INSECTS OF HAWAII

A Manual of the Insects of the Hawaiian Islands, including an Enumeration of the Species and Notes on their Origin, Distribution, Hosts, Parasites, etc.

A Series under the General Direction of

ELWOOD C. ZIMMERMAN

VOLUME 12

DIPTERA: CYCLORRHAPHA II, SERIES SCHIZOPHORA
SECTION ACALYPTERAE I
FAMILY DROSOPHILIDAE

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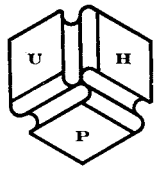

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PREFACE TO VOLUME 12

This volume deals with four hundred species of Drosophilidae and its preparation has required approximately ten years of my time; nevertheless it represents only a preliminary study of this remarkable family of flies. The fantastic speciation rate and the complexity of development of structures and habits which have occurred in Hawaii is unexcelled anyplace in the world, and this family in Hawaii is indeed most ideal for studies of evolution and speciation. While this manuscript has been in press an intensive project on the evolution and genetics of Hawaiian Drosophilidae has begun. This is a cooperative project between the University of Hawaii and the University of Texas Genetics Foundation and involves a team of ten to twelve visiting scientists who come to Hawaii each summer to participate in various aspects of the field and laboratory studies. This team approach to a complex problem has proved highly successful and much additional information has been gained since spring, 1963. Approximately seventy-five additional new species have been collected, and it is now estimated that our fauna contains at least six hundred species. Many additional data have been accumulated on the breeding habits, food preferences, mating behavior, comparative morphology of internal structures and male genitalia, and on the genetics of Hawaiian species. This information will be published by the cooperating specialists as soon as their results are conclusive. The knowledge gained here will have a far-reaching effect over the world. The study of internal morphology which is to be published soon by one of the collaborators will be extremely important in making a phylogenetic arrangement of the genera and species. To date, it has not been feasible to attempt such an arrangement since our knowledge of the fauna has been too inadequate to determine relationships in most groups. It has become obvious, however, that the large genera *Drosophila* and *Scaptomyza* are much more closely related than has been indicated in the literature, and in order to deal with the Hawaiian species the taxonomic concepts of these genera have been drastically modified. It now seems evident that even more modifications will be necessary, and it is not entirely unlikely that there are no reliable external characters which will differentiate these genera.

At the time this work went to press it had not been possible to establish any native species of Drosophilidae in laboratory cultures. Now, approximately three dozen species can be successfully reared in artificial media and many are being used for genetic studies.

Many agencies throughout the State have been helpful to us in our field work by allowing us to work in restricted areas and use private roads, and by assisting our program in a variety of other ways. For this cooperation I am

much indebted to personnel from the State Department of Agriculture, the State Department of Forestry, the State Department of Wildlife, the Federal Department of Wildlife, the State Board of Health, Kokee State Park, Haleakala National Park, Hawaii National Park, Maui Pineapple Company, Hawaii Pineapple Company, Kohala Sugar Company, Pioneer Mills, the Bishop Trust Company, and the Federal Aviation Authority.

This work has been made possible by a grant from the National Science Foundation. I am very grateful for this support.

I am appreciative of the complete cooperation, valuable advice, and assistance given me by Dr. W. Hackman, Helsinki, Finland; Dr. M. R. Wheeler, University of Texas; Dr. E. B. Basden, Edinburgh, Scotland; Dr. H. Burla, Zurich, Switzerland; and the late Dr. G. B. Mainland, Auburn, Alabama.

The art work has been done over a period of years, and I am indebted to the following for this valuable assistance: Mrs. Marian Adachi Kohn, Mrs. Phyllis Habeck, Mrs. Paula Ingold Exton, Mrs. Elizabeth Twigg-Smith Pfeffer, and Mrs. Hope Watson.

The typing was done by Mrs. Anne Sweet Bruch. This was a most arduous task, and her exacting and neat work has greatly simplified the task of proofreading and editing this volume.

Honolulu, Hawaii D. ELMO HARDY

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ERRATA

Page 322, line 26: for *distincta* read *distinguenda*

Page 336, line 2: for *orastes* read *orestes*

Page 343, line 6: *for* treefern *read* tree fern

Page 394, line 15: *for* treefern *read* tree fern

Page 448, line 8–9: for *mescatorum* read *mercatorum*

Page 469, line 11: *for* treefern *read* tree fern

Page 619, line 4: *for* Malloch *read* (Malloch)

Page 631, line 17: *for* posteroventral *read* anteroventral

Page 662, line 7: for *Myporum* read *Myoporum*

Page 747, figure legend, line 2: *for* anterior *read* dorsal

CHECKLIST OF THE INSECTS IN THIS VOLUME

Order **DIPTERA**

Suborder CYCLORRHAPHA

Series SCHIZOPHORA

Section ACALYPTERAE

Family DROSOPHILIDAE

Subfamily AMIOTINAE

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
Genus **GITONIDES** Knab							
perspicax Knab	×	×	×	*	×	*	Philippine Is., Australia, India; appears widely distributed in Orient.
Genus **PSEUDIASTATA** Coquillett							
brasiliensis Costa Lima							Brazil
nebulosa Coquillett							Maryland, Georgia, Virginia
vorax Sabrosky							Trinidad, W. Indies, British Guiana
Subfamily DROSOPHILINAE							
Genus **ANTOPOCERUS** n. gen.							
aduncus n. sp.		×					
arcuatus n. sp.					×		
cognatus (Grimshaw)	×						
diamphidiopodus n. sp.		×	×				
entrichocnemus n. sp.		×					
longiseta (Grimshaw)			×				
orthopterus n. sp.		×					
tanythrix n. sp.	×						
villosus n. sp.		×					
Genus **ATELEDROSOPHILA** n. gen.							
diamphidia n. sp.	×						
preapicula n. sp.	×				×		
Genus **CELIDOSOMA** n. gen.							
nigrocincta n. sp.			×	×	×		
Genus **CHYMOMYZA** Czerny							
procnemis (Williston)	×	×	×	*	×	*	S. U.S.A., W. Indies, C. America; mainly subtropical
Genus **DETTOPSOMYIA** Lamb							
formosa Lamb	×	×	*	*	×	*	Widespread throughout the Pacific, Indian Ocean, and C. America
nigrovittata Malloch	×	×	×	*	×	*	Australia, Canary Is., S. America, California
Genus **DROSOPHILA** Fallén							
Subgenus **Drosophila** *sens. lat.*							
abjuncta n. sp.		×					

*Throughout this checklist an asterisk is used to indicate that the species is probably present.

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
acrostichalis n. sp.		×					
adiastola n. sp.	*	×			*		
adventitia n. sp.						×	
agitona n. sp.						×	
aglaia n. sp.	×				×		
albifacies n. sp.	×		×				
amydrospilota n. sp.		×					
ancyla n. sp.		×					
anomalipes Grimshaw						×	
anthrax n. sp.			×				
apicipuncta n. sp.	×						
apicisetae n. sp.	×						
apodasta n. sp.						×	
apoxyloma n. sp.			×				
aquila n. sp.	×						
araiotrichia n. sp.		×	×				
artigena n. sp.		×					
asketostoma n. sp.		×					
attenuata n. sp.	×						
badia n. sp.		×					
balioptera n. sp.		×					
basimacula n. sp.						×	
basisetosa n. sp.	×						
beardsleyi n. sp.						×	
bicondyla n. sp.	×						
bipolita n. sp.		×			×		
biseriata n. sp.					×		
bizonata Kikkawa and Peng					*		Japan
bostrycha n. sp.			×				
brevicilia n. sp.	×						
brevissima n. sp.			×				
brevitarsus n. sp.					×		
bridwelli n. sp.					×		
brunneifrons n. sp.		×					
brunneisetae n. sp.		×	×				
busckii Coquillett	×	*	*	*	×	×	Cosmopolitan
caccabata n. sp.			×				
canipolita n. sp.	×	×	×	×	×	*	
canuta n. sp.	×	×					
capitata n. sp.						×	
carinata Grimshaw	×	×	×	×	×	×	S. and W. U.S.A., Mexico
carnosa n. sp.					×		
chaetopeza n. sp.	×						
ciliaticrus n. sp.	×	×					
cilifemorata n. sp.	×	×	×				
clavata n. sp.			×		×		
clavitibia n. sp.			×				

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
clydonia n. sp.		×	×				
cnecopleura n. sp.	×						
comatifemora n. sp.		×					
conformis n. sp.	×						
confutata n. sp.					×		
conjectura n. sp.			×				
conspicua Grimshaw	×						
contorta n. sp.		×					
cracens n. sp.	×	×					
crassifemur Grimshaw	×	×	×		×	×	
crucigera Grimshaw					×	×	
curticilia n. sp.		×					
curvitibia n. sp.		×					
dasycnemia n. sp.	×						
deltaneuron Bryan					×		
demipolita n. sp.	×						
denotata n. sp.							
diffusa n. sp.		×		×			
diminuens n. sp.	×		×				
disjuncta n. sp.		×					
dissita n. sp.	×						
disticha n. sp.	×	×	×	×			
distinguenda n. sp.					×		
dolomata n. sp.					×		
dorsigera n. sp.					×		
dorsociliata n. sp.			×				
dracaenae n. sp.						×	
dumalis n. sp.					×		
engyochracea n. sp.	×						
enoplotarsus n. sp.	×						
eumecothrix n. sp.			×				
eurypeza n. sp.						×	
expansa n. sp.	×	×					
fasciculisetae n. sp.		×	×				
fastigata n. sp.					×		
flavibasis n. sp.						×	
flaviceps Grimshaw	×						
flavisternum n. sp.					×		
freycinetiae n. sp.					×		
fundita n. sp.		×					
funebris (Fabricius)		*					Cosmopolitan
fungicola n. sp.	×						
furva n. sp.		×					
furvifacies n. sp.			*		×		
fuscifrons n. sp.		×			*		
fuscoamoeba Bryan					×		
fuscoapex n. sp.						×	
fusticula n. sp.		×					

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
gilvilateralis n. sp.						×	
grimshawi Oldenberg	×	×	×	×			
haleakalae Grimshaw		×					
hawaiiensis Grimshaw	×				×		
hexachaetae n. sp.					×		
hirticoxa n. sp.		×					
hirtitarsus n. sp.	*	×	×				
hirtitibia n. sp.		×	×		×		
humeralis Grimshaw						×	
hydei Sturtevant	×	×	×	×	×	×	Cosmopolitan
iki Bryan	×	×					
illusiopolita n. sp.	×						
imitator n. sp.					×		
immigrans Sturtevant	×	×	×	×	×	×	Cosmopolitan
imparisetae n. sp.	×						
improcera n. sp.					×		
incognita n. sp.	×						
incompleta n. sp.		×					
inedita n. sp.					×		
infuscata Grimshaw	×						
insignita n. sp.					×		
intermedia n. sp.	×						
involuta n. sp.	×						
ischnotrix n. sp.				×	×		
joycei n. sp.		×					
kauluai Bryan					×		
kraussi n. sp.				×	×		
laciniosa n. sp.			×				
lanaiensis Grimshaw				×	×		
larifuga n. sp.					×		
latigena n. sp.	×	×	×				
lemniscata n. sp.		×					
lonchoptera n. sp.		×					
luteola n. sp.					×		
macrochaetae n. sp.		×					
magnimacula n. sp.					×		
magnipalpa n. sp.						×	
mecocnemia n. sp.					×		
mediana n. sp.		×					
megasticta n. sp.	×						
melanoloma n. sp.		×	×	×			
melanopedis n. sp.	×						
melanosoma Grimshaw						×	
mimica n. sp.	×					×	
mimiconformis n. sp.			×				
mimiconfutata n. sp.					×		
mitchelli n. sp.	×		×				
molokaiensis Grimshaw			×				

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
musae n. sp.			×				
musaphilia n. sp.						×	
mycetophila n. sp.					×		
nanella n. sp.						×	
nasalis Grimshaw		×	×				
nasuta Lamb	×	×	×	×	×	×	Pacific, S.E. Asia, W. U.S.A.
neglecta n. sp.					×		
neutralis n. sp.	×		*				
nigella n. sp.		×					
nigra Grimshaw		×					
nigripalpus n. sp.					×		
nigritarsus n. sp.	×		×				
nigrocirrus n. sp.	×						
nigropolita n. sp.			×				
ochracea Grimshaw	×						
olaae Grimshaw	×	×	×				
oreas n. sp.		×					
orestes n. sp.	×	*	×	*	×	×	
parva Grimshaw	×		×		×	×	
paucipuncta Grimshaw	×						
paucula n. sp.					×		
pectinitarsus n. sp.	×						
peniculipedis n. sp.		×			×		
percnosoma n. sp.	×						
perissopoda n. sp.						×	
picticornis Grimshaw						×	
pilimana Grimshaw	×	*	×	*	×	×	
plumosa Grimshaw	×						
polita Grimshaw				×			
polliciforma n. sp.	×						
polychaeta Patterson and Wheeler					×		S. U.S.A., Mexico, C. America
praesutilis n. sp.					×		
pretiosa n. sp.					×		
proceriseta n. sp.			×				
prodita n. sp.	×	×					
prolaticilia n. sp.	×						
prolixa n. sp.			×				
prominens n. sp.						×	
propiofacies n. sp.	×	×					
punalua Bryan					×		
pychnochaetae n. sp.					×		
quadrisetae n. sp.			*		×	×	
quasianomalipes n. sp.						×	
quasiexpansa n. sp.		×					
reducta n. sp.	×						
redunca n. sp.			×				

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
repleta Wollaston	×	*	×	*	×	*	Cosmopolitan
residua n. sp.	×						
retrusa n. sp.			×				
rustica n. sp.			×				
sabroskyi n. sp.					×		
sadleria Bryan					×		
scolostoma n. sp.		×					
seclusa n. sp.	×	×	×				
semifuscata n. sp.		×					
seorsa n. sp.		×					
septuosa n. sp.	×						
setiger Grimshaw			×				
setipalpus n. sp.		×					
sharpi Grimshaw						×	
sordidapex Grimshaw	×						
spectabilis n. sp.			×				
spicula n. sp.	×						
stenoptera n. sp.		×					
swezeyi n. sp.					×		
taeniata n. sp.		×					
tamashiroi n. sp.					×		
taractica n. sp.	×						
tarphytrichia n. sp.					×		
tendomentum n. sp.	×						
tetraspilota n. sp.	×						
torula n. sp.		×	*				
totonigra n. sp.		×			×	*	
transfuga n. sp.		×					
trichaetosa n. sp.	×						
truncipenna n. sp.		×					
undulata Grimshaw	×						
unicula n. sp.	×						
varga n. sp.		×					
variabilis n. sp.		*	×				
velata n. sp.					×		
velutinifrons n. sp.			×				
venusta n. sp.			×				
vicaria n. sp.		×					
villitibia n. sp.			×				
villosipedis n. sp.						×	
vinnula n. sp.					×		
williamsi n. sp.					×		
xanthognoma n. sp.					×		
xanthosoma Grimshaw	×						
xuthoptera n. sp.		×	×				
z-notata Bryan					×		
Subgenus **Hypenomyia** Grimshaw							

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
reburra n. sp.		×					
varipennis (Grimshaw)			×				
Subgenus **Sophophora** Sturtevant							
ananassae Doleschall	×	*	*	*	×	*	Tropics and subtropics of the world
kikkawai Burla	×	×	*	*	×	×	Japan, China, Brazil, Samoa; probably widespread in Orient, Pacific and Neotropics
melanogaster Meigen	×	×	*	*	×	×	Cosmopolitan
simulans Sturtevant	×	×	×	×	×	×	Cosmopolitan
Subgenus **Trichotobregma** n. subgen.							
petalopeza n. sp.		×					
Genus **GRIMSHAWOMYIA** n. gen.							
palata n. sp.		×			×		
perkinsi (Grimshaw)	×						
Genus **IDIOMYIA** Grimshaw							
brunneipennis n. sp.					×		
grimshawi Bryan					×		
hemipeza n. sp.					×		
heteroneura Perkins	×						
nigrifacies n. sp.	×						
oahuensis Grimshaw					×		
obscuripes Grimshaw		×					
perkinsi Grimshaw		×	×				
picta Grimshaw		×	×				
silvestris Perkins	×						
sternoptera n. sp.					×		
Genus **NUDIDROSOPHILA** n. gen.							
amita n. sp.	×						
eximia n. sp.		×	×				
gemmula n. sp.					×		
lepidobregma n. sp.	×						
Genus **SCAPTOMYZA** Hardy							
Subgenus **Alloscaptomyza** Hackman							
aberrans n. sp.			×	*			
buccata Hackman	×	×	×	×	×		
cerina n. sp.			×				
fuscifrons Hackman					×	×	
longisetosa Hackman	×	×	×				
mutica n. sp.		×					
semiflava n. sp.		×	×		×		
stramineifrons Hackman					×		
Subgenus **Bunostoma** Malloch							
anomala n. sp.		×		×		×	
bryanti Hackman	×	×					
cnecosoma n. sp.					×		
confusa n. sp.		×					
hamata n. sp.						×	

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
palmae n. sp.	×	*			×		
varifrons (Grimshaw)					×		
xanthopleura n. sp.					×	*	
Subgenus **Exalloscaptomyza** n. subgen.							
mauiensis (Grimshaw)	×	×	×		×	×	
Subgenus **Parascaptomyza** Duda							
pallida (Zetterstedt)	×	*	*	*	*	*	Cosmopolitan
Subgenus **Rosenwaldia** Malloch							
abrupta Hackman		×					
aloha Hackman			×				
finitima n. sp.					×		
mediopallens Hackman	×						
mitchelli Hackman	*	×					
striatifrons Hackman						×	
Subgenus **Tantalia** Malloch							
albovittata (Malloch)					×		
brunnimaculata n. sp.			×				
flavida n. sp.	×						
gilvivirilia n. sp.		×					
nigrosignata n. sp.	×						
varipicta n. sp.						×	
Subgenus **Trogloscaptomyza** Frey							
acronastes n. sp.					×		
aduṇca n. sp.	×						
affinicuspidata n. sp.		×					
anechocerca n. sp.						×	
apiciguttula n. sp.	×						
apponopusilla n. sp.	×						
argentifrons n. sp.						×	
articulata n. sp.	×		×				
basiloba n. sp.	×						
bilobata n. sp.	×						
bipars n. sp.						×	
brachycerca n. sp.	×						
camptochaites n. sp.					×		
concinna n. sp.		×					
connata n. sp.						×	
cornuta n. sp.	×						
cryptoloba n. sp.		×			×		
ctenophora n. sp.		×					
cuspidata n. sp.	×	×					
cyrtandrae n. sp.	×						
decepta n. sp.		×					
dentata n. sp.						×	
devexa n. sp.		×					
diaphorocerca n. sp.			×				
domita n. sp.		×					
dubautiae n. sp.		×					

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
dubia n. sp.			*			×	
eurystylata n. sp.	×	×			×	×	
evexa n. sp.						×	
exigua (Grimshaw)	×	×	*				
fastigata n. sp.						×	
hackmani n. sp.	×	×	×				
hardyi Hackman						×	
inaequalis (Grimshaw)	×	×	×				
inermis n. sp.						×	
infurcula n. sp.	×						
innotabilis n. sp.						×	
intricata n. sp.		×	×				
isopedon n. sp.	×	×					
kauaiensis Hackman						×	
latitergum n. sp.		×					•
levata n. sp.	×				×	×	
lobifera n. sp.	×						
longipecten Hackman		×	×				
longipecten griseonigra n. subsp.		×					
mecocerca n. sp.						×	
mediana n. sp.		×					
mimula n. sp.			×				
monticola (Grimshaw)	×						
multidenta n. sp.	×						
obscuricornis (Grimshaw)		×	×		×		•
obscurifrons (Grimshaw)			×				
ochromata n. sp.		×					
ostensa n. sp.		×					
pallifrons Hackman	×	×	*			*	
paralobae n. sp.	×						
penicula n. sp.						×	
photophilia n. sp.	×						
phryxothrix n. sp.			×				
protensa n. sp.						×	
punctivena n. sp.		×					
pusilla (Grimshaw)	*	*	×				
quadridentata n. sp.					×		
recava n. sp.	×						
recta n. sp.		×					
retusa n. sp.		×					
robusta n. sp.		×					
rostrata n. sp.						×	
rotundiloba n. sp.					×		
scoliops n. sp.					×		
scoloplichas n. sp.	×						
setiger n. sp.	×						
setosiloba n. sp.		×					
silvicola n. sp.	×	×	×				

	Hawaii	Maui	Molokai	Lanai	Oahu	Kauai	Other Localities
spilota n. sp.		×					
tenuata n. sp.	×						
trivittata n. sp.						×	
tumidula n. sp.	×						
uliginosa n. sp.						×	
umbrosa n. sp.	×	×					
univitta n. sp.					×	×	
vagabunda n. sp.						×	
varia n. sp.					×	×	
villosa n. sp.	×	×	×				
waialealeae n. sp.						×	
Genus **TITANOCHAETA** Knab							
bryani Wirth	×	×	×	×	×		
chauliodon n. sp.		×			×		
evexa n. sp.			×				
glauca n. sp.		×					
ichneumon Knab	×						
kauaiensis n. sp.						×	
setosiscutellum n. sp.	×		×				
silvicola n. sp.	×						
swezeyi Wirth		×			×	×	
vittiger n. sp.						×	

SUMMARY OF THE NEW NOMENCLATORIAL CHANGES MADE IN THIS VOLUME

DROSOPHILADAE

Antopocerus cognatus (Grimshaw), new combination for *Drosophila cognata* Grimshaw.

Antopocerus longiseta (Grimshaw), new combination for *Drosophila longiseta* Grimshaw.

Dettopsomyia argentifrons Okada is a new synonym of *Dettopsomyia nigrovittata* (Malloch).

Drosophila iki Bryan, new combination for *Drosophila nigra* var. *iki* Bryan.

Drosophila mercatorum Patterson and Wheeler is a new synonym of *Drosophila carinata* Grimshaw.

Drosophila spinofemora Patterson and Wheeler is a new synonym of *Drosophila nasuta* Lamb.

Drosophila lulumahu Bryan is a new synonym of *Drosophila punalua* Bryan.

Grimshawomyia perkinsi (Grimshaw), new combination for *Drosophila perkinsi* Grimshaw.

Scaptomyza (*Bunostoma*) *varifrons* (Grimshaw), new combination for *Drosophila varifrons* Grimshaw.

Scaptomyza (*Bunostoma*) *cordigera* Hackman is a new synonym of *Scaptomyza* (*Bunostoma*) *varifrons* (Grimshaw).

Scaptomyza (*Trogloscaptomyza*) *exigua* (Grimshaw), new combination for *Drosophila exigua* Grimshaw.

Scaptomyza (*Trogloscaptomyza*) *inaequalis* (Grimshaw), new combination for *Drosophila inaequalis* Grimshaw.

Scaptomyza (*Trogloscaptomyza*) *hawaiiensis* Hackman is a new synonym of *Scaptomyza* (*Trogloscaptomyza*) *inaequalis* (Grimshaw).

Scaptomyza (*Trogloscaptomyza*) *monticola* (Grimshaw), new combination for *Drosophila monticola* Grimshaw.

Scaptomyza (*Trogloscaptomyza*) *obscuricornis* (Grimshaw), new combination for *Drosophila obscuricornis* Grimshaw.

Scaptomyza (*Trogloscaptomyza*) *obscurifrons* (Grimshaw), new combination for *Drosophila obscurifrons* Grimshaw.

Scaptomyza (*Trogloscaptomyza*) *pusilla* (Grimshaw), new combination for *Drosophila pusilla* Grimshaw.

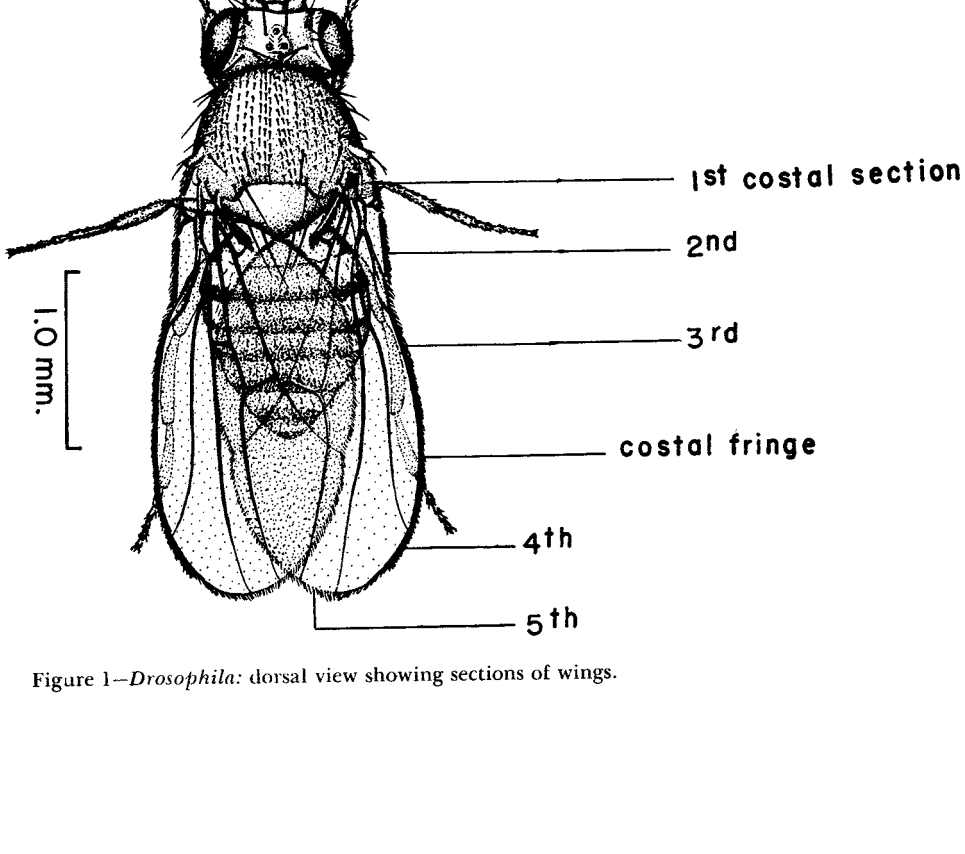


Figure 1—*Drosophila:* dorsal view showing sections of wings.

Family DROSOPHILIDAE Rondani
Pomace or Vinegar Flies

Drosophilina Rondani, 1856, Dipt. Italica 1:133.
Drosophilidae Loew, 1862, Monogr. Dipt. North Amer., Part I. Smith. Misc. Coll. p. 45.
Drosophilinae Schiner, 1864, Fauna Austriaca, Diptera 2:269.

INTRODUCTION

The family Drosophilidae is by far the largest known group of animals in Hawaii and represents one of the most unusual developments of this family in any area of the entire world. We have here a remarkable example of rapid explosive evolution which is almost unparalleled in the animal kingdom, and the Hawaiian Islands should be the most ideal area in the world for studying speciation and evolution in the drosophilids.

The members of this family are small to medium-sized flies, typically slightly less than 3 mm. in length; the Hawaiian species range in size from about 1.0 mm. to 7.0 or 8.0 mm. in length. These are mostly pale yellow or yellow-brown flies, often with bright red eyes in living specimens. A variety of colorations is found in the native Hawaiian species, from pale yellow to polished black, and some species have conspicuous gray or white markings on the body. The wings are often pictured in Hawaiian species. These flies are often referred to as fruit flies but this is a misnomer and this name should apply to the members of the family Tephritidae. The common names pomace or vinegar flies are more appropriate for the Drosophilidae. The family name comes from the Greek *drosos*, dew, plus *philios*, loving.

The members of this family are differentiated from other acalyptrate flies by the following characters: the subcosta of the wing is incomplete, vestigial, or fused with vein R_1 near the tip; there is a break in the costa near the humeral crossvein and also near the end of vein R_1 (fig. 1); there are no inwardly directed lower fronto-orbital bristles; the postvertical (postocellar) bristles are convergent; and the aristae usually bear long dorsal and ventral rays. The front ordinarily possesses three pairs of orbital bristles; the anterior pair is proclinate and the others are reclinate. The relative size and position of these bristles is of considerable taxonomic importance. The typical arrangement of head bristles is shown in figure 2. The bristles of the vibrissal row vary greatly in size and arrangement. Typically the arista possesses long dorsal and ventral rays, but may vary according to the genus and species from densely plumose (fig. 15a), sparcely plumose (fig. 242a), with only dorsal rays (fig. 257a), or pubescent, to nearly or completely bare. The face is typically almost vertical in profile, not prominent, and sometimes slightly concave. In some of the *Drosophila* Fallén and *Scaptomyza* Hardy the face is prominent, distinctly convex, or with a well-developed carina down

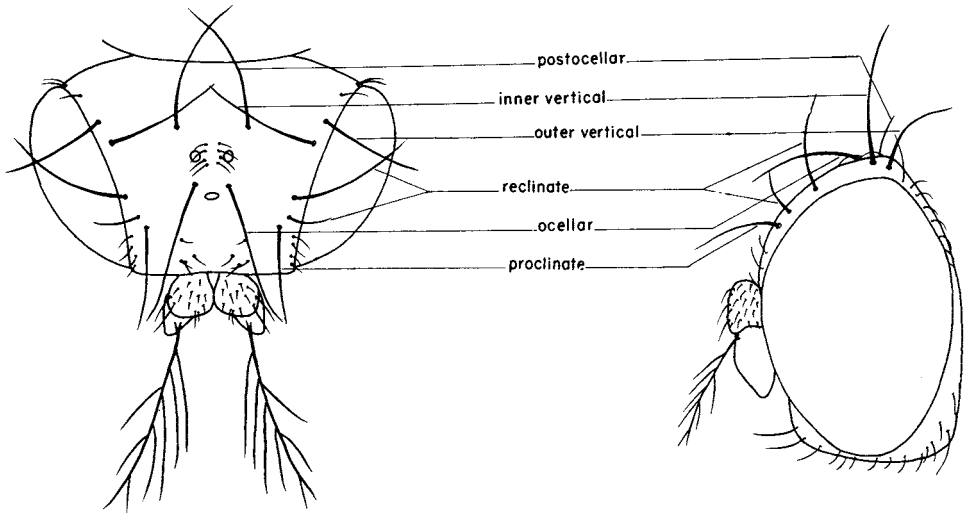


Figure 2—*Drosophila* heads: **a,** dorsal; **b,** lateral, showing bristles.

the middle. The labella of the mouthparts of the males are often highly ornate in Hawaiian *Drosophila* and may be fringed with curved spines or queer processes (figs. 24a, 28c, and 35b). In some species the apex of the labellum has a heavily sclerotized black rim (fig. 62a); this character seems, by circumstantial evidence, to be associated with species which breed in bracket-type fungi. The number and arrangement of the bristles and setae of the thorax are of much taxonomic value, especially the dorsocentral bristles and the acrostichal setae. The number of pairs and the spacing of the dorsocentral bristles are of considerable specific, and some generic, importance, and the number of rows of acrostichal setae is a reliable specific, and sometimes generic, character. In previous literature, the number of rows of acrostichal setae has been used as one of the most important characters for separating *Drosophila* and *Scaptomyza*. In Hawaii this character has been found to be of little value in differentiating these genera (see discussion under the genus *Scaptomyza*). It should be noted that in counting the acrostichal rows the count is made on the anterior portion of the mesonotum, anterior to the anterior supraalar bristles. The legs are often highly ornate in the males; this is especially true of our endemic species, many of which possess strange processes on the tarsi, or long cilia, or unusual bristles on various of the segments especially of the front legs (figs. 12e, 30a, 32a, and 65a). One small complex of native *Drosophila* appears to have only four segments in the front tarsus (fig. 63a). The wings are normally hyaline but are often marked with brown and sometimes ornately so (figs. 18b, 20b, and 68b); nearly 50 percent of the native *Drosophila* have brown markings in the wings. The venation is like that of drosophilids from other world areas except for the extra crossvein present in cell R_5 in *Idiomyia* Grimshaw (fig. 234b) and the adventitious crossveins in

cell R_1 in *Scaptomyza* (*Tantalia*) *albovittata* Malloch (fig. 260b). For the wing venation I use the morphological terminology based upon the Comstock–Needham system as discussed by Ferris (1950:408, fig. A). In much of the literature on the Drosophilidae the Loew system of terminology has been used for referring to the wing veins. This consists of referring to the subcosta as the auxiliary vein and numbering the main veins, starting with R_1, as first, second, third, to the sixth longitudinal veins; the cells are referred to as costal, basal, discal, marginal, submarginal, posterior, anal, and axillary. The crossveins are called anterior (or small) and posterior (or large) crossveins (see Ferris 1950:408, fig. B). This system is very satisfactory for dealing with the wings of most Drosophilidae, but the morphological terminology based upon the Comstock–Needham system is much more accurate.

A variety of "indices" is employed in the descriptive terminology used by the geneticists. I find this a bit confusing since I deal with them so infrequently, and I often have to refer back to Sturtevant (1921:30) or to Kikkawa and Peng (1938: 552) to be sure I know what they are referring to. Sturtevant (*loc. cit.*) used the following indices in referring to the relative lengths of sections of different veins:

Costal index: Length of second section of the costal vein divided by length of its third section.

Fourth-vein index: Length of fourth (distal) section of the fourth vein divided by length of its third section.

4c index: Length of third section of costal vein divided by length of third section of fourth vein.

5x index: Length of third (distal) section of fifth vein divided by length of posterior crossvein.

Sturtevant refers to "the portion of the costa proximal to the apex of the first vein" (vein R_1) as the first section of the costa; "that between the apices of the first and second veins as its second section, etc." The terminology which I use does not follow this; I prefer to designate the first section of the costa as that lying before the humeral crossvein; the second then is between the humeral crossvein and the tip of vein R_1; the third is between the tips of R_1 and R_{2+3}; the fourth is between tips of R_{2+3} and R_{4+5}; and the fifth is between the tips of R_{4+5} and M_{1+2} (fig. 1). I much prefer to go on "spelling out" the actual comparisons of different sections of the wing in order to avoid any possible confusion just for the sake of saving a few words. For instance, if the third costal section is two times longer than the second, it seems clearer to me if that statement is made rather than to say that it has a costal index of two; the term "sterno-index" has also been used (Kikkawa and Peng, 1938:552) to indicate the length of the anterior sternopleural bristle divided by the length of the posterior sternopleural. I am not using this terminology for the Hawaiian species.

The genitalia of both sexes are very important, and many species can be differentiated only by the male genital characters. Except for some slight modifications I am using the terminology of Ferris (1950:411–418); this has been used

rather consistently in dealing with drosophilid genitalia. I prefer to use the term clasper in place of "inner lobe of the ninth tergite" since the former has been commonly used in the literature. Salles (1947:320) pointed out that 20 different terms had been used in the literature in referring to the claspers. The ninth tergum is generally referred to by the geneticists as the genital arch. I am using the term anal plates for the tenth tergum and ovipositor plates for the gonopods of the eighth segment of the female.

For more complete details on the external morphology of the adult refer to the chapter by Ferris in Demerec (1950). For a comparative study of the male genitalia refer to Hsu (1949), and for a number of important papers on comparative morphology refer to Okada (1953–1956). For a thorough discussion of leg chaetotaxy refer to Hannah-Alava (1958:281–310).

Some Ephydridae may resemble the Drosophilidae but are readily differentiated by the divergent postvertical bristles on the head, the more prominent clypeus, and by the lack of the cubital cell in the wing.

Some species of the genus *Drosophila* are among the best known of all flies because they are not only very abundant around habitations in all situations where overripe fruits, decaying vegetation, vinegar, or any products of fermentation are present, but also because of the wide publicity which has been given to the use of these flies as scientific tools. One species, *Drosophila melanogaster* Meigen, has been one of the most important organisms used in biological research since shortly after the turn of the century, and more has been published on this species than perhaps any other in the family. Demerec and Kaufmann (1945:1–2) stated "it would not be an exaggeration to say that we have learned more about the laws of heredity from the study of this fly *Drosophila melanogaster* than from work done on all other organisms combined." The simplicity with which Mendelian principles can be studied using *Drosophila* accounts for the importance of these flies in genetic research. The basic background upon which the field of animal genetics has been built has resulted largely from the investigations which have been carried out on *Drosophila* over the past 60 years, with the major emphasis being upon *melanogaster*. *D. melanogaster* was first suggested as a laboratory animal by Professor C. W. Woodworth, University of California, while studying at the Harvard Zoological Laboratory in 1900–1901 (see Davenport, 1941). Woodworth pointed out to Dr. W. E. Castle that *Drosophila* were far superior for breeding experiments than were the laboratory mammals which Castle had been using. Profiting from this suggestion, Castle and his students, F. W. Carpenter, A. H. Clark, S. O. Mast, and W. M. Barrows, began experiments with *Drosophila melanogaster* (as *D. ampelophila* Loew), and the first published report of this species being used in a biological experiment was apparently by Carpenter (1905), when he studied its reactions to light, gravity, and to agitation. Castle, Carpenter, Clark, Mast, and Barrows (1906) published an extensive study on the effects of inbreeding, crossbreeding, and selection upon the fertility and variability of *Drosophila*. The first studies of the chromosomes of *Drosophila* were apparently done by Stevens (1907, 1908) and the first mutation discovered

in *Drosophila melanogaster* (as *ampelophila*) was reported by Lutz at the Zoological Congress in 1907 (not published until 1911). Delcourt (1909) reported mutations in *D. confusa* and also described some anomalies in *D. melanogaster*. The real emphasis upon the use of this species for genetic studies began with the work of Morgan (1910a–c, and many other publications), and Professor Morgan is looked upon as the father of this field of investigation. For a few of the comprehensive studies devoted to *D. melanogaster* refer to the works of Morgan, Bridges, and Sturtevant (1925); Lutz (1911); Bridges and Morgan (1923); Sturtevant *et al.* (1929); Sturtevant and Dobzhansky (1931); Bridges and Brehme (1944); and to the chapters by various authors in Demerec (1950). Because of the investigations which have been done and are being done by *Drosophila* geneticists over the world, many other species are now being used in genetic research.

These flies are ideal laboratory animals since they can be readily cultured, and the short life cycle of 10 to 20 days per generation makes it possible to obtain numerous generations in a relatively short period. Besides the ease with which they may be handled in the laboratory and the short life cycle, the factor which makes these flies so well suited for study of the laws of heredity is the development of the giant chromosomes in the salivary glands, and as was first demonstrated by Painter (1933, 1934a–b), the fact that the bands of these chromosomes follow precisely the sequence of loci of the known mutant genes as they appear on the "genetic maps" of *Drosophila*. The discovery by Muller (1927, 1930a–b) that X-rays could be used as a means of inducing mutations and rearrangements of the chromosomes has been an important milestone in the use of *Drosophila* in research. Delcourt and Guyénot (1910, 1911a–b) and Guyénot (1913a–e, 1917) published extensive studies of the food requirements of *Drosophila* and they emphasized the role which microorganisms play in the diet, pointing out that these species are primarily yeast feeders. This work led to the techniques now used for rearing the flies under aseptic conditions for controlled laboratory studies. For information concerning culture media and techniques refer to Demerec and Kaufmann (1945); to Spencer, in Demerec (1950); to Bridges (1932, 1937); and to Bridges and Darby (1933).

The students of the *Drosophila* (and also of some other genera) are now placing much emphasis upon the study of speciation, evolution, population dynamics, ecological relationships, food, breeding habits, behaviorisms, etc. The methods which have been developed in the laboratory studies are ideally suited for analyzing the genetic bases underlying the origin of new forms among wild populations and in gaining an understanding of the processes of speciation and evolution. For an excellent review of the field of *Drosophila* evolution and speciation refer to Patterson and Stone (1952). For an analysis of species relationships based on a study of the metaphase and salivary chromosome morphology within the genus *Drosophila* refer to Warton (1943). The use of biochemistry in the study of evolution and taxonomy in *Drosophila* (Throckmorton, 1962) offers exciting new techniques for the study of these flies.

Classification

Seguy (1934:364) divided the Drosophilidae into three subfamilies: Curtonotinae, Diastatinae, and Drosophilinae. Later (1951:699, 701, 702) he raised these to family rank and listed them as follows: Drosophilidae, Diastatidae, and "Cyrtonotidae" (this should be Curtonotidae). Seguy included the genus *Cryptochaetum* Rondani in the Drosophilidae. The latter is now being placed in a family of its own by most authors; see Wheeler (1952b:164) and Brues, Melander, and Carpenter (1954:381). Enderlein (1936:175) treated the Drosophilidae under two subfamilies: Camillinae and Drosophilinae. Brues, Melander, and Carpenter (1954:383–384) divided the family into four subfamilies as follows: Camillinae, Drosophilinae, Steganinae, and Amiotinae. Duda (1935:14) divided the group into two subfamilies: Steganinae and Drosophilinae, and raised *Camilla* Haliday to a family, Camillidae. Oldroyd (1949:42) also treated *Camilla* as a distinct family. Wheeler (1952b:164) says that in his opinion

> attempts to establish sub-families seem rather premature at present. The Amiotinae would seem to be a valid group and is probably the most primitive group in the family (cf. Sturtevant, 1942:26), containing, of our genera, *Amiota, Cacoxenus, Sinophthalmus, Leucophenga, Rhinoleucophenga, Gitona* and perhaps *Stegana* as an offshoot. Within the Drosophilinae several evolutionary lines seem indicated. The subgenus *Hirtodrosophila* of *Drosophila* seems clearly related to *Zygothrica* on the one hand and to *Scaptomyza* on the other hand, the latter in turn showing relationship to *Chymomyza* and *Bunostoma* and with *Neotanygastrella* related to these two. *Mycodrosophila* seems obviously related to *Dettopsomyia* and the oriental *Spuriostyloptera*. However, the majority of the genera do not show clear relationship with any others, owing, in large part, to the lack of essential information concerning them.

Wheeler follows Duda *et al.*, and treats the genus *Camilla* as a distinct family (Camillidae) because of the "bristly mesopleura, lack of sternopleurals and other unique characters," and he includes the genus *Stegana* Meigen under the subfamily Amiotinae. For the Hawaiian fauna I am following Wheeler's suggestion and recognizing only the subfamilies Amiotinae and Drosophilinae, with only one established species (*Gitonides perspicax* Knab) fitting in the former.

Perhaps the most fundamental studies which have served as the basis for the modern classification of the Drosophilidae have been the works of Sturtevant (1921–1942) and Duda (1924–1940). Since these basic works, important taxonomic studies have been published by a great many different workers. For some of the monographic studies on the Drosophilidae of various parts of the world refer to the papers by the following authors: Basden (1954); Burla (1948, 1951, and 1954a); Dobzhansky and Pavan (1943); Duda (1924–1940); Hackman (1954–1962); Hadorn *et al.* (1952); Harrison (1952); Kikkawa and Peng (1938); Okada (1956); Patterson (1943); Patterson and Mainland (1944); Patterson and Wheeler (1942 and 1949); Pavan and da Cunha (1947); Sturtevant (1921, 1927, and 1942); Tan *et al.* (1949); and Wheeler (1949 and 1952b).

Wheeler (1952b), in his monograph of the Drosophilidae of the Nearctic region, excluding *Drosophila*, said that in the United States the Drosophilidae comprises the third largest family of acalyptrate Diptera and is exceeded in num-

ber of species only by the Ephydridae and Chloropidae. In Hawaii the Drosophilidae is by far the best developed family of flies in our endemic fauna, with approximately 400 known species at the present time. The second largest family is Dolichopodidae, of which 188 species are presently known. Without doubt we have one of the most remarkable drosophilid faunas of any area of the world, and it is probable that we have the greatest known concentration of species of the genera *Drosophila* and *Scaptomyza* of any world region. To the time of the present writing, 400 species are recorded from Hawaii. Of these, 243 belong in the genus *Drosophila* and fit largely in the typical subgenus, as presently defined. To date, 114 species of *Scaptomyza* have been described; the bulk of these (84 species) belong in the subgenus *Trogloscaptomyza* Frey. The latest checklist of the species of *Drosophila* for the world (Wheeler, 1959) contains the names of approximately 750, presumably biologically valid, species. This list contains the names of 45 native Hawaiian species (8 of these have now been removed to the genus *Scaptomyza*). Approximately 50 new species have been described since Wheeler's checklist was published, bringing the known number of species for the entire world, excluding Hawaii, to approximately 750 species. The 243 species of *Drosophila* being treated in this volume bring the world total to about 1,000 species, approximately one-fourth of which occur in an area of 6,423 square miles. This represents the greatest known concentration of species in the world. As of 1952 (cf. Patterson and Stone, 1952:47) the greatest number of known species from any world region was 200 for the Neotropical region. This was followed in order by the Nearctic region, with 141 species; the Oriental region, with 128 species; the Australian region, including Hawaii, with 114 species; the Palaearctic region, with 89 species; and the Ethiopian region, with 33 species. These figures are obviously out of date, and, when thorough studies are made in Central and South America and other tropical regions, the Hawaiian record will be surpassed. It is interesting to note that the 194 new species of *Drosophila* described in this paper represent the greatest number of species described in any one decade since the beginning of binomial taxonomy.

The development of the genus *Scaptomyza* in the Hawaiian Islands is in some respects even more remarkable than that of *Drosophila*. The latest listing of the species of the world (Hackman, 1959) contains 70 species for the entire world other than Hawaii. In this paper, I am treating 114 species, plus one subspecies in the genus *Scaptomyza*.

It is obvious that this is still just a preliminary study of the Hawaiian Drosophilidae. Much work still remains to be done on the taxonomy as the islands are more completely collected and as we accumulate knowledge of the biology and habits of the native species. To the present time we have very little information of this kind, and to date it has not been possible to establish native species in artificial media or to rear them under laboratory conditions. Geneticists are now finding frequent cases of reproductively isolated populations of *Drosophila* which are morphologically indistinguishable (cf. Burla *et al.*, 1949; Dobzhansky *et al.*, 1957). Mayr (1942:200) has proposed the term "sibling species" for species

which are morphologically similar or identical. It is probable that many of these sibling species occur in the Hawaiian fauna, and the total number of species of Drosophilidae may be 500–600.

The statements made by Perkins in the introduction to the "Fauna Hawaiiensis" (1913) are still very appropriate. He said:

> To make an approximately complete and thorough study of the Hawaiian species would require the devotion of many years of special work. Not less than 250 species must exist in the islands and double that number may very probably occur.
>
> Some of the species are quite conspicuous and are readily attracted by the sap oozing from a broken limb of a tree, or from exudations caused by decay or disease. Very many breed in stems of trees or plants, which when decaying, yield abundant moisture—such as those of the arborescent lobelias, of bananas, tree ferns, etc. The larvae abound also beneath the bark of some forest trees, which when this is stripped off, reveal a semi-liquid or pulp-like material covering the wood. Some of the larger and very many of the smallest and most obscure species live amongst the soft ferns, which grow in damp places beneath the shade of the forest trees.

It is interesting to note that Perkins apparently did not collect any introduced species of Drosophilidae; at least none were recorded by Grimshaw. In his introduction to the "Fauna Hawaiiensis," however, Perkins indicated that at least one species which he suspected had been introduced was present at that time. It was not mentioned by name and specimens apparently were not sent to the British Museum. Eighteen introduced species are now represented in our fauna, belonging in the following genera: 13 *Drosophila* Fallén; 2 *Dettopsomyia* Lamb; one each in *Scaptomyza* Hardy, *Gitonides* Knab, and *Chymomyza* Czerny.

Except for the works of Duda, Malloch, and a few others, a great share of the taxonomic work on the Drosophilidae has been done by geneticists, and, for many of the species of the genus *Drosophila* and for some of the species of other genera, the species concepts have been based on the study of living specimens in cultures. This has resulted in a much more thorough understanding of the species than can possibly be had by the museum worker who deals entirely with dead specimens. As has been pointed out to me by the late Dr. G. B. Mainland, excellent characters for differentiating species are often present in living but not visible in dead specimens, and it is understandable why the geneticists should have an aversion to dead specimens. I believe this is adequately summed up by the statement made by Kikkawa and Peng in their study of the *Drosophila* of Japan (1938:508). At the end of their account of "collection of material," they said the species represented by "specimens preserved in alcohol or pinned material alone, are disregarded except in a few cases, because investigations based on such materials are rather unreliable." Okada in his monograph of the Japanese *Drosophila* (1956b) had laboratory cultures of almost every species in the fauna and his work is remarkably complete. Many of the taxonomic studies of Sturtevant, Wheeler, Patterson, Mainland, Basden, and others were based predominantly upon species in laboratory cultures and present much more complete understandings of the species than has been achieved in any other family of Diptera. This end is far from being achieved in Hawaii, but it is hoped that the present study will provide the necessary background information to stimulate careful

basic research on our native species. Our fauna provides most unusual opportunities for genetic and cytologic research and for gaining a more thorough understanding of insular evolution. The first major problem which needs to be solved is to learn how to maintain native species in laboratory cultures. This will have to be approached by making analyses of the microflora upon which the various species feed, preparing cultures of the fungi, and working out food media in which the species will breed. This research will require that the climates of the various habitats be duplicated in constant temperature–humidity cabinets. Vast new areas for biological research will be opened up when we learn to breed native Hawaiian drosophilids in the laboratory.

Historical Account

In the original work on the Hawaiian drosophilids ("Fauna Hawaiiensis") 47 species were recorded. All were described as new by Grimshaw (1901 and 1902) except for 2 species which were described by Perkins (1910). Knab (1914:166, 168) described 2 new species of predaceous drosophilids (*Gitonides perspicax* and *Titanochaeta ichneumon*). Sturtevant (1921:126–127) recorded 4 immigrant species from Hawaii. One of these, *Drosophila mulleri* Sturtevant, was incorrectly recorded, as probably were *D. immigrans* Sturtevant and *D. repleta* Wollaston (see Zimmerman, 1943:346). Sturtevant (1921:54) placed *Gitonides* Knab into synonymy with *Gitona* Meigen and placed *Hypenomyia* Grimshaw as a tentative synonym of *Drosophila* Fallén (Sturtevant, 1921:117). Wheeler (1952a:421–422) has reinstated both genera. Bryan (1934) published a checklist of the Hawaiian species and described 5 new species and 1 new variety. His list of the known Hawaiian drosophilids included 5 genera, 58 species, and 1 variety. Zimmerman (1938:131) first recorded *Chymomyza procnemis* (Williston) from Hawaii. Malloch (1938) described the new genus and species *Tantalia albovittata* and recorded the presence of *Dettopsomyia formosa* Lamb. Bryan (1938) presented a key to the Hawaiian Drosophilidae and described 3 new species. Patterson and Wheeler (1942:104) described one new species (*D. spinofemora*) which later proved to be an immigrant and is here recorded as a new synonym of *nasuta* Lamb. Zimmerman (1943) recorded 5 additional immigrant species and Davis (1947) recorded a new immigrant species from the island of Hawaii. Wirth (1952) described 2 new species of *Titanochaeta* Knab which prey on spider eggs in Hawaii. I recorded the presence of *Scaptomyza graminum* (Fallén) (Hardy, 1952b:346). This proved to be an error; Dr. W. Hackman, Helsingfors, Finland, has recently studied all of our "*Scaptomyza*" complex and our common lowland species, which was recorded above, is *Scaptomyza* (*Parascaptomyza*) *pallida* Zetterstedt. In my "Additions and Corrections to Bryan's Check List of the Hawaiian Diptera" (1952a), I recorded the presence of two unknown species of *Bunostoma* Malloch, one additional immigrant species of *Drosophila*, and five unnamed species of *Drosophila*. Wheeler (1952), in his key to the genera of Drosophilidae of the Pacific Islands, listed 11 genera for Hawaii. By replacing the name *D. mulleri* Sturtevant with *D. hydei* Sturtevant and excluding *Pseudiastata pseudo-*

coccivora Sabrosky, which has apparently not become established, the number of described species known from Hawaii previous to this study is 73. I had reported 80 species in my 1952 summary, but this included 7 unnamed species. To the present study our species have been placed in 10 genera, treating *Hypenomyia* Grimshaw as a distinct genus. Under the present classification they are arranged in 13 genera and 10 subgenera. *Hypenomyia* Grimshaw is being reduced to a subgenus under *Drosophila*, and *Bunostoma*, *Rosenwaldia*, and *Tantalia* are being treated as subgenera under *Scaptomyza*.

Specimens of the genus *Pseudiastata* Coquillett were purposely introduced into the Hawaiian Islands between 1924 and 1937 in an attempt to establish natural enemies of the pineapple mealybug *Dysmicoccus brevipes* (Cockerell). These were treated in the literature as *P. nebulosa* Coquillett, but actually none was this species (ref. discussion under *Pseudiastata*) and three species were present in collections sent in from Central and South America. None has established in Hawaii.

Collecting of Drosophilidae

A wide variety of techniques has been used by the geneticists and entomologists for collecting Drosophilidae. The most effective methods under most situations for collecting on a large scale have been by using bait traps or bait collecting stations. The University of Texas geneticists have popularized the "portable refuse can" technique and have used this with great success (see Patterson, 1943:12). They have used a 50-pound lard can with the lid raised slightly by supporting it on two thin pieces of wood placed across the top of the can, and the lid is held in place by being weighted down with a stone. The can is baited with attractant materials of various kinds. Refuse composed of almost any rotting or fermenting organic material is usually effective; overripe bananas and other fruits are especially attractive. The raised lid leaves an opening around the top so that the flies may enter, and the can is dark enough inside so that the flies tend to stay in once they have entered the trap. The insects are removed from the trap by means of a small insect net, about 12 inches in diameter, which has the tip of the net reduced to the form of a tube about 1½ mm. in diameter, the tip portion stiffened with a solution of celluloid dissolved in acetone. Dr. M. R. Wheeler, University of Texas, has made a modification of this which is far superior to the original technique. He cements a small plastic funnel into the tip of the net and cuts the end of the funnel to a size which will fit the threads of a 1×3-inch plastic vial. After removing the lid the net is placed quickly over the top of the can and the can is agitated with the foot causing the flies to rise into the net. The collecting is completed by making a few quick swings in the upper portion of the can. The captured flies are then forced down into the tip of the net and then transferred to killing vials or to food or culture vials. With the Patterson net, the flies are transferred by means of a small funnel leading into a vial through a perforated rubber stopper, by inverting the net until the tip is opened into the funnel. With the Wheeler modification the flies are concentrated in the small vial, this is closed off with the thumb, and removed from

the funnel. The flies are then transferred into other vials for culture or killing. The screw-topped vials slip in and out of the plastic funnel easily, and removal of the flies is greatly simplified. I have used a similar size clear plastic polyethylene vial, fitted for snap-on tops, with good success. This type has a thickened rim around the top of the vial and is not so apt to slip from the funnel while sweeping. In Hawaii, we have had good success using 1-gallon size bait cans.

One of the simplest ways to collect *Drosophila* is to create an artificial refuse pile by exposing various foodstuff or attractant materials on the ground and later collecting the various flies which are attracted to it.

Many collectors place bait in half-pint milk bottles, lamp chimneys, small paper cups, or other small containers and suspend these from trees or shrubs (Sturtevant, 1921:45; Spencer, in Demerec, 1950:541–547; Dobzhansky, 1936; Basden, 1954:604). Some collectors leave the containers open at the end and recover the flies by use of a collecting cylinder which fits over the caps of the bottles (see Spencer, 1950:543). Other collectors use the bottles as actual traps by having cork stoppers which contain two 10 mm. width holes through which two pieces of rubber tubing project about 1½ inches into the bottle. Burla (1951:29) uses a bottle fitted with a small funnel in the end. Johnson (1950) devised a suction trap for small air-borne insects, which automatically segregates the catch into successive hourly samples. This type of trap has been used very successfully in gathering information concerning flight habits of Drosophilidae as well as other types of insects. This was improved by Taylor (1951). For other collecting techniques refer to Hadorn, Burla, *et al.* (1952:135); Williams and Miller (1952); Williams (1953); Dobzhansky and Epling (1944:18), and others.

In Hawaii we have used plastic traps baited with overripe bananas with very good success. This is a bell-shaped trap, opened at the top and the bottom, with the bottom invaginated to form a rim around the inside in which the bait is placed (fig. 3a). This type of trap apparently originated in Japan but has been widely used as a fruit fly (Tephritidae) trap and is commonly referred to throughout the United States as the "McPhail trap," since M. McPhail, now with the Fruit Insects Section, U. S. Department of Agriculture, Mexico City, apparently first popularized its use for sampling fruit fly populations. The newly modified U. S. D. A. plastic fruit fly trap (refer to Steiner, 1957), which consists of a plastic cylinder 4 by 6 inches with a small opening at each end (fig. 3b), has proved very excellent for testing chemical attractants and also for use with banana baits. These plastic traps are light in weight and relatively easy to carry. Overripe bananas are used as bait and after the exposure period the flies are removed by means of an aspirator. This method obviously cannot compete with the "garbage can" technique in the number of flies obtained, but it has been very useful here in the islands in collecting numerous species which have not been picked up by using any other method of collecting.

It seems universally true that the common species of drosophilids, especially *Drosophila*, are highly domestic and strongly attracted to all sorts of ferment-

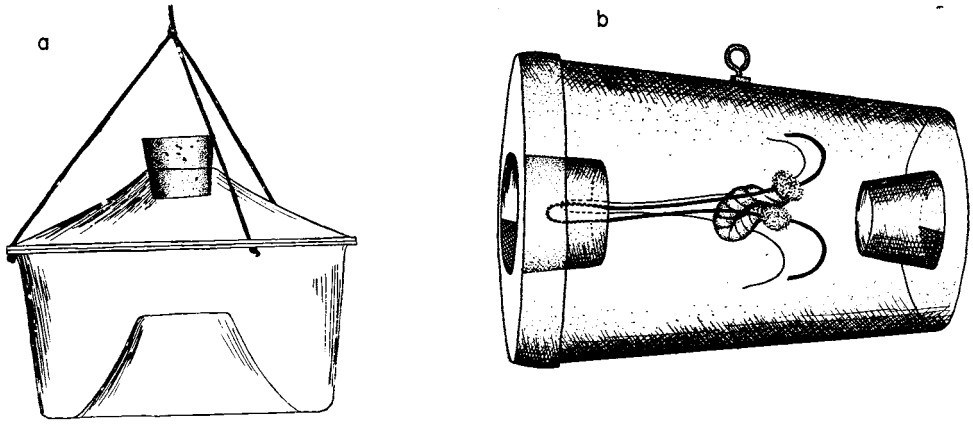


Figure 3—Plastic traps used for testing attractants: **a, McPhail (wet lure)** type, approximately ¼ actual size; **b,** U.S.D.A. dry trap, approximately ⅓ actual size.

ing fruits, rotting plant materials, and other food refuse, so that the park and city garbage cans make a favorite collecting spot for the *Drosophila* hunters. In Hawaii we find many native species are attracted to fermenting bananas. To obtain a thorough sample of the fauna, however, it is necessary that a variety of techniques be used; also it is essential to have considerable knowledge of the habits of the species involved. This is especially true in the Hawaiian Islands and probably other parts of the tropics and subtropics of the world. Our species obviously live in such a wide range of habitats that no one technique can be entirely successful. The greatest number of species has been collected by sweeping over leaf mold, or accumulated rotting vegetation in the wet mountain regions; the most successful single technique has been to use a heavy beating bag for collecting. This is devised with a bolting silk window in the top of a bag so that the specimens can be aspirated from the window as they fly to the light.

Perhaps the most serious drawback in the use of bait traps in Hawaii has been that we have not been able to find suitable baits for attracting a great share of the native species. Some experiments have been conducted to try to find chemical attractants, but to date this has not been successful in Hawaii. (Refer to A. S. West, 1961, for information on chemical attractants for *Drosophila.*) It has not been possible to make thorough trapping collections in most of the areas in the islands where the endemic species occur. We have not been able to make use of the "portable garbage can" technique which has proved so successful in other areas since there are few places in the islands where one can drive a car to good collecting grounds. The most interesting areas in the interior of these islands are accessible only by trail and often the trails are completely overgrown with vegetation, the country is wet, and often the going is very rugged. We have had to rely upon small traps which could be carried on a pack and since there are very few places to camp in the interior we usually do not have an opportunity

to spend enough time in one spot to use the traps successfully. If a more thorough trapping program could be carried throughout the islands, it is probable that a great many additional species would be collected.

The use of light traps needs to be more throughly investigated as a collecting technique. To date, I have records of nearly 30 species taken at lights in Hawaii. Approximately 20 endemic species were collected in a light trap at Kilauea during one period of collecting by J. W. Beardsley. It has not been possible to test the effectiveness of light traps in Hawaii due to the lack of power sources in the back country or to a light weight generator which might be transported into the interior; also the nights, in the areas where most endemics occur, are usually too cold and wet for insect activity.

Breeding Habits

Members of the family Drosophilidae, although predominantly living as scavengers, especially upon decaying fruits (the larvae feed upon yeasts, bacteria, and other microorganisms growing in the medium), breed in a very wide range of habitats. For information concerning the utilization of wild yeasts refer to Dudgeon (1954). The meager information which we have on the Hawaiian species indicates that besides the typical food preferences our species occur in a number of different ecological situations. Some of the rotting vegetation infesting species seem to have special plant preferences, such as *Drosophila hydei* Sturtevant showing a distinct preference for decaying cactus; *D. ananassae* Doleschall being strongly attracted to overripe pineapple, and *D. nasuta* Lamb showing a preference for rotting guava fruits. Some of our species are predaceous such as *Titanochaeta* spp. on spider eggs and *Gitonides perspicax* Knab on mealybugs. At least two endemic species, *Drosophila sadleria* Bryan, and *D. diminuens* n. sp., are known to be stem miners. The leafminer, *Scaptomyza graminum* Fallén, has erroneously been recorded from Hawaii but apparently is not present here; other species, such as *D. busckii* Coquillett, may possibly (on some occasions) be leafminers (see Okada and Sasakawa, 1956:26). Some of the native species have been found breeding in polyporous fungi and have been found to be attracted to other basidiomycetous fungi; it is also probable that some species live in association with other fungi (in addition to yeasts). At least one of our (imported) species, *Chymomyza procnemis* (Williston), has been reported as highly attracted to slime flux exudations from tree wounds, although this habit has not been observed for this species in Hawaii. I suspect that many of our native species live in leaf mold, mosses, in rotting bark, and other such environments although the many attempts which have been made to obtain specimens by rearing them from such media brought in from the field have not been too successful. The food habits of the species of the genus *Drosophila* have been rather thoroughly studied in the Nearctic region and some other areas of the world. Sturtevant (1921:16) has divided these food habits into five main categories: 1. Those which are parasitic on cercopids; 2. Those which feed on corollae of large flowers; 3. Those which feed on fungi; 4. Those which feed on decaying fruits; and 5. Those

which are general scavengers, feeding on such things as rotting potatoes, excrement, rotting meat, etc. Sturtevant (1942:20–21) has given a more detailed discussion of the feeding and breeding habits of the *Drosophila*. He said the species may be roughly characterized as "general scavengers, fruit feeders, sap feeders, or fungus feeders."

> The general scavengers feed on decaying vegetable matter (such as potatoes, cabbages, and sometimes manure), occasionally on animal matter (*busckii* and *funebris*) are common about stale formalin-preserved materials in laboratories). . . . In the temperate zone these species are all associated with man; with the possible exception of *funebris* (which has perhaps recently changed from a fungus diet) they are all introduced in the United States. Included here are *busckii*, *funebris*, *repleta*, *hydei*, and the tropical *ananassae*.
>
> The fruit feeders in the temperate zone are also introduced forms associated with man. . . . This group includes *melanogaster*, *simulans*, and *immigrans*.
>
> The sap feeders are to be found on many kinds of bleeding trees—both conifers and dicotyledons. *Pinus*, *Quercus*, *Betula*, and *Populus* are perhaps the most favored trees, but the largest populations I have seen have been around *Vitis*. This feeding habit occurs in *Pholadoris*, in the *obscura* group of *Sophophora*, in the *melanica*, *robusta*, *tripunctata*, and *pinicola* groups of *Drosophila*, and in the species *californica* and *occidentalis* of *Drosophila*. All of these are attracted to fruit, and certainly breed on it when it is available.
>
> The fungus feeders are to be found around either *Agarics* or *Boletus*. . . . This group includes *transversa*, the *testacea* group, *guttifera*, so far as is known all of the subgenus *Hirtodrosophila*, and the related genera *Leucophenga* and *Mycodrosophila*.
>
> Another type of feeding habit is represented by *quinaria*, *deflecta*, *palustris*, and *subpalustris*. The first is common about tomato plants, even before the fruit is ripe, and I have taken it in early spring on water-cress. The remaining three species are associated with water plants—especially *Nymphaea* and *Sagittaria*. Apparently these forms breed on moist decaying parts of such succulent plants.
>
> A similar feeding-habit is that of utilizing decaying parts of desert succulents, such as *Cactaceae*, *Yucca*, or *Agave*. This habit, found in *mojavensis*, is perhaps to be correlated with the fact that the related *repleta* and *hydei* are general scavengers.
>
> Still another feeding-habit is that of utilizing flowers. This is found in the tropical *florae*, *lutzii*, *alfari*, and *tristani*, and in the Californian *floricola*. Observations on the latter indicates that the chief larval food is pollen; this group alone seems therefore not to be dependent on yeast and bacteria for it is clear that in all the other types the medium itself is not the chief direct food supply. Several kinds of flowers are used; both in California and in the tropics there are records for Malvaceae (*Gossypium* in Jamaica, *Hibiscus* in California), and *Datura*, morning-glories, and melon. In both regions *Datura* is most frequently used.

The study of food habits has been further discussed by Patterson and Stone (1952:92–94); Carson and Stalker (1951); Dobzhansky and da Cunha (1955); Dobzhansky, Cooper, *et al.* (1956); Okada (1954); Okada and Sasakawa (1956) and others. Clausen (1940:413–414) summarizes the knowledge concerning the predaceous species.

In Hawaii the introduced species are found almost without exception in the lowlands where they are associated with the garbage pails, fermenting fruits and vegetables, and mulched pineapple fields. For the most part the species found at higher elevations, above 1,500 feet, are native to the islands with the greatest numbers of species occurring in the rain forest regions between approximately 2,000 and 5,000 feet elevation.

Natural Enemies

According to Perkins (1913: clxxxix) the larvae of drosophilids in Hawaii are often highly parasitized by various Hymenoptera. He recorded *Proctotrypes hawaiiensis* Ashmead, "species of *Phaenopria* (Proctotrupoidea), several of the Eucoilinae (Cynipoidea) and *Spalangia lanaiensis* (Chalcidoidea) having been bred from them. The common Crabronid wasp, *Hylocrabro tumidoventris*, often fills its cells entirely with species of *Drosophila*, but the one which it most usually carries off is, I suspect, an introduced one." Dresner (1954) reared the pteromalids, *Spalangia* sp. and *Pachycrepoideus dubius* Ashmead, and the diapriid, *Trichopria* sp., from two or more species of *Drosophila* in the laboratory on Oahu. It is apparent that staphylinid, carabid, and possibly other beetles, as well as Dermaptera and other predaceous insects, prey commonly upon drosophilids in the islands. These insects are often abundant in rotting fruits and other media infested with *Drosophila*. Sturtevant (1921:18) listed the natural enemies of *Drosophila* under the following categories: parasitic protozoa; parasitic fungi; nematodes and mites; hymenopterous parasites (proctotrupoid, cynipoid, and chalcidoid wasps); predaceous beetles, wasps, spiders, and flies and also domestic fowl which feed upon the larvae. Wolfson, Stalker, and Carson (1957:170) reported that a parasitic protozoan was a serious menace to their laboratory cultures.

Parthenogenesis

Parthenogenesis in *Drosophila* has been reported by Stalker (1951, 1952, and 1954), Carson, Wheeler, and Heed (1957), and by others. They have reported that facultative parthenogenesis occurs in several species. Of 28 species studied by Stalker, a low rate of parthenogenesis was discovered in 23; of these only 3, *D. parthenogenetica* Stalker, *D. polymorpha* Dobzhansky and Pavan, and *D. affinis* Sturtevant, produced adult progeny. Unfertilized eggs of the remaining 20 species did not develop beyond the larval stages. We have no information concerning parthenogenesis in Hawaii.

Subfamily and Generic Arrangement

Only two subfamilies are presently recognized in Hawaii: Amiotinae, which is represented by only one established species, *Gitonides perspicax* Knab, and Drosophilinae which includes the remainder of our fauna. The Drosophilinae fall into two major groups, with the exception of *Chymomyza* Czerny and *Dettopsomyia* Lamb; these consist of those genera related to *Drosophila* Fallén and those related to *Scaptomyza* Hardy. *Drosophila* is divided into four subgenera: *Drosophila sens. lat.*, *Hypenomyia* Grimshaw, *Sophophora* Sturtevant, and *Trichotobregma* n. subgen. Six genera are closely related to *Drosophila*: *Antopocerus* n. gen., *Ateledrosophila* n. gen., *Celidosoma* n. gen., *Grimshawomyia* n. gen., *Idiomyia* Grimshaw, and *Nudidrosophila* n. gen. *Scaptomyza* is divided into seven subgenera: *Alloscaptomyza* Hackman, *Bunostoma* Malloch, *Exalloscaptomyza* n. subgen., *Parascaptomyza* Duda, *Rosenwaldia* Malloch, *Tantalia* Malloch, and

Trogloscaptomyza Frey. The genus *Titanochaeta* Knab appears to fit intermediate between *Scaptomyza* and *Drosophila*. The species have a *Scaptomyza*-like arista and male genitalia rather similar to *Scaptomyza*. The acrostichal setae are *Drosophila*-like and the female ovipositor plates are sclerotized. This possibly should be treated as a subgenus of *Scaptomyza*, but mainly because of its distinctive biology it is being retained as a full genus. The genus *Celidosoma* also appears somewhat intermediate between the two groups being typified by having four rows of acrostichal setae but with other characters *Drosophila*-like except that the male genitalia are distinct from both groups. These groups show definite intergradation in the Hawaiian fauna. Previously *Scaptomyza* was defined as lacking ventral rays on the arista and having two to four rows of acrostichal setae on the mesonotum. A large complex of *Scaptomyza* species which has six rows of acrostichal setae occurs in Hawaii. Others have one or two ventral rays on the arista; species like *Drosophila reducta* n. sp. and *taractica* n. sp. appear to be typical *Drosophila*, but they possess *Scaptomyza*-like male genitalia. The females of these two species have not been studied and it is possible that these should actually fit in *Scaptomyza*.

Key to Genera and Subgenera of Hawaiian Drosophilidae

1. Arista pubescent. Prescutellar bristles and usually the base of vein M_{3+4} distinctly developed (fig. 4a). Subfamily Amiotinae 2

   Arista plumose or pectinate (note the rays are short in *Scaptomyza* (*Exalloscaptomyza*, n. subgen.). Prescutellar bristles and base of vein M_{3+4} absent. Subfamily Drosophilinae 3

2(1). Mesonotum covered with brown spots. Third costal section 2.5 times longer than the fourth. Wings hyaline, a distinct crossvein present between cells 1st M_2 and M, and the r–m crossvein is situated at the middle of cell 1st M_2 (fig. 4a) ..... **Gitonides** Knab.

   Mesonotum not spotted with brown. The third costal section is about 5 times longer than the fourth. Wings with a dark pattern of spots on the veins and in the cells. A faint indication of a crossvein present between cells 1st M_2 and M, and the r–m crossvein is situated at the basal third of cell 1st M_2 (fig. 5a) ..... **Pseudiastata** Coquillett.

3(1). Four to five strong dorsocentral bristles present; two pairs are presutural in position. Thorax conspicuously spotted or marked with brown. Wings almost en-

tirely dark brown except for the hyaline base. Second antennal segment pointed apically above (fig. 18a). Male genitalia as in figure 18d ..... **Celidosoma** n. gen.

Not as above, rarely with one pair of presutural dorsocentral bristles present. Other characters not entirely as above. If the second antennal segment is pointed see *Grimshawomyia* n. gen. 4

4(3). Six or more rows of acrostichal setae present over the anterior half of the mesonotum 5

Only two to four rows of acrostichal setae present on the anterior portion of the mesonotum 18

5(4). Arista with one or more ventral rays basad of the apical fork, or densely haired dorsally (fig. 10b). Female ovipositor sclerotized, usually dentate, except in *Scaptomyza* (*Alloscaptomyza*) *stramineifrons* Hackman (an aberrant *Scaptomyza* which runs near *Drosophila*). Male claspers usually not exposed from lateral view 6

Arista with two to four dorsal rays but no ventral rays basad of apical fork (fig. 257a). Female ovipositor often fleshy, not sclerotized or dentate, or it is thin, rather needle-shape (fig. 249b). Male claspers usually conspicuously developed beyond the edges of the ninth tergum 16

6(5). No reclinate, proclinate, or ocellar bristles present. Ocellar triangle with a series of laterally directed, recumbent, inconspicuous hairs (fig. 238c). Front bare except for microscopic pubescence or scales ..... **Nudidrosophila** n. gen.

At least proclinate and upper reclinate bristles well developed, or with a clump of long reclinate hairs on the lower half of the front 7

7(6). Arista preapical (fig. 17a). Ocellar and anterior reclinate bristles lacking. Front rather densely setose ..... **Ateledrosophila** n. gen.

Arista normal in position. Ocellar and anterior reclinate bristles present 8

8(7). The anterior reclinate bristles are placed well in front of the proclinates. The postocellar bristles are tiny, poorly developed (fig. 19a). Inner surface of front femor of male spinose (fig. 19c). Front femor, tibia,

and basitarsus black. Wings with a milky-white apex (fig. 19b). (Only one species, *procnemis*, present in Hawaii.) ..... **Chymomyza** Czerny.

Not as above. Anterior reclinate bristles situated slightly below proclinates only in *Drosophila mimica* n. sp., but the other characters are very different 9

9(8). An extra crossvein present in cell R_5, directly above the m crossvein (fig. 232b) ..... **Idiomyia** Grimshaw.

No such crossvein present 10

10(9). Second antennal segment sharply pointed at apex, extending over the base of the third segment. Sides of the vertex swollen, the vertical and upper ocellar bristles are situated on the swelling (fig. 222a). The face is strongly carinate, developed into a noselike point above the epistoma. Costal fringe elongate, extending nearly to apex of vein R_{4+5}. Wing markings distinctive, as in figure 222c ..... **Grimshawomyia** n. gen.

Not as above, second antennal segment not pointed, etc. 11

11(10). First antennal segment large, extending well beyond the margin of the front; in the male it is concave on the ventral surface, almost equal in length to the third antennal segment and slightly longer than the second. Male antennae strongly porrect. Arista densely short-haired dorsally, bare below except near apex in some species (figs. 10b, 12a, and 14a) ..... **Antopocerus** n. gen.

First antennal segment tiny, reduced to a narrow ring, scarcely visible beyond margin of front. Antennae not porrect; arista not as above 12

12(11). The acrostichal setae are arranged in six irregular rows. Head short and broad, distinctly broader than the thorax (measured between the notopleural bristles) and about two times higher than long. Female ovipositor fleshly, not sclerotized. Only one humeral bristle present. Male claspers strongly developed, conspicuous (fig. 245a). The longest diameter of the eye is nearly vertical (only one aberrant species, *stramineifrons* Hackman, is known to fit here) ..... **Scaptomyza (Alloscaptomyza)** Hackman.

Acrostichals arranged in six to ten distinct rows, other characters not as above ..... *Drosophila sens. lat.* 13

13(12). Lower angles of face protruded and containing a dense mystax of about a dozen black bristles arranged in two rows (fig. 217a) . . . . subgen. **Hypenomyia** Grimshaw.

Lower angles of face lacking such a mystax of bristles, oral vibrissae with not more than four to five strong bristles in a single row 14

14(13). Front with distinct proclinate and lower reclinate bristles and lacking long hairs. Ocellar bristles well developed, nearly as strong as the vertical bristles 15

Front lacking proclinate bristles but with seven or eight long reclinate hairs so that no anterior reclinate bristles can be differentiated. Female with two reclinate bristles on lower front and with four to six short bristles in a row between the anterior and posterior reclinates. Ocellar bristles tiny, about equal in length to the fine hairs on the ocellar triangle . . . . . **Trichotobregma** n. subgen. (Only one known species, *petalopeza* n. sp.)

15(14). Front tarsi of male with well-developed sex combs (figs. 219a, 220a) or with transverse rows of stout black ventral setae on the first two tarsal segments (fig. 218a) . . . . . subgen. **Sophophora** Sturtevant.

Lacking sex combs on the tarsi . . . . . **Drosophila** Fallén.

16(5). Apical fork of arista deep, the branches about as long as the two dorsal rays and longer than the stem of the arista (fig. 263a). Scutellum white, except on the sides. Posteromedian portion of mesonotum white and with a broad yellow, lightly gray-white pollinose, vitta extending longitudinally between the dorsocentral rows. Basal scutellar bristles situated opposite or slightly before the anterior corners of the scutellum (fig. 260d). Male genitalia as in figure 263c. (One aberrant species, *varipicta* n. sp., runs here.) . . . . . **Scaptomyza (Tantalia)** Malloch.

Not as above 17

17(16). Head nearly square as seen from lateral view, lower margin approximately equal in length to the upper (fig. 282a). Female ovipositor weakly sclerotized, not dentate. Male claspers large, conspicuously protruding beyond the margins of the tergum (fig. 288a) . . . . . **Scaptomyza (Trogloscaptomyza)** Frey. (In part.)

Head about 1.5 times higher than long, distinctly nar-

rowed ventrally with the front oblique (figs. 343a, 347a), except in *vittiger* n. sp. The eyes are densely hairy. Female ovipositor needle-like (fig. 249b), except in *evexa* n. sp. Male genitalia as in figures 343a and 348b ..... **Titanochaeta** Knab.

18(4). A deep costal incision present just before apex of vein R_1, forming a distinct black lobe which protrudes conspicuously beyond the wing margin. Third costal section nearly equal or longer than the fourth (fig. 20b–c). Arista with five dorsal and two ventral rays in addition to the apical fork. Mesonotum dark brown to black with distinct gray vittae ..... **Dettopsomyia** Lamb.

Not as above ..... **Scaptomyza** Hardy, *sens. lat.* 19

19(18). A strong presutural dorsocentral bristle present. Head flattened, about as long as high; eyes strongly oblique (fig. 259a); arista lacking ventral rays in Hawaiian species ..... subgen. **Rosenwaldia** Malloch.

No presutural dorsocentral bristles except in *Bunostoma cnecosoma* n. sp., which has two ventral rays on the arista, etc. 20

20(19). Arista with two ventral rays. Body usually polished black. Male genitalia as in figures 246a, 248a and 250c ..... subgen. **Bunostoma** Malloch.

Not over one ventral ray, usually none. Male genitalia not as above. Not polished black species 21

21(20). Arista with a ventral branch basad of the apical fork (fig. 240a). Head short and broad, about two times higher than long and distinctly broader than the thorax (measured between the notopleural bristles). The longest diameter of the eye is nearly vertical. Vertical bristles prominent, inner verticals usually as long as the vertical diameter of the eye ..... subgen. **Alloscaptomyza** Hackman.

Not as above. Arista lacking ventral rays except in *Parascaptomyza* Duda. Head equal to or narrower than the width of the thorax. Longest diameter of eye distinctly oblique 22

22(21). Arista with a deep apical fork, the branches of the fork about equal in length to the two dorsal rays and longer than the stem of the arista (fig. 260a). Basal

scutellar bristles opposite or slightly before the anterior corners of the scutellum (fig. 260c). Scutellum white except on the sides. The mesonotum with a broad white stripe down the middle or at least white on the posteromedian portion. Male genitalia as in figures 260d, 261b, and 262d. . subgen. **Tantalia** Malloch.

Apical fork comparatively small, sometimes rudimentary or lacking. Basal scutellar bristles situated beyond the hind corners of the scutellum. Thorax not marked as above 23

23(22). Rays of the arista long (figs. 255a, 281a). Male aedeagus usually not elongate. If sclerotized ovipositor blades are present on the female (*Parascaptomyza*) they are not fused at the ends 24

Arista very short haired (fig. 254a). Male aedeagus elongate (fig. 254c). Ovipositor plates fused on both ends (fig. 255e) . . . . . **Exalloscaptomyza** n. subgen. (Only one known species, *mauiensis* (Grimshaw) .)

24(23). Arista lacking ventral rays (fig. 292a). Male genitalia lacking spinose secondary claspers (figs. 288a, 289a, 292c) . . . . . subgen. **Trogloscaptomyza** Frey.

Arista with one ventral ray (fig. 255a). Mesonotum with only two rows of acrostichal setae. Male genitalia with well-developed secondary claspers as in figure 255b . . . . . subgen. **Parascaptomyza** Duda. (Only one species known in Hawaii, *pallida* Zetterstedt.)

Subfamily AMIOTINAE Brues and Melander

Amiotinae Brues and Melander, 1932, Classification of Insects, p. 345.

Members of this subfamily are characterized by the pubescent aristae and by having cell 1st M_2 separated from cell M by a crossvein, or a clear fold or crease which is actually the base of vein M_{3+4} (fig. 4a). Wheeler (1952:164) has indicated that this is probably the most primitive group in the family and in America contains the "genera, *Amiota, Cacoxenus, Sinophthalmus, Leucophenga, Rhinoleucophenga, Gitona* and perhaps *Stegana* as an offshoot." The genus *Gitonides* Knab would also fit in this subfamily; it is the only genus represented in Hawaii.

The Amiotinae which I have studied (*Gitona* Meigen, *Gitonides* Knab, *Cacoxenus* Loew, *Paracacoxenus* Hardy, and *Leucophenga* Mik) are further characterized by having the lower reclinate bristles of the front strong, equal in

size to the proclinates; by having the upper reclinate bristles situated high on the front, nearly in line with the hind pair of ocelli and near the inner vertical bristles; by having prescutellar acrostichal bristles present; and by having the anterior pair of dorsocentral bristles located on the posterior portion of the mesonotum, opposite the wing bases. All of these except *Leucophenga* have pubescent aristae. I am also tentatively including *Pseudiastata* Coquillett under Amiotinae although it does not have the crossvein between cells 1st M_2 and M. Refer to discussion under that genus.

Genus **GITONIDES** Knab

Gitonides Knab, 1914, Insecutor Inscitiae Menstruus 2 (1) :165.

This genus was placed into synonymy with *Gitona* Meigen by Sturtevant (1921:54) and by Hendel (1933:46). It was reinstated by Wheeler (1952a:422) although the same year (1952b:173) he listed it as a questionable synonym under *Cacoxenus* Loew. In recent correspondence Wheeler has indicated that he thinks that *Gitona, Gitonides,* and *Cacoxenus* (as he knows it from the Nearctic region) should possibly be treated as one genus, broken down into subgenera. He indicates that *Gitona* can be separated from *Gitonides* and *Cacoxenus* by having the "crossvein between discal and second basal cells present only as a clear fold or crease." Also, according to Wheeler, *Gitona* differs from the Nearctic *Cacoxenus,* which he has studied, by having the hairs of the lower portion of the sternopleuron short, scattered, and disarranged, and by having two stout bristles on the dorsal portion of each middle coxa. Wheeler said that *Gitonides* and *Cacoxenus* have the "discal and second basal cells separated by a dark crossvein," and in the latter the hairs of the lower portion of each sternopleuron are rather long, arranged into a vertical comblike row (only males have been seen and this may be a sexual difference). The occiput of *Gitonides* is slightly concave and the spermathecae of the female are tiny and oblong.

Only one species is known.

Type of genus: *Gitonides perspicax* Knab.

From my studies of the groups in question I feel that there is ample justification for treating these as four distinct genera differentiated by the following characters:

Gitona Meigen—Base of vein M_{3+4} represented only by a clear fold or crease. Male genitalia lacking claspers. Ninth tergum with a pair of closely placed stout black spines at lower posterior margin ("toe" of Hsu, 1949, and others) (fig. 4c). Each sternopleuron has a moderately strong bristle near the posteroventral corner and just two or three closely placed hairs and about four widely spaced hairs in a row immediately above this; the other hairs on the lower sternopleuron are short and scattered. Each middle coxa with two large posterodorsal bristles.

Gitonides Knab—Base of M_{3+4} present as a distinct vein (fig. 4a). Male clasper

large, conspicuous, thickly covered with stout spines. Ninth tergum not shaped as above (fig. 4b). A strong posteroventral bristle is present on each sternopleuron and the setae are short, sparse, and irregularly placed. Each middle coxa has two moderately strong posterodorsal bristles and two anterior bristles.

Paracacoxenus Hardy—Base of M_{3+4} present, as above. Male claspers rather small, broadly cone shaped, and bearing a few conspicuous setae at the apices. Ninth tergum rather broad on dorsal portion and attenuated ventrally. Sixth tergum terminating in a strong spine at the posterior corners (fig. 4d). Mesonotum with a brown spot at base of each seta. Each sternopleuron with a comblike row of about ten long hairs extending from the ventral margin to about the middle, over the hind portion of the sclerite; the ventral bristle is not differentiated from the long hairs. The middle coxae lack dorsal bristles. Front of male about as wide as long, and 8–10 rows of acrostichals present.

Cacoxenus Loew (based upon *indagator* Loew, the type of the genus)—As above, except that the male claspers are large and quite differently shaped (fig. 4e); the ninth tergum is narrowed medianly, and the sixth tergum does not terminate in a spine. The mesonotum is gray, not spotted. The sternopleuron has a strong posteroventral bristle plus a vertical row of several inconspicuous, short hairs. Each middle coxa has two strong posterodorsal bristles. Front of male one-half longer than wide and tapered below, and 15–20 irregular rows of acrostichals present.

For more complete details refer to Hardy and Wheeler (1960).

Gitonides perspicax Knab (figs. 4a–b).

Gitonides perspicax Knab, 1914, Insecutor Inscitiae Menstruus 2(1):166.
Cacoxenus punctatus Duda, 1924, Arc. für Naturg. 90(3):224–225, fig. 8.

Synonymy by Hendel (1933:46).

Oahu (type locality: Honolulu), Molokai, Hawaii, and Maui. Probably on all of the main islands.

Immigrant. This species has been reported from the Philippine Islands, Australia, and India. Knab said it appears to be widely distributed in the Orient.

Type in the United States National Museum.

Hosts. A general predator on mealybugs. In Hawaii it has been reared from the following species: *Pseudococcus adonidum* (Linnaeus), *P. boninsis* (Kuwana), *P. giffardi* (Ehrhorn), *P. palmarum* (Ehrhorn), *P. vastator* (Maskell), *Saccharicoccus sacchari* (Cockerell), *Trionymus rostellum* Lobdell, and *Dysmicoccus brevipes* (Cockerell). Swezey (1928:182 and 1932:12) recorded it from *Trionymus insularis* (Ehrhorn) on various grasses. This very probably was a misidentification for *T. rostellum*. Refer to Beardsley (1957:209).

This species has also been collected at lights, on windows, and in traps baited with protein hydrolysate and with dog faeces (the latter by D. P. Wilton, State of Hawaii Department of Health).

This species superficially resembles members of the *repleta* complex of the genus *Drosophila* because of the numerous black spots over the mesonotum. The

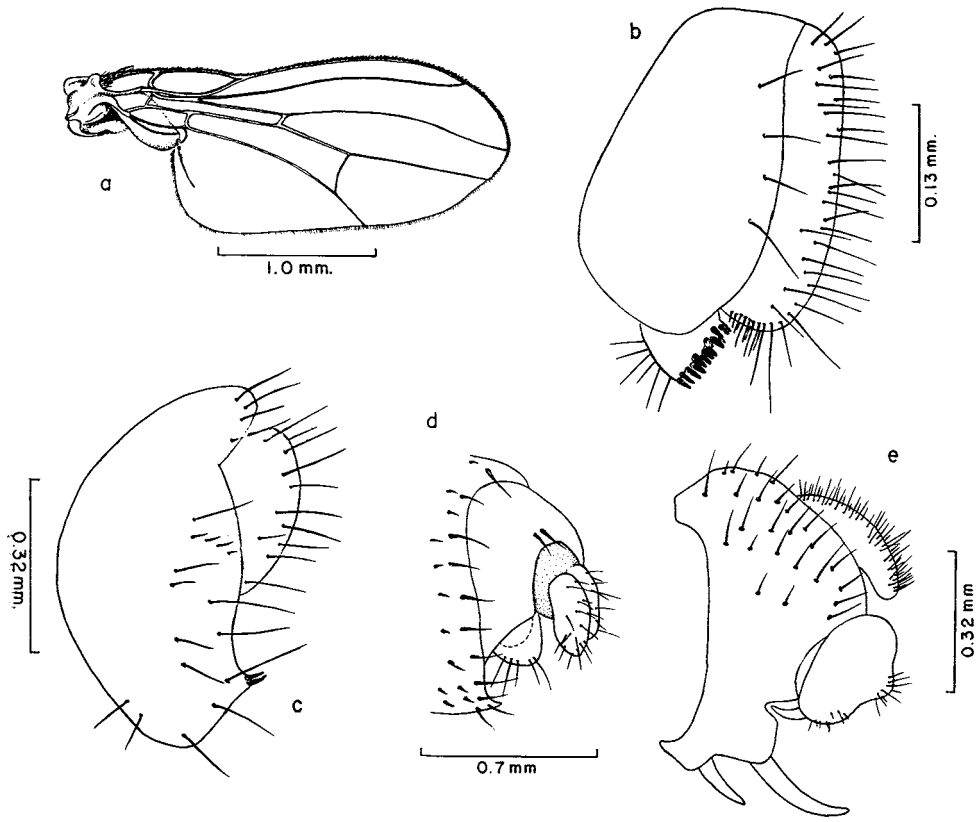


Figure 4—*Gitonides perspicax* Knab: **a,** wing; **b,** male genitalia. *Gitona americana* Patterson: **c,** male genitalia. *Paracacoxenus guttatus* Hardy and Wheeler: **d,** male genitalia. *Cacoxenus indagator* Loew: **e,** male genitalia.

eyes are nearly round, and the occiput is very narrow except on the lower portion. The genae are moderately developed and each contains 1 strong bristle plus 6–8 short black bristles. The front is densely yellow-gray pruinose. Three pairs of strong fronto-orbital bristles are present, the upper reclinate bristles are situated nearly in line with the upper ocelli, the lower reclinate bristles are situated at the midline of the front, and the proclinate bristles are situated near the lower fourth of the front. The median portion of the front has numerous suberect setae, each with a small brown spot at its base. The postocellar bristles are small, scarcely larger than the enlarged setae of the ocellar triangle. The ocellar triangle has about ten enlarged black setae arranged in two irregular rows. The face is concave on the sides and has a broad flat carina down the middle. The antenna is yellow; the third segment is lightly tinged with brown; the first two segments are rather thickly covered with short black setae on the dorsal surface and the second segment has a dorsal bristle near the middle. The arista is densely pubescent. The thorax is predominantly yellow in ground color, densely covered with yellow-gray

pruinosity; the mesonotum is very thickly covered with short black setae and is covered with irregular brown spots; most of the setae have a small brown mark at the base; some of these are confluent and form blotches of brown. Each pleuron has three irregular, longitudinal, brown vittae—one across the upper margin of the mesopleuron, one through the median portion of the mesopleuron and through the upper portion of the pteropleuron, and one over the upper margin of the sternopleuron and through the middle of the hypopleuron; these are not always contiguous. Each sternopleuron has two large bristles near the upper margin and one strong bristle at the ventral margin; small setae are also scattered in vertical lines through the median portion of the sclerite. The anterior dorsocentral bristles are rather weak, about equal in size to the prescutellar bristles, and are situated approximately opposite the wing bases near the posterior one-fifth of the mesonotum. About ten rows of acrostichals extend over the mesonotum. Each humerus has one strong bristle in addition to numerous black setae. The scutellum is short and broad, about as wide as long. The anterior scutellar bristles are situated near the midline. Halteres yellow. Legs entirely yellow. Middle coxae with two posterior and two dorsal bristles. In the male the first three joints of the hind tarsus have a coarsely serrated ventral comb, and the middle tarsus has a row of stout black ventral setae at apex of each joint. Wings hyaline. Third costal section 2.5 times longer than fourth and fourth section 1.35 times longer than the fifth section. The costa extends to the apex of vein M_{1+2} although it is much thinner beyond the tip of R_{4+5}. The costal fringe of stout setae extends about two-thirds the distance between the tips of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated at the middle of cell 1st M_2 and the penultimate section of vein M_{1+2} is one-half as long as the ultimate section. The m crossvein is curved outward beyond the middle so that the lower apex of cell 1st M_2 is acute. The m crossvein is about equal in length to the ultimate section of vein M_{3+4} (fig. 4a). First two abdominal segments predominantly yellow in ground color, yellow-gray pruinose, with a brown spot on each side and usually with a brown spot in the middle of each segment. The other terga are broadly brown across their anterior four-fifths and are yellow-gray at apices and on the lateral margins. The male genitalia are brownish yellow. The anal plates are long and slender and densely setose. The ninth tergum is rather narrow and is not produced ventrally. The claspers are well developed, are distinctly separated from the tergum, oblong in shape, and densely covered with short black spines; the lower portion is covered with fine hairs (fig. 4b) and the inner margin has a secondary clump of stout setae toward the anterior end. The aedeagus is large and rather boat-shaped. In the female the anal portion (ninth segment) is protruded. The ovipositor plates are weakly sclerotized and are not produced. No distinct ovipositor is present.

Length: body, 3.0 mm.; wings, 3.2 mm.

The larvae live in the tight roll of the leaf axils of sugarcane and other grasses, *Pandanus*, and other plants where they are protected from ants and other predators. When the larvae are exposed the ants quickly attack and kill them; this is especially true in areas where the Argentine ant occurs. J. W. Beardsley, Univ.

of Hawaii, feels that *Gitonides perspicax* may be more efficient as a predator on sugarcane mealybugs than *Cryptolaemus* beetles since the latter seem to occur only where there are large colonies of mealybugs and the *Gitonides* are effective predators in light as well as heavy infestations.

Beardsley found this species parasitized by *Pachycrepodeus dubius* Ashmead in May, 1962.

Genus **PSEUDIASTATA** Coquillett (figs. 5a–e and 6a–e)

Pseudiastata Coquillett, 1908, Proc. Ent. Soc. Wash. 9:148.

This genus is not represented in Hawaii although specimens of probably three species were liberated here on several occasions between 1924 and 1937 in an attempt to control the pineapple mealybug (Fullaway, 1933:57, and Carter, 1935:1039–40). Since the *Pseudiastata* are important mealybug predators and there is a good likelihood that further efforts may be made to establish some of the species in Hawaii, the diagnostic characters of the known species are being included in this study.

The genus resembles *Gitonides* Knab in many respects, such as: the pubescent arista; the large bare eyes; the presence of three pairs of strong orbital bristles; the presence of prescutellar bristles; the two pairs of dorsocentral bristles rather close together on the hind portion of the mesonotum; the concave occiput; the densely setose mesonotum; and the short broad scutellum. It is differentiated from *Gitonides* by lacking the brown spots on the mesonotum or the front; by lacking a distinct crossvein between cells 1st M_2 and M, by having the r–m crossvein situated near the basal third of cell 1st M_2; by having the third section of the costa five to six times longer than the fourth section; by the wing markings (figs. 4a, 5a, and 6a); and by the very different male genitalia as shown in figures 4b and 5b. The male genitalia of *Pseudiastata* lack claspers, and the ninth tergum is lobate ventrally. In *Pseudiastata* the postocellar and prescutellar bristles are much more strongly developed than in *Gitonides*; the wings are marked with transverse brown to black spots in *Pseudistata* and are hyaline in *Gitonides*.

These are robust species, predominantly yellow to rufous sometimes faintly tinged with brown. The mesonotum is densely setulose, the acrostichal setae are arranged in 10–12 rows. The palpi are very broad and flat.

According to Dr. Walter Carter, formerly of the Pineapple Research Institute, specimens were brought in from the Panama Canal Zone, Guatemala, and Brazil, and apparently specimens from these three localities were released in the field in Hawaii. It is probable that three species were involved although they were all considered to be *P. nebulosa* Coquillett. But, as pointed out by Sabrosky (1951:625), most of the material which had been called *nebulosa* in the Hawaiian literature was no doubt *P. pseudococcivora* Sabrosky. It is also probable that most of the specimens from Brazil were *P. brasiliensis* Costa Lima. Specimens in the Pineapple Research Institute collection from the original introductions are

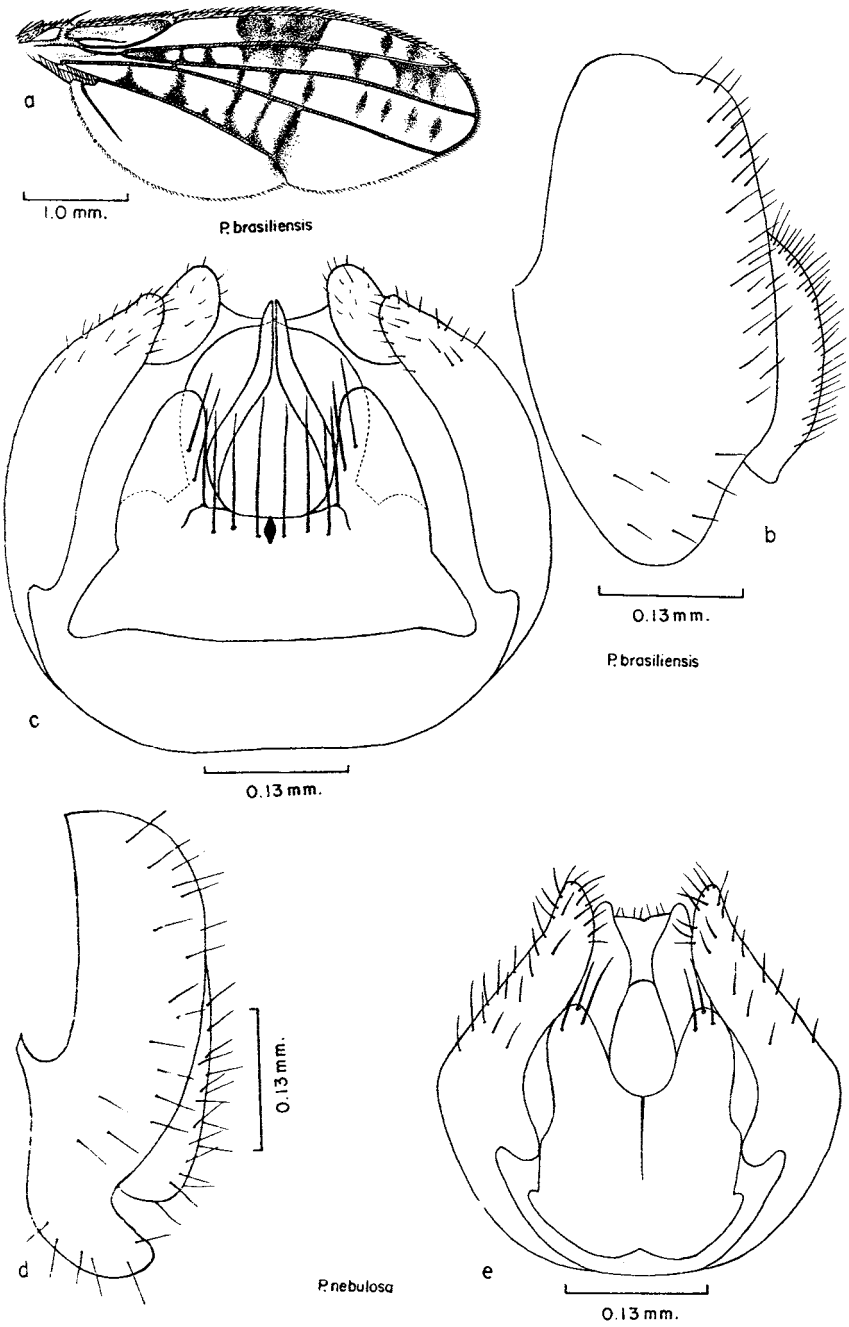


Figure 5—*Pseudiastata brasiliensis* Costa Lima: **a,** wing; **b,** male genitalia, lateral; **c,** male genitalia, ventral. *P. nebulosa* Coquillett: **d,** male genitalia, lateral; **e,** male genitalia, ventral.

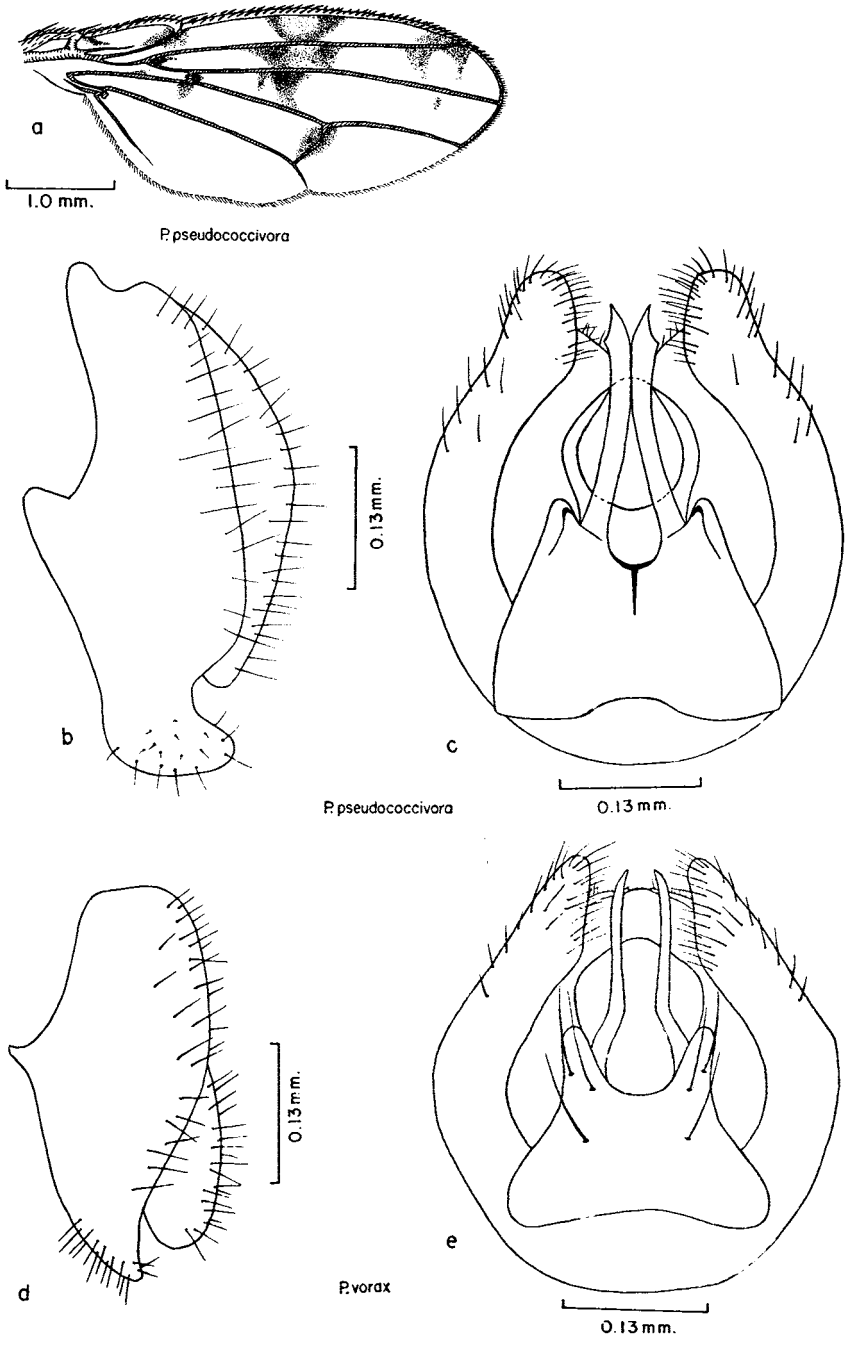


Figure 6—*Pseudiastata pseudococcivora* Sabrosky: **a,** wing; **b,** male genitalia, lateral; **c,** male genitalia, ventral. *P. vorax* Sabrosky: **d,** male genitalia, lateral; **e,** male genitalia, ventral.

from Guatemala, Brazil, and British Guiana. These represent three distinct species, and are listed in the Checklist at the front of this volume. Specimens introduced by the State Department of Agriculture were from Panama; the latter were obviously *pseudococcivora*.

To date, five species of *Pseudiastata* have been described: *P. nebulosa* Coquillett (1908, Proc. Ent. Soc. Wash. 9:148), from Eastern United States (known, in the literature, only from Maryland and Georgia); *P. brasiliensis* Costa Lima (1937, Chacaras e Quintaes 55 (2) :179–182), from Brazil; *P. pseudococcivora* Sabrosky (1951, Bull. Ent. Res. 41 (3) :624), from Panama, Mexico, and Guatemala; *P. vorax* Sabrosky (1951, Bull. Ent. Res. 41 (3) :624), from Trinidad, and *P. armata* Wheeler (1957, Univ. Texas Pub. 5721:111), from Panama. The type of the genus, *nebulosa*, is known in the literature only from the type and one female specimen, and its habits are not known; the other species are reported to be predators on pineapple mealybugs, *Dysmicoccus brevipes* (Cockerell).

The three species imported as "*P. nebulosa*" from South and Central America for biological control of pineapple mealybug in Hawaii are as follows: specimens from Panama, Guatemala, and some from Brazil were *P. pseudococcivora*; most of those from Brazil were *P. brasiliensis*; and the material from British Guiana was *P. vorax* Sabrosky. The latter specimens failed to establish a colony in the laboratory and were not released.

As pointed out by Sabrosky (1951), *P. brasiliensis* is readily differentiated from the other known species of *Pseudiastata* by the distinctive wing venation; the numerous vertical streaks of brown through cells R_5 and 1st M_{1+2} are distinctive (fig. 5a). All other species of the genus look superficially alike and have a wing pattern as in the figure of *pseudococcivora* (fig. 6a). These are distinguished only by the male genital characters.

Type of the genus: *Pseudiastata nebulosa* Coquillett.

Key to Known Species of Pseudiastata

1. Wings with three irregular transverse streaks of brown as in figure 6a. Ninth tergum of male lobate ventrally 2

   Cells R_5 and 1st M_2 with numerous streaks of brown as in figure 5a. Ventral aspects of ninth tergum broad, rounded, not distinctly lobate (fig. 5b). Ninth sternum as in figure 5c. (Brazil.) ..... **brasiliensis** Costa Lima.

2. Base of vein R_{4+5} bare 3

   Base of vein R_{4+5} setose. (Panama.) ..... **armata** Wheeler.

3. Ninth sternum of male with three bristles on each side, the posterolateral lobes not divided 4

   Ninth sternum devoid of bristles, each posterolateral

lobe divided at the apex (fig. 6c). Lobes of ninth tergum as wide as long (fig. 6b). (Panama, Guatemala, Mexico, and Brazil—probably widespread over the Neotropical region.) ..... **pseudococcivora** Sabrosky.

4. Bristles on the ninth sternum situated near the apices of the postero-lateral lobes (fig. 5e). Ventral aspects of ninth tergum rounded apically and curved upward (fig. 5d). (Eastern North America.) ..... **nebulosa** Coquillett.

Bristles of ninth sternum extending to below middle of segment (fig. 6e). Ventral aspects of sternum pointed apically and not curved (fig. 6d). (Trinidad, British Guiana.) ..... **vorax** Sabrosky.

Subfamily DROSOPHILINAE Rondani

Drosophilina Rondani, 1856, Dipt. Italica 1:133.

As discussed in the Introduction, all except one of the known Hawaiian drosophilids fall into this subfamily. The species have the arista plumose or pectinate and lack prescutellar bristles; also the base of vein M_{3+4} is absent in the wing.

Genus **ANTOPOCERUS**, new genus

(From the Greek *antopos*, strange or odd, and *keros*, horn. Gender masculine.)

This genus is an offshoot of *Drosophila* and is characterized by the unusual development of the antennae. The first antennal segment is comparatively large, extended well beyond the margin of the front, concave on the anteroventral surface, about equal in length to the third antennal segment, and slightly longer than the second segment. The arista is very densely short haired on the dorsal surface and bare on the ventral surface, except for some short hairs just before the apex in some species. The front tibia of the male is slightly curved on the anterior surface. The front basitarsus of the male is usually very long and slender, being about two-fifths to four-fifths as long as the front tibia depending upon the species; also the second and third tarsal segments are often elongated in the male. Usually no strong bristles are present in the vibrissae of the males. The front margin of the head is slightly produced, the face is oblique, and the occiput is rather strongly swollen (see figs. 10b and 12a). *Antopocerus* species are moderate sized, predominantly rufous or brownish red. The female specimens are recognized by the enlarged first antennal segment; this is especially noticeable on the inner and upper margins, which protrude well above the margin of the front. The arista of the female is more similar to that of a *Drosophila*, except that the

rays are somewhat shorter and more numerous (fig. 12b) than is typical for that genus. In other details the *Antopocerus* fit the characteristics of *Drosophila*.

The genus is endemic to Hawaii and contains nine known species.

Type of genus: *Antopocerus longiseta* (Grimshaw).

KEY TO SPECIES OF ANTOPOCERUS
(Based on Males)

1. Wings expanded on apical half, the costa curves upward so the wing is broadest beyond m crossvein (fig. 12d) 2
   Wings not expanded, broadest before m crossvein (fig. 7b) 4

2. Wings with a brown anteroapical spot (fig. 12d). Front tibia with a long preapical anterodorsal black hair and front basitarsus almost as long as tibia (fig. 12e). Molokai ..... **longiseta** (Grimshaw).
   Not as above 3

3. Wings hyaline, lacking brown markings. Mesonotum with a brown longitudinal vitta down the middle. Front tibia very densely villose down the anteroventral, dorsal, and posterior surfaces (fig. 15b). Front basitarsus with a dense clump of long black hairs near base. Maui ..... **villosus** n. sp.
   Wings with a pale yellow-brown streak extending longitudinally through middle (fig. 8b). Front tibia with a row of cilia down each of the dorsal and anteroventral surfaces (fig. 8c) but not densely villose as above. Front basitarsus lacking a clump of hairs. Oahu ..... **arcuatus** n. sp.

4. Wings with a distinct tinge of brown on anteroapical portion. Front basitarsus 6/7 as long as the tibia (fig. 7c). Front tibia not ciliated. Maui ..... **aduncus** n. sp.
   Wings not marked with brown. Front basitarsus not over 3/5 as long as tibia. If the front tibia lacks long ciliation, the front basitarsus has a very long preapical hair 5

5. Front tibia with long conspicuous hairs 6
   Front tibia lacking long cilia. Front basitarsus with a long preapical hair as in figure 14c. Second tarsal

segment very short, third segment two-thirds as long as the first. Hawaii ..... **tanythrix** n. sp.

6. Front basitarsus lacking an unusually long ventral hair and three or more times longer than the third tarsal segment (fig. 11a) 7

Front basitarsus about equal in length to the third tarsal segment and with a very long ventral hair, usually preapical, at least as long as remainder of tarsus. Third tarsal segment about equal to the first; fourth segment produced at apex (fig. 10c) 8

7. Front tibia with one row of long, closely placed hairs on both the anterodorsal and the posterodorsal surfaces; these extend the full length of the segment. Mesonotum and scutellum brown. Maui ..... **entrichocnemus** n. sp.

Front tibia quite different, with three long posterodorsal hairs and with a dense clump of hairs at apical fourth (fig. 13a). Mesonotum with a broad median yellow vitta. Scutellum yellow. Maui ..... **orthopterus** n. sp.

8. About ten long dorsal hairs extending the entire length of the front tibia (fig. 9a). Mesonotum marked with brown. Costal fringe extending about half the distance between the tips of veins R_{2+3} and R_{4+5}. Hawaii ..... **cognatus** (Grimshaw).

Three long dorsal hairs arranged on median portion of front tibia (fig. 10c). Mesonotum rufous. Costal fringe extending about one-fourth the distance between tips of R_{2+3} and R_{4+5}. Molokai and Maui ..... **diamphidiopodus** n. sp.

Antopocerus aduncus new species (fig. 7a–e).

Rather similar to *A. longiseta* (Grimshaw), but the wings are not expanded and the brown markings are different as in figure 7b; also the front tibia does not have the long preapical hair, typical of the former species, on the anterior surface. (Compare figs. 7c and 12e.)

MALE. *Head:* The front is about as wide as long, is predominantly light brown, and dark brown along the orbits. The ocellar triangle is black. The lower reclinate bristle is about four-fifths as long as the proclinate bristle but is only about half as wide; the lower reclinate bristle is situated distinctly above the proclinate. The head is shaped very much like that of *longiseta* (fig. 12a). The occiput is predominantly yellow, the face is entirely so; the latter has a moderate-

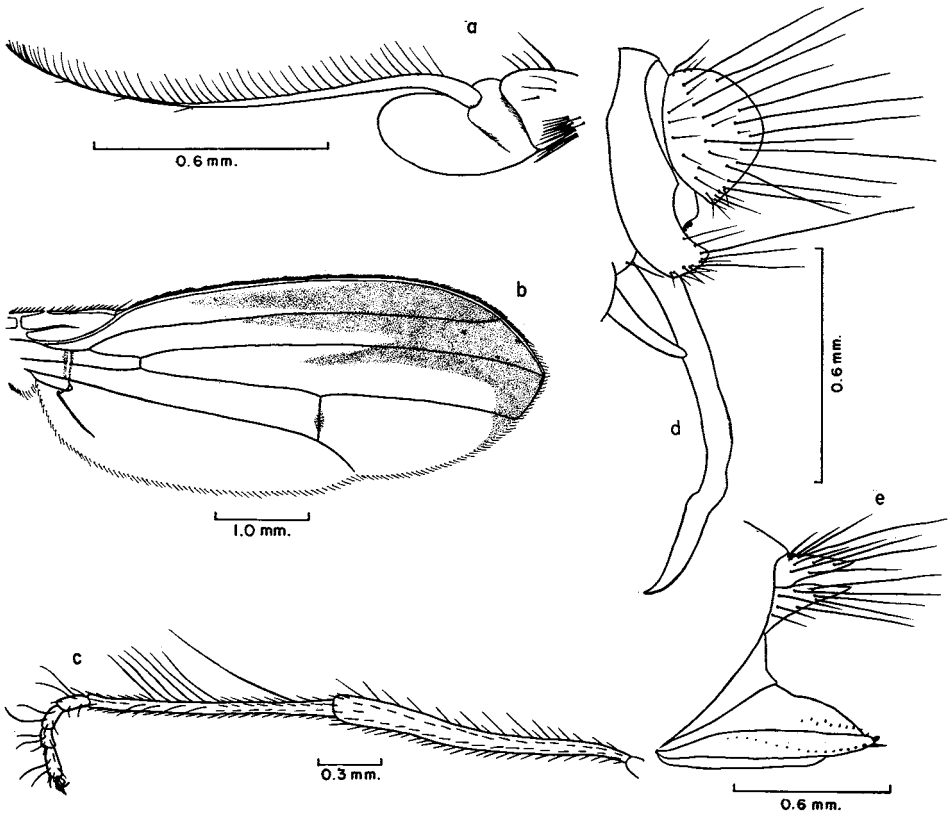


Figure 7—*Antopocerus aduncus* n. sp.: **a,** male antenna; **b,** wing; **c,** front tibia and tarsus; **d,** male genitalia, lateral; **e,** female genitalia, lateral.

ly strong carina down the middle. The setae of the vibrissal rows are moderately weak; no strong bristles are developed. The mouthparts are entirely yellow. The proboscis is rather slender and has a few short setae scattered around the lower edge and the apex; there are no strong bristles present. The antennae are as in *longiseta*; they are yellow, tinged with brown on the dorsal surface of the first two segments and on the apical half of the third. The aristae are densely pubescent on the dorsal surface, bare below (fig. 7a). *Thorax:* Yellow to rufous, with three brown vittae extending down the mesonotum. The median vitta is rather broad and extends the full length of the sclerite. The lateral vittae are interrupted at the suture; they are less distinct than the median vitta and extend from approximately opposite the anterior notopleural bristle almost as far as the posterior dorsocentral bristles. About four rather strong bristle-like hairs are situated in the dorsocentral row in front of the anterior dorsocentral bristle; these extend to just beyond the suture. The scutellum, metanotum, and pleura are entirely yellow. The anterior sternopleural bristle is about four-

fifths as long as the posterior bristle. *Legs:* Entirely yellow, except for the brownish apices of the tarsi. Each front femur has about five moderately strong posterodorsal bristles and about five posteroventral bristles. The front tibiae are moderately arched on their anterior surfaces and lack long ciliation. The front basitarsus is long and slender, approximately six-sevenths as long as the tibia. The basitarsus has one long anterodorsal hair just beyond the base and another near the middle of the segment; it also has numerous erect dorsal and anterodorsal hairs scattered over the apical two-fifths of the segment (fig. 7c). The second tarsal segment is moderately short, slightly less than one-sixth as long as the basitarsus, and bears two dorsal hairs. The third segment is slightly shorter than the second, and the fourth is subequal to the third. The latter two bear two or three long hairs on the dorsal surfaces. *Wings:* Subhyaline, slightly yellowish tinged, the anteroapical portion of the wing predominantly brown; the brown marking extends broadly along the apical three-fifths of vein R_{2+3}, extends obliquely across cell R_3, and through the upper half of cell R_5 to the wing apex (fig. 7b). The wing is not expanded. The costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the preceding section, and the last section of vein M_{3+4} is about equal to the m crossvein. *Abdomen:* Predominantly brown. The first tergum and the sides of terga two to six are yellow-brown. The genitalia are yellow, tinged with brown. The ninth tergum is approximately the same width throughout and is not strongly narrowed dorsally; the ventral margin is straight and bears one long bristle on each side in addition to the numerous setae (fig. 7d).

Length: body, 5.9 mm.; wings, 6.2 mm.

FEMALE. Like the male except for sexual dimorphisms in the shape and development of the antennae, the front legs, and in the coloration of the wings. The antennae are very similar to those of *longiseta*; the arista has about 10 or 11 dorsal and 3 or 4 ventral rays in addition to the apical fork and the rays are comparatively short. The front legs are not ornate, and the wings are evenly colored, pale yellow-brown. The ovipositor is well developed, sharp-pointed at the apex, extends well beyond the apex of the anal plates, and is distinctly serrated along the ventral margin (fig. 7e).

Holotype male: Kula Pipeline, Maui, June 11, 1927 (O. H. Swezey); allotype female: same locality as type, 4,500 ft. elevation, April 8, 1932 (O. Bryant); 49 paratypes (18 males and 31 females) from following localities: same locality, elevation, and collector as allotype, March 15, 1932; Olinda, Maui, August 1, 1932 (N. L. H. Krauss); Puu Kukui, Maui, 3,000–4,500 ft. elevation, July, 1953 (D. E. Hardy); and Waikamoi, Maui, 4,000 ft., in banana bait traps and swept from vegetation in wet rain forest, August, 1958 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

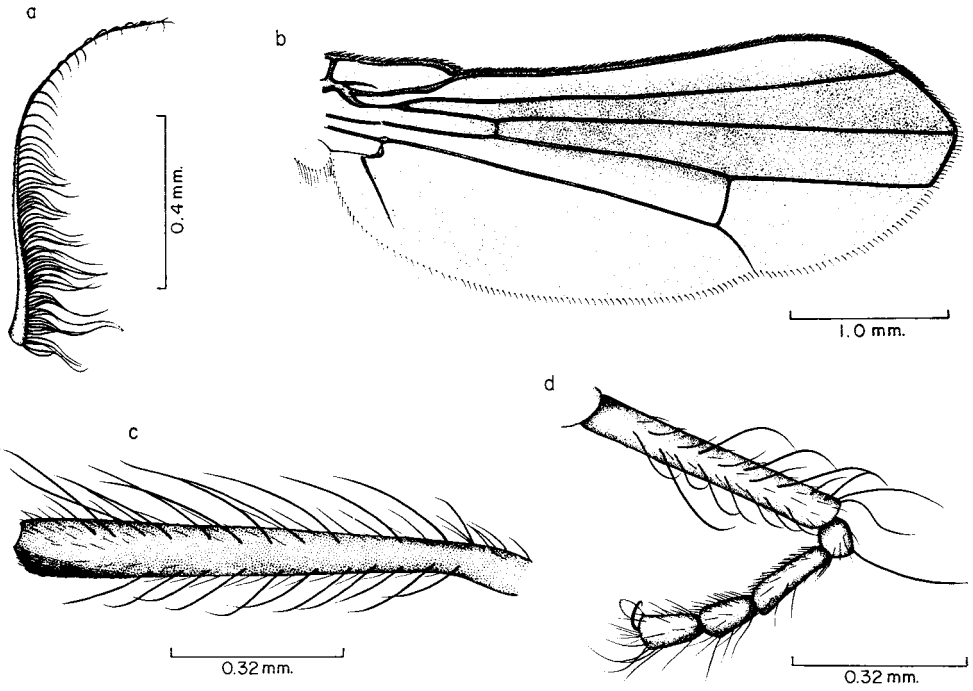


Figure 8—*Antopocerus arcuatus* n. sp.: **a,** arista; **b,** wing; **c,** front tibia; **d,** male genitalia.

Antopocerus arcuatus new species (fig. 8a–d).

This species appears to be related to *A. longiseta* (Grimshaw), from Molokai, because of the arcuate costa. It differs rather strikingly, however, and is readily distinguished by the lack of an anteroapical spot in the wing and lack of the long preapical hair on the front tibia, and by having a row of long cilia down each of the anterodorsal and anteroventral surfaces of the front tibia.

MALE. A predominantly yellow to rufous species. *Head:* The front is about as wide as long, and is yellow, tinged faintly with brown; the orbits are tinged with brown. The lower reclinate bristle is almost as long as the proclinate but is much more slender and hairlike; it is situated distinctly above the proclinate bristle. The remainder of the head is entirely yellow except for the brownish red eyes and except for a brown mark across the upper hind portion of the occiput. The genae are rather narrow; the distance from the vibrissal row to the eye margin is equal to the length of three or four rows of eye facets. The face is slightly carinate down the median portion. Each palpus has a small, preapical, black bristle, and several black setae extend down the outside surface. The mouthparts are entirely yellow, the labella are not ornate. One or two moderately small bristles are present at the upper portion of each vibrissal row. The antennae are yellow, tinged lightly with brown on the upper portion of the second segment and on the apical portion of the third. The first segment is strongly developed,

as is typical for members of this genus, and has a ring of prominent black hairs around the apical margin. The second antennal segment has a pair of stout, black, preapical bristles on the anterior surface and the posterior surface has a comb of black hairs along the apex of the segment. The third antennal segment is two times longer than wide and is densely yellow pubescent. The arista is very densely black haired along the dorsal surface; the ventral surface is bare except for a few short hairs just before the apex (fig. 8a). *Thorax:* Entirely yellow with a very faint tinge of brown in the ground color of the mesonotum. Six to eight rows of acrostichal setae are present. The anterior dorsocentral bristles are strong, equal in length to the second pair of supraalars, and situated opposite the latter. Two strong humeral bristles are present. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Entirely yellow; each front coxa has three moderately strong, black dorsal bristles. The middle coxa has four black bristles plus numerous black hairs over the anterior surface. The hind coxa has a moderately strong, black ventral bristle and a black dorsal bristle. The coxal bristles are about equal in size to the bristle at the lower edge of the sternopleuron. The front femur is slender, five times longer than wide. The posteroventral and posterodorsal bristles are moderately developed. The front tibia has a row of long, black, anterodorsal hairs and another row of slightly shorter, black, anteroventral hairs extending almost the full length of the segment (fig. 8c). The front basitarsus is about one-half as long as the tibia. A row of moderately long dorsal cilia extends from near the base to the apex of the segment, and another row of black posterodorsal bristles extends over the apical three-fifths of the segment (fig. 8d). The second tarsal segment is very tiny, just a fraction of the length of the first, and has a moderately strong, black, dorsal bristle at the apex. *Wings:* Predominantly hyaline but with a faint yellow-brown streak extending longitudinally almost the full length of the wing down the median portion. The costa is rather strongly arched upward near the apical fourth of the wing, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5} (fig. 8b). The third costal section is 5.5 times longer than the fourth, and the penultimate section of vein M_{1+2} is 1.2 times longer than the last section. *Abdomen:* Yellow on the sides, on the venter, and over terga one, two, and six; brown over the dorsal portions of terga three to five and with a brown submedian spot on each side of the second tergum. The genitalia have not been relaxed for study. The visible portions are yellow.

Length: body, 5.2 mm.; wings, 5.4 mm.

FEMALE. Unknown.

Holotype male: Punaluu, Oahu, no date given (O. H. Swezey).

Type in the Hawaiian Sugar Planters' Association collection.

Antopocerus cognatus (Grimshaw), **new combination** (fig. 9a–b).

Drosophila cognata Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :69.

Endemic. Hawaii (type locality: Olaa). The original description listed the species from "Molokai Mts., two females, 4,000 ft. May, 1893. —Hawaii, Olaa,

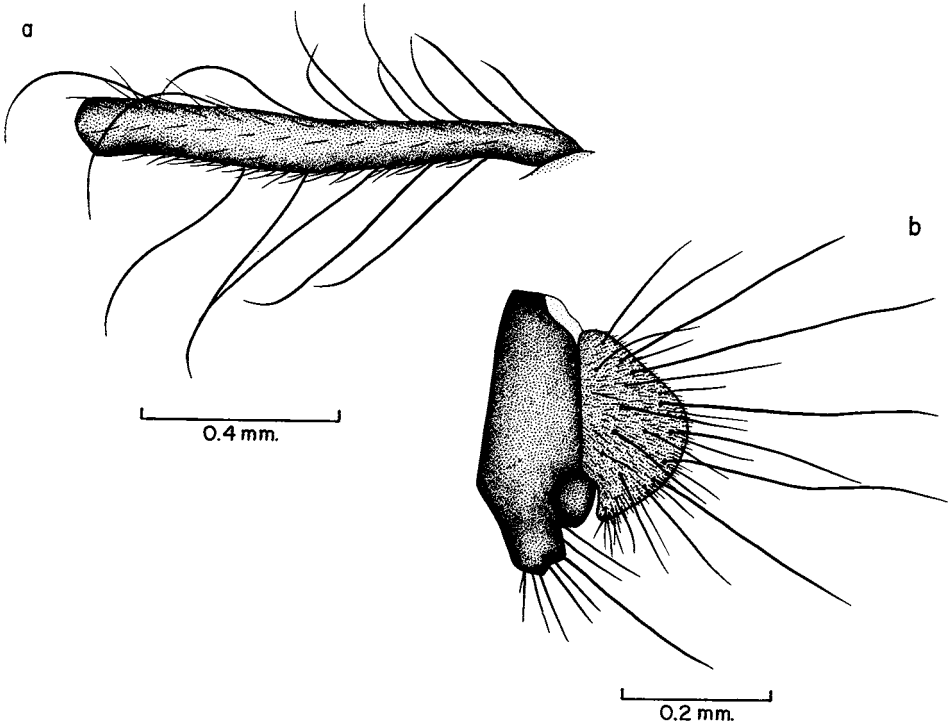


Figure 9—*Antopocerus cognatus* (Grimshaw) : **a,** front tibia; **b,** male genitalia.

one female, December 1896." The latter specimen is labeled "type." These are females of *Antopocerus* and the specimens from Molokai are no doubt a different species and are probably *A. diamphidiopodus* n. sp. They cannot be accurately placed without the male.

The exact identity of this species is questionable. I have not found reliable characters for separating the females of this genus although the males have most striking specific characters. A female (and an associated male) specimen on hand from "Upper Olaa Forest, Haw, July, 1953 (D. E. Hardy)" has been compared with the type of *cognatus* and seems to fit that species in all respects. I am assuming that this species is *cognatus* (Grimshaw). Another species, *A. tanythrix* n. sp., occurs in the same habitat as the above and I am not sure that the females can be positively differentiated. The type of *cognatus*, however, has the mesonotum discolored with brown, as does the female from Olaa that I have mentioned above. The specimens of *tanythrix* have the entire thorax yellow to rufous, with only a faint tinge of brown on the mesonotum.

This species, as based upon the male specimen from Upper Olaa Forest, is closely related to *A. diamphidiopodus* n. sp. from Molokai and Maui and fits the description of that species in most details. It differs by having about 10

moderately long posterodorsal and 5–6 long anterodorsal hairs extending the entire length of the front tibia (fig. 9a) rather than with 3 long, dorsal hairs arranged near the middle of the segment; the long black ventral hair of the front basitarsus is situated at the apical three-fifths of the segment rather than just before the apex. The mesonotum is marked with brown, rather than all rufous, and the costal fringe extends about one-half the distance between the tips of veins R_{2+3} and R_{4+5} rather than about one-fourth the distance as in *diamphidiopodus*. The male genitalia are as in figure 9b; the anal plates are pointed ventrally and the ninth tergum is almost straight-sided.

Length: body, 4.65–5.0 mm.; wings, 5.0–5.5 mm.

Antopocerus diamphidiopodus new species (fig. 10a–d).

This species is readily differentiated from other known members of this genus by the unusual development of the front legs (fig. 10c); it appears most closely related to *orthopterus* n. sp. and *cognatus* (Grimshaw).

MALE. *Head:* Front predominantly yellow-brown, dark brown along the orbits, and about as wide as long. The upper reclinate bristles are slightly larger than the proclinates; the lower reclinates are about two-thirds as long as the proclinates and are situated distinctly above the latter. Except for the upper occiput, vertex, and front and, also, the dark-colored eyes, the head is entirely yellow. The antennae are yellow, tinged with brown on the upper surface of the second segment and on the apical half of the third. The arista is densely villose dorsally and has a few short hairs on the ventral surface near the apex (fig. 10b). The oral vibrissae are made up of rather small setae, no distinct bristles are present; also the palpi have short black setae on the outside surface but no distinct apical bristles. *Thorax:* Entirely yellow, tinged with rufous on the mesonotum. The chaetotaxy is as in other members of this genus; the two humeral bristles are subequal and the anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. The front femora have the usual rows of posterodorsal and posteroventral bristles. Each front tibia is rather strongly curved on the anterior surface and possesses six long anteroventral hairs and three long dorsal hairs. The front basitarsus is just slightly over half as long as the tibia, it has a very strong subapical ventral hair, a rather dense clump of apical dorsal hairs, and one isolated dorsal hair situated just below the middle of the segment. The second tarsal segment is very short, about one-seventh or one-eighth as long as the basitarsus, and bears two to four erect hairs on the dorsal surface. The third tarsal segment is rather elongate, strongly flattened dorsoventrally, about equal in length to the basitarsus, and bears seven erect hairs along the anterodorsal surface. The fourth tarsal segment is also rather strongly flattened dorsoventrally, is produced at the apex, has a few erect hairs along the anterodorsal surface, and is about one-half as long as the third tarsal segment (fig. 10c). *Wings:* Rather long and narrow, about three times longer than wide, with the costal margin straight. Subhyaline, and faintly brownish tinged with a slight indication of infuscation at the extreme apices of cells R_3 and R_5. The third

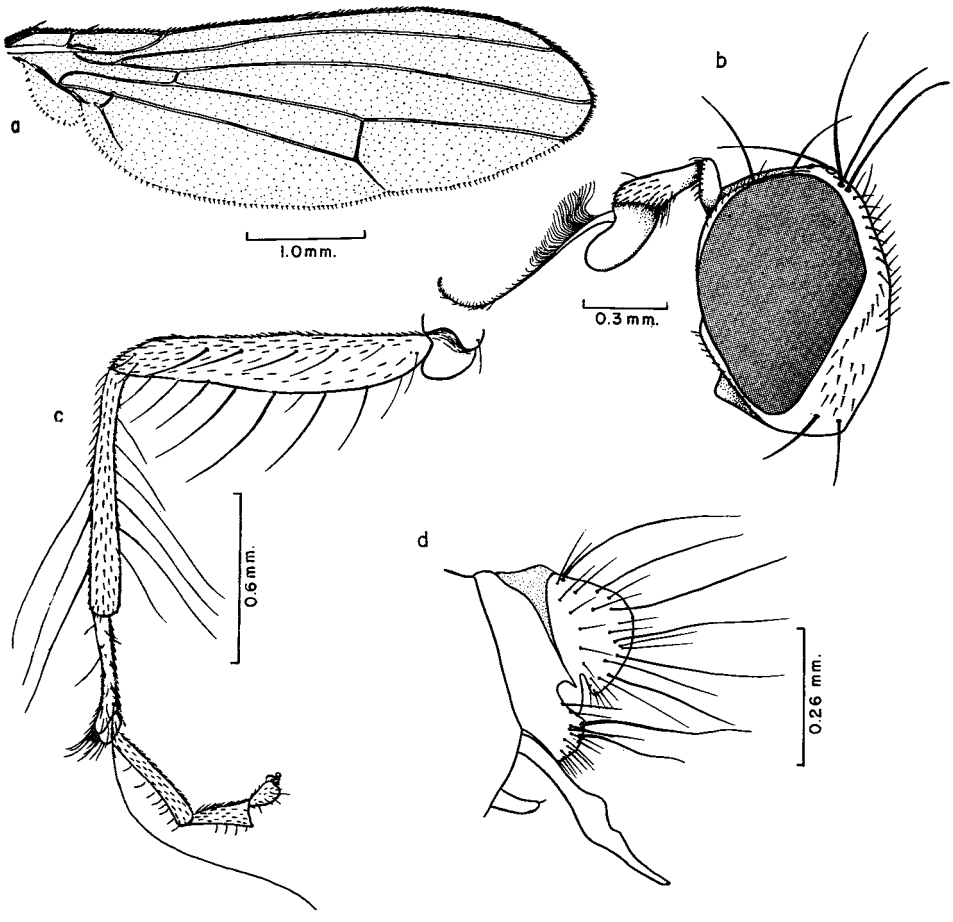


Figure 10—*Antopocerus diamphidiopodus* n. sp.: **a,** wing; **b,** head; **c,** legs; **d,** male genitalia.

costal section is about six times longer than the fourth, and the costal fringe ends at about the basal two-fifths of the distance between the apices of veins R_{2+3} and R_{4+5}. The ultimate section of vein M_{1+2} is just slightly longer than the penultimate section, and the last section of vein M_{3+4} is about equal to the m cross-vein (fig. 10a). *Abdomen:* Principally brown, yellow on the first segment and around the apex of the abdomen. Genitalia as in figure 10d; the ninth tergum is rather strongly narrowed on the dorsal portion.

Length: body, 4.66 mm.; wing, 4.50 mm.

FEMALE. Similar to the male except for the usual sexual dimorphism characteristic of members of this genus. The aristae have 10 or 11 moderately long dorsal rays and about 4 ventral rays in addition to the apical fork. The vibrissae have 2 or 3 moderately strong bristles at the lower angles of the face and each

palpus has a moderately strong apical bristle. The wings are not so narrow as in the male, the anterior margin is slightly convex as is typical of most species. The abdomen is predominantly brown; each tergum has a large yellow basal spot on each side. The ovipositor plates are similar to those of other species of this genus and are rather sharp-pointed at the apices and serrate ventrally.

Holotype male: Puu Kolekole, Molokai, 3,600 ft., July, 1953 (D. E. Hardy); allotype female: same locality and date as type (M. Tamashiro); 36 paratypes (22 males and 14 females) from the following localities: same as type except that some were collected in July, 1952; Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); Puu Kukui, Maui, circa 4,000 ft., June, 1953 (D. E. Hardy); Haleakala, Maui, 3,000 ft., March 24, 1932 (O. Bryant); Waikamoi, Maui, 4,000 ft., in banana bait traps and swept from vegetation in wet rain forest (D. E. Hardy); McVeigh Cabin, Molokai, December 24, 1925 (O. H. Swezey); Olinda, Maui, March, 1932 (O. Bryant); and Kula Pipeline, Maui, June, 1927 (O. H. Swezey), and April, 1932 (O. Bryant).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, Hawaiian Sugar Planters' Association, British Museum (Natural History), and the University of Hawaii.

Antopocerus entrichocnemus new species (fig. 11a–c).

This species is readily differentiated from other known members of this genus by the densely haired front tibiae (fig. 11a), by the all-brown mesonotum and scutellum, as well as by other details.

MALE. *Head:* The front is chiefly brownish red, dark brown along the orbits, and about as wide as long. The upper reclinate bristles are slightly larger than the proclinates, and the lower reclinate bristles are about one-half the size of the latter. The lower occiput, the face, mouthparts, and palpi are yellow; the face has a distinct carina down the median portion. Each palpus has short, black setae along the outer edge but lacks distinct bristles. The upper bristle of each vibrissal row is strongly developed. The first antennal segment is rufous, the second is rufous below, brown above, and the third is yellow to rufous on the basal portion and otherwise brown. The arista is densely pubescent above and has just a few short hairs near the apex on the ventral surface (fig. 11b). *Thorax:* Predominantly brown, the pleura are yellow to rufous, tinged with brown. The mesonotum and scutellum are dark brown, rather thickly covered with gray-brown pollen. The anterior dorsocentral bristles are situated opposite the posterior supraalar bristles. Two strong humeral bristles are present, the lower bristle about four-fifths as long as the upper. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. Front femora with the usual posterodorsal and posteroventral bristles. Each front tibia with a row of long hairs down each anterodorsal and posterodorsal surface, those along

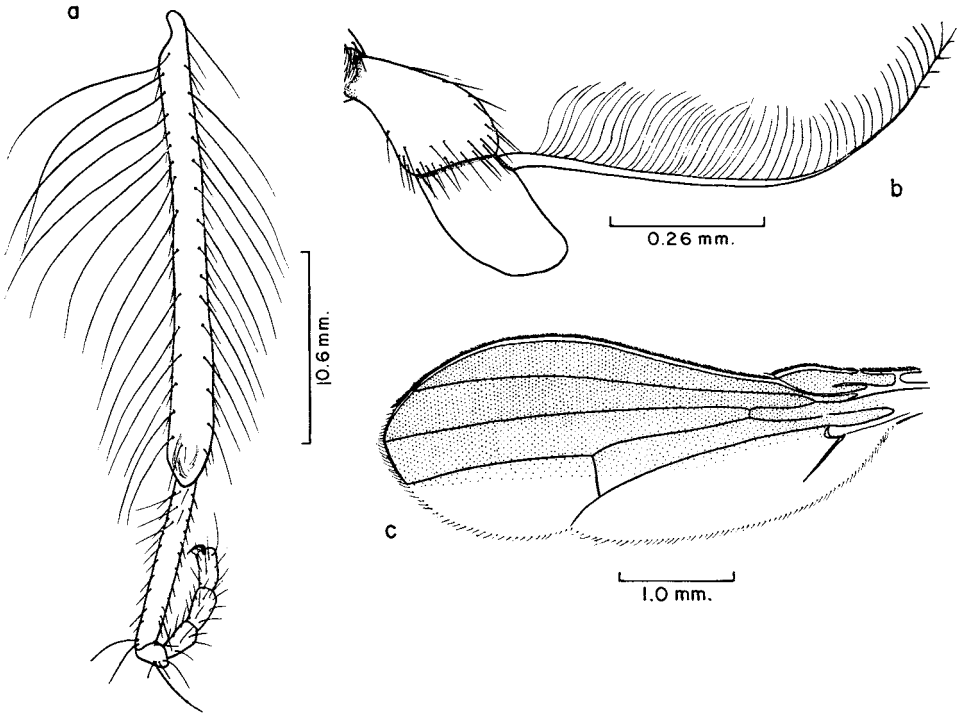


Figure 11—*Antopocerus entrichocnemus* n. sp.: **a,** front tibia and tarsus; **b,** antenna; **c,** wing.

the anterodorsal surface wavy at apices. The front tibia is almost straight, just slightly arched on the anterior surface, and very slightly swollen at the apex. The front basitarsus is comparatively short, only about two-fifths as long as the tibia and with three rather short, black, dorsal hairs on the basal half and one anterodorsal hair at the apex. The second tarsal segment is about one-sixth as long as the first and bears two hairs on the dorsal surface. The third segment is just slightly longer than the second (fig. 11a). *Wings:* Subhyaline, slightly yellow-brown. The costal margin is rather strongly arched on the apical half so that the wing is broadest at about the m crossvein. The posterior margin is rather distinctly incised at the apex of vein M_{3+4}. The third costal section is slightly over five times longer than the fourth and the costal fringe ends near the halfway point between the tips of veins R_{2+3} and R_{4+5}. The ultimate section of vein M_{1+2} is about equal in length to the penultimate section (fig. 11c). *Abdomen:* Predominantly dark brown, the first tergum and the apices of the other terga tinged with yellow. The genitalia have not been dissected for study.

Length: body, 5.3 mm.; wings, 5.0 mm.

FEMALE. Unknown.

Type male: Haleakala, Maui, no date or collector given.

Type in the B. P. Bishop Museum.

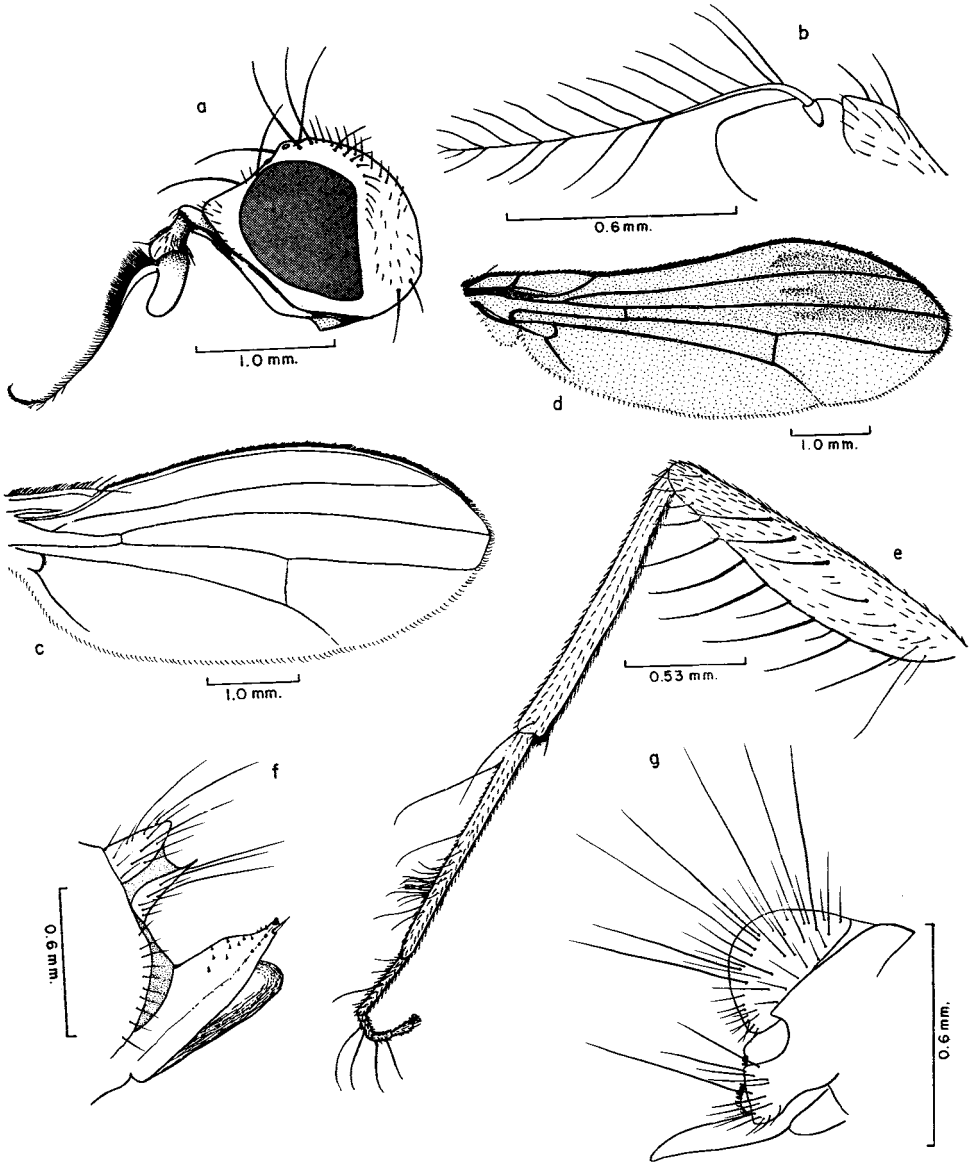


Figure 12—*Antopocerus longiseta* (Grimshaw): **a,** head; **b,** arista of female; **c,** wing of female; **d,** wing of male; **e,** front leg of male; **f,** female genitalia; **g,** male genitalia.

Antopocerus longiseta (Grimshaw), **new combination** (fig. 12a–g).

Drosophila longiseta Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :68.

Endemic. Molokai (type locality: "Molokai Mts. 4,000 ft.").

Type in the British Museum (Natural History). I have studied the type

and have designated homeotypes. The species is rather common in the Puu Kolekole region, Molokai, at elevations from 3,600–4,000 feet.

In the original description Grimshaw indicated one male and one female. Both specimens in the British Museum collection are females; the "male" has the ovipositor broken off.

A large, well-defined species differing from other members of the genus by the ornamentations on the front legs of the male as well as in other details. The brown fumosity of the wings and the arista, which is entirely bare on the ventral portion, ally it to *A. aduncus*, n. sp.; but the wings of the male are broadly expanded on the apical half (fig. 12d) and the front tibia has a long preapical hair on the anterior surface (fig. 12e).

MALE. *Head:* Slightly produced on the upper front margin, the face is distinctly oblique. The occiput is rather strongly swollen; at its widest point it is slightly over half the width of the eye. The upper portion of the occiput is gradually sloped from the vertex to the cervix; the upper median portion is very slightly concave. The front is as wide as long, and is yellow with brown to black down the orbits to the proclinate bristles. The ocellar triangle and the sides of the vertex are brown to black. The proclinate bristles are slightly stronger than the upper reclinates. The lower reclinate bristles are about two-thirds as long as the upper pair and are situated well above the proclinates. The face, genae, and lower four-fifths of the occiput are yellow; the former has a distinct carina down the middle. The oral vibrissae are rather weakly developed. The clypeus, palpi, and mouthparts are predominantly yellow, tinged lightly with brown. The palpi are sparsely setose and lack strong bristles. The antennae are produced as in figure 12a; they are yellow to rufous, tinged with brown on the third segment. The second antennal segment has two stout, preapical bristles on the anterior surface. The aristae are very densely haired on the dorsal surface and each has a few short hairs on the anterior surface toward the apex; the ventral surface is bare. *Thorax:* Rufous in ground color, marked with brown to black on the sides and on the dorsum. The mesonotum is indistinctly trivittate, a dark brown to black vitta extends down each side from the humerus to about opposite the posterior dorsocentral bristles, and a brown vitta extends down the median portion. This is divided by a rufous to yellow vitta extending down each dorsocentral area from the front margin to about halfway between the two pairs of dorsocentral bristles. The hind portion of the mesonotum is entirely brown. The scutellum is dark brown to black on the disc, yellow to rufous on the sides. The mesopleura and the upper portions of the pteropleura are dark brown to black. The rest of the pleura are yellow. The metanotum and the halteres are entirely yellow. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. Front femur with three moderately strong and three to four rather weak posterodorsal bristles and about six strong posteroventral bristles. Front tibia curved slightly on anterior surface, devoid of conspicuous hairs except for one long, black, preapical hair on anterior surface. The front basitarsus is very

long and slender, almost as long as the tibia, equaling about eight-ninths as long; the basitarsus has two long hairs on the dorsal surface situated on the basal half of the segment, also a row of short, black, curved hairs extending from about the middle to near the apical one-sixth along the posterior surface, and a clump of posterodorsal hairs situated at the apical one-third of the segment. The second tarsal segment is also elongate, slightly under one-third as long as the basitarsus, and bearing only one conspicuous dorsal hair before the apex; the third tarsal segment is about one-half as long as the second and bears two strong dorsal hairs. The fourth segment also bears two strong dorsal hairs (fig. 12e). The middle and hind basitarsi are about two-thirds as long as the tibiae. *Wings:* Predominantly subhyaline, faintly yellowish tinged; the anteroapical portion is brown. The brown marking extends through cells R_1, R_3, and the upper portion of R_5 at about the apical third of the wing. The costal margin is rather strongly convex so that the wing is broadest at about the m crossvein. The third costal section is about six times longer than the fourth, and the costal fringe extends about halfway between the apex of vein R_{2+3} and the tip of vein R_{4+5}. The last section of vein M_{1+2} is approximately equal in length to the penultimate section. The last section of vein M_{3+4} is about one-half longer than the m crossvein (fig. 12d). *Abdomen:* Predominantly dark brown to black, rather densely covered with gray-brown pollen. The first tergum is yellow-brown. The genitalia are yellow, tinged with brown on the ventral portions of the ninth tergum. The anal plates are densely covered with long black hairs. The ninth tergum is moderately slender, the ventral portions are lobate, and the ventral margin is straight and bears one long and numerous short hairs (fig. 12g).

Length: body, 6.40 mm.; wing, 6.75 mm.

FEMALE. Showing rather marked sexual dimorphism from the male. The antenna is not porrect and the arista is not pubescent; also, the front legs are not ornate and the wings have no brown markings (fig. 12c). The first antennal segment is distinctly produced beyond the anterior margin of the front. The first segment is densely fringed with black hairs around the margin. The second and third antennal segments are directed downward, fitting along the face, as is normal for Drosophilidae. The arista has 12 to 16 dorsal rays and 5 to 6 ventral rays in addition to the apical fork (fig. 12b). The front basitarsi are three-fourths to four-fifths as long as the tibiae, and the basitarsi of the middle and hind legs are about two-thirds as long as the tibiae. The ovipositor and the anal plates are yellow, tinged lightly with brown. The plates of the ovipositor are sharp-pointed, triangular in shape, and extend slightly beyond the apices of the anal plates (fig. 12f).

Antopocerus orthopterus new species (fig. 13a–c).

This species is readily differentiated from other known members of this genus by the characteristics of the front legs as shown in figure 13a.

MALE. *Head:* Very similar in shape and coloration to other species of this genus. The front is brown, the orbits are black. The posterior reclinate bristles

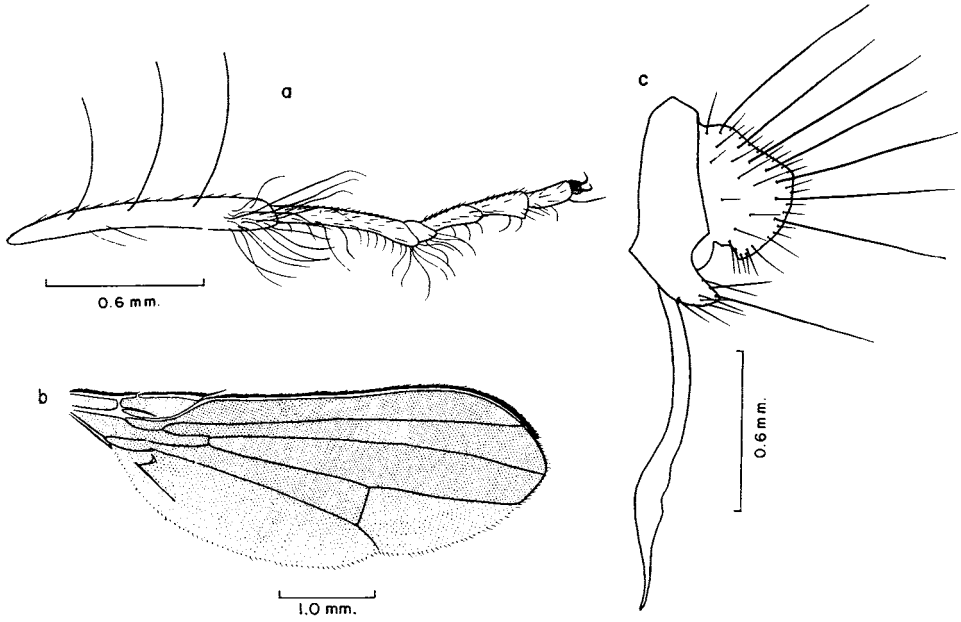


Figure 13—*Antopocerus orthopterus* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia.

are stronger than the proclinates and the anterior reclinates are about one-half as long as the posterior bristles; the latter are situated distinctly above the proclinate bristles. One moderately strong bristle is present at the upper portion of each vibrissal row. The palpi have numerous short black setae around the outside margins and no bristle at apices. The antennae are similar to those of other species; the first segment is tinged with brown above, the second is brown on the dorsal surface, and the third is brown on the apical two-thirds. The arista is densely villose on the upper margin and has a few short, scattered ventral hairs near the apex. *Thorax:* Predominantly yellow with brown markings on the dorsum and on the pleura. The mesonotum has a broad yellow vitta down the median portion and is yellow on the sides, leaving a broad brown vitta extending down each dorsocentral area. The scutellum is entirely yellow. The mesopleura and upper portions of the hypopleura are brown, the pleura are otherwise yellow, except for a slight tinge of brown on the lower portion of each sternopleuron. The chaetotaxy of the thorax is similar to that of other species; the anterior sternopleural bristle is well developed and approximately three-fourths to four-fifths as long as the posterior bristle. *Legs:* Entirely yellow, except for a tinge of brown on the apical segments of the tarsi. Each front femur has about three moderately developed posterodorsal bristles and about six rather strong posteroventral bristles. Each front tibia is very slightly arched on the anterior margin. The anteroventral surface of the tibia bears two erect, moderately strong hairs at about the basal two-fifths of the segment. The dorsal surface has three long,

black, dorsal hairs evenly spaced at about the middle of the segment. A preapical clump of hairs, which are curved at their apices, extends from the dorsal surface around to the anteroventral surface of the tibia. The front basitarsus is about three-fifths as long as the tibia and bears a row of fine erect hairs along the anterodorsal surface; one hair situated at about the basal two-fifths of the segment is about two times longer than the others. The basitarsus also has three or four long, black, apical hairs on the anterodorsal surface. The second tarsal segment is short, not over one-fourth as long as the third, and bears two erect hairs on the dorsal surface. Each remaining tarsal segment has a row of short erect hairs along the anterodorsal surface. The third tarsal segment is moderately elongated; it is almost one-third as long as the basitarsus (fig. 13a). *Wings:* Subhyaline, faintly brownish fumose. The apices of cells R_3 and R_5 have a faint infuscation at the extreme edge. The front margin of the wing is straight, and the wing is about three times longer than wide. The third costal section is about six times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about equal to the penultimate section (fig. 13b). *Abdomen:* Brown down the median portion of the dorsum and yellow on the sides and on the venter. The genitalia are as in figure 13c.

Length: body, 4.6 mm.; wings, 4.8 mm.

FEMALE. Similar to the male except for the sexual dimorphism in the head, wings, and front legs. The first bristle of the vibrissal row is strongly developed and each palpus has a strong apical, plus a moderately strong subapical, bristle. The aristae each have about eight dorsal rays and about four ventral rays in addition to the apical fork. The wing is distinctly broader than in the male and the anterior margin is not so straight. The females are apparently differentiated from other members of this genus by the chiefly brown mesonotum with the yellow to rufous vitta down the median portion.

Holotype male and allotype female: Paliku, Haleakala Crater, Maui, 6,500 ft., June, 1953 (D. E. Hardy). Nineteen paratypes (9 males and 10 females): mostly same locality as type, June, 1952, and June, 1953 (D. E. Hardy, C. R. Joyce, and M. Tamashiro); one from Olinda, Maui, 4,500 ft., March 15, 1932 (O. Bryant); and four from Waikamoi, Maui, 4,000 ft., July, 1956 (R. Namba).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum; remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Antopocerus tanythrix new species (fig. 14a–d).

This species is related to those which lack brown markings on the wing and which have the anterior border of the wing straight. It is differentiated by the lack of long ciliation on the front tibia of the male, by the presence of a very long preapical hair on the front basitarsus, and by other details of the front legs as shown in figure 14c.

MALE. Rather small species for *Antopocerus. Head:* The front is predominant-

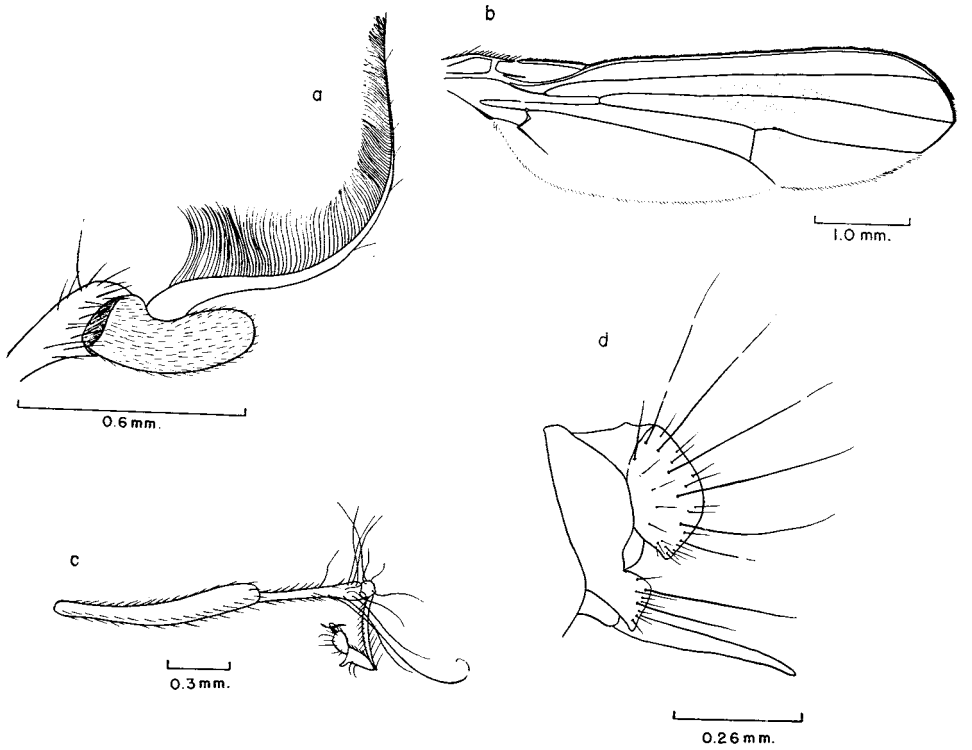


Figure 14—*Antopocerus tanythrix* n. sp.: **a,** antenna; **b,** wing; **c,** front tibia and tarsus; **d,** male genitalia.

ly brown, the orbits are darker than the median portion, and the front is about as wide as long. The proclinate bristles are about one-third longer than the upper reclinates, and the lower reclinates are very small, hair-like, about one-half as long as the proclinates, and situated slightly above the latter. The occiput and face are yellow, the latter slightly carinate on the median portion. The palpi and mouthparts are yellow, the former lacking distinct bristles; also, no strong bristles are present in the vibrissal rows. The first antennal segment is well developed; in ventral view it is distinctly longer than the third segment. The antennae are predominantly yellow, tinged with brown on the upper portion of the first two segments and on the apical half of the third. The arista is very densely pubescent (or villose) on the dorsal surface and has some short pubescence on the ventral surface near the apex (fig. 14a). *Thorax:* Entirely yellow to rufous, without dark markings. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. Each sternopleuron has an irregular row of short black hairs extending vertically across the median portion. Both humeral bristles are well developed, the outer bristle about four-fifths as long as the inner. *Legs:* Entirely yellow. Each front femur has about five posterodorsal and

six posteroventral bristles. Front tibia distinctly arched on the anterior surface and lacking long ciliation. The preapical dorsal bristle of the tibia is not differentiated from the other setae. The front basitarsus is comparatively short, about one-half as long as the tibia, and flattened on the posterior surface; just before the apex the basitarsus has one very long posteroventral hair, about two times as long as the segment, and numerous shorter posteroventral, posterodorsal, and dorsal hairs. The second tarsal segment is about one-fifth to one-sixth as long as the basitarsus and has two or three moderately long dorsal hairs. The third and fourth tarsal segments are strongly flattened dorsoventrally. The third is about three-fourths as long as the basitarsus and has five erect hairs along the anterodorsal margin. The fourth segment is slightly produced at the apex, is about one-third to one-fourth as long as the third segment, and has one moderate-sized anterodorsal hair (fig. 14c). *Wings:* Subhyaline, very faintly tinged; the extreme apical portions of cells R_3 and R_5 show a faint indication of infuscation at the margins. The front margin of the wing is straight so that the wing is moderately long and narrow, about three times longer than wide. The third costal section is seven or more times longer than the fourth and the costal fringe ends at about the basal two-fifths of the distance between the tips of veins R_{2+3} and R_{4+5}. The ultimate section of vein M_{1+2} is just slightly longer than the penultimate section, and the last section of vein M_{3+4} is slightly longer than the m crossvein (fig. 14b). *Abdomen:* Predominantly brown on the dorsum, yellow on the venter and the sides. The male genitalia are as in figure 14d.

Length: body, 5.2 mm.; wings, 5.5 mm.

FEMALE. Similar to the male except for the usual sexual dimorphism peculiar to this genus. It should be noted that the females of all observed *Antopocerus* have one or two moderately strong bristles at the upper part of the vibrissal row and in some cases one apical bristle is present on the palpus. In *tanythrix* two moderately strong bristles are present on the lower angles of the face, and one moderately strong apical bristle is present on each palpus. The arista has about eight moderate-sized dorsal and four or five ventral rays, in addition to the apical fork. The wings are not so narrowed as in the male and the anterior margin is very slightly convex; also the membrane is tinged more distinctly with yellow. The ovipositor is moderately developed, sharp-pointed at the apex, and with serrations along the outer edge of the ventral surface very similar to those of *aduncus* (fig. 7e).

Type male and allotype female: from the upper Olaa Forest, Hawaii, 4,000 ft., July, 1956, collected in treefern jungle by sweeping around the bases of the trees (D. E. Hardy). Twenty-six paratypes (15 males and 11 females) from the following localities on Hawaii: same as type, August, 1952, July, 1953, and July, 1956; Mauna Loa Truck Trail, 4,500 ft., November, 1956, and August 14, 1958 (J. W. Beardsley and W. C. Mitchell); Kahuku Ranch, 3,600 ft., July, 1953 (D. E. Hardy); Kulani, August, 1952 (W. C. Mitchell); and Kilauea, August, 1958, collected in light trap (J. W. Beardsley).

Type, allotype, and some paratype in the B. P. Bishop Museum. Paratype

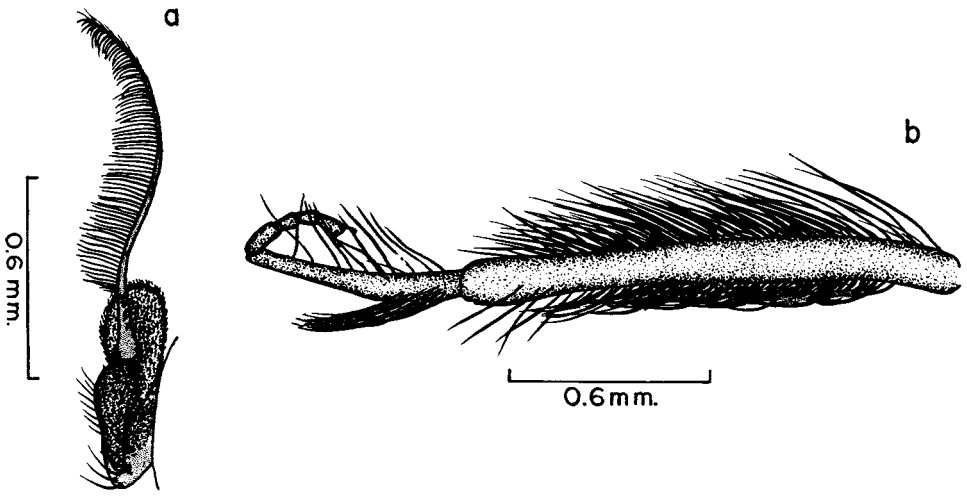


Figure 15—*Antopocerus villosus* n. sp.: **a,** arista; **b,** front tibia and tarsus.

also in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

Antopocerus villosus new species (fig. 15a–b).

This species is related to *A. longiseta* (Grimshaw) and to *arcuatus* n. sp. because of the strongly curved costal margin of the male wing. It is differentiated from other known species in this genus by the very densely villose front tibiae of the male (fig. 15b) and also by the brown longitudinal vitta down the middle of the mesonotum and by the brown markings on the sides of the mesonotum.

MALE. *Head:* Predominantly yellow, brown to black on the upper occiput, vertex, and front. A thin brown line extends along each vibrissal row. The antennae are brown to black, tinged with yellow to rufous on the ventral portions. The arista is bare ventrally and very densely haired on the dorsal portion (fig. 15a). The mouthparts and palpi are yellow; the latter have no strong bristles. One moderately strong bristle is present at the upper edge of each vibrissal row. The anterior reclinate bristle is rather small, scarcely one-half as long as the proclinate. *Thorax:* Predominantly yellow, with a broad brown median vitta extending the full length of the mesonotum, with a brown posthumeral spot and a postsutural vitta extending down each side. The scutellum is yellow with a faint tinge of brown on the disc. The two humeral bristles are almost equal in size and are approximately as large as the anterior notopleural bristle. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. Each front tibia is slightly arcuate on the anterior surface, this surface entirely devoid of hairs except at the apex. The anteroventral surface, the dorsal, and posterior surfaces are densely covered with long black

hairs (fig. 15b). The front basitarsus is about one-half as long as the tibia and has a very dense clump of long black posterior hairs near the base and a row of moderately long curved dorsal hairs extending the full length of the segment. The second tarsal segment is very short. *Wings:* Entirely hyaline. The costa curves up strongly on the posterior half so that the wing is broadest at about a level with the m crossvein. The third costal section is five times longer than the fourth. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is equal or slightly shorter than the penultimate section. The last section of vein M_{3+4} curves downward distinctly at its apex and is about one-fourth longer than the m crossvein. *Abdomen:* Predominantly dark brown to black, rather densely black haired and conspicuously shortened, about two-thirds as long as the thorax. The genitalia have not been relaxed for study.

Length: body, 5.6 mm.; wings, 6.5 mm.

FEMALE. Fitting the description of the male in most respects, lacking, however, the ornamentation on the front legs, the strongly produced antenna, etc. The antennae are similar to those of other females of this group; the arista has about ten dorsal rays and five ventral rays in addition to the apical fork. Two moderately strong bristles are present at the upper edge of each vibrissal row. Each palpus has a moderately strong black bristle at its apex. The anterior reclinate bristle is two-thirds to three-fourths as long as the proclinate. The wings are faintly infuscated; the venation is similar to that of the male. The abdomen is dark brown to black, almost as long as the thorax. Each ovipositor plate terminates in a sharp black spine at the apex; the ventral margin has a row of small black teeth.

Length: body, 5.5–6.3 mm.; wings, 6.3–7.0 mm.

Holotype male, allotype female, and one paratype female: Waikamoi, Maui, 4,000 ft., July, 1956 (D. E. Hardy and R. Namba). Two female paratypes: Kula Pipeline, Maui, 4,200 ft., July, 1956 (D. E. Hardy and R. Namba).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Genus **ATELEDROSOPHILA new genus**

(From the Greek *ateles,* imperfect, combined with *drosophila.* Gender feminine.)

Two species at hand are strikingly different from other known Drosophilidae and appear to represent a distinct genus. *Ateledrosophila* is readily differentiated by the preapical arista (fig. 16a) and by having no discernible anterior reclinate or ocellar bristles. The upper reclinate bristle is also smaller than the proclinate and the entire front is conspicuously setose. The front tibia has no preapical dorsal bristle. The second antennal segment is rather thickly covered with hairs on the dorsal portion but no dorsal bristles are present. In other respects this appears to be similar to *Drosophila* Fallén.

Type of the genus: *Ateledrosophila preapicula* n. sp.

KEY TO KNOWN SPECIES OF ATELEDROSOPHILA

Front tibia of male slender, straight-sided, with long dorsal ciliation extending over most of the length (fig. 16b). Hawaii ..... **diamphidia** n. sp.

Front tibia slightly swollen, lacking such long ciliation but with a row of anterodorsal hairs on the apical third of the segment (fig. 17b). Oahu .... **preapicula** n. sp.

Ateledrosophila diamphidia new species (fig. 16a–c).

This remarkable species differs from the only other known *Ateledrosophila* by the very different development of the front tibia of the male (figs. 16b and 17b).

MALE. *Head:* As seen from direct lateral view the head is just slightly higher than long. The front is predominantly brown, tinged with black on the upper portions and on the upper eye orbits to the proclinate bristles, and yellow along the lower eye orbits. The ocellar triangle, vertex, and upper occiput are black, faintly covered with gray pollen. The occiput is predominantly brown, the extreme lower portion is yellow. The genae are yellow except for a narrow line of black along each vibrissal row. The face is black, tinged with yellow in the upper portions of the lateral furrows; the median portion of the face is raised into a distinct keel. The palpi and mouthparts are yellow. Each palpus has a small black apical bristle. One strong bristle is present at the upper edge of each vibrissal row, this about equal in size to the inner vertical bristles. Measured from the median ocellus to the front margin, the front is nearly two times wider than long. The upper reclinate bristle is small, about one-half as long as the proclinate and situated at about the upper fourth of the front and much closer to the inner vertical bristle than the proclinate. The front is rather distinctly setose; no discernible anterior reclinate or ocellar bristles are present. The antennae are dark brown. The arista is located just before the apex of the third segment and has five dorsal and two ventral rays in addition to the apical fork; the anterior hairs are well developed on the arista and are nearly half as long as the dorsal and ventral rays. *Thorax:* Predominantly dark brown, tinged with black on the dorsum, and with the sternopleura, hypopleura, and the lower portion of each humerus yellow, tinged faintly with brown. The halteres are pale yellow. The dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. Six to eight rows of acrostichals are present. Each humerus has two strong bristles. The anterior sternopleural bristle is almost as long as the posterior bristle. *Legs:* Entirely pale yellow, the segments slender. Posteroventral and posterodorsal bristles are well developed on the femur. The front tibia is slender, straight-sided, and a row of about seven long, curved anterodorsal cilia extend down the apical two-thirds of the segment; two short, erect anterodorsal cilia are located just before the base of the segment (fig. 16b).

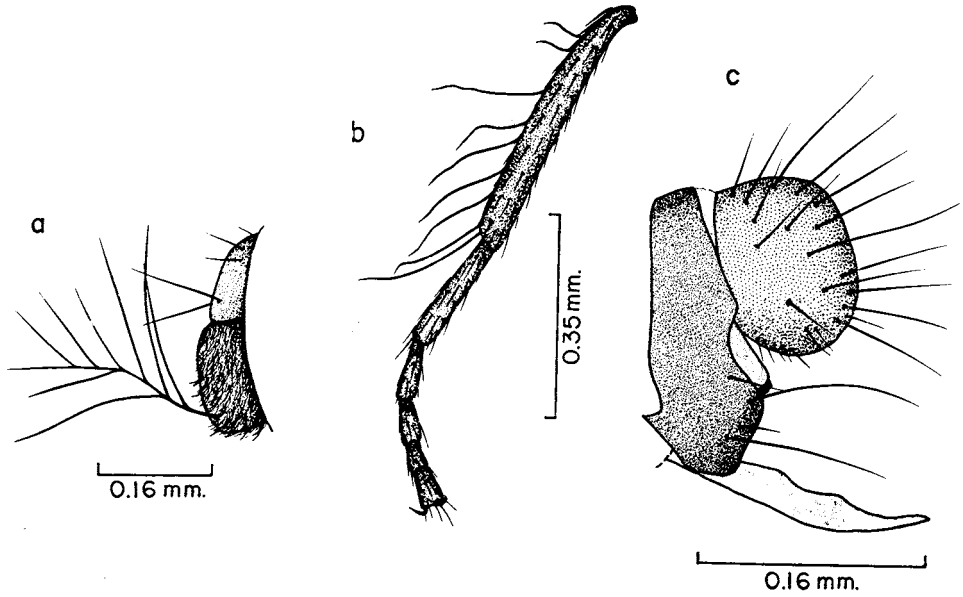


Figure 16— *Ateledrosophila diamphidia* n. sp.: **a,** antenna; **b,** front tibia and tarsus; **c,** male genitalia.

The tarsi lack long ciliation. The basitarsus is about two-fifths as long as the tibia and approximately two times longer than the second segment. *Wings:* Almost hyaline, with no distinct brown markings. The third costal section is 3.7 times longer than the fourth and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.86 times longer than the penultimate section. Vein M_{3+4} evanesces just before reaching the wing margin. *Abdomen:* Entirely dark brown on the dorsum, yellow on the venter. The cerci are nearly two times higher than long and are rounded ventrally. The ninth tergum is slightly narrowed over the dorsal portion and is distinctly expanded ventrally (fig. 16c).

Length: body, 2.2 mm.; wings, 2.4 mm.

FEMALE: Unknown.

Holotype male: Kaiholena, Kohala Mountains, Ditch Trail, Hawaii, 2,000 ft. elevation, in banana thicket, July, 1958 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Ateledrosophila preapicula new species (fig. 17a–d).

This species differs from *A. diamphidia* n. sp. by the distinctive development of the front tibia as shown in figures 16b and 17b.

MALE. Rather small, dark-bodied species. *Head:* The front is about one-third wider than long and is entirely brown, gray-brown pollinose along the orbits and

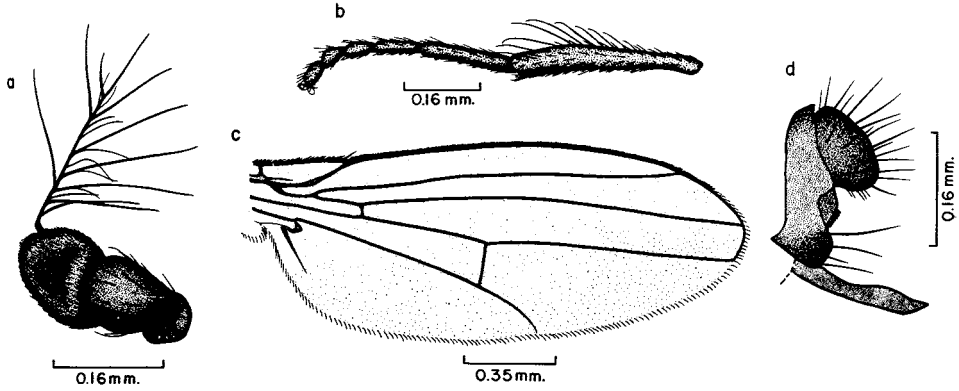


Figure 17—*Ateledrosophila preapicula* n. sp.: **a,** antenna; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

down the median portion in a wedge-shaped mark extending from the sides of the ocellar triangle; a large subshining brown to brownish black V-shaped mark is present in the middle of the front, set off by the gray-brown pollinose areas. No ocellar bristles or anterior reclinate bristles are discernible. If these are present they are setiform and are not differentiable from the surrounding setae. The upper reclinate bristles are situated approximately in line with the lower ocellus. The proclinate bristles are situated on a line about halfway between the ocellus and the anterior margin of the front. The front is rather thickly covered with fine, pale hairs. The vertex is black, indistinctly gray pollinose. The upper half of the occiput is brown. The lower half of the occiput and the upper edge of each gena are yellow, the lower edge of the gena is tinged with brown. The face is brownish yellow covered with gray pollen; a very slight carina is present down the median portion. The genae are very narrow, about equal in width to three rows of eye facets. The clypeus is dark brown to black, the mouthparts, including the palpi, are yellow. Each palpus has a short, black apical bristle. No strong bristles are present in the vibrissal rows. The antennae are yellow-brown. The second segment has numerous short hairs on the dorsal surface but no distinct dorsal bristles. The arista is apicodorsal in position and each has five to seven dorsal rays and two to three ventral rays, in addition to the apical fork; also, the inner edge of the arista is thickly covered with rather long hairs (fig. 17a). *Thorax:* Shining brown to black in ground color, dusted with gray pollen, more densely pollinose on the pleura. About six rows of acrostichals are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Two moderately strong humeral bristles are present. The anterior sternopleural bristle is approximately as long as the posterior bristle. The halteres are yellow, tinged with brown at their apices. *Legs:* Entirely yellow. The front femora are slender, each with a row of four or five, moderate-sized, posteroventral bristles and five or six, short, posterodorsal bristles. The front tibia enlarges slightly at

the apical third and has a row of black anterodorsal hairs on the apical third of the segment; this is continuous to the base of the segment as a row of shorter yellow hairs (fig. 17b). The front basitarsus is about one-half as long as the tibia and has one moderately long, erect hair at the middle of the segment. *Wings:* Hyaline, thickly covered with microtrichia. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is four times longer than the fourth. The last section of vein M_{1+2} is 1.75 times longer than the penultimate section (fig. 17c). *Abdomen:* Shining black, tinged with reddish brown in the ground color. Rather sparsely gray-brown pollinose. The anal plates are nearly two times higher than long and not pointed ventrally. The ninth tergum is just slightly narrowed dorsally and is rounded on each side ventrally. The posterior margin of the tergum is straight. The claspers are plainly visible from lateral view (fig. 17d).

Length: body, 2.4 mm.; wings, 2.5 mm.

FEMALE. Unknown.

Holotype male and two male paratypes: labeled "Honolulu Mountains, Oahu, 1,800 ft." (no date or collector given). These were probably collected on Mt. Tantalus behind Honolulu. Four male paratypes: one each from Kaumauhona, Oahu, November 23, 1919 (E. H. Bryan, Jr.); "Kil. H." (most probably Kilauea, Hawaii), June, 1903 (no collector given); Mt. Tantalus, Oahu, June, 1956 (D. E. Hardy); and April, 1960 (J. W. Beardsley).

Type and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum; Hawaiian Sugar Planters' Association; and the University of Hawaii.

Genus **CELIDOSOMA new genus**

(From the Greek *celido,* spot or blemish, and *soma,* body. Gender feminine.)

In Wheeler's key to the genera of Drosophilidae of the Pacific Islands (1952a: 421) this would run to *Chaetodrosophilella* Duda, but would fit only the first statement of this part of the couplet. It differs from *Chaetodrosophilella* by lacking a comb of short spines on the front femur, by having a very weakly carinate face rather than a prominent face with a well-developed carina, and by having two strong sternopleural bristles, rather than one strong bristle and two hairs present on the upper portion of the sternopleuron. I have not seen an adequate description of the genus *Chaetodrosophilella,* but the type species, C. *quadrilineata* (de Meijere), is strikingly different from the species at hand. It should be noted that *Chaetodrosophilella* dates to 1923 in Duda (1923:40); the name was listed without description at this time, as a subgenus of *Drosophila* with *quadrilineata* de Meijere as the only included species. In his next paper, Duda (1924:180) raised this to generic rank but spelled the name "*Chaetodrosophila.*" He included this in his key to genera and listed it as a new genus. Sturtevant (1927:367) reduced *Chaetodrosophilella* Duda to a subgenus of *Drosophila* and Wheeler

(1952a:421) again raised it to generic rank. Neave, "Nomenclator Zoologicus," does not list *Chaetodrosophilella*, but cites "*Chaetodrosophila* Duda, 1934, in Lindner, Die Flieg. Palaearct. Reg. 58 (G) :16".

Celidosoma is readily differentiated from any other known genus of Hawaiian Drosophilidae by having four or five pairs of dorsocentral bristles and only four rows of acrostichal setae. It also differs by having the anterior reclinate and the proclinate bristles situated near the anterior margin of the front. The second antennal segment is shaped like that of *Grimshawomyia* n. gen.; it is rather strongly produced at the apex, extending over the basal portion of the third antennal segment (fig. 18a). These two genera somewhat resemble one another in other respects, but the resemblance is superficial and the two differ strikingly in the following respects: *Celidosoma* has only four distinct rows of acrostichal setae, (sometimes a few misplaced setae indicate six irregular rows); has four to five strong dorsocentral bristles with two bristles presutural in position; has two strong humeral bristles; the face is flat medianly on the lower one-half and just slightly carinate above; the head is differently shaped as in figure 18a; the anterior reclinate and proclinate bristles are situated near the anterior margins of the front; each tibia has two black bands; the wings are predominantly dark brown, hyaline only on the basal portion. The male genitalia of the two genera differ as shown in figures 18d and 223b. The female genitalia of *Celidosoma* are like those of *Grimshawomyia*; ovipositor blades are rudimentary, poorly developed, and lack dentations (fig. 18c).

Type of the genus: *Celidosoma nigrocincta* n. sp.

Celidosoma nigrocincta new species (fig. 18a–d).

A very striking species, readily differentiated from all other known Hawaiian Drosophilidae by the generic characters cited above.

The sexes are difficult to differentiate since the genitalia are poorly developed in both sexes and I see no evidence of any sexual dimorphism.

FEMALE. A predominantly yellow-gray species, conspicuously spotted with brown over the thorax. *Head:* Distinctly higher than long. The genae slope downward on the posterior portion. The occiput is flat, only the edge visible from a lateral view. The front, measured from the upper ocelli to the front median margin, is two times longer than wide, and is entirely yellow except for brown markings in the area occupied by the orbital bristles. The upper reclinate bristles are situated at the median portion of the front, and the lower reclinates and the proclinates are situated almost in line with the anterior median margin of the front. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated opposite the latter. The ocellar triangle and the portion of the vertex and occiput immediately behind the ocelli are black. The head is otherwise yellow-white, except for the dark reddish brown eyes. The eyes are almost circular, just slightly higher than long, and densely short pilose. The ocellar setae are strong, rather bristle-like. Three or four moderately strong bristles are present in the upper portion of each vibrissal row. The basal two-

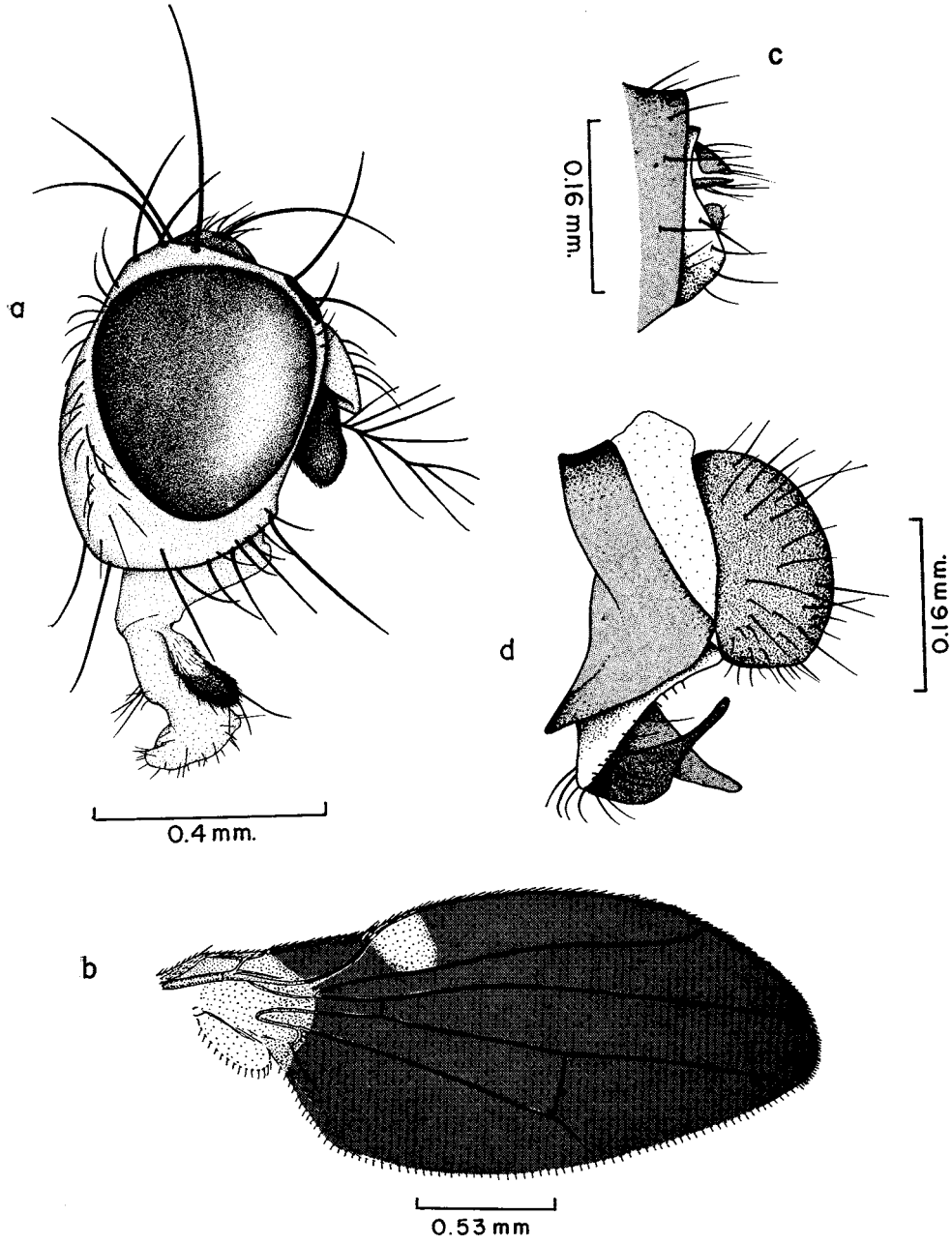


Figure 18—*Celidosoma nigrocincta* n. sp.: **a,** head; **b,** wing; **c,** female ovipositor; **d,** male genitalia.

antennal segments are pale yellow-white. The second segment is produced on the upper apical portion, extending over the base of the third segment (fig. 18a). The third antennal segment is entirely dark brown to black and is but little longer than the second segment. The arista has four or five dorsal and two ventral rays in addition to the apical fork. The face has a slight carina extending down the upper median portion and has a prominent black spot in the middle just below the carina. The apical half of each palpus is black, the basal portion pale yellow. Each palpus has one moderate-sized apical bristle and two smaller subapical bristles, plus numerous black setae extending down the outside surface. *Thorax:* Predominantly cinereous with three irregular streaks of brown extending longitudinally across the pleura and with brown spots on the mesonotum arranged irregularly in seven longitudinal vittae. A median brown vitta is usually complete and extends the full length of the mesonotum, expanding on the posterior portion and extending on to the disc of the scutellum. The scutellum is predominantly yellow in the type; only the mid-basal region is brown. In some other specimens the entire disc is brown with just the margins yellow. Four rows of moderately developed acrostichal setae are present; these reduce in number to two rows behind a level with the second pair of supraalar bristles, and the acrostichal setae extend only slightly beyond the posterior pair of dorsocentrals. The area in front of the scutellum is bare. Four or five pairs of strong dorsocentrals are present; one pair is situated in line with the suture and one pair is situated in front of the suture. One strong bristle and two bristle-like hairs are present on each humerus. The metanotum is predominantly brown, yellow on the sides. The halteres are clear yellow. The anterior sternopleural bristle is almost equal in size to the posterior bristle. *Legs:* Yellow, except for a brown dorsal spot near the base of each coxa, a broad brown band around each femur, and two brown to black bands around each tibia, one apical and one at the basal third of the segment. The apical segments of the tarsi are also brown to black. The front basitarsus is about three-fifths as long as the tibia and only three-fourths longer than the second tarsal segment. *Wing:* Predominantly dark brown; the base is hyaline and a moderately large hyaline spot is situated in the basal portion of cell R_1 just beyond the apex of vein R_1 (fig. 18b). The costal fringe extends almost to the apex of vein R_{4+5}. The third costal section is about 2.5 times longer than the fourth. The last section of vein M_{1+2} is just slightly longer than the penultimate section. *Abdomen:* Subshining brown, the narrow apices and sides of the terga yellow-gray. No evidence of an ovipositor can be seen in the specimens at hand (no dissections have been made). The anal plates are very tiny and inconspicuous (fig. 18c).

Length: body and wings, 3.3 mm.

MALE. Fitting the description of the female in all respects; the specimen at hand has lost some of its appendages so is not being used as the type. The ninth tergum is very narrow, reduced to just a thin ring over the dorsal portion and enlarged ventrally. The claspers are scarcely differentiated from the lower edges of the ninth tergum; they are rather long and slender, and have numerous setae

along the edge but no combs of teeth as are present in most species of Drosophilidae. The parameres are well developed, their apices are slender and attenuated and protrude conspicuously beyond the edges of the ninth tergum. The anal plates are about two-thirds wider than long and are short-haired compared to most Drosophilidae (fig. 18d).

Length: as for the female.

Holotype female: Schofield–Waikane Trail, Oahu, 2,000 ft., March, 1958, beating vegetation (D. E. Hardy). Allotype male: Lanaihale, Lanai, 3,200 ft., June, 1953 (D. E. Hardy). Two paratypes, both females: one each from Lanai Mountains, Lanai, October 29, 1947 (N. L. H. Krauss), and Puu O Kaeha, Molokai, July, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. One paratype in the United States National Museum and one in the University of Hawaii collection.

Genus **Chymomyza** Czerny

Chymomyza Czerny, 1903, Zeitschr. für Syst. Hym. u. Dipt. 3:199.

The members of this genus possess approximately eight rows of acrostichal setae and are differentiated from other genera with numerous acrostichals by having the anterior reclinate bristles large and placed well in front of the proclinate bristles; by the very tiny postocellar bristles; and by the stout anteroventral spines on the front femora of the males. The only known species in Hawaii is readily differentiated from all other Hawaiian drosophilids by the specific characters given below.

Apparently all observed species of this genus have the habit of constantly waving their wings. Some *Chymomyza* have been reported as being attracted to bleeding wounds on trees and others are attracted to fermenting fruits. Wheeler (1952: 175) has had considerable success raising *Chymomyza* in the laboratory "where it has been observed that non-yeasted food is preferable." Wheeler (*op. cit.*: 174) has stated that "courtship is usually very simple, the males often flying rapidly to the female and attempting copulation without any true courtship other than wing-waving. The males use the spiny fore femora to hold on to the wings of the female and they have also been observed fighting among themselves using the front legs like boxers."

Type of genus: *Drosophila costata* Zetterstedt.

Chymomyza procnemis (Williston) (fig. 19a–g).

Drosophila procnemis Williston, 1896, Trans. Ent. Soc. Lond. 3:412.

Oahu, Maui, Hawaii, Molokai, and probably on all the main islands.

Immigrant: Mainly subtropical in distribution and widely distributed over the southern United States, the West Indies and Central America, and through South America to Brazil. It was first recorded in Hawaii by Zimmerman (1948: 131). Some of the previous records of this species for the eastern United States have been confused; as was pointed out by Wheeler (1952:175), two species were

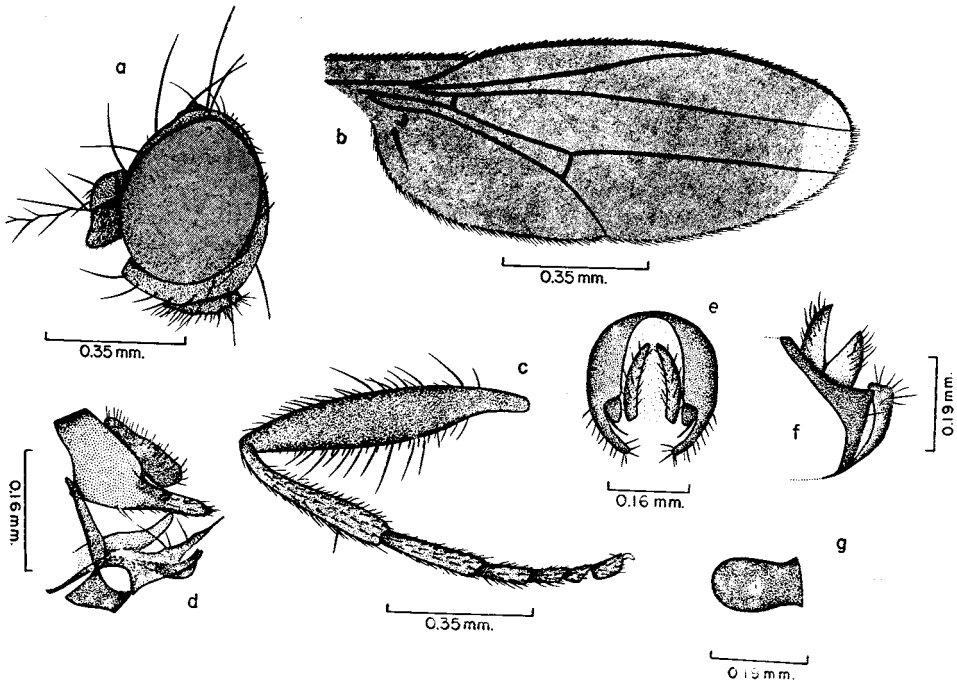


Figure 19—*Chymomyza procnemis* (Williston): **a,** head; **b,** wing; **c,** front leg; **d,** male genitalia, lateral; **e,** male genitalia, end view; **f,** female genitalia; **g,** spermatheca of female.

actually involved in the earlier concept. Wheeler said *procnemis* comes to traps readily and can be easily reared in the laboratory. In Hawaii it is attracted to fermenting fruits of various kinds and some specimens have been collected on flowers.

Four cotype specimens are in the British Museum (Natural History). A type has apparently not been designated.

This species is readily recognized by its distinctive actions, by the smoky fumose wings with the hyaline apex, and by the shining black front legs. The head is yellow, the front is predominantly golden yellow, and the orbits are yellow-gray. The frontal bristles are arranged as in figure 19a. The face is straight or nearly so with a very slight ridge extending down the middle. The gena is very narrow; at its broadest point it is about one-seventh the eye height. Antennae yellow, third segment tinged slightly with brown. Arista with three dorsal and two ventral rays in addition to the terminal fork. Thorax entirely reddish yellow. Eight rows of acrostichal setae and two pairs of dorsocentral bristles are present, the anterior pair situated well behind the suture, approximately in line with the anterior supraalar bristles and these rather small compared to the posterior pair, being about one-third as long. One strong bristle is present on each humerus. Lower portions of pleura clear yellow. Halteres yellow. Front legs predominantly

black; coxae, trochanters, bases of femora, and tarsal segments two to five are yellow. Each front femur of the male has two rows of strong anteroventral spines extending the entire length of the segment (fig. 19c). The middle and hind legs are entirely yellow. The wings are faintly smoky, hyaline at apices; the first two costal sections are brownish, densely covered with microtrichia. The third costal section is about one-third longer than the fourth. Costa brown, lower margin black; costal fringe of stout setae extending nearly four-fifths the distance between the tips of veins R_{2+3} and R_{4+5}. Cell R_5 slightly expanded opposite the m crossvein. The ultimate section of vein M_{1+2} two and one-half times longer than penultimate section. The abdomen is polished black. The male genitalia are as in figures 19d and 19e. The claspers are small and the teeth on the inner lobe are blunt and placed in a dense clump. The ninth tergum is produced into a long ventral lobe. The ninth sternum is divided into a pair of lobes on each side at the apex; the outer lobe is armed with a very strong bristle at the apex and has several smaller bristles ventrally (fig. 19d). The ovipositor plate of the female (fig. 19f) is rather broad and rounded at apex with about six to eight bristles around the apical portion. The spermathecae are slightly over two times longer than wide, are truncate at one end, and rounded at the other (fig. 19g).

Length: body and wings, 2.0 to 2.4 mm.

Genus **Dettopsomyia** Lamb

Dettopsomyia Lamb, 1914, Trans. Linn. Soc. Lond., Ser. 2, 16:349.

Members of this genus are distinguished from other Hawaiian Drosophilidae by the presence of a deep costal incision just before the apex of vein R_1. The lobe formed by the protruding costa is thickened and black and bears two strong bristles at the apex (fig. 20c). Also, the wing venation is distinctive, since vein R_{2+3} ends near the middle of the anterior margin of the costa so that the third costal section is about equal in length to the fourth. The genus is further characterized by the widely separated antenna, and by the swelling on the upper portion of the face (fig. 20a) This genus seems to fit closest to *Mycodrosophila* Oldenberg, which is widespread over the Pacific, North and South America, the Orient, and Europe. *Dettopsomyia* differs by having only four rows of acrostichal setae developed (rather than six to eight rows) and by having two pairs of well-developed dorsocentral bristles with the anterior bristle situated nearly level with the transverse suture. Most species of *Mycodrosophila* have but one pair of dorsocentral bristles and the anterior bristle is situated well behind the suture. The mesonotum of *Dettopsomyia* is not so strongly convex as in *Mycodrosophila,* and the body coloration, markings, and other details are quite different in the two genera.

Two species of *Dettopsomyia* occur in Hawaii; both are immigrants.

Type of genus: *Dettopsomyia formosa* Lamb.

KEY TO SPECIES OF DETTOPSOMYIA IN HAWAII

Wings spotted; vein R_{2+3} curved upward abruptly, entering the costa at a right angle to the remainder of the vein (fig. 20b) ..... **formosa** Lamb.

Wings hyaline; vein R_{2+3} gradually slanted to costa (fig. 20c) ..... **nigrovittata** Malloch.

Dettopsomyia formosa Lamb (fig. 20a–b).

Dettopsomyia formosa Lamb, 1914, Trans. Linn. Soc. Lond. 16 (4) :349.

Oahu, Hawaii, Maui, and probably on all the main islands.

Immigrant. This species is apparently quite widespread. It was originally described from the Seychelle Islands but has been recorded from the Palau and Solomon Islands, Yap, Samoa (reported by Wheeler in recent conversation), and the Philippine Islands; also from El Salvador and Honduras in Central America (see Wheeler, 1957:106). *D. formosa* was first recorded in Hawaii by Malloch (1938:54). It seems to be restricted to the lowlands; most specimens have been taken sweeping vegetation, or on windows.

The type is in the British Museum (Natural History).

A beautiful little species, which along with *D. nigrovittata,* represents the smallest Hawaiian Drosophilidae. It is distinguished from other known *Dettopsomyia* by the spotted wings and by the sharp upward bend in vein R_{2+3} (fig. 20b). The body is predominantly shining brown to black with gray longitudinal markings over the thorax and head. The head is nearly quadrate in lateral view with the top anterior margin slightly protruberant above the antennae. The eyes are nearly round (fig. 20a). The front is gray along the orbits and also has a gray vitta extending along each side of the ocellar triangle, these converge at the anterior portion of the front. The gray vittae are separated by two dark brown to black vittae, each of which is divided into a short fork near the anterior margin by a faintly orange-yellow spot above each antenna. The ocelli are anterior in position, situated near the middle of the front, with the ocellar bristle located exactly at the middle. The lower fronto-orbital bristles are close together near the anterior margin of the front. The upper reclinate bristle is strong, the lower reclinate is very weak, and the proclinate bristle is in line with, and about two-thirds as long as, the upper reclinate. The antennae are separated by a distance equal to the width of the first segment, and the face has a snoutlike carina on the upper half, between and below the antennae (fig. 20a). The genae are largely yellow-gray, with a black spot on each side at the junction with the face. The thorax is subshining brown to black with four narrow gray vittae, one on each side of the dorsocentral rows; these are not continuous but are slightly interrupted at the suture and near the posterior third of the mesonotum. The sides of the mesonotum are dusted with gray. Two pairs of dorsocentral bristles

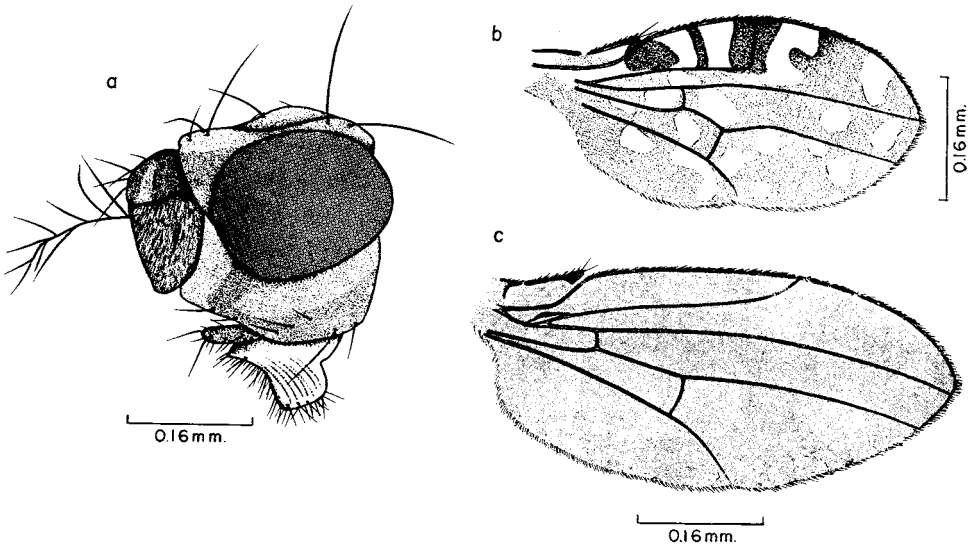


Figure 20—*Dettopsomyia formosa* Lamb: **a,** head; **b,** wing. *D. nigrovittata* Malloch: **c,** wing.

are present, the anterior pair situated very near the suture. Four irregular rows of acrostichal setae are present; these are very sparse on the posterior portion of the mesonotum. The scutellum is brown with a yellow streak down the middle and with a gray spot on each side and at the apex. The pleura are shining brown to black, each with a longitudinal gray vitta extending through the middle portion and a less distinct vitta through upper portion. The legs are predominantly shining black, the apices of the femora are yellow-white. Each tibia has a yellow-white band around the middle, the apex, and the base. The tarsi are yellow. Wings as in figure 20b, predominantly brown with numerous hyaline spots. Abdomen polished black, rather ovate, and flattened.

Average length: body, 1.20 mm.; wings, 1.25 mm.

For further descriptive details refer to Lamb (1914:349) and to Malloch (1938:54).

According to Wheeler (1957:106), the eggs of *D. formosa* have four short filaments, each about one-third the egg length.

Dettopsomyia nigrovittata (Malloch) (fig. 20c).

Drosophila nigrovittata Malloch, 1924, Proc. Linn. Soc. N.S.W. 49:352.

Dettopsomyia argentifrons Okada, 1956, Systematic Study of Drosophilidae and Allied Families of Japan, Gihodo Co., Ltd., pp. 55–57. **New synonymy.** Our specimens compare perfectly with Okada's description and the synonymy has been confirmed by Okada after comparison of Hawaiian specimens with the type.

Oahu, Maui, Molokai, Hawaii; evidently widespread over the islands. It has been collected sweeping vegetation in the mountains to an elevation of about 4,000 feet and has also been taken in the lowlands; some specimens have been collected at light.

Immigrant. Described from Australia (type locality: Sydney, N. S. Wales); also reported from Canary Islands and South America (see Frey, 1958:47). It was recorded from California in 1950 by Wheeler (1951:92) and was first recorded in Hawaii by Hardy (1956:17); the earliest Hawaiian record is June, 1950. Wheeler observed it breeding in a "rotting, bleeding area of about 20 sq. in. on a large banana plant" in California. He also said (1952:182) that the species can be reared on standard *Drosophilia* media but requires constant attention. Its breeding habits have not been observed in Hawaii.

Type in the School of Public Health and Tropical Medicine, University of Sydney.

A small dark-colored species with gray markings on the head and thorax similar to those of *D. formosa* but differing strikingly in details of wing markings and venation (fig. 20c). The front is not distinctly produced as in *formosa* and the ocelli are in the normal position at the upper portion of the front. The orbits are gray and a gray vitta extends down the front on each side of the ocellar triangle and converges near the anterior margin of the front. The gray markings are divided by the brown stripe down each side of the front. The area immediately above each antenna is yellow. The upper reclinate bristle is spaced well behind the proclinate bristle and is about one-third longer. The lower reclinate bristle is small. The antennae are predominantly dark brown to black; the apical portion of the second segment is yellow. Each arista possesses five long rays above and two below in addition to the apical fork. The antennae are separated by a distance nearly equal to the width of the first segment. The face is largely yellow, brown to black in the middle and on sides; the upper half is rather strongly carinate. The genae are mostly yellow, bordered with brown below. Thorax subshining brown to black, mesonotum with a longitudinal gray vitta on each side of each dorsocentral row and also gray on the sides; the inner pair of vittae not interrupted, the outer pair interrupted at the suture. Two pairs of dorsocentral bristles are present, the anterior pair situated very near the suture. The acrostichals are arranged in four rows with a few scattered setae sometimes present outside these rows near the middle of the mesonotum. Pleura brown to black, lacking vittae. Scutellum brown to black, sometimes slightly paler in the median portion but lacking gray marks. The halteres are yellow except for brownish discolorations just beneath the knobs. Legs predominantly dark-colored. Coxae, trochanters, and femora black except for yellow apices on the latter. Tibiae with two brown to black bands, one subapical and one subbasal. Tarsi yellow. Wings entirely hyaline except for a very faint yellowish tinge. The venation is as in figure 20c. The third and fourth costal sections are approximately equal in length. Vein R_{2+3} slants gradually to the costa. The abdomen is polished brown to black, rather broad and flattened. The genitalia have been

adequately described and figured by Okada (1956:56, fig. 31). He also has described and figured some of the internal structures. Some of these were also described by Wheeler (1952:182).

In Hawaii the specimens vary in body length from about 1.30 to 1.50 mm. and in wing length from about 1.60 to 1.75 mm. The specimens which Wheeler recorded from California are slightly larger. He recorded the length as 2 mm.; the specimens which I have seen from the mainland of the United States measured 1.7 mm. for the body and 1.9 mm. for the wing. Okada stated that the body of *argentifrons* measured about 1.3 mm.

According to Wheeler (1952:182), "the eggs are quite small with four short filaments. The puparia are pale yellowish tan; each anterior spiracle has about 9 branches; most of them are as long as the spiracular stalk; the latter plus its branches is nearly one-fourth the length of puparium. Posterior spiracles weakly divergent apically."

Malloch (1924:352) notes that "this species is apparently referable to the genus *Spuriostyloptera* Duda, but I do not consider that genus is entitled to separation from *Drosophila*. The deep incision at apex of the auxiliary vein and the attendant black spot are to some extent present in *Drosophila repleta* and its allies, and this species Duda retains in *Drosophila*."

Genus **DROSOPHILA** Fallén

Drosophila Fallén, 1823, Geomyzides Sveciae, 4.

This is a very large and complex genus. The subgeneric taxonomy is confused in the literature and I cannot confirm the synonymies under *Drosophila*. In dealing with the Hawaiian species I am defining *Drosophila* as having the following characteristics: six or more rows of acrostichal setae; one or more ventral rays on the arista; presutural dorsocentral bristles rarely present; the anterior reclinate bristles opposite or above the proclinates except in *D. mimica* n. sp.; two pairs of humeral bristles usually present; the first antennal segment small, scarcely visible beyond the margin of the front; the antennae not porrect; the female ovipositor blades sclerotized, usually conspicuous, and dentate along the margins; the male claspers usually hidden beneath the ventral lobes of the ninth tergum and bearing a row of teeth. In Hawaii some *Drosophila* show definite intergradation with *Scaptomyza* Hardy and the genera are not as clearly defined as in most parts of the world.

Type of the genus: *Musca funebris* Fabricius.

Key to Subgenera and Species of the Genus Drosophila Known from Hawaii

1. Oral vibrissae with not more than four to five strong bristles in a single row on each side at the lower angle of the face; in a few species, densely placed

setae are present in a secondary row 3
A dense clump of strong black bristles present at each lower angle of the face (fig. 217a). These are arranged in two distinct rows . . . . . Subgenus **Hypenomyia** Grimshaw 2

2(1). Shining black species. Face and antennae dark brown to black. Last section of vein M_{1+2} about equal to the penultimate section. Front femur of male densely bristled on the posteroventral surface (fig. 216b). Front tibia lacking dorsal cilia or spines. Maui . . . . . **reburra** n. sp.
Predominantly brown or yellow-brown species. Face and antennae yellow. Last section of vein M_{1+2} is 2.5 times longer than the preceding section (fig. 217e). Front femur not bristled as above. Front tibia ciliated and a strong preapical dorsal spine is present (fig. 217c). Molokai . . . . **varipennis** (Grimshaw).

3(1). Front normal, with distinct proclinate and lower reclinate bristles and lacking long hairs. Ocellar bristles well developed, nearly as strong as the vertical bristles . 4
Front lacking proclinate bristles, but with seven or eight long reclinate hairs so that in the male no anterior reclinate bristles are differentiable. The female has two reclinate bristles on the lower front and four to six short hairs in a row between the anterior and posterior reclinates. The ocellar bristles are tiny, about equal in length to the fine hairs on the ocellar triangle. Maui . . . . . **Trichotobregma petalopeza** n. sp.

4(3). Wings marked with brown; they may be completely pale with fuscous or dark markings in some areas, usually at the apex and on the crossveins (best seen in reflected light); or only the basal cells may be brown; or the entire wing may be dark brown fumose 5
Wings hyaline, or evenly and faintly fumose, without distinct fuscous markings 141

5(4). Crossvein m forked on upper portion before meeting vein M_{1+2}, forming a "Y" as in figure 75. Oahu . . . . . **deltaneuron** Bryan.
No such forking of the m crossvein 6

6(5). Wings broad, rather truncate apically (especially in the males) (fig. 202e). Basal portion of wing dark brown,

remainder largely yellow-brown. A distinctive tiny brown spot is present just before the wing apex near the upper edge of vein M_{1+2} (fig. 202e). Front legs of male as in figure 202b. Maui ..... **truncipenna** n. sp.

Not as above 7

7(6). Anterior margin of wing continuously infuscated, either from humeral crossvein to the apex of vein R_{2+3} (fig. 90e) or from near base of cell R_1 around the apex of the wing (fig. 22a); or, if the brown marking fades out toward the apical portion of cell R_1, the front tibia has a long anterior bristle at middle and the front basitarsus has long, black posterior bristles near base (cf. **apoxylema** n. sp., fig. 35d) 8

Wings not fuscous along the entire anterior margin 15

8(7). Wings with brown markings in addition to those on the anterior margin (figs. 198b, 214b, 215b). Thorax not polished black 9

Wings brown only along anterior margin (fig. 90e). Entire body polished black 14

9(8). A presutural pair of dorsocentral bristles present; these are small but distinct from the other hairs of the mesonotum. Mesonotum and scutellum entirely rufous, lacking brown markings. Pleura with two brown longitudinal vittae. Wings of the male as in figure 214b. Molokai and Maui ..... **xuthoptera** n. sp.

No presutural dorsocentral bristles present. Thorax with longitudinal black vittae or with brown spots, or entirely brown to black 10

10(9). Mesonotum yellow to rufous with brown vittae or spots, or brownish red with conspicuous yellow-gray vittae 11

Mesonotum entirely reddish brown to black, dusted with gray or brown; not vittate. Wings as in figures 186d and 191a 13

11(10). Wings with brown markings over the median portion, at least over the two crossveins and along the second section of vein M_{1+2} 12

Median portion of wing hyaline, with a milky white streak extending longitudinally the full length of the wing and marked with brown along the costal margin and on vein M_{3+4} (fig. 198b). Mesonotum yellow with four brown spots across the median portion. Hawaii ..... **tetraspilota** n. sp.

12(11). Head higher than long (fig. 215e). Mesonotum with three gray longitudinal vittae. Last section of vein M_{1+2} straight. Wing with a Z-shaped hyaline mark through the middle (fig. 215b). Oahu . . . . **z-notata** Bryan.

Head longer than high (fig. 203a). Mesonotum with four gray vittae, and a narrow brown line down each dorsocentral row. Last section of vein M_{1+2} undulated. The veins are bordered with brown as in figure 203b. Hawaii . . . . . **undulata** Grimshaw.

13(10). Thorax entirely black, legs predominantly so. Wings dark brown with white spots in the cells as in figure 191a. Molokai . . . . . **spectabilis** n. sp.

Mesonotum reddish brown in the male, brown to black in the female; pleura rufous, tinged with brown; legs rufous. Wings brown on the anterior half and with a brown streak extending along the basal section of vein M_{1+2} and over the m crossvein (fig. 186d). Maui . . . . . **semifuscata** n. sp.

14(8). Front tibia of the male with a long black anterior bristle at the middle, and front basitarsus with two posterior bristles at the base; these are equal in length to the tibia (fig. 35d). The costal band fades out in the apical portion of cell R_1 (fig. 35c). Molokai . . . . . **apoxyloma** n. sp.

Not as above. Front tarsus with dorsal cilia (fig. 90b). Cell R_1 entirely brown (fig. 90e). Kauai . . **eurypeza** n. sp.

15(7). Costal and basal cells brown, remainder of wing hyaline. Front basitarsus of male with a strong, peculiarly developed, dorsoapical comb of black curved bristles. Second and third tarsal segments each with a strong black dorsal bristle (fig. 42a). Kauai . . . . . **basimacula** n. sp.

Wings not marked as above. If the front tarsus is as above (in *perissopoda* n. sp.) the wings are brown at apices, hyaline at bases. The anterior dorsocentral bristle is strong and situated opposite the second supraalar bristle 16

16(15). Second tarsal segment of front leg of male short, broad and flat, concave on anterior surface, spoonlike (fig. 190a). Wings with brown fumosity concentrated in anteroapical portion (figs. 74b, 117b, 190b). (Notation: The females cannot be placed without associa-

tion with the males.) 17

Legs not as above. Wing markings usually not concentrated on anteroapical portion 21

17(16). Wing markings consisting of a dark brown spot in apical half of cell R_3, extending slightly into cells R_1 and R_5 (fig. 190b). Sixth abdominal segment exposed, about equal in length to the fifth segment, and entirely yellow. Hawaii ..... **sordidapex** Grimshaw.

Anteroapical portion of wing more generally infuscated, the brown markings not concentrated in cell R_3 (fig. 74b). Sixth abdominal segment black, or short, scarcely exposed from dorsal view 18

18(17). Front tibiae of male lacking rows of conspicuous bristly hairs. The preapical dorsal bristle is clearly differentiated from the other setae 19

Front tibia with two rows of moderately long, black bristly hairs extending the full length of the segment, one each down the dorsal and posterodorsal surfaces; these are equal or longer than the preapical dorsal bristle and the latter, cannot be differentiated from the other setae of the dorsal row. Hawaii ..... **dasycnemia** n. sp.

19(18). Legs entirely yellow. Basal two antennal segments predominantly or entirely yellow 20

Coxae, trochanters, and femora brown to black. Antennae brown to black. Hawaii ..... **percnosoma** n. sp.

20(19). Front basitarsus of male with only three to four inconspicuous hairs on the anterior surface just before the apex (fig. 66a). Sternopleura yellow, abdominal terga yellow on anterolateral angles. Infuscation at upper wing apex not dark brown. Hawaii ..... **conformis** n. sp.

A row of conspicuous black hairs extends down the anterior half of the front basitarsus (fig. 118a). Sternopleura brown. Abdomen black. The spot at the upper wing apex is dark brown (fig. 118b). Hawaii ..... **incognita** n. sp.

21(16). Brown markings restricted to the apical one-third to one-fourth of the wing (fig. 49a), or the anteroapical portion, or one or both crossveins (fig. 39b). The spots on the crossveins may be large and may extend into

the surrounding cells (fig. 114b), and/or the costal cells may be brown (fig. 188c), or a subbasal brown spot may be present in the wing. The wings may sometimes be evenly light fumose throughout but will have darker brown markings at the apex or at least on the m crossvein 62

Wings more extensively marked with brown, including brown markings in the cells (fig. 165c), over the middle of the wing (fig. 106b), or at least a well-defined mark near the middle of vein R_{2+3} (fig. 87d) 22

22(21). Mesonotum predominantly pale colored with a broad brown median vitta and with conspicuous lateral spots 23

Mesonotum not marked as above; if a median brown vitta is present a complete vitta is also present down each side, at least behind the suture 27

23(22). At least the apical two-thirds of the third antennal segment is brown to black; the first two segments are largely yellow. Tibiae yellow, not more than extreme apices brown. Face all yellow. Each abdominal tergum with a large yellow spot on each side. Wings as in figures 71a and 106b 24

First two antennal segments black, third segment white at apex (fig. 165a). Tibiae each with two brown bands. Face with two black spots on each side. Each abdominal tergum with two yellow-gray spots on each side. Wings brown with numerous small hyaline spots (fig. 165c). Kauai ..... **picticornis** Grimshaw

24(23). Wings with a transverse hyaline band across the apical third as in figure 106b, or with irregular transverse hyaline patterns and with a large isolated brown spot in cell 2nd M_2 as in figure 71a 25

Wings brown with hyaline spots in the cells, most of these confined within the cells (fig. 41b). The last section of vein M_{1+2} shorter than the penultimate section. Maui ..... **balioptera** n. sp.

25(24). Wings with a transverse hyaline band across apical third; the brown markings are arranged as three irregular crossbands (fig. 106b) 26

Wings lacking a hyaline crossband, the brown and hyaline markings are irregular and some isolated spots are present (fig. 71a). Oahu and Kauai .....

..... **crucigera** Grimshaw.

26(25). Middle and hind femora brown to black except at the extreme apices. Upper portion of each sternopleuron black. Basal one-half of front tibia of male devoid of long ciliation. Cilia of front basitarsus straight and as in figure 106a. Molokai, Lanai, Maui, and Hawaii ..... **grimshawi** Oldenberg.

Femora entirely yellow. Upper portion of sternopleuron yellow except for a brownish discoloration on the anterior edge. Ciliation of front tibia short but extending to base of segment. Front basitarsus with abundant long, curved and densely placed cilia (fig. 47a). Molokai ..... **bostrycha** n. sp.

27(22). A pair of strong bristle-like acrostichals present near the midline of the mesonotum, in line with the presutural bristles. Apex and apical two-fifths of the anterior margin of the wing infuscated as in figure 22a. Thorax entirely brown except for yellow humeri and for a tinge of yellow on the pleura. Maui ..... **acrostichalis** n. sp.

Not as above 28

28(27). Wings fumose along the veins and crossveins, hyaline in the cells (fig. 113b). Thorax dark brown to black in ground color with a yellow longitudinal vitta extending through the median portion of each pleuron and with the sides of the mesonotum yellow. Front tarsi of male as in figure 113a. Kauai ..... **humeralis** Grimshaw.

Not as above 29

29(28). Third costal section equal or distinctly shorter than the fourth. Vein R_{2+3} ending almost opposite the m crossvein 30

Third costal section about 1.5 or more times longer than the fourth. Vein R_{2+3} ending well beyond a level with the m crossvein 31

30(29). Fourth section of costa longer than third. Wings markings as in figure 103c, with four hyaline spots along the anterior margin arranged from vein R_1 to the apex of vein R_{4+5}, and with two spots at the apex of cell M_2. Oahu ..... **fuscoamoeba** Bryan.

Fourth section equal to third. Wing markings as in

figure 25 with two large spots on the anterior margin and one spot in cell M_2. Kauai ..... **agitona** n. sp.

31(29). Third costal section less than 2 times longer than the fourth. Vein R_{4+5} undulated (figs. 64b, 100b) 32

Third costal section at least 2.8 times longer than the fourth. Vein R_{4+5} not undulated 34

32(31). Thorax largely yellow, with brown vittae extending longitudinally down the mesonotum. Wings with a brown spot at the base extending to the r–m crossvein 33

Thorax dark brown to black, mesonotum not vittate. Basal portion of wing hyaline (fig. 100b). Front tarsus of male as in figure 100a. Maui ..... **furva** n. sp.

33(32). The third costal section is 1.4 to 1.5 times longer than the fourth. Wing markings as in figure 64b. Pleura entirely brown, sides of mesonotum with a continuous brown vitta. Front tarsus and apex of tibia of male with long curved dorsal cilia (fig. 64d). Maui and Molokai ..... **clydonia** n. sp.

Third costal section 1.66 times longer than fourth. Wing markings as in figure 48a. Lower half of each pleuron yellow. Mesonotum with a brown spot behind each humerus and with a narrow brown postsutural vitta on each side, plus a broad median vitta extending the full length of the mesonotum. Front tarsus of male with short dorsal cilia (fig. 48b). Hawaii ..... **brevicilia** n. sp.

34(31). Wings predominantly brown, with numerous hyaline spots (figs. 23b, 162b). Front basitarsus of male flattened laterally (figs. 23a, 162a) 35

Wings predominantly hyaline, with brown marks or spots (fig. 135b). Front basitarsus not flattened 36

35(34). Mesonotum with three brown longitudinal vittae. Front entirely brown, 1.5 times wider than long. Front basitarsus of male not as wide as the tibia (fig. 162a). Cell 1st M_2 with two hyaline spots continuous through cell M_4 and with a hyaline spot near the base of cell 2nd M_2; this does not extend into cell R_5 (fig. 162b). Maui and Oahu ..... **peniculipedis** n. sp.

Mesonotum with five brown vittae; an extra narrow brown line is present down each dorsocentral row.

Front 1.2 times wider than long. Front basitarsus of male broader than the tibia (fig. 23a). Three to four hyaline spots present in cell 1st M_2 and four similar spots present in cell M_4. The subbasal hyaline spot in cell 2nd M_2 extends through cell R_5 (fig. 23b). Maui and probably Hawaii and Oahu . . . . **adiastola** n. sp.

36(34). Mesonotum with three brown vittae (one median and two lateral) 37

Mesonotum with five, four, two, or no brown vittae; or the mesonotum is cinereous down the middle with two large brown spots on the sides. When the mesonotum is vittate, the vittae are usually marked off by cinereous lines 44

37(36). Wings with two brown marks in cell R_1 (figs. 126b, 196b) 38

A single brown mark fills the apical two-thirds of cell R_1. Wings as in figure 135b. Hawaii . . . . **megasticta** n. sp.

38(37). The fuscous mark in the middle of cell R_1 is elongate, at least one-half as long as the cell (figs. 80b, 126b). Wings sometimes slender 39

Fuscous mark in the middle of cell R_1 rather short, about one-fourth to one-fifth as long as the cell (figs. 26a, 196). Wings never unusually narrow or pointed apically 41

39(38). The lateral vittae on the mesonotum interrupted at the suture. Male wings normal in shape, about 2.4 times longer than wide, the brown markings extensive as in figure 80b. Front tibia of male not with long cilia extending the entire length down the anterodorsal and posterodorsal surfaces, nearly or entirely devoid of long cilia 40

Lateral vittae complete, not interrupted at the suture. Male wings slender and pointed apically, 3.4 to 4.0 times longer than wide, and more sparsely marked with brown as in figure 126b. Front tibia of male with elongate cilia extending the entire length over the antero- and posterodorsal surfaces (fig. 126a). Lanai and Oahu . . . . . **lanaiensis** n. sp.

40(39). Front tibia of male with two large, black dorsal cilia at the middle of the segment. The lateral vittae of the mesonotum are indistinct behind the suture. (Some

specimens may run here.) Molokai..... **bostrycha** n. sp.

Front tibia of male lacking long cilia. The lateral brown vittae are distinct from the suture to the inner supraalar bristles. Maui..... **disjuncta** n. sp.

41(38). Mesonotum predominantly yellow to rufous, usually with three brown vittae (these are faint only in *tarphytrichia* n. sp.). Vein M_{3+4} fuscous only at the apex and near the m crossvein (figs. 26a, 196b)..... 42

Mesonotum brown with but a faint indication of a yellow vitta down each dorsocentral line (see also under couplet 53). Vein M_{3+4} with an elongate brown mark extending over most of its length (fig. 171e). Front legs of male devoid of ciliation except for three to four long, black dorsal hairs at the base of the tibia (fig. 171d). Hawaii..... **prolaticilia** n. sp.

42(41). Mesonotum with only faint indications of brown vittae (see also couplet 48). Front basitarsus of male expanded on apical half and with a dense clump of black dorsal hairs on apical portion (fig. 196a). Oahu ..... **tarphytrichia** n. sp.

Mesonotum distinctly vittate. Front legs of male not as above 43

43(42). Wings with three brown spots in cell R_3. The third costal section is 3.5 times longer than the fourth (fig. 26a). Scutellum yellow with a brown spot at its base. Palpi black. Arista with ten dorsal and five ventral rays in addition to the apical fork; the anterior surface of the arista is densely haired. Oahu and Hawaii ..... **aglaia** n. sp.

Wings not as above; third costal section five times longer than the fourth (fig. 157b). Scutellum brown except for the yellow lateral margins. Palpi yellow to rufous. Arista with seven to eight dorsal and two ventral rays in addition to the apical fork; anterior surface sparsely haired. Maui..... **oreas** n. sp.

44(36). Vein R_{4+5} with a fuscous spot nearly opposite the m crossvein or a continuous band from the costal margin extending transversely over the middle of the wing at a level with the m crossvein 45

Vein R_{4+5} without such a spot. Wings not as above..... 58

45(44). Body shining dark brown to black except for a small

yellow spot at the apex of the scutellum. Only one humeral bristle present. Anterior sternopleural bristle tiny, not over one-third as long as the posterior bristle. Front tibia and tarsus of male lacking ciliation. Middle and hind femora predominantly brown to black. Wings long and slender, nearly four times longer than wide (fig. 192b) 56

Not as above; if the body is brown to black the legs are yellow. The humerus has two bristles, the front tarsi of the male are ciliated, etc. 46

46(45). Cell R_1 or vein R_{2+3} with two brown marks in addition to any brown marking at the extreme base of the cell; one mark situated near the middle of the cell and one at the apex of vein R_{2+3}. Third costal section four times longer than the fourth 47

Cell R_1 and/or vein R_{2+3} with only one brown mark extending over the apical two-thirds. Third costal section about three times longer than the fourth (fig. 37c) 57

47(46). Thorax entirely pale yellow, with no dark markings. Front legs of male with three long straight hairs on the dorsum of the tibia and three on basitarsus (fig. 109a). The mark on vein R_{4+5} continuous from the middle of the wing to the apex (fig. 109b). Oahu ..... **hexachaetae** n. sp.

At least dorsum of scutellum brown; thorax usually predominantly brown or marked with brown on the dorsum and on the sides. Front legs not as above 48

48(47). Thorax rufous, distinctly marked with brown only on the disc of the scutellum (see also couplet 42). Front basitarsus of male expanded on apical half and with a dense clump of black dorsal hairs on the apical portion (fig. 196a). Oahu ..... **tarphytrichia** n. sp.

Mesonotum distinctly vittate or chiefly brownish in ground color. Front legs of male not as above 49

49(48). The brown mark in the middle of cell R_1 is narrow, only about one-fourth as long as the cell and usually about equal in length to the m crossvein 50

The brown mark in the middle of cell R_1 is elongate, occupying half the length of the cell and about equal in length to the last section of vein M_{1+2} (fig. 68b) 55

50(49). Front tibia of male with two erect dorsal hairs at the

apical one-fourth and one dorsal hair at the basal fifth; also three long erect dorsal hairs present on the front basitarsus (fig. 148a). Mesonotum entirely brownish yellow, densely pollinose, and not vittate. Oahu ..... **neglecta** n. sp.

Front legs not as above. Mesonotum with brown vittae, or entirely brown 51

51(50). Legs entirely yellow. Thorax predominantly rufous to brownish red in ground color, gray to yellow-gray pollinose 53

Coxae and femora dark brown to black. Thorax dark brown to black in ground color 52

52(51). Front tibia of male villose on the entire dorsal surface (fig. 210a). Last section of vein M_{1+2} equal to the penultimate section. Antennae yellow, tinged lightly with brown. Front yellow to reddish. Face, genae, palpi, and occiput chiefly yellow. Kauai ..... **villosipedis** n. sp.

Front tibia of male lacking long hairs (fig. 144a). The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. Antennae, palpi, genae, lower margin of face, and most of the occiput brown. Front black above, reddish brown below. Kauai ..... **musaphilia** n. sp.

53(51). Sternopleura entirely yellow, mesonotum with three indistinct brown vittae. (See also under couplet 41.) Basal section of vein M_{3+4} with an elongate brown spot (fig. 171e). Front tibia of male with three to four long black dorsal hairs at base of segment. Tibia and tarsus otherwise devoid of curved hairs. Hawaii ..... **prolaticilia** n. sp.

Sternopleura discolored with brown. Mesonotum with four brown vittae; no median vitta. Vein M_{3+4} lacking the long brown spot (fig. 108b). Front legs of male different in development, the tibiae lacking the above mentioned long hairs (fig. 108a) 54

54(53). Front tibia of male lacking long ciliation on the dorsal surface. Front tarsus with an abundance of long straight cilia, especially on the basitarsus (fig. 108a). Hawaii and Oahu ..... **hawaiiensis** Grimshaw.

Front tibia with long dorsal ciliation extending the entire length of the segment. The cilia on the front

tarsus curved (fig. 61b). Hawaii and Maui..... **ciliaticrus** n. sp.

55(49). Mesonotum yellow, with two narrow brown to black vittae extending down the median portion, plus a continuous black vitta down each side from the humerus to the inner postalar bristle. Pleura almost entirely yellow. Front tibia of male with long dorsal cilia on the apical half (fig. 68a). Hawaii..... **conspicua** Grimshaw.

Mesonotum brown in ground color, densely gray pollinose, with two submedian vittae extending about opposite the presutural bristle to just beyond the anterior dorsocentral bristles, and with a short brown vitta on each side from just behind the suture to about opposite the outer postalar bristle. Front tibia of male with long dorsal cilia extending over the entire length. Molokai..... **villitibia** n. sp.

56(45). Front femur lacking long cilia down the anteroventral surface. Antennae entirely yellow (in the male). Front coxae yellow. Maui..... **stenoptera** n. sp.

Front femur of male with a row of moderately long cilia extending down the anteroventral surface (fig. 62b). Antennae predominantly black. Front coxae tinged with brown. Maui, Molokai, and Hawaii..... **cilifemorata** n. sp.

57(46). Front tarsus of male with long dorsal ciliation (fig. 36a). Entire thorax dark brown or blackish, tinged with red. Front and face brown to black. Hawaii..... **aquila** n. sp.

Front tarsus of male with short, sparse ciliation (fig. 37b). Thorax rufous, tinged with brown. Face yellow, front predominantly so. Molokai and Maui..... **araiotrichia** n. sp.

58(44). Thorax predominantly brown, with cinereous to yellow-gray markings on the mesonotum..... 59

Thorax chiefly yellow to rufous, usually with brown vittae extending down the mesonotum..... 60

59(58). Mesonotum with a large brown spot on each side and a broad yellow-gray vitta extending down the middle (fig. 166a). Front tibiae and tarsus of male with long dorsal cilia extending over most of the length of the segments (fig. 166c). Oahu, Kauai, Molokai, Hawaii,

and probably Maui and Lanai. (All specimens from Hawaii and Kauai are females, but appear to belong here.) ..... **pilimana** Grimshaw.

The lateral brown spots are distinctly divided by a cinereous vitta on each side so that four vittae are present. The front tibia of the male lacks dorsal ciliation. The front tarsus has some long cilia extending down the anterodorsal surface but has a very large black spinelike development at the basal third of the dorsal surface of the basitarsus (fig. 92a); this appears to be made up of several long hairs fused together. Molokai and Maui ..... **fasciculisetae** n. sp.

60(58). Mesonotum with four brown longitudinal vittae; the lateral vittae may be interrupted at the suture 61

Thorax entirely yellow, without brown marks. Crossvein r–m infuscated (fig. 155b). Front legs as in figure 155a. Hawaii ..... **ochracea** Grimshaw.

61(60). The brown markings on the mesonotum consist of a pair of brown vittae extending down each side, narrowly separated down the dorsocentral row by a yellow line; these brown vittae converge on the anterior portion of the mesonotum and sometimes between the anterior and posterior dorsocentral bristles. The scutellum has two longitudinal stripes of brown extending over the disc. The spot on vein R_{2+3} is situated near the basal third of the vein (fig. 87d). Front tibia and tarsus of male as in figure 87c. Hawaii .... **engyochracea** n. sp.

The lateral vittae on the mesonotum are widely separated by yellow (the separation is equal in width to the median yellow vitta) and do not join on the hind part of the mesonotum. Scutellum all yellow or all brown on the disc. The spot on vein R_{2+3} is situated at the middle of the vein (fig. 175b). Front tibia of male with a clump of long, curved hairs at the base (fig. 175a). Oahu ..... **punalua** Bryan.

62(21). Apex of wings, or tips of veins R_{2+3}, R_{4+5}, and M_{1+2} infuscated with brown; sometimes only faint brown markings are located at the tips of the veins or on the m crossvein 63

Apex of wing, including the apices of the veins, hyaline or no darker than the remainder of the wing 126

63(62). Costal fringe very short, extending only a short distance beyond the apex of vein R_{2+3}. The reclinate and the inner vertical bristles are rudimentary or the mentum is very large and expanded (fig. 197a) 64

Costal fringe extending one-third or more of the distance between the apices of veins R_{2+3} and R_{4+5}. Head bristles and mentum not as above 65

64(63). Mentum of male enlarged, expanded as wide as oral depression. Head bristles normal. Front basitarsus of male one-half as long as the tibia and with scattered erect cilia (fig. 197c). Wings with a rather indistinct brown marking at apex. Hawaii ..... **tendomentum** n. sp.

Mentum not expanded. Reclinate and inner vertical bristles rudimentary. Front basitarsus about one-third as long as the tibia, densely covered with short erect cilia (fig. 49b). Wings with a dark brown spot occupying the apical fourth (fig. 49a). Molokai ..... **brevissima** n. sp.

65(63). Palpi and third antennal segment black. Pleura vittate, each with a broad, brown band extending longitudinally at a level with the upper two-thirds of the mesopleuron and with a brown streak over the upper edge of each sternopleuron. The mesonotum is brownish yellow; a conspciuous dark brown to black mark is present on each side behind the humerus. Front tarsus not ciliated (fig. 151b). Head shaped as in figure 151a. Oahu ..... **nigripalpus** n. sp.

Not fitting the above 66

66(65). Thorax predominantly brown to black, usually shining, sometimes densely gray pollinose. If the mesonotum is brown tinged with red, the pleura are mostly dark brown to black. Front tarsus of male lacking apical comb. 67

Thorax predominantly yellow to rufous; sometimes the mesonotum is yellow with longitudinal brown vittae; if the mesonotum is rufous tinged with brown, the pleura are predominantly or entirely yellow or front tarsus of male with an apical comb (fig. 164a). 101

67(66). Wings with a brown spot on each of the crossveins and with a faint spot at the apices of each of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section and the third

costal section is about two times longer than the fourth (fig. 159b). Mesonotum with three dark longitudinal vittae. Hind tibiae banded with brown. Tiny species: body, 1.5 mm. Hawaii, Molokai, Oahu, and Kauai ..... **parva** Grimshaw.

Not as above 68

68(67). Thorax and abdomen densely gray pollinose, with a faint indication of three brown vittae extending down the mesonotum. Wing markings faint (fig. 39b). Arista with four dorsal and two ventral rays in addition to the tiny apical fork. Front tarsus of male with long dorsal ciliation (fig. 39d). Labella armed with strong teeth (fig. 39a). Maui ..... **asketostoma** n. sp.

Body dark reddish brown to black, usually shining, sometimes lightly gray pollinose but with no brown vittae. Other characters not as above 69

69(68). Coxae and femora brown to black. Front tarsus lacking dorsal ciliation but with some cilia on the anterior and posterior surfaces, or the ventral surface is densely pilose. Predominantly shining black species. Scutellum all black. Crossvein m infuscated with brown 70

Not as above, legs usually all yellow, or at least the front legs are yellow and the scutellum usually yellow at the apex or on the disc 71

70(69). Large species: body and wings, 6.0 mm. Lower third of front yellow to rufous. Oral vibrissae with a secondary row of long curved hairs in addition to a row of four to five bristles (especially evident in the male) (fig. 150c). Posteroventral surface of front femur of male very densely bristled. Front tibia as in figure 150d. Labellum of male not rimmed with black. Maui ..... **nigra** Grimshaw.

Smaller species: body and wings, 4.0 mm. Lower portion of front brownish yellow. Vibrissae not arranged in a dense clump but consist of about three bristles plus scattered hairs. Front femur not densely bristled. Tibia and tarsus different, as in figure 114a. Labellum of male with a heavy rim. Hawaii and Maui ..... **iki** Bryan.

71(69). Front basitarsus lacking an appendage at the apex 72

Front basitarsus with a strong dorsal appendage at apex (fig. 65a). Pleura all yellow. Mesonotum and scutellum dark brown. Hawaii..... **cnecopleura** n. sp.

72(71). Front basitarsus two or more times longer than the second tarsal segment..... 73
Front basitarsus slightly shorter than the second tarsal segment. Sternopleura, hypopleura, and all of the legs yellow. Antennae bright yellow in the male. The costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. Kauai..... **melanosoma** Grimshaw.

73(72). Lower reclinate bristle of the male larger than the proclinate. Front tarsus of male with long dorsal ciliation (fig. 116a). Wings with a rather dark brown apical spot and with a basal brown spot (fig. 116b). Thorax largely dark reddish brown, tinged with black. The scutellum is yellow-brown on the disc. The face is black. Hawaii..... **imparisetae** n. sp.
Lower reclinate bristle smaller than, or scarcely equal to, the proclinate. Most characters not as above..... 74

74(73). Wings hyaline except for a dark brown streak extending along the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, as in figure 77b. Oahu..... **denotata** n. sp.
Wing markings not as above..... 75

75(74). Wings rather evenly infuscated, no distinct brown markings present but with the apicoanterior portion slightly darker than the remainder of the wing. Front basitarsus of the male with a clump of about five black dorsal cilia at apex (fig. 122a). Labella not ornate (note that this species is also being keyed in the section with dark markings lackings in the wings). Hawaii..... **intermedia** n. sp.
Not as above..... 76

76(75). Large, polished black species with the apex of the scutellum narrowly yellow. Body and wings 5.35 mm. Wings with a large dark brown spot occupying the apical third and with a hyaline streak extending through each of cells R_1, R_3, R_5, and 1st M_2 as in figure 183a. Only one humeral bristle present. Oahu..... **sabroskyi** n. sp.

Not fitting the above 77

77(76). Face, genae, and palpi yellow (the palpi are brown in the females). Labellum of male with a heavily sclerotized black rim (fig. 107b) 78
Face, genae, and palpi chiefly or entirely brown to black and/or no such sclerotized rim on the labellum of the male 95

78(77). Males 79
Females 88

79(78). Antennae yellow, arista with three to seven dorsal rays and usually two ventral rays. Inner surface of arista sparsely haired on apical half 80
Third antennal segment and dorsal portion of second segment brown. Eight dorsal and three ventral rays on arista (fig. 107a). Inner surface of arista rather thickly haired over almost the entire length. Maui ..... **haleakalae** Grimshaw.

80(79). Sternopleura brown to black. Thorax opaque, brownish pollinose on the dorsum, gray on the sides. Abdomen all brown 86
Sternopleura entirely yellow. Thorax shining black on the dorsum. Apex of sixth tergum and the genitalia usually yellowish 81

81(80). Ocellar bristles displaced, located in front of the ocellar triangle, about opposite the proclinate bristles. Front yellow, upper half gray pollinose. Mesonotum gray-white pollinose. No distinct dark mark present in the wing but the anteroapical portion is slightly darker brown fumose than the remainder of the wing. Maui ..... **transfuga** n. sp.
Ocellar bristles normal 82

82(81). Only one humeral bristle present. Wings with a large dark brown spot over the apical third and a dark brown spot over the m crossvein (fig. 207b). Front basitarsus long and slender. Front tibia only 1.2 times longer than the basitarsus. Front entirely yellow except for the upper eye orbits. Molokai ..... **venusta** n. sp.
Two humeral bristles present, other characters not as above 83

83(82). Crossvein m hyaline, not infuscated with brown. Front largely or entirely yellow. Front basitarsus slender,

two-thirds as long as the tibia 84
Crossvein m infuscated with brown. Front black above a level with the proclinate bristles. Front basitarsus not over two-fifths as long as the tibia 85

84(83). Upper half of each pleuron dark brown to black. The interfrontal area, between the ocellar triangle and the eye orbits, is yellow, tinged faintly with reddish brown. The brown marking is spread over the wing apex, including the apical portion of cell R_1. Male genitalia as in figure 133c. Oahu ..... **mecocnemia** n. sp.
Pleura entirely yellow except for a tinge of brown on the metapleura and upper pteropleura. Interfrontal area brown. Wing with a well-defined oblong spot at apex (fig. 121a). Male genitalia as in figure 121b. Oahu ..... **insignita** n. sp.

85(83). Front tibia with a prominent, erect posteroventral hair at the middle and another which is preapical in position. The front tibia measures about 0.66 mm. and the basitarsus measures 0.38 mm. Ventral lobes of ninth tergum rather densely setose at apices (fig. 95d). Oahu ..... **flavisternum** n. sp.
Front tibia lacking such hairs. Tibia and tarsus short, averaging 0.45 mm. for the tibia and 0.22 mm. for the basitarsus. Ventral lobe of ninth tergum almost devoid of setae (fig. 169e). Oahu ..... **pretiosa** n. sp.

86(80). Wing markings rather indistinct; no distinct brown marking present on the m crossvein. No long ciliation present on the front tibia or tarsus 87
Wing markings dark brown, with a large spot on the m crossvein (fig. 193c). Front tibia and tarsus ciliated (fig. 193a, b). Oahu ..... **swezeyi** n. sp.

87(86). Last section of vein M_{1+2} equal to the penultimate section. Front predominantly yellow. (Position questionable.) Hawaii ..... **flaviceps** Grimshaw.
Last section of vein M_{1+2} is 1.5 times longer than the penultimate section. Front brown to black on the upper two-fifths to one-half. Maui, Lanai, and Molokai ..... **melanoloma** n. sp.

88(78). Sternopleura conspicuously marked with yellow 89
Sternopleura brown to black 91

89(88). Sternopleura entirely yellow 90

Sternopleura brown along the upper edges. Oahu ..... **pretiosa** n. sp.

90(89). Palpi brown to black. Oahu ..... **mecocnemia** n. sp.
Palpi yellow, very faintly discolored with brown. Oahu ..... **flavisternum** n. sp.

91(88). Wing markings rather indistinct, no dark brown mark present on the m crossvein 92
Wing markings dark brown; a large brown spot is present on the m crossvein. (Female unknown, but it will probably run here.) Oahu ..... **swezeyi** n. sp.

92(91). Last section of vein M_{1+2} at least one-third longer than the penultimate section. Upper half to three-fifths of front brown to black 93
Last section of vein M_{1+2} equal to the penultimate section. Front predominantly grayish yellow. (The exact position of this species is questionable.) Hawaii ..... **flaviceps** Grimshaw.

93(92). Arista with about eight dorsal and three ventral rays. Inner surface of arista hairy. All femora yellow. Anterior dorsocentral bristles situated about halfway between the first and second supraalar bristles, i.e., the distance between the anterior dorsocentral bristle and the posterior dorsocentral bristle is about equal to the distance from the posterior dorsocentral bristle to the hind margin of the mesonotum 94
Arista with four to five dorsal and two ventral rays. Inner surface of arista sparsely haired on the apical portion. Middle and hind femora marked with brown. Anterior dorsocentral bristle opposite the first supraalar; the distance between the anterior dorsocentral and the posterior dorsocentral is one-half greater than the distance from the posterior dorsocentral to the hind margin of the mesonotum. Molokai and Maui ..... **melanoloma** n. sp.

94(93). Front femur with very long posteroventral bristles, three to four times greater than the width of the femur (fig. 130a). Front tibia with abundant short erect hairs over all surfaces. Wings expanded on apical half, brown markings extending to about level with the m crossvein (fig. 130b). Maui ..... **macrochaetae** n. sp.

Bristles of front femur normal. Posteroventrals about 1.5 times longer than the width of the femur (fig. 107d). Front tibia not as above. Wings narrower, brown markings not so extensive (fig. 107c). Maui ..... **haleakalae** Grimshaw.

95(77). Front tarsus of male not ciliated 96
Front tarsus of male with long ciliation 97

96(95). Shining black species with the apex of the scutellum yellow. Last section of vein M_{1+2} is 1.35 times longer than the penultimate section. Hawaii ... **fungicola** n. sp.
Brown, tinged with yellow and with two yellow vittae down the mesonotum. Last section of vein M_{1+2} is 1.05 times longer than the penultimate section. Maui ..... **incompleta** n. sp.

97(95). Crossvein m infuscated with brown. Labellum of male with yellow spines at the margin 98
Crossvein m hyaline. Labellum of male with a clump of black spines at the margin (fig. 141c) 100

98(97). Front basitarsus of male with numerous long dorsal cilia extending over at least the apical three-fourths of the segment. Second tarsal segment with long hairs over the dorsal surface (fig. 60b) 99
Front basitarsus with only six or seven dorsal cilia, confined to the apical half. Second tarsal segment with three rather long dorsal hairs at the apex (fig. 28a). Maui ..... **amydrospilota** n. sp.

99(98). Front tarsus of male with one row of long anterodorsal cilia extending to the base of the segment (fig. 60b). Front basitarsus two-fifths as long as the tibia. Labellum of male with a fringe of yellow spines around the margin (fig. 60a). Third costal section six times longer than the fourth. The markings at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2} are distinct. Hawaii ..... **chaetopeza** n. sp.
Front tarsus with two rows of long dorsal hairs, basal one-fourth of basitarsus bare. Front basitarsus one-half as long as the tibia. Labellum with three long closely placed spines in the median portion. Apical spots on wing veins small and indistinct. (Some specimens may run here.) Hawaii, Maui, and Molokai. ..... **olaae** Grimshaw.

100(97). Front tibia of male densely covered with short erect hairs over the posterior and posterodorsal surfaces; the hairs are about equal in length to the preapical dorsal bristle of the tibia. Front tarsus with long cilia extending down the posterodorsal, dorsal, and anterodorsal surfaces. Labellum not narrowed at apex (fig. 141c). Hawaii and Molokai ..... **mitchelli** n. sp.

Front tibia lacking erect hairs. Tarsus with long cilia only down the dorsal surface. Labellum narrowed at apex (fig. 153b). Hawaii ..... **nigrocirrus** n. sp.

101(66). Wing markings consisting of a large conspicuous brown spot occupying the apical one-third to one-fourth of the wing. Anterior sternopleural bristle small, hairlike, one-fourth to one-third as long as the posterior bristle. Front legs not ciliated. Tiny species: body, 2.00 mm.; wings, 2.25 mm. 102

Not fitting the above characters 103

102(101). Wing spot oval in shape and occupying about the apical one-fourth of the wing as in figure 195c. Third costal section 5.75 times longer than the fourth; the last section of vein M_{1+2} is 3.3 times longer than the penultimate section. Front basitarsus slender, two times longer than the second tarsal segment and three-fifths as long as the tibia. Oahu ..... **tamashiroi** n. sp.

Wing markings widespread over the apical two-fifths of the wing. The third section of the costa is about 3.48 times longer than the fourth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. Front basitarsus shorter than the second segment (fig. 104a). Kauai ..... **fuscoapex** n. sp.

103(101). Mesonotum predominantly yellow with distinct brown longitudinal vittae 104

Mesonotum not vittate 108

104(103). Front tarsus lacking long cilia (fig. 143a). Mesonotum with five brown vittae, or with two yellow vittae 105

Front tarsus long ciliated 106

105(104). Mesonotum yellow, with five brown vittae. Front predominantly yellow, face entirely so. Molokai ..... **musae** n. sp.

Mesonotum brown with two yellow vittae. Front brown, tinged faintly with yellow. Lower half of face yellow-brown. Maui ..... **incompleta** n. sp.

106(104). Crossvein r–m situated near the basal one-fourth of cell 1st M_2. Last section of vein M_{1+2} just slightly longer than the penultimate section. A dark brown subbasal spot present at the apex of the second costal cell. Mesonotum with two to four brown vittae.....107

Crossvein r–m situated just slightly before the middle of cell 1st M_2. Last section of vein M_{1+2} nearly two times longer than the penultimate section. No subbasal spot present in the second costal cell (fig. 184a). Mesonotum with six narrow brown vittae. Front tarsus of male as in figure 184b. Oahu....**sadleria** Bryan.

107(106). Front tibia of male with long ciliation on anterior and dorsal surfaces. Pleura all yellow. Larger species: body, 6.50 mm.; wings, 6.70 mm. Oahu .....**distinguenda** n. sp.

Front tibia lacking ciliation. Pleura predominantly brown. Smaller species: body, 3.40 to 3.75 mm.; wings, 3.80 to 4.20 mm. Oahu.....**inedita** n. sp.

108(103). Large species: body, 5.25 mm.; wings, 6.00 mm. Body chiefly brownish red. Front tibia and tarsus of male devoid of long ciliation, but the tibia is produced into a thumblike process at apex. The front femur has a dense clump of black hairs on the anteroventral surface near base (fig. 30a). Kauai.....**anomalipes** Grimshaw.

Not as above, usually smaller species. Legs differently developed.....109

109(108). Front femur with a row of short stout spines along the anteroventral edge. A rufous species. The crossveins and tips of veins R_{2+3}, R_{4+5}, and M_{1+2} very lightly infuscated. Cosmopolitan.....**immigrans** Sturtevant.

No such stout spines on the front femur.....110

110(109). Crossvein r–m covered by a large, dark brown, round spot which extends into the surrounding cells nearly filling cells R_1 and 1st M_2 opposite the r–m crossvein (fig. 131b). Thorax yellow, tinged lightly with brown. Third costal section about three times as long as the fourth. Oahu .....**magnimacula** n. sp.

Crossvein r–m infuscated only in *mimica* n. sp. and *pychnochaetae* n. sp. and never covered by a large spot which extends into the surrounding cells. Third costal section over four times longer than the fourth 111

111(110). Front basitarsus of male with either a strong basal or an apical appendage as in figures 88b and 96b 112
Front legs not as above 113

112(111). Only four segments in the front tarsus of the male. The basitarsal appendage is apical in position and longer than the remainder of the segment. The preapical dorsal bristle of the front tibia is large, as long as the basal portion of the basitarsus (fig. 88a). Mesonotum yellow. Hawaii ..... **enoplotarsus** n. sp.
Front tarsus with five segments. Basitarsal appendage basal in position, scarcely one-half as long as remainder of segment. Preapical dorsal bristle of tibia tiny (fig. 96b). Mesonotum brownish red. Oahu ..... **freycinetiae** n. sp.

113(111). Front tarsus of male with the second segment produced dorsally into a thumblike projection (fig. 168c). Labellum of male as in figure 168a. Front tibia of male flattened laterally and carinate along the dorsal surface. Hawaii ..... **polliciforma** n. sp.
Not as above 114

114(113). Front basitarsus of male expanded dorsally in the middle bearing two strong black bristles and about five comblike black hairs on the expanded portion (fig. 164a). Anterior reclinate bristle equal in size to the proclinate. Wings marked with brown only around the apex (fig. 164b). Kauai ..... **perissopoda** n. sp.
Not as above 115

115(114). Anterior reclinate bristles situated behind or opposite the proclinates. Male with two pairs of strong dorsocentral bristles and the apical bristle of the male palpus not unusually large. Crossvein r–m not infuscated 116
Anterior reclinate bristles situated below the proclinates. Only one pair of well-developed dorsocentral bristles present in the male, the second pair weak, rudimentary. The apical bristle of the male palpus is elongate, about equal in length to the palpus (fig. 139b). Crossvein r–m is distinctly infuscated with brown. Hawaii and Kauai ..... **mimica** n. sp.

116(115). Front tarsus of male ciliated 117
Front tarsus lacking long ciliation (fig. 124a). Wings

lightly infuscated, with rather faint brown markings over the apex and over the m crossvein. Maui ..... **joycei** n. sp.

117(116). Wings rather intensely yellow-brown fumose throughout, darker brown at apices of veins R_{2+3}, R_{4+5}, M_{1+2}, and over the m crossvein (fig. 214b). Front tibia of male lacking long ciliation, front tarsus with long cilia over the dorsal surface of the second segment and over the apical half of the basitarsus (fig. 214a). Mesonotum with two longitudinal black vittae. (This species usually fits best in the group which has a continuous marking along the anterior margin of the wing, but some specimens may run here.) Molokai and Maui ..... **xuthoptera** n. sp.

Wings predominantly hyaline or subhyaline. Front legs different, mesonotum not vittate, and anterior margin of wings not marked with brown 118

118(117). Crossvein m covered by a large dumbbell-shaped brown spot (fig. 160b) 119

If a brown marking is present over the m crossvein, it is not expanded 120

119(118). Thorax brown, tinged with red or yellow. Wings with a dark brown spot at apex of second costal cell; this spot extends through the basal portion of cells R_3 and R_5. Female ovipositor elongate (fig. 160c). (Known only from the female.) Hawaii ..... **paucipuncta** Grimshaw.

Thorax entirely yellow. Wings lacking the brown subbasal spot. Female ovipositor short, triangular, not extending much beyond apices of anal plates. Front basitarsus of male with a dense clump of black hairs on the dorsal surface just before the apex (fig. 176c). Oahu ..... **pychnochaetae** n. sp.

120(118). Crossvein m infuscated with brown. Labellum of male with processes on the apical margin 121

Wings hyaline except for a large anteroapical brown spot. Labellum fleshy, not ornate. Front basitarsus as in figure 59c. Oahu ..... **carnosa** n. sp.

121(120). Front tibia of male lacking long ciliation. Front basitarsus rather slender, not flattened laterally, and about one-half as long as the tibia. Female front one-

third wider than long; the anterior reclinate bristle is situated just below the middle of the front, measured from the lower ocellus to the anterior margin 122

Front tibia of male with five erect posteroventral cilia just before the apex. Front basitarsus short and flattened laterally (fig. 124d), about one-third as long as the tibia. Female front about as long as wide, anterior reclinate bristles situated at lower third of front. Pale yellow species. Oahu ..... **kauluai** Bryan.

122(121). At least the basal half of each front basitarsus of male devoid of cilia (fig. 79b). Apical wing markings in the form of spots at the tips of the veins (fig. 79c).... 123

Entire basitarsus ciliated, at least on anterodorsal surface (fig. 120d). The anteroapical portion of the wing is at least faintly infuscated or the entire wing apex is distinctly brown 124

123(122). Apical half of front basitarsus of male ciliated (fig. 79b). Wings with an indistinct marking of brown along the base of vein R_{4+5}. Hawaii and Molokai ..... **diminuens** n. sp.

Cilia of front basitarsus confined to a dense clump at the apex of the segment (fig. 32a). Wing base not marked with brown. Hawaii ..... **apicipuncta** n. sp.

124(122). Predominantly or entirely yellow to rufous. At least the lower half of the front and all of the face and genae yellow. If the anterior reclinate bristle is as long as the proclinate, the front tarsus is densely haired as in figure 78a 125

Thorax brown, sometimes tinged with rufous. Front, face, and genae dark colored, brown to black. Anterior reclinate bristle larger than proclinate. (Some specimens may run here.) Hawaii ..... **imparisetae** n. sp.

125(124). Anterior reclinate bristles smaller than proclinates. Pleura and scutellum yellow. Front entirely yellow. Labellum of male ornate (fig. 120a). Front basitarsus of male rather sparsely ciliated (fig. 120d). Shining species, with three rather distinct bristles on each humerus. Hawaii ..... **infuscata** Grimshaw.

Anterior reclinate bristles as long as the proclinates. Disc of scutellum and upper edge of mesopleuron brown. Upper half of front brown to black. Label-

lum not ornate. Front tarsus densely ciliated especially near the apex (fig. 78a). Maui ..... **diffusa** n. sp.

126(62). Wings brown only in the second costal section and through the middle of the basal cells (fig. 188c). Costal margin faintly infuscated. Thorax and abdomen polished black, legs bright yellow 127

Wings fuscous only on one or both crossveins, except in *D. sharpi* Grimshaw which has the second costal cell brownish fumose; the body of *sharpi*, however, is reddish not black 128

127(126). Front tibia of male with a single long black anterodorsal bristle near the apical three-fifths of the segment. Front basitarsus with two very long black dorsal bristles near the base (fig. 188b). Molokai .... **setiger** Grimshaw.

Front tibia with four black bristles on the anterodorsal surface. Basitarsus with three black posterodorsal bristles and one anterodorsal bristle; the second and third tarsal segments each with one black posterodorsal bristle (fig. 115a). Oahu ..... **imitator** n. sp.

128(126). A longitudinal row of short stout bristles extends along the anteroventral surface of the front femur (fig. 147a). Male genitalia as in figure 147b. Third costal section about 3.5 times longer than the fourth. Cosmopolitan ..... **nasuta** Lamb.

No such row of stout bristles on the front femur. Third costal section five or more times longer than the fourth 129

129(128). Last section of vein M_{1+2} two times longer than the penultimate section. Vein R_{2+3} curves upwards at its tip. Thorax dark cinereous with three obscure, dark, longitudinal vittae. Front basitarsus of male less than one-fourth as long as the tibia. Arista with three dorsal and one ventral ray in addition to the apical fork. Tiny species: length of body and wings, 1.50 to 2.00 mm. Hawaii, Molokai, Kauai, and Oahu .... **parva** Grimshaw.

Not as above 130

130(129). Front tarsus of male with the second segment produced dorsally into a thumblike projection (fig. 168c). Front basitarsus of male flattened laterally and with a sharp

dorsal keel (fig. 168b). Male labellum as in figure 168a. Hawaii ..... **polliciforma** n. sp.

Not as above 131

131(130). Mesonotum and scutellum brown to black 132

Thorax all rufous, faintly tinged with brown 138

132(131). Two pairs of strong dorsocentral bristles present; the anterior bristle is one-half to two-thirds as long as the posterior bristle 133

Anterior dorsocentral bristles rudimentary, inconspicuous, about two times longer than acrostichal setae, and about one-third as long as the posterior bristle. Kauai ..... **flavibasis** n. sp.

133(132). Front tarsus of male ciliated 134

Front tarsus of male lacking long hair. Hawaii ..... **involuta** n. sp.

134(133). Front basitarsus slender, one-half or more as long as the tibia. Anterior reclinate bristles situated above the proclinates. Labellum of male as in figures 156a and 208a. Front not gray pollinose 135

Front basitarsus short, rather thick, one-third as long as the tibia. Anterior reclinate bristles situated opposite the proclinate. Species either with silvery gray pollen on the front, or the labellum has a dark-colored projection at the apex (fig. 111b) 136

135(134). Front basitarsus about one-half as long as the tibia and with two rows of long cilia (fig. 156c). Face predominantly brown, with a broad carina down the middle. Larger species: wings, 5.0 to 6.0 mm. Abdomen marked with yellow on the sides of the terga. Labellum as in figure 156a. Hawaii, Maui, and Molokai ..... **olaae** Grimshaw.

Front basitarsus over one-half as long as the tibia, with about five rather short curved hairs in a single row down the dorsum, and with two long dorsal hairs at the apex (fig. 208b). Face yellow, carina not noticeably broad. Smaller species: wings, 3.3 mm. Abdomen all brown. Labellum as in figure 208a. Maui ..... **vicaria** n. sp.

136(134). Basitarsus of male with long dorsal and posteroventral cilia extending down the whole length of the segment (fig. 40b) and with abundant erect setae over

the posterior surface. Maui ..... **badia** n. sp.
Front basitarsus with only dorsal ciliation 137

137(136). Pleura brown. Labellum of male developed into a dark brown to black, bluntly pointed, projection at the apex (fig. 111b) and lacking curved spines. (Most specimens run in the group which has the wings entirely hyaline; however, some may possibly run here.) Maui, Molokai, and Hawaii? ..... **hirtitarsus** n. sp.
Pleura yellow. Labellum fringed with curved spines and not produced as above. Molokai ..... **conjectura** n. sp.

138(131). Two humeral bristles present. Pleura not marked with brown spots 139
One humeral bristle present. Pleura with three conspicuous brown spots. Front femur and tibia as in figure 65b. Maui ..... **comatifemora** n. sp.

139(138). Second costal cell lacking brown markings except for a narrow border along the upper edge of vein R_1 in *quasianomalipes* n. sp. Crossvein m faintly infuscated. Front femur of male sometimes densely haired beneath as in figure 178a 140
Apical one-half to two-thirds of second costal cell brown. Crossvein m distinctly infuscated with brown. Front femur lacking long hairs or unusual bristles beneath. Kauai ..... **sharpi** Grimshaw.

140(139). Second costal cell marked with brown along the upper edge of vein R_1. Pleura all rufous. Entire ventral surface of front femur hairy (fig. 178a). Front tibia with a ventral swelling at the apex; this appears as a brown striated area (fig. 178c). Kauai. ..... **quasianomalipes** n. sp.
Wings infuscated only over the m crossvein. Pleura with two brown vittae over the upper half. Femur not hairy ventrally. Front tibia not as above. Tarsus ciliated as in figure 51c. Oahu ..... **bridwelli** n. sp.

141(4). A pair of well-developed presutural dorsocentral bristles present. Small species with a short costal fringe, lacking ornamentation on the front tarsus, and with a sclerotized black rim at the apex of each labellum. Oahu ..... **praesutilis** n. sp.
No presutural dorsocentral bristle developed. Sometimes with a large presutural seta in the dorsocentral

row 142

142(141). Middle and hind tibiae conspicuously banded with two brown rings 143

Middle and hind tibiae not banded, or, if a faint indication of brown bands is on the hind pair, the inner vertical bristles are longer than the head height (fig. 172a) 147

143(142). The costal fringe extends to or near the apex of vein R_{4+5} 144

Costal fringe comparatively short, extending not over half-way between the apices of veins R_{3+4} and R_{4+5} 145

144(143). Wings pointed at the apex. Costal fringe extending slightly beyond the tip of vein R_{4+5}. Third costal section 2.3 times longer than the fourth. Only two humeral bristles developed. Tibiae predominantly brown. Maui ..... **lonchoptera** n. sp.

Wings rounded at apex. The costal fringe ends slightly before the tip of vein R_{4+5}. Third costal section 3.3 times longer than the fourth. Three humeral bristles present. Tibiae predominantly yellow. Molokai ..... **prolixa** n. sp.

145(143). Mesonotum distinctly vittate. Front tarsus of male not ciliated. Mouthparts of male not ornate 146

Mesonotum entirely brown. Front basitarsus of male with three long, anterodorsal cilia (fig. 24b). Each labellum armed with a long slender apical appendage (fig. 24a). Kauai ..... **adventitia** n. sp.

146(145). Front femur strongly swollen (fig. 70a), predominantly dark brown to black with the ventral surface rufous. Male genitalia with a large conspicuous, transparent semi-membranous lobe arising posteriorly from the ninth tergum; this is plainly visible *in situ* (fig. 70b). Aedeagus enlarged, bulbous at the tip, usually protruding beyond the remainder of the genitalia. Ovipositor plates of female pointed apically, seventh sternum not expanded (fig. 70c). Maui, Molokai, Kauai, Hawaii, and Oahu ..... **crassifemur** Grimshaw.

Front femur not so swollen, entirely dark brown to black. No such lobe on the ninth tergum, the tergum expanded ventrally on each side into an attenuated

densely hairy lobe. Anal plates nearly as long as high. Ovipositor plates of female broad and blunt (fig. 146e). Ninth sternum of female greatly swollen and yellow. Molokai and Maui ..... **nasalis** Grimshaw.

147(142). Front femur of both sexes with a row of short anteroventral spines on the apical half (fig. 115d). Usually a faint indication of brown is present at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, or over the m crossvein 148

Not as above 149

148(147). Abdominal terga banded with brown. Third costal section 4.5 to 5.0 times longer than the fourth. Front basitarsus of male one-third as long as the tibia. Tarsus short ciliated (fig. 115d). Cosmopolitan ..... **immigrans** Sturtevant.

Abdomen pale yellow, tinged lightly with brown but with no distinct brown bands. Third costal section 3.0 to 3.5 times longer than the fourth. Front basitarsus one-half as long as the tibia. Tarsus not ciliated. Western United States, Pacific region, and Southeast Asia ..... **nasuta** Lamb.

149(147). Mesonotum yellowish with distinct brown to black longitudinal stripes, the median one forked posteriorly (fig. 54a). The preapical dorsal bristles are lacking on the front and middle tibiae. Cosmopolitan ..... **busckii** Coquillett.

Not as above. Preapical dorsal bristles are present on the front tibiae; these are rudimentary only in *D. mycetophila* n. sp. 150

150(149). Middle tibia of male strongly clavate (fig. 63d). Thorax yellow 151

Middle tibia not as above 152

151(150). The enlarged portion of the middle tibia is longer than the attenuated portion, and the apical fourth of the segment is black (fig. 104d). Front tibia and tarsus all yellow. The ciliation of the front basitarsus is as in figure 104c. The anterior reclinate bristles are situated opposite the proclinates. Maui ..... **fusticula n. sp.**

The enlarged portion of the middle tibia is entirely black and about one-half as long as the attenuated portion (fig. 63d). Front tibia and basitarsus brown

to black. Basitarsus as in figure 63c. The anterior reclinate bristles are situated in front of the proclinates. Molokai ..... **clavitibia** n. sp.

152(150). Front basitarsus of male bearing a conspicuous appendage which is equal to or longer than the remainder of the segment (figs. 43b, 96b, 161d) 153

No strong projection present on the front basitarsus; if the basitarsus is pointed on the upper apex the point is less than one-third the length of the segment 166

153(152). Only four distinct segments present in the front tarsus of the male; basitarsal appendage apical in position 154

Five segments in the front tarsus. Basitarsal appendage basal in position. (Some specimens may run here.) Oahu ..... **freycinetiae** n. sp.

154(153). A strong apicoventral bristle present on the front tibia in both sexes 155

No apicoventral bristle present on the front tibia 159

155(154). The base of the front basitarsus densely setose above; the apical appendage rather thick and curved (fig. 43b). The anterior reclinate bristle is one-third to one-half longer than the proclinate. The anterior dorsocentral bristle is smaller than the humeral bristles. Hawaii ..... **basisetosa** n. sp.

The base of the front basitarsus nearly devoid of setae; the appendage not as above. Anterior reclinate bristles equal to or smaller than the proclinates. Anterior dorsocentral bristles about equal to the humeral bristle 156

156(155). The appendage of the front basitarsus longer than the base and distinctly capitate or clavate, or with a comblike row of black dorsal setae and with a dorsal bristle at the apex (figs. 58b, 63b, 161d) 157

The appendage scarcely over one-half as long as the base of the basitarsus and short and thick (fig. 84a) with yellow setae over the dorsal surface. Oahu ..... **dorsigera** n. sp.

157(156). The appendage on the front basitarsus distinctly capitate, not comblike. Anterior reclinate bristles smaller than proclinates 158

The appendage on the front basitarsus straight-sided with numerous erect comblike setae along the anterior edge (fig. 161d). Anterior reclinate bristles equal in size to the proclinates. Hawaii ..... **pectinitarsus** n. sp.

158(157). The appendage of the front basitarsus gradually enlarged and hairy all along the anterior edge (fig. 63b). The costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. Oahu and Molokai ..... **clavata** n. sp.

The appendage strongly attenuated, swollen and hairy only on the apical half (fig. 58b). Costal fringe extending one-third the distance to vein R_{4+5}. Kauai ..... **capitata** n. sp.

159(154). Anterior reclinate bristles long and slender, three to four times longer than the proclinates 160

Anterior reclinate bristles of male about equal to or smaller than the proclinates 162

160(159). The process on the front basitarsus not strongly curved, rather short and thick, about equal in length to the basal portion of the segment (fig. 174a). Maui and Hawaii ..... **propiofacies** n. sp.

The appendage on the front basitarsus slender and curved, two times longer than the base (fig. 69c) 161

161(160). Front tibia with a row of rather strong posterior setae at apex. Pleura entirely brown. Abdominal terga five and six almost all yellow. Front coxae tinged with brown. Maui and Hawaii ..... **cracens** n. sp.

Front tibia lacking conspicuous setae at the apex. Sternopleura and propleura yellow. Abdomen brown except for the yellow-brown sixth tergum. Legs yellow. Molokai ..... **proceriseta** n. sp.

162(159). The appendage on the front basitarsus with strong black dorsal hairs over the basal portion. Maui ..... **fundita** n. sp.

The appendage with dorsal hairs on the apical portion 163

163(162). The appendage on the front basitarsus curved and slender, at least slightly clavate on apical half (fig. 29a), strongly so in *attenuata* n. sp. (fig. 40a) 164

The appendage straight-sided, not enlarged apically

. 165

164(163). The appendage on the front basitarsus strongly clavate with a long attenuated base, and nearly two times longer than the second tarsal segment (fig. 40a). Fourth costal section less than one-half longer than the fifth, and the costal fringe extending beyond the middle of the distance between the tips of veins R_{2+3} R_{4+5}. The sides of the face are straight. Hawaii . . . . . **attenuata** n. sp.

Not so shaped and slightly shorter than the second tarsal segment (fig. 29a). Fourth costal section about two times longer than the fifth. Costal fringe extending scarcely over one-third the distance from the apices of veins R_{2+3} to R_{4+5}. Sides of face convergent below. Maui . . . . . **ancyla** n. sp.

165(163). The appendage on the front basitarsus is shorter than the second tarsal segment. Mesonotum brown, tinged with red. Molokai and Maui? . . . . . **variabilis** n. sp.

The appendage is nearly two times longer than the second tarsal segment and drawn to a slender point at the apex. The mesonotum is rufous. (Some specimens may run here.) Hawaii . . . . . **enoplotarsus** n. sp.

166(152). Palpi greatly enlarged, very conspicuous, three or more times normal size (fig. 132a). Male genitalia as in figure 132b. Kauai . . . . . **magnipalpa** n. sp.

Not as above 167

167(166). Front basitarsus (of both sexes, at least in *melanosoma*) very short, shorter than the second tarsal segment (figs. 50b, 138a) 168

Front basitarsus distinctly longer than the second tarsal segment 171

168(167). Front basitarsus lacking prominent hairs or bristles (fig. 138a). Body polished black except for the yellow sternopleura and yellow apex of the scutellum. The labellum of the male with a black rim at the apex. (Some specimens may run here.) Kauai . . . . . **melanosoma** Grimshaw.

Front basitarsus with a row of strong curved apicodorsal bristles (fig. 50b). Body not as above. Labellum not with a black rim 169

169(168). Front basitarsus not expanded, bristles arranged over

the dorsal two-thirds to three-fourths of the basitarsus (fig. 50b). Second tarsal segment with three prominent anterodorsal black hairs. Oahu ..... **brevitarsus** n. sp.

Front basitarsus expanded dorsally and with the bristles confined to the dorsoapex (fig. 91a). Second tarsal segment not as above 170

170(169). Front basitarsus notably produced at dorsoapex. One black dorsoapical cilia present on the second segment (fig. 91a). Front tibia short and thick, about two-thirds as long as the femur. Hawaii and Maui .... **expansa** n. sp.

Front basitarsus gently expanded dorsally. Two black bristles present at the apex of the second tarsal segment plus one long bristle in the middle of the segment. Tibia slender and elongate, just slightly shorter than the femur. Maui ..... **quasiexpansa** n. sp.

171(167). Front basitarsus of male terminating in a hairy knob dorsally. Second tarsal segment with a strong dorsal projection at apex (fig. 44a, 128b) 172

Not as above 173

172(171). Only one pair of dorsocentral bristles situated on the mesonotum. Large conspicuous acrostichal setae present on the anterior portion of the mesonotum. Anterior reclinate bristle nearly two times longer than the proclinate. Mesonotum rufous with a brown longitudinal vitta extending down the middle. Maui ..... **lemniscata** n. sp.

Two pairs of dorsocentral bristles present. The anterior acrostichals not enlarged. Anterior reclinate bristles smaller than proclinates. Mesonotum entirely dark brown. Hawaii ..... **bicondyla** n. sp.

173(171). Second tarsal segment of the front legs of male short, broad, and flat; concave on the anterior surface, spoonlike (fig. 82a) 174

Front tarsus not as above 178

174(173). Front tibia of male with a row of strong black bristle-like setae down the dorsal surface and another down the posterodorsal surface (fig. 82a). The preapical dorsal bristle of the front tibia is difficult to differentiate because of the strong setae. Front basitarsus one-third as long as the tibia 175

Front tibia lacking the rows of strong setae, sometimes with rather densely placed erect setae scattered over the posterior surface. Front basitarsus approximately one-half as long as the tibia 176

175(174). Body predominantly or entirely dark brown to black. Front basitarsus of male almost one-half as long as the tibia and lacking a clump of bristles on the posterior surface. Face convex, plainly visible from a lateral view. Front femora yellow-brown. Maui, Molokai, Hawaii, and Lanai ..... **disticha** n. sp.

Almost entirely yellow, tinged with brown on the abdomen. Front basitarsus one-fourth to one-fifth as long as the tibia, and with a dense clump of black bristles on the posterior surface near base (fig. 69b). Face receding, not visible from a lateral view (fig. 69a). Maui ..... **contorta** n. sp.

176(174). Antennae, face, clypeus, palpi, and front coxae yellow. Front yellow, tinged with brown. Molokai ..... **mimiconformis** n. sp.

Antennae, lower face, clypeus, and palpi dark brown to black. Front coxae tinged with brown. Front brown, sometimes tinged with yellow 177

177(176). Front tibia densely covered with erect setae on the posterior surface. Femora discolored with brown. Hawaii ..... **septuosa** n. sp.

Front tibia lacking conspicuous erect setae on the posterior surface. All femora yellow. Hawaii and Molokai? ..... **neutralis** n. sp.

178(173). Costal fringe elongate, extending almost to the apex of vein R_{4+5} 179

Costal fringe extending not over one-half the distance from the tip of vein R_{2+3} to R_{4+5} except in *varga* n. sp. in which the costal fringe extends about two-thirds the distance, but this species has only one humeral bristle; or if the costal fringe extends slightly over one-half the distance, the inner vertical bristles are not unusually developed and no dorsocentral bristles are present opposite the suture 181

179(178). Predominantly brown to black species. Femora and front dark colored. Only one well-developed humeral bristle. Anterior dorsocentral bristle situated just be-

hind the suture. Inner vertical bristles large, subequal to, or distinctly longer than, the head height . . . 180

Predominantly yellow to rufous species, including the femora and front. Both humeral bristles well developed. Anterior dorsocentral bristle situated opposite the second (posterior) supraalar bristle and a moderately large seta present in each dorsocentral row just behind the suture. The third costal section is less than two times longer than the fourth and the last section of vein M_{1+2} is slightly over two times longer than the penultimate section. Oahu, southern United States, Mexico, and Central America . . . . . **polychaeta** Patterson and Wheeler.

180(179). Almost totally black species except for the yellow tarsi and narrow bases of tibiae. Front basitarsus two-thirds as long as the tibia. No secondary humeral bristle evident. Inner vertical bristle equal or slightly shorter than the head height. Oahu, Maui, and possibly Kauai . . . . . **totonigra** n. sp.

Brown species, tinged with yellow and rather densely gray-brown pollinose. Tibiae yellow, faintly tinged with brown. Front basitarsus about one-half as long as the tibia. One large and two small humeral bristles present. Inner vertical bristles distinctly longer than the head height. Molokai . . . . . **prolixa** n. sp.

181(178). Inner vertical bristles situated directly above the upper reclinates and as near or nearer to the reclinates than to the outer vertical bristles 182

Inner vertical bristles normal in position, situated near the outer verticals 185

182(181). Front femur with an elongate, preapical, posterodorsal bristle (fig. 89b). Front tibia densely setose on posterior surface and basitarsus with moderately long cilia over the entire length (fig. 89c). Molokai . . . . . **eumecothrix** n. sp.

Front legs lacking the above features; basitarsus with one or more black bristles at apex (fig. 38b), or with about five dorsal cilia on the apical two-thirds. 183

183(182). Front tibia distinctly arcuate as seen from a dorsal view and long and slender, approximately equal in length to the femur. Front basitarsus with a black dorsal bristle at the apex and with anterodorsal cilia con-

fined to the apical third or fourth of the segment (fig. 38b). Genae narrow; at the narrowest point the measurement from the vibrissal row to the eye margin is scarcely more than the width of one eye facet. Maui ..... **artigena** n. sp.

Front tibia normal in shape. Front tarsus not as above; see figures 81b and 180b. The space between the vibrissal row and the eye margin is equal to two and one-half rows of eye facets 184

184(183). Front basitarsus with two black posterodorsal bristles at about the apical one-sixth of the segment and with a row of short anterodorsal cilia extending over the apical half to two-thirds of the segment. Mesonotum entirely brown. Hawaii ..... **dissita** n. sp.

Front basitarsus with five black dorsal hairs extending over the apical three-fifths of the segment and no anterodorsal cilia (fig. 180b). Mesonotum yellow, tinged faintly with brown, and with a brown longitudinal vitta extending down the middle. Hawaii ..... **residua** n. sp.

185(181). Only one humeral bristle present; if a small secondary bristle—or seta—is present (as in *curvitibia* n. sp.), the anterior dorsocentral bristle is small, poorly developed. Pleura with brownish yellow markings, or with the sides of the mesonotum yellow 186

Two well-developed humeral bristles present 190

186(185). Thorax dark brown except for the yellow humeri and lateral margins of mesonotum. Antennae dark brown to black. Anterior dorsocentral bristles small, scarcely two times longer than the surrounding setae. A small secondary humeral bristle is developed. Front tibiae long, slender, and curved (fig. 73a). Maui ..... **curvitibia** n. sp.

Thorax predominantly yellow. Antennae yellow. Dorsocentral bristles well developed. No secondary bristle on the humerus. Front tibia normal in size and shape 187

187(186). Mesonotum with a brown median vitta. Front tibia and tarsus of male densely setose on posterior surface. Front basitarsus slightly thickened (fig. 185b). Maui ..... **scolostoma** n. sp.

Mesonotum not vittate. Front legs not as above 188

188(187). Front tarsus of male conspicuously ciliated. Costal fringe ending slightly before the middle of the distance between the tips of veins R_{2+3} and R_{4+5} 189

Front tarsus not ciliated (fig. 204e). The costal fringe extends two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. Maui ..... **varga** n. sp.

189(188). Front femur of male with about a dozen long ventral hairs near the base (fig. 65b). Front basitarsus one-half as long as the tibia and with dorsal cilia extending to its base (fig. 65b). (Note that the m crossvein is faintly infuscated and that this species will key in the section with dark markings on the wing.) Maui ..... **comatifemora** n. sp.

Front femur lacking ventral hairs. Front basitarsus of male two-thirds as long as the tibia and with dorsal cilia only on the apical two-fifths of the segment (fig. 134a). Maui ..... **mediana** n. sp.

190(185). Mesonotum gray, each bristle and seta of the mesonotum arising from a black or dark brown spot, these spots sometimes fused 191

Mesonotum not spotted 193

191(190). Front tarsus of male with long anterior ciliation (fig. 113e). The black or brown abdominal bands are expanded laterally so that the sides of the tergum are continuously dark colored (fig. 113d). No dark spot is present on the costa at the distal break. The presutural acrostichal setae are not distinctly enlarged. The third costal section is about 3.4 times longer than the fourth. Cosmopolitan . **hydei** Sturtevant.

Tarsus not ciliated. The lateral expansions of the dark abdominal bands are conspicuously interrupted so that the sides of the tergum are plainly marked with yellow. Presutural acrostichal setae enlarged. A dark brown to black spot present on the costa at the distal break. The third costal section is about 3.0 times longer than the fourth 192

192(191). Front coxae dark brown, much darker than the tibiae and tarsi. Cosmopolitan ..... **repleta** Wollastan.

Front coxae and remainder of legs pale yellow. General over the Hawaiian Islands, southern United States, Mexico, and Central America . **carinata** Grimshaw.

193(190). Eyes much longer than high. Genae very broad, about two-thirds as wide as the vertical height of the eye (fig. 127c). Hawaii, Maui, and Molokai . . . . **latigena** n. sp.

Eyes higher than long. Genae narrow 194

194(193). Third costal section two or more times longer than the fourth; or, if just slightly less than two times longer, a strong sex comb is present on each of the first two segments of the front tarsus of the male 195

Third costal section 1.5 times longer than the fourth. Predominantly yellow species with narrow brown bands across the apices of the abdominal terga and with a row of enlarged acrostichal setae behind the posterior dorsocentral bristles. Front tarsus of male with tiny ventral combs (fig. 218a). Tropics and subtropics of the world . . (**Sophophora**) **ananassae** Doleschall.

195(194). Males with sex combs on the front tarsi (fig. 219a). Predominantly yellow to rufous species . . . . . Subgenus **Sophophora** Sturtevant 196

Males lacking distinctly formed combs but often with black bristles or long cilia on the front tarsi 198

196(195). Males with sex combs on the first two segments on the front tarsus (fig. 219a). One prominent bristle present on each palpus. Yellow bands are present on all abdominal segments. The last section of vein M_{1+2} is 2.5 times longer than the penultimate section. The acrostichal setae are arranged in six rows. Cosmopolitan . . . . . (**Sophophora**) **kikkawai** Burla.

Male with sex combs only on the first segment. Several prominent bristles present on each palpus. Last two abdominal segments solid black. Last section of vein M_{1+2} two times longer than the penultimate section . . 197

197(196). Ninth tergum of male with a large conspicuous clam-shell-like process on the posteromedian margin; this is broadly sickle-shaped and sharp-pointed at the lower apex (fig. 220c). Cosmopolitan . . . . . (**Sophophora**) **simulans** Sturtevant.

Ninth tergum with a smaller, less conspicuous process; this is not broad and curved (fig. 220b). Cosmopolitan . . . . . (**Sophophora**) **melanogaster** Meigen.

198(195). Thorax, head, and appendages yellow. Front tarsi with short erect setae (fig. 211a). Ninth tergum of male

with a prominent lobe developed on each anteroventral margin (fig. 211b). Claspers densely setose on inner margins (fig. 211c). Oahu ..... **vinnula** n. sp.

Not fitting the above 199

199(198). Predominantly yellow species; abdomen pale yellow with faint bands of brown at the apices of the terga. The second vibrissal bristle is about equal to the first. The costal fringe extends one-fourth the distance from the apex of vein R_{2+3} to R_{4+5}. No ornamentation present on the front tarsus. Male genitalia as in figure 46c. Oahu?, Japan .... **bizonata** Kikkawa and Peng.

Not fitting the above. If predominantly yellow species, the front tarsus of the male has long ciliation or a comblike row of black spines at the apex 200

200(199). Lower reclinate bristle distinctly longer than the proclinate. Front tarsus of male as in figures 55a, 86b, and 127a, or the front tibia with long ciliation extending to its base (fig. 112b) 201

Lower reclinate bristle about equal to or shorter than the proclinate 207

201(200). Front tibia with long ciliation extending to its base. Front tarsus with long cilia but no strong spines or bristles. Oahu, Molokai, and Maui ..... **hirtitibia** n. sp.

Front tibia not ciliated, tarsus very different from above 202

202(201). Front basitarsus slender, almost one-half as long as the tibia, and not enlarged or pointed apically 203

Front basitarsus enlarged or pointed at the dorsoapical portion (figs. 33a, 93a), usually less than one-third as long as the tibia 205

203(202). Outer vertical bristles large, equal or larger than the inner verticals. Upper reclinate bristles normal in position, situated slightly below a level with the lower ocellus 204

Outer vertical bristles rudimentary, about two-fifths as long as the inner. Upper reclinate bristles situated near the vertex, about opposite the upper ocelli. Male genitalia as in figure 127b. Oahu ... **larifuga** n. sp.

204(203). Thorax and abdomen yellow to rufous. Femora yellow. Front, face, and antennae yellow, tinged faintly with brown. Wings hyaline, last section of vein M_{1+2} near-

ly two times longer than the penultimate section. Front tarsus of male as in figure 86b. Kauai ..... **dracaenae** n. sp.

Body and head, including the appendages, dark brown to black. Femora brown. Wings faintly infuscated with brown. Last section of vein M_{1+2} about equal in length to the penultimate section. Molokai ..... **caccabata** n. sp.

205(202). Front basitarsus about one-fourth or less as long as the tibia and with promiment black dorsal cilia at the apex (fig. 33a, 191b). Anterior dorsocentral bristles situated about halfway between the first and second supraalars 206

Front basitarsus over one-third as long as the tibia, lacking dorsal cilia at apex but with two black anteroventral hairs before the apex (fig. 93a). Anterior dorsocentral bristles situated opposite the second (posterior) supraalars. Oahu ..... **fastigata** n. sp.

206(205). A pair of strong acrostichal setae present, these almost equal in size to the long lower reclinate bristles and at least two times longer than the surrounding setae of the mesonotum. The front basitarsus is pointed at the upper apex. The second tarsal segment is about one-fourth as long as the basitarsus (fig. 191b). Hawaii ..... **spicula** n. sp.

No such acrostichal setae present. Front basitarsus not pointed but with a strong spinelike development and a row of closely placed black bristles at the apex. Second tarsal segment about two-thirds as long as the basitarsus. Hawaii ..... **apicisetae** n. sp.

207(200). Front basitarsus of male with a dorsal row of closely placed black preapical bristles (fig. 137a). Tibiae and tarsi predominantly black. Hawaii ... **melanopedis** n. sp.

Not as above. If the front basitarsus has dorsal cilia or bristles, they are not arranged in a short row just before the apex 208

208(207). Front basitarsus of male with a single rather thick, black apicodorsal bristle; second tarsal segment also with but one apicodorsal bristle (fig. 204a). Hawaii ..... **unicula** n. sp.

Not as above 209

209(208). Front basitarsus with three or more black bristles or with several curved cilia at or near the apex and lacking long curved cilia along the segment; sometimes a preapical clump of dorsal bristles is present 210
Not as above. Front basitarsus often with long cilia arranged along the segment 221

210(209). Front basitarsus with a preapical clump of five closely placed black bristles (fig. 87b). Oahu ..... **dumalis** n. sp.
Not as above 211

211(210). Front basitarsus with four or five curved cilia at or near the apex (fig. 125d); posterior surface of basitarsus densely covered with short erect setae, including one row of curved hairs. Front basitarsus about six times longer than second tarsal segment. Molokai ..... **laciniosa** n. sp.
Not as above 212

212(211). Front basitarsus with a pair of moderately long posteroventral cilia near the apical third of the segment (fig. 213c). Head, thorax, and legs yellow. Hawaii ..... **xanthosoma** Grimshaw.
Not as above 213

213(212). Three or four small straight bristles arranged in a transverse row at the apex of the front basitarsus (fig. 123c); the apex is not raised into a prominence. The labellum of the male is highly ornate, fringed with rows of strong curved spines. Predominantly yellow species. Face and antennae yellow. No bristles present in the vibrissal row. Oahu and Lanai ..... **ischnotrix** n. sp.
The apical bristles arranged irregularly on a slight dorsal prominence at apex of basitarsus. Labellum not ornate. Usually predominantly black species 214

214(213). Thorax entirely rufous. Front basitarsus with a clump of about six stout, black dorsoapical bristles and a comblike row of about eight wavy bristles extending across the apex from the dorsal to the posterodorsal side (fig. 42a). Second tarsal segment about one-third as long as the first and with a strong black apicodorsal bristle. (Note that the bases of the wings are brown fumose, but some specimens may possibly run here.) Kauai ..... **basimacula** n. sp.
Not as above 215

215(214). Second tarsal segment of front legs of male shortened and with a strong prominence on the dorsoapical portion (fig. 199b). Basitarsus with four long anterior cilia extending along the full length, apical black bristles as in figure 199a. Maui and probably Molokai ..... **torula** n. sp.

Second tarsal segment slender, lacking such a process. Front basitarsus not ciliated 216

216(215). Apex of front basitarsus of male with a thick black bristle or with a spinelike process made up of two to three closely appressed bristles (fig. 53a) plus two or more separated black bristles (figs. 34a, 171a, and 179d) 217

Front basitarsus with three black, approximately equal-sized bristles at the apex (fig. 201b). Second tarsal segment with two apicodorsal bristles. Hawaii ..... **trichaetosa** n. sp.

217(216). Front basitarsus with a pair of closely appressed black, preapicodorsal bristles, plus a pair of equal-sized, distinctly separated, black apical bristles (fig. 34a). Kauai ..... **apodasta** n. sp.

Apex of front basitarsus with a thick black bristle or a spinelike process made up of two to three closely appressed bristles plus a group of smaller bristles or hairs (figs. 53a, 179d, 186a) 218

218(217). The apical bristles or hairs, beside the large apicodorsal bristle, arise on the anterior surface 219

The extra apical bristles arise on the posterior surface of the basitarsus 220

219(218). Front basitarsus about one-third as long as the tibia. A clump of about six black anteroapical bristles are present (fig. 171a). Maui and Hawaii ..... **prodita** n. sp.

Front basitarsus one-fifth as long as the tibia. Several pale brown hairs present in a row on the anteroapical surface. Maui and Molokai ..... **brunneisetae** n. sp.

220(218). Anterior reclinate bristles small, hairlike, scarcely two-thirds as long as the proclinates and situated about two-fifths the distance between the proclinates and the upper reclinate bristles. The bristles on the posteroapical surface of the basitarsus are bent sharply at right angles. The second tarsal segment is two-

thirds as long as the first (fig. 179d). Molokai ..... **redunca** n. sp.

Anterior reclinate bristles equal or slightly larger than the proclinates and situated just slightly above the latter. Posteroapical bristles of the basitarsus gently curved. Second tarsal segment about one-half as long as the first (fig. 186a). Hawaii, Molokai, and Maui ..... **seclusa** n. sp.

221(209). Front basitarsus very short, one-fourth as long as the tibia and with two rather large, erect anterior setae (fig. 117a); dorsal surface of tarsus with numerous erect setae. Face gently convex. Male genitalia as in figure 117b. Thorax yellow to rufous. Anterior dorsocentral bristles opposite the second supraalar bristles. Oahu ..... **improcera** n. sp.

Not as above. If the front basitarsus is short and densely setose, the face has a sharp carina down the middle .. 222

222(221). Front tarsus not ciliated except for a dorsal preapical hair which is often present on the basitarsus. A rather prominent hair is sometimes present in front of the anterior (second) dorsocentral bristle 223

Front tarsus of male with at least curved cilia or with black dorsal bristles 244

223(222). Femora almost entirely polished black. Posterodorsal surface of front femur thickly bristled. Face, clypeus, and palpi black. Front basitarsus of male two-thirds as long as the tibia. Body shining black, apex of scutellum yellow. Labellum of male not rimmed. Maui ..... **nigella** n. sp.

Not as above. If the body is shining black and the apex of the scutellum yellow, the labellum is rimmed with black. If the femora are brown to black, they are tinged with rufous and the other characters differ from above 224

224(223). Not shining black species with a yellow tip on the scutellum. Male labellum not rimmed with black. Anterior sternopleural bristles well developed 225

Predominantly shining black species or black dusted with gray on the mesonotum; scutellum often with a yellow apex. Labellum of male with a black rim around the apex (fig. 76a). Front brown to black over the upper two-thirds and usually bright yellow below.

Anterior sternopleural bristle often tiny, hair-like, and inconspicuous ..... **polita complex.**
..... 233

225(224). Face with a prominent carina developed into a sharp keel, or a flat-topped projection present in the middle of the face (fig. 98a) 226
Face gently convex on the upper median portion, not developed as above 229

226(225). Front basitarsus very short, about one-fourth as long as the tibia and densely covered with short erect setae. Face with a sharp keel down the middle. Male claspers extended, conspicuously developed (figs. 179c, 195e) 227
Front basitarsus approximately one-half as long as the tibia, not densely setose. Face with a broad flat keel in the middle. Claspers not produce as above 228

227(226). Arista with four dorsal and two ventral rays. Thorax reddish brown. Male genitalia with well-developed secondary lobes as in figure 179c. Hawaii .. **reducta n. sp.**
Arista with three dorsal and one ventral ray in addition to the apical fork. Thorax predominantly dark brown, tinged with black on the dorsum. Genitalia lacking secondary claspers as in figure 195e. Hawaii
..... **taractica n. sp.**

228(226). Last section of vein M_{1+2} 1.3 times longer than the penultimate section. Apex and ventral portion of anal plates of male conspicuously spinose. Ninth tergum broad, spinose on the ventral margin and fused with the clasper as in figure 98c. Maui, Cosmopolitan
..... **funebris (Fabricius).**
Last section of vein M_{1+2} nearly two times longer than the penultimate section. Anal plates not spinose, genitalia normal in development. Maui ... **abjuncta n. sp.**

229(225). Tiny species: body, about 1.8 mm. in length. The front basitarsus short, less than one-third as long as the tibia. Tarsal segments one to four each with a ventral brush of tiny black spines (fig. 146a). Kauai .....
..... **nanella n. sp.**
Not as above 230

230(229). Femora dark brown to black, tinged with rufous in the ground color. Tibiae discolored with brown around

the median portions. Inner vertical bristles longer than the head height. Thorax black covered with gray pollen. Front basitarsus lacking long cilia but densely covered with erect setae (fig. 57a). Only three dorsal rays on the arista. Two rather strong bristles present on the mesonotum anterior to the anterior dorsocentrals. Hawaii and Maui ..... **canuta** n. sp.

Not as above 231

231(230). Dark brown species, tinged with black on the mesonotum. Front tarsus lacking erect setae. Femora tinged with brown. (This is a poor couplet; the species cannot be definitely placed.) Molokai ..... **molokaiensis** Grimshaw.

Thorax predominantly yellow to rufous, tinged lightly with brown. Front basitarsus with an apicodorsal seta, which is more prominent than the surrounding setae. Femora yellow 232

232(231). Costal fringe ending before the middle, or near the basal two-fifths, of the distance between the apices of veins R_{2+3} and R_{4+5}. Pleura predominantly rufous, lower portions yellow. Oahu ..... **confutata** n. sp.

Costal fringe extending distinctly beyond middle, approximately three-fifths the distance between the apices of vein R_{2+3} and R_{4+5}. Pleura brownish red. Oahu ..... **mimiconfutata** n. sp.

233(224). Scutellum with a yellow apex. Costal fringe extending approximately one-half the distance from the tip of vein R_{2+3} to R_{4+5} 234

Scutellum all black. Costal fringe short, extending about one-fourth the distance to the apex of vein R_{4+5}. Male genitalia as in figure 154c. Molokai ..... **nigropolita** n. sp.

234(233). Pleura entirely dark brown to shining black. Abdomen of male entirely dark brown 235

At least lower half of each pleuron clear yellow 239

235(234). Front tibia with about four, moderately long cilia on posteroventral surface (fig. 31a). Femora brown. Face and front entirely brown to black. Molokai ..... **anthrax** n. sp.

Front tibia lacking ciliation. If the femora are brownish, the face is yellow 236

236(235). Lower third to one-half of front bright yellow. Ninth tergum of male nearly straight-sided, scarcely narrowed dorsally 237

Front of male entirely brown to black. Ninth tergum narrowed dorsally (fig. 102b). Maui and Lanai ..... **fuscifrons** n. sp.

237(236). Mesonotum polished black. Genae rather narrow, about equal in width to three rows of eye facets. Male claspers situated rather deep inside the genital chamber (fig. 76d) 238

Entire thorax dusted with gray. Genae rather broad, about equal in width to eight rows of eye facets. Claspers situated at or near the apices of the ventral lobes of the ninth tergum (fig. 187b). Maui ..... **seorsa** n. sp.

238(237). Third antennal segment, clypeus, and palpi brown; legs all yellow. Palpus with one apical bristle. Hawaii ..... **demipolita** n. sp.

Antennae yellow except for a faint tinge of brown on the apex of the third segment. Clypeus and palpi yellow. Middle and hind femora brown. Palpus with with several long hairs at or near the apex (fig. 181a). Molokai ..... **retrusa** n. sp.

239(234). Pleura entirely yellow. Male genitalia as in figure 129d–e. Vibrissae in two distinct rows. Oahu ..... **luteola** n. sp.

Upper halves of pleura brown to black. Genitalia not as above. Vibrissae in one row 240

240(239). Ocellar bristles displaced, situated far in front of ocelli, about opposite the proclinate bristles. (Some specimens may run here.) Maui ..... **transfuga** n. sp.

Ocellar bristles normal 241

241(240). Lower portion of front brownish yellow. Anterior sternopleural bristle well developed, slightly over one-half as long as the posterior bristle. Lower half of the face white. Front basitarsus one-half as long as the tibia. Antennae, clypeus, and apex of palpus brown. Male genitalia as in figure 114e. Hawaii ..... **illusiopolita** n. sp.

Lower front pale yellow. Other characters not in the same combination 242

242(241). Polished black on the dorsum of the thorax. Third antennal segment brown to black. Front tarsus long and slender (.36–.38 mm.), front tibia 1.4 to 1.5 times longer than the basitarsus (fig. 44c). Fifth and sixth terga of the male not completely yellow 243

Dorsum of thorax distinctly gray pollinose. Antennae entirely yellow. Front tarsus shorter (.22–.25 mm.), the tibia about two times longer than the basitarsus. Fifth and sixth terga of male yellow. Oahu, Molokai, Maui, Lanai, Hawaii, and probably Kauai ..... **canipolita** n. sp.

243(242). Larger species: body and wings, 3.75 mm. (The male is not known but the species may possibly run here.) Lanai ..... **polita** Grimshaw.

Smaller species: Males, 2.2 to 2.5 mm. Male genitalia as in figure 44d. Oahu and Maui ..... **bipolita** n. sp.

244(222). Front coxa of male densely black setose on the anterior surface (fig. 110c). Six equal-sized bristles present at the upper portion of each vibrissal row (fig. 110a). Ventral portion of labellum densely covered with strong black spines. Maui ..... **hirticoxa** n. sp.

Not as above 245

245(244). Mesonotum yellow, except for a broad dark brown to black median longitudinal vitta; a brown mark also extends over the upper half of each pleuron. The middle and hind femora are brown on the apical halves. Front tarsi as in figure 194b. Maui ..... **taeniata** n. sp.

Not as above 246

246(245). Thorax rufous, faintly tinged with brown on the posterior portion of the mesonotum and on the disc of the scutellum. Front basitarsus with a row of six or seven anterior cilia extending the full length of the segment plus two or three apicodorsal cilia (fig. 211d). Second tarsal segment one-fourth to one-fifth as long as the basitarsus. Oahu ..... **williamsi** n. sp.

Not with the above combination of characters 247

247(246). Predominantly yellow or rufous species, not more than a faint tinge of brown present on the sides of the thorax, and with the abdominal terga conspicuously marked with yellow 248

At least the mesonotum dark brown. Abdomen not

marked with yellow except in a few species which have yellow on the first and second terga 249

248(247). The long cilia of the front tarsus confined to the anterior surface (fig. 212a). The costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The sides of the thorax are tinged with brown. Oahu ..... **xanthognoma** n. sp.

The cilia of the front tarsus situated on the dorsal surface (fig. 85b). The costal fringe extends one-fourth to one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. Thorax entirely yellow. Molokai ..... **dorsociliata** n. sp.

249(247). Front tibia of male lacking long ciliation. Posterior surface of front tibia sometimes densely covered with short erect setae 250

Front tibia with at least four long dorsal cilia (figs. 112b, 182b) 263

250(249). Pleura entirely yellow. First abdominal tergum and base and sides of second tergum pale yellow 251

At least the upper half of each pleuron brown and the sides of the abdominal terga entirely dark brown 253

251(250). Front with a distinct silvery sheen on the upper half. The m crossvein is at least slightly infuscated with brown. (This species is also keyed in the group which has brown markings on the wing.) Maui ..... **badia** n. sp.

Not as above 252

252(251). The costal fringe ends slightly before the middle of the distance from the apex of vein R_{2+3} to R_{4+5}. The anterior dorsocentral bristles are situated distinctly in front of the second supraalar bristles. The preapical dorsal bristle of the front tibia is prominent. Male genitalia as in figure 105b. Kauai ..... **gilvilateralis** n. sp.

The costal fringe extends distinctly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}, approximately three-fifths the distance. The anterior dorsocentral bristles are situated opposite the second supraalar. The preapical dorsal bristle of the front tibia is inconspicuous, scarcely larger than the surrounding setae (fig. 145a). Male genitalia as in figure 145c. Oahu ..... **mycetophila** n. sp.

253(250). The cilia of the front tarsus are comparatively short; the curved hairs are confined to segments 2–4. The basitarsus has only two erect dorsal hairs situated just before the apex; these are about equal in length to the width of the basitarsus (fig. 72a). The lower half of each pleuron is yellow. The anterior dorsocentral bristles are situated opposite the second supraalar bristles. Maui ..... **curticilia** n. sp.

Cilia much more elongate and conspicuous as in figures 101a, 189a, and 206b. Pleura all brown 254

254(253). Front basitarsus with two strong, black anterodorsal bristles situated just before the apex of the segment and with two shorter, anterior cilia on the basal half of the segment (fig. 189a). Front basitarsus short, about one-third as long as the tibia. The palpus lacks an apical bristle but is densely setose. Maui ..... **setipalpus** n. sp.

Not as above. Front basitarsus usually about one-half as long as the tibia. Palpus distinctly setose only in *velutinifrons* n. sp. and *furvifacies* n. sp. 255

255(254). Not over four (rarely five) long cilia confined to the apical two-thirds to two-fifths of the front basitarsus, except in *orestes* n. sp., which has three anterior cilia on the basitarsus as in figure 158a 256

Front basitarsus with numerous (six or more) long dorsal cilia extending over the entire length of the segment (figs. 101a, 173c, 206b) 264

256(255). Front basitarsus with three conspicuous black hairs arranged in a row down the segment (fig. 158a) 257

Not as above 258

257(256). The long hairs of the front basitarsus are anterior in position and arranged from the base to apex of segment (fig. 158a). Palpi and sternopleura yellow. Ninth tergum of male not strongly convex on the posterior margin (fig. 158c). The costal fringe extends one-fourth to one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. Hawaii, Molokai, Oahu, Kauai, and probably Maui and Lanai ..... **orestes** n. sp.

The long hairs are anterodorsal in position and are arranged over the apical two-thirds of the segment (fig. 125a). Pleura entirely dark brown. Palpi pre-

dominantly black. Ninth tergum of male strongly convex on the posterior margin (fig. 125b). The costal fringe extends nearly one-half the distance between the apices of veins R_{2+3} and R_{4+5}. Lanai and Oahu ..... **kraussi** n. sp.

258(256). Front basitarsus of male with two strong dorsal cilia on the apical half. The second tarsal segment with one strong dorsal cilia in the middle (fig. 52a). Wings brown fumose 259

Not as above 260

259(258). Thorax and abdomen brown, tinged with rufous in the ground color. Femora and apices of tibiae tinged with brown. Tarsi yellow. Maui ..... **brunneifrons** n. sp.

Thorax and abdomen black. Femora and tibiae all yellow. Last two or three tarsal segments black. Hawaii and Molokai ..... **nigritarsus** n. sp.

260(258). The dorsum of the thorax is black, the pleura are largely yellow. The anterior reclinate bristles are situated well above the proclinates, nearly halfway between the proclinates and upper reclinate bristles. Ninth tergum narrow; over the dorsal portion it is about one-third as long as the anal plates (fig. 205d). Oahu ..... **velata** n. sp.

Not as above 261

261(260). Front basitarsus with four, or sometimes five, dorsal cilia on the apical two-thirds of the segment (fig. 177b). Face yellow. Anterior dorsocentral bristle placed distinctly in front of second (posterior) supraalars. The ninth tergum is broad 262

Front basitarsus with the cilia arranged as in figure 43d, with two dorsoapical curved hairs, two anterior cilia at or just before the apex, and one preapical dorsal cilium. Face predominantly brown to black. Anterior dorsocentral bristles situated in line with the second supraalars. Ninth tergum greatly narrowed dorsally (fig. 43f). Dorsum of thorax black, covered with gray pollen. Apex of scutellum yellow. Kauai ..... **beardsleyi** n. sp.

262(261). Entire thorax dark brown to black. At least one strong bristle at the upper edge of each vibrissal row. Ninth tergum of male broadly expanded dorsally. Claspers inconspicuous, not visible from lateral view (fig.

177c). Kauai and Molokai ..... **quadrisetae** n. sp.

Thorax predominantly rufous, tinged with brown, the lower half of each pleuron yellow. No bristles present in the vibrissal row. Ninth tergum not expanded dorsally. Claspers large, plainly visible from a lateral view (fig. 83d). Oahu ..... **dolomata** n. sp.

263(249). Labellum of male not rimmed. Front tibia and tarsus with two rows of long dorsal hairs extending over the entire length (fig. 112b). Pleura entirely yellow. No apical bristle present on the palpus. Female ovipositor long and slender (fig. 112d). (Some aberrant specimens with the anterior reclinate bristles about equal to the proclinates will run here.) Oahu, Maui, and Molokai ..... **hirtitibia** n. sp.

Labellum of male with a black rim. The single row of rather sparsely placed long hairs extends over the front basitarsus and on the apical half of the tibia (fig. 182b). Pleura brown, tinged with rufous. The palpus has one apical bristle. Molokai ..... **rustica** n. sp.

264(255). Front of both sexes yellow, faintly tinged with brown on the sides along the eye orbits, with a vertical reddish brown vitta extending through the middle of the front, and with a pair of broad velvety black submedian vertical stripes (fig. 206a). The palpus is thickly covered with large bristle-like setae and no apical bristle can be differentiated. Front basitarsus as in figure 206b. Legs predominantly brown. Molokai ..... **velutinifrons** n. sp.

Not as above 265

265(264). The apical bristle of the palpus is very large and slender, equal or longer than the palpus. Labellum of male with a thick black rim at the apex. Kauai ..... **prominens** n. sp.

Apical bristle not unusually large, scarcely half as long as the palpus. Labellum not rimmed 266

266(265). Posterior surface of front tibia of male densely covered with short black hairs; these are conspicuously longer and more erect than the setae on the other surfaces. Palpi densely black setose. Labellum with strong black spines on the upper apex (fig. 101c). Kauai and probably Molokai ..... **furvifacies** n. sp.

Front tibia lacking conspicuous erect setae. Palpus

with only few black setae on the outside surface.....267

267(266). Entire head, including appendages, dark brown to black. Coxae and middle and hind femora brown. Front basitarsus with a clump of dorsal cilia on the apical half (fig. 55a). Molokai.....**caccabata** n. sp.

At least the genae, lower occiput, palpi, and mouthparts are yellow. Legs yellow. Front tarsi not as above.....268

268(267). One row of long cilia present on the front basitarsus (figs. 27a, 161a); these are paired only at the apex....269

The long cilia on the front basitarsus are arranged in pairs, in two irregular rows.....270

269(268). Labellum of male with strong spines along apical margin (fig. 27b). Face white. Costal fringe short, extending one-fourth to one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. Front tarsus as in figure 27a. Hawaii and Molokai.....**albifacies** n. sp.

Labellum normal, lacking spines or ornamentation. Face yellow, faintly tinged with brown below. Costal fringe extending nearly one-half the distance between the apices of veins R_{2+3} and R_{4+5}. Front tarsus as in figure 161a. Oahu.....**paucula** n. sp.

270(268). Front basitarsus with about three complete pairs of dorsal cilia as in figure 111c. Labellum with a dark brown to black, pointed, sclerotization at apex (fig. 111b) and with no black spines. The costal fringe extends over halfway to the tip of vein R_{4+5}. Maui, Molokai, and probably Hawaii.....**hirtitarsus** n. sp.

Front basitarsus with about five complete pairs of dorsal cilia (fig. 45b). Labellum not as above and with conspicuous black spines at the apex (fig. 45a). The costal fringe extends one-third to two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. Oahu.....**biseriata** n. sp.

Subgenus **DROSOPHILA** Fallén

When we have a more complete understanding of the habits, biologies, and internal morphologies of the Hawaiian species, it obviously will be necessary to divide the native species into many subgenera and natural groups. Based only upon external morphological characters, however, it is not logical to separate

these, and the great bulk of our species will fall into the subgenus *Drosophila* as presently defined.

In Hawaii the members of the typical subgenus are characterized by lacking sex combs (transverse rows of stout, black, ventral setae on the first two tarsal segments); by having distinct proclinate and lower reclinate bristles and lacking long hairs on the front; and by lacking a mystax of hairs or dense cluster of oral vibrissae.

Sturtevant (1942:30) characterized the subgenus *Drosophila* as follows:

> Three or four egg-filaments (two in the *melanica* group), at least anterior ones tapering; ventral receptacle long, fine, usually kinky; testes long, spiral; posterior Malpighian tubes forming a closed loop around the gut, their distal ends sometimes merely apposed but usually fused and with a continuous lumen; dark posterior bands on abdomen usually narrowed or broken in mid-dorsal line; sternoindex usually .5 or more; cheeks often wide; puparial "horns" often more than 1/5 length of puparium.

Drosophila abjuncta new species (fig. 21a–c).

This is a somewhat nondescript species which resembles *D. ananassae* Doleschall in general appearance. It does not fit in the same taxonomic group, however, with *ananassae* and is readily differentiated by the longer third costal section; by lacking the tiny ventral combs on the front tarsi of the male; by the much broader genae; as well as by many other details. It runs in the group of species which lacks long cilia or ornamentation on the front legs of the male and which has the thorax entirely yellow to rufous. It fits near *D. funebris* (Fabricius) but the male genitalia are very different (figs. 21c, 98c). It also fits near *D. confutata* n. sp. and *mimiconfutata* n. sp. from Oahu but differs by having the abdominal terga conspicuously marked with yellow; by having the third costal section not over three times longer than the fourth; and the last section of vein M_{1+2} is about 1.7 times the penultimate section in the male and 2.4 times that section in the female.

MALE. *Head:* Approximately one-third higher than long as seen in lateral view. The front is yellow, tinged faintly with brown on the upper portion. The upper eye orbits, the ocellar triangle, and the upper portion of the occiput are tinged with brown to black, covered with gray-brown pollen. Measured from the median ocellus to the anterior margin of the front, the front is about two times longer than wide. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated slightly above the latter. The genae are comparatively broad; measured from the vibrissal row to the eye margin each gena is about equal in width to approximately six rows of eye facets. The genae are yellow with a faint tinge of brown on the median portion and along the vibrissal row. The face is yellow, tinged with brown on the lower portion. The median portion of the face is strongly carinate; a prominent flat-topped ridge is developed down the entire length. The clypeus is pale brown. The mouthparts are yellow, tinged slightly with brown on the mentum. The palpi are yellow, each with a small apical and a small preapical bristle. One strong black bristle

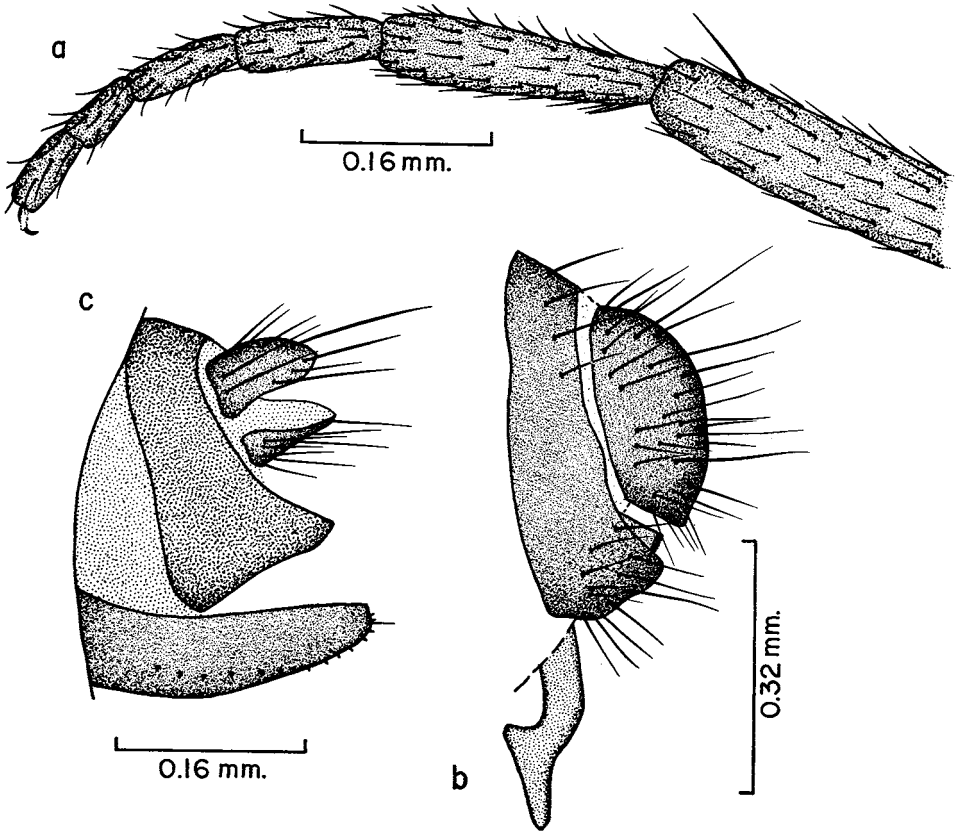


Figure 21—*Drosophila abjuncta* n. sp.:**a,** front tibia and tarsus; **b,** male genitalia; **c,** female genitalia.

is present at the upper margin of each vibrissal row. The antennae are almost all dark brown and are yellow only on the basal portions of the first two segments. The arista has three dorsal and two ventral rays in addition to the apical fork. *Thorax:* Yellow to rufous, tinged faintly with brown on the dorsum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. About six rows of acrostichal setae are present; two pairs of enlarged acrostichals are present near the midline on the anterior portion of the mesonotum approximately opposite the presutural bristles. Two well-developed humeral bristles are present. The anterior sternopleural bristle is almost as large as the posterior bristle. *Legs:* Entirely yellow and devoid of long ciliation or ornamentation. The front tarsus has short and inconspicuous, slightly curved hairs along the dorsal surface (fig. 21a). The basitarsus is about one-half as long as the tibia and nearly two times as long as the second tarsal segment. *Wings:* Entirely hyaline. The third costal section is 2.8–3.0 times longer than the fourth, and the last section of vein M_{1+2} is 1.7 times longer than the pe-

nultimate section. The costal fringe extends approximately one-third the distance between the apices of veins R_{2+3} and R_{4+5}. *Abdomen:* With a broad, yellow, longitudinal vitta extending the entire length down the midline and with a posterior lateral spot of yellow on the sides of each of the terga. The terga are otherwise brown. The anal plates are two times higher than long and are pointed ventrally. The ninth tergum is nearly straight-sided, slightly convex on the posterior median margin. The claspers are plainly visible from a lateral view (fig. 21b).

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. Fitting the description of the male in most respects. Two prominent bristles are present on the upper portion of each vibrissal row. The genae are not so broad, being about equal in width to three rows of eye facets. The third costal section is about 2.7 times longer than the fourth, and the last section of vein M_{1+2} is 2.4 times longer than the penultimate section. The ovipositor blades are short, rounded at their apices, and with a fringe of teeth along the apical and ventral margins (fig. 21c). The ovipositor blades extend approximately as far as the apices of the anal plates.

Length: body, 2.2 mm.; wings, 2.4 mm.

Holotype male and allotype female: from Kula Pipeline, Maui, elevation 4,500 feet, March 19, 1932 (O. Bryant).

Type and allotype in the B. P. Bishop Museum.

Drosophila acrostichalis new species (fig. 22a–b).

This species is differentiated from other known Hawaiian *Drosophila* by the predominantly brown thorax and femora, by the pair of strong acrostichals on the anterior third of the mesonotum, and by the wing markings (fig. 22a).

FEMALE. *Head:* Nearly one-third higher than long. The front is slightly wider than long; the lower half is yellow to rufous, tinged lightly with brown in the median portion. The upper half is predominantly black, gray pollinose on the orbits and across the vertex. The face is yellow on the sides, yellow brown in the median portion, and brown to black covered with gray pollen on the lower portion. The median portion of the face is slightly carinate. Three moderately strong bristles are present in the upper portion of each vibrissal row. The lower half of the occiput is yellow; the upper portion is brown, densely covered with gray pollen. The genae are yellow. The oral margin is brown to black. The clypeus is brown. The palpi are brown, tinged lightly with yellow; each palpus has a moderately strong apical bristle. The first antennal segment is yellow, the second is brown, tinged very lightly with rufous, the third is dark brown. The arista has five to six dorsal and two ventral rays in addition to the apical fork. The lower reclinate bristle is about four-fifths as long as the proclinate and is situated distinctly above the latter. *Thorax:* Mesonotum entirely dark brown, rather densely covered with gray-brown pollen. A faint gray vitta extends the entire length down the median portion; the sides of the mesonotum are rather

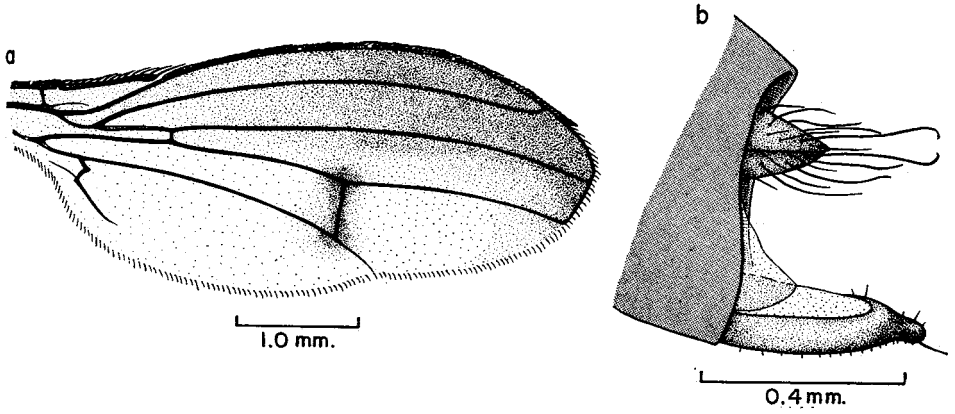


Figure 22—*Drosophila acrostichalis* n. sp.: **a,** wing; **b,** female genitalia.

distinctly gray, especially along the suture and above the wing bases. The enlarged acrostichal setae lie approximately in line with the presuture bristles. The anterior dorsocentral bristles are situated in line with the second pair of supraalars. The scutellum is dark brown to black, densely gray-brown pollinose. The humeri are yellow; two strong humeral bristles are present. Metanotum and pleura brown, tinged with rufous. Halteres bright yellow. Anterior sternopleural bristle three-fourths as long as the posterior bristle. *Legs:* Coxae and femora brown; the middle and hind pairs are tinged with yellow. The tibiae are yellow with a brown discoloration extending over the median portions. The front femur has three strong bristles on each of the posteroventral and posterodorsal surfaces. The front basitarsus is about one-half as long as the tibia. *Wings:* Nearly three times longer than wide. Predominantly subhyaline to faintly fuscous. The anterior and the apical portions of the wing are infuscated pale brown; this infuscation is darker on the apical third of the wing than on the basal portion; a pale brown mark also extends over the m crossvein, and into the surrounding cells (fig. 22a). The third costal section is slightly over five times longer than the fourth and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section, the proportions being 46 to 38. *Abdomen:* Black, covered with gray-brown pollen. The ovipositor plates are rufous, rather long and slender, almost equal in length to the ventral margin of the seventh abdominal segment (fig. 22b).

Length: body, 4.0 mm.; wings, 4.8 mm.

MALE. Unknown.

Holotype female: Paliku, Haleakala Crater, 6,300 feet, August, 1952 (W. C. Mitchell).

Type in the B. P. Bishop Museum.

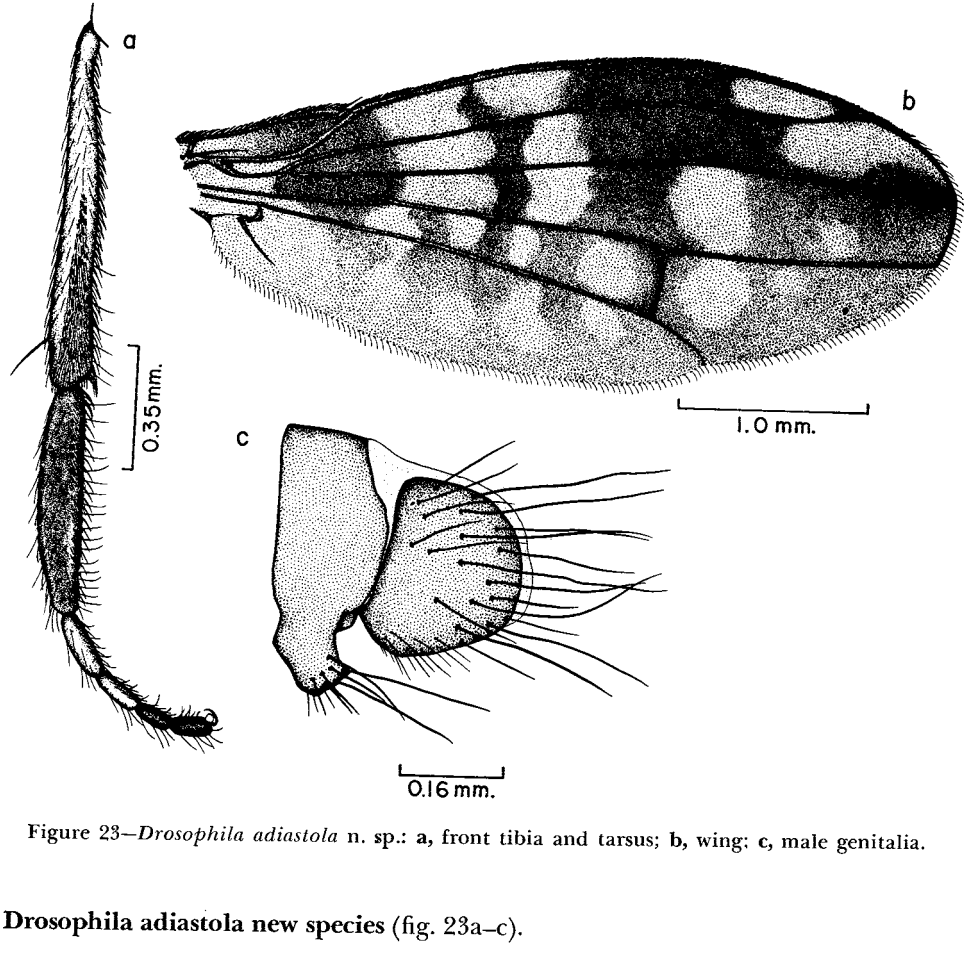


Figure 23—*Drosophila adiastola* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia.

Drosophila adiastola new species (fig. 23a–c).

This species is rather closely related to *D. peniculipedis* n. sp. and is differentiated by the following characters: the mesonotum has five black, longitudinal vittae (an extra vitta is present on each side, formed by a thin black line down each dorsocentral row) rather than three; the front is almost as long as wide, and the lower half is bright yellow, rather than the front being 1.5 times wider than long and entirely brown; the front basitarsus of the male is broader than the tibia, rather than being slightly narrower than the tibia; cell 1st M_2 has three or four hyaline spots corresponding with the same number of spots in cell M_4 and a large hyaline spot present near the base of cell 2nd M_2 is continuous with a large spot extending through cell R_5; no hyaline spot is present directly above the m crossvein. In *peniculipedis* cell 1st M_2 has two large hyaline spots which are continuous through cell R_4 and the large hyaline spot near base of cell 2nd M_2 is isolated, not continuing into cell R_5; also a large hyaline spot is present immediately above the m crossvein (fig. 23b).

MALE. *Head:* The head is about one-fourth higher than long. The eyes are

oblong in shape slightly narrowed on the lower portion. The front, measured from the upper ocelli to the anterior median margin, is about as long as wide; the lower half of the front is clear yellow, the upper half is yellow, tinged with brown. The orbits are brown, tinged with black to the proclinate bristles. The lower reclinate bristles are about three-fifths as long as the proclinates and are situated distinctly above the latter. The ocellar triangle and the upper median portions of the occiput and the vertex are black; the remainder of the vertex is brown, tinged lightly with yellow. The upper lateral margins of the occiput are brown; the remainder of the occiput is clear yellow. The face is yellow-white, the genae, mouthparts, including the palpi, and the antennae are pale yellow. No distinct bristles are present in the vibrissal rows; the hairs consist of short, black setae. The palpi lack a distinct apical bristle but are rather thickly covered with short black setae. The mouthparts are extended, their length being about equal to the width of the head as seen from lateral view. The labella are not ornate; the apical margins are fringed with short pale hairs. The arista has six or seven dorsal rays and three ventral rays in addition to the apical fork; the inner surface is bare. *Thorax:* Mesonotum yellow, with a broad brown band extending down the median portion, expanding posteriorly over the area set off by the posterior dorsocentral bristles; with a narrow dark brown to black line extending down each dorsocentral row to behind the humeri; and also with a sublateral brown to black vitta down each side. The humeri, notopleura, and supraalar areas are yellow, and also a presutural yellow spot is present. The area immediately behind each humerus is black. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Two strong humeral bristles are present. The mesopleura, the upper halves of the pteropleura, and the metapleura are brown. The remainder of the pleura are yellow except for the black anterodorsal margin of each sternopleuron. The halteres are yellow. The metanotum is yellow with a tinge of brown in the central portion. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Yellow, except for the apical two segments of the tarsi and for the front basitarsi, which are brown. Front femur slender, three moderately strong posterodorsal bristles situated on the apical third of the segment, posteroventral bristles very short. Front tibia densely covered with short, erect setae over the posterior surface. Front basitarsus distinctly flattened laterally, thicker than the tibia, and slightly over one-half the length of the tibia (fig. 23a). The posterior surface of the basitarsus is very densely covered with short, erect hairs. One row of short, erect hairs extends down the anterodorsal surface. *Wings:* Predominantly brown with numerous hyaline spots extended through the cells. The arrangement of the spots is somewhat variable, but is typically as in figure 23b. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.75 times longer than the fourth, and the penultimate section of vein M_{1+2} is slightly longer than the ultimate section. *Abdomen:* Dark brown to black, with a large spot on each anterolateral corner of the terga. The anal plates are large, hemispherical. The ninth

tergum is much shorter than the anal plates, is slightly narrowed dorsally, and lobate on the ventral margins; the ventral lobes are densely haired at the apices. Two moderately strong bristles are present at the upper apex of each lobe. The claspers are not visible in lateral view (fig. 23c).

Length: body, 5.40 mm.; wings, 5.55 mm.

FEMALE. Fitting the description of the male except for sexual characters. The front legs are not ornate. Also, two moderately strong bristles are present at the upper portion of each vibrissal row, and a moderately strong apical bristle is present on each palpus. The terga of the abdomen are entirely subshining black, faintly gray-brown pollinose. The sternum is yellow, tinged with brown. The ovipositor plates are sharp-pointed, almost as long as the ventral margin of the seventh segment.

Length: body, 5.55 mm.; wings, 6.10 mm.

Holotype male and allotype female: from Kula Pipeline, Maui, 4,200 feet, July, 1956 (D. E. Hardy). Eleven paratypes (five males and six females): one same data as type; the remainder from Waikamoi, Maui, 4,000 feet, July 1956, and August, 1958 (the latter series taken in banana bait trap), (D. E. Hardy). Five specimens which appear to belong here are also present from the following localities: Upper Olaa Forest, Hawaii, August, 1952 (W. C. Mitchell); 29 Mi. Olaa, August, 1925 (W. M. Giffard); Kohala Mts., Hawaii, September 2, 1919, Upper Hamakua Ditch Trail (O. H. Swezey); Mt. Kalena, Waianae Mountains, Oahu, April, 1931 (F. X. Williams); and Mt. Kaala, May, 1924 (O. H. Swezey). These differ slightly, however, in coloration and wing markings, and more specimens need to be studied to be certain of their placement; these are not being designated as paratypes.

Type and allotype in the B. P. Bishop Museum. The paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila adventitia new species (fig. 24a–b).

This species belongs in the *crassifemur–nasalis* complex because of the presence of brown bands on the tibiae. It is differentiated from other known species in this complex by having the mesonotum all brown, the front basitarsi with long ciliation (fig. 24b), and by having a long, slender, apical appendage on each labellum of the male (fig. 24a).

MALE. *Head:* About as high as long, the occiput is slightly convex. The front is just slightly wider than long, is entirely brown, tinged slightly with black along the orbits. The frontal bristles are broken on the specimen at hand. The anterior reclinate bristle is situated slightly above the proclinate. The ocellar triangle is black, covered with gray-brown pollen, and the vertex is also black in ground color. The upper portion of the occiput is brown, tinged lightly with yellow; the lower half is yellow. The genae, face, and mouthparts, including the palpi, are yellow; the former have a narrow edge of brown along the lower margin, and the clypeus is tinged slightly with brown. The oral vibrissae are made up of short,

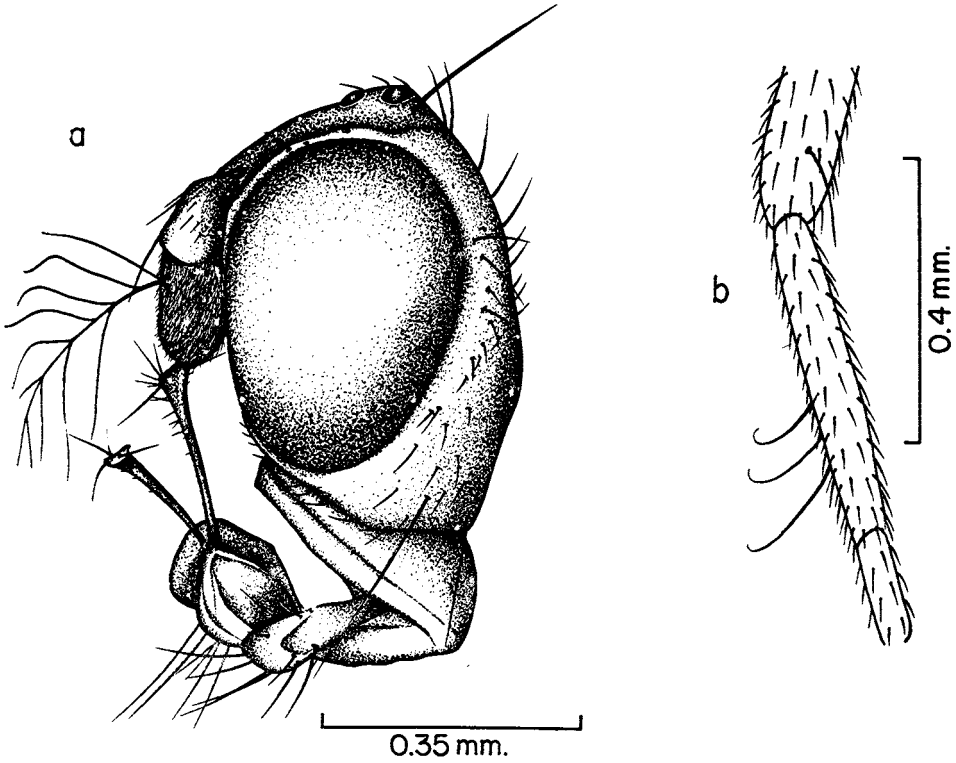


Figure 24—*Drosophila adventitia* n. sp.: **a**, head; **b**, front basitarsus.

fine hairs; no distinct bristles are present. The face is flat and no carina is developed in the median portion. Each palpus has six or eight black, bristle-like hairs around the apicoventral margin. Each labellum has a long, slender, apical projection, almost equal in length to the remainder of the mouthparts; each process is slightly enlarged at the apex and bears an apical scale-like seta and a pair of large, horizontally placed, bristle-like processes (fig. 24a). The two basal segments of the antennae are yellow-brown, the second has two moderately strong dorsal bristles, and the third antennal segment is dark brown. The arista has seven dorsal and three ventral rays in addition to the apical fork; the inner surface is bare. *Thorax:* Predominantly dark brown to black in ground color, covered with brown pollen. The humeri and the sides of the pleuroterga are yellow, tinged faintly with brown. The humeral bristles are broken on the specimen at hand. The front margin of the mesonotum and the ventral margins of the sclerites of the pleura are tinged with yellow in the ground color. The halteres are yellow. Six or eight rows of acrostichal setae are present and the anterior dorsocentral bristle is situated about halfway between the first and second pair of supraalars. The sternopleural bristles are broken; from the sizes of the bases

I would estimate that the anterior bristle is at least two-thirds as long as the posterior. *Legs:* The coxae are yellow, tinged with brown. The trochanters are yellow. The femora are entirely dark brown to black; the front femur is slender, about five times longer than wide; only one or two moderately strong posterodorsal and about three posteroventral bristles are developed. The front tibiae are not ornate; the basitarsus is about two-thirds as long as the tibia and has three moderately strong anterodorsal hairs (fig. 24b). All tibiae are predominantly yellow and each has a brown band near the basal fourth of the segment and another broad, brown, preapical band. *Wings:* Faintly infuscated, with no distinct brown markings. The costal fringe extends almost half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.9 times longer than the fourth. The last section of vein M_{1+2} is 1.32 times longer than the penultimate section. The last section of vein M_{3+4} is about 1.4 times longer than the m crossvein. *Abdomen:* Predominantly black covered with gray-brown pollen, the extreme bases of the terga are faintly tinged with yellow-brown in the ground color. The male genitalia have not been dissected for study.

Length: body, 4.40 mm.; wings, 4.75 mm.

FEMALE. Unknown.

Holotype male: Poomau Valley, Kauai, 3,000 feet elevation, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila agitona new species (fig. 25).

This species is closely related to *D. clydonia* n. sp. from the islands of Maui and Molokai; it is differentiated, however, by having the third costal section equal in length to the fourth, and vein R_{2+3} ending almost opposite the m crossvein (fig. 25). It runs near *D. fuscoamoeba* Bryan, but the wing markings are distinctly different as shown in figures 25 and 103c.

FEMALE. *Head:* The front, measured from the median ocellus to the anterior margin, is about two times wider than long. The orbits, the median portion of the front, and the area surrounding the ocellar triangle are yellow; a brown vertical streak extends at each side of the front, inside the eye orbits from the anterior margin almost to the inner vertical bristles; this sets off a triangle-shaped, yellow mark surrounding the ocellar triangle. The ocellar triangle is brown. A broad, sublateral streak of brown extends over each side of the upper half of the occiput; the upper portion of the occiput is yellow with a faint tinge of brown on the median portion, and the lower half of the occiput is pale yellow. The genae are yellow except for a narrow line of brown to black extending along the vibrissal row. In the median portion of the gena the distance from the vibrissal row to the eye margin is almost equal in width to three rows of eye facets. The face is entirely yellow, almost flat, just slightly raised in the upper median portion. The clypeus is yellow, tinged very faintly with brown. The palpi are yellow; each has a rather small apical bristle, an equal-sized subapical bristle, and numerous black setae over the apical and outside surfaces. The

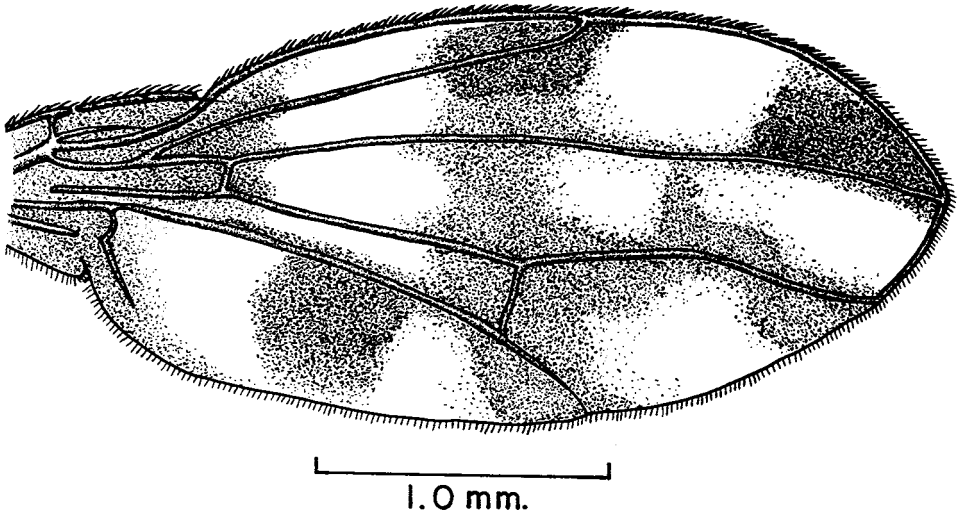


Figure 25—*Drosophila agitona* n. sp.: wing.

mouthparts are entirely yellow. The anterior reclinate bristle of the front is small, about one-half as long as the proclinate, and situated just slightly above the latter. The antennae are brown, tinged faintly with yellow. The arista has five or six dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly brown with two broad, submedian yellow vittae extending the entire length of the mesonotum in line with the dorsocentral rows. The humerus is entirely yellow except for the extreme upper edge which is brown; the propleura and also the hypopleura are yellow. The scutellum is dark brown to black, yellow at the apex. *Legs:* Predominantly yellow, tinged with brown on the apical portions of the tibiae and over the tarsal segments. The front basitarsus is slightly over half as long as the tibia. *Wings:* Conspicuously marked with brown. The third costal section is equal in length to the fourth, and the costal fringe extends nearly three-fourths the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_{2+3} ends slightly beyond a level opposite the m crossvein. Vein R_{4+5} is very slightly undulated. The last section of vein M_{1+2} is slightly curved upward in the median portion and is 1.25 times longer than the penultimate section. Three large brown marks are present along the anterior margin of the wing; the median marking extends transversely across the wing at a level with the m crossvein. The apices of veins R_{4+5} and M_{1+2} are marked with brown and a large brown spot is present at the middle portion of cell M_4 (fig. 25). *Abdomen:* Entirely subshining black, covered with gray-brown pollen. The ovipositor blades are subacutely pointed at the apices and extend approximately two times the length of the anal plates.

Length: body, 3.25 mm.; wings, 3.60 mm.

MALE. Unknown.

Holotype female: from Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy). Type in the B. P. Bishop Museum.

Drosophila aglaia new species (fig. 26a–b).

This species belongs in the group which has three broad brown vittae extending down the mesonotum and which has brown markings in cell R_3 and over the median portion of vein R_{4+5}. It seems closely related to *peniculipedis* n. sp., but the wings are not so completely spotted, the venation is quite different (fig. 26a), and the thorax is predominantly yellow, not brown.

FEMALE. *Head:* About one-third higher than long; predominantly yellow except for the brown eyes, the brown ocellar triangle, brown discoloration across the vertex and upper occiput, and a distinct brown spot on each gena, just below the eye margin. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated slightly above the latter. The face is just slightly raised down the median portion. One strong bristle is present at the upper edge of each vibrissal row. The palpi are brown and each has a moderately strong apical bristle. The mouthparts are otherwise yellow. Antennae yellow, tinged with brown on the dorsum of the second segment and on the apical portion of the third. Arista with about ten dorsal and five ventral rays, in addition to the apical fork, also with numerous short hairs along the anterior surface. *Thorax*: Predominantly clear yellow. Mesonotum with three longitudinal brown vittae, the median vitta equal in width to nearly four rows of acrostichal setae. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Scutellum brown at the base, broadly yellow around the margins. Metanotum and pleura entirely yellow except for a streak of brown across the upper edge of each mesopleuron, a brown spot in the upper median portion of the pteropleuron, and a large pale brown spot covering the upper posterior corner of each sternopleuron. Two strong humeral bristles are present. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. Front femur with about six posterodorsal and five posteroventral bristles and

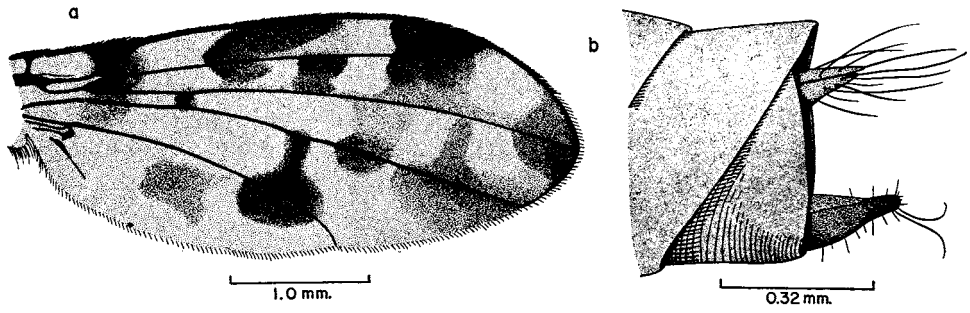


Figure 26—*Drosophila aglaia* n. sp.: **a,** wing; **b,** female genitalia.

also one posterior bristle near base of segment. The front basitarsus is nearly three-fifths as long as the tibia. *Wings:* 2.75 times longer than wide. Predominantly hyaline, rather irregularly spotted with brown. The third costal section is 2.3 times longer than the fourth and the costal fringe extends about three-fourths the distance between the apices of veins R_{2+3} and R_{4+5} The extreme base of the wing is hyaline; a brown spot extends through the apical portion of the second costal cell and also through the bases of cells R_1 and R_3. The r–m and m crossveins are distinctly infuscated and the other wing markings are as in figure 26a. The r–m crossvein is situated near the middle of cell 1st M_2 and the last section of vein M_{1+2} is 2.5 times longer than the penultimate section; the proportions are 51 to 22. *Abdomen:* Brown, with a large yellow spot occupying the posterior corners of each tergum. The ovipositor plates are yellow, rather slender, almost as long as the ventral margin of the seventh abdominal segment, and setose around the margin (fig. 26b).

Length: body, 4.0 mm.; wings, 5.0 mm.

MALE. Unknown.

Holotype female: Mt. Kaala, Oahu, November 17, 1946, collected in a banana bait trap (G. Mainland). One paratype female (head missing): from Kilauea, Hawaii, February 17, 1916 (O. H. Swezey).

Type in the B. P. Bishop Museum. Paratype in the Hawaiian Sugar Planters' Association collection.

Drosophila albifacies new species (fig. 27a–c).

This species fits near *D. hirtitarsus* n. sp. because of the hyaline wings, the brown thorax, and ciliate front tarsi (fig. 27a). It is differentiated from *hirtitarsus* by having only a single row of long cilia extending down the front basitarsus; a very short costal fringe; the labellum with spines at the apex (fig. 27b); and the face white.

MALE. *Head:* The front is entirely brown except for a tinge of black along the orbits and around the ocellar triangle. The orbits, ocellar triangle, and vertex are covered with gray-brown pollen. The upper third to one-half of the occiput is brown, the lower portion is yellow. The genae are yellow except for a narrow line of black along the vibrissal row. Measured from the vibrissae to the eye margin, the genae are about equal in width to three rows of eye facets. The face is entirely white, distinctly convex down the median portion. The clypeus is yellow, tinged faintly with brown. The palpi and mouthparts are yellow. Each palpus has a moderately strong apical bristle about equal in size to the lower genal bristle. The labellum has two or more strong spines and numerous yellow hairs around the apex (fig. 27b). No strong bristles are present in the vibrissal row, the vibrissae are represented by a row of rather short, inconspicuous, brown hairs. The anterior reclinate bristle is about one-half as long as the proclinate and is situated slightly above the latter. The antennae are brown, tinged with yellow on the basal segments. The second segment has two conspicu-

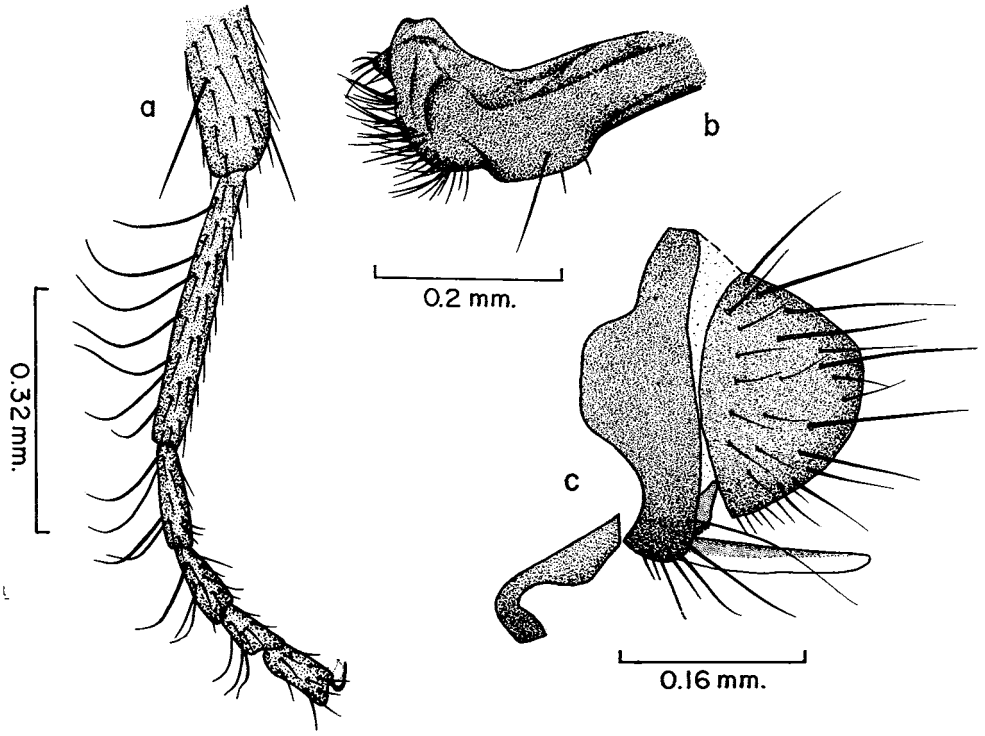


Figure 27—*Drosophila albifacies* n. sp.: **a,** front tarsus; **b,** labellum of male; **c,** male genitalia.

ous dorsal bristles. The arista has five dorsal and two or three ventral rays in addition to the apical fork. *Thorax:* Almost completely dark brown, tinged with black on the dorsum and with a tinge of rufous on the pleura. The halteres are yellow. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the coxae and on the tarsi. The front tibiae lack long ciliation. The front tarsi are ciliated as shown in figure 27a. The basitarsus has five long anterodorsal cilia extending over most of the length of the segment, plus a pair of preapical anterodorsal cilia. Segments two, three, and four have several dorsal cilia each. The front basitarsus is about one-half as long as the tibia. *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends approximately one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.55 times longer than the penultimate section. *Abdomen:* Entirely brown on the dorsum, tinged with yellow to rufous in the ground color. The sternum is entirely yellow. The anal plates are nearly two times higher than long and evenly rounded at the apex and on the venter. The ninth tergum is rather narrow; at

its widest point it is scarcely over one-half the length of the anal plate. The tergum is slightly expanded on the posterior median margin (fig. 27c), the ventral lobes are rather narrow, and the claspers are plainly visible from a direct lateral view.

Length: body, 2.3 mm.; wings, 2.7 mm.

FEMALE. Unknown.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Two paratype males: Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy); and Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy).

Type male in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila amydrospilota new species (fig. 28a–d).

This species is rather closely related to *D. diminuens* n. sp. but differs by having the thorax predominantly brown and by lacking distinct apical spots on the wings. The front tarsus of the male has only six or seven erect dorsal hairs on the basitarsus and three long hairs at apex of second tarsal segment (fig. 28a) rather than the dense clump of long, erect hairs over the dorsal two-fifths to one-half of the basitarsus and over the entire second tarsal segment characteristic of *diminuens*. It keys closely to *chaetopeza* n. sp. and *olaae* Grimshaw, but the ornamentation of the front tarsus is very different.

MALE. Predominantly reddish brown species. *Head:* The front is nearly two times wider than long, is predominantly yellow to rufous, tinged with brown through the median portion, and more distinctly brown along the orbits as far as the proclinate bristles. The vertex and upper occiput are brown. The remainder of the head, excluding the compound eyes, is yellow. The face is slightly raised; noticeably narrowed in the upper median and lower portions. No strong bristles are present in the vibrissal rows. The palpi and mouthparts are yellow. Each palpus has one moderately strong apical bristle plus a black preapical bristle. Each labellum has a dense fringe of long yellow spines around the margin (fig. 28c). The antennae are yellow, tinged with brown on the upper portion of the second segment. The second segment has two moderately strong dorsal bristles. The arista has seven dorsal and three ventral rays in addition to the apical fork. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated just slightly above the latter. *Thorax:* Brown, tinged with rufous. The mesonotum and scutellum are rather densely yellow-gray pollinose. The anterior dorsocentral bristles are almost equal in size to the presutural bristles and are situated in line with the second pair of supraalars. Eight rows of acrostichal setae are present. The pleura are predominantly brown, tinged with rufous in the ground color. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Wings:* Subhyaline, faintly infuscated with brown over the m crossvein and along the last sections of veins M_{1+2} and M_{3+4}; the costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is four times longer than the fourth,

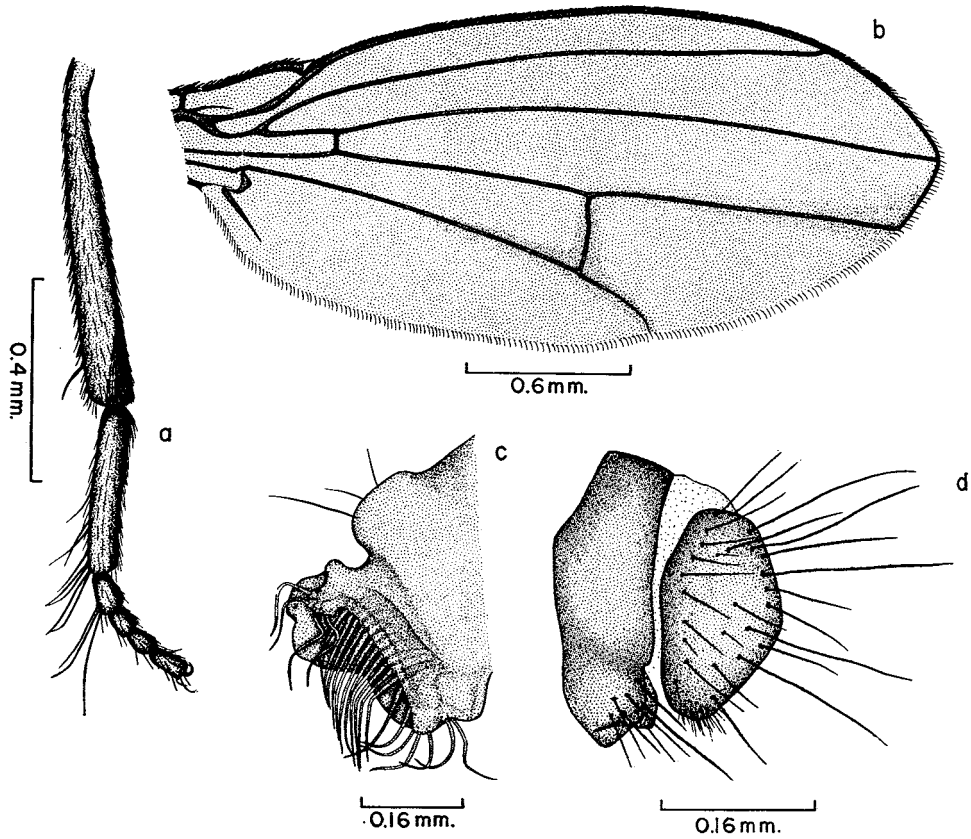


Figure 28—*Drosophila amydrospilota* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** labellum of male; **d,** male genitalia.

and the last section of vein M_{1+2} is 1.17 longer than the penultimate section (fig. 28b). *Legs:* Yellow. The front femur has about three posterodorsal bristles and four or five posteroventral bristles; the segment is slender, about five times longer than wide. The front tibia is devoid of long ciliation, but the posterior surface is rather densely covered with short, erect, yellow pile. The front basitarsus is slightly over one-half as long as the tibia and has erect dorsal hairs only on the apical portion; these are rather sparse; about seven hairs are present. The second tarsal segment has three moderately long dorsal hairs at the apex (fig. 28a). *Abdomen:* Brown, tinged with yellow in the ground color. The ninth tergum is about two-thirds as long as the anal plates and is not narrowed dorsally; the ventral margin is rather truncate and has a series of about five black setae toward the upper edge (fig. 28d). The claspers are hidden from direct lateral view.

Length: body, 3.75 mm.; wings, 3.90 mm.

FEMALE. Unknown.

Holotype male and three male paratypes: from Haleakala, Maui, 1,500–2,000 feet elevation (no date or collector given).

Type in the B. P. Bishop Museum; paratypes in the United States National Museum and the University of Hawaii.

Drosophila ancyla new species (fig. 29a–c).

This species fits in the complex which is characterized by having a strong, apical appendage on the front basitarsus of the male. It apparently fits closest to *D. attenuata* n. sp. from the island of Hawaii, but differs by having the appendage on the front basitarsus not so elongated or clavate and shorter than the second tarsal segment (fig. 29a). The fourth costal section is two times longer than the fifth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}.

MALE. *Head:* The front is entirely brown, except for a tinge of yellow along the lower orbits. The upper orbits, the ocellar triangle, the vertex, and the upper occiput are dark brown, tinged with black, and covered with gray-brown pollen. The median portion of the occiput is brown, the extreme lower part is yellow. The genae are yellow except for a thin brown line extending along the vibrissal rows. Each gena is very narrow; from the vibrissae to the eye margin it is less than the width of two rows of eye facets. The face is yellow except for a faint tinge of brown on the lower median portion. The clypeus is pale brown. The palpi and mouthparts are entirely yellow. No distinct black bristles are present on the palpi, but a number of black setae extend around the apices. The median portion of the face is just slightly raised. One strong bristle is present at the upper edge of each vibrissal row. The anterior reclinate bristle is three-fourths to four-fifths as long as the proclinate and is situated distinctly above the latter. The antennae are brown. The second segment has three moderately strong dorsal bristles. The arista has five to six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Shining brown in ground color on the dorsum, covered with gray-brown pollen. The pleura are predominantly yellow with a tinge of brown on the mesopleura and the upper pteropleura. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second (posterior) pair of supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow, not ornate except for the distinctive development of the front basitarsi. Each basitarsus has a rather slender, curved appendage extending from the apical portion; this is rather densely covered with moderately long dorsal hairs over the apical half and has a black bristle at its apex (fig. 29a). The appendage is about equal in length to the basal portion of the basitarsus and is distinctly shorter than the second tarsal segment. It should be noted that only four visible segments are present in the tarsus. The second and third tarsal segments have moderately strong apical dorsal hairs. *Wings:* Entirely hyaline. The third costal section is slightly over four times longer

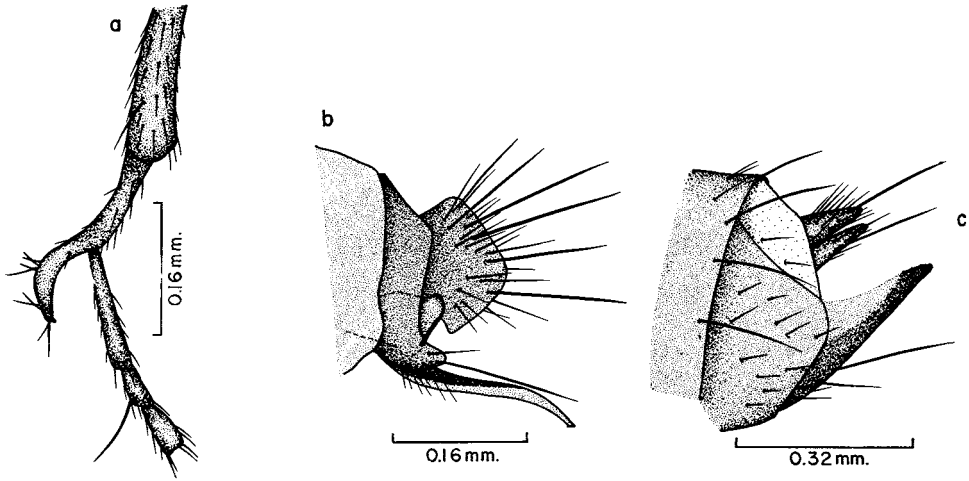


Figure 29—*Drosophila ancyla* n. sp.: **a,** front tarsus; **b,** male genitalia; **c,** female genitalia.

than the fifth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately 1.7 times longer than the penultimate section. *Abdomen:* The terga are entirely shining brown covered with gray-brown pollen. The cerci are approximately two times higher than long and are distinctly pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion and distinctly lobate ventrally (fig. 29b).

Length: body, 2.3 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The front legs are not ornate. The front basitarsus is scarcely over one-third as long as the tibia. A distinct but small apical bristle is present on each palpus, and the last section of vein M_{1+2} is approximately two times longer than the penultimate section. The ovipositor blades are comparatively narrow, almost straight-sided, and subacutely pointed at the apices. They extend about twice the length of the anal plates and are serrated around the apical margins (fig. 29c).

Length: body, 2.5 mm.; wings, 2.8 mm.

Holotype male and allotype female: from Waikamoi, Maui, 4,000 feet, August, 1958 (D. E. Hardy). Six paratypes (five males and one female): same locality as type, collected July, 1956 (D. E. Hardy and R. Namba); and Kula Pipeline, Maui, June 11, 1927, on *Rubus* (O. H. Swezey).

Type and allotype in the B. P. Bishop Museum. Paratypes in the United States National Museum, British Museum (Natural History), and in the University of Hawaii collection.

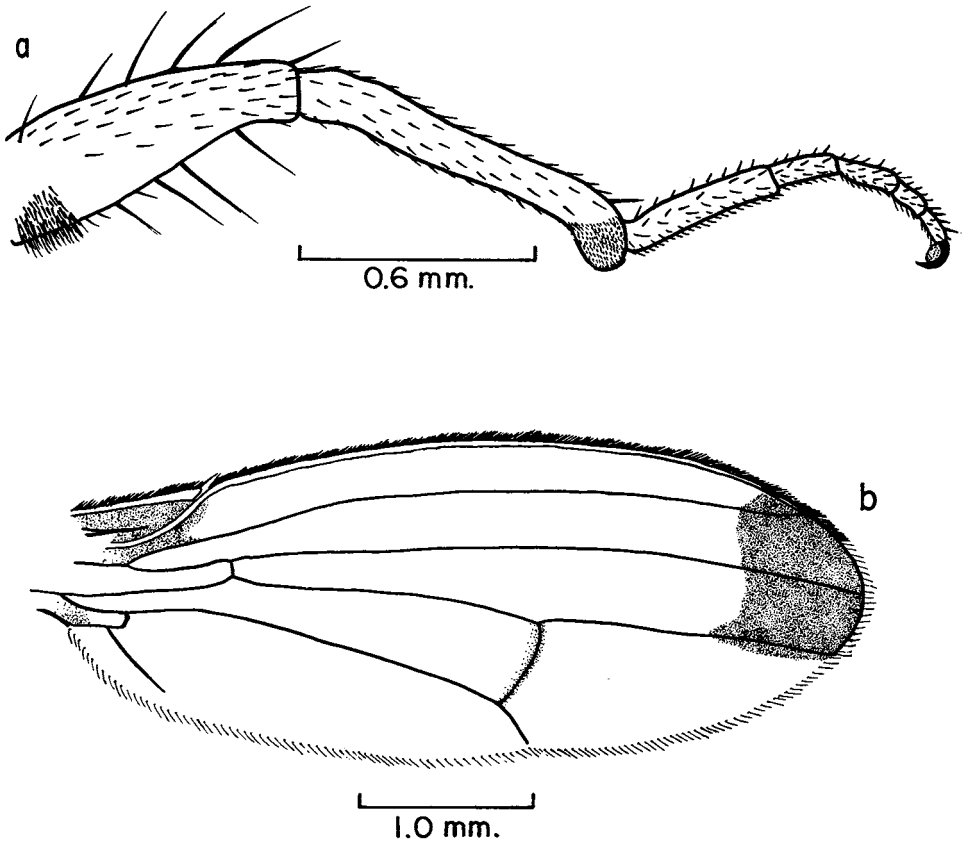


Figure 30—*Drosophila anomalipes* Grimshaw: **a,** front leg, drawn from type; **b,** wing, drawn from type.

Drosophila anomalipes Grimshaw (fig. 30a–b).
Drosophila anomalipes Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :62.

Endemic. Kauai (type labeled "Kauai, 4,000 ft."; probably taken in the Kokee region).

Type in the British Museum (Natural History). I have studied the type and the following notes are based upon this specimen. In the original, Grimshaw mentioned two males, but only the type is present in the British Museum collection. The species has not been recorded since the original collection.

A moderately large, chiefly brownish red, species readily recognized by the peculiar development of the front tibia of the male (fig. 30a).

The front is brownish red in ground color and densely pollinose; the orbits and the area just above the antennae are yellow. The face is clear yellow, almost completely flat with no evidence of a median carina. The antennae are black; each arista has eight or nine long dorsal rays and two ventral rays in addition to

the apical fork. The mouthparts are not ornate, the palpi are brown, and just one short preapical bristle is visible on the type. The oral vibrissae are made up of a row of short, rather densely placed hairs; no strong bristles are present on the lower angles of the face. The thorax is reddish brown on the dorsum, more rufous on the sides and on the metanotum. The entire thorax is rather densely pollinose. The scutellum is brownish on the disc, yellow on the sides. The halteres are yellow. The legs are yellow. Each front coxa has a clump of stout curved bristles at the inner apical margin. Each front femur has a dense clump of black hairs on the inside surface near the base. The front tibia is slightly curved and has a peculiar thumblike process developed at the apex; this is covered with minute striations (fig. 30a). The front basitarsus is slightly less than one-half as long as the tibia. The wings are predominantly hyaline with a dark brown spot at the extreme apex and another brown spot at the base occupying the costal cell and the base of cell R_1; the m crossvein is also slightly fumose (fig. 30b). The third costal section is about six times longer than the fourth and the costal fringe extends approximately two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about equal in length to the preceding section, and the last section of vein M_{3+4} is very short, just slightly more than half the length of the m crossvein. The abdomen is rufous, tinged with brown and the extreme apices of the segments are black; a black band extends across the second tergum; this is indistinct on terga three and four.

Length: body, 5.25 mm.; wings, 6.00 mm. Grimshaw gave the length of the body as 4.5 mm. and the wings as 5.5 mm.

Drosophila anthrax new species (fig. 31a–b).

This species belongs in the *polita* complex by having the body predominantly polished black, the apex of the scutellum yellow, and a black sclerotized rim at the apex of each labellum. It fits near *D. demipolita* n. sp. from the island of Hawaii. It differs by having the front tibia ciliated (fig. 31a), the femora brown, and the face and front entirely brown to black.

MALE. *Head:* Entirely black except for the reddish brown eyes and the lower median portion of the front, which is red, tinged with brown. Measured from the median ocellus to the front margin, the front is slightly less than two times wider than long. The upper eye orbits, the vertex, and the area around the ocellar triangle are dusted with gray-brown pollen; the major portion of the front is velvety black. The anterior reclinate bristle is subequal to the proclinate and is situated distinctly above the latter (about one-fourth the distance from the proclinate to the upper reclinate). The palpi and mouthparts are reddish, tinged with brown. Each labellum has a heavy black rim at the apex. Each palpus has a small, black apical bristle plus several black setae along the outside surface. Three strong bristles are present at the upper portion of each vibrissal row. The uppermost bristle is about equal in size to the humeral bristles. The first antennal segment is yellow, the second is predominantly brown to black

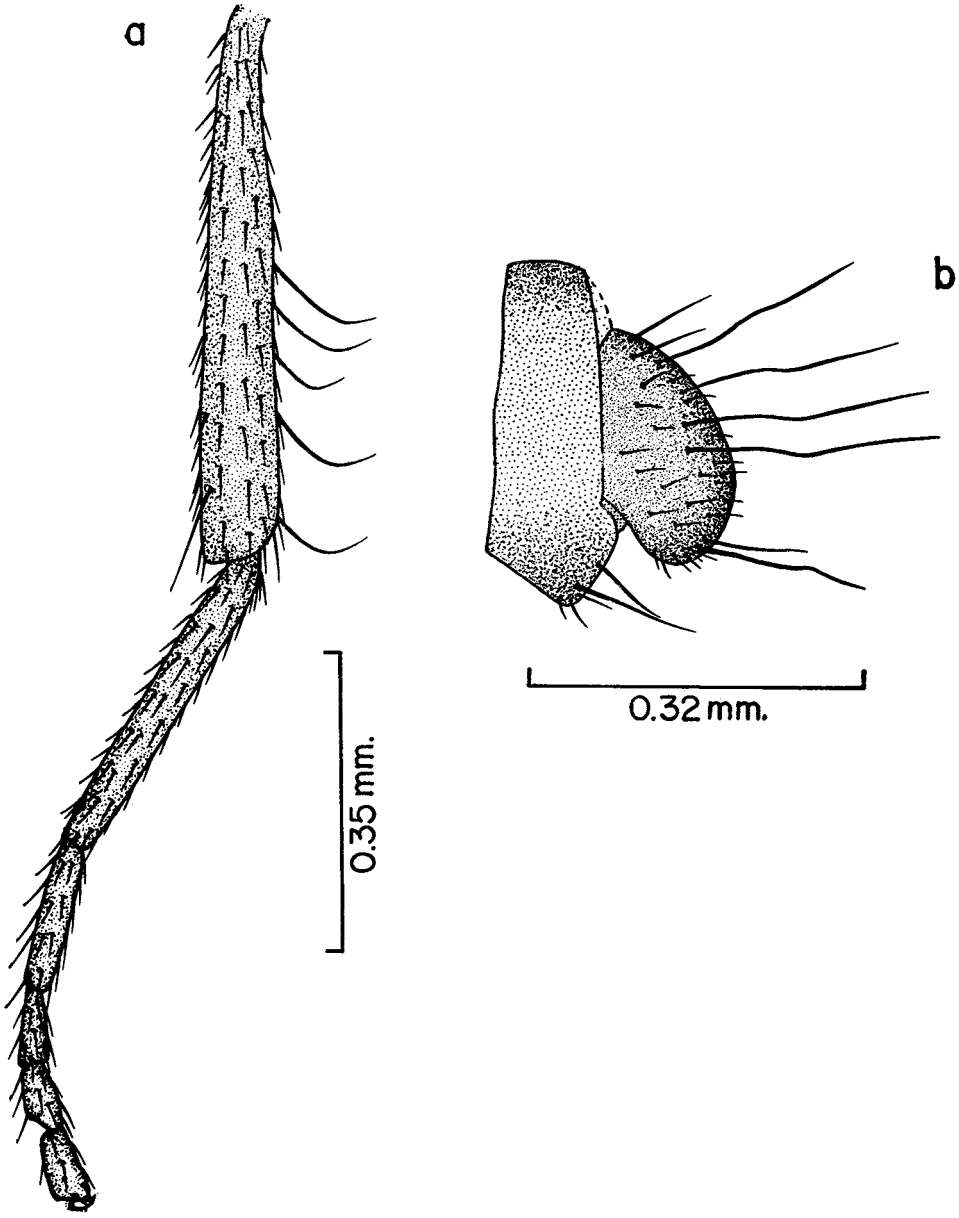


Figure 31—*Drosophila anthrax* n. sp.: **a,** front tibia and tarsus; **b,** male genitalia.

marked with yellow at the apex, and the third segment is dark brown to black. The arista has six to seven dorsal rays and two or three ventral rays in addition to the apical fork. *Thorax:* Entirely polished black except for the yellow apex of the scutellum, lightly covered with gray-brown pollen. The anterior dorso-

central bristles are situated just slightly behind a line drawn between the first (anterior) supraalars. About six rows of acrostichal setae are present. A bristle-like seta is present on each dorsocentral row almost in line with the suture; these are about two times larger than the surrounding acrostichal setae. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is about two-fifths as long as the posterior bristle. The halteres are rufous, tinged faintly with brown. *Legs:* The coxae are yellow-brown. The trochanters, the tibiae, and the first three segments of each tarsus are yellow. The femora and the apices of the tarsi are brown, tinged with yellow on the front legs. Posteroventral and posterodorsal bristles are moderately well developed on the front femora. Each front tibia has about five posteroventral cilia arranged on the apical three-fifths of the segment (fig. 31a). The posterior surface of the tibia has numerous short, erect setae extending the entire length of the segment. The tarsi are not ornate except for some short, erect hairs along the posterior surface. The basitarsus is about two-thirds as long as the tibia. *Wings:* Nearly hyaline, faintly infuscated with gray. The third costal section is about 4.5 times longer than the fourth, and the costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.2 times longer than the penultimate section. *Abdomen:* Entirely polished black, faintly covered with gray-brown pollen. The anal plates are about two times higher than long, rather strongly oblique on the posterior margin, and subacutely pointed ventrally. The ninth tergum is rather broad, not narrowed over the dorsal portion, and slightly expanded ventrally. The claspers are not visible from a direct lateral view (fig. 31b).

Length: body and wings, 2.9–3.4 mm.

FEMALE. Unknown.

Holotype male and one paratype male: Manawainui Valley, Molokai, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila apicipuncta new species (fig. 32a–d).

This species is very closely related to *D. diminuens* n. sp. but is differentiated by having the dorsal ciliation on the front basitarsus of the male confined to the apex of the segment as in figure 32a. Unlike those of *diminuens*, the wings lack the brownish marking at the basal portion.

MALE. Fitting the description of *diminuens* in most respects. *Head:* The front is wider than long, is predominantly yellow, tinged with brown, and more distinctly brown along the upper two-thirds of the orbits. The lower reclinate bristle is about two-thirds to three-fourths as long as the proclinate and is situated just slightly above the latter. The face is slightly carinate in the upper median portion. No strong bristles are present in the vibrissal rows. The apical bristle is moderately developed on each palpus. Each labellum has a rather dense fringe of

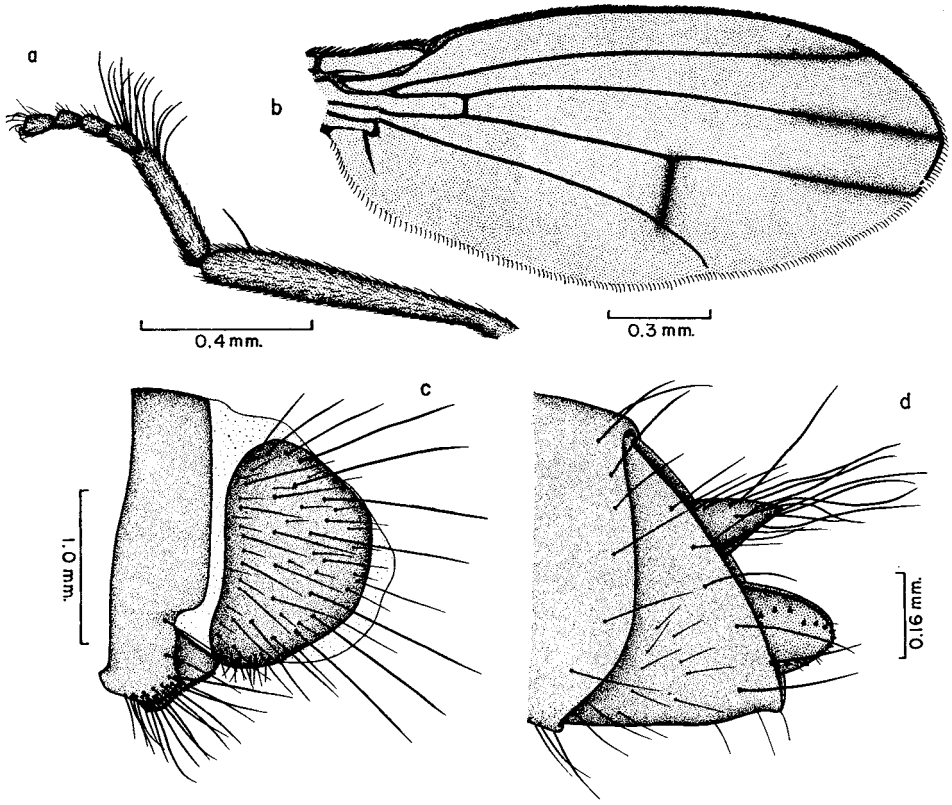


Figure 32—*Drosophila apicipuncta* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia; **d,** female genitalia.

yellow bristles around the margin. One stout spinelike process is present at the upper edge. *Thorax:* Predominantly yellow, tinged faintly with brown, and with two faint brown vittae extending across the upper half of each pleuron. The antennae are yellow, tinged with brown on the apices of the third segment and on the dorsal surface of the second. The arista has seven dorsal and three ventral rays. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The anterior dorsocentrals are opposite the second pair of supraalars. Six to eight rows of acrostichal setae are present. *Legs:* Entirely yellow. The front tibiae are not ciliated. The front basitarsus is about two-fifths as long as the tibia and has a rather dense clump of dorsal hairs at the apex. The second tarsal segment is covered by a dense clump of dorsal hairs. The other tarsal segments are devoid of conspicuous cilia (fig. 32a). *Wings:* Subhyaline to rather intensely yellow-brown fumose, distinctly darker brown over the m crossvein and over the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section

is 4.3 times longer than the fourth. The last section of vein M_{1+2} is just slightly longer than the penultimate section. The proportions are 35 to 31 (fig. 32b). *Abdomen:* Yellow, tinged with brown; the basal segments are entirely yellow, the posterior segments more distinctly brown. The ninth tergum is narrow, about two-thirds as wide as the anal plates; the ventral margins are nearly truncate and are thickly haired (fig. 32c). The apices of the claspers are visible just beyond the margins of the tergum.

Length: body, 3.50 mm.; wings, 3.75 mm.

FEMALE. Similar to the male except for the sexual differences. A pair of moderately strong bristles are present in the upper portion of each vibrissal row. The ovipositor plates are broad and blunt with small black teeth around the apices (fig. 32d).

Length: body, 4.7–5.2 mm.; wings, 5.0–5.3 mm.

Holotype male: Upper Hamakua Ditch Trail, Hawaii, April 10, 1929, on miscellaneous ferns (O. H. Swezey). Allotype female: Kilauea, Hawaii, June 24, 1934, reared from rachis of *Sadleria* fern (O. H. Swezey). Four paratypes (one male, three females): three, same data as allotype except one taken July 19, 1934, among ferns; and one from Napau Crater, Kilauea, Hawaii, July, 1953 (D. E. Hardy). The allotype and two of the paratypes are the specimens mentioned by Swezey (1954:185) as *D. sadleria* Bryan in the statement: "the frond stems of *Sadleria* in the Kilauea area are heavily infested, but the adult flies are seldom seen or reared." These specimens had been determined by Bryan as *sadleria;* they are very distinct, however, from that species.

Type and allotype in the Hawaiian Sugar Planters' Association collection. The paratypes are in the collections of the B. P. Bishop Museum, United States National Museum, and the University of Hawaii.

Drosophila apicisetae new species (fig. 33a–b).

This species fits near *D. spicula* n. sp., but has no strong acrostichal setae on the anterior portion of the mesonotum, and the front tarsi are very differently developed (fig. 33a).

MALE. Predominantly dark-colored species. *Head:* As seen from a lateral view the head is about one-third higher than long. The front is velvety brown in the median portion and black covered with gray pollen along the orbits. The ocellar triangle, the vertex, and the upper occiput are black; the remainder of the occiput is brown. The genae are yellow, faintly tinged with brown, and a narrow strip of brown extends along the lower edge. The lower portion of the face is dark brown to black; the upper portion is yellow-brown and slightly raised in the middle. One or two black bristles are present at the upper edge of each vibrissal row. The clypeus is brown. The mouthparts are yellow, faintly tinged with brown. The labella are not ornate. Each palpus has three or four black setae arranged at or near the apex, but no strong bristles. The antennae are dark brown and the second segment has two dorsal bristles. The arista has six dorsal

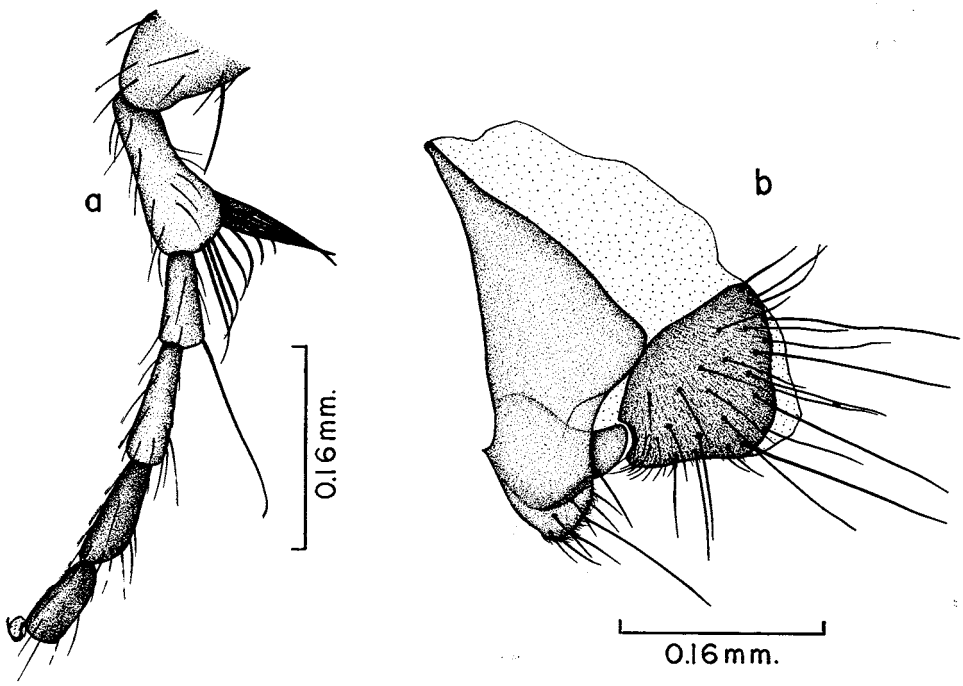


Figure 33—*Drosophila apicisetae* n. sp.: **a**, front tarsus; **b**, male genitalia.

rays and two ventral rays in addition to the apical fork. *Thorax:* Almost entirely brown, tinged with black on the dorsum; the humeri are yellow with a faint tinge of brown. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the posterior pair of supraalars. Six to eight rows of acrostichal setae are present. The lower humeral bristle is about two-thirds as long as the upper bristle. The anterior sternopleural bristle is almost equal in size to the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apical segments of the tarsi. The front femora are slender; each has about five posterodorsal bristles and three to four posteroventral bristles. The posterior surface of each front tibia is rather thickly covered with suberect, short setae. The dorsal bristle on the tibia does not extend to the apex of the segment. The front basitarsus is expanded apically, short, about one-fifth as long as the tibia, and has at the apex a spinelike, closely placed cluster of black hairs plus a rather comblike row of moderately long, curved hairs (fig. 33a). The second tarsal segment is about two-thirds as long as the first and has a strong black bristle at the apex which extends beyond the apex of the third tarsal segment. *Wings:* Subhyaline with no distinct brown markings. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is slightly over four times longer than the fourth, and the last section of vein M_{1+2} is 1.44 times longer than the penultimate section. *Abdomen:* Entirely dark brown

covered with gray-brown pollen and subopaque. The ninth tergum is reduced to a narrow ring over the dorsal portion, expanded medianly, and rounded on the ventral surfaces (fig. 33b). The anal plates are about equal in length to the longest portion of the tergum.

Length: body, 2.5 mm.; wings, 2.8 mm.

FEMALE. The females of this species may be difficult or impossible to separate from those of closely related species. However, the specimens which seem to be associated with the above males apparently can be differentiated by the all-brown sternopleura. These specimens are not being designated in the type series, however, since there is a possibility that they are not correctly associated. For the most part, the specimens fit the description of the male except that the anterior reclinate bristle is not enlarged, the front tarsi are not ornate, and the bristles of the vibrissal row are much better developed.

Holotype male: Kaluakauka, Hawaii, 5,500 feet, October, 1952 (D. E. Hardy). Paratypes, four males: same as type; and Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

The type is in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila apodasta new species (fig. 34a–b).

This species is differentiated from other known Hawaiian species which have clear wings, predominantly dark colored bodies, and ornate front tarsi on the males by the development of the bristles on the front basitarsus (fig. 34a).

MALE. Moderately small, dark-bodied species. *Head:* The front is predominantly brown and the orbits are black, covered with gray pollen. The vertex and ocellar triangle are black and the occiput is predominantly brown, yellow on the lower portion. The gena is yellow with a narrow border of brown along the lower portion. The face is yellow above, brown to black on the lower portion, and with a slight keel down the median portion. One moderately strong bristle is present at the upper edge of each vibrissal row. The clypeus is brown. The palpi are yellow, tinged faintly with brown; each has a small apical and one or two small subapical bristle. The labella are not ornate. The antennae are brown, tinged faintly with yellow on the lower portion of the second segment and the base of the third. The arista has four dorsal and two ventral rays in addition to the apical fork. The lower reclinate bristle is three-fourths to four-fifths as long as the proclinate and is situated slightly above the latter. The inner vertical bristle is strong, equal in thickness and length to the outer bristle. *Thorax:* Subshining brown covered with brownish gray pollen. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the posterior supraalars. Six rows of acrostichal setae are present. The lower humeral bristle is almost equal in length to the upper, and the anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The leg joints are slender. The

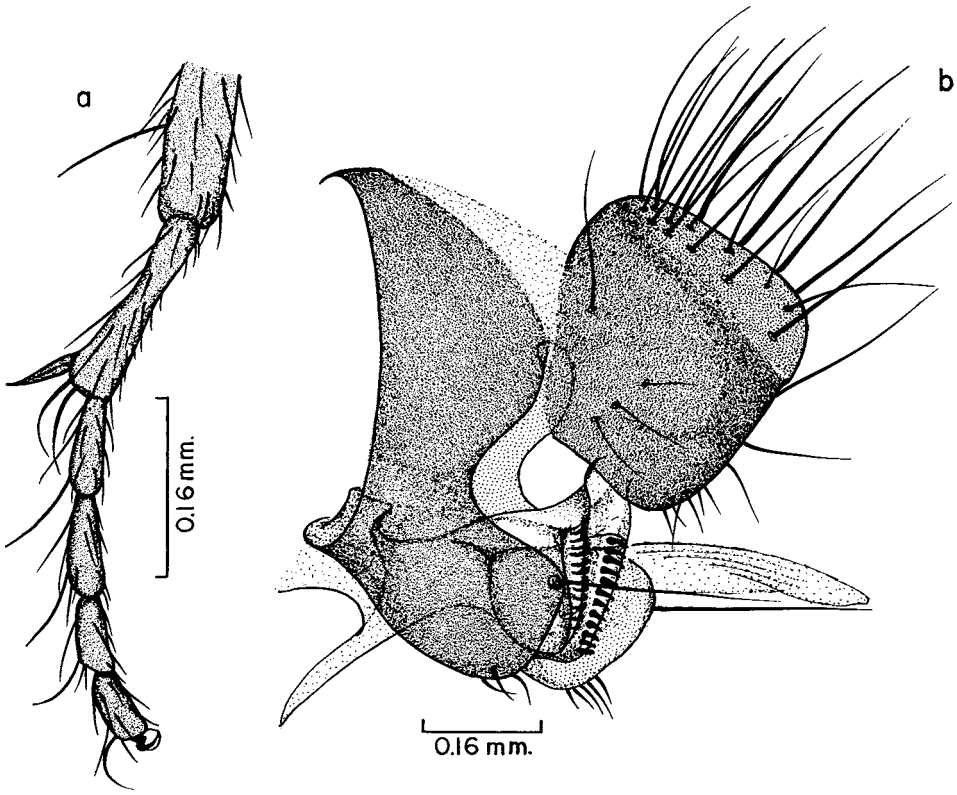


Figure 34—*Drosophila apodasta* n. sp.: **a**, front tarsus; **b**, male genitalia.

front femur has four or five posterodorsal bristles and three to four posteroventral bristles. The front tibia is not ornate; the preapical dorsal bristle extends slightly beyond the apex. The front basitarsus is about one-third as long as the tibia and has four black bristles at the apex, the lower two curved downward and the upper two closely appressed at their apices with the bases distinctly separated (fig. 34a). The second tarsal segment is almost one-half as long as the first and has a moderate apicodorsal bristle. *Wings:* Faintly infuscated but with no distinct brown markings. The costal fringe extends slightly over one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is slightly over four times longer than the fifth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The last section of vein M_{3+4} is nearly two times longer than the m crossvein. *Abdomen:* Predominantly brown, covered with gray-brown pollen, the sixth segment yellow. The anal plates are pointed ventrally, and the ninth tergum is rather strongly narrowed on each ventral margin (fig. 34b).

Length: body, 2.2 mm.; wings, 2.7 mm.

FEMALE. Fitting the description of the male in most respects except that the front legs are not ornate, two moderately large bristles are present at the upper edge of each vibrissal row, and the bristles on the palpi are stronger. The ovipositor plates are slender, pointed, extending distinctly beyond the tips of the anal plates.

Length: body, 2.3 mm.; wings, 2.9 mm.

Holotype male and allotype female: from Mt. Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy). Seven paratypes, (four males, three females): all same as type except one from Alakai Swamp, Kauai, 3,800 feet, July, 1952 (D. E. Hardy). All were collected in the extremely wet, swampy region near Mt. Waialeale.

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila apoxyloma new species (fig. 35a–e).

This belongs in the group of species which is characterized by having the anterior margin of the wing marked with brown. It fits near *D. eurypeza* n. sp., but is readily differentiated by the long black bristles on the front tibiae and basitarsi (fig. 35d).

MALE. *Head:* The compound eyes are slightly higher than long as seen in direct lateral view (fig. 35a). The front is predominantly polished black, yellow on the lower margin. The vertex is polished black, the occiput is black covered with gray pollen. The face is yellow-white. The genae are yellow, tinged with brown along the lower margins. The oral vibrissae are made up of fine hair-like setae on the anterior portion with about four moderately strong bristles developed posteriorly. The anterior reclinate bristle is fine, hair-like, about four-fifths as long as the proclinate, and situated opposite the latter. The inner vertical bristles are strong, about equal in size to the second pair of dorsocentrals. The antennae are brown, with a tinge of rufous on the sides of the second segment. The arista has five to six dorsal and one or two ventral rays in addition to the apical fork. The labella are ornate, armed with black curved teeth at the apices, and each with a dorsal appendage bearing black spines or setae at the apex (fig. 35b). The palpi are rather short, extending less than half the length of the mouthparts; they are pale brown and have several small black bristles around the apices. *Thorax:* Entirely polished black, including the humeri and the knobs of the halteres. Only one strong bristle is present on each humerus, the upper represented only by a small, inconspicuous seta. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) supraalar bristles. Six rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely clear yellow, two to three bristles present on each of the posterodorsal and posteroventral surfaces on the front femora. A long, black anterior bristle is present at the middle of the front

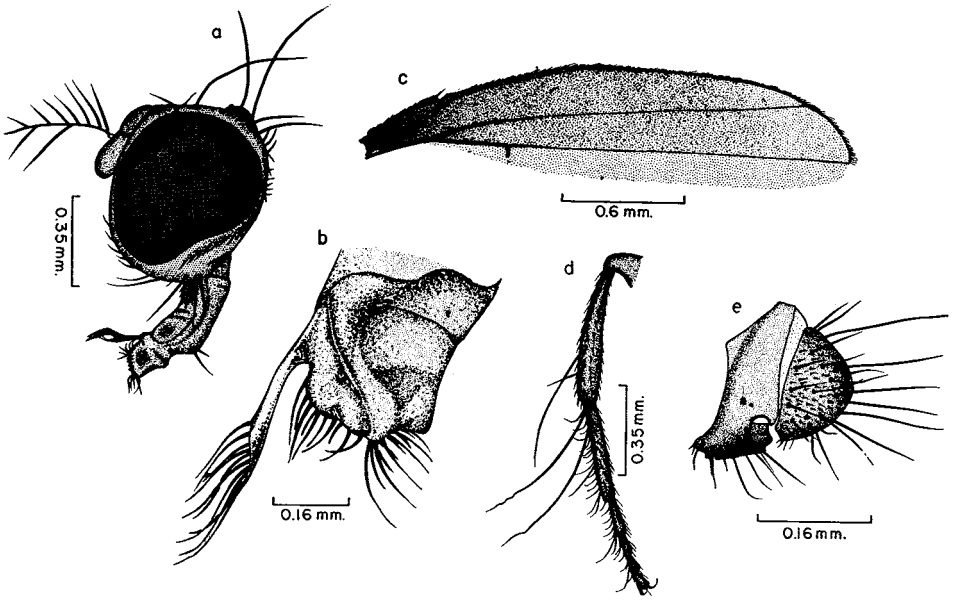


Figure 35—*Drosophila apoxyloma* n. sp.: **a,** head; **b,** labellum of male; **c,** anterior margin of wing; **d,** front tibia and tarsus; **e,** male genitalia.

tibia; this extends four-fifths as long as the segment. The preapical dorsal bristle on the front tibia is moderately strong, situated about its own length from the apex of the tibia. The front basitarsus is about two-thirds as long as the tibia and has two long, black posterior bristles situated at the base of the segment (fig. 35d); these extend approximately to the apex of the third or the fourth tarsal segment. The basitarsus also has a straight black dorsal bristle at the apical three-fourths of the segment and has two large posterior bristles at the apical third. The tarsus has numerous curved cilia extending down the dorsal surface. *Wings:* Predominantly hyaline, brown in the costal cells and through most of cell R_1; the brown marking fades gradually in the apical half of the cell R_1 (fig. 35c). The third costal section is five times longer than the fourth and the costal fringe extends one-third to one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.4 times longer than the penultimate section. *Abdomen:* Entirely polished black except for a narrow yellow-gray band across the apex of each of the first three terga. The anal plates are distinctly higher than long and are longer than the ninth tergum. The tergum is narrowed dorsally and lobate ventrally (fig. 35e).

Length: body and wings, 3.2 mm.

FEMALE. Unknown.

Holotype male: Pepeopae, Molokai, 4,000 feet, July, 1959 (D. H. Habeck). Type in the B. P. Bishop Museum.

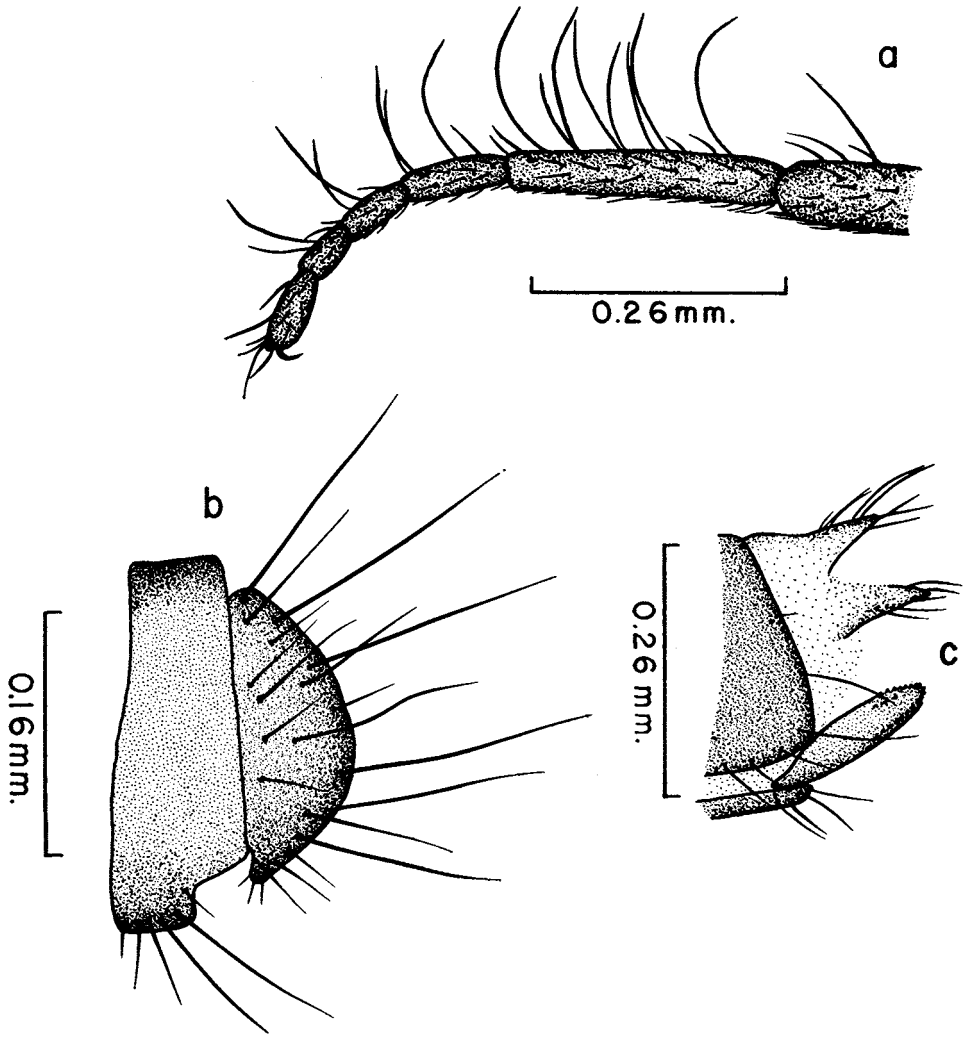


Figure 36—*Drosophila aquila* n. sp.: **a,** front tibia and tarsus; **b,** male genitalia; **c,** female genitalia.

Drosophila aquila new species (fig. 36a–c).

This species is closely related to *D. megasticta* but is differentiated by the entirely dark brown to black thorax and by the brown to black front and face.

MALE. Almost entirely dark-colored species. *Head:* Entirely dark except for a yellow streak along the orbits opposite the bases of the antennae; the extreme lower portion of the occiput and the hind portions of the genae are also yellow. The front is about one-third wider than long and is predominantly velvety black. The face and upper portions of the genae are dark brown to black. The palpi are

yellow, are rather thickly swollen through the median portion, and have numerous dark-colored setae around the outside edges. The mouthparts are yellow. The apices of the labella are armed with stout, bristle-like teeth. One moderately strong bristle is situated at each lower angle of the face. The lower reclinate bristle is about one-half as long as the proclinate and is situated opposite the latter. The first two antennal segments are brown, tinged with yellow; the second has two moderately stout dorsal bristles. The third segment is dark brown to black. The arista has six dorsal rays and four ventral rays in addition to the apical fork. *Thorax:* Mesonotum and scutellum entirely dark brown to black with no indication of vittae. The pleura are predominantly brown; the lower portions of the sternopleura are yellow, tinged with brown. The anterior dorsocentral bristles are situated almost in line with the front pair of supraalar bristles. *Legs:* Yellow, faintly tinged with brown on the tarsi. The front legs are not ornate; the tibiae lack long ciliation, and the tarsi have moderately long dorsal cilia extending the entire length (fig. 36a). *Wings:* The venation and markings appear identical with those of *megasticta* (fig. 134b). The brown mark extending through the middle of the wing from the costa is not continuous with the brown mark over the m crossvein, a slight interruption occurring in the middle of cell R_5. The fuscous marking along vein M_{3+4} is not quite so distinct as in *megasticta*. *Abdomen:* Entirely dark brown to black. The anal plates are subacutely pointed ventrally. The ninth tergum is straight-sided, not at all narrowed over the dorsal portion, and rather abruptly lobate ventrally (fig. 36b).

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Fitting the description of the male except that the front tarsi and the mouthparts are not ornate. Each palpus has one moderately strong apical bristle and one preapical bristle on the outside surface. The ovipositor plates are short, rather thick, and triangular; they extend just slightly beyond the apices of the anal plates (fig. 36c).

Length: body, 3.0 mm.; wings, 3.4 mm.

Holotype male and allotype female: from Keanakolu, on the slopes of Mauna Kea, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Eleven paratypes (six males and five females): from Upper Olaa Forest, Hawaii, 4,000 feet, August, 1952, to July, 1956 (D. E. Hardy); and Kohala Ditch Trail, Honokane Nui Stream, Hawaii, August, 1956 (D. E. Hardy).

Type, allotype, and two paratypes are in the B. P. Bishop Museum; the other paratypes are in the collections of the United States National Museum, the British Museum (Natural History), and the University of Hawaii.

Drosophila araiotrichia new species (fig. 37a–d).

The wing markings and venations seem to indicate that this is related to *D. megasticta* n. sp. from Hawaii. It differs, however, by having no vittae on the mesonotum, by the very sparsely haired front tarsi, and by the very faint marking along vein M_{3+4} (fig. 37c). It also fits near *aquila* n. sp., but the ciliation on the front tarsi is very different (fig. 37b).

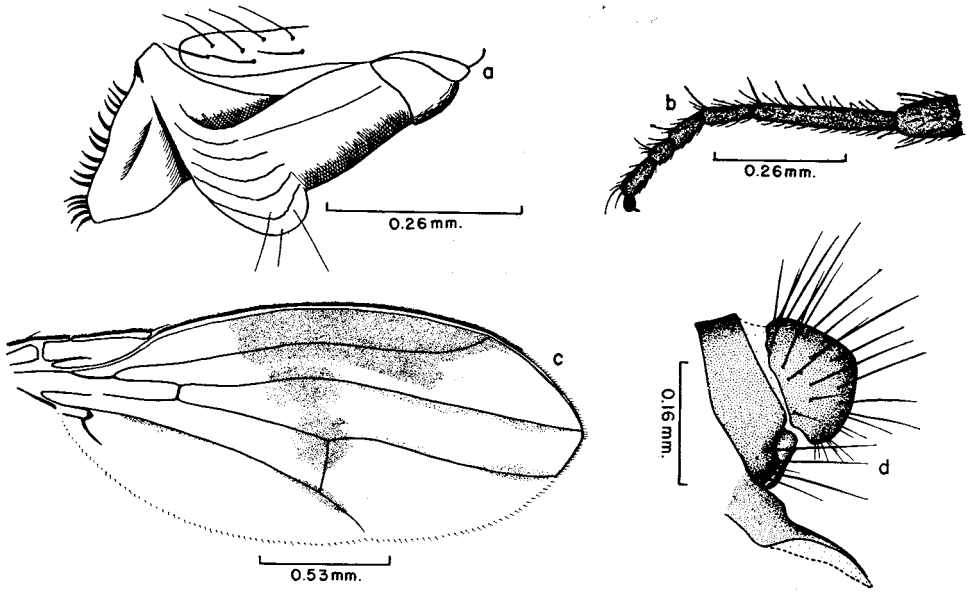


Figure 37—*Drosophila araiotrichia* n. sp.: **a,** labellum of male; **b,** front tarsus; **c,** wing; **d,** male genitalia.

MALE. *Head:* Principally yellow; the upper portion of the front is tinged with brown, the median vertex and upper occiput are brown, and the ocellar triangle is black. The front is about one-third wider than long. The lower reclinate bristles are about half as long as the proclinates and are situated opposite the latter. The palpi and mouthparts are yellow; the former have several small black bristles around the outer edge and apex. Each labellum is armed with a row of bristle-like hairs at the apex (fig. 37a). The basal antennal segments are yellow, tinged with brown. The third segment is brown. The arista has four to five dorsal rays and two ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow to rufous with a faint tinge of brown in the ground color of the posterior portion of the mesonotum and the disc of the scutellum and with a yellow-brown marking extending across the top portion of each mesopleuron, pteropleuron, and metapleuron. Some specimens have the thorax largely brown, tinged with yellow. The sternopleura are entirely yellow; the anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The halteres are yellow, tinged lightly with brown on the knobs. *Legs:* The front legs are not ornate; the tarsi have only a few short, erect hairs scattered over the dorsal surface. The basitarsus is about one-half as long as the tibia (fig. 37b). *Wings:* Largely subhyaline with no distinct brown markings in the basal portion. A dark brown mark extends through the apical two-thirds of cell R_1, across vein R_{2+3}, through the upper two-thirds of cell R_3, and narrows to a band which extends across the middle of the wing at a level with the m crossvein. Faint brown marks are also present on the

apical portions of veins R_{4+5} and M_{1+2}, and a faint indication of brown fumosity extends along vein M_{3+4} and over the r–m crossvein (fig. 37c). The wings are about 2.5 times longer than wide. The third costal section is about three times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.5 longer than the penultimate section. *Abdomen:* Dark brown to black. Male genitalia as in figure 37d. The ninth tergum is nearly straight-sided, slightly attenuated on the ventral apices. The claspers are plainly visible from a lateral view.

Length: body, 2.5–2.8 mm.; wings, 2.7–3.0 mm.

FEMALE. Fitting the description of the male except that the mouthparts are not ornate and the front tarsi have no erect cilia. The ovipositor plates are short and triangular in shape; they are scarcely longer than the anal plates.

Length: body, 2.7–3.0 mm.; wings, 3.0–3.4 mm.

Holotype male and allotype female: Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy). Forty paratypes (21 males and 19 females) from the following localities: same as type, July, 1952, and July, 1953 (D. E. Hardy and M. Tamashiro); Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy); Hanalilolilo, Molokai, July, 1952 (D. E. Hardy); Manawainui Valley, Molokai, August, 1953 (D. E. Hardy); Puu Kukui, Maui, 3,000–4,500 feet, June, 1953 (D. E. Hardy); Ridge above Haelaau, Maui, 3,000–3,300 feet, December 21, 1928 (E. H. Bryan, Jr.); Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (C. R. Joyce); Kula Pipeline, Maui, July, 1956 (D. E. Hardy); and Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy).

The type, allotype, and a series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila artigena new species (fig. 38a–b).

This species appears to be closely related to *D. dissita* n. sp., but the development of the front legs of the male is distinctly different (fig. 38b); also the very narrow genae will readily differentiate it.

MALE. *Head:* Normal in shape, just slightly higher than long as seen from direct lateral view. The posterior and anterior margins of the head are almost vertical. The face is concave so that the margins are not visible in direct lateral view; the upper median portion of the face is very slightly raised. The oral vibrissae are represented by small black setae; no distinct bristles are present. The front is nearly two times broader than long, has a velvety brown V-shaped mark in the median portion, and the orbits and area surrounding the ocellar triangle are tinged with black in the ground color and rather densely gray pollinose. The occiput is yellow, tinged faintly with brown along the sides. The genae are yellow. The face is predominantly yellow, tinged with brown on the lower lateral mar-

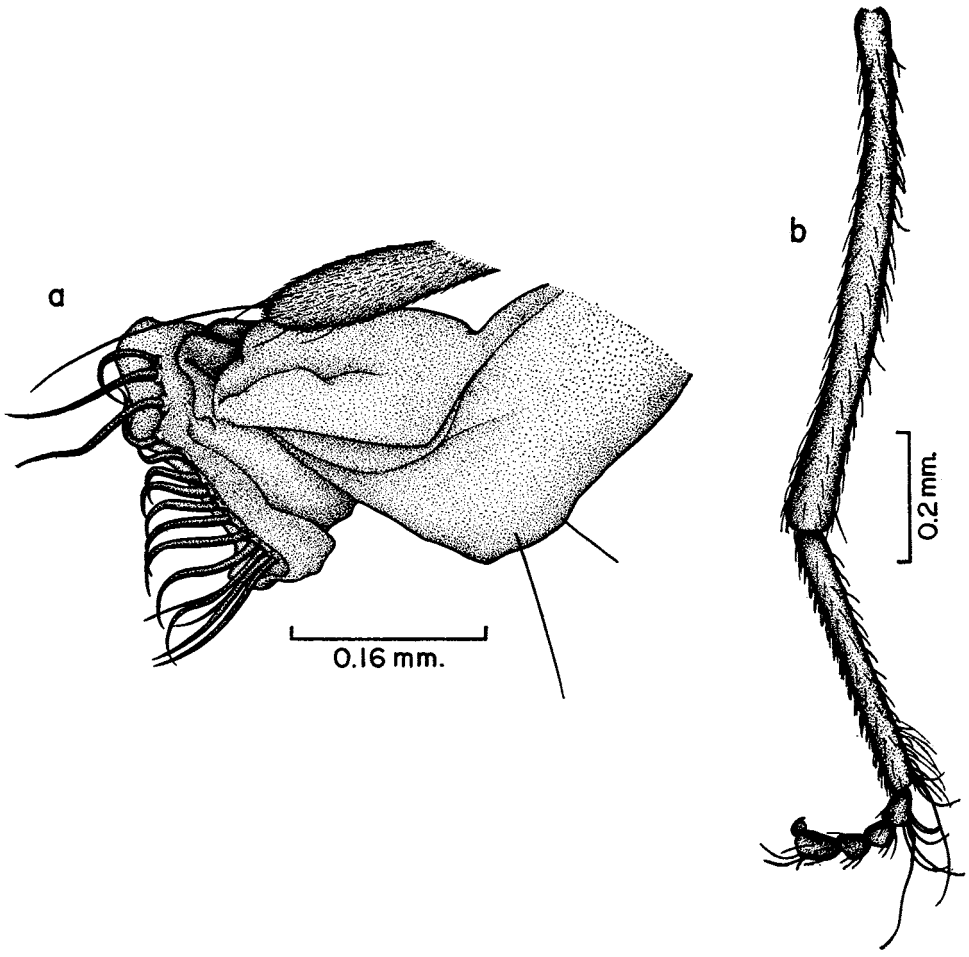


Figure 38—*Drosophila artigena* n. sp.: **a,** labellum of male; **b,** front tibia and tarsus.

gins. The clypeus is yellow, faintly tinged with brown. The palpi are yellow, each with a moderately strong apical bristle. The labella are yellow, tinged with brown, the margin of each produced into a series of spinelike teeth (fig. 38a). The antennae are brown; the second segment has two dorsal bristles. The arista has five dorsal and two ventral rays in addition to the apical fork. The inner vertical bristles are situated nearer to the upper reclinate than to the outer verticals; they are long and slender, hairlike, but equal in length to the outer. The lower reclinate bristle is small, about one-half as long as the proclinate, and situated slightly above the latter. *Thorax:* Predominantly brown, tinged with yellow and covered with gray-brown pollen. The median portion of the mesonotum is black in ground color so that a broad, but faint, black vitta extends the entire length of the mesonotum. The lateral margins of the mesonotum and the humeri are clear

yellow. The lower humeral bristle is about one-third as long as the upper bristle. The anterior sternopleural bristle is approximately three-fourths as long as the posterior bristle. The anterior dorsocentral bristles are small, rather inconspicuous (only about one-third as long as the posterior bristles), and situated just slightly behind a line drawn between the posterior supraalars. Six to eight rows of acrostichal setae are present. *Legs:* Yellow, faintly tinged with brown on the mid and hind coxae. The front femora are slender; each has two posterodorsal bristles and about five posteroventral bristles. Front tibia slender, approximately equal in length to the femur, and arcuate as seen from direct dorsal view. The preapical dorsal bristle extends approximately to the apex of the segment. The tibiae lack ciliation. The front basitarsus is long and slender, slightly over one-half as long as the tibia and with a strong apical dorsal bristle, and with anterodorsal cilia on the apical one-fourth of the segment. Second tarsal segment about one-eighth as long as the basitarsus and bearing a bristle and several long cilia at the apex (fig. 38b). *Wings:* Entirely hyaline. The costal fringe is very short, extending only about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Dark brown covered with gray-brown pollen. The genitalia have not been dissected for study.

Length: body, 3.00 mm.; wings, 3.75 mm.

FEMALE. Unknown.

Holotype male: Paliku, Haleakala Crater, Maui, August, 1952 (W. C. Mitchell).

Type in the B. P. Bishop Museum.

Drosophila asketostoma new species (fig. 39a–f).

Fitting in the group of species which has fuscous markings only on the m cross-vein, the last section of vein M_{1+2} equal in length to the penultimate section, and the body predominantly dark brown to black. It is readily differentiated from other species in this complex by the densely gray pollinose thorax, the very ornate mouthparts (fig. 39a), and the ciliated front tarsi (fig. 39d) of the male.

MALE. *Head:* About one-sixth higher than long. Front one-fifth wider than long, yellow to rufous on the lower third, brown to black on the upper portion. The lower reclinate bristle is nearly three-fifths as long as the proclinate and is situated just slightly above the latter. The vertex and occiput are dark brown to black. The genae and face are yellow, the latter very slightly convex in the median portion. The palpi and mouthparts are yellow; each palpus has two small bristles at its apex. Each labellum is armed with six very strong teeth at its apex (fig. 39a). All of the bristles of the vibrissal row are about equal in size. The basal two antennal segments are yellow; the third segment is yellow ventrally and tinged with brown on the dorsal half. The third segment is very short, scarcely longer than the second. The arista has three to four dorsal and two ventral rays in addition to the tiny apical fork (fig. 39c). *Thorax:* Dark brown to gray in ground

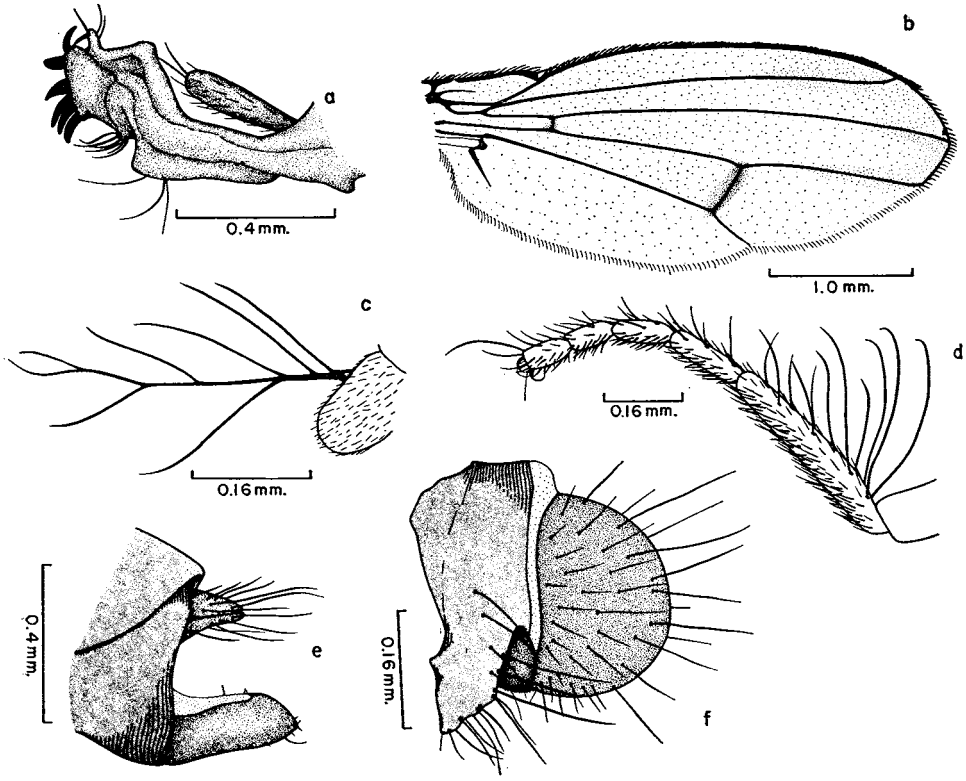


Figure 39—*Drosophila asketostoma* n. sp.: **a,** labellum; **b,** wing; **c,** antenna; **d,** front tarsus; **e,** female genitalia; **f,** male genitalia.

color, predominantly gray pollinose, mesonotum with faint indications of three brown vittae. The humeri are yellow, tinged lightly with brown. The anterior dorsocentral bristles are situated opposite the second supraalars. A moderately strong bristle-like seta is present in each dorsocentral row opposite the first pair of supraalar bristles. Only one strong humeral bristle is present. The pleura are entirely brown to black, covered with gray pollen. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. Halteres pale yellow. *Legs:* Coxae and femora brown, tinged with yellow; legs otherwise yellow, except for the brown apical segments of the tarsi. Front tibia devoid of ciliation. Front basitarsus and second tarsal segments with long anterodorsal cilia (fig. 39d). Front basitarsus about two-fifths as long as the tibia. *Wings:* Faintly fumose with a pale brown mark extending over the m crossvein. The wing is about 2.5 longer than wide. The third costal section is 4.6 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of M_{1+2} is equal in length to the penultimate section (fig. 39b). *Abdomen:* Dark brown to black, densely gray-brown pollinose.

The apices of the segments are slightly yellow. The ninth tergum is narrowed dorsally, the upper median margin is strongly concave; the ventral margins of the tergum are attenuated and bear numerous setae; at the broadest point the tergum is two-thirds to three-fourths as wide as the cerci. The claspers are plainly visible from a lateral view (fig. 39f).

Length: body, 3.0 mm.; wings, 3.9 mm.

FEMALE. Fitting the description of the male except that the mouthparts and front legs are not ornate. Also the apices of veins R_{2+3}, R_{4+5} and M_{1+2} appear to be very faintly infuscated; the third antennal segment, palpi, and clypeus are brown. The mesonotum is more distinctly vittate with three narrow vittae down the middle in the acrostichal area, plus one short vitta on each side just outside each dorsocentral row; the sides of the mesonotum are also brown.

Length: body, 3.3–4.0 mm.; wings, 4.0–5.0 mm.

Holotype male, allotype female, and 21 paratypes (10 males and 11 females): from Haleakala, Maui, 8,600 feet, August, 1956, collected on the flowers of silverswords (*Argyroxiphium*), (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila attenuata new species (fig. 40a).

This species fits in the group which is characterized by having a projection at the apex of the front basitarsus, only four distinct segments in the front tarsus of the male, and lacking an apicoventral bristle on the front tibia. It is differentiated from other species in this complex by having the apical projection of the front basitarsus strongly clavate on the apical half, with a long attenuated base (fig. 40a).

MALE. A small predominantly pale-colored species. *Head:* The front is brown, tinged with yellow on the lower portion. The vertex and the upper portion of the occiput are brown. The ocellar triangle is black. The anterior reclinate bristle is about equal in size to the proclinate and is situated opposite the latter. The remainder of the head, except for the reddish brown compound eyes, is entirely yellow. The face has a slight carina down the median portion. Two small, black bristles are present at the upper portion of each vibrissal row. The apical bristle on the palpus is small. The antennae are yellow. The arista has six or seven dorsal and two ventral rays in addition to the apical fork. *Thorax:* Almost entirely yellow with a very faint tinge of brown in the ground color of the scutellum and the mesonotum. About eight rows of acrostichal setae are present. The anterior dorsocentral bristles are long, about equal in size to the presutural bristles, and situated about halfway between the first and second supraalar bristles. Two pairs of moderately strong humeral bristles are present. The anterior sternopleural bristle is almost equal in length to the posterior bristle. The front tarsus contains only four visible segments. The appendage at the apex of the basitarsus has a

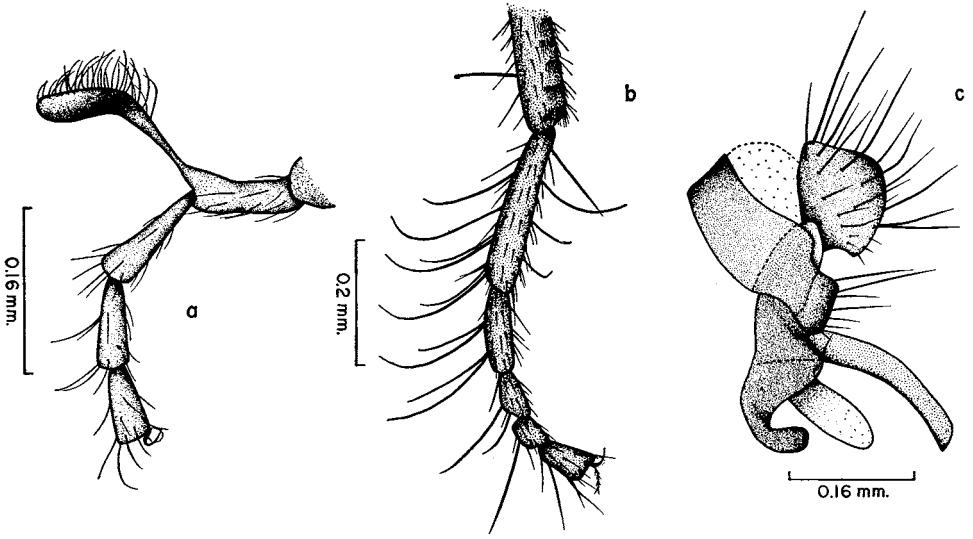


Figure 40—*Drosophila attenuata* n. sp.: **a,** front tarsus. *D. badia* n. sp.: **b,** front tarsus; **c,** male genitalia.

long, slender base, is capitate or clavate at the apex, and the swollen portion is densely pilose (fig. 40a). The second tarsal segment is approximately equal in length to the attenuated portion of the projection on the basitarsus and about one-third longer than the basal portion of the basitarsus. The apical segments of the tarsus have short, rather inconspicuous, dorsal setae. *Wings:* Subhyaline, very faintly infuscated but with no distinct brown markings. The costal fringe extends half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 5.25 times longer than the fourth, and the last section of vein M_{1+2} is 1.57 times longer than the penultimate section. The last section of vein M_{3+4} is 1.7 times longer than the m crossvein. *Abdomen:* Yellow, tinged with brown. The genitalia have not been dissected for study.

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Unknown.

Holotype male: Kaiholena, Ditch Trail, Kohala Mountains, Hawaii, 2,000 feet, July, 1958 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila badia new species (fig. 40b–c).

This species runs near *D. olaae* Grimshaw, but is differentiated by its much smaller size, by the shorter front basitarsus with very different ciliation (fig. 40b), and by having the lower reclinate bristles opposite the proclinates rather than situated distinctly above the latter.

MALE. *Head:* The front is one-third to one-fourth wider than long; the lower

portion is yellow, the upper two-thirds is brown to black in ground color. The entire front is densely silvery white pollinose. The lower reclinate bristles are about two-thirds to three-fourths as long as the proclinates and are situated opposite the latter. The vertex and the upper third of the occiput are brown covered with gray pollen. The remainder of the head, excepting the reddish brown eyes, is yellow. The face has a distinct carina extending down the upper two-thirds of the median portion. The lower portion of the face is flat. No strong bristles are present in the vibrissal rows. The ventral edge of the compound eye is straight. Measured at a level with the lower hind corner of the eye, the gena is approximately one-sixth as wide as the eye height. Each palpus has one moderately strong apical bristle, plus one smaller preapical bristle, and numerous black setae extending over the outside surface. The margins of the labella are fringed with yellow spinelike processes. The first two antennal segments are yellow, tinged with brown on the dorsal surfaces. The third segment is brown, faintly tinged with yellow. The second segment has two dorsal bristles. The arista has five to six dorsal and two to three ventral rays in addition to the apical fork; the inner surface has a few short hairs scattered over the apical half. *Thorax:* On the type the pleura are yellow, the sides of the mesonotum are reddish brown, the median portion of the mesonotum has an indistinct dark reddish brown vitta extending the entire length; this broadens out on the posterior portion and extends over the area bordered by the posterior dorsocentrals. The dorsal surface of the scutellum is also dark reddish brown. The entire mesonotum and scutellum are covered with yellow-gray pollen. On the paratype the dorsum is brownish black and the pleura entirely brown. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the first pair of supraalars. About eight rows of acrostichal setae are present. A pair of enlarged acrostichal setae are present near the midline slightly in front of the suture. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. Two pairs of humeral bristles are present. *Legs:* Entirely yellow. Front femora rather slender, with three or four moderate-sized posteroventral bristles and two posterodorsal bristles. The front tibiae lack ciliation. The preapical dorsal bristle is rather small. The front basitarsus is short, just slightly over one-third as long as the tibia. The tarsus has long erect cilia extending down the anterodorsal and posteroventral surfaces (fig. 40b). The posterior surface of the tarsus is also rather densely covered with short, erect hairs. *Wings:* Entirely hyaline except for a brown infuscation extending over the m crossvein. The costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth. The last section of vein M_{1+2} is 1.2 times longer than the penultimate section. The last section of vein M_{3+4} is about equal in length to the m crossvein. *Abdomen:* The first tergum is yellow. The other terga are predominantly brown with a faint line of yellow-gray along the posterior margin. The sternum is yellow, tinged with brown. The dorsum of the abdomen is lightly gray pollinose. The anal plates are about one-half higher than long and not pointed ventrally. The ninth tergum is broad, about

equal in length to the anal plate. The ventral lobe is truncate at the apex (fig. 40c). The claspers are not visible from a lateral view.

Length: body, 3.2 mm.; wings, 3.6 mm.

FEMALE. Unknown.

Holotype male and one male paratype: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum, paratype in the University of Hawaii collection.

Drosophila balioptera new species (fig. 41a–c).

This species fits in the group which is characterized by a broad, brown vitta down the middle of the mesonotum and brown spots on the sides. It is differentiated from other known Hawaiian *Drosophila* by the predominantly brown wings with hyaline spots in the cells (fig. 41b). The front tibiae and tarsi of the male resemble those of *D. punalua* Bryan because of the long dorsal ciliation; but the wing and thoracic markings, as well as other details, are very different in the two species.

FEMALE. A comparatively large, distinctively marked, species. *Head:* Slightly higher than long, the occiput concave posteriorly. The eyes are short pubescent, the hind margin is oblique, and the occiput at its widest point is about one-half the width of the compound eye. The front is slightly wider than long, the orbits are yellow, and the median portion is rufous, tinged lightly with brown. The anterior reclinate bristle is about three-fifths as long as the proclinate and situated distinctly above the latter. The face is entirely yellow and is slightly raised down the median portion. The occiput is predominantly yellow, brown to black on the upper portion. The genae are yellow, except for a brown spot just beneath the eye margin. Two moderately strong black bristles are present in the upper portion of each vibrissal row. The palpi are dark brown and each possesses a strong apical bristle. The clypeus and mouthparts are yellow-brown. The first two antennal segments and the basal third of the third segment are yellow. The apical portion of the third segment is dark brown. The second antennal segment has three moderately stout dorsal bristles. The arista has about eight dorsal and four ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow, rather densely covered with yellow-gray pollen. The median brown vitta on the mesonotum is equal in width to five rows of acrostichal setae. The brown markings at the sides of the mesonotum are arranged in spots as follows: one behind the humerus, one just in front of the suture, one at the upper margin of the notopleural callus, and one at the wing base. The humeri are yellow except for the brown upper margin. Two strong humeral bristles are present. The anterior pair of dorsocentral bristles are situated opposite the second pair of supraalars. The scutellum is brown on the disc, with a broad yellow margin. The metanotum is brown in the middle, tinged with yellow on the sides. The pleura are predominantly brown to black, tinged with rufous; the propleura are yellow. The

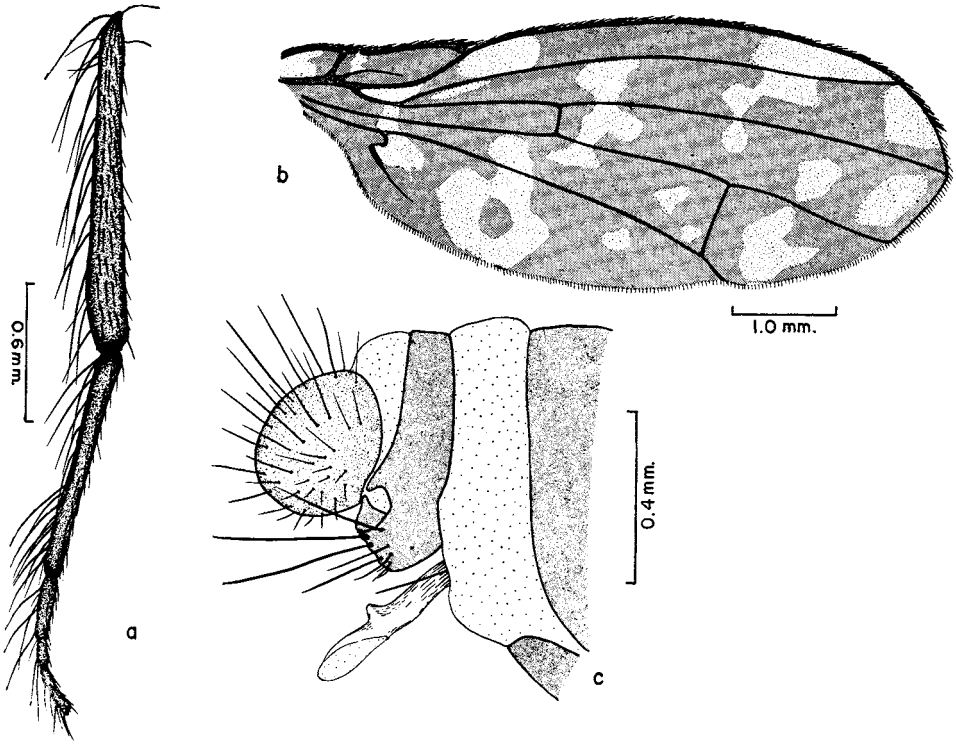


Figure 41—*Drosophila balioptera* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia.

sternopleural bristles are broken off the type. *Legs:* The coxae and the middle and hind femora are brown, tinged with red; the front femora are yellow, tinged lightly with brown. *Wings:* Rather broad, about 2.5 times longer than wide. The third costal section is about four times longer than the fourth, and the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The wings are predominantly brown, with hyaline spots in the cells as in figure 41b: one spot is present at the base of the second costal cell, one spot is near the base of cell R_1, and another spot is just before the apex of cell R_1. The latter expands over into cell R_3. Cell R_3 has a hyaline spot at the apex, a spot continuous with the subapical spot in R_1, a small spot near middle of cell, another larger spot at the basal third of the cell, and a slight hyaline streak at the base of the cell. Cell R_5 has four hyaline spots arranged through the section of the cell beyond the r–m crossvein, plus a small spot near the r–m crossvein which extends over into the median portion of cell 1st M_2. Cell 1st M_2 also has a dumbbell-shaped hyaline spot just behind the m crossvein and another spot near the basal fourth of the cell which extends over into cell M_4. The apical portion of cell 2nd M_2 has a large hyaline spot in the middle. Cell M_4 has some rather irregularly arranged hyaline markings at the base and another large hyaline

spot at the basal third which surrounds a brown spot; also a round hyaline spot is present in the apical fourth of the cell (fig. 41b). The last section of vein M_{1+2} is only three-fourths as long as the penultimate section. The m crossvein is concave posteriorly. The last section of vein M_{3+4} is very short, about one-fifth as long as the m crossvein. Abdomen predominantly brown; a large yellow spot is present on the side of each tergum. The ovipositor plates are moderately slender, and are also equal in length to the ventral margin of the seventh abdominal segment.

Length: body and wings, 5.0–5.2 mm.

MALE. Fitting the coloration of the female except that the specimen at hand may be slightly teneral and is not so dark-colored as the type specimen. The anterior sternopleural bristle is tiny, only about one-fourth as long as the posterior bristle. The front tibiae and tarsi have numerous long cilia extending the entire length down the dorsal surface (fig. 41a). The front basitarsus is almost three-fourths as long as the tibia and is about four times longer than the second tarsal segment. The coxae and femora are yellow, lightly tinged with brown. The thoracic and wing markings are as in the female except that they are not so dark-colored. There are some rather slight variations in the patterns of the hyaline marks in the wings. The male genitalia are as in figure 41c; the ninth tergum is rather narrow and weakly sclerotized.

Length: body, 5.50–5.70 mm.; wings, 6.25 mm.

Holotype female: Halehaku, Maui, June 10, 1920 (E. H. Bryan, Jr.). Allotype male: ridge above Haelaau, Maui, 3,000–3,500 feet, December 19, 1928 (E. H. Bryan, Jr.).

Type and allotype returned to the B. P. Bishop Museum.

Drosophila basimacula new species (fig. 42a–d).

The front legs of the male are remarkably similar to those of *D. perissopoda* n. sp., but the two species are quite different in other respects. *D. basimacula* is differentiated by having a dark brown spot occupying the costal cells and the basal cells at the base of the wing (fig. 42b) rather than the basal portion of the wing being hyaline with a brown infuscation at the apex. Also, the anterior dorsocentral bristles are small, about one-half as long as the presutural bristles, and are situated behind a line drawn between the second pair of supraalars, rather than the anterior dorsocentral being strong, equal in size to the presutural, and situated opposite the second pair of supraalars. The coloration is predominantly rufous, rather than brownish, tinged with yellow. *D. basimacula* is also slightly larger than *perissopoda*.

MALE. *Head:* The front is about as wide as long, predominantly brown, tinged with yellow on the lower two-thirds. The upper portion of the front and the orbits are brown. The vertex and the upper median portion of the occiput are brown, rather thickly covered with gray-brown pollen. The remainder of the

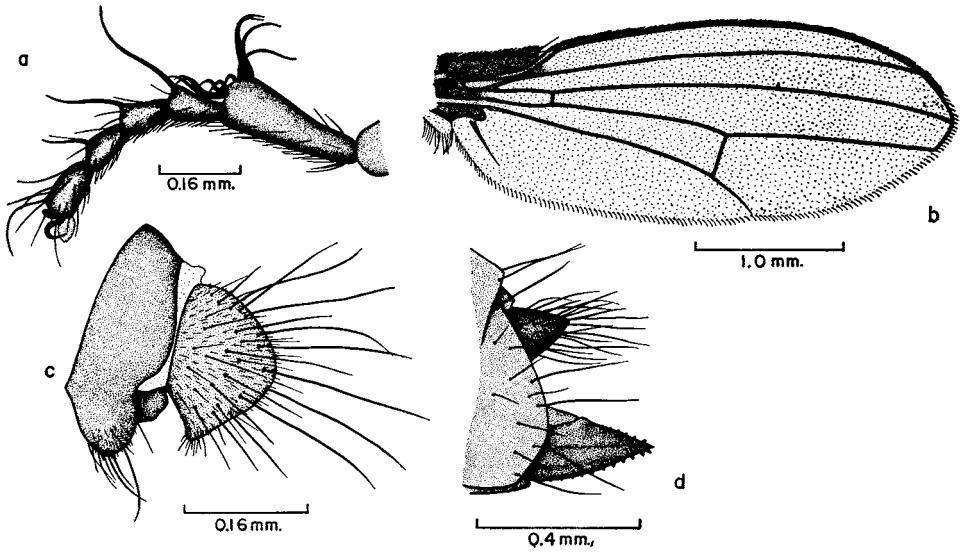


Figure 42—*Drosophila basimacula* n. sp.: **a,** front tarsus; **b,** wing; **c,** male genitalia; **d,** female genitalia.

occiput, the genae, and face are yellow. The mentum, mouthparts, and palpi are yellow, tinged with brown. The labella are not ornate. The face is almost flat, with no distinct carina. No strong bristles are present in the vibrissal rows, and no distinct bristles are present at the apices of the palpi. The antennae are yellow-brown; the second segment has three dorsal bristles. The arista has five dorsal and two ventral rays in addition to the apical fork. The lower reclinate bristle is about two-thirds to three-fourths as long as the proclinate and is situated distinctly above the latter. *Thorax:* Predominantly rufous, tinged lightly with brown, especially on the upper portion of each sternopleuron, through the median portions of the mesopleura and metapleura, and with a very faint tinge of brown in the ground color of the mesonotum. About six rows of acrostichal setae are present. The anterior dorsocentral bristles are rather weak, about one-half as large as the presutural bristles, and situated slightly behind a line drawn between the second pair of supraalars. Two strong bristles are present on each humerus. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Predominantly yellow, the front and hind coxae are tinged with brown, the basal two-fifths of the middle tibiae are brown, and the hind tibiae are predominantly brown, yellow only at the apices. The front femora are about five times longer than wide, the posteroventral and posterodorsal bristles are moderately developed. The front tibiae are not ornate; the dorsal bristle is rather large. The front basitarsus is about one-third as long as the tibia, is expanded at the apex, and is armed with a peculiar comb of densely placed, curved bristles at the upper apex; about four of these bristles curve upward and the remainder

slant anteriorly and are bent downward at their apices. The second and third tarsal segments have a moderately strong bristle at each upper apex (fig. 42a). The posterior basitarsi are about two-thirds as long as the tibiae. *Wings:* Predominantly subhyaline, faintly infuscated, rather dark brown in the basal cells, the coloration occupying the first two costal sections and the basal portions of cells R and M. The wing is 2.75 times longer than wide. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth. The last section of vein M_{1+2} is 1.2 times longer than the penultimate section, and the last section of vein M_{3+4} is about one-fourth to one-third longer than the m crossvein. *Abdomen:* Predominantly brown, covered with gray-brown pollen. The first tergum is yellow, tinged faintly with brown; the apex of the sixth tergum is narrowly yellow and the sixth and seventh sterna are yellow; the latter protrudes distinctly beyond the margins of the terga so that the seventh sternum is conspicuous *in situ*. The ninth tergum is rather broad, almost as long as the anal plates, and scarcely narrowed dorsally; the ventral margins are rounded and bear numerous short, black setae at the apices. The claspers are almost completely hidden in lateral view. The anal plates are rather acutely pointed ventrally (fig. 42c). The ninth tergum is entirely yellow. The anal plates are dark brown.

Length: body, 4.0 mm.; wings, 4.5 mm.

FEMALE. Fitting the description of the male in most respects except for sexual characters and secondary developments. One strong and two smaller bristles are present in the upper portion of each vibrissal row, and a moderately strong apical bristle is present on each palpus. The anterior sternopleural bristle is normal in development, about equal in size to the presutural bristle. The basal markings in the wing are paler brown, not so distinct as in the males. The ovipositor plates are rather broad, sharp-pointed, and with minute serrations around the ventral margin; the plates are approximately equal in length to the ventral portion of the seventh abdominal segment (fig. 42d).

Length: body, 4.25 mm.; wings, 4.75 mm.

Holotype male and allotype female: Mt. Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy). Thirty-seven paratypes (15 males and 22 females): from the following localities in the Mt. Waialeale–Kokee region of Kauai—same as type; Alakai Swamp, 3,800 feet, July, 1952 (D. E. Hardy), and August, 1921 (O. H. Swezey); Halemanu Swamp, August, 1953 (D. E. Hardy); Kokee and near Kokee, 4,000 feet, September 7, 1946, and August 25, 1953 (W. W. Wirth and R. H. Van Zwaluwenburg); Kalalau Lookout, 4,000 feet, August, 1921 (O. H. Swezey), and August, 1953 (D. E. Hardy); Nualolo Valley, July, 1952, 3,400 feet (D. E. Hardy); and South Mohihi Ridge, July, 1937 (E. C. Zimmerman).

The type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are deposited in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

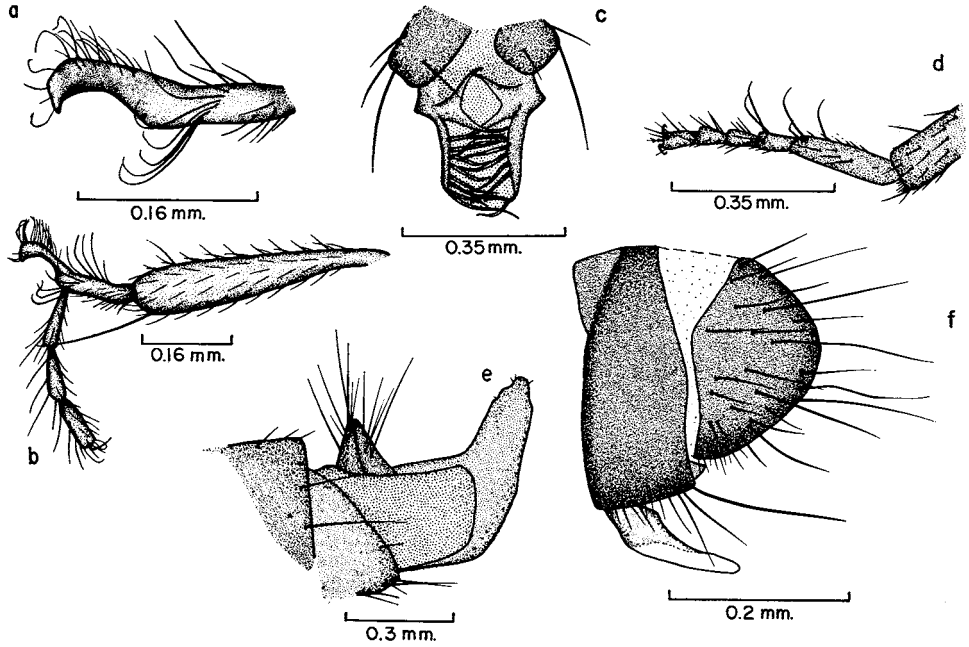


Figure 43—*Drosophila basisetosa* n. sp.: **a,** appendage on front basitarsus; **b,** front tarsus. *D. beardsleyi* n. sp.: **c,** labellum, dorsal view; **d,** front tarsus; **e,** female genitalia; **f,** male genitalia.

Drosophila basisetosa new species (fig 43a–b).

This species fits in the complex which is characterized by having the front basitarsus of the male extended into a conspicuous projection at the apex, and it fits in the group of species which also has a strong apicoventral bristle on the front tibia. It is differentiated by having the base of the front basitarsus of the male densely setose above, and the apical appendage rather thick and curved (fig. 43a–b). Also, the very tiny anterior dorsocentral bristles and the moderately long reclinate bristles help to differentiate this species.

MALE. Predominantly dark brown species. *Head:* Slightly higher than long, almost entirely dark brown, tinged faintly with yellow at the lower portion of the occiput; black on the ocellar triangle, across the vertex, and along the orbits to the proclinate bristles. The face has an indistinct carina down the median portion and is distinctly narrowed on the lower part, but not as markedly so as in *proceriseta*. Anterior reclinate bristles one-third to one-half longer than the proclinates and situated opposite the latter. One small bristle is present at the upper portion of each vibrissal row. No distinct bristles are present on the palpi, but several short hairs are situated around the margins. The labella are not ornate; each has a row of fine hairs around the margin. The antennae are as in *proceriseta*; the arista has four or five dorsal and two ventral rays in addition

to the apical fork. *Thorax:* Entirely dark brown with a faint rufous tinge in the ground color. Six to eight rows of acrostichal setae are present. The anterior dorsocentrals are small, scarcely two times longer than the acrostichal setae and smaller than the humeral bristles; they are situated opposite the second pair of supraalars. The anterior sternopleural bristle is two-thirds to three-fourths as long as the posterior bristle. The anterior portion of the mesonotum is rather long setose; these hairs are two to three times longer than the other mesonotal setae. *Legs:* Entirely yellow. The front tibiae are devoid of ornamentation except for the presence of a strong apicoventral bristle which is four times longer and stronger than the preapicodorsal bristle and extends to the apex of the first tarsal segment. The basal portion of the front basitarsus is densely setose on the anterodorsal surface, and the apical projection on the basitarsus is short, thick, and slightly curved, about equal in length to the basal portion of the segment (fig. 43a–b). The second tarsal segment is moderately short, about equal in length to the basal portion of the first segment. Segments two to four have several short, erect hairs along the dorsal surface. *Wings:* Entirely hyaline. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is four times longer than the fourth section, and the last section of vein M_{1+2} is two times longer than the penultimate section. The last section of vein M_{3+4} is almost two times longer than the m crossvein. *Abdomen:* Entirely dark brown to black, tinged faintly with rufous in the ground color, more distinctly rufous on the venter. The genitalia have not been dissected for study.

Length: body, 2.5 mm.; wings, 2.7 mm.

FEMALE. Unknown.

Holotype male: Upper Olaa Forest, Hawaii, July, 1953 (D. E. Hardy). One male paratype: from Pauahi, Hawaii, 4,300 feet, August, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum; paratype in the University of Hawaii collection.

Drosophila beardsleyi new species (fig. 43c–f).

Fitting near *D. quadrisetae*, but the arrangement of the cilia on the front basitarsus is very different as shown in figure 43d; the face is predominantly brown to black, the anterior dorsocentral bristles are situated in line with the second supraalars, and the genitalia are very differently developed (fig. 43f).

MALE. *Head:* About one-half higher than long. The front, measured from the median ocellus to the anterior margin, is about two times wider than long. The lower half of the front is rufous; the upper portion is reddish brown to black. The upper eye orbits, the vertex, the ocellar triangle, and the upper portion of the occiput are black covered with gray pollen. The median portion of the occiput is brown; the lower portion is yellow. The genae are yellow except for a line of black along the vibrissal row. Each gena is very narrow; from the

vibrissal row to the eye margin the width is less than two rows of eye facets. The face is predominantly black, but yellow in the upper portions of the furrows and the upper median margin. The median portion of the face is slightly raised. The clypeus is dark brown to black. The palpi are yellow, the mouthparts yellow, tinged with brown. Each palpus has a moderately strong apical bristle and one or two subapical bristles on the outside surface. The labella are fringed with strong curved spines at the apices (fig. 43c). The anterior reclinate bristles are approximately equal in length to the proclinate and are situated just slightly above the latter. The two basal segments of the antennae are yellow, tinged with brown on the dorsal surfaces. The second segment has three short, black dorsal bristles. The arista has six dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly dark brown to black, rather densely covered with brownish gray pollen. The apex of the scutellum is yellow; the humeri are yellow except for a tinge of brown on the dorsal portions and a longitudinal band of yellow extending along the lower portion of each mesopleuron. The halteres are pale yellow. The anterior dorsocentral bristles are situated opposite the second (posterior) pair of supraalars. About eight rows of acrostichal setae are present. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Predominantly yellow, tinged with brown on the posterior apical portions of the middle and hind femora, just before the bases of the middle and hind tibiae, and also on the apical segments of the tarsi. The front basitarsus is slightly over one-third as long as the tibia and has two dorsal cilia at the apex and one dorsal cilia at about the apical third of the segment (fig. 43d). *Wings:* Hyaline, very faintly infuscated. The third costal section is slightly over five times longer than the fourth, and the costal fringe extends approximately two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately 1.3 times longer than the penultimate section. *Abdomen:* Polished black in ground color covered with gray pollen. The anal plates are nearly two times higher than long. The ninth tergum is rather strongly narrowed over the dorsal portion and gradually expanded ventrally (fig. 43f). The claspers are not visible in direct lateral view except, possibly, for the extreme upper portion.

Length: body, 3.6 mm.; wings, 3.9 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. Two rather strong bristles are present at the upper portion of each vibrissal row. The ovipositor is prominent, extends well beyond the apices of the anal plates, and is blunt at the apex (fig. 43e).

Length: body, 3.8 mm.; wings, 4.0 mm.

Named after Dr. J. W. Beardsley, University of Hawaii, who has made many valuable contributions to this study.

Holotype male and allotype female: from Kokee, Kauai, August 27, 1959, in banana bait trap (J. W. Beardsley).

Type and allotype in the Hawaiian Sugar Planters' Association collection.

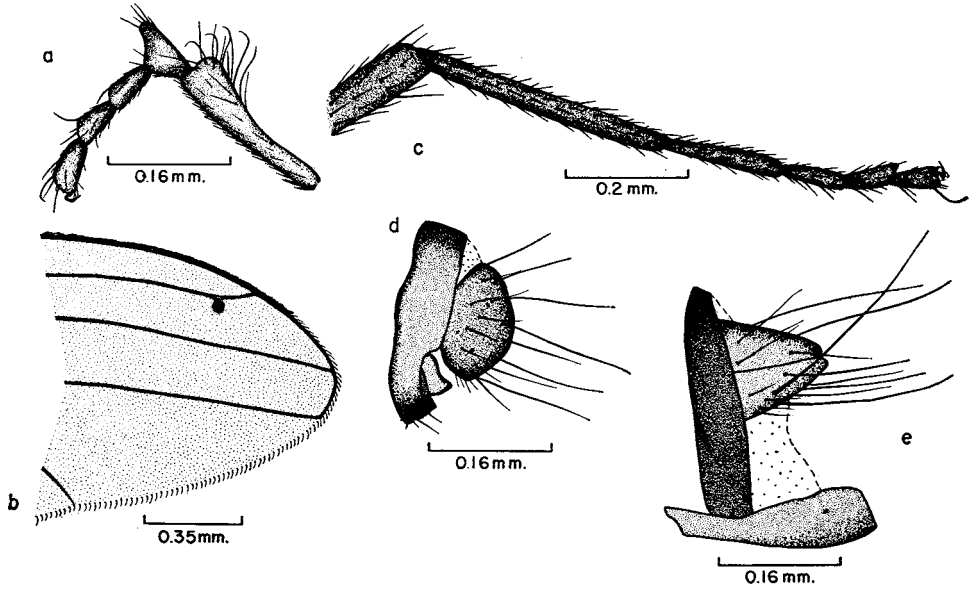


Figure 44—*Drosophila bicondyla* n. sp.: **a,** front tarsus; **b,** apex of female wing. *D. bipolita* n. sp.: **c,** front tarsus; **d,** male genitalia; **e,** female genitalia.

Drosophila bicondyla new species (fig. 44a–b).

This species is readily differentiated from all other known Hawaiian *Drosophila* by having the front basitarsus of the male terminating in a hairy knob dorsally and by the strong dorsal projection on the second tarsal segment (fig. 44a).

MALE. Predominantly dark-bodied species. *Head:* The front is two times wider than long, is largely velvety brown, black along the orbits. The ocellar triangle and the vertex are black, the upper portion of the occiput dark brown. The lower reclinate bristle is slightly shorter and much thinner than the proclinate and is situated opposite the latter. The lower half of the occiput is yellow-brown. The genae are yellow, with a brown streak along the vibrissal row. The distance from the vibrissal row to the eye margin is slightly less than the width of two rows of eye facets. One small bristle is present at the upper portion of each vibrissal row. The face is yellow, tinged with brown down the median portion, and with black along the lower edge; a distinct carina extends down the middle of the face. The palpi are yellow, tinged lightly with brown; no distinct bristles are present on the palpi. The antennae are brown; the second segment has three short, dorsal bristles. The arista has six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly dark brown, tinged with yellow on the humeri, lower sternopleura, and on the metanotum. Six to eight rows of acrostichal setae are present. The anterior dorsocentral bristles are moderately developed, about equal in size to the presutural bristles, and situated about halfway between the

first and second pair of supraalars. The anterior sternopleural bristle is three-fourths to four-fifths as long as the posterior bristle. *Legs:* Yellow, except for a faint tinge of brown on the front coxae, and for brown apical segments of the tarsi. Front femur slender, with about four short, posterodorsal bristles and three moderately long posteroventral bristles. Front tibia devoid of bristles or long cilia except for the preapical dorsal bristle. Front basitarsus about one-half as long as the tibia, terminating in a blunt knob dorsally; the apical portion is densely setose over the dorsal and anterior surfaces. The second tarsal segment is short and produced into a rather large dorsal lobe which has several short setae around its margin (fig. 44a). The remainder of the tarsus is devoid of long setae or ornamentation. *Wings:* Evenly but faintly brown fumose with no distinct brown markings. Third costal section is 5.25 times longer than the fourth; the last section of vein M_{1+2} is 1.32 times longer than the penultimate section. The last section of vein M_{3+4} is 1.4 times longer than the m crossvein. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. *Abdomen:* Almost entirely brown, covered with gray-brown pollen; the sixth tergum is yellow, tinged lightly with brown. The genitalia have not been relaxed for study.

Length: body, 2.6–3.0 mm.; wings, 3.2–3.5 mm.

FEMALE. Fitting the description of the male in most respects. Three bristles are present at the upper portion of each vibrissal row. A moderately strong apical bristle is present on each palpus. The front legs are not ornate. The entire first tergum of the abdomen and the posterior lateral corners of the other terga are yellow. The ovipositor blades are narrow and sharp-pointed at their apices; when fully extended they are almost as long as the ventral margin of the seventh sternum. The wing of the allotype has a freak growth near the apex of vein R_{2+3}. This is a wartlike development on the underside of the vein and is present on both wings (fig. 44b).

Length: same as for male.

Holotype male and allotype female: from Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy). Fifteen paratypes (six males and nine females): from Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy); Kulani Hawaii, 5,200 feet, July, 1952 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila bipolita new species (fig. 44c–e).

This species may possibly be closely related to *D. polita* Grimshaw, but that species is known only from the female and appears to be considerably larger than specimens of *bipolita*. It is not possible to be certain that the two are closely related until the male of *polita* has been studied. *D. bipolita* is closely related to *canipolita* n. sp. and is differentiated by having the dorsum of the thorax shining

black, the third antennal segment brown to black, and the front tarsus long and slender with the basitarsus two-thirds as long as the tibia (fig. 44c); also the fifth and sixth abdominal terga are not completely yellow.

MALE. *Head:* The upper half of the front is polished black, the lower portion is pale yellow. The occiput is dark brown to black, yellow only on the lower portion and is covered with gray pollen. The genae, face, palpi, and mouthparts are yellow, except for the black rim on the apex on each labellum. The face is slightly raised in the upper median portion. Two moderately strong bristles are present at the upper portion of each vibrissal row. The first antennal segment is yellow, tinged faintly with brown on the dorsal portion; the third segment is predominantly brown. The second antennal segment has two or three dorsal bristles. The arista has six dorsal and three ventral rays in addition to the apical fork. Each palpus has a moderate apical bristle and a small subapical bristle. The anterior reclinate bristle is approximately four-fifths as long as the proclinate and is situated just slightly above the latter. *Thorax:* Entirely polished black over the dorsum except for the broadly yellow apex of the scutellum. The mesonotum and scutellum are dusted with gray. The upper half of each pleuron is dark brown to black. The metanotum is brown, tinged with rufous. The lower half of each pleuron and the halteres are pale yellow. The anterior dorsocentral bristles are situated about opposite the first (anterior) supraalars. Two well-developed humeral bristles are present. The anterior sternopleural bristle is small, hair-like, one-third to two-fifths as long as the posterior bristle. *Legs:* Entirely yellow, lacking ornamentations. The front legs are slender; the basitarsi are approximately two-thirds as long as the tibiae and two times longer than the second tarsal segment (fig. 44c). *Wings:* Hyaline or nearly so, lacking dark markings. The third costal section is 4.4 times longer than the fourth and the costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.9 times longer than the penultimate section and the last section of vein M_{3+4} is approximately three times longer than the m crossvein. *Abdomen:* Predominantly shining dark brown to black, covered with gray-brown pollen, distinctly tinged with yellow on the first and second terga and sometimes over the median portion of the fifth tergum; some specimens have the sixth tergum entirely yellow. The anal plates are about one-half higher than long, subacutely pointed ventrally. The ninth tergum is rather straight-sided, not narrowed over the dorsal portion, and slightly attenuated and rather slender ventrally (fig. 44d). The claspers are plainly visible from a direct lateral view and are armed with conspicuous long teeth at their apices.

Length: body, 2.50–2.65 mm.; wings, 2.80 mm.

FEMALE. Fitting the characteristics of the male in most respects, but lacking the black rim on the labellum, and the upper two-thirds of the front is polished black. The yellow anterior portion of the front is much narrower than in the male; the palpi and the clypeus are brown, tinged with rufous. The abdomen is shining black. The ovipositor blades are short, blunt at apices (fig. 44e).

Length: body, 2.88 mm.; wings, 3.20 mm.

Holotype male: Mount Kaala, Oahu, May, 1952 (M. Tamashiro). Allotype female: same locality as type, April, 1953 (D. E. Hardy). Twenty paratypes (9 males and 11 females): from the following localities—same data as type, also April, 1949 (G. B. Mainland); Pupukea, Oahu, December, 1952, in banana thicket (D. E. Hardy); Palikea, Waianae Mountains, Oahu, November 8, 1936, 2,800 feet (F. X. Williams); Olympus, Oahu, no date given, collected on *Broussaisia* (O. H. Swezey); Halawa Ridge, Oahu, 2,000 feet, September, 1952 (D. E. Hardy); Kahana, Oahu, September, 1924 (O. E. Swezey); Makaleha, Oahu, April, 1952 (Ed. Dresner); Kawainui Valley, Oahu, August 26, 1945, swept from forest floor (W. W. Wirth); Makamakaole Valley, Maui, June, 1953 (D. E. Hardy); and Hana, Maui, June, 1953 (D. E. Hardy).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and University of Hawaii.

Drosophila biseriata new species (fig. 45a–d).

This species fits near *D. hirtitarsus* n. sp., but is differentiated by the arrangement of the cilia on the front tarsi (fig. 45b), by the strong black spines at the apex of the labellum (fig. 45a), the shorter costal fringe on the wings, and by male genital characters (fig. 45c).

MALE. *Head:* About one-third higher than long as seen in direct lateral view. The compound eyes are distinctly short pilose. The front, measured from the median ocellus to the anterior margin, is two times wider than long. The lower half is yellow, faintly tinged with brown on the median portion; the upper portion is brown, tinged with rufous in the ground color. The upper eye orbits, the vertex, the ocellar triangle, and the upper portion of the occiput are black in ground color covered with gray pollen. The lower portion of the occiput is yellow. The genae are yellow except for a faint line of brown along the the vibrissal row. In the median portion of the gena the distance from the vibrissal row to the eye margin is about equal in width to two rows of eye facets. The face is entirely yellow; the median portion is slightly raised. The clypeus is yellow-brown. The palpi are yellow; no distinct apical bristles are present but each has numerous black setae around the apical portion. The mouthparts are yellow. Each labellum has a series of four or five black spines at the upper apical portion (fig. 45a). The oral vibrissae are all approximately equal in length with no strong bristles present, and the black setae are equal or slightly larger than the acrostichal setae of the thorax. The anterior reclinate bristles are two-thirds to three-fourths as long as the proclinates and are situated approximately opposite the latter. The first two antennal segments are yellow, tinged with brown dorsally; the second segment has two dorsal bristles. The third segment is brown, tinged with yellow. The arista has five or six dorsal and three ventral rays in addition to the apical fork. *Thorax:* Dark brown, faintly tinged with black on the dorsum

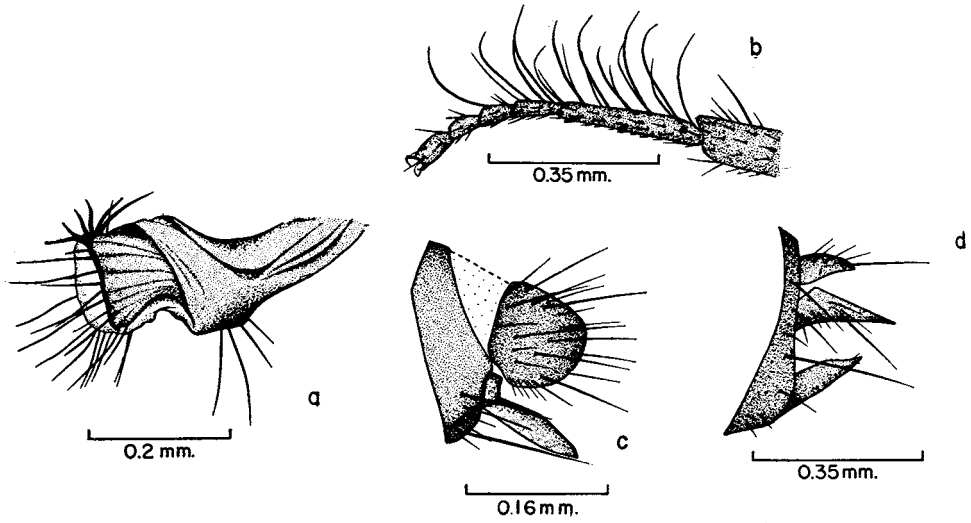


Figure 45—*Drosophila biseriata* n. sp.: **a,** labellum; **b,** front tarsus; **c,** male genitalia; **d,** female genitalia.

and tinged with rufous in the ground color of the pleura. The halteres are yellow. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. About eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow and not ornate except for conspicuous long, black ciliation down the dorsal surface of the front tarsus. The front basitarsus is about half as long as the tibia and has approximately five pairs of dorsal cilia (fig. 45b). Segment two has approximately four long dorsal cilia and segment three has one. *Wings:* Entirely hyaline. The third costal section is 5.5–5.7 times longer than the fourth, and the costal fringe extends about one-third to two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely dark brown, tinged faintly with reddish in the ground color, and covered with gray-brown pollen. The anal plates are about one-half higher than long and are rounded ventrally; the ninth tergum is slightly narrowed over the dorsal portion, with a lobate convexity on the anterior margin near the upper edge and with the ventral lobes shaped as in figure 45c. The claspers are visible from a direct lateral view.

Length: body, 2.9 mm.; wings, 3.1 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. Two moderately strong bristles are present at the upper edge of each vibrissal row. The wings are faintly infuscated, and the costal fringe extends scarcely beyond one-third the distance between the apices of veins R_{2+3} and

R_{4+5}. The ovipositor blades are short, sharp-pointed, serrated on both margins, and extend approximately to the apices of the anal plates (fig. 45d).

Length: body and wings, 3.35 mm.

Holotype male: Manoa Falls, Oahu, June, 1950 (N. Morton). Allotype female: Manoa Valley, Oahu, February, 1952 (D. E. Hardy). Three male paratypes: two same data as type and one same data as allotype.

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila bizonata Kikkawa and Peng (fig. 46a–c).

Drosophila bizonata Kikkawa and Peng, 1938, Trans. Jap. Jour. Zool. 7(4):532.

Oahu. The species is not known to be established in Hawaii. The office of the State Quarantine Service sent me six specimens for determination (Hardy, 1960). They had been reared from mushrooms shipped in from Japan. Local residents have reported finding mushrooms infested with larvae on the local market, but to date only the above-mentioned specimens have been reared. My determination of *bizonata* was confirmed by Dr. T. Okada, Tokyo Metropolitan University.

Immigrant? Previously recorded only from Japan. According to Iwamura and Nobuchi (1954), and T. Okada (in correspondence), this species is a very serious pest of edible mushrooms ("Matsutake," *Armillaria matsudake* Ito and Imai).

Type in the Zoological Institute, Kyoto Imperial University, Japan.

This is the only member of the *bizonata* species group which has been seen in Hawaii.

This species is differentiated from other *Drosophila* (*Drosophila*) in Hawaii by its predominantly pale coloration, by the short costal fringe, the bristling on the palpi (fig. 46a), and the male genital characters (fig. 46b).

The thorax, legs, and head are entirely pale yellow except for the reddish brown eyes, the brown ocellar triangle, and the yellow-brown third antennal segment. The front is about as wide as long; the lower reclinate bristle is tiny, scarcely one-third as long as the proclinate and situated distinctly above the latter. Two moderately strong bristles are present at the upper portion of each vibrissal row; these are approximately equal in size and are almost as large as the anterior reclinate bristles. Each palpus has several short, black bristles on the apical margin and a number of closely placed brown hairs at the apex (fig. 46a). The third antennal segment is tinged with brown. The arista has four dorsal and two ventral rays in addition to the small apical fork. Six rows of acrostichal setae are present in front of the anterior dorsocentrals; on the posterior portion of the mesonotum the acrostichals are reduced from four to two rows. The anterior dorsocentral bristles are situated slightly behind a line drawn between the first pair of supraalars. The lower bristle on each humerus is about one-third longer

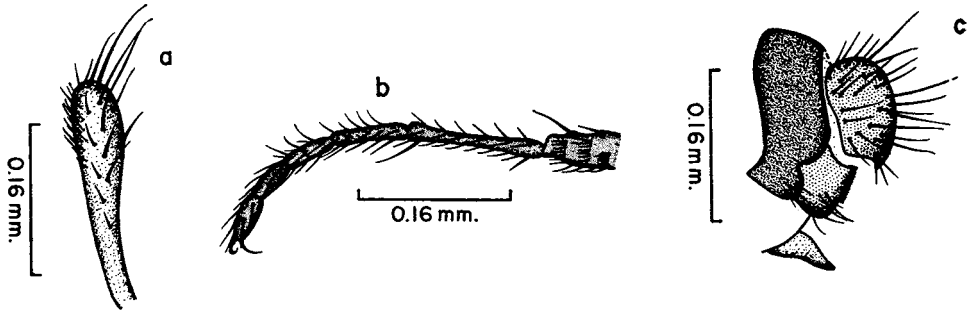


Figure 46—*Drosophila bizonata* Kikkawa and Peng: **a,** palpus; **b,** front tarsus; **c,** male genitalia.

than the upper bristle. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle; a moderately strong black hair or hair-like bristle about four-fifths as long as the anterior bristle is present between the two sternopleurals. The front basitarsus is slender, about three-fifths as long as the tibia (fig. 46b). The wings are hyaline. The third costal section is about three times longer than the fourth, and the last section of vein M_{1+2} is 1.76 times long than the penultimate section. The costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. A very faint infuscation of brown is present on the r–m and m crossveins. The abdomen is pale yellow, faintly tinged with brown along the posterior margins of the terga. The male genitalia are as in figure 46c. The anal plates are rather broad. The ninth tergum is narrowed dorsally, has a rather striking indentation on the posterior median margin, and is lobate ventrally, with a clump of black hairs on the posteroventral margin. The claspers are well developed and heavily toothed along the hind margin.

For more complete descriptive details of the genitalia and internal structures, refer to Okada (1956b:135, figs. 74, 76, 78).

Length: body and wings, 2 mm.

Drosophila bostrycha new species (fig. 47a–d).

This species fits in the group which is distinguished by having the mesonotum predominantly yellow with a broad brown median vitta and with conspicuous spots on the sides of the mesonotum. It fits near *grimshawi* Oldenberg, but is differentiated by having the femora entirely yellow and by the very different arrangement and development of the vestiture of the front legs of the male (fig. 47a).

MALE. *Head:* Just slightly higher than long, rather quadrate in profile. Hind margin of the eye oblique, the occiput at its widest point nearly one-half the width of the compound eye. The front is just slightly wider than long, yellow on the sides, and yellow to reddish, tinged with brown through the median portion.

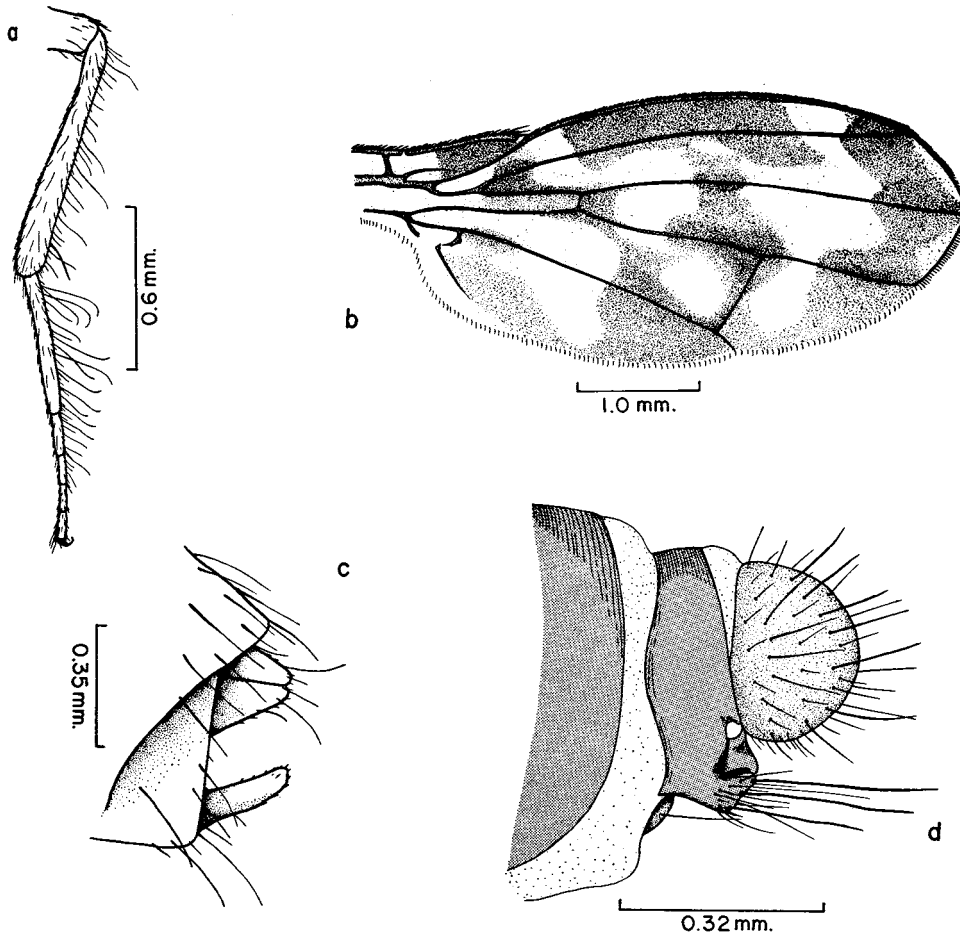


Figure 47—*Drosophila bostrycha* n. sp.: **a**, front tibia and tarsus; **b**, wing; **c**, female genitalia; **d**, male genitalia.

The occiput is entirely yellow except for a brown discoloration through the upper median portion. The genae are yellow except for a brown spot on the lower edge of each eye. The face and clypeus are yellow; the former is convex, with a slight carina down the middle. The palpi are yellow to rufous, tinged faintly with brown, and each has a small apical bristle. The labella are densely covered with fine yellow hairs. One strong bristle is present at the upper margin of each vibrissal row. The antennae are yellow, tinged lightly with brown on the upper portion and on the apical half of the third. The arista has about seven dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow, rather densely yellow-gray pollinose. The median brown stripe extends the entire length of the mesonotum; on the anterior portion its width is about equal to that of four rows of acrostichal setae and it expands slightly

posteriorly to a width equal to about five rows of acrostichal setae. A dark brown spot is present just above each humerus and another brown spot is present at the suture. The anterior pair of dorsocentral bristles is situated slightly behind a line drawn between the second pair of supraalars. Two or three of the setae in front of, and in line with, the anterior dorsocentrals are stronger than the surrounding setae, rather bristle-like. Two strong humeral bristles are present. The humeri are yellow except for the brown upper margin. The scutellum is brown on the disc, with a broad yellow margin. The pleura are yellow, except for a streak of brown across the upper edge of the mesopleuron and another through the median portion of the mesopleuron extending slightly onto the upper part of the pteropleuron; also, the upper front and hind corners of the sternopleuron and the upper edge of the hypopleuron are brown. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The halteres are entirely yellow. *Legs:* Entirely yellow. Front femora with eight strong posterodorsals and six strong posteroventral bristles. Front tibia and tarsus with rather long ciliation extending down the entire dorsal surface. The front tibia has rather dense ciliation down the anterodorsal and anterior surfaces and has two long, black, curved dorsal hairs situated at, and just beyond, the middle of the segment. The dorsal cilia of the tarsus are rather dense and are long and curved (fig. 47a). The front basitarsus is almost two-thirds as long as the tibia and nearly three times longer than the second tarsal segment. *Wings:* About 2.5 times longer than wide, extensively marked with brown as in figure 47b. The apical portion of the first costal section and the apical half of the second are brown; the latter extends through the base of cell R_1 through the base of cell R_3 and covers over the basal section of cell R_5 and the r–m crossvein. A large brown spot extends through the median portion of cell R_1 approximately two-thirds the length of the third costal section; this dark mark extends as a broad spot over the upper median half of cell R_3, then narrows to form a transverse streak across the wing, extends over the m crossvein to the wing margin, and posteriorly through the apical half of cell M_4 into the lower apical portion of cell 1st M_2. A brown streak also extends across the wing apex over the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, connecting with the brown marking over the m crossvein. *Abdomen:* Each tergum has a large yellow spot on each side; the median and apical portions of each segment are brown. The genitalia are as in figure 47d. The ninth tergum is curved upward slightly and distinctly lobate on the ventral margins; the ventral apices are truncate.

Length: body, 4.50–5.00 mm.; wings, 4.75–5.25 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor plates are yellow, comparatively long and slender, and almost equal in length to the ventral margin of the seventh abdominal segment (fig. 47c).

Length: body, 4.75–5.00 mm.; wings, 5.25–5.50 mm.

Holotype male and allotype female: Wailau Trail, Molokai, 3,000 feet, December, 1937 (F. X. Williams). Four paratypes (three males and one female): from Wailau Valley, Molokai, July, 1952 (E. Dresner).

Type in the Hawaiian Sugar Planters' Association collection. Allotype and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila brevicilia new species (fig. 48a–b).

Fitting in the *fuscoamoeba* complex, but differing distinctly from that species by the wing venation and maculation as shown in figures 48a and 103c. It is closely related to *D. clydonia* n. sp., but the wing markings are quite different as shown in figures 48a and 64b; the third costal section is nearly two times longer than the fourth, the lower halves of the pleura are yellow, the mesonotum has a brown spot behind each humerus and also a narrow brown postsutural vitta, the front tarsi of the male have short dorsal cilia (fig. 48b), and the front tibia of the male has no long cilia.

Moderate-sized yellow and brown species.

MALE. *Head:* Largely yellow; the ocellar triangle is brown and the upper occiput, the vertex, and the median portion of the front are tinged with brown. The lower margins of the face and the edges of the genae are faintly tinged with brown. The lower reclinate bristles are small, hair-like, scarcely two-fifths as long as the proclinates and situated distinctly above the latter. The two basal antennal segments are yellow, tinged with brown. The third segment is brown to black. The second segment has two moderately strong dorsal bristles. The arista has six dorsal and three ventral rays in addition to the apical fork. The bristles of the vibrissae are rather weak; the second bristle of the row is the strongest. The palpi are brown; each has one moderately strong apical bristle plus numerous short dark-colored setae. The mouthparts are ornate; each labellum has about a dozen yellow, hooked bristles arranged around the margin. *Thorax:* Predominantly yellow with three brown vittae down the mesonotum. Typically, the lateral vittae consist of a brown spot behind each humerus narrowly connecting with a brown postsutural vitta; in some specimens these are disconnected at the suture. A broad bright yellow stripe extends the full length of the mesonotum, down each dorsocentral line. The anterior dorsocentral bristles are situated about in line with the anterior supraalars. A brown stripe extends longitudinally over the upper half of each pleuron, and the lower half is bright yellow. The anterior sternopleural bristle is about half the size of the posterior bristle. The scutellum is brown, tinged with yellow at the base. The halteres are yellow, tinged lightly with brown at the apices. *Legs:* Largely yellow; the tibiae and tarsi are tinged with brown. Each front femur has only two strong posteroventral bristles. Front legs not ornate except for short, inconspicuous dorsal cilia on the apical portion of the basitarsus and over the other tarsal segments as in figure 48b. All tibiae with preapical dorsal bristles. *Wings:* Predominantly hyaline. Third costal section just slightly less than two times longer than the fourth, and the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_{4+5} rather strongly undulate. The last section of vein M_{1+2} is just slightly longer than the penul-

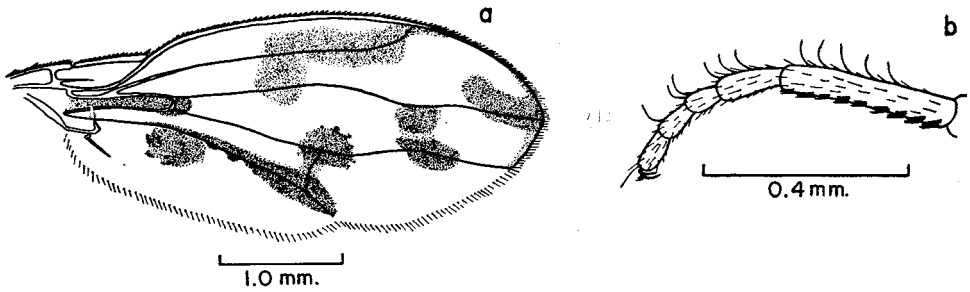


Figure 48—*Drosophila brevicilia* n. sp.: **a,** wing; **b,** front tarsus.

timate section. The costal cells are hyaline, or but faintly fumose. A large brown spot is present along the apical half of vein R_{2+3}; this extends through the apical portion of cell R_1, extends over into cell R_3, crosses this cell, and extends into cell R_5 about one-fourth the distance from the base. A brown mark extends along the apical portion of vein R_{4+5}, and one extends across cell R_5 at about its apical third and extends slightly over into the upper portion of cell second M_2. Another brown spot is present on the upper portion of the m crossvein. Another is present on the lower portion of the m crossvein, covers much of the apical portion of vein M_{3+4}, and extends along that vein almost to its base, flowing over into cell M_4 through the median portion; another brown streak extends longitudinally from the base of the wing through cells R, R_5, and extends just across the r–m crossvein (fig. 48a). *Abdomen:* Brown, tinged with yellow on the sides of the segments. The genitalia are predominantly yellow-brown. They have not been dissected for study.

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Fitting the description of the male except that the mouthparts are not ornate and the front tarsi lack the dorsal ciliation; also the wing markings are distinctly darker in the female. The ovipositor plates are yellow and appear rather similar to those of *clydonia.*

Length: body, 3.0 mm.; wings, 3.3 mm.

Holotype male and allotype female: Upper Olaa Forest, Hawaii, July, 1953 (D. E. Hardy). Four paratypes (three females, one male): same data as type; near Pawaina, Kona, Hawaii, 3,000 feet, July, 1953 (D. E. Hardy); and Honokane Nui Stream, Kohala Ditch Trail, Hawaii, August, 1956 (D. E. Hardy).

Type and allotype in B. P. Bishop Museum. Paratypes in the United States National Museum and University of Hawaii collection.

Drosophila brevissima new species (fig. 49a–c).

This species fits close to *D. tendomentum* n. sp., but is readily differentiated by the mentum not being expanded; by the dark brown spot occupying the apical fourth of the wing; by the much shorter front basitarsus of the male; and by the

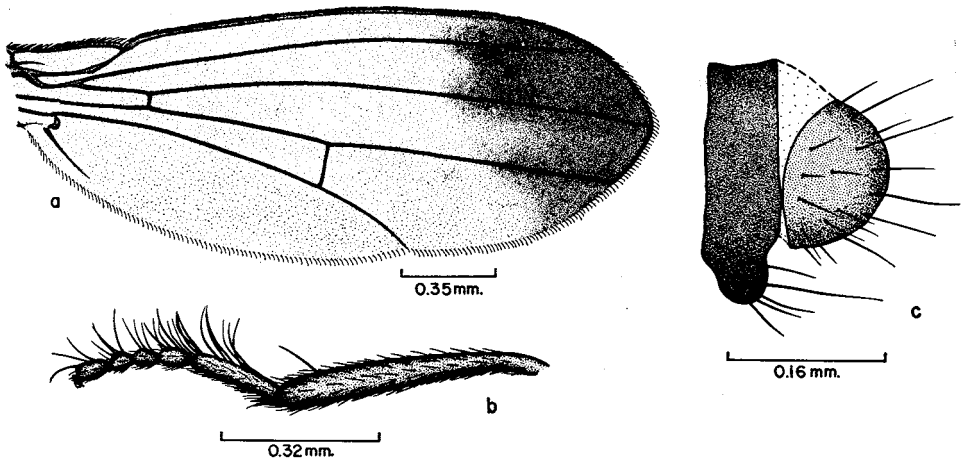


Figure 49—*Drosophila brevissima* n. sp.: **a**, wing; **b**, front tibia and tarsus; **c**, male genitalia.

short, erect cilia over the front tarsi (fig. 49b). It differs from all known *Drosophila* by having rudimentary reclinate and inner vertical bristles.

MALE. *Head:* The front is about one-fourth wider than long, predominantly yellow, and tinged lightly with brown; the orbits are brown. The anterior reclinate bristles are tiny, scarcely differentiated from the orbital setae, and situated slightly above the proclinate bristles. The upper reclinate and the inner vertical bristles are small, hair-like, about one-half to two-thirds as long as the lower reclinate bristles, and about equal to or smaller than the occipital setae. The vertex is brown and the upper portion of the occiput is yellow, tinged lightly with brown. The remainder of the occiput, the genae, and the mouthparts, including the palpi, are yellow. The face is yellow, tinged with brown on the lower portion and faintly gray pollinose. The upper median portion of the face is slightly carinate. Each labellum is armed with numerous, closely placed, yellow spines around the margin. One long yellow process is present near the upper edge of the labellum. Each palpus has a moderately strong apical bristle. The basal two antennal segments are yellow, the second tinged lightly with brown on the dorsal portion. The third segment is brown. The second antennal segment has two or three moderately strong dorsal bristles. The arista has five dorsal and two ventral rays in addition to the apical fork; the anterior surface is sparsely haired. *Thorax:* Predominantly yellow, tinged lightly with brown on the mesonotum, scutellum, upper edge of the sternopleura, and through the median portions of the mesopleura, pteropleura, and metapleura. The anterior dorsocentral bristles are very small, about one-fourth as large as the posterior dorsocentrals; the anterior pair is situated opposite the second pair of supraalars. About eight rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Yellow. The femora are slender. The front tibiae

have no long ciliation, and rather densely placed black cilia extend over the dorsal surface of the front tarsus from about the middle of the basitarsus to the apex of the tarsus (fig. 49b). The front basitarsus is about one-third as long as the tibia. The hind basitarsus is about three-fifths as long as the tibia. *Wings:* 3.5 times longer than wide, the apical fourth covered by a dark brown spot (fig. 49a). The costal fringe ends just slightly beyond the tip of vein R_{2+3}. The third costal section is about five times longer than the fourth, and the last section of vein M_{1+2} is 1.6 times longer than the penultimate section. The last section of vein M_{3+4} is two times longer than the m crossvein. *Abdomen:* Brown, tinged faintly with yellow. The anal plates are hemispherical in shape. The ninth tergum is straight-sided, not narrowed over the dorsal portion. The claspers are hidden from direct lateral view (fig. 49c).

Length: body, 2.5 mm.; wings, 3.0 mm.

FEMALE. Unknown.

Holotype male and one male paratype: Puu Kolekole, Molokai, 3,600 feet, July, 1952 (M. Tamashiro).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila brevitarsus new species (fig. 50a–c).

This species would fit near *D. melanosoma* Grimshaw from Kauai because of the characteristically short front basitarsi. The two do not appear to be related in other respects, however, and *brevitarsus* is readily differentiated by the peculiar ornamentation of the front basitarsus (fig. 50b), by the lack of brown markings in the wings, by the difference in body coloration and by many other details brought out in the description.

MALE. *Head:* Just slightly higher than long and predominantly yellow, tinged with brown on the upper and hind portions. The lower front is yellow, tinged faintly with brown; the upper portion is brownish yellow. The eye orbits to the proclinate bristles, the vertex, and the ocellar triangle, are dark brown to black covered with gray pollen. The anterior reclinate bristle is slightly shorter than the proclinate and is situated approximately opposite the latter. No strong bristles are present in the vibrissal row. The setae are all hair-like, especially those in the upper portion. The palpi and mouthparts are yellow. Each palpus has a small, inconspicuous black apical bristle. The labella are not ornate. The antennae are brown, tinged with yellow. The arista has four dorsal rays and one ventral in addition to the apical fork (fig. 50a). *Thorax:* Dark brown to black on the dorsum, reddish brown on the sides. The anterior dorsocentral bristles are almost in line with the first pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two moderately developed bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Wings:* Faintly infuscated yellow-brown. The third costal section is 4.5 times longer than the fourth and the costal fringe extends about one-third the distance be-

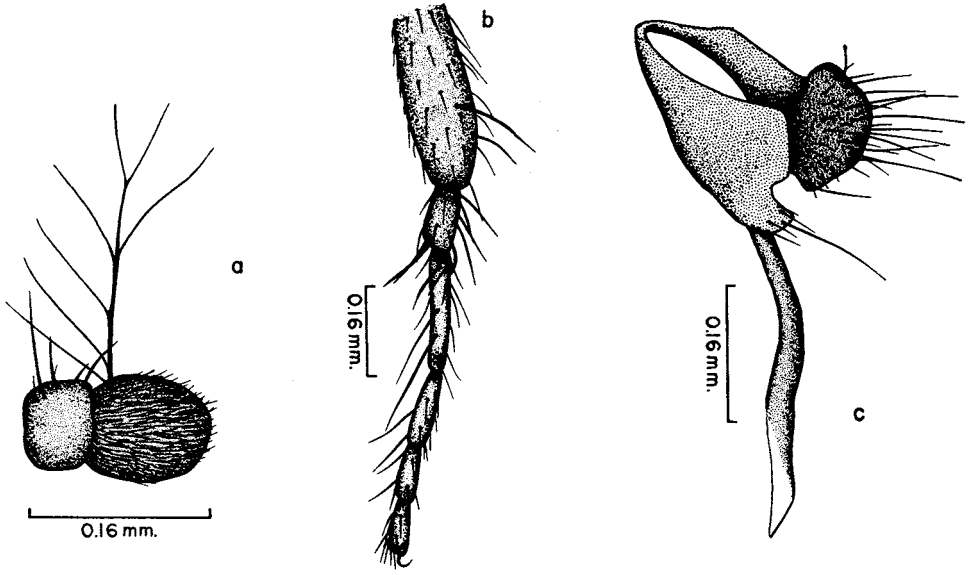


Figure 50—*Drosophila brevitarsus* n. sp.: **a**, antenna; **b**, front tarsus; **c**, male genitalia.

tween the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Almost entirely dark brown, tinged with yellow at the base. The anal plates are nearly two times higher than long and are almost ventral in position. The ninth tergum is greatly narrowed over the dorsal portion and broadened medianly; at the widest point the tergum is approximately equal to the horizontal length of the anal plates. The ventral margins are lobate as in figure 50c.

Length: body, 2.15 mm.; wings, 2.50 mm.

FEMALE. Specimens are on hand which contain the same data as the type male, but they cannot be definitely associated and are not being considered as part of the type series. They fit the above description except for sexual differences.

Type male and one male paratype: labeled "Oahu, Hawaii, Bridwell collection." Three females same data as type (not designated as paratypes). Also one male paratype: Mount Kaala, Oahu, 2,900–3,500 feet, April 21, 1929 (E. H. Bryan, Jr.).

Type and the three female specimens have been returned to the United States National Museum. The paratypes are in the B. P. Bishop Museum and the University of Hawaii collections.

Drosophila bridwelli new species (fig. 51a–e).

A predominantly rufous species looking superficially like *D. immigrans* Sturtevant but lacking the row of short ventral spines on the front femur. It

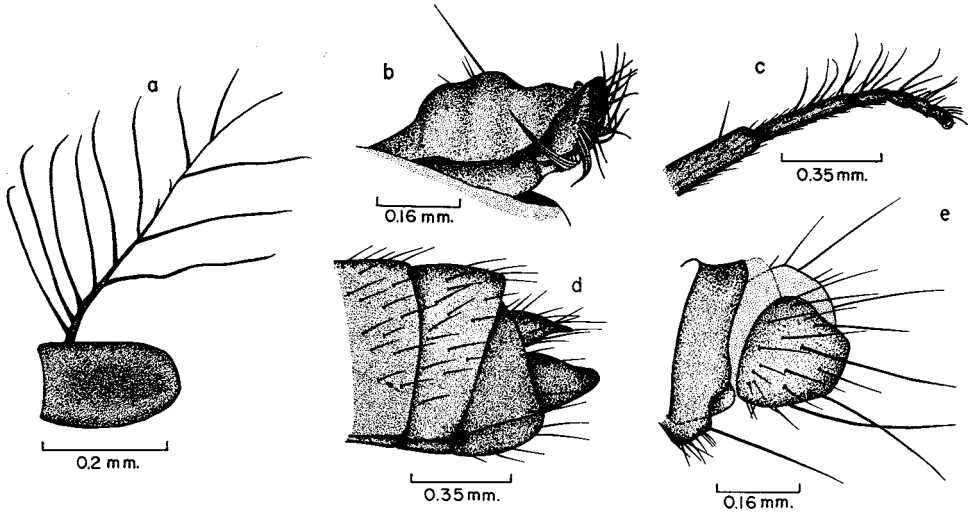


Figure 51—*Drosophila bridwelli* n. sp.: **a,** antenna; **b,** labellum of male; **c,** front tarsus; **d,** female genitalia; **e,** male genitalia.

also somewhat resembles *quasianomalipes* n. sp. from Kauai, but differs in a number of important respects as pointed out in the key on page 104.

MALE. *Head:* Predominantly yellow; brown along the upper eye orbits, the ocellar triangle, the vertex, and the upper occiput. The front is golden yellow, very faintly tinged with brown, and two times wider than long measured from the median ocellus to the anterior margin. The anterior reclinate bristle is approximately equal in length to the proclinate and is situated slightly above the latter. The antennae are yellow, the third segment tinged with brown. The arista has seven dorsal and three ventral rays in addition to the apical fork (fig. 51a). The face has a slight keel extending through the median portion. The vibrissae are about equal in size; no strong bristles are situated at the upper portion of the row. The palpi are yellow, each with a prominent apical bristle. The labella are ornate; each has a row of yellow, curved bristles along the apical margin and a set of three to four closely placed, long, black bristles on the upper apical edge. The latter are closely appressed, often appearing as one large bristle; these black bristles are directed outwardly, the two sets cruciate (fig. 51b). *Thorax:* Predominantly yellow to rufous, tinged with brown on the dorsum, and with two brown longitudinal vittae extending across the upper half of each pleuron. Two strong humeral bristles are present. The anterior dorsocentral bristles are situated opposite the second (posterior) pair of supraalars. About eight rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow; the segments are typical in development except for the ciliation on the front tarsi. Except for the basal half of the front basitarsus the tarsus has long, dorsal ciliation extending the entire length

(fig. 51c). The basitarsus is about two-fifths as long as the tibia. *Wings:* Faintly and evenly tinged with yellow, infuscated with brown only over the m crossvein. The third section of the costa is five times longer than the fourth, and the costal fringe extends almost half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.25 times longer than the penultimate section. *Abdomen:* Dark brown, tinged with red in ground color. The anal plates are about as long as high. The ninth tergum is not narrowed dorsally; the ventral lobes are nearly truncate (fig. 51e).

Length: body and wings, 3.7 mm.

FEMALE. Fitting the description of the male in most respects. Three to four strong bristles are present on the upper edge of each vibrissal row. The ovipositor is rather broad and blunt and extends well beyond the apex of the anal plates (fig. 51d).

Length: body and wings, 4.3 mm.

Named in honor of J. C. Bridwell, who collected many of the new species described in this volume.

Holotype male: Hauula, August 2, 1914 (no collector given). Allotype female: labeled "Oahu, Hawaii, Bridwell collection." Eight paratypes (five males and three females): from the following localities—same as type; same as allotype; Mt. Kaala, Oahu, on *Gunnera* sp. 3,600 feet, January 22, 1939 (F. X. Williams); head of Kaluanui Valley, Oahu, May, 1951 (D. E. Hardy); and Kahana, Oahu, September 7, 1924 (O. H. Swezey).

The type and two paratypes have been returned to the Hawaiian Sugar Planters' Association collection. The allotype and two paratypes are in the United States National Museum, and three paratypes are in the University of Hawaii collection.

Drosophila brunneifrons new species (fig. 52a–c).

This species fits near *D. quadrisetae* n. sp. from Kauai because of the sparsely arranged cilia on the front tarsi of the male. It differs by having only two strong dorsal cilia on the upper fifth of the front basitarsus and only one strong cilium in the middle of the second tarsal segment (fig. 52a). Also the wings are dark and the front is entirely brown. *D. nigritarsus* n. sp. may possibly be just a subspecies of *brunneifrons*; it differs by having the legs yellow except for the dark brown to black apical two or three segments of each tarsus.

MALE. *Head:* The front is entirely brown. The orbits to the proclinate bristles, the ocellar triangle, the vertex, and the upper occiput are dark brown to black. The entire occiput is brown. Each gena is yellow except for a brown stripe extending along the lower margin. The lower portion of the face is brown, the upper median portion yellow. The face is nearly flat. The clypeus and the apical halves of the palpi are brown. Each palpus has a moderately strong apical bristle. No distinctive ornamentations can be seen on the mouthparts of the specimens at hand. The antennae are dark brown; the second segment has three

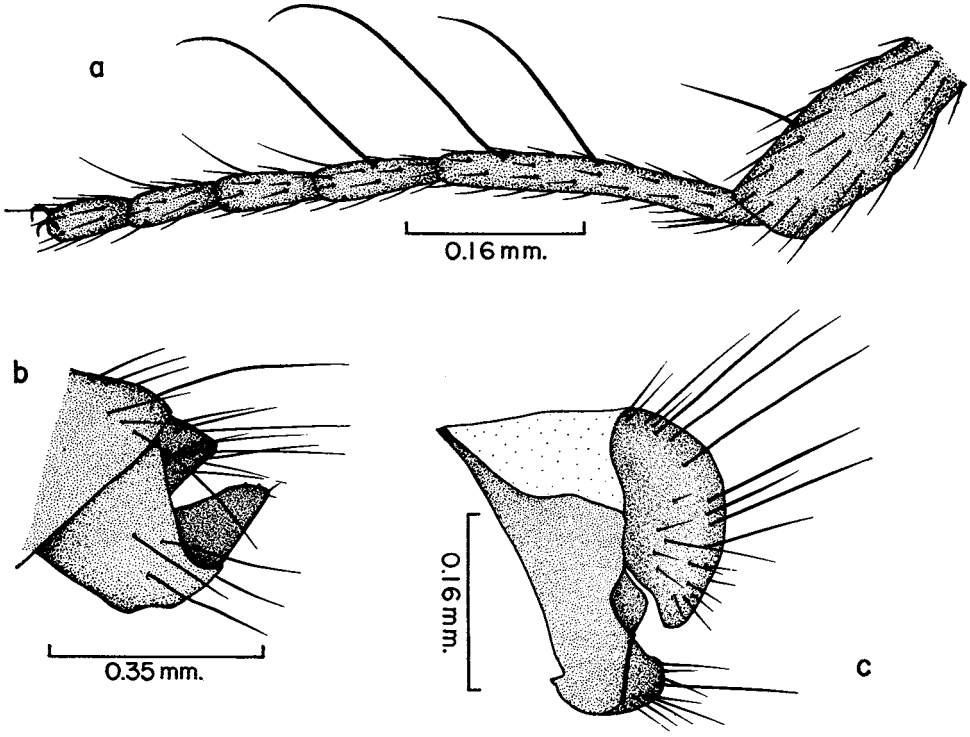


Figure 52—*Drosophila brunneifrons* n. sp.: **a,** front tarsus; **b,** female genitalia; **c,** male genitalia.

short bristles on the dorsal surface. The arista has five or six dorsal and two ventral rays in addition to the small apical fork. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated slightly above the latter. About three strong bristles are present at the upper portion of each vibrissal row; the uppermost bristle is about equal in size to the ocellar bristles. *Thorax:* Entirely dark brown covered with gray-brown pollen. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is almost as large as the posterior bristle. *Legs:* Yellow except for a slight tinge of brown on the coxae and on the apices of the tibiae. Posteroventral and posterodorsal bristles are well developed on the front femora. The legs are not ornate except for three prominent black dorsal cilia on the front tarsi—two arranged on the apical half of the basitarsus and one on the apical two-thirds of the second tarsal segment (fig. 52a). The front basitarsus is one-half as long as the tibia and two times longer than the second segment. *Wings:* Evenly light brown fumose. The third costal section is five times longer than the fourth, and the costal fringe extends one-third to two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The

last section of vein M_{1+2} is 1.45 times longer than the penultimate section. *Abdomen:* Brown covered with gray-brown pollen on the dorsum, yellow on the venter. The anal plates are nearly two times higher than long and are subacutely pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion and is expanded and convex on the posteromedian margin so that at this point the segment is wider than the anal plate. The ventral portion of the tergum is lobate as in figure 52c.

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Fitting the description of the male in most respects. The coxae and femora are brownish yellow but the tibiae are not marked with brown at the apices. The ovipositor blades are rather short, blunt at apices, and extend slightly beyond anal plates (fig. 52a).

Holotype male, allotype female, and seven paratypes (six males and one female): from Haelaau, Maui, 3,000–5,000 feet, December 18, 1928, collected on *Broussaisia* and on *Clermontia arborescens* (E. H. Bryan, Jr.). Also two male paratypes. Ridge above Haelaau, Maui, 3,000–3,600 feet, December 19, 1928 (E. H. Bryan, Jr.); and Puu Kukui, Maui, 3,000–4,500 feet, June, 1953 (D. E. Hardy).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the United States National Museum, the British Museum (Natural History), and the University of Hawaii collections.

Drosophila brunneisetae new species (fig. 53a–b).

This species fits in the large complex which is characterized by having the body brown, the wings hyaline, the legs yellow, and a prominent apicodorsal bristle on the front basitarsus of the male. It is differentiated from other known species by having the front basitarsus about one-fifth as long as the tibia, and a series of pale brown anteroapical hairs on the front basitarsus (fig. 53a).

MALE. *Head:* The front is about one-half wider than long; it is brown, tinged with rufous in the median portion, and with black on the orbits and on the anterior margin. The vertex, the ocellar triangle, and the upper occiput are black; the lower portion of the occiput is yellow. The genae are yellow except for a narrow rim of brown along the vibrissal row; at the narrowest point, the gena is slightly less than the width of two rows of eye facets. The upper portion of the face is yellow, the lower margin dark brown to black; the face is slightly carinate down the median portion. The clypeus is brown to black. The palpi and mouthparts are yellow. Each palpus has a series of black setae around the outside margin, but has no strong apical bristle. No distinct bristles are present in the vibrissal row; the uppermost seta is about equal in size to the acrostichal setae. The first two antennal segments are yellow, tinged slightly with brown, especially on the dorsal portions. The third segment is brown with a faint tinge of yellow at its base. The second antennal segment has three dorsal bristles. The arista has four to five dorsal and two ventral rays in addition to the apical fork. The anterior reclinate bristle is almost equal in size to the proclinate and is

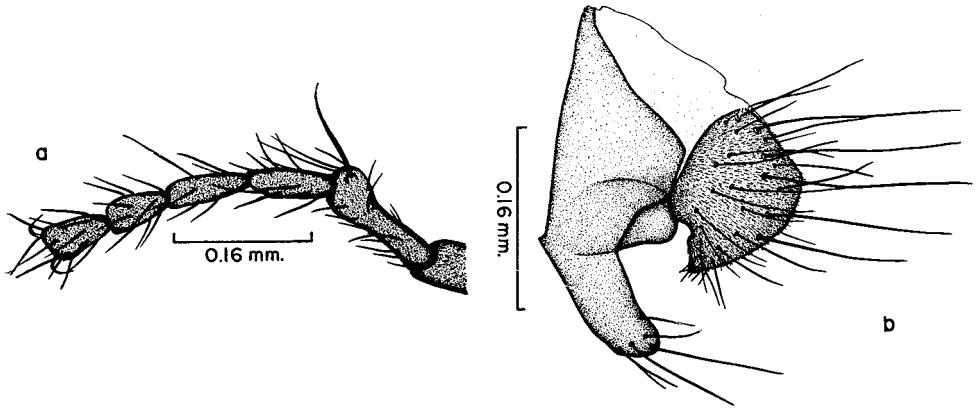


Figure 53—*Drosophila brunneisetae* n. sp.: **a**, front tarsus; **b**, male genitalia.

situated slightly above the latter. *Thorax:* Subshining brown, tinged with rufous in the ground color, and faintly infuscated with brownish gray pollen. The lower two-thirds of each sternopleuron is yellow, faintly tinged with brown. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the posterior supraalars. Approximately eight rows of acrostichal setae are present. The lower humeral bristle is almost as large as the upper. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is about one-fifth as long as the tibia and has a strong black apicodorsal bristle (fig. 53a) and several anteroapical yellow-brown hairs. The second tarsal segment is two-thirds to three-fourths as long as the first and has a black apicodorsal hair. The remaining tarsal segments have black, erect hairs at their apices. *Wings:* Faintly infuscated but with no distinct brown markings. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is slightly over four times longer than the fifth; the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The last section of vein M_{3+4} is nearly two times longer than the m crossvein. *Abdomen:* Dark brown covered with gray-brown pollen. The genitalia are yellow except for the black claspers. The anal plates are distinctly pointed ventrally, and the ninth tergum is produced into a ventral lobe on each side and is strongly narrowed dorsally (fig. 53b).

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. Fitting the characteristics of the male in most respects except for the lack of ornamentation on the front tarsi, the distinctly stronger bristles in the vibrissae, and the presence of a well-developed bristle at the apex of each palpus. The ovipositor plates are rather slender, each terminating in a sharp point.

Length: body, 2.7 mm.; wings, 3.2 mm.

Holotype male and allotype female: from Puu Kukui, Maui, *circa* 4,000 feet, June, 1953 (D. E. Hardy and C. R. Joyce). Thirteen paratypes (10 males and 3

females) : from the following localities—same as type; and Manawainui, Molokai, July, 1952 (D. E. Hardy).

Type, allotype, and a series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila busckii Coquillett (fig. 54a–c).

Drosophila busckii Coquillett, 1901, Ent. News 12:18.

Drosophila rubrostriata Becker, 1908, Mitt. Zool. Mus. 4:155.

Drosophila plurilineata Villeneuve, 1911, Wien. Ent. Zeits. 30:38.

Oahu, Hawaii, and Kauai; probably common on all the main islands.

Immigrant. A widely distributed cosmopolitan species. It has often been associated with rotting organic matter.

Type locality: Washington, D. C.

Type in the United States National Museum.

This species is readily differentiated from all other *Drosophila* by the lack of preapical dorsal bristles on the front and middle tibiae and by the yellow mesonotum with three brown to black vittae, the median one forked posteriorly (fig. 54a).

The arista has five dorsal and two ventral rays in addition to the apical fork; the inner edge of the arista has six to eight short hairs. The first two segments of the antennae are yellow, the third brown. The front is predominantly yellow, gray on the orbits and around the ocellar triangle. The lower reclinate bristle is slightly over half as long as the proclinate and is situated just above the latter. The face is pale yellowish white; a strong carina is present down the median portion. Two moderately strong bristles are present at the upper edge of each vibrissal row, the second bristle shorter than the first. The palpi are yellow, rather densely haired, but with only a subapical bristle; this is stronger, more evident, in the females. The thorax is predominantly yellow, often tinged lightly with brown and sometimes faintly gray pollinose. The mesonotum has three narrow, brown to black, longitudinal vittae, one down each dorsocentral row and one down the middle; the latter is bifid posteriorly (fig. 54a). The scutellum is brown on the disc, yellow on the sides, and has a faint yellow vitta extending longitudinally down the middle portion. The anterior dorsocentral bristles are situated approximately opposite the second (posterior) pair of supraalars. A brown vitta extends longitudinally over the upper edges of each mesopleuron, pteropleuron, and metapleuron; also, a brown stripe occurs across the upper portion of the sternopleuron. The legs are yellow; the preapical dorsal bristles are not differentiated on the first two pairs of legs. The legs are not ornate; the front basitarsus is about two-fifths as long as the tibia. The wings are hyaline. The costal fringe extends about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.1–3.5 times longer than the

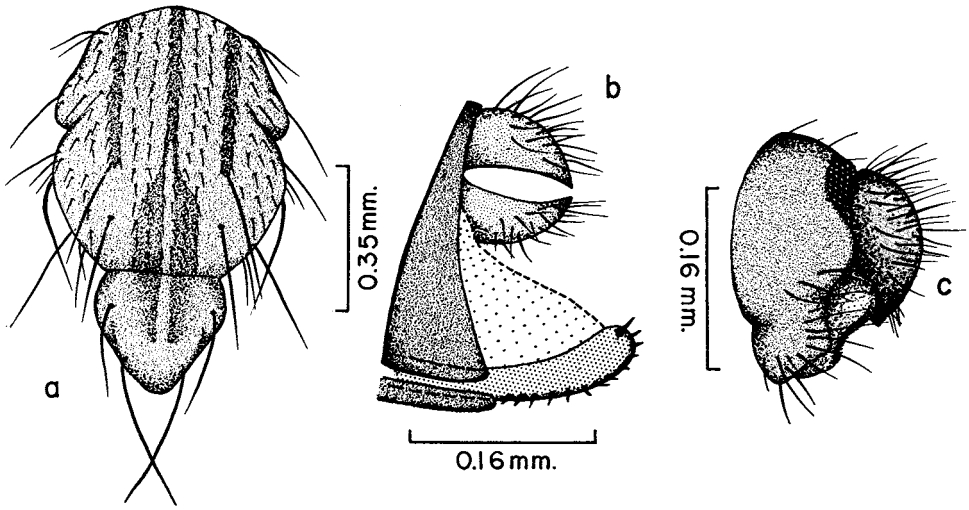


Figure 54—*Drosophila busckii* Coquillett: **a**, thorax, dorsal view; **b**, female genitalia; **c**, male genitalia.

fourth. The last section of vein M_{1+2} is 2.1 times longer than the penultimate section. The last section of vein M_{3+4} is nearly two times longer than the m crossvein. The abdomen is yellow except for a broad, brown to black band across the posterior margin of each tergum; this is rather broadly interrupted mid-dorsally by a yellow line extending the entire length of the abdomen. The female egg guides are blunt and armed with stout teeth around the margin (fig. 54b). The male genitalia are as in figure 54c; the claspers are densely pectinate on the inner margins.

Length: body and wings, 2.0–2.5 mm.

Drosophila caccabata new species (fig. 55a–c).

This species fits in the complex which is characterized by having the anterior reclinate bristle longer than the proclinate. It is differentiated from other species in this complex by the predominantly black coloration; by the front basitarsus approximately one-half as long as the tibia and not enlarged at the apex; and by the dense clump of dorsal cilia on the front basitarsus (fig. 55a).

MALE. *Head:* Entirely dark brown to black except for a tinge of yellow on the upper portion of the face and the yellow apices of the labella. The front is predominantly velvety brown, the face often tinged with yellow on the upper portion; only the apices of the labella are yellow and in some specimens even these are tinged with brown. The anterior reclinate bristle is slightly longer than the proclinate and is situated distinctly above the latter. Four or five moderately developed bristles are present in the upper half of each vibrissal row; these are about equal in size to the uppermost setae of each occipital row. Each

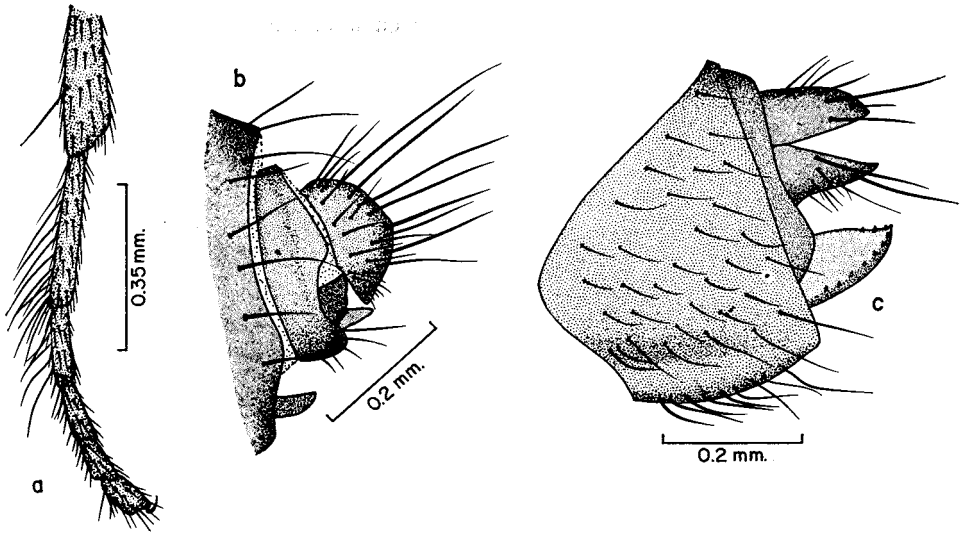


Figure 55—*Drosophila caccabata* n. sp.: **a,** front tarsus; **b,** male genitalia; **c,** female genitalia.

palpus has one small black apical seta plus two or three preapical setae on the outside surface. The labellum is not ornate. The second antennal segment has three or four short black bristles. The arista has six dorsal and two ventral rays in addition to the small apical fork. *Thorax:* Entirely dark brown, with a slight tinge of black on the dorsum; only the halteres are yellow. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Two well-developed humeral bristles are present. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* The coxae are brown. The mid and hind femora are brown except for very narrow yellow apices. The front femora are tinged with brown on the basal halves, yellow apically. The apical segments of the tarsi are brown, the legs otherwise yellow. The front basitarsus is densely ciliate on the anterodorsal surface; the long cilia extend almost the entire length of the segment but are arranged in a dense clump on the apical third to one-half (fig. 55a). The basitarsus is almost one-half as long as the tibia. Several dorsal cilia are present on the second tarsal segment. *Wings:* Slightly infuscated with brown as seen in indirect light. A faint brown infuscation extends over the apical portion and also on the m crossvein; these markings are so indistinct, however, that they are not clearly discernible, and the species is not being keyed with those which have brown markings on the wings. The third costal section is five times longer than the fourth, and the costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.3 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black covered with gray-brown pollen. The anal plates are about two times higher than long, and are slightly pointed

ventrally. The ninth tergum is greatly narrowed over the dorsal portion, somewhat expanded on the posterior margin, and lobate ventrally as in figure 55b.

Length: body, 3.0–3.6 mm.; wings, 3.5–4.2 mm.

FEMALE. The females cannot be definitely associated with the males and are obviously very similar in appearance to several other species from Molokai. The specimens on hand, which apparently fit here, differ from the description of the male in having the lower portion of the front distinctly tinged with yellow to rufous; the lower occiput, the genae and the upper portion of the face yellow, tinged faintly with brown; and the mouthparts yellow, tinged with brown. The arista has seven or eight dorsal and three ventral rays in addition to the apical fork. The ovipositor blades are short, sharp-pointed at the apices, and extend approximately as far as the anal plates (fig. 55c).

Length: body, 4.0–4.3 mm.; wings, 4.3–4.7 mm.

Holotype male: Puu Kolekole, Molokai, July, 1952 (M. Tamashiro). Four paratypes (all males): three, same locality and same data as type (D. E. Hardy and M. Tamashiro); one, from Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy). Six female specimens are on hand. These are not being considered part of the type series. They are from the following localities on Molokai: same as type and Manawainui Valley, July, 1952 (D. E. Hardy).

Type and some of the female specimens in the B. P. Bishop Museum. The remainder of the specimens are being distributed among the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila canipolita new species (fig. 56a–c).

This species is related to *D. bipolita* n. sp., but is differentiated by having the dorsum of the thorax distinctly gray pollinose, the antennae entirely yellow, the front tarsi distinctly shorter with the basitarsus about one-half as long as the tibia, the fifth and sixth abdominal terga predominantly yellow, and the male genitalia as in figure 56b.

MALE. *Head:* The front is predominantly yellow, tinged with brown to black on the upper portion, but never polished black above as in *bipolita*. The upper front and the vertex are dusted with gray pollen. The eye orbits above the anterior reclinate bristles are brown to black. The vertex and ocellar triangle are black in ground color. The upper two-thirds of the occiput is brown to black covered with gray pollen, the lower portion pale yellow. The genae, face, antennae, palpi, and mouthparts, except for the black rim on the labellum, are pale yellow. Each palpus has a moderately long apical bristle; this is approximately equal in length to the palpus and is slender and hair-like. One moderately strong bristle plus two smaller bristles are situated on the upper portion of the vibrissal row, the uppermost bristle approximately equal in size to the proclinate bristles of the front. In the median portion the gena, measured from the vibrissal row to the eye margin, is approximately equal in width to three rows of eye facets.

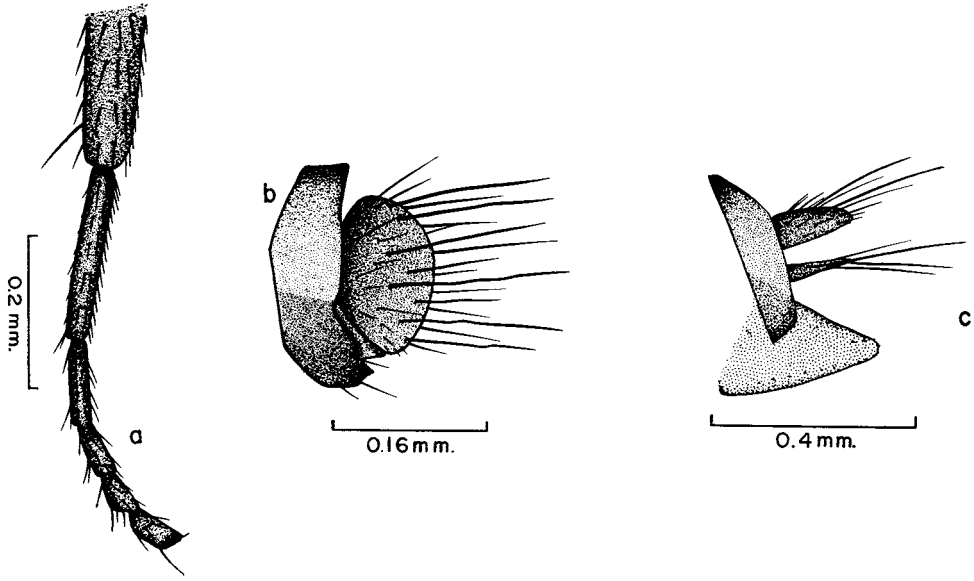


Figure 56—*Drosophila canipolita* n. sp.: **a**, front tarsus; **b**, male genitalia; **c**, female genitalia.

The face is very slightly convex on the upper median portion. The second antennal segment has two dorsal bristles. The arista has five or six dorsal and two ventral rays in addition to the apical fork. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated well above the latter, about two-fifths the distance from the proclinate to the upper reclinate bristle. The vertical bristles are comparatively small, about equal in size to the other upper head bristles. *Thorax:* Dark brown to black on the dorsum, except for the broadly yellow apex of the scutellum, and covered with gray pollen. The upper half of each pleuron is also brown to black. The metanotum is brown, tinged with rufous. The humeri, notopleural calli, and the lower half of each pleuron, are pale yellow. The anterior dorsocentral bristle is situated almost opposite the first (anterior) supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is rudimentary, represented by a tiny seta which is smaller than the secondary seta and just a fraction of the length of the posterior bristle. *Legs:* Entirely yellow, lacking ornamentation. The front tarsi are comparatively short, the basitarsus is about one-half as long as the tibia and approximately two times longer than the second tarsal segment (fig. 56a). *Wings:* Subhyaline, with no dark markings. The third costal section is 4.25 times longer than the fourth, and the costal fringe extends slightly beyond the middle of the distance beyond the apices of veins R_{2+3} and R_{4+5}. The last section of M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* The first tergum is yellow, tinged with brown. Terga two, three, and four are entirely brown, with but a faint tinge of yellow in the ground color.

Terga five and six are entirely yellow except for a faint line of brown along the posterior margin of the fifth. The venter of the abdomen is yellow. The anal plates are two times higher than long and subacutely pointed ventrally. The ninth tergum is rather narrow, almost straight-sided, one-half to two-thirds as wide as the anal plate, and rounded ventrally (fig. 56b). The claspers are hidden by the ventral lobes of the tergum and are scarcely visible from a lateral view.

Length: body, 2.00–2.25 mm.; wings, 2.2–2.5 mm.

FEMALE. Fitting the description of *bipolita* except that the mesonotum is distinctly gray pollinose. Females differ from the males by having the third antennal segment predominantly brown, the palpi and the clypeus brown, and the lower portion of the face tinged with brown. The ovipositor plates are as in figure 56c.

Length: body, 2.00–2.25 mm.; wings, 2.20–2.50 mm.

Holotype male: Puu Kolekole, Molokai, July, 1953 (D. E. Hardy). Allotype female: same data as type (M. Tamashiro). About 60 paratypes (sexes evenly distributed): from the following localities—same as type, July, 1952, and July, 1953 (D. E. Hardy and M. Tamashiro); Manawainui Valley, Molokai, July 1952 (D. E. Hardy); Kahuaawi Gulch, Molokai, July, 1952 (D. E. Hardy); Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy); Kainalu, Molokai, 1,800–2,000 feet, July 20, 1927 (E. H. Bryan, Jr.); Kaiholena, Kohala Mountains, Ditch Trail, Hawaii, 2,000 feet, July, 1950, in banana thicket (D. E. Hardy); South Kona, Hawaii, August 8, 1919 (O. H. Swezey); Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley); Glenwood, Hawaii, March 2, 1919 (O. H. Swezey); Kulani Road, Hawaii, July 19, 1952 (E. C. Zimmerman); Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy); Lanaihale, Lanai, 3,200 feet, June, 1953 (D. E. Hardy); Waihee Valley, Maui, June, 1952 (D. E. Hardy); Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy); Makamakaole Valley, Maui, June, 1953 (D. E. Hardy); Mount Kaala, Oahu, 3,000–4,000 feet elevation, April and June, 1949, 1952, and 1953 (G. B. Mainland, D. E. Hardy, M. S. Adachi, and M. Tamashiro); Makaleha Valley, Oahu, June, 1952, 1,800 feet (L. D. Tuthill); Poamoho Trail, 1,700 feet, May, 1953. (M. S. Adachi); Pupukea, Oahu, and Pupukea Trail, April to September, 1952, 1955, and 1958, collected in banana thicket (D. E. Hardy). Also on hand is one male specimen which appears to belong here from Nualolo, Kauai, September 1, 1921, on *Pelea* (O. H. Swezey); it is not being designated as a paratype.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila canuta new species (fig. 57a–d).

This species resembles *D. anthrax* n. sp. because of the black thorax and dark brown to black femora. The two are not related, however; *canuta* is readily differentiated by lack of a black rim on the labellum of the male, by lack of a

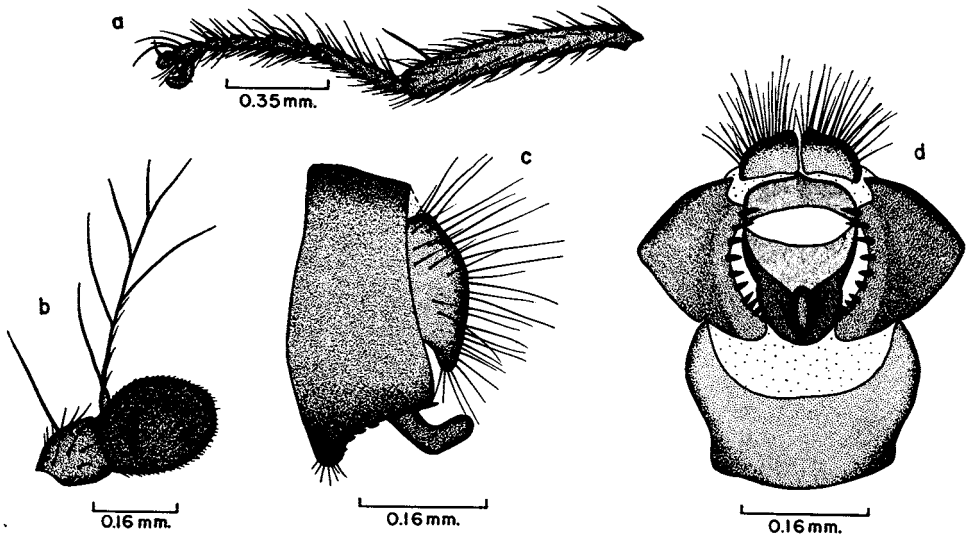


Figure 57—*Drosophila canuta* n. sp.: **a,** front tibia and tarsus; **b,** antenna; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

yellow apex on the scutellum, by the gray pollinose thorax, as well as by many other details. *D. canuta* also superficially resembles *D. prolixa* n. sp. because of the dark coloration and the elongate inner vertical bristles. These are also not related, however, and *canuta* is readily separated by the short costal fringe, by having the anterior dorsocentral bristle much more posterior in position, by the short bristly setae on the front tibiae and tarsi, and by other details.

MALE. *Head:* The front is about two-thirds wider than long, predominantly brown, and yellow to rufous on the lower one-third. The orbits above the proclinate bristles, the ocellar triangle, and the vertex are black covered with gray pollen. The occiput is brown, tinged with rufous, yellow only on the extreme lower portion. The genae are yellow, the face predominantly so, tinged with brown to black on the lower median portion. At the lower edge of the eye, the gena, measured from the vibrissal row to the eye margin, is about equal in width to three rows of eye facets. The face is slightly convex on the upper median portion. The clypeus is black. The palpi and mouthparts are yellow to rufous. Each palpus has a rather small subapical bristle and several black setae scattered over the dorsal surface. The labellum is comparatively small and is not ornate. One strong bristle is present at the upper edge of each vibrissal row; this is almost as large as the upper reclinate bristle of the front. The anterior reclinate bristle is about four-fifths as long as the proclinate and is situated slightly above the latter. The inner vertical bristles are long and slender, their length greater than the head height. The antennae are rufous, tinged with brown along the dorsal portions. The arista has three dorsal and one ventral ray in addition to the apical fork (fig. 57b). *Thorax:* Black, rather densely gray pollinose. The

anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Two additional small bristles are present in each dorsocentral row: one is equal in size to the lower humeral bristle which is situated just posterior to the suture, and one is about two times longer than the acrostichal setae and situated just before the suture. About eight rows of acrostichal setae are present. Each humerus has three distinct bristles; the median bristle is strong, almost equal in size to the presutural bristle; the upper and the lower bristles are fairly small, about one-third to two-fifths as long as the median bristle. The anterior sternopleural bristle is subequal to the posterior bristle, and a row of four erect setae extends vertically between the two bristles. *Legs:* The front coxae are yellow, tinged faintly with brown. The other coxae are yellow-brown. On the type the femora are dark brown to black, tinged with rufous in the ground color. The narrow apices of all the segments are yellow, and the ventral portion of the second segment is yellow. On the paratype the femora are yellow, discolored with brown medianly. The front femora are moderately thickened, and each has a strong row of posterodorsal and anterodorsal bristles and also numerous erect setae scattered over the dorsal surface. On the type the front tibiae are brown except for yellow bases and apices. The middle and hind tibiae are yellow, tinged with brown in the median portions. The tibiae are all yellow on the paratype. The tarsi are yellow except for the brown apical segments. The front tibiae and tarsi are densely covered with short erect setae (fig. 57a). The front basitarsus is about two-fifths as long as the tibia and approximately two times as long as the second tarsal segment. *Wings:* Entirely hyaline. The third costal section is 3.3 times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.25 times longer than the penultimate section. The anal plates are three to four times higher than long and are tapered ventrally. The claspers are large and conspicuous, strongly toothed on the apical surface, and apparently fused to the ninth tergum (fig. 57c–d). The tergum is almost straight-sided.

Length: body, 3.2 mm.; wings, 3.6 mm.

FEMALE. Unknown.

Holotype male: Kau, Hawaii, 4,000 feet (no date or collector given). One male paratype: Waihee Valley, Maui, June, 1952 (D. E. Hardy). The paratype has paler legs than the type and may possibly be teneral.

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila capitata new species (fig. 58a–b).

This species is closely related to *D. clavata* n. sp. but is differentiated by having the appendage of the front basitarsus of the male strongly attentuated, swollen, and pilose only on the apical half (fig. 58b); also the costal fringe extends only about one-third the distance between the apices of veins R_{2+3} and R_{4+5}.

The description of *D. clavata* fits in most respects and differs only in the

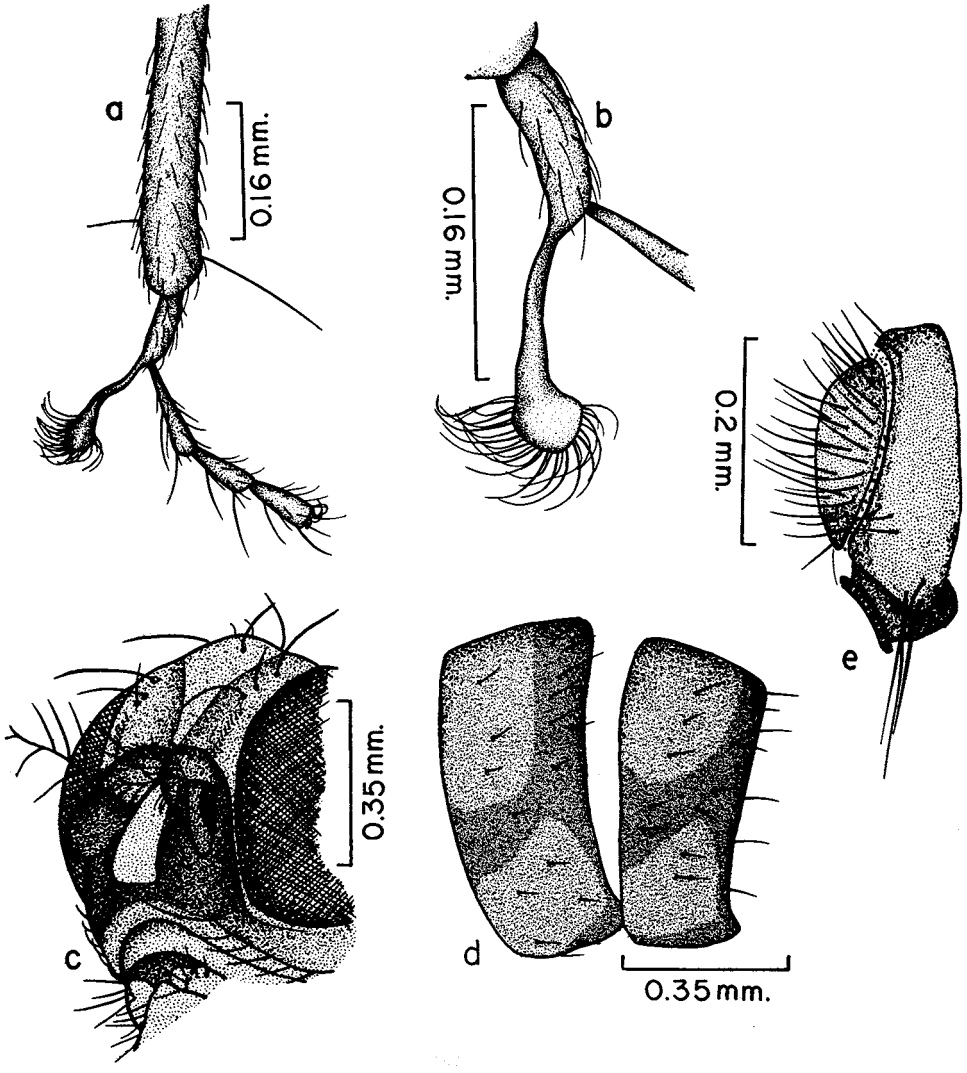


Figure 58—*Drosophila capitata* n. sp.: **a**, front tarsus; **b**, front basitarsus. *D. carinata* Grimshaw: **c**, carina on face; **d**, pattern of brown markings on sides of terga; **e**, male genitalia.

following details: The mesonotum and scutellum are brown, tinged with red, and the upper half of each pleuron is yellow-brown. The antennae are yellow, tinged with brown. The front tarsus is four-segmented, the basitarsus is as described above and as is shown in figure 58b, and the appendage is capitate in shape and densely haired around the apex. The apical three segments of each tarsus have several erect setae along the dorsal surface (fig. 58a). The costal fringe extends only about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.3 times longer than the fourth, and the last

section of vein M_{1+2} is two times longer than the penultimate section. The genitalia have not been studied.

Length: body, 2.25 mm.; wings, 2.75 mm.

FEMALE. Unknown.

Holotype male: Mt. Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila carinata Grimshaw (fig. 58c–e).

Drosophila carinata Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :70; pl. 3, fig. 20.

Drosophila mercatorum Patterson and Wheeler, 1942, Univ. Texas Publ. 4213:93. **New synonym.**

Widespread throughout the islands; rather common in the lowlands.

Immigrant. Widely distributed over southern and western United States, Mexico, and Hawaii. First collected in Hawaii in 1892.

Type locality of *carinata*, Kona, Hawaii. The type of *mercatorum* is from Santa Barbara, California.

Type of *carinata* in the British Museum (Natural History). The type of *mercatorum* is in the United States National Museum.

I have studied the type of *carinata*; it is slightly teneral but agrees well with typical specimens of *mercatorum*. The latter was first reported in Hawaii by Zimmerman (1943:346).

This species is closely related to *D. repleta* Wollaston and I find no really satisfactory morphological characters for separating the Hawaiian specimens. Apparently the most reliable character is the entirely pale-colored legs of *carinata*. According to previous descriptions and keys which have differentiated between these species on the mainland of the United States, *carinata* is also supposed to be differentiated by having the abdominal pattern much lighter; less distinct than in *repleta*; and also by having the third costal section about 2.8 times longer than the fourth rather than 3.0 times longer than the fourth. I see no such differences in the Hawaiian specimens. If there is a slight difference in body coloration and in the length of the costal sections, it is of no significance. Patterson and Wheeler in the original description stated "A slightly darker strain of this same species occurs in the Hawaiian Islands where it has been called *D. mulleri*–. Breeding tests between strains from California and Hawaii demonstrate that the two forms belong to the same species." This species has been adequately described in the original. The face is carinate as in figure 58c, and as figured by Hsu (1949:136, figure 6). It fits the description of *repleta* in most details, differing by having the legs entirely pale yellow. The yellow markings on the sides of the abdomen are as in figure 58d. Male genitalia as in figure 58e.

Drosophila carnosa new species (fig. 59a–c).

This species fits in the complex which has a brown anteroapical spot in the wing and the body predominantly pale colored. It differs from the similarly

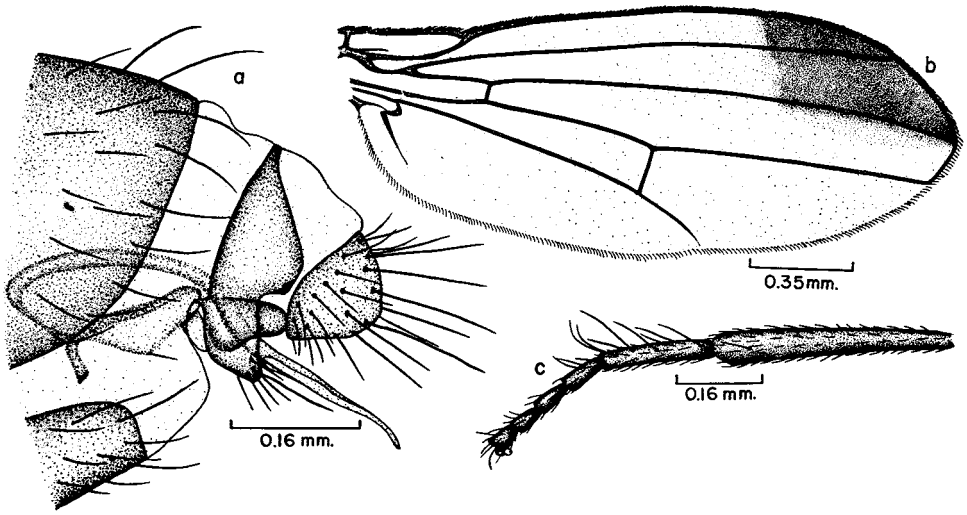


Figure 59—*Drosophila carnosa* n. sp.: **a,** male genitalia; **b,** wing; **c,** front tarsus.

marked species by having the labellum fleshy, lacking teeth or processes, and by the very differently developed front legs of the male (fig. 59c).

MALE. Rather small, predominantly pale-colored species. *Head:* The front is about one-fourth wider than long, is predominantly rufous, and the orbits are brown to the proclinate bristles. The anterior reclinate bristle is almost as large as the proclinate and is situated just slightly behind the latter. The vertex and the upper occiput are brown; the lower occiput, the genae, and most of the face are yellow. The lower portion of the face is brown. The clypeus is also brown. The mouthparts, including the palpi, are yellow except for the yellow-brown mentum. Each palpus has a small black apical bristle. The labellum is fleshy, not ornate. The upper bristle of each vibrissal row is moderately strong. The antennae are yellow, tinged with brown on the third segment. The second segment has two moderately strong dorsal bristles. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow, tinged faintly with brown on the dorsum and also on the disc of the scutellum. Halteres pale yellow. The anterior dorsocentral bristles are situated almost opposite the first pair of supraalars. Six rows of acrostichal setae are present. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front tibiae lack ciliation. The front basitarsus is about one-half as long as the tibia and has about eight erect, black hairs extended along the dorsal and anterodorsal surfaces. The second tarsal segment has only two or three erect hairs, and the other tarsi have no conspicuous cilia (fig. 59c). *Wings:* The third costal section is 4.4 times longer than the fourth, and the costal fringe extends half the distance between the apices of veins R_{2+3} and R_{4+5}. The brown spot is very conspicuous and occupies the upper wing apex from the apical fourth of cell R_1 through the apex of cell R_3 to slightly below vein R_{4+5}

(fig. 59b). The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Largely subshining brown to black on the dorsum and yellow on the sides of the terga and on the dorsum of the sixth tergum. The genitalia are pale yellow. The ninth tergum is rather strongly narrowed on the dorsal portion and broadened through the median portion; at its widest point it is about equal in length to the anal plates. The ventral margins of the tergum are attenuated and possess a clump of setae at the apex (fig. 59a).

Length: body, 2.3–2.4 mm.; wings, 2.7–2.8 mm.

FEMALE. Unknown.

Holotype male and seven paratype males: Mt. Kaala, Oahu, April, 1952, and April, 1953 (D. E. Hardy). Two male paratypes: Manoa Valley, Oahu, "31.6" (no date or collector given); and August, 1958 (D. E. Hardy).

Type in the B. P. Bishop Museum; paratypes in the United States National Museum, British Museum (Natural History), and the University of Hawaii collections.

Drosophila chaetopeza new species (fig. 60a–c).

This species fits close to *D. fungicola* n. sp. but is readily differentiated by the ciliated front tarsi and ornate mouthparts of the male, by the conspicuous brown spot on the m crossvein, and by the rather densely gray pollinose body. It is separated from *olaae* Grimshaw by having only one row of cilia on the front tarsi (fig. 60b), by the differences in the labella (fig. 60a), and by other details.

MALE. *Head:* About one-third higher than long. The lower hind margin of the eye is rather strongly oblique. The genae are rather broad; in the median portion the measurement from the eye margin to the oral vibrissae is about equal to five rows of eye facets. Front about one-third wider than long, predominantly yellow to orange, with a black band extending down the orbit to the proclinate bristle. The ocellar triangle, the vertex, and upper occiput are black, rather densely gray pollinose. The genae and the lower occiput are yellow; the lower half of the face is brown to black; the upper portion is yellow, tinged lightly with brown. The face is slightly carinate down the median portion. The bristles of each vibrissal row are all equal in size. The palpi and the mouthparts are yellow. Each labellum terminates in a fringe of moderately long spinelike processes (fig. 60a). Each palpus has a moderately strong apical bristle and a strong subapical bristle on the outside surface. The lower reclinate bristle is about three-fourths as long as the proclinate and is situated opposite the latter. *Thorax:* Dark brown to black, tinged lightly with rufous in ground color and rather densely gray pollinose. The scutellum is yellow at the apex, yellow-brown on the disc, and black on the sides. The anterior dorsocentral bristles are situated about opposite the second pair of supraalars. Two strong sternopleural bristles are present. The anterior sternopleural bristle is nearly two-thirds as long as the posterior bristle. Halteres pale yellow. *Legs:* Entirely yellow. Front tibia not ornate. Front tarsi with moderately long anterodorsal ciliation extending over the basal two segments (fig. 60b). The front basitarsus is just slightly more than

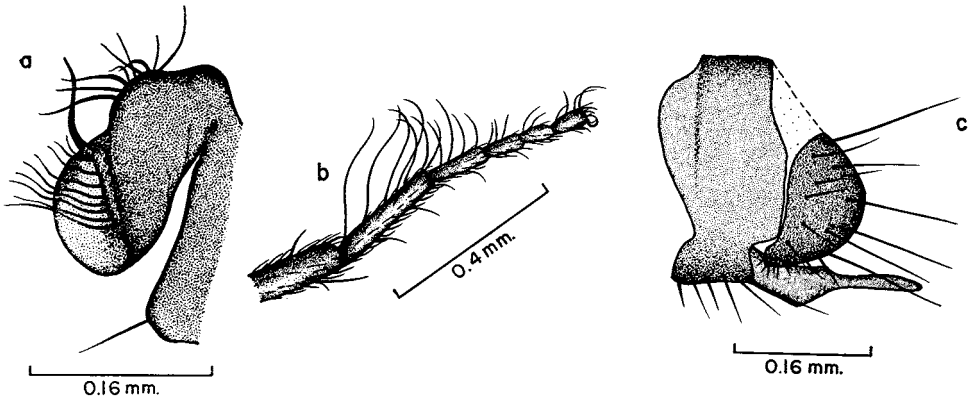


Figure 60—*Drosophila chaetopeza* n. sp.: **a**, labellum; **b**, tarsus; **c**, male genitalia.

one-third as long as the tibia. *Wings:* Pale yellowish fumose, with faint infuscations at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, and with a distinct brown mark extending over the m crossvein. The third costal section is about six times longer than the fourth and the costal fringe ends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about equal in length to the penultimate section. *Abdomen:* First tergum reddish brown, remainder of abdomen completely black in ground color of the dorsum, rather thickly gray pollinose. The sterna are yellow. The anal plates are about one-half higher than long and subacutely pointed ventrally. The ninth tergum is broad, about equal in length to the anal plates, and truncate at apex of each ventral lobe (fig. 60c). The claspers are hidden from a direct lateral view.

Length: body, 3.0 mm.; wings, 3.8 mm.

Holotype male and three male paratypes: from Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the United States National Museum and the University of Hawaii.

Drosophila ciliaticrus new species (fig. 61a–e).

This species belongs in the *hawaiiensis* complex but differs from related species by having long dorsal ciliation on the front tibiae of the male and curved dorsal cilia of the front tarsi (fig. 61b).

MALE. *Head:* The compound eyes are about one-third higher than wide and are rather densely pubescent. The front is just slightly wider than long and is predominantly yellow, tinged lightly with brown on the upper portion. The orbits are yellow-gray; this pale coloration continues all the way around the eye margin. The upper median portion of the occiput and the median portion of the vertex are brown; the ocellar triangle is dark brown to black. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above

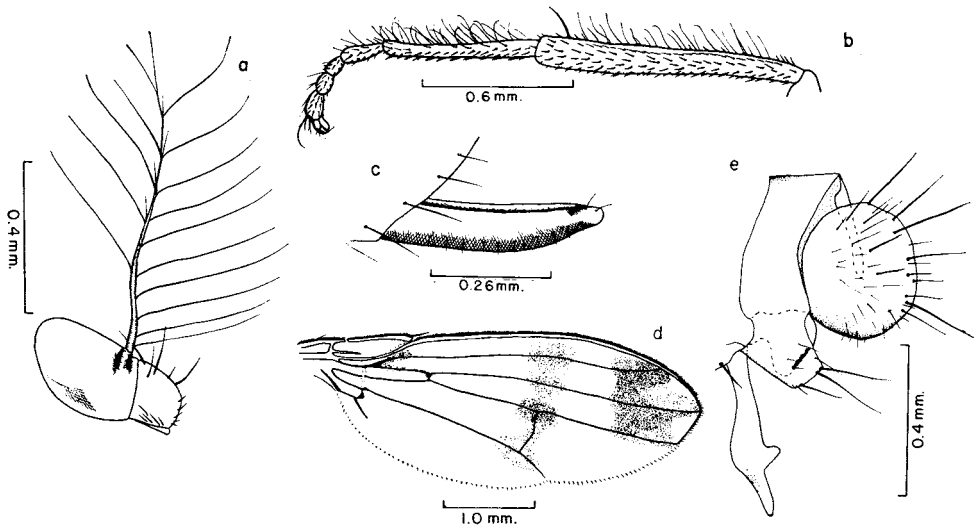


Figure 61—*Drosophila ciliaticrus* n. sp.: **a,** antenna; **b,** front tibia and tarsus; **c,** ovipositor of female; **d,** wing; **e,** male genitalia.

the latter. Two to three moderately strong bristles are present in the upper portion of each vibrissal row. The clypeus is yellow-brown. The mouthparts are yellow tinged lightly with brown at the apices. The palpi are yellow, each with a moderately strong bristle at the apex, and the antennae are yellow-brown. The arista has about nine long dorsal rays and four ventral rays (fig. 61a) in addition to the apical fork; the anterior surface is rather densely haired. *Thorax:* Predominantly yellow-gray pollinose, with four brown vittae extending down the mesonotum; two are submedian and extend from about opposite the hind margins of the humeri to just before the posterior dorsocentral bristles, and two are lateral and extend from the suture to about level with the posterior dorsocentrals. The anterior dorsocentral bristles are opposite the hind pair of supraalars. The scutellum is pale brown in the ground color of the disc, yellow around the margins and on the venter, and rather thickly dusted with gray pollen. The metanotum, sternopleura, lower portions of hypopleura, and at least median portions of mesopleura are yellow-brown in ground color, densely gray pollinose. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. Each sternopleuron has a strong ventral bristle and a vertical row of rather irregularly placed, dark-colored hairs extending from the ventral bristle to the dorsal edge of the sclerite. Halteres clear yellow. *Legs:* Entirely yellow. Front femur with about six bristles on each posterodorsal and posteroventral surface. Front tibiae and tarsi with conspicuous ciliation, as in figure 61b. Front basitarsus about two-thirds as long as the tibia. *Wings:* Predominantly subhyaline, with a narrow transverse brown band extending across the middle of the wing, and with the apical portion predominantly brown as in

figure 61d. A brown spot extends across the apical two-fifths of the second costal section and over the basal parts of cells R_1 and R_3. The r–m crossvein is slightly infuscated. The third costal section is about five times longer than the fourth, and the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is slightly over one-third longer than the penultimate section. *Abdomen:* Brown on the apical halves and the median portions of each tergum; the posterior corners of the terga are broadly yellow-gray. The male genitalia are as in figure 61e.

Length: body, 4.2–4.5 mm.; 4.5–5.0 mm.

FEMALE. Fitting the description of the male except that the front tibiae and tarsi are not ciliated. The ovipositor plates are moderately long, slender, and slightly longer than the seventh segment (fig. 61c).

Holotype male, allotype female, and five paratypes (four males and one female): from Kaiholena Ridge, Hawaii, 2,300 feet, taken sweeping in dense treefern jungle, August, 1952 (D. E. Hardy). Also one paratype male from Olinda, Maui, 4,500 feet, March 15, 1932 (O. Bryant).

Type and allotype in B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila cilifemorata new species (fig. 62a–d).

This species is closely related to *D. stenoptera* n. sp. but is differentiated by having the anteroventral surface of the front femur of the male ciliated, the antennae predominantly black, and the front coxae brown.

MALE. Predominantly shining black species. *Head:* The front, measured from the upper ocellus to the front median margin, is about as long as wide, the upper three-fifths to one-half is velvety black, and the lower portion is bright yellow. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter about two-fifths the distance between the proclinate and the upper reclinate bristle. The occiput is entirely brown, tinged with yellow-red on the lower portion. The face is brown to black, covered with gray-brown pollen; the median portion is very slightly raised. The genae are yellow, tinged lightly with brown just below the eye margin; the lower margin is dark brown to black. Each gena is about equal in width to four or five rows of eye facets. Three moderately strong bristles are present at the upper portion of each vibrissal row. The clypeus is black; the mentum is red, tinged faintly with brown; and the labella are reddish brown, each with a heavy, black ring around the apical margin (fig. 62a). Palpi dark brown, each with a moderately strong apical bristle and numerous setae around the margins. Antennae almost entirely brown, tinged with yellow only at the apices of the first two segments. The second antennal segment has two moderately strong dorsal bristles. The arista has seven dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely shining black in ground color, rather thickly gray to gray-brown pollinose. A small yellow spot is present at the extreme apex of the scutellum. The anterior pair of

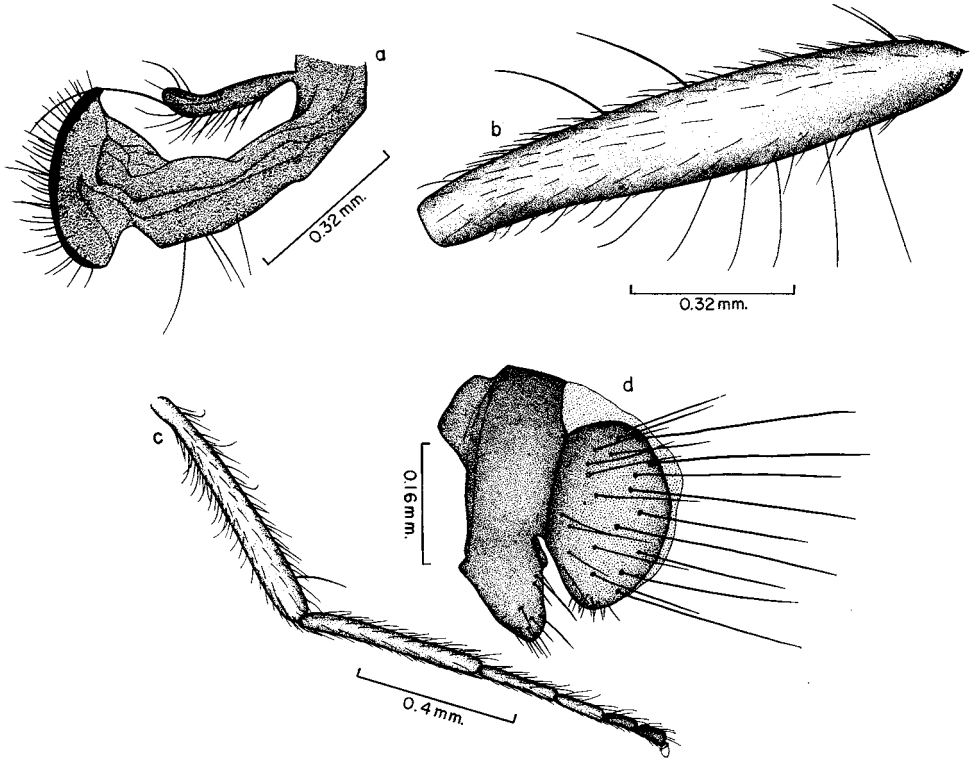


Figure 62—*Drosophila cilifemorata* n. sp.: **a,** labellum; **b,** front femur, anterior view; **c,** front tarsus; **d,** male genitalia.

dorsocentral bristles is situated opposite the first pair of supraalars. A small bristle is present in each dorsocentral row just posterior to the suture; this is about equal in size to the anterior sternopleural bristle. Six to eight rows of acrostichal setae are present. The anterior sternopleural bristle is slightly less than one-third as long as the posterior bristle. The halteres are bright yellow. *Legs:* The coxae are brown, tinged faintly with yellow in the ground color. The front femora and the basal halves of the middle and hind tibiae are yellow, tinged with brown. The middle and hind femora are predominantly black. The legs are otherwise yellow except for the brown to black apical segments of the tarsi. In addition to the row of long anteroventral cilia, the front femur has two moderately strong posterodorsal bristles situated between the apical two fifths and the apical third of the segment, two long posterior hairs situated at the base of the segment, and a row of moderately long posteroventral bristles extending the full length of the segment (fig. 62b). The front tibiae and tarsi are not ornate; the former have short, erect, dorsal hairs but these are inconspicuous. The basitarsus is about two-thirds as long as the tibia (fig. 62c). *Wings:* Moderately long and slender, about 3.75 times longer than wide; very similiar to those of *stenoptera.* The costal fringe

extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about 5.0 to 5.5 times longer than the fourth. Vein R_{4+5} is gently arched so that cell R_5 is slightly narrowed at the apex. The last section of vein M_{1+2} is about 1.34 times longer than the penultimate section. The last section of vein M_{3+4} is approximately equal in length to the m cross-vein. The wings are predominantly subhyaline with two broad, brown marks extending across the wing; one is near the middle portion and one at the apex. *Abdomen:* Shining brownish black, covered with gray-brown pollen. The anal plates are nearly two times higher than long. A clump of short setae is present on the lower surface. The ninth tergum is very slightly attenuated ventrally, has a few short setae around the margin, and broadens considerably near the dorsal margin as seen in direct lateral view (fig. 62d).

Length: body, 4.5–5.0 mm.; wings, 5.0–6.0 mm.

FEMALE. Fitting the description of the male in most respects. The front femora lack the long ciliation on the anteroventral surface, and the labella are not rimmed at the apices. The wings are not so elongate, being about three times longer than wide. The ovipositor blades are rather short and blunt and extend just slightly beyond the anal plates.

Length: body, 4.6 mm.; wings, 5.3 mm.

Holotype male: Puu Kukui, Maui, *circa* 4,000 feet, June, 1953 (D. E. Hardy). Allotype female: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy). Five paratypes (two males, three females): from the following localities—same locality as type, April, 1954, and August, 1958 (M. Tamashiro and D. E. Hardy); Kawela, Molokai, December 14, 1956 (J. W. Beardsley); Puu Kolekole, Molokai, July, 1952 (D. E. Hardy); and Pauahi, Kona Coast, Hawaii, August, 1952 (D. E. Hardy). The latter is a female but seems to fit this species.

Type and allotype in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, and the University of Hawaii.

Drosophila clavata new species (fig. 63a–b).

This species fits in the complex which is characterized by having a large apical projection on the front basitarsus of the male and a strong apicoventral bristle on the front tibia. It is differentiated from related species by having the appendage of the front basitarsus gradually enlarged and pilose along the anterior edge (fig. 63a–b), and by having the costal fringe extending one-half the distance to the apex of vein R_{4+5}. The completely rufous antenna and predominantly rufous mesonotum are also distinctive features. The front is distinctly wider than long and is almost entirely brown, tinged with yellow-red in the ground color along the front margin. The lower reclinate bristle is smaller than the proclinate and is situated slightly above the latter. About three pairs of short, cruciate hairs are situated on the anteromedian portion of the front. The vertex is dark brown to black, and the orbits are tinged with black. The occiput is brown on the upper portion, yellow below. The genae are yellow, except for a

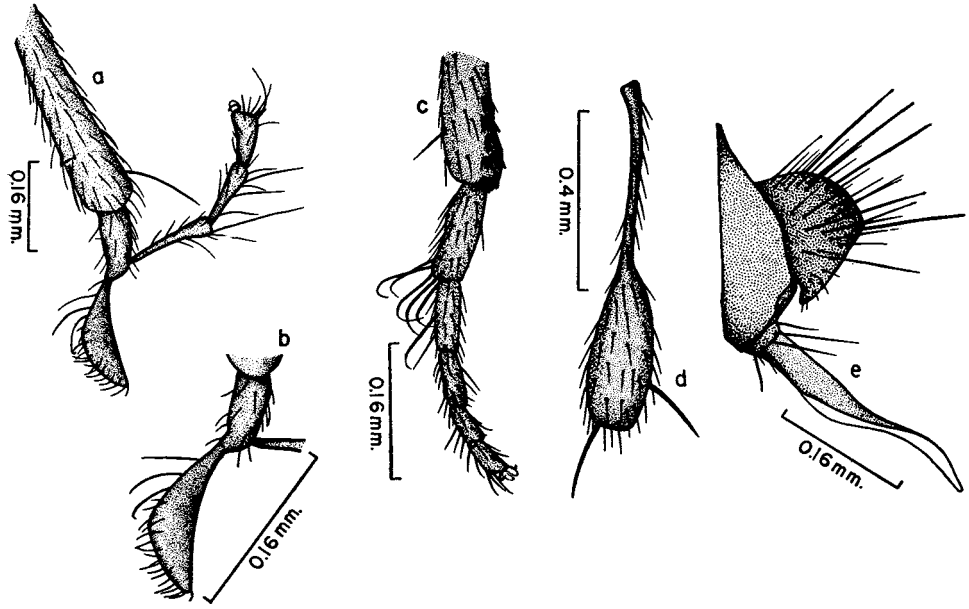


Figure 63—*Drosophila clavata* n. sp.: **a**, front tarsus; **b**, front basitarsus. *D. clavitibia* n. sp.: **c**, front tarsus; **d**, middle tibia; **e**, male genitalia.

thin brown line along the vibrissal row. Measured from the vibrissal row to the eye margin, the gena is scarcely more than two facets wide. The face is yellow, tinged lightly with brown on the lower median portion; a distinct carina extends down the middle. One small, black bristle is present at the upper edge of each vibrissal row. The clypeus is pale brown. The mouthparts, including the palpi, are yellow; the latter have no distinct bristles but have numerous black setae around the margins. The antennae are rufous; the arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow to rufous, tinged faintly with brown on the anterior half of the mesonotum and over the disc of the scutellum. About six rows of acrostichal setae are present. The anterior dorsocentral bristles are well developed, equal or larger than the humeral bristles, and situated slightly in front of a line drawn between the second pair of supraalars. The anterior sternopleura bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. Apicoventral spur of front tibia about two times larger than the preapicodorsal bristle and extending approximately to the base of the second tarsal segment. Front tarsus with only four visible segments. The basal portion of the first segment is rather short, being about half as long as the projected lobe at the apex; the apical projection is gradually enlarged, clavate in shape, and has a row of hairs along the anterodorsal surface as in figure 63b. The remainder of the tarsal segments have several moderately long, erect hairs along the dorsal surface (fig. 63a). *Wings:* Entirely hyaline. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal

section is 3.75 times longer than the fourth and the last section of vein M_{1+2} is 1.7 times longer than the penultimate section. The last section of vein M_{3+4} is 1.65 times longer than the m crossvein. The abdomen is dark brown, tinged faintly with red in the ground color; the surface is slightly covered with gray-brown pollen. The genitalia have not been dissected for study.

Length: body, 2.25 mm.; wings, 2.50 mm.

FEMALE. Unknown.

Holotype male and one male paratype: from Mt. Kaala, Oahu, April, 1949 (G. B. Mainland). One male paratype: from Puu Kolekole, Molokai, July, 1952 (M. Tamashiro).

Type in the B. P. Bishop Museum and paratypes in the United States National Museum and the University of Hawaii collection.

Drosophila clavitibia new species (fig. 63c–e).

This species fits in the complex which is strikingly characterized by the clavate middle tibia (fig. 63d). It is related to *D. fusticula* n. sp. but differs by having the middle tibia more strongly attenuated with the narrowed portion nearly two times longer than the swollen portion, the enlarged portion of the mid-tibia entirely black, and the front tibia and basitarsus black. Also, the ornamentation of the front basitarsus differs as shown in figure 63c.

MALE. Moderately small, predominantly pale-colored species. *Head:* About one-half higher than long and entirely yellow except for a tinge of brown on the upper occiput and on the upper eye orbits. The ocellar triangle is brown. The front is nearly two times wider than long and is predominantly golden yellow. The face is yellow-white and is slightly carinate down the median portion. The palpi are yellow, each with a small bristle at the apex and several black setae around the margin. The labella are not ornate. The lower reclinate bristle is about four-fifths as long as the proclinate and is situated distinctly anterior to the latter. The oral vibrissae consist of 12 or more rows of approximately equal-sized black setae, or bristles. The antennae are yellow; the second segment has two black dorsal bristles plus a number of black setae over the dorsal portion. The arista has five dorsal rays and one ventral ray in addition to the apical fork. *Thorax:* Entirely yellow. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the anterior supraalars. Six to eight rows of acrostichal setae are present. The lower humeral bristle is subequal in length to the upper, and the anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Predominantly pale yellow, conspicuously blackened at the apices of the middle tibiae, and brown on the front tibiae and basitarsi. The front femora are slender; each has about six posterodorsal and five posteroventral bristles. The front tibia is predominantly brown; the dorsal bristle is well developed and extends beyond the apex of the segment. The front basitarsus is about one-third as long as the tibia and has a series of black hook-like dorsal hairs at the apex (fig. 63c). The second tarsal segment is about two-thirds as long as the first and has two curved black dorsal setae. The attenuated portion of the

middle tibia is entirely yellow and is nearly two times longer than the black swollen portion. The tibia has a moderately large, thick preapical dorsal bristle and an apical ventral bristle (fig. 63d). *Wings:* Entirely hyaline, 2.6 times longer than wide. The costal fringe extends almost one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Reddish brown to black on segments two and three. Yellow, tinged faintly with brown, over the remainder of the abdomen. The anal plates are rather sharply pointed ventrally. The ninth tergum is narrowed dorsally and shaped as in figure 63e.

Length: body, 2.5 mm.; wings, 2.7 mm.

FEMALE. Similar to the male in color but the legs are not ornate; the first and the third bristles of the vibrissal row are the strongest, and the black apical bristle of the palpus is much better developed. The anterior reclinate bristle is about opposite or just slightly anterior to the proclinate. The ovipositor extends about two times the length of the anal plates and is rather slender, being about as wide as the second tarsal segment of the hind legs.

The size is the same as for the male.

Holotype male: Manawainui Valley, Molokai, July, 1952 (D. E. Hardy). Allotype female: same locality as type, August, 1953 (D. E. Hardy). Five paratypes (two males and three females): same data as type.

Type and allotype in the B. P. Bishop Museum. The paratypes are being deposited in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila clydonia new species (fig. 64a–f).

This species belongs in the *fuscoamoeba* complex but is readily differentiated from that species by the wing venation and markings as shown in figures 64b and 103c. It is closely related to *D. brevicilia* n. sp. but is separated by the different wing markings as shown in figures 64b and 48a, by the shorter third costal section (only about one-third longer than the fourth section), by the all-brown pleura, by the continuous brown vitta on each side of the mesonotum, and by the long curved dorsal cilia on the front tarsi and the apices of the front tibiae of the male (fig. 64d).

MALE. *Head:* Predominantly yellow; the median portion of the front is sometimes discolored with brown. The antennae and mouthparts are entirely yellow. The second antennal segment has two moderately strong dorsal bristles; the arista has five or six dorsal rays and three ventral rays (fig. 64e) in addition to the apical fork. Each palpus has one moderately strong apical spine plus numerous small black setae over the apical portion. No strong bristles are present in the row of oral vibrissae; all are moderately short and hair-like up to the strong genal bristle. The mouthparts are ornate; each labellum terminates in about four strong, curved spines (fig. 64a). Lower reclinate bristles are moderately developed, about three-fifths to two-thirds as long as the proclinates, and situated just

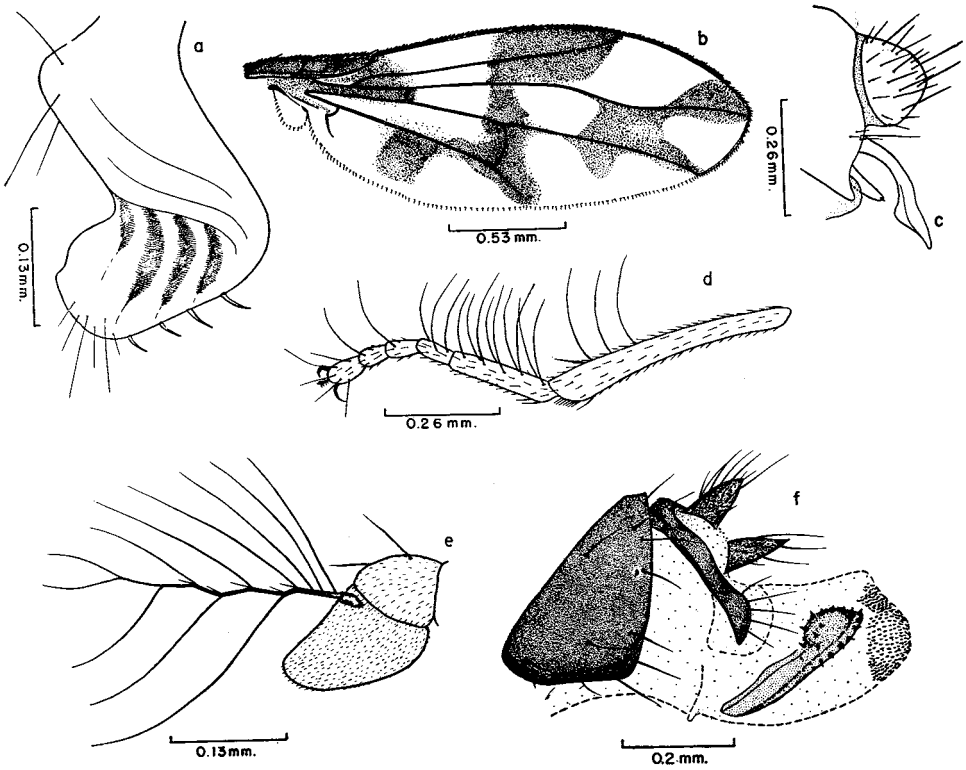


Figure 64—*Drosophila clydonia* n. sp.: **a,** labellum; **b,** wing; **c,** male genitalia; **d,** front tibia and tarsus; **e,** antenna; **f,** female genitalia.

slightly above the latter. *Thorax:* Mostly brown. Mesonotum with a dull yellow vitta down each dorsocentral area. Humeri and propleura yellow; remainder of pleura brown, tinged with yellow. Halteres yellow, knobs tinged with brown. Scutellum entirely brown. The anterior dorsocentral bristles are situated almost in line with the anterior supraalar bristles. *Legs:* Yellow. Front femora each with four rather strong posterior bristles and four to five strong posteroventral bristles. Each front tibia has three long curved anterodorsal cilia on apical third. The front tarsus has long curved dorsal cilia extending the entire length. The basitarsus is slightly less than one-half the length of the tibia (fig. 64d). Preapical dorsal bristles are present on all tibiae. *Wings:* The third costal section is about 1.5 times longer than the fourth, and the costal fringe extends about two-thirds the distance between the tips of veins R_{2+3} and R_{4+5}. Vein R_{4+5} is distinctly undulated. The last section of vein M_{1+2} is 1.5 to 1.7 times longer than the penultimate section, and the last section of M_{3+4} is about equal in length to the m crossvein. The costal cells and the basal portion of the wing (to the r–m crossvein) are deep brown fumose; also a large brown spot is present in the apical half of cell R_1. This extends across the middle of the wing through cell R_3, nar-

rowing through cell R_5, and extending across the m crossvein to the wing apex. Another spot of brown is present in the middle of cell M_4, and still another in the middle of the apical third of cell R_5. This latter extends posteriorly through a portion of cell 2nd M_2, and also along veins M_{1+2} and R_{4+5} (fig. 64b). *Abdomen:* Shining black in ground color, faintly pollinose, and rather densely setose; the basal portion of the abdomen is lightly tinged with yellow in the ground color. The male genitalia are as in figure 64c.

Length: body, 2.5–3.0 mm.; wings, 3.0–3.3 mm.

FEMALE. Fitting the description of the male except that the mouthparts and front legs are not ornate. The ovipositor plates are yellow, moderately developed, and shaped as in figure 64f.

Holotype male, allotype female, and four paratypes (two males and two females): from Haleakala, Maui, 2,000 feet, collector unknown. Also one paratype male: from Makamakaole Valley, Maui, June, 1953 (D. E. Hardy); one paratype female: from Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); and one paratype male: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy); one paratype male: Haleakala, Maui, 2,000 feet (no date or collector).

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila cnecopleura new species (fig. 65a).

This species fits in the complex which is characterized by having a large brown spot in the anteroapical portion of the wing and the dorsum of the thorax entirely dark brown. It is differentiated by the strong dorsal appendage at the apex of the front basitarsus (fig. 65a). Because of the latter characteristic it would fit near *D. enoplotarsus* n. sp.; but the tarsal appendages are very differently developed in the two, and the body coloration differs as pointed out in the description below.

MALE. *Head:* Predominantly pale yellow (including the appendages), tinged with brown on the upper portion of the front, with black on the upper eye orbits, black in the ground color of the ocellar triangle and the posterior edge of the vertex, and brown on the upper one-third to two-fifths of the occiput. The front, measured from the median ocellus to the anterior margin, is nearly two times wider than long. Measured at a level with the lower portion of the eye, the gena, from the vibrissal row to the eye margin, is about equal in width to two rows of eye facets; the area along the vibrissal row is not discolored with brown to black. One moderately small bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the anterior reclinate bristle of the front. The palpi have no distinct bristles, but each has several black setae around the apex. The labella are not ornate. The antennae are entirely pale yellow. The second segment has two or three dorsal bristles. The arista has six dorsal and two ventral rays in addition to the apical fork. The anterior reclinate bristle is al-

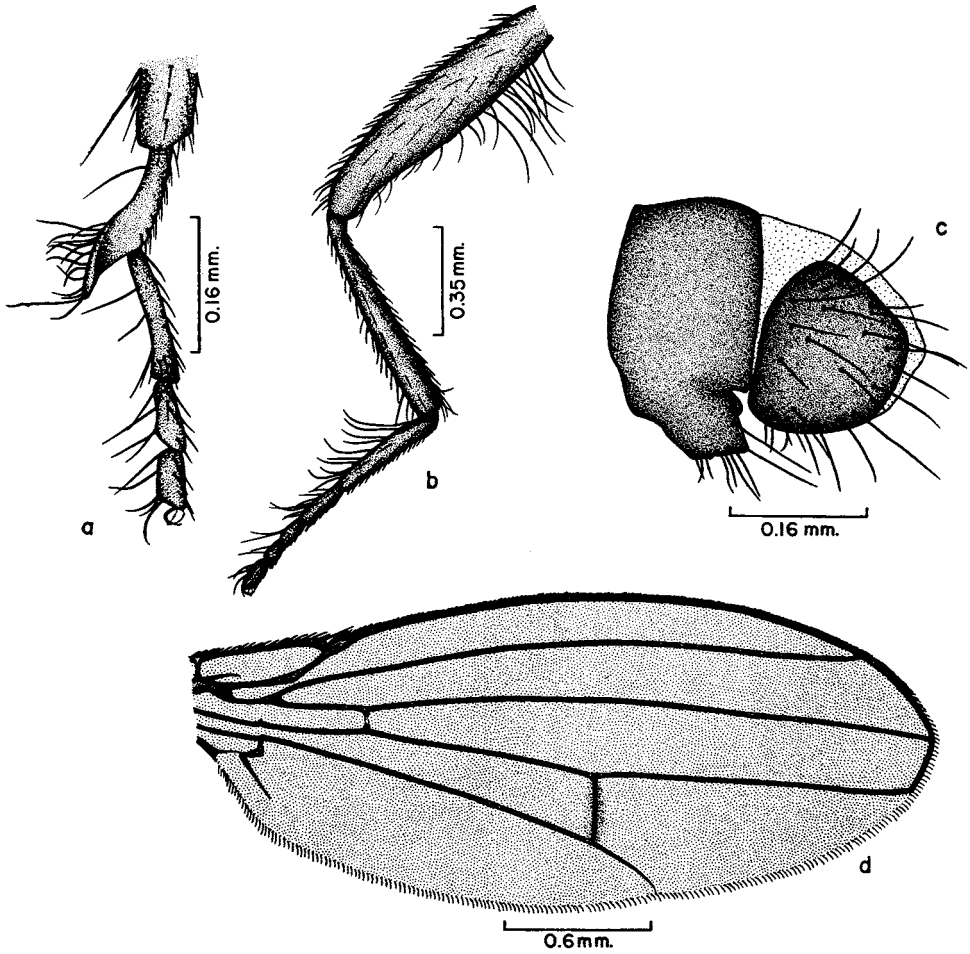


Figure 65—*Drosophila cnecopleura* n. sp.: **a**, front tarsus. *D. comatifemora* n. sp.: **b**, front leg; **c**, male genitalia; **d**, wing.

most as long as the proclinate and is situated just slightly above the latter. *Thorax:* Dark brown on the dorsum, entirely pale yellow on the pleura. The anterior dorsocentral bristles are situated opposite the second (posterior) pair of supraalars. Six rows of acrostichal setae are present. Two well-developed humeral bristles are present. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Entirely pale yellow, lacking ornamentation except for the basitarsus. The front tarsi contain only four segments. The basitarsus is developed into a strong dorsal lobe at the apex; this is rather thickly covered with black setae over the upper surface and is almost equal in length to the basal portion of the segment. The basal portion of the basitarsus has one erect dorsal seta. The second tarsal segment is slender, is approximately one-fourth longer

than the basal portion of the basitarsus, and has two erect dorsal setae (fig. 65a). *Wings:* Hyaline except for a large brown spot covering the anteroapical portion and extending through the apical portions of cells R_1, R_3, and the upper edge of R_5 beyond the m crossvein. The third costal section is about 3.46 times longer than the fourth, and the costal fringe extends scarcely beyond the basal one-fourth of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.65 times longer than the penultimate section. *Abdomen:* Shining brown covered with gray-brown pollen except for the third tergum, which is yellow, rather faintly tinged with brown. The genitalia have not been dissected for study.

Length: body, 2.2 mm.; wings, 2.5 mm.

FEMALE. Unknown.

Holotype male: Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

Type in the B. P. Bishop Museum.

Drosophila comatifemora new species (fig. 65b–d).

This species runs near *D. sharpi* Grimshaw but has no brown spot in the second costal cell, the marking over the m crossvein is very faint, and the front femur of the male has a dense clump of ventral hairs near the base (fig. 65b). It rather closely resembles *D. quasianomalipes* n. sp. but the details of the legs, wings, and genitalia are strikingly different as pointed out in the discussion under that species.

MALE. *Head:* Yellow, except for the red eyes, and for brownish discoloration on the upper portion of the front, vertex, and the upper median occiput. From a lateral view the head is about one-fifth higher than long. The front is about as long as wide. The lower reclinate bristle is about two-thirds to three-fourths as long as the proclinate and is situated slightly above the latter. The face is slightly convex in the median portion. The palpi and mouthparts are yellow except for a thick, brown rim around the apex of each labellum. Each palpus has one short, black, apical bristle plus numerous black setae around the apical portion. One short, black, bristle is present at the upper edge of each vibrissal row. The antennae are yellow, tinged with brown. The second segment has three moderately strong dorsal bristles. The arista has six or seven dorsal rays and three ventral rays in addition to the apical fork. *Thorax:* Yellow, tinged lightly with brown on the sides of the mesonotum, on the upper edge of each mesopleuron, sternopleuron, and pteropleuron. The halteres are pale yellow. The anterior dorsocentral bristles are strong, about equal in size to the second pair of supraalars, and are situated slightly in front of a line drawn between these bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front femora are slender; each has a moderately dense clump of long black, anteroventral hairs on the basal third of the segment (fig. 65b). No long hairs or strong bristles are present on the apical half of the femur. The front tibia is not ornate although the dorsal and posterior surfaces

are rather thickly covered with short, erect hairs. The front tarsus has moderately long erect ciliation down the dorsal surface (fig. 65b). The front basitarsus is about one-half as long as the tibia. *Wings:* Faintly but evenly infuscated with pale yellow, slightly brownish over the m crossvein (fig. 65d). The costa extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about five times longer than the fourth. The last section of vein M_{1+2} is 1.32 times longer than the penultimate section. *Abdomen:* Yellow at the bases of the segments, brown at the apices, with a thin brown marking extending longitudinally through the median portion of each tergum. The venter is entirely yellow, tinged lightly with brown. The ninth tergum is rather broad, its length almost equal to the length of the cerci; the dorsal portion is not narrowed, and the ventral portion is distinctly attenuated to a truncate lobe on each side; this is rather sparsely covered with short black hairs along the margin (fig. 65c). The claspers are completely hidden from direct lateral view.

Length: body, 4.75 mm.; wings, 4.50 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (R. Namba). Allotype female: same data as type (D. E. Hardy). 38 paratypes (20 males, 16 females): predominantly same data as type and allotype. One specimen from Kula Pipeline, Maui, 4,200 feet, July, 1956 (D. E. Hardy); one near Olinda, Maui, 4,500 feet, August 20, 1937 (E. C. Zimmerman); and one same locality as type, 4,500 feet, January 14, 1926 (O. H. Swezey).

The type, allotype, and a series of paratypes are in the B. P. Bishop Museum. Paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila conformis new species (fig. 66a–c).

This species belongs in the *sordidapex* complex and apparently fits closest to *incognita* n. sp. It is differentiated from this and other species in this complex by having only three to four inconspicuous preapical hairs on the anterior surface of the front basitarsus of the male (fig. 66a–b) and also by the sixth tergum of the abdomen being typically black and nearly as long as the fifth.

MALE. *Head:* The front is yellow to rufous, lightly tinged with brown above; the orbits are black to the reclinate bristles. The ocellar triangle, the sides of the vertex, and the upper occiput are black. The lower one-third of the face and the narrow edges of the genae are dark brown to black, the clypeus is brown tinged with yellow, and the head is otherwise yellow. The mouthparts and palpi are yellow, tinged lightly with brown. The latter have a few black setae scattered around the apices but no strong bristles. The mouthparts are not ornate. The two basal segments of the antennae are yellow, except for a brown tinge on the dorsal portions. The third segment is brown, tinged with yellow at its base. The arista has six to seven dorsal and two ventral rays in addition to the apical fork. The upper bristle of each vibrissal row is situated just slightly above the upper edge of the oral margin. *Thorax:* The mesonotum is yellow to rufous on the

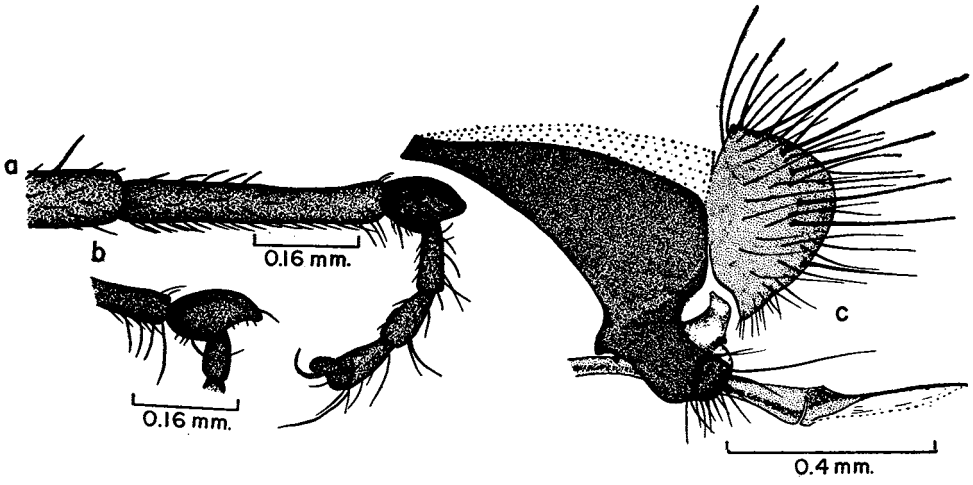


Figure 66—*Drosophila conformis* n. sp.: **a**, front tibia and tarsus; **b**, second tarsal segment; **c**, male genitalia.

anterior and median portions and brown on the sides. The scutellum is yellow-brown above, yellow around the margin. The upper portions of the pleura, except for the propleura, are brown; the sternopleura and hypopleura are yellow. Two moderately strong humeral bristles and two strong sternopleural bristles are present; the anterior sternopleural bristle is almost as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segment of each tarsus; very similar to those of *dasycnemia,* except that the front tibia does not have the posterior surface densely setose and the dorsal bristle is well differentiated (fig. 66a–b). *Wings:* The wing venation and maculation appear to be identical with those of *dasycnemia. Abdomen:* Predominantly black with a yellow anterior spot on the side of each tergum; the front and hind margins of the first three terga are narrowly yellow. The sixth tergum is typically black and is three-fourths as long as the fifth. The anal plates are yellow; the ninth tergum is brown and is very strongly narrowed on the dorsal surface. The ventral margin is shaped as in figure 66c.

Length: body, 2.7–3.0 mm.; wings, 3.3–3.5 mm.

FEMALE. The association of the female with the male has not been positively made, but specimens on hand appear to belong here. They fit the description of the male in all details except for the characteristics of the front legs and for sexual differences. The ovipositor plates are short, triangular, and extend just slightly beyond the tips of the anal plates.

Holotype male and allotype female: from Upper Olaa Forest, Hawaii, July, 1953 (D. E. Hardy). Thirty-five paratypes (26 males and 9 females): from the following localities—same locality and collector as type, July, 1953 and 1958, and August, 1952; Olaa Flume Road, Hawaii, July, 1953 (D. E. Hardy); Keauhou

Ranch, Kilauea, Hawaii, July, 1953 (D. E. Hardy); Napau Crater, Kilauea, Hawaii, July, 1953 (D. E. Hardy); and Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

The type, allotype, and the series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila confutata new species (fig. 67a–c).

A rather nondescript species which does not seem to fit any of the described species known to me, but which apparently has no particularly distinctive features. It is differentiated from other known species in Hawaii by its rufous coloration, the lack of ornamentation on the front legs of the male, by the presence of a pair of moderately developed bristles in front of the usual anterior dorsocentrals, by the genital characters of the male (fig. 67c), and by the rather slender ovipositor of the female (fig. 67b). It is closely related to *mimiconfutata* n. sp. (refer to discussion under that species). This species would fit Grimshaw's description of *D. cognata,* but, as I have pointed out elsewhere, *cognata* fits in the new genus *Antopocerus.* The specimens in the Bridwell collection were in the National Museum under the name "*cognata* Grimshaw."

MALE. *Head:* Predominantly yellow; brown to black on the upper orbits, the vertex, and upper occiput; black on the ocellar triangle. The face is almost flat; just a slight elevation is present in the upper median portion. The anterior reclinate bristle is almost equal in size to the proclinate and is situated slightly above the latter. Two rather large bristles about equal in size to the proclinate bristles are present at the upper edge of each vibrissal row. The palpi and mouthparts are entirely yellow. Each palpus has a black apical bristle and a black preapical bristle on the outside surface. The antennae are yellow, tinged with brown. The arista has six or seven dorsal and usually two ventral rays in addition to the apical fork. The labella are not ornate. *Thorax:* Predominantly yellow to rufous, tinged with brown in the ground color of the hind portion of the mesonotum, over the disc of the scutellum, and on the pleura. A rather well-developed bristle is present in front of the anterior dorsocentrals and situated slightly in front of a line drawn between the first pair of supraalars; this bristle is approximately three times larger than the surrounding setae on the mesonotum. Six rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front legs are devoid of ornamentation except for a few rather prominent dorsal setae at or near the apex of the basitarsus and on the second segment; these are just slightly longer than the other setae on the tarsus (fig. 67a). The front basitarsus is approximately three-fifths as long as the tibia. *Wings:* Subhyaline, faintly infuscated yellow-brown. The third costal section is 5.7 times longer than the fourth, and the costal fringe ends near the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last sec-

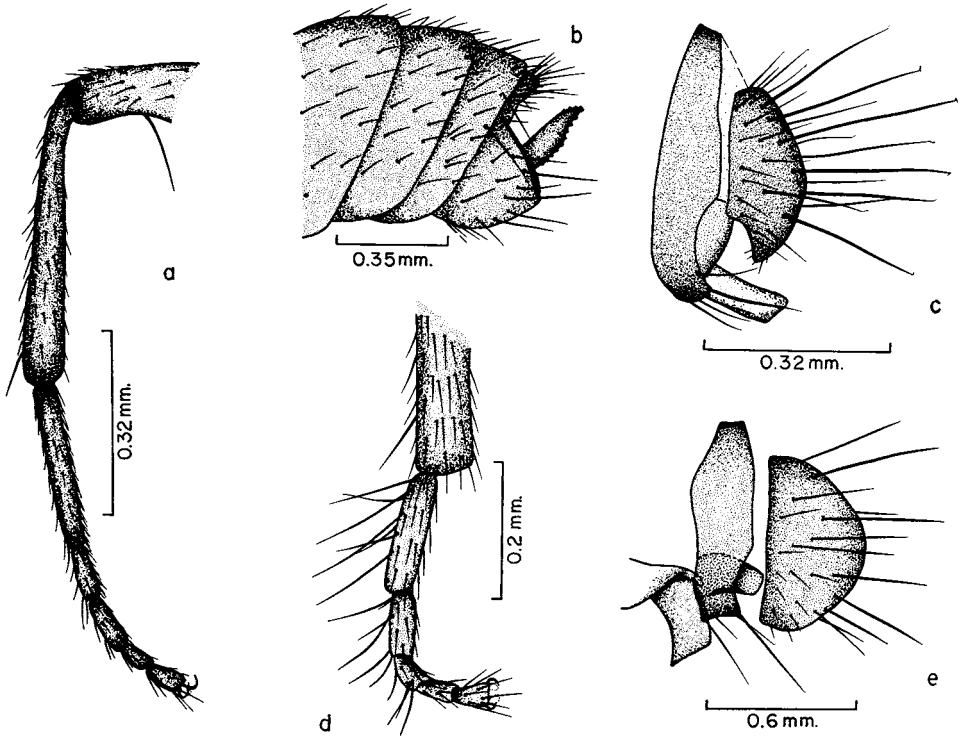


Figure 67—*Drosophila confutata* n. sp.: **a,** front tibia and tarsus; **b,** female genitalia; **c,** male genitalia. *D. conjectura* n. sp.: **d,** front tarsus; **e,** male genitalia.

tion of vein M_{1+2} is 1.2 times longer than the penultimate section. *Abdomen:* Predominantly brown, tinged with rufous in the ground color and yellow over the base of the first tergum and the apex of the fifth. The anal plates are three times higher than long and tapered ventrally. The ninth tergum is almost straight-sided but greatly narrowed ventrally. The claspers are plainly visible from a lateral view (fig. 67c).

Length: body, 3.2–3.5 mm.; wings, 3.6–3.9 mm.

FEMALE. The specimens at hand fit the description of the male except for sexual characters. The rays on the arista vary from four to six on the dorsal portion in the specimens at hand. The apical bristle on the palpus is stronger than in the male. The ovipositor blades are slender and rather sharp-pointed; the ventral margin is serrated (fig. 67b).

Length: body, 3.0–3.6 mm.; wings, 3.2–3.9 mm.

Holotype male, allotype female and 18 paratypes (17 females and 1 male): labeled "Oahu, Hawaii, Bridwell collection" (no specific locality or date given); one female labeled Punaluu, Oahu, Koolau Mountains, June, 1916 (J. C. Bridwell) (it is probable that the series labeled "Oahu" was collected at this locality);

also, one female, Waipio, Oahu, February 14, 1953 (C. P. Hoyt) and one male, Waiahole, Oahu, August 13, 1916 (O. H. Swezey).

The type and some of the paratypes are in the B. P. Bishop Museum. The allotype and most of the paratypes are being returned to the United States National Museum. Paratype specimens are being deposited in the British Museum (Natural History) and the University of Hawaii collections.

Drosophila conjectura new species (fig. 67d–e).

This species fits near *D. badia* n. sp. but differs in lacking ventral ciliation on the front basitarsus and erect setae on the posterior surface of the front tarsus as well as in other details. Some specimens of *hirtitarsus* may possibly have the wings entirely hyaline and will fit near *conjectura*. The mouthparts of the two, however, are very differently developed, and *conjectura* has the pleura yellow.

MALE. *Head:* One-half higher than long as seen in direct lateral view. The front measured from the median ocellus to the anterior margin is two times wider than long, is yellow, tinged with brown on the upper portion, and tinged with black in the ground color of the upper eye orbits; the upper two-thirds of the front is covered with a silvery gray sheen. The ocellar triangle is dark brown, tinged with black. The upper one-third of the occiput is brown, faintly tinged with black. The lower portion is pale yellow. The genae are yellow. The face is yellow on the upper portion, tinged with brown on the lower two-thirds. The upper median portion of the face is convex. The clypeus is yellow, faintly tinged with brown. The palpi and mouthparts are yellow. Each palpus has a rather small apical bristle, about equal in size to the uppermost vibrissals. The outside surface of each palpus is densely black setose. The labella are fringed with curved yellow spines. The vibrissal setae are rather small; counting from the upper edge the first five vibrissae are about equal in size to the acrostichal setae on the mesonotum; setae seven and eight are conspicuously larger than the others, approximately equal in size to the genal bristles. The anterior reclinate bristle is two-thirds to three-fourths as long as the proclinate and is situated approximately opposite the latter. The first two antennal segments are yellow except for the brown dorsal portion of the second. The second segment has two dorsal bristles. The third segment is brown, tinged faintly with yellow. The arista has six dorsal and two or three ventral rays in addition to the apical fork. *Thorax:* Brownish red on the dorsum, yellow on the pleura. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the second (posterior) pair of supraalars. Six to eight rows of acrostichal setae are present. Two or more large setae are present, in line with the dorsocentrals, and between the suture and anterior dorsocentral bristle. Two well-developed humeral bristles are present. The anterior sternopleural bristle is approximately two-thirds as long as the posterior bristle; the intermediate seta is very tiny. The halteres are yellow. *Legs:* Entirely yellow. The front femur has three or four posterodorsal bristles and about five posteroventral bristles. The tibia lacks long ciliation, but the posterior surface is densely covered with suberect setae. The apical ventral bristle is about

equal in size to the preapical dorsal bristle. The front basitarsus is approximately one-third as long as the tibia and has two irregular rows of long, dorsal cilia extending the entire length of the segment (fig. 67d); dorsal cilia are also present on segments two and four. *Wings:* Subhyaline, very faintly infuscated, with a distinct infuscation of brown over the m crossvein. The third costal section is five times longer than the fourth, and the costal fringe extends about halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Dark brown to black, tinged with rufous on the basal segments. The anal plates are two times higher than long and are rather blunt ventrally. The ninth tergum is comparatively narrow, scarcely over half as long as the anal plate, and is slightly narrowed dorsally, almost straight-sided. The ventral lobe is truncate (fig. 67e). The claspers are only partially visible from a direct lateral view.

Length: body, 2.3–2.5 mm.; wings, 2.6–2.8 mm.

FEMALE. Unknown.

Holotype male: Manawainui Valley, Molokai, 1952 (D. E. Hardy). Two paratype males: one same data as type; and one Puu Kolekole, Molokai, July, 1952 (M. Tamashiro).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila conspicua Grimshaw (fig. 68a–d).

Drosophila conspicua Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :59.

Endemic. Hawaii (type locality: Olaa).

Type in the British Museum (Natural History). I have studied the type and a series of specimens from various localities on Hawaii. The male has not previously been recorded.

This is a large, well-defined species fitting in the complex which is characterized by having an elongate brown marking along vein R_{2+3}, a brown mark on vein R_{4+5} opposite the m crossvein, and, in addition, brown spots at the apices of the veins and over the crossveins (fig. 68b). It is differentiated from related species by the predominantly yellow thorax, the four brown vittae down the mesonotum, and the long dorsal ciliation on the apical third of each front tibia as in figure 68a.

The front is about as wide as long, yellow, and tinged with brown on the upper portion. The lower reclinate bristles are situated about halfway between the lower ocellus and the anterior median margin of the front. The lower reclinate bristle is about one-half as long as the proclinate and is situated above the latter. The antennae are brown, tinged with yellow; the arista has 11 to 13 long, dorsal rays and about 4 ventral rays, in addition to the apical fork. The face has one strong bristle at each lower angle. The palpi are pale yellow, long and slender, and each has one small bristle at its apex. The mouthparts are rather elongate; the labellum is hairy but has no bristles or teeth developed around the margin. The thorax is predominantly yellow. The mesonotum has a pair of submedian

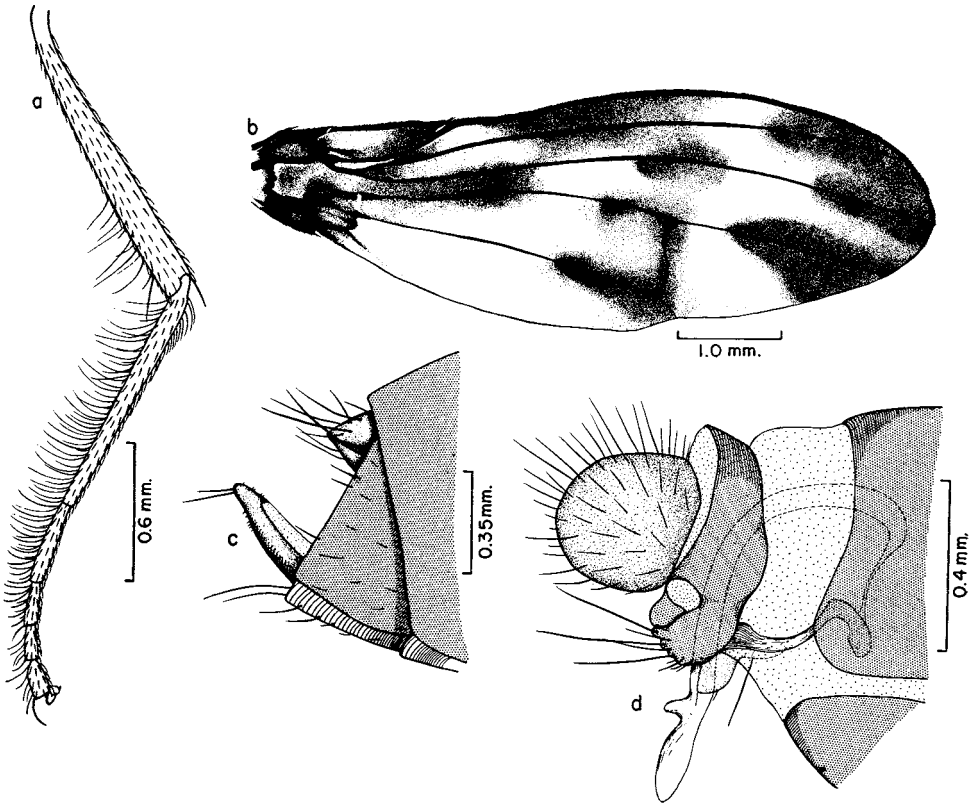


Figure 68—*Drosophila conspicua* Grimshaw: **a,** front tibia and tarsus; **b,** wing; **c,** female genitalia; **d,** male genitalia.

brown vittae extending the entire length and another brown vitta on each side extending over the humerus to the inner postalar bristle. The disc of the scutellum is dark brown; the sides are yellow. The anterior dorsocentrals are situated opposite the second pair of supraalar bristles. The pleura are entirely yellow except for a small brown spot on the upper portion of each pteropleuron and a brown spot between the sternopleural bristles; sometimes a faint brown discoloration is present in the middle of the mesopleuron. The legs are yellow except for the hind tibiae and basitarsi, which are predominantly brown. The front tibia has dorsal ciliation on the apical third, and the tarsus has abundant long dorsal ciliation over the entire length (fig. 68a). The front basitarsus is long and slender, about two-thirds as long as the tibia. The second tarsal segment is about one-third as long as the basitarsus. The wing markings are as in figure 68b. The third costal section is five times longer than the fourth, and the costal fringe extends about half the distance between the tips of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated near the basal two-fifths of cell first M_2 and the last section of vein M_{1+2} is about one-half longer than the penultimate section. The ultimate

section of vein M_{3+4} is short, about one-half as long as the m crossvein. The abdomen is dark brown to black; the posterior corners of the segments are yellow. The male genitalia are as in figure 68d. The posteroventral aspects of the ninth tergum are curved upward and pointed. The female ovipositor is rather elongate and slender, is about equal in length to the ventral margin of the seventh abdominal segment, and bears a pair of preapical dorsal bristles (fig. 68c).

Length: body, 5.5–6.0 mm.; wings, 6.5–7.0 mm. Grimshaw, in the original description, measured the body as 5 mm. and the wings as 6 mm.

Drosophila contorta new species (fig. 69a–b).

This species fits near *D. dasycnemia* n. sp. because of the densely bristled front tibiae of the male and the flattened, spoon-shaped second tarsal segment. It differs by being almost entirely yellow, by having the front basitarsus very short and with a clump of black posterior bristles near the base (fig. 69b); and also by the very different shape of the head, with the face receding and not visible in lateral view (fig. 69a).

MALE. *Head:* The lower two-thirds of the front is yellow; the upper portion is brown. The upper orbits, the ocellar triangle, the vertex, and the upper occiput are brown tinged with black. The median portion of the occiput is brown, the lower one-third pale yellow. The genae, face, clypeus, palpi, and mouthparts are yellow. The face is almost flat; the upper median portion is just slightly raised. Each palpus has a few inconspicuous, short setae around the apex, but no distinct bristles. No bristles are present in the vibrissal row; the vibrissae are represented by fine inconspicuous setae. The labella are not ornate. The anterior reclinate bristle is distinctly longer than the proclinate and is situated just slightly above the latter. The antennae are entirely yellow. The second segment has about four short bristles on the dorsal surface. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely yellow, very faintly tinged with brown on the mesonotum. The anterior dorsocentral bristles are tiny, scarcely two times larger than the surrounding setae, and approximately one-fourth as long as the posterior dorsocentrals. The anterior bristles are situated opposite the second (posterior) pair of supraalars. About eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is equal in size to the posterior. *Legs:* Entirely pale yellow. The front coxae are devoid of bristles except for a row at the apices. Posteroventral and posterodorsal bristles are moderately developed on the front femora. Each front tibia has the posterior surface densely bristled, these bristles equal to, or slightly longer than, the apicodorsal bristle. The front tarsi are contorted; the basitarsus is curved, about one-fourth to one-fifth as long as the tibia, and has a strong clump of posterior bristles near the base (fig. 69b). The second tarsal segment is short, flat, and concave on the inner surface. *Wings:* Almost hyaline, faintly infuscated yellow-brown. The third costal section is four times longer than the fourth, and the costal fringe extends almost half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penul-

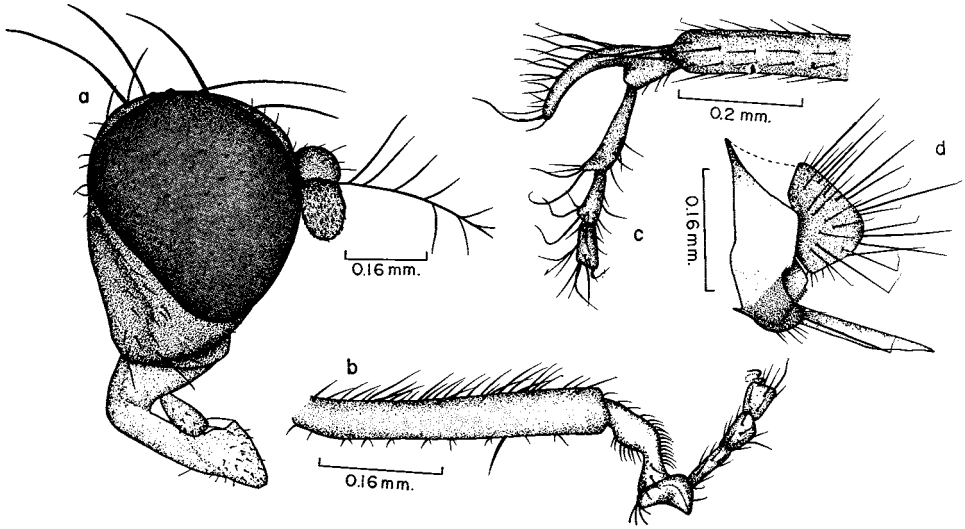


Figure 69—*Drosophila contorta* n. sp.: **a**, head; **b**, front tibia and tarsus. *D. cracens* n. sp.: **c**, front tarsus; **d**, male genitalia.

timate section. *Abdomen:* Reddish brown on the dorsum, yellow on the sides and on the venter. The genitalia have not been dissected for study.

Length: body, 2.15 mm.; wings, 2.50 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila cracens new species (fig. 69c–d).

This species fits near *D. proceriseta* n. sp. from Molokai but differs by having a row of rather strong posterior setae at the apex of each front tibia, by having the pleura nearly brown, and terga five and six almost all yellow. The species also superficially resembles *basisetosa* n. sp. but differs by having large anterior reclinate bristles on the front; the anterior portion of the mesonotum is not long-haired; the basal portion of the front basitarsus is bare, not setose; and by other details brought out in the description below.

MALE. *Head:* Nearly two times higher than long as seen in direct lateral view. The eyes are distinctly short pilose and rather strongly oblique on the posteroventral margin, so, when measured on the ventral margin, the length is approximately half the length of the eye measured at a level with the bases of the antennae. The front, measured from the median ocellus to the anterior margin, is nearly two times wider than long; it is yellow, tinged with brown on the upper portion, and black on the eye orbits above the proclinate bristles. The ocellar triangle, vertex, and upper occiput are black covered with gray pollen. The occiput is predominantly brown covered with gray pollen, yellow only on the

extreme lower portion and along the eye margins. The genae are yellow except for a brown to black line along each vibrissal row. The face is yellow except for a tinge of brown along the lower portion. The base is slightly convex medianly. The clypeus is brown. The palpi and mouthparts are yellow. No bristles are present at the apex of the palpus. The labella are not ornate. One rather small bristle is present at the upper edge of each vibrissal row, this about equal in length to the acrostichal setae. The sides of the face are rather strongly converged on the lower portion; at the epistoma the face is about half as wide as just below the antennae. The anterior reclinate bristle is five or six times longer than the proclinate and is situated slightly above the latter. The first two segments of the antenna are yellow except for a tinge of brown on the dorsal surface. The second segment has three or four short dorsal bristles. The third segment is yellow-brown. The arista has five or six dorsal and two ventral rays in addition to the small apical fork. *Thorax:* Entirely dark reddish brown, tinged with black in the ground color of the dorsum and rather densely covered with gray pollen. The anterior dorsocentral bristles are small, about one-third as long as the posterior bristles, and situated distinctly behind the second (posterior) supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is subequal to the posterior bristle. *Legs:* The front coxae and the basal two-thirds of the front femora are brown covered with gray pollen. The legs are otherwise yellow except for a tinge of brown on the apices of the tarsi. The front legs lack ornamentation except for the strong, slender, and curved development at the apex of the front basitarsus. This process is two times longer than the basal portion of the segment and covered with rather strong, black setae over the dorsal surface (fig. 69c). The front tibia has a row of three or four moderately long, black posteroapical hairs, approximately equal in length to the second tarsal segment. The second segment is rather long and slender, equal in length to the projection on the first, and distinctly pointed on the dorsoapical portion. *Wings:* Entirely hyaline. The third costal section is 3.8 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* The first tergum is yellow-brown. The second tergum is entirely dark brown except for a very narrow line of yellow along the posterior margin and a yellow spot at the anterior median margin. Terga three and four are brown dorsally and yellow on the sides; terga five and six are entirely yellow except for a brown mark extending down the median portion. The sternum is yellow. The anal plates are nearly two times higher than long and are subacutely pointed ventrally. The ninth tergum is narrowed across the dorsal portion, convex on the posterior median margin, and lobate ventrally (fig. 69d). The claspers are plainly visible from a direct lateral view; the teeth are well developed.

Length: body, 2.85 mm.; wings, 3.20 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The anterior reclinate bristles are not enlarged. The ovipositor

plates are rather slender, sharp-pointed, and extend well beyond the apices of the anal plates.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Allotype female: Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley). Twelve paratypes (all males): from the following localities—same data as type (D. E. Hardy and C. R. Joyce); Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley); and Olinda, Maui, May 13, 1926 (O. H. Swezey).

Type and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila crassifemur Grimshaw (fig. 70a–c).

Drosophila crassifemur Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :66.

Endemic. Maui (type locality: Haleakala, 5,000 feet), Molokai, Hawaii, Oahu, and Kauai.

Type in the British Museum (Natural History). I have examined the type and have designated homeotypes.

This species is related to *D. nasalis* Grimshaw but is readily differentiated by having the front femora of the male strongly swollen and rufous on the ventral surfaces and also by the very differently developed genitalia of both sexes as shown in figure 70b, c.

Predominantly brown species. The mesonotum has six, longitudinal, yellow-gray vittae; the lateral vittae are not complete. The front is brown except for the anterior margin, which is yellow; in some specimens the orbits are yellow discolored with brown. The area surrounding the ocellar triangle is gray pollinose. The lower reclinate bristles are almost as large as the proclinates and are situated opposite the latter. The face is yellow, tinged slightly with brown on the sides, and a strong keel is developed down the median portion. One large bristle is present at the upper margin of each vibrissal row; a smaller secondary bristle is also present. No strong bristles are present on the palpi. The labella are not ornate. About eight rows of acrostichal setae are present, and the anterior pair of dorsocentrals is situated opposite the first pair of supraalars. The scutellum is predominantly brown, the apex yellow. The humeri are yellow; two humeral bristles are present. The lower bristle is about two-fifths as long as the upper. The pleura are brown, with a longitudinal streak of yellow extending through the median area at a level with the lower portion of the mesopleuron; also, the ventral portion of the sternopleuron is tinged with yellow. The two basal antennal segments are yellow, tinged lightly with brown on the upper portion; the dorsal surface of the second segment has two moderately large, and three small, black bristles. The third antennal segment is brown with a yellow tinge at the base. The arista has five or six dorsal and one or two ventral rays in addition to the apical fork. The middle and hind tibiae each have two distinct brown bands, one at about the apical third of segment and one preapical; the front tibia has

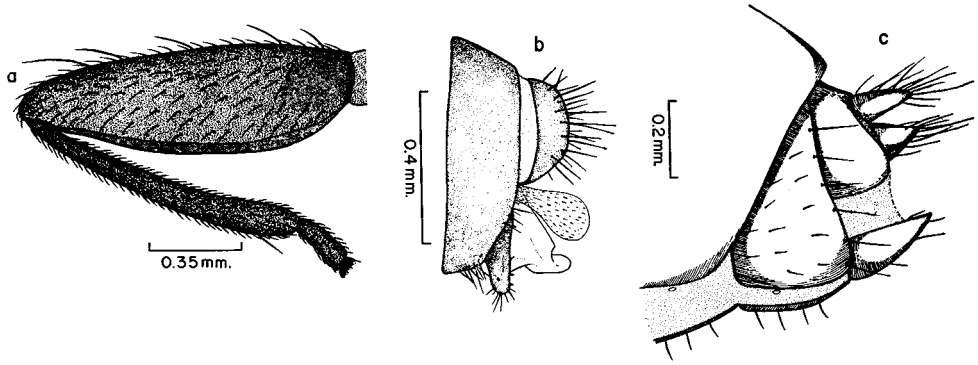


Figure 70—*Drosophila crassifemur* Grimshaw: **a,** front leg; **b,** male genitalia; **c,** female genitalia.

indistinct brown bands. The front coxae are yellow, tinged lightly with brown. The front femora are rather strongly swollen, slightly less than three times longer than wide, predominantly dark brown to black, and rufous on the venter. The ventral surface is densely covered with yellow-gray pubescence. The anteroventral portion of the front femur is devoid of setae, slightly depressed, and densely covered with microscopic yellow-gray pubescence (fig. 70a). The front tibiae and tarsi lack long ciliation; the tibia is 3.3 times longer than the basitarsus. The wings are faintly, but evenly, tinged with pale brown; no distinct dark markings are present. The costal fringe extends about two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.2 times longer than the fourth. The last section of vein M_{1+2} is 1.33 times longer than the m crossvein. The abdomen is dark brown to black, the first tergum is usually yellow to rufous, tinged with brown, and the apices of terga two to five are narrowly margined with a band of yellow-gray pollen. The anterior margins of the terga are sometimes yellow, tinged with brown. The anal plates of the male are two or more times higher than long and are pointed on their ventral margins. The ninth tergum is broader than the anal plates, is not narrowed dorsally, and the ventral margins are slightly attenuated and have only scattered short setae. A large semimembranous lobe is present on each side of the ninth tergum at about the lower third of the posterior margin (fig. 70b). The claspers are plainly visible in lateral view; each has the inner surface lined with short, black teeth, especially before the apex. The male aedeagus is greatly enlarged apically, protruberant, and usually plainly visible *in situ*. The seventh sternum of the female is small. The ovipositor plates are narrow, triangular, and subacute at apices (fig. 70c).

Length: body, 3.5–4.5 mm.; wings, 3.8–4.6 mm.

This species is rather common on the ground cover in the wet rain forests at an elevation of around 4,000 feet.

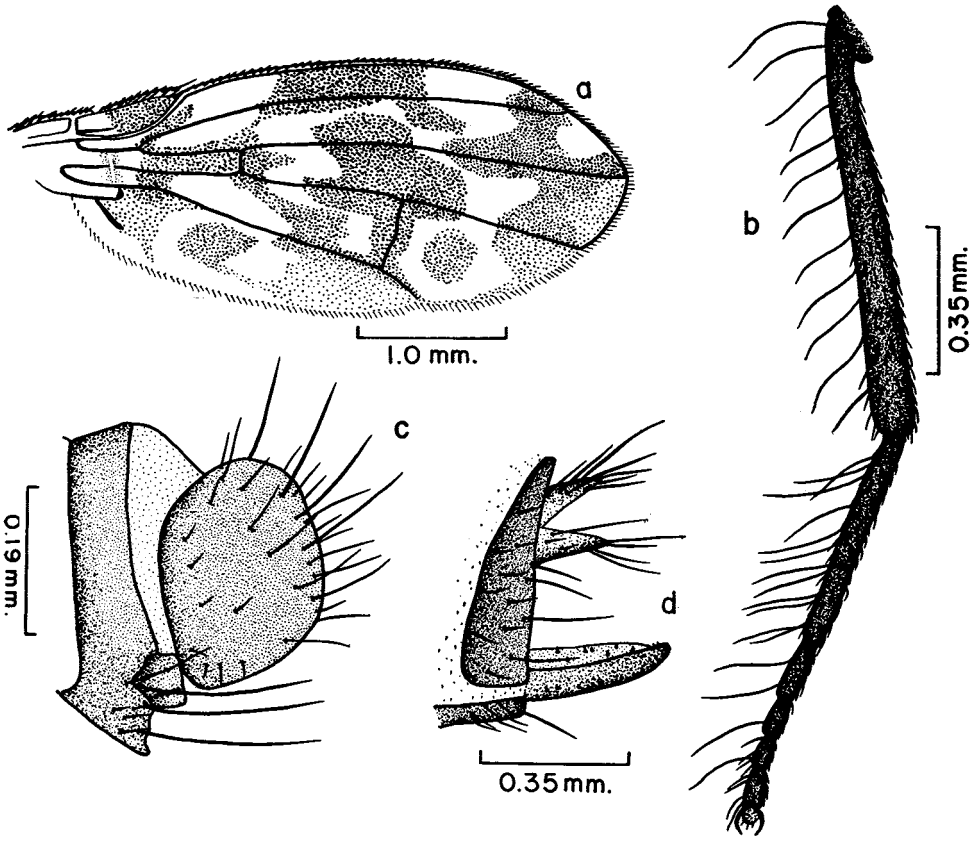


Figure 71—*Drosophila crucigera* Grimshaw: **a,** wing; **b,** front tibia and tarsus; **c,** male genitalia; **d,** female genitalia.

Drosophila crucigera Grimshaw (fig. 71a–d).

Drosophila crucigera Grimshaw, 1902, Fauna Hawaiiensis 3 (2) :86.

Endemic. Oahu (type locality: "Waialua Mts."). This species is rather common in both the Koolau and the Waianae mountains; it is commonly attracted to banana baits. One specimen is on hand from Wainiha Valley, Kauai, August, 1953 (D. E. Hardy) ; this is a new island record.

Type in the British Museum (Natural History). I have studied the type.

This species is readily differentiated from other Hawaiian *Drosophila* by the distinctive wing markings, as shown in figure 71a, in combination with the broad brown vitta down the median portion of the mesonotum and the brown spots on the sides. The front is brown on the median portion, yellow on the sides; the face, genae, and lower occiput are clear yellow. The anterior reclinate bristle is well developed, about three-fourths as long as the proclinate bristle, and situated distinctly above the latter. The first two antennal segments are yellow, the third

is dark brown to black; the second segment has four short, but thick, bristles on the dorsal surface. The arista has about nine dorsal rays and four ventral rays in addition to the apical fork. One very strong bristle is present in each vibrissal row. The palpi are dark brown to black and each has a moderately strong apical bristle. The median vitta on the mesonotum is just slightly wider than four rows of acrostichals over most of its length, and on the hind portion, it expands to cover the area between the dorsocentrals. A black spot is present immediately behind each humerus, a dark brown to black spot is present on the suture, another smaller brown spot is present just above each notopleuron, and a large brown spot is present on each hind corner of the mesonotum behind the supraalar bristles. The anterior median portion of the scutellum is brown, the remainder is clear yellow. The median portion of the metanotum is brown, the sides are yellow. The pleura are principally yellow with brown markings across the mesopleura, the upper portion of the pteropleura, the metapleura, and the sternopleura. The anterior sternopleural bristle is two-thirds to three-fourths as long as the posterior bristle. The legs are yellow; the coxae, femora (especially on the basal portions), and the apices of the tibiae are discolored with brown. Each front femur has about 8 strong posterodorsal bristles and about 10 strong posteroventral bristles extending almost the full length of the segment. The front tibiae and tarsi have numerous long erect cilia extending down the dorsal surfaces (fig. 71b). Wings with irregular markings as in figure 71a. The characteristic feature is the zigzag arrangement of the hyaline areas across the wing, with a large isolated brown spot present in the middle of cell 2nd M_2. Abdomen dark brown to black with a large yellow spot on each side of each tergum. The genitalia of both sexes are as in figure 71c, d.

This species is quite variable in size. The body and wings range from about 3.10 mm. to 4.75 mm.

Drosophila curticilia new species (fig. 72a–c).

This species fits in the complex which is characterized by having the thorax predominantly brown, the wings hyaline, and the front tarsi of the male with dorsal ciliation. It is differentiated from other species in this complex by having the cilia of the front tarsus comparatively short, with the curved hairs confined to segments two to four, and with only two short, preapical dorsal hairs on the basitarsus; and also by having the anterior dorsocentral bristle situated opposite the second pair of supraalars.

MALE. *Head:* The lower half of the front is yellow; the upper portion, between the ocellar triangle and the eye orbits, is brown. The orbits are tinged with black, covered with gray pollen to the proclinate bristles. The ocellar triangle, the vertex, and the upper edge of the occiput are black covered with gray pollen. The median portion of the occiput is brown, the lower one-third is yellow. The genae, face, palpi, and mouthparts are pale yellow. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated about opposite the latter. No strong bristles are present in the vibrissal row; the

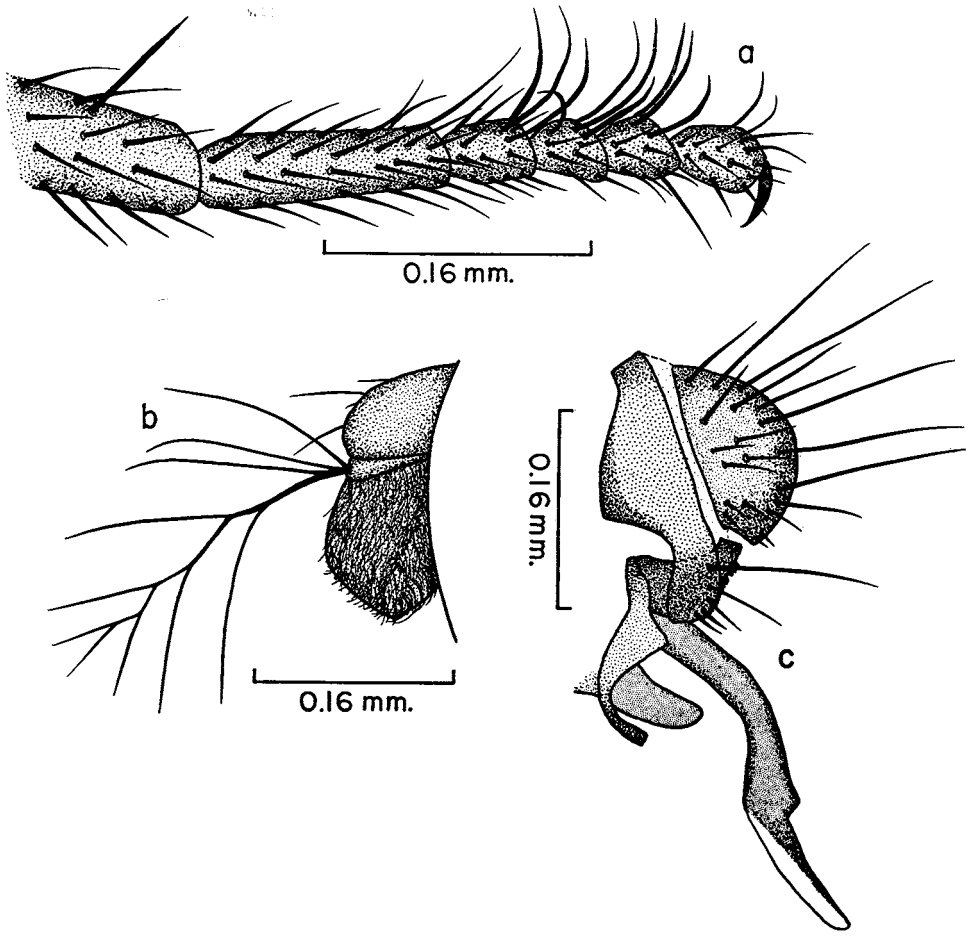


Figure 72—*Drosophila curticilia* n. sp.: **a,** front tarsus; **b,** antenna; **c,** male genitalia.

vibrissae are represented by fine, brown hairs. Each palpus has a moderately strong black bristle at the apex. Each labellum is fringed with yellow bristles on the margin. The face is slightly raised in the upper median portion. The antennae are yellow and are tinged with brown on the dorsum of the second segment and over the apical four-fifths of the third. The arista has five dorsal and three ventral rays in addition to the small apical fork (fig. 72b). *Thorax:* Predominantly brown, lightly gray-brown pollinose; the lower half of each humerus, the propleura, the sternopleura, and the hypopleura is yellow. The mesopleura, the upper portion of the pteropleura, and the metapleura are brown, tinged faintly with yellow. The anterior dorsocentral bristles are situated opposite the second (posterior) pair of supraalars. An enlarged seta is present in each dorsocentral row approximately opposite the lateral margins of

the suture; this is approximately two times larger than the surrounding setae. Six rows of acrostichal setae are present. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The segments lack distinct ornamentation except on the front tarsi. The front basitarsus lacks long ciliation, but has two erect preapical dorsal hairs which are about equal in length to the width of the segment. The second, third, and fourth tarsal segments have several curved dorsal cilia; their length is about two times greater than the width of the segment (fig. 72a). The front basitarsus is about one-third as long as the tibia and approximately three times longer than the second tarsal segment. *Wings:* Almost hyaline. The third costal section is four times longer than the fourth, and the costal fringe ends near the basal two-fifths of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.75 times longer than the penultimate section. *Abdomen:* The terga are dark brown covered with gray-brown pollen. The sterna are yellow. The anal plates are about two times higher than long. The ninth tergum is narrowed over the dorsal portion and is distinctly convex on the hind median margin. The ventral lobes are as in figure 72c. The claspers are distinctly visible from a lateral view.

Length: body, 1.85 mm.; wings, 2.00 mm.

FEMALE. Unknown.

Holotype male and two male paratypes: from Makamakaole Valley, Maui, June, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum. One paratype each in the United States National Museum and the University of Hawaii collections.

Drosophila curvitibia new species (fig. 73a–d).

This species fits in the complex which is characterized by having only one well-developed humeral bristle; it fits near *D. scolostoma* n. sp. but the two are obviously not related. *D. curvitibia* is readily differentiated by having the thorax almost entirely dark brown with only the lateral margins yellow, by having the anterior dorsocentral bristle tiny and poorly developed, by the details of the legs (fig. 73a–b), and by other characteristics.

MALE. *Head:* The lower portion of the front is yellow, tinged with brown. The upper portion is brown between the eye orbits and the ocellar triangle. The orbits to the proclinate bristles, the ocellar triangle, the vertex, and the upper occiput are brownish black covered with gray pollen. The occiput along the hind margin of the eyes is tinged with brown and covered with gray pollen. The remainder of the occiput is yellow. The face and genae are yellow; the former is slightly raised in the upper median portion. The clypeus is brown. The mouthparts are yellow, tinged with brown on the mentum and on the labella; the latter are armed with strong spines along the margins (fig. 73c). The palpi are yellow; each has a strong bristle at the apex. The antennae are dark brown to black. The arista has four dorsal and two ventral rays in addition to the apical fork. The anterior reclinate bristle is small, scarcely one-half as long

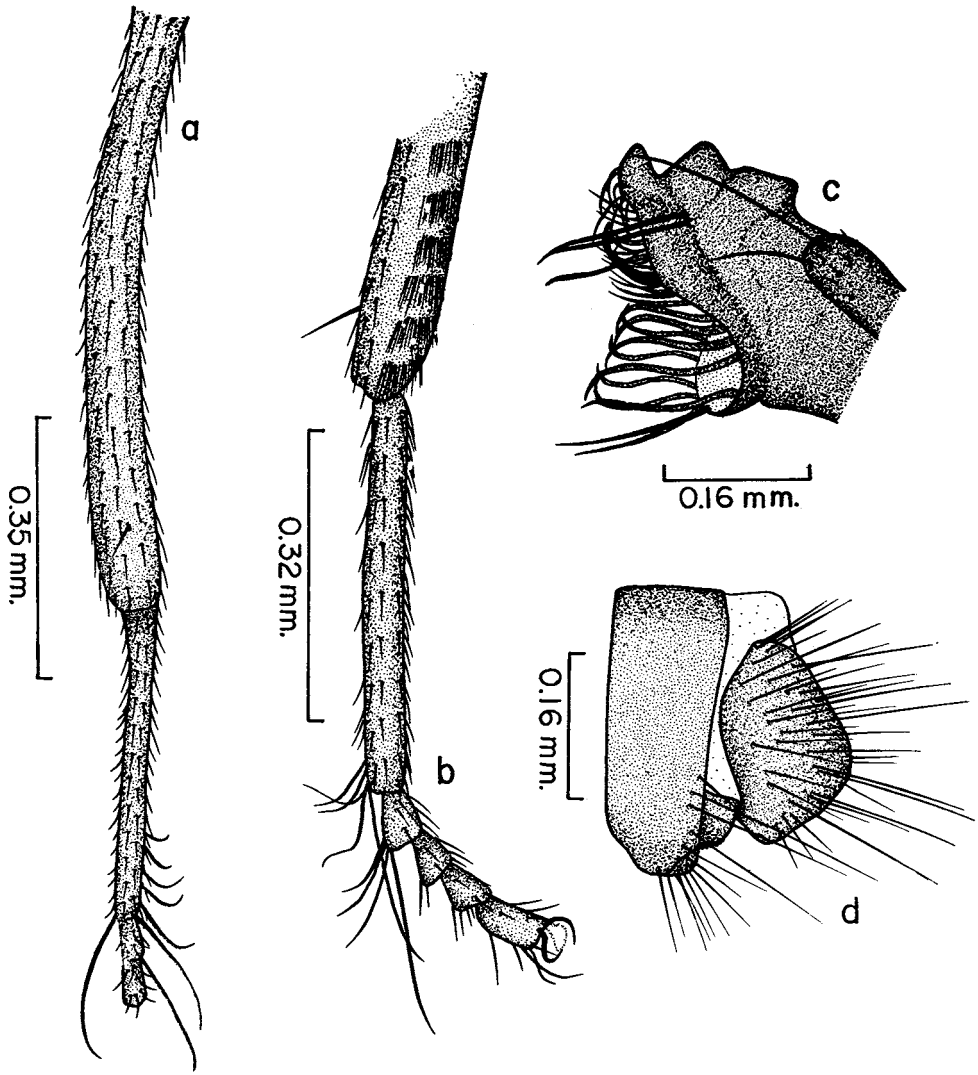


Figure 73—*Drosophila curvitibia* n. sp : **a,** front tibia and basitarsus, dorsal view; **b,** front tarsus, lateral; **c,** labellum of male; **d,** male genitalia.

as the proclinate, and is situated slightly above the latter. *Thorax:* Almost entirely brown in ground color, covered with gray-brown pollen. The humeri and sides of the mesonotum and also the apex of the scutellum are yellow. The anterior dorsocentral bristles are tiny, scarcely two times larger than the acrostichal setae, and are situated about opposite or slightly posterior to the second (posterior) supraalars. Six to eight rows of acrostichal setae are present. A tiny (ventral) secondary humeral bristle is present; this is approximately

equal in size to the acrostichal setae on the mesonotum. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Predominantly yellow, tinged faintly with brown on the apices of the tibiae, femora, and tarsi. The front tibia is slender, distinctly curved, and arcuate as seen in dorsal view (fig. 73a). The front basitarsus is slender, about one-half as long as the tibia, distinctly flattened laterally, about six or seven times longer than the second tarsal segment, and with two black apical cilia on the dorsum. The short second tarsal segment has two or three long black dorsal hairs at its apex (fig. 73b). As seen from a dorsal view the basitarsus has a row of short erect anterodorsal hairs on the apical fourth of the segment, and the posterior surface is covered with short, erect hairs; their length is slightly less than the width of the segment. *Wings:* Almost hyaline, faintly infuscated. The third costal section is five times longer than the fourth, and the costal fringe is short, extending only about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.32 times longer than the penultimate section. The anal plates are about one-half higher than long. The ninth tergum is broad, straight-sided, not narrowed over the dorsal portion, and scarcely narrowed ventrally (fig. 73d).

Length: body, 3.3 mm.; wings, 4.0 mm.

MALE. Unknown.

Holotype male: Paliku, Haleakala Crater, Maui, June, 1952 (M. Tamashiro). Type in the B. P. Bishop Museum.

Drosophila dasycnemia new species (fig. 74a–c).

This species fits in the *sordidapex* complex but is readily differentiated from related species by having the posterior surface of each front tibia of the male densely covered with black setae (fig. 74a). In the latter regard it fits close to *D. disticha* n. sp. but that species lacks a dark marking in the wing, the front femora and palpi are brownish, and the clypeus and lower face are black.

MALE. *Head:* The front is predominantly yellow to rufous and black along the orbits to about the proclinate bristles; the ocellar triangle, upper occiput, and sides of vertex are also black. The lower half of the occiput, the genae, and the face are yellow, the latter faintly discolored with brown near the oral margin. The clypeus is yellow-brown, and the mouthparts and palpi are yellow, tinged lightly with brown; the latter have several black setae around the apex, but no strong apical bristles. The mouthparts are not ornate. The antennae are yellow; the apical half of the third segment is tinged with brown. The arista has six dorsal and two ventral rays in addition to the apical fork. The upper bristle of each vibrissal row is situated slightly above the lower edge of the face. The clypeus is distinctly separated from the oral margin by a space slightly greater than the width of the clypeus. *Thorax:* Entirely brown, tinged with yellow to rufous, and with the anteromedian portion of the mesonotum yellow. The halteres and the lower two-thirds of each humerus are yellow; the anterior median portion of the mesonotum is also yellow, but tinged very lightly with brown. Two

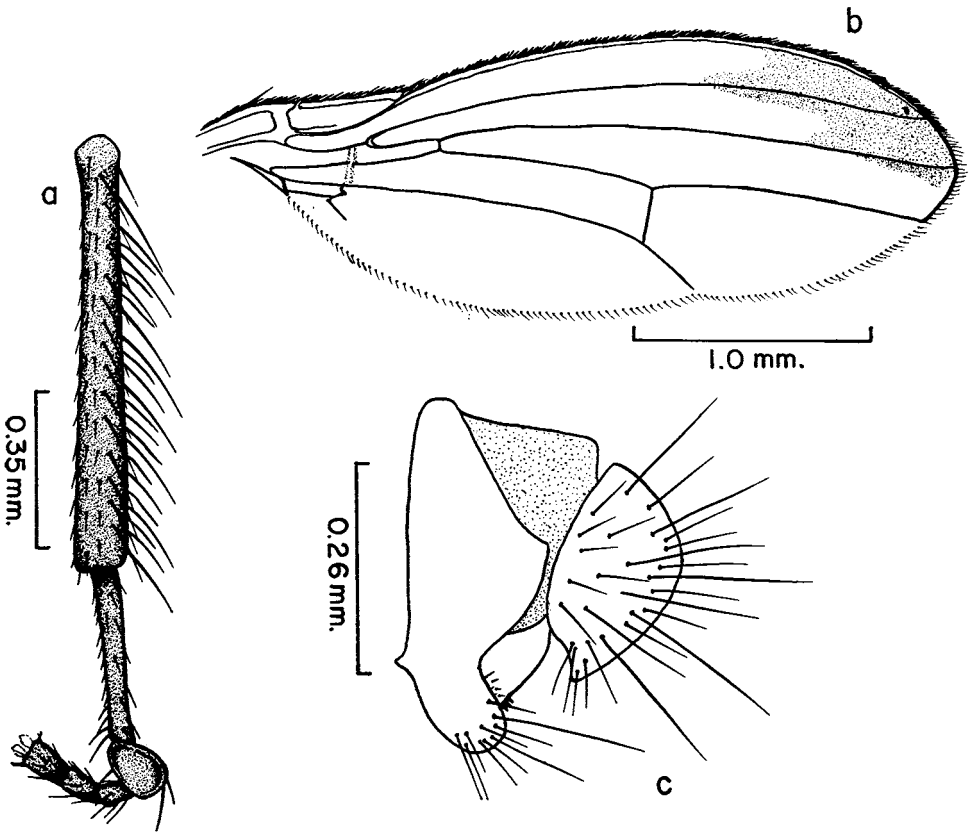


Figure 74—*Drosophila dasycnemia* n. sp.: **a**, front tibia and tarsus; **b**, wing; **c**, male genitalia.

pairs of rather strong humeral bristles are present. The anterior sternopleural bristle is three-fourths to four-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for the yellow-brown front coxae and the brown apical segments of the tarsi. Each front femur has one moderately strong posterodorsal bristle and three moderately strong posteroventral bristles in addition to several setae arranged along these surfaces. The dorsal and posterodorsal surfaces of the front tibia each have a row of moderately strong, erect, black bristle-like setae extending the entire length of the segment; these are equal to, or longer than, the preapical dorsal bristle, and the latter is not discernible from the other setae. The front tarsi are very similar to those of *sordidapex;* the first segment is elongated and slender and bears two to four erect hairs on the anterior surface near the apex; the second segment is short, flat, and concave on the anterior surface and bears a small seta at its apex (fig. 74a). *Wings:* Subhyaline with a brownish infuscation extending through the apical third of cell R_1, across cell R_3, and through about the upper half of cell R_5 (fig. 74b). The third costal section is about 5.5 times

longer than the fourth. The costal fringe extends about two-fifths the distance from the apex of vein R_{2+3} to the apex of R_{4+5}. The last section of vein M_{1+2} is half again as long as the penultimate section. *Abdomen:* Black, lightly tinged with yellow on the first tergum. The sixth tergum is scarcely exposed; from a direct dorsal view just a narrow line of the tergum is visible. The genitalia are as in figure 74c. The ninth tergum is rather strongly narrowed dorsally, and the ventral apices are rounded and bear numerous stout setae.

Length: body, 2.5–2.8 mm.; wings, 3.0–3.5 mm.

FEMALE. Fitting the description of the male except for sexual characters and except that fumose markings in the wings are very indistinct or lacking. The females are probably easily confused with those of *sordidapex* and other closely related species unless they are associated with the males.

Holotype male: Upper Olaa Forest, Hawaii, August, 1952 (D. E. Hardy). An allotype is not being designated since the sexes cannot be definitely associated. Thirty male paratypes: from the following localities—same as type, July, 1953, July, 1956, and August, 1958 (D. E. Hardy and W. C. Mitchell); Kaiwiki, Hawaii, September 22, 1918 (O. H. Swezey); Volcano, Hawaii, May 21, 1915 (A. Busck); and Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

The type and a series of paratypes are in the B. P. Bishop Museum. Paratypes are being deposited in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila deltaneuron Bryan (fig. 75).

Drosophila deltaneuron Bryan, 1938, Proc. Haw. Ent. Soc. 10 (1) :40.

Endemic. Oahu (type locality: Lulumahu Valley).

Type in the B. P. Bishop Museum. This species has been collected in a number of localities in the Koolau Mountains; it is associated with wild bananas. I have studied the type and the type series.

D. deltaneuron is differentiated from all other known *Drosophila* by the Y-shaped fork of the m crossvein (fig. 75).

The species has been adequately described by Bryan except that the thorax is predominantly yellow to rufous rather than brown. A brown longitudinal streak occurs along the upper edge of each mesopleuron, a brown spot is present in the upper portion of each pteropleuron, and another is present in the middle of the metapleuron. Two pairs of moderately strong hair-like bristles are sometimes present in front of the anterior dorsocentrals. The anterior sternopleural bristle is about 0.50 to 0.65 as long as the posterior bristle. The arista has six dorsal rays and three ventral, in addition to the apical fork. Each palpus has a strong apical bristle. The third costal section is about five times longer than the fourth, and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The wing markings and venation are as in figure 75. The male genitalia have not been studied. The female ovipositor is short, pointed, and triangular in shape. The abdomen is dark brown to black.

Length: body and wings, 3.7–4.0 mm.

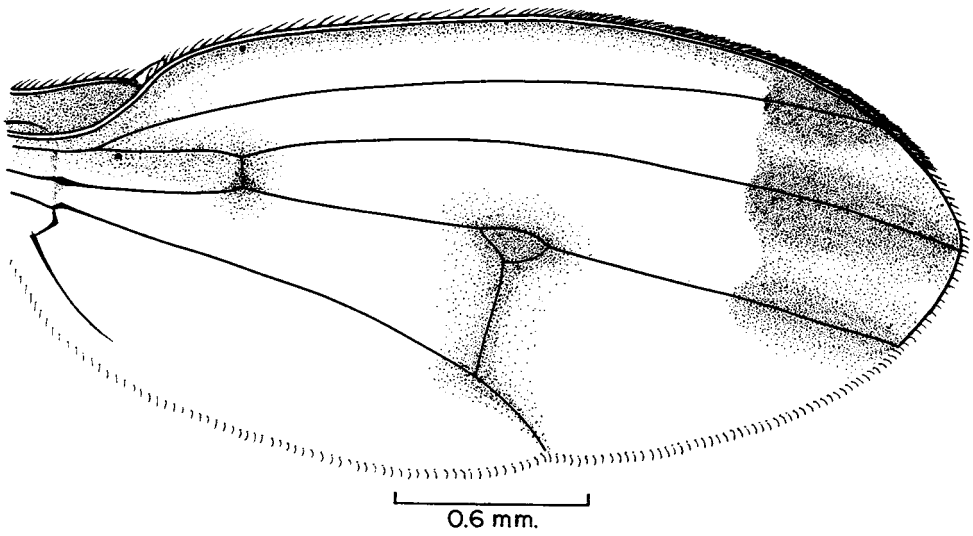


Figure 75—*Drosophila deltaneuron* Bryan: wing.

Drosophila demipolita new species (fig. 76a–d).

This species is differentiated from other members of the *polita* complex by having the pleura of the male entirely dark brown to shining black; the abdomen entirely dark brown; the third antennal segment dark brown to black; and the costal fringe extending slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}.

MALE. *Head:* As seen from direct lateral view the head is about one-third higher than long. The lower half of the front is yellow, the upper portion is predominantly black, and the orbits are black to the proclinate bristles. The upper half of the front (including the ocellar triangle), the vertex, and the major portion of the occiput are black covered with gray pollen except for the median portions of the vertex, which are polished black. The extreme lower margin of the occiput is yellow. The genae are yellow except for a narrow, brown to black line along the upper edge of the vibrissal row. The face is yellow except for a brown spot on each side at the upper edge of the vibrissal row. The clypeus is brown. The palpi are yellow, tinged with brown around the apices; each has a prominent black bristle at the apex. The mouthparts are yellow except for a narrow black rim around the apex of each labellum (fig. 76a). The apical bristle on each palpus is two-thirds to equal the length of the segment. The first two antennal segments are yellow, tinged with brown on the dorsum. The third segment is dark brown, faintly tinged with yellow at its base. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated distinctly above the latter. About two strong bristles are present at the upper

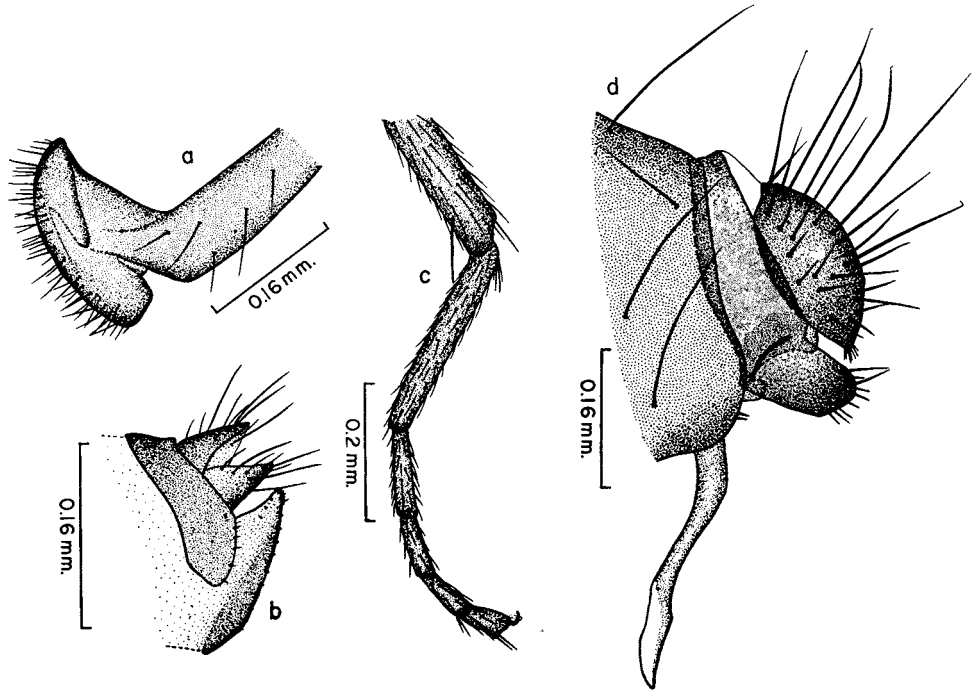


Figure 76—*Drosophila demipolita* n. sp.: **a,** labellum; **b,** female genitalia; **c,** front tarsus; **d,** male genitalia.

edge of each vibrissal row. *Thorax:* Predominantly polished black, tinged with rufous in the ground color of the pleura, and with a conspicuous yellow apex on the scutellum. The disc of the scutellum is covered with gray pollen. The anterior dorsocentral bristles are situated in line with the first (anterior) pair of supraalars. About six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is thin, hair-like, and approximately two-fifths as long as the posterior bristle. *Legs:* Entirely yellow and completely lacking ornate hairs. The front basitarsus is three-fifths to two-thirds as long as the tibia (fig. 76c). *Wings:* Almost hyaline, faintly infuscated with brown. The third costal section is four times longer than the fourth and the costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Entirely polished black. The anal plates are two times higher than long and are subacutely pointed ventrally. The ninth tergum is just slightly narrowed over the dorsal portion, and the ventral lobes are shaped as in figure 76d. The male claspers are distinctively placed, are deeply set in the genital chamber, and are not visible from lateral view (fig. 76d).

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. Fitting the characteristics of the male except for sexual differences. The ovipositor blades are short, sharp-pointed, and serrated on the ventral margin (fig. 76b).

Length: body, 2.8 mm.; wings, 3.2 mm.

Holotype male, allotype female, and four paratypes (three males and one female): from five miles southwest Honokaa, Hawaii, August, 1952 (D. E. Hardy); one female, Pauahi, Hawaii, 4,300 feet, August, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila denotata new species (fig. 77a–d).

Showing rather close relationship to *D. haleakalae* but the wing markings are very different (fig. 77b) and the front basitarsus is much more elongate (fig. 77a).

MALE. Predominantly shining black species. *Head:* Front about as long as wide, yellow on the lower third, dark brown to black on the upper two-thirds. Lower reclinate bristle about half to three-fifths as long as the proclinate and situated distinctly above the latter. Face predominantly yellow, tinged with brown on the lower portion, with a very slight carina down the middle. The genae, lower occiput, palpi, and mouthparts are predominantly yellow; each labellum has a black rim at the apex. The clypeus is pale brown. Three moderately strong black bristles are present at the upper portion of each vibrissal row. The antennae are entirely yellow; the arista has about eight dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly shining black, lightly dusted with gray. The scutellum is yellow at the extreme apex. The anterior dorsocentral bristles are situated about opposite the first pair of supraalars, and the distance between the anterior and posterior dorsocentrals is about three-fourths greater than the distance between the posterior dorsocentral and the hind margin of the mesonotum. Only one humeral bristle is present. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs:* Entirely yellow including the coxae. Front coxa with only one preapical dorsal bristle. The front femur has about six bristles arranged on each of the posterior dorsal and posterior ventral surfaces. The front tibiae and tarsi are not ornate. The front basitarsus is about two-thirds as long as the tibia (fig. 77a). *Wings:* Predominantly hyaline with a dark brown streak down the apical portions of veins R_{2+3}, R_{4+5}, and M_{1+2} (fig. 77b). Third costal section about four times longer than the fourth and the costal fringe extends almost halfway between the tips of veins R_{2+3} and R_{4+5}. Last two sections of vein M_{1+2} equal. The last section of vein M_{3+4} is slightly longer than the m crossvein and evanesces at its tip. *Abdomen:* Entirely shining, dark brown to black, very lightly gray pollinose on the dorsum. Genitalia as in figure 77c.

Length: body, 3.7–4.2 mm.; wings, 4.0–4.3 mm.

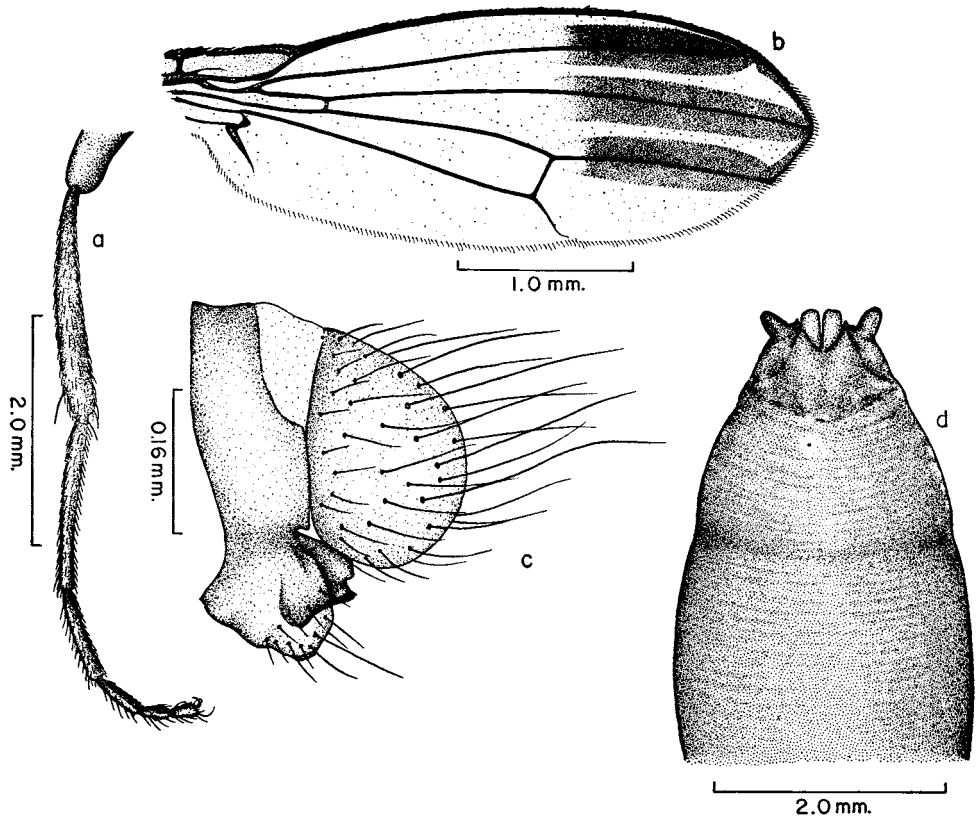


Figure 77—*Drosophila denotata* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia; **d,** posterior end of puparium.

FEMALE. Fitting the description of the male in most respects. The ovipositor plates are short, triangular, rather sharp-pointed, and extend almost to the apices of the anal plates.

On the puparium the posterior spiracles are borne on yellow tubercles. In addition to the spiracular tubercles the posterior end of the pupa has six prominent projections: two rather closely placed on the dorsal surface, two widely spaced on the ventral surface, and two lateral tubercles (fig. 77d). The anterior spiracles are also situated on a prominence and are pale yellow-red in color.

Holotype male, allotype females, and 12 paratypes (5 males and 7 females): from Poamoho Trail, Oahu, October, 1953, bred from fungus (E. J. Ford).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila diffusa new species (fig. 78a–b).

This species appears to be related to *D. imparisetae* n. sp. and to *infuscata*

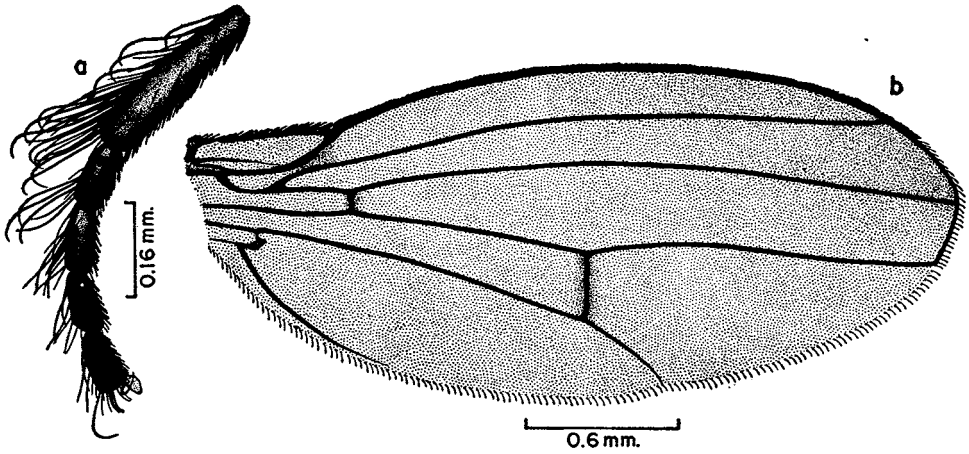


Figure 78—*Drosophila diffusa* n. sp.: a, front tarsus; b, wing.

Grimshaw. However, the ornamentation of the front tarsus of the male is distinctly different from that of either as shown in figure 78a, and there are also difference in several other respects as pointed out in the key on page 102.

MALE. *Head:* Almost quadrate in profile view. The front margin is straight and just a narrow portion of the face is seen near the eye margin. The lower half of the front is yellow, the upper portion is brown to black, gray pollinose down the orbits, and velvety brown between the orbits and the ocellar triangle. The ocellar triangle, vertex, and upper occiput are dark brown to black covered with gray pollen. The lower portion of the occiput, the genae, and face are yellow-white. The palpi and mouthparts are yellow. Each palpus has one moderately strong, black, apical bristle and three black setae on the ventral surface. The labella are fleshy and armed with fine hair but have no spines around the margins. The face is slightly carinate in the upper median portion. The genae are about equal in width to seven rows of eye facets. Two moderately strong bristles are present at the upper portion of each vibrissal row. The lower reclinate bristle is equal in length to the proclinate but is much thinner than the latter; it is situated distinctly above the proclinate. Antennae bright yellow; second segment with two short bristles on the anterodorsal surface. Arista with seven dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow to rufous, brown over the disc of the scutellum and along the upper edge of the mesopleuron, and with a brown median spot on the hind portion of the mesonotum between the posterior dorsocentral bristles. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are moderately strong and are situated about halfway between a line drawn from the first and second pairs of supraalar bristles. A faint tinge of brown is also present at the upper posterior portion of each sternopleuron and over the metapleuron. The metanotum is yellow, tinged lightly with brown in the median portion. The

halteres are bright yellow. *Legs:* Entirely yellow except for the apical segments of the tarsi, which are black. The front femora are slender, the ventral portions are bare, and the posteroventral and posterodorsal bristles are moderately developed. The front tibia is devoid of long hairs. The front basitarsus is about one-third as long as the tibia; it has a row of erect, black cilia extending the entire length of the segment over the anterodorsal surface and a dense clump of black, dorsal hairs at the apex. Segments two and three also have numerous black, dorsal cilia (fig. 78a). The hind basitarsi are slightly over one-half as long as the tibiae. *Wings:* Subhyaline, with a diffusion of pale brown over the m crossvein (fig. 78b) and in the anteroapical portion of the wing; also the apical half of the second costal section is tinged with brown. The third costal section is five times longer than the fourth and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. *Abdomen:* Black, tinged with rufous on the first and sixth segments. The genitalia have not been dissected for study.

Length: body, 3.8 mm.; wings, 4.3 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila diminuens new species (fig. 79a–c).

Fitting in the group of species which have brown markings only on the crossveins and at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, and which have the thorax yellow to rufous. *D. diminuens* fits near *kauluai* Bryan but is readily differentiated by the differences in the ornamentation and development of the front legs of the male (fig. 79b): the front tibiae are not ciliated and the front basitarsi are not shortened or thick and have dorsal cilia only on their apical halves.

MALE. *Head:* Slightly higher than long, nearly quadrate as seen in lateral view. The front is about one-third wider than long, is yellow, and tinged with brown through the median portion. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The face is entirely yellow, and has a small carina down the median portion. No strong bristles are present in the vibrissal rows. The mouthparts and palpi are yellow, tinged lightly with brown. The latter have one moderately strong apical bristle plus numerous black setae around the margins. The antennae are yellow-brown. The aristae have six or seven dorsal and two or three ventral rays in addition to the apical fork. The labellum has a row of moderately long bristle-like hairs on each side at the apical margin and one slender projection near the apical portion (fig. 79a). *Thorax:* Entirely yellow to rufous, very slightly shining in the ground color of the mesonotum. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front tibia is without long ciliation. The

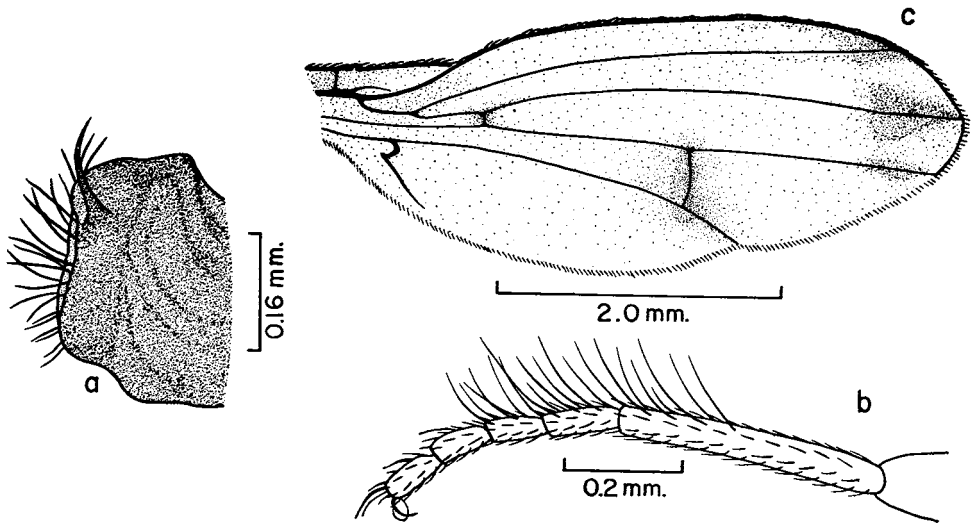


Figure 79—*Drosophila diminuens* n. sp.: **a,** labellum of male; **b,** front tarsus; **c,** wing.

basal half of the front basitarsus is devoid of cilia; long dorsal ciliation is present on the apical half or two-fifths of the basitarsus and over the entire length of segments two and three (fig. 79b). The front basitarsus is about three-fifths as long as the tibia. *Wings:* Predominantly hyaline, with faint brown markings over the crossveins and at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}; also a faint streak of brown extends along the basal portion of vein R_{4+5}. The third costal section is about 4.5 times longer than the fourth, and the costal fringe extends nearly half the distance between the tips of R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately equal to the penultimate section (fig. 79c). The abdomen is brown except for the yellow posterior corners of the segments. The genitalia have not been relaxed for study.

Length: body, 4.0 mm.; wings, 4.7 mm.

FEMALE. A female specimen from Kulani, Hawaii, 5,200 feet, July, 1952 (D. E. Hardy), seems to fit with the male although I see no satisfactory way to differentiate it from the female of *apicipuncta* n. sp. The specimen is not being designated as an allotype.

Holotype male: Kilauea, Hawaii, April 22, 1920 (O. H. Swezey). One paratype male: from Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley). One male specimen from Puu Kolekole, Molokai, 3,600 feet, July, 1953 (M. Tamashiro), appears to be this species. The wings are in poor condition, however, and I cannot be certain. It is not being designated as a paratype.

Type and the female specimen in the Hawaiian Sugar Planters' Association collection. Paratype in the University of Hawaii collection.

Drosophila disjuncta new species (fig. 80a–d).

This species is very close to *D. bostrycha* n. sp. from Molokai and differs by

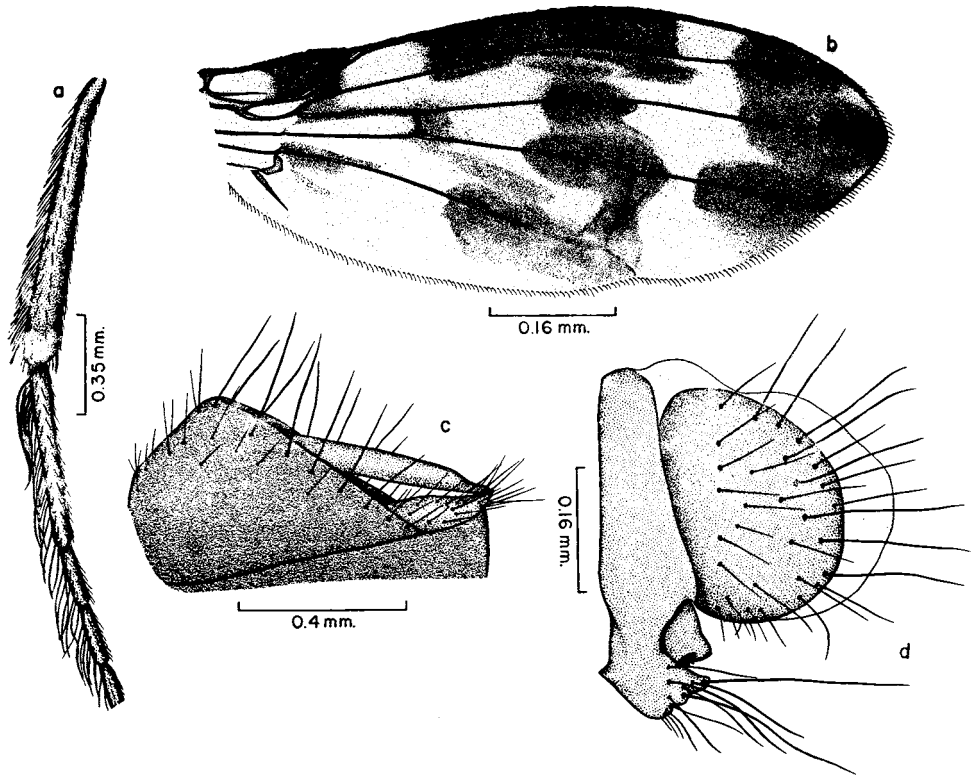


Figure 80—*Drosophila disjuncta* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** female ovipositor; **d,** male genitalia.

lacking long ciliation on the front tibiae of the male and by having the brown lateral vittae distinctly developed on the mesonotum behind the suture.

MALE. A predominantly yellow species, conspicuously marked with brown on the thorax. *Head:* Entirely yellow except for the reddish brown eyes, the black ocellar triangle, a pair of broad brown to black submedian vittae extending the whole length of the front, and a small brown spot on the gena at the lower margin of the eye. The sides of the front, along the orbits, are entirely yellow. The front is slightly wider than long. The lower reclinate bristle is about one-half to three-fifths as long as the proclinate and is situated distinctly above the latter, about one-third the distance between the proclinate and the upper reclinate bristles. The palpi and mouthparts are yellow; the former have a moderately developed apical bristle and numerous black setae along the outer surfaces. The labella are not ornate; they are densely covered with short, yellow hairs around the margins. Two strong bristles are present in the upper portion of each vibrissal row. The median portion of the face is distinctly carinate. The first two antennal segments are yellow; the second is tinged with brown on the upper portion. The

third segment is predominantly brown, yellow only at the extreme base. The arista has eight dorsal and three ventral rays in addition to the apical fork; the inner surface is sparsely haired on the apical half. *Thorax:* Chiefly bright yellow. A moderately broad brown vitta extends the entire length down the median portion; this is not expanded posteriorly and is equal in width to about four rows of acrostichal setae. A black spot is present behind each humerus and a black vitta extends on each side from the suture to the inner supraalar bristle. The humeri are yellow as are the sides of the metanotum. The pleura are yellow marked with brown on the anterodorsal edge of the sternopleuron and along the upper edges of the mesopleuron and the metapleuron. The metanotum is yellow, except for a tinge of brown in the median portion. The scutellum has a large brown spot on the disc and is otherwise yellow. About six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The anterior sternopleura bristle is about four-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs:* Almost entirely yellow, tinged with brown at the apices of the tibiae. Front femora rather slender, posterodorsal and posteroventral bristles strong and extending almost the entire length of the segment. Front tibia lacking long ciliation but with rather abundant short suberect hairs over the anterior and anterodorsal surfaces. An abundance of long black hairs extends down the dorsal surfaces of the tarsi (fig. 80a). The basitarsus is rather slender, about three-fifths as long as the tibia. *Wings:* Almost two and one-half times longer than wide, marked with three irregular, transverse brown streaks; one brown marking extends over the apex of the wing, one near the middle portion is in line with the m crossvein, and another is just beyond base of wing. A large brown spot extends through the middle portion of cell R_1 overlapping into cell R_5 and continues on as a narrower mark through the remainder of the middle part of the wing (fig. 80b). The costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_2 is rather distinctly curved upward in the median portion. The third costal section is 5.9 times longer than the fourth. The penultimate section of vein M_{1+2} is slightly longer than the ultimate section. The last portion of vein M_{3+4} is very short, about one-third as long as the m crossvein, and evanesces before reaching the wing margin. *Abdomen:* Predominantly yellow, brown on the apices and down the median portions of the terga. The anal plates are nearly oval, slightly higher than long, and the ventral portion is sparsely short-haired. The ninth tergum is rather slender; at its longest point it is nearly two-thirds as long as the anal plates. The tergum is narrowed dorsally, and each ventral lobe has three or four strong bristles at upper apex (fig. 80d).

Length: body, 6.5 mm.; wings, 6.0 mm.

FEMALE. A female specimen on hand from the type locality agrees in most details with the male; however, since there are some points of disagreement it cannot be definitely associated until additional specimens are studied. This specimen differs by having the anterior reclinate bristles situated opposite the proclinates; by having a much stronger bristle at the apex of the palpus; by the

lateral vittae on the mesonotum not being interrupted at the suture; and by the last section of vein M_{3+4} being about three-fourths as long as the m cross-vein. In other details I see no essential differences in these specimens. The front legs are not ornate. The ovipositor plates are long and slender, and are longer than the ventral margin of segment seven (fig. 80c).

Length: body, 5.3 mm.; wings, 5.7 mm.

Holotype male: Waikamoi, Maui, 4,000 feet, August, 1959, collected in banana bait trap (D. E. Hardy). The above female is not being designated as the allotype. The specimen contains the same data as the type.

The type is in the B. P. Bishop Museum. The female specimen is in the collection at the University of Hawaii.

Drosophila dissita new species (fig. 81a–c).

This species runs to *D. eumecothrix* n. sp. because of the displaced inner vertical bristles on the head; but the two are not related. The details of the front legs of the male (fig. 81b) as well as other features are very different in these two species.

MALE. Medium-sized, predominantly dark-colored species. *Head:* The front is brown, tinged with yellow in ground color on the lower portion, dark brown to black on the upper orbits. The vertex, ocellar triangle, and upper occiput are dark brown to black. The inner vertical bristles are long and slender, about equal in length to the outer vertical, and situated nearer to the upper reclinate bristle than to the outer vertical. The lower reclinate bristle is rather tiny, scarcely over half as long as the proclinate and situated distinctly above the latter. The lower occiput, genae, and face are yellow; the face is predominantly flat, just slightly raised in the upper median portion. No distinct bristles are present in the vibrissal rows; the rows are represented by fine setae. The palpi are yellow; about three, short, black bristles are present at or near the apex. The mouthparts are yellow; the labella are very ornate, with long, spine-like processes on the apices (fig. 81a). The first two antennal segments are yellow, the second is tinged with brown on the upper portion; the third segment is brown. The second segment has two distinct dorsal bristles. The arista has six dorsal rays and three ventral rays in addition to the apical fork. *Thorax:* Predominantly dark brown; the humeri are yellow and the propleura are yellow, tinged with brown. The anterior dorsocentral bristles are situated almost opposite the anterior pair of supraalars. Six rows of acrostichal setae are present. Two strong bristles are present on each humerus. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. The femora are slender; each front pair has two or three black bristles on the posteroventral and the posterodorsal surfaces. The front tibiae are not ornate. The dorsal bristle is tiny, scarcely two times larger than the surrounding setae. The front basitarsus is flattened laterally, is about three-fifths as long as the tibia, has posterodorsal and anterodorsal cilia extending almost the full length of the segment, and has two black dorsal bristles, one preapical and one apical (fig.

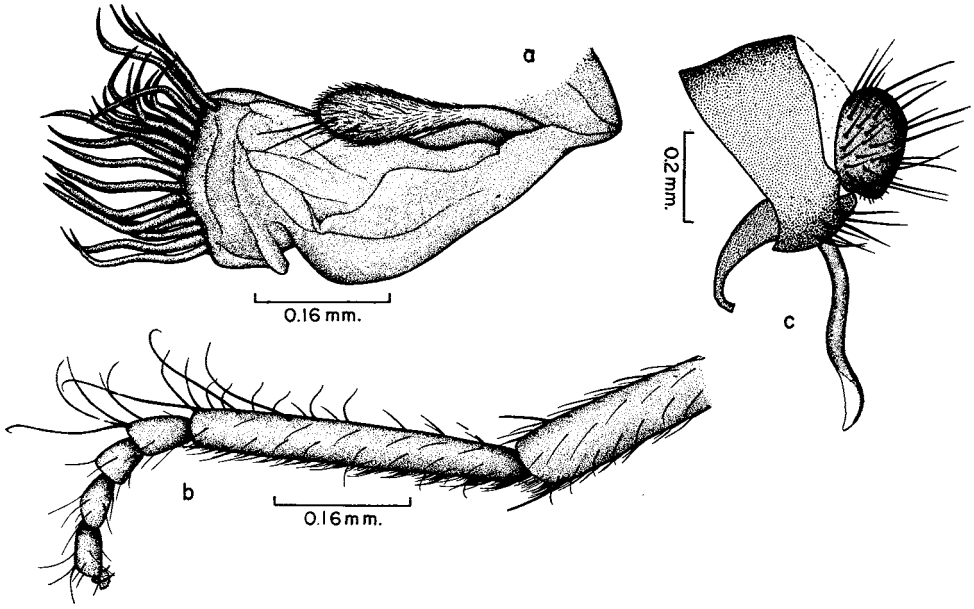


Figure 81—*Drosophila dissita* n. sp.: **a,** labellum of male; **b,** front tarsus; **c,** male genitalia.

81b). The second tarsal segment is about one-fifth as long as the first and has three black bristles at the apex. *Wings:* Subhyaline without distinct brown markings, about two and two-thirds times longer than wide. The costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The last section of vein M_{3+4} is about one-half longer than the m crossvein. *Abdomen:* Dark brown; the conjunctiva between the segments is gray. The anal plates are nearly two times higher than long and are bluntly pointed on the ventral portions. The ninth tergum is very broad over the dorsum; at the widest point it is nearly two times longer than the anal plates. The tergum narrows gradually on the sides, and the ventral lobes are as in figure 81c. The claspers are small and rather inconspicuous but the upper portion of each is visible from a direct lateral view.

Length: body, 3.0 mm.; wings, 3.4 mm.

FEMALE. Unknown.

Holotype male and one male paratype: from Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila disticha new species (fig. 82a–c).

This species appears closely related to *D. dasycnemia* n. sp. but is differentiated by having the wings subhyaline and lacking a brown marking in the

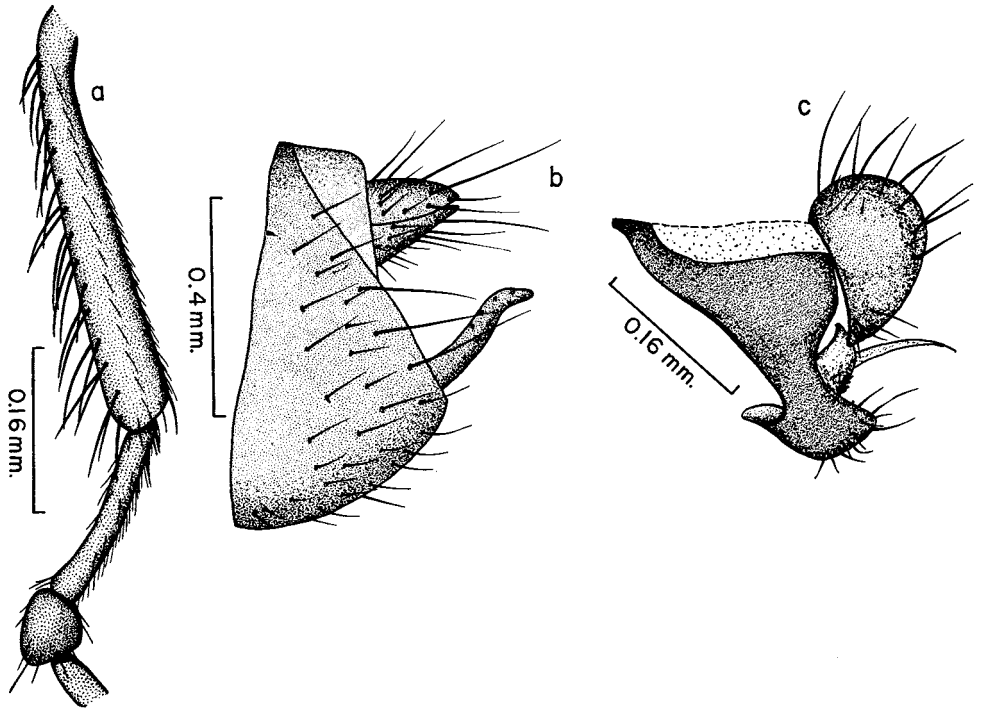


Figure 82—*Drosophila disticha* n. sp.: **a,** front tibia and tarsus; **b,** female genitalia; **c,** male genitalia.

anterior apical portion. Also, the mesonotum is dark brown to black, the clypeus and lower face are black, and the palpi and the front femora are tinged with brown.

MALE. *Head:* Predominantly dark-colored. The front is rust-brown, the lower occiput is yellow, tinged with brown. The genae, anterior margins, and the upper portion of the face are yellow; the lower face and clypeus are black. The palpi are yellow, tinged with brown. The palpus has no black bristles but has numerous black setae around the apex. The labella are not ornate. The median portion of the face is slightly raised. The anterior reclinate bristles are about four-fifths as long as the proclinate and are situated slightly above the latter. The antennae are principally yellow, brown at the apex of the third segment, and tinged with brown on the dorsal surface of the second. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. Two or three moderately developed bristles are present at the upper portion of each vibrissal row. The uppermost bristle is the largest and is approximately equal in size to the proclinate bristles. *Thorax:* Predominantly dark brown, tinged with black on the dorsum and covered with gray to gray-brown pollen. Some specimens have a distinct tinge of yellow to rufous on the anterior median portion of the mesonotum. The lower edge of each humerus is yellow and a faint tinge of rufous is

present in the ground color of the anteromedian portion of the mesonotum and also in the ground color of the pleura. The anterior dorsocentral bristles are situated about opposite the second (posterior) pair of supraalars. Eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* The front coxae and femora are yellow-brown. The legs are otherwise yellow except for the brownish pretarsi. Two rows of strong black setae extend down the dorsal and posterodorsal surfaces of the front tibia (fig. 82a); these are equal to, or larger than the preapical dorsal bristle, and the latter bristle is not differentiated. The front basitarsus is almost one-half as long as the tibia. The second tarsal segment is rather oblong in shape, much broader than the basitarsus, and slightly longer than the third tarsal segment (fig. 82a). *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Predominantly dark brown covered with gray-brown pollen. The first tergum is yellow, tinged with brown. The second tergum is tinged with yellow at the base and is yellow on the anterior lateral margins. The hind margin of each tergum is narrowly gray. The sixth tergum is yellow, tinged with brown, and terga three, four, and five are narrowly marked with yellow on the lateral margins. The anal plates are subacutely pointed ventrally. The ninth tergum is narrowed over the dorsal surface and rather strongly convex on the posteromedian surface (fig. 82c). The claspers are plainly visible from a lateral view.

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. A large series of female specimens has been collected in the same habitat as the males; however, the females cannot be separated from closely related species and are not being included in the type series. The genitalia are as in figure 82b.

Holotype male: Waikamoi, Maui, 4,000 feet, collected in rain forest, July, 1956 (D. E. Hardy). About seventy-five male paratypes: from the following localities—same as type; Puu Kukui, Maui, 3,000–4,500 feet, June, 1953 (D. E. Hardy); same locality as type, 4,500 feet, January 14, 1926 (O. H. Swezey); Haelaau, Maui, December 19, 1928, collected on ferns (O. H. Swezey); Kula Pipeline, Maui, June, 1927, on ferns (O. H. Swezey), and July, 1956 (D. E. Hardy); Upper Olaa Forest, Hawaii, 4,000 feet, August, 1952, July, 1953, July, 1956, collected in tree fern jungle (D. E. Hardy); Kilauea, Hawaii, August, 1919 (W. M. Giffard), and August, 1958, collected in light trap (J. W. Beardsley); Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy and C. P. Hoyt); Kulani, Hawaii, 5,200 feet, August, 1952 (W. C. Mitchell); Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy); Pepeopae, Molokai, 4,000 feet, July 30, 1954 (D. E. Hardy); Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy and M. Tamashiro); Lanaihale, Lanai, 3,200 feet, June, 1953 (D. E. Hardy); and Glenwood, Hawaii, March, 1917 (O. H. Swezey).

Many duplicates from the above mentioned localities are in the collection.

The type and a series of paratypes are in the B. P. Bishop Museum. Paratypes are being deposited in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila distinguenda new species (fig. 83a–b).

This species resembles *D. inedita* n. sp.; the wing venation and markings are rather similar in the two. *D. distinguenda* is readily differentiated by the long ciliation on the front tibiae, the all-yellow pleura, and by its large size.

MALE. *Head:* The front is yellow, faintly tinged with brown, and almost as long as wide. The vertex is yellow, the ocellar triangle and the median portion of the occiput are brown; the sides and lower portion of the occiput are yellow. The genae are yellow, tinged with brown. The face is pale yellow-white and has a slight carina extending the entire length down the middle. Clypeus yellow above, yellow-brown on the sides. Palpi and mouthparts yellow; the labella are not ornate and are densely yellow-haired around the margins. Each palpus has a moderately strong apical bristle about equal in length to the segment. The first antennal segment is yellow; the remainder of the antenna is dark brown to black. The aristae of the type have ten dorsal and four ventral rays in addition to the apical fork; the inner surface is sparsely haired. The frontal bristles have been broken; the lower reclinate bristles are situated distinctly above the proclinates. *Thorax:* Predominantly yellow, with a pair of narrowly separated, submedian brown vittae extending the entire length of the mesonotum, and with a brown vitta on each side extending from behind the suture to the inner postalar bristle. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. About eight rows of acrostichal setae are present. The scutellum is brown on the disc and yellow around the margin and on the ventral portion. The metanotum is clear yellow, the pronotum pale brown. The halteres are yellow. The humeri are yellow and each has two strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. The front femora are slender, about 5.5 times longer than wide, and the posteroventral and posterodorsal bristles are moderately developed. The front tibiae have long dorsal and anterior ciliation extending over the apical two-thirds to three-fourths of the segment; there are about 4 or 5 dorsal hairs extending from about basal two-thirds to just before the dorsal bristle (fig. 83a) and about 10 anterior hairs in a more irregular row from about the basal fourth to about the apical fourth of the segment. Two rows of moderately long dorsal hairs extend over the first three tarsal segments. The basitarsus is about three-fifths as long as the tibia. The apical spur of the middle tibia is rather short, about one-fourth as long as the basitarsus. *Wings:* The entire membrane is rather evenly infuscated with yellow, and dark brown spots are present over the m crossvein, the apex of the wing, in the apical portion of the second costal cell, and the base of cell R_1 (fig. 83b). The third section of the costa is 5.5 times longer than the fourth.

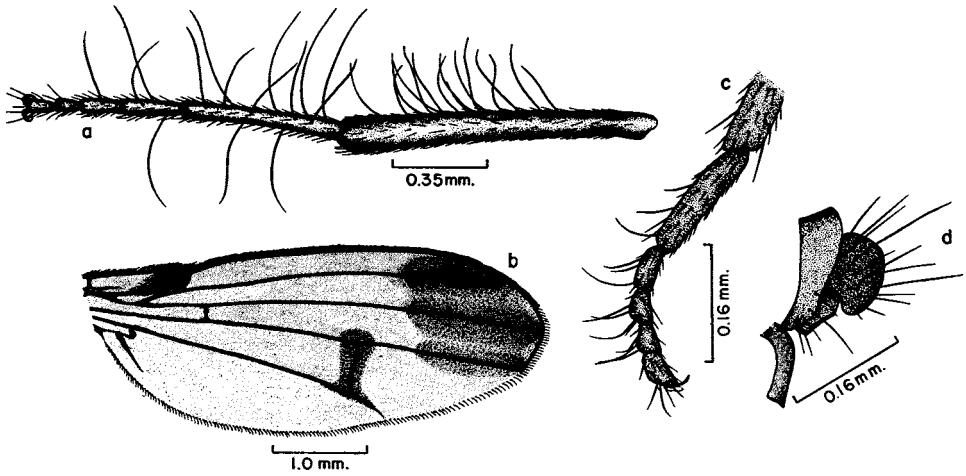


Figure 83—*Drosophila distinguenda* n. sp.: **a**, front tibia and tarsus, anterodorsal view; **b**, wing. *D. dolomata* n. sp.: **c**, front tarsus; **d**, male genitalia.

The costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated near the basal one-third to one-fourth of cell 1st M_2. The last section of vein M_{1+2} is just slightly longer than the penultimate section; the proportions are 58 to 54. The last section of vein M_{3+4} is slightly shorter than the m crossvein and evanesces just before reaching the wing margin. *Abdomen:* Principally brown, yellow on the sides of the first two terga, and rather densely yellow-brown pollinose, especially on the sides. The genitalia have not been dissected for study; the aedeagus is rather elongated and it extends beyond the margin of the abdomen a distance nearly equal to the height of the terga.

Length: body, 6.5 mm.; wings, 6.7 mm.

FEMALE. Unknown.

Holotype male: Makalaha Valley, Oahu, June, 1952 (L. D. Tuthill).

Type in the B. P. Bishop Museum.

Drosophila dolomata new species (fig. 83c–d).

This species fits near *D. quadrisetae* n. sp. but is differentiated by having the thorax predominantly rufous, tinged lightly with brown, and with the sternopleura and hypopleura entirely yellow; by having no bristles in the vibrissal row; the ninth tergum not expanded over the dorsal portion; and by the large well-developed claspers as seen in figure 83d.

MALE. *Head:* The front, measured from the median ocellus to the anterior margin, is two and one-half times wider than long; the lower portion, anterior to the proclinate bristles, is yellow; the upper portion is golden brown. The upper eye orbits, the vertex, and the upper portion of the occiput are brown,

tinged with black. The ocellar triangle is black in ground color. The lower half to three-fifths of the occiput is pale yellow. The genae, face, clypeus, palpi, and mouthparts are yellow. Each palpus has a moderately strong apical bristle. The vibrissal rows are made up of hair-like setae. The anterior reclinate bristle is small, about one-half as long as the proclinate and is situated opposite the latter. The third antennal segment is yellow-brown; the second segment is yellow, tinged with brown on the dorsal surface. The second segment has two small dorsal bristles. The arista has five to six dorsal and two or three ventral rays in addition to the small apical fork. The labellum is fringed with a few rather inconspicuous yellow spines and numerous yellow hairs at the apex. *Thorax:* The dorsum is entirely reddish brown. The upper half of each pleuron is discolored with brown; the lower half of each pleuron is pale yellow. The anterior dorsocentral bristles are situated about halfway between the first and second pairs of supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is approximately two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is about two-fifths as long as the tibia and has four or five anterodorsal cilia arranged on the apical two-thirds of the segment (fig. 83c). Segments two, three, and four have about three dorsal cilia each. *Wings:* Almost hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.75 times longer than the penultimate section. *Abdomen:* Brown, tinged with yellow to rufous in ground color. The anal plates are slightly pointed on the lower apices. The ninth tergum at its broadest point is almost equal to the length of the anal plates and is gradually tapered to the rather narrow, ventral lobes. The claspers are well developed, plainly visible from lateral view (fig. 83d).

Length: body, 1.80 mm.; wings, 2.15 mm.

FEMALE. Unknown.

Holotype male and two male paratypes: from Manoa Valley, February, 1952 (D. E. Hardy). Also one paratype male: Lulumahu Valley, Oahu, April 11, 1937 (F. X. Williams); and one male paratype: Mt. Tantalus, Oahu, June 11, 1957 (J. W. Beardsley).

Drosophila dorsigera new species (fig. 84a–b).

This species fits in the complex which has only four apparent segments in the front tarsus of the male and which has a prominent lobe developed at the apex of the front basitarsus. It is differentiated from other members of the complex by having the apical projection comparatively short (scarcely over one-half as long as the base of the basitarsus) and by having the dorsal surface of the projection rather densely covered with yellow setae.

MALE. *Head:* The front is almost entirely brown, the orbits above the proclinate bristles are black, and the lower corners of the front are tinged with yellow. The upper half to two-thirds of the occiput is brown; the lower portion is yellow. The genae are yellow except for a line of black on the vibrissal row. In

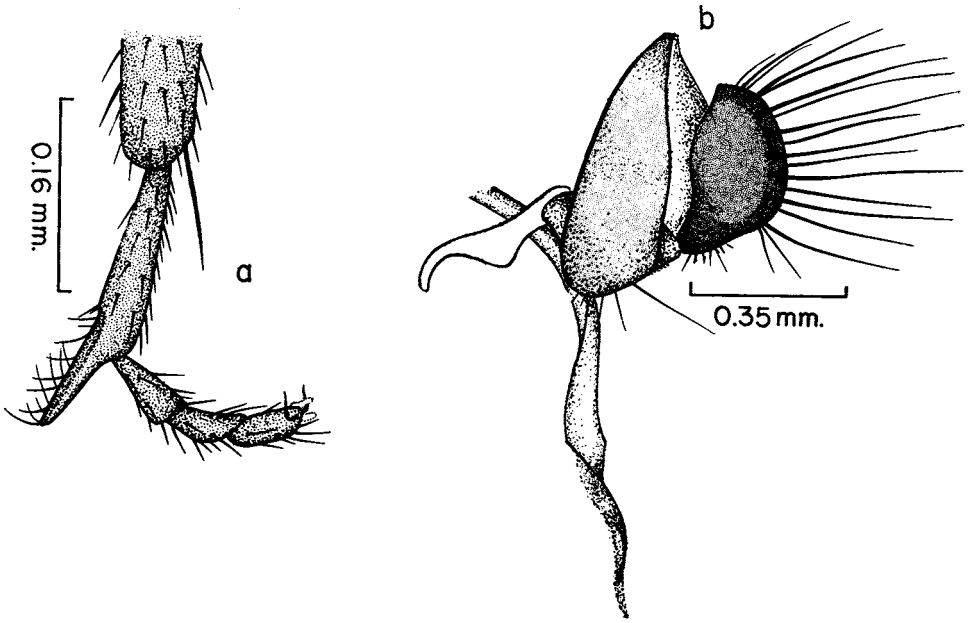


Figure 84—*Drosophila dorsigera* n. sp.: **a**, front tarsus; **b**, male genitalia.

the median portion the distance from the vibrissae to the eye margin is about equal in width to two rows of eye facets. The face is discolored with brown to black on the lower portion and otherwise yellow, faintly tinged with brown. The median portion of the face is slightly raised. The clypeus is brown, the palpi and mouthparts yellow. Each palpus has a small black apical bristle. The mouthparts are not ornate. A moderately strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the anterior reclinate bristles. The anterior reclinate is subequal in length to the proclinate. The first two antennal segments are yellow except for the brown dorsal surface on the second. The third segment is brown, faintly tinged with yellow. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Subshining brown on the dorsum, tinged faintly with rufous in the ground color of the mesonotum, and covered with brownish yellow pollen. The pleura are pale yellow. The anterior dorsocentral bristles are situated about opposite the second (posterior) supraalars. Eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The sternopleural bristles are broken on the specimen at hand; from the sizes of the bristle sockets it is obvious that both are well developed and it is probable that the anterior bristle is approximately two-thirds as long as the posterior. *Legs:* Entirely pale yellow. The front tibiae lack long ciliation, but a moderately developed preapical ventral bristle is present; this extends approximately one-half the length of the basal portion of the basitarsus. The preapical dorsal bristle is tiny, poorly developed, scarcely differen-

tiated from the surrounding setae, and does not extend to the apex of the segment. The front tarsus is four-segmented. The front basitarsus, including the apical projection, is slightly over half as long as the tibia. The projection is rather short, thick and rounded, scarcely over half as long as the basitarsus, and rather thickly covered with pale setae on the dorsal surface (fig. 84a). The second tarsal segment is slightly shorter than the projection at the apex of the basitarsus. *Wings:* Entirely hyaline, approximately two and one-half times longer than wide. The third costal section is 3.57 times longer than the fourth, and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about two times longer than the penultimate section. *Abdomen:* Predominantly brown, tinged with rufous in the ground color of the first three or four terga, blackened at the apices of terga four and five. The anal plates are approximately two times higher than long and are pointed ventrally. The ninth tergum is strongly narrowed across the dorsal portion and somewhat concave on the posterior margin. The ventral lobe is broad and rounded. The claspers are plainly visible in lateral view (fig. 84b).

Length: body and wings, 2.3 mm.

FEMALE. Unknown.

Holotype male: Halawa Trail, Oahu, May, 1951 (M. Tamashiro).

Type in the B. P. Bishop Museum.

Drosophila dorsociliata new species (fig. 85a–c).

A predominantly yellow species fitting near *D. xanthognoma* n. sp. from Oahu but differing by having the ciliation of the front basitarsus confined to the dorsal surface (fig. 85b), the costal fringe very short, and by other details as brought out in the description below.

MALE. *Head:* Entirely yellow except for the reddish brown compound eyes and a tinge of brown in the ground color of the ocellar triangle and along the upper edge of the occiput. The front, measured from the median ocellus to the front margin, is nearly two times wider than long. The anterior reclinate bristle is about three-fourths to four-fifths as long as the proclinates and is situated slightly above the latter. One strong bristle is present at the upper edge of each vibrissal row; this is equal in length or slightly longer than the proclinate bristles. The palpi and mouthparts are pale yellow. Each palpus has a small, black apical bristle plus two or more black setae on the outside surface. The labella are not ornate. The antennae are yellow. The arista has five to six dorsal and two ventral rays in addition to the apical fork (fig. 85a). *Thorax:* Entirely yellow except for a faint tinge of brown on the upper posterior portion of the mesopleuron. The dorsocentral bristles are situated almost opposite the first pair of supraalars. Six rows of acrostichal setae and two strong humeral bristles are present. The anterior sternopleural bristle is approximately four-fifths as long as the posterior bristle. *Legs:* Entirely pale yellow. The femora are slender; the posteroventral and posterodorsal bristles are rather well developed. The

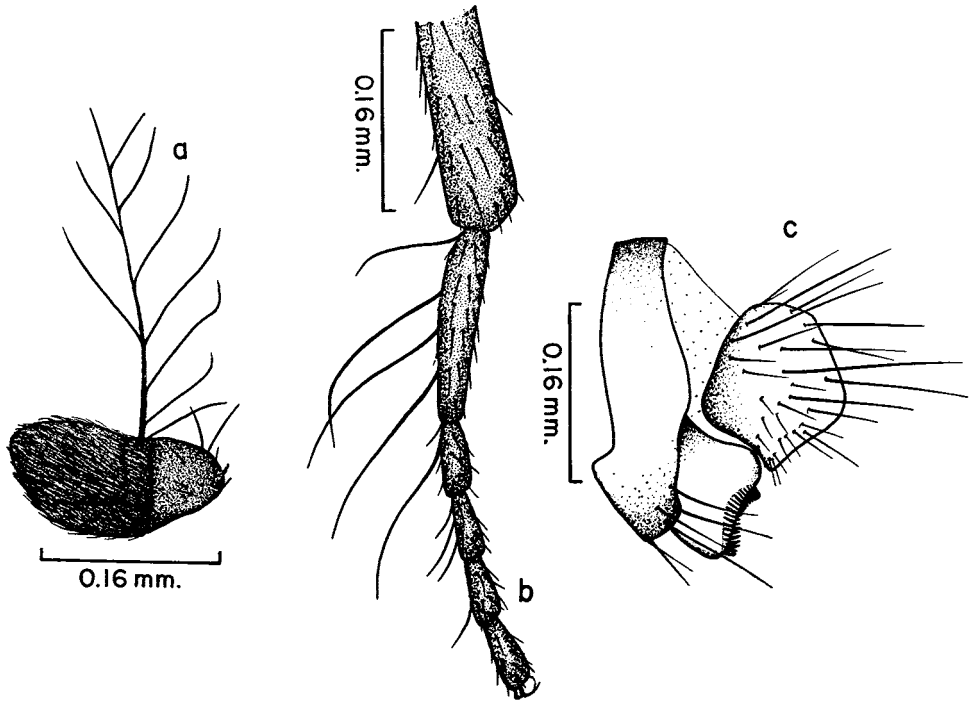


Figure 85—*Drosophila dorsociliata* n. sp.: **a,** antenna; **b,** front tarsus; **c,** male genitalia.

front tibiae are not ornate. The front basitarsus has four long, evenly spaced, black hairs extending down the dorsal surface (fig. 85b). A long black dorsal hair is also present on the second tarsal segment. The first segment is about one-half as long as the tibia and is two and one-half to three times longer than the second tarsal segment. *Wings:* Almost entirely hyaline, faintly infuscated with yellow-brown. The third costal section is four times longer than the fourth and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Yellow to rufous, tinged with brown on the dorsal portion, and the apical portion is clear yellow. The anal plates are nearly two times higher than long and are pointed on their ventral apices. The ninth tergum is greatly narrowed over the dorsal portion; the posterior margin is convex and the ventral lobes are truncate or slightly rounded at apices. The claspers are densely black spiculate on the hind margins and on the inner surfaces (fig. 85c).

FEMALE. Fitting the description of the male except for sexual differences. The arista, however, has four or five dorsal rays and two ventral rays in addition to the small apical fork, and the third antennal segment is distinctly tinged with brown. The ovipositor blades are narrow, straight-sided, rather blunt at

apices, and extend approximately two times the length of the anal plates.

Length: body and wings, 2.5 mm.

Holotype male and the allotype female: from Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy). Seven paratypes (three males and four females): from the following localities on Molokai—Puu Kolekole, 3,600 feet, July, 1952 and August, 1953 (M. Tamashiro); Hanalilolilo, 4,000 feet, August, 1953 (D. E. Hardy); Manawainui Valley, July, 1952 (D. E. Hardy); and Puu O Kaeha, 3,700 feet, July, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila dracaenae new species (fig. 86a–d).

A moderately small, all-yellow species which fits near *D. caccabata* n. sp. because of the elongate anterior reclinate bristles of the front. It differs strikingly from *caccabata* by having the body, head, and appendages yellow, rather than brown to black; and the wings hyaline with the last section of vein M_{1+2} nearly two times longer than the penultimate section, rather than being faintly infuscated with brown with the last section of vein M_{1+2} about equal in length to the penultimate section. The front tarsi and other structural details also differ strikingly in the two species, and they are obviously not related.

MALE. *Head:* Nearly two-thirds higher than long as seen in direct lateral view; the front is strongly oblique, slanted downward almost vertical. The lower margin of the head is straight or nearly so. The front is entirely yellow-brown, shining on the orbits and the ocellar triangle. Measured from the median ocellus to the anterior margin, the front is one-half wider than long. The occiput is largely yellow-brown covered with gray pollen; the upper portion is rather distinctly concave. The genae are yellow, tinged faintly with brown; at the lower margin of the eye they are very narrow; and measured from the vibrissal row to the eye margin the gena is scarcely as wide as two rows of eye facets. The face has a broad convexity in the upper median portion; the upper portion is yellow, the lower margin is tinged with brown, and is flattened. The palpi are yellow; each has two rather strong apical bristles approximately equal in length to the proclinate bristles of the front. Each labellum has a fringe of long curved spines around the apex (fig. 86a). No strong bristles are present in the vibrissal rows. The vibrissae are represented by fine setae. The anterior reclinate bristles are well developed, distinctly longer than the proclinates, and situated well above the latter. The upper reclinate bristles are just slightly longer than the lower bristles and are situated rather high on the front, almost opposite the median ocellus. The antennae are yellow, tinged faintly with brown on the third segment; the third segment is comparatively elongate, distinctly longer than wide. The arista has five or six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely yellow to rufous, polished, almost devoid of pollen. The anterior dorsocentral bristles are scarcely over half as long as the posterior bristles and are situated about opposite the second (posterior) supraalars. About

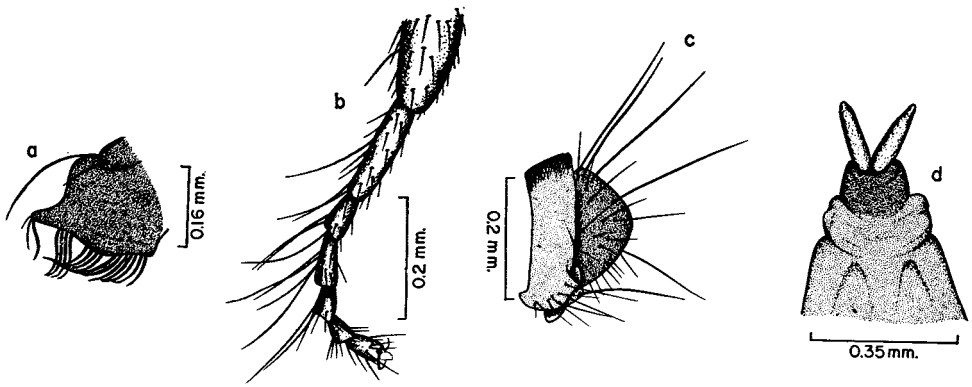


Figure 86—*Drosophila dracaenae* n. sp.: **a**, labellum of male; **b**, front tarsus; **c**, male genitalia; **d**, posterior end of puparium.

eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow. The front tibia is devoid of ciliation. The front basitarsus is almost one-half as long as the tibia and has paired dorsal cilia arranged on the apical half of the segment—two near the middle, two at about the apical one-third, and two to three long cilia at the apex; the second tarsal segment has four long cilia at the apex; the third has three (fig. 86b). *Wings:* Entirely hyaline. The third costal section is 4.5 times longer than the fourth, and the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 to 2.0 times longer than the penultimate section. *Abdomen:* Entirely yellow to rufous, rather faintly tinged with brown. The anal plates are slightly higher than long, rounded on the ventral margins. The ninth tergum is straight-sided, scarcely narrowed over the dorsal portion, and lobate ventrally. The claspers are plainly visible in lateral view and are dentate on the hind margins (fig. 86c).

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. Fitting the description of the male except for sexual characters. The front legs and the labella are not ornate. Two strong bristles are present at the upper portion of each vibrissal row; these are approximately equal in size to the upper reclinates of the front. The ovipositor plates are broad, triangular, subacutely pointed at the apices, and extend slightly beyond the apices of the anal plates.

Length: body, 2.7 mm.; wings, 3.0 mm.

The posterior end of the puparium is shaped as in figure 85d.

Holotype male, allotype female, and three paratypes (two males and one female); Kumuwela, Kauai, July 7, 1932, ex *Dracaena* (O. H. Swezey).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the Hawaiian Sugar Planters' Association and the University of Hawaii.

Drosophila dumalis new species (fig. 87a–b).

This species fits in the complex which is characterized by having preapical dorsal bristles on the front basitarsi of the male; it is differentiated from other known species by having five black bristles arranged in a dense clump before the apex of the basitarsus (fig. 87b).

MALE. *Head:* Almost quadrate as seen in direct lateral view, approximately as high as long, with the cheeks unusually broad. The front is predominantly brown, yellow on the anterior lateral margins. The upper orbits are tinged with black and covered with gray pollen. The ocellar triangle, vertex, and upper occiput are dark brown to black covered with gray pollen. The median portion of the occiput is brown; the lower one-third to two-fifths is yellow. The genae are entirely yellow; in the median portion the distance from the vibrissal row to the eye margin is equal to approximately one-sixth the height of the eye. The face is entirely yellow, almost flat, just slightly raised in the upper median portion. The clypeus, palpi, and mouthparts are yellow. Each palpus has one small black apical bristle and several black setae around the outside surface. The labella are not ornate. Two medium-sized bristles are present at the upper edge of each vibrissal row. These are slightly shorter than the anterior reclinate bristles of the front. The anterior reclinates are about four-fifths as long as the proclinates and are situated approximately opposite the latter. The antennae are brown, tinged with yellow to rufous on the first two segments. The second segment has three black dorsal bristles. The arista has four or five dorsal and one ventral ray in addition to the apical fork (fig. 87a). *Thorax:* Predominantly yellow, tinged with brown on the mesopleura and the upper portions of the pteropleura; brown tinged over the disc on the scutellum, over the hind median portion of the mesonotum between the dorsocentral bristles, and with three rather indistinct vittae extending over the anterior two-thirds of the mesonotum. The sides and under portion of the scutellum are yellow, the basal half to two-thirds of the metanotum is yellow, covered with yellow-gray pollen, and the posterior third is shining yellow-brown. The halteres are pale yellow. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. About six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is nearly three-fourths as long as the posterior bristle. *Legs:* Entirely yellow except for the dark brown apices of the tarsi. The legs are not ornate except for the dense clump of five black preapical dorsal bristles on the front basitarsus (fig. 87b). The front basitarsus is about one-half as long as the tibia and two times longer than the second tarsal segment. *Wings:* Hyaline or nearly so. The third costal section is five times longer than the fourth and the costal fringe extends approximately two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.35 times longer than the penultimate section. *Abdomen:* Entirely brownish yellow over the dorsum, yellow on the sides and venter. The genitalia have not been dissected for study.

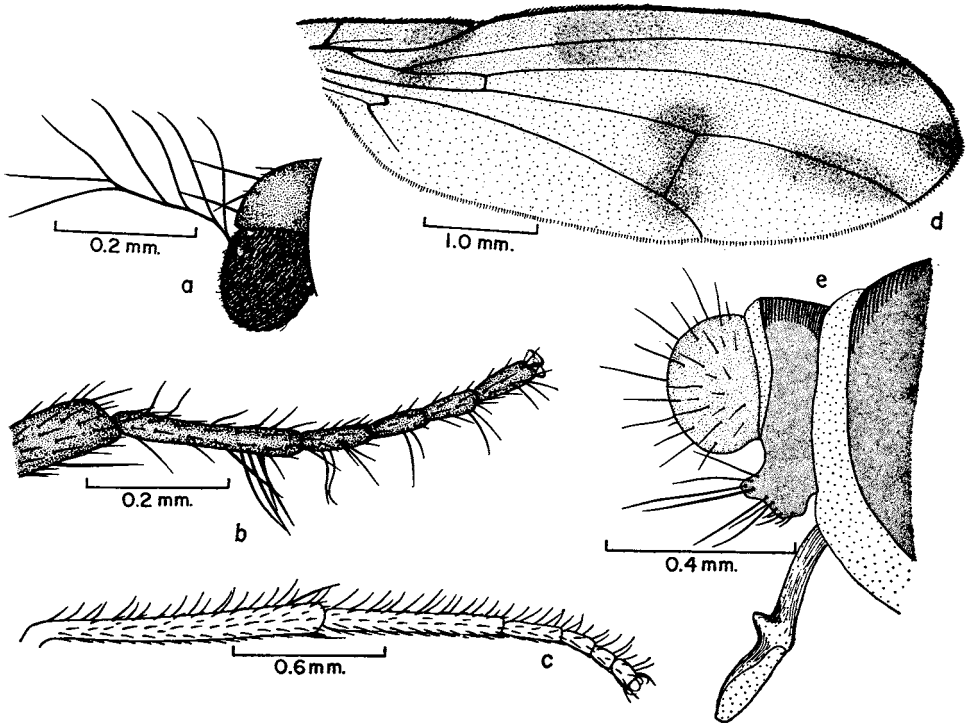


Figure 87—*Drosophila dumalis* n. sp.: **a,** antenna; **b,** front tarsus. *D. engyochracea* n. sp.: **c,** front tibia and tarsus; **d,** wing; **e,** male genitalia.

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Unknown.

Holotype male: Manoa Falls, Oahu, June, 1950 (N. Morton).

Type in the B. P. Bishop Museum.

Drosophila engyochracea new species (fig. 87c–e).

This species is closely related to *ochracea* Grimshaw but differs by having dark brown vittae down the mesonotum and on the scutellum and by having the third costal section 4.7 times longer than the fourth, rather than the third costal section being slightly less than three times longer than the fourth.

MALE. A moderate-sized, predominantly yellow species. *Head:* About one-fourth higher than long, the occiput somewhat swollen, and convex posteriorly as seen in direct lateral view. The front is just slightly wider than long and predominantly yellow to rufous; the orbits are brown on the upper portions. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated above the latter. The occiput is clear yellow except for the brown upper median portion. The genae and face are yellow. The latter is slightly raised down the median portion. Each vibrissal row has one strong bristle at the upper

edge. The palpi are yellow, and each has a long apical bristle. The antennae are brown, tinged with yellow. The aristae have seven to nine dorsal and four ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow. Mesonotum with four, dark brown, longitudinal vittae; two submedian vittae extend from the front margin almost to a level with the posterior pair of dorsocentral bristles, these separated by a distance equal to four or five rows of acrostichal setae. The sublateral vittae extend from just behind the humeri to the dorsocentral bristles; these are slightly interrupted at the suture. The posterior pair of dorsocentral bristles are situated about opposite the second pair of supraalars. Two strong bristles are present on each humerus. The anterior sternopleural bristle is about one-half to three-fifths as long as the posterior bristle. The scutellum is yellow with a brown streak down each side, in line with the apical bristles. The pleura are entirely yellow, except for the dark-colored sclerites at the wing base, and for a dark brown spot at the upper hind corner of each mesopleuron. *Legs:* Yellow except for the brown apical segments of the tarsi. Front tibia and tarsus with rather numerous, erect cilia extending down the entire dorsal surface (fig. 87c). The basitarsus is about two-thirds as long as the tibia and is three times longer than the second tarsal segment. All of the femora are slender, straight-sided. *Wings:* Predominantly glassy hyaline with brown spots at the apices of veins R_{2+3}, R_{4+5}, M_{1+2}, over the m crossvein, and at the apical portion of the second costal cell. Also a brown spot is present on vein R_{2+3}, extending through cell R_1 at about the basal third of the cell. The brown spot in the apical portion of the second costal cell extends across the bases of cells R_1 and R_2 and into the basal section of cell R. The r–m crossvein is faintly infuscated. The brown spot over the m crossvein is enlarged on the upper and lower portions, dumbbell-shaped. The third costal section is 4.7 times longer than the fourth, and the costal fringe extends about halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section; the proportions are about 51 to 44 (fig. 87d). *Abdomen:* Predominantly dark brown to black; the first segment and the posterior lateral corners of the other segments are yellow. The male genitalia are as in figure 87e. The claspers are hidden from direct lateral view. The tergal plates are rather truncate at apices and bear numerous long hairs.

Length: body, 4.8 mm.; wings, 5.5 mm.

FEMALE. Unknown.

Holotype male: Mauna Loa Truck Trail, Hawaii, November, 1956 (W. C. Mitchell). One paratype male: Upper Olaa Forest, Hawaii, July, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the United States National Museum.

Drosophila enoplotarsus new species (fig. 88a–b).

This remarkable species fits fairly close to *D. freycinetiae* because of the peculiar development on the front tarsus. It is readily differentiated by having

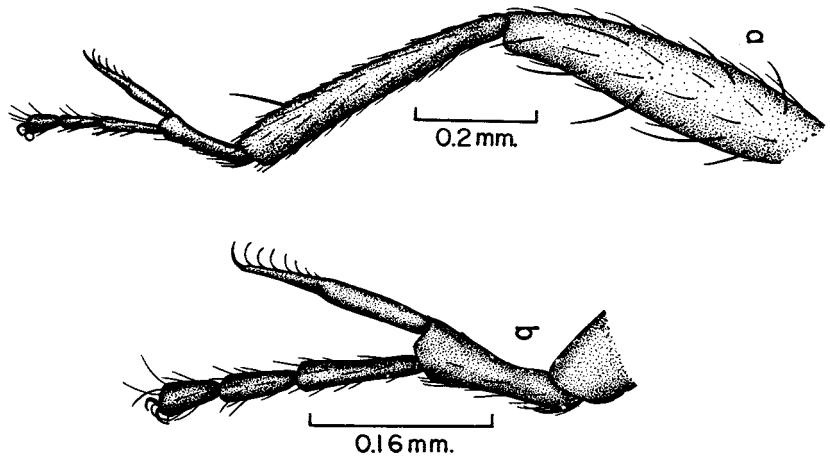


Figure 88—*Drosophila enoplotarsus* n. sp.: **a,** front tibia and tarsus; **b,** front tarsus.

the process apical in position rather than basal, by the very different development as shown in figure 88a–b, and also, by the large conspicuous dorsal bristle on the front tibia, and the nearly all-yellow thorax.

MALE. Predominantly yellow species. *Head:* The front is nearly as long as wide and is yellow, tinged with brown. The lower reclinate bristle is about equal in size to the proclinate and is situated just slightly above the latter. The vertex and upper occiput are brown; the lower occiput, genae, and face are yellow. The mouthparts, including the palpi, are yellow. The labellum is fleshy, with no spines or processes developed. The apical bristle on each palpus is tiny, poorly developed. The face is entirely white and is slightly raised down the median portion. One strong bristle is present at the upper edge of each vibrissal row. The antennae are entirely yellow; the third segment is yellow-white. Each arista has five dorsal and two ventral rays in addition to the apical fork; the anterior surface of the arista is nearly bare. *Thorax:* Entirely yellow. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. About eight rows of acrostichal setae are present. A pair of prescutelar acrostichals are moderately developed, about two times larger than the remaining acrostichal setae. The scutellum is yellow, tinged with brown on the disc. The halteres are yellow. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely pale yellow. The femora and tibiae are not ornate, except that the dorsal bristle of each front tibia is large, equal to the basal portion of the front basitarsus. The front basitarsus is very unusual in development and has an elongate process developed at the apex; this is equal in length to the next two tarsal segments, has a black spine at the apex, and a fringe of cilia along the dorsal margin (fig. 88a–b). The front tarsus contains but four apparent segments; it is possible that the projection actually represents a displaced second segment. *Wings:* Hyaline except for a faint brownish infusca-

tion in the anteroapical portion. The costal fringe extends half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.5 times longer than the fourth. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Brown, tinged with yellow or rufous. The genitalia have not been dissected for study.

Length: body and wings, 2.65 mm.

FEMALE. Unknown.

Holotype male: Kohala Ditch Trail, Honokane Nui Stream, Hawaii, August, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila eumecothrix new species (fig. 89a–d).

This species is readily differentiated from all other known Hawaiian *Drosophila* by the presence of an elongate, posterodorsal bristle on each front femur, by the great reduction of the setae in the oral vibrissae, and by the ornamentation of the front leg of the male (fig. 89c).

MALE. Rather small, largely brownish yellow species. *Head:* The front is about one-half wider than long and is predominantly yellow, tinged with brown. The orbits are brown to black. The vertical triangle, the vertex, and upper occiput are brown, tinged with black. The inner vertical bristle is thin and hair-like and is situated about halfway between the outer ocellar and the upper reclinate bristle. The lower reclinate bristle is about one-half as long as the proclinate and is situated distinctly above the latter. The oral vibrissae are poorly developed; on the upper half only fine yellow setae are present, black setae are present on the lower half. The genae are narrow, about equal in width to three rows of eye facets. The lower occiput, genae, and the face are yellow; the latter is very slightly raised in the median portion. The palpi and mouthparts are yellow. Each palpus has two moderate-sized bristles at the apex, and each labellum has a fringe of long inwardly curved spines along the apical margin (fig. 89a). The antennae are yellow, tinged with brown over the dorsal portion of the second segment and over the dorsoapical portion of the third. The second segment has two dorsal bristles. The arista has six to seven dorsal rays and two to three ventral rays in addition to the apical fork. *Thorax:* Entirely yellow-brown, covered with pale brown pollen. The anterior dorsocentral bristles are situated opposite the posterior supraalars. Six to eight rows of acrostichal setae are present. The humerus has two moderately strong bristles, and the anterior sternopleural bristle is almost four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front femora are slender and devoid of black bristles except for a very prominent preapical, posterodorsal bristle which extends two times the distance from the base of the bristle to the apex of the femur (fig. 89b), for a small black posterodorsal bristle situated near the apex, and for a long, slender ventral bristle at the base of the segment. The posterior surface of the front femur is rather thickly covered with erect brown setae. The front tibia is densely

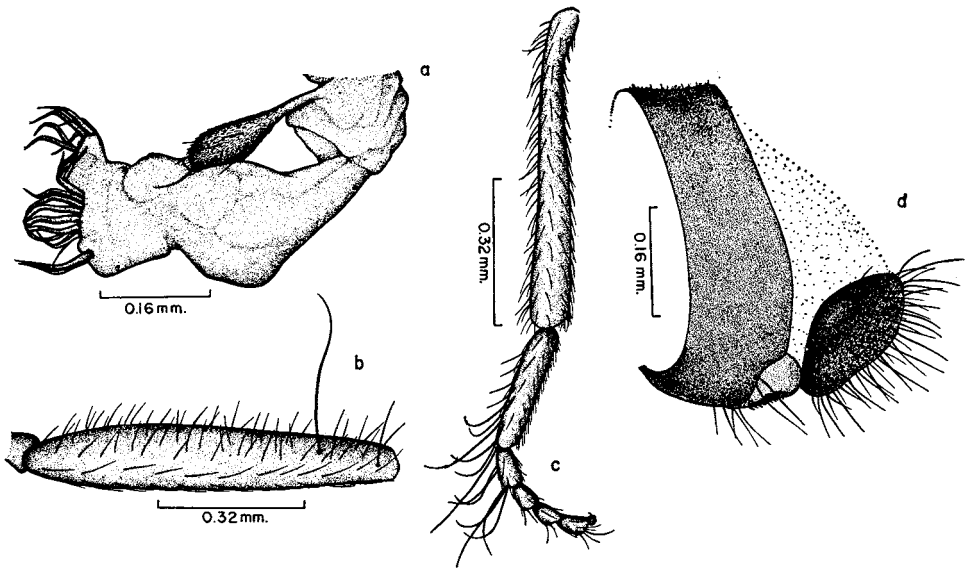


Figure 89—*Drosophila eumecothrix* n. sp.: **a,** labellum of male; **b,** front femur; **c,** front tibia and tarsus; **d,** male genitalia.

setose on the posterior and posteroventral surfaces; the hairs become longer toward the end of the segment. The preapical, dorsal bristle is tiny, scarcely differentiated from the surrounding setae. The front tarsi are rather thickly setose on the posterior surface, have long curved dorsal cilia extending over the first two segments, and moderately long posteroventral cilia along the basitarsus (fig. 89c). *Wings:* Almost three times longer than wide, faintly infuscated but with no distinct brown markings. The costal fringe extends almost half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth, and the last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Subshining brown, blackened on the sides, covered lightly with gray-brown pollen. The ninth tergum is reduced to a rather narrow rim about three times higher than long. The claspers are small, finely dentate, and scarcely visible in direct lateral view (fig. 89d). The anal lobes are about equal in height to the ninth tergum.

Length: body, 2.85 mm.; wings, 2.95 mm.

FEMALE. Unknown.

Holotype male: from Manawainui Valley, Molokai, August, 1953 (D. E. Hardy). Three male paratypes: from Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy and M. Tamashiro).

Type in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum and the University of Hawaii.

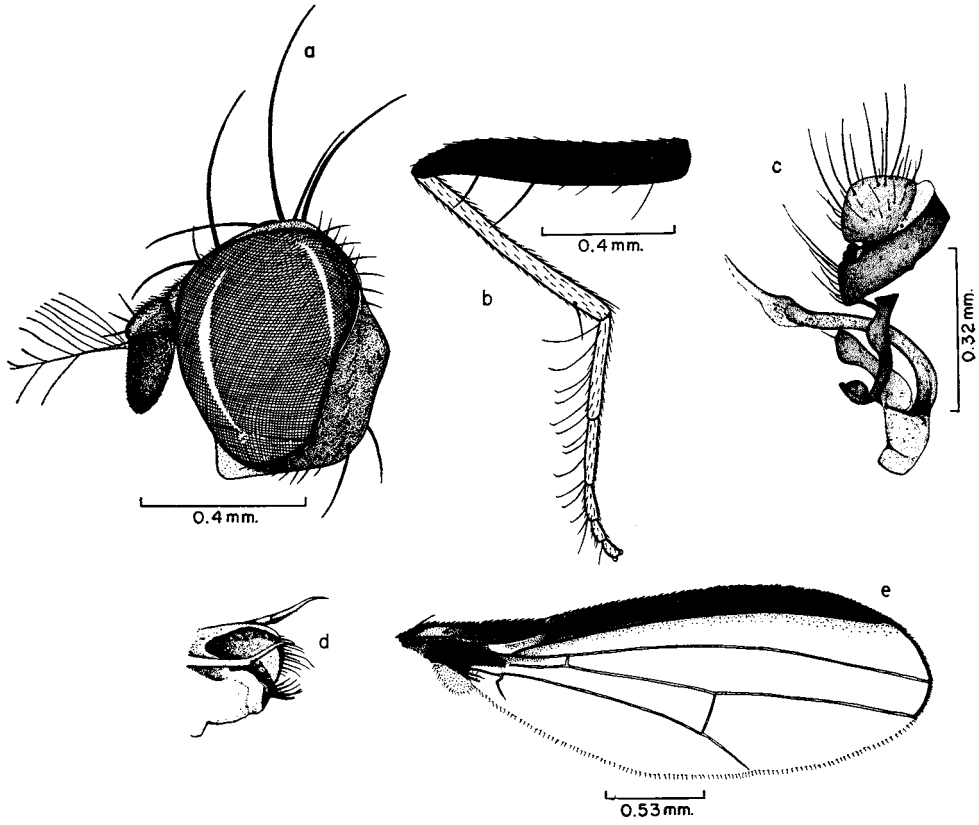


Figure 90—*Drosophila eurypeza* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** male genitalia; **d,** labellum of male; **e,** wing.

Drosophila eurypeza new species (fig. 90a–e).

This species is related to *D. setiger* Grimshaw and *imitator* n. sp. but is readily differentiated by the continuous brown marking along the anterior margin of the wing (fig. 90e) and by the very different ornamentation of the front legs and mouthparts of the male (fig. 90b, d); also the brown coxae and femora will differentiate it.

MALE. Predominantly polished black species. *Head:* Slightly higher than long (fig. 90a). The hind margin of the eye is oblique. The front is slightly wider than long and predominantly black; the anterior portion is faintly tinged with rufous and is lightly gray pollinose. The occiput is brown to black; the genae are yellow, tinged with brown. The face is largely white, the upper median portion tinged with brown. The face is just slightly raised in the upper median portion. The palpi are dark brown and each has two moderate-sized bristles at the apex. The mouthparts are yellow-brown. The labellum is extended and

has a row of teeth-like bristles along the apices; also a long slender appendage is developed from each upper margin. This has a rather strong seta at the apex (fig. 90d). The lower reclinate bristle is about two-thirds as long as the proclinate and is situated opposite the latter. The antennae are dark brown to black. The arista has about eight dorsal and two ventral rays in addition to the apical fork (fig. 90a). *Thorax:* Entirely black, polished on the dorsum, faintly gray pollinose on the sides. One humeral bristle is present. The anterior dorsocentral bristles are situated on a line drawn about halfway between the two supraalar bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The stems of the halteres are yellow, the knobs are brown to black. *Legs:* Coxae and femora brown, tinged with yellow or red; trochanters, tibiae, and tarsi yellow. Front femora rather slender and with only two bristles each on the posterodorsal and posteroventral surfaces. Front tibia lacking ciliation. Front tarsus with moderately long, curved cilia extending down the dorsal surface (fig. 90b). *Wings:* The anterior margin is brown fumose from the second costal section to the apex of vein R_{2+3}; also the basal cells are brown (fig. 90e). The third costal section is slightly over four times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of vein R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is nearly one-half longer than the penultimate section. *Abdomen:* Entirely polished black. The male genitalia are as in figure 90c. The ninth tergum is rather slender and is slightly expanded at the ventral apices. The claspers are plainly visible in lateral view.

Length: body, 2.5–2.7 mm.; wings, 2.8–3.2 mm.

FEMALE. Similar to the male except that the mouthparts and front legs are not ornate. Also, one rather strong bristle is present at the apex of each palpus. The ovipositor plates are rather broad, triangular in shape.

Length: body, 4.0–4.2 mm.; wings, 4.2–4.5 mm.

The eggs possess four long filaments.

Holotype male: Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy). Allotype female: Waialae Stream, Kauai, 3,600 feet, August, 1953 (D. E. Hardy). Forty-five paratypes (18 males and 27 females): from the following localities on Kauai—same as type; same as allotype; Mt. Waialeale Trail, 4,500 feet, August, 1953 (D. E. Hardy); Kainamanu, 3,800 feet, August, 1952 (D. E. Hardy); Halemanu Swamp, August, 1953 (D. E. Hardy); Alakai Swamp, 4,000 feet, August, 1953 (D. E. Hardy); and Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

One female specimen is on hand from Volcano, Hawaii, May 21, 1915 (A. Busck), which apparently is this species. I am not designating the specimen as a paratype, however, since it has not been associated with male specimens from Hawaii. The specimen is in the United States National Museum.

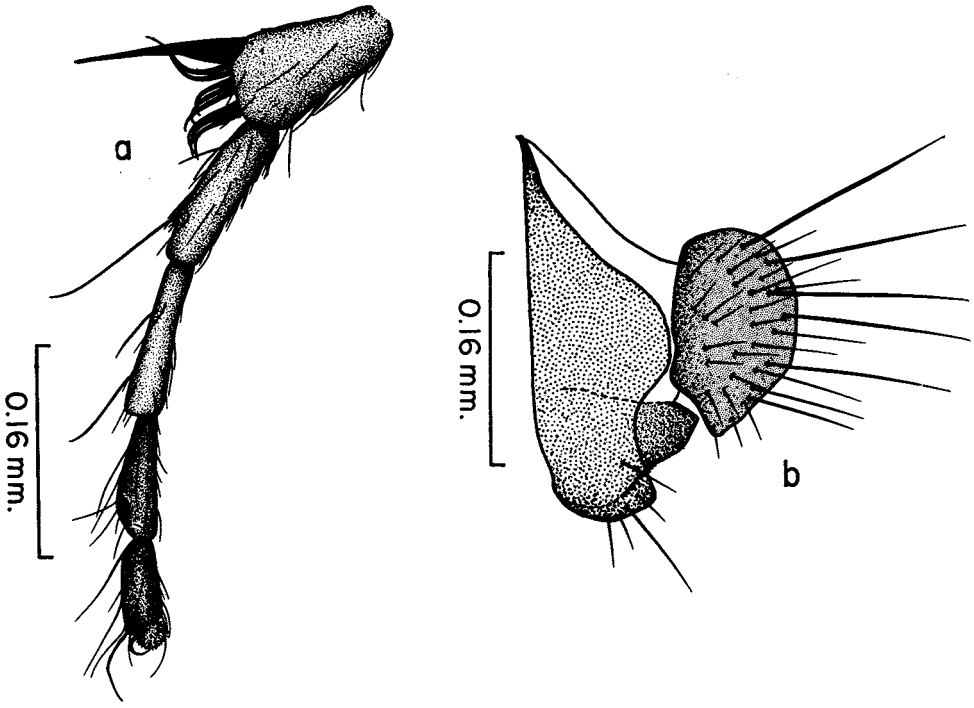


Figure 91—*Drosophila expansa* n. sp.: **a,** front tarsus; **b,** male genitalia.

Drosophila expansa new species (fig. 91a–b).

This species fits near *D. redunca* n. sp. and *seclusa* n. sp. but is differentiated by the short, expanded first tarsal segment of the front legs of the male (fig. 91a). It also differs from *quasiexpansa* n. sp. by having a strong dorsoapical prominence on the front basitarsus (fig. 91a) as well as by other details.

MALE. *Head:* About one-half longer than wide as seen from lateral view. A brown V-shaped mark occupies the median portion of the front; the orbits and ocellar triangle are black covered with gray pollen. The lower third of the occiput is yellow; the upper portion is brown. The genae are yellow; each has a brown line along the vibrissal row. In the median portion the gena is equal to about three rows of eye facets. The face is yellow, tinged faintly with brown on the upper two-thirds and brown to black in ground color below. The entire face is covered with gray pollen, and the median portion is distinctly carinate. The palpi and mouthparts are yellow; each palpus has one apical bristle about equal in size to the setae of the vibrissal row and has numerous black setae along the outside margin. The setae of the vibrissal row are approximately equal in size; no strong bristles are present. The lower reclinate bristle is equal to, or slightly longer than, the proclinate and is situated just slightly above the latter. The inner vertical bristle is about four-fifths as long as the outer bristle. *Thorax:*

Predominantly brown, tinged with black on the dorsum. The sternopleura are largely yellow, tinged faintly with brown on the upper portions. The anterior dorsocentral bristles are situated slightly in front of a line draw between the posterior supraalars. About eight rows of acrostichal setae are present. The lower humeral bristle is about three-fourths as long as the upper bristle, and the anterior sternopleural bristle is approximately three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. The front tibia is short, slightly thickened; the posterior surface is rather thickly covered with short suberect setae. The dorsal bristle on the tibia extends beyond the apex of the segment. The front basitarsus is short and expanded, about one-fifth as long as the tibia, and armed with distinctive bristles at the apex. The basitarsal ornamentation consists of a large spine-like apicodorsal process, which appears to be made up of several closely appressed bristles, and also a row of black, strongly curved bristles on the posteroapical surface (fig. 91a). The second tarsal segment is almost as long as the first and has one erect seta near the apex. *Wings:* Faintly infuscated. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.4 times longer than the fourth and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely brown covered with gray-brown pollen. The anal plates are nearly two times higher than long and are subacutely pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion, is broadly concave in the posteromedian portion, and the lower margins are shaped as in figure 91b.

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. Unknown.

Holotype male: Kaiholena, Kohala Mountains, Hawaii, 4,000 feet, August, 1952 (D. E. Hardy). One male paratype: from Kula Pipeline, Maui, 4,200 feet, July, 1958 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila fasciculisetae new species (fig. 92a–b).

This species rather closely resembles *D. pilimana* Grimshaw but is distinguished by the following characteristics: the lateral brown spots of the mesonotum are divided by cinereous vittae so that four brown stripes are present rather than just two; the front tibiae of the male lack dorsal ciliation; the front basitarsus has a large black spine-like development made up of several long hairs fused together at the basal third of the dorsal surface (fig. 92a).

MALE. Predominantly brownish yellow species, rather densely yellow-gray pollinose. *Head:* Slightly higher than long, almost quadrate in lateral view. The front is about one-fourth wider than long and dark brown to black on the lower median third to one-half; the orbits are yellow and the upper median portion is yellow, tinged lightly with brown. The face is yellow-white, slightly convex in the median portion. Two moderately strong bristles are present at the upper edge of each vibrissal row. Palpi brown, each with a moderately strong

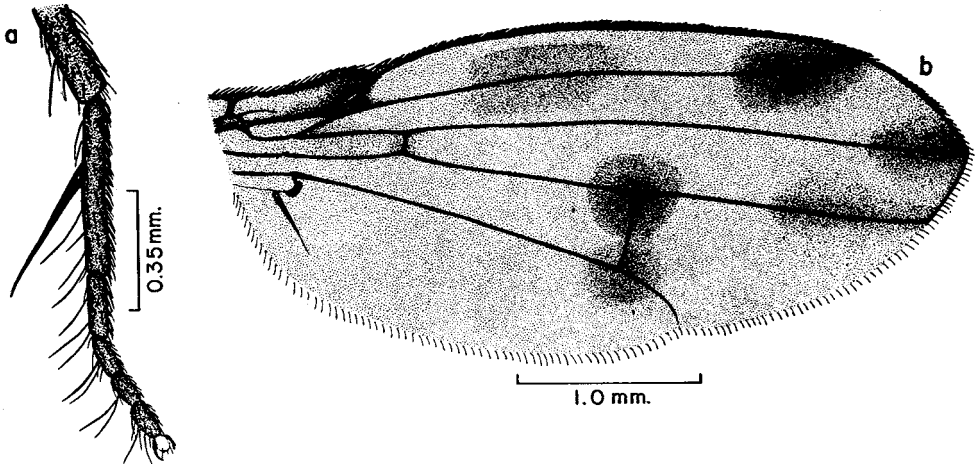


Figure 92—*Drosophila fasciculisetae* n. sp.: **a**, front tarsus; **b**, wing.

apical bristle. First two antennal segments brown, tinged with yellow, third segment dark brown. The arista with about eight dorsal and three ventral rays in addition to the apical fork and with several hairs scattered along the anterior surface. *Thorax:* Yellow-brown in ground color; the mesonotum is densely yellow-gray pubescent on the anterior and posterior portions and on the sides and has a yellow-gray vitta through the median portion and another down the dorsocentral rows. A pair of elongate subshining yellow-brown submedian spots extends from just behind the anterior dorsocentral bristle to about level with the anterior notopleural bristle. The sublateral yellow-brown vittae are more obscured by the pollen and extend from the suture to the inner postalar bristle. The anterior dorsocentral bristles are situated slightly behind a line drawn between the second pair of supraalars. Two moderately strong humeral bristles are present. The scutellum is yellow-brown on the disc, pale yellow around the margin. The metanotum and the humeri are yellow, and the pleura are predominantly so, with a streak of brown across the upper edges of the mesopleuron, the pteropleuron, and the metapleuron; the upper posterior portion of the sternopleuron is also brown. *Legs:* Entirely yellow. The front tibiae lack long ciliation. Each front tarsus has moderately long anterodorsal ciliation extending from about the apical half of the basitarsus over the fourth tarsal segment; the basitarsus has a large bristle-like process before the middle of the dorsal surface; this is apparently made up of three or more long black hairs fused together (fig. 92a). The basitarsus is just slightly over half as long as the tibia. *Wings:* Nearly three times longer than wide. The third costal section is 3.4 times longer than the fourth section and the costal fringe extends about two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. A moderately large brown spot is present at the apical portion of the second costal cell and extends over the bases of cells R_1 and R_3; a large brown spot is present in the median portion of cell

R_1, and brown spots are present on the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}; also a large dumbbell-shaped brown spot extends over the m crossvein (fig. 92b). The last section of vein M_{1+2} is about one-fourth longer than the penultimate section. The proportions are 43 to 35. *Abdomen:* The posterior margins and the median portions of the terga are brown. The anterior corners are broadly yellow-gray. The genitalia have not been relaxed for study.

Length: body, 4.50 mm.; wings, 4.75 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor plates are moderately slender and are almost as long as the ventral portion of the seventh abdominal segment.

Length: body, 4.8–5.2 mm.; wings, 5.0–5.5 mm.

Holotype male, allotype female, and two female paratypes: from Waialua Valley, Molokai, July, 1952 (Ed Dresner). Also three paratypes (one male and two females): from Waikamoi, Maui, 4,000 feet, August, 1958 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum and the University of Hawaii.

Drosophila fastigata new species (fig. 93a–c).

This species fits near *D. spicula* from Hawaii but is differentiated by having the front basitarsus over one-third as long as the tibia, and lacking dorsal cilia at the apex but with two black anteroventral cilia before the apex (fig. 93a), also by the anterior dorsocentral bristles being situated opposite the second (posterior) supraalars.

MALE. *Head:* The front is brown, tinged with yellow in the median portion and on the lateral margins below the proclinate bristles. The upper orbits, the ocellar triangle, the vertex, and upper occiput are dark brown to black covered with gray-brown pollen. The median portion of the occiput is brown, the lower third is yellow. The genae are yellow except for a brown to black line extending along the vibrissal row. The genae are very narrow; the distance between the vibrissal row and the eye margin, measured in the median portion, is scarcely wider than one row of eye facets. The face is yellow with a tinge of brown to black on the lower portion. The median portion of the face is raised into a low carina. The clypeus is brown. The palpi and mouthparts are yellow. Each palpus has several black setae but no distinct bristles over the outside surface. The mouthparts are not ornate. The anterior reclinate bristle is one-third to one-half longer than the proclinate and is situated slightly above the latter. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in length to the proclinate bristles. The antennae are mostly yellow, tinged with brown on the third segment and on the dorsal surface of the second segment. The second segment has three or four short, black, dorsal bristles. The arista has about five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly dark brown covered with gray-brown pollen. The anterior dorsocentral bristles are situated opposite the second (posterior) supraalars. About eight rows of acrostichal setae are present. Each humerus

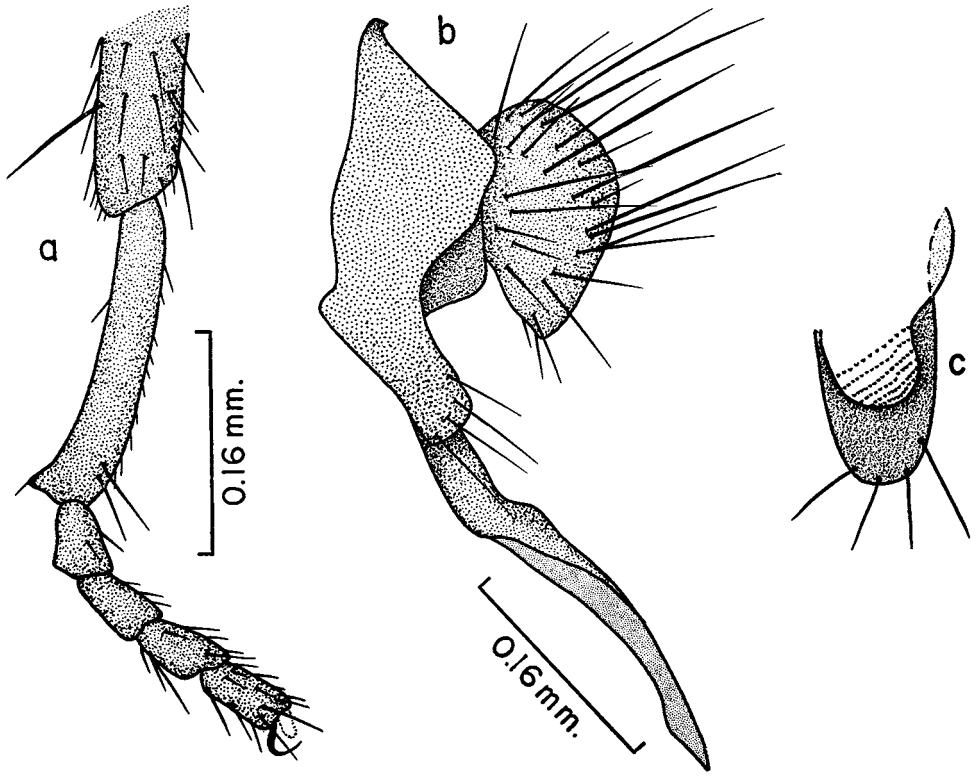


Figure 93—*Drosophila fastigata* n. sp.: **a,** front tarsus; **b,** male genitalia; **c,** inner view of male clasper (diagrammatic, not to scale).

has two strong bristles. The anterior sternopleural bristle is subequal to the posterior bristle. *Legs:* Entirely yellow except for a faint tinge of brown on the apices of the tarsi. The tibiae lack ornamentation. The preapical dorsal bristle is situated about its own length from the apex of the tibia. The front basitarsus is slightly over one-third as long as the tibia, is developed into a distinct dorsal point apically, and possesses two black, ventral, preapical hairs (fig. 93a). The second tarsal segment is very short, scarcely over one-sixth as long as the first. *Wings:* Subhyaline, very faintly infuscated. The third costal section is 4.37 times longer than the fourth, and the costal fringe extends halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* The first tergum is distinctly marked with yellow and is brown at the apex. Terga 2–5 are entirely brown, covered with gray-brown pollen. The sixth tergum is yellow with a faint tinge of brown. The anal plates are nearly two times higher than long and are acutely pointed ventrally. The ninth tergum is strongly narrowed across the dorsal portion, the posterior median margin is convex, and the ventral portion is developed into a moderately long lobe on each side (fig. 93b). Each clasper is produced into a

broad, obtuse anteroventral lobe which is hidden from view (as seen from the side) by the ventral lobes of the tergum. The inner surface of the clasper has numerous striations made up of microscopic teeth (fig. 93c).

FEMALE. Unknown.

Holotype male: Pupukea, Oahu, July, 1958, collected in banana thicket (D. E. Hardy). Two male paratypes: from the following localities on Oahu—Poamoho Trail, 1,700 feet, May, 1953 (D. E. Hardy); and Mt. Kaala, 2,900–3,500 feet, April 21, 1929 (E. H. Bryan, Jr.).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila flavibasis new species (fig. 94a–d).

This species fits in the complex which has no brown markings over the apical portion of the wing but which has the m crossvein infuscated. It fits near *olaae* Grimshaw but is differentiated by the yellow pleura and legs, by the short basitarsus of the front legs, by the difference in the ciliation of the front tarsus, as well as in other details.

MALE. *Head:* Front about one-fourth wider than long, predominantly reddish brown, yellow along the lower margin. The vertex and the upper occiput are black, covered with gray pollen. The lower portion of the occiput, the genae, mentum, palpi, and mouthparts are yellow. The face is yellow, tinged with brown on the lower half; a distinct carina extends down the middle of the face about two-thirds its length and the lower median portion is flat. No strong bristles are present in the vibrissal rows; the setae of the upper portion of each row are small, hair-like. Each palpus has a strong, slender apical bristle which is nearly equal to distinctly longer than the segment. The outside surface of each palpus is densely black setose. The labella are ornate, each with a fringe of curved yellow spines along the margin (fig. 94a). The lower reclinate bristle is situated opposite or slightly in front of the proclinate bristle. The front is rather distinctly gray pruinose. The antennae are yellow-brown. The arista has seven to nine dorsal and three to four ventral rays in addition to the apical fork. *Thorax:* Entirely dark brown on the dorsum, yellow on the sides. Only one pair of strong dorsocentral bristles present; the secondary pair is represented by a weak bristle on each side, which is scarcely two times longer than the acrostichal setae, and situated about opposite the second pair of supraalar bristles. About eight rows of acrostichal setae are present. Halteres pale yellow. Anterior sternopleural bristle about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front femora are rather slender. The posteroventral bristles are about one-third longer than the width of the femur. Front tibiae not ornate. Front tarsi with moderately long anterodorsal ciliation extending over the first three segments (fig. 94b). The basitarsus is about one-third as long as the tibia. *Wings:* Subhyaline with a brown infuscation over the m crossvein. The wings are about 2.6 times longer than wide. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The

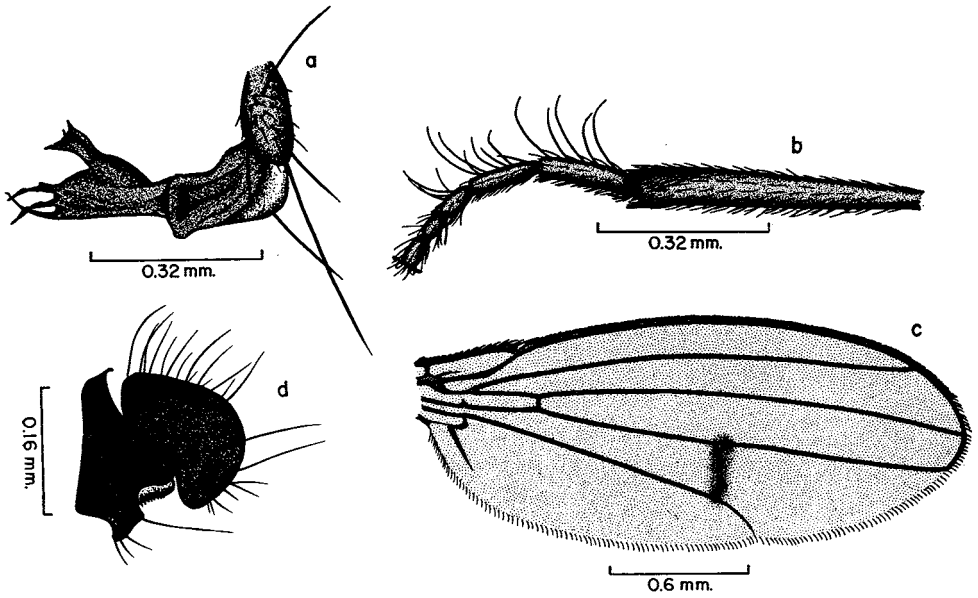


Figure 94—*Drosophila flavibasis* n. sp.: **a,** labellum; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

third costal section is 4.6 times longer than the fourth; the last section of vein M_{1+2} is 1.22 times longer than the penultimate section (fig. 94c). *Abdomen:* Predominantly shining, dark brown to black; the basal segment is yellow. The anal plates are about two times higher than long. The ninth tergum is slightly narrowed dorsally, nearly straight-sided, and tapered to a point on each ventral margin (fig. 94d).

Length: body, 2.75 mm.; wings, 3.50 mm.

FEMALE. Fitting the description of the male in most respects. At least one moderately strong bristle is present at the upper edge of each vibrissal row. The ovipositor plates are short and blunt, with fine teeth around the apex.

Holotype male: Halemanu Swamp, Kauai, August, 1953 (D. E. Hardy). Allotype female: Nualolo Valley, Kauai, August, 1953, 3,400 feet (D. E. Hardy). Eight paratypes (all males): from the following localities on Kauai—same as allotype, July, 1952, and August, 1953 (D. E. Hardy); and Waipoo Falls, August, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila flaviceps Grimshaw.

Drosophila flaviceps Grimshaw, 1901, Fauna Hawaiiensis 3:63.

Endemic. Hawaii (type locality: Kona, 3,500 feet).

The type was in the British Museum collection but has been lost; the label and pin are present but the specimen and nadel are missing.

I am unable to place this species; none of the species which I have taken on the island of Hawaii appears to fit Grimshaw's description. *D. flaviceps* seems to be related to the *haleakalae* group but differs by having the antennae bright yellow, and probably also in many other details. It would appear to be closely related to *D. melanoloma* n. sp. from Molokai and Maui, but the original description indicates that the front is light yellow except for being a little darker on the orbits and vertical triangle, and also the last section of vein M_{1+2} is equal in length to the penultimate section. In *melanoloma* the upper two-thirds to three-fifths of the front is black and the last section of vein M_{1+2} is about one-half longer than the penultimate section. In addition to the above notes the original description indicates that the face is grayish yellow, the mouthparts and palpi are yellow. The thorax is dark cinereous, somewhat shining. The pleura are shining, blackish brown, and the scutellum is dark brown, tinged with yellow. The wings are rather narrow and hyaline with the apical half slightly infuscated.

Length: body, "2¼mm"; wings, "2½ mm."

Drosophila flavisternum new species (fig. 95a–d).

This species is apparently a fungus feeder and fits in the *haleakalae* complex near *pretiosa* n. sp. It is differentiated from this species by having two erect posteroventral hairs on the front tibia of the male (fig. 95b); by having the leg segments longer, with the front tibia measuring an average of 0.66 mm. as compared to 0.38 mm. for the basitarsus; also the ventral lobes of the ninth tergum are more thickly setose (fig. 95d). This species is also probably related to *flaviceps* Grimshaw but I cannot be sure of the identity of that species. *D. flavisternum* is apparently differentiated from *flaviceps* by the yellow sternopleura and by having the last section of vein M_{1+2} 1.5 times longer than the penultimate section rather than the two sections being equal.

MALE. *Head:* Front about as wide as long, the upper three-fifths dark brown to black, the lower portion yellow. The lower reclinate bristles are three-fourths to four-fifths as long as the proclinates and are situated just slightly above the latter. Antennae yellow except for a slight tinge of brown on the upper portion of the second segment. Second segment with two moderately strong dorsal bristles. Arista with six dorsal and two ventral rays in addition to the apical fork. The inner surface of each arista has just a few short, sparsely placed hairs on the apical half. The face is entirely yellow-white; the median portion is concave especially on the lower half. The genae, lower portion of the occiput, mouthparts, and palpi are pale yellow. Two or three moderately strong black bristles are present at the upper portion of each vibrissal row. The palpi are slender, each with a moderate-sized apical bristle and several short, black setae extending along the outside surface. Each labellum has a heavily sclerotized black rim at the apex (fig. 95a). *Thorax:* Predominantly subshining black, lightly gray dusted; the lower halves of the pleura and all of the sterna are yellow. The

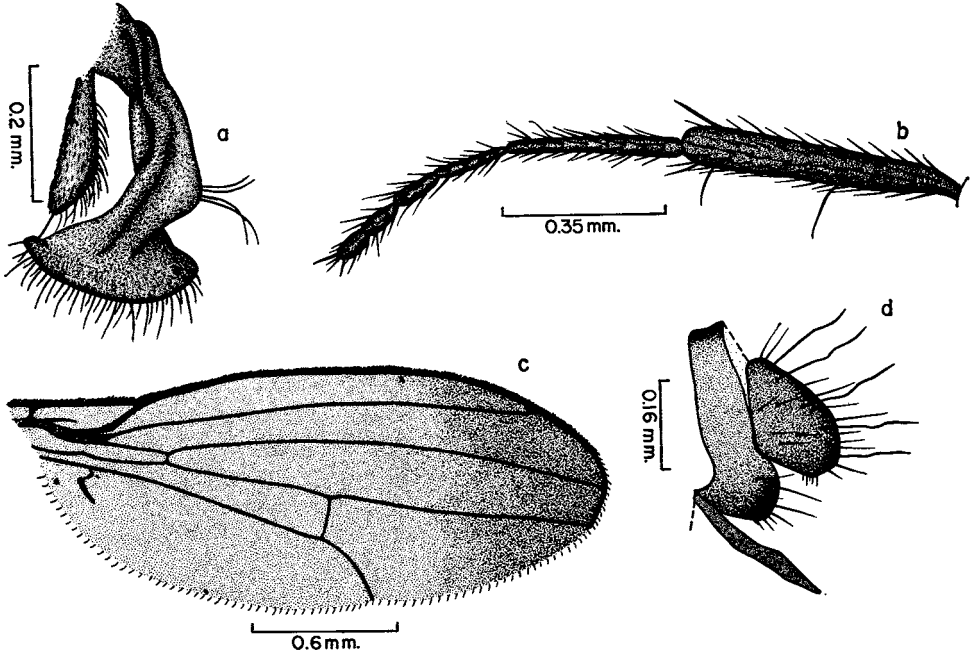


Figure 95—*Drosophila flavisternum* n. sp.: **a,** labellum of male; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

lower portion of each humerus, the hind part of each notopleuron, the area around the wing bases, the apex of the scutellum, and the halteres are yellow. The anterior dorsocentral bristles are situated about opposite the second pair of supraalars. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow, except for the brown apical segments of the tarsi. The legs are not ornate except for a prominent posteroventral hair at middle of front tibia and another just before the apex (fig. 95b). The front basitarsus is slightly less than two-thirds as long as the tibia. *Wings:* The entire membrane is faintly infuscated but the apical third to one-fourth is more distinctly pale brown fumose. The third section of the costa is slightly more than four times longer than the fourth. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_{2+3} does not curve upward noticeably at the apex. Veins R_{4+5} and M_{1+2} converge slightly toward their apices. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section (fig. 95c) and the last section of vein M_{3+4} is nearly two times longer than the m crossvein. *Abdomen:* The terga are brown, except that the apical portion of the sixth is usually tinged with yellow. The conjunctiva between the segments and the sterna are yellow. The ninth tergum is moderately broad, not narrowed dorsally, and is rounded on each ventral margin; each ventral margin has one strong bristle and a clump of small setae. The anal plates

are about equal in length to the ninth tergum (fig. 95d). The row of teeth at the apex of each clasper is about equal in length to the width of the lobes of the ninth tergum.

Length: body and wings, 2.7–3.1 mm.

FEMALE. Fitting the description of the male in most respects. The third antennal segment, however, is tinged with brown and the palpi also are brownish tinged. The aristae have seven dorsal rays in the typical specimens, with five or six dorsal rays in some, and some specimens also have three ventral rays. The brown infuscations on the wings are confined along the apical portions of veins R_{2+3}, R_{4+5}, and M_{1+2}. In some the apical fourth of the wing is rather evenly infuscated. The ovipositor plates are short and blunt.

Length: body, 3.50 mm.; wings, 3.75 mm.

Holotype male, allotype female, and three paratypes (two males and one female): from Pupukea, Oahu, December, 1952, and July, 1958, collected in banana thicket (D. E. Hardy). Also one paratype male: from Mt. Kaala, Oahu, April 3, 1953 (C. P. Hoyt).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes deposited in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila freycinetiae new species (fig. 96a–d).

This species is apparently rather closely related to *D. perissopoda* n. sp. but the peculiarly developed lobe at the base of the front basitarsus as well as the differences in the wing markings and other details, readily differentiate the species.

MALE. *Head:* Slightly higher than long. The front is as long as wide, the lower portion is yellow to rufous, the upper two-thirds is reddish, tinged with brown; the orbits are pale brown from the vertex to the proclinate bristles. The ocellar triangle, vertex, and upper occiput are brown, tinged with black. The lower occiput, genae, face, and mouthparts are entirely yellow, except for a black rim at the apex of each labellum (fig. 96a); this rim has tiny serrations along the edge. The face has a distinct carina down the median portion. The hairs of each vibrissal row are approximately equal in size and are brown to black. Antennae entirely yellow; the arista has four dorsal and two ventral rays in addition to the apical fork; the anterior surface is bare. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated distinctly above the latter. *Thorax:* Brown, tinged with red on the dorsum, yellow on the sides. The scutellum is yellow-brown on the disc, yellow around the margin. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Two moderately strong humeral bristles are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. Halteres yellow, tinged lightly with brown on the knobs. *Legs:* Entirely yellow. Front tibia not ornate. Front basitarsus with a strong finger-like poste-

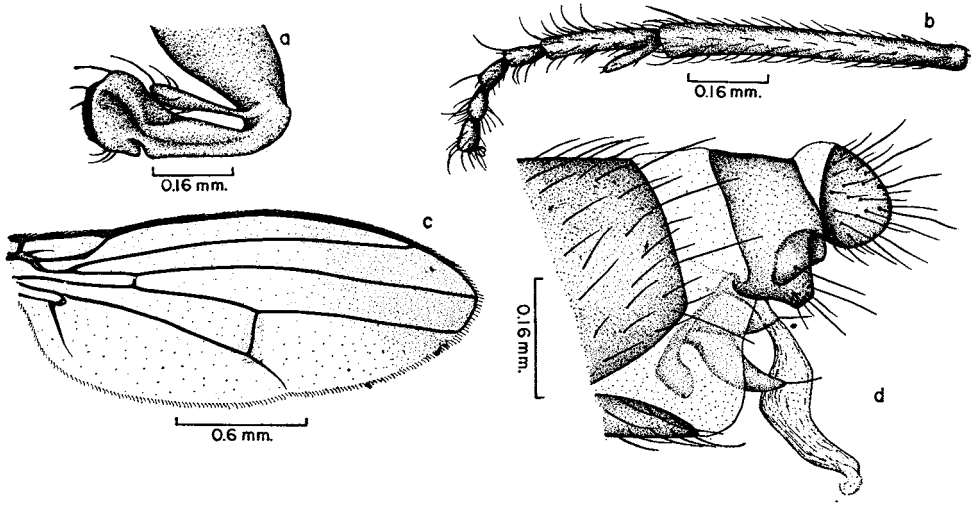


Figure 96—*Drosophila freycinetiae* n. sp.: **a,** labellum; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

rior lobe at the base; this extends half the length of the basitarsus (fig. 96b). The basitarsus is about two-fifths as long as the tibia and slightly over two times longer than the second tarsal segment; the basitarsus is flattened postero-anteriorly and the posterior surface has a dense patch of very small peg-like setae on the basal half; these correspond with a row of short peg-like setae which extend down on the inner surface of the posterior lobe. Rather sparse yellow cilia are present down the dorsal surface of the tarsus. *Wings:* About three times longer than wide. The third costal section is nearly four times longer than the fourth and the costal fringe extends nearly two-thirds the distance between the tips of veins R_{2+3} and R_{4+5}. The anteroapical portion of the wing is faintly brown fumose, and a faint infuscation is present over the m crossvein. The r–m crossvein is situated near the basal third of cell 1st M_2 and the last section of vein M_{1+2} is about two-fifths longer than the penultimate section (fig. 96c). *Abdomen:* Shining brown to black, faintly tinged with rufous along the anterior margins of the segments. The dorsum of the abdomen is lightly gray pollinose. The male genitalia are as in figure 96d. The ninth tergum is rather broad and is truncate on the ventral margins. The parameres are prominent and each is gradually tapered to a sharp point.

Length: body, 2.1 mm.; wings, 2.4 mm.

FEMALE. Fitting the description of the male in most details; however, the front legs are not ornamented. The ovipositor plates are rather short, triangular, and with fine serrations around the ventral margin.

Length: body, 2.30–2.50 mm.; wings, 2.50–2.75 mm.

Holotype male, allotype female: from Mt. Tantalus, Oahu, August, 1952, collected on *Freycinetia* (ieie) (D. E. Hardy and M. S. Adachi). About forty

paratypes (sexes evenly distributed): from the following localities on Oahu—same as type, November, 1953, August, 1955 (D. E. Hardy and M. S. Adachi); Mt. Kaala, April, 1946 (W. W. Wirth), and April–June, 1949, on *Freycinetia* (G. B. Mainland); Manoa Cliff Trail, July 25, 1917 (no collector given); Palolo Ridge, April 8, 1917 (no collector given); Haleanau Valley, Mt. Kaala, April, 1949, on *Freycinetia* (G. B. Mainland).

Drosophila fundita new species (fig. 97a–c).

This species fits in the complex which is characterized by having only four visible segments in the front tarsus of the male and a strong apical appendage on the front basitarsus (fig. 97a). It is differentiated from other species of this complex by having numerous black dorsal hairs extending over the basal portion of the basitarsal appendage.

MALE. *Head:* The front is brown except for a yellow streak along the lower portion of each eye orbit. The upper orbits, the vertex, the ocellar triangle, and upper occiput are brown covered with gray-brown pollen. The median portion of the front is brown, the lower portion is yellow. The genae are yellow except for a faint streak of brown along the vibrissal row. The face is yellow except for a discoloration of brown on the lower median portion. The face is slightly convex in the median portion. The clypeus is faintly tinged with brown. The palpi and mouthparts are yellow. No distinct bristles are present on the palpus, several black setae extend around the apical surface. The anterior reclinate bristle is about four-fifths as long as the proclinate and is situated slightly above the latter. The antennae are yellow-brown. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. *Thorax:* Brown on the dorsum, gray on the sides. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the second supraalars. Six to eight rows of acrostichal setae are present. The anterior sternopleural bristle is almost as strong as the posterior bristle. *Legs:* The front tarsi are four-segmented with the basitarsus extended into a dorsal appendage at the apex; this appendage is almost equal in length to the base of the segment and has numerous black hairs over the basal portion (fig. 97a). The second tarsal segment is considerably longer than the appendage on the basitarsus. The second and third segments each have approximately two long dorsal hairs at the apex. *Wings:* Almost hyaline, faintly infuscated. The third costal section is four times longer than the fourth, and the costal fringe extends just slightly over one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.8 times longer than the penultimate section. *Abdomen:* The terga are entirely subshining brown covered with gray-brown pollen. The anal plates are about two times higher than long and are slightly pointed ventrally. The ninth tergum is narrowed over the dorsal portion and is distinctly lobate ventrally. The claspers are plainly visible in direct lateral view (fig. 97b).

Length: body, 2.2 mm.; wings, 2.5 mm.

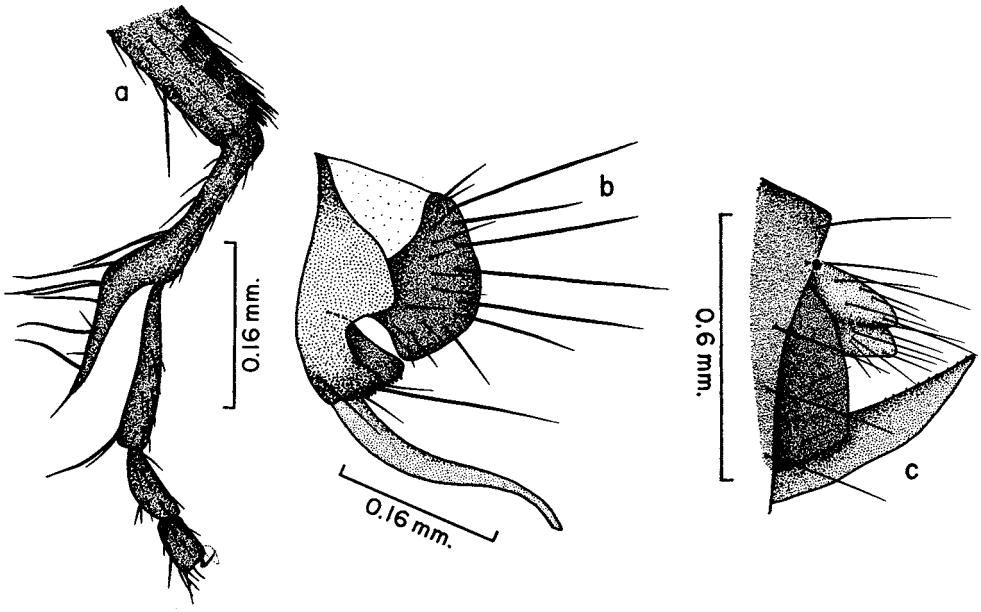


Figure 97—*Drosophila fundita* n. sp.: **a**, front tarsus; **b**, male genitalia; **c**, female genitalia.

FEMALE. Fitting the description of male except for sexual differences. The entire body is brownish yellow. The ovipositor blades are rather long and slender, about three times longer than the anal plates (fig. 97c).

Holotype male: Puu Kukui, Maui, 4,500 feet, April, 1954 (M. Tamashiro). Allotype female: Haelaau, Maui, December 21, 1928 (O. H. Swezey). Five paratypes (all males): three same locality as type, 3,000–4,500 feet, June, 1953 (D. E. Hardy and C. R. Joyce); one same data as allotype; and one from Upper Olaa Forest, Hawaii, July, 1958 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum, the Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila funebris (Fabricius) (fig. 98a–c).

Musca funebris Fabricius, 1787, Mantissa Insectorum 2:345.

Drosophila clarkii Hutton, 1901, Trans. New Zealand Inst. 33:91.

Immigrant. A cosmopolitan species common throughout much of the world. This is the first record for this species in Hawaii. It is not known to be established here. To date only one specimen has been seen. This was collected at Kula Pipeline, Maui, 4,500–5,000 feet, March 15, 1932 (O. Bryant). This specimen has been compared with specimens from the University of Texas collection collected at Hampton, New Hampshire.

This is the type of the genus *Drosophila*.

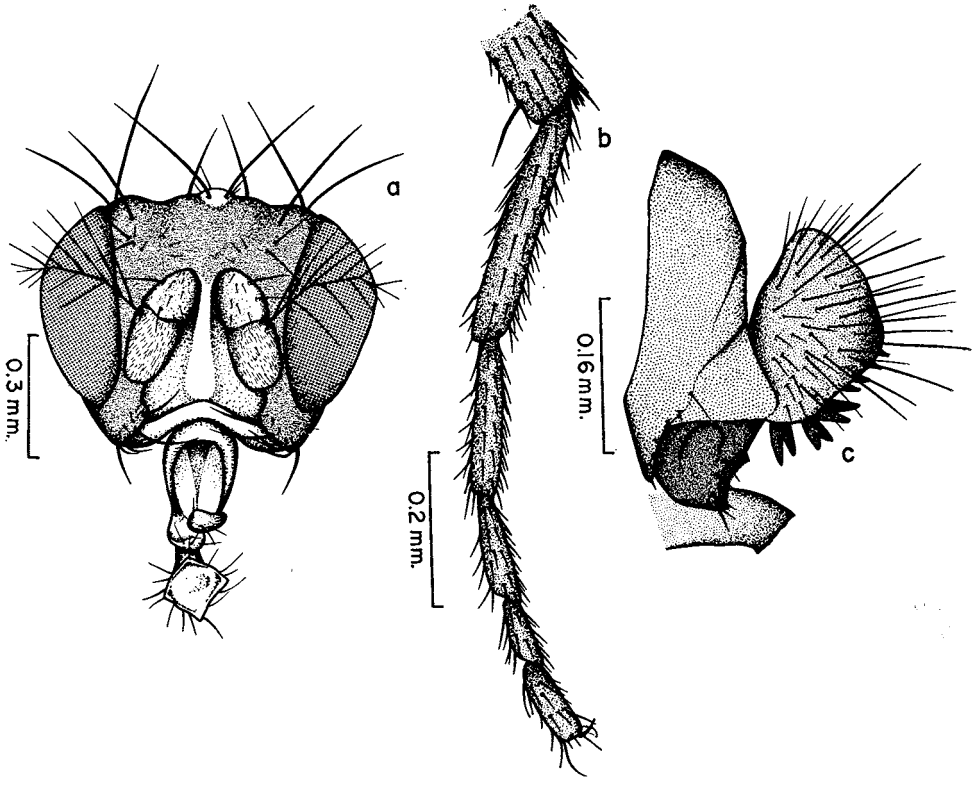


Figure 98—*Drosophila funebris* (Fabricius): a, head, frontal view; b, front tarsus; c, male genitalia.

Type locality: "Hafniae Dom. Lund."

The type is probably not extant.

This species is readily recognized by its distinctive male genitalia (fig. 98c), by the yellow-brown coloration of the body, the flat carina down the middle of the face, and by the lack of ornamentation on the front tarsi.

It appears most unusual that the only known specimen of this species would have been taken at Kula Pipeline, Maui. This is in the Waikamoi section on the wet slopes of Haleakala at an elevation of about 4,000 feet, and is a region rich in both endemic flora and fauna. The following introduced species, however, were also taken in the same area in 1932 by Mr. Bryant: *Drosophila busckii* Coquillett; *D. hydei* Sturtevant; *D. melanogaster* Meigen; and *D. mercatorum* Patterson and Wheeler (= *carinata* Grimshaw).

D. funebris is a predominantly brownish red species. The thorax is distinctly tinged with yellow in the ground color, especially on the pleura. The front is yellow along the lower portion and reddish brown above a level with the proclinate bristles. The eye orbits are tinged with brown to black. The face is

yellow, tinged with brown along the lower portion. The median carina is large and conspicuous (fig. 98a). The anterior reclinate bristle is rather small, about two-thirds as long as the proclinate and situated distinctly above the latter. Two strong bristles are present in each vibrissal row. The genae are comparatively broad; measured from the vibrissal row to the eye margin and at a level with the lower portion of the eye, each gena is equal in width to five or six rows of eye facets. The palpi and mouthparts are yellow. Each palpus has one small apical and one preapical bristle. The labella are not ornate. The anterior dorsocentral bristles are situated about halfway between the first and second pair of supraalars. About eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is approximately two-thirds as long as the posterior bristle. The legs are not ornate. The front basitarsus is about two-fifths as long as the tibia and approximately one-third longer than the second tarsal segment (fig. 98b). The wings are entirely hyaline. The third costal section is 3.3 times longer than the fourth, and the costal fringe extends almost halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately 1.3 times longer than the penultimate section. The abdomen is brown, tinged with rufous, and the first tergum of the male is mostly yellow, marked with brown on the sides. The female specimen on hand (from New Hampshire) has yellow markings on the posterior lateral margins of all the abdominal terga. The male genitalia are very distinct as shown in figure 98c. Each anal plate possesses spines at the apex and on the ventral portion. The ninth tergum is broad, spinose on the ventral lobe, and fused with the claspers. The female ovipositor is short, rather inconspicuous *in situ*, extending about as far as the anal plates and with a row of spines around the margin.

Length: body and wings, 3.0 mm.

For more complete descriptive details refer to Sturtevant (1921:85), Patterson (1943:110), Hsu (1949:104, pl. XI, fig. 1), and Harrison (1952:515).

Drosophila fungicola new species (fig. 99a–d).

This species fits in the *haleakalae* complex near the species which lack the sclerotized black border at the apex of the labellum and which lack long ciliation on the front tarsus of the male. It is differentiated from related species by the brown front coxae, by the all-black face and genae, by the narrow genae (in the median portion only about two eye facets wide from the eye margin to the vibrissal row), and by the slender, rather elongate front tarsus (fig. 99a).

MALE. *Head:* Scarcely over one-sixth higher than long. Front black on the upper two-thirds, yellow to rufous below. Face black with a faint tinge of yellow on the extreme upper portion; the median portion is slightly convex longitudinally and the lower margin is slightly concave. The genae are dark brown to black except for a narrow yellow rim around the orbits. The occiput is dark brown to black, yellow on the lower portion. The clypeus and the palpi are brown; the mouthparts are otherwise yellow, tinged lightly with brown. The labella are not ornate; the margins, however, are fringed with moderately long

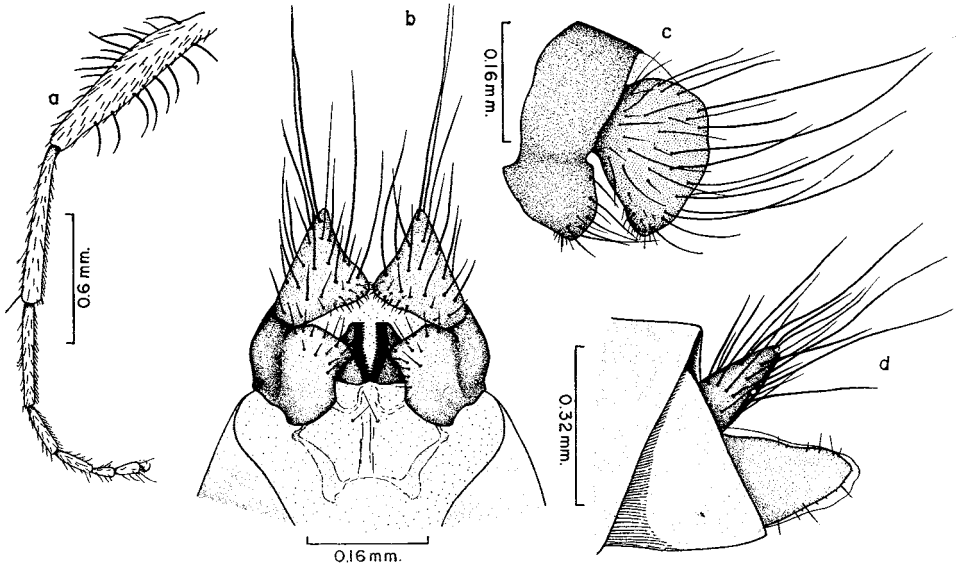


Figure 99—*Drosophila fungicola* n. sp.: **a,** front leg; **b,** male genitalia, ventral; **c,** male genitalia, lateral; **d,** female genitalia.

yellow hairs. Each palpus has a strong apical bristle and a moderately strong preapical bristle, the latter situated on the outside surface. The lower reclinate bristle is about one-half as long as the proclinate and is situated distinctly above the latter. The antennae are brown except for the yellow first segment, extreme apex, and base of the second and third segment. The second segment has three moderately strong black dorsal bristles. The arista has five or six dorsal and three ventral rays in addition to the apical fork; the anterior surface is rather thickly haired. All of the setae making up the vibrissal row are black; two strong bristles are present at the upper edge. *Thorax:* Shining black in ground color covered with gray pollen. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the second pair of supraalars. The scutellum is black, except for a large yellow spot at the apex. Two moderately strong humeral bristles are present. The anterior sternopleural bristle is about one-half as long as the posterior bristle. Halteres pale yellow. *Legs:* Yellow except for the brownish yellow front coxae (sometimes all yellow) and apical segments of tarsi. Front femur rather densely black setose on the dorsal and posterodorsal surfaces. Posterodorsal surface also with four or five moderately strong bristles; posteroventral surface with about eight strong bristles. Front tibiae and tarsi lack long ciliation but the tarsi do have some short erect setae on the dorsal surface. The front basitarsus is about two-thirds as long as the tibia (fig. 99a). *Wing:* Fitting the description and figure of *D. haleakalae* (fig. 107c). The last section of vein M_{1+2} is 1.35 times longer than the penultimate section. *Abdomen:* Entirely polished black, faintly gray pollinose on the dorsal surface. Genitalia

as in figure 99b and 99c. The anal plates are about one-half higher than long and the ninth tergum is broad, almost straight-sided.

Length: body, 3.2–3.5 mm.; wings, 3.8–4.3 mm.

FEMALE. Fitting the description of the male except that the front coxae are yellow. The ovipositor plates are short and broad, extending just slightly beyond the apices of the anal plates (fig. 99d).

Length: body, 3.5–3.7 mm.; wings, 4.2–4.6 mm.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Allotype female: Bird Park, Kilauea, Hawaii, July, 1953 (D. E. Hardy). Sixty-nine paratypes (37 male and 32 female); from the following localities on Hawaii—same as type; same as allotype; Pauahi, 4,300 feet, August, 1952 (D. E. Hardy); North slope of Hualalai, 4,000–6,000 feet, July, 1953, collected on bracket fungi (D. E. Hardy), and April 20, 1944, 6,000–6,500 feet (N. L. H. Krauss); Hawaii National Park, March, 1946 (W. W. Wirth), and March, 1954 (R. Namba); and Kilauea, February and August, 1919 (O. H. Swezey).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila furva new species (fig. 100a–b).

This species rather closely resembles *D. clydonia* but the front legs of the male lack the long dorsal ciliation, the mesonotum is brown and lacks the yellow vittae, and the wings lack a basal brown mark (fig. 100b).

MALE. Small dark-bodied species. *Head:* The front is about two-thirds wider than long; the length is measured from the upper portion of the ocellar triangle to the anterior median margin of the front. The median portion of the front, the orbits, and the anterior margin are yellow, the remainder is brown. The occiput and vertex are brown to yellow. The genae, face, palpi, and mouthparts are yellow. The face is nearly flat, just slightly raised down the median portion. No strong bristles are present in the vibrissal rows. The lower reclinate bristle is small, hair-like, about half as long as the proclinate, and situated opposite the latter. The first two antennal segments are yellow, tinged lightly with brown; the third segment is brown. The arista has five dorsal rays and three ventral rays in addition to the apical fork. *Thorax:* Entirely brown except for the yellow lower portion of each humerus, rather densely gray-brown pollinose. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The anterior sternopleural bristle is about one-half as long as the posterior bristle. Each humerus has one black bristle and one fine yellow-brown hair. *Legs:* Entirely yellow. Front tibia not ornate. Front tarsus with comparatively short cilia extending down the dorsal surface (fig. 100a). *Wings:* Approximately three times longer than wide. The brown markings are as in figure 100b. A transverse brown band extends across the middle of the wing at a level with the m crossvein. A brown spot is present at the apical fourth of cell

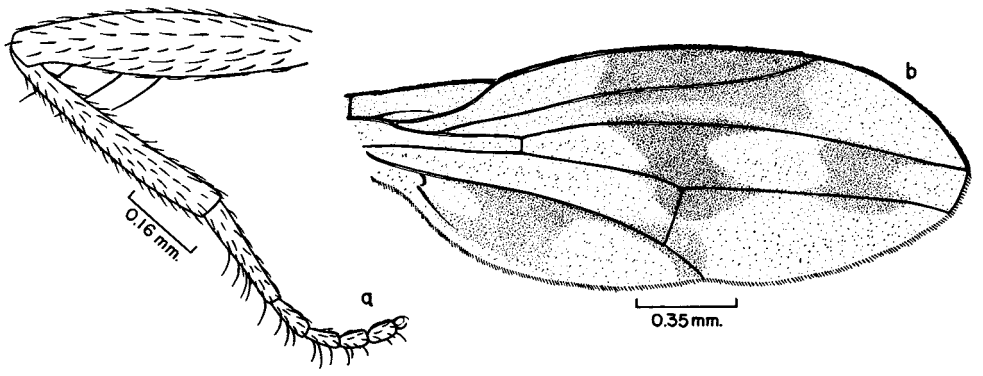


Figure 100—*Drosophila furva* n. sp.: **a**, front legs; **b**, wing.

R_5 and extends a short distance along veins R_{4+5} and M_{1+2}; another brown spot is present in the middle portion of cell M_4. The third costal section is two times longer than the fourth and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is slightly over one-half longer than the penultimate section; the proportions are 75 to 47. *Abdomen:* Entirely brown, rather thickly covered with brown hairs. The genitalia have not been relaxed for study.

Length: body, 2.2 mm.; wings, 2.4 mm.

FEMALE. Unknown.

Holotype male: Haleakala, Maui, 2,000 feet, collector and date not given. Type in the B. P. Bishop Museum.

Drosophila furvifacies new species (fig. 101a–e).

This species fits near *D. hirtitarsus* n. sp. from Maui and Molokai, but differs by having the posterior surface of the front tibia densely covered with short, erect setae; by having the face black and the lower portion of the front brown; by having the palpi densely black setose and the labellum of the male with strong black spines on the upper apex (fig. 101c).

MALE. *Head:* The front, measured from the median ocellus to the front median margin, is approximately two times longer than wide and is predominantly brown, tinged with rufous. The eye orbits to the proclinate bristles, the vertex, the ocellar triangle, and the upper occiput are black. The lower occiput and the genae, except for a narrow black line down each vibrissal row, are yellow. The face is black on the lower one-half, predominantly yellow, tinged with brown above. The median portion of the face is distinctly carinate. The anterior reclinate bristle is slightly shorter than the proclinate and is situated just above the latter. The antennae are brown to black, tinged with rufous on the first two segments and on the base of the third segment. The arista has five to six dorsal and three ventral rays in addition to the apical fork (fig. 101b). The

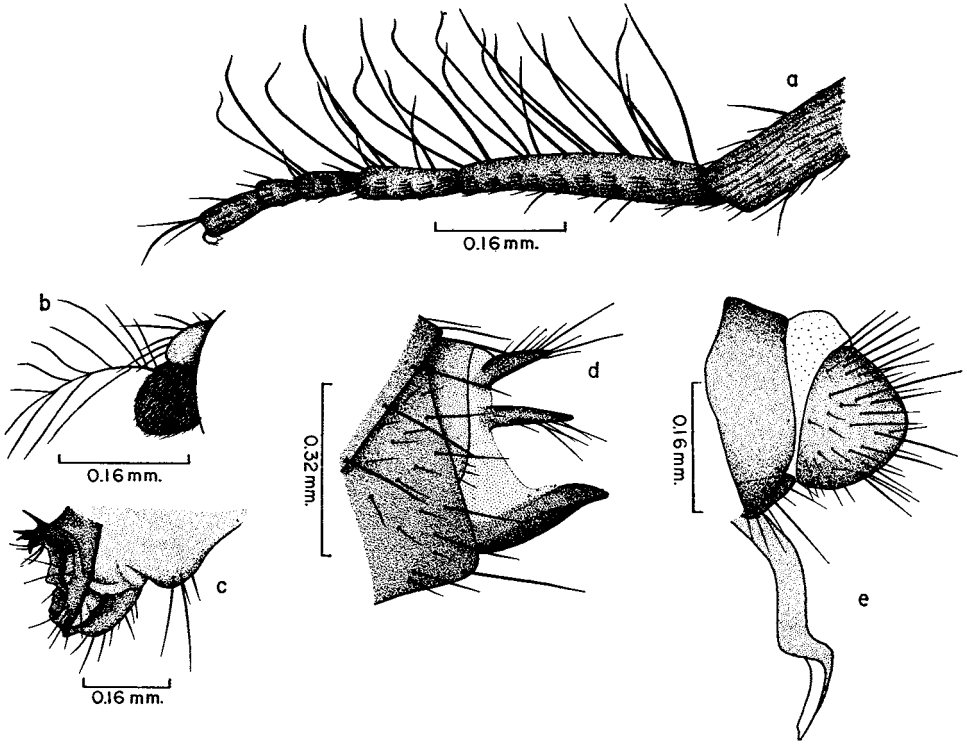


Figure 101—*Drosophila furvifacies* n. sp.: **a,** front tarsus; **b,** antenna; **c,** labellum; **d,** female genitalia; **e,** male genitalia.

setae of the vibrissal rows are poorly developed and no strong bristles are present. Each labellum is armed with strong, incurved, black spines on the upper apical portion (fig. 101c). In some specimens the labella are folded together so that the spines on the inner margins are not readily visible. The palpi are yellow to rufous, rather densely covered with black setae. The apical bristle is not conspicuous. *Thorax:* Dark brown, faintly tinged with black on the dorsum, rufous, tinged with brown on the pleura. The anterior dorsocentral bristles are about opposite the second supraalars. Eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Predominantly yellow with a faint tinge of brown on the coxae and the femora. The posterior surface of the front tibia is densely covered with short, erect setae. Two to three rows of long, black hairs extend down the dorsal surface of the first three tarsal segments and the entire length of the basitarsus (fig. 101a). The front basitarsus is about one-half as long as the tibia. *Wings:* Almost entirely hyaline, very faintly infuscated. The third costal section is five times longer than the fourth and the costal fringe ends just slightly before the middle of the section between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penulti-

mate section. *Abdomen:* Shining brown to black in ground color covered with gray-brown pollen. The anal plates are about one-half higher than long and are broad and rounded ventrally. The ninth tergum is broad over the dorsal portion, almost straight-sided, and only slightly tapered ventrally (fig. 101e).

Length: body, 3.0 mm.; wings, 3.4 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. Approximately two bristles are strongly developed in each vibrissal row. The apical bristle on each palpus is strong. There appears to be a slight variation in the length of the costal fringe in the series at hand; in some specimens it ends at about the basal two-fifths of the distance between the apices of vein R_{2+3} and R_{4+5} and in others it extends approximately to the middle of this section. A very faint tinge of brown is present along the costal margin of the apex of cell R_3 in some specimens. The ovipositor blades are slender, sharp-pointed (fig. 101d).

Length: body, 3.0–3.5 mm.; wings, 3.3–3.7 mm.

Holotype male and allotype female: Nualolo Valley, Kauai, July, 1952, 3,400 feet (D. E. Hardy). Fifty paratypes (5 males and 45 females): from the following localities in the Kokee region of Kauai—same as type; Kawaikoi Stream, 3,700 feet, August, 1953; Kalalau Lookout, 4,000 feet, August, 1953; and Kokee, 3,600 feet, July, 1952 (D. E. Hardy); Kainamanu, 3,800 feet, July, 1952 (D. E. Hardy); Poomau Valley, 3,000 feet, July, 1952 (D. E. Hardy); Kaunuohua Ridge, 4,000 feet, August, 1953 (D. E. Hardy); Koaie Stream, August, 1950 (D. E. Hardy); and Kokee, June 18–19, 1922 (E. H. Bryan, Jr).

Type, allotype, and a series of paratypes are in the B.P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

This species may possibly be the one which Grimshaw indicated as *Drosophila* sp. (Number 26 of his listing of the species) in the "Fauna Hawaiiensis," 1901, vol. 3 (1):68. He had two specimens from "Koholuamano," Kauai (this probably should be Kaholuamanu), April, 1895, which he did not describe because they were in poor condition.

One male specimen from Puu Alii, Molokai, 4,200 feet, August, 1953 (D. E. Hardy) fits the description of *furvifacies* in all respects except that the labellum has a fringe of black spines along the apex, not just on the upper portion. The front basitarsus is slightly longer (one-half as long rather than about two-fifths), and the male genitalia seem slightly different. This is probably a new species but is not being described until further specimens can be studied. One female from Manawainui Valley, Molokai, August, 1953 (D. E. Hardy) seems to belong with the above male.

Drosophila fuscifrons new species (fig. 102a–c).

This species fits in the *polita* complex because of the yellow apex of the scutellum and the black rim on each labellum of the male. It fits in the group

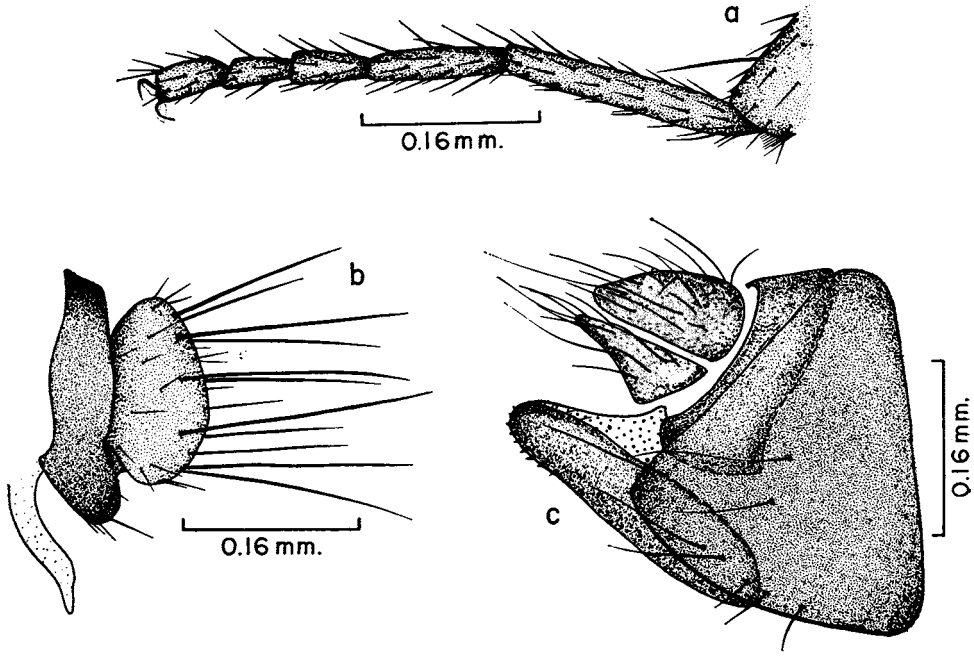


Figure 102—*Drosophila fuscifrons* n. sp.: **a**, front tarsus; **b**, male genitalia; **c**, female genitalia.

which has the pleura predominantly brown and is differentiated from related species by having the front entirely brown to black and the ninth tergum of the male conspicuously narrowed dorsally (fig. 102b).

MALE. *Head:* The compound eyes are about one-third higher than long, rather oval in shape. The front is entirely dark brown to black, covered with gray pollen; the extreme lower margin of the front is tinged with yellow in ground color. The eye orbits are shining black in ground color, rather lightly gray pollinose. The occiput is predominantly brown to black, covered with gray pollen; the extreme lower portion is yellow. The gena is yellow except for a thin line of brown along the vibrissal row. Each gena, measured from the vibrissal row to the eye margin, is about equal in width to three or four rows of eye facets. The face is entirely pale, slightly raised in the upper median portion. The clypeus is yellow, faintly tinged with brown. The palpi are yellow, tinged with brown; each has a small apical bristle plus a subapical bristle and numerous yellow-brown to black setae along the posterior surface. The mouthparts are yellow except for the black rim at the apex of each labellum. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the proclinate bristles of the front. The anterior reclinate bristles are about four-fifths as long as the proclinates and are situated just slightly

behind the latter. The antennae are predominantly brown, tinged with yellow on the first two segments. The second antennal segment has two dorsal bristles. The arista has five or six dorsal and two or three ventral rays in addition to the apical fork. *Thorax:* Shining dark brown to black, tinged faintly with rufous, especially in the ground color of the pleura, and with the lower portion of the sternopleuron yellow, faintly tinged with brown. The entire thorax is lightly gray dusted. The anterior dorsocentral bristles are situated almost opposite the first (anterior) pair of supraalars. About six rows of acrostichal setae are present. One rather prominent bristle is present in each dorsocentral row almost in line with the lateral margins of the suture. Two rather well-developed humeral bristles are present. The anterior sternopleural bristle is almost one-half as long as the posterior bristle. The halteres are pale yellow. *Legs:* Predominantly or entirely yellow. The hind legs are broken off the type, but the front and middle legs are entirely yellow, except for a tinge of brown on the apices of the tarsi. On one male paratype the mid and hind femora are tinged with brown. The legs are devoid of ornamentation. The front basitarsus is one-half as long as the tibia (fig. 102a). *Wings:* Entirely hyaline. The third costal section is about five times longer than the fourth and the costal fringe extends almost one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.66 times longer than the penultimate section. *Abdomen:* Entirely yellow-brown. The anal plates are about two times higher than long and are subacutely pointed ventrally. The ninth tergum is distinctly narrowed across the dorsal portion and is lobate ventrally (fig. 102b). The claspers are scarcely visible from a direct lateral view.

Length: body, 2.3 mm.; wings, 2.7 mm.

FEMALE. Fitting the description of the male in most respects. The lower one-third to one-fourth of the front is yellow. Two rather strong bristles are present at the upper edge of each vibrissal row. The ovipositor blades are short, triangular in shape, and extend approximately as far as the apices of the anal plates (fig. 102c).

Length: body, 3.0 mm.; wings, 3.5 mm.

Holotype male and allotype female: Kula Pipeline, Maui, 4,500 feet, April 8, 1932 (O. Bryant). Four paratypes (one male and three females): from the following localities on Maui—same as type, March, 1932; Iao Valley, August 8, 1918 (O. H. Swezey); Olinda, March, 1932 (O. Bryant); and ridge above Haelaau, 3,000–3,300 feet, December 21, 1928 (E. H. Bryan, Jr.). One male specimen on hand from Lanaihale, Lanai, 3,200 feet, June, 1953 (D. E. Hardy), differs slightly by having the mid and hind femora distinctly brown and the last section of M_{1+2} 1.26 times longer than the penultimate section. It is not being designated as a paratype.

Type and allotype in the B. P. Bishop Museum. The paratypes and the specimen from Lanai are in the collections of the United States National Museum and the University of Hawaii.

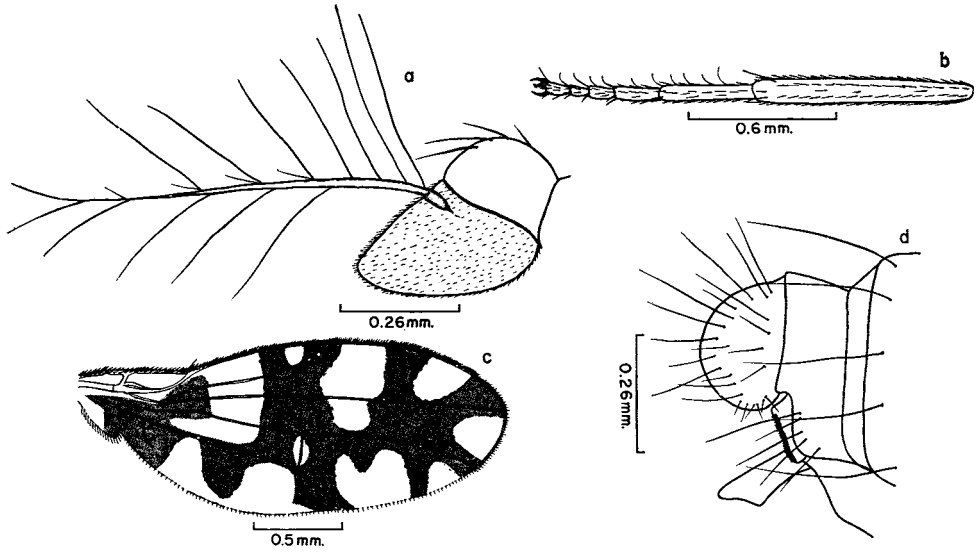


Figure 103—*Drosophila fuscoamoeba* Bryan: **a,** antenna; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

Drosophila fuscoamoeba Bryan (fig. 103a–d).

Drosophila fuscoamoeba Bryan, 1934, Proc. Haw. Ent. Soc. 8 (3) :438.

Endemic. Oahu (type locality: Tantalus). Known from both the Waianae and the Koolau Mountains.

Type in the B. P. Bishop Museum.

This is a very distinctive species readily differentiated from all known Hawaiian *Drosophila* by the very short third costal section of the wing and by the presence of two star-shaped fuscous marks in the wings (fig. 103c).

Predominantly brown to black flies with two cinereous vittae extending down the mesonotum. The upper occiput, the vertex, the ocellar triangle, and the median portion of the front are brown; the orbits, face, genae, and lower portion of occiput are yellow. The lower reclinate bristle is small and is situated just slightly above the proclinate bristle. The antennae and palpi are brown, tinged with yellow. The arista has about seven long dorsal rays and four ventral rays in addition to the apical fork (fig. 103a). Each palpus has several short bristles around the apex. The thorax is dark brown, yellow only behind the wing bases and on the propleura. The knobs of the halteres are brown. A cinereous stripe extends down each dorsocentral row. The anterior sternopleural bristle is about one-half the size of the posterior bristle. Each front femur has three rather strong posterior bristles and three strong posteroventral bristles in addition to a series of posteroventral hairs. All tibiae have moderately strong, preapical, dorsal bristles; the front tibiae are not ornate. The front tarsi have short, erect, slightly curved hairs down the dorsal surface (fig. 103b). The third costal section is

shorter than the fourth and the costal fringe extends about three-fourths the distance between the tips of veins R_{2+3} and R_{4+5}. The brown markings on the wings are arranged in two roughly star-shaped patterns as in figure 103c. The abdomen is dark brown to black in ground color, lightly dusted with brown pollen, and with the apices of the terga faintly gray. The female ovipositor is short and triangular in shape. The male genitalia are as in figure 103d; the ninth tergum is pointed at each ventral margin.

Length: body and wings, 2.5–3.5 mm.

Drosophila fuscoapex new species (fig. 104a–b).

A tiny species closely related to *D. tamashiroi* n. sp. from Oahu. It is differentiated by the short basitarsus of the front legs (fig. 104a), the brown marking at the apex of the wing rather widespread over the apical third; the third section of the costa about 3.5 times longer than the fourth, rather than six times longer; and by the last section of vein R_{3+4} 1.5 times longer than the penultimate section, rather than 3.3 times longer.

MALE. *Head:* The front is as long as wide, the upper two-thirds is dark brown to black, densely gray-brown pollinose, and the lower third of the front is yellow. The anterior reclinate bristle is small, about one-half as long as the proclinate bristle, and situated distinctly above the latter. The proclinate bristles are situated at about the lower two-fifths of the front, measured from the antennae to the vertex. Vertex and upper occiput subshining dark brown to black. Lower occiput, genae, and the face entirely yellow. Mouthparts, including the palpi, entirely yellow, except for a narrow black sclerotized rim at the apex of each labellum. Each palpus has a moderately strong bristle at the apex. The bristles and hairs of the vibrissal rows, genae, and lower occiput are all yellow; one moderately strong bristle is present on each side at the lower angles of the face. Face with a moderate carina down the middle. Antennae entirely yellow. The tips of the aristae are broken on the specimen at hand; apparently about six dorsal rays and two ventral rays are present in addition to the apical fork. *Thorax:* Brown on the dorsum, tinged lightly with red in ground color. The apex of the scutellum is yellow, the metanotum is brown, tinged with red, and the pleura are predominantly yellow with a faint streak of brown extending longitudinally through the median portion of the mesopleuron, the upper pteropleuron, and across the metapleuron. The anterior dorsocentral bristles are situated about opposite the first pair of supraalars. About six rows of acrostichal setae are present at the middle portion of the mesonotum; these become rather sparse on the posterior portion. The sternopleural bristles are broken off the specimen at hand; from the appearance of the base, it is probable that the anterior bristle is tiny, hair-like. Halteres clear yellow. *Legs:* Entirely yellow, the segments rather slender. The front femora are about 5.5 times longer than wide and about twice as wide as the tibiae. The bristles of the femora are rather weak and yellow; on the posteroventral surface only the bristle nearest the apex is well developed (about two times longer than the width of the femur), the

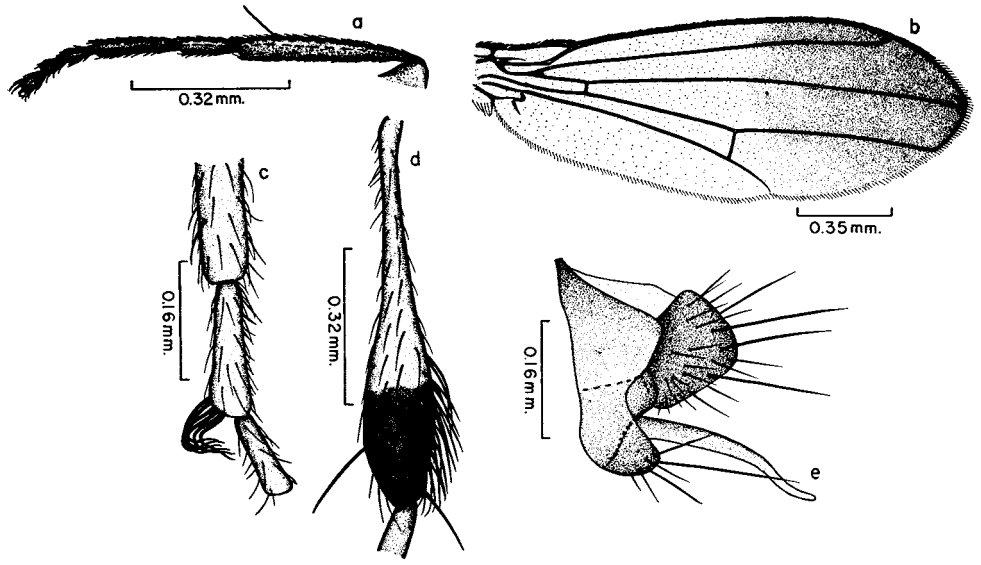


Figure 104—*Drosophila fuscoapex* n. sp.: **a,** front tibia and tarsus; **b,** wing. *D. fusticula* n. sp.: **c,** front basitarsus; **d,** middle tibia; **e,** male genitalia.

others are fine and hair-like. Front tibiae and tarsi lack long ciliation. The dorsal bristle of the front tibia is moderately developed. The front tarsi are without conspicuous hairs; the basitarsus is short (about one-fourth as long as the tibia and shorter than the second tarsal segment) (fig. 104a). The apical spur on the middle tibia is rather elongate, at least one-half as long as the basitarsus. *Wings:* Subhyaline, the apical two-fifths rather dark brown (fig. 104b). The wings are moderately slender, about 3.2 times longer than wide. The third costal section is 3.47 times longer than the fourth and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_{2+3} curves up very slightly at its apex. The last section of vein M_{1+2} is 1.35 times longer than the penultimate section, and the last section of vein M_{3+4} is about 1.5 times longer than the m crossvein. *Abdomen:* The first tergum, the basal portion of the second, and terga five and six are pale yellow; the remainder of the dorsal portion of the abdomen is pale brown; the venter is entirely yellow. The genitalia are yellow-brown; they have not been relaxed for study. A moderately strong bristle is visible on each ventral margin of the tergum.

Length: body, 2.0 mm.; wings, 2.4 mm.

FEMALE. Unknown.

Holotype male: Alakai Swamp, Kauai, 5,800 feet, July, 1952 (D. E. Hardy). Type in the B. P. Bishop Museum.

Drosophila fusticula new species (fig. 104c–e).

This species is closely related to *D. clavitibia* n. sp. but is readily differentiated by the difference in the shape of the middle tibia (fig. 104d); by the all-yellow

front legs; by the anterior reclinate bristle which is situated slightly behind the proclinate; and by the costal fringe which extends only about one-fourth the distance between the apices of vein R_{2+3} and R_{4+5}.

MALE. *Head:* Similar in most respects to that of *clavitibia*. The black bristles of the vibrissal rows are all approximately equal in length. Each palpus has a small black apical bristle plus numerous black setae around the outside margin. The arista has four dorsal and one ventral ray in addition to the apical fork. The anterior reclinate bristle is about four-fifths as long as the proclinate and is situated just slightly above the latter. *Thorax:* Almost entirely yellow, tinged with brown on the pleura. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the posterior supraalars. Six rows of acrostichal setae are present. The lower humeral bristle is about five-sixths as long as the upper. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for the black apices of the middle tibiae and the brown apical segments of the tarsi. The front tibiae are not ornate. The dorsal bristle is situated about its own length from the apex of the segment. The basitarsus is about one-fourth as long as the tibia and has a dorsoapical row of about six black, strongly hooked bristles (each is bent at a right angle on its apical half as shown in figure 104c). The second tarsal segment is three-fourths as long as the first. The middle tibia is rather gradually attenuated to its base (fig. 104d); the apical one-fourth of the segment is black. *Wings:* Faintly infuscated, about two and one-half time longer than wide. The costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.3 times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Predominantly dark brown on the dorsum, yellow on the venter; the sixth tergum is yellow, tinged with brown. The anal plates are about one-half higher than long and are slightly pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion, broadly expanded medianly, and developed into a broadly rounded lobe on each ventral margin. The claspers are plainly visible from a lateral view (fig. 104e).

Length: body, 2.5 mm.; wings, 2.7 mm.

FEMALE. Similar in coloration to the male except that the thorax is tinged with brown and the legs are entirely yellow. Each vibrissal row has two moderately strong bristles at the upper portion. The arista has five dorsal and two ventral rays in addition to the apical fork. The abdomen is yellow, marked with brown. The ovipositor is rather slender, sharp-pointed, and each plate has a series of teeth along the ventral edge.

Length: body, 2.7 mm.; wings, 3.0 mm.

Holotype male and allotype female: from Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy and R. Namba). Two paratype males: one same data as type; one from Puu Niauniau, Maui, April, 1954 (M. Tamashiro).

Type and allotype in the B. P. Bishop Museum.

The paratypes are in the collections of the United States National Museum and the University of Hawaii.

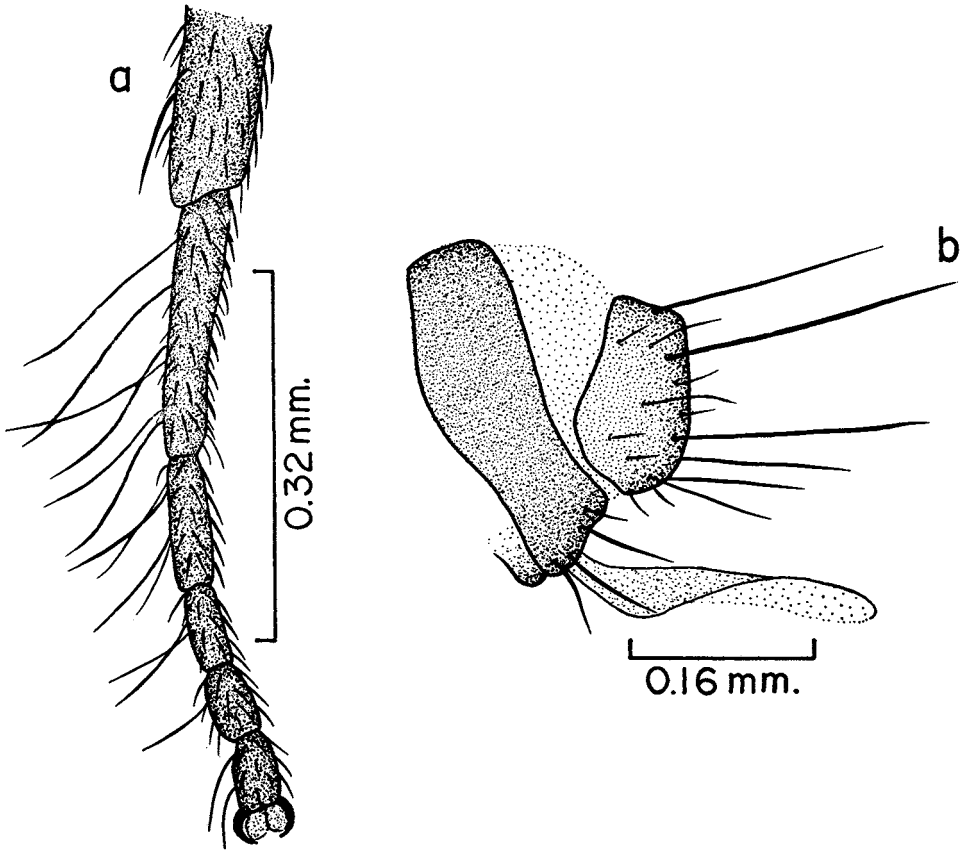


Figure 105—*Drosophila gilvilateralis* n. sp.: **a**, front tarsus; **b**, male genitalia.

Drosophila gilvilateralis new species (fig. 105a–b).

This species fits *D. furvifacies* n. sp. but is readily differentiated by having the pleura, the first abdominal tergum, the sides of the second tergum, and all of the sterna of the abdomen yellow. Also, the front tibia is not setose on the outside surface and the species differs in many other details.

MALE. *Head:* The front below the median ocellus is largely yellow, tinged faintly with reddish brown. The upper portion is reddish brown, black on the eye orbits and around the ocellar triangle. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated opposite the latter. The lower occiput, the genae (except for a black line along the vibrissal row), and the upper two-thirds of the face are yellow. The lower portion of the face is brown except for a black line extending vertically on each side in line with the vibrissal row. Two moderately strong black bristles are present at the upper edge of each vibrissal row. The palpi and mouthparts are yellow. Each palpus has a short, black, apical bristle, approximately equal in size to the acrostichal

setae on the mesonotum, or just slightly smaller than the anterior reclinate bristles. I see no evidence of strong spines or ornamentations on the labella. The antennae are brown, tinged with yellow to rufous. The arista has six or seven dorsal rays and three ventral rays in addition to the apical fork. *Thorax:* Reddish brown on the dorsum, yellow on the pleura. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six to eight rows of acrostichal setae are present. An enlarged seta is present in each dorsocentral row in front of the anterior dorsocentral bristles and approximately opposite the first anterior supraalar bristles. Each humerus has two strong black bristles. The anterior sternopleural bristle is two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Posterodorsal and posteroventral bristles are moderately developed on the front femur. The front tarsus has long ciliation extending down the anterodorsal surface (fig. 105a). The front basitarsus is approximately one-third as long as the tibia. Each front tibia terminates in a short black ventral bristle almost equal in size to the preapical dorsal bristle. *Wings:* Distinctly infuscated, pale yellow-brown. The third costal section is five times longer than the fourth and the costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_1 is 1.4 times longer than the penultimate section. *Abdomen:* Predominantly shining brown, lightly gray-brown pollinose. The first tergum, the sides of the second, the extreme lateral margins of the other terga, and the entire venter are yellow. The cerci are nearly two times higher than long. The ninth tergum is not noticeably narrowed over the dorsal portion, the sides are nearly straight, and the ventral portions are gradually narrowed to a subacute point on each side (fig. 105b). The claspers are plainly visible from a direct lateral view.

Length: body, 3.0 mm.; wings, 3.3 mm.

FEMALE. Unknown.

Holotype male and four male paratypes: from Kaiholena, Kauai, April, 1958 (W. C. Mitchell). One paratype male: from Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila grimshawi Oldenberg (fig. 106a–c).

Drosophila variegata Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :57.

Drosophila grimshawi Oldenberg, 1914, Arch. fur Natur. 80, A2:23. Change of name for *D. variegata* Grimshaw, preoccupied by *D. variegata* Fallén.

Endemic. Molokai (type locality: "Molokai Mts., 4,000 ft."), Lanai, Maui, and Hawaii. The latter is a new island record; specimens have been seen from north of Pawaina, Kona, 3,000 feet, July, 1953 (D. E. Hardy).

Type in the British Museum (Natural History). I have studied the type.

This species is most closely related to *D. bostrycha* n. sp. but is differentiated by having the femora chiefly brown to black, the upper portions of the sterno-

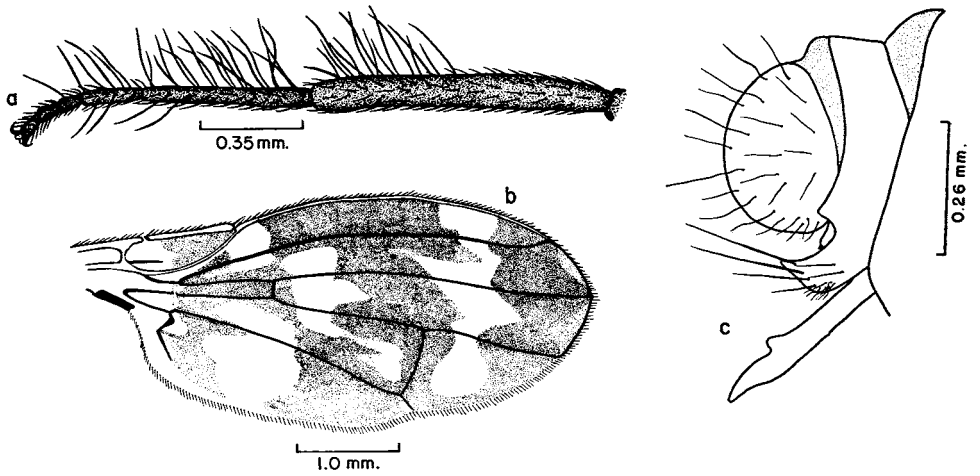


Figure 106—*Drosophila grimshawi* Oldenberg: **a,** front tarsus; **b,** wing; **c,** male genitalia.

pleura broadly blackened, the basal half of the front tibia of the male devoid of long ciliation, and the ciliation on the front tarsi different as shown in figures 47a and 106a. The wing markings (fig. 106b) will also distinguish this from related species.

Anterior reclinate bristle strong, about three-fourths to four-fifths as long as the proclinate bristle, and situated distinctly above the latter. The first two antennal segments are yellow, slightly tinged with brown dorsally. The third segment is dark brown to black. The arista has eight dorsal rays and three ventral rays in addition to the apical fork. The palpi are dark brown to black; each has a moderately strong bristle at apex. The mesonotum has a broad brown stripe down the median portion and four brown spots on the sides, counting the one at the posterior corner. Each mesopleuron has a large dark brown to black spot covering the upper three-fourths of the sclerite. A small black spot is present on the upper portion of each pteropleuron, and a black spot is present in the middle of each metapleuron. The front half and the posterodorsal corner of each sternopleuron are black. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. The coxae and femora are predominantly brown to black; the latter are yellow on the apices. Each front femur has about seven strong posterodorsal bristles and about six posteroventral bristles. The front tibia has no distinct preapical dorsal bristle but the apical third of the segment has numerous long straight hairs scattered over the dorsal surface. These also extend over the dorsal surface of the tarsal segments (fig. 106a). The wings are predominantly brown with transverse hyaline streaks as in figure 106b. The first costal section is brown, the basal cells are subhyaline. The base of the second costal section is hyaline, the apical two-thirds is brown. Cell R_1 has a hyaline spot opposite the base of the third costal section and another hyaline spot just

before the apex; the latter is continuous with a hyaline band which extends transversely across the apical fourth of the wing (fig. 106b). The third costal section is about four times longer than the fourth, and the costal fringe extends about half the distance between the tips of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is slightly shorter than the penultimate section, the proportions being about 82 to 92. The last section of vein M_{3+4} is very short, scarcely one-third as long as the m crossvein. The abdomen is dark brown to black with a large yellow-gray spot at the anterior lateral margin of each tergum. The male genitalia are as in figure 106c.

Length: body and wings, 4.5–5.5 mm.

Drosophila haleakalae Grimshaw (fig. 107a–e).

Drosophila haleakalae Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :64.

Endemic. Maui (type locality: Haleakala, 6,000 feet). Known only from Haleakala.

Type in the British Museum (Natural History). I have studied the type and have designated a series of homeotypes from Haleakala.

The *haleakalae* complex of species is characterized by having the body shining black in ground color, the upper two-thirds of the front black and the lower third rufous, and the scutellum black with a yellow spot at the tip. Usually the legs are predominantly yellow. The apex of the wing has rather pale brown markings, and just a slight indication of an infuscation is present on the m crossvein. Because of the black heavily sclerotized apical border of each labellum *haleakalae* seems to be more closely related to *melanoloma* than to other species in this complex. It differs by having the third antennal segment and the dorsal portion of the second segment brown; by having about eight dorsal and three ventral rays on the arista in addition to the apical fork; and by having the anterior dorsocentral bristles situated distinctly behind the first pair of supraalars.

I believe that most of the members of the *haleakalae* complex are fungivores, and they are associated with polyporus fungi.

The lower third of the front, the entire face, genae, palpi, and mouthparts are yellow to rufous, except for the black rim bordering the apex of each labellum (fig. 107b). The genae are about three to four rows of eye facets in width (from the eye margin to the vibrissal row). The first two antennal segments are yellow except for a brown mark over the dorsal surface of the second segment. The basal portion of the third segment is yellow; the remainder of the segment is brown. The aristae are as in figure 107a. Two moderately strong black bristles are present at the upper edge of each vibrissal row. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated distinctly above the latter. The thorax is polished black in ground color, dusted with gray pollen. The scutellum has a conspicuous yellow spot at the apex. The anterior dorsocentral bristles are situated about halfway between the first and second pair of supraalars. The anterior sternopleural bristle is small, hair-like, scarcely two-fifths as long as the posterior bristle. The legs, including the coxae, are entirely yellow. The front

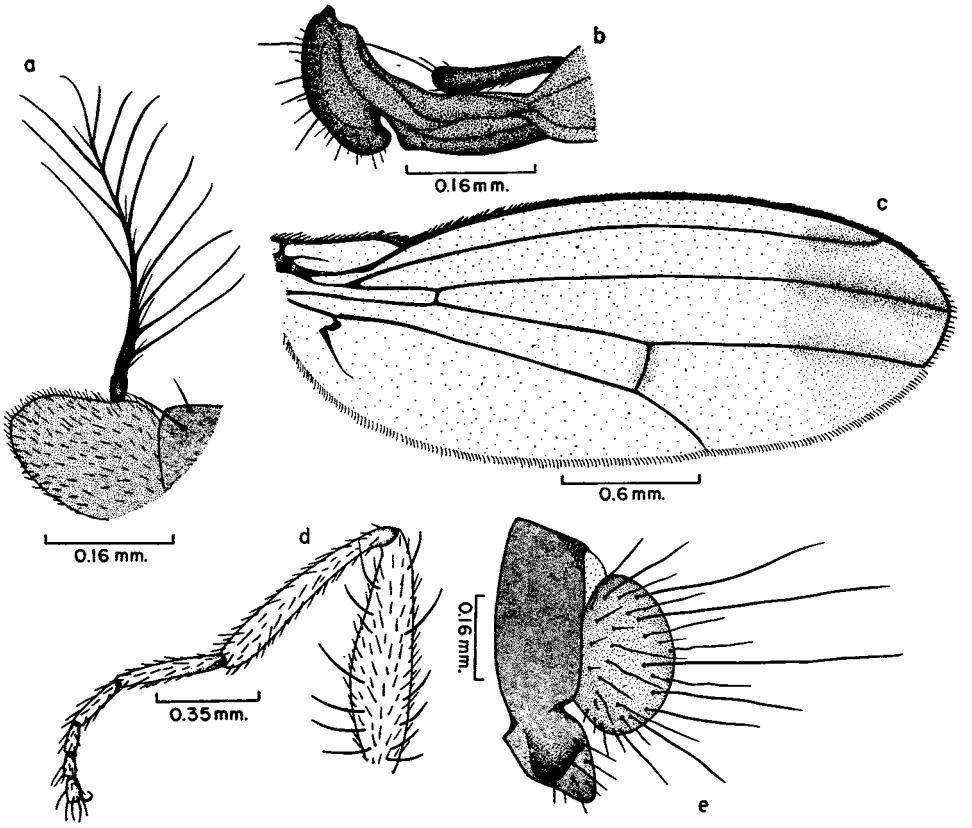


Figure 107—*Drosophila haleakalae* Grimshaw: **a,** antenna; **b,** labellum; **c,** wing; **d,** front leg; **e,** male genitalia.

tibiae and tarsi of the male are not ornate; the front basitarsus is one-half as long as the tibia and is two times longer than the second tarsal segment (fig. 107d). The entire wing is lightly tinged with yellow, the apex is pale brown, and the m crossvein is faintly infuscated as in figure 107c. The third costal section is 5.6 times longer than the fourth and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about one-fourth longer than the penultimate section; the proportions are about 44 to 32. The last section of vein M_{3+4} is nearly two times longer than the m crossvein. Abdomen polished dark brown to black. The male genitalia are as in figure 107e. The female ovipositor plates are moderately short, blunt at apices, and extend just slightly beyond the anal plates; the edges have small serrations.

Length of male: body, 3.0 mm.; wings, 3.8–4.0 mm. Of female: body, 3.5–3.8 mm.; wings, 4.0–4.2 mm.

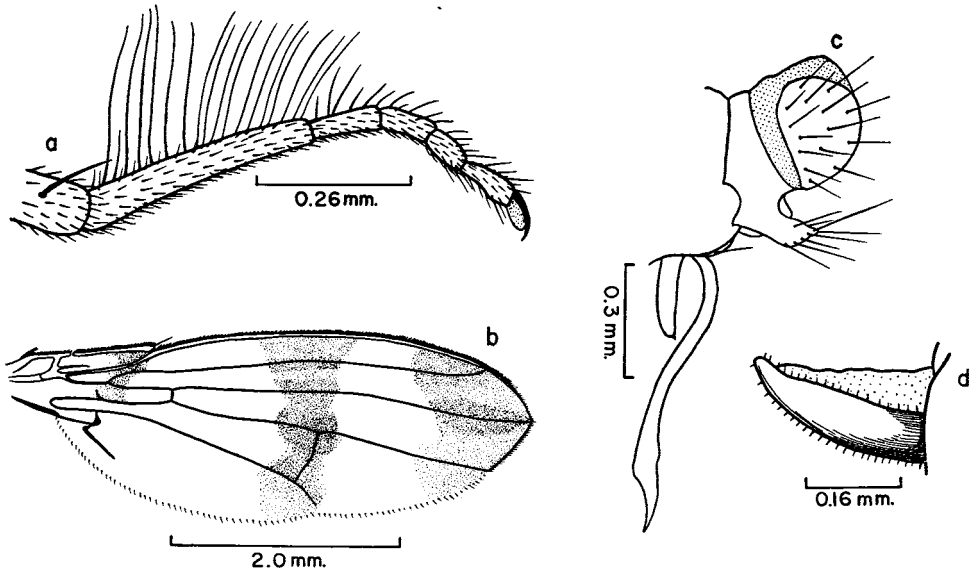


Figure 108—*Drosophila hawaiiensis* Grimshaw: **a**, front tarsus; **b**, wing; **c**, male genitalia; **d**, female ovipositor.

Drosophila hawaiiensis Grimshaw (fig. 108a–d).

Drosophila hawaiiensis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :60.

Endemic. Hawaii (type locality: Kona) and Oahu.

Type in the British Museum (Natural History).

The *hawaiiensis* complex of species is differentiated from other *Drosophila* by the following: a transverse band of brown extends across the middle of the wing from the costal margin to the hind margin at a level with the m crossvein, the apical portion of the wing is brown, the mesonotum is yellow-gray to brownish gray pollinose with two to four rather indistinct brown longitudinal vittae, the abdomen is brown with the posterior corners of the segments yellow-gray, and the legs are entirely yellow. *D. hawaiiensis* fits closest to *ciliaticrus*, n. sp., but differs by lacking dorsal ciliation on the front tibiae of the male and by having the dorsal cilia on the front tarsi straight (fig. 108a) rather than curved. Grimshaw mentioned in the original description that the species is quite variable in coloration. Specimens from Oahu are slightly paler and a little smaller than are typical specimens from the island of Hawaii; however, I have not been able to find any structural differences in these specimens and question whether it is advisable to consider them even as subspecies.

In addition to the above notes, the orbits are yellow and the front is predominantly so, slightly discolored with brown on the upper median portion. The first two antennal segments are brownish yellow, the third is dark brown. The arista has five or six dorsal rays and three ventral rays in addition to the apical

fork. The mesonotum varies from rufous, tinged with brown to yellow in ground color, has two submedian brown vittae just inside the dorsocentral rows, and has two sublateral brown vittae just above a line drawn from the inner postalar bristle to the margin of the humerus. The vittae on each side of the mesonotum are sometimes separated only by a thin line of yellow-gray pollen and may appear as a large brown spot on each side. The mesopleura and sternopleura are predominantly brown; the other portions of the pleura are mostly yellow. The specimens from Hawaii have the pleura more extensively brown than do the specimens from Oahu; however, the former are all old specimens (paratypes collected in 1892 and 1896) and are badly discolored. The front tibiae are not ornate. The front tarsi have long, straight hairs down the dorsal surface as in figure 108a. The wing markings are as in figure 108b; the third costal section is 4.5 times longer than the fourth and the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The male genitalia are as in figure 108c. The ventral margins of the ninth tergum are curved upward at their apices. The ovipositor plates of the female are moderately long and slender (fig. 108d), about as long as the seventh abdominal segment.

Length: body, 3.5–4.5 mm.; wings, 3.8–4.75 mm.

Drosophila hexachaetae new species (fig. 109a–d).

This species fits in the complex which has a transverse brown streak across the median portion of the wing and brown markings over the apical portion. It is differentiated from related species by having the thorax entirely yellow with no dark markings. Also, the front legs of the male have three dorsal cilia on the tibia and three on the basitarsus as in figure 109a.

MALE. *Head:* About one-fifth higher than long, entirely yellow except for the reddish brown eyes and for the brown ocellar triangle. The front is just slightly wider than long and the lower reclinate bristle is about three-fifths as long as the proclinate and situated just slightly above the latter. The face is slightly raised down the median portion. One strong black bristle is present at the upper edge of each vibrissal row. The palpi and mouthparts are entirely yellow. Each palpus has a strong black apical bristle in addition to numerous black setae around the margins. The antennae are yellow, tinged lightly with brown on the upper portion of the second segment and the apical half of the third. The arista has five dorsal and three ventral rays in addition to the apical fork. *Thorax:* Entirely yellow, except for a small pale brown spot on the upper median portion of each pteropleuron. The anterior pair of dorsocentral bristles are situated opposite the second pair of supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Front femur with three moderately strong posteroventral bristles on the apical half of the segment and with four posterodorsal bristles rather evenly distributed from about the apical fourth to the basal one-sixth of the segment. Front tibia with three moderately long anterodorsal cilia, one near basal third of segment, one just slightly beyond the apex, and one at

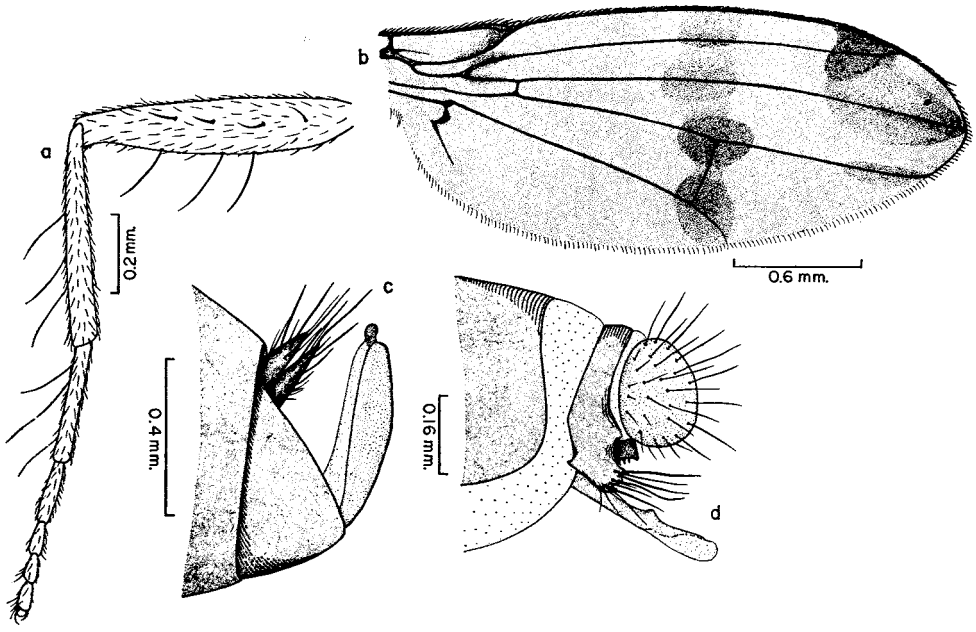


Figure 109—*Drosophila hexachaetae* n. sp.: **a,** front leg; **b,** wing; **c,** female genitalia; **d,** male genitalia.

apical third of segment. Front basitarsus with three long anterodorsal cilia (fig. 109a) and nearly three-fifths as long as the tibia and about two times longer than the second tarsal segment. *Wings:* 2.7 times longer than wide. The third costal section is 3.75 times longer than the fourth section and the costal fringe extends nearly two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. A pale brown vitta extends transversely across the wing at a level with the m crossvein; also the apices of veins R_{2+3}, R_{4+5}, and M_{1+2} are brown (fig. 109b). The last section of vein M_{1+2} is just slightly longer than the penultimate section; the proportions are 99 to 80. *Abdomen:* Brown, with the anterior corners of the terga broadly yellow. Genitalia as in figure 109d.

Length: body, 2.8 mm.; wings, 3.2 mm.

FEMALE. Similar to the male except for the lack of ornamentation on the front legs. The ovipositor plates are rather long, slender, and slightly longer than the ventral margin of the seventh abdominal segment (fig. 109c).

Holotype male and allotype female: Manoa Valley, Oahu, February, 1947, in banana bait trap (G. B. Mainland). Thirty-two paratypes (27 females and 5 males): from the following localities—same as type; Mt. Kaala, Oahu, November, 1950 (G. B. Mainland); Haleanau Valley, Mt. Kaala, Oahu, April, 1945, in banana bait trap (G. B. Mainland); Mt. Tantalus, Oahu, October, 1946, on ginger bloom (G. B. Mainland); Manoa Falls, Oahu, October, 1946, in banana

bait trap (G. B. Mainland); Makaleha, Oahu, April, 1952 (Ed Dresner); Brodie Trail, August 27, 1916 (no collector given); and one specimen labeled Honolulu, Hawaii, no date or collector given.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila hirticoxa new species (fig. 110a–d).

This species fits in the complex of clear-winged *Drosophila* which have the front tarsus of the male ciliated on the dorsal surface. It is differentiated from related species by having the front coxa of the male densely setose on the anterior surface (fig. 110c), by having six well-developed bristles in the upper portion of each vibrissal row, and by having the ventral portion of each labellum densely covered with strong, black spines (fig. 110a).

MALE. *Head:* Almost quadrate as seen in direct lateral view; the face is slightly concave laterally, and the epistomal margin is slightly protruded on each side. The front is yellow, tinged with brown on the upper portion between the ocellar triangle and the orbits. The upper eye orbits to the upper reclinate bristles, the ocellar triangle, and the upper occiput are brown to black and rather densely covered with gray pollen. Measured from the median ocellus to the front margin, the front is about two-thirds wider than long. The anterior reclinate bristles are small, rather poorly developed, about equal in size to the acrostichal setae on the anterior margin of the mesonotum, and less than one-half as long as the proclinate bristles. The clypeus is pale brown and the apices of the labella are dark brown. The head and its appendages, with the exception of the above-mentioned portion, are entirely yellow. The second antennal segment has two or three moderately stout bristles on the dorsal surface. The arista has four dorsal and two ventral rays in addition to the apical fork. The face is evenly concave with only a slight indication of a raised area in the upper median portion. Each vibrissal row has about six moderately strong, equal-sized bristles in the upper portion. Each palpus has a moderately strong apical bristle. The labella are highly ornate, armed with strong, black spines on the ventral surfaces as shown in figure 110a. *Thorax:* Predominantly pale brown in ground color and densely covered with gray pollen. The sides of the mesonotum, the humeri, and the propleura are yellow. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six rows of acrostichal setae are present. Two enlarged acrostichals are situated near the mid-line opposite the presutural bristles; these are three to four times longer than the surrounding acrostichal setae. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The anterior surface of each front coxa is densely black setose (fig. 110c). The front tibia has no long cilia and the preapical dorsal bristle is small, extending just slightly beyond the apex of the segment. The front tarsus has numerous curved cilia extending down

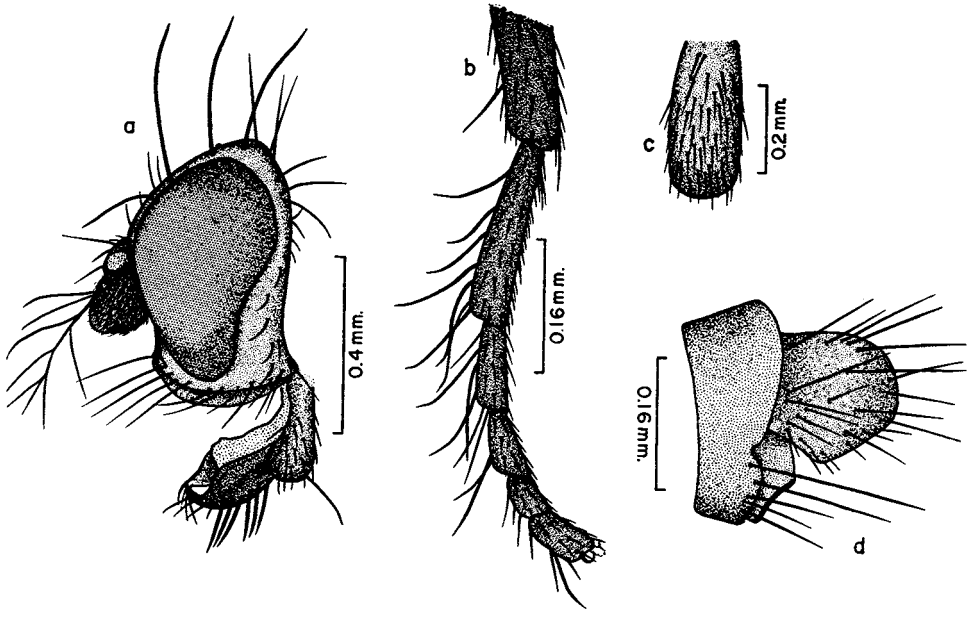


Figure 110—*Drosophila hirticoxa* n. sp.: **a**, head; **b**, front tarsus; **c**, front coxa, inner surface; **d**, male genitalia.

the dorsal surface of the first three segments; these cilia extend the entire length of the basitarsus (fig. 110b). The basitarsus is about two-fifths as long as the tibia. *Wings:* Almost entirely hyaline. The third costal section is five times longer than the fourth, and the costal fringe is very short, extending scarcely over one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Almost entirely yellow, tinged with brown on terga two to four. The anal plates are just slightly higher than long. The ninth tergum is broad, not at all narrowed over the dorsal portion, and shaped as in figure 110d. The claspers are plainly visible from a lateral view.

Length: body, 2.85 mm.; wings, 3.20 mm.

FEMALE. A female specimen from the same locality as the type may possibly belong here. It has the thorax gray pollinose as in the male. The anterior reclinate bristle, however, is about two-thirds as long as the proclinate; the sides of the mesonotum, the humeri, and the propleura are brown, not yellow; the third costal section is four times longer than the fourth; and the front coxae are not setose. This may possibly belong to a different species and is not being designated as part of the type series.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (C. R. Joyce). The above-mentioned female is from the same locality and month, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila hirtitarsus new species (fig. 111a–e).

This species fits near *D. hirtitibia* n. sp. but is differentiated by lacking ciliation on the front tibiae of the male and by having the thorax entirely dark colored. The labellum is very differently developed (fig. 111b), and the ovipositor (figs. 111d and 112d) and the male genitalia are differently shaped (figs. 111e and 112c). This species appears most closely related to *D. furvifacies* n. sp. from Kauai but is differentiated by lacking conspicuous, erect setae on the posterior surface of the front tibia; by having the face yellow and the lower portion of the front rufous; by having only a few black setae on the outside surface of the palpus; and by lacking evident spines on the labella of the male.

MALE. *Head:* The upper portion of the front is brown, the lower portion is rufous. The eye orbits to the proclinate bristles, the vertex, ocellar triangle, and upper portion of the occiput are dark brown to black. The lower occiput, the genae, and the face are pale yellow. The face is slightly raised down the median portion. The antennae are yellow, tinged with brown on the third segment and over the dorsal surface of the second. The mouthparts and palpi are yellow except for a dark brown to black heavily sclerotized apical development on each labellum (fig. 111b). Each palpus has a small black bristle at the apex and several black setae along the outside surface. The anterior reclinate bristle is two-thirds to three-fourths as long as the proclinate and is situated almost opposite the latter. No strong bristles are present in the vibrissal rows; the vibrissae are represented by a row of black setae approximately equal in size to the occipital setae. Each arista has six dorsal and two ventral rays in addition to the apical fork (fig. 111a). *Thorax:* Dark brown faintly tinged with black on the dorsum, yellow to rufous, tinged with brown on the pleura. The anterior dorsocentral bristles are situated slightly in front of the line drawn between the second (posterior) pair of supraalars. Six to eight rows of acrostichal setae are present on the mesonotum. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Posterodorsal and posteroventral bristles are moderately developed on the front femora. The front tibiae are not ornate; the preapical dorsal bristle is situated about its own length from the apex of the tibia. The front tarsus has long, black cilia extending down the dorsal surface (fig. 111c); the long hairs extend almost to the base of the front basitarsus. The front basitarsus is approximately two-fifths as long as the tibia. *Wings:* Faintly infuscated. The third costal section is five times longer than the fourth, and the costal fringe extends just beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Dark brown to shining black in ground color, covered with gray-brown pollen. The anal plates are nearly two times higher than long and are blunt on the ventral margins. The ninth tergum is expanded over the dorsal portion and is slightly attenuated to a subacute point on each ventral margin (fig. 111e). The claspers are plainly visible in lateral view.

Length: body and wings, 2.3–2.7 mm.

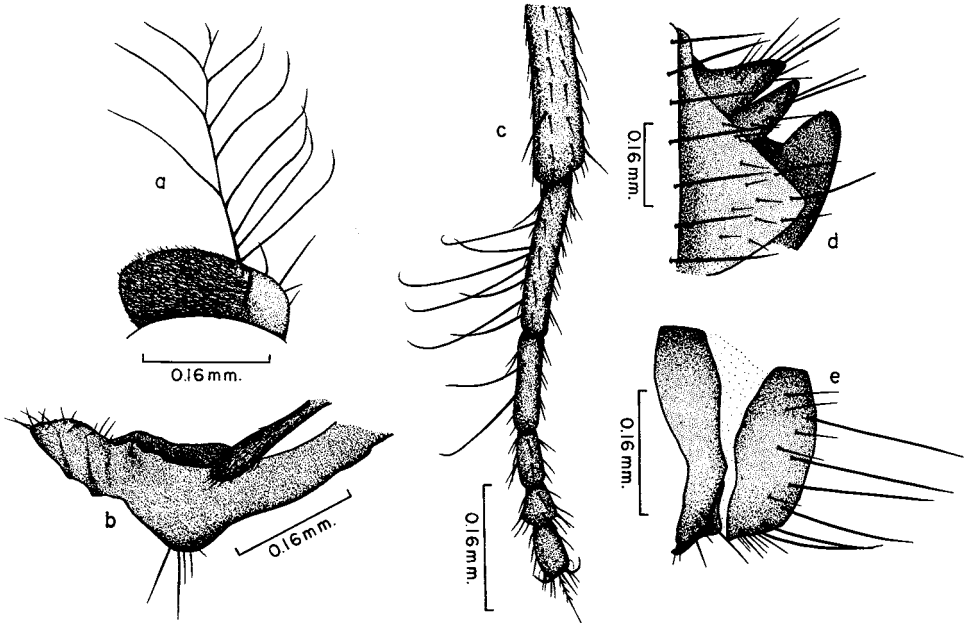


Figure 111—*Drosophila hirtitarsus* n. sp.: **a,** antenna; **b,** labellum; **c,** front tarsus; **d,** female genitalia; **e,** male genitalia.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. One or two strong bristles are present in the upper portion of each vibrissal row. The apical bristle on the palpus is much stronger than in the male, approximately equal in size to the genal bristle. The ovipositor blades are rather short and blunt, armed with a row of short teeth around their apices, and extend just slightly beyond the anal plates (fig. 111d).

Length: body, 2.5–2.8 mm.; wings, 2.7–3.0 mm.

Holotype male and allotype female: Makamakaole Valley, Maui, June, 1953 (D. E. Hardy). Thirty-four paratypes (26 males and 8 females): from the following localities—same as type; Kailua, Maui, March, 1956 (N. L. H. Krauss); Keanae, Maui, June, 1952 (D. E. Hardy); Manawainui Valley, Molokai, July, 1952 (D. E. Hardy and M. Tamashiro); and Puu Kolekole, Molokai, July, 1952 (M. Tamashiro). Two male specimens from Hawaii [Kilauea, February, 1946, "#45" (no collector given); and Keanakolu Trail, 4,500 feet, October 29, 1952 (C. P. Hoyt)] appear to belong here. One has the m crossvein slightly infuscated. They are not being designated as paratypes.

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila hirtitibia new species (fig. 112a–d).

Because of the well-developed anterior reclinate bristles this species would fit near *D. spicula* n. sp. and *apicisetae* n. sp. but the development of the front legs is very different as shown in figures 33a, 112b, and 191b; it also differs in many other respects and is apparently not related to the above-mentioned species. The ornamentation of the front legs of the male, in combination with the hyaline wings, brown mesonotum, and yellow pleura, will differentiate this from all known species.

MALE. *Head:* The upper half of the front is brown, the lower portion is yellow. The eye orbits, the vertex, and ocellar triangle are shining black, rather lightly covered with gray pollen. The upper two-thirds of the occiput is brown to black covered with gray pollen; the lower portion, as well as the gena, is yellow. The lower third to one-half of the face is brown, the sides and upper portion are yellow. A moderately developed keel is present on the upper median portion of the face. The anterior reclinate bristle is at least one-third longer than the proclinate and is situated distinctly above the latter. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the proclinate bristles. The palpi are yellow and lack distinct bristles. The mouthparts are not ornate. The antennae are yellow, tinged with brown. The arista has five to six dorsal and three ventral rays in addition to the apical fork (fig. 112a). *Thorax:* Entirely dark brown on the dorsum, yellow only on the lower one-third to one-half of each humerus. The pleura are entirely yellow, as are the halteres. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second (posterior) pair of supraalars. A moderately strong seta is present in each dorsocentral row slightly behind a level with the transverse suture; these are nearly two times larger than the surrounding setae on the mesonotum. Six rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is nearly four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The posterodorsal and posteroventral bristles are moderately developed on the front femora. Each front tibia has numerous long cilia extending down the dorsal surface; the longest of these are at the extreme base of the segment. About five long cilia extend in a row down the anterior surface of the tibia. Each front tarsus has long cilia extending over the dorsal surface of the first two segments (fig. 112b). The front basitarsus is one-half to three-fifths as long as the tibia. *Wings:* Hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends to or slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Brown, tinged faintly with yellow on the dorsum, yellow on the lateral margins of the terga and on the venter. The anal plates are slightly higher than long, the greatest length is on the lower margin. The ninth tergum is narrowed dorsally, and gradually expanded ventrally; the lower portion is not distinctly lobate. At the widest portion the tergum is about two-thirds to three-fourths the length of the anal plates (fig. 112c).

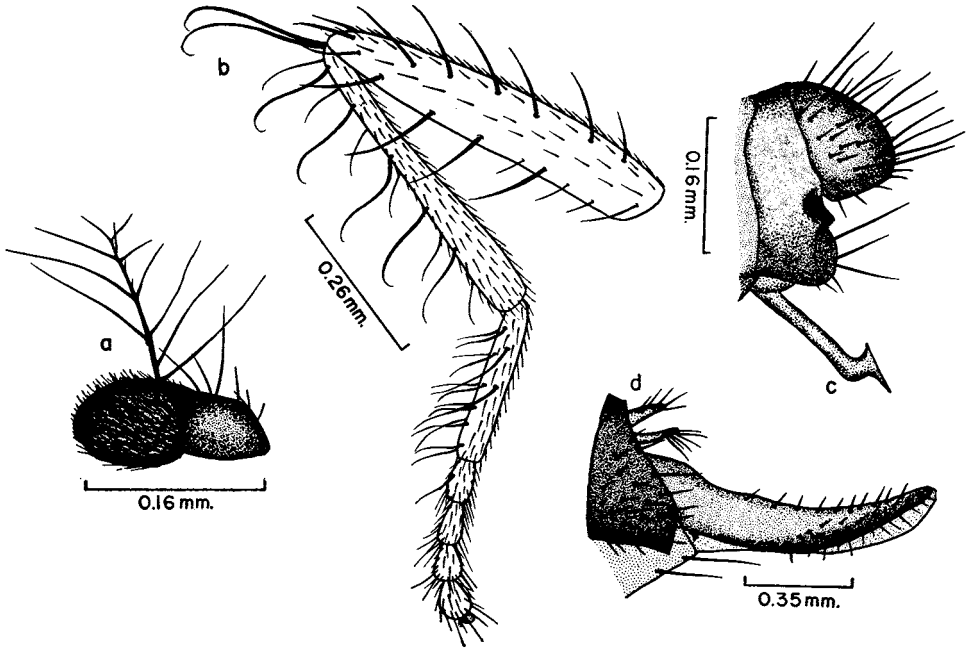


Figure 112—*Drosophila hirtitibia* n. sp.: **a,** antenna; **b,** front leg, posterior surface; **c,** male genitalia; **d,** female genitalia.

Length: body and wings, 2.5 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. Each palpus has a moderately strong black apical bristle. The anterior reclinate bristle is about equal in length to the proclinate. The ovipositor blades are long and slender, slightly curved upward. The ovipositor is approximately two times longer than the seventh abdominal segment and about eight times the length of the anal plates (fig. 112d). The terga of the abdomen are entirely dark brown.

Length: body, 2.25–2.50 mm.; wings, 2.50–2.70 mm.

Holotype male, allotype female: from Mt. Kaala, Oahu, May, 1952 (M. Tamashiro). About fifty paratypes (both sexes about evenly represented): from the following localities—same as type, June, 1919, May, 1952, and April, 1953 (O. H. Swezey, D. E. Hardy, C. P. Hoyt, and M. Tamashiro); Heleanau Valley, Mt. Kaala, Oahu, April, 1949 (G. B. Mainland); Makaleha, Oahu, April–June, 1952, 1,800 feet (E. Dresner and L. D. Tuthill); Manoa Valley, Oahu, "47" (no collector given); Waianae, Oahu, December, 1947 (G. B. Mainland); Kalihi, Oahu, no date given (O. H. Swezey); Maunawili, Oahu, November 8, 1906 (no collector given); also February, 1905 (W. M. Gifford); Tantalus, Oahu, 1,300 feet, January, 1905 (W. M. Gifford); Waialae Iki, Oahu, May, 1922 (O. H. Swezey); Mt. Olympus, January, 1919 (O. H. Swezey); Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); Kula Pipeline, Maui, March, 1932, 4,500–

5,000 feet (O. Bryant); and Olinda, Maui, February, 1926, on "Ohia Lehua" (O. H. Swezey). One male specimen from Kahuaawi Gulch, Molokai, July, 1932 (D. E. Hardy), appears to be *hirtitibia* but has the anterior reclinate bristles shorter than normal. It is not being designated as a paratype.

The type, allotype, and a series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are being deposited in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila humeralis Grimshaw (fig. 113a–c).

Drosophila humeralis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :64.

Endemic. Kauai (type locality: "Kauai 4,000 ft."; probably taken in the Kokee area).

Type in the British Museum (Natural History).

The following descriptive notes are based upon a study of the type male and allotype female.

A moderately small, chiefly black or dark colored species, characterized by the wing markings (fig. 113b), the ciliated front tibiae of the male (fig. 113a), and by the yellow vittae on the pleura and on the sides of the mesonotum. The front is entirely dark brown to black. The face is obscurely yellow, with a brown to black band across the lower portion just above the epistoma; the median portion of the face is distinctly carinate. The antennae are brown. The arista has six long dorsal rays and two ventral rays in addition to the apical fork. Moderately strong setae are present along the lateral margins of the mouth but no strong bristles are present in the vibrissal row. The thorax is dark brown to black in ground color and gray-brown pollinose on the dorsum. The humeri and the extreme lateral margins of the mesonotum are yellow. The margins of the scutellum are also yellow, as are the halteres. A yellow longitudinal vitta extends through the median portion of each pleuron. The coxae and femora are yellow, tinged with brown, and the tarsi and tibiae are yellow. The front tarsi of the male are very slender, the basal segment is approximately four-fifths as long as the tibia, and the dorsal surface of the front tarsus is densely covered with long conspicuous hairs (fig. 113a). The wings are light yellow-brown fumose in the costal cells and along the veins and the crossveins and hyaline in the middle of the cells. Evidently some variation is present in the amount of fumosity present in the wings; the allotype has the costal border of the wing entirely fumose to the apex (fig. 113b), and the holotype male has the costal border just slightly fumose. The costal fringe extends about half the distance between the tips of veins R_{2+3} and R_{4+5}. The third costal section is slightly over four times longer than the fourth, and the fourth section is about two times longer than the fifth costal section. The last section of vein M_{1+2} is one-third to one-fourth longer than the preceding section; the proportions of the two sections are 39 to 28. The abdomen is brown, slightly discolored on both specimens which have been studied, but apparently with the extreme apices of each tergum narrowly yellow-

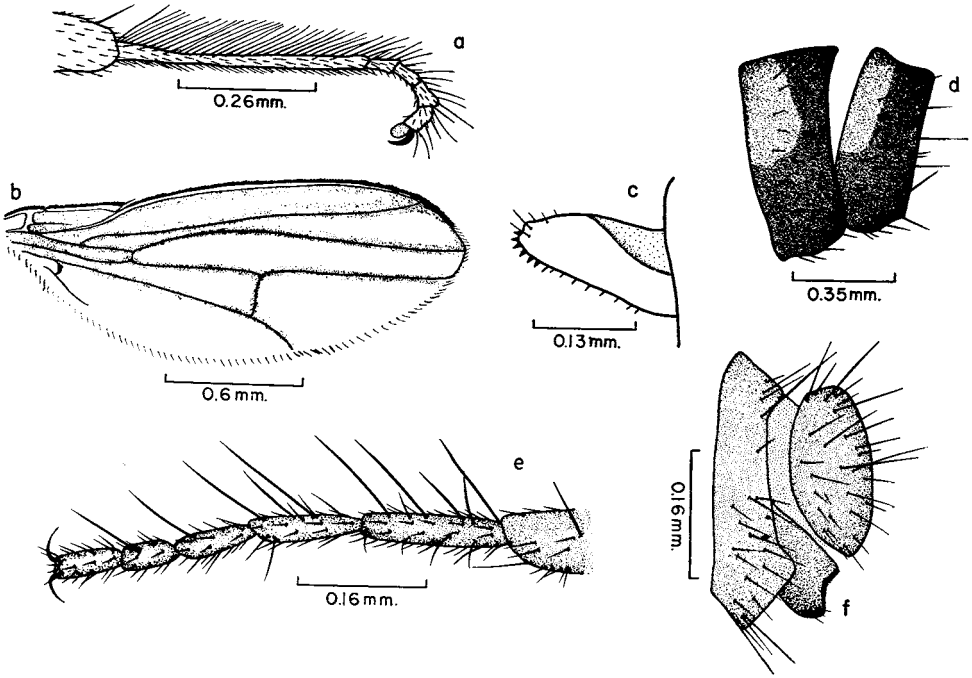


Figure 113—*Drosophila humeralis* Grimshaw: **a**, front tarsus; **b**, wing; **c**, female ovipositor. *D. hydei* Sturtevant: **d**, pattern of brown bands on terga; **e**, front tarsus; **f**, male genitalia.

ish and with a small yellow spot on each side of the segments. The ovipositor plates are brownish yellow, about three times longer than wide, blunt at apices, and with minute setae around the margins (fig. 113c).

Length: body, 3.25 mm.; wings, 3.50 mm.

Drosophila hydei Sturtevant (fig. 113d–f).

Drosophila hydei Sturtevant, 1921, Carnegie Inst. Wash. Publ. 301:101.

Widespread throughout the islands; one of the common species found in the lowlands. It breeds in all sorts of rotting vegetation and rotting fruits, and is extremely abundant in the pineapple fields after the plant material has been mulched. Swezey (1952:357) reared specimens from decaying *Heliconia* blossoms.

Immigrant. Cosmopolitan.

This species has been adequately described in the original; also by Patterson (1943:126), Harrison (1952:510), Okada (1956b:161), and others.

Type locality: Lakeland, Florida.

Type in the American Museum of Natural History.

This species is differentiated from other members of the *repleta* group in Hawaii by having the brown abdominal bands expanded laterally so the sides of the tergum are continuously dark colored (fig. 113d). Also, no dark spot

is present on the costa at the distal break, the presutural acrostichal setae are not distinctly enlarged, and the third costal section is about 3.4 times longer than the fourth section. The front tarsus has long cilia down the anterior surface as in figure 113e. The male genitalia are as in figure 113f and as figured by Hsu (1949:135, fig. 5).

Length: body, 2.5–3.0 mm.; wings, 2.5 mm.

Drosophila iki Bryan, **new combination** (fig. 114a–c).

Drosophila nigra var. *iki* Bryan, 1934, Proc. Haw. Ent. Soc. 8 (3) :439.

Endemic. Hawaii (type locality: Kilauea) and Maui. The latter is a new island record. I have studied specimens from Olinda, March 15, 1932 (no collector given); and Kula Pipeline, 4,500–5,000 feet, March 15, 1932, and June 11, 1927 (O. Bryant and O. H. Swezey).

Type in the B. P. Bishop Museum. I have studied the type and have designated a series of homeotypes.

This species is superficially like *nigra* Grimshaw but is very distinctly different from that species. It is readily differentiated by its smaller size, by the lower portion of the front being brownish yellow, and by the vibrissae not being arranged in a dense clump; the front femora of the male is not densely bristled, and the front tibiae and tarsi of the male are very differently developed as shown in figure 114a.

A predominantly black species similar in coloration to *D. nigra*. The front is largely brown to black; the lower edge is yellow, tinged with brown. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The face and upper portions of the genae are yellow, discolored with brown to black; the remainder of the head is dark brown to black. The palpi and mouthparts are black. Each palpus has one moderately strong apical bristle. The antennae are brown, the basal segments tinged with rufous. The arista has six or seven dorsal and two ventral rays in addition to the apical fork. Each vibrissal row has about three moderate-sized bristles on the upper portion. Thorax entirely shining black, rather faintly gray pollinose. Two moderately strong humeral bristles are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Numerous stout black setae are present in the area just inside the postalar bristles. The halteres are yellow-white. The anterior sternopleural bristle is about half as long as the posterior bristle. The coxae and femora are dark reddish brown to black; the trochanters, tibiae, and tarsi are yellow. Each front femur has five or six bristles down the posterodorsal and posteroventral surfaces. The front tibia of the male has moderately long, erect, ventral cilia on the apical two-fifths of the segment, and long, erect hairs are present along the posteroventral and anteroventral surfaces of the tarsi (fig. 114a). The front basitarsus of the male is slightly over half as long as the tibia, and the second tarsal segment is three-fifths as long as the basitarsus. The wing markings are as in figure 114b; a prominent brown marking is present over the apical portion of the wing and over the m crossvein.

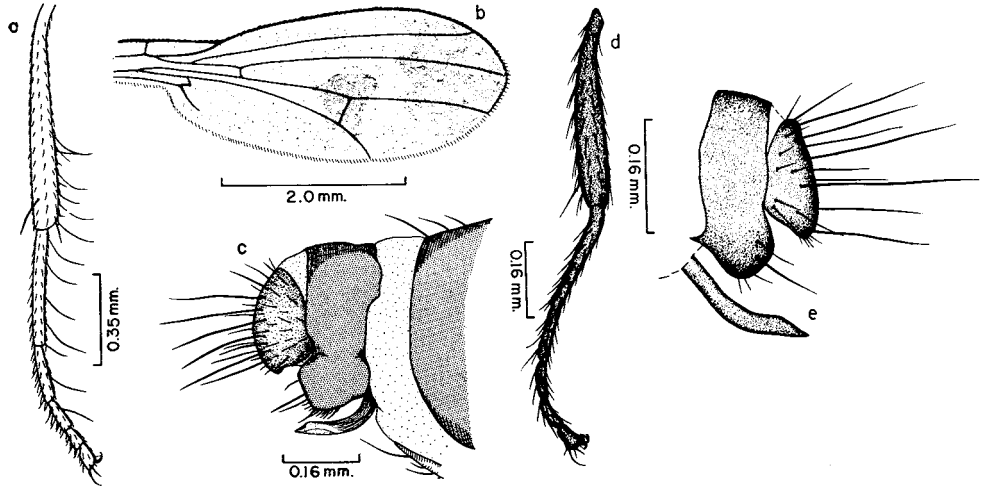


Figure 114—*Drosophila iki* Bryan: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia. *D. illusiopolita* n. sp.: **d,** front tibia and tarsus; **e,** male genitalia.

The third costal section is 4.5 times longer than the fourth and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The abdomen is shining black in ground color, lightly gray pollinose. The male genitalia (fig. 114c) are rather similar to those of *nigra*; the anal plates are small and the ventral margins of the ninth tergum completely cover the claspers as seen in lateral view. The female ovipositor plates are short and rounded at the apices.

Length: body and wings, 3.75–4.00 mm.

Drosophila illusiopolita new species (fig. 114d–e).

This species is related to *D. canipolita* n. sp. and *bipolita* n. sp. but is differentiated by having the front entirely dark colored and tinged with yellow on the lower portion, by having the male genitalia distinctly developed (fig. 114e), by the well-developed anterior sternopleural bristle, and by other details brought out in the description below.

MALE. *Head:* The front is predominantly shining black, lightly covered with gray pollen; the lower third is yellow-brown. The occiput is brown, covered with gray pollen except for the yellow lower portion. The genae are yellow except for a line of brown on the vibrissal row. The face is predominantly white and is very slightly raised in the upper median portion. The clypeus and the apical halves of the palpi are brown. Each palpus has a moderately strong apical bristle which is almost equal in length to the segment. The mouthparts are yellow except for the broad rim at the apex of each labellum. The antennae are brown to black except for a tinge of yellow on the first two segments. The

second antennal segment has two dorsal bristles. The arista has six dorsal and two ventral rays in addition to the apical fork. Two or three moderately strong bristles are present in the upper edge of each vibrissal row; the uppermost bristle is about equal in size to the proclinate bristles of the front. The anterior reclinate bristles are about two-thirds as long as the proclinates and are situated approximately opposite the latter. *Thorax:* Shining dark brown to black on the dorsum, lightly gray pollinose; the apex of the scutellum is conspicuously yellow. The upper half of each pleuron is dark brown to black, the lower half is pale yellow. The anterior dorsocentral bristles are situated about opposite the first (anterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is distinctly developed, slightly over one-half as long as the posterior bristle. *Legs:* Entirely yellow, lacking ornamentations. The front basitarsus is about one-half as long as the tibia (fig. 114d). *Wings:* Subhyaline, without dark markings. The third costal section is almost five times longer than the fourth and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Shining brown to black, faintly tinged with yellow in the ground color, especially on the first and fifth terga. The sternum is pale yellow. The anal plates are about three times higher than long, pointed ventrally. The ninth tergum is almost straight-sided, slightly enlarged, rounded ventrally (fig. 114e). The claspers are completely hidden from a direct lateral view.

Length: body, 2.2–2.5 mm.; wings, 2.4–2.6 mm.

FEMALE. I see no way to differentiate the female from those of *canipolita*.

Holotype male and allotype female: from Kaiholena, Kohala Mountains, Ditch Trail, Hawaii, 2,000 feet, July, 1958, collected in banana thicket (D. E. Hardy). Two male paratypes: from Upper Olaa Forest, Hawaii, August, 1952 (W. C. Mitchell); and July, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila imitator new species (fig. 115a–c).

Closely resembling *D. setiger* Grimshaw but differentiated by the differences in the ornamentations on the front legs and the mouthparts of the male (figs. 115a and 115b). This species also is related to *D. eurypeza* n. sp. but the costal margin is not continuously brown, and the front legs and mouthparts of the male are very different.

MALE. A predominantly polished black species. *Head:* About one-fourth higher than long. Front polished black, tinged with yellow on the anterior margin. The occiput is dark brown to black. The genae are pale yellow, and the face is entirely white. The face is flat; no distinct carina is present. The palpi are brown and each has several short bristles around the apical portion. The mouthparts are yellow; the labellum is yellow-brown and very ornate (fig. 115b). No strong bristles are present in the vibrissal rows. The antennae are

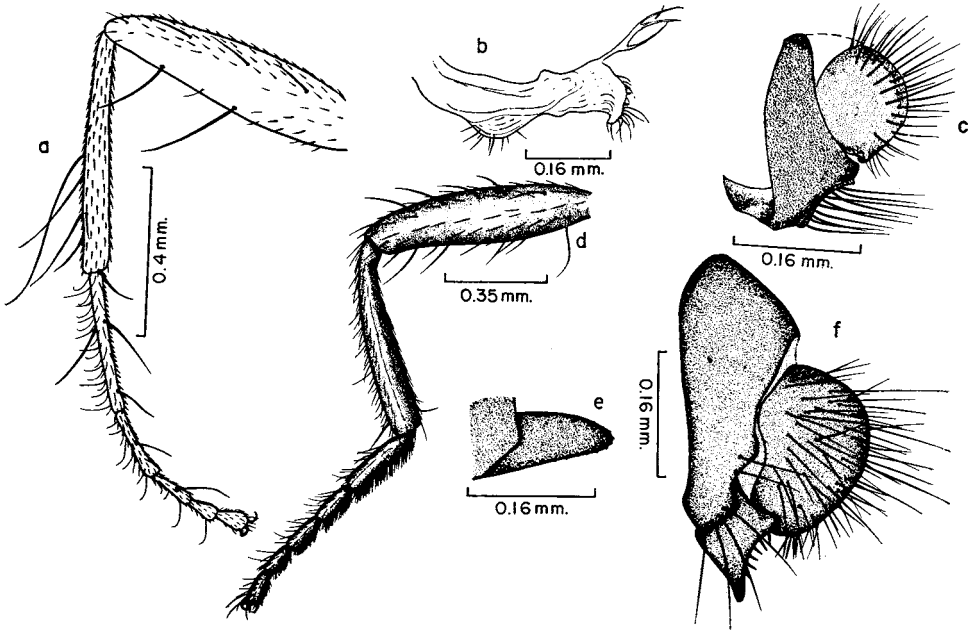


Figure 115—*Drosophila imitator* n. sp.: **a,** front leg; **b,** labellum; **c,** male genitalia. *D. immigrans* Sturtevant: **d,** front leg; **e,** female ovipositor blade; **f,** male genitalia.

dark brown to black. The arista has seven or eight dorsal and two ventral rays in addition to the apical fork. The front is about as long as wide. The lower reclinate bristles are about two-thirds as long as the proclinates and are situated slightly above the latter. *Thorax:* Entirely polished black on the mesonotum, scutellum, and metanotum; dark brown to black, tinged with red in the ground color on the pleura. Knobs of halteres dark brown to black. Anterior dorsocentral bristles situated in line with the front pair of supraalars; only one humeral bristle present; anterior sternopleural bristle nearly two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Front femur with only two or three moderately developed black bristles on each of the posterodorsal and posteroventral surfaces. Front tibia with four anterodorsal bristles on the posterior half of the segment. Front basitarsus with three moderately strong posterodorsal bristles; one at base, one near middle, and one preapical; also with one strong anterodorsal bristle at middle. Segments two and three each with one black posterodorsal bristle. The entire tarsus is rather densely ciliate over the dorsal portion (fig. 115a). The front basitarsus is about three-fifths as long as the tibia and is nearly two times longer than the second tarsal segment. *Wing:* Identical with that of *D. setiger* (fig. 188c); I see no differences in these except, that in the specimens I have compared, there is a slight difference in the comparative lengths of the last section of vein M_{1+2} with the penultimate section of that vein. In *imitator* the comparative lengths of these sections are 90 to 65 and in *setiger* they are 90 to

60; this difference is too trivial to be of any significance. *Abdomen:* Dark brown to black, entirely polished. The genitalia are as in figure 115c. The anal plates are rather small. The ninth tergum is narrow dorsally and expanded on the ventral aspects. The claspers are plainly visible from a lateral view.

Length: body, 2.60 mm.; wings, 2.85 mm.

FEMALE. Unknown.

Holotype male: Pupukea, Oahu, December, 1952, in a grove of wild bananas (D. E. Hardy). One paratype male: Lanihuli, Oahu, May 25, 1919 (O. H. Swezey).

Type in the B. P. Bishop Museum. Paratype in the United States National Museum.

Drosophila immigrans Sturtevant (fig. 115d–f).

Drosophila immigrans Sturtevant, 1921, Carnegie Inst. Wash. Publ. 301:83.

Drosophila brouni Hutton, 1901, Trans. New Zealand Inst. 33:91.

Drosophila immigrans Sturtevant has been placed on the "Official List of Specific Names in Zoology," 1958, Opinion 396, Page 86. *Drosophila brouni* Hutton has been suppressed under the plenary powers in the "Official Index of Rejected and Invalid Specific Names in Zoology," 1958, Opinion 396, Page 30.

Widespread and common over all the main islands.

Immigrant. Cosmopolitan.

Type locality: White Plains, New York.

Type: in the American Museum of Natural History.

D. immigrans is the most abundant species found breeding in fallen guava fruits throughout the islands. Zimmerman (1943:346) said that the earlier records of *D. immigrans* from Hawaii were erroneous and that this species had been confused with *spinofemora* Patterson and Wheeler (=*nasuta* Lamb). Mainland (1949:327) first correctly identified *immigrans* from Hawaii. He found it to be very common on Oahu. Since then the present writer has found the species to be the most predominant one breeding in guavas on all the islands, and strongly suspects that both *immigrans* and *nasuta* have been present here for many years.

The redescription of this species by Harrison (1952) is very adequate. The only species in the Hawaiian fauna which might be confused with *immigrans* would be *nasuta* Lamb. The two are similar since they both have a row of stout anteroventral bristles on each front femur and both typically have the m cross-vein infuscated with brown. *D. immigrans* is readily differentiated from *nasuta* by the presence of distinct brown markings on the abdominal terga; by having the tips of veins R_{2+3}, R_{4+5}, and M_{1+2} infuscated, and the third costal section 4.5 to 5.0 times longer than the fourth; by the short, front basitarsus (fig. 115d); and by the presence of rather dense ciliation and ventral brushes on the front tarsi of the male. Also, the male and the female genitalia are different as shown in figures 115e and 115f. In most other details this species fits the description of *nasuta*. The ninth tergum is rather broad dorsally and attenuated ventrally,

with a group of seven or eight strong bristles along the ventral margin. The claspers are readily visible from a lateral view and have numerous blunt teeth along their inner edges. The anal plates are rather large; each has a set of stout setae on the lower apex (fig. 115f).

Length: body and wings, 3.0 mm.

For more descriptive details, refer to Harrison (1952), Patterson (1943:180 and Pl. 10), and Okada (1956b:147). For a picture of the metaphase chromosome complement refer to Wharton (1943:289 and 317).

Drosophila imparisetae new species (fig. 116a–c).

The dark brown body coloration and the infuscated wing apices would place this species near the *haleakalae* complex. It differs, however, from other known Hawaiian species by having the lower reclinate bristles very large, longer than the proclinates. The ornamentation of the front tarsus of the males (fig. 116a), the body coloration, and the wing markings (fig. 116b) will also help to differentiate this species.

MALE. Predominantly dark reddish brown, tinged with black. *Head:* About one-fourth higher than long. Front about one-third wider than long, predominantly brown to black, tinged with rufous through the median portion; the orbits are gray-brown pollinose. The lower reclinate bristle is about one-third longer than the proclinate and is situated distinctly above the latter. The lower half of the face is brown to black; the upper portion is yellow on the sides, brown in the middle. The lower margin of each gena is dark brown to black, and a brown median spot is present just below the eye. The setae of each vibrissal row are only moderately developed and no strong bristles are present; the main row is made up of setae of approximately equal size, the upper portion with one or two accompanying rows of fine yellow hairs. The occiput is brown, tinged with rufous. The clypeus is dark brown to black on the upper portion, reddish brown on the sides. The clypeus is red, tinged with brown; the mouthparts are yellow. The palpi are brown; no strong bristles are present but numerous dark colored setae extend around the outside surface and over the apex. The first two antennal segments are yellow to rufous, brown on the dorsal surfaces; the second segment has two or three black bristles plus numerous pale colored setae. The third segment is dark brown to black. The arista has seven dorsal and two ventral rays in addition to the apical fork, and the anterior surface is bare. *Thorax:* Largely brown, tinged with rufous, often with black discolorations on the sides and on the posterior portion of the mesonotum. The anterior median portion of the mesonotum is yellow to rufous. The entire thorax is rather densely covered with gray-brown pollen. The scutellum is yellow to rufous, lightly tinged with brown on the dorsum, and brown to black on the sides. The pleura are chiefly dark brown to black. Two strong humeral bristles are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The anterior sternopleural bristle is strong and three-fourths to four-fifths as long as the posterior bristles. The halteres are pale yellow. *Legs:*

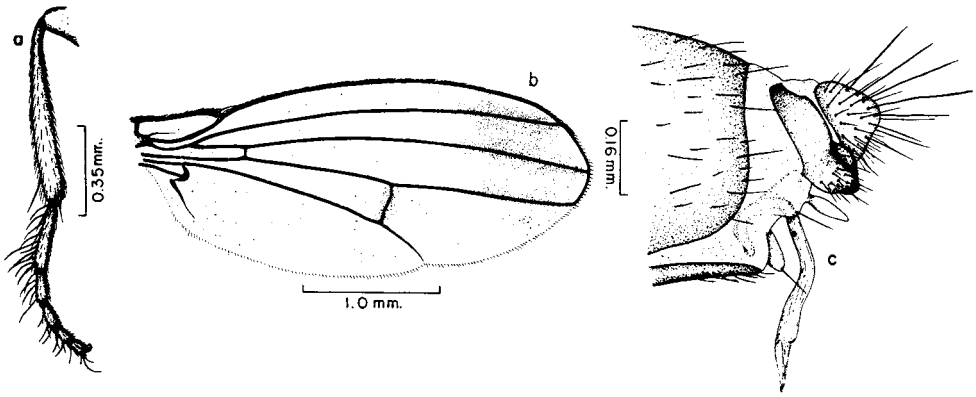


Figure 116—*Drosophila imparisetae* n. sp.: **a**, front tibia and tarsus; **b**, wing; **c**, male genitalia.

Yellow except for brownish discolorations over the coxae. Each front coxa has two moderately strong dorsal bristles. Front femur with about five or six black bristles, plus numerous brown setae along the posterodorsal surface, and with about four moderate-sized bristles along the posteroventral surface. Front tibia not ornate; front tarsus with moderately long ciliation down the dorsal surface (fig. 116a). The basitarsus is about one-half as long as the tibia and about two times longer than the second tarsal segment. *Wings:* About two and one-half times longer than wide. The third costal section is about four times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. A brown mark extends over the apical fourth of the wing, one over the m crossvein, and another brown spot is present near the base of the wing (fig. 116b). The last section of vein M_{1+2} is just slightly longer than the penultimate section. The last section of vein M_{3+4} is about one-half longer than the m crossvein. *Abdomen:* Dark brown to black, tinged lightly with red on the sides and anterior margins of the segments; the dorsal portion is rather densely gray pollinose. Male genitalia as in figure 116c; the ninth tergum is rather strongly narrowed on the dorsal surface.

Length: body, 3.0 mm.; wings, 3.8 mm.

FEMALE. Similar to the male but the anterior reclinate bristles are not so enlarged; they are slightly smaller than the proclinates. The front legs are not ornate; the ovipositor is rather slender, nearly equal to the ventral portion of the seventh abdominal segment.

Length: body, 3.25–3.75 mm.; wings, 3.75–4.25 mm.

Holotype male: north slope Hualalai, Hawaii, 4,000–6,000 feet, July, 1953 (D. E. Hardy). Allotype female: Bird Park, Kilauea, Hawaii, August, 1952 (D. E. Hardy). Thirty paratypes (20 males and 10 females): from the following localities on Hawaii—same as type; Kulani, 5,200 feet, June, 1951–August, 1952 (W. C. Mitchell, D. E. Hardy, and J. W. Beardsley); Upper Olaa Forest, August, 1952 (W. C. Mitchell); Hawaii National Park, 4,000 feet, July, 1952, collected

at light (H. A. Bess); Kahuku Ranch, 3,000 feet, July, 1953 (D. E. Hardy); Pauahi, Kona, 4,300 feet, August, 1956 (D. E. Hardy); Keanakolu, 5,200 feet, October, 1931 and October, 1952 (O. H. Swezey and D. E. Hardy); and Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

Type, allotype, and some paratypes in the B. P. Bishop Museum. The other paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila improcera new species (fig. 117a–d).

This species differs from other Hawaiian *Drosophila* which have a rufous thorax and hyaline wings by its very short front basitarsus about one-fourth as long as the tibia, two rather large erect anterior setae (fig. 117a), a characteristic male genitalia (fig. 117b–c), and other diagnostic details.

MALE. *Head:* Entirely yellow (including the appendages) except for a tinge of brown on the upper occiput and the ocellar triangle and a very faint tinge of brown on the upper eye orbits. The front, measured from the median ocellus to the anterior margin, is nearly two times wider than long. The gena measured at the lower eye margin is about equal in width to two or three rows of eye facets. The upper median portion of the face is slightly convex. One rather small bristle is present near the upper edge of each vibrissal row; this is almost equal to the anterior reclinate bristles of the front. The palpi have no distinct bristles, but each has several black setae around the apex. The labellum is not ornate. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated distinctly above the latter. The second antennal segment has two distinct dorsal bristles. The arista has four dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely shining, rufous with a very faint tinge of brown in the ground color of the posterior portion of the mesonotum, the disc of the scutellum, and the upper halves of the pleura. The anterior dorsocentral bristles are situated opposite the second (posterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The posterior surface of the front tibia is rather thickly covered with short erect setae. The front basitarsus is about one-fourth as long as the tibia and nearly three times longer than the second tarsal segment. The front tarsus has several erect dorsal setae on each segment, and the basitarsus has two rather prominent erect anterior setae on the apical half of the segment (fig. 117a). *Wings:* Subhyaline, very faintly infuscated with brown. The third costal section is almost five times longer than the fourth, and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Dark brown to black on the dorsum except for the yellow first tergum. The venter is entirely pale yellow. The anal plates are three or four times higher than long, attenuated ventrally. The ninth tergum is about two times longer

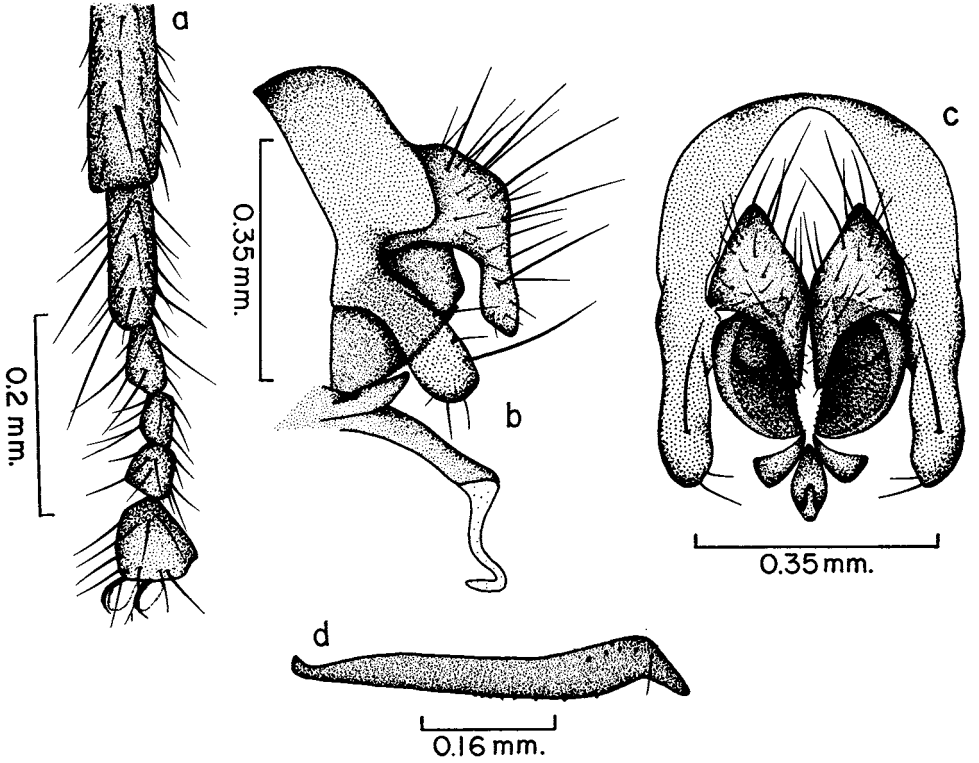


Figure 117—*Drosophila improcera* n. sp.: **a,** front tarsus; **b,** male genitalia, lateral; **c,** male genitalia, ventral; **d,** ovipositor plate of female.

than the anal plates and is developed into a slender, straight-sided lobe on each ventral margin (fig. 117b). The claspers are large, plainly visible from a lateral view; the inner surface of each is densely black setose (fig. 117c).

Length: body, 2.5 mm.; wings, 2.8 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The bristle at the upper edge of each vibrissal row is well developed, approximately equal in size to the proclinate bristle on the front; a moderately strong apical bristle is present on each palpus. The upper portion of the front is faintly tinged with brown. Each abdominal tergum is narrowly yellow along the anterior lateral margin. The anal plates are yellow. The ovipositor plates are rufous, long and slender, and sharply pointed at the apices (fig. 117d).

Length: body, 2.80–3.00 mm.; wings, 3.00–3.25 mm.

Holotype male, allotype female, and six paratypes (one male, five females): from Lulumahu Valley, Oahu, in banana grove, October 4, 1936, and April 11, 1937 (F. X. Williams).

Type, allotype, and one paratype in the Honolulu Sugar Planters' Associa-

tion collection. The remainder of the paratypes are in the following collections: B. P. Bishop Museum, United States National Museum, and the University of Hawaii.

Drosophila incognita new species (fig. 118a–c).

This species belongs in the *sordidapex* complex and apparently fits closest to *conformis* n. sp.; it is differentiated by having conspicuous ciliation down the anterior surface on the apical half of the front basitarsus of the male, by the brown sternopleura, and the dark brown markings at the upper wing apex.

MALE. Predominantly dark brown species. *Head:* The front is chiefly yellow; the orbits are black to the reclinate bristles. The vertex, ocellar triangle, and upper occiput are black. The face is yellow above and black on the lower third. The lower reclinate bristle is about two-thirds as long as the proclinate bristle and is situated opposite the latter. The upper bristle of each vibrissal row is situated distinctly above the oral margin at about the lower one-sixth of the face. The two basal antennal segments are yellow; the third segment is yellow at the base, brown on the apical half. The second antennal segment has two short, stout bristles on the dorsal surface, plus several small black setae. The arista has six dorsal and two ventral rays in addition to the apical fork. The clypeus is dark brown to black. The palpi and mouthparts are yellow, tinged lightly with brown. The palpus has a few small hairs scattered over the apical surface. The mouthparts are not ornate. The lower edge of the head is straight. *Thorax:* Dark brown to black, tinged with rufous on the front, the median portion of the mesonotum, and in the ground color of the pleura. The scutellum is dark brown to black, the apex narrowly yellow. Two moderately strong humeral bristles are present, and the anterior sternopleural bristle is almost as large as the posterior bristle. *Legs:* Entirely yellow. Each front femur has a row of about five moderately strong, black posterodorsal bristles and four strong posteroventral bristles. Front tibiae not ornate; the preapical dorsal bristle is well differentiated. The front basitarsus is long and slender, about half as long as the tibiae; the anterior surface bears one moderately long hair at about the basal fourth of the segment and a row of seven or eight moderately long, slightly curved cilia on the apical half of the segment (fig. 118a). The second tarsal segment is shaped as in *sordidapex*. *Wings:* Hyaline or subhyaline, except for a rather large dark brown spot at the upper apex; this extends through the apical part of cell R_1, through R_3, and obliquely to the wing margin through cell R_5 (fig. 118b). The venation is the same as in *dasycnemia* and *conformis*. *Abdomen:* Predominantly dark brown to black. The first tergum is yellow at its base and at its apex, the fifth tergum is lightly tinged with yellow, and the sixth tergum is entirely yellow. The latter is exposed; in dorsal view it is just slightly over half as long as the fifth abdominal segment. The ninth tergum is reduced to just a narrow ring around the dorsal portion; the ventral aspects are rounded and have a fringe of hairs around the margins (fig. 118c).

Length: body, 3.0 mm.; wings, 3.5 mm.

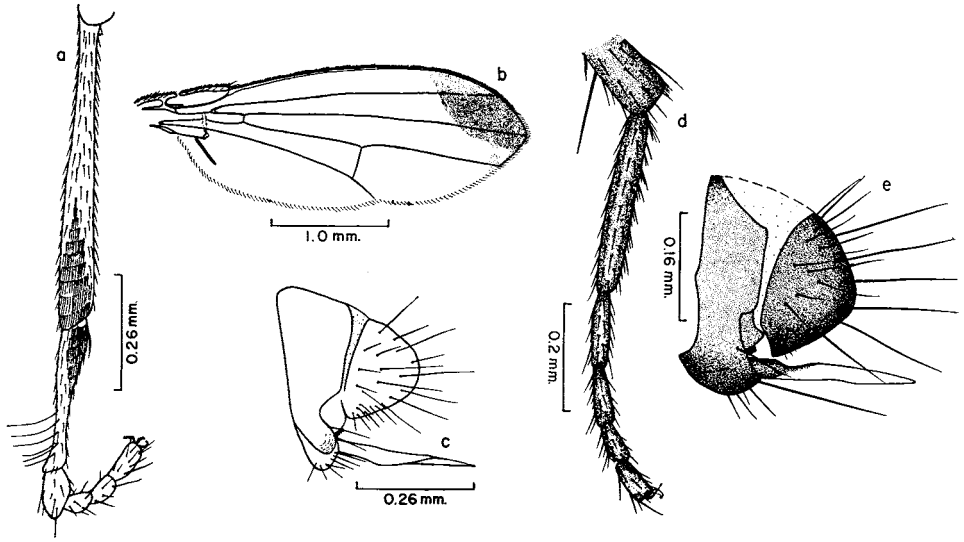


Figure 118—*Drosophila incognita* n. sp.: **a,** front tibia and tarsus, ventral view; **b,** wing; **c,** male genitalia. *D. incompleta* n. sp.: **d,** front tarsus; **e,** male genitalia.

FEMALE. The female sex has not been definitely associated; one specimen, which apparently belongs here, is at hand from Keauhou Ranch, Kilauea, Hawaii, July, 1953 (D. E. Hardy); it is not, however, being designated as the allotype or as a paratype. The specimen fits the description of the above male in most respects; however, it is consistently darker in color. The thorax is black, rather faintly tinged with brown; also the palpi and mouthparts are brown; the wing markings are not so intense and are more evenly diffused over the apex of the wing. The abdomen is entirely black, the ovipositor is dark brown to black. The anal plates are short and triangular, extending just slightly beyond the apex of the anal plates.

Holotype male: Upper Olaa Forest, Hawaii, August, 1952 (W. C. Mitchell). Six paratype males: from the following localities—four same as type, August, 1952, and July, 1956 (D. E. Hardy); one Kaiholena, Hawaii, Kohala Mountains, 2,000 feet, August, 1952 (D. E. Hardy); and one Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

Type in the B. P. Bishop Museum; paratypes in the United States National Museum and the University of Hawaii collections.

Drosophila incompleta new species (fig. 118d–e).

This species keys near *D. fungicola* n. sp. because of the predominantly dark coloring of the body, the lack of ornamentation on the front leg of the male, and the dark markings of the wing apex and over the m crossvein. *D. fungicola* is readily differentiated from *incompleta* by being predominantly shining black with a yellow spot at the apex of the scutellum; by having the last section of vein M_{1+2}

about 1.35 times longer than the penultimate section rather than approximately equal to it; and by other details. *D. incompleta* shows rather close relationship to *musae* n. sp. It differs by having the second bristle of the vibrissal row almost equal in size to the first, by having the front predominantly brown and the face brown on the ventral portion, by having the anterior reclinate bristle distinctly smaller than the proclinate, and by having the last section of vein M_{1+2} approximately equal in length to the penultimate section. It also differs from *musae* by having the thorax predominantly brown with two rather faint yellow vittae extending down the mesonotum. Since this species is somewhat borderline in coloration, it is being keyed with the group which has the thorax dark colored as well as with the group which has the thorax predominantly pale colored.

MALE. *Head:* One-third to one-half higher than long. The front is about two times wider than long (measured from the median ocellus to the anterior margin) and is entirely brown, tinged very faintly with yellow in the ground color of the lower portion. The upper eye orbits are dark brown, tinged with black. The extreme upper portion of the occiput is also dark brown, tinged with black; the upper median portion is brown, and the lower portion of the occiput and the genae, except for a faint brown line along the vibrissal row, are entirely yellow. The face is yellow on the upper portion and distinctly brown on the lower one-third to one-half. The face is slightly convex in the upper median portion. The clypeus is brownish yellow. The palpi and mouthparts are yellow. Each palpus has a well-developed bristle (about equal in size to the anterior reclinate bristles) and a smaller subapical bristle in addition to several black setae around the outside surface. The labella are apparently not ornate. The anterior reclinate bristle is two-thirds to three-fourths as long as the proclinate and is situated slightly above the latter. The inner vertical bristles are well developed, almost equal in length to the height of the head. The antennae are predominantly brown; the first two segments are yellow ventrally. The arista has six dorsal and two ventral rays in addition to the apical fork. Two rather well-developed bristles are present at the upper edge of each vibrissal row; these are approximately equal in size and are slightly larger than the proclinate bristles on the front. *Thorax:* Predominantly brown; the humeri are yellow, and a yellow vitta extends down each side of the mesonotum in line with the dorsocentral bristles; the dorsum is otherwise dark brown. The pleura are brown, tinged with rufous in the ground color. The halteres are pale yellow. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second (posterior) supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is approximately three-fourths as long as the posterior bristle. *Legs:* Entirely yellow except for the two dark brown to black apical segments of the tarsi. The legs lack ornamentation although each front basitarsus has about six short, erect, anterior setae extending over the apical half of the segment (fig. 118d). The front basitarsus is almost two-thirds as long as the tibia and slightly over two

times longer than the second tarsal segment. *Wings:* Subhyaline, marked with brown over the apical one-fourth, especially along the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, and with a large pale brown marking over the m crossvein. The third costal section is five times longer than the fourth, and the costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section, approximately 1.05 times longer. The last section of vein M_{3+4} is about equal in length to the m crossvein. *Abdomen:* Entirely dark brown. The anal plates are nearly two times higher than long and are distinctly pointed ventrally. The ninth tergum is strongly narrowed over the dorsal portion, expanded on the posterior median margin, and lobate ventrally (fig. 118e). At the widest portion the ninth tergum is equal to about three-fourths the length of the anal plate. The claspers are almost completely hidden from lateral view.

Length: body, 3.2 mm.; wings, 3.6 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, August, 1958 (D. E. Hardy). Type in the B. P. Bishop Museum.

Drosophila inedita new species (fig. 119a–d).

This species fits near *D. sadleria* Bryan but the markings on the thorax, and on the wings, and also the wing venation, are very different. *D. inedita* has only four brown vittae down the mesonotum, the pleura are intensely colored with brown, the r–m crossvein is situated near the basal fourth of cell first M_2, the last section of vein M_{1+2} is but slightly longer than the penultimate section, and a dark brown spot is present at the apical portion of the second costal cell (fig. 119b). Also the ciliation on the front tarsi of the male is very different (fig. 119a). The wing markings and venation are similar to those of *distincta* n. sp. but that species has the front tibiae of the male ciliated and also differs in other respects. The front is about as wide as long, and is predominantly yellow, tinged with brown along the upper orbits and often over the upper portion of the front. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The occiput is predominantly yellow, the upper median portion is tinged with brown; each gena has a faint brown spot in front of the genal bristle and is otherwise yellow. The face is white, very slightly carinate down the median portion. The clypeus is yellow above, yellow-brown on the sides. The palpi and mouthparts are yellow, tinged very lightly with brown; the former are covered with short black hairs but have no strong bristles. The mouthparts are not ornate. Only one strong bristle is present at each lower angle of the face (upper edge of the vibrissal row). The first two antennal segments are brown, tinged with yellow; the second has two moderately strong dorsal bristles. The third segment is brown, tinged with yellow at its base. The arista has about eight dorsal rays and four ventral rays in addition to the apical fork. *Thorax:* Largely yellow. A brown longitudinal vitta extends down the side just inside each dorsocentral row from the front margin of

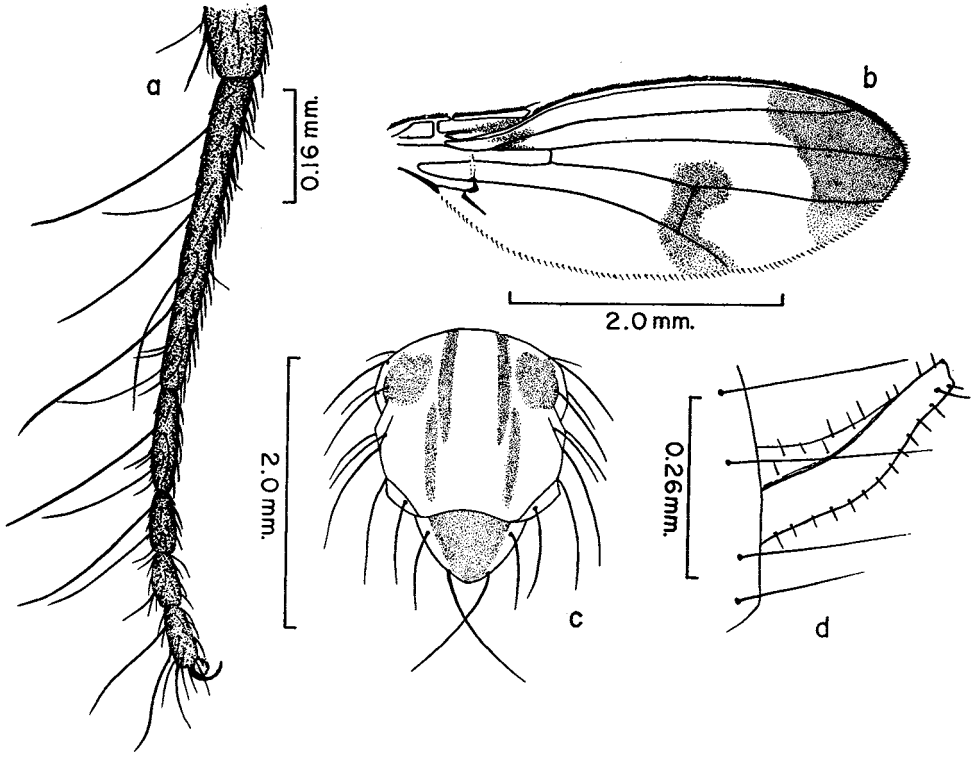


Figure 119—*Drosophila inedita* n. sp.: **a,** front tarsus; **b,** wing; **c,** thorax, dorsal view; **d,** female ovipositor blades.

the mesonotum to the anterior dorsocentral bristle. A short brown vitta is present on each side just outside each dorsocentral row and extends from just behind the suture almost to a level with the posterior dorsocentral bristles. A moderately large presutural brown spot is also present on each side just behind each humerus (fig. 119c). The hind portion of each humerus is brown. The scutellum is brown on the dorsum and yellow on the lateral margins. The anterior dorsocentral bristles are situated in line with the second pair of supra-alars. The pleura are predominantly brown; the sclerites are clear yellow only around the margins. The pleuroterga are yellow. The metanotum is brown on the sides, yellow down the median portion. The halteres are clear yellow. *Legs:* Entirely yellow. The front tibiae are not ornate except for about two erect cilia on the dorsal surface just before the dorsal bristle. The front tarsi have numerous, distinctly spaced, long black hairs extending down each anterodorsal and posterodorsal surface (fig. 119a). The front basitarsus is about three-fifths as long as the tibia and slightly over three times longer than the second tarsal segment. *Wings:* Hyaline except for a large brown spot over the wing apex; a dumbbell-shaped mark over the m crossvein; and a brown spot extending through

the apical half of the second costal cell, across the bases of cell R_1 and cell R_3, and into the basal portion of cell R. The third costal section is 4.5 times longer than the fourth and the costal fringe extends just slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section. The proportions are about 75 to 89 (fig. 119b). *Abdomen:* Brown; yellow on the posterior corners of each tergum. The male genitalia are characterized by having each ventral margin of the ninth tergum produced into two prominent points.

Length: body, 3.40–3.75 mm.; wings, 3.80–4.20 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor plates are moderately elongate and slender, almost as long as the seventh abdominal segment (fig. 119d).

Length: body, 3.5–3.8 mm.; wings, 4.0–4.5 mm.

In some female specimens a distinct indication of a rather broad brown vitta is present extending down the median portion of the mesonotum. The specimens appear to agree in all other respects, and this is apparently just an aberration.

Holotype male and allotype female: from Haleanau Valley, Mt. Kaala, Oahu, April 21, 1949, collected in banana bait trap (G. Mainland). Twenty-seven paratypes (16 males and 11 females): from the following localities on Oahu—same as type; Manoa Valley, February, 1952, and specimens without a date (D. E. Hardy and G. B. Mainland); Manoa Falls, April 16, 1949, and May, 1952, in banana bait traps (G. B. Mainland and D. E. Hardy); Manoa Cliffs Trail, March 29, 1918 (no collector given); Mt. Kaala, June 4, 1916 (no collector given); Opaeula, March 30, 1913 (O. H. Swezey); Tantalus, August, 1952 (D. E. Hardy); and Waialae Iki Valley, Southeast Koolau Mountains, February 24, 1917 (no collector given).

Type, allotype, and a series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes have been distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila infuscata Grimshaw (fig. 120a–d).

Drosophila infuscata Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :63.

Endemic. Hawaii (type locality: Olaa). Known from several localities on the wet slopes of Mauna Loa and the Kohala Mountains. One specimen collected by Swezey (Kilauea, July 10, 1934) is labeled "ex *Osmanthus*."

Type in the British Museum (Natural History). I have studied the type, and also topotypic and homeotypic specimens.

This species fits in the complex which is characterized by having the apical portion of the wing and the m crossvein faintly infuscated with brown; the thorax yellow, tinged lightly with brown; and which lacks ciliation on the front tibiae but has ciliation on the dorsal surfaces of the front tarsi. It fits close to *D. diminuens* n. sp. and is differentiated by having the front basitarsus entirely

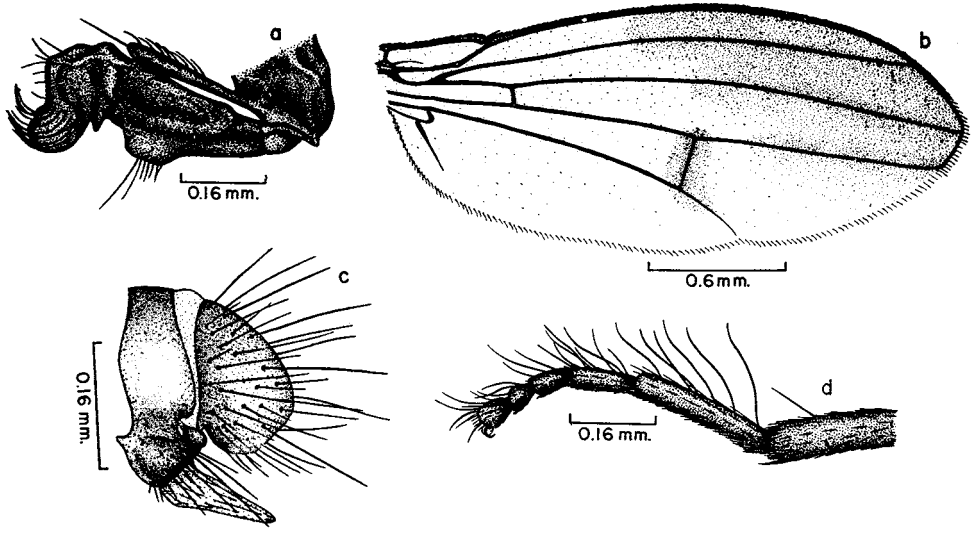


Figure 120—*Drosophila infuscata* Grimshaw: **a**, mouthparts of male; **b**, wing; **c**, male genitalia; **d**, front tarsus.

ciliated (rather than the basal half being bare); by the pleura being yellow, not tinged with brown; by the silvery gray pollinosity on the front; and by the differences in the armature of the labella as shown in figures 79a and 120a. *D. infuscata* is also scarcely over half as large as *diminuens*. It differs from *diffusa* n. sp. by the very different ornamentation on the front tarsi of the male, by having three rather well-developed humeral bristles, and by other details.

MALE. *Head:* Front about one-third wider than long, almost entirely yellow, tinged with brown along the orbits to the proclinate bristles, and also brown around the ocellar triangle; the upper three-fourths of the front is silvery gray pollinose, best seen from an anterior rather than a dorsal view. The lower reclinate bristle is about four-fifths as long as the proclinate and is situated opposite the latter. The vertex and upper occiput are yellow-brown. The remainder of the occiput, the genae, and mouthparts, including the palpi, are pale yellow; the face is white, faintly tinged with yellow. No distinct bristles are differentiated in the vibrissal rows. The face is slightly carinate in the median portion on the upper half and is flat below. The antennae are yellow, tinged lightly with brown on the upper portion of the second segment and at the apex of the third. The second segment has two moderately stout dorsal bristles. The arista has five to seven dorsal rays and two to three ventral rays; the inner surface has just a few scattered short hairs on the apical half. The labella are very ornate; the apex of each is armed with a comb-like series of long curved bristles (fig. 120a). The terminal bristle of each palpus is rather small, scarcely differentiated from the other black setae. *Thorax:* Shining brownish yellow on the dorsum, clear yellow on the sides. The anterior pair of dorsocentral bristles is situated opposite the

second pair of supraalars. About eight rows of acrostichal setae are present. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. Halteres yellow. Three rather distinct humeral bristles are developed. *Legs:* Mostly yellow, brown on the apical segments of the tarsi. Front femora moderately slender; the posteroventral bristles are about 1.5 times longer than the width of the femur. Front tibiae not ornate. Front tarsus with moderately long dorsal ciliation extending its entire length. The front basitarsus is approximately two times longer than the second tarsal segment and is slightly less than half as long as the tibia (fig. 120d). *Wings:* About 2.5 times longer than wide, broadest through the median portion. The entire anteroapical portion of the wing is distinctly infuscated with pale brown, extending from about the basal two-fifths of cell R_1 diagonally across cell R_3, and along the upper portion of cell R_5. The m crossvein is brown. In two of the specimens, possibly teneral, the brown markings are not present; this species is, however, also being keyed in the group which has clear wings. The third costal section is 4.5 times longer than the fourth. Vein R_{2+3} is straight, not curved upward at its apex. The costal fringe extends nearly three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section (fig. 120b). *Abdomen:* The first tergum and the basal portion of second are yellow, the sixth is yellow, tinged with brown, and the remaining terga are light brown, subshining, and lightly gray dusted. The sternum is entirely yellow. The ninth tergum narrows very slightly over the dorsal portion, and the ventral margins are nearly truncate and almost completely obscure the claspers from lateral view (fig. 120c). Each ventral margin of the tergum has one moderately strong bristle and numerous smaller black hairs. The anal plates are about one-third longer than the ninth tergum.

Length: body, 3.0 mm.; wings, 3.2 mm.

FEMALE. Fitting the description of the male in most respects. The mouthparts and front legs are not ornate, and moderately strong bristles are present at the upper portion of each vibrissal row; also, the apical bristle of each palpus is moderately strong. The ovipositor plates are yellow, rather large, and triangular in shape; they extend well beyond the apices of the anal plates and are about equal in length to the seventh abdominal segment. The abdomen is typically colored as in the male; in some specimens, however, it is yellow, tinged with brown.

Length: body, 3.1 mm.; wings, 3.4 mm.

Drosophila insignita new species (fig. 121a–b).

This species fits near *D. mecocnemia* n. sp. but is differentiated by having the pleura entirely yellow except for a tinge of brown along the upper portion; by the brown interfrontal area; by the well-defined brown wing spot (fig. 121a); and by the genital characters as shown in figure 121b.

MALE. *Head:* Just slightly higher than long. The front is yellow on the lower portion to a level opposite the point of the ocellar triangle; the upper portion

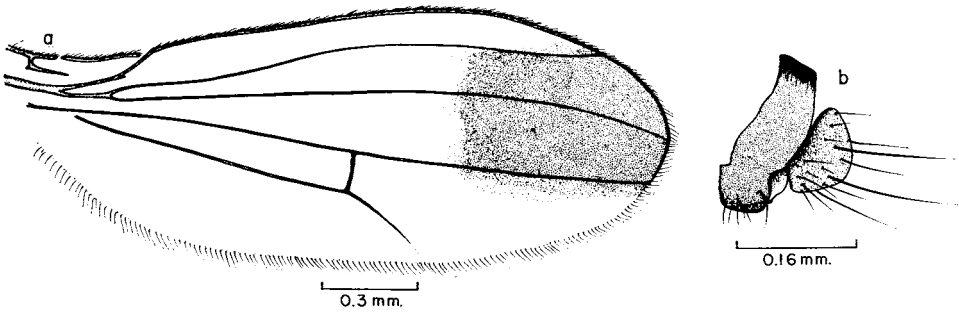


Figure 121—*Drosophila insignita* n. sp.: **a,** wing; **b,** male genitalia.

is brown. The vertex and upper half of the occiput are yellow-brown. The lower half of the occiput, the genae, face, clypeus, and palpi are yellow. The mouthparts are yellow except for a dark brown to black rim at the apex of each labellum. The uppermost bristle of the vibrissal row is about equal in size to the proclinate bristles of the front; a secondary vibrissal bristle is present on each side, this approximately equal to the lower reclinate bristles of the front. No prominent bristles are present on the palpus; several thin setae occur along the outside surface. The face is slightly convex down the median portion. The first two antennal segments are yellow. The third is yellow except for a tinge of brown over the dorsal and apical portions. The arista has five to six dorsal and two ventral rays in addition to the apical fork. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. *Thorax:* The dorsum is entirely dark brown covered with gray pollen except for the yellow apex of the scutellum. The pleura are yellow except for a tinge of brown in the ground color of the upper hind portion of the mesopleuron, the upper portion of the pteropleuron, and the median portion of the metapleuron. The metanotum is brown, tinged with rufous. The halteres are bright yellow. Six to eight rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about opposite the first (anterior) supraalars. Two humeral bristles are present. The anterior sternopleural bristle is rather small, about one-third to two-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The segments are slender, and no long cilia or ornamentations are present. The front basitarsus is slender, approximately two-thirds as long as the tibia, and two times longer than the second tarsal segment. *Wings:* Nearly three times longer than wide and hyaline except for the large spot at the apex as shown in figure 121a. The third costal section is 4.75 times longer than the fourth and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.72 times longer than the penultimate section. The last section of vein M_{3+4} is about two times longer than the m crossvein. *Abdomen:* Entirely yellow-brown, covered with gray-brown pollen. The anal plates

are nearly two times higher than long and are not pointed ventrally. The ninth tergum is straight sided, not narrowed over the dorsal portion, and subequal in length to the anal plates. The ventral margin of each side of the tergum is slightly attenuated. The claspers are plainly visible from a lateral view (fig. 121b.)

Length: body, 2.50 mm.; wings, 2.65 mm.

FEMALE. Unknown.

Holotype male: Palikea, Waianae Mountains, Oahu, 3,000 feet, November 15, 1936, on foliage (F. X. Williams). One male paratype: same locality as type except that it is labeled 2,800 feet, collected November 8, 1936.

Type in the Hawaiian Sugar Planters' Association collection. Paratype in the University of Hawaii collection.

Drosophila intermedia new species (fig. 122a–c).

This species is intermediate between those which have distinct fuscous markings in the wings and those which have the wings evenly tinged or without fuscous markings; it is being keyed in both sections. It is differentiated from other known *Drosophila* by having the wings uniformly fumose, slightly darker in the anterior portion; by the predominantly brown to black body, tibiae, and tarsi; and by the characteristic clump of five erect hairs near the apex of the first tarsal segment of the male (fig. 122a).

MALE. *Head:* The front is predominantly brown to black, rather thickly gray pollinose; the lower third of the front is rufous, tinged with brown. The front is about one-fourth wider than long. The lower reclinate bristle is about three-fourths to four-fifths as long as the proclinate and is situated opposite the latter. The vertex and the upper half of the occiput are black, covered with gray pollen. The upper portion of the occiput is slightly concave as seen from lateral view. The lower occiput, the genae, and the mouthparts, including the palpi, are yellow. The face and clypeus are white, tinged slightly with yellow. Each palpus has two short, black bristles (one apical and one preapical) plus numerous black setae around the apical portion. Each vibrissal row has two or three moderately developed bristles in the upper portion. The labella are fleshy, not ornate. The face is almost flat down the central portion, with just a slight carina in the upper median area. The antennae are yellow, tinged with brown on the dorsal portion of the second segment. The second segment has two moderately strong dorsal bristles plus numerous black setae over the dorsal surface. The arista has four or five dorsal rays and one ventral ray in addition to the apical fork (the typical number is apparently four dorsal—one specimen on hand has five dorsal rays on one arista). *Thorax:* Predominantly brown in ground color, covered with gray pollen. The mesonotum is dark brown to black. The pleura are brown over most of the sclerites, yellow around the margins. The humeri are yellow, tinged with brown on the upper portions. The scutellum is reddish brown on the dorsum and yellow, tinged with brown around the margins and on the under portion. The metanotum is largely reddish brown, yellow on the sides, and densely covered with gray pollen. The halteres are clear yellow. Six rows of acrostichal

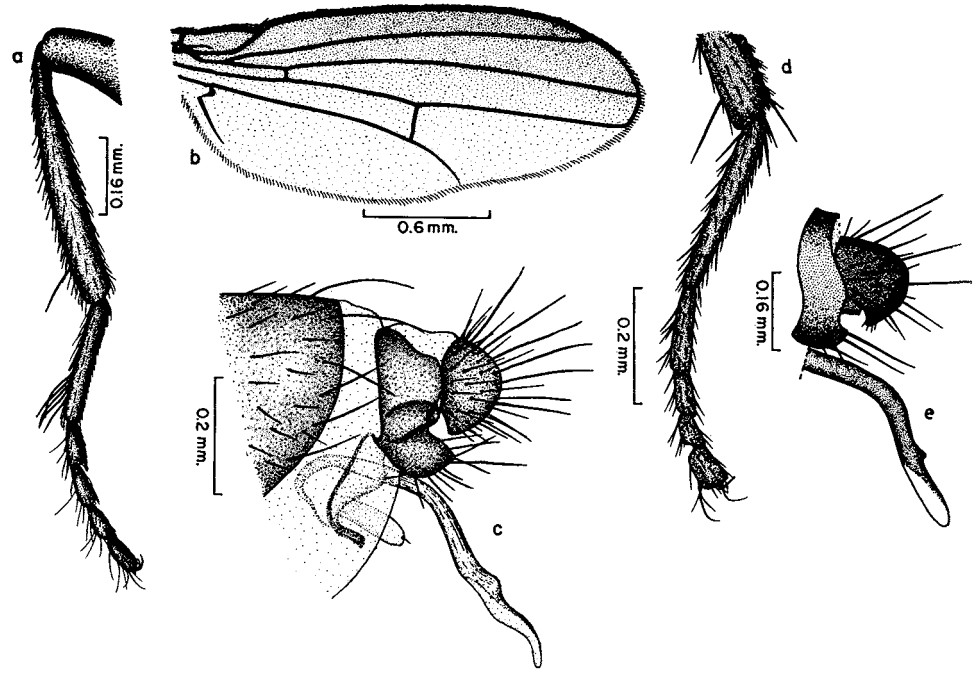


Figure 122—*Drosophila intermedia* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia. *D. involuta* n. sp.: **d,** front tarsus; **e,** male genitalia.

setae are present. The anterior pair of dorsocentral bristles is situated on a line drawn about halfway between the first and second pair of supraalars. One pair of moderately strong setae is present in the dorsocentral row approximately in line with the presutural bristles. These are about 1.5 times longer than the surrounding setae of the mesonotum. Anterior sternopleural bristle about four-fifths as long as the posterior bristles. *Legs:* Coxae and trochanters yellow. Femora yellow, tinged lightly with brown. Tibiae and tarsi brown to black. Four or five bristles are developed on each of the posteroventral and posterodorsal surfaces of the front femora; the posteroventral bristles are about 1.4 times longer than the width of the femur. Front tibiae not ornate. Front basitarsus about one-half as long as the tibia and with about five erect black hairs near the apical portion. Other tarsal segments with scattered erect hairs as in figure 122a. *Wings:* Rather uniformly infuscated with pale brown, slightly darker anteriorly (fig. 122b). The third costal section is 4.5 times longer than the fourth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Dark brown, tinged with yellow on the apical terga. The anal plates are yellow, tinged with brown; the remainder of the genitalia are yellow. The ninth tergum is narrowed dorsally, and the ventral margins are quadrate and rather densely haired (fig. 122c). The claspers are hidden from lateral view.

Length: body, 3.0 mm.; wings, 3.4 mm.

FEMALE. Unknown.

Holotype male and one paratype male: Upper Olaa Forest, Hawaii, July, 1956, 4,000 feet (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila involuta new species (fig. 122d–e).

This species fits in the complex which is characterized by having only the m crossvein infuscated with brown and the body predominantly dark brown in color. It fits closest to *D. olaae* Grimshaw but is very distinct from this as well as other species in the complex. It is readily separated by the lack of ornamentation on the front tarsi of the male.

MALE. *Head:* About one-half higher than long. The front is yellow, tinged with brown on the upper portion, and brown, tinged faintly with black, on the upper eye orbits. The ocellar triangle is black. The upper one-third of the occiput is dark brown, covered with gray pollen. The lower portion of the occiput is yellow. The genae are yellow except for a narrow line of black along the vibrissal row. At the lower eye margin the gena, measured from the vibrissal row to the eye, is about equal in width to three rows of eye facets. The face is entirely yellow, slightly convex in the median portion. The clypeus is yellow, tinged faintly with brown. The palpi and mouthparts are entirely yellow. Each palpus has a moderate-sized apical bristle, approximately equal in development to the upper bristle of the vibrissal row. The labella are not conspicuously ornate except for two or three curved yellow spines on each side near the upper portion. The anterior reclinate bristles are broken on the specimen at hand. They are situated opposite the proclinates. The first two antennal segments are yellow except for the brown dorsal surfaces. The third segment is brown, slightly yellow at the base. The arista has six dorsal and three ventral rays in addition to the apical fork. *Thorax:* Brown, tinged with yellow to rufous on the dorsum, completely yellow on the sides. The dorsocentral bristles are situated about halfway between the first and second supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles plus a bristle-like seta near the upper portion. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. The front legs lack long ciliation, but a row of short, inconspicuous, erect hairs extends down the anterior surface of the basitarsus (fig. 122d). The front basitarsus is about one-half as long as the tibia and approximately two times longer than the second tarsal segment. *Wings:* Hyaline except for a dark brown mark over the m crossvein. The third costal section is nearly six times longer than the fourth, and the costal fringe extends just beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.35 times longer than the penultimate section. *Abdomen:* The first tergum is yellow; the other terga are brown, faintly tinged with rufous, and each has a narrow edge of gray on the posterior margin. The anal plates are nearly two times higher than long and are subacutely pointed ventrally.

The ninth tergum is narrowed on the dorsal portion and gradually expanded ventrally (fig. 122e).

Length: body, 3.2 mm.; wings, 3.6 mm.

FEMALE. Unknown.

Holotype male: from near Pawaina, Kona, Hawaii, 3,000 feet, July, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila ischnotrix new species (fig. 123a–f).

This species fits near *D. trichaetosa* n. sp. but is differentiated by being much smaller, by lacking distinct bristles in the vibrissal row, and by the differences in the development of the front tarsus as shown in figure 123c–d.

MALE. *Head:* The front is yellow to rufous, tinged with brown on the upper portion. The upper orbits are brown, covered with gray pollen. The ocellar triangle is dark brown to black. The upper portion of the occiput is brownish yellow. The anterior reclinate bristle is tiny, scarcely over one-half as long as the proclinate, and is situated almost opposite the latter. The upper reclinate bristle is approximately equal in size to the inner vertical. Strong bristles are lacking in the vibrissal row. The vibrissae are represented by small, rather inconspicuous, yellow-brown setae. The antennae are yellow, tinged with brown on the upper portions of segments two and three. The arista has five or six dorsal rays and usually three ventral rays in addition to the apical fork (fig. 123b). The palpi and mouthparts are yellow. Each palpus has a black bristle at the apex. The labella are armed with curved yellow bristles at their apices (fig. 123a). *Thorax:* The mesonotum is yellow, rather distinctly tinged with brown. The disc of the scutellum is yellow-brown. A faint discoloration of brown extends over the top half of each pleuron. The lower portions of the pleura are pale yellow. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Pale yellow, lacking ornamentation except on the tarsi. The front basitarsus is about one-half as long as the tibia and has three or four short dorsal bristles at the apex (fig. 123c–d). Two or three prominent dorsal setae are present on tarsal segments two and three. *Wings:* Entirely hyaline. The third costal section is 4.4 times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is nearly two times longer than the penultimate section. *Abdomen:* Predominantly yellow-brown on the dorsum, clear yellow on the venter. The anal plates are higher than long. The ninth tergum is narrowed on the dorsal portion. The anterior margin is convex; through the median portion the tergum is about equal in length to the anal plates; the ventral lobe of the tergum is shaped as in figure 123f.

Length: body, 1.75–2.50 mm.; wings, 2.00–2.30 mm.

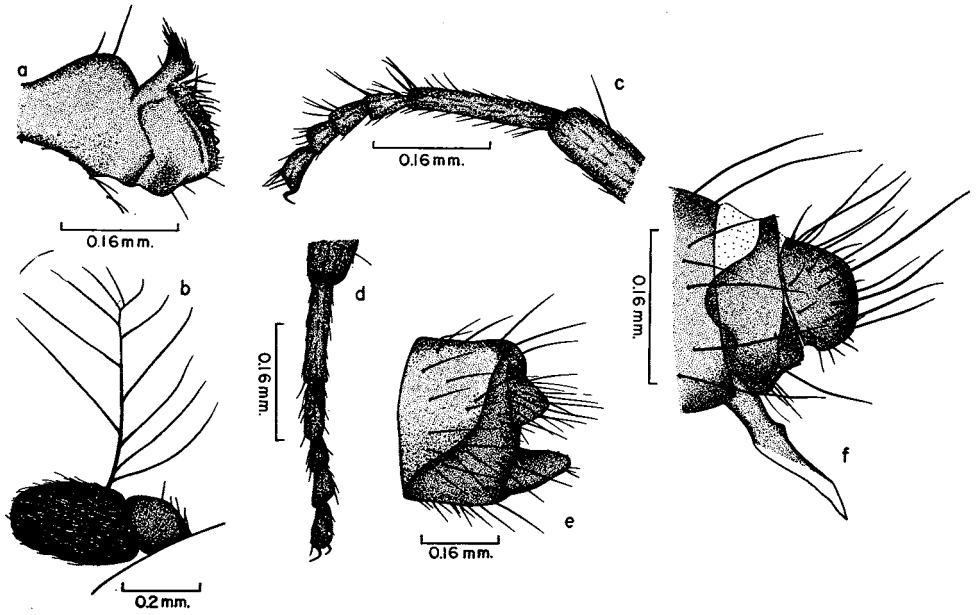


Figure 123—*Drosophila ischnotrix* n. sp.: **a,** labellum; **b,** antenna; **c,** front tarsus, lateral; **d,** front tarsus, dorsal; **e,** female genitalia; **f,** male genitalia.

FEMALE. Fitting the description of the male in most respects. The apical bristle on the palpus is considerably stronger, however, and one prominent bristle is present at the upper edge of each vibrissal row. The ovipositor blades are short, rather triangular (fig. 123e).

Length: body and wings, 2.30–2.65 mm.

Holotype male and allotype female: Mt. Tantalus, Oahu, November and December, 1953 (D. E. Hardy and M. S. Adachi). About fifty paratypes (sexes about equal in numbers): from the following localities on Oahu—same as type, May, 1953; Pupukea, July, 1958, in banana thicket (D. E. Hardy); Manoa Valley, January–February, 1952 (D. E. Hardy, M. Tamashiro, and M. S. Adachi); Mt. Kaala, April–May, 1953 (D. E. Hardy and C. P. Hoyt); Wailupe, December, 1919 (E. H. Bryan, Jr.); and Mt. Tantalus, August, 1955, collected on *Freycinetia* sp. ("ieie") (D. E. Hardy). Also two paratypes, one male and one female: Lanaihale, Lanai, 3,200 feet, June, 1953 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila joycei new species (fig. 124a–b).

This species fits in the complex which is characterized by having the wings marked with brown at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, and with a

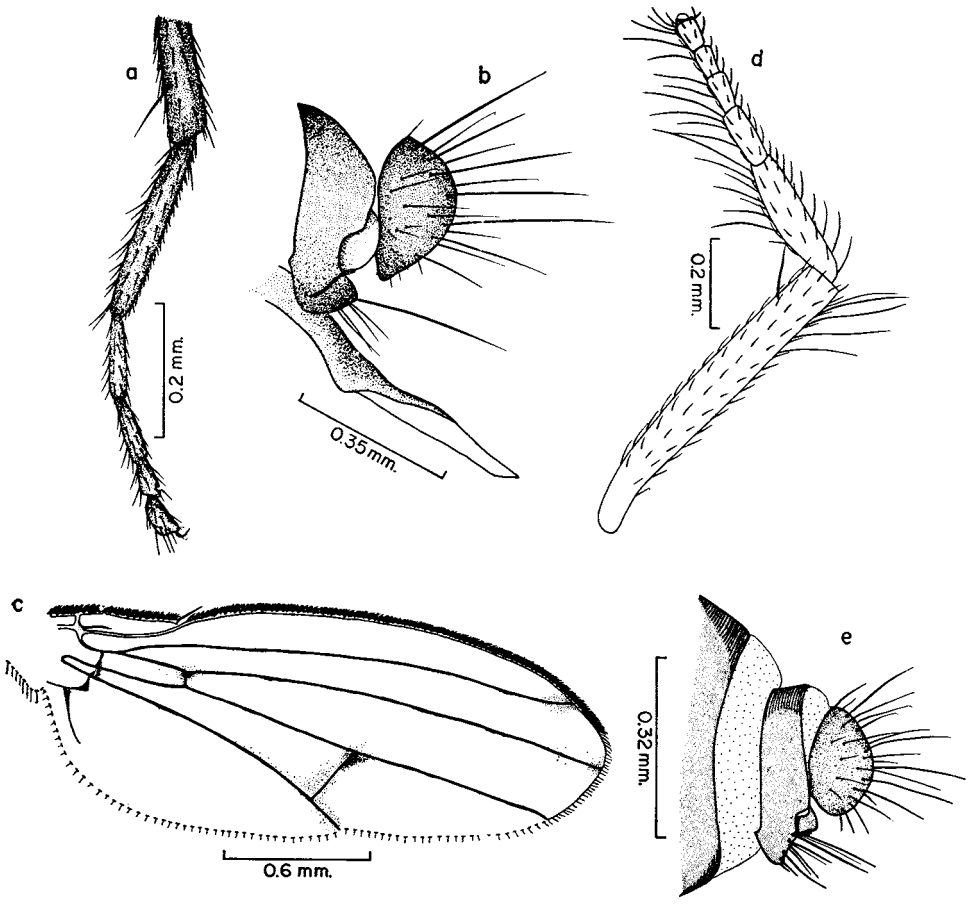


Figure 124—*Drosophila joycei* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. kauluai* Bryan: **c,** wing; **d,** front tibia and tarsus; **e,** male genitalia.

brown marking over the m crossvein. It is differentiated from other species in this complex by a complete lack of ornamentation on the front legs of the male. It fits nearest to *D. xuthoptera* n. sp., but the characteristics of the front legs as well as other details will readily separate these.

MALE. *Head:* About one-third higher than long as seen in direct lateral view. The front, measured from the median ocellus to the anterior margin, is two times wider than long. The front is predominantly velvety brown; the lower half is yellow, tinged lightly with brown. The eye orbits above the proclinate bristles are dark brown, tinged with black, and covered with gray-brown pollen. The ocellar triangle is shining black in ground color covered with gray-brown pollen. The upper half of the occiput is brown, tinged with black; the lower portion is pale yellow. The genae, face, clypeus, palpi, and mouthparts are entirely yellow. The face is just slightly raised in the upper median portion. Two moderately

strong bristles are present at the upper portion of each vibrissal row; these are almost equal in size to the humeral bristles. Each palpus has a moderately strong apical bristle which is about equal in length to the dorsal rays on the arista. The labella are fleshy, lacking spinous processes or ornamentation. The gena, measured at the lower edge of the eye from the vibrissal row to the eye margin, is about equal in width to four or five rows of eye facets. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated opposite the latter. The upper reclinate bristle is strong, almost equal in size to the vertical bristles. The antennae are predominantly brown; the first segment is yellow and the second segment is yellow on the ventral portion. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Yellow, marked with brown on the dorsum and on the sides. The disc of the scutellum is predominantly dark brown to black, the lateral margins are yellow. A broad brown mark is present on each side of the mesonotum just outside the dorsocentral row and extends from about level with the wing bases to just beyond the suture. A brown median vitta extends from the scutellum to the anterior margin of the mesonotum. On the anterior half beyond the anterior dorsocentrals, this vitta is distinctly narrow; on the posterior portion it is broad, filling most of the area between the dorsocentral rows. The posterior two-thirds of each mesopleuron, the hind one-third of each sternopleuron, the hypopleuron, and the upper portion of each pteropleuron are brown, tinged with rufous; the pleura are otherwise yellow. The halteres are pale yellow. The anterior dorsocentral bristles are situated almost opposite the first (anterior) pair of supraalars. Two well-developed humeral bristles are present. The sternopleural bristles are broken on the specimen at hand; from the size of the sockets it is obvious that both are well-developed bristles. *Legs:* Entirely yellow except for a tinge of brown at the apices of the femora and on the apical segments of the tarsi. The legs are without ornamentation; the front basitarsus is about three-fifths as long as the tibia and is two times longer than the second tarsal segment (fig. 124a). *Wings:* Subhyaline, faintly infuscated with yellow-brown, and with pale brown markings at the apices of veins R_{2+3}, R_{4+5}, M_{1+2}, and over the m crossvein. The third costal section is five times longer than the fourth, and the costal fringe extends almost two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The anal plates are about two times higher than long and are rather sharply pointed ventrally. The ninth tergum is narrowed over the dorsal portion, convex along the posterior median margin, and lobate ventrally; at its widest point it is almost equal to the length of the anal plate. The claspers are plainly visible from a lateral view (fig. 124b).

Length: body, 3.8 mm.; wings, 4.0 mm.

FEMALE. Unknown.

The species is named after Dr. C. R. Joyce, Medical Entomologist, United States Public Health Service, who has made many contributions to our knowledge of medically important flies in Hawaii.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (C.R. Joyce).

Drosophila kauluai Bryan (fig. 124c–e).

Drosophila kauluai Bryan, 1934, Proc. Haw. Ent. Soc. 8 (3) :439.

Endemic. Oahu (type locality: Pacific Heights), in both the Waianae and Koolau Mountains. Specimens have been bred from the fruit of *Sideroxylon* which had fallen to the ground.

Type in the B. P. Bishop Museum. I have studied the type.

Fitting in the complex of species which is characterized by having the thorax entirely yellow to rufous and the brown wing markings confined to the crossveins and to the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}. It fits near *D. diminuens* n. sp. but is differentiated by the ciliation of the front tibia and tarsus of the male and by the short, slightly thickened basitarsus (fig. 124d). The females are very similar to those of *infuscata* Grimshaw, but the front is longer and the anterior reclinate bristles are situated at about the lower third of the front.

The head is about three-fifths higher than long, and the front is about one-third wider than long. The latter is yellow, tinged lightly with brown, and, in the male, is distinctly silvery gray pollinose through the median portion, with a very slight purplish tinge in some lights. The face is carinate, yellow down the median portion, and yellow, tinged with brown in the furrows. The anterior reclinate bristles are very strong, almost equal in size to the proclinates, and situated opposite the latter. No unusually strong bristles are present in the vibrissal rows. The mouthparts and palpi are yellow; the latter have one moderately strong apical bristle plus numerous black setae arranged around the margins. The labella of the males are ornate and have moderately long, curved yellow hairs at their apices. Front tibia of male with a row of five erect, posteroventral cilia just before the apex. The front basitarsus (fig. 124d) is short, rather thickened, flattened laterally, and about one-third as long as the tibia. The tarsus has long ciliation down the anterodorsal surface, and the posterior surface of the tarsus is densely covered with short, suberect hairs. The wings are predominantly hyaline. The brown markings over the crossveins and the tips of the vein are rather faint (fig. 124c). The wings are about three times longer than wide and the third costal section is slightly more than five times longer than the fourth section. The costal fringe extends about two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section. One female specimen at hand has the m crossvein of one wing forked (Y-shaped), *deltaneuron*-like. The thorax is entirely yellow to rufous. The dorsal portions are shining. The anterior pair of dorsocentral bristles is situated opposite the second pair of supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The abdomen is brown except for the yellow bases and lateral margins. The male genitalia are as in figure 124e.

Length: body, 2.8–3.0 mm.; wings, 3.3–3.5 mm.

Drosophila kraussi new species (fig. 125a–b).

This species fits near *D. orastes* n. sp. from the island of Hawaii but is separated by the difference in the arrangement of the long cilia on the front tarsi of the male (fig. 125a), by having the palpi predominantly black, by the brown apices of the tibiae, and by the entirely dark brown pleura. The species is also larger, and the genitalia are quite different.

MALE. *Head:* About one-half higher than long; dark brown to black, tinged with yellow on the lower portion of the front; and yellow, tinged faintly with brown on the genae, lower occiput, and upper portion of the face. The front measured from the median ocellus to the front margin is two times longer than wide. The anterior reclinate bristle is almost as long as the proclinate and is situated distinctly above the latter. One strong bristle is present at the upper edge of each vibrissal row; this is equal to or slightly larger than the proclinate bristle. The third and fourth setae in the vibrissal row are approximately equal in size to the apical bristle on the palpus. The lower one-third to two-fifths of the face is black. The median portion of the face is slightly convex. The apical two-thirds to three-fourths of each palpus is black. The labella are apparently not ornate. The first two antennal segments are yellow, discolored with brown on the dorsal portions. The third segment is brown, faintly tinged with yellow in ground color. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely dark brown covered with gray-brown pollen. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. About eight rows of acrostichals are present. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is broken on the specimen at hand; from the size of the base it is obviously a well-developed bristle. The halteres are pale yellow. *Legs:* The coxae are yellow-brown; the femora are yellow, tinged faintly with brown toward the apices. The tibiae are yellow basally, distinctly brown at the apices. The tarsi are predominantly pale yellow; the apical two segments are dark brown. On the paratypes from Oahu the legs are all yellow except for the apical segments of the tarsi. Posteroventral and posterodorsal bristles are well developed on the femora. The front tibia is slightly shorter than the femur and has no conspicuous cilia. The preapical dorsal bristle is moderately developed. The front basitarsus has three long, curved anterodorsal cilia. The second tarsal segment has one long, curved, dorsal hair (fig. 125a). The basitarsus is almost one-half as long as the tibia and is two times longer than the second tarsal segment. *Wings:* Evenly infuscated, pale brown. The third costal section is slightly more than five times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Dark brown to black, dusted with gray-brown pollen. The anal plates are about one-half higher than long and subacutely pointed ventrally. The ninth tergum is

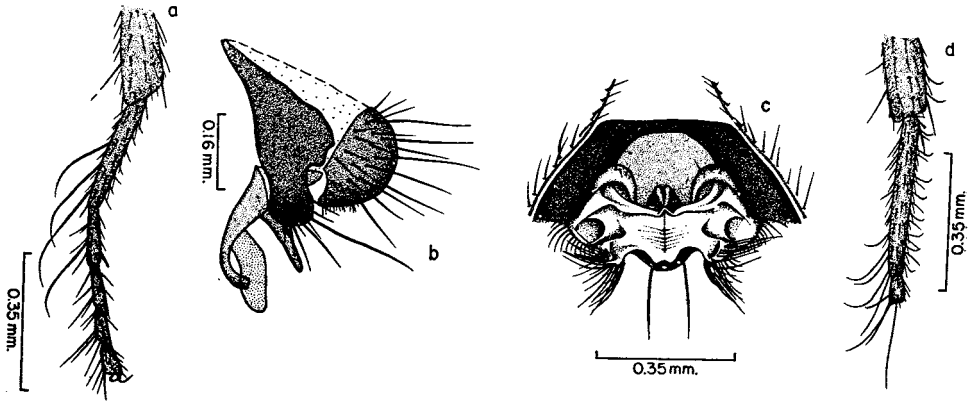


Figure 125—*Drosophila kraussi* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. laciniosa* n. sp.: **c,** mouthparts, end view; **d,** first two tarsal segments of front legs.

greatly narrowed over the dorsal portion, expanded on the posteromedian margin, and lobate ventrally as in figure 125b.

Length: body and wings, 3.6 mm.

FEMALE. Unknown.

Named after N. L. H. Krauss, Entomologist, State of Hawaii Department of Agriculture, a most energetic and capable collector who has collected extensively over much of the world.

Holotype male: Lanai Mountains, Lanai, Hawaii, October 29, 1947 (N. L. H. Krauss). Six paratypes, all male: from Mt. Kaala, Oahu, July 4, 1916 (no collector given); February 18, 1923 (O. H. Swezey); April 21, 1929 (E. H. Bryan, Jr.); and April, 1953, 4,000 feet (M. S. Adachi); one labeled "Oahu, Hawaii, Bridwell collection."

Type and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum and the University of Hawaii.

Drosophila laciniosa new species (fig. 125c–d).

This species fits in the complex of dark-bodied *Drosophila* which lacks dark markings on the wings and which has long curved cilia confined to, or near, the apex of the front basitarsus of the male. It is separated from other known species by the ornamentation of the front tarsus (as shown in fig. 125d) with four or five curved cilia at or near the apex of the basitarsus and with the posterior surface densely covered with short, erect setae.

MALE. *Head:* About one-third higher than long. The lower third of the front is yellow, tinged very faintly with brown; the upper two-thirds of the front is black along the orbits and brown between the orbits and the ocellar triangle. The ocellar triangle, vertex, and upper occiput are black covered with gray pollen; the gray pollen also extends down the eye orbits. The lower one-third

of the occiput is yellow with a faint tinge of brown near the eye margins; the median portion of the occiput is brown, tinged with black along the eye margin. The genae are yellow except for a thin line of brown to black along the vibrissal row. The face is black on the epistomal margin and yellow, faintly tinged with brown on the upper two-thirds. The median portion of the face is slightly convex. The clypeus is dark brown to black. The palpi are yellow; each has a moderately strong apical bristle, approximately equal in size to the proclinate bristles on the front. The mouthparts are yellow, tinged with brown on the mentum and with black markings on the labella. Each labellum has two sets of strong, curved yellow spines around the lower margin (fig. 125c). The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. No strong bristles are present in the vibrissal row. The antennae are brown, tinged faintly with yellow. The arista has four dorsal and two ventral rays in addition to the apical fork. The second antennal segment has two dorsal bristles. *Thorax:* Predominantly brown, tinged with black on the dorsum and covered with gray-brown pollen. The humeri are yellow, tinged slightly with brown on the upper portions. The halteres are pale yellow. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. Eight rows of acrostichal setae are present. One strong acrostichal is present on each side in line with the dorsocentral bristles and opposite the presutural bristle; this is about two times longer than the surrounding acrostichal setae. Each humerus has two well-developed bristles plus a strong bristle-like seta which is over half as long as the upper humeral bristle. The anterior dorsocentral bristle is about three-fourths as long as the posterior bristle. *Legs:* Almost entirely yellow-brown, more distinctly brown on the hind two pairs. The preapical dorsal bristle of the front tibia is small, poorly developed, and about two times larger than the surrounding setae of the tibia. The front basitarsus has four or five curved hairs at or near the apex of the segment, and the posterior surface is densely covered with short erect setae and one row of curved hairs. The second tarsal segment has three long, curved dorsal cilia at the apex (fig. 125d). The basitarsus is slightly more than half as long as the tibia and is about six times longer than the second tarsal segment. *Wings:* Entirely infuscated, pale brown. The third costal section is five times longer than the fourth, and the costal fringe extends approximately one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black except for a tinge of yellow to rufous on the first two terga. The genitalia have not been relaxed for study.

FEMALE. Specimens are on hand containing the same data as the type and apparently belong here. They differ from the male by having two strong bristles developed on the upper portion of each vibrissal row and by having the thorax brownish red and the legs yellow, faintly tinged with brown. The ovipositor blades are about two times longer than the anal plates, and each terminates in

a sharp acute point. Each abdominal tergum has a yellow mark on each side at the extreme base of the segment.

Holotype male and allotype female: Puu Kolekole, Molokai, 3,600 feet, July, 1953 (M. Tamashiro).

One female specimen on hand, same locality and date as type (D. E. Hardy), is paler in color than the allotype and is not being designated as a paratype.

Type and allotype in the B. P. Bishop Museum.

Drosophila lanaiensis Grimshaw (fig. 126a–d).

Drosophila lanaiensis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :60.

Endemic. Lanai (type locality: "Lanai, 2,000 feet") and Oahu.

Type in the British Museum (Natural History).

This species is readily recognized by the long, narrow, sharply pointed wings of the male and by the wing markings as shown in figure 126b, in combination with the presence of three brown vittae down the mesonotum.

The male has not previously been described. Grimshaw based the species upon five female specimens from Lanai. Males and females from the Koolau Mountains, Oahu, have been compared with the type series and are apparently the same. In the male the front tibiae and tarsi have numerous elongate, erect

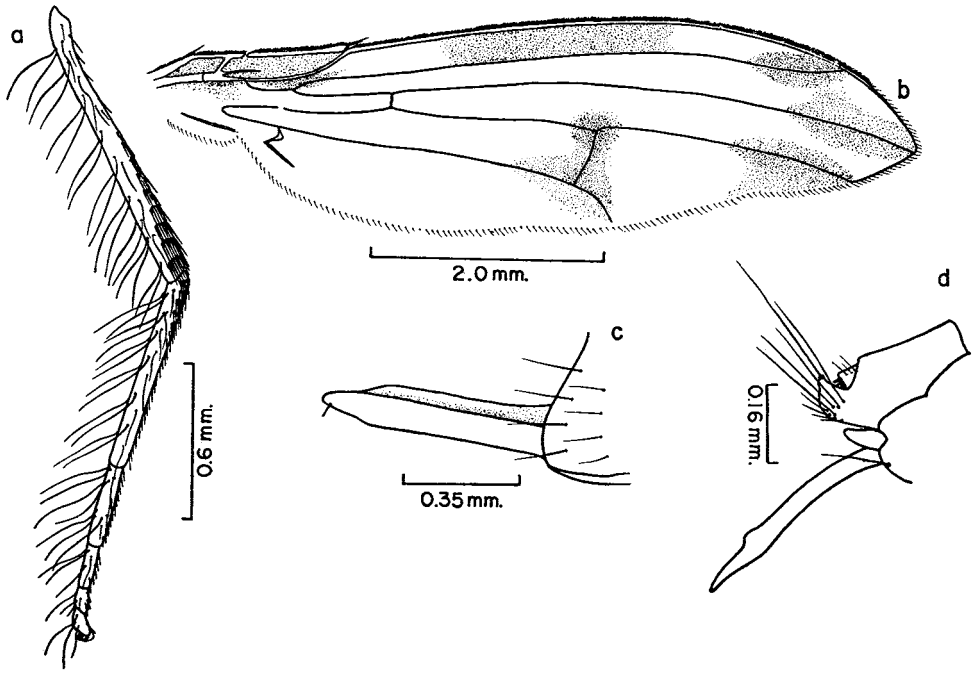


Figure 126—*Drosophila lanaiensis* Grimshaw: **a**, front tibia and tarsus; **b**, wing; **c**, female ovipositor blades; **b**, male genitalia (anal plates not shown).

hairs extending the entire length down the dorsal, anterodorsal, and posterodorsal surfaces. The front basitarsus is about two-thirds as long as the tibia (fig. 126a). The male wings are 3.5–4.0 times longer than wide and are sharply pointed at the apex (fig. 126b). The wing markings are similar in both sexes. An elongate brown spot extends through the middle portion of cell R_1, across the middle of cells R_3 and R_5, and over the m crossvein. Large brown spots are present on the apical portions of veins R_{2+3}, R_{4+5}, M_{1+2}, and M_{3+4}. A brown spot is also present in the apical half of the second costal cell, extends across the basal portions of cells R_1 and R_3, and along the base of vein R_{4+5} to the r–m crossvein. The male genitalia are as in figure 126d. The aedeagus is elongate and conspicuous. Each ventral margin of the ninth tergum has three strong black bristles at the edge plus two black preapical bristles in addition to several small pale hairs. In both sexes the thorax is yellow except for the three conspicuous brown vittae extending the full length of the mesonotum and for a large brown spot on each mesopleuron; also the median portion of the scutellum is discolored with brown. The abdomen is dark brown with a large yellow spot on the posterior corners of the terga. The ovipositor plates are very well developed and elongate. They are longer than the seventh abdominal segment (fig. 126c).

Length: both sexes, body, 4.30 to 4.75 mm.; wings, 6.00 mm. (female), 6.70 mm. (male).

Drosophila larifuga new species (fig. 127a–b).

This species resembles *D. vinnula* n. sp. but is differentiated by the long, slender anterior reclinate bristles, the highly placed upper reclinate bristles, the rudimentary outer vertical bristles, as well as by the highly ornate labella and other characters. In the key it runs near *D. dracaenae*, but the head bristles are very different and also striking differences are found in the male genitalia.

MALE. *Head:* Nearly one-third higher than long as seen in direct lateral view. The front is yellow on the lower one-third, yellow-brown covered with gray pollen on the orbits, and bronze colored in the interfrontal areas. The ocellar triangle is dark brown, rather lightly covered with gray pollen. The upper one-third of the occiput is yellow-brown in ground color, covered with gray pollen. The remainder of the head, excepting the reddish brown compound eyes and including the appendages, is pale yellow. The genae are narrow; measured at the lower margin of the eye, from the vibrissal row to the eye margin, the gena is less than the width of two rows of eye facets. Each palpus has a moderately strong black apical bristle. The labella are highly ornate, fringed with long, curved spines. The arista has five dorsal and two ventral rays in addition to the apical fork. No strong bristles are present in the vibrissal row and the vibrissae are represented by fine hairs. The median portion of the face is gently convex. The anterior reclinates are long and slender, about equal to the proclinates, and are situated well above the latter. The upper reclinate bristles are shorter than the anterior pair and are situated near the vertex, about opposite the upper ocelli. *Thorax:* Entirely yellow, except for a tinge of brown along the upper edge of each pleuron,

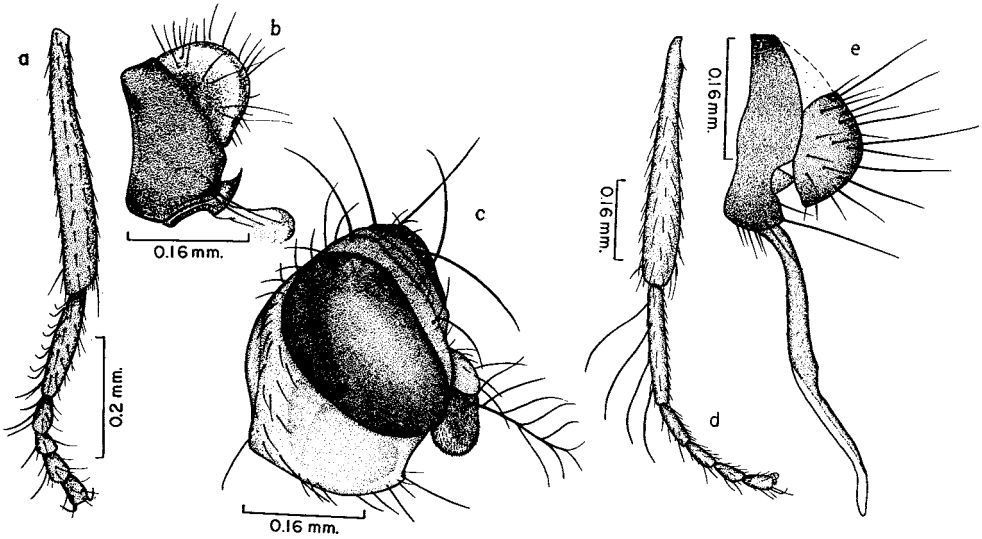


Figure 127—*Drosophila larifuga* n. sp.: **a,** front tibia and tarsus; **b,** male genitalia. *D. latigena* n. sp.: **c,** head; **d,** front tibia and tarsus; **e,** male genitalia.

subshining on the dorsum. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are rather small, approximately three-fifths as long as the posteriors and situated opposite the second (posterior) supraalars. Two well-developed humeral bristles are present. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front tibiae are not ornate. The front tarsus has numerous short, erect dorsal and anterodorsal setae. The front basitarsus is about two-fifths as long as the tibia and three to four times longer than the second tarsal segment (fig. 127a). *Wings:* Hyaline or nearly so. The third costal section is four times longer than the fourth, and the costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.85 times longer than the penultimate section. The last section of vein M_{3+4} is approximately two times longer than the m crossvein. *Abdomen:* Brown, tinged with yellow, pale yellow on the posterolateral margins of the terga. The anal plates are about one-half higher than long and are subacutely pointed ventrally. The ninth tergum is slightly narrowed over the dorsal portion, extended ventrally, and with two moderately large black setae on each ventral margin. The claspers are rather inconspicuous as seen in direct lateral view; each has strong teeth along the ventral margin and terminates in a sharp point at the base (fig. 127b).

Length: body, 2.00 mm.; wings, 2.25 mm.

FEMALE. Unknown.

Holotype male: Tantalus, Oahu, August, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila latigena new species (fig. 127c–e).

This species is very readily differentiated from all other known Hawaiian *Drosophila* by the very broad genae and the rather elongate eyes (fig. 127c). The ornamentation of the front tarsus is also distinctive (fig. 127d).

MALE. *Head:* The compound eyes are about 1.5 times longer than high and the genae are about two-thirds as wide as the eye (fig. 127c). From a lateral view the head is rather quadrate in shape. The front is yellow to rufous, tinged lightly with brown on the upper portion. Measured from the upper ocellus to the front median margin, the front is approximately two times wider than long. From a dorsal view the head is approximately two times wider than long. The ocellar triangle and the area of the vertex at the sides of the triangle are dark brown to black in ground color covered with gray pollen. The upper portion of the occiput is yellow, tinged with brown. The lower occiput and the genae are yellow-white, the latter are slightly concave as seen from direct lateral view. The face is yellow, the median portion is just slightly raised. The clypeus and the mouth-parts, including the palpi, are entirely yellow. Each palpus has one moderately strong apical bristle and several black setae along the outside surface. The labella are not ornate. One moderately strong bristle is present at the upper edge of each vibrissal row; the other vibrissae are made up of fine inconspicuous setae. The lower reclinate bristle is about three-fourths as long as the proclinate and is situated opposite the latter. The antennae are predominantly rufous, a large brown spot is present on the upper basal portion of the third segment. Specimens from Molokai have the third segment entirely black, and one from Maui has it predominantly black. The arista has five dorsal and two ventral rays in addition to the apical fork; the inner surface is bare. *Thorax:* Predominantly yellow; brown in the ground color of the median portion of the mesonotum, over the disc of the scutellum, and over the upper portions of the pleura. Also, the metanotum is tinged with brown. The dorsal portion of the thorax and the upper portion of each pleuron is lightly gray pollinose. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated opposite the first pair of supraalars. Two pairs of humeral bristles are present and the anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. Front femora slender; each has three or four posteroventral and one or two posterodorsal bristles. The front tibia is devoid of long ciliation, the preapical dorsal bristle is short but distinct. The front basitarsus is about one-half as long as the tibia and has four long, black dorsal hairs (fig. 127d) on specimens from Hawaii and only three long hairs on specimens from Maui and Molokai. *Wings:* Entirely hyaline with no dark markings. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is four times longer than the fourth and the last section of vein M_{1+2} is 1.6 times longer than the penultimate section. The last section of vein M_{3+4} is 1.5 times longer than the m crossvein. *Abdomen:* Dark brown, tinged with red in the ground color. The anal plates are slightly pointed ventrally. The ninth tergum

is narrowed across the dorsum, convex on the posteromedian margin, and lobate ventrally (fig. 127e).

Length: body and wings, 2.75 mm.

FEMALE. Unknown.

Holotype male: Upper Olaa Forest, Hawaii, 4,000 feet, swept from ground cover in treefern jungle, July, 1956 (D. E. Hardy). Five male paratypes; two same locality as type, August, 1952 (D. E. Hardy); one Puu Kukui, Maui, 4,500 feet, April, 1952 (M. Tamashiro); one Puu Kolekole, Molokai, July, 1952 (M. Tamashiro); and one Pepeopae, Molokai, July 30, 1959 (D. H. Habeck).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila lemniscata new species (fig. 128a–c).

This species is very readily differentiated from all other known Hawaiian *Drosophila* by having only one pair of dorsocentral bristles, by the peculiar development of the front tarsus of the male (fig. 128b), the extremely long anterior reclinate bristles of the head (fig. 128a), the presence of elongate acrostichal setae on the anterior portion of the mesonotum and by having a brown longitudinal vitta on the middle of the mesonotum. The large anterior reclinate bristles and the prominent acrostichals on the front portion of the mesonotum would suggest that this is similar to *D. spicula* n. sp. However, the two are very different in most other respects and probably are unrelated. The development of the front tarsus of the male is similar to that of *bicondyla* n. sp. (compare figs. 128b and 44a); but in other respects these do not appear to be related.

MALE. *Head:* As seen from a lateral view the head is one-half higher than long. The front is yellow, tinged with brown. The upper eye orbits, vertex, ocellar triangle, and upper occiput are brown to black covered with gray pollen. The anterior reclinate bristle is nearly two times longer than the proclinate and approximately one-half longer than the upper reclinate bristle. The anterior reclinate is situated distinctly above the proclinate. The inner vertical bristles are long and slender. The length is equal to or slightly greater than the height of the head (fig. 128a). Measured from the median ocellus to the front middle margin the front is nearly three times wider than long. The face is brown on the lower portion, yellow above. The median portion of the face is convex. The epistoma is entirely brown. The palpi are yellow, tinged faintly with brown; each has small black setae around the apex. The labella are not ornate. The oral vibrissae are rather poorly developed. The uppermost bristle is scarcely larger than the acrostichal setae on the mesonotum. *Thorax:* Yellow to rufous on the mesonotum with a brown, longitudinal vitta extending down the median portion. This expands posteriorly so that on the hind portion it covers most of the area between the dorsocentral bristles. The scutellum is brown on the disc, yellow on the sides. The pleura are predominantly brown, tinged with rufous. Only the posterior dorsocentral bristles are present. Eight rows of acrostichal setae are present. On the anterior median portion of the mesonotum

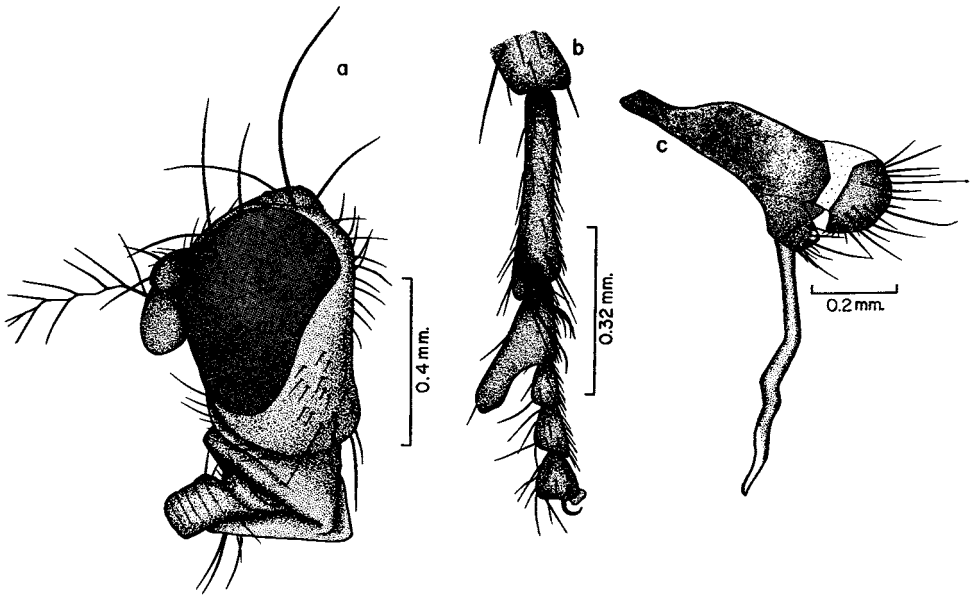


Figure 128—*Drosophila lemniscata* n. sp.: **a**, head; **b**, front tarsus; **c**, male genitalia.

two or three pairs of acrostichals are very well developed; these are two or more times longer than the surrounding setae. Two humeral bristles are present. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apices of the tarsi. Posteroventral and posterodorsal bristles are rather well developed on the front femora. The front tibia has no long cilia; the preapical, dorsal bristle is moderately developed and situated slightly beyond its length from the tip of the tibia. The tibia also possesses a black ventral bristle at the apex; this is slightly smaller than the dorsal bristle. The front basitarsus is developed into a knob on the anterodorsal surface; this is densely covered with black bristles. The second tarsal segment is produced into a long lobe on the dorsoapical portion; this lobe is equal to, or slightly longer than, the remainder of the segment (fig. 128b). The basitarsus is about one-third as long as the tibia. *Wings:* Faintly but evenly infuscated with yellow-brown. The third costal section is five times longer than the fourth and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.36 times longer than the penultimate section. *Abdomen:* Brown on the apices and the sides of the segments, yellow on the bases. The anal plates are comparatively small, ventral in position, and hemispherical in shape. The ninth tergum is rather strongly narrowed dorsally, expanded in the median portion, and lobate below (fig. 128c).

Length: body, 3.0–3.2 mm.; wings, 3.7 mm.

FEMALE. Unknown.

Holotype male and five paratypes (all males): from Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy and C. R. Joyce).

Type and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum, British Museum (Natural History), and University of Hawaii.

Drosophila lonchoptera new species (fig. 129a–b).

This species fits near *D. adventitia* n. sp. from Kauai because of the banded mid and hind tibiae and the lack of vittae on the thorax. It differs by having the costal fringe extending to or slightly beyond the apex of vein R_{4+5}, as well as by many other details. It also is near *prolixa* n. sp. but differs by the characters given in the key. It is differentiated from all species of *Drosophila* known to me by having the wings pointed at the apices (fig. 129a).

FEMALE. *Head:* Nearly two times higher than long as seen in direct lateral view. The front, measured from the median ocellus to the anterior margin, is two times wider than long and is yellow, tinged with brown; the upper sides of the front are rust-brown. The eye orbits are brownish gray pollinose; above the proclinate bristles they are tinged faintly with black in the ground color. The ocellar triangle and the upper portion of the occiput are brownish black covered with gray-brown pollen. The remainder of the occiput is yellow-brown densely covered with gray pollen. Two rows of black setae extend down each side of the occiput except for a short space near the upper median portion where only the row next to the eye margin is continuous. The lower hind margin of the eye is oblique so the lower occiput and the hind portion of each gena are rather broad. The sides of the genae, along the eye margins and the lateral margins of the face, are yellow and rather densely covered with yellow-gray pollen. The lower gena, along the vibrissal rows, is dark brown to black. The face is brown, tinged with black in the furrows, and yellow down the median portion. The middle of the face is carinate. The clypeus, palpi, and the mentum are brown, tinged with black. The labella are yellow and lack ornamentation. Each palpus has two or three apical or subapical bristles plus numerous black setae over the apical and outside portions. Two rows of oral vibrissae are present on each side, the uppermost bristle of the inner row is very strong, equal in size to the inner vertical bristles; the second and third bristles of the inner row are approximately equal in size to the genal bristles. In the median portion each gena, measured from the inner vibrissal row to the eye margin, is about equal in width to five rows of eye facets. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated slightly above the latter. The first two antennal segments are yellow to rufous, tinged lightly with brown dorsally. The second segment has about three bristles plus numerous black setae scattered over the dorsal surface. The third antennal segment is dark brown. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. *Thorax:* Entirely dark brown, tinged faintly with rufous in the ground color, and densely covered with gray-brown pollen. The anterior dorsocentral bristles

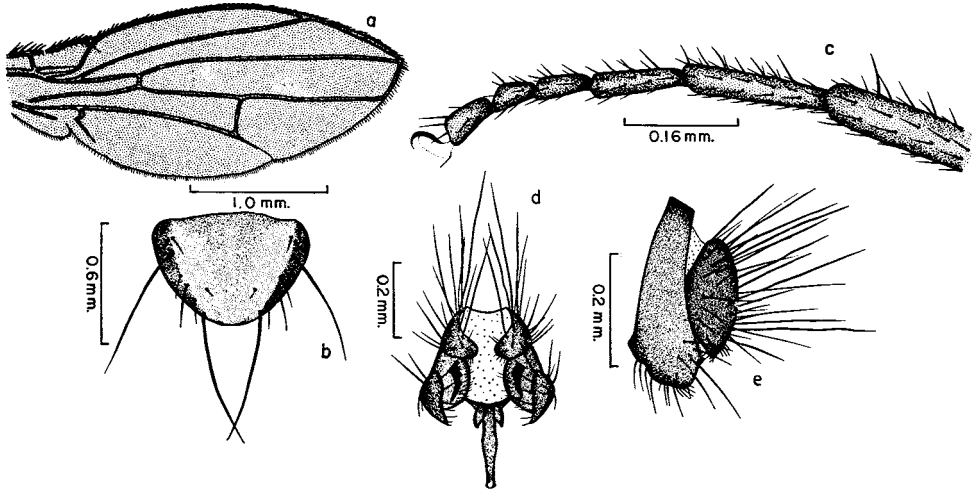


Figure 129—*Drosophila lonchoptera* n. sp.: **a,** wing; **b,** scutellum. *D. luteola* n. sp.: **c,** front tarsus; **d,** male genitalia, ventral; **e,** male genitalia, lateral.

are about opposite the first (anterior) pair of supraalars. Approximately ten rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is subequal to the posterior bristle, and the intermediate seta is almost two-fifths as long as the anterior bristle. The scutellum has three well-developed setae on each side between the bristles; one of these is bristle-like and approximately two-fifths as long as the upper scutellar bristles. About four small setae are present on each side above the uppermost bristle, and two small sublateral setae are present on the disc (fig. 129b). The halteres are entirely yellow to rufous. *Legs:* The coxae are brownish red. The trochanters are yellow, tinged faintly with brown. The femora are almost entirely brown, tinged faintly with black, and narrowly yellow at the bases and apices. The tibiae are yellow except for a brown band just before the apex and another broad, brown band near the basal one-third of the segment. The tarsi are yellow, tinged faintly with brown on the apical segments. Each front coxa has three posterodorsal bristles and numerous small black setae scattered over the dorsal surface. The preapical, dorsal bristle on the front tibia is well developed, extending distinctly beyond the apex of the segment. The front basitarsus is slightly over half as long as the tibia and is two times longer than the second tarsal segment. *Wings:* Entirely subhyaline with a very faint tinge of yellow as seen in direct light. The wing is broad through the median portion, strongly tapered basally and apically, and comes to a subacute point at the apex of vein R_{4+5} (fig. 129a). The first two costal sections are conspicuously setose and bear two rows of comparatively large setae. The incision at the apex of the second section is very distinct; the apex of the second costal section is not produced into a prominent black lobe, however, as in *Mycodrosophila* Oldenberg and *Upolumyia*

Malloch. The third costal section is 2.3 times longer than the fourth, and the costal fringe extends slightly beyond the apex of vein R_{4+5}. The last section of vein M_{1+2} is 1.33 times longer than the penultimate section. *Abdomen:* Dark brown, covered with gray-brown pollen, distinctly gray on the apices of segments two to six. The ovipositor blades are tiny, inconspicuous, and do not extend as far as the apices of the anal plates.

Length: body, 3.6 mm.; wings, 3.4 mm.

MALE. Unknown.

Holotype female: Iao Valley, Maui, March 27, 1924 (O. H. Swezey).

Type in the Hawaiian Sugar Planters' Association collection.

Drosophila luteola new species (fig. 129c–e).

This species fits in the *polita* complex by having the mesonotum shining brown to black, the apex of the scutellum yellow, the labella of the male rimmed with black, and the wings lacking brown markings. It is differentiated from other species in this complex by having the pleura entirely yellow, the vibrissae arranged in two distinct rows, and by the male genital characters (fig. 129d–e).

MALE. *Head:* About one-half higher than long; the lower margin is almost straight. The front is about one-third wider than long and is predominantly yellow, tinged with brown on the upper portions, and brown to black on the orbits above the anterior reclinate bristles. The anterior reclinate bristles are about three-fourths as long as the proclinates and are situated well above the latter (about two-fifths the distance between the proclinates and the upper reclinates). The vertical bristles, upper reclinates, ocellar, and postocellar bristles are approximately equal in size. The upper half of the occiput is brown to black covered with gray pollen; the lower half is yellow. The genae, face, palpi, mouthparts, and antennae are pale yellow except for the black rim on each labellum. The face is slightly convex in the upper median portion. The oral vibrissae consist of three moderately developed bristles arranged on a slight prominence on each side of the lower portion of the face and an outside row of fine hairs extending to the genal bristles. The inner vibrissae are almost equal in size to the anterior reclinate bristles. In the median portion the gena, measured from the vibrissal row to the eye margin, is scarcely wider than two rows of eye facets. Each palpus has a moderately developed apical bristle. The antennae are entirely pale yellow. The second segment has two dorsal bristles. The arista has six dorsal and two or three ventral rays in addition to the apical fork. *Thorax:* The entire dorsum is shining brown and rather faintly gray pollinose except for the conspicuously yellow apex of each scutellum. The pleura are entirely pale yellow. The metanotum is rufous, tinged with brown. The anterior dorsocentral bristles are situated about opposite the first (anterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is thin, hair-like, about two-fifths to one-half as long as the posterior bristle; a tiny secondary hair is situated between the two bristles. The halteres are pale yellow. *Legs:* Entirely yellow, lacking ornamenta-

tions except for very short, erect dorsal setae over the front tibia and tarsus. The front basitarsus is about two-fifths as long as the tibia and is slightly less than two times longer than the second tarsal segment (fig. 129c). *Wings:* Hyaline, with no dark markings. The third costal section is about 3.9 times longer than the fourth and the costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Predominantly yellow-brown, distinct yellow on the first, fifth, and sixth terga; the sternum is pale yellow. The anal plates are about two times higher than long; each has a clump of short black setae on the ventral edge. The ninth tergum is almost straight-sided, slightly enlarged, and rounded ventrally (fig. 129e). The claspers are plainly visible from a direct lateral view; the inner surface of each is densely setose (fig. 129d).

Length: body and wings, 2.5 mm.

FEMALE. The female has not been associated with the male and may be confused with *polita* or other closely related species.

Holotype male: Mt. Kaala, Oahu, May, 1952 (D. E. Hardy). Two male paratypes: one same data as type (M. Tamashiro); and one Halawa Valley, March 12, 1933, on *Osmanthus* (O. H. Swezey).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila macrochaetae new species (fig. 130a–c).

A feeder on fleshy fungi and closely related to *D. haleakalae* Grimshaw. It is readily differentiated by the very long posteroventral bristles of the front femora, the numerous erect setae over the front tibiae (fig. 130a), and by the broader more extensively marked wings (fig. 130b). The females are very similar to those of *haleakalae* and may be difficult to differentiate from that species. The best characters which have been noted to date are the slightly more slender front femora, the longer posteroventral bristles (about two times longer than the width of the femur), and the more extensive brown spot extending nearly to a level with the m crossvein at the apex of the wing in *macrochaetae*.

MALE. *Head:* Front about as wide as long; upper two-fifths to one-half dark brown to black, lower portion bright yellow. Lower reclinate bristles small, scarcely over half as long as the proclinates, and situated distinctly above the latter. Vertex and upper half of occiput dark brown to black, remainder of head (excepting the compound eyes) yellow-white. Basal two segments of the antennae yellow, second segment faintly tinged with brown on the dorsal surface; third segment brown on the apical three-fifths, yellow basally. Arista with seven dorsal and four basal rays in addition to the apical fork; inner surface of arista rather thickly haired almost the entire length. Palpi yellow-white, each with two rather strong black apical bristles and a number of black setae on the sides and below. The mouthparts are yellow; each labellum has a heavily sclerotized rim at the apex, similar to that shown for *haleakalae* (fig. 107b). Two moderately strong

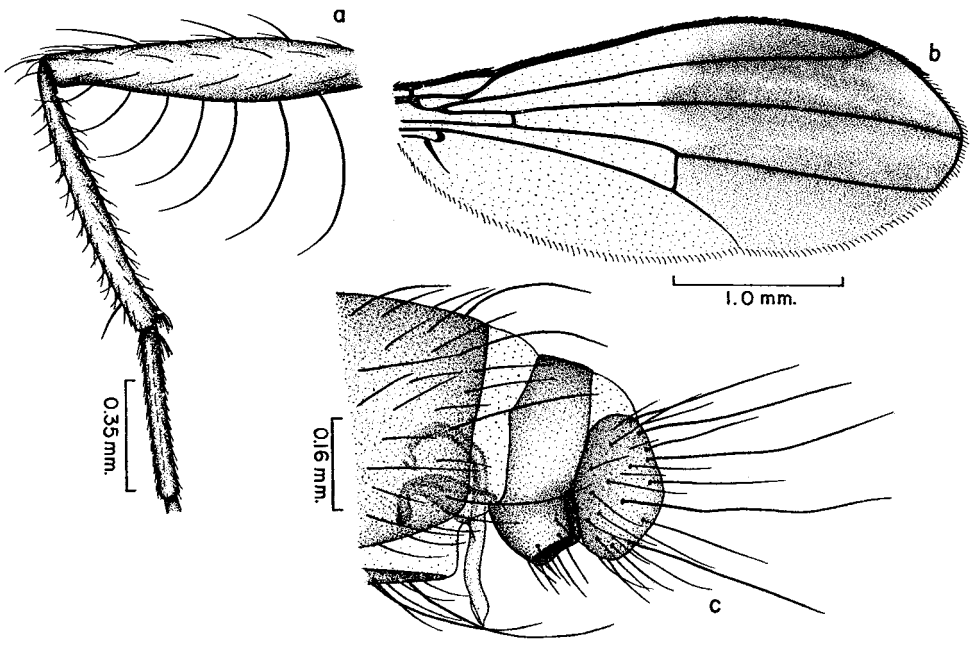


Figure 130—*Drosophila macrochaetae* n. sp.: **a**, front femur, tibia, and basitarsus; **b**, wing; **c**, male genitalia.

black bristles are present at the upper edge of each vibrissal row. The face is slightly carinate in the middle on the upper half and is very slightly concave below. *Thorax:* Predominantly dark brown, tinged with red in the ground color of the pleura. The lower portions of the humeri, the hind portion of each notopleuron, the halteres, and the apex of the scutellum are yellow. The mesonotum is polished in ground color and rather densely brownish gray pollinose. The anterior dorsocentral bristles are situated about opposite the first pair of supraalars. The posterior dorsocentrals and the basal pair of scutellars are 1.65 times longer than the scutellum. The anterior sternopleural bristle is tiny, only about 0.25 to 0.30 as long as the posterior bristle. *Legs:* Yellow, except for the brown apical segments of the tarsi. Femora slender; posteroventral bristles of front pair very long and conspicuous, the longest bristles four to five times greater than the width of the femur. Each front tibia with numerous short erect setae scattered over the entire segment (fig. 130a). The tarsi lack conspicuous ciliation although short erect hairs are present down the dorsal surface. The front basitarsus is about three-fifths as long as the tibia. The hind basitarsus is moderately elongate, about two-thirds as long as the tibia. The dorsal bristle of the tibia is situated about its own length from the apex of the segment. *Wings:* 2.6 times longer than wide, broadest at about a level with the apex of vein M_{3+4}. Basal three-fifths of the wing hyaline, apical portion distinctly infuscated with brown to a level about opposite the m crossvein. Third section of the costa 3.5 times longer than the

fourth. The apical portion of vein R_{2+3} bends upward slightly at the tip. The costal fringe extends approximately two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section (fig. 130b). *Abdomen:* Brown to black, rather thickly covered with gray pollen, with a rufous tinge in the ground color especially at the base of the abdomen. The ninth tergum is not narrowed dorsally and is curved upward and rounded ventrally just barely covering the apices of the claspers from lateral view (fig. 130c).

Length: body, 4.50 mm.; wings, 4.75 mm.

FEMALE. Fitting the description of the male in most respects except that the bristles of the front femora are not so long and conspicuous, the tibiae and tarsi have no erect setae, and the palpi are brown. The ovipositor is rather short and triangular, somewhat blunt at the apex. The wings are not so noticeably expanded apically as in the male.

Length: body, 4.55 mm.; wings, 5.30 mm.

Holotype male: Olinda, Maui, March, 1932 (O. Bryant). Allotype female: same data as type. Eight paratypes (two male and six female): same as data as type; same locality and collector, March 12, 1931, "on soft shell fungus-mating," 4,500 feet; and Kula Pipeline, 4,500 feet, April 8, 1932 (O. Bryant).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila magnimacula new species (fig. 131a–d).

This species fits in the group which has the markings of the wings confined to the apices of the veins and the crossveins and the thorax pale-colored. It is differentiated from similar species by the large dark brown spots on the crossveins of the wings (fig. 131b).

MALE. *Head:* Front brownish yellow, about one-third wider than long. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated directly above the latter. The vertex is yellow-brown; the occiput is yellow, tinged very lightly with brown on the upper portion. The genae are yellow with a thin line of brown along the lower margin. The face is yellow-white, tinged with brown on the lower half; the upper median portion is slightly carinate. No strong bristles are present in the vibrissal rows. The first two antennal segments are yellow except for the brown dorsal surface of the second. The third segment is brown except for the yellow basal portion. The second segment has three moderately strong dorsal bristles. The arista has six to eight dorsal rays and three to four ventral rays in addition to the apical fork; the inner surface of the arista has about nine short, sparsely placed hairs. The palpi and mouthparts are yellow; each palpus has a strong apical bristle almost as long as the segment. The labella are ornate; each has a comb-like series of about five strong black bristles on the upper margin and a rather dense clump of brown hairs on the lower portion (fig. 131c). *Thorax:* Yellow, tinged with brown. The anterior dorsocentral

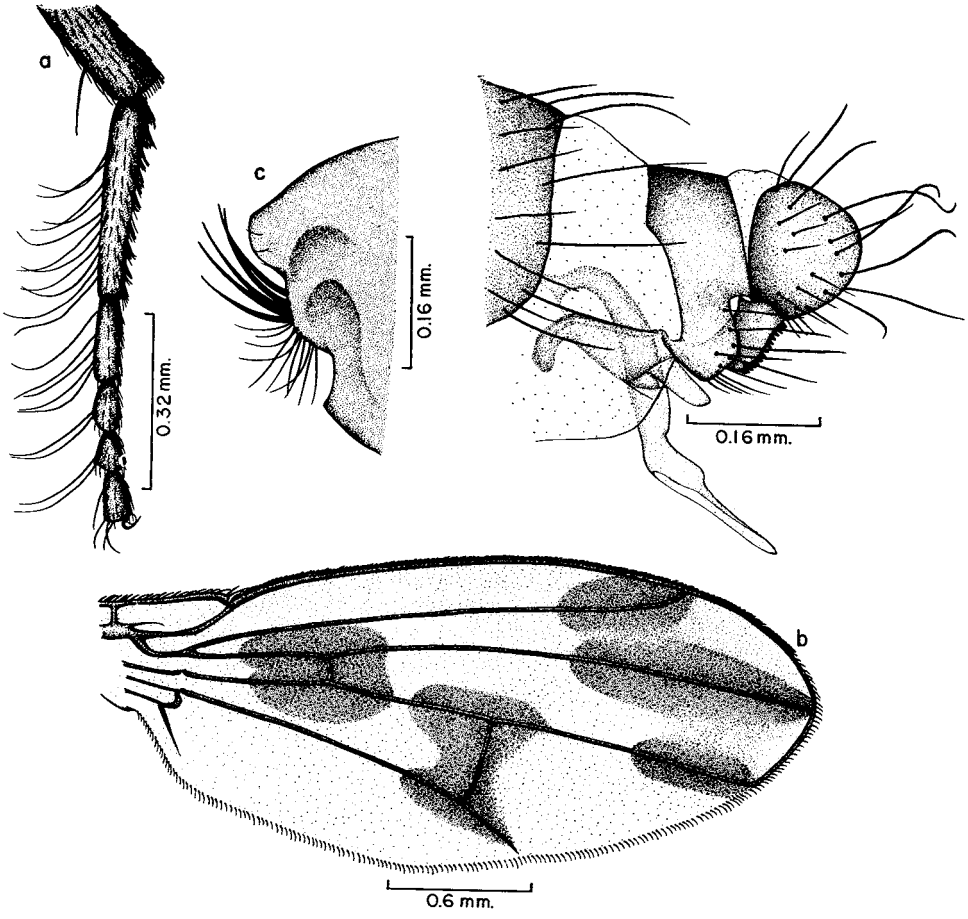


Figure 131—*Drosophila magnimacula* n. sp.: **a,** front tarsus; **b,** wing; **c,** labellum; **d,** male genitalia.

bristles are situated opposite the second pair of supraalars. About six rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The acrostichal setae on the posterior portion of the mesonotum are longer than those over the remainder of the sclerite, but they are not unusually developed. Halteres yellow. *Legs:* Entirely yellow. Front femora slender, nearly six times longer than wide; the posteroventral and posterodorsal bristles are moderately developed, the longest bristles about 1.7 times the width of the femur. Front tibiae without long ciliation. Front tarsus bearing long, slightly curled, dorsal cilia the entire length (fig. 131a). Front basitarsus about one-half as long as the tibia. Apical spur of middle tibia about one-half as long as the middle basitarsus. *Wings:* The entire membrane is lightly infuscated, and large dark brown spots are present on the crossveins and at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2} (fig. 131b). The spot over the r–m cross-

vein is quadrate, the one over the m crossvein is nearly dumbbell-shaped, and the apical spots are rather elongate. The third section of the costa is 2.68 times longer than the fourth. The costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6–1.7 times longer than the penultimate section. The last section of vein M_{3+4} is slightly shorter than the m crossvein and evanesces at its apex. *Abdomen:* Shining brown, lightly gray pollinose. The ninth tergum is rather long (about four-fifths as long as the anal plates) and the dorsal margin is not narrowed; the ventral margins are rounded, and a row of long setae are present along the posteroventral surface (fig. 131d). The claspers are visible from lateral view.

Length: body, 4.0 mm.; wings, 4.5 mm.

FEMALE. Similar to the male in most respects. The bristles of the vibrissal rows are slightly larger. The ovipositor plates are rather broad, triangular in shape, but rounded at the apices; they extend beyond the tip of the abdomen a distance about equal to twice the length of the anal plates.

Length: body, 3.8–4.5 mm.; wings, 4.5 mm.

Holotype male: Pupukea Trail, Oahu, July, 1958, collected in banana thicket (D. E. Hardy). Allotype female: Lulumahu Valley, Oahu, June 14, 1938, "banana stem" (F. X. Williams). Seven paratypes (one male and six female): from the following localities in the Koolau Mountains of Oahu—same locality and collector as allotype, April 18 and May 2, 1937; Mt. Olympus, June 18, 1918, no collector given; and Kaluanui Valley, 2,100 feet, November 28, 1937 (F. X. Williams).

Holotype male and one paratype in the B. P. Bishop Museum. Allotype female and one paratype in the Hawaiian Sugar Planters' Association. Remainder of paratypes deposited in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila magnipalpa new species (fig. 132a–c).

This species is readily differentiated from all other known species of Hawaiian *Drosophila* by having the palpi greatly enlarged to three or more times normal size (fig. 132a). The male genitalia are also very characteristic (fig. 132b–c).

MALE. *Head:* Almost one-half higher than longer as seen in direct lateral view. The front, measured from the median ocellus to the anterior margin, is about one-half to one-third wider than long; it is dark brown, tinged with black, yellow only along the lower edge, and with a faint tinge of yellow in the median portion. The eye orbits above the proclinate bristles are shining black in ground color; the entire front is covered with gray pollen. The ocellar triangle, vertex, and upper occiput are black covered with gray pollen. The remainder of the occiput is predominantly brown, tinged with black and is yellow only on the lower portion. The genae and face are yellow; the latter is gently carinate down the median portion. Measured at the lower edge of the eye, the gena (from the vibrissal row to the eye margin) is about equal in width to three or four rows of eye facets. The clypeus is yellow, tinged with brown; the mouthparts, including

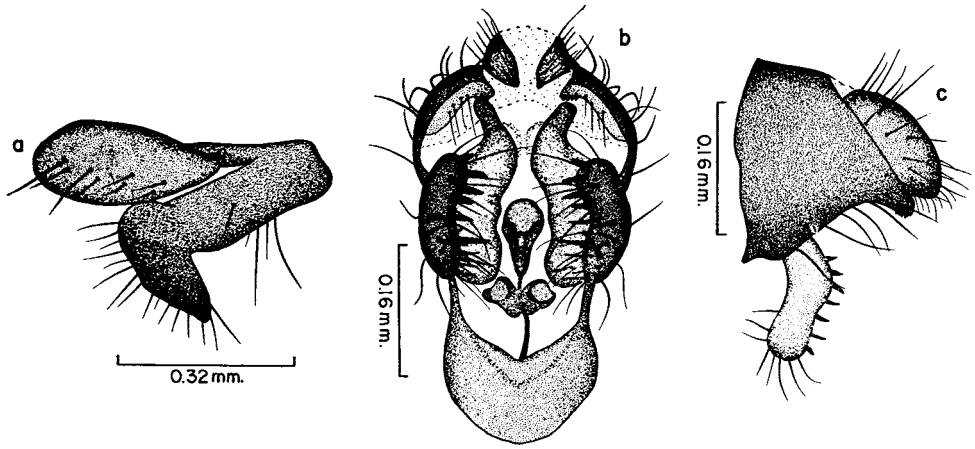


Figure 132—*Drosophila magnipalpa* n. sp.: **a**, mouthparts; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

the palpi, are rufous with a faint tinge of brown. The palpi are greatly enlarged, three or four times normal size, and protrude conspicuously beyond the oral margin (fig. 132a). The palpi are bare except for a few scattered setae along the ventral surfaces. The mouthparts are small; the labella are not ornate. One strong bristle is present at the upper edge of each vibrissal row; this is slightly larger than the proclinate bristles on the front. The first two antennal segments are rufous, tinged with brown dorsally. The third segment is brown, faintly tinged with rufous in ground color. The second antennal segment has three or four short dorsal bristles. The arista has four dorsal and two ventral rays in addition to the apical fork. The anterior reclinate bristles are about two-thirds as long as the proclinates and are situated almost opposite the latter. The inner vertical bristles are well developed; their length is slightly greater than the height of the head. *Thorax:* Entirely dark brown, tinged with black, except for the yellow lower edges of the humeri. The entire thorax is densely gray pollinose. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six rows of acrostichal setae are present. An enlarged postsutural seta is present on each side in line with the dorsocentral bristles. One large and two comparatively small bristles are present on each humerus. The anterior sternopleural bristle is subequal to the posterior bristle and two intermediate setae are present: one opposite the anterior bristle and one slightly below and anterior to the posterior bristle. The halteres are yellow, tinged faintly with brown on the knobs. *Legs:* Entirely yellow, except for the brown apices of the tarsi, and lacking ornamentations. The front basitarsus is approximately one-half as long as the tibia and is two times longer than the second tarsal segment. *Wings:* Hyaline or nearly so. The third costal section is 2.85 times longer than the fourth, and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5

times longer than the penultimate section. *Abdomen:* Shining dark brown to black. The genitalia are very distinctively developed. The anal plates are comparatively small and are approximately three times higher than long. The ninth tergum is narrowed over the dorsal portion and has a V-shaped concavity on the anterior edge. The anteromedian margins are strongly convex at the widest portion; the ninth tergum is equal in width to the seventh and is four or more times wider than the anal plates. The claspers are strongly produced and developed into two prominent lobes. The basal lobe is armed with stout teeth along the upper surface (fig. 132b). From a ventral view the genitalia are as in figure 132c.

Length: body and wings, 2.8–3.0 mm.

FEMALE. Unknown.

Holotype male: Kaholuamanu, Kauai, April 29, 1920 (J. A. Kusche). One paratype male: Kokee, Kauai, July 7, 1937, collected at light (E. C. Zimmerman).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila mecocnemia new species (fig. 133a–c).

This species rather closely resembles *D. flavisternum* n. sp. and *pretiosa* n. sp. but differs by having the front basitarsus very long, slender, and two-thirds as long as the tibia (fig. 133a); by having the front entirely yellow; by the one bristle at the upper edge of each vibrissal row; by the lack of infuscation on the m crossvein; and by the short row of teeth on the claspers (scarcely over one-half the width of the ventral lobe of the ninth tergum) (fig. 133c).

MALE. *Head:* The front is entirely yellow except on the extreme upper portions and on the upper eye orbits. The portion of the front above the level of the lower ocellus is tinged with brown. The eye orbits above the anterior reclinate bristle are dark brown, faintly tinged with black and covered with gray-brown pollen. The ocellar triangle, the vertex, and upper occiput are black, faintly gray pollinose. The front is about one-third wider than long (measured from the median ocellus to the anterior median margin). The anterior reclinate bristle is about one-half as long as the proclinate and is situated distinctly above the latter. The proclinate bristles are situated at the middle of that portion of the front from the median ocellus to the anterior margin. The lower occiput, the genae, face, clypeus, palpi, and mouthparts (except the black rim at the apex of each labellum) are pale yellow. The oral vibrissae are made up of small, inconspicuous setae, except for one strong bristle at the upper margin which is approximately equal in size to the proclinate bristles on the front. In the median portion the gena, measured from the vibrissal row to the eye margin, is equal in width to about five rows of eye facets. The face is flat on the lower portion, slightly convex on the upper median portion. Each palpus has a fine, black, hair-like bristle at the apex and another just before the apex on the outer margin; these are about equal in length to the dorsal rays of the arista. The antennae are entirely yellow; the second segment has two dorsal bristles. The arista has six dorsal and

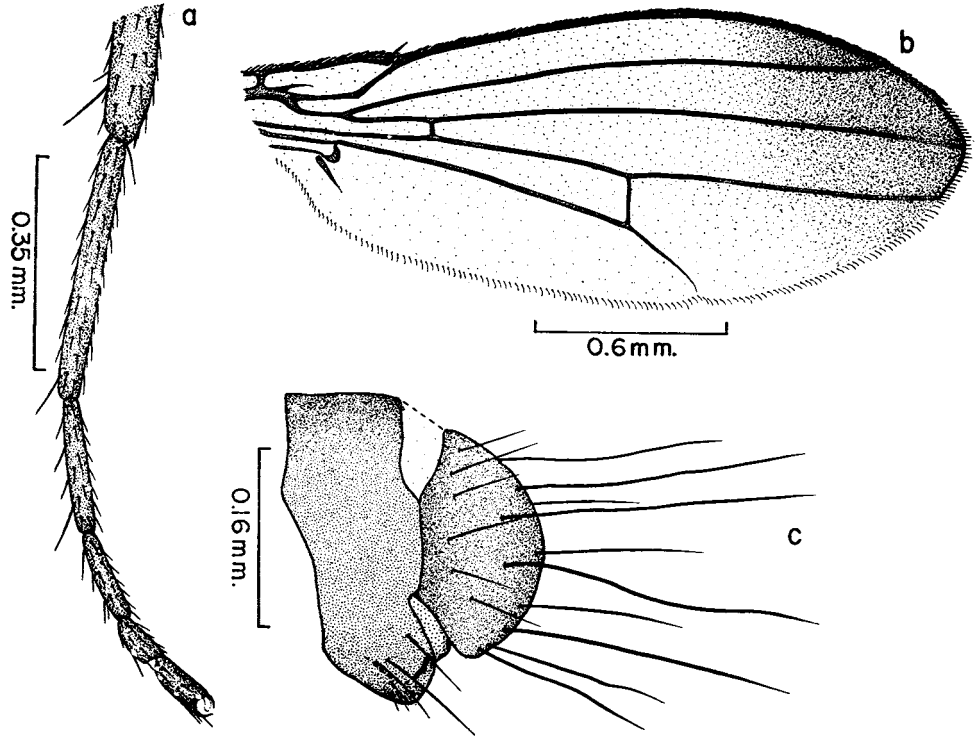


Figure 133—*Drosophila mecocnemia* n. sp.: **a,** front tarsus; **b,** wing; **c,** male genitalia.

two or three ventral rays in addition to the small apical fork. *Thorax:* Entirely shining black on the dorsum except for the yellow apex of the scutellum. The upper halves of the pleura are dark brown, tinged with black. The sternopleura and hypopleura are entirely yellow. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the first (anterior) supraalars. A rather prominent bristle-like seta is present in each dorsocentral row almost opposite the suture. On the type, one of these is very well developed, nearly two-thirds as long as the anterior dorsocentral bristle. In other specimens it is approximately two times larger than the acrostichal setae. Two moderately well-developed humeral bristles are present. The anterior sternopleural bristle is small, about one-third to one-fourth as long as the posterior bristle; the intermediate hair (between the two bristles) is very tiny, microscopic. *Legs:* Yellow; the front basitarsus is long and slender, with one erect preapical dorsal seta (fig. 133a). *Wings:* The apical one-fourth of the wing is evenly infuscated with brown, the basal portion of the wing is subhyaline (fig. 133b). The third costal section is about five times longer than the fourth, and the costal fringe extends approximately three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section.

Abdomen: Predominantly shining black, tinged with yellow to rufous on the first tergum, and with the sixth tergum predominantly yellow. The anal plates are slightly pointed ventrally. The ninth tergum is broad, at its greatest width is approximately equal the length of the anal plate, and is slightly tapered ventrally. The row of teeth at the apex of each clasper is rather short; the length is scarcely over half the width of the ventral lobes of the tergum (fig. 133c). The clasper is not haired on the inner surface next to the row of teeth.

Length: body, 3.2–3.4 mm.; wings, 3.4–3.6 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. A small secondary bristle is present in each vibrissal row. The allotype specimen has the palpi dark brown and the apical bristle has been broken off. The abdomen is entirely shining brown, faintly tinged with black, and covered with gray-brown pollen. The ovipositor blades are rather inconspicuous, extend about two-thirds the distance to the apices of the anal plates, and are rounded at their tips. The wings are similar to those of the male except that the brown markings are more confined to the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}.

Length: body and wings, 3.5 mm.

Holotype male and allotype female: from Pupukea, Oahu, July, 1958, collected in banana thicket (D. E. Hardy). Three paratype male: two same locality and collector as type, December, 1952, and September, 1955; and one Lulumahu Valley, Oahu, April 18, 1937 (F. X. Williams).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the Hawaiian Sugar Planters' Association and the University of Hawaii.

Drosophila mediana new species (fig. 134a–c).

This species is closely related to *D. comatifemora* n. sp. but differs by lacking a fuscous marking over the m crossvein; by lacking long ventral hairs on the front femora of the male; by having the front basitarsus of male elongate (two-thirds as long as the tibia) and with dorsal cilia only on the apical two-fifths of the segment (fig. 134a). The only satisfactory character which I find for separating the females is the absence of a fuscous mark on the m crossvein in *mediana.*

MALE. Predominantly yellow to rufous. *Head:* The front is about one-third wider than long, entirely rufous except for a faint tinge of brown along the orbits. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The upper median portion of the occiput is brown, the ocellar triangle is black. The remainder of the head in pale yellow except for the dark reddish brown eyes. No strong bristles are present in the vibrissal rows. The apical bristle of the palpus is strong, equal in size to the genal bristle. The labella are ornate; the apical margins are developed into strong reddish brown incurved spines (fig. 134b). The face is flat on the lower portion and is slightly carinate on the upper median portion. The antennae are yellow, except for a tinge of brown on the dorsal surface of the second segment. The arista has five or six dorsal and three ventral rays in addition to the

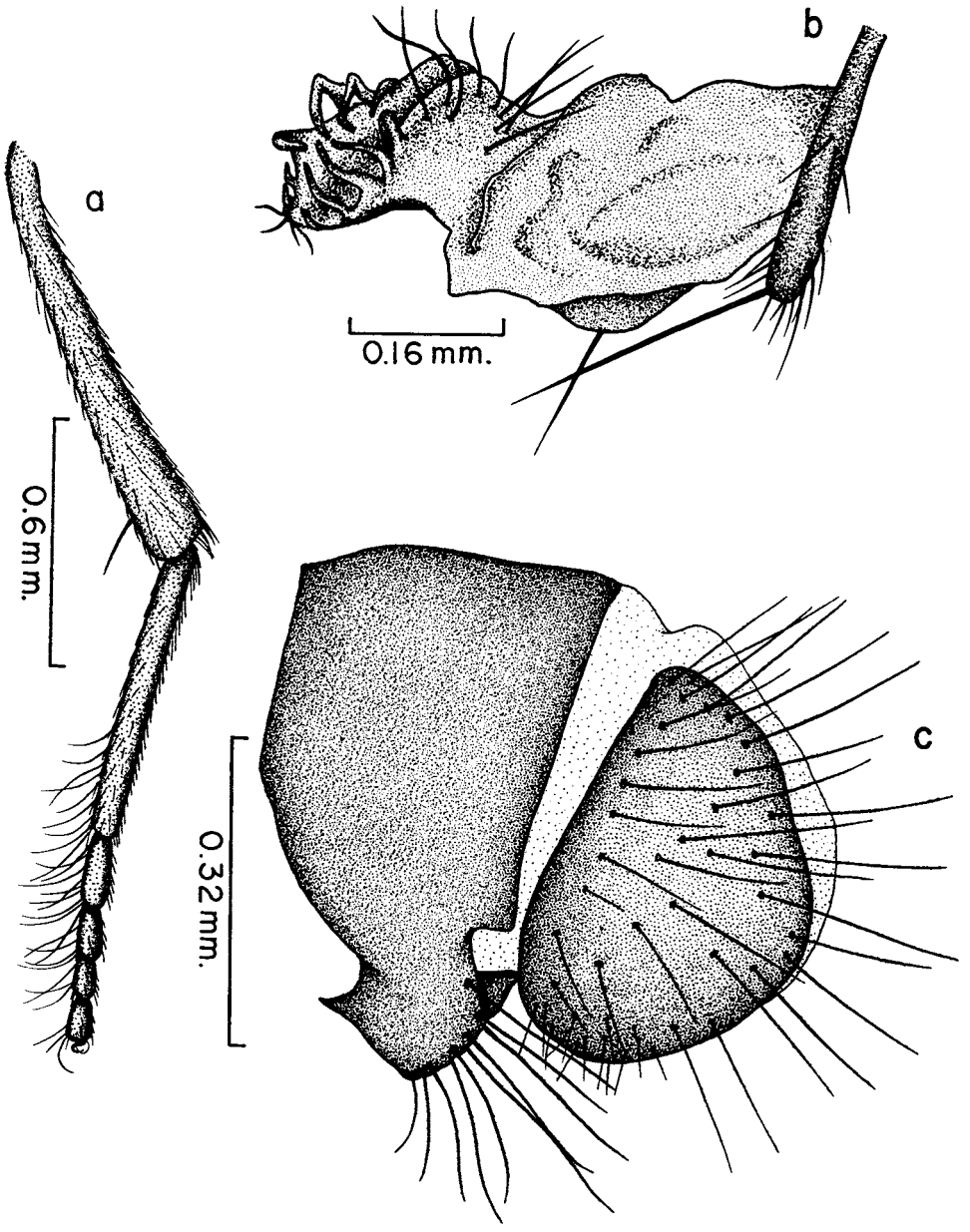


Figure 134—*Drosophila mediana* n. sp.: **a**, front tibia and tarsus; **b**, mouthparts; **c**, male genitalia.

apical fork; the inner surface is bare. *Thorax:* Almost entirely yellow to rufous, tinged with brown on the dorsum and with distinct brown spots on the pleura. The disc of the scutellum is brownish red, the margins are yellow. The brown

spots on the pleura are situated on the upper margins of the mesopleura and the pteropleura and on the upper posterior corner of the sternopleura. Only one humeral bristle is present. About six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about halfway between the first and second pair of supraalars. Two rather strong setae are situated mesad of the posthumeral bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The metanotum is entirely yellow. The halteres are yellow. *Legs:* Yellow except for the brown apical segments of the tarsi. The front femur has only four rather short posteroventral bristles and two posterodorsal bristles. The front tibia lacks long ciliation; the posterior surface is rather densely covered with short, fine, yellow hairs which are inconspicuous unless seen in a lateral view. The front basitarsus is rather elongate, about two-thirds as long as the tibia, and about four times longer than the second tarsal segment. Moderately long dorsal ciliation extends from the apical two-fifths of the basitarsus to the apex of the tarsus (fig. 134a). *Wings:* Subhyaline, without dark markings. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about 5.5 times longer than the fourth section, and the last section of vein M_{1+2} is 1.6 times longer than the penultimate section. The last section of vein M_{3+4} is about equal in length to the m crossvein. *Abdomen:* Subshining brown to black, tinged faintly with red in the ground color, and with a narrow gray border on the posterior margin of each tergum. The genitalia are as in figure 134c.

Length: body, 4.65 mm.; wings, 4.75 mm.

FEMALE. Fitting the description of the male in most respects. The front legs and the labella are not ornate. The ovipositor plates are short, subacute, and extend just slightly beyond the apices of the anal plates.

Length: body, 4.0 mm.; wings, 4.4 mm.

Holotype male and allotype female: from Waikamoi, Maui, 4,000 feet, August, 1958 (D. E. Hardy). Thirty-nine paratypes (23 males, 16 females): predominantly same locality as type, July, 1956, and August, 1958 (D. E. Hardy); and Kula Pipeline, Maui, 4,000 feet, July, 1956 (D. E. Hardy and R. Namba).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum; the remainder of the paratypes are in the collections of the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila megasticta new species (fig. 135a–b).

This species is differentiated from other *Drosophila* by having three brown vittae down the mesonotum, by having a large brown mark filling the apical two-thirds of cell R_1, and by the wing maculations as shown in figure 135b.

MALE. *Head:* Front slightly wider than long; predominantly brown, brownish yellow down the orbits. The vertex and upper occiput are brown; the lower occiput, genae, and face are yellow. The palpi and mouthparts are yellow, the former with several short, black bristles around the apical portion. The first two antennal segments are brownish yellow, the third is dark brown to black; each

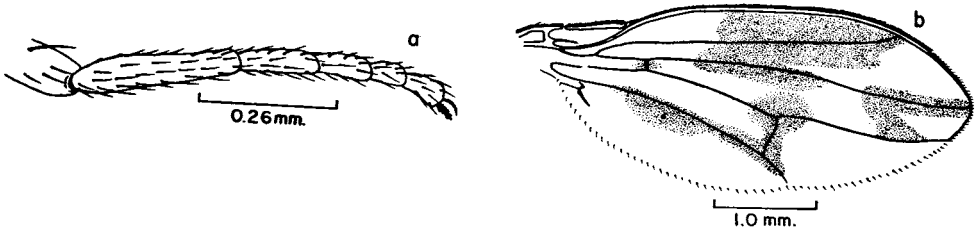


Figure 135—*Drosophila megasticta* n. sp.: a, front tarsus; b, wing.

arista has six dorsal and three ventral rays in addition to the apical fork. Each labellum has a row of rather strong bristle-like hairs along its upper margin. The lower reclinate bristle is small, about two-fifths as long as the proclinate, and is situated opposite the latter. The eyes are almost round; the genae are slightly less than one-sixth as high as one eye. The oral vibrissae are rather weak, no strong bristles are present; the vibrissae are about equal in length, but not so thick as the bristles of the occipital row. *Thorax:* The mesonotum is yellow, except for a broad median vitta extending the entire length, and for the brown lateral margins. The humeri are yellow; two moderately strong humeral bristles are present. The scutellum is brownish yellow, yellow on the sides. The metanotum is yellow with a streak of brownish yellow down the median portion. The mesopleura, upper portions of pteropleura, anterior halves of metapleura, and upper posterior corners of sternopleura are brown, tinged with yellow. The remainder of the pleura are yellow. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. Halteres yellow. *Legs:* Entirely yellow. The front legs are not ornate (fig. 135a), the tibiae lack ciliation, and the tarsi have rather short, suberect cilia down the dorsal surfaces; these hairs are scarcely 1.5 to 2.0 times longer than the width of the tarsal segments. *Wings:* The third costal section is about three times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The wings are chiefly subhyaline; the costal and basal cells are faintly yellow fumose. A brown mark extends through the apical two-thirds of cell R_1, across the median portions of cells R_3 and R_5, and over the m crossvein. A brown marking extends around the apical portion of cell R_3, along the margin, and over the apical one-fourth of vein R_{4+5}, bending at right angles to cross cell R_5 at about the apical one-fourth. Vein M_{3+4} is also clouded with brown (fig. 135b). *Abdomen:* Entirely dark brown except for the yellow venter. The male genitalia have not been studied.

Length: body, 3.0 mm.; wings, 3.7 mm.

FEMALE. Fitting the description of the male in most respects, but the labella are not ornate. Each palpus has two rather strong bristles, one on the apex and one preapical on the outside surface. The abdomen is dark brown to black, and the ovipositor plates are short and triangular, extending just slightly beyond the apices of the anal plates.

Holotype male, allotype female, and two paratypes (both females): from Keanakolu, on the slopes of Mauna Kea, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum; one paratype each in the United States National Museum and the University of Hawaii.

Drosophila melanoloma new species (fig. 136a–d).

This species is rather closely related to *D. haleakalae* Grimshaw but is slightly smaller in size, the arista has only four or five dorsal and two ventral rays, the anterior dorsocentral bristles are situated in line with the first pair of supraalar bristles, the antennae are bright yellow in the males, and the middle and hind femora are discolored with brown in the females.

MALE. *Head:* About one-third higher than long; the occiput is scarcely visible in direct lateral view. Front about as wide as long, the lower two-fifths bright yellow, the upper portion black. The lower reclinate bristle is about three-fifths to four-sevenths as long as the proclinate bristle and is situated distinctly above the latter. The face and genae are yellow-white; the former is very slightly raised down the median portion. In the median portion each gena, from the hind margin to the vibrissal row, is about as wide as three eye facets. Each vibrissal row has two moderately strong bristles at the upper edge. The palpi and mouthparts are yellow except for a heavy black rim at the apex of each labellum (fig. 136a), as in *haleakalae*. Each palpus has a moderately strong bristle. *Thorax:* Predominantly shining black in ground color, covered with gray pollen. The humeri, notopleural calli, and the extreme apex of the scutellum are yellow. The anterior dorsocentral bristles are situated opposite the first pair of supraalars, and the distance between the anterior and the posterior dorsocentrals is 1.5 times greater than the distance between the posterior dorsocentrals and the hind margin of the mesonotum. Two moderately strong humeral bristles are present. The anterior sternopleural bristle is small, hair-like, and only about one-third as long as the posterior bristle. Halteres pale yellow. *Legs:* Yellow, tinged with brown at apices of the tarsi. Front legs not ornate, no conspicuous cilia present on the tibiae and tarsi. Front basitarsus about three-fifths as long as the tibia (fig. 136c). *Wings:* About 2.8 times longer than wide. Faintly fumose, with very pale brown markings in the upper apical portion and over the m crossvein. The third costal section is about 4.4 times longer than the fourth, and the costal fringe ends near the basal one-third of the distance between the apices of veins R_{2+3} and R_{4+5}. Last section of vein M_{1+2} about 1.5 times longer than the penultimate section, and last section of vein M_{3+4} two times longer than the m crossvein (fig. 136b). *Abdomen:* Shining dark brown to black, very lightly gray-brown pollinose down the dorsal surface. Genitalia as in figure 136d. The ninth tergum is not narrowed dorsally, and the claspers are plainly visible from a lateral view.

Length: body, 2.3–2.6 mm.; wings, 2.5–3.1 mm.

FEMALE. Fitting the description of the male, except that the third antennal

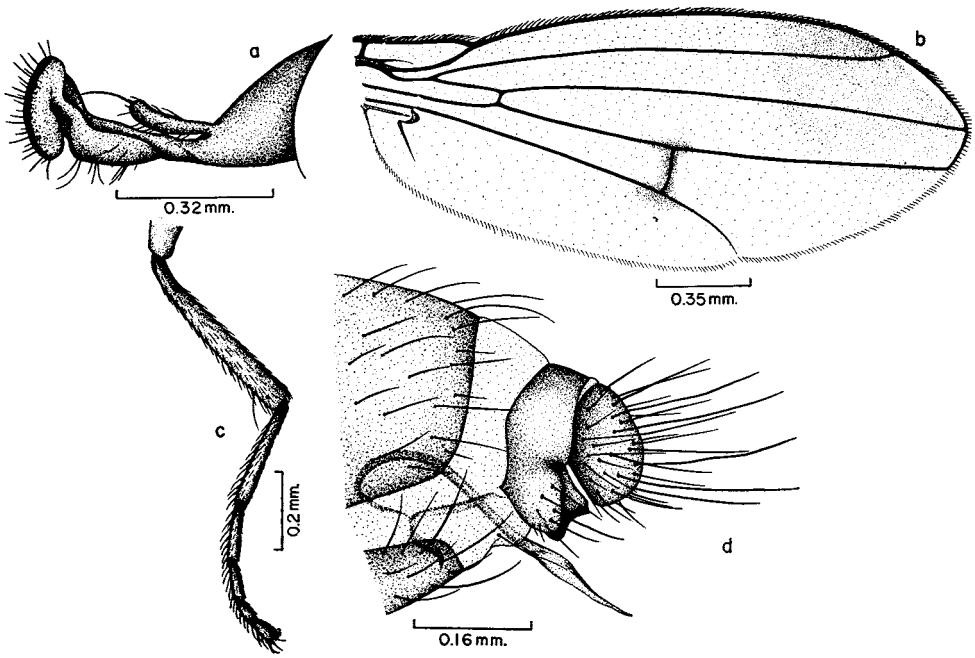


Figure 136—*Drosophila melanoloma* n. sp.: **a**, labellum; **b**, wing; **c**, front tibia and tarsus; **d**, male genitalia.

segment is predominantly brown, the second segment is tinged with brown on the upper portion, and also the middle and hind femora are broadly brownish through the median portions. The ovipositor plates are short and blunt and extend just slightly beyond the apices of the anal plates.

Length: body, 3.0 mm.; wings, 3.3–3.5 mm.

Holotype male and allotype female: Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy). About fifty paratypes (sexes evenly distributed): from the following localities—same as type (M. Tamashiro and D. E. Hardy); Hanalilolilo, Molokai, July, 1952 (D. E. Hardy); Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); Paliku, Haleakala Crater, Maui, 6,300 feet, June, 1952, and June, 1953 (D. E. Hardy and C. R. Joyce); Kula Pipeline, Maui, 4,500 feet, March–April, 1952 (O. Bryant); and Lanaihale, Lanai, 3,200 feet, June, 1953 (D. E. Hardy). One male specimen, Kulani, Maui, 5,200 feet, August, 1952 (W. C. Mitchell), apparently belongs here, but the specimen is not in good condition and is not being designated as a paratype.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

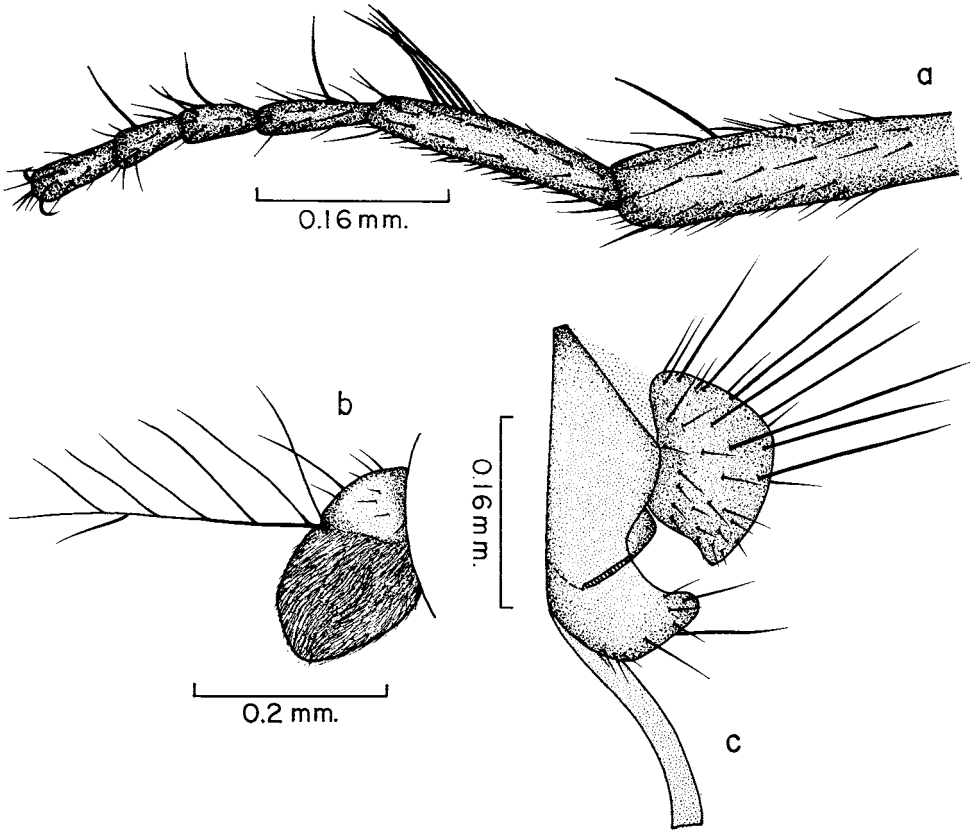


Figure 137—*Drosophila melanopedis* n. sp.: **a,** front tarsus; **b,** antenna; **c,** male genitalia.

Drosophila melanopedis new species (fig. 137a–c).

This species is readily differentiated by the dorsal row of black preapical bristles on the front basitarsus of the male and by the predominantly black tibiae and tarsi.

MALE. *Head:* Rather quadrate in shape, less than one-half higher than long as seen in lateral view. The front is entirely dark-colored except for a tinge of rufous along the lower portion; the upper two-thirds is brown, tinged with black. The eye orbits above the proclinate bristles, the vertex, the ocellar triangle, and the upper portion of the occiput are black, faintly tinged with brown. The lower third of the occiput, the genae, and the entire face are pale yellow. The anterior reclinate bristle is slightly smaller than the proclinate and is situated just above the latter. The antennae are yellow, tinged faintly with brown. The second segment has two short, black bristles and several black setae on the dorsal surface. The arista has five dorsal and one ventral ray in addition to the apical fork (fig. 137b). Two or three rather small, black bristles are present in the upper portion of each vibrissal row; the uppermost bristle is about equal in size

to the anterior reclinate. The mouthparts and palpi are yellow; each palpus has a small, black apical bristle and several black setae along the outside surface. No strong spines are evident on the mouthparts, but each labellum appears to have a heavily sclerotized area at the upper basal portion. *Thorax:* Almost entirely brown, covered with gray pollen, with a tinge of yellow to rufous in the ground color of the pleura, and with the lower half of each humerus clear yellow. The anterior dorsocentral bristles are situated on a line drawn halfway between the first and second supraalars. Six rows of acrostichal setae are present. Two pairs of humeral bristles are well developed and the anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The halteres are bright yellow. *Legs:* The coxae and femora are yellow. The tibiae and tarsi are black except for the narrow yellow bases of the former. The front coxa has two rather prominent apical dorsal bristles. The middle coxa has about four bristles on the dorsal surface, and the hind coxa has one bristle. The posterodorsal and posteroventral bristles are rather well developed on the front femora. The preapical dorsal bristle on the front tibia is situated just slightly more than its length from the apex. The front basitarsus is about one-half as long as the tibia and has a row of about five black dorsal bristles extending just before the apex (fig. 137a). The other tarsal segments have sparse, rather inconspicuous dorsal cilia. *Wings:* Slightly infuscated yellow-brown. The third costal section is 4.5 times longer than the fourth and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black, tinged with yellow to rufous in the ground color, and lightly covered with gray pollen. The anal plates are approximately two times higher than long and are rather sharply pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion, rather broadly expanded medianly, and terminates in a truncate lobe at the ventroapical portion (fig. 137c).

Length: body and wings, 2.75–2.85 mm.

FEMALE. The females have not been definitely associated with the males. Two specimens on hand may possibly belong here. They were taken in the same habitat as some of the males of this series, but they seem to differ by having the costal fringe very short and this may represent a distinct species. They are not being considered part of the type series.

Holotype male: Upper Olaa, Hawaii, in fern jungle, August, 1952 (W. C. Mitchell). Three male paratypes: two same locality as type, July, 1953 (D. E. Hardy); and one Keauhou Ranch, Kilauea, Hawaii, July, 1953 (D. E. Hardy).

The type is in the B. P. Bishop Museum. The paratypes are in the collections of the United States National Museum and University of Hawaii.

Drosophila melanosoma Grimshaw (fig. 138a–d).

Drosophila melanosoma Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :68.

Endemic. Kauai (type locality: "Mt. Waimea").

Type in the British Museum (Natural History). I have studied the type and

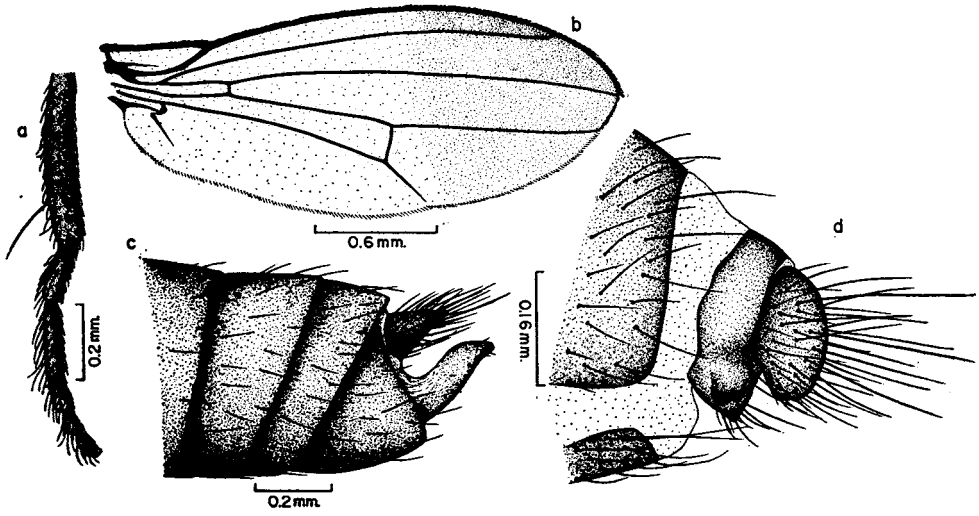


Figure 138—*Drosophila melanosoma* Grimshaw: **a,** front tibia and tarsus; **b,** wing; **c,** female genitalia; **d,** male genitalia.

have designated homeotypes. The species is common in the Kokee region of Kauai.

Fitting in the *haleakalae* complex by having the wing infuscations confined to the apical portions, the body predominantly shining black, and the scutellum yellow at the apex. It also shows relationship to *haleakalae* by having a black rim at the apex of each labellum. *D. melanosoma* is readily differentiated from other known species by the very short basitarsi of the front legs of both sexes (fig. 138a).

MALE. The head is about one-third higher than long. The front is about as long as wide and the lower third of front is yellow to rufous; upper portion black, merging into reddish or yellowish brown in the median parts of the front. The lower reclinate bristle is almost three-fifths as long as the proclinate and is situated distinctly above the latter. Face entirely yellow-white, slightly convex in the median portion, and concave in the middle of the front margin. Genae, lower occiput, palpi, and mouthparts entirely yellow except for the black rim at the apex of each labellum. Each palpus has a moderately strong apical bristle. Each oral vibrissa has two or three moderately strong bristles at the upper portion. The genae are rather narrow; in the median portion the measurement from the eye margin to the vibrissal row is scarcely greater than two eye facets. The antennae are pale yellow; the second segment has two moderately strong bristles plus one short, black bristle on the dorsal surface. Each arista has six dorsal and two ventral rays in addition to the apical fork; the anterior surface is sparsely haired. The thorax is typically polished black, lightly gray dusted; the mesonotum is reddish brown in teneral specimens. The sternopleura and hypopleura are entirely yellow. The anterior dorsocentral bristle is about three-fifths as long as the posterior bristle. Halteres pale yellow. Scutellum with a

bright yellow spot at apex. Metanotum dark brown, tinged with red. Legs entirely yellow except for a slight tinge of brown at apices of tarsi. Front legs rather short and lacking long ciliation. The preapical dorsal bristle on the front tibia is strong and about two times longer than the width of the segment. The basitarsus is less than one-fourth as long as the tibia and is about two-thirds as long as the second tarsal segment (fig. 138a). Wings evenly fumose with more intense brownish coloration in the upper apical third of the wing (fig. 138b); this fumosity is faint, or lacking, in some specimens. Third costal section four times longer than the fourth, and the costal fringe extends half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section. The proportions are 90–75. Abdomen entirely polished dark brown to black, faintly gray dusted on the dorsal portion. Male genitalia as in figure 138d.

Length: body, 3.0 mm.; wings, 3.2 mm.

FEMALE. Fitting the description of the male, except that the labellum does not have the sclerotized border. The female ovipositor is short, broad, and blunt (fig. 138c), it extends just slightly beyond the apices of the anal plates.

Length: body, 3.30 mm.; wings, 3.75 mm.

Drosophila mimica new species (fig. 139a–e).

Fitting close to *D. paucipuncta* Grimshaw but differing in a number of respects in wing markings, venation, and body coloration as pointed out in the key and in figures 139d and 160b. One other striking feature of this species is that the lower reclinate bristles are situated distinctly below the proclinates, and the front is cinereous.

MALE. *Head:* Yellow except for the reddish brown eyes and the brownish discoloration on the upper portion of the occiput, across the vertex, and in the ground color of the upper two-thirds of the front. The lower portion of the front is yellow to rufous, and the entire front is cinereous with a faintly blue sheen. The proclinate bristles are situated at the middle of the front and are rather near the upper reclinate bristle; the distance between the two is about equal to the distance between the ocellar bristles. The lower reclinate bristles are three-fourths to four-fifths as long as the proclinates and are situated distinctly below the latter. The lower hind margin of the eye is rather strongly oblique. The face is gently carinate down the median portion. In the median portion each gena is equal in width to about four rows of eye facets. The oral vibrissae are made up of rows of rather short, black bristles of about equal length. The palpi and mouthparts are entirely yellow. Each labellum has a series of long, curved bristle-like processes extending from the apex (fig. 139a). Each palpus is rather densely setose over the apical third and has a very strong apical bristle (fig. 139b). Antennae predominantly yellow, tinged with brown on the dorsal portion. Each arista with seven or eight dorsal and four ventral rays in addition to the apical fork. *Thorax:* Mesonotum reddish brown, pleura entirely yellow. The scutellum is reddish brown, narrowly yellow at the apex and on

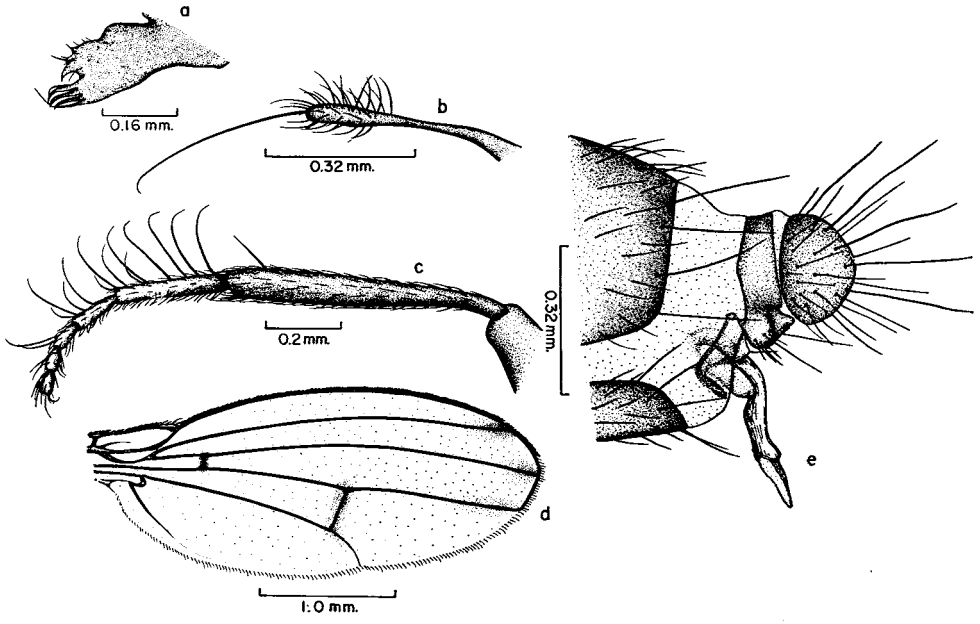


Figure 139—*Drosophila mimica* n. sp.: **a,** labellum; **b,** palpus; **c,** front tibia and tarsus; **d,** wing; **e,** male genitalia.

the extreme lateral margins. The humeri, the notopleural calli, and the lateral margins of the mesonotum are yellow. Only one pair of strong dorsocentral bristles is present; the secondary pair is represented by thin bristle-like hairs situated just slightly in front of a line drawn between the second pairs of supra-alar bristles. Two pairs of strong humeral bristles are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Front tibia not ornate. Front tarsus with long ciliation down the dorsal surface (fig. 139c). The front basitarsus is about one-half as long as the tibia and is two times longer than the second tarsal segment. *Wings:* Predominantly hyaline with pale brown markings at the apices of veins R_{2+3}, R_{4+5}, M_{1+2}, over the m crossvein, and over the r–m crossvein (fig. 139d). Third costal section five times longer than the fourth, the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about one-third longer than the penultimate section. *Abdomen:* The first and sixth terga are yellow, the others, predominantly brown with narrow yellow apices. The lateral margins and the ventral surface of the abdomen are entirely yellow. The genitalia are as in figure 139e. The ninth tergum is rather narrow, the ventral aspects possess strong marginal bristles, and the claspers are plainly visible from lateral view. The parameres are rather broad and blunt.

Length: body, 3.30–3.50 mm.; wings, 3.75 mm.

FEMALE. Fitting the description of the male except that the mouthparts are not ornate, the apical bristle on the palpus is not so elongate and the front tarsi

are not ciliated. The terga beyond the first are entirely shining brown to black. The ovipositor plates are short, triangular-shaped, and extend scarcely beyond the apices of the anal plates.

Length: body, 3.7 mm.; wings, 4.0 mm.

Holotype male and allotype female: Mauna Loa Truck Trail, Hawaii, 4,000 feet, August, 1952 (D. E. Hardy). Seventy-eight paratypes (23 males and 55 females): from the following localities, all in the Kilauea area of the island of Hawaii—same as type, some taken November, 1956 (W. C. Mitchell); Bird Park, Kilauea, August, 1952, and July, 1953 (D. E. Hardy); Kilauea, April, 1944 (N. L. H. Krauss); and Upper Olaa Forest, August, 1952 (W. C. Mitchell). Two males, which fit *mimica* in all details, are also on hand: from Halemanu Swamp, Kauai, August, 1953 (D. E. Hardy); and from Nualolo Valley, Kauai, August, 1952, 3,400 feet (D. E. Hardy). They are not being designated as paratypes.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are being distributed in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila mimiconformis new species (fig. 140a–b).

In many respects this species is like *D. conformis* n. sp. but differs by having the wings entirely hyaline and lacking dark markings; by having the third antennal segment yellow, the upper portion of each sternopleuron dark brown, and the abdomen entirely dark brown to black and lacking yellow markings on the sides of the segments.

MALE. *Head:* Yellow except for the red eyes and the dark brown to black upper portion of the occiput, vertex, ocellar triangle, and upper portion of each eye orbit. The front, measured from the median ocellus to the anterior margin, is approximately two times wider than long. The lower reclinate bristle is about two-thirds to three-fourths as long as the proclinate and is situated opposite the latter. The antennae are entirely yellow. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. The first and third bristles of the vibrissal row are the strongest; the third is three-fourths as long as the first. The palpi and mouthparts are entirely yellow. The labella are yellow, not ornate, and the palpi have no unusually strong bristles. *Thorax:* Brown, tinged with yellow to rufous in the ground color. The lower portion of each sternopleuron is yellow. The upper portion is tinged with brown. The anterior dorsocentral bristles are slightly in front of a line drawn between the second (posterior) supraalar bristles. About eight rows of acrostichal setae are present just in front of the anterior dorsocentral bristles. Two humeral bristles are present. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The halteres are yellow. *Legs:* Entirely yellow. The femora are slender; posterodorsal and posteroventral bristles are well developed on the front pair. The front tibiae have no unusual setae; the preapical dorsal bristle is situated about its own length from the apex of the segment. The front basitarsus is about one-

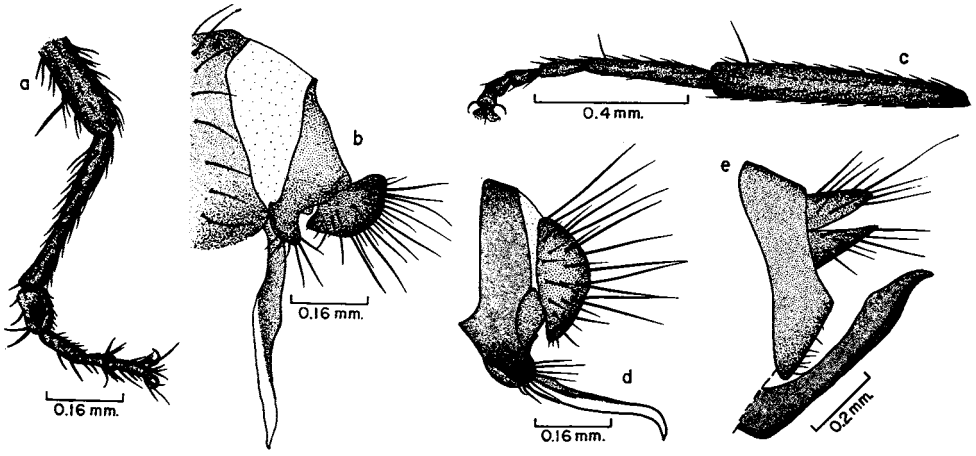


Figure 140—*Drosophila mimiconformis* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. mimiconfutata* n. sp.: **c,** front tibia and tarsus; **d,** male genitalia; **e,** female genitalia.

half as long as the tibia and has no elongate cilia. The second tarsal segment is flat and rounded, slightly concave on the inner surface (fig. 140a). *Wings:* Entirely subhyaline, very faintly infuscated. The third costal section is five times longer than the fourth, and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Predominantly black on the dorsum, covered with gray-brown pollen. The anal plates are rather sharply pointed ventrally. The ninth tergum is greatly narrowed across the dorsum, rather broad through the median portion, and lobate ventrally; the ventral lobe has a cluster of setae at the apex (fig. 140b).

Length: body and wings, 2.65–2.85 mm.

FEMALE. The female sex cannot be positively associated with the male at the present time since the females of this complex of species apparently all look alike. The specimens on hand from the type locality appear to belong with the males and fit the description of the above except for the sexual differences. The ovipositor blades are moderately slender and extend distinctly beyond the anal plates.

Length: same as for the male.

Holotype male: from Manawainui Valley, Molokai, July, 1952 (D. E. Hardy). Twenty paratypes (all males): from the following localities on Molokai—same data as type; Puu Alii, 4,200 feet, July, 1953 (D. E. Hardy and M. Tamashiro); and Hanalilolilo, 4,000 feet, August, 1953 (M. Tamashiro). A series of female specimens is on hand, but these are not being designated as part of the type series.

The type and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States Na-

tional Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila mimiconfutata new species (fig. 140c–e).

This species is very close to *confutata* n. sp., and the two were included together in the same series in the original sorting. *D. mimiconfutata* differs by having the costal fringe more elongate and extending distinctly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}; by having the pleura evenly colored reddish brown; and by having one prominent seta at the end of the front basitarsus (fig. 140c).

MALE. Fitting the description of *confutata* in most respects. *Head:* The front is predominantly yellow to rufous, tinged with brown. The anterior reclinate bristle is approximately equal in length to the proclinate and is situated just slightly above the latter. The antennae are brown, tinged with yellow to rufous. The arista has six dorsal and two ventral rays. A strong bristle is present at the upper edge of each vibrissal row; this is slightly stronger than the proclinate bristles. The third bristle of the vibrissal row is moderately developed, about two-thirds as long as the first bristle. A strong apical bristle is present on each palpus; this is about equal in size to the anterior reclinate. *Thorax:* Rufous, tinged with brown in the ground color. The pleura are brown, tinged with yellow to rufous. One or two of the acrostichal setae in line with the dorsocentrals are enlarged just before the anterior dorsocentrals and are nearly two times larger than the surrounding setae. *Legs:* Yellow, with a faint tinge of brown on the femora; devoid of long ciliation except for one erect, preapical dorsal hair on the front basitarsus (fig. 140c). *Wings:* Slightly infuscated with yellow-brown. The third costal section is five times longer than the fourth, and the costal fringe extends distinctly beyond the middle of the section between the apices of veins R_{2+3} and R_{4+5} (approximately three-fifths this distance). The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Brown with yellow markings at the extreme bases of the terga. The anal plates are more than two times higher than long and are rather pointed ventrally. The ninth tergum is not greatly narrowed across the dorsal portion; at its greatest width it is slightly less than the horizontal length of the anal plates. The lower portion of the ninth tergum is lobate as in figure 140d.

Length: body, 3.2 mm.; wings, 3.6 mm.

FEMALE. Fitting the description of the male except for sexual characters. The erect hair is absent at the apex of the front basitarsus. Two strong bristles are present in the vibrissal row. The arista has five to six dorsal and three ventral rays in addition to the apical fork. The ovipositor blades are slender, sharp-pointed at apices, and serrated along ventral margins (fig. 140e).

Holotype male: Pupukea, Oahu, July, 1958, collected in banana thicket (D. E. Hardy). Allotype female: same locality and collector as type, December, 1952. Five male paratypes: same data as type; Punaluu, Oahu, June, 1916 (J. C. Bridwell); and Wahiawa, Oahu, 5–14–13 (no collector given).

The type and one paratype are in the B. P. Bishop Museum; one paratype is in the United States National Museum and one is in the University of Hawaii collection.

Drosophila mitchelli new species (fig. 141a–d).

This species appears rather closely related to *D. infuscata* Grimshaw. The male is readily differentiated, however, by the very long ciliation on the front tarsi (fig. 141a), the ciliation on the posterodorsal surface of the front tibiae, the brownish tinged femora of the male, the yellow-brown pleura, and the uninfuscated m crossvein in both sexes. The labella of the male are also distinctly differentiated as shown in figures 141c and 120a.

MALE. *Head:* The front is nearly one-third wider than long, brown, and tinged with yellow only on the lower orbits. Anterior reclinate bristle about four-fifths as long as the proclinate. Vertex and upper occiput brown to black; lower portion of occiput yellow. Genae yellow, tinged with brown along the lower edge. Face brown to black; the upper median portion of the face is slightly carinate, the lower portion is flat. No strong bristles are present in the vibrissal rows; the hairs of the lower angles of the face are fine, rather inconspicuous. The clypeus is pale brown; the mouthparts, including the palpi, are yellow, except for the black, heavily sclerotized apices of the labella. Each labellum has a clump of black hairs and a series of strong black teeth at its apex (fig. 141c). Each palpus has a moderately strong apical bristle plus numerous black setae. The first two antennal segments are predominantly yellow; the second is brown on the dorsal surface and has two moderately strong bristles; the third antennal segment is brown. The arista typically has six dorsal and three ventral rays in addition to the apical fork; the inner surface is very sparsely covered with short hairs. *Thorax:* Brown to black, strongly tinged with rufous, especially on the sides. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. Two pairs of humeral bristles are present. The halteres are yellow to rufous. *Legs:* Yellow, lightly tinged with brown on the femora and on the front coxae. Front femora short and thick, about three times longer than wide, and five or six times thicker than the tibiae. The posteroventral bristles of the femur are just slightly longer than the greatest width of the segment. The entire posterior surface of the front tibia is densely covered with erect cilia about equal in length to the width of the segment. Front tarsus with moderately long, erect cilia extending over the dorsal surfaces of the first three segments (fig. 141a). Front basitarsus about two times longer than the next tarsal segment and about half as long as the tibia. *Wings:* Subhyaline, infuscated with pale brown in the anteroapical portion; this marking extends through the apical portions of cells R_1, R_3, and into the upper half of cell R_5; in some specimens it extends through the apical portion of cell R_5. The third costal section is about 5.4 times longer than the fourth. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.35

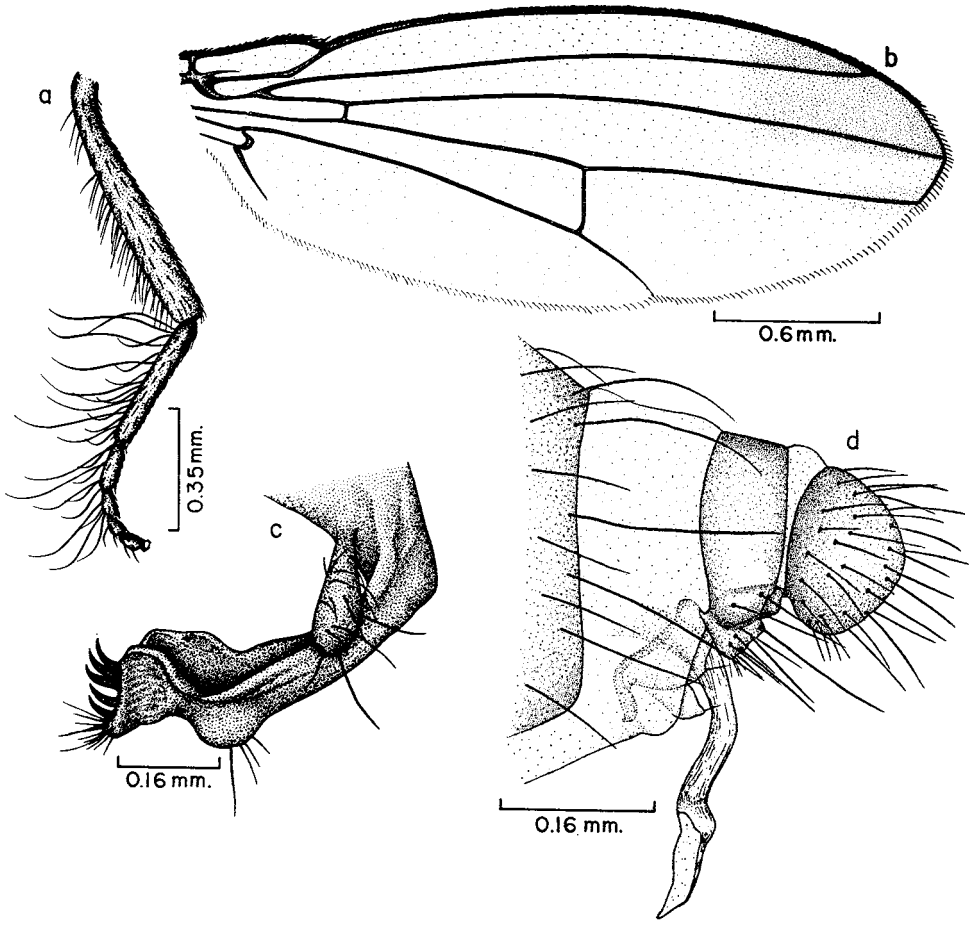


Figure 141—*Drosophila mitchelli* n. sp.: **a**, front tibia and tarsus; **b**, wing; **c**, mouthparts; **d**, male genitalia.

times longer than the penultimate section (fig. 141b). *Abdomen:* Predominantly dark brown; the first tergum, and often the basal portion of the second, is yellow. The ninth tergum is not narrowed dorsally; the ventral portion is extended over the bases of the claspers so that only the upper portion of each clasper is visible from a lateral view (fig. 141d). Each ventral margin of the tergum is covered with numerous dark-colored setae. The anal plates are one-third to one-fourth longer than the ninth tergum.

Length: body, 3.75–4.00 mm.; wings, 3.90–4.20 mm.

FEMALE. Fitting the description of the male in most respects. The mouthparts and legs are not ornate and the femora are predominantly yellow. The ovipositor is yellow to rufous, is moderately developed, is about two-thirds as

long as the lower margin of the seventh segment, and extends well beyond the apices of the anal plates.

Length: body, 4.0–4.4 mm.; wings, 4.3–4.5 mm.

This species is named after Dr. W. C. Mitchell, University of Hawaii, who has accompanied me on many field trips and who has contributed greatly to this study.

Holotype male: Olaa Flume Road, Hawaii, July, 1953 (D. E. Hardy). Allotype female: Upper Olaa Forest, Hawaii, August, 1952 (W. C. Mitchell). Nineteen paratypes (12 males and 7 females): same data as type and allotype; two male paratypes from Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); and one male paratype each from Kohala Mountains, Hawaii, May, 1917 (O. H. Swezey), and Kau, Hawaii, 4,000 feet (no date or collector given); three paratype males from Kaiholena Ridge, Kohala Mountains, 2,000 feet, July, 1958 (D. E. Hardy).

Type, allotype, and a series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are being deposited in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Assocation, and the University of Hawaii.

Drosophila molokaiensis Grimshaw (fig. 142a–b).

Drosophila molokaiensis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :67.

Endemic. Molokai (type locality: Molokai mountains, 4,000 feet, September, 1893). Known only from the type.

Type in the British Museum (Natural History).

I have studied the type male; it is in rather poor condition and the head and one wing are lacking; the species cannot be definitely placed. None of the specimens which I have compared with the type appear to be this species. *D. molokaiensis* seems to fit near *confutata* n. sp. and *mimiconfutata* n. sp., and one of these species may possibly be a synonym. It apparently differs by having the body predominantly dark brown, tinged with black over the thorax. The femora are tinged with brown on the type of *molokaiensis;* this also possibly is distinctive.

The following descriptive notes are based upon the type: Moderate-sized dark brown to black species. The thorax is entirely brown, rather densely brown pollinose and tinged with black on the mesonotum and pleura. The legs are chiefly yellow, the coxae are brown, and the femora are tinged with brown. The apical two segments of the tarsi are black. The front legs are simple, with no evidence of ciliation present. The front basitarsus is about two-thirds as long as the tibia (fig. 142a). The wings are distinctly yellow fumose. The costal fringe ends slightly before the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about five times longer than the fourth, and the fourth costal section is slightly longer than the fifth. The last section of vein M_{1+2} is about one-third longer than the penultimate section (fig. 142b). The abdomen is black; the specimen has been greased and it appears that the abdomen should be densely covered with brown pollen.

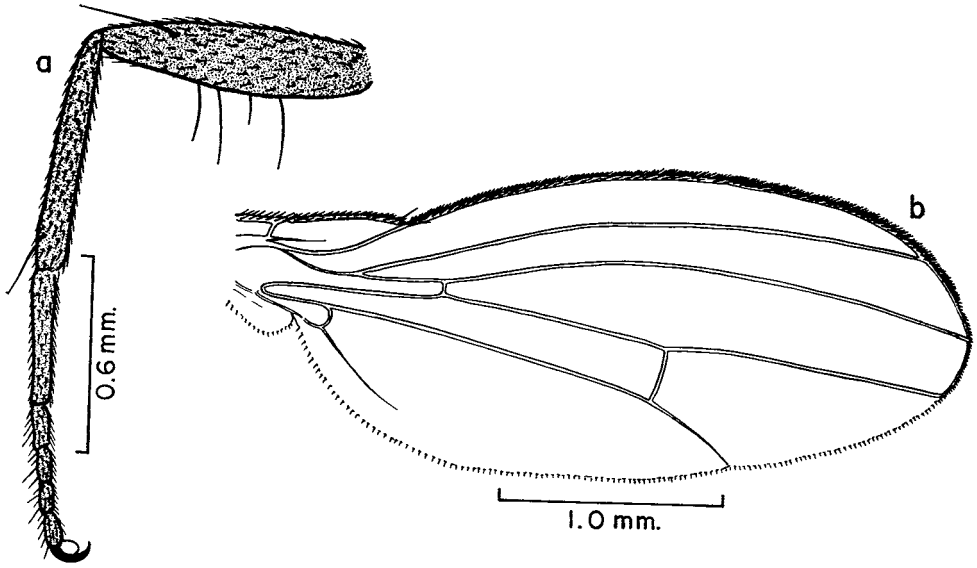


Figure 142—*Drosophila molokaiensis* Grimshaw: **a**, front leg; **b**, wing.

Length: body without head, 3.25 mm.; wings, 4.3 mm.
FEMALE. Unknown.

Drosophila musae new species (fig. 143a–b).

This species fits in the *sadleria* complex by having brown markings over the apex of the wing and over the m crossvein and by having brown longitudinal vittae extending down the mesonotum. It differs from other known members of this complex by lacking ornamentation on the front legs of the male.

MALE. *Head:* Rather quadrate in shape, scarcely one-third higher than long as seen in direct lateral view. The front, measured from the median ocellus to the anterior margin, is two times wider than long. The portion below a level with the anterior reclinates is entirely yellow; the upper portion is brownish yellow, tinged faintly with black. The eye orbits are yellow-brown covered with gray-brown pollen. The upper portion of the occiput is brown, covered with gray-brown pollen. The lower occiput, genae, face, clypeus, palpi, and mouthparts are entirely yellow. Each palpus has a moderately strong apical bristle and another smaller subapical bristle. The labella are not ornate. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the lower humeral bristle. The upper median portion of the face is slightly convex. The anterior reclinate bristle is subequal to the proclinate and is situated distinctly above the latter. The antennae are brownish yellow, slightly darker at the apex of the third segment. The arista has five to seven dorsal and one or two ventral rays in addition to the apical fork. *Thorax:* Pre-

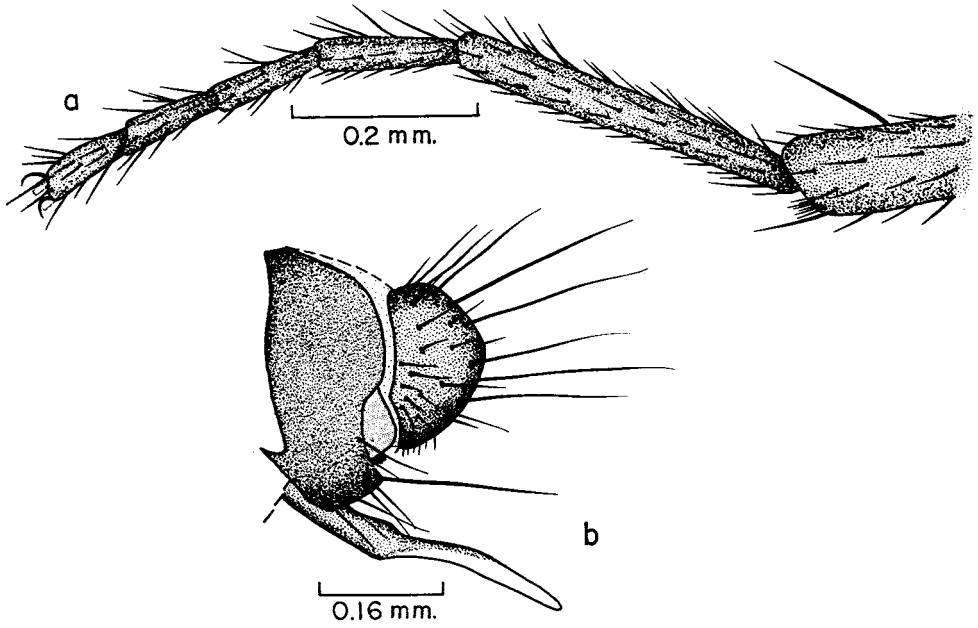


Figure 143—*Drosophila musae* n. sp: **a**, front tarsus; **b**, male genitalia.

dominantly yellow, with five rather narrow brown vittae extending down the mesonotum and with the upper half of the pleuron tinged with brown. The disc of the scutellum is entirely reddish brown; the lateral margins are yellow. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths to five-sixths as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. The front legs are not ornate, but the tarsi have some short erect setae along the anterior surface; about six of these setae are present on the apical half of each basitarsus. The front basitarsus is approximately three-fifths as long as the tibia and nearly two times longer than the second tarsal segment (fig. 143a). *Wings:* Subhyaline, with a pale brown marking at the apex of the wing and covering over the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}, and with a brown marking extending over the m crossvein. The third costal section is five times longer than the fourth, and the costal fringe extends just beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.2 times longer than the penultimate section. *Abdomen:* Entirely yellow-brown. The anal plates are nearly two times higher than long and are pointed ventrally. The ninth tergum is narrowed over the extreme dorsal portion and is expanded medianly on the posterior margin so that at its widest point it is equal to or greater than the length

of the anal plate. The ventral lobe of the ninth tergum is shaped as in figure 143b. The claspers are only partially visible from a direct lateral view.

Length: body, 3.6 mm.; wings, 3.9 mm.

FEMALE. Unknown.

Holotype male: Wailau Trail, Mapulehu, Molokai, 2,600 feet, collected in banana grove, December, 1937 (F. X. Williams).

Type in the Hawaiian Sugar Planters' Association collection.

Drosophila musaphilia new species (fig. 144a–c).

Very closely related to *D. villosipedis* n. sp.; superficially the two look alike and consequently were both mixed with the same series. The two were also taken in exactly the same habitat and both are strongly attracted to fermenting bananas.

D. musaphilia is differentiated from *villosipedis* by the following characteristics: the r–m crossvein is situated near the basal two-fifths of cell 1st M_2; the last section of vein M_{1+2} is 1.4 times longer than the penultimate section; the front is velvety black above, reddish brown below; the face is brown on the oral margin, and the antennae, genae, palpi, and most of the occiput are brown; only a very narrow median gray vitta is present on the mesonotum; the brown marking in the middle of cell R_1 is expanded, considerably wider than the mark in the median portion of vein R_{4+5} (fig. 144b); also the front tibia of the male has no long hairs on the dorsal surface (fig. 144a).

MALE. Moderately large, predominantly black species. *Head:* The head is about one-third higher than long, the occiput is slightly convex in the median portion. The front is almost as long as wide, is black on the upper half, reddish brown below; the upper orbits and the extreme anterior margin are yellow. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The occiput is entirely brown to black except for a narrow yellow border around the eye orbits. The face is nearly flat, just slightly convex in the median portion; the lower margin is dark brown to black. The clypeus, mentum, and sclerotized portions of the mouthparts are dark brown to black. The palpi are yellow-brown; each has a strong apical bristle. Two strong black bristles are present at the upper edge of each vibrissal row. The antennae are dark brown to black, except for a tinge of yellow on the first segment. The arista has about eight dorsal and four ventral rays in addition to the apical fork, and the anterior margin has about eight conspicuous hairs. *Thorax:* Mesonotum predominantly black, narrowly yellow around the extreme margins. The mesonotum is opaque, gray to black pollinose, with a very narrow gray vittae extending down the median portion and a very faint indication of a gray vitta extending down each dorsocentral line. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The scutellum is black on the disc, yellow on the sides. The humeri are entirely yellow and each possesses two strong bristles. The metanotum and the pleura are dark reddish brown to black; tinges of yellow are present around the margins of the

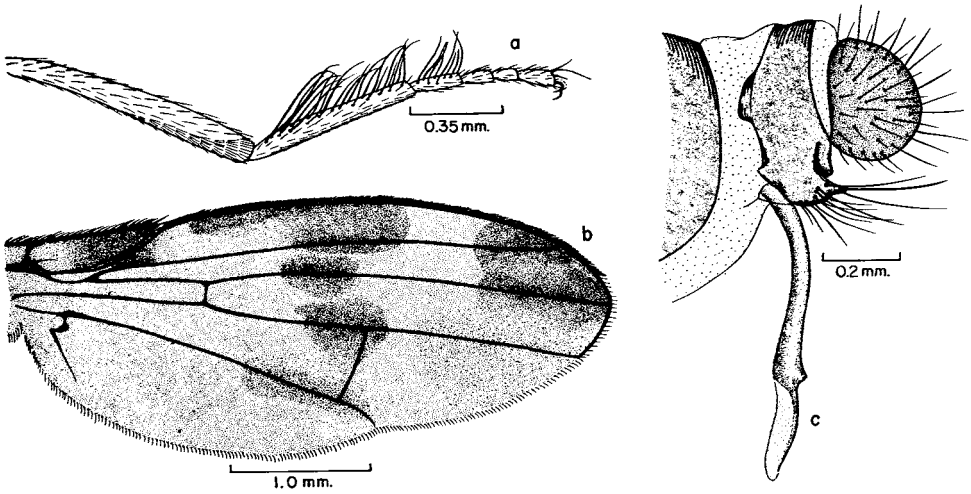


Figure 144—*Drosophila musaphila* n. sp.: **a**, front tibia and tarsus; **b**, wing; **c**, male genitalia.

sclerites. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The halteres are pale yellow. *Legs:* Coxae and femora blackish brown; trochanters brown, tinged with yellow. The extreme apices of the femora and all of the tibiae and tarsi are yellow, except for the brown apical tarsal segments. The front tibia is devoid of ornamentation. The first two segments of the front tarsus have abundant long black hairs down the dorsal surface (fig. 144a). The front basitarsus is about two-thirds as long as the tibia. *Wings:* Three times longer than wide. The markings are as in figure 144b. The third costal section is about six times longer than the fourth, and the costal fringe extends about two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. Crossvein r–m is situated at the basal two-fifths of cell 1st M_2 and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Predominantly dark brown to black, rather densely brown pollinose. Terga with a large yellow-gray spot on each anterior corner. Male genitalia as in figure 144c.

Length: body, 5.00 mm.; wings, 5.25 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor is about equal in length to the ventral margin of the seventh abdominal segment.

Holotype male, allotype female, and eight paratypes (all females): from Kokee, Kauai, 3,600 feet, July, 1952, in banana bait trap (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila mycetophila new species (fig. 145a–d).

This species fits in the complex which is characterized by having the mesonotum brown and the front tarsi with long, dorsal ciliation (fig. 145a). It differs

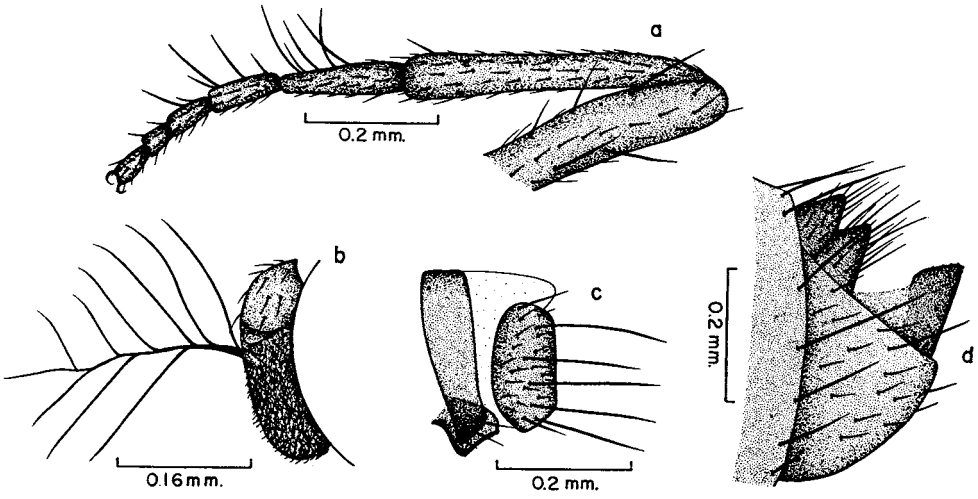


Figure 145—*Drosophila mycetophila* n. sp.: **a,** front leg; **b,** antenna; **c,** male genitalia; **d,** female genitalia.

from related species by having the pleura and the first abdominal segment pale yellow; by having the preapical dorsal bristle of the front tibia inconspicuous (scarcely larger than the surrounding setae); and also by its smaller size.

MALE. *Head:* Predominantly yellow, tinged with brown on the upper portion of the front; brownish black on the upper eye orbits, the ocellar triangle, the vertex, and upper occiput. The lower portion of the front is pale yellow. The entire front is covered with gray pollen. The anterior reclinate bristle is two-thirds to three-fourths as long as the proclinate and is situated distinctly above the latter. The oral vibrissae are rather small; the largest setae are scarcely larger than the acrostichal setae of the mesonotum. The palpi and mouthparts are pale yellow. Each palpus has a small black apical bristle. I see no evidence of ornamentation on the labella although on the type the mouthparts are withdrawn into the oral cavity and are not plainly visible. The face is distinctly carinate. The genae are about equal in width to three rows of eye facets. The antennae are yellow, tinged with brown on the third segment and over the dorsal surface of the second. The arista has five dorsal and three ventral rays in addition to the apical fork (fig. 145b). *Thorax:* Brown faintly tinged with yellow on the dorsum, pale yellow on the sides. The mesonotum and scutellum are covered with gray-brown pollen. The anterior dorsocentral bristles are situated opposite the second (posterior) supraalars. About six rows of acrostichal setae are present. Each humerus has two moderately developed bristles. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. Posterodorsal and posteroventral bristles are moderately developed on the front femora. The front tibia is not ornate. The preapical dorsal bristle is small, inconspicuous, scarcely larger than the sur-

rounding setae on the tibia. The front tarsus has long ciliation down the dorsal surface; the ciliation over the basitarsus extends from about the basal third to the apex of the segment (fig. 145a). The front basitarsus is approximately one-half as long as the tibia and about two times longer than the second tarsal segment. *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.45 times longer than the penultimate section. *Abdomen:* Predominantly shining brown; yellow over the first tergum and the base of the second tergum, and yellow faintly tinged with brown on the venter. The anal plates are nearly two times higher than long. The ninth tergum is widest over the dorsal surface and is gradually narrowed ventrally (fig. 145c). The claspers are just barely visible from a direct lateral view.

Length: body and wings, 2.0–2.2 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. One or two strong bristles are present at the upper edge of each vibrissal row. The dorsum of the thorax is often tinged with black, and the face is discolored with brown on the median portion. The ovipositor blades are rather short, subacutely pointed, and serrated around the apices (fig. 145d).

Length: body, 2.5 mm.; wings, 2.8 mm.

Holotype male, allotype female, and three paratypes (all female); taken at Kolekole Pass, Oahu, reared from bracket fungus, July, 1958 (K. Sakimura).

Type and allotype in the B. P. Bishop Museum. Paratypes in the United States National Museum and the University of Hawaii collections.

Drosophila nanella new species (fig. 146a–b).

Superficially, this species resembles *reducta* n. sp. and *taractica* n. sp., two aberrant species which possess a *Drosophila*-like arista and six rows of acrostichal setae on the mesonotum but which have *Scaptomyza*-like male genitalia. *D. nanella* differs strikingly from these, however, by possessing typical *Drosophila* genitalia (fig. 146b). The species is differentiated from other *Drosophila* which have clear wings and the unornamented front legs by its very small size, the short front basitarsi, and by the ventral brush of tiny black spines on each of the tarsal segments (fig. 146a).

MALE. *Head:* Nearly one-half higher than long as seen in direct lateral view. The front is clear yellow on the lower half and yellow, tinged with brown and covered with brownish yellow pollen on the upper portion. The front, measured from the median ocellus to the front margin, is nearly two times wider than long. The upper eye orbits are brown, faintly tinged with yellow in ground color. The ocellar triangle, the vertex, and upper occiput are brown, faintly tinged with black, and covered with gray-brown pollen; the orbits are also gray pollinose. The median portion of the occiput is tinged with brown, the lower portion is pale yellow. The genae are yellow except for a black line extending

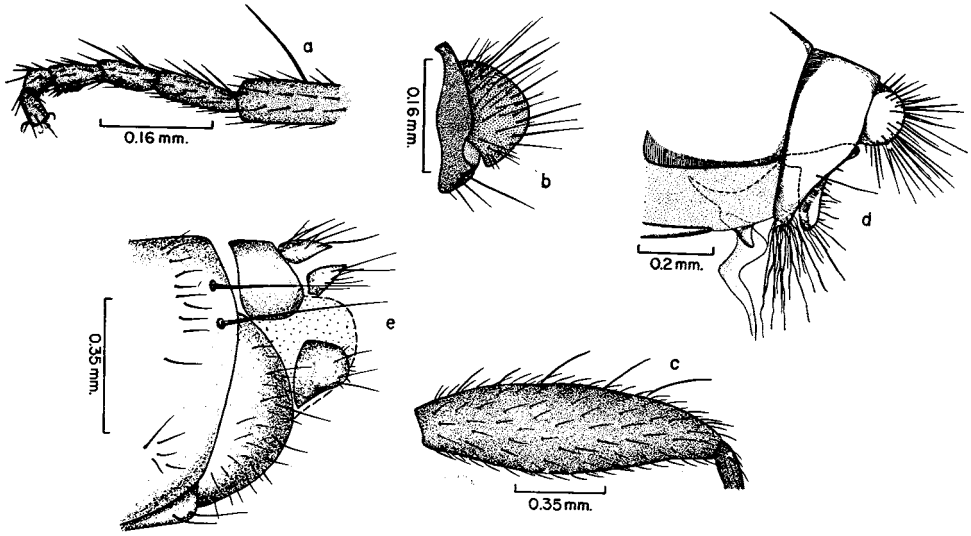


Figure 146—*Drosophila nanella* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. nasalis* Grimshaw: **c,** front femur; **d,** male genitalia; **e,** female genitalia.

along the vibrissal row. The face is predominantly yellow, but dark brown to black along the oral margin and in the lower median portion. The upper median portion of the face is slightly raised. The clypeus is brown. The palpi and mouthparts are yellow. Each palpus has a moderately strong, black bristle at the apex; this is approximately equal in size to the uppermost bristle of the vibrissal row. The mouthparts are ornate; each labellum has several curved yellow spines extending from the apical margin. One moderately strong bristle is present in each vibrissal row. The anterior reclinate bristle is approximately one-half as long as the proclinate and is situated about opposite the latter. The antennae are brown, strongly tinged with yellow on the two basal segments. The second segment has two black dorsal bristles. The arista has five or six dorsal rays and three ventral rays in addition to the apical fork. *Thorax:* Predominantly brown, tinged with yellow in the ground color of the pleura, and with the sternopleura and hypopleura largely yellow, tinged with brown only on the upper portions. The anterior dorsocentral bristle is situated about halfway between the first and second supraalars. Six rows of acrostichal setae are present. Each humerus has two moderately strong bristles. The anterior sternopleural bristle is almost three-fifths as long as the posterior bristle. *Legs:* Entirely pale yellow. Posteroventral and posterodorsal bristles are well developed on the front femora. The front tibiae are almost equal in length to the femora, and the preapical dorsal bristle is strong, about equal in size to the apical bristle on the palpus, and extends distinctly beyond the apex of the tibia. The front basitarsus is about one-third as long as the tibia. Each tarsal segment has a dense ventral clump (brush) of short black bristles or stubby setae, as in figure 146a. *Wings:* Entirely

hyaline. The third costal section is 3.75 times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.85 times longer than the penultimate section. *Abdomen:* Predominantly yellow, tinged with brown at the bases of the terga. The anal plates are nearly two times higher than long. The ninth tergum is very narrow, and at its widest point it is scarcely over half as long as the anal plate; the segment is shaped as in figure 146b. The claspers are plainly visible from a direct lateral view.

Length: body, 1.80 mm.; wings, 2.15 mm.

FEMALE. Unknown.

Holotype male: Halemanu Swamp, Kauai, August, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila nasalis Grimshaw (fig. 146c–e).

Drosophila nasalis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :66.

Endemic. Molokai (type locality: "Molokai Mountains") and Maui. This species is found in the same environment as *D. crassifemur* Grimshaw, but apparently is much more restricted in its distribution.

Type in the British Museum (Natural History). I have studied the type and have designated homeotypes.

This species is closely related to *D. crassifemur* but is differentiated by having the front femur of the male less swollen, and completely black (not rufous) along the venter; by lacking the semimembranous apical lobe on the ninth tergum; and by having the other parts of the genitalia very differently developed as shown in figure 146d. The females are readily separated by the greatly swollen, yellow seventh sternum, and by the very broad, blunt, ovipositor plates (fig. 146e).

Fitting the description of *D. crassifemur* in most respects. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. Each palpus has two moderate-sized bristles at or near the apex. The front coxae are brown to black, faintly tinged with rufous. The front femora are entirely dark brown to black and are about 3.5 times longer than wide (fig. 146a). All tibiae are distinctly banded with brown. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.25 times longer than the fourth, and the last section of vein M_{1+2} is 1.45 times longer than the penultimate section. The male anal plates are almost as long as high and are densely long pilose on the anteroventral surfaces. The ninth tergum is rather broad medianly and strongly attenuated and densely black setose on the ventral margins. Accessory lobes are lacking on the tergum, and the claspers are only partially visible from lateral view (fig. 146d). The aedeagus terminates in a slender, curved point. The seventh sternum of the female is greatly swollen and yellow. The ovipositor plates are broad and blunt (fig. 146e).

Length: body, 3.5–4.4 mm.; wings, 4.0–5.0 mm.

It should be noted that the wing length character given by Grimshaw and repeated by Bryan (1938:37) is of no value; I see no differences in the comparative wing lengths of these species.

Drosophila nasuta Lamb (fig. 147a–c).

Drosophila nasuta Lamb, 1914, Trans. Linn. Soc. Lond. 2nd Ser. (Zool.) 16:346.

Drosophila albomicans Duda, 1924, Arch. f. Naturg. 90 A3:209.

Drosophila spinofemora Patterson and Wheeler, 1942, Univ. of Texas Publ. 4213:104. **New synonymy** based upon a study of the type of *nasuta* in the British Museum (Natural History).

Common on all of the main Hawaiian Islands, especially in the valleys where guava thickets occur.

Immigrant. Widespread over the Pacific and southeast Asia and western United States. Probably it has a much wider distribution over the world than is now recognized. The species was described from the Seychelles Islands. Specimens are also in the British Museum from Samoa, Fiji, and Malaya. *D. spinofemora* was described from specimens from Honolulu and has subsequently been recorded from western America.

This species fits in the complex which is characterized by having an infuscation of brown only on the m crossvein. It is differentiated from all other known species in this complex by having a row of short anteroventral spines on the front femur (fig. 147a). In the latter regard *nasuta* fits very close to *D. immigrans* Sturtevant. It differs from the latter by lacking distinct brown bands or markings on the abdomen; by the third costal section being shorter, about 3.5 times longer than the fourth in the female and about 3.0 times longer than the fourth in the male; rather than being 4.5 to 5.0 times longer than the fourth in both sexes; by lacking infuscations at the tips of veins R_{2+3}, R_{4+5}, and M_{1+2}; by lacking ciliation on the front tarsi of the male; and by the basitarsus being one-half as long as the tibia, rather than about one-third as long. Some specimens of *nasuta* have the wings entirely hyaline, with no evident mark along the m crossvein, and so in my key I have also treated them in the group which have the wings entirely clear.

A moderately small, predominantly pale species. The front is entirely yellow; the orbits are silvery gray pollinose. The lower reclinate bristles are one-half to three-fifths as long as the proclinates and are situated about two-fifths the distance between the proclinate and the upper reclinates. The face and mouthparts are entirely yellow; the former is gibbose, the carina is rather broad and evenly rounded. Each palpus has one apical and one preapical bristle. Two moderately strong bristles are present at the upper portion of each vibrissal row. Each arista has six or seven dorsal and three ventral rays in addition to the apical fork. The thorax and legs are entirely yellow. Eight rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about opposite the second pair of supraalars. The anterior sternopleural bristle is about two-thirds

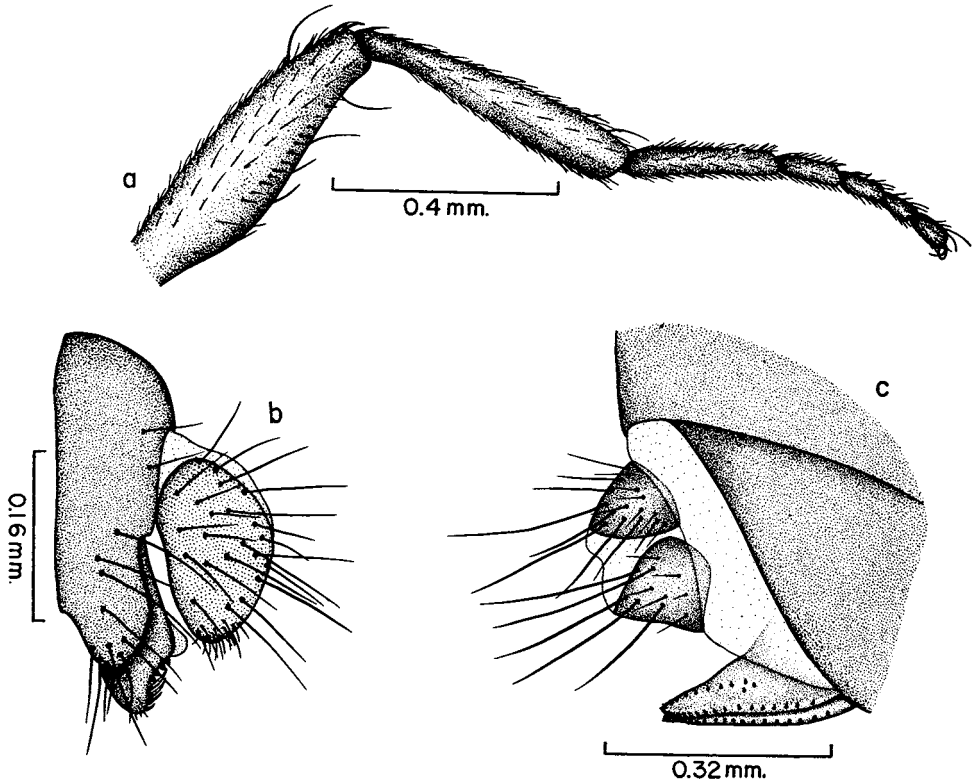


Figure 147—*Drosophila nasuta* Lamb: **a,** front leg, inside view; **b,** male genitalia; **c,** female genitalia.

as long as the posterior bristle. The front legs of the male are as in figure 147a; the tarsi lack conspicuous ciliation although some erect, short pile is present on the dorsal surface. No distinct tarsal brush is present, and the front basitarsus is about one-half as long as the tibia. The wings are predominantly subhyaline; typically a faint tinge of brown is present over the m crossvein. The third costal section varies from 3.0 to 3.5 times longer than the fourth, and the costal fringe ends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.25 to 1.40 times longer than the penultimate section. The abdomen is pale yellow, faintly tinged with brown on the apices of the segments, but with no distinct brown markings. The male genitalia have been described and figured by Hsu (1949:111, Pl. 14, Fig. 8). The ninth tergum is rather broad, is not narrowed on the dorsal portion, and has eight to ten bristles over the lower portion. The claspers are plainly visible from a lateral view with about seven stout teeth along the apical margin and three or four thick bristles or spines on the inner surface; a lobate process is also developed at the upper apical portion of each clasper (fig. 147b). The anal plates are oblong; each has a clump of short, fine setae at lower apex. The ovipositor plates are

moderately long and pointed, and each has a row of short, stout spines along the ventral margin and another row near the dorsal margin (fig. 147c).

Length: body, 2.5–3.1 mm.; wings, 2.4–2.7 mm.

Some notes on the internal structures, the characters of the eggs, puparia, and chromosomes are given in the original description of *spinofemora*. An analysis and figure of the metaphase chromosome complement is given by Wharton (1943:289 and 317).

Drosophila neglecta new species (fig. 148a).

This species is very closely related to *hexachaetae* n. sp. but is differentiated by having the thorax predominantly brownish yellow and the front tibia of the male with one anterodorsal cilia at the basal one-fifth of the segment and two erect cilia at about the apical one-fourth of the segment (fig. 148a).

MALE. Fitting the description of *D. hexachaetae* in most respects. Differing in the following details: The arista has six dorsal and three ventral rays in addition to the apical fork; the mentum, sides of clypeus, and apices of palpi are tinged with brown; the mesonotum is yellow-brown, and the pleura are tinged lightly with brown; the ciliation of the front tibia and tarsi is as in figure 148a. The abdomen is entirely brown, with only the extreme anterior corners of the segments yellow. The wing markings and venation appear to be identical with those of *hexachaetae*. The genitalia have not been relaxed for study.

Length: body, 3.00 mm.; wings, 3.25 mm.

FEMALE. A specimen on hand fits the description of the male in all details except for sexual characters. The ovipositor plates are moderately long and slender like those of *hexachaetae*.

Length: body, 3.15 mm.; wings, 3.40 mm.

Holotype male: Kaala Mountains, Oahu, no date given (O. H. Swezey). Allotype female: Tantalus, Oahu, 1906, no month or collector given.

Type in the Hawaiian Sugar Planters' Association. Allotype in the B. P. Bishop Museum.

Drosophila neutralis new species (fig. 148b–c).

This species is very close to *D. septuosa* n. sp. and may actually be a variation, although from the specimens at hand the two appear very distinct. *D. neutralis* is differentiated by lacking conspicuous, erect setae on the front tibiae and by having the femora all yellow. Also, the second tarsal segment of *neutralis* appears to be differently shaped, is more straight-sided, and not so broad as in *septuosa*. Also, the leg segments are distinctly more slender in *septuosa*; the front tibia measures from 0.76 to 1.06 mm., and the basal portion of the basitarsus is slightly swollen and possesses a row of short, erect hairs along the dorsal surface (fig. 148b). In *neutralis* the segments are shorter and thicker; the front tibiae measure from 0.59 to 0.76 mm.; the basitarsi are straight-sided, and have black, erect hairs above.

MALE. *Head:* Predominantly brown; black on the upper eye orbits, the verti-

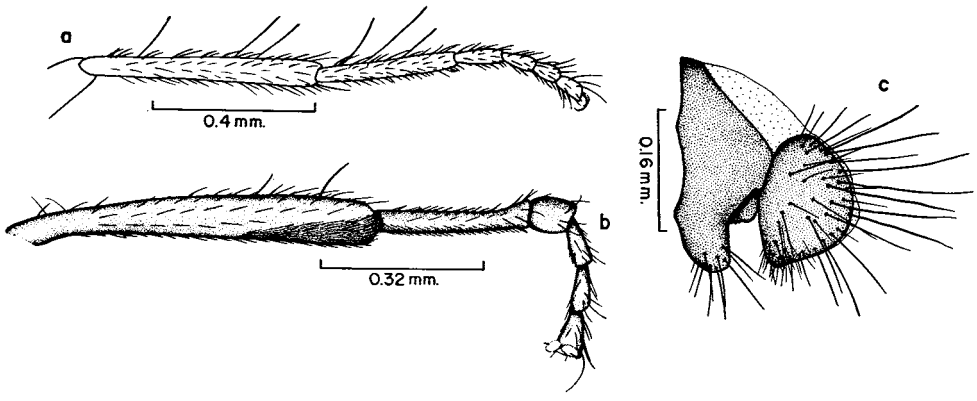


Figure 148—*Drosophila neglecta* n. sp.: **a**, front tibia and tarsus. *D. neutralis* n. sp.: **b**, front tibia and tarsus; **c**. male genitalia.

cal triangle, and the upper portion of the occiput, and yellow only along the genae, the front eye margins, and on the extreme upper portion of the face. The upper median portion of the face is brown, tinged with black, and the lower half is black. The clypeus is black. The palpi are yellow, tinged faintly with brown especially at the apices. The palpus has no bristles but has numerous black setae around the apex. The mouthparts are yellow, tinged with brown on the mentum. The labella are not ornate. The median portion of the face is distinctly convex. The uppermost bristle of the vibrissal row is well developed, about equal in size to the proclinate bristle of the front. The third and fourth bristles are also moderately developed, almost equal in size to the anterior reclinate bristle. The front is predominantly dark rust-brown. The anterior reclinate bristle is approximately four-fifths as long as the proclinate and is situated opposite the latter. The first antennal segment is yellow. The remainder of the antenna is dark brown. The arista has six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely dark brown, tinged with black, and covered with gray-brown pollen. The anterior dorsocentral bristles are situated about halfway between the first and second pair of supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is approximately two-thirds as long as the posterior bristle. *Legs:* Entirely yellow except for the yellow-brown front coxae and apical segments of the tarsi. The front tibiae lack conspicuous ciliation or erect setae; the preapical dorsal bristle is situated about its own length from the apex of the tibia. The front basitarsus is straight-sided, approximately one-half as long as the tibia. The second tarsal segment is rectangular in shape, scarcely broader than the apex of the basitarsus, and about two-thirds to three-fourths as long as the third segment (fig. 148b). *Wings:* Subhyaline, faintly infuscated with brown but with no brown markings. The third costal section is five times longer than the fourth, and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}.

The last section of vein M_{1+2} is 1.33 times longer than the penultimate section. *Abdomen:* Predominantly shining dark brown to black covered with gray-brown pollen; yellow over the first segment and the bases and sides of the second tergum. The venter is entirely black. The male genitalia are similar to those of other members of this complex. The anal plates are slightly pointed ventrally. The ninth tergum is narrowed over the dorsal portion and convex on the postero-median margin. The claspers are visible from a lateral view (fig. 148c).

Length: body, 2.8–3.2 mm.; wings, 3.2–3.7 mm.

FEMALE. A large series of female specimens have been taken in the same environment as the males, but they cannot be associated with certainty since at present I see no characters for separating the females from closely related species.

Holotype male and 20 male paratypes: from Kilauea, Hawaii, August, 1958, collected in light trap (J. W. Beardsley); one of these dated August, 1949, collected on cucumber (D. E. Hardy). Also about forty additional paratypes: from the following localities on Hawaii—Upper Olaa Forest, August, 1952, July, 1953, and July, 1956 (D. E. Hardy); Pauahi, 4,300 feet, July, 1952 (D. E. Hardy); 29 mi. Olaa, Hawaii, August, 1925 (W. M. Gifford); Napau Crater, Kilauea, July, 1953 (D. E. Hardy); Keanokolu, 5,200 feet, October, 1952 (D. E. Hardy); Kahuku Ranch, 3,000 feet, July, 1953 (D. E. Hardy). One male specimen on hand from Manawainui Valley, Molokai, July, 1952 (D. E. Hardy) appears to be this species.

Type and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila nigella new species (fig. 149a–b).

This species somewhat resembles members of the *polita* complex because of its shining black thorax and the yellow apex on the scutellum. It differs from members of this complex, however, by lacking the sclerotized rim on the apex of the labellum, by having the femora polished black and the posterior surface of the front femur thickly bristled, and in other details.

MALE. *Head:* The upper two-thirds of the front is black; the lower portion is yellow to rufous, faintly tinged with brown. Measured from the median ocellus to the front middle margin, the front is almost as long as wide. The occiput is black, except for the yellow lower margins. Each gena is dark brown to black along the inner edge and down the vibrissal row and yellow between the vibrissae and the eye margin; the latter space is very narrow, less than the width of two rows of eye facets. The face is entirely black, tinged with brown in ground color except for a narrow strip down each eye orbit. The clypeus is entirely black; the palpi are dark brown to black on their apical halves. Each palpus has a moderately strong apical bristle plus numerous black setae around the apical portion. The mouthparts are entirely yellow. The labellum is not rimmed. The anterior reclinate bristle is about two-thirds to three-fourths as long as the proclinate and is situated slightly above the latter. The first two antennal segments are yellow,

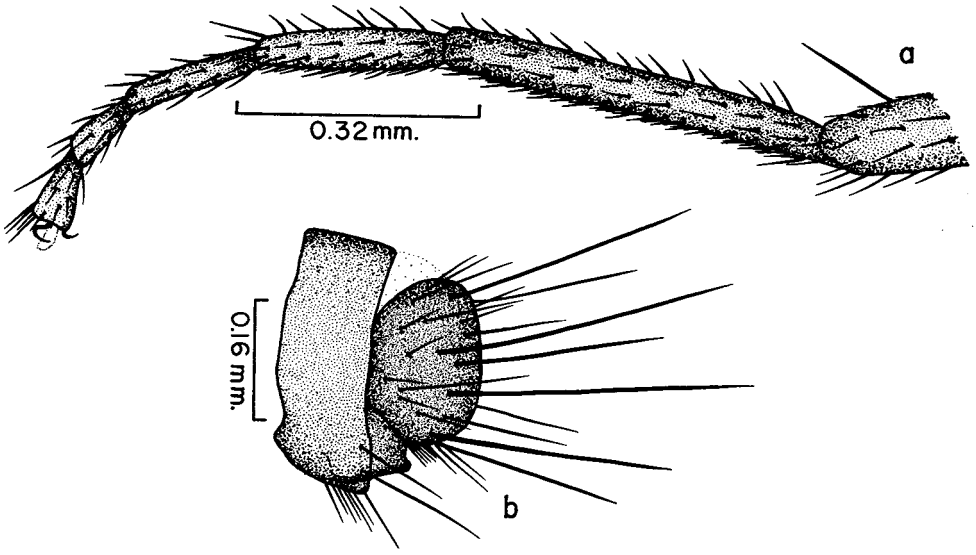


Figure 149—*Drosophila nigella* n. sp.: **a**, front tarsus; **b**, male genitalia.

tinged with brown to black on the dorsal surfaces. The third segment is predominantly dark brown to black. The arista has five dorsal and two ventral rays in addition to the apical fork. The oral vibrissae are in two rows at the upper portion; two to three strong bristles are situated on the inner edge and a row of rather fine black hairs extends along the outer edge. *Thorax:* Entirely polished black, lightly covered with gray-brown pollen, tinged faintly with rufous in the ground color of the pleura, and with a conspicuous yellow apex on the scutellum. The anterior dorsocentral bristles are situated about opposite the first (anterior) pair of supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* The coxae, trochanter, tibiae, and tarsi are entirely yellow except for a discoloration of brown to black on the dorsal surface of each front coxa and a faint discoloration on the apices of the tarsi. The femora are polished black except for the narrow yellow bases and apices of the segments. The tibiae and tarsi are not ornate; the front basitarsus is about two-thirds as long as the tibia and approximately two times longer than the second tarsal segment (fig. 149a). *Wings:* Entirely hyaline. The third costal section is four times longer than the fifth, and the costal fringe extends halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.43 times longer than the penultimate section. *Abdomen:* Polished dark reddish brown, tinged with yellow at the apex, and faintly covered with gray-brown pollen. The anal plates are just slightly higher than long and are not pointed ventrally. The ninth tergum is rather broad, not narrowed across the dorsum, and almost straight-sided (fig. 149b).

Length: body, 3.60 mm.; wings, 3.85 mm.

FEMALE. Fitting the description of the male in most respects. The specimens on hand have three ventral rays on the arista and four rather strong bristles are present at the upper edge of each vibrissal row; the secondary row of fine setae is more poorly developed than in the male. The front basitarsus is less slender, about one-half as long as the tibia. The third costal section is five times longer than the fourth. The ovipositor blades are short, triangular, and extend approximately to the apices of the anal plates.

Length: body and wings, 4.0 mm.

Holotype male, allotype female, and one paratype female: from Puu Kukui, Maui, 4,500 feet, April, 1954 (M. Tamashiro). Also 11 paratypes (3 males and 8 females): Waikamoi, Maui, July, 1956 (D. E. Hardy); Kula Pipeline, Maui, 4,500 feet, June, 1927, on ferns (O. H. Swezey), and March–April, 1932 (O. Bryant); and Ukulele, Maui, July, 1919, ex *Crabro* nest (Timberlake).

Type and allotype in the B. P. Bishop Museum. The paratype is in the collections of the United States National Museum, the British Museum (Natural History), the Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila nigra Grimshaw (fig. 150a–h).

Drosophila nigra Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :62.

Endemic. Maui (type locality: Haleakala, 5,000 feet). Previously known only from the type female, and this is in rather poor condition.

Type in the British Museum (Natural History). I have studied the type and a series of specimens from Haleakala and Kula Pipeline, Maui.

This is a very distinctive species, related to but quite different from *iki* Bryan. It is readily differentiated by its large size, by the dense clump of long curved hairs and bristles which make up the oral vibrissae (fig. 150c), and by the development of the front legs of the male as shown in figure 150d–e.

The face is entirely black, somewhat concave, slightly raised in the median portion. The palpi of the male are yellow on their extreme bases. Each possesses two moderately strong bristles plus numerous long brown hairs around the apical portion. The upper two-thirds of the front is dark reddish brown to black, shining in ground color, very lightly gray pollinose; the lower one-third is rufous. The lower reclinate bristles are about two-thirds as long as the proclinates and are situated distinctly above the latter. The arista has six dorsal and two or three ventral rays in addition to the apical fork (fig. 150a–b). The oral vibrissae are as in figure 150c; the hairs and bristles are much longer and more densely placed in the male than in the female. The thorax is entirely dark brown to black, tinged with rufous in the ground color of the pleura. Mesonotum and scutellum lightly gray pollinose, just slightly obscuring the polished ground color. The halteres are rufous with brown discolorations on the knobs. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The coxae and femora are dark reddish brown to black; the femora are more consistently black in the females and are tinged with rufous in the males. The entire posteroventral

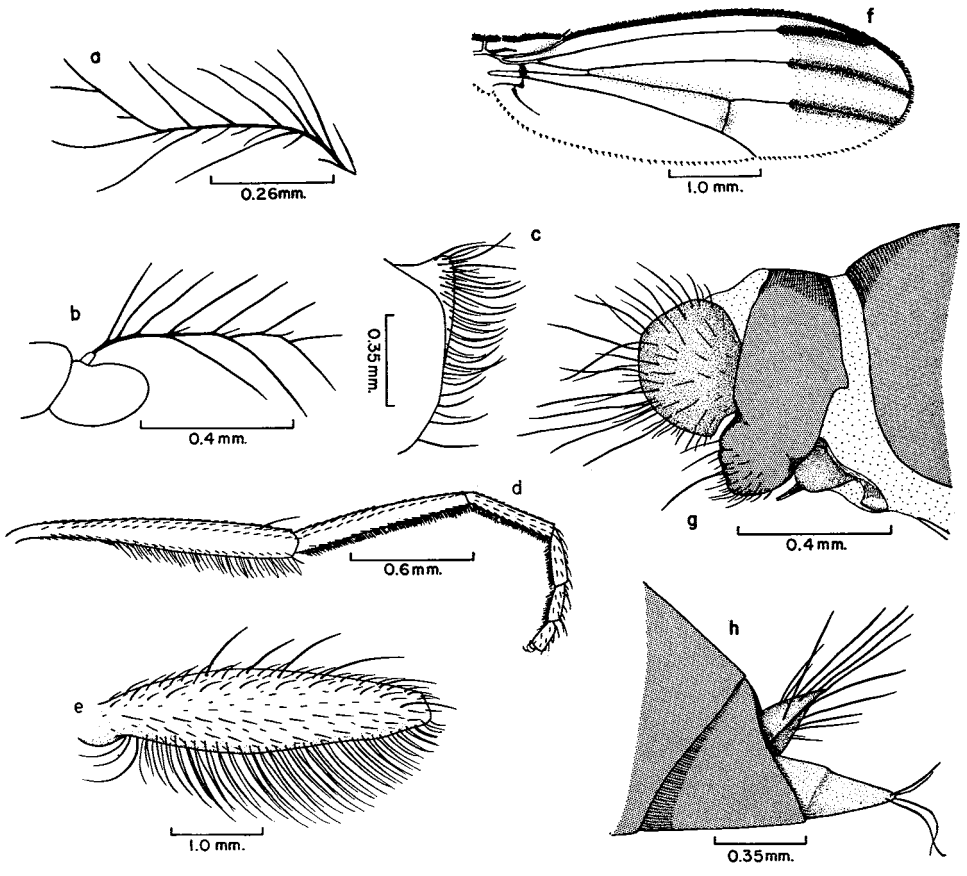


Figure 150—*Drosophila nigra* Grimshaw: **a,** arista, drawn from type female; **b,** antenna; **c,** lower edge of head showing vibrissae; **d,** front tibia and tarsus; **e,** front femur; **f,** wing; **g,** male genitalia; **h,** female genitalia.

surface of the front femur of the male is densely covered with long bristles and hairs arranged in two irregular rows (fig. 150e). The trochanters, tibiae, and tarsi are yellow. The front tibia of the male has moderately long, erect, ventral cilia over the apical three-fifths of the segment, and the front tarsus of the male has a dense brush of short erect hairs down the ventral surface (fig. 150d). The front basitarsus of the male is about two-thirds as long as the tibia, and the second tarsal segment is approximately half as long as the basitarsus. The wings of the male are predominantly subhyaline, with a brown mark along the apices of each of veins R_{2+3}, R_{4+5}, and M_{1+2}; also a faint brown infuscation occurs over the m crossvein, and a faint indication of this is present along the basal section of vein M_{1+2} (fig. 150f). The third section of the costa is about four times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just

slightly longer than the penultimate section. The female wings are slightly yellowish with distinct brown markings at the apices of the veins as in the male and a paler brown marking over the m crossvein and along the basal section of vein M_{1+2}. The abdomen is polished dark reddish brown to black in ground color, very faintly dusted with gray pollen. The male genitalia are as in figure 150g. The ninth tergum is rather broad and the ventral aspects are rounded and completely cover the claspers from lateral view. Each ventral margin of the ninth tergum has one strong bristle plus numerous short hairs (fig. 150g). The ovipositor plates are rather narrow and sharp-pointed, are almost as long as the seventh abdominal segment, and bear two pairs of moderately long bristles at the apices (fig. 150h). The bristles on the anal plate are very elongate.

Length: body and wings, 6.0–6.4 mm.

Drosophila nigripalpus new species (fig. 151a–c).

This species fits in the complex which is characterized by having the apical portion of the wing brown. It is differentiated from related species by having the palpi and third antennal segment black, the thorax vittate on the dorsum and on the sides, the head nearly quadrate as shown in figure 151a, and the costal fringe ending slightly before one-third the distance between the apices of veins R_{2+3} and R_{4+5}.

MALE. *Head:* Just slightly higher than long. The anterior and ventral margins are straight or nearly so. The front, measured from the median ocellus to the anterior margin, is about two times wider than long and is entirely yellow. The orbits are yellow, as is the major portion of the vertex. The ocellar triangle is brown to black in ground color. The upper portion of the occiput is pale brown. The lower portion is yellow. The genae and face are yellow; the latter is slightly raised in the median portion. The genae are rather broad, almost one-fifth as wide as the eye height. The anterior reclinate bristle is almost as long as the proclinate and is situated opposite the latter. The palpi are black except for the extreme bases which are yellow; each palpus has a small apical bristle. The mouthparts are yellow; I see no evidence of ornamentation on the labella. One strong bristle is present at the upper edge of each vibrissal row. The first two antennal segments are yellow, tinged faintly with brown dorsally; the third segment is black. The arista has five dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow to rufous with the hind portion of the mesonotum largely brown and with five rather faint brown vittae extending the entire length of the segment. A dark brown to black spot is present behind each humerus; this extends as a brown marking along the side of the mesonotum. The disc of the scutellum is reddish brown; the sides and the ventral portion are yellow. A broad, brown band extends longitudinally across each pleuron at a level with the upper two-thirds of the mesopleuron, and a faint brown streak extends across the upper portion of each sternopleuron. The anterior dorsocentral bristles are situated almost in line with the first (anterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed

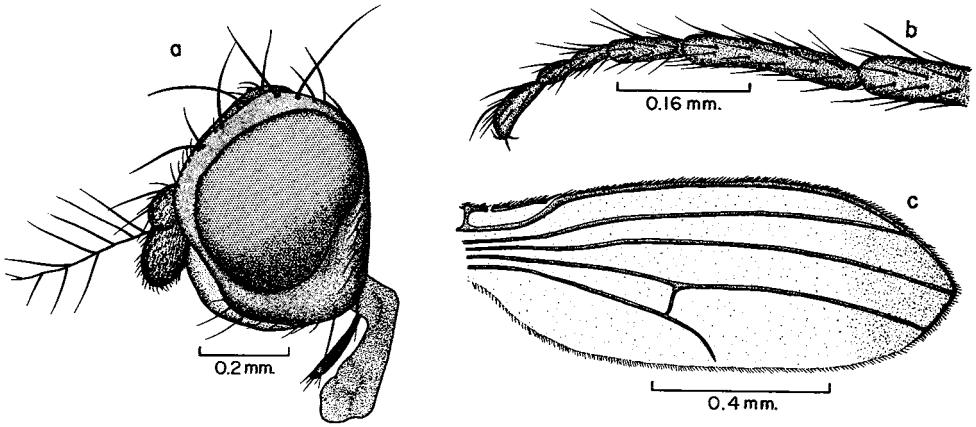


Figure 151—*Drosophila nigripalpus* n. sp.: **a,** head; **b,** front tarsus; **c,** wing.

bristles. The anterior sternopleural bristle is approximately one-half as long as the posterior bristle. The halteres are yellow. *Legs:* Entirely yellow, lacking ornamentation. The front basitarsus is about half as long as the tibia and approximately two times longer than the second tarsal segment (fig. 151b). *Wings:* Hyaline except for a pale brown marking covering the entire apex (fig. 151c). The third costal section is 4.5 times longer than the fourth, and the costal fringe extends almost one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section. *Abdomen:* Dark brown with a yellow spot on the anterior lateral margins on each of the terga. The genitalia have not been studied.

Length: body, 2.2 mm.; wings, 2.5 mm.

FEMALE. Unknown.

Holotype male: Mt. Kaala, Oahu, April, 1949 (G. B. Mainland).

Type in the B. P. Bishop Museum.

Drosophila nigritarsus new species (fig. 152a–c).

This species is closely related to *D. brunneifrons* n. sp. from Maui and may possibly be just a subspecies or possibly a variation. The specimens on hand differ from those of *brunneifrons* by having the thorax and the abdomen entirely shining black, the femora and tibiae all yellow, and the last three tarsal segments black.

MALE. *Head:* Almost entirely dark brown to black, tinged with yellow on the upper portion of the face, and with the mouthparts predominantly yellow to rufous. The front is velvety brown, the orbits and ocellar triangle are subshining black. The face is almost completely flat, just slightly raised in the upper median portion. Three or four strong bristles are present in the upper portion of each vibrissal row; the uppermost bristle is almost equal in size to the postocellar bristles. The palpi are brown and each has a moderately strong apical bristle.

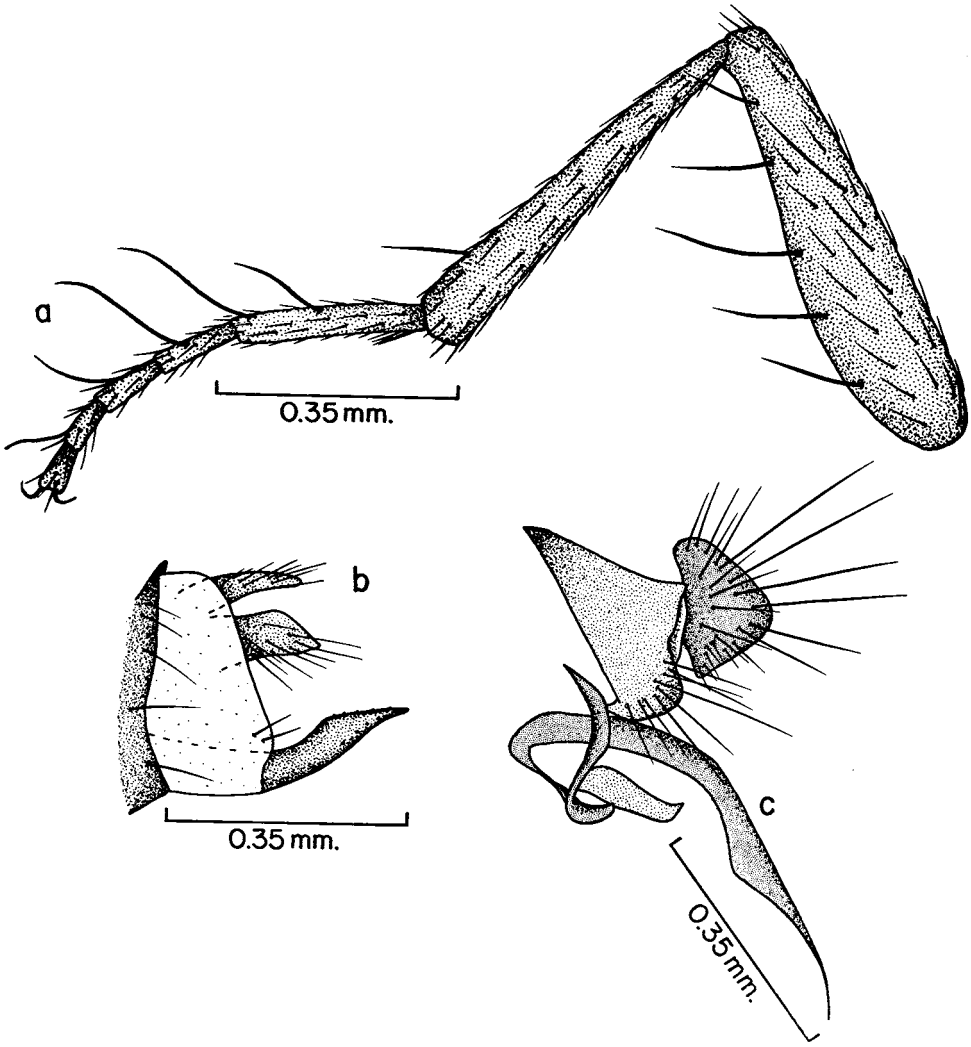


Figure 152—*Drosophila nigritarsus* n. sp.: **a**, front leg; **b**, female genitalia; **c**, male genitalia.

The labella are not ornate. The anterior reclinate bristle is about four-fifths as long as the proclinate and is situated approximately opposite the latter. The antennae are entirely dark brown to black; the second segment has four stout bristles on the dorsal surface. The arista has six or seven dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely shiny black covered with gray-brown pollen. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. About eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The halteres are pale yellow.

Legs: Predominantly yellow, faintly tinged with brown on the coxae, and with the last three tarsal segments of each leg black. The front basitarsus is about half as long as the tibia and has two or three black dorsal cilia on the apical two-fifths of the segment. One black, dorsal, preapical bristle is present on each of tarsal segments two, three, and four (fig. 152a). *Wings:* Pale brown fumose. The third costal section is 5.0–5.5 times longer than the fourth, and the costal fringe extends about halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Entirely black, covered with gray-brown pollen. The anal plates are about two times higher than long and are subacutely pointed ventrally. The ninth tergum is narrowed to a thin line over the dorsal portion, the posterior median portion is concave, and the ventral margin is lobate on each side as in figure 152c. A pair of large, blunt, accessory lobes extends from the ninth sternum; these are usually plainly visible *in situ*.

Length: body, 3.5 mm.; wings, 3.7 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The ovipositor blades are slender and sharp-pointed as in figure 152b.

Length: body, 3.4 mm.; wings, 3.6 mm.

Holotype male and allotype female: from Upper Olaa Forest, Hawaii, July, 1953 (D. E. Hardy). Nine paratypes (eight males and one female): from the following localities in the Kilauea section of Hawaii—same as type, August, 1952, and August, 1958 (D. E. Hardy); Kulani, 5,200 feet, July, 1952 (D. E. Hardy); Kilauea, December, 1950 (N. L. H. Krauss); and August, 1958, in light trap (J. W. Beardsley). Three paratypes (two males and one female) are also on hand from Puu Kolekole, Molokai, July, 1952 (D. E. Hardy); and Pepeopae, Molokai, 4,000 feet, July, 1956 (D. E. Hardy).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila nigrocirrus new species (fig. 153a–d).

This species is rather closely related to *D. chaetopeza* n. sp. but is readily differentiated by having the m crossvein hyaline, by the more elongate front basitarsus and by having the labellum narrowed at the apex and with a clump of black teeth at the margin. Also, the body is reddish brown rather than dark brown to black. This species is also closely related to *D. mitchelli* n. sp. and is differentiated by the development of the front legs (fig. 153a) and the labellum of the male. The front tibiae lack the erect hairs over the posterior and posterodorsal surfaces, which are characteristics of *mitchelli*, and the long cilia on the front tarsi are situated on the dorsal surface, rather than being arranged in three rows over the dorsal portion; also the labellum is narrowed at apex and differently developed (fig. 153b). The male genitalia also differ as shown in figures 153d and 141d.

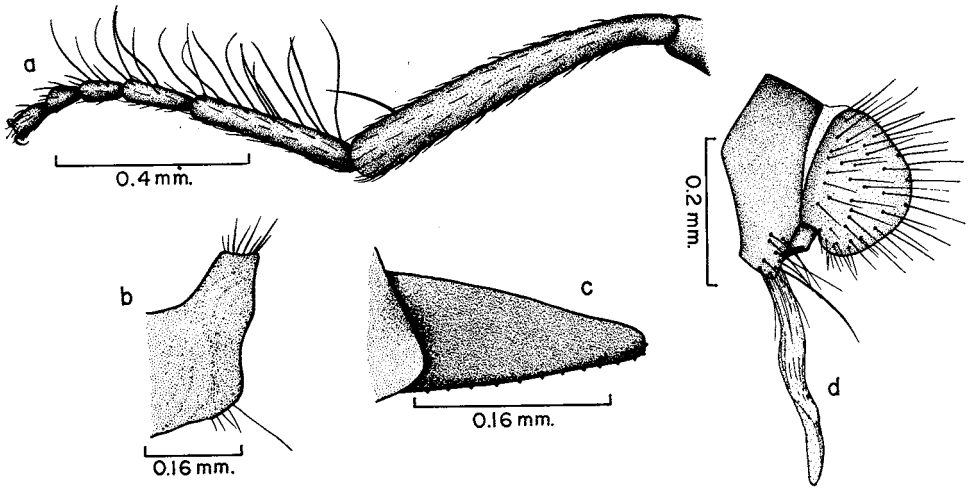


Figure 153—*Drosophia nigrocirrus* n. sp.: **a,** front tibia and tarsus; **b,** labellum; **c,** female ovipositor blade; **d,** male genitalia.

MALE. *Head:* Front about one-third wider than long, yellow on the lower third, brown above, gray-brown pollinose over the entire front. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The vertex is rather dark brown. The upper occiput is brown, tinged with yellow; the remainder of the occiput and the genae are yellow. The face is yellow-white, tinged with brown on the lower margin; the median portion is very slightly raised. The mouthparts and palpi are yellow; the labellum is narrowed at the apical portion and is fringed with black spines (fig. 153b). The palpi are broad, rather thickly black setose, with a small black apical bristle. Three or four rather strong black bristles are present at the upper portion of each vibrissal row. The antennae are yellow, tinged with brown on the third segment. The second segment has two strong dorsal bristles. Each arista has six dorsal and three ventral rays in addition to the apical fork; the anterior surface is sparsely haired. *Thorax:* Rather dark subopaque brown on the dorsum and rufous, tinged with brown on the sides and on the metanotum. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Approximately ten rows of acrostichal setae are present. The mesonotum is gray-brown pollinose. The scutellum is brown on the disc, yellow on the margins. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow, lacking ornamentation except on the front tarsi. The front tarsi have long dorsal ciliation over the first three segments (fig. 153a). The basitarsus is about one-half as long as the tibia. *Wings:* Rather broad, about 2.4 times longer than wide. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. A brown fumosity extends over the anteroapical portion of the wing and fills the apical one-fifth of cell R_1, the apical portion of cell R_2, and the upper apical portion of cell R_5; the remainder of

the wing is subhyaline. The third costal section is about six times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely shining brown, tinged lightly with rufous in the ground color. The ninth tergum is broad dorsally, the ventral margins are attenuated, and the upper apical margin is rather densely setose (fig. 153d).

Length: body, 3.50–3.75 mm.; wings, 4.00–4.25 mm.

FEMALE. The female has not been definitely associated with the male; however, a specimen on hand, taken in the same habitat with the type, is probably correctly placed. It fits the description of the male except for the secondary sexual characters and for being slightly paler in color. The metanotum is entirely yellow, faintly tinged with brown. The ovipositor plates are sharp-pointed, triangular in shape, with short teeth around the margins (fig. 153c).

Length: body, 3.8 mm.; wings, 4.0 mm.

Holotype male and allotype female: Kaiholena Ridge, Hawaii, August, 1952, 2,500 feet, in treefern jungle (D. E. Hardy). One male paratype: near Pawaina, Kona, Hawaii, 3,000 feet, July, 1953 (D. E. Hardy).

The type and allotype are in the B. P. Bishop Museum; the paratype is in the University of Hawaii collection.

Drosophila nigropolita new species (fig. 154a–c).

This species fits in the *polita* complex but is readily differentiated by having the scutellum all black, the costal fringe short, and by other details as brought out in the description below.

MALE. *Head:* The upper half of the front is almost entirely dark brown to black, the lower half is bright yellow. The upper eye orbits, vertex, the ocellar triangle, and the upper portion of the occiput are black covered with gray-brown pollen. The median portion of the occiput is brown, tinged with red, and the extreme lower portion is yellow. The genae and the face are entirely yellow. The former are very narrow, scarcely equal in width to two rows of eye facets. The face is just slightly raised in the upper median portion. The antennae are bright yellow; each arista has four to five dorsal and two ventral rays in addition to the apical fork (fig. 154b). One strong bristle is present at the upper edge of each vibrissal row; the other vibrissae are represented by pale, brown hairs. The palpi and mouthparts are yellow except for the black rim at the apex of each labellum. One strong apical bristle is present on each palpus; this is at least two-thirds as long as the segment. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. *Thorax:* Entirely shining black covered with gray-brown pollen. The anterior dorsocentrals are situated opposite the first (anterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two moderately large bristles. The anterior sternopleural bristle is tiny, approximately one-fifth as long as the posterior bristle. The pleura are entirely brown. The halteres are yellow, tinged faintly with brown on the knobs. *Legs:* Entirely yellow. Posterodorsal and posteroventral bristles are well developed on the front femora. A long, slender posterior

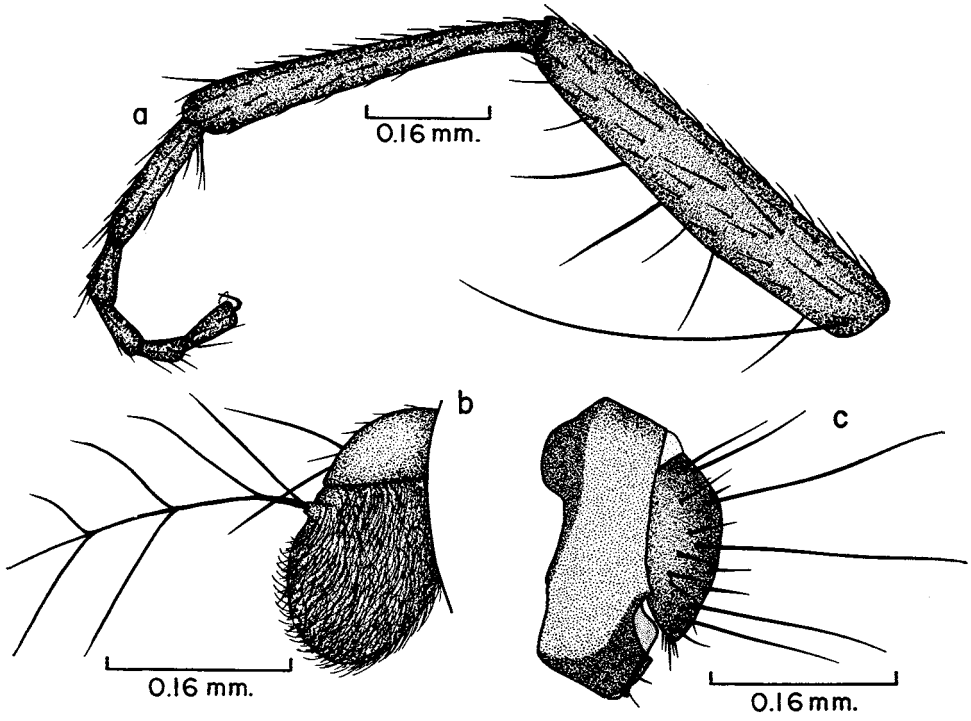


Figure 154—*Drosophila nigropolita* n. sp.: **a,** front leg; **b,** antenna; **c,** male genitalia.

bristle is present at the base of each femur; this extends almost the full length of the segment. The front tibiae and tarsi have no long cilia. The front basitarsus is about one-half as long as the tibia (fig. 154a). *Wings:* Entirely hyaline with but a faint infuscation extending over the membrane. The third costal section is four times longer than the fifth, and the costal fringe extends approximately one-fourth the distance between the veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black covered with gray-brown pollen. The anal plates are two times higher than long and are slightly pointed ventrally. The ninth tergum is broad across the dorsal portion and truncate on the ventral apices (fig. 154c).

Length: body, 2.2–2.5 mm.; wings, 2.5–2.8 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The ovipositor blades are very short, subacutely pointed, and do not extend as far as the apices of the anal plates.

Length: body, 2.50 mm.; wings, 2.85 mm.

Holotype male and allotype female: from Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy and M. Tamashiro). Eleven paratypes (all males): eight same locality as type, July, 1952, and July, 1953 (D. E. Hardy and M. Tamashiro); two from Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy);

and one from Puu Okaeha, Molokai, 5,100 feet, July, 1953 (D. E. Hardy).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila ochracea Grimshaw (fig. 155a–d).

Drosophila ochracea Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :61.

Endemic. Hawaii (type locality: Olaa).

Type in the British Museum (Natural History). I have studied the type, a series of paratypes and topotypes, and also specimens from other localities on Hawaii. Described from female specimens; this is the first description of the male.

This species belongs in the complex which has conspicuous brown spots at the apices of veins R_{2+3}, R_{4+5}, M_{1+2}, the r–m and m crossveins, in the middle of vein R_{2+3}, and at the apex of the second costal cell (fig. 155b). It differs from related species by having the thorax entirely yellow to rufous without brown marks and also by the ciliation of the front legs of the male (fig. 155a).

Body and legs entirely yellow to rufous except for brown markings on the abdomen. The front is about as wide as long. The lower reclinate bristle is situated distinctly above the proclinate and is about three-fifths as long as the latter. The antennae are rufous, tinged with brown. Each arista has seven or

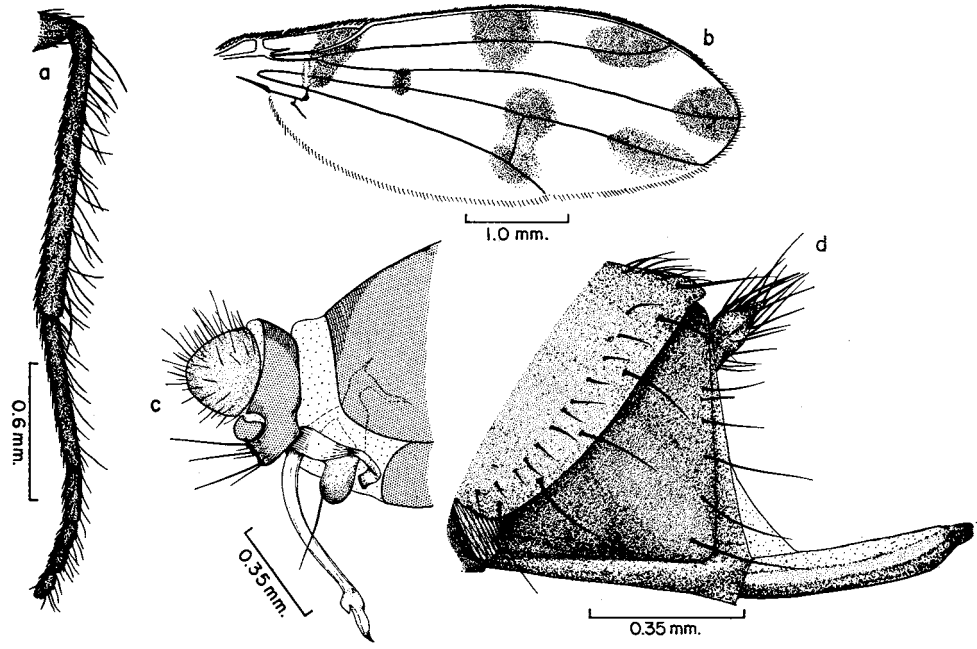


Figure 155—*Drosophila ochracea* Grimshaw: **a,** front tibia and tarsus; **b,** wing; **c,** male genitalia; **d,** female genitalia.

eight dorsal rays and three or four ventral rays in addition to the apical fork. Each front femur has 11 or 12 moderately strong posteroventral bristles and about 8 posterodorsal bristles. The front tibiae and tarsi of the male have an abundance of fine hairs down the dorsal surface (fig. 155a). The front basitarsus is just slightly over half the length of the tibia. The third costal section is about three times longer than the fourth, and the costal fringe extends about two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The wing markings are as in figure 155b. The r–m crossvein is situated just slightly beyond the basal third of cell 1st M_2, and the last section of vein M_{1+2} is about one-third longer than the penultimate section. The dorsal surface of the abdomen is brown except for the large yellow spots on the posterior corners of the segments. The male genitalia are as in figure 155c. The parameres are heavily sclerotized, broad, blunt and somewhat capitate at apices, and each bears an apical bristle. The female ovipositor is rather long and slender, about equal in length to the ventral margin of the seventh abdominal segment (fig. 155d).

Length: body, 4.8–5.2 mm.; wings, 5.0–5.5 mm.

Drosophila olaae Grimshaw (fig. 156a–d).

Drosophila olaae Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :66.

Endemic. Hawaii (type locality: Olaa), Maui, and Molokai. The latter two are new island records; specimens which compared favorably with the type are on hand from Makamakaole Valley, Maui, June, 1953 (D. E. Hardy), and Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy).

Type in the British Museum (Natural History). I have examined the type and have designated homeotypes from the Upper Olaa Forest, Hawaii, August, 1952 (D. E. Hardy).

This species typically fits in the group which lacks dark coloration at the apex of the wing and is differentiated from related species by the brown thorax and abdomen and by the ornamentation of the front tarsi and the labella of the male (figs. 156a and 156c). Some specimens have faint indications of brown markings at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2} and would key near *D. chaetopeza* n. sp. The two are readily differentiated by the differences in the front tarsi and labella and in the wing venation (fig. 156a–c).

A predominantly dark-colored species. The front is about one-third wider than long, is brown, tinged with red, yellow along the front margin, and black on the orbits. The lower reclinate bristle is about equal in length to the proclinate but is much thinner; it is situated slightly above the proclinate bristle. The occiput is yellow, tinged with brown. The face is subshining black on the lower portion, yellow, tinged with brown above; the upper two-thirds of the face is gently convex in the median portion; the lower portion is flat. No strong bristles are present in the vibrissal rows. One moderately large apical bristle is present on each palpus. The palpi are yellow, tinged with brown at their apices. The mouthparts are yellow-brown. Each labellum has three strong, yellow-brown spines placed very close together at the middle of the apical margin (fig. 156a).

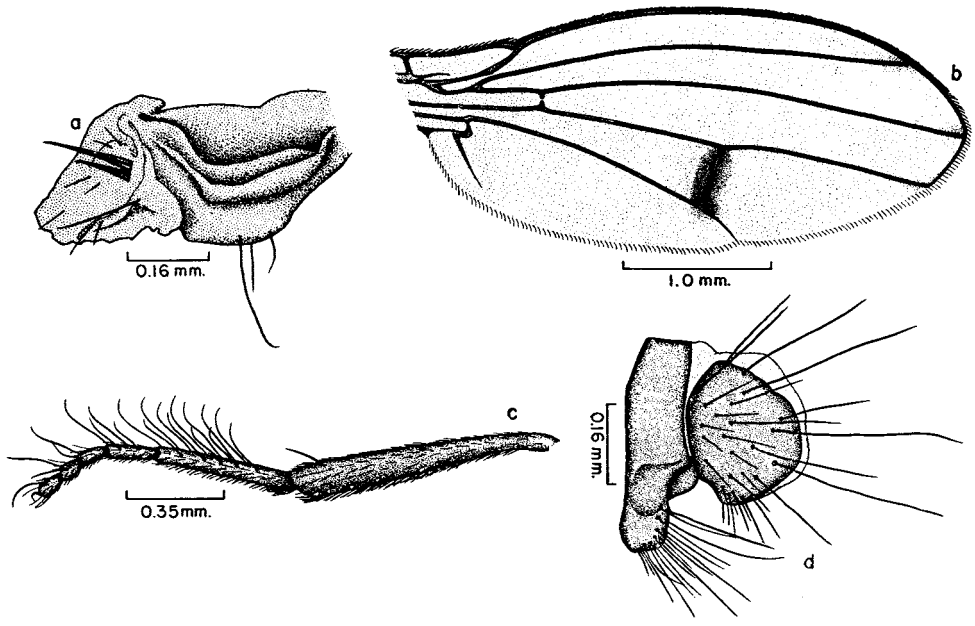


Figure 156—*Drosophila olaae* Grimshaw: **a,** labellum; **b,** wing; **c,** front tibia and tarsus; **d,** male genitalia.

The antennae are yellow-brown. The third segment is dark brown. The arista has seven or eight dorsal rays and three ventral rays in addition to the apical fork; the inner margin is bare or nearly so. The thorax is entirely brown, dusted with gray-brown pollen. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Eight to ten rows of acrostichal setae are present. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The coxae and femora are yellow, tinged with brown; in some specimens the brown coloration predominates. Each front tibia has a rather dense covering of short erect hairs along the posterior surface. The front has two rows of moderately long, erect cilia extending down the dorsal surface; the basal fourth of the basitarsus is bare; the basitarsus is about one-half as long as the tibia (fig. 156c). The wings are rather evenly pale yellow-brown fumose with a distinct brown marking over the m crossvein and sometimes with a faint indication of a brown marking at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}. The costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.7 times longer than the fourth, and the last section of vein M_{1+2} is 1.28 times longer than the penultimate section. The last section of vein M_{3+4} is about two-thirds as long as the m crossvein (fig. 156b). The abdomen is predominantly shining brown in ground color, yellow along the extreme posterior borders of the segments, and with yellow markings on the posterior lateral margins of the terga. The genitalia are brown, tinged lightly with yellow.

The ninth tergum is rather narrow, parallel-sided. The dorsal surface is not narrowed; the ventral margins are rounded and are densely haired along the edge (fig. 156d).

Length: body, 5.0–5.3 mm.; wings, 5.3–5.6 mm.

Drosophila oreas new species (fig. 157a–c).

Fitting in the complex of species which has three brown vittae down the mesonotum and which has the brown spot in the middle of cell R_1 extended across cell R_3 over the median portion of vein R_{4+5}. It is apparently most closely related to *D. aglaia* n. sp. but the wings are very differently marked as shown in figures 157b and 26a; the third costal section is five times longer than the fourth; the scutellum is brown, except for the yellow lateral margins; the palpi are yellow to rufous; and the aristae are different as shown in figure 157a.

FEMALE. *Head:* Just slightly higher than long; the occiput is distinctly convex as seen in lateral view; entirely yellow to rufous except for the reddish brown eyes and the brown to black ocellar triangle. Front about one-third wider than long. The face is just slightly raised down the median portion. Only one strong bristle is present at the upper margin of each vibrissal row. The palpi are yellow; each possesses a strong apical bristle. The antennae are yellow, tinged with brown dorsally and on the apical portion of the third segment. The arista has seven to eight dorsal and two ventral rays in addition to the apical fork; the anterior surface is sparsely haired. Anterior reclinate bristle about two-thirds as long as the proclinate and situated distinctly above the latter. *Thorax:* Predominantly yellow. Mesonotum with three brown longitudinal vittae extending the entire length. Over the front half of the mesonotum the median vitta is equal in width to about four rows of acrostichal setae; on the hind portion it expands to the width of about six rows of acrostichal setae. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. A moderately strong bristle-like hair is situated in the dorsocentral row just slightly anterior to a line drawn between the first pair of supraalars. The scutellum is brown, except for the yellow lateral margins. The metanotum is yellow, tinged lightly with brown. The pleura are yellow, except for a brown mark across the upper edge of the mesopleuron, through the upper median portion of the pteropleuron, and over the upper hind corner of each sternopleuron. Two moderately strong anterior sternopleural bristles are present; these are two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Front femur with about four moderately strong bristles on each of the posterodorsal and posteroventral surfaces. The front basitarsus is approximately three-fifths as long as the tibia. *Wings:* Nearly three times longer than wide. The third costal section is about five times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The wing markings are as in figure 157b. The costal margin, from the apical two-thirds of the second costal section to the apex of vein R_{2+3} is predominantly brown with the brown markings interrupted by three rather small hyaline marks in cell R_1. The brown mark in the apical portion of

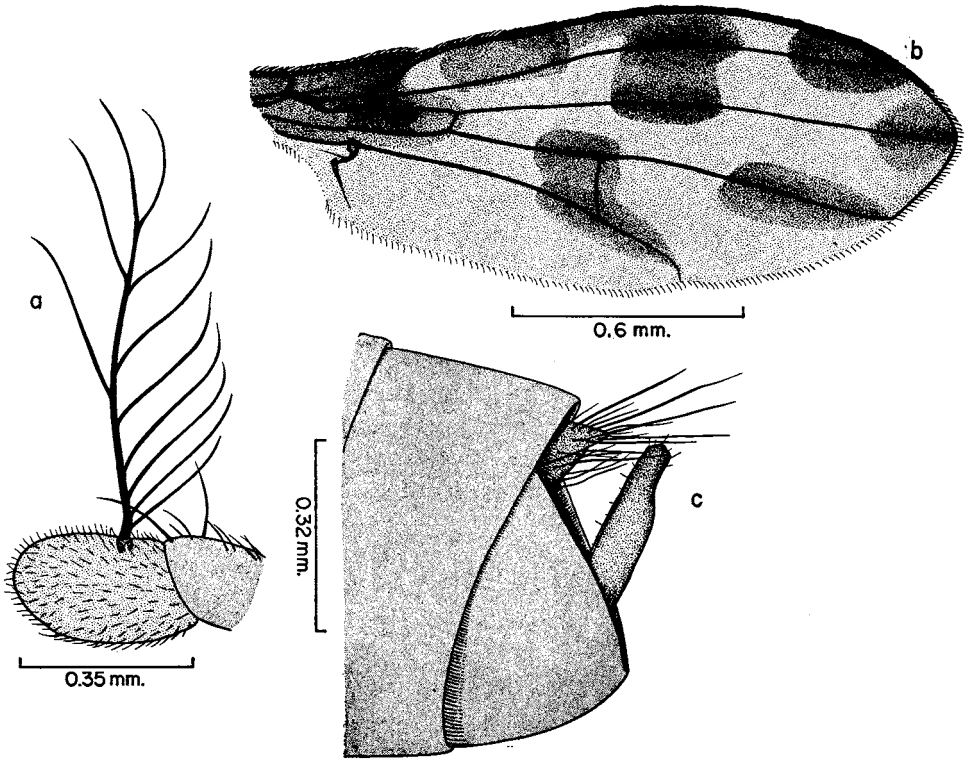


Figure 157—*Drosophila oreas* n. sp.: **a**, antenna; **b**, wing; **c**, female genitalia.

the second costal section extends across the bases of cells R_1, R_3, R_5, and cell 1st M_2. The brown mark in the middle of cell R_1 extends across cell R_3 and into the upper portion of cell R_5 but is not connected with the broad brown mark which extends over the m crossvein. An oblong brown spot extends over the apex of each of veins R_{2+3}, R_{4+5} and M_{1+2}. The last section of vein M_{1+2} is two times longer than the penultimate section, and the last section of vein M_{3+4} is approximately one-third longer than the m crossvein. *Abdomen:* Predominantly subshining brown, with a moderately large yellow spot on the anterior corners of each tergum. The ovipositor plates are rather slender, almost equal in length to the ventral portion of the seventh segment (fig. 157c).

Length: body, 4.00 mm.; wings, 4.65 mm.

MALE. Unknown.

Holotype female: Haleakala, Maui, 1,500 feet, no collector or date given.

Type in the B. P. Bishop Museum.

Drosophila orestes new species (fig. 158a–c).

This species fits in the complex which is characterized by having the wings hyaline, the body predominantly brown, and the front tarsi ciliated. It is dif-

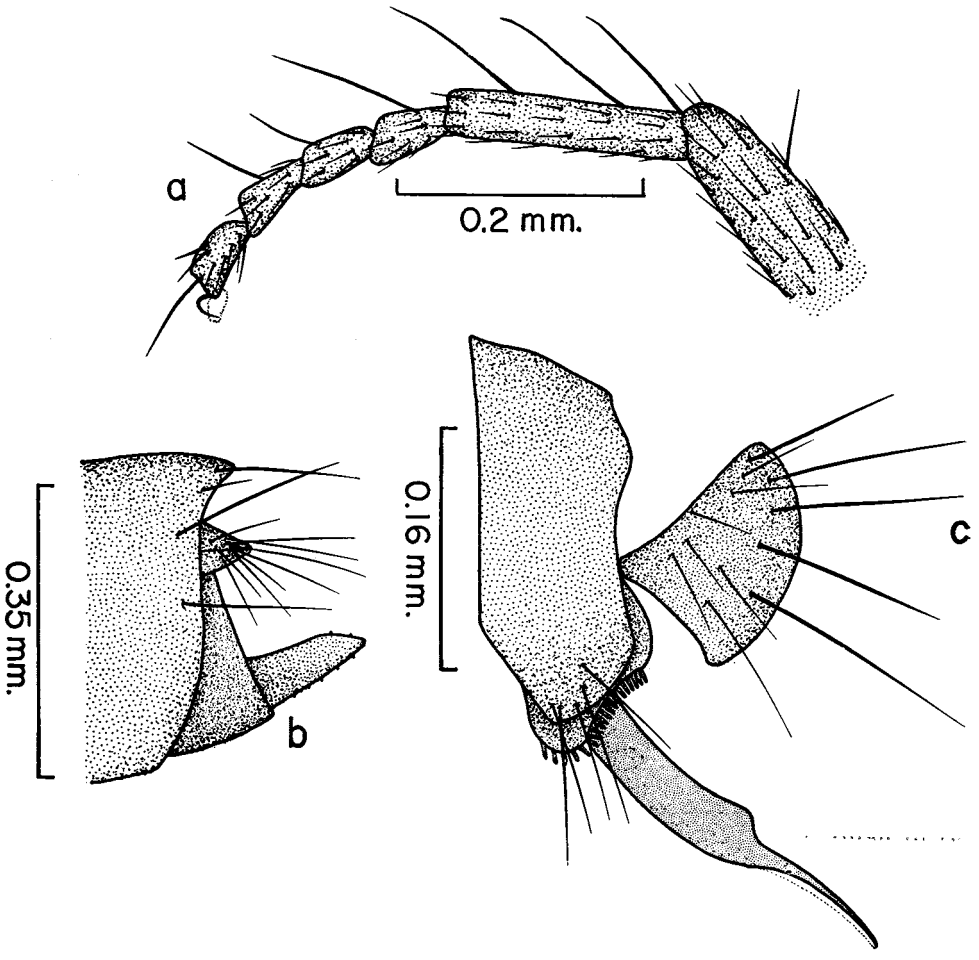


Figure 158—*Drosophila orestes* n. sp.: **a**, front tarsus; **b**, female genitalia; **c**, male genitalia.

ferentiated by having only three black, anterior cilia on the front basitarsus (fig. 158a).

MALE. *Head:* Rather quadrate, just slightly higher than long. The genae are well developed; the space between the vibrissal row and the eye margin is equal in width to almost three rows of eye facets. The front is yellow-brown, tinged with black along the upper eye orbits. The ocellar triangle, vertex, and upper occiput are black covered with gray pollen. The median portion of the occiput is brown; the lower one-third is yellow. The genae are entirely yellow except for a faint streak of brown along each vibrissal row. The face is yellow, tinged with brown on the lower portion; the upper median portion is slightly convex. The palpi and mouthparts are pale yellow. Each palpus has a small black apical bristle. I see no evidence of ornamentation on the labella. One moderately

strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the anterior reclinate bristle. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated opposite the latter. The front, measured from the median ocellus to the anterior margin, is about one-half wider than long. The antennae are brown, tinged with yellow on the basal segments. The arista has five or six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Almost entirely dark brown except for the yellow sternopleura and hypopleura and for a tinge of yellow on the lower portion of each humerus. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The halteres are yellow, tinged faintly with brown on the knobs. *Legs:* Entirely yellow. The segments lack ornamentation except for the tarsi. Each basitarsus has three long, black anterior hairs arranged down the segment. The second and third tarsal segments have one long anterior hair at the middle of the each segment (fig. 158a). The front basitarsus is about one-half as long as the tibia. *Wings:* Entirely hyaline with no dark markings. The third costal section is 3.65 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Entirely yellow-brown. The anal plates are about one-half higher than long and are distinctly pointed on the lower apex. The ninth tergum is greatly narrowed over the dorsal margin, and is expanded on the posterior margin so that at its widest point it is equal to or slightly longer than the anal plate. The lower margins of the terga are shaped as in figure 158c. The edges of the claspers are plainly visible in direct lateral view.

Length: body, 2.2 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The ovipositor blades are rather short, but are slender and subacutely pointed at the apices (fig. 158b).

Holotype male, allotype female, and one male paratype: from Pauahi, Hawaii, on the slopes of Mauna Loa, 4,300 feet, August, 1956 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila parva Grimshaw (fig. 159a–d).

Drosophila parva Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :65.

Endemic. Hawaii (type locality: Kilauea), Molokai, Kauai, and Oahu. Probably on all the major islands; it has been previously recorded only from Hawaii.

Type in the British Museum (Natural History). I have studied the type series.

A very small, dark-colored species readily recognized by its small size, by the wing markings and venation (fig. 159b), by the very short front basitarsi of the

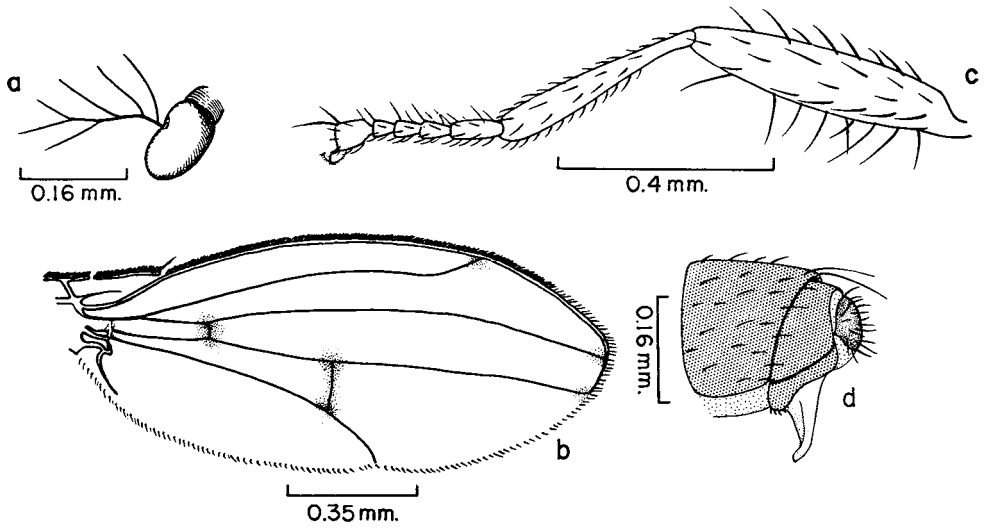


Figure 159—*Drosophila parva* Grimshaw: **a,** antenna; **b,** wing; **c,** front leg; **d,** male genitalia.

male (fig. 159c), and by the presence of three brown vittae down the mesonotum. Also, the more sparsely rayed arista is distinctive (fig. 159a).

The front is slightly longer than wide, is yellow-gray on the sides, and gray in the median portion with a brown to black V-shaped mark extending down the sides and meeting at the lower portion of the front. The face is predominantly yellow, the lower margin is brown, and a sharp keel extends down the median portion of the face. Each lower angle of the face has one strong bristle. The palpi are yellow and each has three moderate-sized bristles around the outer apical edge. The antennae are yellow, tinged lightly with brown. The arista has three dorsal rays and one ventral ray in addition to the apical fork (fig. 159a). The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The thorax is predominantly brown, densely covered with gray pollen. The mesonotum has three brown longitudinal vittae extending its full length. The coxae are yellow, the femora are brown; the tibiae are yellow, and each has two indistinct brown rings. The front basitarsus of both sexes is very short, slightly less than one-fourth as long as the tibia and shorter than the combined lengths of the next two tarsal segments (fig. 159c). In the female the basitarsus is about one-half as long as the tibia. The tibiae and tarsi have short erect hairs down the dorsal surface in the male. The wings are hyaline, distinct brown markings occur over the r–m and m crossveins, and a faint brown spot is present at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}. The third costal section is about two times longer than the fourth, and the costal fringe extends about half the distance between the tips of R_{2+3} and R_{4+5}. The r–m crossvein is situated near the middle of cell first M_2 and the last section of vein M_{1+2} is about two times longer than the penultimate section (fig. 159b). The abdomen is entirely

brown. The male genitalia are as in figure 159d. The anal plates are comparatively small. The ventral margins of the ninth tergum are slightly expanded, and each has two bristles on the median portion. The claspers are large, readily visible from lateral view, the lower portion of each lobate and curved inward. The female ovipositor plates are short and inconspicuous.

Length: body, 1.50 mm.; wings, 1.65 mm.

Drosophila paucipuncta Grimshaw (fig. 160a–c).

Drosophila paucipuncta Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :62.

Endemic. Hawaii (type locality: Olaa). Known only from the three female specimens in Grimshaw's original series.

Type and one paratype in the British Museum (Natural History). One paratype in the B. P. Bishop Museum.

This belongs in the group of species which has brown infuscations at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2} and a brown marking over the m cross-vein as in figure 160b. It fits in the key close to *D. mimica* n. sp., and superficially the two species closely resemble one another. They are not closely related, however, and *paucipuncta* is readily separated by a number of characteristics as pointed out in the key. The more striking characters for differentiating *paucipuncta* would be the normally placed lower reclinate bristles and the normally developed dorsocentral bristles, and also the presence of a subbasal brown spot in the wing (fig. 160b).

Predominantly brownish red species. The front is about as long as wide, the orbits are yellow, and the median portion is rufous, tinged lightly with brown. The ocellar triangle, vertex, and upper occiput are brown; the lower occiput, genae, face, palpi, and mouthparts are yellow. The lower reclinate bristle is one-half to three-fifths as long as the proclinate and is situated above the latter. The face has a small carina down the median portion; the lower margin of the face is faintly tinged with brown. Only one strong black bristle is present on the upper edge of each vibrissal row. Each palpus has a moderately strong black apical bristle (fig. 160a). The antennae are yellow to rufous, and tinged lightly with brown on the dorsal surface. The second antennal segment has two moderately strong dorsal bristles. The arista has about six dorsal and two ventral rays in addition to the apical fork; the apical half has six or eight fine hairs on the anterior surface. The mesonotum is reddish brown, rather densely gray-brown pollinose. The scutellum is reddish brown on the disc, and yellow around the margin. The pleura are largely yellow with brownish discoloration through the mesopleura, upper portion of pteropleura, and through the metapleura. Two pairs of moderately strong humeral bristles are present. The anterior dorsocentral bristles are well developed and are situated just slightly in front of a line drawn between the second pair of supraalar bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The legs are entirely yellow; the basitarsus is about one-half as long as the tibia. Wings faintly yellowish fumose with a rather distinct brown subbasal spot; spots at apices of

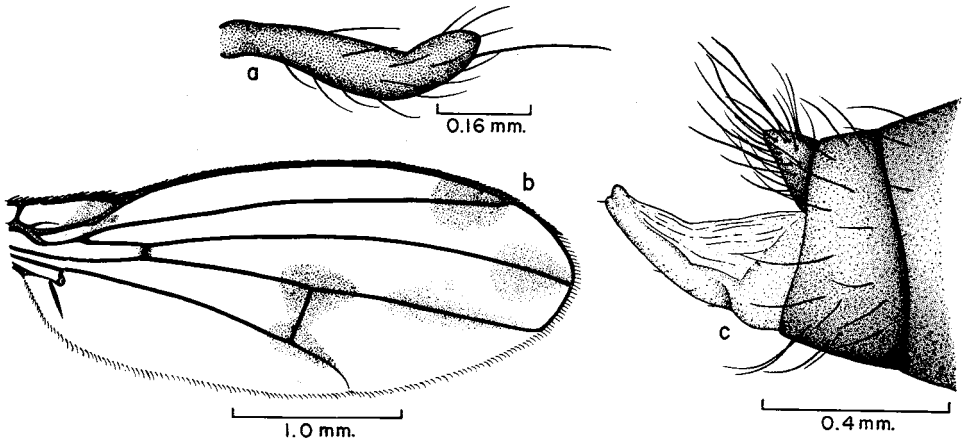


Figure 160—*Drosophila paucipuncta* Grimshaw: **a,** palpus; **b,** wing; **c,** female genitalia.

veins R_{2+3}, R_{4+5}, and over the m crossvein; also a faint infuscation along the apex of veins M_{1+2} (fig. 160b) .The third costal section is four times longer than the fourth, and the costal fringe ends near the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. Last section of vein M_{1+2} is 1.45 times longer than the penultimate section. The abdomen is brown with yellow spots on the anterior corners of the terga. The ovipositor plates are rather slender, subacutely pointed, and about equal in length to the ventral margin of the seventh sternum (fig. 160c) .

Length: body, 3.8 mm.; wings, 4.0 mm.

MALE. Unknown.

Drosophila paucula new species (fig. 161a–b).

This species fits near *D. albifacies* n. sp. from the island of Hawaii but differs by having the labella of the male normal and lacking spines or ornamentations, the face yellow, the costal fringe extending nearly one-half the distance between the apices of veins R_{2+3} and R_{4+5}, and by genital and other characters.

MALE. *Head:* The front is yellow, tinged with brown on the upper portion. The eye orbits above the proclinate bristles are brown, tinged faintly with black. The ocellar triangle and the upper portion of the occiput are brown, tinged with black, and covered with gray pollen. The median portion of the occiput is yellow-brown; the lower one-half to two-fifths is yellow. The genae are yellow except for a faint line of brown extending along each vibrissal row. In the median portion of the gena, the distance from the vibrissal row to the eye margin is about equal in width to two rows of eye facets. The face is yellow with a faint tinge of brown in the ground color of the lower median portion. The median portion of the face is distinctly convex. The clypeus is yellow-brown. The palpi and mouthparts are yellow. Each palpus has a small, rather inconspicuous apical

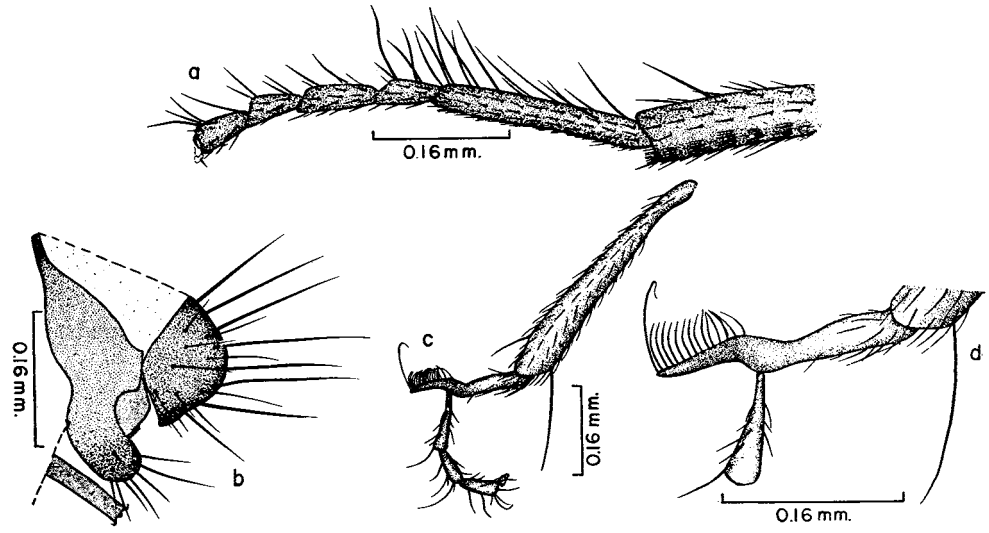


Figure 161—*Drosophila paucula* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. pectinitarsus* n. sp.: **c,** front tibia and tarsus; **d,** front basitarsus.

bristle. The labella are fleshy. One moderately strong bristle is present at the upper edge of each vibrissal row; this is about equal in size to the proclinate bristles of the front. The anterior reclinate bristles are approximately equal in length to the proclinates and are situated opposite the latter. The first two antennal segments are yellow, tinged with brown on the dorsal surfaces. The third segment is brown. The arista has six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Evenly dark brown over the entire dorsal surface and tinged with brown on the upper half of each pleuron, with the exception of the propleuron. The sternopleura and hypopleura are yellow. The halteres are yellow. The metanotum is yellow to rufous, tinged faintly with brown. The anterior dorsocentral bristles are situated about halfway between the first and second pair of supraalars. Six to eight rows of acrostichal setae are present. The two humeral bristles are approximately equal in size. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* The front basitarsus is almost one-half as long as the tibia and has a row of about eight moderately long anterodorsal cilia extending the entire length of the segment; a rather strong black dorsal hair (or small bristle) is situated at the apex of the segment (fig. 161a). The second tarsal segment has approximately four dorsal cilia, and segments three and four have two or more dorsal cilia. *Wings:* Faintly infuscated with brown but with no distinct brown markings. The third costal section is nearly five times longer than the fourth, and the costal fringe extends almost to the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.36 times longer than the penultimate section. *Abdomen:* Shining, dark brown to black, rather lightly gray pollinose with a narrow gray-

white border on the apices of each of the terga. The anal plates are about two times higher than long and are subacutely pointed ventrally. The ninth tergum is strongly narrowed over the dorsal portion, convex posteriorly, and lobate on the ventral margins as shown in figure 161b. The claspers are plainly visible from a direct lateral view.

Length: body and wings, 2.50–2.65 mm.

FEMALE. Unknown.

Holotype male: Mt. Kaala, Oahu, April 3, 1953 (C. P. Hoyt).

Type in the B. P. Bishop Museum.

Drosophila pectinitarsus new species (fig. 161c–d).

This species fits in the complex which is characterized by having an apical projection on the front basitarsus of the male and a strong apicoventral bristle on the front tibia of both sexes. It is differentiated from other species in this group by having the appendage on the front basitarsus straight-sided and bearing numerous erect comb-like setae along the anterior edge (fig. 161c–d).

MALE. Predominantly dark-bodied species. *Head:* Almost entirely dark brown to black, with a tinge of yellow in the ground color of the face, the genae, and the lower occiput. The face has a small, but distinct, median carina. The lower reclinate bristle is about equal in size to the proclinate and is situated approximately opposite the latter. One small bristle is present at the upper edge of each vibrissal row. The antennae are brownish yellow. The arista has five dorsal and two ventral rays in addition to the apical fork. Each palpus has a short, inconspicuous apical bristle. *Thorax:* Entirely dark brown to black, tinged faintly with rufous in the ground color and predominantly subshining, and covered with gray pollen. About eight rows of acrostichal setae are present. The anterior dorsocentrals are approximately equal in size to the humeral bristles and are situated opposite the second pair of supraalars. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The apicoventral bristle of the front tibia is about three times longer and stronger than the preapical dorsal bristle, is about one-third as long as the tibia, and approximately equal in length to the basal portion of the front basitarsus. The basal portion of the basitarsus is rather elongate and distinctly longer than the second tarsal segment; the apical projection of the basitarsus is approximately equal in length to the basal section and has a comb-like arrangement of erect, black setae along the anterior edge (fig. 161c–d). The apical segments of the tarsus have several short, erect setae along the dorsal surface. *Wings:* Entirely hyaline. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.3 times longer than the fourth, and the last section of vein M_{1+2} is nearly two times longer than the penultimate section. The last section of vein M_{3+4} is two times longer than the m crossvein. *Abdomen:* Entirely subshining, dark brown to black, covered with gray-brown pollen. The genitalia have not been dissected for study.

Length: body, 2.3 mm.; wings, 2.7 mm.

FEMALE. The female specimens which have been associated with the males fit the above description except that the front tarsi are normal. The apicoventral bristle on the front tibia is smaller, nearly two times longer than the preapicodorsal bristle; also the anterior dorsocentral bristles are stronger, approximately equal in size to the upper reclinate and to the vertical bristles of the head. The ovipositor plates are apparently normal in development and extend slightly beyond the apices of the anal plates.

Length: body, 2.50 mm.; wings, 2.75 mm.

Holotype male and allotype female: from Kilauea, Hawaii, March 3, 1945 (W. W. Wirth). Eleven paratypes (six males and five females): from the following localities—same as type; Bird Park, Hawaii National Park, Hawaii, 4,000 feet, March 3, 1946 (W. W. Wirth); Upper Olaa Forest, Hawaii, August, 1952 (W. C. Mitchell); and Kilauea, Hawaii, April 18, 1944 (N. L. H. Krauss).

Type, allotype, and five paratypes in the United States National Museum. The remainder of the paratypes are in the B. P. Bishop Museum, British Museum (Natural History), and the University of Hawaii collections.

Specimens of *pectinitarsus* in the United States National Museum collection from Kilauea, Hawaii, were labeled *Drosophila varifrons* Grimshaw; but these two species are not related.

Drosophila peniculipedis new species (fig. 162a–c).

This species fits rather loosely in the *lanaiensis* complex because of the presence of three brown vittae down the mesonotum. It more closely resembles *D. picticornis* Grimshaw than any other previously described species because of the spotted wings. It is not, however, closely related to *picticornis* and differs in many respects as pointed out in the key. It is readily differentiated from other species which have the three brown vittae by the predominantly brown wings with numerous hyaline spots as in figure 162b; by the chiefly brown thorax with the median vitta broadly expanded posteriorly; and by the brush of dense, short pile, which extends down the posterior surface of each front tibia and tarsus of the male (fig. 162a). *D. peniculipedis* is closely related to *adiastola* n. sp. and is differentiated by the characters discussed under that species.

MALE. *Head:* Ocellar triangle black; upper occiput, vertex, and most of the front brown; the orbits are brown, tinged with yellow. The face, genae, and lower occiput are entirely yellow. The antennae are yellow, tinged lightly with brown on the upper edge. The second segment has two moderately developed dorsal bristles. The arista has seven dorsal rays and three ventral rays in addition to the apical fork. None of the oral vibrissae is strongly developed. The mouthparts are not ornate. The palpi are yellow and are rather thickly covered with short black setae. The lower reclinate bristles are small, about half as long as the proclinates, and situated distinctly above the latter. *Thorax:* Predominantly brown; mesonotum with a yellow vitta extending down each dorsocentral line, this narrows greatly on the posterior portion due to the lateral expansion of the median brown vitta just before the scutellum. The scutellum is dark brown

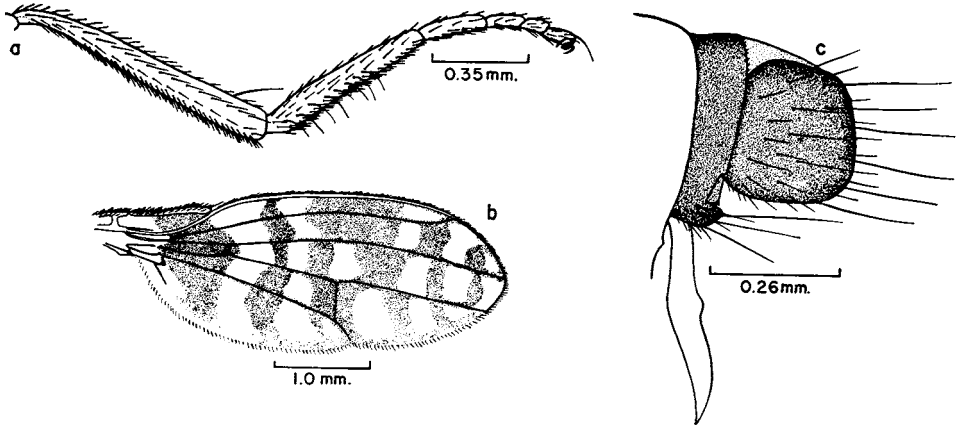


Figure 162—*Drosophila peniculipedis* n. sp.: **a**, front tibia and tarsus; **b**, wing; **c**, male genitalia.

to black in ground color; the metanotum is brown, tinged lightly with yellow on the sides. The pleura are predominantly brown. The propleura and the posterior halves of the sternopleura are yellow. The lower portion of each humerus is yellow. The anterior dorsocentral bristles are situated opposite the second supraalar bristles. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Largely yellow; the femora are tinged lightly with brown and the front coxae and tarsi are yellow-brown. Each front femur has three or four posterodorsal bristles but no strong bristles on the posteroventral surface. A dense brush of short hairs extends down the posterior surface of the front tibia and tarsus. The front basitarsus is distinctly flattened laterally; at its widest point it is almost as broad as the apex of the tibia; the basitarsus is about two-thirds as long as the tibia (fig. 162a). Strong preapical dorsal bristles are present on all tibiae. *Wings:* The third costal section is nearly four times longer than the fourth, and the costal fringe extends about two-thirds the distance between the tips of veins R_{2+3} and R_{4+5}. The basal portion of the wing is semi-hyaline. A broad brown transverse band extends across the wing from about the basal half of the second costal section to just slightly beyond the r–m crossvein. Cell R_1 contains three hyaline spots, cell R_3 has five hyaline spots, cell R_5 contains six spots counting the one at the apex of the cell, cell 1st M_2 has two spots, second M_2 has two spots, and two hyaline spots are also present in cell M_4. The brown markings are arranged as in figure 162b. The last section of vein M_{1+2} is about one-fourth longer than the penultimate section. The r–m crossvein is situated near the basal third of cell 1st M_2. *Abdomen:* Dark brown to black, tinged with yellow on the anterior lateral margins of the terga. The aedeagus extends well beyond the ventral portion of the genitalia. The anal plates are very large, conspicuous, and densely bristled (fig. 162c). The claspers are rather inconspicuous and are hidden in lateral view.

Length: body and wings, 4.0–4.7 mm.

FEMALE. Fitting the description of the male in most respects. The second bristle of the vibrissal row, however, is strongly developed; the front legs are not ornate; and the large brown mark in the apical one-half to two-thirds of cell R_1 is interrupted by one or two small hyaline spots. The ovipositor plates are yellow, gently tapered, and extend about one-third longer than the anal plates.

Length: body and wings, 4.7 mm.

Holotype male, allotype female, and six paratypes (three males and three females): from Haleakala, Maui, 1,500–2,000 feet, no date or collector given; one from Mt. Kaala, Oahu, August, 1924 (O. H. Swezey).

The type and allotype are in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), the Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila percnosoma new species (fig. 163a–c).

This species fits in the *sordidapex* complex because of the development of the flat spoon-shaped second tarsal segment of the front legs of the male (fig. 163a). It fits closest to *D. dasycnemia* because of the dense erect setae on the posterior portion of the front tibia. It is readily differentiated from *dasycnemia* by its predominantly black color, by having all coxae, trochanters, and femora dark brown to black; the front all brown; the antennae, mouthparts including palpi, brown to black; the last section of vein M_{1+2} just slightly longer than the penultimate section; and by having rather conspicuous erect setae along the dorsal surface of the front basitarsus.

MALE. An almost entirely dark-colored species. *Head:* Predominantly brown to black except for the reddish compound eyes and for a narrow band of yellow over the genae, sides of face, and across the upper portion of the face. The front is mostly velvety brown, black along the orbits. The ocellar triangle is subshining black. The occiput is brown, tinged with yellow. The clypeus is black, the palpi and mouthparts are brown to black. Each palpus has one weak apical bristle plus numerous black setae around the apex. The labella are thickly armed with dark brown to black setae around the margins, but there is no evidence of strong spines or processes. The upper median portion of the face is slightly carinate. The antennae are entirely brown to black; the second segment has three moderately strong dorsal bristles. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. The lower reclinate bristle is about three-fourths as long as the proclinate and is situated distinctly above the latter. *Thorax:* Almost entirely dark brown to black, tinged lightly with yellow to rufous in the ground color, and yellow on the lower half of each humerus. About eight rows of acrostichal setae are present, and the anterior dorsocentral bristles are situated about in line with the second pair of supraalars. The mesonotum and scutellum are gray pollinose. The apex of the scutellum is narrowly yellow. *Legs:* Coxae, trochanters, and femora black; front tibia lacks

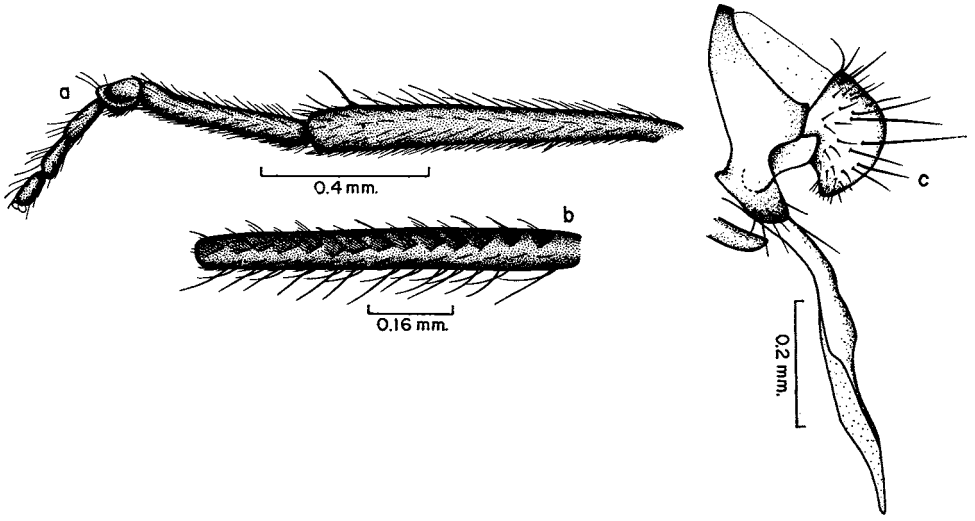


Figure 163—*Drosophila percnosoma* n. sp.: **a,** front tibia and tarsus; **b,** hind basitarsus, ventral view; **c,** male genitalia.

long ciliation but possesses numerous erect setae over the posterior surface, these approximately as long as the preapical dorsal bristle. Front basitarsus almost one-half as long as the tibia, densely covered with short, erect hairs over the dorsal surface, and with a dense brush of short, fine hairs on the ventral surface. The second tarsal segment is flattened, slightly concave on the dorsal surface; the segment is just slightly longer than wide (fig. 163a). The hind basitarsi are about two-thirds as long as the tibiae. The hind tarsi have several rows of short, erect setae extending the entire length of each dorsal surface; they have a hair seam developed on the posteroventral surface, and a rather dense brush made up of fine setae arranged in numerous comb-like rows over the ventral surface (fig. 163b). *Wings:* Rather intensely pale infuscated, slightly darker brown over the anterior apical portion of the wing. The wing is 2.6 times longer than wide. The costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The third section of the costa is 5.8 times longer than the fourth, and the last section of vein M_{1+2} is 1.16 times longer than the penultimate section. *Abdomen:* The basal portion is yellow, tinged lightly with brown. The remainder of the abdomen is subshining black, gray pollinose. Each tergum has a narrow, gray posterior margin. The sixth segment is short, scarcely exposed from a dorsal view. The anal plates are higher than long and are subacutely pointed ventrally. The ninth tergum is strongly narrowed over the dorsal portion, expanded medianly, and lobate ventrally (fig. 163c). The claspers are largely hidden by the lobes of the tergum. The aedeagus is elongate and terminates in a slender point.

Length: body, 4.00 mm.; wings, 4.35 mm.

FEMALE. Fitting the description of the male except for sexual characters. Also

the legs are yellow and the last section of vein M_{1+2} is 1.3 times longer than the penultimate section. The ovipositor blades are comparatively slender, straight-sided, pointed at apices, and dentate along the hind margins.

Length: body, 3.5 mm.; wings, 3.9 mm.

Holotype male: Upper Olaa Forest, Hawaii, 4,000 feet, August, 1958, collected in dense fern jungle (D. E. Hardy). Allotype female: same habitat and collector, July, 1956. Six paratypes (four males and two females): same data as type and allotype; and Napau Crater, Hawaii, 2,900 feet, July, 1956 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila perissopoda new species (fig. 164a–d).

This species belongs in the group which has the thorax yellow-brown and the anteroapical portion of the wing infuscated. It is readily differentiated from all other known species by the peculiar development of the front basitarsus of the male (fig. 164a).

MALE. *Head:* Front about as wide as long; predominantly yellow, brown on the orbits to just below the proclinate bristles, and also brown to black around the ocellar triangle. Vertex and upper occiput brown to black. Anterior reclinate bristle thinner but slightly longer than the proclinate and situated opposite the latter. Lower portion of occiput yellow; genae yellow, except for a faint tinge of brown along the lower margin. The face is yellow except for brown along the lower margin. The clypeus is pale brown; the mouthparts, including the palpi, are yellow. The mouthparts are not ornate, and the palpi lack distinct bristles. The upper half of each vibrissal row is made up of fine hairs; no distinct bristles are present at lower angle of the face. Antennae yellow, third segment lightly tinged with brown. Arista with four or five dorsal rays and two ventral rays in addition to the apical fork. *Thorax:* Brown, tinged with yellow on the dorsum; yellow, tinged faintly with brown on the sides. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. About six rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. Halteres yellow. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. Front femora about five times longer than wide; the posteroventral and posterodorsal bristles are black and moderately developed. Each front tibia is slightly swollen just before the dorsal bristle. Front basitarsus short, flattened laterally, with a peculiar comb-like structure on the dorsal surface; this consists of two straight bristles plus about five strongly curved bristles set closely together (fig. 164a). The second tarsal segment has a moderately strong black apical bristle on the dorsal surface, and the other tarsal segments have erect dorsal hairs at the apices. *Wings:* 2.6 times longer than wide. Predominantly subhyaline with a prominent brown spot in the anteroapical portion extending diagonally through the apices of cells R_1, R_3, and R_5

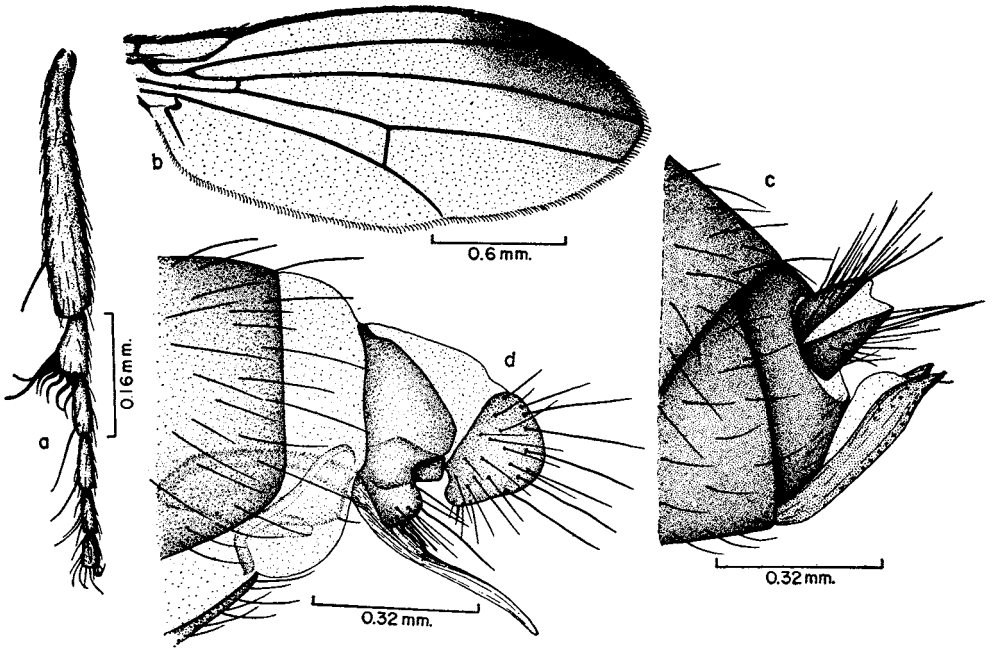


Figure 164—*Drosophila perissopoda* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** female genitalia; **d,** male genitalia.

(fig. 164b). Third section of the costa four times longer than the fourth. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_{2+3} is straight, the apex not curved upward. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The last section of vein R_{3+4} is about two times longer than the m crossvein. *Abdomen:* Brown, tinged with yellow on the first tergum and on the basal portion of the second. The ninth tergum is rather strongly narrowed to just a thin rim on the dorsal surface; the ventral margins are rounded and protrude well beyond the bases of the claspers (fig. 164d). One strong bristle plus several fine hairs are present at each ventral margin of the tergum.

Length: body, 2.6–2.8 mm.; wings, 3.0–3.4 mm.

FEMALE. Fitting the description of the male except for sexual characters. Also one or two moderately strong bristles are present at the upper portion of each vibrissal row, and each palpus has a moderately strong black apical bristle. The ovipositor plates are rather long and slender, about equal in length to the ventral margin of the seventh segment, rather sharp-pointed at apices, and with a series of small tubercles around the margin (fig. 164c).

Length: body, 3.3–4.0 mm.; wings, 3.5–4.0 mm.

Holotype male and allotype female: Mt. Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy). About 250 paratypes (sexes rather evenly distributed): from the following areas in the wet sections of the mountains of Kauai—

same as type; Kalalau Lookout, 4,000 feet, August, 1953 (D. E. Hardy); Nualolo Valley, July, 1952, 3,400 feet (D. E. Hardy); Kokee, 3,600 feet, July, 1952, and August, 1955 (D. E. Hardy and J. Beardsley); Kainamanu, 3,800 feet, July, 1952 (D. E. Hardy); Alakai Swamp, 3,800 feet, July, 1952 (D. E. Hardy); Koaie Stream, August, 1953 (D. E. Hardy); Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy); Mohihi River, 3,500 feet, August, 1953 (D. E. Hardy); Halemanu Swamp, August, 1953 (D. E. Hardy); and Waialae Stream, 3,600 feet, August, 1953 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. Remainder of paratypes in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila picticornis Grimshaw (fig. 165a–g).

Drosophila picticornis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :57.

Endemic. Kauai (type locality: "Waimea Mts., 4,000 ft."). This species is common in the Kokee area; it is strongly attracted to banana baits. Terry's record of *D. picticornis,* bred from decaying bananas from Tantalus, Oahu (Terry, 1907:126), was obviously an error. He no doubt was dealing with *crucigera* Grimshaw.

Type in the British Museum (Natural History). I have studied the type.

A very picturesque species which is readily differentiated from all other Hawaiian *Drosophila* by the wing markings (fig. 165c) as well as by the markings on the face, antennae, legs, and abdomen. The front is slightly wider than long, is brown on the median portion and yellow on the sides and front margin. The anterior median portion of the front is densely covered with short black hairs. The anterior reclinate bristles are one-half to three-fifths as long as the proclinates and are situated distinctly above the latter. The first two antennal segments and the basal half of the third segment are black. The apical portion of the third is bright yellow. The arista has eight dorsal and two ventral rays in addition to the apical fork. The face has a black spot on each side opposite the bases of the antennae and another black spot on each lower angle at upper portions of the vibrissal rows (fig. 165a). The sides of the mesonotum are largely yellow in ground color, rather densely cinereous, with irregular brown spots; the central portion is broadly brown. The scutellum is largely brown, yellow-gray around the margin and down the median portion. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The coxae and femora are principally dark brown to black. The apices of the latter are broadly yellow. The tibiae are yellow, each with a narrow brown band at about basal two-fifths and with another brown band at apex of the segment. The front femur has five rather strong posterodorsal bristles and about six moderately strong posteroventral bristles. The front tibiae and tarsi have a row of long erect cilia extending down the anterodorsal surface of each (fig. 165b). The wings are predominantly brown with numerous small hyaline spots as in figure 165c. The

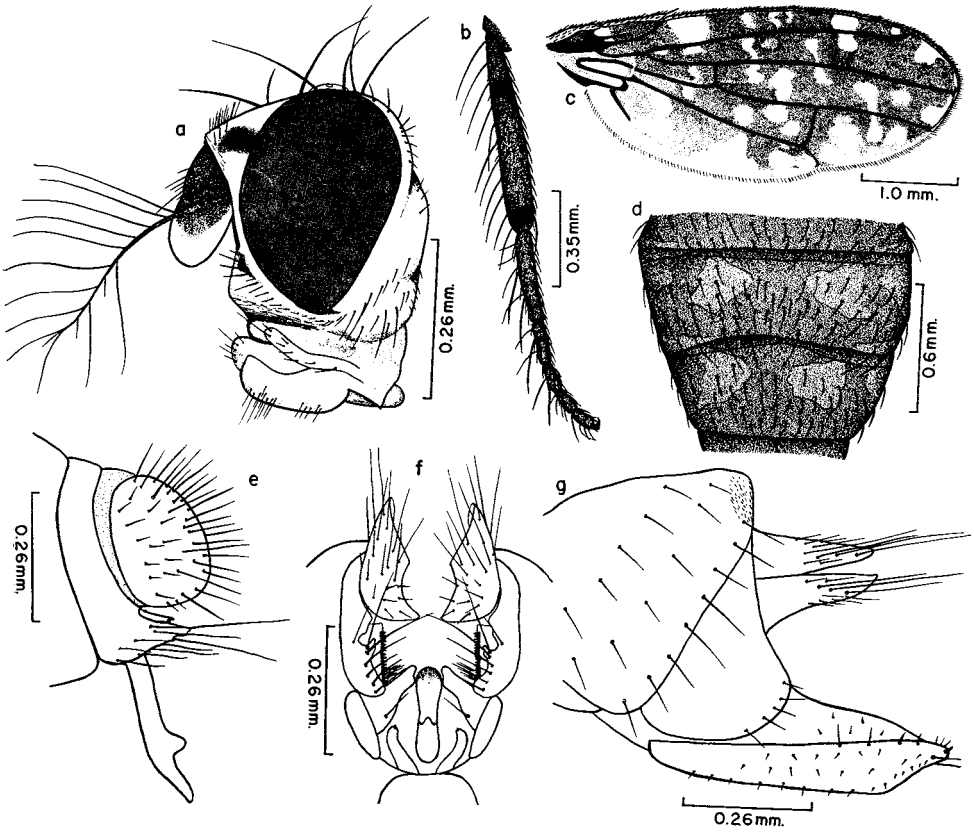


Figure 165—*Drosophila picticornis* Grimshaw: **a,** head; **b,** front tibia and tarsus; **c,** wing; **d,** pattern of gray marks on terga; **e,** male genitalia, lateral; **f,** male genitalia, ventral; **g,** female genitalia.

abdomen is dark brown, and most of the abdominal terga have four gray spots as in figure 165d. The male aedeagus is black and extends well beyond the other portions of the genitalia. The genitalia of both sexes are as in figure 165e, f, g. The eggs have two filaments.

Length: body, 3.20–3.65 mm.; wings, 3.50–4.00 mm.

Drosophila pilimana Grimshaw (fig. 166a–d).

Drosophila pilimana Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :61.

Endemic. Oahu (type locality: Waianae Mountains), Kauai, Molokai, Hawaii, and probably general over all the islands.

The specimens recorded from Molokai may possibly be *fasiculisetae* n. sp., and there may be a question as to whether or not it actually occurs on Kauai and Hawaii since I have seen only female specimens from these islands and there is a possibility of another species being involved.

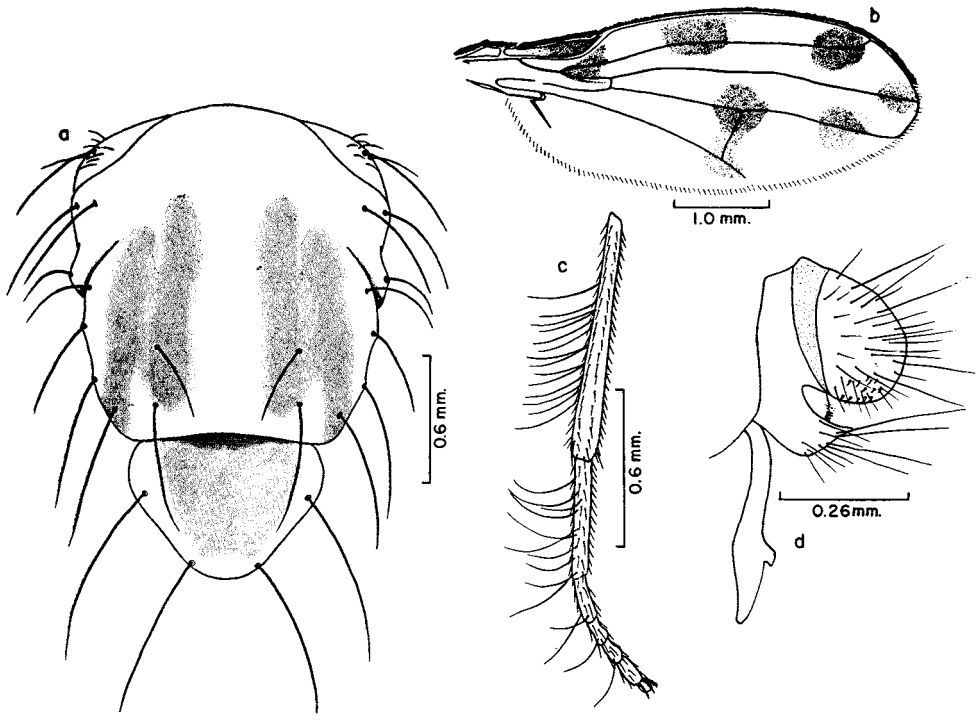


Figure 166—*Drosophila pilimana* Grimshaw: **a,** thorax, dorsal, showing pattern of dark marks; **b,** wing; **c,** front tibia and tarsus; **d,** male genitalia.

Type in the British Museum (Natural History). I have studied the type series and have designated homeotypes. This is a common species in the mountains of Oahu; it is attracted to banana baits as well as to other fermenting plant and animal products, including rotting meat.

This species is apparently related to *D. ochracea* Grimshaw but is differentiated by the presence of two large brown spots on the mesonotum (fig. 166a), by having the pleura and scutellum marked with brown, and also by lacking infuscation on the r–m crossvein.

The front is just slightly wider than long, is dull yellow, tinged with brown. The anterior portion is more distinctly brownish tinged. The face, genae, and lower occiput are pale yellow to white. The lower reclinate bristle is about three-fifths the size of the proclinate and is situated slightly above the latter. The antennae are yellow to rufous, tinged lightly with brown on the upper portion. The arista has nine dorsal rays and four ventral rays in addition to the apical fork. The palpi are pale-colored; each has a strong bristle at the apex. The mesonotum is yellow-gray to gray pollinose around the margins and down the median portion; a very large brown spot present on each side, extending from before the suture to the posterior dorsocentral bristle and the posterior supra-alar bristle (fig. 166a). The basal portion of the scutellum is dark brown to

black, the margins are broadly yellow. The pleura have brown markings on the mesopleura, upper portions of pteropleura, the metapleura, and the upper third to one-half of each sternopleuron. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. The legs are entirely yellow. Each front tibia has long erect dorsal cilia on the apical three-fifths of the segment. The front tarsi have numerous long dorsal cilia as in figure 166c. Each front femur has about six strong posterodorsal bristles and three to five strong posteroventral bristles. The third costal section is about 3.7 to 3.8 times longer than the fourth, and the costal fringe extends two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The wings are predominantly yellowish fumose with a moderately large dark brown spot present in the apical half of the second costal section and extending over the bases of veins R_{2+3} and R_{4+5}; a brown spot is present near the middle of cell R_1 extending over into cell R_3; another is present at the apex of cell R_1 extending over into R_3; a paler brown spot is also present at the apex of vein R_{4+5}; another is near the apex of vein M_{1+2}; and a dumbbell-shaped spot extends over the m crossvein (fig. 166b). The abdomen is dark brown to black and has large yellow spots at the anterior angles of the segments. The male genitalia are as in figure 166d.

Length: body and wings, 3.7–4.5 mm.

Drosophila plumosa Grimshaw (fig. 167a–b).

Drosophila plumosa Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :72.

Endemic. Hawaii (type locality: Kona and Olaa).

Type in the British Museum (Natural History).

I am unable to place this species. I have studied the specimens in the British Museum collection. The original description said that Grimshaw had one male specimen from Kona and one female from Olaa; however, only two specimens are in the collection and both are from Olaa. One is labeled, "Type, male" and the other labeled, "Type, female." The specimen labeled "Type, male" is actually a female specimen. The other specimen has the abdomen broken off so that I cannot be absolutely sure of the sex; it appears, however, to be a female specimen. Grimshaw allied this species to *D. obscurifrons* Grimshaw and *exigua* Grimshaw and differentiated it on the basis of having six dorsal and three ventral rays on the arista. Both *obscurifrons* and *exigua* are *Scaptomyza* and *plumosa* is obviously not related to these. It is impossible to place this from the female specimens and it will be necessary to study the male in order to find where it correctly fits.

The following descriptive notes are based upon the type. The front is yellowish brown in color, covered with yellow pollen. The upper eye orbits, the vertex, and the ocellar triangle are brown in ground color. The face is entirely yellow. The palpi are yellow, and each has two or more short preapical bristles. The first two antennal segments are predominantly yellow, brown to black on the dorsal surfaces; the third segment is dark brown. The arista has six or seven moderately long dorsal and three long ventral rays in addition to the apical fork (fig. 167a).

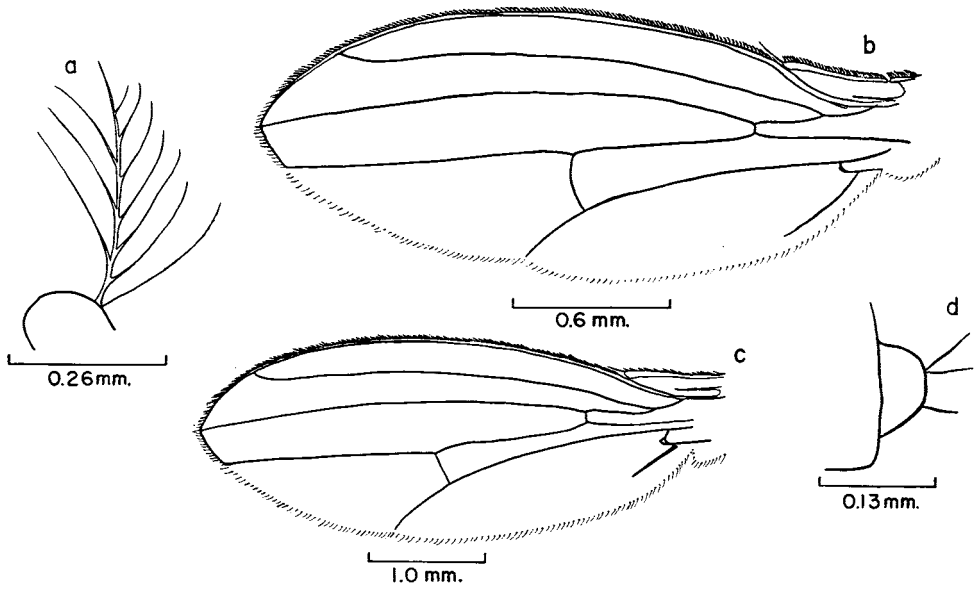


Figure 167—*Drosophila plumosa* Grimshaw: **a**, arista drawn from type female; **b**, wing drawn from type. *D. polita* Grimshaw: **c**, wing, drawn from type; **d**, visible portion of female genitalia, from type.

The ground color of the mesonotum is dark brown, that of the pleura and metanotum is brownish yellow; the humeri are yellow. The entire thorax is rather thickly covered with yellow-brown pollen. The legs are entirely yellow; the front basitarsus is about one-half as long as the tibia. The wings are hyaline and the costal fringe extends slightly less than one-half the distance between the apices of R_{2+3} or R_{4+5}. Cell R_5 at the apex is about two-thirds as wide as the apex of cell R_3 (fig. 167b). The last section of M_{1+2} is approximately 1.5 times longer than the penultimate section. The abdomen is dark brown to black; the details of the ovipositor are not visible.

Length: body, 2.5 mm.; wings, 3.0 mm.

Drosophila polita Grimshaw (fig. 167c–d).

Drosophila polita Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :71.

Endemic. Lanai (type locality: "Lanai," 2,000 feet, December, 1893).

Type in the British Museum (Natural History). I have studied the type; it is a female in excellent condition.

This species cannot definitely be placed since the male is unknown and the females of several species cannot be separated. I had previously thought this to be the species which I have here described as *bipolita* n. sp.; however, upon comparing specimens of this with the type of *polita*, I decided that they could not be definitely placed together. The type of *polita* is distinctly larger than

bipolita and until the males are associated it probably will not be possible to recognize this species. This may possibly be a clear-winged female specimen of the complex which possesses anteroapical brown markings on the wings of the male.

Following is a redescription of the type female of *polita*. The upper two-thirds of the front is shining black, the lower portion is yellow, faintly tinged with brown. The face is entirely yellow with the upper median portion slightly convex. The basal segments of the antennae are yellow-brown, blackened dorsally. The third antennal segment is dark brown to black. The aristae are broken off the type. The palpi are yellow at their bases, black at their apices, and each possesses one moderately strong black bristle near the apex. One moderately strong bristle is present at the upper edge of each vibrissal row; the other vibrissae are represented by rather weak hair-like setae. The thorax is polished black except for the yellow sternopleura, hypopleura, lower portion of each pteropleuron, and apex of the scutellum. The disc of the scutellum is subopaque black. The halteres are brownish yellow. The legs are entirely yellow; the front tarsi are considerably longer than the tibiae. The front basitarsus is about two-thirds as long as the tibia. The wings are very faintly yellowish fumose; the costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third section of the costa is four times longer than the fourth, and the fourth section is two times wider than the fifth. The last section of vein M_{1+2} is about 1.5 times longer than the preceding section, and the last section of vein M_{3+4} is about two times longer than the m crossvein (fig. 167c). The abdomen is entirely black, the sides of the posterior portion are polished, and the median portion is opaque; this is probably due to the abdomen being greased on the type, and it appears that the entire abdomen should be subshining black. The ovipositor is not plainly visible; just the tips of the blades are seen *in situ*. The visible portion is yellow-brown, very blunt, and rounded at the apex (fig. 167d).

Length: body and wings, 3.75 mm. Grimshaw in the original gave the length as body 3.25 mm. and wings 3.50 mm.

MALE. Unknown. It is probable that the male has a black rim on the labellum and may be synonymous with one of several species in this complex; since these cannot be accurately placed from the female, the identification of the species will have to be questioned until further material can be studied from Lanai. I have collected many times on Lanai but have not been able to rediscover Grimshaw's *polita*.

Two female specimens are on hand which compare very favorably with the type. I have determined these, however, as *polita* with a question mark; they are from Hawaii National Park, 4,000 feet, March, 1954 (R. Namba), and Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

Drosophila polliciforma new species (fig. 168a–c).

This species belongs in the complex which has the m crossvein infuscated and very slight infuscations present at the tips of veins R_{2+3}, R_{4+5}, and M_{1+2};

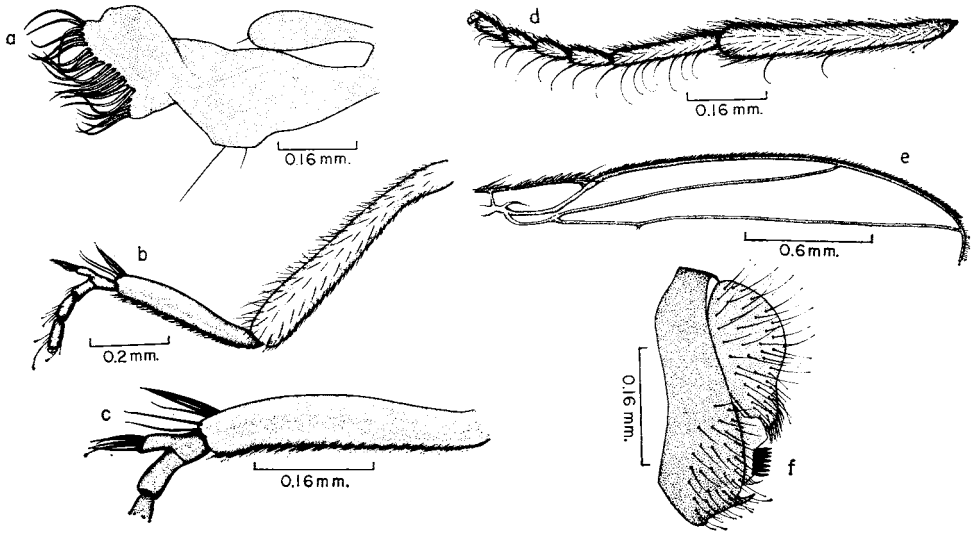


Figure 168—*Drosophila polliciforma* n. sp.: **a,** labellum; **b,** front tibia and tarsus; **c,** first three segments of front tarsus. *D. polychaeta* Patterson and Wheeler: **d,** front tibia and tarsus; **e,** anterior margin of wing; **f,** male genitalia.

the latter are indistinct and the species is also being keyed with those species which lack fuscous markings in the apical portion of the wing. It is readily differentiated from all other known Hawaiian species by the peculiar thumb-like development on the dorsal apex of the second tarsal segment of the male and also by the flattened front basitarsus which bears a sharp keel down the dorsal surface (fig. 168c).

MALE. The front is slightly wider than long, is predominantly yellow, and tinged lightly with brown on the dorsal surface and through the median portion; the orbits are clear yellow. The lower reclinate bristle is equal in size to the proclinate and is situated almost opposite the latter. The vertex and the upper portion of the occiput are yellow to rufous, tinged with brown. The remainder of the head, with the exception of the compound eyes, is yellow. The face is almost flat with a slight carina down the upper median portion; the face is slightly narrowed on the lower portion just above the oral margin. Three strong bristles are present in the upper portion of each vibrissal row. The palpi are entirely yellow; the apical bristle is weak and no black setae are present. The mouthparts are yellow; each labellum is densely fringed with long yellow spines (fig. 168a). The antennae are yellow, tinged with brown at the apex of the third segment and on the dorsal surface of the second. The arista has seven dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow, tinged with brown. The mesonotum and scutellum are gray pollinose. Eight rows of acrostichal setae are present. The anterior dorsocentral bristles are strong, equal to or longer than the presutural bristles, and situated

opposite the second pair of supraalars. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the apical segments of the tarsi. The front tibiae are devoid of long ciliation but are rather densely covered with short, yellow hairs on the posterior surface. The front basitarsus is developed into a sharp dorsal keel and is devoid of bristles or long hairs except for about six dorsal hairs at the apex. The basitarsus is about one-half as long as the tibia. The second tarsal segment is developed into a thumb-like dorsal lobe which is armed with four or five closely placed black setae at its apex (fig. 168b–c). *Wings:* Faintly infuscated with brown over the m crossvein and at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth. The last section of vein M_{1+2} is just slightly longer than the penultimate section; the proportions are 40 to 36. *Abdomen:* Predominantly brown, marked with yellow on the sides of the first five terga. The genitalia have not been relaxed for study; *in situ* the anal plates are very large, equal in length to the sixth abdominal segment.

Length: body, 3.80–4.00 mm.; wings, 4.25 mm.

FEMALE. Unknown.

Holotype male: Kohala Mountains, Hawaii, May 24, 1917 (O. H. Swezey).

Type in the Hawaiian Sugar Planters' Association collection.

Drosophila polychaeta Patterson and Wheeler (fig. 168d–f).

Drosophila polychaeta Patterson and Wheeler, 1942, Univ. Texas Publ. 4213:102.

Oahu. Known in Hawaii only from one series of specimens taken in a banana bait trap at the University of Hawaii, March, 1948 (G. B. Mainland).

Immigrant. Southern United States (type locality: Galveston, Texas), Mexico, and Central America.

Type in the American Museum of Natural History.

This species was first reported in Hawaii by Hardy (1952a:471) based upon the specimens mentioned above. As pointed out at that time, this is the species which Dr. Mainland had listed, *nomen nudum*, as "*Drosophila pattersoni* n. sp." in "Drosophila Information Service" 22:59 (1948). This was listed by Patterson and Wheeler (1949:229) as "*D. pattersoni*, manuscript name." It should be noted that *pattersoni* was again used under *Drosophila* by Pipkin (1956:251).

This species is readily differentiated from other *Drosophila* in Hawaii by the elongate costal fringe of the wing (fig. 168e), and by the one or two enlarged setae in front of the anterior dorsocentral bristles.

A predominantly pale-colored species. The front is yellow, tinged faintly with brown, especially along the orbits. The anterior reclinate bristles are two-thirds to three-fourths as long as the proclinates and are situated slightly above the latter. The face is yellow, tinged faintly with brown below and also on the median portion. The median portion is raised into a strong blunt keel. The second bristle of the vibrissal row is about two-thirds as long as the first. The

clypeus is brownish yellow. The palpi are yellow and lack distinct black bristles but have numerous dark-colored setae around the apical portions. The first two antennal segments are yellow; the second has two moderately strong dorsal bristles. The third antennal segment is yellow-brown. The arista has about five dorsal and two ventral rays in addition to the apical fork; the inner surface is lined with short hairs. The thorax is yellow, tinged very faintly with brown. Eight rows of acrostichal setae are present; the hairs of the posterior (prescutellar) row are slightly larger than are the other acrostichals. The anterior (second) dorsocentral bristles are situated about opposite the second (posterior) pair of supraalars, and one or two enlarged bristle-like setae are situated in line with, and anterior to, the anterior dorsocentral bristles. These extra dorsocentrals vary somewhat in size and development. In the Hawaiian specimens they are about twice as long as the surrounding setae and approximately three-fifths as long as the anterior dorsocentral bristles; in the two specimens on hand from Galveston, Texas, these hairs are developed into distinct bristles, almost as long as the anterior dorsocentrals. A row of about four moderately strong setae extend vertically directly above the presutural bristle. The lower humeral bristle is subequal to the upper and the two sternopleural bristles are almost equal in length. The legs are entirely yellow except for the brown apices of the tarsi. The front tarsi of the male have rather numerous curved cilia extending down the dorsal and anterodorsal surfaces. The front tibia has two short curved cilia on the anterior dorsal surface (fig. 168d). The front basitarsus of the male is slightly over half as long as the tibia. The wings are subhyaline, tinged very faintly with brown, but with no brown markings. The costal fringe extends almost to the apex of vein R_{4+5} (fig. 168e). The third costal section is 1.75 to 2.00 times longer than the fourth. The last section of vein M_{1+2} is 2.2 times longer than the penultimate section. The first tergum and the basal portion of the second are yellow, tinged faintly with brown. The remainder of the abdomen is brown, faintly dusted with gray-brown pollen. The male genitalia are very distinctive, as shown in figure 168f. The ninth tergum has a distinct hook-like process on each posteroventral margin. The anal plates are rather strongly narrowed ventrally. Hsu (1949:108 and 138, fig. 1) indicates that the anal plate is fused with the ninth tergum along the upper half; in the specimens I have studied the two plates are distinctly separated. The claspers are small; each is divided into two lobes. The upper is blunt, rounded at apex, and without setae; the lower possesses a comb-like row of five to seven black teeth (fig. 168f).

Length of Hawaiian specimens: body, 2.3–2.6 mm.; wings, 2.5–2.9 mm. The specimens from the mainland are slightly larger. Patterson and Wheeler, in the original, gave the following measurements of the live specimens. Male: body, 2.85 mm.; wings, 2.45 mm. Female: body, 3.60 mm.; wings, 2.80 mm.

Drosophila praesutilis new species (fig. 169a–b).

A small predominantly pale yellow species, differentiated from all other known Hawaiian *Drosophila* by having strong, presutural dorsocentral bristles.

MALE. *Head:* Just slightly higher than long as seen in direct lateral view; the lower hind margin of the eye is distinctly oblique. The front is entirely yellow to rufous, faintly tinged with brown, and covered with yellow-gray pollen. The ocellar triangle, the vertex, and upper occiput are faintly tinged with brown to black in ground color and covered with gray pollen. The remainder of the head, excepting the compound eyes, is yellow. The palpi and mouthparts are yellow; each labellum has a narrow black rim around the apex. Each palpus has a moderately developed apical bristle. The face is just slightly convex in the upper median portion. The lower portion of the face is faintly tinged with brown. Two moderately strong bristles are present on the upper portion of each vibrissal row. The genae are moderately broad; in the median portion the distance from the vibrissal row to the eye margin is about equal in width to four or five rows of eye facets. The antennae are predominantly yellow, tinged with brown on the dorsal surface of the second segment and over the apical two-thirds of the third. The arista has four dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly yellow with a faint tinge of brown in the ground color of the dorsum and over the upper portion of each pleuron. Three pairs of evenly spaced, well-developed dorsocentral bristles are present. The anterior bristles are about equal in size to the proclinate bristles of the front and are situated opposite the presutural bristles. The second pair of dorsocentrals are situated opposite the first (anterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two moderately developed bristles. The anterior sternopleural bristle is scarcely over one-half as long as the posterior bristle. *Legs:* Entirely yellow and devoid of ornamentation or long ciliation. The front basitarsus is about two-fifths as long as the tibia and slightly over two times longer than the second tarsal segment (fig. 169a). *Wings:* Subhyaline, faintly infuscated with yellow-brown. The third costal section is 4.5 times longer than the fourth, and the costal fringe extends one-fourth to one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Brown, distinctly tinged with yellow, especially on the basal terga. The anal plates are nearly two times higher than long and are subacutely pointed. The ninth tergum is not narrowed on the dorsal portion and the sides are almost straight; at its widest point it is approximately two-thirds as long as the anal plates. The ventral lobes are developed as in figure 169b. The claspers are plainly visible from a direct lateral view.

Length: body, 2.2 mm.; wings, 2.4 mm.

FEMALE. Unknown.

Holotype male: Pupukea, Oahu, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila pretiosa new species (fig. 169c–e).

This species belongs in the *haleakalae* complex and fits near *D. flavisternum* n. sp. It is differentiated by its smaller size, shorter legs, lack of erect hairs on the front tibia. The ventral lobe of the ninth tergum is almost devoid of setae at

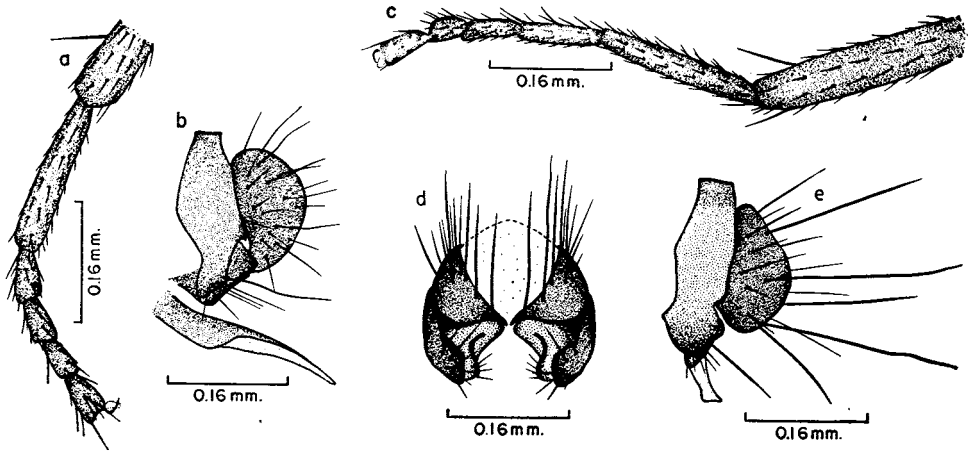


Figure 169—*Drosophila praesutilis* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. pretiosa* n. sp.: **c,** front tibia and tarsus; **d,** male genitalia, ventral; **e,** male genitalia, lateral.

the apex (fig. 169e), and the inner surface of the clasper is not setose (fig. 169d).

MALE. Similar in most respects to the description of *flavisternum. Head:* The front above the proclinate bristle is subshining to subvelvety black, above the proclinate bristles lightly dusted with gray pollen; the lower portion of the front is clear yellow. The genae and face are yellow-white. The lower portion of the face is flat; the upper median portion is slightly convex. A secondary bristle is moderately developed at the upper portion of each vibrissal row. Each palpus has a moderately longer hair-like bristle at the apex; this is approximately equal in length to the dorsal rays of the arista. The antennae are entirely yellow. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Shining black, faintly tinged with brown in ground color on the dorsum, and with the apex of the scutellum yellow. The upper half of each pleuron is dark brown, tinged with black. The sternopleura are predominantly yellow; the upper edge, however, is tinged with brown. *Legs:* Entirely yellow, lacking ornamentation (fig. 169c). The front tibiae measure 0.45 mm. and the front basitarsus measures 0.22 mm. *Wings:* Predominantly subhyaline, infuscated with brown across the apex (especially at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}) and on the m crossvein. The third costal section is 4.25 times longer than the fourth section, and the costal fringe extends about halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.25 times longer than the penultimate section. *Abdomen:* Predominantly shining black, lightly gray-brown pollinose, yellow on the apical portion of the sixth tergum. The venter is entirely yellow. The anal plates are rather oblong in shape, about two-thirds higher than long. The ninth tergum is straight-sided, not narrowed over the dorsal portion, and rather sparsely setose on the ventral lobes (fig. 169e). The claspers are plainly visible from a direct lateral view. The line of teeth is slightly greater in length

than the width of the lobes of the ninth tergum. The inner margins of the claspers are not setose (fig. 169d).

FEMALE. Fitting the description of the male except for sexual characters. Also the antennae are dark-colored, with the third segment and the dorsal surface of the second brown, the clypeus brown, and the apices of the palpi brown, tinged with yellow. The ovipositor blades are blunt at apices and extend approximately two times longer than the anal plates.

Length: body, 2.9 mm.; wings, 3.1 mm.

Holotype male: Pupukea, Oahu, July, 1958, collected in banana thicket (H. Toba). Allotype female: Mt. Kaala, May, 1952 (M. Tamashiro). Six paratypes (five males and one female): from the following localities on Oahu—same as allotype, October 17, 1946, in banana bait trap (G. B. Mainland), and April 3, 1953 (C. P. Hoyt); same locality and collector as type, April, 1952; Waianae Mountains, Kanehoa, January 16, 1927 (O. H. Swezey); and Kahana, September 7, 1944 (O. H. Swezey).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum, Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila proceriseta new species (fig. 170a–c).

This species fits in the complex which is characterized by having a large apical appendage on the front basitarsus of the male, and by having only four distinct segments in the front tarsus of the male. It is readily differentiated from other known species by the very long, slender, anterior reclinate bristles; these are three or four times longer than the proclinates. The projection on the front tarsus is distinctive (fig. 170b), and the second tarsal segment also has a small apicodorsal projection. It fits nearest to *D. cracens* n. sp. but differs by lacking strong setae at the posteroapical portion of the front tibia and by having the sternopleura and the propleura yellow.

MALE. *Head:* Slightly higher than long; the occiput is convex on the lower half. The front is about two times wider than long (measured from the upper ocelli to the front median margin) and is entirely brown, tinged lightly with yellow on the lower portion. The anterior reclinate bristles are three to four times longer than the proclinates and are situated distinctly above the latter (fig. 170a). The occiput is predominantly brown; the lower portion is yellow, tinged lightly with brown. The genae are yellow with a streak of brown to black along the vibrissal row; measured from the vibrissal row to the eye margin, the gena is scarcely equal in width to two rows of eye facets. No strong bristles are developed in the vibrissal rows. The face is yellow, tinged lightly with brown in the median portion, with a very slight indication of a vertical carina extending down the median portion, and with the sides strongly convergent ventrally; the face is about twice as broad across the median portion as at the lower margin. The clypeus is yellow-brown; the mouthparts, including the palpi, are yellow. The latter have no strong apical bristles but have numerous black setae around the

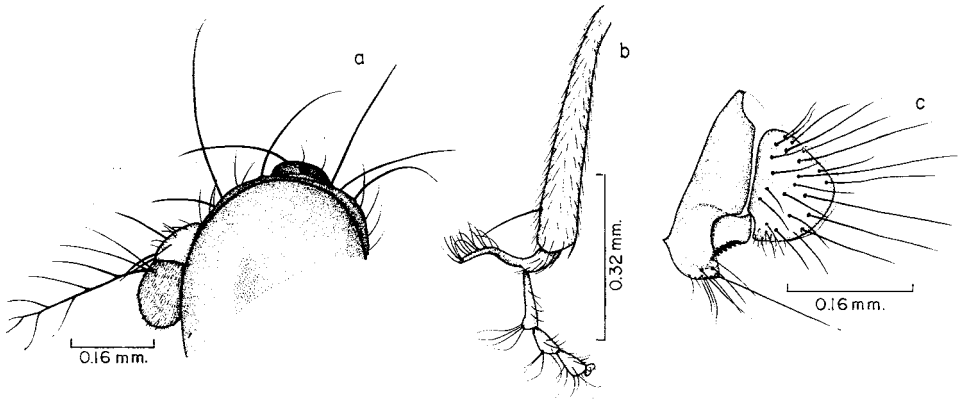


Figure 170—*Drosophila proceriseta* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** male genitalia.

margins. The labella are not ornate. The antennae are brown, tinged with yellow; more distinctly yellow on the base of the third segment and on the ventral portions of the first two. The second antennal segment has three short, dorsal bristles. The arista has four or five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Rather dark brown on the dorsum, tinged with rufous in the ground color. The lower portions of the pleura are yellow; the upper portions, except the propleura, are brown, tinged with yellow. About eight rows of acrostichal setae are present. The anterior dorsocentrals are approximately equal in size to the humeral bristles and are situated opposite the second pair of supraalars. Two pairs of humeral bristles are present. The anterior sternopleural bristle is almost as long as the posterior bristle. The halteres are yellow. *Legs:* Entirely pale yellow. Front femora slender, with three or four moderately small bristles on each of the posteroventral and posterodorsal surfaces. Front tibiae not ornate, lacking ciliation; the preapical dorsal bristle is rather large, extending beyond the apex of the segment. The front tarsus has but four visible segments. The basal portion of the basitarsus is rather short and thick. The apical portion is developed into a rather long, slender, sharp-pointed projection which extends nearly two times longer than the basal portion of the segment; the apical projection of the basitarsus is slightly curved, and the anterodorsal surface contains a row of moderately long black hairs (fig. 170b). The second tarsal segment is moderately long and slender, about three-fourths as long as the basitarsus (including the apical appendage), and bears a prominent dorsoapical point which has three or four moderately long hairs at the tip. Segments three and four also bear three or four moderately long dorsal setae. *Wings:* Hyaline with a very faint indication of a brownish tinge. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.8 times longer than the fourth, and the last section of vein M_{3+4} is 1.4 times longer than the penultimate section. The last section of vein M_{3+4} is 1.66 times

longer than the m crossvein. *Abdomen:* Predominantly dark brown; the sixth tergum is yellow-brown. The ninth tergum is reduced to just a narrow rim across the dorsal portion; a blunt lobe with numerous setae around the apex is developed on each side of the ventral margin. The clasper is plainly visible from direct lateral view (fig. 170c). Each anal plate has numerous short setae around the ventral margin.

Length: body, 2.50–2.70 mm.; wings, 2.75–3.00 mm.

FEMALE. Similar in most respects to the male but lacking ornamentation on the front legs; also the anterior reclinate bristle is normal in size, about equal to the proclinate. One moderately strong bristle is present at the upper edge of each vibrissal row. The ovipositor blades are moderately developed, subacute at apices, and extend nearly two times longer than the anal plates.

Length: body, 2.3 mm.; wings, 2.5 mm.

Holotype male and allotype female: from Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy). About fifty paratypes (predominantly males): from the following localities on Molokai—same as type, July, 1952, and July, 1953 (D. E. Hardy and M. Tamashiro); and Puu Alii, 4,300 feet, July, 1953 (D. E. Hardy).

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila prodita new species (fig. 171a–b).

This species fits near *D. brunneisetae* n. sp. but is readily differentiated by the differences in development of the front tarsi (figs. 171a and 53a).

MALE. *Head:* About one-half higher than long as seen from lateral view. The front is about two-thirds wider than long, brown in the median portion, blackened on the orbits and on the posterior and anterior portions; the orbits are dusted with gray. The vertex, ocellar triangle, and upper portion of the occiput are black. The median portion of the occiput is brown; the lower edge is yellow. The gena is yellow, a brown line extends along the vibrissal row, and in the middle portion the gena is equal in width to three or four rows of eye facets. The face is predominantly brown to black, tinged with yellow in the ground color of the upper portion, and with a slight carina through the middle. The clypeus is black; the palpi are brown, and each has a number of black setae around the outside margin but no distinct apical bristle. The labella are not ornate. The uppermost bristle of the vibrissal row is about one-third longer than the other setae and approximately equal in size to the genal bristle. The antennae are dark brown; the second segment has three dorsal bristles. The arista has five dorsal rays and two ventral rays in addition to the apical fork. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated distinctly above the latter. The inner vertical bristle is nearly one-third longer than the outer. *Thorax:* Predominantly brown, tinged with black, with a yellow

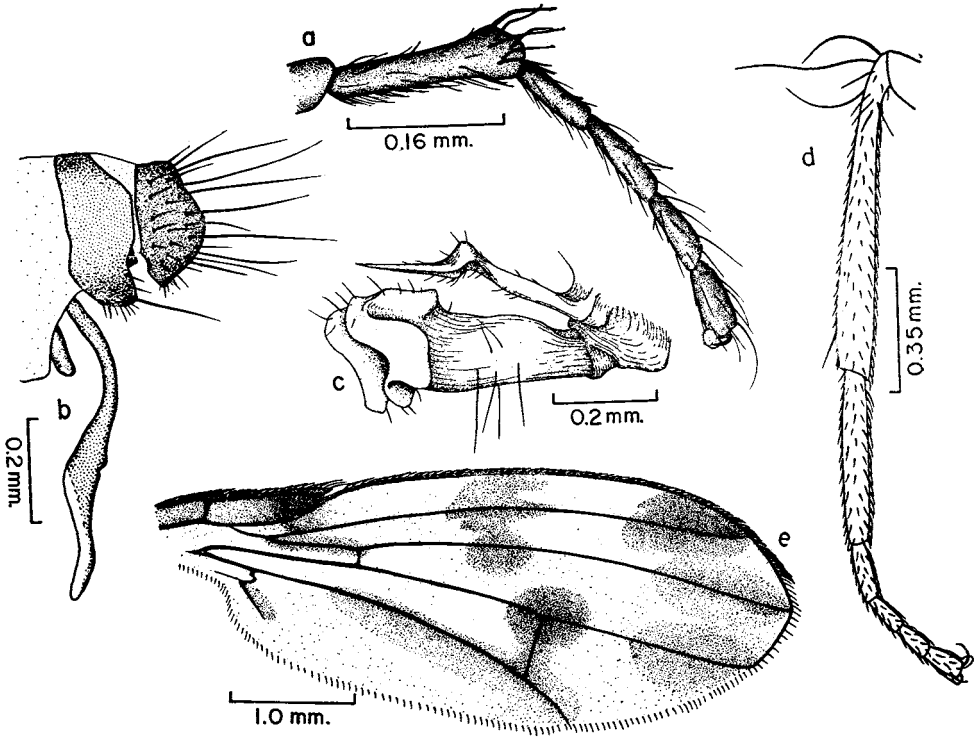


Figure 171—*Drosophila prodita* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. prolaticilia* n. sp.: **c,** mouthparts; **d,** front tibia and tarsus; **e,** wing.

tinge in the ground color of the humeri and on the lower portion of each sternopleuron. The thorax is rather densely covered with brownish gray pollen. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the posterior supraalars. Eight rows of acrostichal setae are present. The lower humeral bristle is about three-fourths to four-fifths as long as the upper bristle. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Yellow. The front basitarsus is about one-thirds as long as the tibia and is slightly swollen on the dorsoapical portion and bears a thickened dorsoapical bristle plus a clump of about six anteroapical bristles (fig. 171a). The second tarsal segment is about two-thirds as long as the first. *Wings:* Slightly infuscated. The costal fringe extends nearly two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.4 times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The last section of vein M_{3+4} is nearly two times longer than the m crossvein. *Abdomen:* Entirely brown covered with gray-brown pollen. The anal plates and the visible parts of the genitalia are brown, tinged slightly with yellow. The anal plates are about two times higher than long and are slightly pointed ventrally. The ninth tergum is strongly narrowed over the dorsal

portion and is expanded and concave on the posteromedian margin; the ventral lobes are rather truncate at the apices (fig. 171b).

Length: body, 2.5 mm.; wings, 2.9 mm.

FEMALE. Unknown.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Two male paratypes: one from Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy); one from Kohala Mountains, Upper Hamakua Ditch Trail, Hawaii, September 3, 1919 (O. H. Swezey).

Type in the B. P. Bishop Museum. Paratypes in the collections of the Hawaiian Sugar Planters' Association and the University of Hawaii.

Drosophila prolaticilia new species (fig. 171c–e).

This species fits in the *hawaiiensis* complex by having a transverse streak of brown extending across the middle of the wing and brown infuscated apices of veins R_{2+3}, R_{4+5}, and M_{1+2}. It is differentiated from other known Hawaiian species by lacking ciliation on the front legs of the male except at the bases of the tibiae (fig. 171d), by the predominantly reddish brown mesonotum and the all-yellow sternopleura, and by the elongate brown spot which extends down vein M_{3+4} (fig. 171e).

MALE. A moderate-sized, predominantly pale species. *Head:* Just slightly higher than long, almost quadrate in lateral view. The front is just slightly wider than long and is yellow to rufous, tinged lightly with brown on the upper orbits. Occiput, genae, face, palpi, and mouthparts entirely yellow. The face is slightly raised down the median portion. Each palpus terminates in a very strong, yellow spine-like process (fig. 171c). One strong bristle is present on the upper portion of each vibrissal row. The antennae are yellow, tinged with brown on the dorsal surface of the second segment and on the apical portion of the third. The arista has eight dorsal and four ventral rays in addition to the apical fork. The lower reclinate bristle is small, about half as long as the proclinate, and situated distinctly above the latter. *Thorax:* Brownish yellow or brownish red on the mesonotum, with a faint indication of a yellow vitta in line with each dorsocentral row, and with yellow lateral margins of the mesonotum. The scutellum is brown on the disc, yellow on the sides; the metanotum is entirely yellow; the pleura are all yellow except for a longitudinal streak of brown across the top edge and a faint spot of brown on the upper median portion of the mesopleuron and also a faint spot of brown on the upper portion of each pteropleuron. Two strong humeral bristles are present. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. The anterior dorsocentral bristles are situated slightly behind a line drawn between the second pair of supraalars. *Legs:* Entirely yellow. Front femur with three or four irregularly spaced posterodorsal bristles and five or six posteroventrals. The front tibiae and tarsi are devoid of ciliation except for about four rather long black hairs at the base of the tibia (fig. 171d). The front basitarsus is just slightly over one-half as long as the tibia. *Wings:* About 2.7 times longer than wide. The third costal section

is 4.5 times longer than the fourth, and the costal fringe ends near the median portion of the distance between the apices of veins R_{2+3} and R_{4+5}. The costal cells are predominantly brown, and the brown marking in the second costal cell extends across the basal portions of cells R_1 and R_3, and into the base of cell R_5 just before the r–m crossvein. A brown spot is present in the middle of cell R_1, and extends transversely across the wing through cells R_3 and R_5, and over the m crossvein. An oblong brown spot is present at the apex of each of veins R_{2+3}, R_{4+5}, and M_{1+2}, and a broad brown streak extends along vein M_{3+4} nearly four-fifths its length (fig. 171e). *Abdomen:* Brown with a large yellow basal spot present on the side of each tergum. The genitalia have not been studied.

Length: body, 4.5 mm.; wings, 5.0 mm.

FEMALE. Unknown.

Holotype male: Kaiholena Ridge, Hawaii, 2,500 feet, August, 1952 (D. E. Hardy). One paratype male: from Napau Crater, Kilauea, Hawaii, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum. The paratype is in the University of Hawaii collection.

Drosophila prolixa new species (fig. 172a–d).

This species fits near *D. polychaeta* Patterson and Wheeler because of the elongate costal fringe on the wing; the two species are not related, however. *D. prolixa* is readily differentiated by its predominantly dark coloration, by the elongate inner vertical bristles, by having the anterior dorsocentral bristles situated near the suture, and the penultimate section of vein M_{1+2} just slightly shorter than the last section of that vein. It also differs in many other details as pointed out in the description below. It also fits near *D. lonchoptera* n. sp., but the wings are not pointed, the third costal section is longer, and it differs in other details as brought out in the key.

MALE. *Head:* Shaped as in figure 172a, the bristles large and conspicuous; the inner vertical bristles are especially well developed. Three moderately strong bristles are present in each vibrissal row. The lower reclinate bristle is about two-thirds to three-fourths as long as the proclinate and is situated opposite the latter. The front, vertex, and upper occiput are brown to black. The front, measured from the lower ocellus to the anterior median margin, is nearly three times wider than long. The upper reclinate bristles are situated near the median portion of the front. The occiput, genae, and face are yellow, tinged faintly with brown; the latter has a distinct carina extending down the median portion. Each gena has a brown streak along the vibrissal row. The palpi are brown; each has three black bristles at or near the apex in addition to several black setae along the outside surface. The first two antennal segments and the basal portion of the third are rufous, tinged faintly with brown. The apical portion of the third segment is brown. The arista has five to six moderately long dorsal rays and two ventral rays in addition to the apical fork. *Thorax:* Predominantly brown, tinged with yellow or rufous in the ground color, and covered with pale brown

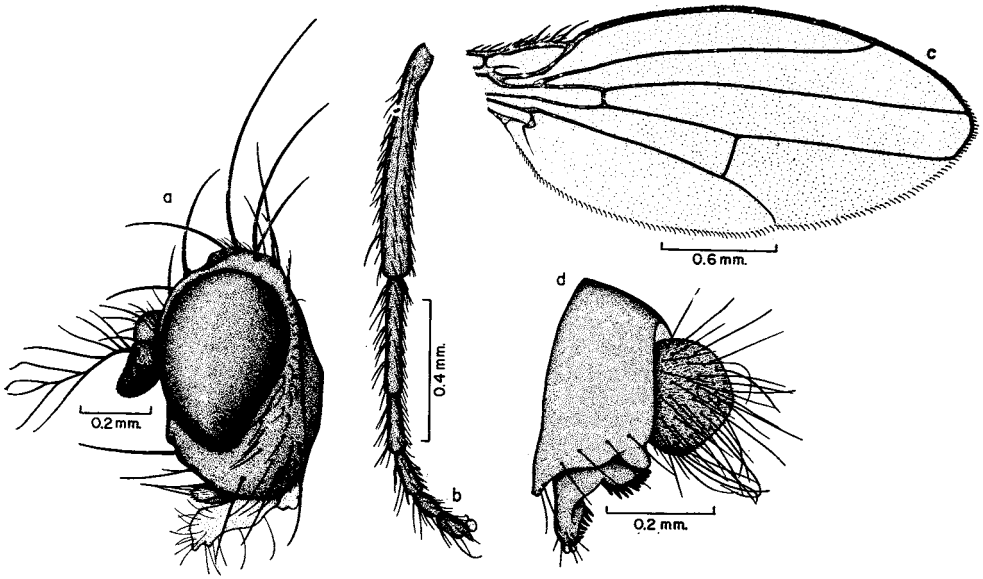


Figure 172—*Drosophila prolixa* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

pollen. The dorsocentral bristles are widely spaced; the posterior pair is situated on the hind portion of the mesonotum and the anterior pair is situated almost in line with the suture. Six to eight irregular rows of acrostichal setae are present in the median portion of the thorax. One large and two small humeral bristles are present. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. A moderately developed secondary bristle is present at the upper edge of the sternopleuron just posterior to and almost as large as the anterior bristle, and a vertical row of black setae extends from the posteroventral corner of each sternopleuron almost to the anterior bristle. The humeri are yellow. The metanotum is yellow covered with yellow-gray pollen. Conspicuous setae are present between the scutellar bristles. *Legs:* The coxae and femora are brown, tinged with yellow; the tibiae and tarsi are yellow. Moderately strong dorsal bristles are present on all of the coxae. The front femora are slender; the posterodorsal and posteroventral bristles are well developed. The front tibiae and tarsi are not ornate. The latter have short, suberect setae extending down the dorsal portion (fig. 172b). The front basitarsus is slightly more than one-half as long as the tibia. At the apex of the middle tibia is a strong ventral bristle one-half as long as the basitarsus; a moderately large preapical bristle is also present. The dorsal bristle of the hind tibia is situated about its own length from the apex of the segment. *Wings:* Rather broad, scarcely over two times longer than wide, and faintly tinged with yellow (fig. 172c). Three pairs of moderately strong bristles are situated on the second costal section just before the incision. The costal fringe extends seven-eighths the distance between the

apices of veins R_{2+3} and R_{4+5}. The third costal section is 2.8 to 3.4 times longer than the fourth section. The last section of vein M_{1+2} is about one-half longer than the penultimate section. The last section of vein M_{3+4} is one-half longer than the m crossveins. *Abdomen:* Predominantly brown; the apices of the terga are yellow. The last visible tergum is entirely yellow and sometimes the first tergum is all yellow; in some specimens the apical half to three-fourths of terga two to six is yellow. The ninth segment is entirely yellow, almost two times higher than long, and produced into a slender point on the anteroventral margin. The anal plates are semicircular, rather densely black-haired. The claspers are elongate, arcuate on the inner margin, and with five or six very closely placed black teeth on the posterior portion and more widely spaced teeth along the inner margin (fig. 172d).

Length: body, 2.8–3.2 mm.; wings, 3.2–3.6 mm.

FEMALE. Fitting the description of the male in most respects. The third costal section is about three times longer than the fourth, and the last section of vein M_{1+2} is one-third longer than the penultimate section. The ovipositor is poorly developed, the plates are scarcely visible *in situ*, and do not extend as far as the anal plates.

Length: body, 3.6 mm.; wings, 4.0 mm.

Holotype male: Puu Kolekole, Molokai, 3,600 feet, July, 1952 (D. E. Hardy). Allotype female: same as type, July, 1953. Nine paratypes (eight males and one female): from the following localities on Molokai—same as type; Puu Alii, 4,200 feet, July, 1953 (D. E. Hardy); Manawainui Valley, July, 1952, and August, 1953 (D. E. Hardy); Puu Kaeha, July, 1953 (D. E. Hardy); and Kawela, Molokai, 3,700 feet, December, 1925 (E. H. Bryan, Jr.).

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila prominens new species (fig. 173a–e).

This species fits in the complex near *D. furvifacies* n. sp. but is readily differentiated by the very strong apical bristle on the palpus, by the heavy black rim on the margin of each labellum (fig. 173a), and by the short costal fringe on the wing.

MALE. *Head:* The upper two-thirds to three-fourths of the head as seen from direct frontal view is velvety black, slightly gray pubescent along the eye orbits and in the ocellar triangle; the lower one-fourth to one-third of the front is reddish brown. Measured from the median ocellus to the anterior margin, the front is two times wider than long. The upper half of the occiput is yellow, tinged with brown; the lower portion is pale yellow. The genae are yellow, except for a brown to black streak extending along the vibrissal row. The genae are very narrow; from the vibrissae to the eye margin the space is scarcely greater than two rows of eye facets. The face is brown to black on the lower portion, yellow, tinged with brown medianly on the upper half. The middle portion of

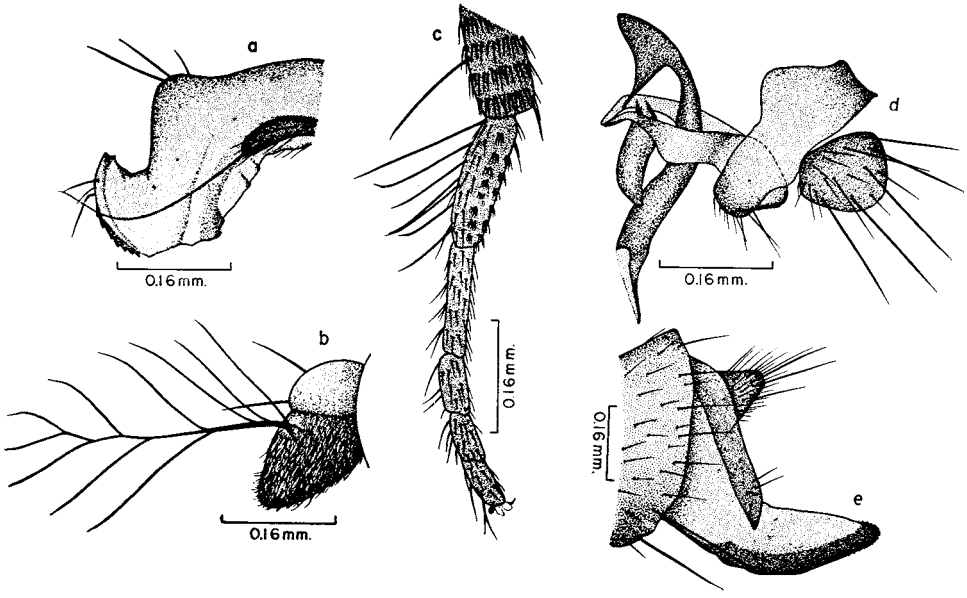


Figure 173—*Drosophila prominens* n. sp.: **a**, mouthparts; **b**, antenna; **c**, front tarsus; **d**, male genitalia; **e**, female genitalia.

the face is slightly raised. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the lower humeral bristle. The anterior reclinate bristle is rather tiny, thin, and hair-like, less than half as long as the proclinate, and about equal in size to one of the acrostichal setae of the mesonotum. The antennae are brown with a faint tinge of rufous in the ground color. The arista has five dorsal and three ventral rays in addition to the small apical fork (fig. 173b). The palpi and mouthparts are predominantly yellow; the apical bristle on each palpus is very large, equal to, or longer than, the palpus. The labellum has a heavily sclerotized black rim on the apex. This is slightly dentate as shown in figure 173a. *Thorax:* Almost entirely dark brown, tinged with black on the dorsum and the pleura; the lower half of each humerus is almost clear yellow. The halteres are pale yellow. The anterior dorsocentral bristles are situated almost opposite the second supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Predominantly yellow, tinged with brown on the coxae and femora. Posteroventral and posterodorsal bristles are well developed on the front femora. The front tibia is not ornate; the preapical dorsal bristle is, however, rather well developed and is about equal in size to the upper bristle of each vibrissal row. The front basitarsus has long, slender, black cilia extending down the dorsal surface; these diminish in length from the base to the apex of the segment. Short, erect setae also extend over the dorsal surface of the remainder of the tarsus (fig. 173c).

The front basitarsus is rather short, about one-third as long as the tibia, and only 1.5 times longer than the second tarsal segment. *Wings:* Faintly, but evenly infuscated with yellow-brown. The third costal section is five times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Shining brown to black in ground color, covered with gray-brown pollen. The anal plates are almost as long as high, nearly hemispherical. The ninth tergum is broad over the dorsal portion, almost straight-sided, scarcely attenuated ventrally. The aedeagus is very distinctively shaped as shown in figure 173d.

Length: body, 3.0 mm.; wings, 3.6 mm.

FEMALE. Very similar in most respects to *D. furvifacies* n. sp. but differentiated by the blunt ovipositor blades (fig. 173e) and by the short costal fringe on the wing. The apical bristle on the palpus is strong but not so elongate as in the male. It is subequal in length to the palpus and approximately equal in size to the proclinate bristles of the front. The ovipositor blades are blunt and armed with teeth around the apices. *In situ*, the blades extend but slightly beyond the apices of the anal plates; when protruded, as in figure 173e, they extend nearly two times the length of the anal plates.

Length: body, 3.2 mm.; wings, 3.6 mm.

Holotype male and allotype female: Kawaikoi Stream, Kauai, 3,700 feet, August, 1953 (D. E. Hardy). Twelve paratypes (two males and ten females): from Nualolo Valley, Kauai, July, 1952, and August, 1953, 3,400 feet (D. E. Hardy); Halemanu Swamp, Kauai, August, 1953 (D. E. Hardy); Mount Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy); Waiakoali Valley, Kauai, 3,700 feet, August, 1953 (D. E. Hardy); Kainamanu, Kauai, 3,800 feet, July, 1952 (D. E. Hardy); and Kawaikoi Stream, Kauai, 3,700 feet, August, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the United States National Museum, British Museum (Natural History), and the University of Hawaii collections.

Drosophila propiofacies new species (fig. 174a–c).

This species fits in the *proceriseta* complex because of the very elongate anterior reclinate bristles and the convergent lower margins of the face. It is readily differentiated from other known species in this complex by having the process on the front basitarsus of the male short and thick (about equal in length to the basal portion of the segment) and with the basal portion broad (about equal in width to the apex of the tibia) (fig. 174a). The all-brown pleura will also help differentiate this from related species.

MALE. *Head:* Almost two times higher than long as seen in direct lateral view; the eyes are rather conspicuously short pilose. The front, measured from the median ocellus to the anterior margin, is two times wider than long. The face is predominantly yellow, the eye orbits above the proclinate bristles are shining

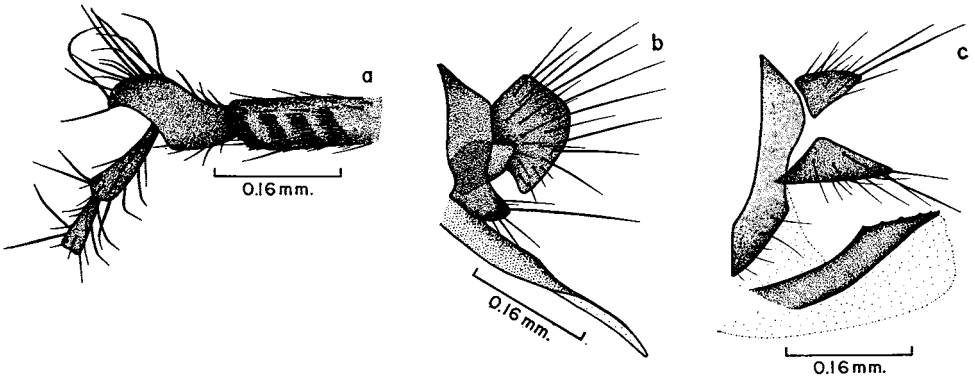


Figure 174—*Drosophila propiofacies* n. sp.: **a,** front tarsus; **b,** male genitalia; **c,** female genitalia.

black covered with gray pollen, and the upper part of the face between the ocellar triangle and the orbits is yellow-red, tinged with brown to black. The ocellar triangle, vertex, and upper occiput are shining black covered with gray-brown pollen. The major portion of the occiput is dark brown to black; only the extreme lower portion is yellow. The genae are yellow except for a narrow brown line extending down each vibrissal row. At the lower anterior margin of the eye, the gena is rather narrow, equal in width to two or three rows of eye facets. The face is predominantly yellow, tinged with brown along the lower margin. The median portion of the face is slightly convex. The clypeus is yellow-brown. The palpi and mouthparts are yellow. No distinct bristles are present on the palpi, but numerous black setae extend over the apical portion. The labella are not ornate. One small bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the acrostichal setae on the mesonotum. The anterior reclinate bristle is very well developed, is very similar to that of *proceriseta* n. sp., extends three or four times longer than the proclinate, and is situated distinctly above the latter. The arista has five dorsal and two ventral rays in addition to the apical fork. The basal two antennal segments are yellow except for the dorsal portion. The third segment is brown, tinged with yellow in ground color. *Thorax:* Dark reddish brown, tinged faintly with black in the ground color of the dorsum, and rather densely covered with gray pollen. The anterior dorsocentral bristles are situated about opposite the second (posterior) supraalars and are scarcely one-half as long as the posterior dorsocentrals. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is approximately four-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs:* Entirely yellow except for a tinge of brown at the apices of the tarsi. The front femora and tibiae are not ornate. The front basitarsus has a thick projection extending from the apicodorsal surface; this is densely covered with black hairs and shaped as in figure 174a. *Wings:* Entirely hyaline. The third costal section is approximately four times longer than the fourth, and the costal fringe extends about

two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Entirely dark brown on the dorsum, tinged with yellow to rufous in the ground color. The venter is entirely yellow. The anal plates are nearly two times higher than long and are acutely pointed ventrally. The ninth tergum is narrowed over the dorsal portion, convex on the posteromedian margin, and lobate ventrally (fig. 174b). The claspers are plainly visible from direct lateral view, but the row of teeth is hidden by a slight expansion of the outside edge of each clasper.

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. The female specimens which appear to belong here are similar in most respects to the male. However, the front is predominantly brown, the anterior reclinate bristles are slightly smaller than the proclinates, one large plus one or more smaller bristles are present in each vibrissal row, a small bristle is present at the apex of each palpus, and the legs are not ornate. The ovipositor blades are rather slender, sharp-pointed, and extend distinctly beyond the apices of the anal plates (fig. 174c).

Length: body, 2.85 mm.; wings, 3.20 mm.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Allotype female: Ridge of Haelaau, Maui, 3,500 feet, December 19, 1928 (E. H. Bryan, Jr.). Ten paratypes (six males and four females): same data as type and same data as allotype.

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila punalua Bryan (fig. 175a–d).

Drosophila punalua Bryan, 1934, Proc. Haw. Ent. Soc. 8 (3) :438.

Drosophila lulumahu Bryan, 1938, Proc. Haw. Ent. Soc. 10 (1) :39. **New synonymy.**

Endemic. Oahu (type locality: Punaluu; type locality of *lulumahu:* Lulumahu Valley). This species is common in the mountains of Oahu and is strongly attracted to fermenting bananas.

Type in the B. P. Bishop Museum.

I believe it is quite obvious that the female specimens which Bryan described as *punalua* were teneral specimens of what he later described as *lulumahu.* He distinguished the latter by being "larger and darker." I have studied the type series and a large series of specimens from various localities on Oahu, and the range in size appears to be normal for the species; the very pale (typical *punalua*) specimens are all freshly emerged, teneral individuals.

This species fits in the complex which has a fuscous mark in the middle of vein R_{2+3} but no mark on vein R_{4+5}, and which has the thorax yellow to rufous with four longitudinal brown vittae. It fits nearest to *engyochracea* n. sp. but is differentiated by having the lateral vittae on the mesonotum widely separated,

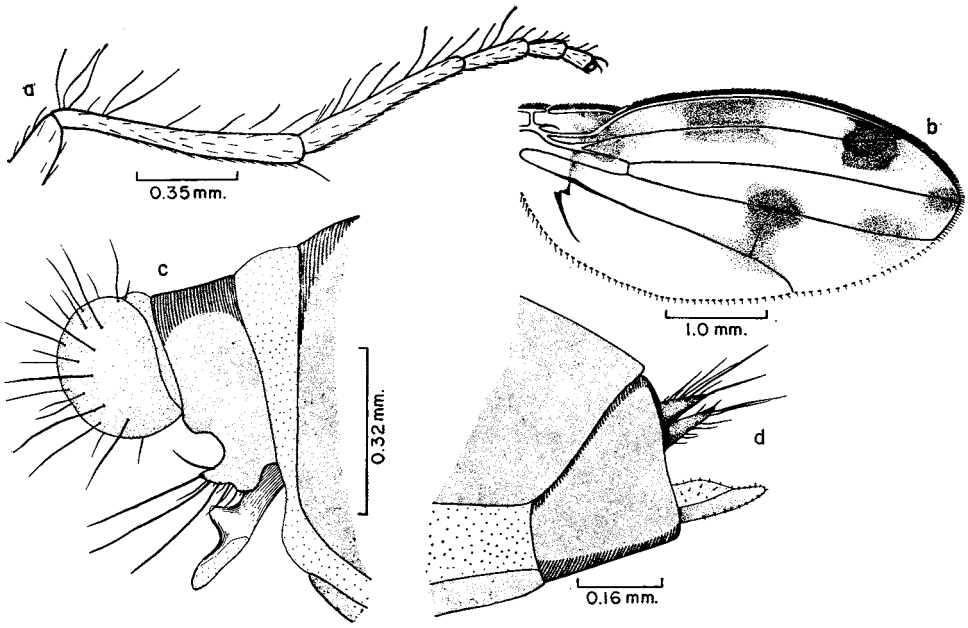


Figure 175—*Drosophila punalua* Bryan: **a**, front tibia and tarsus; **b**, wing; **c**, male genitalia; **d**, female genitalia.

by having the scutellum either all yellow or brown on the disc, by the spot on vein R_{2+3} being at the middle of the vein, and by the very different front legs of the male (fig. 175a).

Predominantly yellow to rufous species with four brown vittae extending longitudinally down the mesonotum; the disc of the scutellum is chiefly brown, and a brown mark extends along the upper edge of the mesopleuron and through the upper portion of the pteropleuron. The front is yellow, tinged faintly with brown, and about as wide as long. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated distinctly above the latter. The face is entirely yellow and is flat in the median portion. Each vibrissal row has one or two strong bristles at the upper portion. The antennae are yellow, tinged with brown. The arista has 12 to 13 dorsal and about five ventral rays in addition to the apical fork; the anterior surface has numerous short hairs. The palpi are yellow and are devoid of distinct bristles in the male; in the female a moderately strong apical bristle is present. The longitudinal vittae on the mesonotum are rather narrow; the submedian vittae extend the entire length of the segment and are separated by a distance equal to about four rows of acrostichal setae. The lateral vittae extend from the suture to about opposite the posterior dorsocentral bristles. The upper edge of each humerus is brown, and a brown spot is present just behind each humerus. The scutellum is typically brown on the disc and broadly yellow on the margins; in teneral specimens the scutellum may be

entirely yellow. The anterior pair of dorsocentral bristles is situated slightly posterior to a line drawn between the second pair of supraalars. The legs are entirely yellow. The front tibia of the male has long anterodorsal and posterodorsal cilia extending the entire length of the segment; also a basal clump of long, wavy, dorsal hairs is present. The front tarsus has numerous long, dorsal hairs extending almost the full length (fig. 175a). The basitarsus is slightly over half as long as the tibia and is two times longer than the second tarsal segment. The third section of the costa is 4.5 times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The wings are hyaline to subhyaline with brown markings at the apex, over the m crossvein, at middle of vein R_{2+3}, and with a brown mark extending to the apical half of the second costal cell across the wing over the r–m crossvein. The apical brown mark is continuous around the margin from the apical portion of cell R_1 to the apical portion of cell M_4. The brown mark over the m crossvein is very large and extends through about three-fifths of cell R_5. The brown mark on vein R_{2+3} rather large and well defined in the female, filling the median portion of cell R_1 (fig. 175b); in the male this mark is less distinct and is often reduced to a rather faint brown streak extending along vein R_{2+3}. The last section of vein M_{1+2} is about one-third longer than the penultimate section. The anterior margins of the abdominal segments are yellow; the posterior portions are brown. The ninth tergum of the male is rather broad, and lobate on the ventral margin; the ventral margins have numerous long, black bristles (fig. 175c). The claspers are small, not usually visible in lateral view. The female ovipositor plates are rather long and slender, almost as long as the ventral margin of the seventh segment, and armed with stout teeth around the margins (fig. 175d).

Length: body, 4.00–4.75 mm.; wings, 4.50–5.70 mm.

Drosophila pychnochaetae new species (fig. 176a–e).

This species fits close to *D. paucipuncta* Grimshaw but the two are not related. *D. pychnochaetae* is readily differentiated by the all-yellow thorax, by lacking the brown subbasal spot on the wing, by the short triangular ovipositor of the female, and by the dense clump of black hairs on the front basitarsus of the male (fig. 176c).

MALE. Small, predominantly yellow species. *Head:* Front entirely yellow, tinged lightly with brown on the upper portion; about one-third wider than long. Anterior reclinate bristles small, about one-half as long as the proclinate. Vertex and upper portion of occiput faintly tinged with brown. Remainder of the head yellow, except for the red compound eyes. No strong bristles are developed in the vibrissal rows; the upper half of each row is made up of very fine pale hairs. The face is slightly raised in the upper median portion, flat below. Antennae yellow, tinged faintly with brown over the third segment and on the upper portion of the second. Arista with five dorsal and three ventral rays in addition to the apical fork (fig. 176a); the inner surface of each arista is sparsely

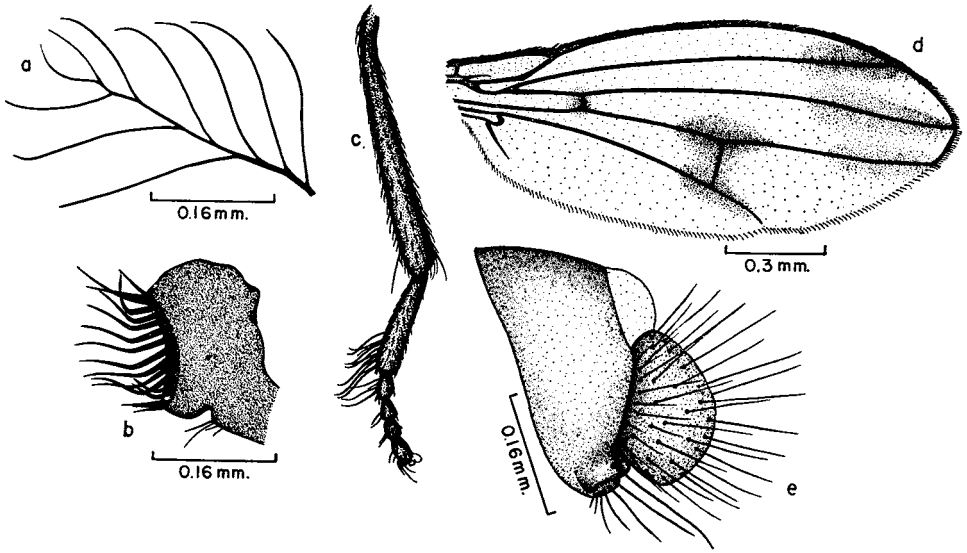


Figure 176—*Drosophila pychnochaetae* n. sp.: **a**, arista; **b**, labellum; **c**, front tibia and tarsus; **d**, wing; **e**, male genitalia.

haired. The palpi and mouthparts are yellow, and each labellum has a series of rather long and curved, yellow-red bristle-like structures at the apex (fig. 176b). No strong bristles present on the palpi; the apical bristle is very tiny, scarcely differentiated from the other black setae. *Thorax:* Entirely yellow. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. About eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Front femur slender, about five times longer than wide, and about two times thicker than the tibia. Front tibia devoid of conspicuous ciliation. Front basitarsus with a dense clump of moderately long erect dorsal hairs at the apex (fig. 176c); second tarsal segment also with several erect dorsal hairs. Basitarsus about three to four times longer than the second tarsal segment, about two-fifths as long as the tibia. *Wings:* Predominantly subhyaline, with an expanded brown, dumbbell-shaped spot over the m crossvein, and with a brown spot extending along each of veins R_{2+3}, R_{4+5}, and M_{1+2} just before the apices. The r–m crossvein is also slightly infuscated. The wings are 2.5 times longer than wide. Vein R_{2+3} curves upward slightly at its apex. The third costal section is about 4.3 times longer than the fourth. The costal fringe extends nearly half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.46 times longer than the penultimate section (fig. 176d). *Abdomen:* Predominantly yellow, tinged with brown on the apices of terga two to five. The ninth tergum is very broad, distinctly expanded dorsally, its length nearly one-third greater than that of the anal plates. The ventral margins of the tergum are rather truncate, and each has a small clump

of moderately long hairs near the upper edge (fig. 176e). From a direct lateral view the claspers are hidden by the edges of the tergum.

Length: body, 2.75 mm.; wings, 3.10 mm.

FEMALE. Fitting the description of the male except for sexual characters. A moderately strong black bristle is present at the upper edge of each vibrissal row. The ovipositor plates are yellow, triangular in shape, rather pointed, and extending just slightly beyond the apices of the anal plates.

Length: body, 2.60–2.75 mm.; wings, 2.75–3.00 mm.

Holotype male and allotype female: Pupukea, Oahu, December, 1952, collected in banana thicket (D. E. Hardy). Seven paratypes (five males and two females): one same data as type; one same locality and collector as type, July, 1958; one, Lulumahu Valley, Oahu, April 11, 1937 (F. X. Williams); one, Punaluu, Oahu, no date given (O. H. Swezey); one, Poamoho Trail, Oahu, 1,700 feet, May, 1953 (M. S. Adachi); one, Waimano, Oahu, May, 1913 (no collector given); and one, Mt. Tantalus, Oahu, December, 1953 (M. S. Adachi).

Type and allotype in the B. P. Bishop Museum. Remainder of paratypes in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila quadrisetae new species (fig. 177a–c).

This species is similar in many respects to *D. furvifacies* n. sp., and the two are probably closely related. It is differentiated by having relatively few long dorsal cilia arranged over the apical two-thirds of the basitarsus (fig. 177b), by having strong bristles at the upper edge of each vibrissal row, by the labella of the male being very differently developed as in figure 177a, and by the all-yellow face and other details.

MALE. *Head:* The portion of the front below the median ocellus is predominantly yellow to rufous. The upper portion is black along the eye orbits, vertex, and ocellar triangle and reddish brown in the areas between. The upper half of the occiput is brown covered with gray pollen, the lower portion pale yellow. The genae and face are entirely yellow. The first two antennal segments are yellow, tinged with brown on the dorsal portions. The third segment is brown, faintly tinged with rufous. The arista has five or six dorsal rays and two ventral rays in addition to the apical fork. The anterior reclinate bristle is slightly smaller than the proclinate and is situated distinctly above the latter. Two or more moderately strong bristles are present at the upper edge of each vibrissal row. The palpi and the mouthparts are entirely yellow. Each palpus has a rather strong apical bristle; this is approximately equal in size to the anterior reclinate bristles. The labellum is fringed with curved, yellow spines (fig. 177a). *Thorax:* Entirely brown, tinged with black on the dorsum, and tinged with yellow to rufous on the pleura. The anterior dorsocentral bristles are situated in front of a line drawn between the second (posterior) pair of supraalars. Six rows of acrostichal setae are present. Each humerus has two moderately strong bristles.

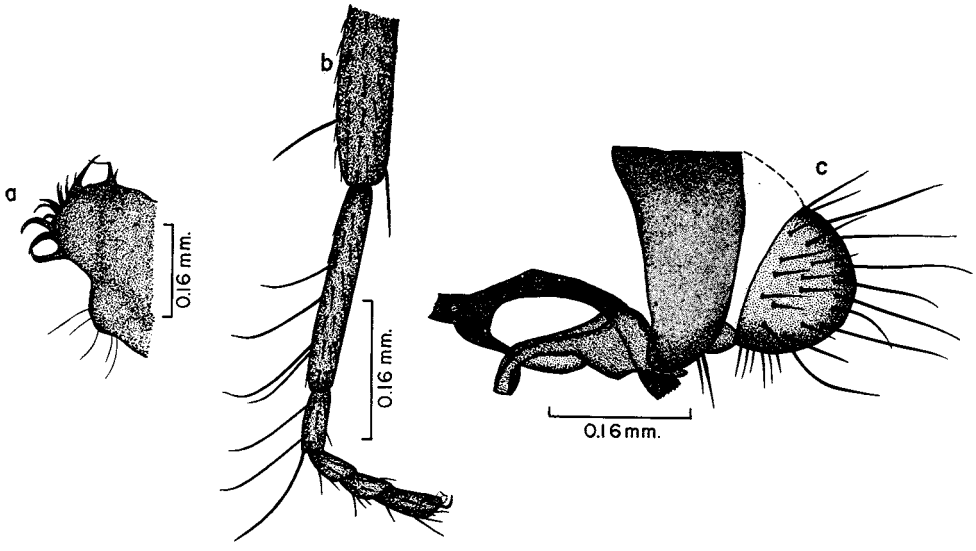


Figure 177—*Drosophila quadrisetae* n. sp.: **a,** mouthparts; **b,** front tarsus; **c,** male genitalia.

The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. Posterodorsal and posteroventral bristles are well developed on the front femora. The front tibia has numerous erect setae extending down the posterior surface; these are slightly longer and more distinctly erect than are the other setae of the tibia. The front tarsus has long dorsal cilia extending over the first two segments; these are sparsely scattered, however, with approximately four dorsal hairs present on the basitarsus and three on the second segment (fig. 177b); the basal third of the basitarsus is devoid of long cilia. The basitarsus is approximately one-half as long as the tibia. *Wings:* Almost completely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Almost entirely polished brown, tinged with black, and covered with gray-brown pollen. The sterna are yellow. The anal plates are nearly hemispherical, almost two times higher than long. The ninth tergum is expanded dorsally, broadest across the upper surface, and gradually narrowed ventrally; at the widest portion it is slightly longer than the anal plates (fig. 177c).

Length: body, 2.3 mm.; wings, 2.6 mm.

FEMALE. The female has not been definitely associated with the male and I have no way to differentiate this sex from *prominens.* It is probable that the female of these two species may be confused.

Holotype male: from Nualolo Valley, Kauai, July, 1952, 3,400 feet (D. E. Hardy). Nine paratypes (all males): from the following localities in the Kokee region of Kauai—same as type, June and July, 1953 (W. C. Mitchell and D. E.

Hardy); Poomau Valley, 3,000 feet, July, 1952 (D. E. Hardy); Kokee Valley, August, 1953 (D. E. Hardy); Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy); and Kainamanu, 3,800 feet, July, 1952 (D. E. Hardy). Also two male paratypes: Manoa Valley, Oahu, May 6, 1945 (W. W. Wirth).

Type and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

A series of five males from Molokai seem to belong here. They fit the specimens from Kauai except for rather slight differences in the shapes of the ninth terga of the males. These are not being designated as paratypes. The specimens are from the following localities: Puu Kolekole, July, 1952 (M. Tamashiro), July, 1953 (D. E. Hardy); Puu O Kaeha, July, 1953 (D. E. Hardy); and Manawainui Valley, July, 1952, and August, 1953 (D. E. Hardy).

Drosophila quasianomalipes new species (fig. 178a–f).

This species fits near *D. comatifemora* n. sp. but is readily distinguished by by having a brown mark in the apex of the second costal cell, by the last section of vein M_{1+2} being equal to the penultimate section, by the entire ventral surface of the front femur being covered with long hairs (fig. 178a), by the unusual development of the apex of the front tibia, and by the lack of ciliation on the front tarsus (fig. 178b). The development on the front tibia of the male is rather similar to that of *D. anomalipes* Grimshaw, but the two species are not alike in other respects.

MALE. Predominantly pale-colored species. *Head:* The front is about as wide as long, entirely brown, and tinged with yellow. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter (about one-third the distance between the proclinate and the upper reclinate bristle). The occiput is entirely yellow except for the upper median portion, which is tinged with brown. The genae, palpi, and mouthparts are yellow except for a narrow brown rim at the apex of each labellum. The palpus has one moderate apical bristle plus numerous black setae at the apical portion. No strong bristles are present in the vibrissal rows; most of the hairs are of equal size. The face is yellow-white and has a distinct ridge down the median portion. The antennae are brown, tinged with yellow; the second segment has three or four black dorsal bristles. The arista has eight dorsal and three ventral rays in addition to the apical fork. The inner margin is sparsely haired. *Thorax:* Entirely yellow with a very faint tinge of brown on the dorsal portion. The anterior dorsocentral bristles are about one-half the size of the posterior bristles and are situated approximately opposite the second pair of anterior supraalars. Six rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The halteres are yellow. *Legs:* Entirely yellow. Front coxae each with a dense clump of short, black hairs covering the anterior and anterodorsal surfaces just before the apex of the segment. Front femora moderately stout, about 3.8 times longer than wide; the anteroventral

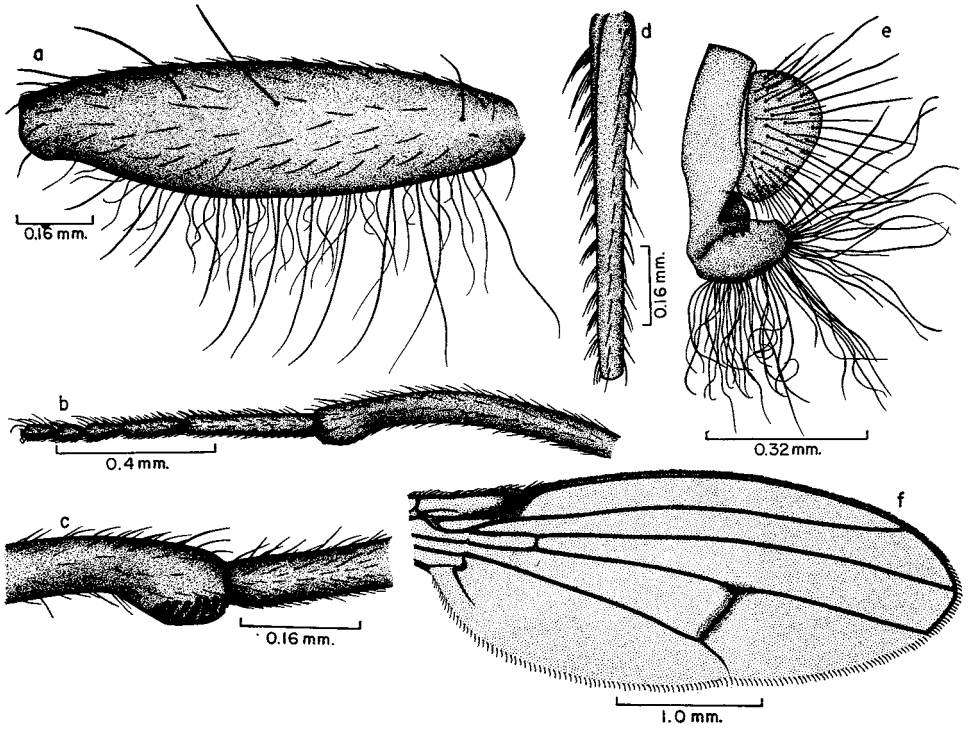


Figure 178—*Drosophila quasianomalipes* n. sp.: **a**, front femur; **b**, front tibia and tarsus; **c**, apex of front tibia; **d**, hind basitarsus; **e**, male genitalia; **f**, wing.

surface is densely villose almost the entire length of the segment. The posteroventral and posterodorsal bristles are moderately developed on the femur with 4 or 5 of the latter and 10 to 12 of the former (fig. 178a). The front tibia is slightly arched on the ventral surface and has a slight knob, which is brown and covered with transverse striations on the anteroventral surface, at the apex of the segment (fig. 178b). The front tarsi are not ornate. The basitarsus is about two-fifths as long as the tibia. The hind basitarsus is slender, slightly tapered from base to apex, about three-fifths as long as the tibia, and with numerous comb-like sets of short setae arranged transversally down the ventral surface (fig. 178c). *Wings:* Rather narrow, about three times longer than wide. Faintly infuscated over the entire surface, lightly brown along the m crossvein, (fig. 178f) and distinctly brown along both sides of vein R_1. The costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth, and the last section of vein M_{1+2} is equal to the penultimate section. The last section of vein M_{3+4} is about two-thirds as long as the m crossvein. *Abdomen:* Yellow-red, tinged lightly with brown. The ninth tergum is very weakly sclerotized, almost membranous over the dorsal portion; each ventral portion is greatly expanded, developed into a large, conspicuous, very densely villose lobe (fig. 178e), readily visible *in situ*.

Length: body, 4.50 mm.; wings, 5.25 mm. by 1.70 mm.

FEMALE. Unknown.

Holotype male: from Kokee, Kauai, 3,600 feet, July, 1952, collected in a banana bait trap (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila quasiexpansa new species (fig. 179a).

This species fits in the complex which is characterized by having the front basitarsus very short (less than the length of the second tarsal segment). It is closely related to *expansa* n. sp. but is differentiated by having the front basitarsus of the male gently expanded dorsally (fig. 179a) rather than with a strong, dorsoapical prominence; by having two strong, black hairs at the apex of the second tarsal segment plus one long, black hair in the middle of the segment; and by the elongate, slender tibia.

MALE. *Head:* Almost quadrate, just slightly higher than long as seen in direct lateral view. The front is entirely brown, faintly tinged with yellow in the ground color of the extreme lower portion; measured from the median ocellus to the front margin, the front is about two times longer than wide. The upper eye orbits, the vertex, the ocellar triangle, and the upper margin of the occiput are shining black in ground color covered with brownish gray pollen. The median portion of the occiput is pale brown. The lower one-third to one-fourth is yellow. The gena is yellow; measured from the vibrissal row to the eye margin, it is equal in width to two rows of eye facets. The face is predominantly yellow, tinged with brown to black on the lower margin. The upper median portion of the face is raised into a small keel. No strong bristles are present in the vibrissal rows. The palpi and mouthparts are entirely yellow. Each palpus has a short, black, apical bristle. The clypeus is yellow-brown. The labella are not ornate. The anterior reclinate bristle is equal to or slightly longer than the proclinate and is situated opposite the latter. The antennae are dark brown. The arista has five dorsal and one ventral ray in addition to the apical fork. *Thorax:* Entirely brown covered with gray-brown pollen. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about three-fourths to four-fifths as long as the posterior bristle. The halteres are brown to black except for the yellow bases. *Legs:* Entirely yellow except for a tinge of brown on the coxae and on the last segment of each tarsus. Only two posterior dorsal bristles are present on the front femur and are located near the apical fourth of the segment; about six posteroventral bristles are present. The front tibia is moderately long and slender, almost equal in length to the femur. The front basitarsus is short, thickened dorsally, and has a fringe of about eight strong black dorsoapical bristles (fig. 179a). The basitarsus is one-sixth to one-seventh as long as the tibia and is slightly shorter than the second tarsal segment. The second segment has one black dorsal hair in the middle of the segment and two dorso-

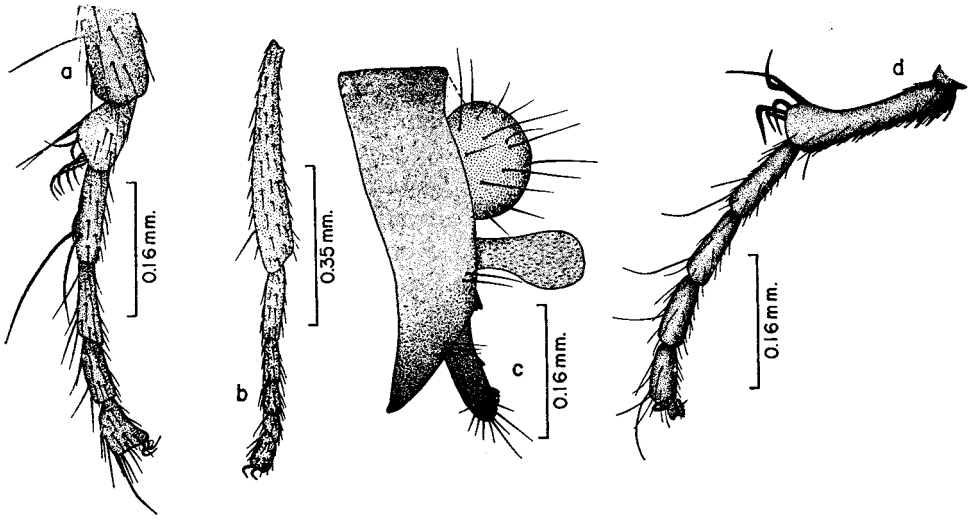


Figure 179—*Drosophila quasiexpansa* n. sp.: **a,** front tarsus. *D. reducta* n. sp.: **b,** front tibia and tarsus; **c,** male genitalia. *D. redunca* n. sp.: **d,** front tarsus.

apical bristles. *Wings:* Almost hyaline. The third costal section is five times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.56 times longer than the penultimate section. *Abdomen:* Entirely dark brown covered with gray-brown pollen. The genitalia have not been dissected for study. *In situ,* the anal plates appear to be slightly pointed ventrally.

Length: body, 2.2 mm.; wings, 2.6 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (R. Namba).

Type in the B. P. Bishop Museum.

Drosophila reducta new species (fig. 179b–c).

This species fits in the complex which is characterized by having the wings hyaline, the tarsi without ciliation, the face with a sharp median keel, and the basitarsus of the front legs about one-fourth as long as the tibia. It fits near *D. taractica* n. sp., but the male genitalia are strikingly different as shown in figures 179c and 195e. Also the body coloration and number of rays on the arista differ as pointed out in the key. The genitalia are somewhat similar to those of *Scaptomyza* (*Parascaptomyza*) Duda, even possessing secondary clasper-like lobes, apparently arising from the posterior surface of the ninth tergum.

MALE. *Head:* About one-third higher than long. The genae are moderately developed; from the vibrissal row to the eye margin, the distance is equal to three or four rows of eye facets. The lower margin of the front, below a level with the proclinate bristles, is yellow. The upper portion is largely brown, black

along the orbits, and around the ocellar triangle. The vertex and upper occiput are black covered with gray pollen. The median portion of the occiput is brown; the lower portion is yellow. The genae and face are entirely yellow. The latter is developed into a sharp carina on the median portion. The palpi and mouthparts are yellow. Each palpus has two short, black bristles at or near the apex. One strong bristle is present at the upper edge of each vibrissal row; this is equal in size to the upper reclinate bristle. The anterior reclinate bristle is about one-half as long as the proclinate and is situated opposite the latter. The first two antennal segments are yellow, tinged with brown on the dorsal surfaces. The second segment has two black bristles. The third segment is brown, tinged faintly with yellow. The arista has four dorsal and two ventral rays in addition to the apical fork. *Thorax:* Reddish yellow in ground color, distinctly brown on the dorsum, faintly tinged with brown on the pleura. The propleura are yellow; the remainder of the pleura are yellow to rufous, tinged with brown. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) pair of supraalars. The mesonotum is covered with gray-brown pollen. Six rows of acrostichal setae are present; the specimen is somewhat rubbed but the bases of the setae are evident. Each humerus has one long and one short bristle; the secondary bristle is approximately one-third as long as the upper bristle. The anterior sternopleural bristle is approximately two-thirds as long as the posterior bristle. The mesonotum is rather densely gray pollinose. The halteres are yellow. *Legs:* Entirely yellow except for the brown apices of the tarsi; the leg segments are rather short and thick. The front coxae have numerous black setae scattered over the anterodorsal surfaces. The front tibiae and tarsi are thickly covered with short, erect setae. The front basitarsus is one-third as long as the tibia (fig. 179b). *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe ends at about the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black. The genitalia are rather complex. The anal plates are produced into slender lobes ventrally. The ninth tergum is comparatively broad across the dorsal section of the segment and is attenuated to a subacute point on the anteroventral margin. A membranous lobe arises from the posteroventral margin of the tergum or from the inner margin of each anal plate (its origin cannot be definitely ascertained). Each clasper is strongly developed with black teeth at the base and a conspicuous apical lobe, which is toothed on the inner surface (fig. 179c).

Length: body and wings, 2.5 mm.

FEMALE. Unknown.

Holotype male: Upper Olaa Forest, Hawaii, July, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila redunca new species (fig. 179d).

This species fits near *D. seclusa* n. sp. but is differentiated by the poorly

developed anterior reclinate bristles and by the development of the bristles on the front basitarsus of the male as shown in figure 179d.

MALE. Similar in most respects to other species of this complex. *Head:* The front is brown in the median portion, blackened on the orbits. The anterior reclinate bristles are small and hair-like, scarcely two-thirds as long as the proclinate, and situated about two-fifths the distance between the proclinate and the upper reclinate bristles. At the narrowest portion the gena is about equal in width to two rows of eye facets. No distinct bristles are present in the vibrissal row; all of the setae are nearly equal in size. The palpi have no distinct bristles but have numerous black setae around the outside surfaces. The antennae are brown; the basal segments are tinged with yellow. The arista has four or five dorsal rays and one ventral ray in addition to the apical fork. *Thorax:* Predominantly brown, tinged with yellow on the lower portion of the sternopleuron, the humerus, and on the propleuron. The anterior dorsocentral bristles are situated about halfway between the posterior and anterior supraalars. Six to eight rows of acrostichal setae are present. The lower humeral bristle is about three-fourths as long as the upper and the anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is about two-fifths as long as the tibia and is slightly expanded at its apex. The apex of the basitarsus bears a spine-like apicodorsal process made up of two or three black, closely appressed bristles and a series of sharply bent bristles which arise on the posteroapical surface (fig. 179d). The second tarsal segment is about two-thirds as long as the first and has an erect seta at the apex. *Wings:* Slightly infuscated; the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Dark brown covered with gray-brown pollen. The genitalia have not been dissected for study.

Length: body, 2.7 mm.; wings, 3.2 mm.

FEMALE. Unknown.

Holotype male: Puu Kolekole, Molokai, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila repleta Wollaston.

Drosophila repleta Wollaston, 1858, Ann. Mag. Nat. Hist. 41:117.

Drosophila punctulata Loew, 1862, Berlin. Ent. Zeit. 6:232.

Drosophila adspersa Mik, 1886, Wien. Ent. Zeit. 5:328.

Probably common on all of the Hawaiian Islands. Specimens have been seen on Oahu, Molokai, and Hawaii.

A cosmopolitan species.

Type locality: Madeira.

Type in the British Museum (Natural History).

The *repleta* group of species is by far the largest and most complex of any of the species groups of the *Drosophila* which have been treated to date. It in-

cludes those species which have the mesonotum gray and covered with numerous small brown spots. The group is New World in origin; many of the species are very closely related and even though genetically distinct are often difficult to separate by morphological characters.

The species *D. repleta* has been frequently recorded in the Hawaiian literature, but, according to Zimmerman (1943:346), *repleta* was not present in the Hawaiian Islands and the specimens which had been referred to under this name were actually *D. hydei* Sturtevant and *D. carinata* Grimshaw (as *mescatorum* Patterson-Wheeler). The first accurate record of this species in the islands is that of Mainland (1949:327). He recorded it from Oahu, taken in banana bait traps on the University of Hawaii campus, in March of 1948. I have also seen specimens from the islands of Molokai and Hawaii, but the species is obviously much more scarce in the islands than are *hydei* and *carinata*.

This species is very closely related to *D. carinata* Grimshaw. The only satisfactory character I have found for separating them is the coloration of the front coxae; in *repleta* these are discolored with dark brown, much darker than the tibiae and tarsi, rather than being pale yellow as in *carinata*. *D. carinata* is also supposed to differ from *repleta* by having the abdominal patterns much lighter and less distinct and by having the third costal section about 2.8 times longer than the fourth rather than three times. I see no evidence of differences in the abdominal or thoracic markings in these species, and the slight differences in the comparative lengths of the third and fourth costal sections are of little significance.

This species has been very adequately described by Harrison (1952:508), by Patterson and Mainland (1943:117), and many others. I see no need to repeat the description here except to point out some of the general characteristics which typify the *repleta* group in Hawaii. The ground color of the mesonotum is gray and a small brown to black spot is present at the base of each seta and bristle; many of these spots are confluent. The median portion of the face has a flat-topped carina extending almost the full length. One strong bristle is present at the upper portion of each vibrissal row. The apical bristle on each palpus is rather small. The arista has four dorsal and two ventral rays in addition to the apical fork. The basal two segments of the antennae are yellow, tinged with brown on the dorsal portion. The third segment is predominantly brown. The front is brown pollinose with cinereous markings along the orbits. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated distinctly above the latter. The front coxae are distinctly tinged with brown. The remainder of the legs are usually rufous, tinged lightly with brown in the Hawaiian specimens; in some specimens, however, the femora are strongly tinged with brown. The front tarsi of the male lack long ciliation.

Drosophila residua new species (fig. 180a–c).

This species fits in the complex which is characterized by having the inner vertical bristles displaced, situated directly above the upper reclinates, and much

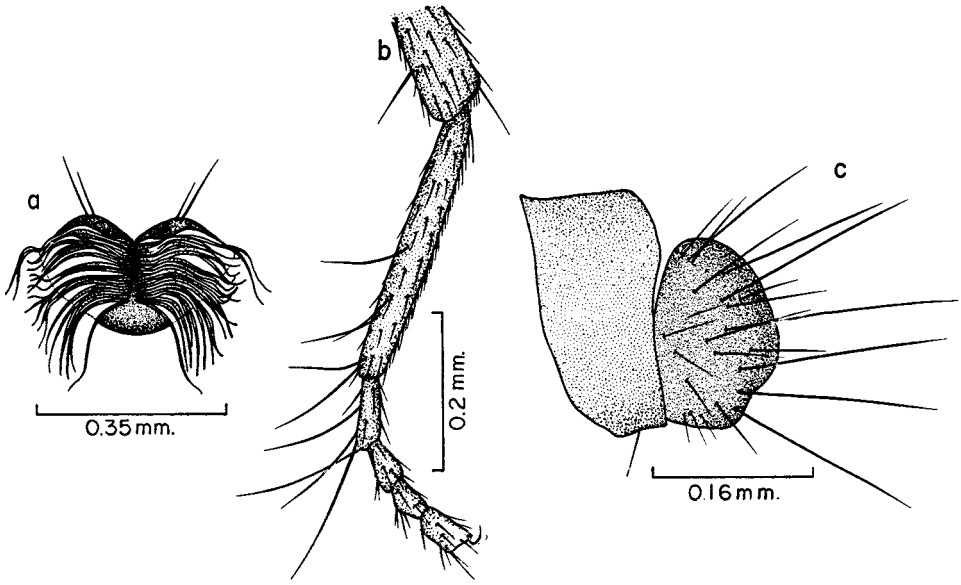


Figure 180—*Drosophila residua* n. sp: **a,** labellum, front view; **b,** front tarsus; **c,** male genitalia.

nearer to the reclinates than is normal. It fits near *D. dissita* n. sp. but is readily differentiated by the difference in the vestiture of the front tarsi (fig. 180b) and by the predominantly yellow mesonotum with a brown median longitudinal vitta.

MALE. *Head:* About one-third higher than long and predominantly yellow, brown on the sides of the front bordering the ocellar triangle and over the upper portion of the occiput, and tinged with black on the ocellar triangle and the median portion of the vertex. The eye orbits are entirely yellow, tinged very faintly with brown on the upper portions. The inner vertical bristle is situated halfway between the outer vertical and the upper reclinate bristle. The anterior reclinate bristle is about three-fourths to four-fifths as long as the proclinate and is situated distinctly above the latter. The face is almost flat, with just a slight convexity down the middle. The palpi and mouthparts are yellow with a tinge of brown on the mentum. Each palpus has a moderately strong, black apical bristle, equaling or slightly larger than the anterior reclinate bristles. The labella are very ornate, armed with a fringe of long, curved spines on the margins (fig. 180a). No strong bristles are present in the vibrissal row; the vibrissae are represented by fine brown hairs. The antennae are yellow, tinged with brown on the dorsal portion of the second segment and over the dorsal half of the third. The second segment has two dorsal bristles. The arista has seven dorsal and two ventral rays in addition to the small apical fork. *Thorax:* Predominantly yellow, tinged faintly with brown on the dorsum, and with a rather distinct brown, longitudinal vitta extending down the median portion of the mesonotum; the

pleura predominantly brown with a yellow marking extending longitudinally through the median portion at a level with the lower part of the mesopleuron. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second pair of supraalars. Six rows of acrostichal setae are present. The humeri are clear yellow; each has two moderately developed bristles. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. Posterodorsal and posteroventral bristles are moderately developed on the front femora. The front tibiae have no long cilia or conspicuous bristles. The front basitarsus is slender, slightly over half as long as the tibia, and has five rather long, black dorsal hairs arranged on the apical three-fifths of the segment (fig. 180b). The second tarsal segment has four long black, dorsal hairs. *Wings:* Almost hyaline, with a faint tinge of brown in the dorsoapical portion; this is not a distinct brown marking and can only be detected in reflected light. The third costal section is 4.4 times longer than the fourth, and the costal fringe extends just slightly beyond the apex of vein R_{2+3}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Predominantly brown, marked with yellow on the first tergum and on the apices and extreme lateral margins of the other terga. The venter is entirely yellow. The anal plates are one-half higher than long, are broadly rounded on the apex and ventral portion, and slightly tapered dorsally. The ninth tergum is very broad over the dorsal portion and slightly attenuated ventrally (fig. 180c).

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Unknown.

Holotype male: Keanakolu, Hawaii, 4,500 feet, October 28, 1952 (C. P. Hoyt). One male paratype: same data as type, 5,200 feet (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila retrusa new species (fig. 181a–c).

This species is very close to *D. demipolita* n. sp. from Hawaii but is differentiated by having the antennae, clypeus, and palpi yellow, the middle and hind femora brown, and also by having several long hairs at or near the apex of each palpus (fig. 181a).

MALE. *Head:* The lower half of the front is orange-yellow, the upper portion is polished black. The occiput is predominantly shining dark brown to black in ground color, covered with gray pollen; the extreme lower portion is yellow. The genae, face, clypeus, palpi, and mouthparts (except for the black rim at the apex of each labellum) are pale yellow. In the middle portion the gena, measured from the vibrissal row to the eye margin, is about equal in width to three or four rows of eye facets. One moderately strong bristle is present at the upper edge of each vibrissal row. This is almost equal in size to the proclinate bristles of the front. The palpus has two or three long black hairs at the apex and a series of long yellow hairs along the posterior margin (fig. 181a). The

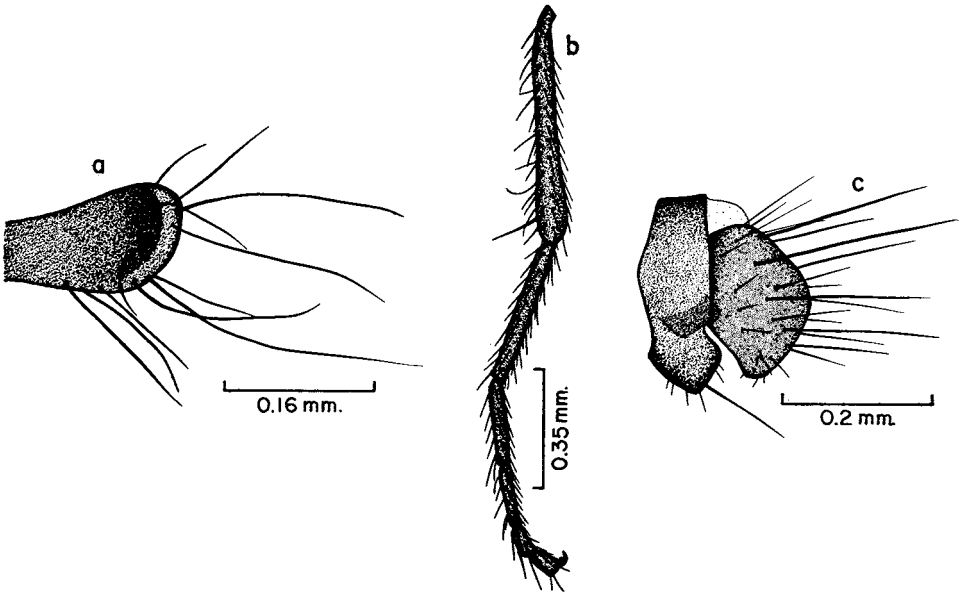


Figure 181—*Drosophila retrusa* n. sp.: **a**, palpus; **b**, front tibia and tarsus; **c**, male genitalia.

anterior reclinate bristle is about two-thirds as long as the proclinate and is situated just slightly above the latter. The antennae are entirely yellow except for a faint tinge of brown on the upper apex of the third segment. The arista has about seven dorsal and three ventral rays in addition to the apical fork; the inner surface of the arista contains a series of long conspicuous setae, about one-half as long as the dorsal rays. *Thorax:* Entirely polished black; rather lightly gray pollinose, more conspicuously so over the scutellum and on the lower sternopleura. The extreme apex of the scutellum is yellow. The anterior dorsocentral bristles are situated opposite the first (anterior) pair of supraalars. Six to eight rows of acrostichal setae are present. One bristle-like seta is present in each dorsocentral row approximately opposite the suture. This is two or more times longer than the acrostichal setae. Two well-developed humeral bristles are present. The anterior sternopleural bristle is approximately one-half as long as the posterior bristle. *Legs:* Predominantly yellow, tinged with brown on the middle and hind coxae, and with the middle and hind femora predominantly brown, broadly yellow at their apices and bases. The front legs are not ornate; the basitarsus is nearly two-thirds as long as the tibia (fig. 181b). *Wings:* Faintly infuscated with brown. The third costal section is five times longer than the fourth. The costal fringe extends almost half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. *Abdomen:* Entirely polished black. The anal plates are nearly two times higher than long. The ninth tergum is almost straight-sided, slightly rounded

ventrally. The claspers are deeply imbedded in the genital chamber, occupying a position almost at the midpoint of the anal plates (fig. 181c).

Length: body, 3.2 mm.; wings, 3.6 mm.

FEMALE. Unknown.

Holotype male: Hanalilolilo, Molokai, July, 1952 (D. E. Hardy). Two male paratypes: Puu Kolekole, Molokai, 3,600 feet, July, 1952, and July, 1953 (D. E. Hardy and M. Tamashiro).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Drosophila rustica new species (fig. 182a–c).

This species fits near *D. hirtitibia* n. sp. because of the ciliate front tibiae and tarsi of the male. The two are not closely related, however, and *rustica* is readily differentiated by having a black rim at the apex of each labellum of the male, by the development of the cilia on the front legs (fig. 182b), by having the pleura brown, tinged with rufous, by having one apical bristle on the palpus, and by other characteristics.

MALE. *Head:* Predominantly yellow except for the reddish brown eyes; tinged with brown along the upper eye orbits, the ocellar triangle, and upper portion of the occiput. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The upper reclinate bristles are considerably more anterior in position than is normal in *Drosophila*; they are situated at about the middle of the eye height and about one-third the distance between the proclinate and the inner vertical bristles. The gena, measured from the vibrissal row to the eye margin, is about equal in width to four rows of eye facets. One moderately strong bristle is present at the upper edge of each vibrissal row. The face is almost flat, just slightly convex in the upper median portion. The clypeus, the mouthparts, and palpi are yellow. A black apical rim is present on each labellum. Each palpus has one rather small apical bristle plus numerous black hairs around the apex. The antennae are yellow-brown. The arista has three dorsal and one or two ventral rays in addition to the apical fork (fig. 182a). The mentum is rather thickly covered with short, pale yellow-brown hairs. *Thorax:* Predominantly brown, tinged with rufous in the ground color, and rather densely covered with gray-brown pollen. The sternopleura and hypopleura are predominantly yellow, tinged with brown along the upper portions. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the first pair of supraalars. Six rows of acrostichal setae are present. A moderately strong seta is present on each side in line with and between the dorsocentral bristles; this is approximately two times larger than the surrounding setae. Two moderately developed humeral bristles are present. The anterior sternopleural bristle is approximately one-half as long as the posterior bristle. The halteres are yellow, tinged faintly with brown. *Legs:* Predominantly yellow, tinged with brown on the tibiae and tarsi. The front tibia has about four erect, anterodorsal cilia extending over the apical three-

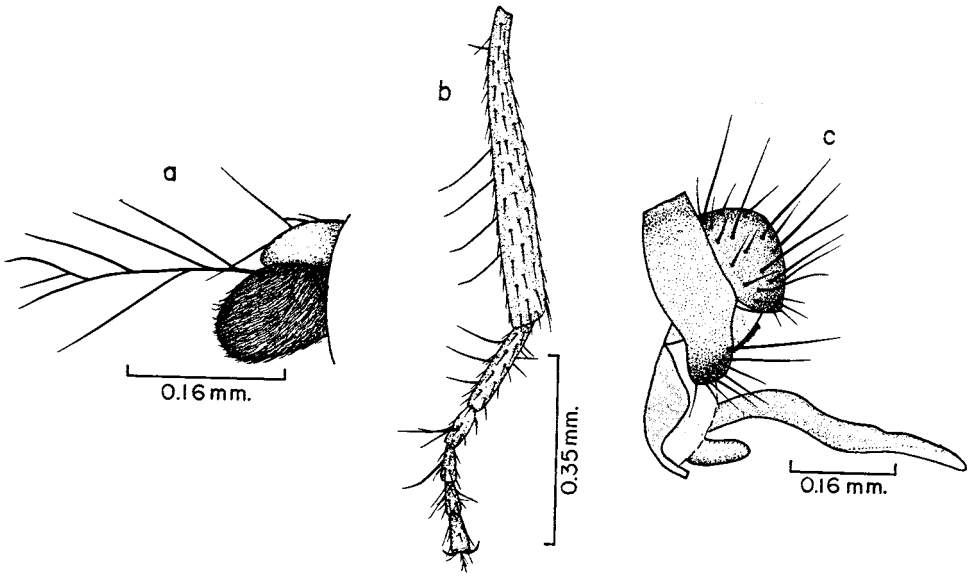


Figure 182—*Drosophila rustica* n. sp.: **a,** antenna; **b,** front tibia and tarsus; **c,** male genitalia.

fifths of the segment. The front basitarsus has three or four moderately long dorsal cilia extending over the segment; segment two has two preapical dorsal hairs, and segment three has one preapical hair (fig. 182a). The front basitarsus is approximately one-half as long as the tibia and two times longer than the second tarsal segment. *Wings:* Evenly tinged with brown. The third costal section in 4.5 times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.75 times longer than the penultimate section. *Abdomen:* The terga are dark brown to black, tinged faintly with rufous in the ground color of the first two segments, and dusted with gray-brown pollen over the entire dorsal portion. The sternum is entirely yellow. The anal plates are about two times higher than long. The ninth tergum is almost straight-sided, not narrowed over the dorsal portion, and slightly attenuated ventrally (fig. 182c). The claspers are visible from direct lateral view.

Length: body and wings, 2.8–3.0 mm.

FEMALE. Unknown.

Holotype male and one paratype male: from Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy and M. Tamashiro).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila sabroskyi new species (fig. 183a–b).

This unusual species is known only from the female, but it is so distinctly

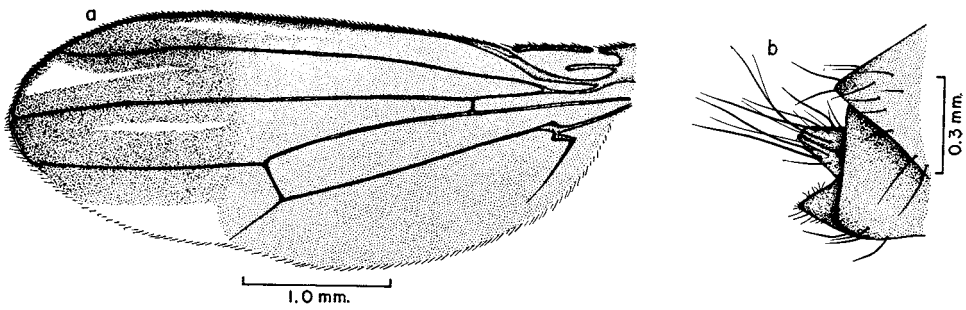


Figure 183—*Drosophila sabroskyi* n. sp.: **a**, wing; **b**, female genitalia.

different that the male should be readily recognized. It fits in the *haleakalae* complex because of the polished black body, yellow apex of the scutellum, and dark markings in the wings; it is probable that the males will have a black sclerotized rim at the apex of each labellum. It is readily distinguished from other known species by its large size, by the distinctive wing markings as shown in figure 183a, and by having only one humeral bristle. It appears to fit closest to *swezeyi* n. sp., but the m crossvein is not marked with brown, and the other details differ as listed above.

FEMALE. *Head:* The front measured from the median ocellus to the anterior margin is about one-half wider than long and is predominantly yellow, brown to black on the sides above a level with the lower point of the ocellar triangle, and with the eye orbits shining black above the proclinate bristles. The orbits are covered with gray pollen. The ocellar triangle is polished black and extends anteriorly to a point almost opposite the anterior reclinate bristles. The vertex and upper occiput are shining black, lightly gray pollinose. The lower portion of the occiput is yellow, tinged lightly with brown. The genae are yellow except for a thin black line extending along the vibrissal row. The face is predominantly yellow, tinged with brown, and black on the lower portion. The clypeus is dark brown to black. The palpi are brownish yellow, and the mouthparts are entirely yellow. Each palpus has a moderately strong black bristle at the apex and several black setae around the outside portion. About three moderately strong bristles are present in the upper portion of each vibrissal row; the upper two bristles are approximately equal in size to the genal bristles. The anterior reclinate bristles are approximately three-fifths as long as the proclinate and are situated slightly above the latter. The head bristles are not unusual in size. The first two antennal segments are yellow, tinged with brown to black on the dorsal portion. The third segment is predominantly brown to black, yellow basally. The arista has six dorsal and three ventral rays in addition to the apical fork. *Thorax:* Polished black in ground color, rather lightly dusted with gray, and with the extreme apex of the scutellum yellow. The halteres are also pale yellow. The anterior dorsocentral bristles are situated just slightly in front of a

line drawn between the second (posterior) pair of supraalars. Six to eight rows of acrostichal setae are present. Only one humeral bristle is developed. The anterior sternopleural bristle is approximately one-half as long as the posterior bristle. *Legs:* Entirely pale yellow. The leg segments are rather slender; the front basitarsus is approximately two-thirds as long as the tibia. *Wings:* Subhyaline, with a large dark brown marking covering the apical third, and with a longitudinal hyaline streak extending through the apices of cells R_1, R_3, and R_5; also with a large hyaline spot in the lower apex of cell 1st M_2 (fig. 183a). The third costal section is slightly over five times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.1 times longer than the penultimate section. *Abdomen:* Entirely polished black, including the genital structures. The ovipositor plates are short and triangular and extend approximately as far as the apices of the anal plates (fig. 183b).

Length: body and wings, 5.35 mm.

MALE. Unknown.

Named after C. W. Sabrosky, one of the leading authorities on Diptera taxonomy.

Holotype female: Poamoho Trail, Koolau Mountains, Oahu, August 27, 1961 (C. W. Sabrosky).

Type in the United States National Museum.

Drosophila sadleria Bryan (fig. 184a–b).

Drosophila sadleria Bryan, 1938, Proc. Haw. Ent. Soc. 10 (1) :41.

Endemic. Oahu (type locality: Niu, *ex rachis* of *Sadleria* fern). Known only from the type male. The original description stated that the type was a female; this was an error.

Type in the B. P. Bishop Museum.

This belongs in the complex of species which has a conspicuous brown mark over the m crossvein and in the apex of the wing and sometimes a brown mark present just before the second costal break or over the r–m crossvein.

D. sadleria is differentiated from related species by having six pale brown longitudinal vittae down the mesonotum and by having the r–m crossvein situated near the middle of cell 1st M_2, and the last section of vein M_{1+2} nearly two times longer than the penultimate section. The ornamentation of the front tarsi of the male also appears to be distinctive (fig. 184b).

The following notes are based upon the type male. The thorax is yellow with six pale brown longitudinal vittae—one pair in line with the inner postalar bristles extends from the hind portion of the mesonotum to the suture; one pair extends the full length of the mesonotum in line with the dorsocentral bristles, these curved outward on the anterior portion of the mesonotum ending near the inner corners of the humeri; and one pair of faint submedian vittae extends over the posterior two-thirds of the mesonotum. A brown longitudinal vitta extends over each pleuron at the upper edge of the mesopleuron. The mark-

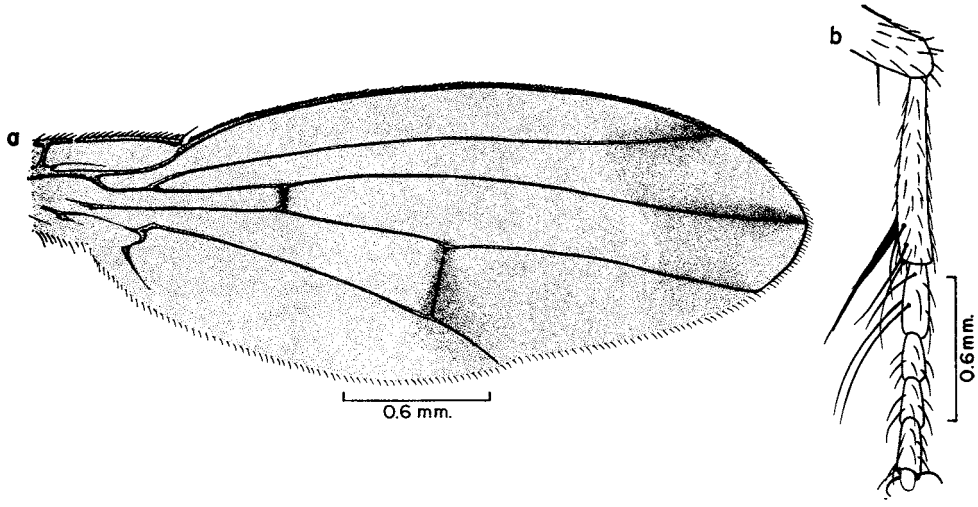


Figure 184—*Drosophila sadleria* Bryan: **a**, wing, from type; **b**, front tarsus, drawn from type.

ings at the wing apex and over the m crossvein are pale brown, and a pale brown mark is present on the r–m crossvein. No brown spots are present in the second costal cell or at the wing base. The third costal section is slightly over four times longer than the fourth section, and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5} (fig. 184a). The legs are yellow. The front tibiae are not ornate. The basitarsus has long erect dorsal hairs on about the apical half, and the second tarsal segment has long erect hairs over the dorsal surface; the remainder of the tarsus has short inconspicuous hairs (fig. 184b).

Length: body, 3.0 mm.; wings, 4.0 mm.

FEMALE. Unknown.

Swezey (1954:185) says, "this small fly has been reared from slender larvae which bore extensively in the parenchyma of the rachis of *Sadleria* fronds. Pupation takes place in the burrows. The frond stems of *Sadleria* in the Kilauea area [Island of Hawaii] are heavily infested, but the adult flies are seldom seen or reared." The specimens from Kilauea were not *sadleria*, but are *diminuens* n. sp. (see under that species).

Drosophila scolostoma new species (fig. 185a–e).

This species is apparently related to *D. comatifemora* n. sp. and *mediana* n. sp. but is differentiated by having a brown longitudinal vitta extending down the median portion of the mesonotum, by having the front basitarsus thickened, and by the densely setose posterior surfaces of the front tibiae and tarsi of the male (fig. 185b).

MALE. Predominantly yellow, marked with brown. *Head:* The front is about

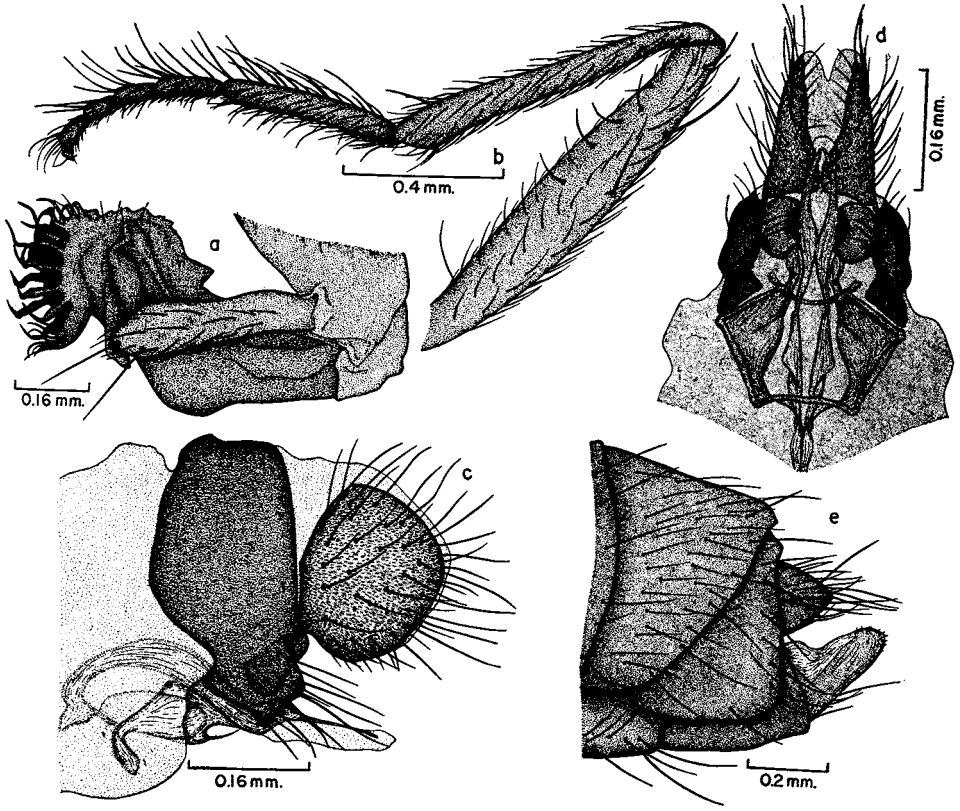


Figure 185—*Drosophila scolostoma* n. sp.: **a,** mouthparts; **b,** front leg; **c,** male genitalia, lateral; **d,** male genitalia, ventral; **e,** female genitalia.

one-half wider than long, is dark brown to black along the orbits, brown, tinged with yellow in the median portion. The ocellar triangle is black. The vertex is brown; the occiput is yellow, tinged faintly with brown on the upper portion. The genae, face, palpi, and mouthparts, excepting the tips of the labella, are yellow; the edges of the labella are tinged with brown. The labella are armed with strong curved spine-like processes at their apices (fig. 185a). Each palpus has a moderately strong apical bristle plus two small subapical bristles. No strong bristles are present in the vibrissal rows. The face is completely flat just above the epistoma; the upper median portion is very slightly raised. The lower reclinate bristle is two-thirds to nearly three-fourths as long as the proclinate bristle. The antennae are yellow, tinged with brown on the dorsal portion of the second segment and the dorsoapical portion of the third; the second segment has two moderately strong dorsal bristles. The arista has six dorsal and three ventral rays in addition to the small apical fork. *Thorax:* Predominantly yellow, marked with brown on the upper portion of the meso-, sterno-, and pteropleura; a brown

median vitta is present on the mesonotum, and a brown mark extends along each side from the humerus to the postalar bristles. The disc of the scutellum is brown, tinged with yellow in the background. The sides are yellow. The anterior dorsocentral bristles are situated opposite the posterior supraalar bristles. About eight rows of acrostichal setae are present. The humeri are clear yellow. Only one bristle is present. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the tarsi. The outside surface of each front leg is densely covered with erect setae; this is most conspicuous on the tibiae and tarsi (fig. 185b). The tarsi also have a row of moderately long cilia along the dorsal and anterior surfaces of each. The front basitarsus is slightly swollen and is about three-fifths as long as the tibia. *Wings:* Subhyaline. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth. The last section of vein M_{1+2} is about 1.2 times longer than the penultimate section. *Abdomen:* Dark brown to black, covered with gray-brown pollen, and densely black setose. The ninth tergum is almost two times higher than long and terminates in a small point on the posteroventral margin (fig. 185c). The anal plates are large, almost globose in shape. The aedeagus is pronged at the apex. The ventral aspects of the genitalia are as in figure 185d.

Length: body, 4.1–4.6 mm.; wings, 4.7–5.2 mm.

FEMALE. Similar in most respects to the male. The front legs and the mouthparts are not ornate. Each vibrissal row has one or two moderately strong black bristles. The ovipositor is moderately developed, extending well beyond the apices of the anal plates; the plates of the ovipositor are blunt, rounded at the apices (fig. 185e).

Holotype male and allotype female: from Paliku, Haleakala Crater, Maui, August, 1952 (W. C. Mitchell). Thirty-three paratypes (16 males and 17 females): same locality as type, August, 1952, August, 1958, June, 1952, and June, 1953 (W. C. Mitchell, D. E. Hardy, M. Tamashiro, and C. R. Joyce).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila seclusa new species (fig. 186a–b).

This species is related to *D. apicisetae* n. sp. but is differentiated by having a smaller anterior reclinate bristle, a more slender front basitarsus, and by lacking a strong dorsal bristle on the second tarsal segment. In the key it fits near *D. redunca* n. sp., but the anterior reclinate bristle is better developed, the bristles on the posteroapical portion of the front basitarsus are gently curved, and the second tarsal segment is about one-half as long as the first (fig. 186a).

MALE. Similar in most respects to other members of this complex. *Head:* Predominantly dark brown; black on the vertex, upper occiput, and the upper

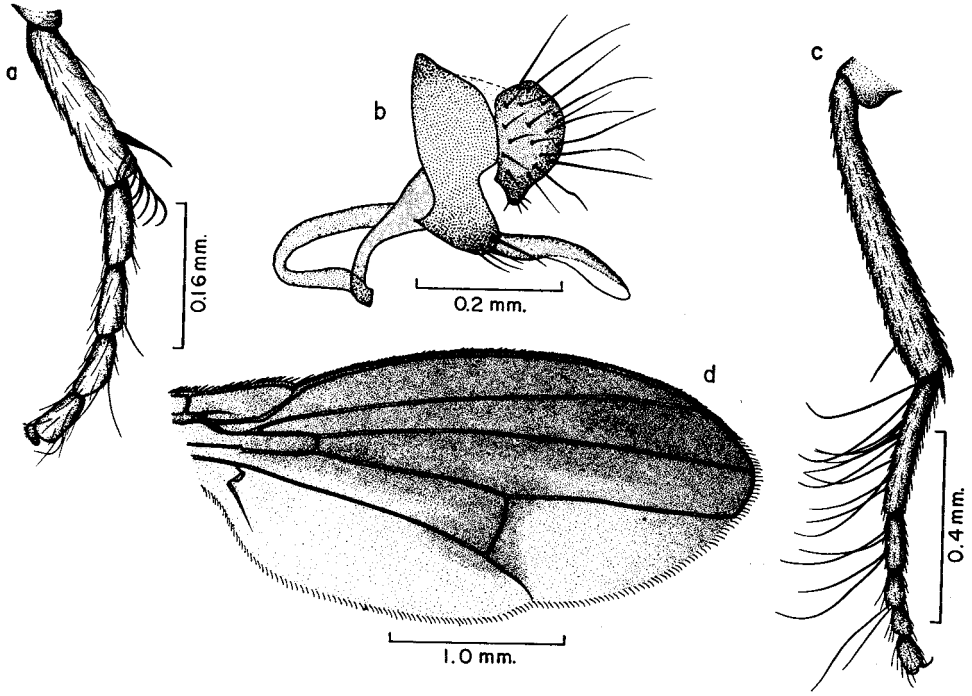


Figure 186—*Drosophila seclusa* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. semifuscata* n. sp.: **c,** front tibia and tarsus; **d,** wing.

portion of the front. In the type the lower portion of the front is yellow, tinged with brown; in the paratype the gena is about equal in width to three rows of eye facets. The face is predominantly brown to black and yellow on the sides and on the upper portion of each depression; the median portion is raised. The clypeus is dark brown to black. The palpi and mouthparts are yellow except for a tinge of brown on the mentum. Each palpus has numerous black setae around the margin. Two small black bristles are situated at the upper portion of each vibrissal row. The longest of these is about equal in length to the basal ray of the arista. The antennae are brown, tinged with yellow on the first two segments. The second segment has three dorsal bristles. The arista has five to six dorsal rays and two ventral rays in addition to the apical fork. The anterior reclinate bristle is just slightly longer than the proclinate and is situated distinctly above the latter. *Thorax:* Predominantly brown, tinged with rufous in the ground color of the pleura, and with a faint blackish tinge on the dorsum. The lower half of each pleuron and the entire propleuron are yellow. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the posterior supraalars. Six to eight rows of acrostichal setae are present. The lower humeral bristle is about two-thirds as long as the upper and the anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:*

Entirely yellow. The front basitarsus is about one-third as long as the tibia, is slightly expanded at the apex, and has an apicodorsal spine-like process and a row of black curved bristles on the outside of the apex (fig. 186a). The second tarsal segment is about one-half as long as the first and has an apicodorsal hair. *Wings:* Distinctly infuscated, but with no brown markings. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about 4.5 times longer than the fourth, and the last section of vein M_{1+2} is about 1.5 times longer than the penultimate section. *Abdomen:* Dark brown to black covered with gray-brown pollen. The anal plates are one-half higher than long, subacutely pointed below. The ninth tergum is narrowed over the dorsum, expanded, convex on the posteromedian margin, and developed into a broadly rounded ventral lobe (fig. 186b).

Length: body, 2.4 mm.; wings, 2.8 mm.

FEMALE. Unknown. The female apparently cannot be differentiated from *brunneisetae* n. sp.

Holotype male: Kulani, Hawaii, 5,200 feet, July, 1952 (D. E. Hardy). Three male paratypes: from Upper Olaa Forest, Hawaii, August, 1952 (D. E. Hardy); Kula Pipeline, Maui, 4,200 feet, July, 1956 (D. E. Hardy); and Puu Kolekole, Molokai, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii

Drosophila semifuscata new species (fig. 186c–d).

This species fits in the group which has the entire anterior portion of the wing infuscated with brown. It runs near *D. spectabilis* n. sp. because of the dark-colored, non-vittate mesonotum; the wing markings (fig. 186d) and the body coloration are strikingly different in the two species.

MALE. Predominantly dark-colored species. *Head:* The front, vertex, and upper occiput are dark brown to black, gray-brown pollinose. The front is about one-third wider than long. The lower reclinate bristle is about four-fifths as long as the proclinate. The sides of the face, the upper portions of the genae, and the sides of the occiput are discolored with brown to black; the median portion of the face is yellow, tinged with brown. All of the bristles of the vibrissal row are moderately strong with the uppermost three bristles being the largest. The palpi are yellow; each has two black bristles at the apex. The mouthparts are yellow, tinged with brown. The labella are fringed with moderately long yellow hairs but have no spines or processes developed. The first two antennal segments are brown, tinged with rufous; the third segment is dark brown. The third segment is one-half to two-thirds longer than wide. The arista has six dorsal and two ventral rays in addition to the apical fork. *Thorax:* Brown, tinged with yellow on the dorsum, yellow, tinged faintly with brown on the sides, and rather densely gray pollinose. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Eight to ten rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the

posterior bristle. A vertical row of small, black setae extends from the ventral to the dorsal surface of each sternopleuron between the two bristles. The halteres are pale yellow. *Legs:* Entirely yellow. Front femur moderately stout; the posteroventral bristles are about one-fourth longer than the greatest width of the femur. The front tibiae are not ornate. The front tarsi have long dorsal cilia extending over the first three segments. The basitarsus is one-half as long as the tibia (fig. 186c). *Wings:* 2.55 times longer than wide. The anterior half is entirely infuscated with brown; this marking extends over most of the apex of the wing, and also along the basal section of vein M_{1+2} and over the m crossvein (fig. 186d). The costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is four times longer than the fourth, and the last section of vein M_{1+2} is 1.29 times longer than the penultimate section. *Abdomen:* Predominantly yellow, discolored with brown at the apices of the segments. The genitalia have not been dissected for study.

Length: body, 3.4 mm.; wings, 3.3 mm.

FEMALE. Fitting the description of the male in most respects; the mesonotum, however, is predominantly black, covered with gray pollen, and the abdomen is subshining black, tinged with red in the ground color. The ovipositor is short, acutely pointed, and extends about twice as far as the exposed portion of the anal plates. The anterior half of the wing is more intensely brown than in the male.

Length: body, 4.0 mm.; wings, 4.5 mm.

Holotype male: Makamakaole Valley, Maui, June, 1953 (D. E. Hardy). Allotype female: Waikapu Valley, Maui, March 23, 1924 (O. H. Swezey).

Holotype male in the B. P. Bishop Museum; allotype female in the Hawaiian Sugar Planters' Association collection.

Drosophila seorsa new species (fig. 187a–b).

This species fits near *D. demipolita* n. sp. but is differentiated by having the entire thorax dusted with gray, the genae rather broad, and the claspers of the male genitalia situated near or at the apices of the ventral lobes of the ninth tergum (fig. 187b).

MALE. *Head:* The lower half of the front is yellow; the upper portion is shining black in ground color rather lightly covered with gray pollen. The occiput is predominantly brown to black, covered with gray pollen; the extreme lower portion is yellow. The genae are yellow, rather broad; in the median portion the width is about equal to eight rows of eye facets (fig. 187a). The face is entirely yellow; the upper median portion is slightly raised. The clypeus is pale brown. The palpi and mouthparts are yellow except for the black rim at the apex of each labellum. Each palpus has a slender apical bristle about equal in length to the segment. The anterior reclinate bristle is approximately three-fifths as long as the proclinate and is situated distinctly above the latter. The first two antennal segments are yellow and are tinged with brown on the dorsal surface. The third segment is brown to black. The arista has five dorsal and

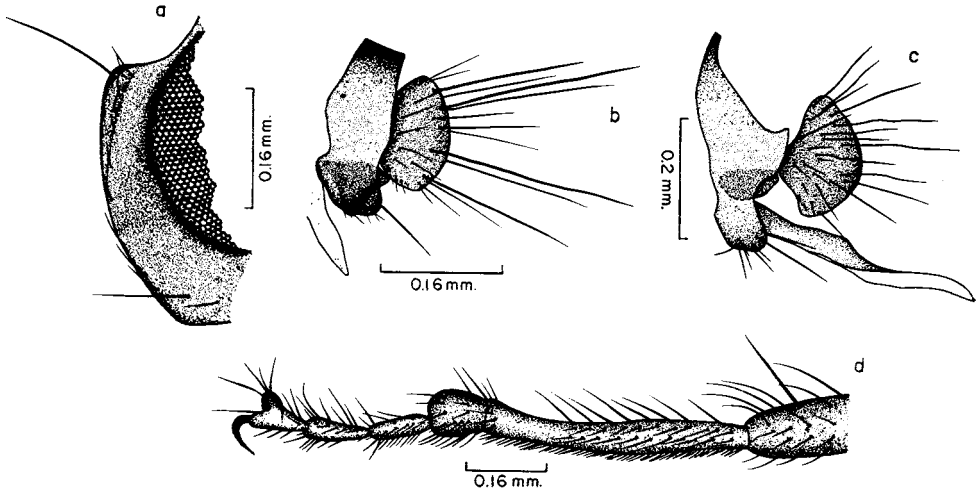


Figure 187—*Drosophila seorsa* n. sp.: **a,** lower portion of head; **b,** male genitalia. *D. septuosa* n. sp.: **c,** male genitalia; **d,** front tarsus.

two ventral rays in addition to the apical fork. *Thorax:* Entirely dark brown to black except for the narrow yellow apex of the scutellum. The thorax is moderately gray pollinose. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the first (anterior) supraalars. Two prominent humeral bristles are present. The anterior sternopleural bristle is small, rather hair-like, one-third to one-fourth as long as the posterior bristle. *Legs:* Entirely yellow except for a faint tinge of brown on the hind femora and on the apices of the tarsi. The front basitarsi are approximately half as long as the tibiae and similar in shape to those of *demipolita* (fig. 76c). *Wings:* Lightly infuscated with brown. The third costal section is almost five times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The anal plates are about 2.0 times higher than long. The ninth tergum is broad, straight-sided, not narrowed ventrally (fig. 187b). The claspers have comparatively long teeth at their apices. The genitalia somewhat resemble those of *bipolita*; however, the ninth tergum is differently developed in the two.

Length: body, 2.5 mm.; wings, 2.9 mm.

FEMALE. Unknown.

Holotype male: Paliku, Haleakala Crater, Maui, June, 1952 (M. Tamashiro). Type in the B. P. Bishop Museum.

Drosophila septuosa new species (fig. 187c–d).

This species is closely related to *D. dasycnemia* n. sp. and in my preliminary study had been included in the series with that species. I had previously treated

dasycnemia as a rather variable species, sometimes lacking brown wing markings and showing considerable differences in coloration. It now appears obvious that, in the complex of species which have the posterior surface of the front tibia densely setose, the presence or absence of a brown marking in the apical portion of the wing and the color markings of the body appears to be rather constant. *D. septuosa* fits nearest to *contorta* n. sp.; but the dark brown to black body, the elongate front basitarsus, the lack of black bristles on the basitarsus, as well as other details, readily differentiate this. *D. septuosa* differs from *dasycnemia* by having the wings unmarked, the mesonotum all dark brown to black covered with gray pollen, the clypeus dark brown to black, the palpi yellow-brown to dark brown, the front femora distinctly tinged with brown, and the front brownish yellow. It also is near *neutralis* n. sp. (refer to the discussion under that species for the differentiating characters).

MALE. *Head:* The front is predominantly rust-brown. The eye orbits above the proclinate bristles are shining black covered with gray pollen, and the extreme lower lateral margins of the front are yellow, tinged with brown. The ocellar triangle, vertex, and upper occiput are shining black covered with gray pollen. The median portion of the occiput is brown, and the lower third is yellow, tinged with brown. The genae are yellow, except for a broad brown to black line down the vibrissal row. The upper one-half to three-fifths of the face is yellow, the lower portion black. In some specimens the lower face may be dark brown, tinged with yellow. The clypeus is black. The palpi are brown to black. The mouthparts are yellow, tinged with brown. The labella are not ornate. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the proclinate bristles of the front. The gena, measured in the median portion from the vibrissal row to the eye margin, is about equal in width to three rows of eye facets. The anterior reclinate bristle is approximately four-fifths as long as the proclinate and is situated about opposite the latter. The antennae are almost all dark brown to black. The arista has six to seven dorsal and two ventral rays in addition to the apical fork. The palpi have several black setae around the apex but no strong bristles. *Thorax:* Predominantly brown, tinged with black and with a faint yellow to rufous tinge in the ground color of the anteromedian portion of the mesonotum. The entire thorax is rather densely gray pollinose. The lower half of each humerus is yellow, tinged faintly with brown. The metanotum is brownish red covered with gray pollen. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. About eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs:* The coxae are brown, faintly tinged with rufous in the ground color. The front femora are predominantly brown, tinged with yellow, and the mid and hind femora are yellow-brown. The posterior surface of the front tibia is densely covered with erect black setae, as in *dasycnemia*. The front basitarsus is about one-half as long as the tibia and is slightly pointed on the dorsoapical portion.

The large flat second tarsal segment is slightly broader than the apex of the basitarsus and almost as long as the third tarsal segment (fig. 187d). *Wings:* Subhyaline, evenly but faintly infuscated, and with no distinct brown markings. The third costal section is 5.5 times longer than the fourth, and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.33 times longer than the penultimate section. *Abdomen:* Predominantly dark brown to black in ground color, yellow-brown over the first tergum, and with a narrow gray border along the posterior margin of each tergum. The venter is entirely black. The anal plates are approximately two times higher than long and are subacutely pointed ventrally. The ninth tergum is narrowed over the dorsal portion, rather strongly concave on the posteromedian margin, and rounded at the apices of the ventral lobes (fig. 187c). The claspers are plainly visible from a direct lateral view.

Length of type: body, 3.7 mm.; wings, 4.3 mm. Other specimens in the series range from 2.8–3.7 mm. for the body and 3.6–4.3 mm. for the wings.

FEMALES. A large series of female specimens is on hand. These individuals obviously belong here, but cannot be separated with certainty from closely related species and are not being designated as part of the type series. The specimens which seem to be associated with males are similar in most respects to the description of the male. The palpus has a moderately strong apical bristle. The femur is completely yellow and the front tibia not so conspicuously setose on the outside surface. The first tergum and the lateral margins of the second are conspicuously yellow. The ovipositor blades are comparatively slender, pointed at apices, and each has a row of teeth along the ventral surface; the blades extend almost two times the length of the anal plates.

Type male: Kilauea, Hawaii, August, 1958, collected in light trap (J. W. Beardsley). Forty-two male paratypes: from the following localities—same data as type; Upper Olaa Forest, Hawaii, collected in treefern jungle, August, 1952, and July, 1953 (D. E. Hardy and W. C. Mitchell); Kahuku Ranch, 3,000 feet, July, 1953 (D. E. Hardy); Pauahi, Hawaii, 4,300 feet, July, 1952 (D. E. Hardy); Keauhou Ranch, Kilauea, Hawaii, July, 1953 (D. E. Hardy); Glenwood, Hawaii, March, 1919 (O. H. Swezey); and "29 mile," Olaa, August, 1925 (W. M. Giffard).

Type and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila setiger Grimshaw (fig. 188a–c).

Drosophila setiger Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :64.

Endemic. Molokai (type locality: "Forest above Pelekunu"). I have also seen specimens from Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy); and Puu Kolekole, Molokai, July, 1952 (M. Tamashiro).

Type in the British Museum (Natural History). I have studied the type male and also the female specimens recorded from "Molokai mountains, 4,000–5,000 ft."

D. setiger belongs in the complex of species which has the body entirely

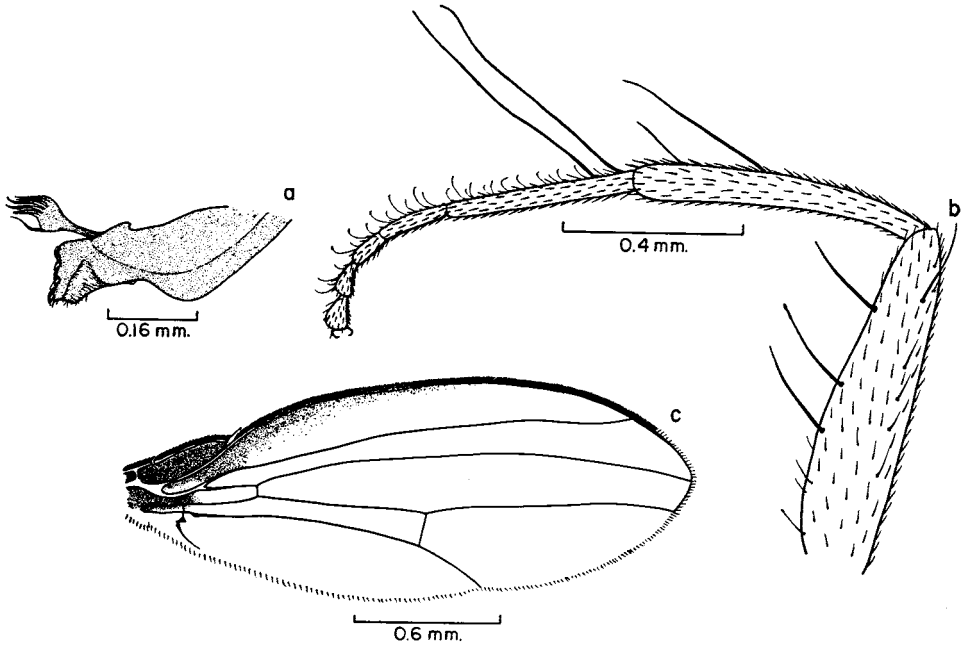


Figure 188—*Drosophila setiger* Grimshaw: **a**, labellum; **b**, front leg; **c**, wing.

shining black and the wings with a dark brown spot in the costal cell and at the base. It is readily differentiated from all other known species by the ornamentation of the front legs of the male, by the long anterodorsal bristle on the tibia, and by the two very long dorsal bristles on the basitarsus (fig. 188b).

The head is about one-third higher than long. The front is about as wide as long and is polished black, faintly tinged with rufous on the anterior portion. The anterior reclinate bristles are almost as large as the proclinates and are situated opposite the latter. The face is entirely white; the median portion is flat, just slightly raised. No strong bristles are present on the lower angles of the face; the oral vibrissae are made up of rather fine hairs. The palpi are dark brown, rather small, inconspicuous, and with short bristles around the apices. The mouthparts are yellow, tinged with brown. The labellum is very ornate (fig. 188a). The antennae are black. The aristae have six or seven dorsal rays and two ventral rays in addition to the apical fork. The mesonotum and scutellum are polished black. The pleura are dark brown to black, tinged with rufous in the ground color. The anterior dorsocentrals are situated opposite the first pair of supraalars. Only one strong humeral bristle is present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The knobs of the halteres are yellow-brown. The legs are entirely yellow. The front tibia of the male has one long anterodorsal bristle at about the apical three-fifths of the segment. The front basitarsus has two long, black dorsal bristles just

beyond the base; the remainder of the tarsus has rather short, erect, curved hairs down the dorsal surface (fig. 188b). The wings are predominantly hyaline, with a dark brown spot filling the second costal cell and extending through the basal portion of cell M; a very faint brownish infuscation extends along the anterior margin of the wing (fig. 188c). The third costal section is slightly over four times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated near the basal third of cell first M_2 and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The abdomen is entirely polished black. The male genitalia have not been studied. The female ovipositor plates are short and broad, rounded at the apices.

Length: body, 2.50–2.70 mm.; wings, 2.75–3.00 mm.

Drosophila setipalpus new species (fig. 189a–b).

This species fits in the complex which is characterized by having the front tarsus sparsely ciliated, the thorax entirely brown, and the wings hyaline or faintly infuscated but with no brown markings. It fits near *D. brunneifrons* n. sp. and *quadrisetae* n. sp., but is differentiated by the development of the long hairs on the front basitarsus (fig. 189a), by the short front basitarsus, by the setose palpi, and by other characteristics.

MALE. *Head:* Predominantly brown, tinged with black on the upper orbits, the ocellar triangle, the vertex, and upper occiput; yellow on the genae; and yellow, tinged with brown on the upper half of the face. The clypeus is brownish yellow. The mouthparts are predominantly yellow, tinged with brown on the mentum. The palpi are yellow on the basal two-thirds, tinged with brown on the apices. Each palpus is densely setose on the outer surface. I see no evidence of ornamentations on the mouthparts. One moderately strong bristle plus two smaller bristles are present at the upper edge of each vibrissal row. The uppermost bristle is slightly larger than the anterior reclinate bristles of the front. Measured from the median ocellus to the front margin, the front is two times wider than long. The anterior reclinate bristle is three-fourths to four-fifths as long as the proclinate and is situated approximately opposite the latter. The antennae are entirely dark brown to black, except for the yellow first segment. The arista has five dorsal rays and has two ventral rays in addition to the apical fork on one side and only one ventral ray on the other side; the five and two combination is probably typical for the species. *Thorax:* Entirely dark brown, tinged with black on the dorsum and over the mesopleura. The anterior dorsocentral bristles are situated slightly in front of the line drawn between the second pair of supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is about three-fourths to four-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a faint tinge of brown on the coxae. Posteroventral and posterodorsal bristles are well developed on the front femora. The tibiae are devoid of long hairs. Long ciliation is present only on the front basitarsus. Two black

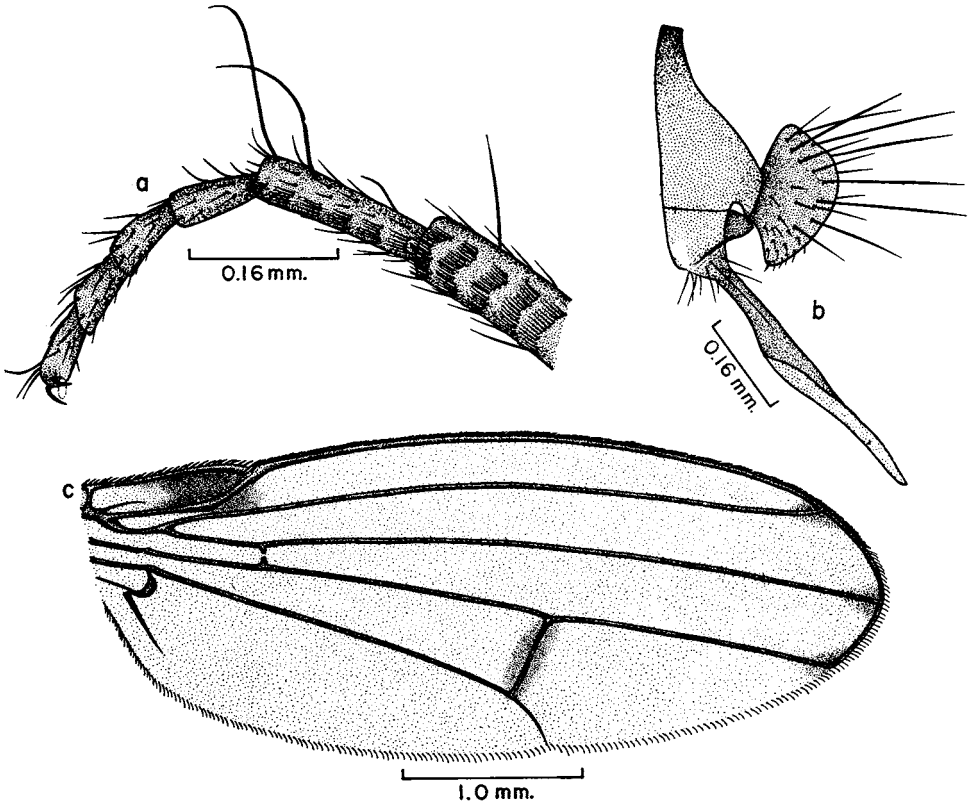


Figure 189—*Drosophila setipalpus* n. sp.: **a**, front tarsus; **b**, male genitalia. *D. sharpi* Grimshaw: **c**, wing.

anterior hairs are located on the basal half of the segment, these about one-half longer than the preapical dorsal bristle of the tibia. Two elongate anterodorsal black bristle-like hairs are located on the apical third of the segment; the longest of these is equal in length to the next three tarsal segments (fig. 189a). The front basitarsus is one-third as long as the tibia and is two times longer than the second tarsal segment. *Wings:* Faintly infuscated with brown. The third costal section is five times longer than the fourth, and the costal fringe extends approximately two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely dark brown except for the yellow venter and for a slight tinge of yellow in the ground color of the first tergum. The abdomen is entirely covered with gray pollen. The anal plates are two times higher than long and are subacutely pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion; the posteromedian margin is convex so that the segment is greater in

width through the median portion than is the anal plate. The tergum is lobate ventrally as in figure 189b. The claspers are plainly visible from a direct lateral view.

Length: body, 3.2 mm.; wings, 3.5 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila sharpi Grimshaw (fig. 189c).

Drosophila sharpi Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :65.

Endemic. Kauai (type locality: Koholuamano). A homeotypic specimen is on hand from Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy).

Type in the British Museum (Natural History). I have studied the type series.

This species belongs in the complex which has no distinct markings in the apical portion of the wing but has a brown mark over the m crossvein. It is differentiated from related species by the presence of a dark brown spot in the apical portion of the second costal cell, by the lack of unusual bristles or long hairs on the front femora, by the rufous thorax, and by the yellow legs.

A moderately large predominantly pale-colored species. The front is yellow to rufous, tinged lightly with brown, and just slightly wider than long. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The vertex is reddish, tinged with brown. The upper median portion of the occiput is brown; the remainder of the occiput, the genae, clypeus, palpi, and mouthparts are yellow. The face is white, faintly tinged with yellow, and slightly raised on the upper median portion and flattened on the lower portion. One moderately small, black, apical bristle is present on each palpus. Two bristles are present at the upper edge of each vibrissal row. The first two antennal segments are yellow and are tinged with brown on the dorsal portion of the second segment; the third segment is brown. The second segment has two moderately stout dorsal bristles. Each arista has seven or eight dorsal rays and three ventral rays in addition to the apical fork; the anterior surface is sparsely haired. The thorax is entirely rufous, tinged lightly with brown on the mesonotum. The anterior pair of dorsocentral bristles is situated near the posterior third of the mesonotum, about opposite the second pair of supraalars. Eight rows of acrostichal setae are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The legs are entirely yellow. No long hairs are present on the ventral surface of the front femur. The wings are evenly tinged with pale yellow-brown, a distinct brown mark extends over the m crossvein, and a brown spot in the apical three-fifths of the second costal section extends over into the base of cell R_1 (fig. 189c). The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 5.5 times longer than the fourth, and the last section of vein M_{1+2} is about equal in length to the penultimate section. The last section of vein M_{3+4} is about three-fourths as long as the m

crossvein. The abdomen is brown to brownish black; a large yellow spot is present on the sides of each tergum. The male genitalia have not been dissected for study. The female ovipositor plates are rather broad and semi-obtuse at apices. The plates extend slightly beyond the apices of the cerci; when fully extended, however, they are probably about equal in length to the ventral margin of the seventh abdominal segment.

Length: body and wings, 5.5–6.3 mm.

Drosophila sordidapex Grimshaw (fig. 190a–c).

Drosophila sordidapex Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :63.

Endemic. Hawaii (type locality: Olaa). This species is rather common in the rain forest (treefern jungle) around the lower slopes of Mauna Loa and Mauna Kea. It is attracted to fermenting banana.

Type in the British Museum (Natural History). I have studied the type and have designated a series of homeotypes from the Upper Olaa Forest, Hawaii.

A complex of species related to *sordidapex* is found in the rain forests of the island of Hawaii. To date, four distinct species have been recognized in this group; these all appear to be rather closely associated in the same general habitats, and are very similar in appearance. The species of this complex have the second tarsal segment of the front legs of the male short, thick and flattened, concave on the inner surface, and spoonlike (fig. 190a). The species are separated by the characters given in the key. Typical *sordidapex* is recognized by the dark brown spot in the apical half of cell R_3 (fig. 190b) and by the yellow sixth abdominal segment.

The front is about one-fourth to one-third wider than long. The lower portion and the middle are rufous to yellow; the orbits, the vertex, and the ocellar triangle are black. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated just opposite the latter. The face is predominantly yellow, the lower margin is brown to black, and a slight carina extends down the median portion. The basal two antennal segments are yellow, tinged with brown dorsally. The third segment is predominantly brown, yellow at the base. The aristae have five to six dorsal and two ventral rays in addition to the apical fork. The pair of strong bristles at the upper end of the vibrissal row is situated distinctly above the oral margin at about the lower one-sixth of the face. The palpi and mouthparts yellow, tinged lightly with brown. The mouthparts are not ornate, and each palpus has several dark setae around the apex but no strong bristles. The thorax is yellow to rufous in ground color, tinged lightly with brown. The propleura, sternopleura, and hypopleura are yellow. The anterior sternopleural bristle is very large, almost as long as the posterior bristle (approximately seven-eighths as long). The legs are entirely yellow, except for brownish discolorations on the tarsi. The front tibiae lack conspicuous setae on the posterior margins. The front basitarsus is slender, almost half as long as the tibia, and is devoid of cilia except for two or three rather inconspicuous hairs on the anterior margin at apex. The second tarsal segment is concave on the inner

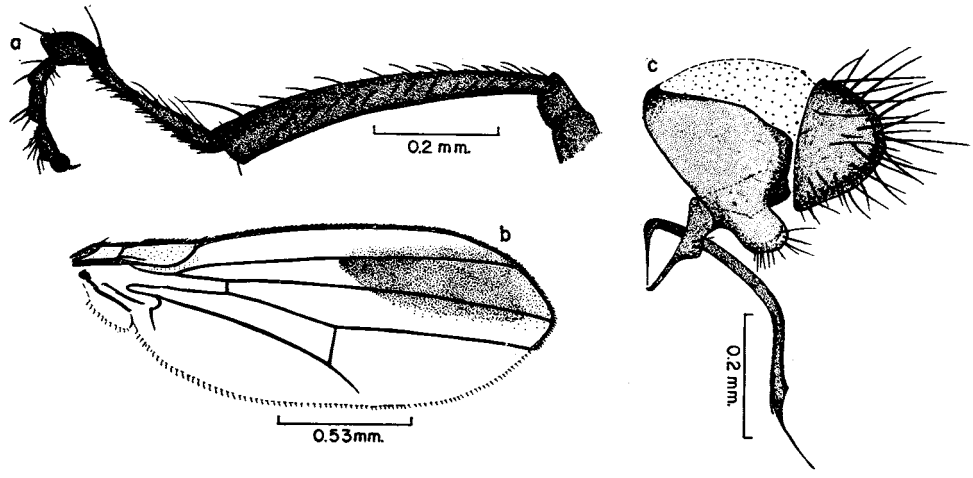


Figure 190—*Drosophila sordidapex* Grimshaw: **a**, front tibia and tarsus; **b**, wing; **c**, male genitalia.

surface, spoon-like, and has a black seta at its apex (fig. 190b). The wing markings consist of a large brown spot occupying much of the apical half of cell R_3 and extending slightly over into cells R_1 and R_5; the remainder of the wing is subhyaline. The third costal section is about 5.5 times longer than the fourth. The costal fringe extends just slightly over one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The ultimate section of vein M_{1+2} is about 1.5 times longer than the penultimate section (fig. 190b). The abdomen is predominantly brown to black, tinged with rufous in the ground color; the apical portion is yellow. The sixth segment is exposed and nearly as long as the fifth. The sixth is entirely yellow, and the fifth segment is brown, tinged with yellow. The genitalia are yellow. The ninth tergum is shaped as in figure 190c.

Length: body, 2.3–2.5 mm.; wings, 2.5–2.8 mm.

FEMALE. Unknown. The females have not yet been associated with the males. It is probable that they lack infuscations in the wings and are, no doubt, very similar to those of *dasycnemia* n. sp.

Drosophila spectabilis new species (fig. 191a).

A large, conspicuously marked species, readily recognized by the entirely black body, predominantly brown to black legs, and by the brown to black wings with white spots in the cells as shown in figure 191a.

FEMALE. *Head:* Higher than long. The front is just slightly wider than long, yellow to rufous, and tinged with brown in the ground color; the orbits are black in the area occupied by the frontal bristles. The occiput is yellow, tinged with brown on the upper median portion. The genae are yellow, except for a brown stripe along the lower margin. The face is yellow, tinged lightly with brown on the lower portion. The median portion of the face is just slightly raised. Four

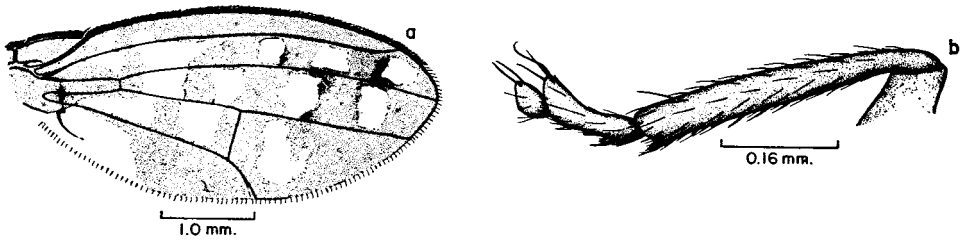


Figure 191—*Drosophila spectabilis* n. sp.: **a**, wing. *D. spicula* n. sp.: **b**, front tibia and first two tarsal segments.

or five moderately strong bristles are present in the upper portion of each vibrissal row. The clypeus, mentum, and palpi are dark brown; each palpus has one strong bristle at the apex plus numerous black setae. The two basal antennal segments are yellow, tinged lightly with brown; the third segment is brown. The arista has six or seven dorsal and three ventral rays in addition to the apical fork. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated just slightly above the latter. *Thorax:* Predominantly black in ground color, the dorsum rather densely brown pollinose. The humeri are yellow on their lower halves and brown to black on the upper portions; two strong humeral bristles are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The halteres are yellow. *Legs:* Predominantly brown to black; tinged with rufous on the mid and hind coxae, trochanters, and all the tibiae and tarsi. The front femur has three moderately strong posterodorsal bristles and about six posteroventral bristles. The front basitarsus is nearly two-thirds as long as the tibia. *Wings:* Brown, with large hyaline spots in the cells (fig. 191a). The margin is entirely brown, except for a rather indistinct hyaline mark in cell R_1 just beyond the apex of vein R_1. Cell R_3 has three hyaline spots in the apical half of the wing and two indistinctly divided spots at about the basal third. Cell R_5 has four hyaline spots. Cell first M_2 contains two large spots and cell second M_2 one spot. The third costal section is approximately five times longer than the fourth, and the costal fringe extends one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is slightly less than 1.5 times longer than the penultimate section; the proportions are 55 to 40. *Abdomen:* Entirely black, rather densely gray-brown pollinose. The ovipositor plates are yellow, moderately long and slender, and almost equal in length to the ventral portion of the seventh abdominal segment.

Length: body, 5.50 mm.; wings, 5.75 mm.

MALE. Unknown.

Holotype female: Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila spicula new species (fig. 191b).

This species fits near *D. apicisetae* n. sp. because of the strong lower reclinate bristles. The two species are very dissimilar, however, in other respects, and *spicula* is readily differentiated by having a strong pair of acrostichal setae on the anterior portion of the mesonotum and by the very differently developed front tarsi of the male (fig. 191b).

MALE. A rather small, predominantly dark brown species. *Head:* Almost one-half higher than long as seen in direct lateral view. The front is largely dark brown. The orbits, the vertex, and the ocellar triangle are black. The occiput is brown, tinged with yellow on the lower portion. The genae are yellow slightly tinged with brown. The face is dark brown to black above the epistoma and brown, tinged with yellow on the upper portion. The upper median portion of the face is slightly raised. The clypeus is brown to black above, yellow faintly tinged with brown on the sides. The palpi and mouthparts are yellow; the former lack strong bristles. The labella are not ornate. Two small black bristles are present at the upper edge of each vibrissal row. The lower reclinate bristle is long and slender, one-half longer than the proclinate, and situated distinctly above the latter. The antennae are dark brown; the second segment has two dorsal bristles. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Subopaque, dark brown, tinged with black on the dorsum, and covered with gray-brown pollen. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the posterior pair of supraalars. Six pairs of acrostichal setae are present. Each humerus has two moderately large bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apical segments of the tarsi. The front femur has four or five posterodorsal bristles and three moderately long posteroventral bristles. The front tibia is not ornate; the dorsal bristle is small, not extending to the apex of the tibia. The front basitarsus is nearly one-third as long as the tibia, is slightly pointed on the upper apical portion, and bears two or three black apical bristles (fig. 191b). The second tarsal segment is short, about one-fourth as long as the first, and has two black bristles at the apex. *Wings:* Faintly infuscated, about two and two-thirds times longer than wide. The costal fringe extends about one-third of the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is slightly over four times longer than the fourth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Entirely subopaque brown, covered with brown pollen. The genitalia have not been dissected for study.

Length: body, 1.9–2.0 mm.; wings, 2.3 mm.

FEMALE. Unknown.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Type in the B. P. Bishop Museum.

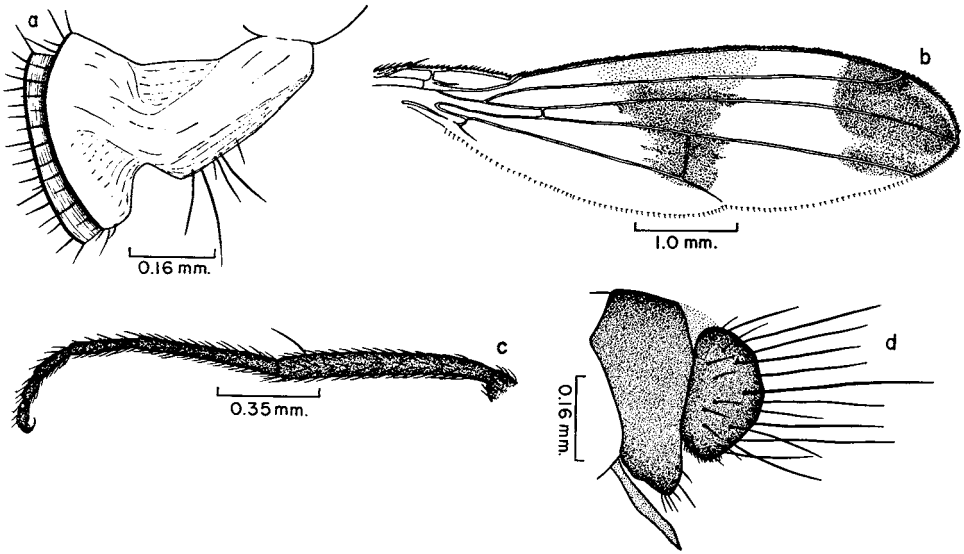


Figure 192—*Drosophila stenoptera* n. sp.: **a,** labellum; **b,** wing; **c,** front tibia and tarsus; **d,** male genitalia.

Drosophila stenoptera new species (fig. 192a–d).

A well-defined species, fitting in the complex which has a brown transverse band across the middle of the wing and the apical portion of the wing brown (fig. 192b). It differs from most species by having the body entirely black, except for a small yellow spot at the apex of the scutellum, and by having the middle and hind femora predominantly black; the anterior sternopleural bristle very short; and only one humeral bristle present. It is related to *D. cilifemorata* n. sp. but differs by lacking anteroventral cilia on the front femora, by the elongate slender wings (fig. 192b), and by the all-yellow antennae. The short anterior sternopleural bristle would seem to place this in the subgenus *Sophophora* Sturtevant, but in other respects it does not fit the characteristics given by Sturtevant (1939:139, and 1942:28, and others). Until the Hawaiian *Drosophila* can be studied in more complete detail I believe it will be best to consider this under the subgenus *Drosophila*. Superficially this species closely resembles *D. haleakalae* Grimshaw, but the characteristics of the wings and legs are distinctly different.

MALE. *Head:* The front is about as wide as long, the lower third of the front is bright yellow, the upper two-thirds is black, velvety in the median portion, opaque with faint gray dust on the orbits. The occiput is chiefly dark brown to black, the lower portion is yellow to yellow-brown. The genae are yellow, the lower edge tinged with brown. The face is yellow faintly tinged with brown on the type, brown to black on other specimens, and is slightly raised down the median portion. Three moderately strong bristles are present in the upper portion of each vibrissal row. The clypeus is rather dark brown; the other mouthparts,

including the palpi, are yellow-brown. The apical margin of the labellum is heavily sclerotized, black, and with numerous erect setae (fig. 192a). The palpi are moderately long and slender; each has a strong apical bristle plus numerous short setae. The antennae are yellow; the second segment is tinged with brown on the dorsal surface. The arista has six or seven dorsal and two ventral rays in addition to the apical fork. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. *Thorax:* Polished black in ground color, rather densely gray pollinose, especially on the dorsum. The apex of the scutellum is yellow. Only one humeral bristle is present. The anterior sternopleural bristle is rather tiny, about one-third as long as the posterior bristle. The anterior dorsocentral bristles are situated about opposite the first pair of supraalars. Halteres clear yellow. *Legs:* Predominantly yellow. The middle and hind femora are brown, except for yellow bases; the apical segments of the middle and hind tarsi are brown; and the coxae are tinged with brown in some specimens. The front femur has two moderately strong posterodorsal bristles situated near the middle of the segment and a row of about eight posteroventral bristles extending the full length of the segment. The tibiae and tarsi are not ornate; the tarsi have short inconspicuous hairs on the dorsal surfaces (fig. 192c). The front basitarsus is nearly two-thirds as long as the tibia and about twice as long as the second tarsal segment. *Wings:* Nearly four times longer than wide; chiefly subhyaline with a broad brown transverse band extending across the middle of the wing and with the apical portion brown (fig. 192b). The third costal section is nearly five times longer than the fourth, and the costal fringe extends about one-fifth the distance between the tips of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.65 times longer than the penultimate section. *Abdomen:* Polished black, rather lightly gray pollinose. The male genitalia are as in figure 192d. The ninth tergum is slightly narrowed ventrally and has only small setae around the margin. The claspers are completely hidden from lateral view.

Length: body, 4.5–5.7 mm.; wings, 5.2–5.5 mm.

FEMALE. Unknown.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila swezeyi new species (fig. 193a–c).

This species is apparently a bracket type fungus feeder which fits in the *haleakalae* complex. It differs from related species by the prominent brown wing markings as shown in figure 193c and by the ciliation on the front tibiae and tarsi as shown in figure 193a–b.

MALE. *Head:* Front about as wide as long, predominantly brown to black, yellow only around the lower margin, and rather densely gray-brown pollinose. Anterior reclinate bristle about two-thirds to three-fourths as long as the proclinate and situated distinctly above the latter. The antennae are yellow, very

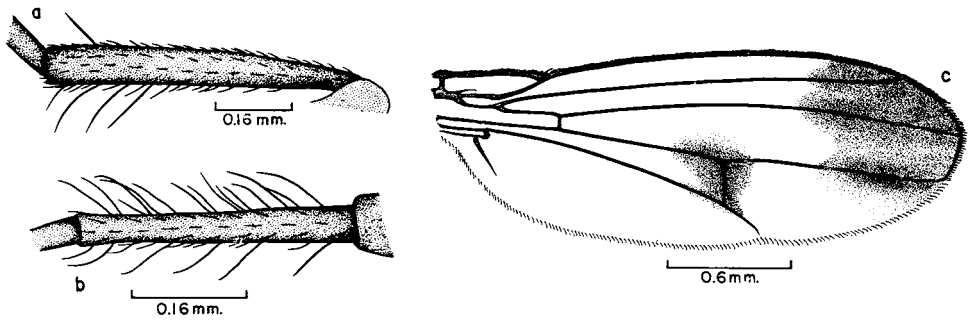


Figure 193—*Drosophila swezeyi* n. sp.: **a**, front tibia; **b**, front tarsus; **c**, wing.

faintly tinged with brown on the third segment and on the dorsum of the second segment. The aristae have five dorsal and two or three ventral rays in addition to the apical fork. The face is white; the genae, lower occiput, palpi, and mouthparts are yellow. The labella are tinged lightly with reddish brown. Each labellum has a black sclerotized rim which is apparently characteristic of those species which breed in bracket type fungi. Each palpus has a moderately strong apical bristle in addition to numerous black setae along the outside surface. Three rather strong bristles are situated along the upper portion of each vibrissal row. *Thorax:* Dark brown to black in ground color, gray-brown pollinose on the dorsum, gray on the sides. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the first (anterior) supraalars. The apex of the scutellum and the halteres are yellow. *Legs:* Entirely yellow except for the apical segments of the tarsi. Six to eight moderately strong posteroventral bristles extend almost the full length of the front femur. Front tibia with several moderately long cilia on the posteroventral surface at apical third of segment (fig. 193a). Front tarsi with conspicuous cilia along the posteroventral and anteroventral surfaces (fig. 193b). Front basitarsus about three-fifths as long as the tibia. *Wings:* Predominantly hyaline, rather slender, three times longer than wide. Third section of the costa nearly five times longer than the fourth. The costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. A large brown spot occupies most of the apical fourth of the wing, and another large spot is present over the m crossvein (fig. 193c). The last section of vein M_{1+2} is about 1.4 times longer than the penultimate section. The last section of vein M_{3+4} is about one-third longer than the m crossvein. Vein R_{2+3} is straight, not curved upward at its apex. *Abdomen:* Subshining brown to black, dusted with gray-brown pollen. The genitalia are dark brown; they have not been relaxed for study.

Length: body, 3.75 mm.; wings, 3.85 mm.

FEMALE. Unknown.

Named after the late Dr. O. H. Swezey, one of the major contributors to our knowledge of Hawaiian insects.

Holotype male: Waianae Mountains, Oahu, January 22, 1924 (O. H. Swezey). Type returned to the Hawaiian Sugar Planters' Association following this study.

Drosophila taeniata new species (fig. 194a–c).

This species fits in the complex which is characterized by having the front tarsi ciliated, the thorax predominantly rufous, two humeral bristles, and wings without brown markings. It is readily differentiated from other species by the broad median vitta down the mesonotum, the broad longitudinal brown band through the pleura, the short costal fringe, the peculiarly ornate labella, and by other characteristics.

MALE. *Head:* Almost quadrate as seen in lateral view, just slightly higher than long. The lower two-fifths of the front is yellow; the upper portion is brown between the ocellar triangle and the orbits. The eye orbits to the proclinate bristles, the vertex, and the ocellar triangle are black in ground color covered with gray-brown pollen. The occiput is predominantly brown. The lower margins are pale yellow. The genae, except for a narrow, brown line along the vibrissal row, and the entire face are pale yellow; the latter is just slightly raised in the upper median portion. The palpi and mouthparts are entirely yellow. Each palpus is very broad, equal in width to the third antennal segment, and with three small bristles around the outer apex. The mentum is broad, slightly expanded on the apical portion. The margin of each labellum is produced and has a series of strong, yellow spines along the upper edge (fig. 194a). No bristles are present in the vibrissal row; the vibrissae are represented by fine, pale brown hairs. The genae are very narrow; on the upper edge, measured from the vibrissae to the eye margin, they are less than the width of two rows of eye facets. The anterior reclinate bristle is small, about half as long as the proclinate, and situated distinctly above the latter. The first two antennal segments are yellow, tinged with brown on the dorsal surface; the third segment is brown, tinged with yellow. The arista has five or six dorsal and three ventral rays in addition to the small apical fork. *Thorax:* Predominantly yellow; a broad, dark brown to black vitta extends the entire length of the mesonotum, and the upper half of each pleuron is brown. The metanotum and the remainder of the thorax are clear yellow. The halteres are yellow. The anterior dorsocentral bristles are situated about opposite the second pair of supraalars and are about two-fifths as long as the posterior dorsocentrals. The second (posterior) supraalars are well developed and are about one-fourth as long as the posterior dorsocentrals. About six rows of acrostichal setae are present. Each humerus has two strong bristles. The sternopleural bristles are broken from the specimen at hand. From the size of the bases they are apparently normal in size. *Legs:* Predominantly yellow; the middle and hind femora are brownish on the apical halves, and the bases of the tibiae are tinged with brown. The front basitarsus is about half as long as the tibia; moderately long, curved dorsal cilia extend over the apical half of the basitarsus. Curved dorsal cilia are also present on tarsal segments two, three, and four (fig.

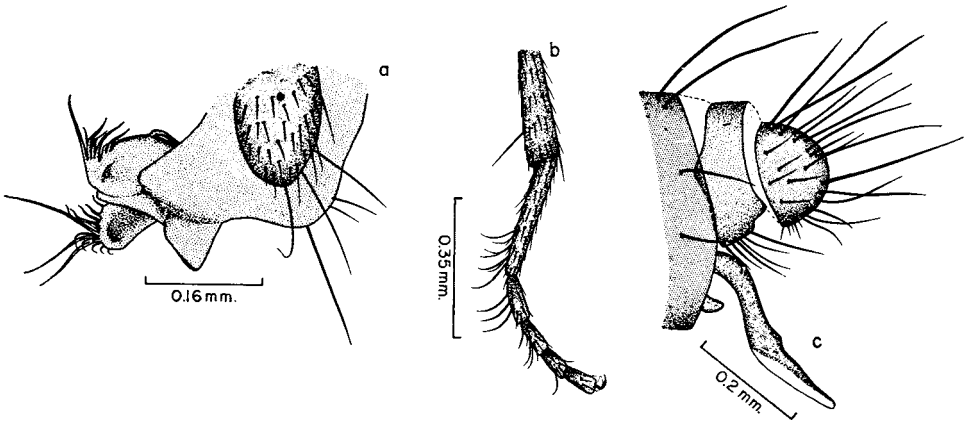


Figure 194—*Drosophila taeniata* n. sp.: **a,** labellum; **b,** front tibia and tarsus; **c,** male genitalia, lateral.

194b). *Wings:* Completely pale, yellow-brown fumose. The third costal section is five times longer than the fourth, and the costal fringe extends about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Entirely dark brown, tinged with black on the apices of the terga, and covered with gray-brown pollen. The anal plates are evenly rounded, hemispherical, pointed ventrally. The ninth tergum is almost straight-sided, is not narrowed over the dorsal portion, and the ventral margin are shaped as in figure 194c.

Length: body, 3.0 mm.; wings, 3.3 mm.

FEMALE. Unknown.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila tamashiroi new species (fig. 195a–c).

A very tiny species fitting in the complex which has the pleura all yellow, the mesonotum yellow-brown, and the wings with a large apical spot; it is differentiated from similarly marked species by the type of wing marking and venation as shown in figure 195c, by the slender front tarsi (fig. 195a), the lack of ornamentation on the front legs, and by the sclerotized rim at the apex of the labellum. This species is closely related to *fuscoapex* n. sp. from Kauai and is differentiated by the wing markings and venation as pointed out in the key and in the discussion under *fuscoapex*.

MALE. *Head:* Front about as wide as long, shining brown on the upper two-thirds, yellow below. Anterior reclinate bristles about two-thirds as long as the proclinates and situated distinctly above the latter. The vertex and upper occiput are brown and the lower occiput, genae, and face are yellow. One strong bristle is

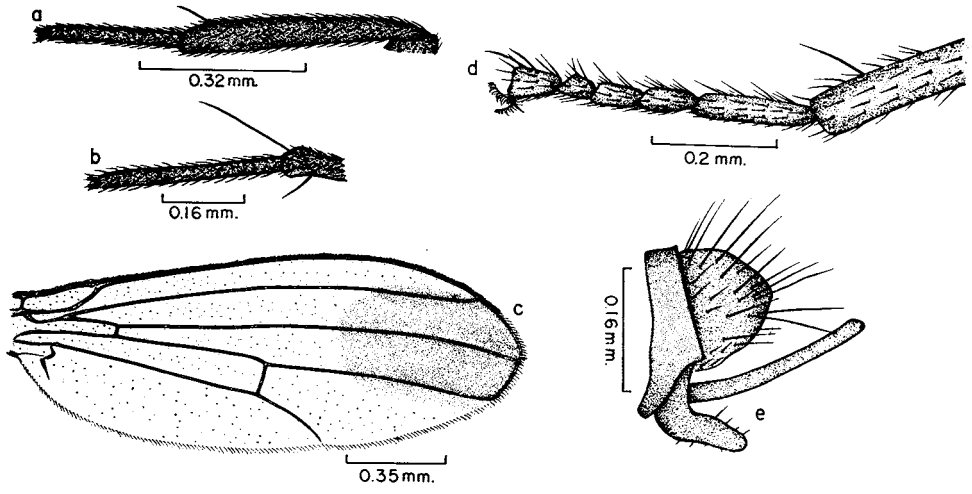


Figure 195—*Drosophila tamashiroi* n. sp.: **a,** front tibia and basitarsus; **b,** middle basitarsus; **c,** wing. *D. taractica* n. sp.: **d,** front tarsus; **e,** male genitalia.

present at the upper edge of each vibrissal row. Mouthparts, including the palpi, entirely yellow except for a heavily sclerotized black rim at the apex of each labellum (similar to that of *haleakalae,* figure 107b). *Thorax:* Brown, tinged with yellow-red on the dorsum and yellow at the apex of the scutellum; pleura entirely clear yellow except for a small brown spot at the lower edge of each mesopleuron and in the middle metapleuron. The anterior pair of dorsocentral bristles is situated opposite the first pair of supraalars. Six rows of acrostichal setae are present in the median portion of the mesonotum, but these are rather sparse on the hind portion. The under portion of the scutellum is clear yellow. The metanotum is yellow, tinged lightly with brown. The anterior sternopleural bristle is very tiny, hair-like, and about one-fourth as long as the posterior bristle. Halteres yellow. *Legs:* Entirely yellow except for a tinge of brown on the apical segments of the tarsi. Posteroventral bristles of front femur not strongly developed; the bristles are scarcely one-third longer than the width of the segment. Front tibiae and tarsi lacking ciliation; the latter are very slender and one-fourth longer than the tibiae. The basitarsus is about three-fifths as long as the tibia (fig. 195a). The dorsal bristle on the front tibia is very weak, scarcely differentiated. The apical spur on the middle tibia is very strong, extending about half as long as the middle basitarsus (fig. 195b); the latter, however, is long and slender, nearly two-thirds as long as the tibia. *Wings:* The markings are as in figure 195c. The third costal section is nearly six times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. Vein R_{2+3} is gently arched upward. The last section of vein M_{1+2} is 1.57 times longer than the penultimate section. The last section of vein M_{3+4} is 3.3 times longer than the m crossvein. *Abdomen:* Predominantly yellow, tinged lightly with brown. The genitalia have not been studied.

Length: body, 2.00 mm.; wings, 2.25 mm.

FEMALE. Unknown.

Named in honor of Dr. M. Tamashiro, University of Hawaii, who has collected many of the new species recorded in this study.

Holotype male: Makaleha Valley, Oahu, May, 1951, collected in stream bed (M. Tamashiro).

Type in the B. P. Bishop Museum.

Drosophila taractica new species (fig. 195d–e).

This species fits very near *D. reducta* n. sp., but the male genitalia are very different as shown in figures 179c and 195e. The species is also much darker colored, and the arista has only three dorsal and one ventral ray in addition to the apical fork. The peculiar shape of the male clasper is somewhat *Scaptomyza*-like.

MALE. Fitting the description of *reducta* in most respects, but the face is paler yellow and the thorax much darker in color, being predominantly brown, tinged with black on the dorsum. The front tibia and tarsus are as in figure 195d. Six rows of acrostichal setae are present. The wings are similar to those of *reducta* except that the costal fringe extends about three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The anal plates are hemispherical, almost as long as high, and are not produced ventrally. The ninth tergum is rather narrow, scarcely more than one-third as long as the anal plates, not narrowed over the dorsal portion, and gradually attenuated ventrally. The claspers are large, completely exposed, and curved as in figure 195e.

Length: body and wings, 2.5 mm.

FEMALE. Unknown.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila tarphytrichia new species (fig. 196a–c).

This species fits in the *hawaiiensis* complex by having brown markings extending transversely across the wing and by the brown-marked apical portion of the wing. It is differentiated from related species by lacking distinct vittae on the mesonotum and by having the front basitarsus of the male expanded on the apical half with a dense clump of dorsal hairs near the apex (fig. 196a).

MALE. Moderate-sized, predominantly yellow to rufous species. *Head:* About one-sixth longer than wide, nearly quadrate as seen in profile. Entirely yellow except for the reddish brown eyes and for a slight tinge of brown on the upper portion of the front, the vertex, and on the upper median portion of the occiput; also with a small brown spot below the lower edge of each eye. The front is slightly wider than long. The lower reclinate bristles are about two-thirds as long as the proclinates and are situated just slightly above the latter. A row of rather short, brown, orbital hairs extends down each side on the lower three-fifths of

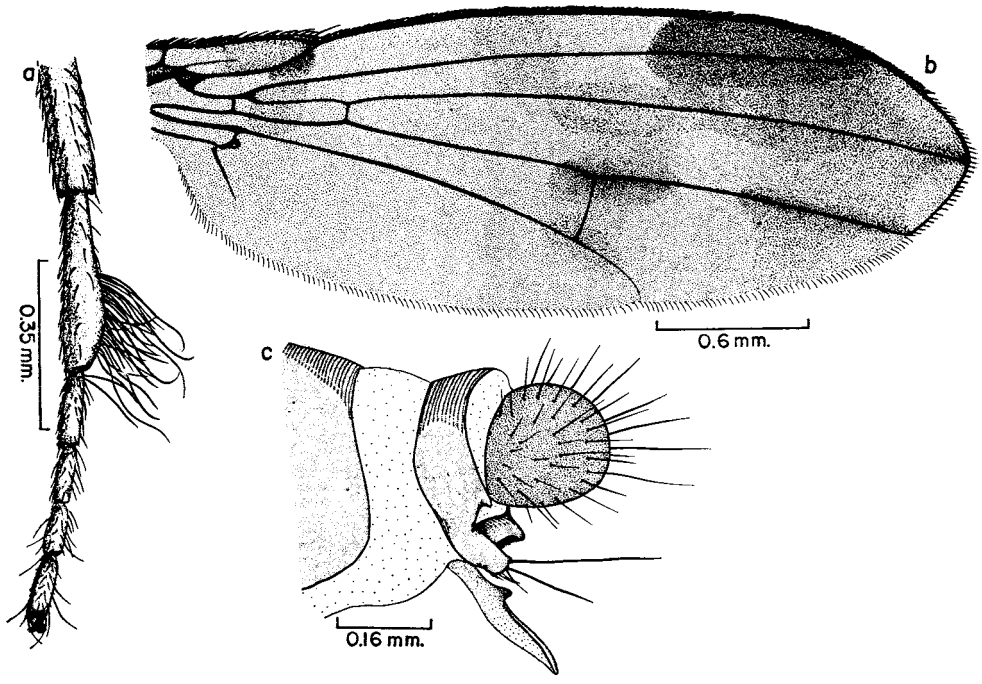


Figure 196—*Drosophila tarphytrichia* n. sp.: **a,** front tarsus; **b,** wing; **c,** male genitalia.

the front. The face has a small carina down the median portion. Two moderately strong bristles are present at the upper edge of each vibrissal row. The palpi and mouthparts are yellow. Each palpus has one moderately strong apical bristle plus numerous black setae around the margins. The labella are armed with numerous slender hairs at apices. Antennae yellow, tinged lightly with brown at the apex of the third segment. Each arista has seven or eight dorsal rays and two ventral rays in addition to the apical fork, and the anterior surface has numerous short hairs on the apical half of the arista. *Thorax:* Almost entirely yellow to rufous with a faint tinge of brown on the disc of the scutellum and on the upper margin of each mesopleuron. The anterior dorsocentral bristles are situated in line with the second pair of supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. Front femur with five or six moderately strong black bristles on each of the posterodorsal and posteroventral surfaces. Front tibia not ornate, lacking a distinct dorsoapical bristle. Front basitarsus rather strongly flattened laterally with a very dense clump of strong black dorsal hairs extending over the apical half of the segment (fig. 196a). Basitarsus about half as long as the tibia and over two times longer than the second tarsal segment. Other tarsal segments not distinctly ciliated. *Wings:* Markings as in figure 196b. A pale brown mark present at about the basal two-fifths of cell R_1 extends

through cell R_3 and connects with the brown marking which extends over the m crossvein. A broad, transverse, brown streak extends over the apical portions of veins R_{2+3}, R_{4+5}, and M_{1+2}, connects through the cells, but leaves the extreme apices of cells R_3 and R_5 subhyaline. The wings are about three times longer than wide. The third costal section is 4.3 times longer than the fourth, and the costal fringe ends near the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about one-fourth longer than the penultimate section; the proportions are 112 to 90. *Abdomen:* Brown; the posterior lateral portions of each tergum are broadly yellow. The genitalia are as in figure 196c. The ninth tergum is rather strongly attenuated on the ventral aspects.

Length: body, 3.75 mm.; wings, 4.00 mm.

FEMALE. Fitting the description of the male except for secondary sexual characters. The ovipositor plates are yellow to rufous, rather slender, and almost as long as the ventral margin of the seventh abdominal segment.

Length: body, 3.8 mm.; wings, 4.2 mm.

Holotype male, allotype female, and one female paratype: from Manoa Falls, Oahu, April 16, 1949, collected in banana bait trap (G. Mainland).

Type in the B. P. Bishop Museum, allotype in the United States National Museum, and paratype in the University of Hawaii collection.

Drosophila tendomentum new species (fig. 197a–d).

This belongs in the large complex of species which has the markings confined to the apical portion of the wing. It is readily differentiated from all other known species by the very large, expanded mentum of the male, by the long yellow spines around the margin of the labellum (fig. 197a), and by the very short costal fringe, which ends slightly beyond the apex of vein R_{2+3} (fig. 197d).

MALE. Predominantly brownish yellow species. *Head:* The front is nearly two times wider than long (measured from the upper ocelli to the front median margin above the antennae). The upper three-fifths of the front is predominantly brown; the lower two-fifths and the narrow orbital margins are yellow. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The vertex and upper occiput are dark brown, rather densely gray pollinose. The lower portion of the occiput, the genae, and the face are yellow. No strong bristles are present in the vibrissal rows. The clypeus and the lower margin of the face are tinged with brown. The palpi are yellow; each has a strong apical bristle. The mentum is very large and expanded, predominantly dark brown in color except for the yellow basal portion, and approximately as wide as the oral depression. The labellum has strong yellow spines along the ventral margin (fig. 197a). The first two antennal segments are yellow; the third segment is yellow, tinged with brown. The second segment has two moderately strong dorsal bristles. Each arista has five or six dorsal rays and two ventral in addition to the apical fork (fig. 197b). *Thorax:* Predominantly yellow, tinged with brown. The mesonotum is yellow, faintly brownish tinged, except for an indistinct brown to black vitta extending down the median portion; this

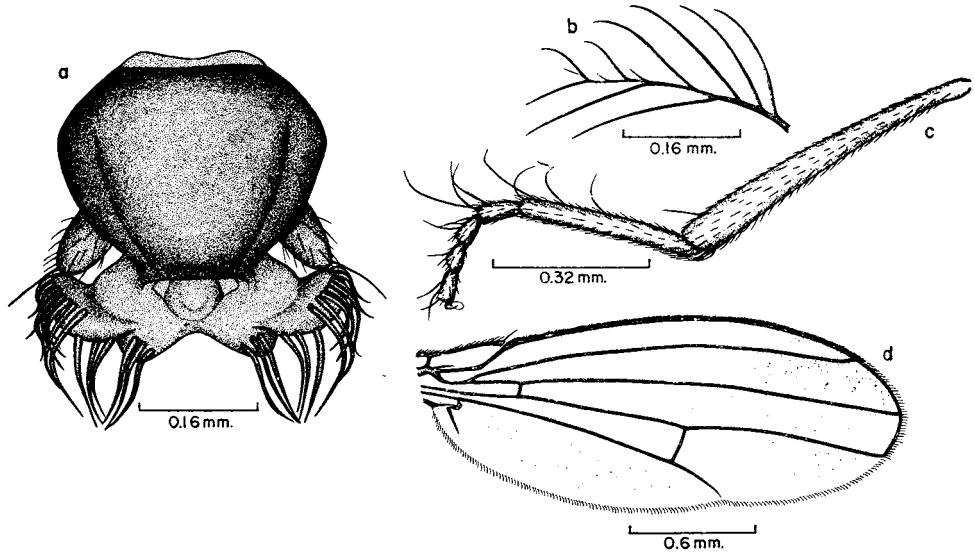


Figure 197—*Drosophila tendomentum* n. sp.: **a,** labellum, ventral view; **b,** arista; **c,** front tibia and tarsus; **d,** wing.

is expanded on the posterior portion of the mesonotum between the dorsocentral bristles. The anterior dorsocentral bristles are about half as long as the posterior bristles and are situated opposite the second pair of supraalars. The humeri are yellow; the pleura are yellow around the margins of most of the sclerites and brown, tinged with yellow in the median portions of the sclerites. The anterior sternopleural bristle is about half as long as the posterior bristle. The halteres are entirely yellow. *Legs:* Entirely yellow, except for a tinge of brown on the apices of the tarsi. The front tibiae are devoid of cilia, and the tarsi are sparsely ciliated; the basitarsus has three or four black dorsal hairs (fig. 197c). The front basitarsus is about one-half as long as the tibia. *Wings:* Predominantly hyaline, rather faintly infuscated in the upper apical portion. The costal fringe extends just a short distance beyond the apex of vein R_{2+3} (fig. 197d). The third costal section is about five times longer than the fourth. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. The last section of vein M_{3+4} is one-half to two-thirds longer than the m crossvein. *Abdomen:* Yellow-brown, yellow on the sides and the apices of the terga. The venter is yellow, tinged lightly with brown. The apex of the abdomen and the genitalia are brown to black. The genitalia have not been dissected for study.

Length: body, 2.7–3.0 mm.; wings, 3.2–3.4 mm.

FEMALE. Fitting the description of the male in most details. The mouthparts are not ornate, and the mentum is not enlarged; also, the front tarsi are not ciliated. The abdomen is almost entirely shining brown. The ovipositor plates are brownish yellow, extend about twice as far as the anal plates, and are broad and blunt at their apices. The eggs have four filaments.

Length: body, 3.3 mm.; wings, 3.7 mm.

Holotype male, allotype female, and four male paratypes: from Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the United States National Museum and the University of Hawaii collections.

Drosophila tetraspilota new species (fig. 198a–b).

This species is readily differentiated from all other known Hawaiian *Drosophila* by the peculiar wing markings (fig. 198b) and by the markings of the mesonotum (fig. 198a).

FEMALE. Predominantly yellow species. *Head:* About one-third higher than long; entirely yellow, except for the brown eyes and the brown to black ocellar triangle. The front, measured on the transverse and the longitudinal midlines, is slightly over one-third wider than long. The lower reclinate bristle is situated opposite the proclinate. The face is yellow-white. The median portion is almost black; one strong bristle is present on each side at the lower angles of the face in the upper portion of each vibrissal row. The palpi are dark brown, and each possesses a strong apical bristle. The mouthparts are yellow. The basal antennal segments are yellow, tinged lightly with brown on the upper portions; the third segment is brown. The arista has about eight dorsal and two ventral rays in addition to the apical fork. *Thorax:* Predominantly shining yellow. Mesonotum with four brown spots (fig. 198a) arranged transversely at a level with the anterior dorsocentral bristles; also two faintly brown submedian streaks are present on the hind portion of the mesonotum. The humeri are brown and a small brown mark is present just behind each humerus. The scutellum is reddish brown on the disc, yellow on the sides. The anterior pair of dorsocentral bristles are situated almost in line with the first pair of supraalars. Two pairs of humeral bristles are present. A transverse brown streak extends through the median portion of each mesopleuron. The sternopleura are almost entirely brown, and a brown spot is present in the middle of each hypopleuron and each metapleuron. The metanotum is reddish brown. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow. *Wings:* Hyaline through the median portion and brown on the anterior margin and over much of the hind portion. A milky white streak extends the entire length of the wing. The brown costal streak extends from about the middle of the second costal section to near the wing apex, filling all of cell R_1 and extending along the upper edge of the apical half of cell R_3. The brown marking in the hind portion of the wing extends over the apical three-fourths of vein M_{3+4}. The third costal section is five times longer than the fourth section and the costal fringe extends just a slight distance beyond the apex of vein R_{2+3}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section (fig. 198b). *Abdomen:* The first segment is yellow. The remainder of the abdomen is brown, tinged with rufous. The ovipositor plates are short, and triangular in shape, and extend scarcely beyond the apices of the anal plates.

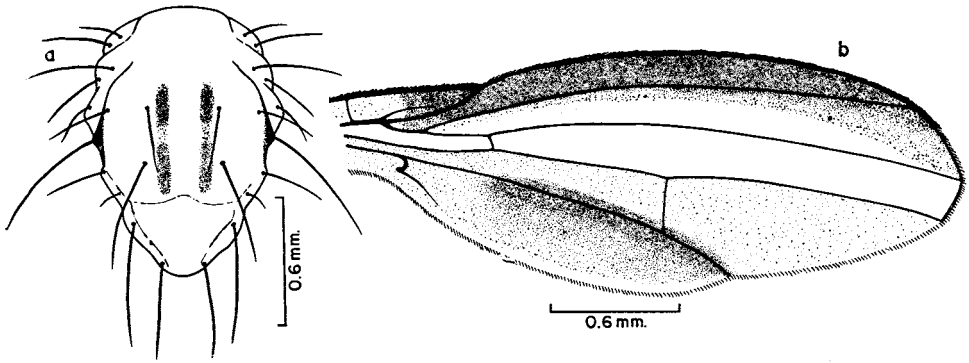


Figure 198—*Drosophila tetraspilota* n. sp.: **a**, thorax, dorsal; **b**, wing.

Length: body, 3.0 mm.; wings, 3.2 mm.

MALE. Unknown.

Holotype female: Upper Hamakua Ditch Trail, Hawaii, July 30, 1921 (O. H. Swezey).

Type in the Hawaiian Sugar Planters' Association collection.

Drosophila torula new species (fig. 199a–b).

This species is differentiated from other clear-winged, dark-bodied *Drosophila* by having a strong prominence on the dorsal surface of the second tarsal segment of the male (fig. 199a).

MALE. *Head:* About one-half higher than long as seen from lateral view. The front is about two-thirds wider than long, dark brown in the median portion, and black on the sides and along the front and upper margins. The vertex and ocellar triangle are black. The upper portion of the occiput is brown, the lower two-thirds is yellow. The gena is yellow except for a brown border along the vibrissal row. The upper portion of the face is yellow, the lower portion is dark brown to black; the face has a slight carina down the median portion. One moderately strong bristle is present at the upper edge of each vibrissal row. The palpi and mouthparts are yellow; the former has no distinct bristles but has numerous black setae around the apical portion. The clypeus is brown. The antennae are brown. The second segment has three dorsal bristles. The arista has five to six dorsal rays and two ventral rays in addition to the apical fork. The lower reclinate bristle is equal to, or slightly longer than, the proclinate, is situated opposite the latter, and is long, slender, hair-like. The inner vertical bristle is about two-thirds as long as the outer. *Thorax:* Subshining brown covered with brownish gray pollen. The anterior reclinate bristles are rather small, about equal in size to the inner postalars, and slightly posterior to a line drawn directly between the posterior supraalars. About eight rows of acrostichal setae are present. The lower humeral bristle is about five-sixths as long as the upper, and the anterior sternopleural bristle is about three-fourths as long as the posterior

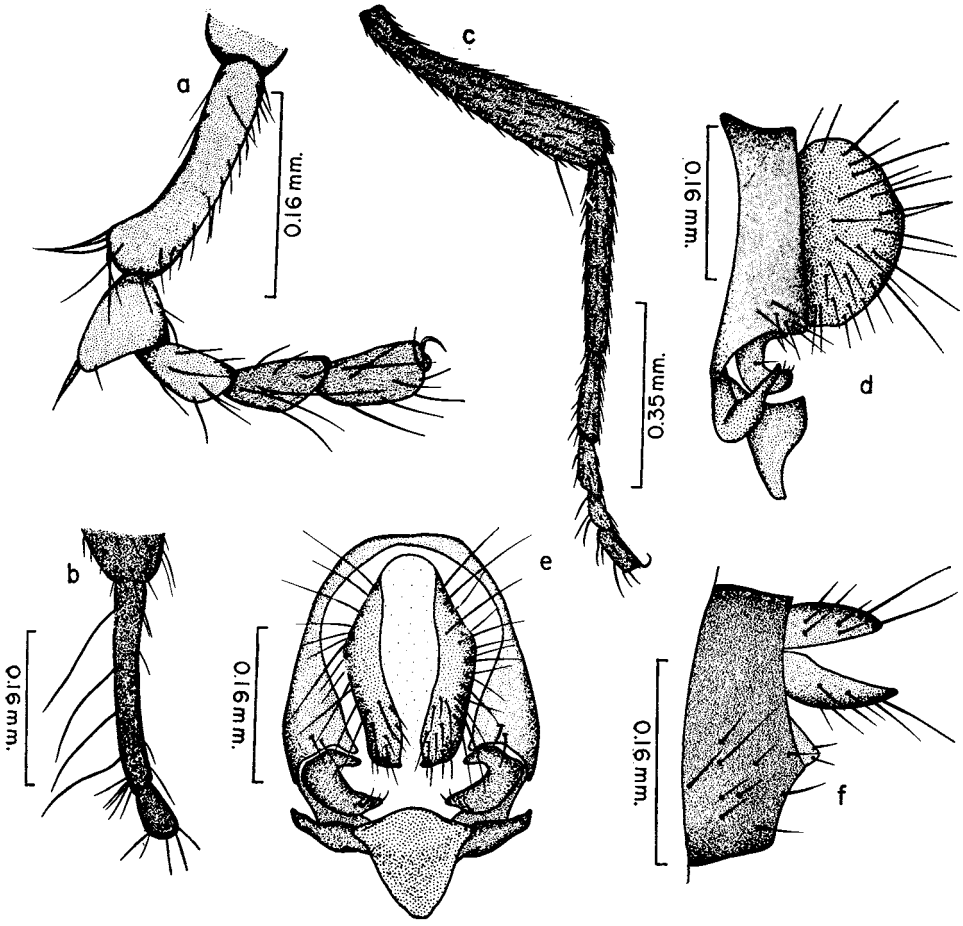


Figure 199—*Drosophila torula* n. sp.: **a,** front tarsus, posterior view; **b,** first two tarsal segments of front legs, dorsal view. *D. totonigra* n. sp.: **c,** front tibia and tarsus; **d,** male genitalia, lateral; **e,** male genitalia, ventral; **f,** female genitalia.

bristle. *Legs:* Entirely yellow. The preapical dorsal bristle of the front tibia is short, extending scarcely to the apex of the segment. The front basitarsus is rather slender, about half as long as the tibia, and with about five or six apicodorsal bristles; two of the latter are closely appressed and usually give the appearance of a rather stout spine. A row of moderately long, yellow cilia extends down the anterodorsal portion of each basitarsus (fig. 199b). The second segment of the tarsus is short, scarcely one-fifth as long as the first, and has a strong dorsal prominence (fig. 199a). *Wings:* Hyaline, faintly infuscated. The costal fringe extends almost one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is five times longer than the fourth. The last section of vein M_{3+4} is one-half to two-thirds longer than the m crossvein. *Abdo-*

men: Dark brown, faintly covered with gray-brown pollen. The genitalia are predominantly yellow. They have not been dissected for study.

Length: body, 2.3 mm.; wings, 3.0 mm.

FEMALE. Similar to the male in most respects. The front tarsi are not ornate, two moderately strong bristles are present at the upper edge of each vibrissal row, and each palpus has two distinct bristles. The lower half of each pleuron is yellow.

Length: body, 2.5 mm.; wings, 2.9 mm.

Holotype male, allotype female, and two female paratypes: from Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy). One male specimen which apparently belongs here is on hand from Puu Kolekole, Molokai, July, 1952 (D. E. Hardy). Some slight differences are seen, however, and it is not being designated as a paratype.

Type and allotype in the B. P. Bishop Museum. Paratypes in the United States National Museum and the University of Hawaii collections.

Drosophila totonigra new species (fig. 199c–f).

This almost totally black species is related to *D. prolixa* n. sp. from Molokai but is readily separated by its black coloration, including the major portion of each tibia; by the more elongate basitarsus of the front legs; by the absence of a secondary humeral bristle; by having the inner vertical bristles about equal to, or slightly shorter than, the height of the head; and by the genital characters as shown in figures 199d–e.

MALE. *Head:* Predominantly brown to black except for the reddish colored eyes and a tinge of yellow across the lower portion of the front, on the basal portion of the second antennal segment, and also over the median portion of the face. The front is densely brown pollinose. The anterior reclinate bristles are about two-thirds as long as the proclinates and are situated opposite or just slightly in front of the latter. The inner vertical bristles are about two times larger than the postocellars and approximately equal in length to the height of the head. One strong bristle is present at the upper edge of each vibrissal row. This is approximately equal in size to the upper reclinate bristles. The palpi are dark brown to black; each has about three short, black bristles at or near the apex. The labella are not ornate. The arista has five to seven dorsal rays and two ventral rays in addition to the apical fork. *Thorax:* Entirely shining black in ground color, covered with gray-brown pollen. The anterior dorsocentral bristles are situated almost opposite the lateral margins of the suture. About six rows of acrostichal setae are present. Each humerus has one strong bristle, and there is no evidence of a secondary bristle. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The knobs of the halteres are dark brown to black; the stems are brown, tinged with red. Two small setae are present on each side of the scutellum between the bristles. *Legs:* Entirely black except for the yellow tarsi and the narrow yellow bases of the tibiae. Each front coxa has two or three moderately strong posterodorsal bristles.

The legs are devoid of long ciliation or ornamentation. The front basitarsus is about two-thirds as long as the tibia and approximately two times longer than the second tarsal segment (fig. 199c). *Wings:* Almost hyaline, faintly tinged with yellow. The third costal section is 2.5 times longer than the fourth, and the costal fringe extends almost to the apex of vein R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely shining black in ground color covered with gray pollen. The anal plates are extended into rather long slender lobes on the apical ventral margins. The ninth tergum is almost straight-sided, only slightly narrowed over the dorsal portion, and is developed into a subacute point on each apical ventral margin. The claspers are readily visible from a lateral view; each is slender, curved, boomerang-shaped as in figure 199d. The aedeagus is rather short, bulbous at the apex, and a short accessory organ extends laterally on each side of the ninth sternum (fig. 199e). The genitalia are distinctly different from those of any *Drosophila* which I have seen.

Length: body, 3.0 mm.; wings, 3.2 mm.

FEMALE. Fitting the description of the male in most regards. No distinct ovipositor plates are developed; these are rudimentary and are represented by a small blunt lobe on each side below the anal plates (fig. 199f).

Length: body, 2.5 mm.; wings, 2.7 mm.

Holotype male, and allotype female: Mt. Kaala, April, 1952 (D. E. Hardy). Twenty-four paratypes (21 females and 3 males): same as type; Makaleha, Oahu, 2,500 feet, April, 1952 (E. Dresner); "Oahu, Hawaii, Bridwell collection" (no date or specific locality given); and Wailuanui, Maui, July 2, 1920 (E. H. Bryan, Jr.).

One paratype male labeled "Oahu, Hawaii, Bridwell collection."

One female on hand from Kaunuohua Ridge, Kauai, 4,000 feet, August, 1953 (D. E. Hardy) may possibly belong here, but the wings are dark brown fumose.

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila transfuga new species (fig. 200a–c).

This species fits in the complex which is characterized by having the dorsum of the thorax black except for the yellow apex of the scutellum and by having a black rim at the apex of the labellum and the ventral half of each pleuron yellow. The wings are intermediate between those which have distinct brown markings and those which lack brown markings; the anteroapical portion of the wing is darker brown fumose than is the remainder, but the coloration is rather generalized and no distinct marking is present; it is necessary to key *transfuga* with both groups. The species is differentiated from all members of the complex by having the ocellar bristles displaced, located in front of the ocellar triangle, approximately opposite the proclinate bristles.

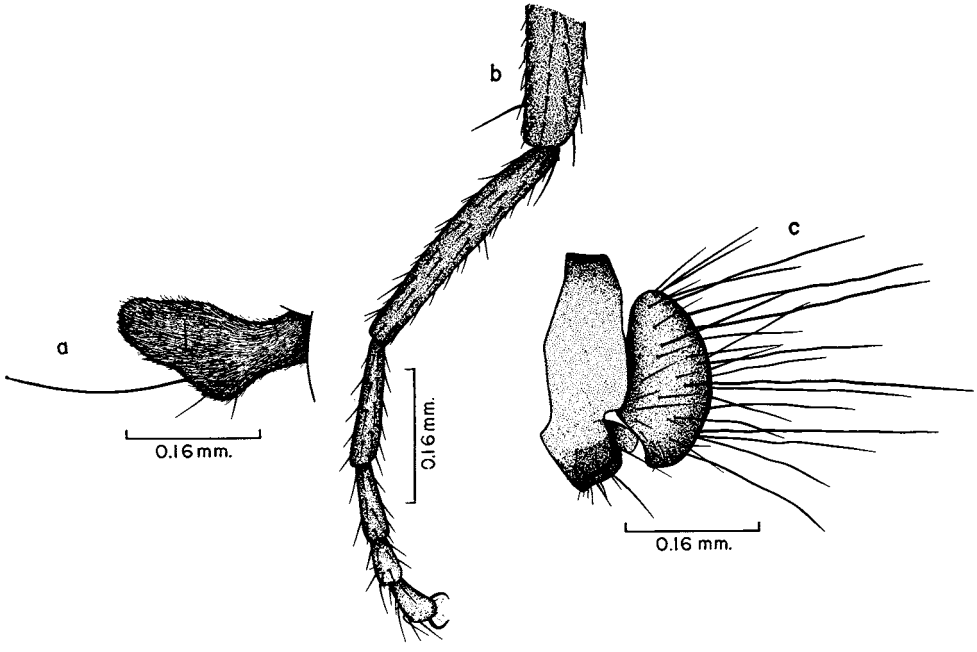


Figure 200—*Drosophila transfuga* n. sp.: **a,** palpus; **b,** front tarsus; **c,** male genitalia.

MALE. *Head:* The compound eyes are oval in shape and about 1.5 times higher than long. The front is yellow, the upper half is rather densely gray pollinose; measured from the median ocellus to the anterior margin, the front is about three-fourths wider than long. The displaced ocellar bristles are situated almost in the median portion of the front, about opposite the proclinate bristles. The eye orbits are discolored with brown to black on the upper portion above the upper reclinate bristles. The ocellar triangle is black in ground color, and the narrow hind edge of the vertex is tinged with brown. The occiput is brown to black on the upper two-thirds, covered with gray pollen; the lower portion is pale yellow. The genae are yellow-white. The face is yellow-white on the sides along the eye margins, pure white in the middle portion; the upper median portion of the face is very slightly raised. The clypeus, palpi, and mouthparts are pale yellow except for a very narrow black rim at the apex of each labellum. Each palpus is rather broad, expanded on the posteromedian margin. No apical bristle is present, but two pale yellow hairlike bristles (setae) are situated at the posteromedian portion of the segment (fig. 200a). One moderately strong bristle is present at the upper edge of each vibrissal row; this is about equal in size to the proclinate bristles of the front. Antennae entirely pale yellow; two dorsal bristles are present on the second segment. The arista has six or seven dorsal and three ventral rays in addition to the small apical fork. *Thorax:* Predominantly shining black in ground color, densely gray-white pollinose over the meso-

notum, with the apex of the scutellum conspicuously yellow and with the lower half of each pleuron yellow. The anterior dorsocentral bristles are situated about opposite the first (anterior) supraalars. Six rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is approximately two-fifths as long as the posterior bristle. *Legs:* Entirely yellow, lacking ornamentation. The front basitarsus is slightly over half as long as the tibia and about two times longer than the second tarsal segment (fig. 200b). *Wings:* Predominantly subhyaline, faintly tinged with brown, more distinctly brownish on the anteroapical portion. The third costal section is 4.4 times longer than the fourth, and the costal fringe extends almost one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Predominantly shining black covered with gray-brown pollen; tinged faintly with rufous in the ground color of the first and sixth terga. The anal plates are about one-half higher than long and are rounded on the dorsal and ventral margins. The ninth tergum is straight-sided, slightly narrowed ventrally (fig. 200c). The claspers are plainly visible from a lateral view.

Length: body, 2.8 mm.; wings, 3.0 mm.

FEMALE. Unknown.

Holotype male: Iao Valley, Maui, June, 1952 (M. Tamashiro).

Type in the B. P. Bishop Museum.

Drosophila trichaetosa new species (fig. 201a–d).

This species differs from the other clear-winged, dark-bodied *Drosophila* known from Hawaii by the ornamentation of the front tarsus of the male. The presence of three black apical dorsal bristles on the front basitarsus will distinguish it (fig. 201b).

MALE. *Head:* Almost entirely dark brown to black, yellow on the genae and the mouthparts. The median portion of the front is velvety brown; the orbits are black in ground color, covered with gray pollen. The palpi are yellow; each has a small black apical bristle and several black setae around the outer edge. The labella are not ornate. One moderately strong black bristle is present at the upper edge of each vibrissal row. The anterior reclinate bristle is about four-fifths as long as the proclinate and is situated slightly above the latter. The antennae are brown; the second segment has two dorsal bristles. The arista has four or five dorsal rays and two ventral rays in addition to the apical fork (fig. 201a). *Thorax:* Entirely dark-colored including the humeri, brown on the sides, tinged with black on the dorsum. The anterior dorsocentral bristles are situated about opposite the anterior supraalars. Six rows of acrostichal setae are present. The lower humeral bristle is about two-thirds as long as the upper and the anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. Front tibiae not ciliated; the dorsal bristle is situated slightly more than its length from the apex of the tibia. The front basitarsus is about two-fifths as long as the tibia and has three black apicodorsal

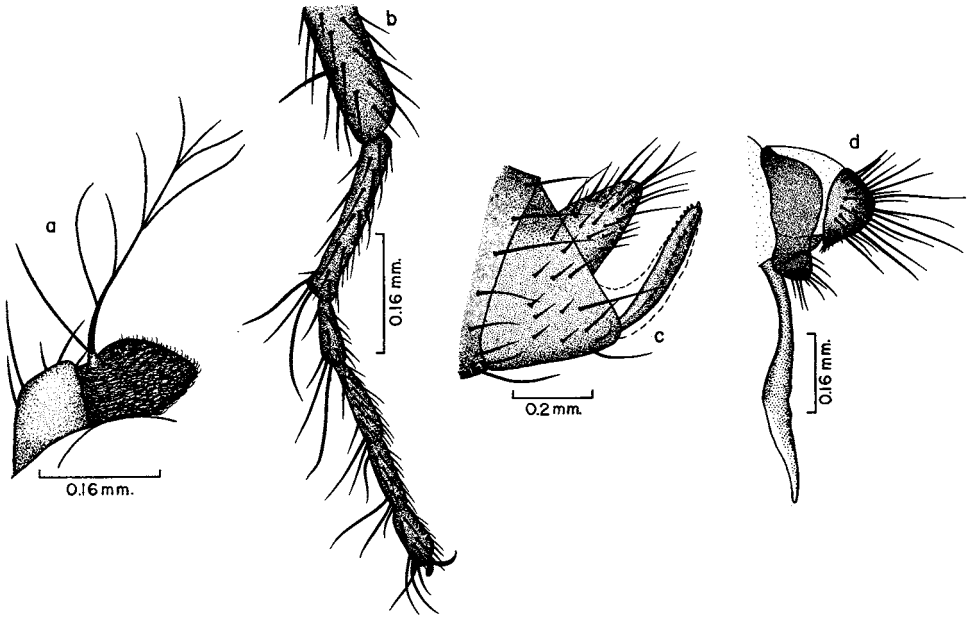


Figure 201—*Drosophila trichaetosa* n. sp.: **a,** antenna; **b,** front tarsus; **c,** female genitalia; **d,** male genitalia.

bristles (fig. 201b). The second tarsal segment is almost half as long as the first and has two black bristles at the apex. The third and fourth segments have several erect setae at the apex. *Wings:* Faintly infuscated but with no distinct brown markings. The wings are 2.6 times longer than wide. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.4 times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Entirely dark brown covered with gray-brown pollen. The male genitalia are as in figure 201d. The ninth tergum is reduced to a narrow ring on the dorsal portion.

Length: body, 2.7 mm.; wings, 3.2 mm.

FEMALE. Similar to the male in coloration, the front legs are not ornate, the vibrissal row has two or three moderately strong bristles, and the apical bristle on the palpus is well developed. The ovipositor is slender, straight-sided (fig. 201c). I see no way to differentiate the females from related species unless they are accompanied by the males.

Length: body, 2.85 mm.; wings, 3.60 mm.

Holotype male and allotype female: Kulani, Hawaii, 5,200 feet, July, 1952 (D. E. Hardy). Sixty-nine paratypes (42 males and 27 females; the females are all from the type locality except for two specimens associated with the male at Waimea): from the following localities—same as type (D. E. Hardy and W. C. Mitchell); Keanakolu, Hawaii, 4,500–5,200 feet, October, 1952 (D. E. Hardy and

C. P. Hoyt); Waimea, Hawaii, April 26, 1944 (N. L. H. Krauss); Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy); and Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

Type, allotype, and series of paratypes in the B. P. Bishop Museum. Remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila truncipenna new species (fig. 202a–e).

This species is very readily differentiated from all other known *Drosophila* by the peculiar shape of the wing and by the wing markings, as well as by the bristling of the front legs of the male (as shown in fig. 202b–c). The wings are not as distinctly truncate in the females as in the males, but the very broad apex of cell R_5 and the tiny brown spot near the wing apex just above vein M_{1+2} are distinctive in both sexes (fig. 202e).

MALE. A predominantly yellow-brown species. *Head:* Almost quadrate in shape as seen from direct lateral view; just slightly higher than long. The front is about one-third wider than long, is yellow-red, tinged lightly with brown. The lower reclinate bristle is about three-fourths to four-fifths as long as the proclinate and is situated well above the latter, or about one-third to two-fifths the distance between the proclinate and the upper reclinate bristle. The ocellar triangle is black. The vertex is rufous, tinged lightly with brown. The occiput is rufous except for a brown spot in the upper median portion. The genae, face, and mouthparts, including the palpi, are yellow. The face is rather strongly carinate down the median portion. The antennae are yellow, tinged faintly with brown. The arista has six or seven dorsal and two to three ventral rays in addition to the apical fork; the inner surface is bare. Three or four moderately strong bristles are present at the upper edge of each vibrissal row. The apical bristles on the palpus is rather small. The labella are not ornate, but each has a dense fringe of black hairs at its apex (fig. 202a). *Thorax:* The mesonotum is predominantly brown, tinged with yellow, and with a pair of submedian yellow vittae extending from the front margin to the anterior dorsocentral bristles. A dark brown line also extends down each dorsocentral row. The scutellum is brownish yellow. The sternopleura and hypopleura are clear yellow; the other sclerites of the pleura, excepting the propleura, are yellow-brown. Two strong humeral bristles are present and the humerus is densely setose. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. Six to eight rows of acrostichal setae are present. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. A vertical line of small, black setae extends across the sternopleuron from the ventral margin to the dorsal margin about halfway between the two sternopleural bristles. The metanotum is clear yellow. The halteres are yellow. *Legs:* Yellow, except for the black apices of the front tibiae and the blackened front tarsi. The front femur is slender and is densely covered with black bristles over the posterodorsal surface (fig. 202d). The front tibia is slightly curved as seen in direct dorsal view and is enlarged

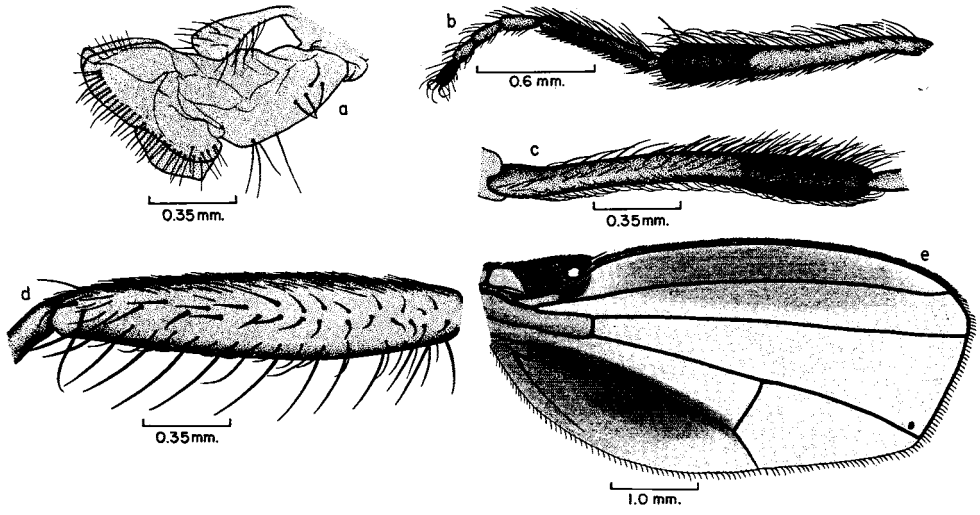


Figure 202—*Drosophila truncipenna* n. sp.: **a,** labellum; **b,** front tibia and tarsus, lateral; **c,** front tibia, dorsal; **d,** front femur, posterior surface; **e,** wing.

and blackened apically; the inner surface is distinctly flattened and the anterodorsal and posterodorsal surfaces are rather thickly covered with short curved cilia (fig. 202c). The front basitarsus is flattened laterally, is about two-fifths as long as the tibia, and is thickly covered with short, black hairs over the dorsal and posterior surfaces (fig. 202b). *Wings:* Distinctively shaped as in figure 202e, the basal cells are dark brown; a distinctive hyaline, window-like spot is present at the apex of the second costal cell and another brown spot is present near the apex of the wing just above vein M_{1+2}. A broad, brown streak extends from the wing base longitudinally through cell M_4 almost to the m crossvein extending slightly into the lower portion of cell 1st M_2. The anterior margin of the wing is yellow-brown fumose. This coloration extends through most of cell R_1 and into the upper portion of cell R_3. The remainder of the wing is faintly yellowish. The costal fringe extends just slightly beyond the apex of vein R_{2+3}. The third costal section is eight times longer than the fourth and the fifth costal section is 2.5 times wider than the fourth. The last two sections of vein M_{1+2} are approximately equal in length. The last section of vein M_{3+4} is about two-thirds as long as the m crossvein. *Abdomen:* Principally dark brown to black; the anterior lateral margins of each segment are yellow. The sternum is entirely yellow. The genitalia have not been dissected for study.

Length: body, 8.5 mm.; wings, 7.9 mm.

FEMALE. Fitting the description of the male in most respects. The front legs, however, are not ornate; the femora have one row each of posteroventral and posterodorsal bristles. The wings lack the dark brown streak extending longitudinally through cell M_4 and the entire membrane is rather evenly yellow-brown fumose, not distinctly darker on the anterior margin. The small hyaline

spot at apex of the second costal cell is also smaller than in the male. The wing apex is gently rounded, not so distinctly truncate, and the fifth costal section is only about 1.5 times wider than the fourth. The costal fringe extends about two-fifths the distance between the tips of veins R_{2+3} and R_{4+5}. The ovipositor plates are slender, sharp-pointed, almost equal in length to the ventral margin of the seventh segment.

Length: body, 7.3 mm.; wings, 7.4 mm.

Holotype male, allotype female, and two female paratypes: from Waikamoi, Maui, 4,000 feet, collected in banana bait trap, August, 1959 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum, paratypes in the United States National Museum and the University of Hawaii collection.

Drosophila undulata Grimshaw (fig. 203a–f).

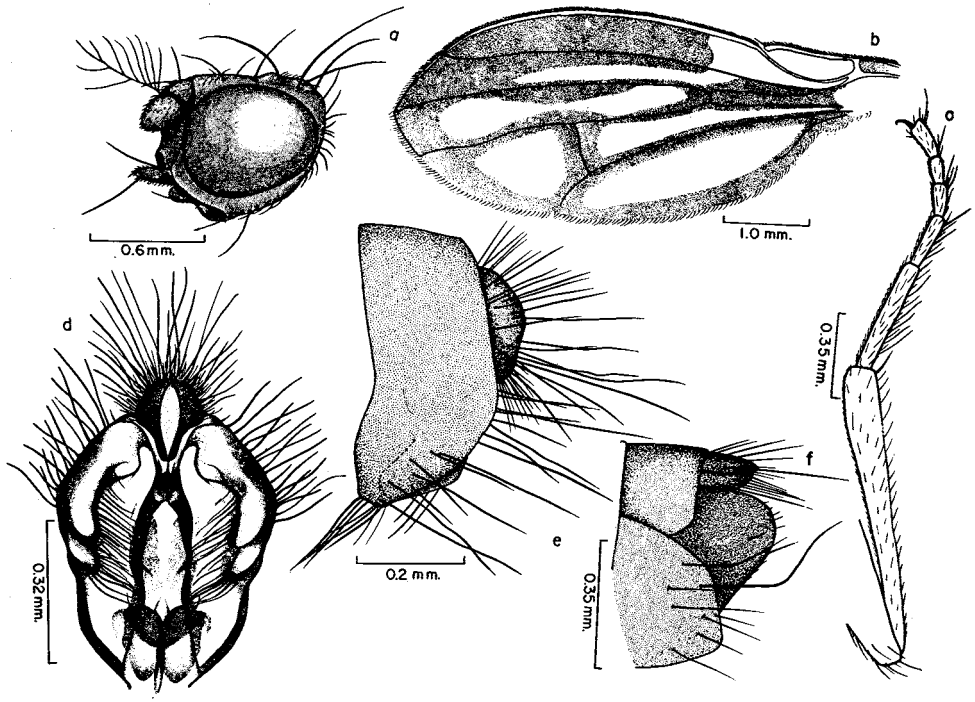
Drosophila undulata Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :58.

Endemic. Hawaii (type locality: Kilauea). Known only from the type (female) taken in 1896, and from one male specimen taken at Olaa, Hawaii, July, 1903 (collector unknown). I have studied both of these specimens.

Type in the British Museum (Natural History). Grimshaw indicated that the type was a male; however, the specimen marked type in the British Museum is a female.

This species is well defined by the border of brown which extends around the wing margin, by other wing markings, venation (fig. 203b), the rather elongate head (fig. 203a), and by the vittate mesonotum.

The type female is in fairly good condition except for the loss of one middle leg, both hind legs, and for partial damage to the thorax by the insertion of the pin. The following descriptive notes are based upon the study of the type, supplemented by study of a male specimen from Olaa, and of a female specimen which contains no collection date. The head is just slightly longer than high, rather square as seen in profile (fig. 203a). Front chiefly brownish red and yellow-gray pollinose along the orbits; a yellow-gray pollinose mark extends down the middle from the occiput, around the ocelli, almost to the anterior median portion of the front. The lower reclinate bristle is slightly over one-half as large as the proclinate and is situated about halfway between the proclinate and the upper reclinate bristle. The face is yellow-brown and has a sharp keel down the median portion. One strong bristle and two moderate-sized bristles are present in the upper portion of each vibrissal row. The palpi are dark brown to black and each has one strong apical bristle plus numerous black setae around the margin. The first two antennal segments are yellow-brown, the third is black. The arista has about seven dorsal and two ventral rays in addition to the apical fork. The thorax is predominantly brown; the mesonotum is yellow-gray pollinose with five brown to black vittae extending the entire length of the sclerite as follows: a median brown vitta, a narrow black vitta in line with each of the dorsocentral rows, and a rather broad lateral vitta extending down each side from behind the humerus. The humeri, the lateral margins, and the anterior



Figures 203—*Drosophila undulata* Grimshaw: **a,** head; **b,** wing, drawn from type female; **c,** front tibia and tarsus; **d,** male genitalia, ventral; **e,** male genitalia, lateral; **f,** female genitalia.

margin of the mesonotum are yellow. One strong humeral bristle is present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first pair of supraalars. The acrostichal setae are arranged in six rows. The scutellum is dark brown to black on the disc, yellowish on the margins. Each pleuron has a broad brown band extending longitudinally over the upper portion of the mesopleuron and over the upper portion of the sternopleuron. The metanotum and the pleuroterga are yellow, tinged with brown. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The coxae and femora are brown to black; the tibiae and tarsi are yellow. The front tarsi of the male have numerous erect dorsal setae as in figure 203c. The wings are marked as in figure 203b; brown markings extend around the margin of the wing, along the veins and crossveins, and the median portions of most of the cells are hyaline. The wing is comparatively broad, about 2.6 times longer than wide. The third costal section is about four times longer than the fourth, and the costal fringe extends half the distance between the tips of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is distinctly undulated and is just slightly longer than the penultimate section. The abdomen is dark brown to black. The segments are slightly yellowish along the extreme anterior margins and on the venter.

The female ovipositor plates are broad and blunt and extend slightly beyond the apices of the anal plates (fig. 203f). The ninth tergum of the male is broad, nearly three times longer than the small anal plates, and the ventral margins are not produced (fig. 203e). The claspers are nearly hidden from a direct lateral view. From ventral view the genitalia are as in figure 203d.

Length: body and wings, 4.0–4.5 mm.

Drosophila unicula new species (fig. 204a–c).

This species appears most closely related to *D. trichaetosa* n. sp. but is differentiated by having only one apicodorsal bristle on the front basitarsus (fig. 204a) and just a single apical bristle on the second tarsal segment. Also, the male genitalia appears to show distinct differences (fig. 204b–c); the inner surface of each clasper of *unicula* is densely black setose whereas this surface is largely bare on *trichaetosa*.

MALE. *Head:* The front is entirely dark brown to black, opaque, rather velvety in the median portion, subshining black and covered with gray pollen on the orbits. The occiput is entirely brown except for the extreme lower portion which is yellow, faintly tinged with brown. The genae are yellow except for a narrow strip of brown on the vibrissal row. In the median portion the gena is very narrow; measured from the vibrissal row to the eye margin it is scarcely equal in width to two rows of eye facets. The face is black, tinged with yellow on the upper portion; the median portion is convex. The clypeus is dark brown to black. The palpi are yellow, faintly tinged with brown. No strong bristles are present on the palpi, but each has several black setae around the apical portion. The mouthparts are yellow. The labella are not ornate. One moderately strong bristle is present at the upper edge of each vibrissal row. This is approximately equal in size to the anterior reclinate bristle. The anterior reclinate bristle is subequal to the proclinate and is situated distinctly above the latter. The antennae are entirely dark brown to black. The second segment has two dorsal bristles. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Almost entirely dark brown, tinged with black on the dorsum, with a tinge of rufous in the ground color of the humeri, and with the lower two-thirds of the sternopleura yellow, tinged faintly with brown. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is three-fourths as long as the posterior bristle. The halteres are pale yellow. *Legs:* Entirely yellow except for the brown pretarsi. The front basitarsus is approximately two-fifths as long as the tibia, is very slightly thickened at the apex, and has a moderately strong apicodorsal bristle. The second tarsal segment is about half as long as the basitarsus and has one apicodorsal bristle (fig. 204a). *Wings:* Distinctly infuscated with pale brown but with no distinct brown markings. The third costal section is 4.4 times longer than the fourth, and the costal fringe ends slightly before the middle of the distance between the apices of veins R_{2+3} and R_{4+5}.

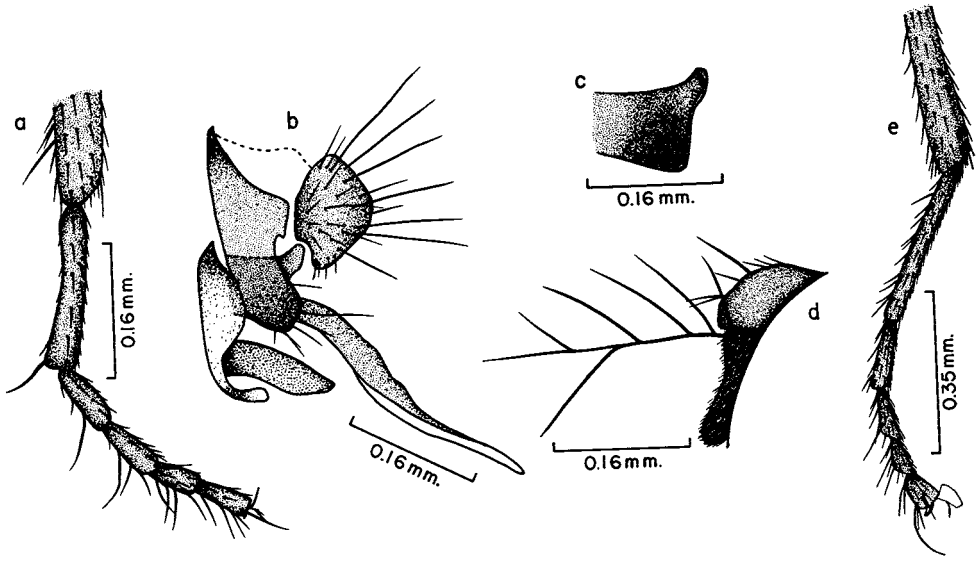


Figure 204—*Drosophila unicula* n. sp.: **a,** front tarsus; **b,** male genitalia; **c,** inner surface of male clasper. *D. varga* n. sp.: **d,** arista; **e,** front tibia and tarsus.

The last section of vein M_{1+2} is 1.43 times longer than the penultimate section. *Abdomen:* Entirely shining brown, covered with gray-brown pollen on the dorsum, yellow on the venter. The anal plates are subacutely pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion, convex on the posteromedian portion, and lobate ventrally (fig. 204b). The inner surfaces of the claspers are densely black setose (fig. 204c).

Length: body and wings, 2.5 mm.

FEMALE. Unknown.

Holotype male and one male paratype: Kilauea, Hawaii, August, 1958, collected in light trap (J. W. Beardsley).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila varga new species (fig. 204d–e).

This species fits in the clear-winged complex which is characterized by having only one humeral bristle. It runs near *D. comatifemora* n. sp. and *mediana* n. sp. but is readily differentiated from these by lacking long cilia on the front tarsi of the male and by having the costal fringe more elongate (extending two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}.

MALE. *Head:* About one-half higher than long; the ventral margin is almost straight. The front, measured from the median ocellus to the anterior margin, is two times wider than long. The entire front, including the eye orbits, is completely yellow, and the vertex is also yellow, covered with yellow-gray pollen.

The ocellar triangle is dark brown to black. The occiput is tinged with brown on the upper median portion and otherwise yellow. The genae and face are yellow. Measured at the lower margin of the eye, the gena is about equal in width to four or five rows of eye facets. The face is gently carinate on the upper median half and flattened on the lower median half. The clypeus is yellow. The palpi are yellow-brown; each has a small black apical bristle. The labella are not ornate. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the humeral bristle. The anterior reclinate bristle is small, rather hairlike, approximately one-half as long as the proclinate, and situated slightly above the latter. The space between the proclinate and the upper reclinate bristles is approximately equal to that between the ocellar bristles. The first two antennal segments are yellow except for a tinge of brown on the dorsum. The third segment is reddish brown. The arista has four dorsal and one ventral ray in addition to the apical fork; the rays are rather distinctively arranged as shown in figure 204d. *Thorax:* Entirely yellow to rufous, rather densely covered with yellow-gray pollen. The anterior dorsocentral bristles are situated almost in line with the first (anterior) pair of supraalars. Six rows of acrostichal setae are present. The humerus has only one bristle. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle, and two black intermediate setae are present, the uppermost approximately one-half as long as the anterior bristle. *Legs:* Entirely yellow, with no long cilia or ornamentation. The front basitarsus is about one-half as long as the tibia and is two times longer than the second tarsal segment (fig. 204e). *Wings:* Entirely hyaline. The third costal section is 2.75 times longer than the fourth, and the costal fringe extends approximately two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.57 times longer than the penultimate section. The last section of vein M_{3+4} is about one-half longer than the m crossvein. *Abdomen:* The basal three terga are yellow, tinged with brown. Terga four to six are dark brown to black, tinged with rufous. The entire abdomen is rather densely gray pollinose. The male genitalia have not been dissected for study.

Length: body and wings, 2.75 mm.

FEMALE. Unknown.

Holotype male: Haelaau, Maui, December 21, 1928 (O. H. Swezey).

The type is in the collection of the Hawaiian Sugar Planters' Association.

Drosophila variabilis new species (fig. 205a–b).

This species fits in the complex which is characterized by having a strong projection at the apex of the front basitarsus of the male (fig. 205a), only four visible segments in the front tarsus of the male, and no apicoventral bristle present on the front tibia. It fits near *enoplotarsus* n. sp. in my key to species, but the front tarsi of the male are very differently developed in the two. *D. variabilis* has the mesonotum predominantly brown and no infuscations in the wing.

MALE. *Head:* The front is about one-half wider than long and is brown,

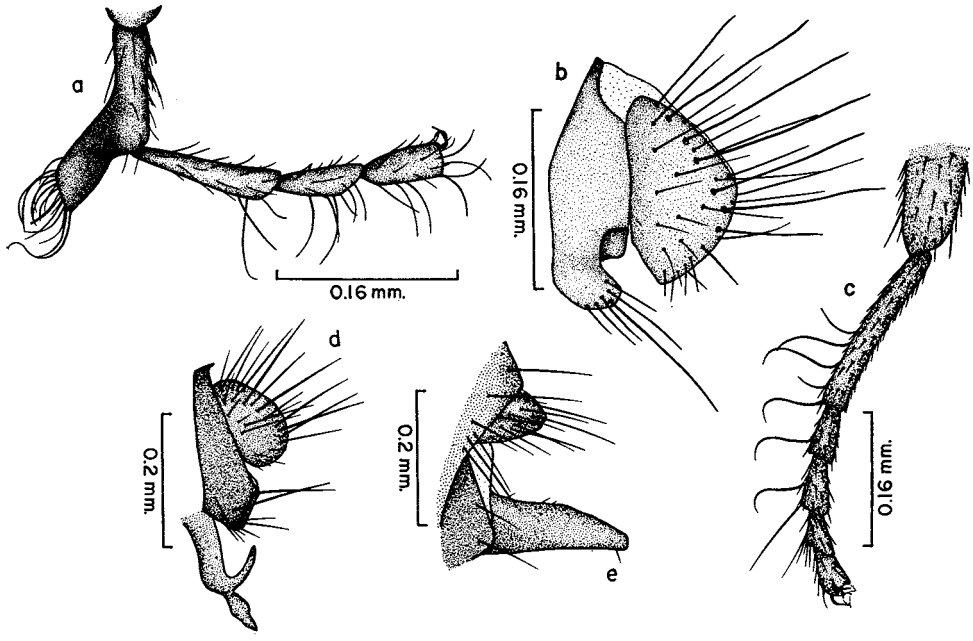


Figure 205—*Drosophila variabilis* n. sp.: **a,** front tarsus; **b,** male genitalia. *D. velata* n. sp.: **c,** front tarsus; **d,** male genitalia; **e,** female genitalia.

tinged with yellow on the lower portion and with black along the orbits. The ocellar triangle is subshining black; the vertex is brown, tinged with black. The upper portion of the occiput is brown, the lower portion yellow. The face, genae, and mouthparts, including the palpi, are yellow. The face has a distinct convexity down the median portion. The anterior reclinate bristles are about equal in size to the proclinate and are situated opposite the latter. One small bristle is present at the upper edge of each vibrissal row. The palpi have no strong bristles but have numerous black setae around the margins. The antennae are yellow-brown. The arista has four or five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Brown, tinged with rufous on the dorsum, yellow on the sides. The anterior dorsocentral bristles are about equal in size to the humerals and are situated opposite the second pair of supraalars. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front tarsi possess only four distinct segments. The basal section of the basitarsus is shorter than the second tarsal segment and about equal in length to the appendage at the apex of the basitarsus. The latter is rather short and thick and is densely haired around the apex (fig. 205a). Each of the last three tarsal segments has several erect hairs on the dorsal surface. *Wings:* Subhyaline with a very faint tinge of brown but with no distinct brown markings. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about four times longer than the fourth, and the last section of vein M_{1+2} is 1.75 times longer than the penul-

timate section. The last section of vein M_{3+4} is 1.5 times longer than the m crossvein. *Abdomen:* Entirely dark brown. The ninth tergum is reduced to a narrow rim over the dorsal portion. The ventral margins are lobate and bear one strong bristle plus numerous erect setae along the margins. The claspers are not plainly visible from a lateral view (fig. 205b).

Length: body, 2.7 mm.; wings, 3.0 mm.

FEMALE. Fitting the description of the male except that the front tarsi are normal. The bristle at the upper portion of the vibrissal row is more strongly developed, and a distinct apical bristle is present on the palpus. The ovipositor plates are slender, almost equal in length to the ventral margin of the seventh sternum, and extend well beyond the apices of the anal plates.

Length: body, 3.0 mm.; wings, 3.3 mm.

Holotype male and allotype female: Puu Kolekole, Molokai, 3,600 ft., July, 1953 (D. E. Hardy and M. Tamashiro). Eleven paratypes (ten males and one female): from the following localities—same as type; and Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy). Two males and two females are also on hand from Puu Kukui, *circa* 4,000 feet, Maui, June, 1953 (D. E. Hardy and C. R. Joyce). These are not being designated in the type series since there is a possibility they represent a distinct species.

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila velata new species (fig. 205c–e).

This species is related to *D. quadrisetae* n. sp. but differs by having the dorsum of the thorax all black and the pleura predominantly yellow, the anterior reclinate bristles placed well above the proclinates, and by the very different male genitalia (fig. 205d).

MALE. *Head:* The front is slightly over one-half wider than long (measured from the median ocellus to the anterior margin). The lower half of the front is yellow, faintly tinged with brown; the upper half of the front is brown, tinged with black. The upper eye orbits, the vertex, ocellar triangle, and upper occiput are shining black covered with gray-brown pollen. The median portion of the occiput is brown; the lower portion is yellow. The genae are yellow except for a line of brown along each vibrissal row; in the median portion the distance from the vibrissal row to the eye margin is equal or slightly less than the width of two rows of eye facets. The face is brown to brownish black in the lower median portion and yellow above and on the sides. The median portion of the face is slightly raised. The clypeus is black. The palpi and mouthparts are yellow. Each palpus has one small, black apical bristle. No distinct ornamentations can be seen on the labella of *in situ* specimens; it appears, however, that a sclerotized rim extends over the upper portion on each side. One strong bristle is present at the upper edge of each vibrissal row; this is about equal in size to the ocellar

bristles. The anterior reclinate bristle is about one-half the size of the proclinate and is situated distinctly above the latter, almost halfway between the proclinate and the upper reclinate bristles. The first two antennal segments are yellow, tinged with brown on the dorsal surfaces. The third segment is brown, faintly tinged with yellow at the base. The arista has an average of four dorsal and two ventral rays in addition to the rather small apical fork. Five or six moderately long rays, approximately one-third as long as the other rays, are present on the inner surface of the arista. *Thorax:* Shining black, faintly tinged with rufous and lightly gray pollinose over the dorsum; predominantly yellow on the sides with but a faint tinge of brown in the ground color of the upper halves of the pleura. The halteres are pale yellow. Each humerus has two moderately strong bristles. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second (posterior) supraalars. About eight rows of acrostichal setae are present. The anterior sternopleural bristle is about five-sixths as long as the posterior bristle. *Legs:* Entirely yellow, lacking long ciliation except on the front tarsi. The preapical dorsal and preapical ventral bristles on the front tibia are poorly developed and are scarcely two times larger than the surrounding setae. The front basitarsus is about two-fifths as long as the tibia and has about four dorsal cilia on the apical two-fifths of the segment (fig. 205c). The second and third tarsal segments have two dorsal cilia each. *Wings:* Almost hyaline, with a very faint tinge of brown at the apex, but with no distinct brown markings. The third costal section is 4.5 times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Predominantly shining brown, tinged with black in the ground color of the dorsum, and covered with gray-brown pollen. The extreme lateral margins of the first three terga are yellow. The anal plates are two times higher than long, rounded at the ventral portions. The ninth tergum is narrow, slightly expanded ventrally as in figure 205d. The claspers are small, not visible from direct lateral view. The aedeagus has a strong preapical dorsal hook.

Length: body, 2.15 mm.; wings, 2.30 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. The ovipositor blades extend two or three times the length of the anal plates and are subacutely pointed (fig. 205e).

Length: body, 2.5 mm.; wings, 2.8 mm.

Holotype male and allotype female: Mt. Kaala, Oahu, May, 1952 (M. Tamashiro). Nine paratypes (seven males and two females): same data as type. One male and two females on hand from Manoa Valley, Oahu, apparently collected by G. B. Mainland, but no specific date is given. One label contains the year 1947. These are not being designated as paratypes, however. Since the male is in rather poor condition, I cannot be certain that it belongs to this species.

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes is in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

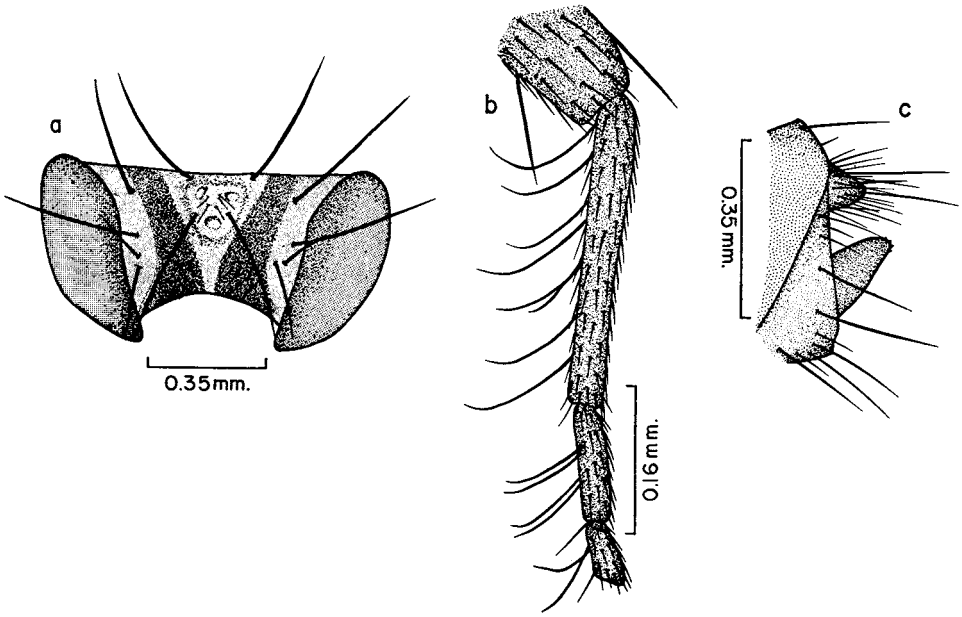


Figure 206—*Drosophila velutinifrons* n. sp.: **a,** head, dorsal view; **b,** front tarsus; **c,** female genitalia.

Drosophila velutinifrons new species (fig. 206a–c).

This species fits in the complex which is characterized by having the front tarsi ciliated. It is differentiated from other known species by the velvety vertical markings on the front (fig. 206a) ; by having the sides of the front yellow, tinged faintly with brown; the legs, especially the middle and hind pairs, predominantly brown; the palpi densely setose; and by other characteristics.

MALE. *Head:* Rather quadrate in shape, scarcely higher than long. The anterior genal margin is slightly produced. The front, measured from the median ocellus to the anterior margin, is two times wider than long. The eye orbits are yellow, faintly tinged with brown; a median reddish brown vitta extends from the median ocellus to the front margin (fig. 206a) ; the remainder of the front is velvety black. The upper half of the occiput is brown, tinged with yellow; the lower portion is pale yellow. The genae are yellow and are rather broad; measured from the vibrissal row to the eye margin, the space is equal to three or four rows of eye facets. The face is predominantly yellow, faintly tinged with brown on the lower median portion; the middle of the face is evenly convex. The clypeus is yellow with a faint tinge of brown. The palpi are yellow, tinged with brown at the apices, very densely covered with bristle-like setae, and no apical bristle is discernible. The mouthparts are yellow except for the black apices of the labella, each of which has short, curved spines along the upper margin. The anterior reclinate bristles are thin, hairlike, approximately three-fifths as long as the proc-

linate, and situated almost opposite the latter. The hairs of the vibrissae are situated in two irregular rows on the upper portion, about three small bristles are developed, these equal to, or slightly smaller than, the setae in the occipital row. The first two antennal segments are yellow, tinged faintly with brown on the dorsal surfaces. The second segment has two stout dorsal bristles. The third segment is broken off the type. *Thorax:* Entirely brown, tinged with black on the dorsum, and with a tinge of yellow on the pleura. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. The first pair of supraalar bristles is rather small, scarcely over one-fourth as long as the second pair of bristles. About eight rows of acrostichals are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The halteres are brown to black, tinged with red. *Legs:* The front pair is yellow, tinged with brown; the middle and hind legs are brown to black, faintly tinged with rufous. The legs are not ornate except for the ciliation on the front tarsi. The front basitarsus has seven or eight anterodorsal cilia extending the entire length of the segment (fig. 206b). Segments two and three have several anterodorsal cilia. The front basitarsus is one-half as long as the tibia and two times longer than the second tarsal segment. *Wings:* Entirely infuscated with brown, but with no distinctive brown markings. The third costal section is five times longer than the fourth, and the costal fringe extends less than one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Entirely dark brown except for a faint tinge of rufous in the ground color of the first tergum. The genitalia have not been studied.

Length: body, 3.0 mm.; wings, 3.6 mm.

FEMALE. Fitting the description of the male in most respects. The distinctive markings on the front are identical with those of the male. The labella of the specimen at hand appear to be sclerotized around the upper portions, somewhat as in the male, but lacking stout spines along the margin. The third antennal segment is entirely brown. The arista has four to five dorsal and two, sometimes three, ventral rays in addition to the apical fork. Each palpus has a moderately strong apical bristle and one or two subapical bristles on the outside surface. The palpus is not as conspicuously setose as in the male. The ovipositor blades are rather short, triangular-shaped, with teeth around the apical margin; they extend just slightly beyond the apices of the anal plates (fig. 206c).

Length: body, 3.5 mm.; wings, 3.9 mm.

Holotype male and allotype female: from Puu Kolekole, Molokai, July, 1952 (D. E. Hardy). One paratype female: same data as type, 3,600 feet, July, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Drosophila venusta new species (fig. 207a–c).

This species fits in the *haleakalae* complex near *D. mecocnemia* n. sp. It is

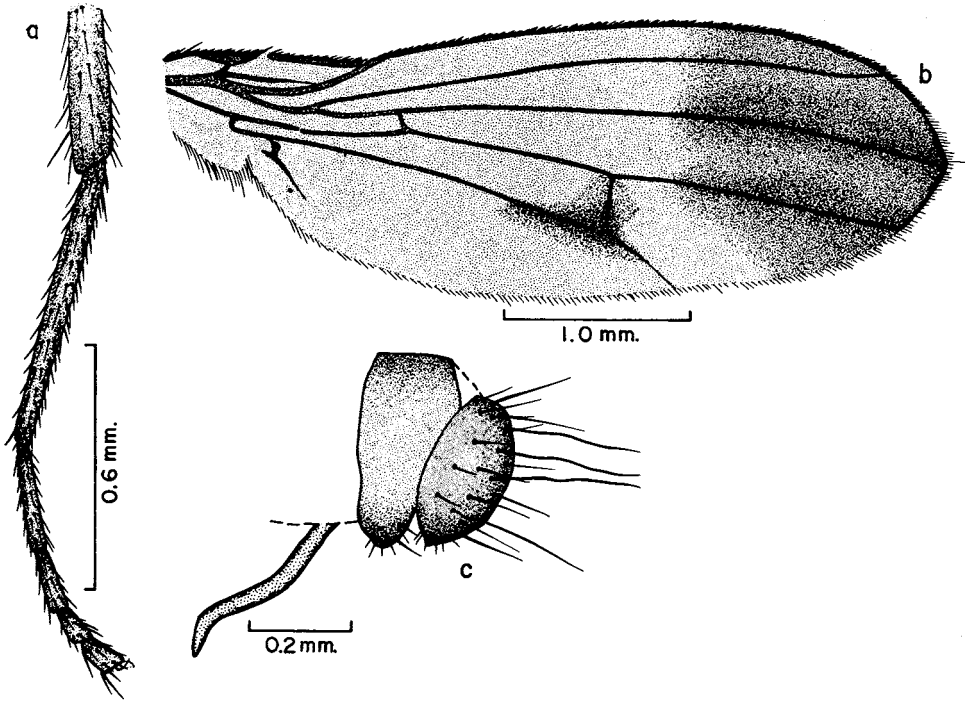


Figure 207—*Drosophila venusta* n. sp.: a, front tarsus; b, wing; c, male genitalia.

readily differentiated by having only one humeral bristle, a very large dark brown spot occupying the apical third of the wing and the m crossvein covered by a dark brown spot, and also by the long, slender front basitarsi (fig. 207a).

MALE. *Head:* About one-third higher than long; the hind margin of the eye is very gently oblique. The front, measured from the median ocellus to the anterior margin, is about two-thirds wider than long; it is entirely yellow except for the eye orbits, which are dark brown to black above the proclinate bristles. The upper portion of the front, on each side of the ocellar triangle, is tinged faintly with brown in ground color. The ocellar triangle is predominantly shining black, yellow-brown around the edges. The upper two-fifths of the occiput is dark brown, tinged with black, and covered with gray pollen. The lower portion of the occiput, the genae, face, palpi, and mouthparts are pale yellow. The clypeus is faintly tinged with brown. Each labellum has a black sclerotized rim around the margin. Each palpus has a moderately developed apical bristle, about equal in size to the second bristle of the vibrissal row, and a small black subapical bristle. Two rather well-developed bristles are present at the upper edge of each vibrissal row; the uppermost bristle is equal to or slightly larger than the anterior reclinate bristle on the front. The face is almost flat; only a slight convexity is present in the upper median portion. The anterior reclinate bristle is about three-fourths as long as the proclinate and is situated distinctly above the latter

(about one-third the distance between the proclinate and the upper reclinate bristles). The antennae are entirely yellow. The second segment has three short dorsal bristles. Each arista has seven dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly shining brown, tinged with black on the dorsum, and with a tinge of rufous on the mesopleura. The sternopleura, hypopleura, and the apex of the scutellum are yellow. The halteres are entirely yellow. The anterior dorsocentral bristles are situated almost opposite the first (anterior) supraalars. About six rows of acrostichal setae are present. Only one humeral bristle is present; this is approximately equal in size to the presutural bristle. The anterior sternopleural bristle is broken on the specimen at hand, but is apparently small. The posterior sternopleural bristle is well developed and about equal in size to the anterior dorsocentral bristles. The intermediate seta of the sternopleuron is tiny and situated immediately opposite the base of the anterior sternopleural. *Legs:* Entirely yellow, lacking long cilia or ornamentation. The segments are long and slender; the front femur is just slightly longer than the tibia, and the tibia is only 1.2 times longer than the basitarsus. The front basitarsus is about 2.5 times longer than the second tarsal segment (fig. 207a). *Wings:* A large dark brown spot occupies approximately the apical third of the wing, and a conspicuous brown mark is present over the m crossvein (fig. 207b). The third costal section is approximately four times longer than the fourth, and the costal fringe extends approximately halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.38 times longer than the penultimate section. The wings are approximately three times longer than wide. *Abdomen:* Shining dark brown, tinged with black at the apices of the terga, and with a faint tinge of yellow to rufous in the ground color. The sixth tergum is largely brownish yellow. The anal plates are about two times higher than long and are rather sharply pointed ventrally. The ninth tergum narrows considerably on the dorsomedian portion; this portion is scarcely visible, however, in direct lateral view, and from a lateral view the tergum appears almost straight-sided, slightly narrowed on the ventral margins (fig. 207c). The claspers are completely hidden from a lateral view.

Length: body, 4.30 mm.; wings, 4.75 mm.

FEMALE. Unknown.

Holotype male: Puu Kolekole, Molokai, July, 1952 (M. Tamashiro).

Type in the B. P. Bishop Museum.

Drosophila vicaria new species (fig. 208a–d).

This species fits near *D. olaae* Grimshaw because of the infuscated m crossvein and the ciliated front tarsi of the male. It is readily differentiated from this species by being considerably smaller, by having the cilia of the front tarsi much more sparsely arranged (fig. 208b) (only one row extending down the basitarsus), by having the face yellow, the carina not as well developed, and by other details as brought out in the description below.

MALE. *Head:* Almost quadrate as seen in direct lateral view, with the lower

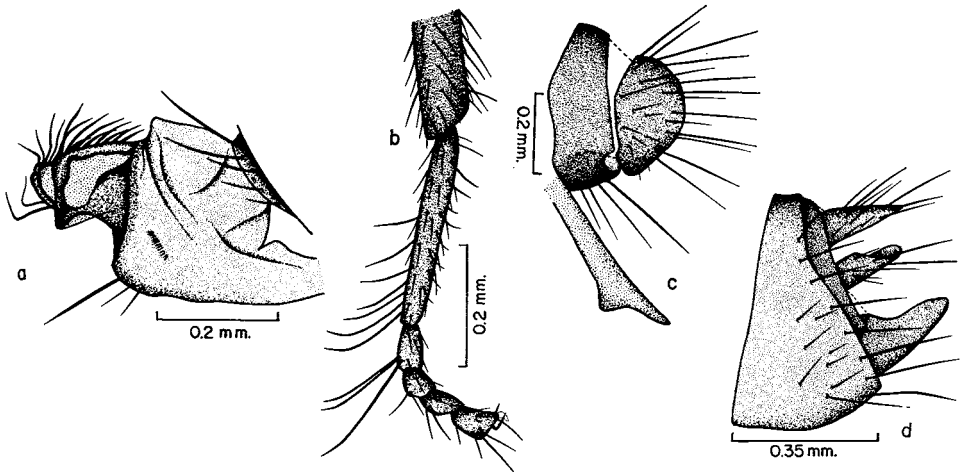


Figure 208—*Drosophila vicaria* n. sp.: **a**, labellum; **b**, front tarsus; **c**, male genitalia; **d**, female genitalia.

margin nearly straight. The front, measured from the median ocellus to the anterior margin, is two times wider than long, entirely yellow, tinged with brown, and covered with yellow-brown pollen. The eye orbits are tinged with black and covered with gray pollen above the proclinate bristles. The occiput is predominantly yellow, with a golden sheen over the sides; the upper third is yellow-brown, covered with gray-brown pollen. The genae are yellow except for a narrow line of brown extending along the vibrissal row. At the upper portion the gena, measured from the vibrissal row to the eye margin, is about equal in width to three rows of eye facets. The face is entirely yellow and is slightly raised down the median portion. The clypeus is yellow, faintly tinged with brown. The palpi are entirely yellow. The mouthparts are rufous. Two small bristles are present at or near the apex of each palpus; these are approximately equal in size to the hairs of the vibrissal row. The labella are highly ornate; the rim is sclerotized, separated from the base of the labellum by a membranous area, and fringed with long curved spines along the margin (fig. 208a). No bristles are present in the vibrissal row; the vibrissae are approximately equal in size to the acrostichal setae. The anterior reclinate bristles are about half as long as the proclinates and are situated distinctly above the latter. The antennae are yellow, tinged with brown over the dorsum. The second segment has three dorsal bristles. The arista has six dorsal and three ventral rays in addition to the apical fork. *Thorax:* Brown, tinged with yellow to rufous, and covered with brownish yellow pollen. The anterior dorsocentral bristles are about half as long as the posterior bristles and are situated approximately opposite the second (posterior) supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two well-developed bristles. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown over the

apices of the tarsi and on the mid and hind coxae. The front tibia is almost as long as the femur and has the posterior surface densely covered with short, erect setae. The front basitarsus is slender, at least six times longer than the second tarsal segment, and half as long as the tibia. The basitarsus has five comparatively short dorsal cilia extending down the apical three-fifths of the segment and two strong apicodorsal cilia (fig. 208b). Numerous short, erect setae are present along the posterior surface of the basitarsus. The second tarsal segment has three long apicodorsal cilia. *Wings:* Hyaline except for an infuscation of brown extending over the m crossvein. The third costal section is slightly over five times longer than the fourth, and the costal fringe extends approximately half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.2 times longer than the penultimate section. The last section of vein M_{3+4} evanesces just before reaching the wing margin. *Abdomen:* Entirely shining dark brown, tinged faintly with black, and with a rufous tinge in the ground color. The anal plates are hemispherical in shape. The ninth tergum is almost straight-sided, just slightly narrowed over the dorsal portion, and not convex on the posterior margin. The ventral lobes are rather truncate at the apices and completely cover the claspers (fig. 208c).

Length: body and wings, 3.3 mm.

FEMALE. Fitting the description of the male except for primary and secondary sexual characters. One moderately strong bristle is present at the apex of each palpus; this is almost as large as the lower humeral bristle. The wings are uniformly pale brown fumose, darker brown on the m crossvein. The ovipositor blades are broad, rounded apically, with a row of teeth around the outside margins. The blades extend slightly beyond the apices of the anal plates (fig. 208d).

Length: body and wings, 3.9 mm.

Holotype male and allotype female: Haleakala, Maui, 2,000 feet, no date or collector given.

Type and allotype in the B. P. Bishop Museum.

Drosophila villitibia new species (fig. 209a–b).

This species closely resembles *D. villosipedis* n. sp. from Hawaii but is readily differentiated by having the brown mark in the median portion of cell R_1 elongate and equal to about half the length of that cell, the r–m crossvein broadly infuscated, the last section of vein M_{1+2} distinctly longer than the penultimate section, the femora all yellow, and the ciliation of the front legs very different as shown in figure 209a. The ciliation of the front tibia and tarsus is very much like that of *D. punalua* Bryan. (Compare figures 175a and 209a; however, the two species are not related.)

MALE. *Head:* Almost as long as high, the occiput distinctly concave in the median portion. The front is just slightly wider than long, is rufous, tinged lightly with brown, and with yellow along the orbits. The occiput is yellow, tinged with brown on the upper third. The genae, clypeus, and most of the mouthparts are

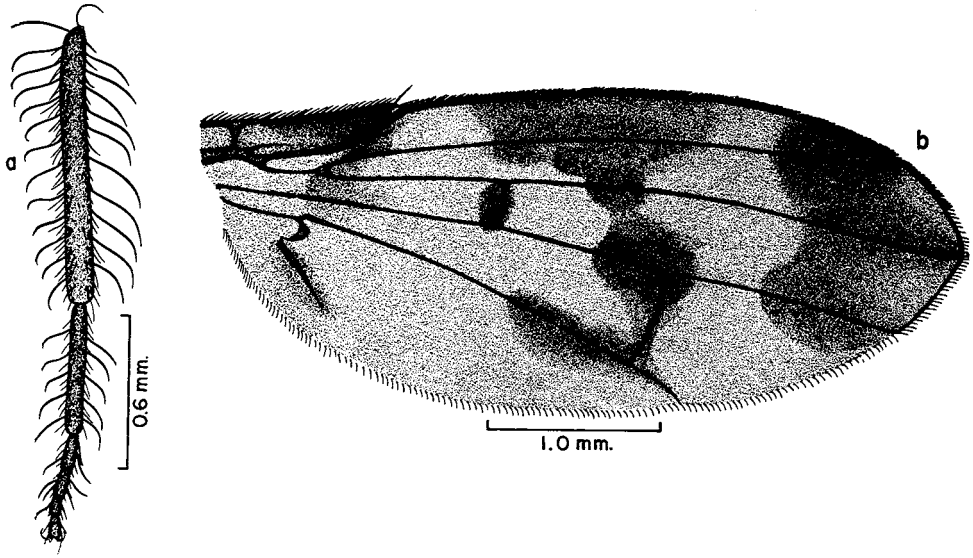


Figure 209—*Drosophila villitibia* n. sp.: **a**, front tibia and tarsus, dorsal view; **b**, wing.

yellow. The palpi are tinged lightly with brown, and each has a moderately strong apical bristle. The face is yellow-white and is very slightly concave in the median portion. The antennae are brown and are tinged with yellow at the apices of the first two segments. The second antennal segment has two moderately strong dorsal bristles and a number of stout setae on the dorsal portion. The arista has eight dorsal rays and four ventral rays in addition to the apical fork, and the anterior surface is sparsely haired. *Thorax:* Predominantly brown in ground color. The mesonotum is largely yellow-gray pollinose with four brown, longitudinal vittae. The submedian vittae are separated by a distance equal to about four rows of acrostichal setae. The lateral vittae extend from about opposite the outer postalar bristles to just before the suture. The hind portions of the humeri and the entire anterior corners of the mesonotum are yellow-gray pollinose. Each humerus is predominantly yellow, the upper portion brown in ground color; two moderately strong bristles are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. A moderately strong erect seta is present in each dorsocentral row just slightly anterior to a line drawn between the first pair of supraalar bristles. The scutellum is brown on the disc, yellow on the sides. The metanotum is yellow-brown. The pleura are predominantly yellow with brown mottling; a streak of brown extends across the upper edge and through the median portion of each mesopleuron and across the upper portion of each ptero- and metapleuron; the upper posterior corner of each sternopleuron is dark brown. The anterior sternopleural bristle is two-thirds as long as the posterior bristle. The halteres are pale yellow. *Legs:* Entirely yellow; the front tibiae and tarsi have long, conspicuous cilia extending down

each anterodorsal and posterodorsal surface (fig. 209a). The front basitarsus is about three-fifths as long as the tibia. *Wings:* Almost three times longer than wide. The third costal section is just slightly over four times longer than the fourth section, and the costal fringe ends near the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The wing markings are as in figure 209b. The last section of M_{1+2} is 1.4 times longer than the penultimate section. The last section of vein M_{3+4} is about half as long as the m crossvein. *Abdomen:* Brown, with a large yellow-gray triangular-shaped spot covering the sides of the terga. The genitalia have not been relaxed for study.

Length: body, 4.7 mm.; wings, 5.2 mm.

FEMALE. Unknown.

Holotype male: Manawainui Valley, Molokai, July, 1952 (M. Tamashiro). Type in the B. P. Bishop Museum.

Drosophila villosipedis new species (fig. 210a–c).

This species belongs in the group which is differentiated by having a transverse brown band across the median portion of the wing and the apical portion marked with brown. It is differentiated from any previously described species by the brown coloration of the thorax and femora, as well as by the details of the front legs of the male as shown in figure 210a. It is very closely related to *D. musaphilia* n. sp. but is differentiated as follows: the front tibia of the male is densely villose down the entire dorsal surface; the last section of M_{1+2} is equal to the penultimate section; the antennae are yellow, tinged lightly with brown; the front is predominantly yellow to reddish, and the face, genae, and palpi are yellow; three distinct gray vittae extend the entire length of the mesonotum; and the brown mark near the median portion of cell R_1 is narrower than the brown marking on the median portion of vein R_{4+5} (fig. 210b).

MALE. *Head:* About one-fourth higher than long. The occiput is slightly convex as seen in direct lateral view and is predominantly yellow, tinged with brown; the area around the orbits is clear yellow. The front is yellow on the lower half and reddish, tinged lightly with brown on the upper portion. The mentum, sclerotized portions of the mouthparts, and the sides of the clypeus are brown. Each vibrissal row has two moderately strong black bristles near the upper margin. Each palpus has one strong apical bristle. The antennae are yellow, very faintly tinged with brown on the upper portion. The arista has eight or nine dorsal rays and four ventral rays in addition to the apical fork. *Thorax:* Predominantly brown in ground color, densely yellow-gray pollinose. The mesonotum has two submedian brown vittae extending almost the entire length of the segment, plus a brown vitta on each side which is broadly interrupted by a yellow-gray pollinose area extending along the suture. The submedian brown vittae are separated by a distance equal to about three or four rows of acrostichal setae. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the second pair of supraalar bristles. The humeri are yellow except for the brown hind margins. Two strong humeral bristles are present.

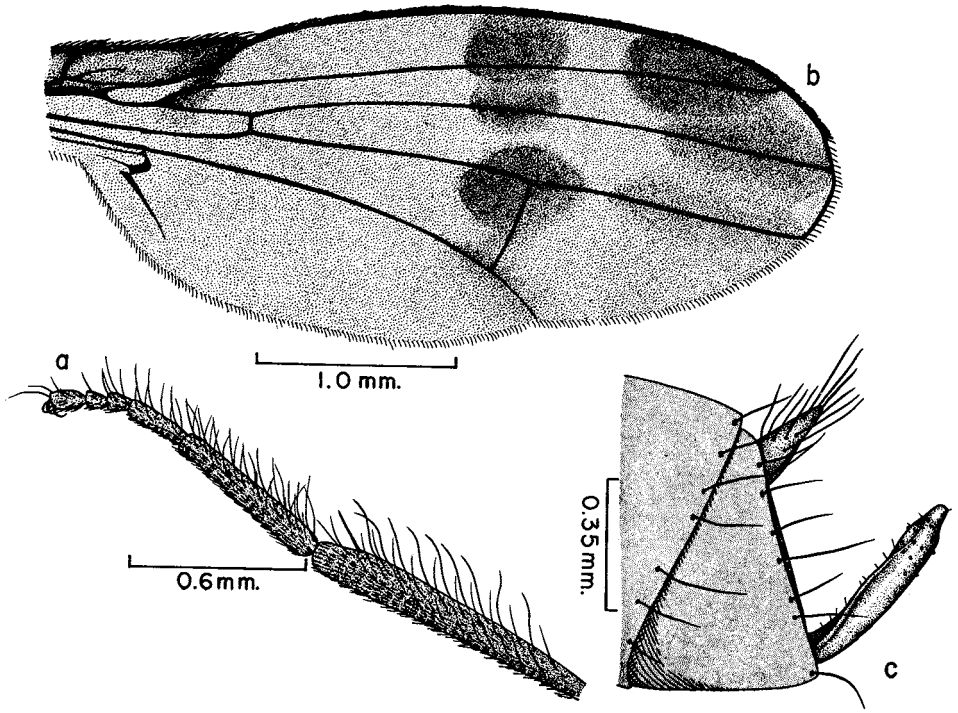


Figure 210—*Drosophila villosipedis* n. sp.: **a,** front tibia and tarsus; **b,** wing; **c,** female genitalia.

The scutellum is brown on the disc, yellow around the margin. The metanotum is yellow-brown. The sternopleura and hypopleura are black, tinged with red. The mesopleura are brown on the upper and median portions, and a brown streak extends across the upper part of each pteropleuron and each metapleuron. The halteres are entirely yellow. The anterior sternopleural bristle is about three-fourths as long as the posterior bristle. *Legs:* Coxae and femora dark brown to black. The dorsal surfaces of the front tibiae and tarsi are very densely villose (fig. 210a). The front basitarsus is approximately two-thirds as long as the tibia. Each front femur has about seven strong bristles on the posterodorsal and on the posteroventral surfaces. *Wings:* With a transverse brown marking extending across the wing on a level with the m crossvein; the brown mark near the middle of cell R_1 is not as wide as the mark in the median portion of vein R_{4+5}. The apex of the wing is predominantly brown, with a small hyaline spot in the apices of cells R_3 and R_5. The third costal section is about five times longer than the fourth, and the costal fringe extends nearly three-fourths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is equal in length to the penultimate section (fig. 210b). *Abdomen:* Brown, the anterior corners of the terga yellow-gray, densely pollinose. The genitalia have not been relaxed for study.

Length: body, 5.00 mm.; wings, 5.25 mm.

FEMALE. Fitting the description of the male except for secondary sexual characters. The ovipositor plates are comparatively long and slender, about equal in length to the ventral margin of the seventh segment (fig. 210c).

Length: body, 4.85–5.20 mm.; wings, 5.20–5.50 mm.

Holotype male and allotype female: from Kokee, Kauai, 3,600 feet, July, 1952, in banana bait trap (D. E. Hardy). Fifty-six paratypes (all females): from the following localities—same as type (D. E. Hardy and J. W. Beardsley, the latter taken August, 1959); Halemanu Valley, Kauai, August, 1953 (D. E. Hardy), and June, 1956 (W. C. Mitchell). Most of the specimens have been collected in banana bait traps.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Drosophila vinnula new species (fig. 211a–c).

An almost all-yellow species which lacks ornamental setae on the front legs or on the labella of the male. It appears to fit rather close to *D. bizonata* Kikkawa and Peng, but the two are obviously not related. *D. vinnula* is readily separated by the distinctive developments of the male genitalia as shown in figure 211b–c; the lobate process on the ninth tergum, and the densely setose inner surface of the clasper will separate this from any known *Drosophila*. Because of the densely spiculate inner margins of the male claspers, this species superficially resembles *D. unicula* n. sp. The two are not related, however.

MALE. *Head:* Entirely pale yellow (including the appendages) except for the dark reddish brown compound eyes and the pale reddish brown ground color of the ocellar triangle and the upper portion of the occiput. As seen from a direct lateral view, the head is 1.45 times higher than long. The front, measured from the median ocellus to the anterior margin, is about two-thirds wider than long. The eye orbits and the ocellar triangle are yellow-gray pollinose. The median portion of the front is opaque yellow; the interfrontal areas have a golden sheen. The genae are comparatively narrow; measured opposite the lower margin of the compound eyes and from the vibrissal row to the eye margin, the width is scarcely more than two rows of eye facets. No strong bristles are present in the vibrissal row. The uppermost bristle is scarcely larger than the acrostichal setae of the mesonotum. No strong bristles are present at the apex of the palpus; several inconspicuous dark-colored setae are present at or near the apex. The arista has five dorsal and two ventral rays in addition to the apical fork. The face is very slightly convex down the median portion. The labella are not ornate. The anterior reclinate bristles are about four-fifths as long as the proclinates and are situated distinctly above the latter. *Thorax:* Entirely yellow, except for a faint tinge of brown on the upper portion of each pteropleuron. The mesonotum is subshining, rather sparsely covered with gray-brown pollen. Six distinct rows

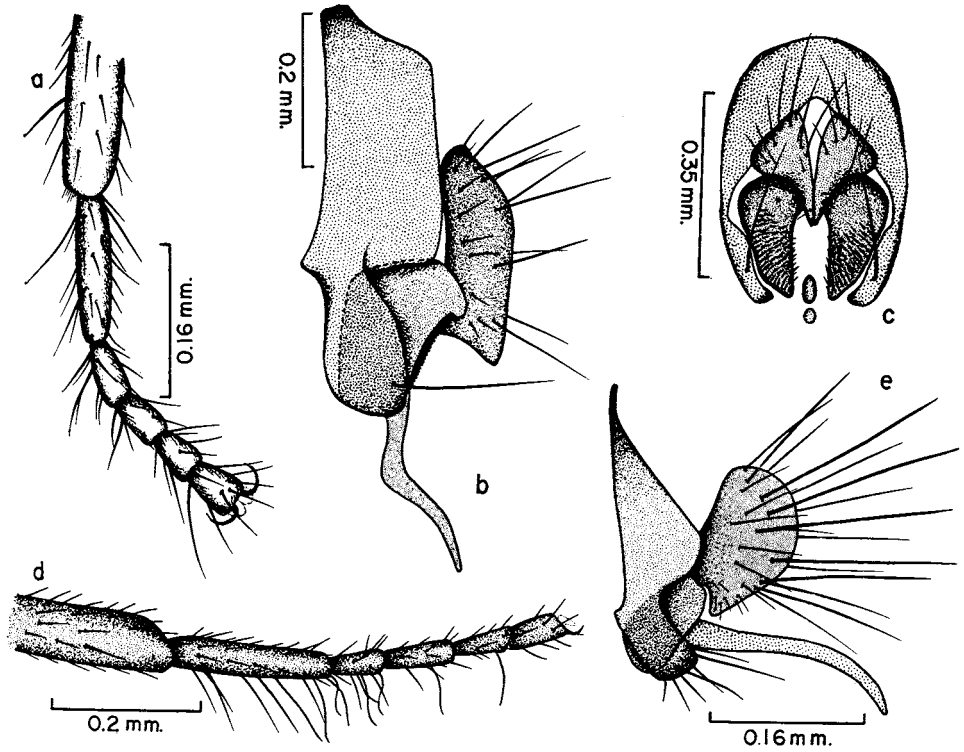


Figure 211—*Drosophila vinnula* n. sp.: **a**, front tarsus; **b**, male genitalia, lateral; **c**, male genitalia, ventral. *D. williamsi* n. sp.: **d**, front tarsus; **e**, male genitalia.

of acrostichal setae are present in front of the anterior dorsocentrals. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. A moderately developed seta is situated about halfway between these bristles; this is approximately half as large as the anterior sternopleural. *Legs:* Entirely pale yellow, except for a very faint tinge of brown at the apices of the tarsi. The leg segments are normal in shape and development. The front femora and tibiae are devoid of erect hairs or ciliation except for the normally present posteroventral and posterodorsal bristles of the femora. The front tarsi have rather numerous, short erect dorsal setae; these are scarcely one and one-half to two times greater in length than the width of the segment. The front basitarsus is about one-fourth as long as the tibia and two times longer than the second tarsal segment (fig. 211a). *Wings:* Subhyaline, with a very faint indication of brownish infuscation over the membrane. The third costal section is 4.4 times longer than the fourth, and the costal fringe extends half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.33 times longer than the penultimate section. *Abdomen:* Brown, tinged with yellow to rufous on the sides and basal portion

of the terga. The anal plates are nearly two times higher than long, rather strongly rostrate on the ventral margins. The ninth tergum is nearly straight-sided; the anteroventral portions are developed into a moderately large lobe on each side. The claspers are conspicuous, very densely covered with short, black spicules along the hind margin as seen in lateral view (fig. 211b). As seen from below, the inner surface of the clasper is very densely spiculose (fig. 211c).

Length: body, 2.4 mm.; wings, 2.7 mm.

FEMALE. Unknown.

Holotype male: Poamoho, Oahu, November 19, 1948 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Drosophila williamsi new species (fig. 211d–e).

This species resembles *D. improcera* n. sp. and *xanthognoma* n. sp. but the characteristics of the front legs are very different as shown in figures 211d, 117a, and 212a; also the male genitalia will differentiate this (fig. 211e).

MALE. *Head:* Almost one-half higher than long; the lower hind margin of the eye is gently oblique. The front, measured from the median ocellus to the anterior margin, is two times wider than long and is predominantly rufous, tinged with brown, covered with golden brown pollen on the upper portions, and dark brown to black on the eye orbits above the proclinate bristles. The upper half of the occiput is brown covered with gray-brown pollen, the lower portion is yellow. The genae are yellow except for a brown stripe extending along the vibrissal row. The face is yellow, tinged faintly with brown on the lower portion, distinctly convex medianly. One moderately strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the proclinate bristles. The palpi and mouthparts are yellow; each palpus has a small apical bristle. The labella are not ornate. The anterior reclinate bristles are slightly shorter than the proclinates and are situated almost opposite the latter. The antennae are yellow, tinged with brown on the third segment and on the dorsal portion of the second segment. The second segment has two distinct dorsal bristles. The arista has six or seven dorsal and two ventral rays in addition to the apical fork. The inner vertical bristles are comparatively short, about equal in size to the presutural bristles of the thorax. *Thorax:* Entirely yellow to rufous with a rather faint tinge of brown on the hind portion of the mesonotum and on the disc of the scutellum. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars. Six to eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. The mesonotum is subshining, rather lightly gray-brown pollinose. The pleura are pale yellow with but a faint tinge of brown in the ground color on the upper portions. *Legs:* Entirely yellow, lacking ornamentation except for the ciliate tarsi. The front basitarsus is about half as long as the tibia and is approximately four times as long as the second tarsal segment. The basitarsus has a row of about seven erect anterior cilia extending the full length of the segment, plus two or three apicodorsal cilia

(fig. 211d). The second tarsal segment has about three dorsal cilia, and the remaining segments have several erect dorsal setae each. *Wings:* Subhyaline, faintly infuscated with brown but with no distinct brown markings. The third costal section is 6.6 times longer than the fourth, and the fourth section is approximately one-third longer than the fifth. The costal fringe extends nearly halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.56 times longer than the penultimate section. *Abdomen:* Predominantly dark brown to black, yellow over the first tergum and on the venter. The anal plates are two times higher than long and are acutely pointed ventrally. The ninth tergum is greatly narrowed over the dorsal portion, convex on the posteromedian margin, and lobate ventrally (fig. 211e). The claspers are plainly visible from a lateral view.

Length: body, 2.5 mm.; wings, 2.8 mm.

FEMALE. The female has not been definitely associated with the male. One specimen from Mount Kaala, Oahu, may possibly belong here but is in rather poor condition and is not being designated as part of the type series. It fits the description of the male in most respects. The third costal section, however, is only four times longer than the fourth, and the costal fringe extends distinctly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. It is probable that this is a distinct species. The ovipositor plates are moderately developed, triangular in shape, and extend distinctly beyond the apices of the anal plates.

Named in honor of Dr. F. X. Williams, one of the outstanding pioneers in Hawaiian entomology.

Holotype male: Lulumahu Valley, Oahu, April 18, 1937 (F. X. Williams). Five male paratypes: two same data as type; one same locality and collector, October 4, 1936; two Mount Kaala, Oahu, May 18, 1920, and July 18, 1922 (O. H. Swezey).

The type is in the Hawaiian Sugar Planters' Association collection. The paratypes are in the collections of the United States National Museum, the B. P. Bishop Museum, and the University of Hawaii.

Drosophila xanthognoma new species (fig. 212a–d).

This species is readily recognized by its predominantly yellow coloring, the bright yellow markings on the abdominal terga, and the ornamentation of the front tarsi as shown in figure 212a.

MALE. *Head:* Predominantly yellow; brown on the upper occiput, the ocellar triangle, and the median portion of the vertex. The upper eye orbits and the upper front are faintly tinged with brown. The front, measured from the middle ocellus to the front margin, is about one-half wider than long. The anterior reclinate bristle is approximately as long as the proclinate but is much thinner, more hairlike; it is situated slightly above the latter. The face is entirely pale yellow. The median portion is just slightly raised. One strong bristle is present at the upper edge of each vibrissal row; this is almost equal in size to the ocellar bristles. The third bristle of the vibrissal row is slightly over half

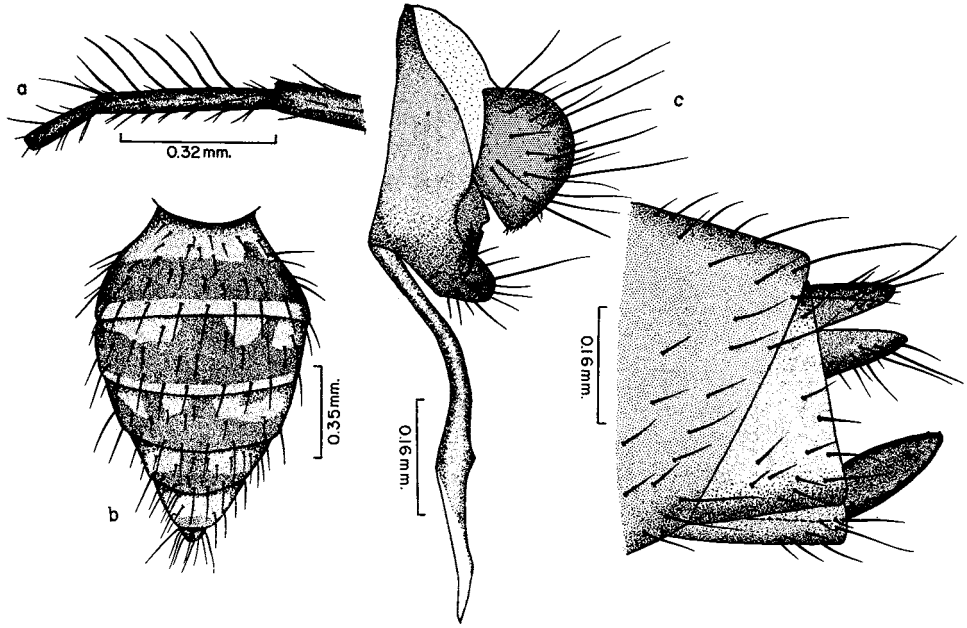


Figure 212—*Drosophila xanthognoma* n. sp.: **a,** front tarsus; **b,** abdomen, dorsal view; **c,** male genitalia; **d,** female genitalia.

as long as the first. The mouthparts including the palpi are entirely yellow. Each palpus has one moderately strong black bristle at the apex. The labella are not ornate. The antennae are yellow, faintly tinged with brown. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* The mesonotum is almost entirely yellow. The hind portion and the notopleural areas are faintly tinged with brown. The disc of the scutellum is tinged with brown, and a brown tinge is present on the upper portion of each pleuron. Each humerus has two strong bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second supraalars. An enlarged seta is present in each dorsocentral row just slightly in front of a line drawn between the first pair of supraalars; this is about two times larger than the other mesonotal setae. Six rows of acrostichal setae are present. *Legs:* Entirely yellow. The front tibiae lack ciliation, and the long ciliae on the front tarsi are confined to the anterior surface of the basitarsus except for one black dorsal hair at the apex of the basitarsus (fig. 212a). The front basitarsus is nearly three-fifths as long as the tibia. *Wings:* Nearly hyaline, with a faint yellowish brown tinge. The third costal section is nearly five times longer than the fourth, and the costal fringe extends about halfway between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Polished black on the apical half to two-thirds

of each tergum. The posterolateral margins of each segment are conspicuously marked with yellow (fig. 212b). The anal plates are higher than long and each is developed to a blunt point ventrally. The ninth tergum is greatly narrowed dorsally; just a thin sclerotized bridge extends over the dorsum. The tergum is expanded in the median portion so that through the middle the length is slightly greater than that of the anal plates. The ninth tergum is lobate on the ventral portion (fig. 212c).

Length: body, 2.30–2.50 mm.; wings, 2.70–2.85 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor blades are triangular, sharp-pointed, and extended slightly beyond the apices of the anal plates (fig. 212d).

Holotype male, allotype female, and 14 male paratypes and 1 female: from Manoa Falls, Oahu, November 8, 1946, banana trap, (G. B. Mainland).

The type and one paratype are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila xanthosoma Grimshaw (fig. 213a–e).

Drosophila xanthosoma Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :68.

Endemic. Hawaii (type locality: Olaa).

Type in the British Museum (Natural History). I have studied the type and a series of topotypic specimens.

Superficially this species resembles *D. nasuta* Lamb and *immigrans* Sturtevant. It differs, however, by lacking the row of short, stout bristles down the anteroventral surface of each front femur, and by having long ciliation on the front tarsi of the male as shown in figure 213c.

Grimshaw indicated that his type was a male. The specimen in the British Museum, however, is actually a female, and the male has not been previously described.

The species is predominantly yellow to rufous. The head is entirely yellow except for the reddish brown eyes, and for a slight tinge of brown on the third antennal segment. The face has a distinct carina extending down the upper two-thirds, and each lower angle has two or three moderately strong bristles. Each palpus has one strong apical bristle plus numerous short, dark setae; the apical bristle is much stronger in the female (fig. 213a) than in the male. The arista has six dorsal and three ventral rays in addition to the apical fork. The mouthparts are not ornate. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated opposite the latter. The thorax is entirely yellow to rufous. The anterior pair of dorsocentral bristles is situated about opposite the second pair of supraalars. The legs are entirely yellow. The front tibia of the male is rather densely covered with short erect hairs along the posterior surface. The front basitarsus of the male has two moderately long, black hairs on the posteroventral surface near the apical third of the segment and several shorter black hairs arranged on the dorsal and anterodorsal surfaces near the apex.

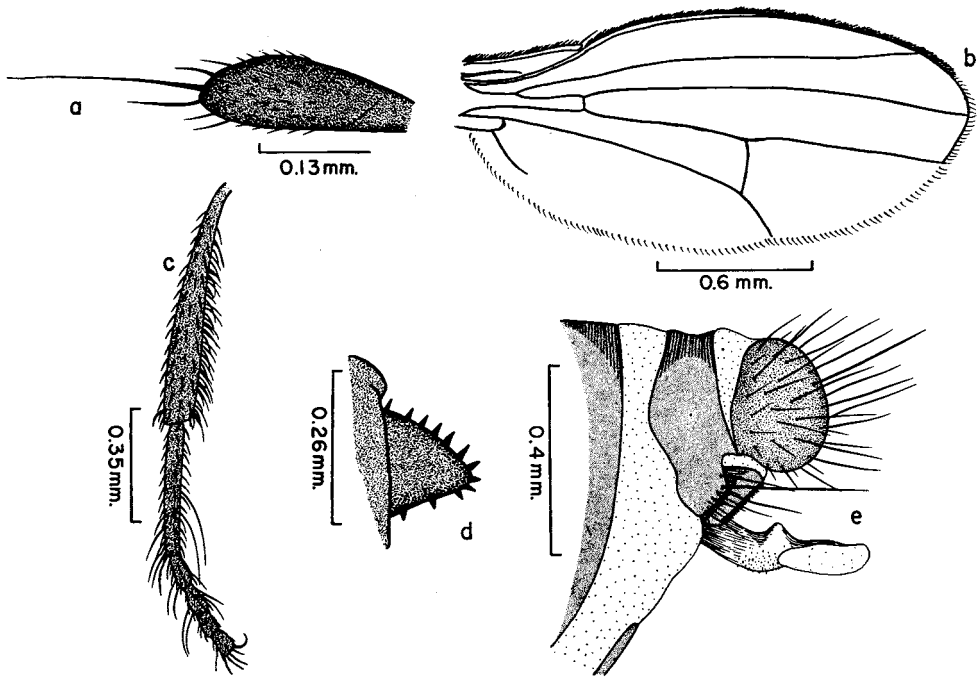


Figure 213—*Drosophila xanthosoma* Grimshaw: **a,** palpus, drawn from type female; **b,** wing, drawn from type female; **c,** front tibia and tarsus; **d,** female ovipositor blades, from type; **e,** male genitalia.

The second and third tarsal segments also have several moderately long black hairs (fig. 213c). The basitarsus is about three-fifths as long as the tibia. The wings are completely hyaline. The third costal section is about 4.5 times longer than the fifth, and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated near the basal third of cell first M_2, and the last section of vein M_{1+2} is just slightly longer than the penultimate section (fig. 213b). The abdomen is chiefly yellow to rufous, tinged with brown on the posterior margins of the segments. The genitalia are yellow, except for the black teeth on the claspers and a slight tinge of brown on the ventral aspects of the ninth tergum. The ninth tergum is narrowed ventrally, and one strong bristle plus numerous black setae are present along the margin (fig. 213e). The claspers are readily visible from a lateral view. The ovipositor plates are yellow to rufous, short, broad, and triangular in shape (fig. 213d).

Length: body and wings, 3.2–3.5 mm.

Drosophila xuthoptera new species (fig. 214a–e).

This species belongs in the complex which has the anterior margin of the wing completely bordered with brown. However, because the entire wing is rather intensely yellow to yellow-brown fumose, it is being keyed in the section

with the species which lack a distinct brown anterior border but which have brown markings in the apex of the wing and on the m crossvein. It appears to be more closely related to *D. z-notata* Bryan than to other known Hawaiian species; but the wing and body markings and coloration are distinctly different. *D. xuthoptera* is differentiated from other *Drosophila* by the intensely fumose wings with the markings as in figure 214b, the all rufous mesonotum, the pair of distinct presutural dorsocentral bristles; the two brown longitudinal vitta over each pleuron, and by the ornamentation of the front tarsi of the male as in figure 214a.

MALE. *Head:* Higher than long and entirely yellow except for the reddish brown eyes, the brown to black ocellar triangle, and the slight discoloration of brown over the vertex. The lower reclinate bristles are moderately large (two-thirds to three-fourths as long as the proclinates) and situated distinctly above the latter. No strong bristles are present in the vibrissal row. Each palpus has one moderately strong bristle at the apex, plus an abundance of short black hairs on the apical half. The labellum has moderately long hairs along the apical margin; these are rather strong and bristle-like on the upper portions. The front is about one-third wider than long. The face is flat, scarcely raised down the median portion. The antennae are entirely yellow; a faint tinge of brown is sometimes present on the upper portion of the second segment. The second segment has two moderately strong dorsal bristles. Each arista has five to six dorsal rays and two ventral rays in additional to the apical fork. *Thorax:* Mesonotum and scutellum entirely yellow to rufous. In the type the presutural dorsocentral bristles are moderately well developed and about equal in size to the outer humeral bristle; in the other specimens at hand the presutural dorsocentrals are smaller and more hairlike, but are distinctly larger than the surrounding setae. The middle pair of dorsocentral bristles is situated opposite the second pair of supraalars. Each pleuron has a brown vitta extending across the upper margin of the mesopleuron to the wing base and another brown longitudinal vitta extending through the median portion of the mesopleuron, through the upper portion of the pteropleuron, and over the metapleuron. The upper hind corner of the sternopleuron is also discolored with brown. The anterior sternopleural bristle is two-thirds to three-fourths as long as the posterior bristle. *Legs:* Entirely yellow. Front tibiae without long ciliation. Front tarsi with long dorsal ciliation over the apical half of the basitarsus and over the full length of the second tarsal segment; the remainder of the tarsi with short inconspicuous hairs (fig. 214a). The front basitarsus is about one-half as long as the tibia and about three times longer than the second tarsal segment. *Wings:* Rather intensely yellowish to yellow-brown fumose, with the anterior margin, the apical portions of veins R_{2+3}, R_{4+5}, and M_{1+2}, and also the m crossvein marked distinctly with brown as in figure 214b. Third costal section about five times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of vein R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is just slightly longer than the penultimate section. The r–m crossvein is situated near the basal third of cell

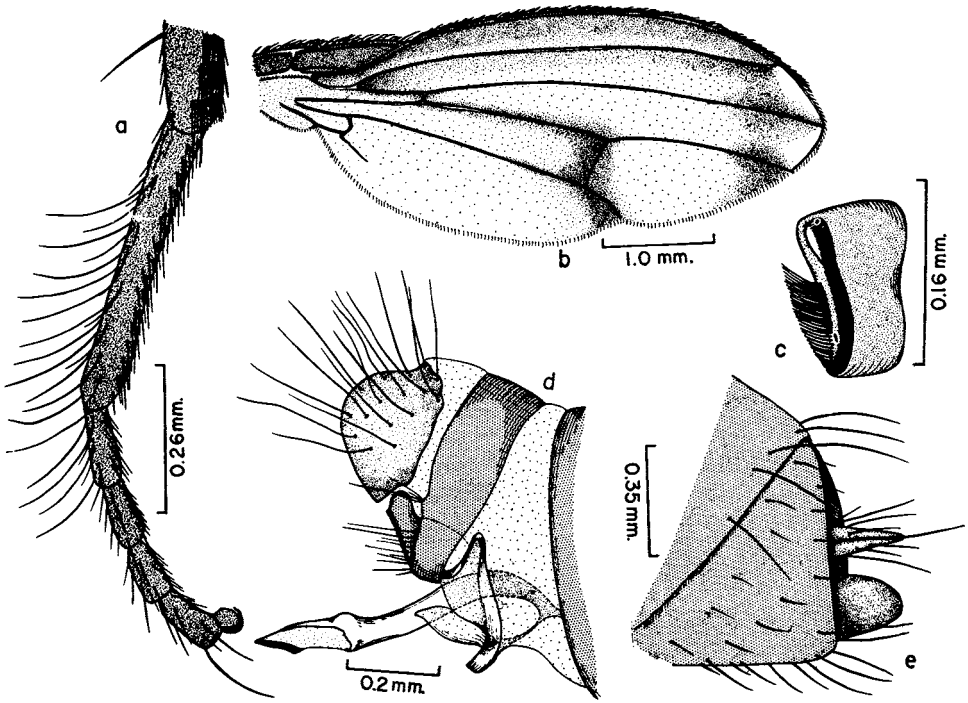


Figure 214—*Drosophila xuthoptera* n. sp.: **a,** front tarsus; **b,** wing; **c,** male clasper; **d,** male genitalia; **e,** female genitalia.

first M_2. *Abdomen:* Brown, the posterior corners of the terga narrowly yellow. The male genitalia are as in figure 214d. The ninth tergum is slightly attenuated on each side ventrally and has a dense clump of bristles on the posteroventral aspect. The parameres are rather broad and are strongly attenuated apically. Each clasper has two rows of teeth; the outer row is made up of short, closely placed teeth and the second is made up of densely placed setae (fig. 214c).

Length: body, 4.0–4.5 mm.; wings, 5.0–5.4 mm.

FEMALE. Fitting the description of the male in all respects except for the ornamentation of the front legs and for the genitalia. The ovipositor plates are short, broad, rounded apically, and with short blunt teeth around the outer edge (fig. 214e).

Length: body, 5.0 mm.; wings, 5.3 mm.

Holotype male: from Puu o Kaeha, Molokai, July, 1953 (D. E. Hardy). Allotype female: Puu Kolekole, Molokai, July, 1952 (M. Tamashiro). Paratypes: one male and one female, same data as allotype (D. E. Hardy); one female, Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy); one male, Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy); one male, Waikamoi, Maui, 4,000 feet, August, 1959 (D. E. Hardy).

One male from Olinda, Maui, January 13, 1916 (O. H. Swezey), is apparently

this species. It agrees in all respects with the type except that the basitarsus is slightly shorter and the third segment of the front tarsus also possesses two moderately long dorsal hairs. It is not being designated as a paratype.

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii. The specimen from Olinda is being returned to the Hawaiian Sugar Planters' Association.

Drosophila z-notata Bryan (fig. 215a–e).

Drosophila z-notata Bryan, 1934, Proc. Haw. Ent. Soc. 8 (3) :437.

Endemic. Oahu (type locality: Waiahole). Previously known only from the type series (all females). The type and two paratypes from Waiahole and two paratypes from Punaluu, collected 1911, 1914, and 1915 respectively. One male is on hand from Punaluu, Oahu (O. H. Swezey), no date given.

Type in the B. P. Bishop Museum.

This species is readily recognized by the wing markings (fig. 215b), the broad brown costal band, the hyaline Z-shaped mark in the middle of the wing, the ornamentation of the front tarsus of the male (fig. 215a), and the male genital characters (fig. 215c).

The following notes are based upon the type series. Predominantly brown species, tinged with red in the ground color of the thorax. The mesonotum has three rather narrow yellow-gray vittae extending longitudinally, one median, and one in each dorsocentral row. The anterior portion of the wing is predominantly brown fumose; the brown marking extends from the second costal cell to just beyond the apex of vein R_{2+3}; a small hyaline spot is present in the apex of cell R_3 and also at the apex of cell R_5; and a large Z-shaped hyaline mark is present in the middle of the wing. The hind portion of the wing is subhyaline (fig. 215b). The third costal section is about four times longer than the fourth and the last section of vein M_{1+2} is about equal in length to the penultimate section. The abdomen is predominantly brown; the posterior margins of the segments are very narrowly yellowish. The ovipositor is rather short and blunt and bears a number of short spine-like setae along the upper edge of each of the plates (fig. 215d).

Length: body, 3.75–4.00 mm.; wings, 4.00–4.30 mm.

The following description of the male is based upon one specimen on hand from Punaluu, Oahu. It is slightly smaller than the female specimens in the type series. The head is higher than long (fig. 215e). The front, measured from the median ocellus to the anterior margin, is about two times wider than long and is entirely yellow, with but a faint tinge of brown. The anterior reclinate bristles are three-fourths to four-fifths as long as the proclinates and are situated slightly above the latter. The genae are yellow except for a thin line of brown along the vibrissal row; in the median portion the distance from the vibrissae to the eye margin is about equal in width to three rows of eye facets. The face is yellow except for a tinge of brown to black on the lower portion; the median

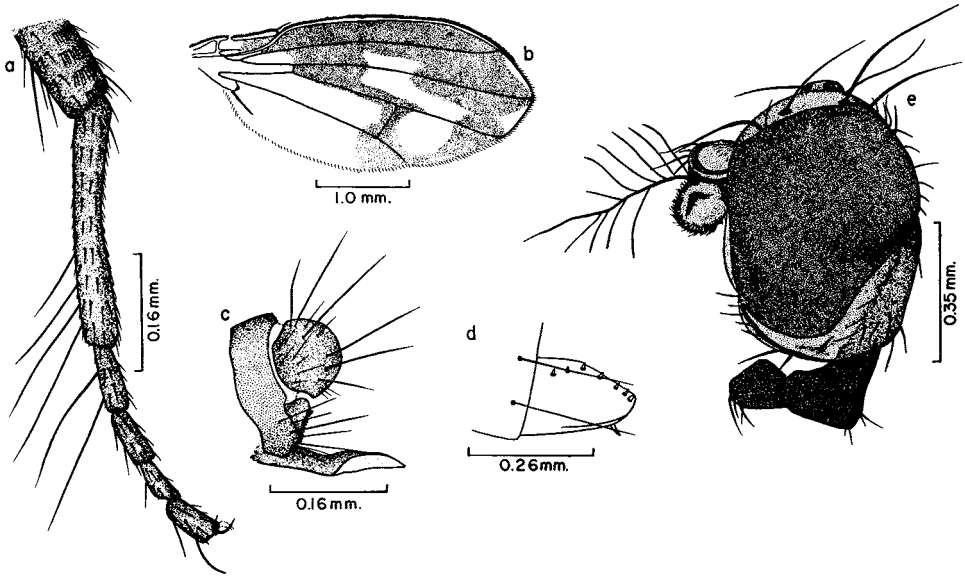


Figure 215—*Drosophila z-notata* Bryan: **a,** front tarsus; **b,** wing; **c,** male genitalia; **d,** ovipositor plate of female; **e,** head, lateral.

portion of the face is just slightly convex. The palpi are yellow; each has a moderately strong apical bristle. The labella have numerous yellow hairs and several curved yellow spines at their apices. No bristles are present in the vibrissal row; the vibrissae are represented by yellow-brown hairs approximately equal in size to the acrostichal setae of the mesonotum. The antennae are predominantly yellow, tinged with brown at the apex of the third and on the dorsal portion of the second segment. The arista has six dorsal and three ventral rays in addition to the apical fork. The thorax is brown, tinged with yellow to rufous in the ground color. The humeri are yellow and a streak of yellow extends across each pleuron at a level with the lower portion of the sternopleuron. The mesonotum has three longitudinal gray vittae. The anterior dorsocentral bristles are situated about halfway between the first and second supraalars, and six to eight rows of acrostichal setae are present. The humeral bristles are well developed. The anterior sternopleural bristle is three-fourths as long as the posterior bristle. The legs are yellow and lack ornamentation except for the ciliation on the front tarsi. Long dorsal cilia are present over the apical two-fifths of the front basitarsus and over the second tarsal segment as shown in figure 215a. The front basitarsus is approximately half as long as the tibia and two and one-half to three times longer than the second tarsal segment. The wings are similar to those of the female except that no brown marking is present along vein M_{1+2} basad to the large brown spot across the m crossvein. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. The abdomen is dark brown to black, yellowish at the bases of the first tergum and of terga five and six. The anal plates are

rather oval in shape, about as long as high, and just slightly pointed ventrally. The ninth tergum is straight-sided, not narrowed over the dorsal portion, and developed as in figure 215c. The claspers are plainly visible from the lateral view and have rather strong teeth along the apical margin.

Length: body, 3.2 mm.; wings, 3.4 mm.

Subgenus **HYPENOMYIA** Grimshaw

Hypenomyia Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :53.

Drosophila (*Hypenomyia*) Grimshaw, Sturtevant, 1921, Carnegie Inst. Wash., Publ. 301:117.

Hypenomyia Grimshaw, Wheeler, 1952, Proc. Haw. Ent. Soc. 14 (3) . 421–423.

The name *Hypenomyia* was used in the Tachinidae by Townsend, 1919, U. S. Nat. Mus., Proc. 56:545. This was changed to *Reinhardiana* Arnaud, 1952, Pan-Pacific Ent. 28:58.

The status of Grimshaw's *Hypenomyia* has never been clarified in the literature; specimens have not been reported since the original. I have studied the type and one homeotype, and in light of the polymorphic nature of the genus *Drosophila* I am considering this as a subgenus. The dense clumps of bristles on the lower angles of the face characterize the two known species, but I fail to find supporting characters which appear to be of generic importance. A number of species of native *Drosophila* have several black bristles on each lower angle of the face, but they are arranged in a single row rather than being in two rows as in *Hypenomyia* although some *Drosophila* do have some short setae in a second row on lower angles of the face. The displaced presutural dorsocentral bristles are also probably significant as a diagnostic character, although these are only 1.5 to 2.0 times longer than the surrounding setae of the mesonotum.

Type of subgenus: *Hypenomyia varipennis* Grimshaw.

Key to Known Species of Drosophila (Hypenomyia) Grimshaw

1. Shining black species. Face and antennae dark brown to black. Penultimate section of vein M_{1+2} about equal to the last section of the vein (fig. 216c). Front femora of the male densely bristled down the posteroventral surfaces (fig. 216b). Front tibiae lacking dorsal ciliation or spines. Maui . . . . . **reburra** n. sp.

   Predominantly brown or yellow-brown species. Face and antennae yellow. The last section of vein M_{1+2} is 2.5 times longer than the preceding section (fig. 217e). The front femora are not bristled as above. The front tibiae have moderately long dorsal ciliation and each has a strong dorsal spine just before the apex (fig. 217c). Molokai . . . . **varipennis** (Grimshaw).

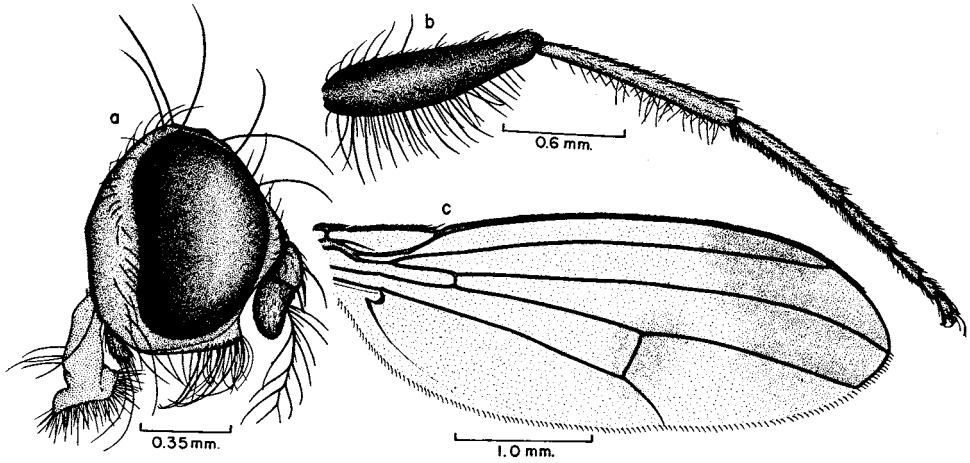


Figure 216—*Drosophila* (*Hypenomyia*) *reburra* n. sp.: **a,** head; **d,** front leg; **c,** wing.

Drosophila (Hypenomyia) reburra new species (fig. 216a–c).

This species differs from *varipennis* (Grimshaw) in many ways. It is a much more slender species and is predominantly shining black. The most striking structural differences are found in the development of the front legs, in the wing venation, and in coloration as pointed out in the key above and in figures 216b–c.

MALE. *Head:* From a lateral view the head is slightly higher than long. The front is about as wide as long, is entirely yellow on the lower half, and yellow-brown to black on the upper half. The lower reclinate bristles are about two-thirds as long as the proclinates and are situated distinctly above the latter. The proclinate bristles are situated at about the lower two-fifths of the front (measured from the upper ocelli to the middle of the front margin). The vertex and upper half of the occiput are dark brown to black, tinged with red in the ground color, lightly gray pollinose. The lower portion of the occiput is yellow, tinged lightly with brown. The genae are yellow. The face is black, the median portion is flat, no distinct carina is present. The oral vibrissae consist of two irregularly placed rows of long black bristles (fig. 216a). The genal bristles are long and slender, almost equal in length to the upper reclinates or the ocellar bristles. The palpi are brown; each has two moderately long apical bristles. The mouthparts are yellow, tinged lightly with brown; the labella are not ornate but are thickly covered with yellow hairs. The antennae are brown; the second segment has one erect dorsal bristle about the same size and length as the lower reclinate bristles and also a clump of three or four stout preapical dorsal bristles. The arista has six dorsal and three ventral rays in addition to the apical fork, and the inner surface is sparsely covered with short hairs. *Thorax:* Dark colored, shining brown to black in the ground color, covered with gray pollen. The pleura are distinctly tinged with reddish in the ground color. In the specimen at hand only one humeral bristle is present. Also, the posterior notopleural bristle is

very short and stout. This may not be typical, however, since the bristles are broken off one side of the thorax. The anterior dorsocentral bristles are situated about opposite a line drawn halfway between the first and second pair of supra-alars. An enlarged seta is also present in line with the dorsocentrals at the suture. This is about two-thirds longer than the surrounding setae of the mesonotum. About six rows of acrostichal setae are present. The anterior sternopleural bristle is very tiny, hair-like, about one-fifth as long as the posterior bristle. (In this regard *reburra* differs strikingly from *varipennis;* the latter has two strong sternopleural bristles.) The halteres are yellow, tinged with red. *Legs:* The coxae are reddish, tinged with brown. The trochanters, tibiae, and tarsi are yellow, and the femora are brown, tinged with reddish in the ground color. The front femur is rather stout, approximately four times longer than wide. The posteroventral surface is very thickly covered with black bristles; the posterodorsal surface has eight moderate-sized bristles extending the entire length of the segment (fig. 216b). The front tibia has erect cilia along the posteroventral and posterior surfaces; these are slightly longer on the apical half of the segment; the preapical dorsal bristle is short. The front tarsi lack long ciliation. The ventral surface is densely covered with short, erect setae. The front basitarsus is about three-fifths as long as the tibia. *Wings:* Predominantly hyaline marked with brown over the m crossvein and over the apical one-fifth of the wing. Wings about three times longer than wide. The third costal section is about 4.6 times longer than the fourth. Vein R_{4+5} is very gently curved downward on the apical portion so that the fourth costal section is two times longer than the fifth. The costal fringe ends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.25 times longer than the penultimate section. The last section of vein M_{3+4} is just slightly longer than the m crossvein (fig. 216c). *Abdomen:* Entirely dark reddish brown, sparsely gray pollinose. About three and one-half times longer than wide. The genitalia have not been dissected for study.

Length: body, 6.25 mm.; wings, 5.75 mm.

FEMALE. Unknown.

Holotype male: Olinda, Maui, March, 1932 (O. Bryant).

Type in the B. P. Bishop Museum.

Drosophila (Hypenomyia varipennis) (Grimshaw) (fig. 217a–f).

Hypenomyia varipennis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :54.

Endemic. Molokai (type locality: "Molokai Mts., 5000 ft."). One female specimen is on hand from Puu Kolekole, Molokai, July, 1952 (D. E. Hardy).

Type in the British Museum (Natural History).

This is a very distinctive species. It is readily differentiated from other Hawaiian drosophilids by the subgeneric characters given above, especially by the dense brush of bristles on each lower angle of the face, by the peculiar ornate development of the front legs of the male (fig. 217c), as well as by wing coloration (fig. 217d–e). The following notes are based upon the type male. The front is entirely

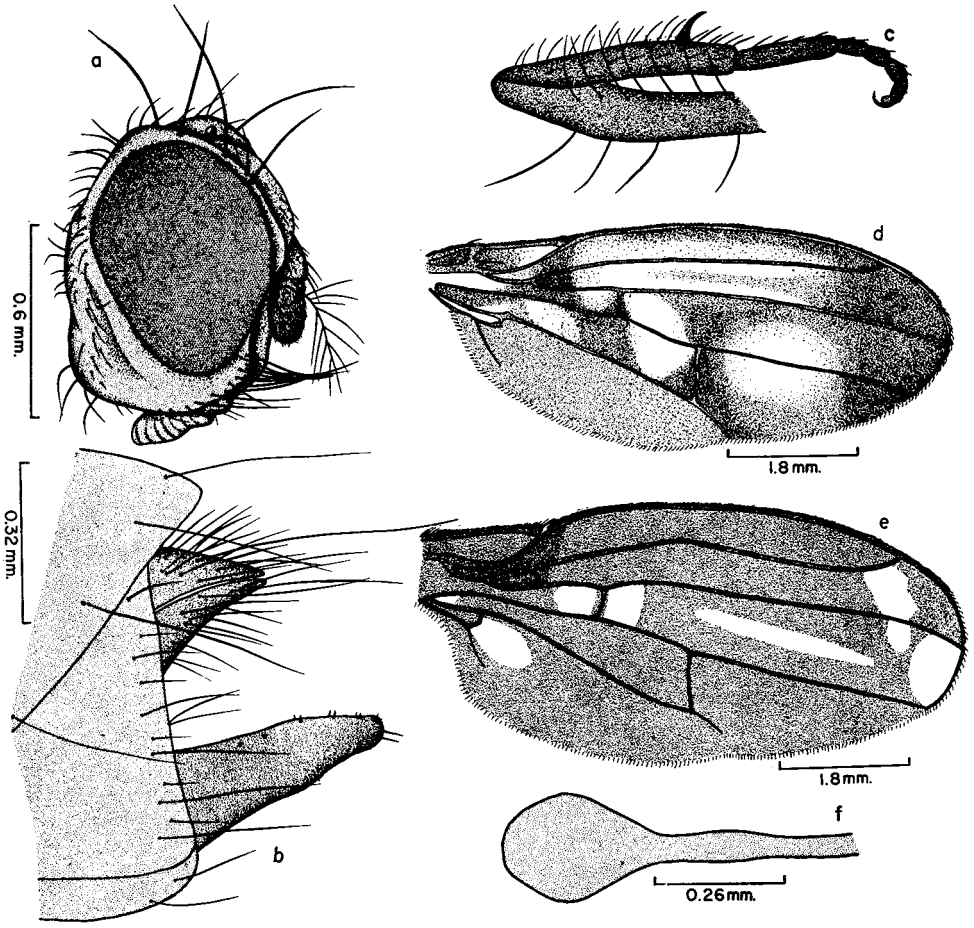


Figure 217—*Drosophila* (*Hypenomyia*) *varipennis* (Grimshaw): **a,** head; **b,** female genitalia; **c,** front leg of type male, somewhat diagrammatic; **d,** wing of female; **e,** wing of type male; **f,** aedeagus of type male.

yellow to rufous except for brownish discolorations along the upper orbits and the brown ocellar triangle. The face is entirely yellow, very slightly raised down the middle portion, but without a distinct keel. The antennae are yellow; each arista has six moderately long dorsal rays and three ventral rays in addition to the apical fork. The oral vibrissae consist of about twelve strong bristles arranged in two irregular rows at lower angles of face and a row of smaller black bristles extending along the oral margin. A strong genal and 2 or 3 rather strong postgenal bristles are present. The palpi are yellow, long and slender, and rather thickly covered with short black setae, especially toward the apices. The mouthparts are yellow; the mentum, labrum, and the edges of the labella are rather thickly covered with moderately long black hairs. The front and median portion of the mesonotum and the lower margin of the metanotum and each humerus,

are yellow to rufous; the sides and hind portion of the mesonotum, the scutellum, and the pleura are largely brown. The scutellum is discolored with brown on the disc, yellow on the margins and the under portion. The halteres are entirely yellow. The front legs are predominantly black; the extreme bases of the tibiae and the second to fourth tarsal segments are yellow. The middle and hind tibiae are rufous, broadly blackened at their apices. The front legs are as in figure 217c; each femur has four strong anterodorsal and seven posterodorsal bristles; the tarsi are about equal in length to the tibiae and the basitarsi are about half as long as the tibiae. Each front tibia has a strong dorsal spine just before the apex and several rows of long curved hairs extend along the dorsal surface. Wings as in figure 217e. The last section of vein M_{1+2} is 2.5 times longer than the preceding section. The r–m crossvein is situated at the middle of cell first M_2. The last section of vein M_{3+4} evanesces before reaching the wing margin. The third costal section is 3.5 times longer than the fourth. Vein R_{2+3} is rather distinctly undulated. The costal fringe of stout setae extends slightly over halfway between the apices of veins R_{2+3} and R_{4+5}. The abdomen is dark brown to black; the first tergum is narrowly yellow along the hind margin. The genitalia have not been dissected, and the parts are not visible in the type except for the apex of the aedeagus which is extruded; the apex is capitate as in figure 217f.

Length: body and wings, 7.25 mm. Grimshaw gave the length of the body as 6.0–7.0 mm. and the wings as 7.0 mm.

A female specimen at hand agrees very well with the type except for the wing maculations. I suspect that the wing coloration is rather variable in this species. The female agrees with the above description except for the following points: the palpi are not quite so elongated, and each has one strong apical bristle in addition to the abundant black setae. The front legs are predominantly rufous, tinged with brown; only the basitarsus and apex of the tibia are black. Also vein R_{2+3} is not so undulate as in the type, and the wing markings differ as shown in figure 217d. The ovipositor is yellow and is very prominent as shown in figure 217b. The head bristles were not described for the type. In the homeotypic specimen the upper reclinate bristles are situated opposite the lower ocellus and the proclinate bristles are situated approximately on the midline of the front. The lower reclinates are situated just slightly above the proclinates and are slightly over half as large as the latter.

Length: body and wings, 7.6 mm.

Subgenus **SOPHOPHORA** Sturtevant

Drosophila (*Sophophora*) Sturtevant, 1939, Proc. Nat. Acad. Sci. 25:139.

The following diagnosis of this subgenus is quoted from Sturtevant (1942:28): "Eggs with two blunt filaments; ventral receptacle not kinky; posterior malpighian tubes free at their distal ends; sterno-index .6 or less; anterior spiracle and its stalk not over one-fifth length of puparium; second to fifth abdominal tergites

with posterior dark bands that are never broken or narrowed in mid-dorsal line; cheeks always relatively narrow." The known species of this subgenus in Hawaii are characterized by having well-developed sex combs on the front tarsi of the males, or, as in *ananassae,* the male with transverse rows of stout black spinules on the ventral surface of the first two tarsal segments of the front legs.

Nine species groups have been recognized in this subgenus to date. These have been established by Sturtevant (1942), Patterson and Stone (1952), Burla (1954[a]), and Mather (1955). Only the *melanogaster* group occurs in Hawaii. The following four species are known from Hawaii: *melanogaster* Meigen, *simulans* Sturtevant, *ananassae* Doleschall, and *kikkawai Burla* (known in the Hawaiian literature as *montium* de Meijere).

Type of the subgenus: *Drosophila melanogaster* Meigen.

The members of this subgenus apparently originated in the Oriental region.

Drosophila (Sophophora) ananassae Doleschall (fig. 218a–e)

Drosophila ananassae Doleschall, 1858, Nat. Tijd. Ned. Ind. 17:128.

Drosophila impartata Walker, 1859, Proc. Linn. Soc. Lond. 3:126.

Drosophila caribbea Sturtevant, 1916, Ann. Ent. Soc. Amer. 9:355.

Recorded only from Oahu and Hawaii but probably common in the lowlands on all of the islands. First recorded in Hawaii by Zimmerman (1943:347).

Immigrant. Widespread throughout the tropics and subtropics of the world.

Type locality: Amboina.

Location of type not known.

This species is readily differentiated from other related species by the comparatively long fourth costal section; the third costal section is 1.5 times longer than the fourth. Also the male genitalia differ as shown in figure 218c–d.

A predominantly rufous species with narrow brown to black bands along the posterior margins of the terga. The head is entirely pale-colored except for the dark reddish brown compound eyes and for the brown ocellar triangle. The front is golden yellow pollinose. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The face has a strong median keel. Two moderately strong bristles are present at the upper edge of each vibrissal row; the second bristle is about four-fifths as long as the first. The palpi are yellow; each has a moderately strong apical bristle. The antennae are yellow. Each arista has four dorsal and three ventral rays in addition to the short apical fork. The anterior dorsocentral bristles are situated about opposite a line drawn halfway between the first and second pairs of supraalar bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The setae in the prescutellar rows of acrostichals are slightly enlarged. The legs are yellow except for the apical segments of the tarsi which are tinged with brown. The front basitarsus is approximately two-fifths as long as the tibia. The first two tarsal segments of the male possess transverse rows of short, stout, black spinules (fig. 218a) on the anteroventral surface (sex combs); these are not as large and conspicuous as in other species of the *melanogaster* group in Hawaii.

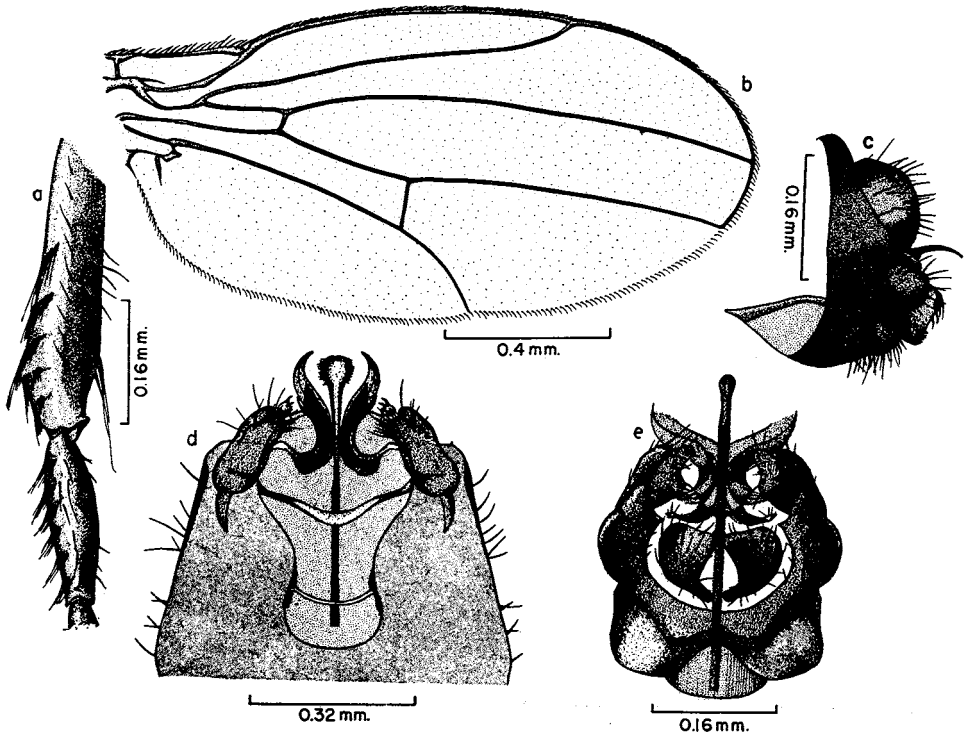


Figure 218—*Drosophila* (*Sophophora*) *ananassae* Doleschall: **a,** apex of tibia and first tarsal segment of front legs, ventral view; **b,** wing; **c,** male genitalia, lateral; **d,** male genitalia, ventral; **e,** male genitalia, dorsal.

The wings are entirely hyaline. The third costal section is 1.5 times longer than the fourth. The last section of vein M_{1+2} is 2.4–2.57 times longer than the penultimate section and the last portion of vein M_{3+4} is about two times longer than the m crossvein. The costal fringe extends half the distance between the apices of veins R_{2+3} and R_{4+5} (fig. 218b). The ninth tergum of the male is broad below and narrowed on the upper portion. A pair of conspicuous black lobes (secondary claspers) is developed from the ventral aspects of the anal plates; each has a large black tooth at the apex and several small teeth at the base. The claspers are short, nearly oval in shape, and each has two sets of black teeth (fig. 218c–e). The egg guides are rounded at the apex, and each has 13 to 18 black teeth around the margin.

Length: body, 2.0 mm.; wings, 2.2 mm.

This species is being rather commonly used in genetical studies, especially by Dr. D. Moriwaki in Japan. For more complete details concerning the genital characters and internal characters, refer to Hsu (1949:96), Okada (1956b:116), and Patterson (1943:74).

Drosophila (Sophophora) kikkawai Burla (fig. 219a–d).

Drosophila kikkawai Burla, 1954, Rev. Brasil. Biol. 14 (1) :47, figs. 13–16.

Drosophila montium, of Kikkawa, 1936, Jap. Jour. Genet. 12:137; and many others. Not *D. montium* de Meijere, 1916, Tijd. Ent. 59:205. Refer to Burla (1954:47) and to Okada (1956b:118) for the references to this species under the name *D. montium*.

Oahu, Hawaii, Maui, and Kauai; no doubt common on all the main islands.

Immigrant. This species has been recorded from Japan, China, Brazil, Hawaii, and Samoa. It is probably widespread throughout the Oriental, Pacific, and Neotropical regions.

This species has been previously known in the Hawaiian literature under the name *D. montium*.

No type was designated at the time the original description was published. Dr. H. Burla has informed me that he has selected a neotype male collected in the Botanical Garden at Rio de Janeiro, August, 1954.

The neotype, a series of 20 males and 12 females topotypes. and also the original slides from which figures 13 to 16, page 50, of Burla's (1954) original description were drawn, are in the Zoologisches Museum, University of Zurich, Switzerland.

According to Burla (1954:48),

> *D. kikkawai* differs from *D. montium* de Meijere, with which it has been mixed up until now, in the lighter color of face, third antennal joint, sixth tergite and genital arch; in the larger size of the genital arch; the smaller size of the hypandrium and penis; as well as in the following characteristics of the male genital apparatus: anal plate and secondary clasper separated from each other, the latter with two strong curved teeth on the inner margin, and without dark teeth on the surface; the forceps conspicuous, with long teeth and bristles; hypandrium as broad as it is long, with a median horn that bears apically two bristles; penis narrower, without long hairs.

In Hawaii this species is readily differentiated from other *Sophophora* by having well-developed sex combs on the first two tarsal segments of the male (fig. 219a).

The species closely resembles *D. ananassae* but is readily differentiated by the well-developed combs on the front tarsi of the male and by the longer third costal section of the wing.

Predominantly yellow species with brown to black bands on the posterior margins of the abdominal terga, but fitting the description of *ananassae* in most other respects. The head is yellow except for the reddish brown eyes and brown to black ocellar triangle. The lower reclinate bristle is about two-fifths as long as the proclinate; the proclinate and the upper reclinate bristles are approximately equal in size. Two bristles are present in the upper portion of each vibrissal row. The second bristle is about four-fifths as long as the first. The palpi are yellow; each has a strong apical bristle about equal in size to the second vibrissal bristle. The antennae are predominantly yellow, the third segment is tinged with brown, and sometimes a faint tinge of brown is present on the dorsal surface of the second segment. The arista has four dorsal and three ventral rays in addition to the small apical fork. The anterior dorsocentral bristles are

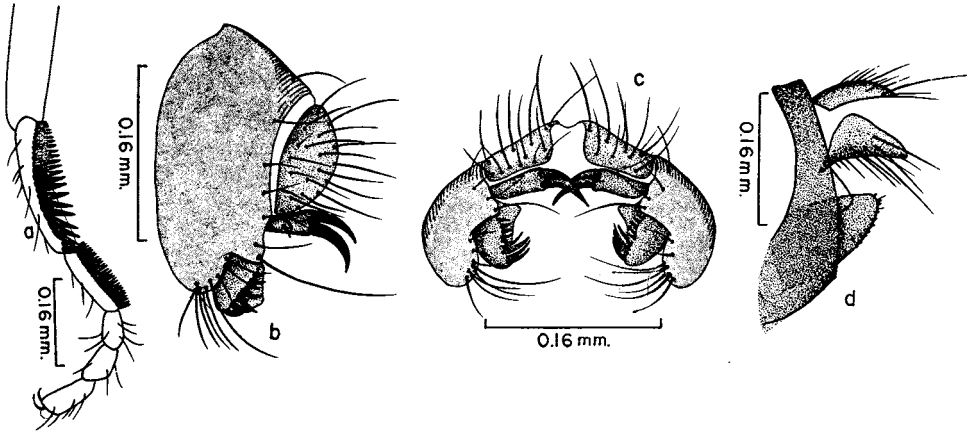


Figure 219—*Drosophila* (*Sophophora*) *kikkawai* Burla: **a**, front tarsus; **b**, male genitalia, lateral; **c**, male genitalia, ventral; **d**, female genitalia.

situated slightly behind a line drawn between the first (anterior) pair of supraalar bristles. Six rows of acrostichal setae are present. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The legs are entirely yellow. The combs of the first two tarsal segments of the male are very well developed as shown in figure 219a. The first tarsal segment is about one-third as long as the tibia. The wings are hyaline. The third costal section is 1.79–2.10 times longer than the fourth section and the last section of vein M_{1+2} is 2.50 times longer than the penultimate section. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The abdomen is predominantly yellow to rufous; each tergum has a narrow brown to black band along the posterior margin. The male genitalia are very distinctive. Secondary lobes ("claspers") are well developed, distinct from the anal plates, and each has two strong spines at its apex. The primary claspers have numerous short bristles or teeth. The other genital characters are as in figure 219b, c. The ovipositor plates are short, broad, rounded, and have numerous teeth around the margin (fig. 219d).

Length: body, 1.75–2.00 mm.; wings, 1.80–2.30 mm.

Drosophila (Sophophora) melanogaster Meigen (fig. 220a–b).

Drosophila melanogaster Meigen, 1830, Syst. Beschr. Eur. Zweifl. Ins. 6:85.

For the synonymy under this species, refer to Okada (1956b:110).

Probably found in the lowlands on all the main islands but has been definitely recorded only from Oahu, Hawaii, Maui, and Kauai. As noted below, most of the records of *melanogaster* in the Hawaiian literature are incorrect.

Cosmopolitan.

Type locality: Austria.

Type probably in Paris.

This species was first recorded in Hawaii by Van Dine (1908:44—under the name *D. ampelophila*) and has been mentioned in the Hawaiian literature many times since that date; but it is probable that most of these reports are erroneous. According to Zimmerman (1943:346), when the late Dr. Gordon Mainland began his studies of the Hawaiian *Drosophila* in 1939, he sent material identified in Honolulu as *D. melanogaster* to Dr. Dobzhansky at Columbia University and the specimens proved to be *D. simulans* Sturtevant. At that time no specimens of true *melanogaster* were found and cultures of this species had to be imported from the mainland for use in teaching and for genetical research at the University of Hawaii. Some time after the study was begun, *melanogaster* was collected on the University of Hawaii campus and was later identified in collections from Lanai. According to Zimmerman "since the first field capture of *D. melanogaster*, it has become abundant around Honolulu." In 1943 Zimmerman said, "It is suggested that *D. melanogaster* may be a recent immigrant to Hawaii—in spite of earlier references to its presence here—and that its apparent sudden appearance, rapid increase and spread in Honolulu may be attributed to escapes from culture bottles of this species imported from California for use by the classes in genetics at the University during the past few years. However, the species may have been present before 1920 and may have been locally replaced by *D. simulans*." It now seems obvious that *simulans* is by far the more common species of the two. The vast majority of the specimens which I have examined from the various collections in Hawaii prove to be *simulans*, with *melanogaster* definitely in the minority and apparently somewhat restricted in distribution. I have found that most of the specimens which have been previously determined in collections here have been misidentified. To date, I have seen specimens only from the islands of Oahu, Maui, and Kauai. The earliest collected specimens of *melanogaster* which I have found to date were taken at the Hawaiian Sugar Planters' Association Experiment Station in Honolulu, November, 1907, on rotting pineapple. The next records are from Honolulu, taken November, 1938, on pineapple; December, 1939, at light; November, 1942, and February, 1943. Then a gap occurs until 1948. It is obvious that no interest was shown in the *Drosophila* during this period and no one bothered to collect specimens.

Along with *simulans*, *melanogaster* can be segregated from other Hawaiian *Drosophila* by the strong sex comb on the front basitarsus of the male (fig. 220a); the yellow thorax, head, and appendages; the all-hyaline wings; the last section of vein M_{1+2} slightly over two times longer than the penultimate section; and the dark brown to black apical portion of the abdomen. In the male the fifth and sixth terga are completely dark-colored; in the female only the sixth tergum is completely brown to black and the other terga have brown to black bands at the apices of the segments. I am unable to find any practical way to differentiate *melanogaster* from *simulans* except by male genital characters. In the literature various authors have attempted to separate these species on the basis of various characters such as the length of the costal fringe, the comparative width of the genae and eye, etc.; but these characters do not seem of any value for the speci-

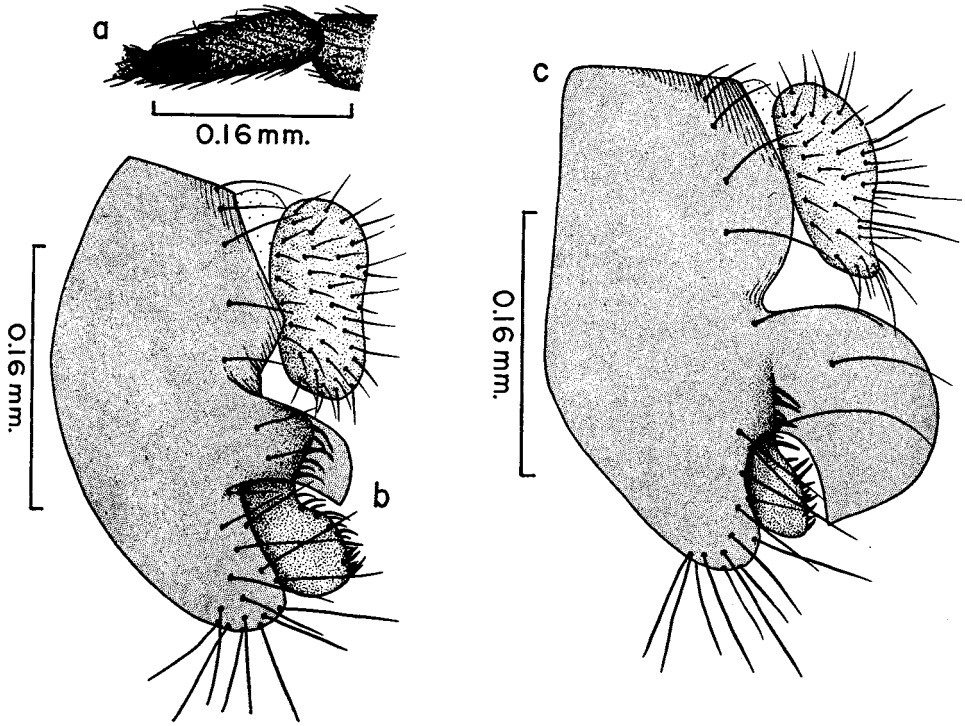


Figure 220—*Drosophila* (*Sophophora*) *melanogaster* Meigen: **a**, sex comb of front tarsus; **b**, male genitalia. *D.* (*S.*) *simulans* Sturtevant: **c**, male genitalia.

mens which I have studied. The process on the posterior median margin of the ninth tergum of the male is much less conspicuous, smaller, and not broad and curved downward in *melanogaster* (fig. 220b).

Length of body and wing averages about 2.0 mm.

This is by far the best known species of the genus *Drosophila*. A voluminous amount of literature has been written concerning it and there is no need to repeat the description here. The book edited by M. Demerec, "Biology of Drosophila," published in 1950 by John Wiley & Sons, Inc., New York, gives a fairly complete discussion of this fly.

Drosophila (Sophophora) simulans Sturtevant (fig. 220c).

Drosophila simulans Sturtevant, 1919, Psyche 26:153.

Widespread and very common throughout the islands from sea level to at least 5,000 ft. in elevation. Most of the references to *D. melanogaster* in the Hawaiian literature should pertain to this species. The earliest collection record I have found is Paauhau, Hawaii, June, 1903.

Immigrant. Cosmopolitan. Type locality: New York City.

Type in the American Museum of Natural History.

Refer to the discussion under *D. melanogaster*. The two are closely related and can be conveniently separated only by the details of the male genitalia. The genitalia of *simulans* are strikingly different because of the presence of a broad, strongly curved, clam-shaped process on the posterior median margin of the ninth tergum (fig. 220c). *D. simulans* is supposed to be separated from *melanogaster* by having larger eyes and narrower genae, with the vertical diameter of the eye about seven times the width of the gena in the same axis, rather than about five times the width of the gena as in *melanogaster*. Also in *simulans*, the costal fringe is supposed to extend about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}, rather than about one-fourth this distance as in *melanogaster*. I find considerable variation in these characters in the specimens which I have studied, and I fail to see that they are of particular value in separating the species.

As noted above, the earliest collected specimens of *simulans* in Hawaii which I have found to date were taken on Oahu, June, 1903. A large series of specimens were found in the B. P. Bishop Museum, Hawaiian Sugar Planters' Association, and other collections which had been determined as *D. melanogaster* taken on Oahu from 1919 to 1934. The first specimens collected on the outer islands are from Iao Valley, Maui, September, 1919; Wailuanui, Maui, July, 1920; Haiku, Maui, December, 1927; and Waikolu, Molokai, June, 1928. The recent collections show a great predominance of *simulans* over *melanogaster*.

Subgenus **TRICHOTOBREGMA new subgenus**

(From the Greek *trichotos*, hairy, and *bregma*, front part of the head. Gender feminine.) The species at hand fits most of the characteristics of the genus *Drosophila*; however, the bristling of the head is so different that I feel that it is necessary to treat this as a new subgenus. It differs strikingly from typical *Drosophila* by lacking proclinate frontal bristles (fig. 221a) and by having numerous long bristle-like hairs on the lower sides of the front completely obscuring the reclinate bristles in the male. In the female two lower reclinate bristles are present as well as a series of four to six short, bristle-like hairs on the orbits between the anterior and posterior reclinates. The male is also characterized by having very tiny ocellar bristles. These are about equal in length to the fine hairs on the ocellar triangle. In the female the ocellar bristles are normal in development.

Type of the subgenus: *Trichotobregma petalopeza* n. sp.

Drosophila (Trichotobregma) petalopeza new species (fig. 221a–e).

MALE. *Head:* One-fourth higher than long; the hind margin of the compound eyes is oblique so that the hind portion of each gena is rather broad. The occiput is broad, distinctly convex as seen in lateral view. The front margin of the face is almost vertical (fig. 221a). The eyes are rather densely short pubescent. The front is nearly two times wider than long, entirely black, covered with gray pollen, especially down the orbits; the area between the orbits and the ocellar triangle

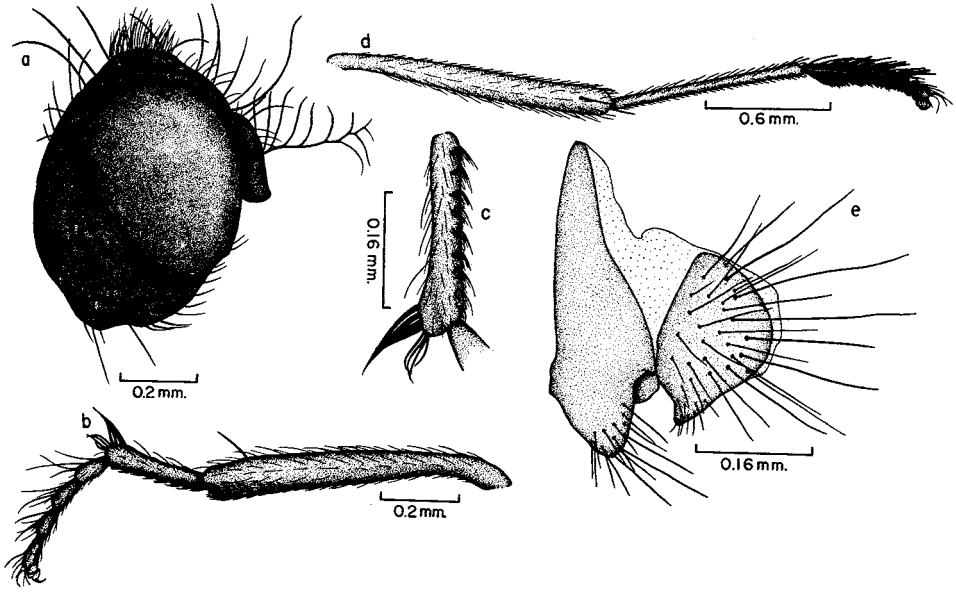


Figure 221—*Drosophila* (*Trichotobregma*) *petalopeza* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** front tarsus; **d,** middle tibia and tarsus; **e,** male genitalia.

is velvety black. The posterior reclinate bristles are well developed; seven or eight rather long, reclinate, bristle-like hairs extend down each side from the upper reclinate to the anterior margin of the front. The lower reclinate bristles cannot be differentiated from the surrounding hairs. The ocellar triangle is densely covered with long pile; these hairs are as long as the ocellar bristles. The vertex is black, covered with gray pollen. The occiput is dark brown to black, tinged faintly with rufous in the ground color, and rather densely gray pollinose. The occipital row of setae is made up of rather strong bristle-like hairs. The genae are yellow-brown; the face is dark brown on the lower portion, yellow, tinged with brown on the upper portion. The median portion of the face is carinate. The clypeus and palpi are dark brown; the latter lack apical bristles but have several black setae around the margins. The mouthparts are predominantly yellow, tinged with brown. The labella are fleshy with a slightly sclerotized rim over the upper portion. The antennae are black; the second segment has one slender dorsal bristle and about four short, thick bristles over the dorsal surface. The arista has six dorsal and two ventral rays in addition to the apical fork; the inner surface is bare. *Thorax:* Predominantly dark brown to black in ground color, densely gray pollinose. The humeri are bright yellow; the extreme apex and the under surface of the scutellum are yellow, tinged with brown. The halteres are bright yellow. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. About eight rows of acrostichal setae are present. Each humerus has two strong bristles. The anterior sternopleural

bristle is about four-fifths as long as the posterior bristle. *Legs:* The coxae are brown, covered with gray pollen. The last three segments of the front and hind tarsi and the last four segments of the middle tarsi are black; the legs are otherwise yellow, with a faint tinge of brown at the bases of the front and middle femora. The front femur has six or seven bristles or bristle-like hairs along each of the posteroventral and posterodorsal surfaces; those on the apical half of the segment are the strongest. The front tibia has no long cilia; the preapical apicodorsal bristle is well developed. The front basitarsus is about one-third as long as the tibia; it has a characteristic clump of four strong, black, bristle-like hairs placed very closely together at the upper apex of the segment and converging apically, seeming to fuse together at their tips; three closely placed curved bristles are situated just beyond the dorsal clump (fig. 221b–c). Each of the remaining tarsal segments has one or two moderately strong dorsoapical hairs. The middle basitarsus is about two-thirds as long as the tibia and is entirely yellow. Tarsal segments two to five are slightly flattened, entirely black, and densely covered with broad, almost scale-like hairs which give the apical portion of the tarsus the appearance of being rather greatly thickened (fig. 221d). *Wings:* Subhyaline, without dark markings. The costal fringe extends slightly more than one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.5 times longer than the fourth section. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. The last section of vein M_{3+4} is about one-half longer than the m crossvein. *Abdomen:* Dark brown to black, covered with gray-brown pollen. The anal plates terminate in a sharp point ventrally. The ninth tergum is greatly narrowed dorsally, consisting of just a sclerotized ring over the upper portion; the ventral portions of the tergum are lobate and are covered with numerous, fine hairs around the margins. The claspers are completely hidden from lateral view (fig. 221e).

Length: body, 3.75–4.25 mm.; wings, 4.50–5.00 mm.

FEMALE. Similar to the male in coloration except that the middle tarsi are not black. Lacking the ornamentation of the front and middle tarsi and with the head bristles and hair somewhat differently developed. The ocellar bristles are strong, about equal in size to the vertical bristles. Two well-developed reclinate bristles are situated on the lower portion of each side of the front, and six or seven short, erect hairs are situated between the lower and upper reclinates. One strong bristle is present at the upper portion of each vibrissal row. Each palpus has a strong apical bristle. The ovipositor plates are rather slender (about two-thirds as long as the ventral portion of the seventh abdominal segment) and each has a series of short, sharp teeth around the margins.

Length: body, 4.5 mm.; wings, 5.3 mm.

Holotype male and allotype female: from Paliku, Haleakala Crater, Maui, 6,500 feet, August, 1958 (D. E. Hardy). About 225 paratypes (both sexes): all except one specimen taken same locality as type, June and August, 1952, June, 1953, and August, 1958 (D. E. Hardy, M. Tamashiro, C. R. Joyce, and W. C. Mitchell). Two females from Haleakala were collected July, 1907 (no

collector given). One male paratype from near Puu Luau, East Maui, 5,500 feet, April 28, 1945 (E. C. Zimmerman). This species is very common in the wet Paliku section of Haleakala Crater. It is apparently the most abundant species found in this area. The adults can be observed in large numbers on the leaves of the Hawaiian raspberry (*Rubus hawaiiensis* A. Gray), but to date we have not been able to find where they breed. I have been able to obtain eggs on exposed stentor dishes containing *Drosophila* medium. The eggs have hatched but I could not rear the larve beyond the first instar.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Genus **GRIMSHAWOMYIA new genus**

(From Grimshaw, plus the Greek *myia*, fly. Gender feminine.)

This genus is differentiated from *Drosophila* by the following characters: the second antennal segment is sharp-pointed at the apex, and extends over the base of the third segment; the sides of the vertex are swollen, and the vertical and upper ocellar bristles are situated on the swollen portion (fig. 222a); the costal fringe extends nearly to the apex of vein R_{4+5}; and the wing markings are distinctive as in figure 223a. Also the male genitalia are quite different from those of *Drosophila* which I have studied. The male claspers are exposed, the ninth sternum is developed into a pair of moderately large lateral lobes which extend beyond the apices of the claspers (fig. 223b), and the ovipositor plates of the female are not developed, rudimentary, and very tiny (fig. 222f). The face has a strong keel down the middle which terminates in a nose-like point at about the lower two-thirds of the face. Only one strong humeral bristle is present. The penultimate section of vein M_{1+2} is 1.1 times longer than the last section.

Type of genus: *Drosophila perkinsi* Grimshaw.

Key to the Known Species of Grimshawomyia

1. Apex of the wing fuscous (fig. 223a). Two reclinate bristles present on the front. Coxae predominantly yellow, front tarsi dark brown to black. Third costal section 2.5 times longer than the fourth. Each pleuron with a broad, transverse yellow vitta extending through the lower portion of the mesopleuron. The lower half of the sternopleuron is yellow. Male genitalia as in figure 223b–c. Hawaii . . . . . **perkinsi** (Grimshaw).

Apex of wing hyaline (fig. 222c). Three reclinate orbital bristles present. Coxae brown, front tarsi yellow.

Third costal section 3.5 times longer than the fourth. Pleura almost entirely brown. Male genitalia as in figure 222d–e. Oahu and Maui ..... **palata** n. sp.

Grimshawomyia palata new species (fig. 222a–f).

This species is differentiated from *G. perkinsi* (Grimshaw) by having the apex of the wing hyaline (fig. 222c), the third costal section 3.5 times longer than the fourth, three distinct reclinate bristles on each side of the front, the coxae brown and the front tarsi yellow, pleura almost entirely dark brown lacking a distinct transverse yellow band at the lower portion of the mesopleuron and also with the sternopleuron entirely brown. The male genitalia differ as shown in figure 222d–e.

MALE. *Head:* Slightly higher than long; the eyes are almost round. The front is yellow in ground color, densely gray-white pollinose (microscopically pubescent) on the sides and on the ocellar triangle. The anterior reclinate bristle is almost as large as the proclinate and is situated slightly above the latter. The occiput is predominantly yellow, tinged faintly with brown, and densely gray pollinose. The genae are pale yellow except for a line of brown along the vibrissal row. The uppermost bristle of the vibrissal row is strong, almost equal in size to the ocellar bristles. The face is predominantly brown, the lower margin above the epistoma is yellow and a yellow streak extends down the top edge of the median keel. The clypeus is pale brown and the mouthparts are yellow, tinged faintly with brown. The palpi are dark brown; each has two bristles at or near the apex and one bristle on the outer edge near the apical two-thirds of the segment. The first two antennal segments are yellow, densely covered with gray pollen; the second segment has numerous black setae and six or seven short bristles scattered over the dorsal surface; the dorsoapical portion is extended over the base of the third antennal segment (fig. 222a). The third segment of the antenna is dark brown. The arista has six or seven long dorsal and three ventral rays in addition to the apical fork. *Thorax:* Predominantly brown in ground color. The mesonotum is densely yellow-gray pollinose, is brown on the sides except for the yellow extreme lateral margins, and with three narrow, brown longitudinal vittae (one median and one down each dorsocentral row). The anterior dorsocentral bristles are situated about opposite the first (anterior) supraalars. About eight rows of acrostichal setae are present. The humeri are yellow. One strong bristle is present in the central portion of the humerus and a ventral and a dorsal seta are present; these are about equal in size to the acrostichal setae of the mesonotum. The pleura are almost entirely dark brown; a faint yellow vitta is present along the extreme lower portion of the mesopleuron. The scutellum is yellow-brown, densely covered with gray pollen on the disc. The metanotum is brown in the median portion and yellow on the sides. The halteres are pale yellow. The anterior sternopleural bristle is almost equal to the posterior bristle, and a moderately large intermediate bristle is present. *Legs:* The coxae, trochanters, and the femora are dark brown to black; the tibiae and tarsi are yellow.

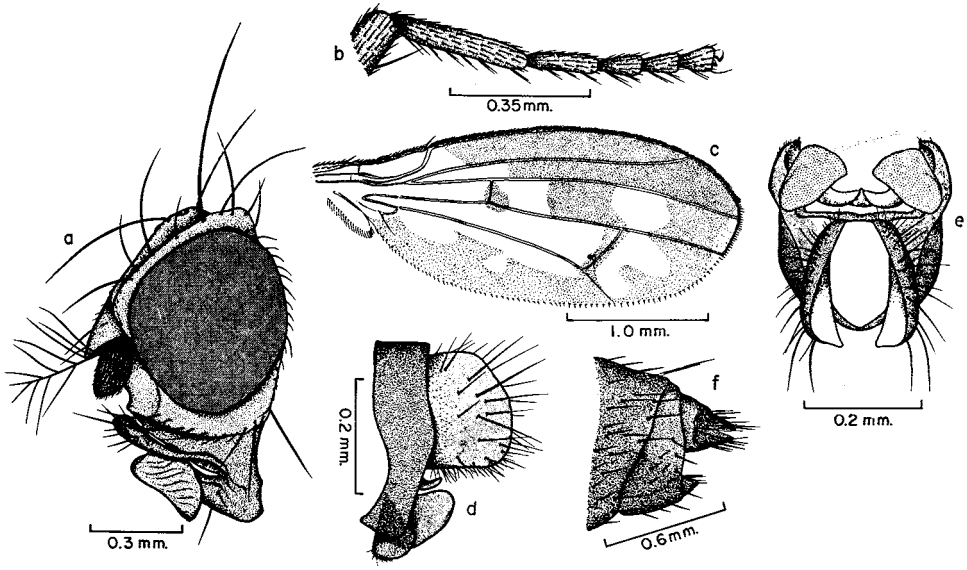


Figure 222—*Grimshawomyia palata* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia, lateral; **e,** male genitalia, ventral; **f,** female genitalia.

The front basitarsi are about one-half as long as the tibiae and have numerous short, suberect setae extending down the dorsal surface (fig. 222b). *Wings:* Very similar to those of *perkinsi* but differing by having the apex hyaline and the third costal section about 3.5 times longer than the fourth (fig. 222c). *Abdomen:* Predominantly brown, conspicuously gray pollinose on the posterolateral margins and along the extreme apex of each tergum. The extreme lateral margin of each tergum, that portion curved beneath the venter, is brown. The genitalia are as in figure 222d–e. The anal plates are higher than long, and the ventral margin is vertical. The ninth tergum is broadest over the dorsal portion, slightly narrowed ventrally. The claspers are plainly visible, evenly rounded ventrally, and lack conspicuous teeth. A large, rounded lobe extends on each side from the ninth sternum (fig. 222d). This is plainly visible *in situ.*

Length: body and wings, 3.5–3.6 mm.

FEMALE. The female fits the description of the male except for sexual characters. The ovipositor is rudimentary; the blades are represented by a pair of very tiny lobes (fig. 222f).

Holotype male and allotype female: from Haleakala, Maui, 2,000 feet (no date or collector given). Eleven paratypes (eight males and three females); same data as type, 1,500–2,000 feet; and Waianae, Oahu, December 10, 1947, taken in trap (very probably banana bait trap) (G. B. Mainland).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

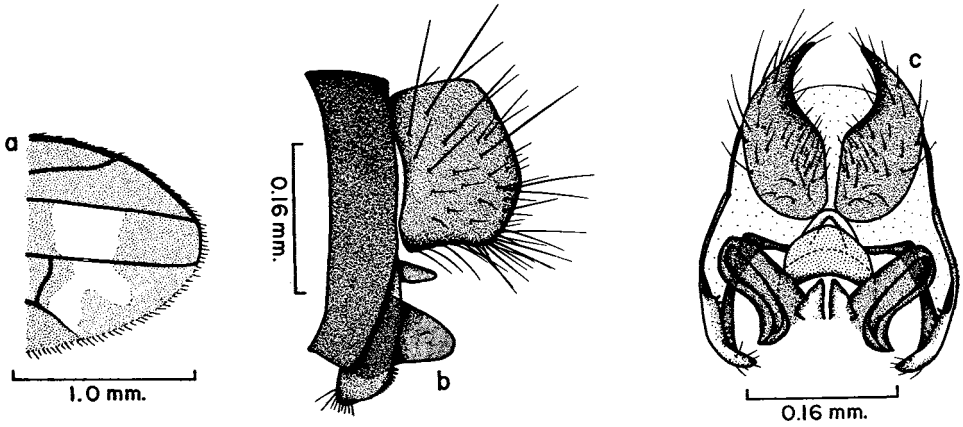


Figure 223—*Grimshawomyia perkinsi* (Grimshaw): **a**, apex of wing; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

Grimshawomyia perkinsi (Grimshaw) **new combination** (fig. 223a–c).

Drosophila perkinsi Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :59.

Endemic. Hawaii (type locality: Kilauea). Specimens have also been seen from South Kona, Hawaii, August, 1919 (O. H. Swezey), and Kaiholena River, Hawaii, August, 1952, 2,300 feet (D. E. Hardy).

Type in the British Museum (Natural History).

It seems evident that Grimshaw included two species in his original concept of *perkinsi*. His type series consisted of two males from Hawaii and one female from Oahu, and it is obvious that the specimens from these different islands represent distinct species. I am describing specimens from Maui and Oahu as *G. palata* n. sp. *G. perkinsi* differs from *palata* by having the entire apex of the wing fuscous as in figure 223a and in Grimshaw's figure 12, plate 3; by having the third costal section about 2.5 times longer than the fourth; by lacking a reclinate or small bristle above the normal upper reclinate bristle of the front; by having the front tarsi brown to black and the coxae and trochanters yellow; by having a broad transverse yellow stripe extending through the median portion of each pleuron and the lower portion of each sternopleuron yellow. Also, the male genitalia differ as shown in figure 223b–c.

Fitting the description of *palata* in most respects. The clypeus is, however, yellow, and the lower margin of the face is more broadly pale yellow. The face, rather than being evenly brown, has a dark brown to black transverse vitta extending across the median portion. The lateral margins of the mesonotum are more conspicuously yellow in *perkinsi*; the yellow markings on the pleura are quite different, and the lower one-half to two-thirds of the sternopleuron is yellow. The third costal section appears to be shorter in comparison with the length of the fourth in *perkinsi*, being about two and one-half times longer than the fourth. The wing markings are as in figure 223a. The abdomen is marked as

in *palata* and the genitalia are as in figure 223b–c. The ninth tergum of the male is rather narrow and is slightly tapered ventrally. The claspers are longer than wide, and each has a row of fine teeth around the ventral surface (fig. 223b).

Length: body, 3.4 mm.; wings, 3.2 mm.

FEMALE. Unknown.

Genus **IDIOMYIA** Grimshaw

Idiomyia Grimshaw, 1901, Fauna Hawaiiensis 3:50.

This genus is very close to *Drosophila*, and the only reliable character which I have found for separating it is the extra crossvein present in cell R_5 (fig. 234b). These flies are predominantly large in size, and some species are probably the largest known drosophilids of the entire world. The wings are elongate and have distinctive patterns of brown in all of the known species; the anterior margin is undulated in the males of some species; in some the front portion of the head may be considerably produced (as seen in lateral view) and the antennae may be porrect. Sturtevant (1921:55) said that "Mr. Lamb writes me that the vibrissa is absent." All of the species have well-developed vibrissae. Except in *I. brunneipennis* the antennae are rather widely separated by a median keel. One species, *heteroneura* Perkins, has the head very broad and narrow with the eyes on prominences (fig. 227c). The anal lobes of the male are large and are densely bristled. The ninth tergum is narrow and is extended ventrally into lobes which cover the claspers (fig. 234d). The claspers are short and flat, and each has a row of short thick spines across the middle (fig. 232d).

Most *Idiomyia* have speciated by islands and are rather restricted in distribution. The genus is unknown from the islands of Kauai and Lanai. Five species are known from Oahu, two are known from Maui (one of these also occurs on Molokai), three from Hawaii, and one (plus the one species which also occurs on Maui) from Molokai. Two apparently new species are also on hand represented by unique females from Oahu and from Puu Kukui, West Maui.

Type of the genus: *Idiomyia perkinsi* Grimshaw.

KEY TO SPECIES OF IDIOMYIA

1. Head normal in shape, front about as long as wide 2
   Head very short and broad, in the male the front is three times wider than long, and the eyes are rather strongly protuberant (fig. 227c). In the female the front is about two times wider than long. The abdominal terga have bright yellow spots on the sides. Hawaii . . . . . **heteroneura** Perkins.

2(1). Wings brown with numerous small hyaline spots (fig. 225d), or with the basal two-thirds and apex brown (fig. 224b) 3

Wings predominantly hyaline with brown markings, especially on crossveins and at apex (fig. 232b) 4

3(2). Wings with hyaline spots (fig. 225d). Oahu ..... **grimshawi** Bryan.

Wings brown on basal two-thirds and at apex (fig. 224b). Oahu ..... **brunneipennis** n. sp.

4(2). Anterior margin of wing lacking a continuous broad band of brown (fig. 233b); although in some specimens of *obscuripes* a narrow marginal band is present; this does not extend beyond cell R_1. The r–m crossvein is situated at or below the basal one-fourth of cell 1st M_2 (fig. 232b), except in *perkinsi* Grimshaw (fig. 231b) 5

Wings with a broad brown band around the front margin extending through much of cell R_3 (fig. 226c); the r–m crossvein is situated at the basal third or at the middle of cell 1st M_2 10

5(4). Arista with 9–10 or more dorsal rays and 3–4 ventral rays in addition to apical fork, and with the anterior surface densely covered with fine pile (fig. 229a) 6

Arista with about five dorsal rays and two ventral rays in addition to apical fork, anterior surface bare (fig. 232a). Thorax predominantly black, with three yellow pollinose vittae. Maui and Molokai **picta** Grimshaw.

6(5). Upper reclinate bristles on front strong, thicker and longer than the proclinate bristles; lower reclinate bristle well developed, about two-thirds as long as proclinate. Face and palpi all yellow 7

Upper reclinate bristles distinctly shorter and much thinner than proclinates. Face black; lower reclinate bristle tiny, hair-like, scarcely differentiated from the small hairs along the orbits 9

7(6). Face and palpi yellow, proboscis yellow to rufous 8

Face predominantly dark brown to black, at least along sides or in area bordering underside of ptilinal suture. Palpi black, proboscis brown to black. Maui ..... **obscuripes** Grimshaw.

8(7). Scutellum dark brown to black, not with a yellow

stripe down the middle. Humeri entirely yellow. Extra crossvein in cell R_5 situated well before the m crossvein (fig. 233b). Hawaii ..... **silvestris** Perkins.

Scutellum with a broad yellow stripe down the middle and dark brown to black on the sides. Lower half of each humerus black. Extra crossvein in cell R_5 in line with the m crossvein (fig. 229c). Oahu ..... **oahuensis** Grimshaw.

9(6). Costa of male strongly arched (fig. 231b). Palpi black, only one strong bristle at apex. Head not pointed. Front tibiae and tarsi lacking ciliation except at bases of tibiae (fig. 231a). Molokai and Maui ..... **perkinsi** Grimshaw.

Costa of male nearly straight. Palpi yellow, long and slender, densely bristled at the apices. Head pointed as seen in lateral view. Front tibia and basitarsus with long cilia down dorsal surface (fig. 228a). Hawaii ..... **nigrifacies** n. sp.

10(4). Extra crossvein in cell R_5 situated well before the m crossvein. Crossvein r–m near basal third of cell 1st M_2 (fig. 226c). Front tibia of male slender, nearly two times longer than the basitarsus. Tibiae and basitarsi of front legs (males) bearing long erect ciliation down the dorsal surfaces (fig. 226b). Male genitalia as in figure 226d. Oahu ..... **hemipeza** n. sp.

Extra crossvein situated well beyond the m crossvein. Crossvein r–m at middle of cell 1st M_2 (fig. 234b). Front tibiae short, rather thick, about one-third longer than basitarsi and lacking ciliation. Male genitalia as in figure 234c. Oahu ..... **stenoptera** n. sp.

Idiomyia brunneipennis new species (fig. 224a–d).

This species is very readily differentiated from all other known *Idiomyia* by the distinctive wing coloration (fig. 224b).

MALE. *Head:* About as long as high. The front is predominantly yellow; the upper orbits, the median portion of the vertex, the upper portion of the occiput, and the ocellar triangle are brown to black. The sides of the vertex and the remainder of the occiput are yellow. The face and genae are dark brown to black. The front is slightly wider than long. The lower reclinate bristle is rather small and is situated directly above the proclinate bristle. The antennae are very close together; there is no perceptible keel separating them at their bases. The antennae are brown, tinged with yellow. The third segment is oblong, two times longer than wide. The arista has seven long dorsal rays and two ventral

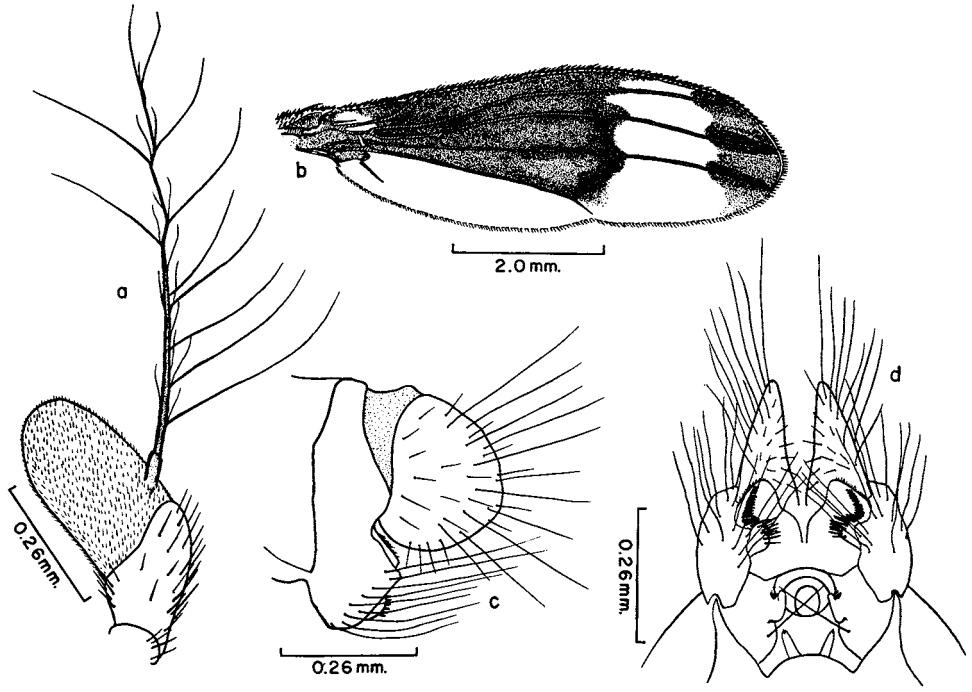


Figure 224—*Idiomyia brunneipennis* n. sp.: **a,** antenna; **b,** wing; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

rays in addition to the apical fork, and the anterior surface is rather sparsely covered with short hairs (fig. 224a). Only two strong vibrissae are present on lower angles of the face; two strong, closely placed bristles are situated on the postgena, and one strong bristle is situated near the lower margin of the occiput. The palpi are yellow, swollen in the median portions, and each has one strong bristle at apex. The clypeus and proboscis are black. *Thorax:* The mesonotum is rufous on the sides and has a broad rufous vitta extending down the median portion to about opposite the postalar bristles. The posterior two-fifths of the mesonotum is almost entirely black, with a very thin rufous line extending down the middle; the black marks extend in line with the dorsocentral bristles almost to the front margin of the mesonotum and expand laterally just beyond the suture. The scutellum and the humeri are yellow. The metanotum is brown on the sides, rufous in the middle. The pleura are predominantly yellow; a vertical streak of brown extends through the front portion of each sternopleuron and through the middle of the mesopleuron. Six rows of acrostichal setae are present. Two strong bristles are present on each humerus, and two bristles on each sternopleuron. Halteres yellow. *Legs:* The front coxae and anterior basal portions of front femora are brown to black, dusted with gray; the legs are otherwise yellow. Each front femur has five posterodorsal bristles evenly spaced down the segment;

each has a posterior bristle situated just before the base, four posteroventral bristles just beyond the apical three-fifths, and another just before the base of the segment. The front femur has a small clump of fine, curved, dorsal hairs at the apex. The tibiae and tarsi are not ornate. The front basitarsus is about three-fourths as long as the tibia. *Wings:* Long and narrow; about four times longer than wide and entirely brown except for a broad hyaline streak extending transversely across the wing just beyond the m crossvein. Vein R_{2+3} is rather strongly arched upward. The costal fringe extends about three-fourths the distance between the tips of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated at the basal fourth of cell 1st M_2. The extra crossvein in cell R_5 is located just before the m crossvein and has a short appendage at the middle on the inner side. The m crossvein is sinuate (fig. 224b). *Abdomen:* First segment entirely yellow, remainder polished black, lightly gray pollinose. The genitalia are rather small and inconspicuous. The aedeagus is not visible *in situ*. The ninth tergum is reduced to a narrow ridge across the dorsal surface and the lateral margins are expanded and are densely bristled (fig. 224c). The anal lobes are moderately developed and are densely bristled. The claspers are rather small and are hidden behind the lobes of the ninth tergum; the ventral edge of each has a crescent-shaped row of short black teeth which are longer and not so closely placed on the lower surface. The parameres are rather broad but taper to sharp points. The upper portion of the ninth sternum has a pair of sharp-pointed, inwardly produced lobes, and a pair of strong, black, convergent bristles are situated on the median portion of the sternum (fig. 224d).

FEMALE. Unknown.

Length: body, 4.6 mm.; wings, 5.8 mm.

Holotype male: Puu Kahuauli, Koolau Mountains, Oahu, April, 1952 (Ed Dresner).

Type in the B. P. Bishop Museum.

Idiomyia grimshawi Bryan (fig. 225a–g).

Idiomyia grimshawi Bryan, 1934, Proc. Haw. Ent. Soc. 8 (3) :435.

Endemic. Oahu (type locality: Punaluu), occurring in both the Waianae and Koolau Mountains. Dr. F. X. Williams collected it on banana plants in Lulumahu Valley (see Bryan 1938:31).

Type in the B. P. Bishop Museum. I have studied the type.

This species is readily recognized from other Hawaiian *Idiomyia* by its predominantly brown wings covered with hyaline spots (fig. 225d), by the ornate mouthparts of the male (fig. 225c), and by the single sternopleural bristle. Also the mesonotum is more setose than in other *Idiomyia*; eight to ten rows of acrostichal setae are present. This resembles *Drosophila picticornis* Grimshaw because of the similar wing markings.

The head is roughly quadrate in profile and predominantly yellow, except for the brown eyes. The lower reclinate bristle is well developed, is two-thirds to three-fourths as long as the upper reclinate, and is situated about halfway

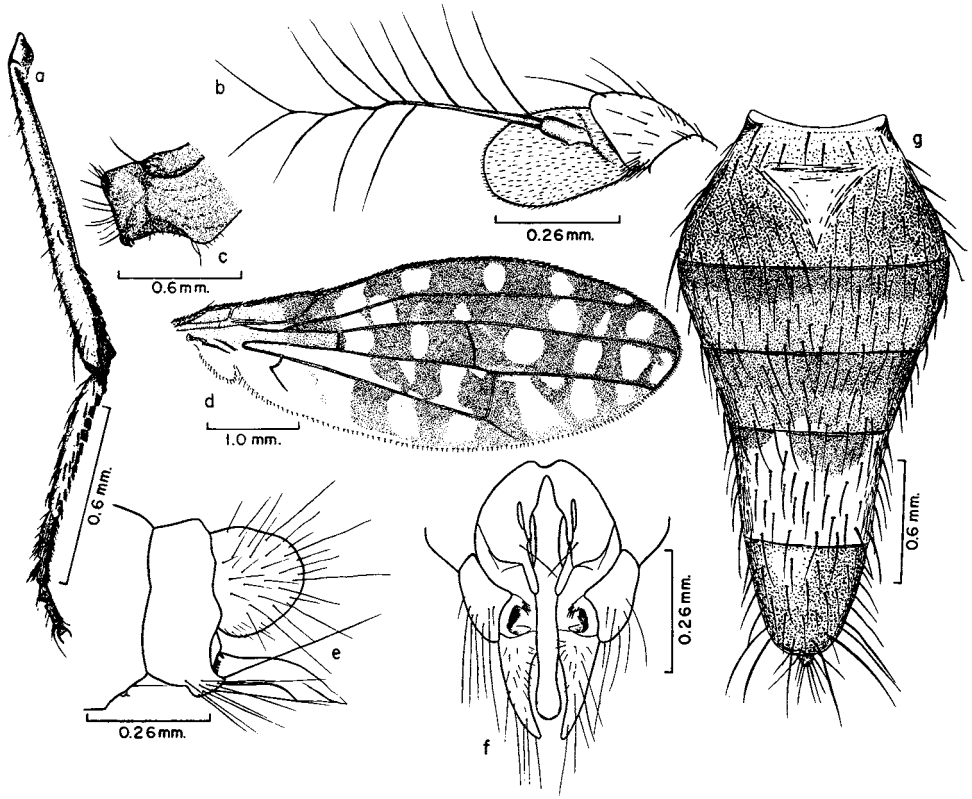


Figure 225—*Idiomyia grimshawi* Bryan: **a,** front tibia and tarsus; **b,** antenna; **c,** mouthparts; **d,** wing; **e,** male genitalia, lateral; **f,** male genitalia, ventral; **g,** male abdomen, dorsal.

between the upper reclinate and the proclinate bristles. The antennae are narrowly separated at their bases by a small keel. The antennae are yellow; the second segment has several short, black bristles on the dorsal surface. The arista is rather sparsely haired with about seven or eight dorsal rays and three ventral rays in addition to the apical fork; the anterior surface is bare and in this regard it is like *I. picta*. A row of about twelve moderately strong oral vibrissae are present. The labellum of the male is expanded and the margins bear long, yellow bristles (fig. 225c). The palpi are short, swollen in the median portion, and have one strong apical bristle. The thorax is predominantly yellow. The mesonotum has a moderately broad brown vitta down the middle; this is expanded on the hind portion, and before the scutellum it fills the area between the dorsocentral bristles. Another short vitta is present on each side extending from just before the inner posterior supraalar bristle to the suture; a small brown spot is present immediately in front of the suture and another just behind each humerus. The scutellum is brown with yellow lateral margins. The metanotum is yellow, tinged lightly with brown in the median portion. The pleura are

almost entirely yellow; a streak of brown extends across the middle of each propleuron and over the upper edge of the mesopleuron, another streak extends through the upper portion of the pteropleuron, and another is present on the upper hind portion of each sternopleuron. The sternopleural bristle is very large, almost equal in size to the scutellar bristles. The legs are entirely yellow. The front femur has a strong curved posterior bristle just before the apex; the posterodorsal surface has two small bristles situated at about the apical third, plus numerous bristle-like hairs extending to the base of the segment. Seven strong posteroventral bristles are situated on the apical half of the femur. Front tibiae moderately short, about equal in length to the tarsi, the dorsal surface thickly covered with short, erect yellow hairs (fig. 225a). The front basitarsus is scarcely over half the length of the tibia. Wings as in figure 225d, brown with numerous hyaline spots. The size and number of spots present seems somewhat variable; the typical number for cell R_1 apparently is five; however, in some individuals seven spots are present. The extra crossvein in cell R_5 is situated well before the m crossvein; this is apparently somewhat variable. In some specimens the penultimate section of vein M_{1+2} is almost equal in length to the m crossvein; in others it is about half that length. The abdomen is black in the female and predominantly so in the male. In the latter the apical four-fifths of the fifth tergum and the basal edge of the sixth are yellow to rufous. The male abdomen tapers very sharply beyond the third segment so that segments five and six are about half as wide as the widest portion of the abdomen (fig. 225g). The male genitalia are small and inconspicuous; *in situ* the parts are yellow, and the aedeagus protrudes a distance about equal to one-third the length of the sixth abdominal segment. The anal plates of the male are comparatively small. The ninth tergum is about three times higher than long as seen from lateral view and is developed into a rather small truncate lobe at each lateral margin; this is densely bristled (fig. 225e). The aedeagus extends about to the apex of the anal lobes. The parameres are slender, attenuated, and each bears a strong bristle at its apex. The ninth sternum has a pair of moderately developed lobes on the dorsal portion and a strong bristle on each side at about the upper one-fourth of the sclerite. The claspers are small and hidden behind the lobes of the ninth tergum (fig. 225f). The female ovipositor is rather broad, blunt at apex, and entirely yellow. It is about one-third longer than the anal plates.

Length: body, 5.0–5.5 mm.; wings, 5.3–6.0 mm.

Idiomyia hemipeza new species (fig. 226a–d).

This species is rather closely related to *I. stenoptera* n. sp. It differs from that species by having the extra crossvein in cell R_5 situated well before the m crossvein, by having the r–m crossvein near the basal third of cell 1st M_2, and by having the front tibiae long and slender (nearly two times longer than the basitarsi), and bearing long erect ciliation down the dorsal surfaces (fig. 226b).

MALE. *Head:* A streak of brown extends just inside the upper orbits, over the vertex, and onto the occiput. The ocellar triangle is black; the front is

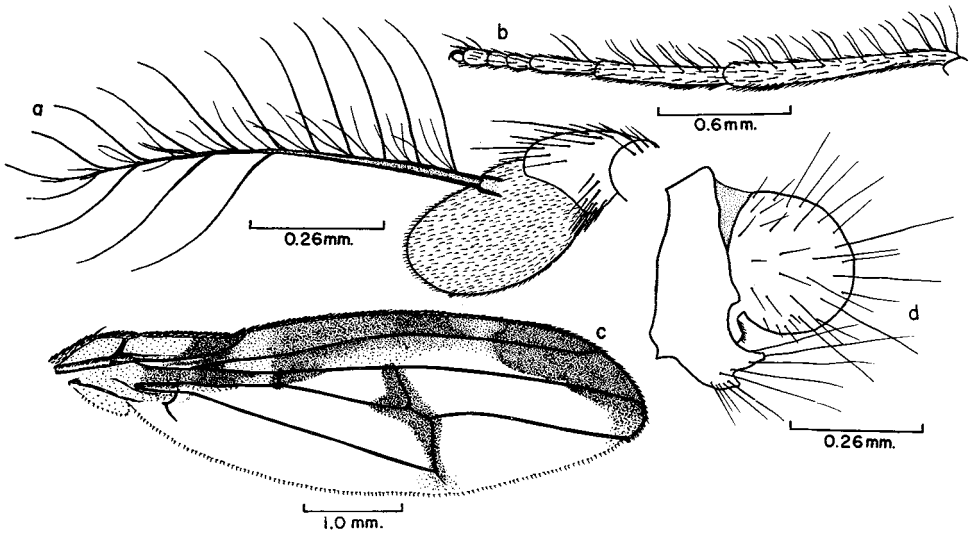


Figure 226—*Idiomyia hemipeza* n. sp.: **a,** antenna; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia.

otherwise yellow, as are the sides of the vertex, the occiput, and most of the genae; each gena has a rather small spot of brown just below the eye margin. The face is pale yellow in ground color, densely covered with white pubescence. The antennae are brown to black; the second segment is rather densely covered with short setae and has one strong dorsal bristle. Each arista has about 10 long dorsal rays and 3 to 4 ventral rays in addition to the apical fork (fig. 226a); the anterior surface is covered with moderately long, fine hairs. The palpi and proboscis are yellow, tinged lightly with brown. The former is thickened in the median portion and has one strong bristle at its apex. The clypeus is clear yellow. The oral vibrissae are rather short. Two strong bristles are developed on the postgenae. The distance between the upper reclinate and the proclinate bristles is almost equal to the distance between the postverticals. The lower reclinate bristle is moderately developed, about one-half as long as the upper reclinate, and situated about two-fifths the distance from the proclinate to the upper reclinate. The front is approximately as long as wide. *Thorax:* Predominantly yellow. The mesonotum has a brown vitta extending down each dorsocentral area, and this is expanded laterally in front of the suture. A brown spot is present just above the anterior supraalar bristles, and the lower portion of each humerus is yellow. Each sternopleuron is predominantly brown, a brown streak extends across the top portion of the mesopleuron, a small brown spot is present near the upper portion of the pteropleuron, and each hypopleuron and metapleuron has a brown discoloration in the median portion; the pleura are otherwise clear yellow. The scutellum has a brown spot in the median basal portion, and the extreme lateral corners of the scutellum are also brown; the remainder

of the scutellum is pale yellow. The metanotum is brown on the sides, yellow in the median portion. Six rows of acrostichal setae are present, and two strong bristles are situated near the upper portion of each sternopleuron. *Legs:* Entirely yellow. Front legs slender. Each front femur has three posterodorsal bristles near the middle of the segment, one near the base, and two or three rather small posteroventral bristles on the apical fourth of the segment. Front tibiae slender, nearly two times longer than the basitarsi. Front tibiae, basitarsi, and the basal portions of the second tarsal segments bearing long erect setae on the dorsal surfaces (fig. 226b); the tibia is distinctly flattened dorsoventrally. *Wings:* Rather long and slender. A broad brown band extends around the anterior margin; this is slightly interrupted just beyond vein R_1 and at about the apical third of cell R_1. The costal fringe extends just slightly over half the distance between the tips of veins R_{2+3} and R_{4+5}. The r–m crossvein is situated near the basal two-fifths of cell 1st M_2 and the extra crossvein in cell R_5 is situated well before the m crossvein; the penultimate section of vein M_{1+2} is about equal in length to the ultimate section of M_{4+5}. The m crossvein is straight (fig. 226c). *Abdomen:* Dark brown to black down the median portion, yellow over the first tergum, and on the sides of the remainder of the abdomen. The anal lobes, apices of the tergum, and the claspers are dark brown. The ninth tergum is narrow, the ventral margins are lobate, and terminate in two small points; the lobes are densely bristled (fig. 226d). The claspers are small and are hidden by the lobes of the ninth tergum.

Length: body, 5.0 mm.; wings, 6.0 mm.

FEMALE. Unknown.

Holotype male and one paratype male: Pupukea, Oahu, about 1,900 feet, in banana grove, April, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum; paratype in the University of Hawaii collection.

Idiomyia heteroneura Perkins (fig. 227a–e).

Idiomyia heteroneura Perkins, 1910, Fauna Hawaiiensis 2 (6) :699.

Endemic. Previously known only from the type female, labeled "Hawaii, ? Olaa 1903."

Type in the B. P. Bishop Museum.

This species is rather closely related to *silvestris* Perkins but differs by having the markings of the mesonotum much more distinct, the margins of the scutellum yellow, and the pleura and legs predominantly yellow; by the yellow spots on the sides of the abdominal terga. Also, the head of the male is much broader; from the dorsal view the head is at least three times wider than long (fig. 227c) rather than about one-half wider than long as in *silvestris*.

Description based upon the type female. Front predominantly golden; dark brown to black across the vertex and in the ocellar triangle. The front is rather short; the ocellar triangle extends about to the middle. From a direct dorsal view the head is approximately two times wider than long, and the front is

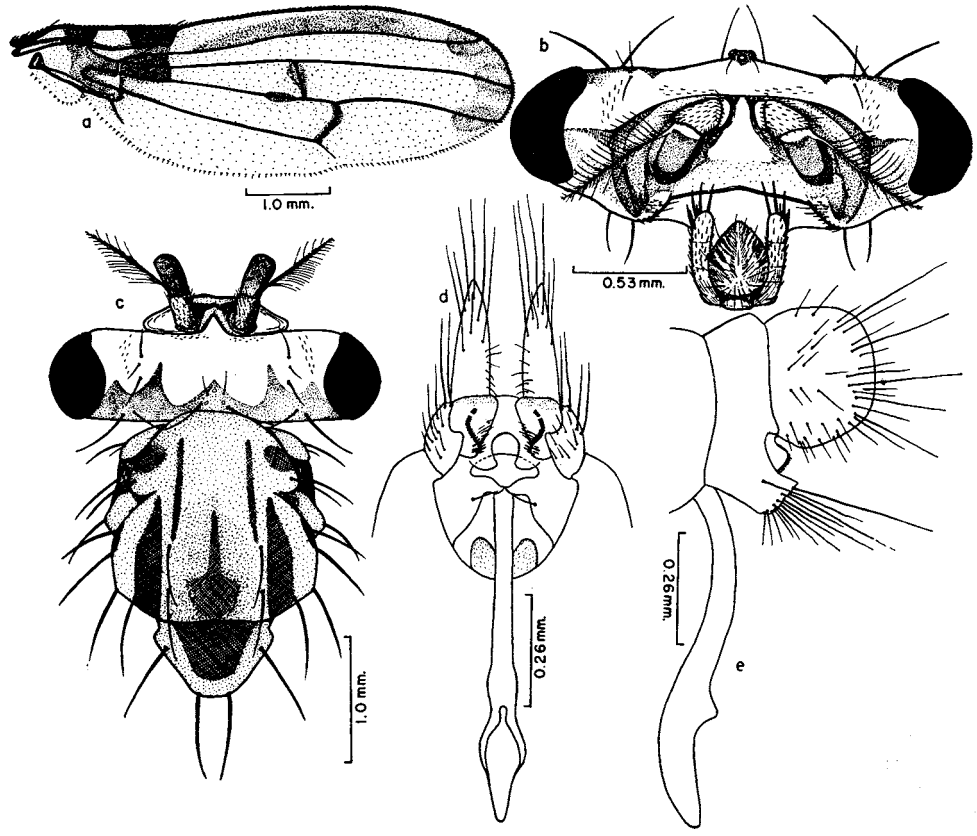


Figure 227—*Idiomyia heteroneura* Perkins: **a**, wing; **b**, head, front view; **c**, head and thorax, dorsal; **d**, male genitalia, ventral; **e**, male genitalia, lateral.

slightly over two times wider than one eye. The second antennal segment is reddish brown and bears only two distinct setae on the dorsal surface. The third segment is dark brown to black; the aristae are broken on this specimen. The face is entirely yellow, and a distinct carina separates the bases of the antennae. The distance between the antennae is about equal to the width of the second segment. The genae, occiput, palpi, and proboscis are yellow, the latter faintly tinged with red. The palpi are moderately short and broad, and each bears four to five stout spines at its apex. The thorax is predominantly yellow. The mesonotum has several black streaks and marks; two submedian vittae extend from near the front margin (just inside each dorsocentral row) to about level with the anterior dorsocentral bristles; another dark vitta extends down the median portion (the specimen is damaged in the middle of the thorax); a large black presutural spot is present on each side, and a black postsutural vitta extends back to the posterior supraalar bristles; also a small spot is present on each side in the area of the anterior supraalars. The scutellum is predominantly black on

the disc with a broad yellow margin. The pleura are almost entirely yellow except for a large black spot on each sternopleuron, on the upper margin of each mesopleuron and pteropleuron, and except for a small mark near the middle of each pteropleuron. The hypopleura are entirely yellow; the metanotum is black, narrowly yellow on the sides, and with a small yellow spot in the middle; the swollen portion directly beneath the scutellum is entirely yellow. The legs are yellow except for slight tinges of brown on the apices of the middle and hind femora and tibiae. The wings are very similar in markings and venation to those of *silvestris,* except that cell R_2 is more brownish infuscated in the median portion. The abdomen is predominantly shining black with a large yellow spot present on the sides of each tergum. The ovipositor is very similar to that of *silvestris.*

Length: body, 5.7 mm.; wings, 7.0 mm.

One male specimen at hand from Pauahi, Hawaii, August, 1952, collected sweeping around the base of a treefern (D. E. Hardy), agrees with the type in most respects except that the head is shorter, broader, and the mouthparts are protuberant. From a dorsal view the male head is very short and broad, and the eyes are conspicuously protuberant. The front is three or more times wider than long and is four times wider than one eye (fig. 227c). The two basal antennal segments are yellow, tinged lightly with brown below; the third segment is brown, tinged with yellow around the apex. The second antennal segment has a clump of about six moderately strong black hairs on the dorsal surface. The arista has about fourteen long dorsal rays and five to six ventral rays in addition to the apical fork, and the anterior surface is densely pilose. The antennae are widely separated by a moderately strong carina at the upper median portion of the face; the distance between the bases of the antennae is about equal to the width of the second antennal segment. The face is rather broad; measured between the epistomal sutures it is about 2.5 times wider than long (measured down the midline). The mouthparts are entirely yellow and are rather strongly protruded. The palpi are moderately slender; their length is about equal to the height of the head; they bear four or five stout black bristles at the apices (fig. 227b). The thorax is marked as in the type. A median dark brown to black vitta is present from the scutellum to about the middle of the thorax (fig. 227c). The wing markings and venation are as in the type and as in figure 227a. The first abdominal segment is entirely yellow. The other terga have a broad dark brown to black mark in the middle of each segment and a dark brown line across the posterior border. The extreme lateral margins of each segment are also dark brown to black. The genitalia are largely yellow, tinged lightly with brown. The aedeagus is very conspicuous and extends as far as the base of the abdomen, as seen *in situ.* The aedeagus has a distinct bump on the dorsal surface just before the fleshy apex. The anal lobes are well developed and densely bristled. The ninth tergum has the lateral margins extended ventrally and developed into two short lobes at apex. The apical portion is strongly bristled; the claspers are short, broad, and flattened, rather inconspicuous, hidden

by the lobes of the tergum, and possessing a row of short, thick teeth arranged in a crescent down the median portion of the clasper (fig. 227e). A pair of short, but rather broad, parameres project from the under portion of the aedeagus, and a pair of short lobes are situated on the dorsal portion of the ninth sternum (fig. 227e).

Length: body, 6.0 mm.; wings, 6.5 mm.

Idiomyia nigrifacies new species (fig. 228a–e).

This species is readily distinguished from other *Idiomyia* by the poorly developed reclinate bristles on the front; by the very long, slender, densely bristled palpi; the black face; and by the characteristics of the genitalia and other details brought out in the description below.

MALE. *Head:* Slightly longer than high as seen in lateral view; the front portion of the head, immediately behind the antennae, is rather markedly produced and pointed; the produced portion, beyond the eye margin to the bases of the antennae, is approximately equal to the length of the second antennal segment. The eyes are comparatively small, almost round, with the hind margin distinctly oblique. The occiput is rather swollen; at its broadest point it is about three-fourths as wide as one eye (fig. 228c). The antennae are black; the first two segments are tinged with yellow to rufous on the upper portions; the second segment is rather sparsely bristled above. The aristae are curved outwardly, and each possesses 14 to 16 long, closely placed dorsal rays and four ventral rays in addition to the apical fork; the anterior surface is very densely pilose. The antennae are separated at their bases by a moderately strong keel. The face is velvety black, faintly rufous in the ground color of the furrows. The front is about as long as wide and is predominantly yellow-gold. The upper orbits are faintly discolored with brown and are rather thickly yellowish pollinose. The ocellar triangle and upper median portion of the occiput are black covered with yellow-gray pollen. The remainder of the occiput, the genae, the palpi, clypeus, and mouthparts are yellow. The upper reclinate bristle is weak, rather hair-like, and much smaller than the proclinate bristle. The lower reclinate bristle is weak and not much stronger than the small setae on the orbits and on the front. The oral vibrissae are represented by two strong bristles and about a dozen short black setae. Two strong bristles are present on the postgena. The palpi are long and slender, about equal in length to the lower margin of the head, and thickly bristled at the apices (fig. 228c). *Thorax:* Mesonotum yellow, except for a narrow black vitta on each side extending from the hind margin just outside the dorsocentral row and ending just before the suture; a small brown to black spot is also present immediately in line with this vitta and located just beyond the suture; a short brown to black vitta extends down the area just inside the dorsocentral rows, from about the suture to the anterior dorsocentral bristles; also, a faint streak of brown is present on each side just above the anterior supraalar bristles. The humeri are entirely yellow, and two strong humeral bristles are present. The scutellum is black on the disc and yellow around the margin. The

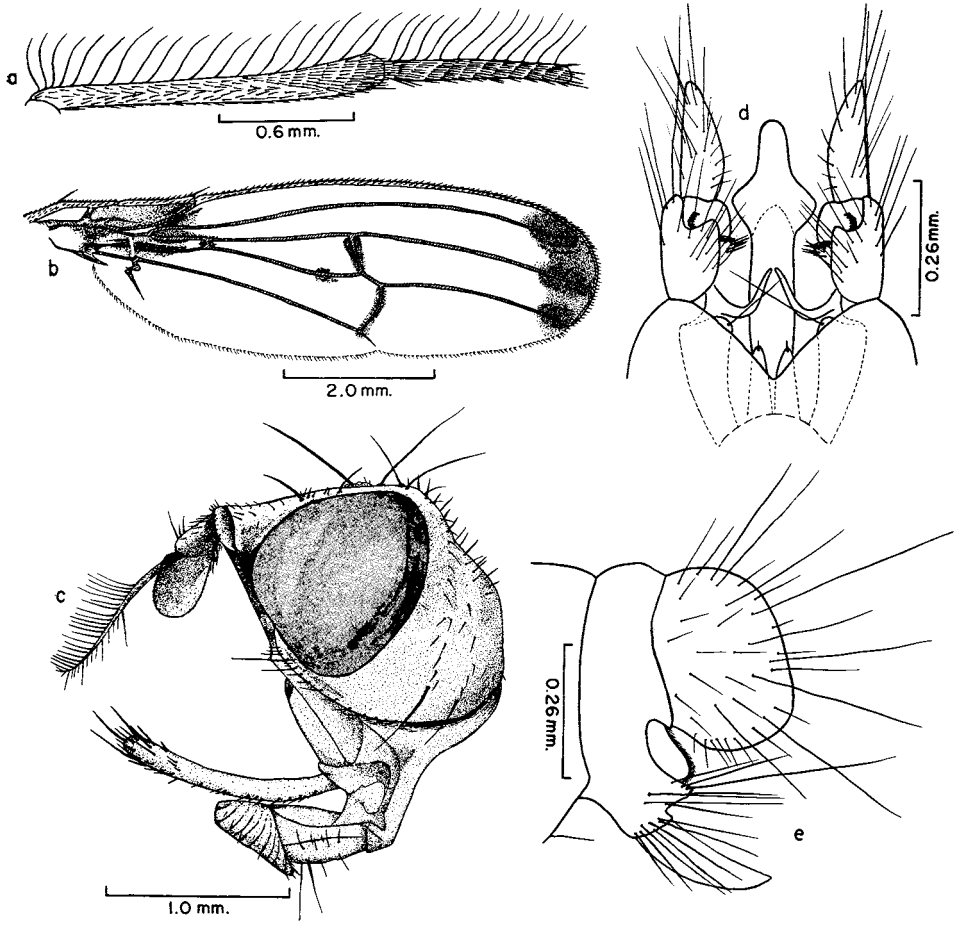


Figure 228—*Idiomyia nigrifacies* n. sp.: **a,** front tibia and basitarsus; **b,** wing; **c,** head, lateral; **d,** male genitalia, ventral; **e,** male genitalia, lateral.

metanotum is brown to black in the upper median portion and is otherwise yellow. The propleura are yellow; the sternopleura and mesopleura are shining black; a black spot is present in the upper portion of each sternopleuron and a slight brownish discoloration is present in the median portions of the hypopleuron and the metapleuron. Two strong sternopleural bristles are situated near the upper margin. *Legs:* Predominantly yellow. The mid and hind coxae and the bases of the mid and hind femora are tinged with brown; the apices of the hind tibiae are also brownish. The front femora are rather slender and slightly curved on the ventral surfaces; each has three small posterodorsal bristles at about the middle and four to five fine posteroventral bristles at apical third. The front tibiae are slightly flattened dorsoventrally; each has a bare area down the dorsal surface and a row of fine curved posterodorsal hairs, a row of fine

anterodorsal hairs, and, also, a rather dense clump of curved hairs at the base of the segment. The long anterodorsal and posterodorsal hairs also extend over the basitarsi (fig. 228a). *Wings:* Largely hyaline; brown in the basal portions, on the crossveins, and at apices of veins R_{2+3}, R_{4+5}, and M_{1+2}; also a small brown spot is present on vein M_{1+2} slightly before the extra crossvein in cell R_5. The costal fringe extends about one-third the distance from the apex of vein R_{2+3} to vein R_{4+5}. The r–m crossvein is situated at the basal third of cell 1st M_2 and the extra crossvein in cell R_5 is situated well before the m crossvein; the penultimate section of vein M_{1+2} is about half as long as the extra crossvein. The m crossvein is slightly convex (fig. 228b). *Abdomen:* Shining black in ground color, rather densely gray-brown pollinose. The apices of terga two to five are very narrowly yellow. The abdomen is broadest at the junction of segments two and three and is rather abruptly narrowed to the apex. Segment six is exposed, nearly equal in length to segment five, but only about half as wide as segment three. *In situ* the genitalia are rufous, rather small, and inconspicuous; only the large densely bristled anal plates are conspicuous. The ninth tergum is narrow and is expanded on the ventral margins into an indistinctly bilobed, rather heavily sclerotized, densely bristled process (fig. 228e). The claspers are inconspicuous and hidden behind the lateral lobes of the tergum; each possesses the usual crescent-shaped row of stout black spines which are longer on the ventral portion. The aedeagus is rather short, extending approximately as far as the bristles of the ninth tergum. The parameres and the lobes of the ninth sternum are slender (fig. 228d).

Length: body, 6.75 mm.; wings, 8.00 mm.

Holotype male: Upper Olaa Forest, Hawaii, July, 1953, collected in banana trap (D. E. Hardy).

Type in the B. P. Bishop Museum.

Idiomyia oahuensis Grimshaw (fig. 229a–e).

Idiomyia oahuensis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :52.

Endemic. Oahu (type locality: Kawailoa Gulch). Found in both the Koolau and Waianae mountains.

Type (female) in the British Museum (Natural History). I have studied the type.

This species shows rather close relationship to *I. perkinsi* Grimshaw but is differentiated by the all-yellow face and palpi, by the lack of a dense clump of fine hairs at the base of the front tibia, and by the presence of a broad yellow streak down the middle of the mesonotum.

The head is predominantly yellow; the orbits are brown to black to the proclinate bristle, also the ocellar triangle and the upper median portion of the occiput are dark brown; in some specimens a brown line extends from the vertex to the ocellar triangle on each side, but in others no dark vitta is present across the vertex. The first two antennal segments are rufous, tinged with brown; the second segment has a dense clump of black hairs on the dorsal surface. The

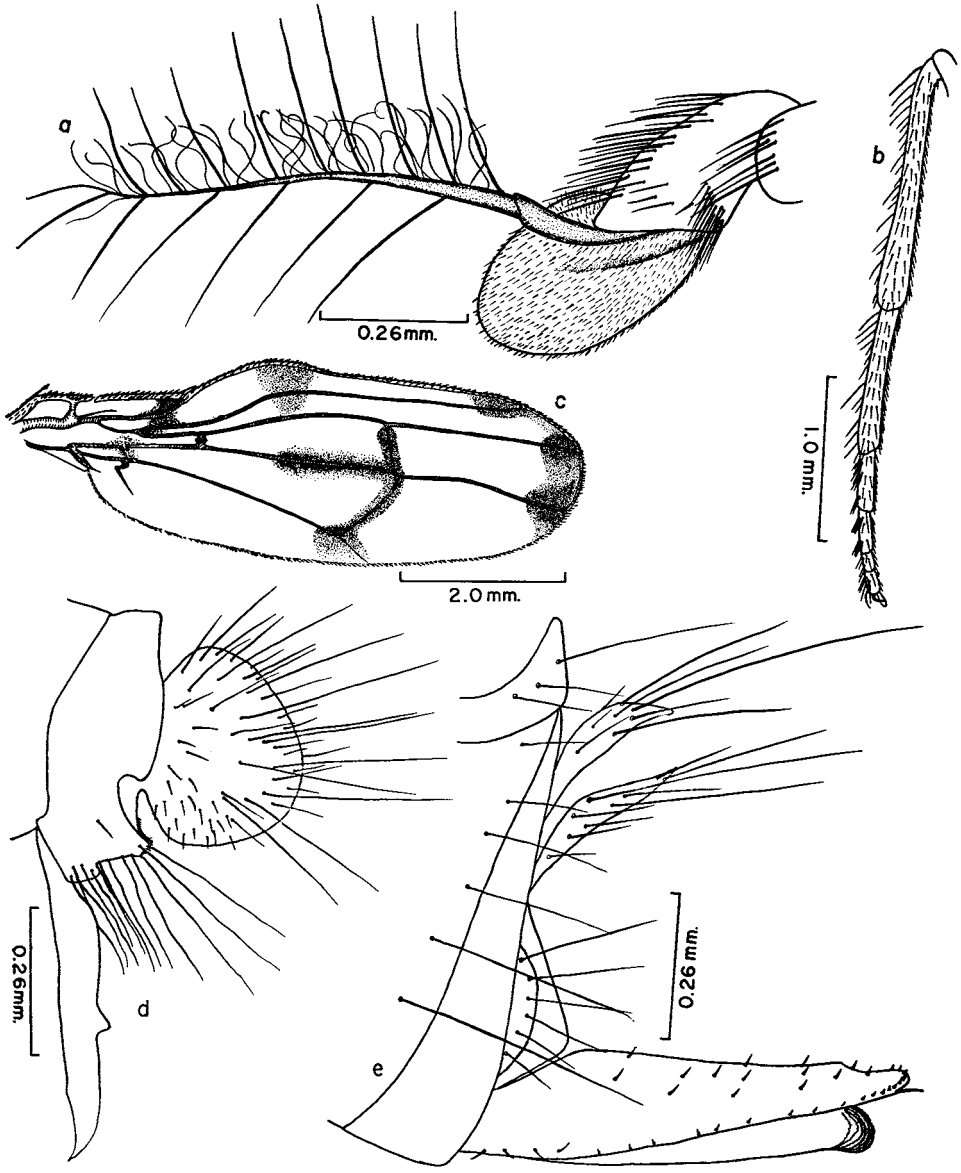


Figure 229—*Idiomyia oahuensis* Grimshaw: **a**, antenna; **b**, front tibia and tarsus; **c**, wing; **d**, male genitalia; **e**, female genitalia.

third segment is dark brown, tinged lightly with rufous around the upper margin. The arista has 9 to 12 long dorsal rays and 4 to 5 ventral rays in addition to the apical fork, and the anterior surface is very densely pilose (fig. 229a). The palpi are comparatively short and broad, distinctly thickened at about the median portion, and with one strong bristle at the apex. The thorax is predomi-

nantly yellow in ground color. The mesonotum has a pair of submedian vittae extending down the area of the dorsocentral rows. These are narrow on the front portion of the mesonotum and are expanded behind; just before the suture the vittae are confluent with the large brown to black presutural spots. The area surrounding the anterior supraalar bristles is also black, and the lower half of each humerus is dark brown to black. The front halves of the meso- and sternopleura are brown to black, a dark brown to black spot is present in the upper portion of each pteropleuron, and a faint streak of brown extends vertically on each hypopleuron. The median portion and the underside of the scutellum are yellow, and the sides are dark brown to black. The metanotum is brown on the sides, rufous in the median portion. The legs are yellow with faint discolorations of brown on the apices of the middle and hind femora and tibiae. The front femur has a small clump of fine hairs at the apex; it has four posterodorsal and only one strong posteroventral bristle. The front tibia has just a few curved hairs at its base and no erect setae down the dorsal surface (fig. 229b). The front tarsus has a row of short curved dorsal setae extending over the first two segments. The wings are very similar to those of *perkinsi*, with the male being characterized by the strongly convex costal margin. The wings of the specimens at hand differ slightly in the markings from the type of *perkinsi* as shown in figures 229c and 231b, but these may be of no particular significance. *I. oahuensis* has a brown mark in cell R_1 just below the arch of the costa, and the brown streak along the penultimate section of vein M_{1+2} extends about two-thirds the distance to the r–m crossvein (fig. 229c). The abdomen is predominantly yellow on the first tergum and is otherwise shining brown to black, lightly gray dusted. The genitalia of the male are rather similar to those of other *Idiomyia* except that the aedeagus is comparatively short, the extended portion is approximately equal in length to the height of the ninth tergum, and the ninth tergum is distinctly bilobed at each lateral margin. The parameres are just slightly protruded beyond the ninth sternum and are obtuse at apices (fig. 229d). The ovipositor is as in figure 229e.

Length: body, 6.00–6.70 mm.; wings, 6.50–7.35 mm.

Idiomyia obscuripes Grimshaw (fig. 230a–e).

Idiomyia obscuripes Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :52.

Endemic. Maui (type locality: "Haleakala, 5,000 ft.").

Type in the British Museum (Natural History). I have studied the type and have designated a series of homeotypes from Paliku, Haleakala Crater, 6,500 feet. The species is known only from Haleakala; it is common in the Paliku area and is attracted to fermenting bananas. This species was previously known only from the females.

I. obscuripes is apparently most closely related to *perkinsi* Grimshaw but is differentiated by the anterior margin of the male wing not being undulated and by the predominantly dark brown to black femora. I question whether or not

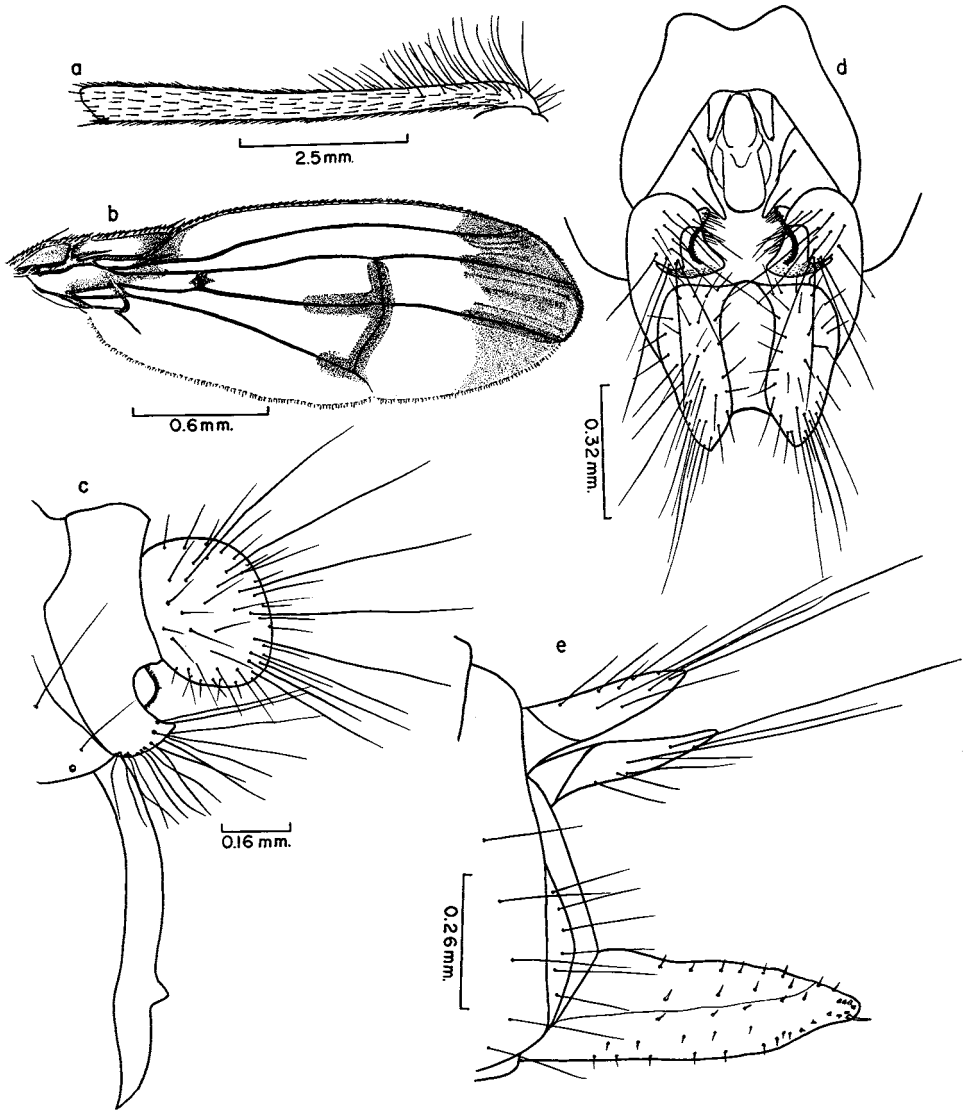


Figure 230—*Idiomyia obscuripes* Grimshaw: **a,** front tibia; **b,** wing; **c,** male genitalia, lateral; **d,** male genitalia, ventral; **e,** female genitalia.

the coloration of the mesonotum and scutellum can be relied upon; there seems to be considerable variation in this regard, probably due to tenerality.

Predominantly dark-colored species. The upper front, the orbits to just below the proclinate bristles, the vertex, and the ocellar triangle are black; the remainder of the front is yellow. The upper reclinate bristles and the proclinates are rather close together; the distance between them is slightly more than the

distance between any ocelli. The lower reclinate bristles are small but distinct and are situated just above the proclinates. Typically the entire face, palpi, and the lower portion of each gena are entirely black; often the median portion of the face is tinged with rufous. The proboscis is dark reddish brown to black. Each palpus is swollen medianly and has one apical bristle. The median portion of the face is developed into a moderately strong carina which separates the bases of the antennae. The antennae are black; the second segment has one moderately strong bristle plus numerous short hairs. The arista has 10 to 12 dorsal rays and 3 or 4 ventral rays in addition to the apical fork; the anterior margin of the arista is pilose. The thorax is predominantly brown in ground color and rufous on the sides of the mesonotum and over the hind portions of the pleura. The mesonotum is rather thickly yellow-gray pollinose and has a pair of indistinct, submedian yellow pollinose vittae and also a small yellow pollinose spot at the inner edge of each suture; in some specimens the median portion of the mesonotum is yellow in ground color. The humeri are predominantly brown, yellow to rufous just around the top margin. The propleura, mesopleura, and sternopleura are almost entirely shining black. The scutellum is black on the sides and reddish brown to yellow down the median portion. The femora are typically brown to black on the anterior surfaces and reddish brown on the posterior surfaces. Each front tibia has a dense clump of dorsal cilia near the base (fig. 230a). The wings are as in figure 230b. The r–m crossvein is situated near the basal fourth of cell 1st M_2 and the extra crossvein in R_5 is situated almost opposite the m crossvein. The abdomen is entirely black, lightly dusted with gray pollen. The genitalia are chiefly brown, tinged with yellow. The aedeagus is very conspicuous and in *in situ* specimens extends to about the middle of the fourth abdominal segment; the aedeagus has a distinct bump on the upper portion just before the fleshy apex (fig. 230c). The anal lobes are large and very densely bristled; the ninth tergum is extended on the lateral margins into a strongly bristled, more heavily sclerotized, and darker colored lobe which extends over the claspers, obscuring them from lateral view. From side view, the lateral margins of the tergum appear truncate, but in ventral view the lower apical margin is produced into a slight incurved lobe. The claspers are rather small and inconspicuous, and each has a row of short black teeth extending down the median portion (fig. 230d). The parameres are well developed and are acute at apices. The female genitalia are predominantly dark brown; the ovipositor plates are conspicuous, blunt at apices, and about three times longer than the anal plates (fig. 230e).

Length: body, 7.0–7.5 mm.; wings, 7.9–8.2 mm.

Idiomyia perkinsi Grimshaw (fig. 231a–d).

Idiomyia perkinsi Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :51.

Endemic; previously known only from the type male labeled "Molokai Mts., above 4,000 ft., June 1893"; recorded here from Waikamoi, Maui, in banana bait trap, 4,000 feet, August, 1958 (D. E. Hardy).

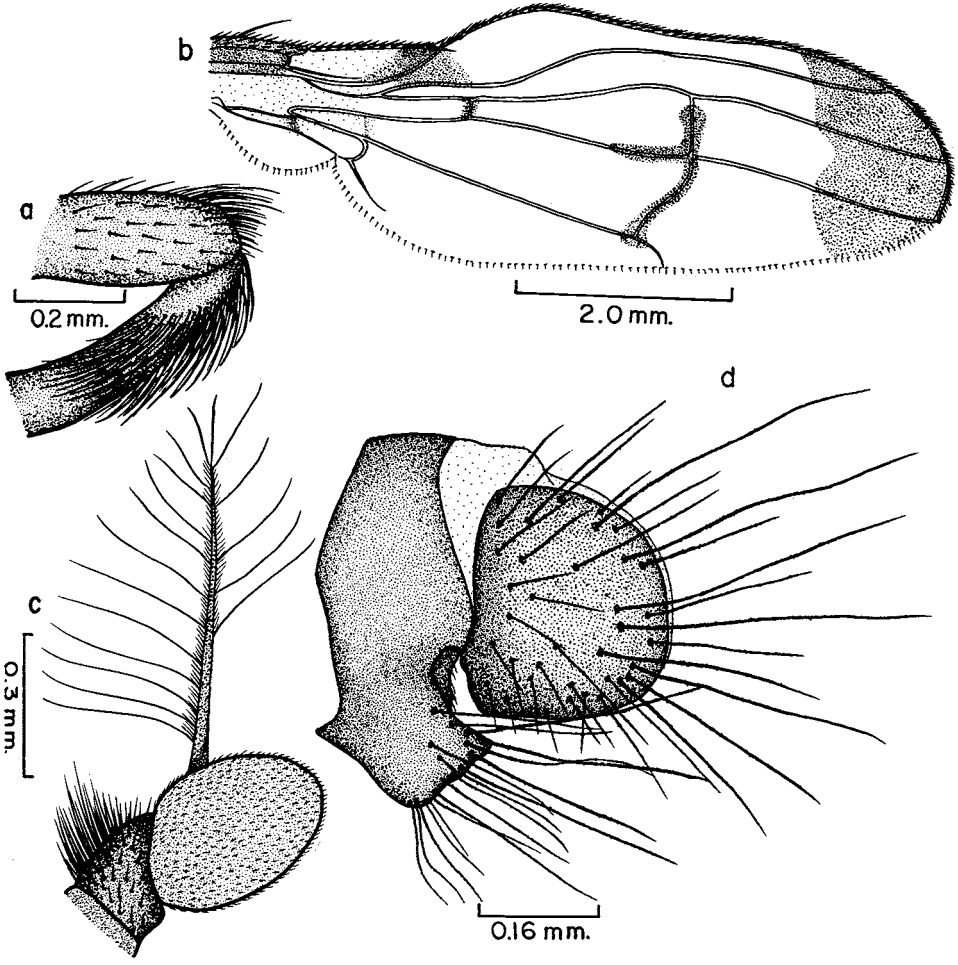


Figure 231—*Idiomyia perkinsi* Grimshaw: **a,** base of front tibia; **b,** wing, drawn from type; **c,** antenna, drawn from type; **d,** male genitalia.

Type in the British Museum (Natural History).

The following notes are based upon an examination of the type and supplemented by details based upon the Maui specimens. The type is in good condition except that the thorax is somewhat greased. This is a very distinctive species easily recognized by the peculiar wings of the male (fig. 231b) in combination with the all-black face, antennae, and palpi, by the coloration of the mesonotum, and by the legs. It appears most closely related to *I. obscuripes* Grimshaw but is differentiated by the characters given above.

The front is predominantly rufous in the median portion and reddish brown

on the lower one-third; the upper orbits, vertex, and ocellar triangle are black. A rather distinct groove extends down each side of the front just inside the orbits. The lower reclinate bristles are very tiny, hair-like, scarcely differentiated from the small orbital hairs. The upper reclinates are rather small, distinctly shorter, and thinner than the proclinates. The lower reclinates are situated distinctly above the proclinates, about half the distance between the proclinates and the upper reclinates. The eyes are just slightly higher than long. The occiput is rather strongly swollen, convex as seen in lateral view. The width of each gena is approximately equal to one-fifth the eye height. No strong bristles are present in the vibrissal rows. The face is entirely black and has a distinct, rather sharp keel extending down the upper median portion between the antennae. The arista has about a dozen long dorsal rays and about four long ventral rays in addition to the apical fork (fig. 231c); the anterior margin is densely pilose. The second antennal segment has a dense clump of short bristles on the dorsal surface. The mouthparts are polished black except for the labella. The palpi are dark brown to black, somewhat clavate in shape, each with a moderately strong apical bristle. The thorax is subopaque black on the dorsum and rufous on the sides of the mesonotum, on the pleurotergite, each meta- and hypopleuron, the lower portion of each pteropleuron, and the hind third to one-half of each sternopleuron; the pro-, meso-, and sternopleura are otherwise black. The scutellum and metanotum are black on the sides with a rufous stripe down the middle. The halteres are yellow. About six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated opposite the second pair of supraalars. One strong humeral bristle is present. The anterior sternopleural bristle is three-fourths as long as the posterior bristle. The legs are chiefly yellow; the bases and apices of the femora and the hind tibiae are obscurely tinged with brown. The tarsi are predominantly yellow. The front femur is slender and has about five rather short posterodorsal bristles and two small posteroventrals, the latter situated just before the apex of the segment. The front tibiae and tarsi are rather long and slender; the basitarsus has about three short, inconspicuous dorsal hairs and is about two-thirds as long as the tibia, and the entire tarsus is about one-third longer than the tibia. The front tibia has a very dense clump of black dorsal hairs at its base and the preapical dorsal bristle is tiny (fig. 231a). The wings are as in figure 231b; the costal margin in strongly undulated. The r–m crossvein is situated near the basal third of cell 1st M_2 and the extra crossvein in cell R_5 is in line with (or nearly so) with the m crossvein. The abdomen is shining black, yellow to rufous on the lateral margins of the segments. The anal plates are nearly semicircular; the ventral portion is thickly covered with short hairs. The ninth tergum is slightly narrowed dorsally and lobate ventrally. The lobes are densely haired at the apices, are truncate, slightly curved upward at the upper apical margin (fig. 231d). The claspers are hidden from lateral view.

FEMALE. Unknown.

According to Grimshaw, the body measures 7.0 mm. and the wings 8.0 mm.

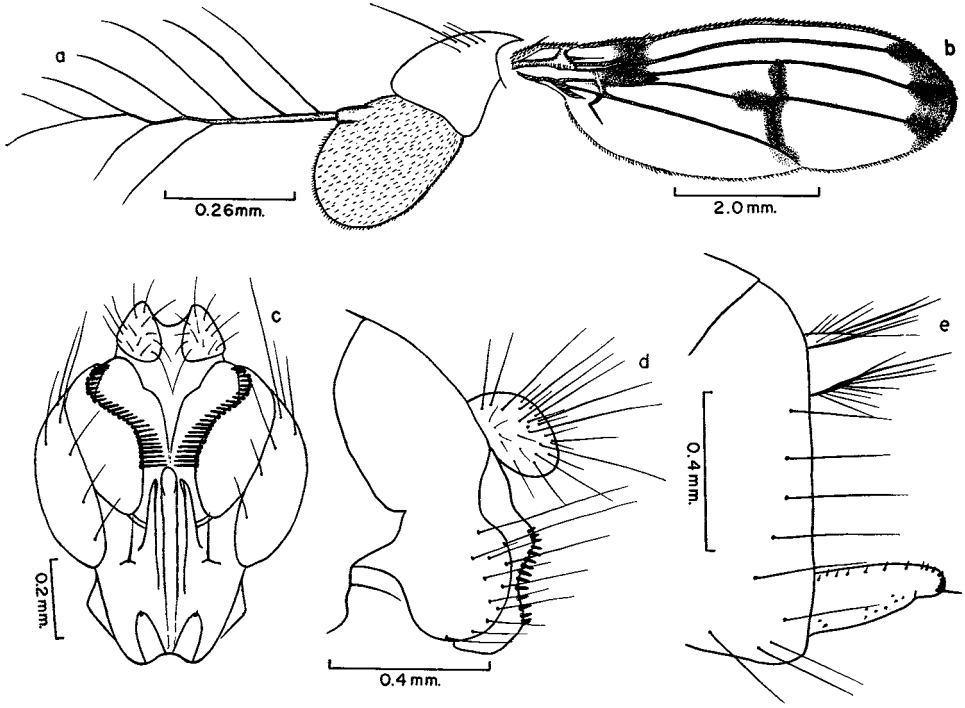


Figure 232—*Idiomyia picta* Grimshaw: **a,** antenna; **b,** wing; **c,** male genitalia, ventral; **d,** male genitalia, lateral; **e,** female genitalia.

Idiomyia picta Grimshaw (fig. 232a–e).

Idiomyia picta Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :53.

Endemic. Maui (type locality: Haleakala "above 5,000 ft.") and Molokai. Previously specimens have been seen only from Haleakala Crater and from Olinda, Maui. One male specimen is on hand labeled "Molokai 4,500 ft. III. 02." The species has been attracted to fermenting bananas at Paliku in Haleakala Crater.

Type in the British Museum. I have examined the type.

This species is readily differentiated from all other Hawaiian *Idiomyia* by the characteristics of the arista (fig. 232a) and by the very distinctive male genitalia (fig. 232c). The arista has about five dorsal rays and two ventral rays in addition to the apical fork, and the anterior surface lacks the fine pile which is characteristic of most species. The anal lobes are smaller than in other *Idiomyia,* and the ninth tergum is comparatively broad and not lobate on its anterior margins. The claspers are very large and exposed, and each has a row of strong black teeth along the margin (fig. 232d). Also the aedeagus is much shorter and is inconspicuous.

The upper orbits, the upper portion of the occiput, the vertex, and the ocellar triangle are black in ground color, rather densely gray pollinose; the

remainder of the front is golden yellow. The lower occiput, face, and genae are yellow. The first two antennal segments are brown, tinged lightly with rufous; the second segment is sparsely haired on the dorsal surface. The third segment is brown to black. The arista is as in figure 232a. The clypeus, proboscis, and palpi are dark brown; the latter each have a strong bristle at the apex, and each is swollen in the median portion. The thorax is predominantly brown in ground color; the mesonotum is yellow pollinose on the sides, along the suture, and in front of the humerus. Also, a narrow yellow vitta extends down each side in line with the dorsocentral bristles to just slightly beyond the suture, and a rather broad median vitta extends from the front margin about two-thirds the length of the mesonotum. The humeri are yellow in ground color with a faint tinge of brown on the lower portion. The pleura are predominantly brown, covered with yellow-gray pollen. The scutellum is dark brown to black on the disc, yellow on the margin. The metanotum is black. The coxae and trochanters are mainly brown to black and the remainder of the legs mainly yellow. The front tibiae and tarsi have no ornamentation. Each front femur has four postero-dorsal bristles (counting the one just before the base) and three posteroventral bristles; the latter are situated on about the apical third of the segment. The wings are as in figure 232b. The r–m crossvein is situated near the basal fourth of cell 1st M_2 and the extra crossvein in cell R_5 is situated just beyond the m crossvein. The abdomen is typically black, covered with brown pollen. The male genitalia are as described above and as shown in figure 232c–d. The aedeagus is very short and blunt at apex, scarcely extending beyond the tips of the parameres. The female ovipositor is rather short, broad, and blunt (fig. 232e). The spermathecae are short and rounded below; the portion connecting with the duct is concave, cup-like.

Length: body, 4.5–6.0 mm.; wings, 5.3–6.4 mm.

Idiomyia silvestris Perkins (fig. 233a–c).

Idiomyia silvestris Perkins, 1910, Fauna Hawaiiensis 3 (6) :700.

Hawaii (type locality: "Hawaii"). Two homeotypic females are on hand from Upper Olaa Forest, Hawaii, 4,000 feet, one collected by sweeping ground vegetation in fern jungle, July, 1956, and one collected in banana bait trap, July, 1953 (D. E. Hardy).

Type female in the B. P. Bishop Museum.

A large conspicuously marked species appearing most closely related to *I. oahuensis* Grimshaw but differentiated by having the scutellum dark brown to black and lacking a yellow vitta down the middle, by having the humeri entirely yellow, and the extra crossvein in cell R_5 situated well before the m crossvein as in figure 233b. This species is known only from the females; male specimens have not been recorded. The head is rather distinctly pointed on the antero-median margin as seen in direct lateral view. The front is entirely golden yellow except for a line of opaque brown to black extending down each eye orbit to a level with the upper reclinate bristles. The ocellar triangle, the vertex, and the

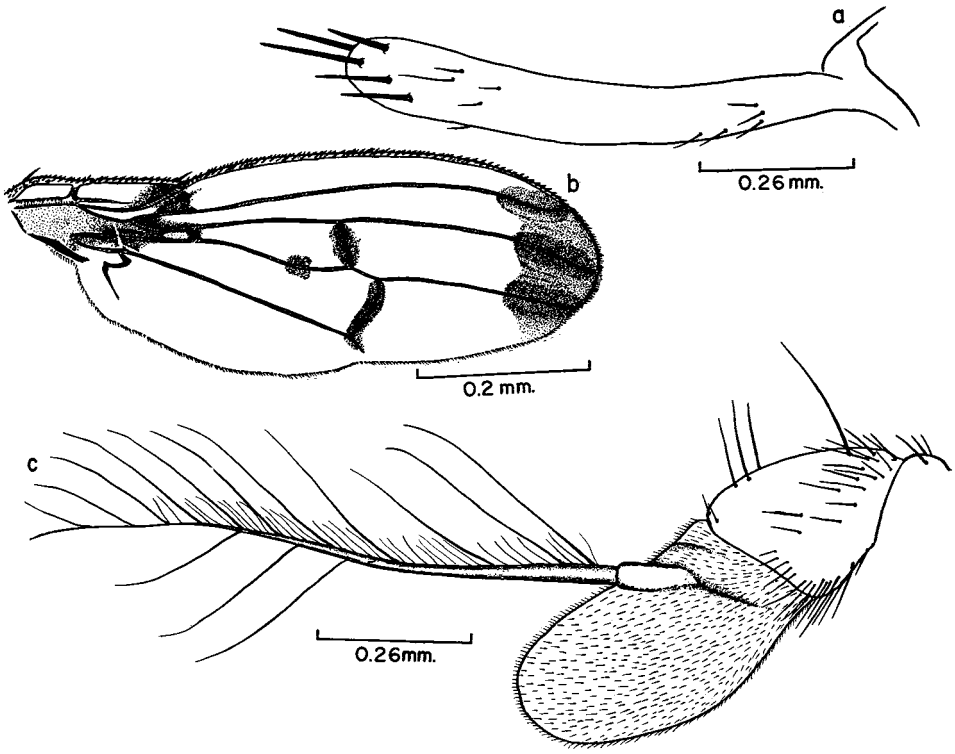


Figure 233—*Idiomyia silvestris* Perkins: **a**, palpus, outside surface; **b**, wing; **c**, antenna.

upper lateral margins and median portions of the occiput are black, covered with gray pollen. The remainder of the occiput is yellow; the genae, face (except for a small brown spot on each side at the eye margin), and palpi are yellow. The median portion of the face is very slightly convex. The palpi are slender; each has several stout black setae at or near the apex (fig. 233a). The antennae are dark brown to black. The arista has 9 or 10 dorsal rays and 3 or 4 ventral rays in addition to the small apical fork. The inner surface of the arista is rather densely haired (fig. 233c). The mesonotum is yellow except for a black longitudinal vitta about equal in width to two rows of acrostichal setae and situated just inside the dorsocentral rows and extending from a level about opposite the presuturals posteriorly to a level just posterior to the anterior dorsocentral bristles. This vitta is very narrowly separated from, or blends into, a slightly broader black vitta just outside the dorsocentral row and which extends from just behind the suture to the posterolateral margins of the mesonotum. A brown to black spot is present between and above the supraalar bristles, and a short streak of brown to black is present about opposite the presutural bristles in line with the outer vittae of the mesonotum. The humeri are yellow. The scutellum is black except for a yellow mark on each posterior corner. The propleura

are yellow. The mesopleura, sternopleura, and upper median portion of the pteropleura are black. The remainder of the pteropleura, the metapleura, and the hypopleura are yellow, tinged with brown. The upper three-fourths of the metapleura are pale yellow; the extreme hind margins of the sternopleura are yellow. The metanotum is dark brown to black, tinged with rufous in the ground color. The halteres are pale yellow. About eight irregular rows of acrostichal setae are present. The anterior dorsocentrals are situated about halfway between the first and second supraalars. Both humeral bristles are well developed. The anterior sternopleural bristle is three-fourths as long as the posterior bristle. Wings predominantly hyaline to subhyaline with dark brown markings at the apices of veins R_{2+3}, R_{4+5}, and M_{1+2}; brown markings over all the crossveins; a small brown spot on vein M_{1+2} just before the extra crossvein in cell R_5; and a streak of brown extending transversely across the basal portion of the wing at a level with the apical two-fifths of the subcostal cell. The wing venation is as in figure 233b. The abdomen is shining black, sparsely covered with gray-brown pollen. The anal plates and the ovipositor plates are yellow; the latter are rather slender, extend well beyond the apices of the anal plates, and are blunt at apices.

Length: body, 6.50–6.65 mm.; wings, 7.70–8.00 mm.

MALE. Unknown.

Idiomyia stenoptera new species (fig. 234a–d).

This species is closely related to *I. hemipeza* n. sp. but is differentiated by the striking differences in wing venation (fig. 234b), by the differences in development of the front legs of the male, and by the male genital characters (figs. 226d and 234d).

MALE. *Head:* Slightly higher than long, the front not produced above the antennae. Predominantly yellow except for the reddish brown eyes, a brown streak along the upper orbits, and a black marking over the ocellar triangle and the upper median portion of the occiput. The antennae are rather closely joined; no distinct carina separates the bases. The antennae are yellow to rufous, lightly tinged with brown. The second antennal segment has numerous short, black setae and one strong dorsal bristle. The arista has about six long dorsal rays and two ventral rays in addition to the apical fork, and the anterior surface has a few scattered, short hairs (fig. 234a). The vibrissae are rather poorly developed and only one strong bristle is present on the front margin; two strong bristles are present on the postgenae. The clypeus is entirely yellow except for a brown discoloration at the extreme lateral margins. The palpi and proboscis are rufous; the former are swollen in the median portions, and each has one strong bristle at apex. The lower reclinate bristle on the front is about one-half as long as the upper reclinate and is situated well above the proclinate bristle. *Thorax:* Sides and median portion of mesonotum yellow, with two submedian black vittae extending the entire length of the mesonotum; these are expanded posteriorly to cover all of the hind portion of the mesonotum except for a narrow red streak

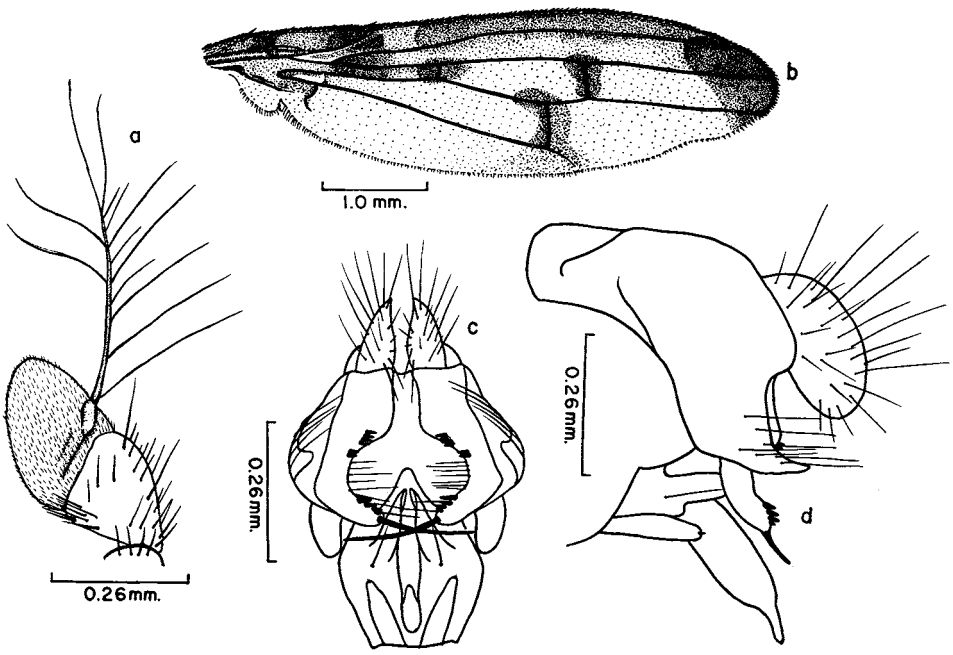


Figure 234—*Idiomyia stenoptera* n. sp.: **a**, antenna; **b**, wing; **c**, male genitalia, ventral; **d**, male genitalia, lateral.

down the middle. A black streak also extends up each side just outside the dorsocentral row to just before the suture; another large brown to black spot is present just beyond the suture. The area just below the anterior supraalar bristles is also brown to black. The scutellum is entirely yellow; the metanotum is black on the sides and rufous in the median portion. The halteres are pale yellow. The pleura are predominantly yellow. Each sternopleuron is largely brown to black, and a brown to black streak extends longitudinally across the lower portion of each humerus and the upper portion of each mesopleuron; a brown spot is present in the upper portion of the pteropleuron and in the middle portion of the metapleuron; the middle portion of the hypopleuron is also discolored with brown. *Legs:* Yellow. Front tibiae short and rather thick, only about one-third longer than the basitarsi; front tibiae and tarsi lacking long ciliation on the dorsal surfaces. Front femur with four posterodorsal bristles arranged on the median portion and about three posteroventral bristles at the apical third. *Wings:* As in figure 234b. The anterior margin is predominantly brown fumose. The costal fringe of short, stout setae extends to the apex of vein R_{4+5}. The r-m crossvein is situated at the middle of cell 1st M_2; the extra crossvein in cell R_5 is situated well beyond the m crossvein, this distance being equal to the length of the crossvein in R_5. *Abdomen:* The first segment is yellow; the remainder of the abdomen is dark brown to black, except for a broad yellow streak extend-

ing down each side. The anal lobes are very small compared to those of other *Idiomyia*, and the ninth tergum is comparatively broad; it has a rather deep V-shaped concavity in the middle of the posterior margin and a U-shaped concavity in the middle of the anterior margin. The anteroventral margins of the sternum are rather sharp-pointed, and each ventral margin is developed into an upward curved pointed lobe at the apex; this has about six moderately strong bristles (fig. 234d). The claspers are very peculiarly modified; each is produced into a conspicuous ventral lobe which bears a very strong black spine at its apex and four stout black spines on the upper margin. The basal portion of the clasper possesses a row of six, stout, black spines (fig. 234c). The aedeagus is rather small and broad, sharply attenuated at its apex, and extending but slightly beyond the spines of the claspers. The parameres are slender and extend about two-thirds the length of the aedeagus (fig. 234c).

Length: body, 4.35 mm.; wings, 5.00–5.30 mm.

FEMALE. Very similar to the male. The ovipositor is large and conspicuous; it is almost equal in length to the two preceding abdominal segments and is rather strongly curved upward.

Holotype male: Mount Kaala, Oahu, April, 1952 (D. E. Hardy). Allotype female: Kawailoa Trail, Oahu, November 11, 1934 (E. C. Zimmerman).

Type and allotype in the B. P. Bishop Museum collection.

Genus **NUDIDROSOPHILA new genus**

(From the Latin *nudus*, bare or naked, combined with *drosophila*. Gender feminine.)

Members of this genus are similar in most respects to *Drosophila* but differ by lacking reclinate, proclinate, or ocellar bristles on the front; by having microscopic pubescence or scales over the front; by having a series of inconspicuous laterally directed recumbent hairs on each side of the ocellar triangle (fig. 238c); and by having no preapical, dorsal bristles on the front tibiae. The group shows some resemblance to *Ateledrosophila* n. g. but differs by lacking proclinate and upper reclinate bristles; by having the arista normal in position; as well as in other respects.

The upper portion of the head has only the inner and outer vertical bristles and the postocellar bristles developed. Long hairs are present on the anterior surface of the arista; these are often nearly half as long as the dorsal and ventral rays. Two or three tiny, inconspicuous hairs are present on each side of the upper third of the front, in the position normally occupied by the upper reclinate bristles. A thick, rather flattened, spine-like development is present at the apex of each palpus (figs. 237a and 238a).

The females have not been definitely associated with the males, and the specimens at hand (which appear to belong with the males of at least two of the species) possess all of the characters of typical *Drosophila*. It may be that the female sex is not differentiable from *Drosophila*.

Four species are known to date.
Type of genus: *Nudidrosophila lepidobregma* n. sp.

KEY TO KNOWN SPECIES OF NUDIDROSOPHILA

1. Front basitarsus with a row of dorsal or anterodorsal cilia extending the full length of the segment (figs. 236a and 237b) 2
Front basitarsus with only two long dorsal cilia (fig. 238d). Each palpus with a flat, bluntly tipped, yellow process at the apex (fig. 238a). Front distinctly scaled. Hawaii ..... **lepidobregma** n. sp.

2 (1). Front tibia with one or two rows of dorsal cilia extending the full length of the segment. Front basitarsus with seven to ten anterodorsal cilia. Apical process on palpus black 3
Front tibia with only about two tiny inconspicuous dorsal hairs basad to the preapical dorsal bristle. Front basitarsus with four to five anterodorsal cilia (fig. 237b). Apical process on palpus yellow. Oahu ..... **gemmula** n. sp.

3(2). Front tibia with only one distinct row of pale, rather inconspicuous cilia which are scarcely as long as the width of the segment. Cilia of front basitarsus not over two times longer than the width of the segment (fig. 235a). Sternopleura yellow. Hawaii ..... **amita** n. sp.
Two rows of long black cilia present on the front tibia; these are three or more times longer than the width of the segment and with long conspicuous hairs at the base of the segment. Front basitarsus long ciliated; the apical hair extends almost to the apex of the tarsus (fig. 236a). Sternopleura dark brown. Maui ..... **eximia** n. sp.

Nudidrosophila amita new species (fig. 235a–c).

This species is differentiated from other known members of this genus by the arrangement of the ciliation on the front legs as shown in figure 235a.

MALE. *Head:* Almost quadrate as seen in direct lateral view; slightly expanded on the dorsoapical portion, where the sides of the lower portion of the front expand slightly above the eye margin. The front is very densely pubescent; the lateral margins appear to be covered with minute scales. The median portion of the front is not as distinctly concave as in *lepidobregma* n. sp. The lower

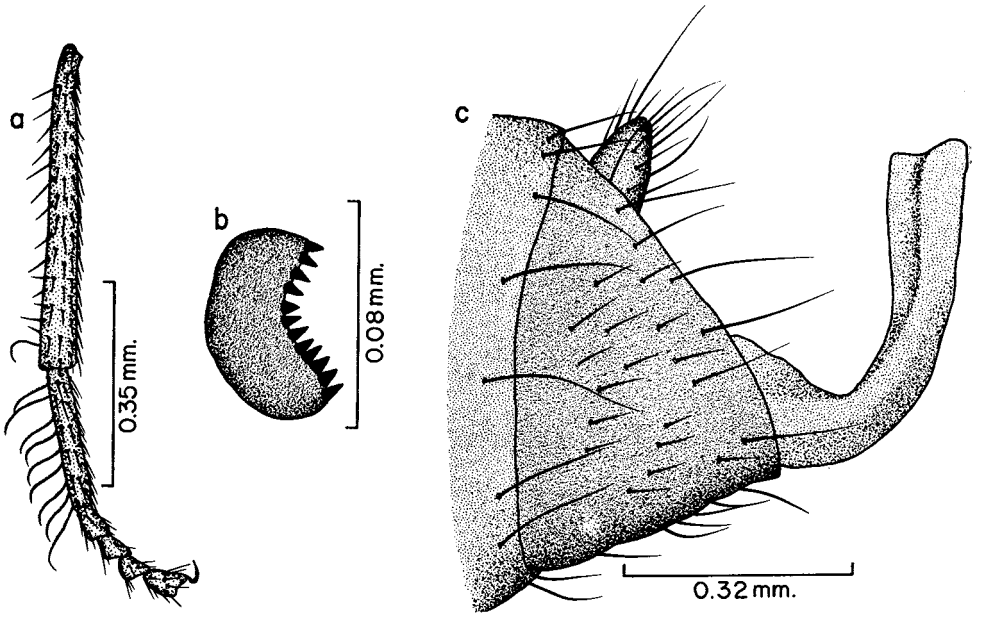


Figure 235—*Nudidrosophila amita* n. sp.: **a,** front tibia and tarsus; **b,** clasper of male; **c,** female genitalia.

third of the front is yellow; the upper portion is black, tinged with brown and covered with yellow-brown pollen along the orbits. The vertex and ocellar triangle are black; the occiput is predominantly brown, the lower third is yellow. In other details the head characters are much like those of *lepidobregma*; the apical projection of each palpus, however, is black and is not quite as broad or as blunt at the apex. The arista has five dorsal and two ventral rays in addition to the apical fork; the anterior surface has numerous elongate hairs extending approximately half the length of the dorsal and ventral rays. *Thorax:* Predominantly dark brown, yellow on the sternopleura, yellow-brown on the propleura, and brown, tinged with yellow across the remainder of the pleura. The halteres are pale yellow. The anterior dorsocentral bristles are situated just slightly behind the first pair of supraalars, and a prominent seta is present in each dorsocentral row just behind the suture. The other details of the thorax are similar to those of *lepidobregma. Legs:* Entirely yellow. The front femur has a dense clump of yellow pile just before the apex on the upper portion. The front tibiae are long and slender, equal or slightly longer than the femora. One row of pale, anterodorsal hairs extends the entire length of the tibia; the length of the hairs is about equal to the width of the segment. No preapical dorsal bristle is present on the front tibia. The front basitarsus is slightly more than half as long as the tibia and has a row of nine curved anterodorsal cilia extending the entire length of the segment (fig. 235a). *Wings:* Almost hyaline, lacking brown markings. The third costal section is 3.7 times longer than the fourth, and the costal fringe

ends slightly before the middle of the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.74 times longer than the penultimate section. *Abdomen:* Entirely dark brown on the dorsum, yellow on the venter. The male genitalia are very similar to those of *lepidobregma* as shown in figure 238e. The aedeagus has a distinct preapical hook on the dorsal surface. The claspers are as in figure 235b.

Length: body, 2.3 mm.; wings, 2.5 mm.

FEMALE. Closely resembling *lepidobregma* but the ovipositor blades are elongate and curved (fig. 235c).

Holotype male and allotype female: Kilauea, Hawaii, June 27, 1917 (O. H. Swezey). Seventeen paratypes (3 males, 14 females) from the following localities on the island of Hawaii: same as type, some specimens collected June, 1903 (no collector given); June 28, 1917 (O. H. Swezey); and August 4, 1946 (E. C. Zimmerman); Kau, Kona, 3,700 feet, August 24, 1917 (W. M. Giffard); S. Kona, August 16, 1919, on *Clermontia* (O. H. Swezey); and Glenwood, March 2, 1919 (O. H. Swezey).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Nudidrosophila eximia new species (fig. 236a–d).

This species appears to be related to *N. amita* n. sp., but the ornamentation of the front tarsi is very different as shown in figure 236a, and the sternopleura are dark brown rather than yellow.

MALE. *Head:* Rather broad, just slightly higher than long. The lower third to two-fifths of the front is yellow, tinged faintly with brown; the upper portion is subshining black except for a faint tinge of yellow along the eye orbits. The front, measured from the median ocellus to the front margin, is about two times longer than wide. The front is covered with fine microscopic pubescence. The vertex, ocellar triangle, and upper portion of the occiput are subshining black covered with gray-brown pollen. The median portion of the occiput is brown, the lower one-fourth to one-fifth is yellow. A series of laterally directed recumbent hairs extend from each side of the ocellar triangle. The genae are yellow, the face is yellow, tinged with brown. The face is almost entirely flat; the upper median portion is just slightly raised. The clypeus is brown; the palpi and mouthparts are yellow. Each palpus has a broad, flat, pale brown apical bristle approximately equal in size to the genal bristle. One strong bristle is present at the upper edge of each vibrissal row. The anterior reclinate, ocellar, and the proclinate bristles are lacking. The antennae are predominantly brown; the first two segments are yellow on the lower two-thirds. The arista has six dorsal and three ventral rays in addition to the apical fork (fig. 236b). *Thorax:* Entirely dark brown, lightly covered with gray-brown pollen. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the second pair of supraalars. Six to eight rows of acrostichal setae are present. Each humerus

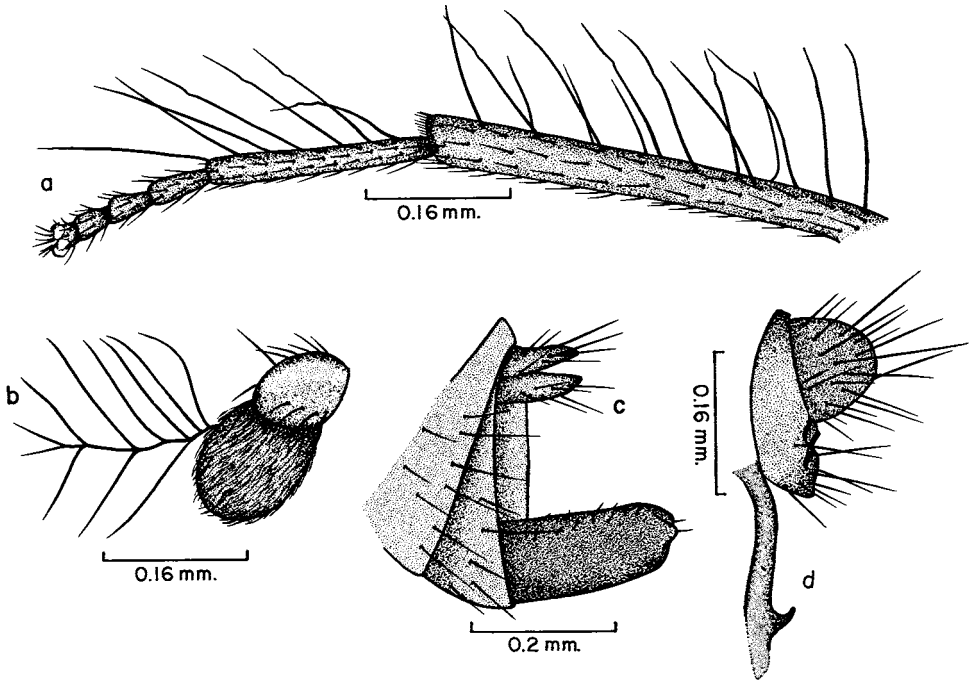


Figure 236—*Nudidrosophila eximia* n. sp.: **a,** front tibia and tarsus; **b,** antenna; **c,** female genitalia; **d,** male genitalia.

has two well-developed bristles. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front coxae are devoid of bristles except for the apicodorsal row. Posterodorsal and posteroventral bristles are moderately developed on the front femora. The front tibia has two rows of long, conspicuous cilia, one dorsal and one anterodorsal in position; the latter hairs are one-half to two times longer than the former; and two or more long curved cilia are present at the base of the segment. The front basitarsus has six long dorsal hairs extending the entire length of the segment; the apical hair reaches almost to the apex of the tarsus (fig. 236a). The remainder of the tarsus has no longer cilia. The front basitarsus is slightly more than one-half as long as the tibia and is three to four times longer than the second tarsal segment. *Wings:* Infuscated except for a faint brownish tinge. The third costal section is four times longer than the fourth, and the costal fringe extends approximately three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section. *Abdomen:* Polished dark brown to black, faintly dusted with gray pollen. The anal plates are about one-half higher than long. The ninth tergum is just slightly narrowed over the dorsal portion and is lobate ventrally. The claspers are plainly visible from a direct lateral view. The aedeagus has a distinct, hook-like preapical point on the dorsal surface (fig. 236d).

Length: body, 2.0 mm.; wings, 2.2 mm.

FEMALES. Specimens which apparently belong here fit the description of the male except for secondary and primary sexual characters. Well-developed frontal bristles are present; the anterior reclinate bristle is slightly smaller than the proclinate and is situated just above the latter. The ovipositor blades are straight-sided, blunt at the apices, and extend approximately three times the length of the anal plates (fig. 236c). The spermathecae are oblong in shape.

Length: body and wings, 2.2 mm.

Holotype male: Makemakeole Valley, Maui, June, 1953 (D. E. Hardy). Allotype female: Keanae, Maui, July, 1953 (D. E. Hardy). Six paratypes (five males, one female) from the following localities: same as type; same as allotype; Hana, Maui, June, 1953 (D. E. Hardy); Waihee, Maui, March 1, 1926, on *Straussia* (O. H. Swezey); and Puu Kolekole, Molokai, July, 1952 (M. Tamashiro).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Nudidrosophila gemmula new species (fig. 237a–c).

This species is readily differentiated from other known *Nudidrosophila* by having the front tibia almost devoid of erect hairs; by the row of four or five anterodorsal cilia on the front basitarsus (fig. 237b); and by the very slender, straight-sided palpi (fig. 237a).

MALE. *Head:* Just slightly higher than long. The compound eyes are oval in shape. The front, measured from the median ocellus to the anterior margin, is nearly two times wider than long, is predominantly dark brown to black, and tinged with rufous in the ground color. The front is microscopically pilose; the sides appear to be covered with tiny scales. The inner vertical bristles are subequal in length to the postocellar bristles and are approximately two-thirds as long as the outer verticals. The genae and face are yellow, tinged with brown; the latter is slightly raised on the upper median portion. The genae are very narrow; at the lower eye margin the distance from the vibrissal row to the eye margin is equal to about two rows of eye facets. The clypeus is pale brown. The palpi and mouthparts are yellow with a faint tinge of brown on the mentum. Each palpus is long and slender, extending almost the length of the mouthparts, and a thick yellow bristle is present at the apex (fig. 237a). The labella are not ornate. No bristles are developed in the vibrissal row. The antennae are brown. The second segment is densely covered with fine, pale pile over the dorsal portion. The arista has four dorsal and two ventral rays in addition to the apical fork; the inner surface is conspicuously haired. *Thorax:* Almost entirely dark brown, tinged with rufous in the ground color of the pleura, and with yellow on the lower portion of each humerus. The mesonotum is gray-brown pollinose. The anterior dorsocentral bristles are situated about opposite the second (posterior) supraalars. Six rows of acrostichal setae are present. Two bristles are present on each humerus. The anterior sternopleural bristle is subequal to the posterior

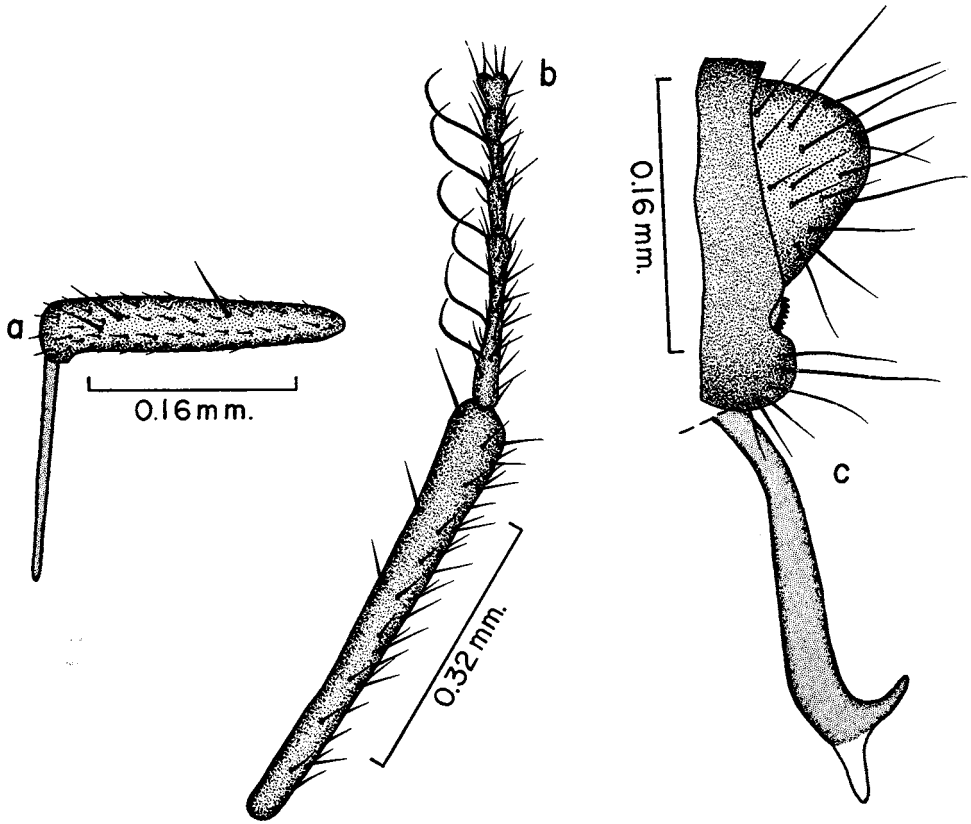


Figure 237—*Nudidrosophila gemmula* n. sp.: **a,** palpus; **b,** front tibia and tarsus; **c,** male genitalia.

bristle. The halteres are pale yellow. *Legs:* Entirely pale yellow. The front tibia lacks ciliation. The preapical dorsal bristle of the front tibia is rather small, and two short, inconspicuous, erect dorsal hairs are present near the middle of the segment. The front basitarsus is approximately one-half as long as the tibia and has four or five curved cilia along the anterodorsal surface. The second and third tarsal segments have one anterodorsal cilia each (fig. 237b). *Wings:* Almost hyaline, with a very faint tinge of brown on the membrane. The third costal section is 3.5 times longer than the fourth, and the costal fringe extends about half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Dark brown, tinged with yellow to rufous on the first tergum and on the apical segments. The height of the anal plates is almost two times greater than the width of the ninth tergum. The tergum is almost straight-sided, rounded ventrally (fig. 237c). The claspers are plainly visible from a lateral view. Each has 10 or 12 black teeth along the margin. The aedeagus has a strong, preapical dorsal hook.

Length: body, 1.8–2.0 mm.; wings, 2.2 mm.

FEMALE. A female specimen at hand apparently belongs here. It appears to have the same structural characteristics as *N. amita* n. sp. from the island of Hawaii, and the two may not be separable from the female specimens. The ovipositor is long and slender and curved as in *amita*; because of this character the females would also closely resemble those of *Drosophila hirtitibia* and *N. gemmula*. It can apparently be differentiated from *hirtitibia* by having the pleura entirely dark brown; also, the second antennal segment is densely pilose, and the setae on the median portion of the front are very fine and inconspicuous.

Length: body, 2.25 mm.; wings, 2.75 mm.

Holotype male: Tantalus, Oahu, 1,300 feet, March 11, 1905 (W. M. Giffard). Two male paratypes: one, Nuuanu, Oahu, March 16, 1950 (no collector given); another, Mount Kaala, Oahu, April, 1949 (G. B. Mainland). The above-mentioned female specimen is labeled "Kaala Mts., Oahu (O. H. Swezey)," no date given; it is not being designated as an allotype.

Nudidrosophila lepidobregma new species (fig. 238a–f).

This species is readily differentiated from other known members of this interesting genus by the arrangement of the cilia on the front tibiae and tarsi (fig. 238d) and by the broad, flat, yellow projection from the apex of each palpus (fig. 238a).

MALE. *Head:* Almost quadrate as seen in direct lateral view, just slightly higher than long. The front is densely covered with microscopic scales, especially on the lateral portions. The front is yellow medianly beneath the ocellar triangle and is distinctly concave in this section. The sides of the front are slightly swollen and are tinged with brown to black in ground color. The upper front and the sides of the vertex are black. The ocellar triangle is brown, tinged with black. The occiput is predominantly reddish brown, covered with gray pollen. The lower one-fourth to one-fifth of the occiput is pale yellow. The genae are yellow except for a line of dark brown to black extending along the vibrissal row. Each gena is about equal in width to three rows of eye facets. The face is pale brown along the lower portion and in the furrows, yellow on the upper median portion; the median portion of the face is slightly carinate. The clypeus is pale brown. The palpi and mouthparts are pale yellow. Each palpus has a broad, strap-like projection from the apex (figs. 238a). One strong bristle is present at the upper edge of each vibrissal row. The recumbent hairs on the sides of the ocellar triangle are yellow (fig. 238c). The first two antennal segments are yellow, tinged with brown on the dorsal portions. The third segment is entirely brown. The arista has three dorsal and two ventral rays in addition to the apical fork (fig. 238b). The anterior hairs of the arista are well developed and extend almost half as long as the dorsal and ventral rays. The front has two or three short, conspicuous hairs in the position normally occupied by the upper reclinate bristles. *Thorax:* Predominantly brown, tinged with yellow in the ground color of the pleura, and covered with gray pollen. The anterior dorso-

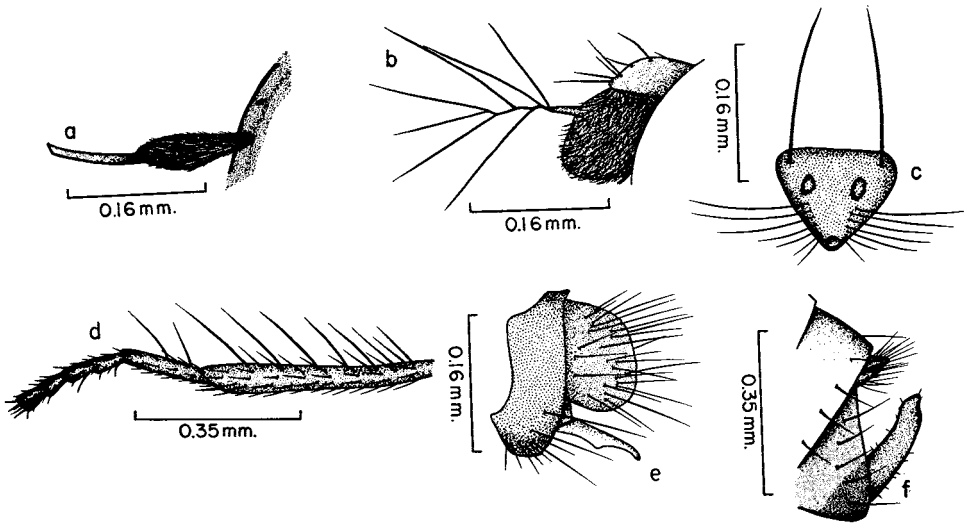


Figure 238—*Nudidrosophila lepidobregma* n. sp.: **a,** palpus; **b,** antenna; **c,** ocellar triangle; **d,** front tibia and tarsus; **e,** male genitalia; **f,** female genitalia.

central bristles are situated almost in line with the first pair of supraalars. One slightly enlarged seta is present on each side in the dorsocentral row just behind the suture; this is approximately two times longer than the surrounding setae. Each humerus has two well-developed bristles. The anterior sternopleural bristle is four-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs:* Entirely pale yellow; the segments are slender. The front femur has moderately developed posteroventral and posterodorsal bristles and has a clump of pale yellow pile at the apex on the anterodorsal surface. The front tibia is almost as long as the femur, has about three long, black dorsal cilia at the base, a row of dorsal cilia, and a row of elongate, anterior cilia extending almost the entire length of the segment. The front basitarsus has two long, black dorsal cilia arising near the middle of the segment (fig. 238d). The front basitarsus is almost one-half as long as the tibia. *Wings:* Hyaline, with no brown markings. The third costal section is 3.7–4.0 times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about two times longer than the penultimate section. *Abdomen:* Predominantly dark brown, covered with gray-brown pollen, and tinged with yellow on the base of the first tergum. The anal plates are hemispherical, about one-half higher than long, and rounded ventrally. The ninth tergum is slightly narrowed on the dorsal portion, the sides are almost straight, and the lower portion is shaped as in figure 238e. The claspers are not directly visible from lateral view.

Length: body, 2.15 mm.; wings, 2.50 mm.

FEMALE. Two specimens are on hand containing the same data as the type

series and are evidently *lepidobregma*. They are like typical *Drosophila*. The frontal bristles are well developed, the anterior reclinate bristle is almost as large as the proclinate, and is situated distinctly above the latter. The arista of the female differs from that of the male by having three dorsal and two ventral rays in addition to the apical fork, and by having very long, conspicuous hairs on the anterior surface. The large setae in the dorsocentral rows just behind the suture are well developed. The ovipositor blades are comparatively short and straight-sided. The females appear to differ from those of *amita* by the shape of the ovipositor blades (figs. 235c and 238f).

Length: body, 2.3 mm.; wings, 2.5 mm.

Holotype male, allotype female, and three paratypes (two males and one female): from Kilauea, Hawaii, August 4, 1946 (E. C. Zimmerman); one paratype male: Upolu, Hawaii, June 19, 1922, on *Cyrtandra* (O. H. Swezey).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the United States National Museum and the University of Hawaii collection.

Genus **SCAPTOMYZA** Hardy

Scaptomyza Hardy, 1849, Proc. Berwickshire Naturalists Club, 349.
Scaptomyzella Hendel, 1928, Zool. Anz. 76:290. (Neave 1940:125, states, also as *"Scaptomyzetta."*)

Following the recent concepts of Hackman (1959), this genus now encompasses a very broad assemblage of drosophilids. Previous to Hackman's thorough study of this group, the now recognized *Scaptomyza, sens. lat.*, had been broken down into a number of not too clearly defined genera. I agree with Hackman's conclusions that these should be reduced to subgenera under *Scaptomyza*.

Typically *Scaptomyza* are separated from other drosophilids which have plumose or pectinate aristae by having only two to four presutural acrostichal setae, two pairs of postsutural dorsocentrals, and, rarely, one pair of presutural dorsocentrals; the third costal section is at least 2.5 times longer than the fourth; and the head nearly quadrate as seen in profile, or distinctly longer than high. A rather large complex of *Scaptomyza* (*Trogloscaptomyza*) species which have six distinct rows of presutural acrostichals occur in Hawaii; because of this character the group would appear to fit in *Drosophila* more nearly than in typical *Scaptomyza*. These species differ from *Drosophila*, however, by lacking ventral rays on the aristae; by the prominent, well-developed and exposed, male claspers; and by the poorly sclerotized, non-dentate, female ovipositor of the *Trogloscaptomyza*. These specimens also would appear to fit near *Titanochaeta* Knab because of the six rows of presutural acrostichals and the lack of ventral rays on the aristae. They differ from *Titanochaeta* by having the head quadrate in shape as seen in lateral view, but the lower margin approximately equal in length to the upper margin (fig. 282a). Also, they are differentiated by the weakly sclerotized, fleshy

female ovipositor, and by having the male claspers much differently developed as shown in figures 255b, 258b, and 344e.

The typical subgenus is characterized by having two humeral bristles, which are subequal in size, and rather strongly sclerotized and usually coarsely dentate ovipositor guides. No specimens of *Scaptomyza* (*Scaptomyza*) are apparently present in the Hawaiian Islands. *S. graminum* was erroneously recorded from Hawaii by Hardy (1952b). This was a misidentification of *S.* (*Parascaptomyza*) *pallida* (Zetterstedt). This species was confused with *graminum* until Hackman's revision. The Hawaiian *Scaptomyza* are presently divided into seven subgenera. These are separated by the characters given below in the key to subgenera. Some of the species of *Scaptomyza* are known to be leafminers; however, in Hawaii we have no definite evidence that any of our species are herbivorous.

Article 23 (b) of the "International Code" states: "A name that has remained unused as a senior synonym in the primary zoological literature for more than fifty years is to be considered a forgotten name (*nomen oblitum*)." In dealing with *Scaptomyza* (*Bunostoma*) *varifrons* (Grimshaw) and *S.* (*Trogloscaptomyza*) *inaequalis* (Grimshaw), which are senior synonyms of *S. cordigera* Hackman and *S. hawaiiensis* Hackman, respectively, I am assuming that the mention of the Grimshaw names in Bryan's (1934) checklist would constitute usage even though these species have not been recognized since the original description. The Hackman names have appeared only once (1959) in the literature, and I feel it is better to give priority to the Grimshaw (1901) names.

Type of the genus: *Drosophila graminum* Fallén.

Key to the Subgenera of Scaptomyza Hardy
(Including the genus *Titanochaeta* Knab)

1. Only two dorsocentral bristles present; or, if three pairs present (*Bunostoma cnecosoma* n. sp.), two ventral rays present on the arista. Head usually not flattened, and normally higher than long 2

   A pair of presutural dorsocentral bristles present; these are strong bristles except in *finitima* n. sp. Head flattened, about as long as high, eyes strongly oblique (fig. 259a). No ventral rays present on Hawaiian species ..... **Rosenwaldia** Malloch.

2(1). Rays of arista elongate 3

   Arista very short-haired (fig. 254a). Male aedeagus elongate (fig. 254c). Female ovipositor plates fused on both sides (fig. 254e). ..... **Exalloscaptomyza** n. subgen.

3(2). Arista with one to two ventral rays in addition to the

apical fork 4
Arista lacking ventral rays 6

4(3). Arista with two ventral rays. Male genitalia as in figures 251a and 252a, the claspers distinctive in shape. Usually polished black species ..... **Bunostoma** Malloch.
Arista with one ventral ray. Male genitalia not as above 5

5(4). Head short and broad, about two times higher than long, and distinctly broader than the thorax (measured between the notopleural bristles). The longest diameter of the eye nearly vertical. Inner vertical bristles large. Male genitalia lacking secondary claspers ..... **Alloscaptomyza** Hackman.
Head about as long as high, not wider than thorax. Only two rows of acrostichal setae in the one species known from Hawaii. Male genitalia with secondary lobes developed from the anal plates (fig. 255b). ..... **Parascaptomyza** Duda.

6(3). Arista with a deep apical fork, the branches about equal to the dorsal rays and longer than the stem of the arista (fig. 260a). Basal scutellar bristles opposite or slightly before the anterior corners of the scutellum (fig. 260d). Scutellum white except on the sides. Mesonotum with a broad white stripe down the middle, or at least white on the posteromedian portion. Male genitalia as in figures 260e, 262a, and 263a. ..... **Tantalia** Malloch.
Apical fork comparatively small. Basal scutellar bristles situated beyond the hind corners. Thorax not marked as above 7

7(6). Head nearly square as seen from direct lateral view, lower margin approximately equal in length to the frontal margin. Front transverse or nearly so (fig. 282a). Eyes nearly bare or microscopically pilose. Female ovipositor fleshy, not sclerotized or dentate. Male claspers large and conspicuously protruded well beyond the edges of the ninth tergum (figs. 287b, 291a, and 292c) ..... **Trogloscaptomyza** Frey.
Head about one-half higher than long, front slanting, lower margin of head narrowed (except in *vittiger* n. sp.). Eye densely and conspicuously pillose (except in *evexa* n. sp.). Female ovipositor needle-like (figs.

343f, 344e, and 349b). Male genitalia as in figures 343a, 344d, and 348b ..... genus **Titanochaeta** Knab.

Subgenus **ALLOSCAPTOMYZA** Hackman

Scaptomyza (*Alloscaptomyza*) Hackman, 1962, Notulae Ent., 42:37.

The members of this group are differentiated from other *Scaptomyza* by the short, broad head which is approximately two times higher than long and is distinctly broader than the thorax, the latter measured between the postalar bristles; and also, by having one ventral ray on the arista, the vertical bristles on the front very prominent, and the inner verticals approximately as long as the vertical diameter of the eye. The longest diameter of the eye is nearly vertical. Four rows of acrostichal setae are present except in *stramineifrons* Hackman, which has six irregular rows. No presutural dorsocentrals are present. Each humerus has one prominent bristle. The fourth costal section is long compared to most *Scaptomyza* and the costal fringe is much longer than is usual in this genus. The male claspers are rather small and inconspicuous (figs. 240b, 241a, and 243b). The ninth sternum and the accessory structures of the aedeagus are characteristically developed (figs. 239b, 240c, and 245b). The ovipositor is very weakly sclerotized.

Eight species are presently known from Hawaii.

Type of the subgenus: *Scaptomyza* (*Alloscaptomyza*) *buccata* Hackman.

Key to Known Species of Scaptomyza (Alloscaptomyza) Hackman

1. Gena broad, almost one-half the length of the vertical diameter of the eye (fig. 240a). Costal fringe extending about one-third the distance between the apices of veins R_{2+3} and R_{4+5} 2
   Gena much narrower, about one-fourth to one-fifth as wide as the eye height. Costal fringe usually extending one-half to three-fourths the distance between the apices of veins R_{2+3} and R_{4+5} 4

2(1). Thorax and abdomen dark brown, covered with gray pollen 3
   Thorax and abdomen entirely yellow. Molokai ..... **cerina** n. sp.

3(2). Front yellow except for the gray orbits and the ocellar triangle. Genae and legs yellow. Anal plates of male pointed ventrally (fig. 240b). Maui, Molokai, Hawaii, Oahu, and Lanai ..... **buccata** Hackman.
   Front and genae entirely dark-colored. Legs predomi-

nantly dark-colored. Anal plates as long as high, not pointed ventrally (fig. 243a). Maui ..... **mutica** n. sp.

4(1). Thorax and front predominantly yellow, tinged faintly with brown, and covered with gray pollen. Aedeagus rather broad as in figure 245a or blunt and curved upwards at the tip (fig. 242b). Median lobes of ninth sternum prominent, heavily sclerotized (figs. 242c and 245b) 5

Thorax entirely brown to black except for the yellow sternopleura and hypopleura in *semiflava* n. sp. The front and face are often black. If a tinge of yellow is present in the ground color of the mesonotum (*semiflava*), median lobes of the sternum are lacking (fig. 244b) 6

5(4). Acrostichal setae arranged in six irregular rows. Third antennal segment yellow. Median lobes of ninth sternum small, rather inconspicuous (fig. 245b). Aedeagus broad and rather flat (fig. 245a). Oahu .... **stramineifrons** Hackman.

Acrostichals in four rows. Third antennal segment dark brown. Median lobes of sternum large and conspicuous (fig. 242c). Aedeagus blunt, curved upward at the apex (fig. 242b). Molokai, Maui, and Oahu ..... **longisetosa** Hackman.

6(4). Front entirely opaque black, genae brown to black. Pleura entirely brown to black. The median lobes of the ninth sternum are well developed, parameres are transverse in position (fig. 241e), or the ninth tergum is lobate ventrally (fig. 239a) 7

At least the median portion of the front is yellow to rufous. The sternopleura and hypopleura are yellow. The ninth tergum is gently produced, broadly rounded on the posteroventral margins (fig. 244a). The parameres are longitudinal in position and no median lobes are visible on the ninth sternum (fig. 244b). Oahu ..... **semiflava** n. sp.

7(6). Ninth tergum slender, not as long as the anal plates, gradually tapered on anteroventral margins. The sternal lobes at the base of the aedeagus are well developed (fig. 241e), and the parameres are transverse in position. The aedeagus is flat and rather broad. Kauai ..... **fuscifrons** Hackman.

Ninth tergum comparatively broad, longer than the

anal plates and lobate on posteroventral margins. The sternal lobes, which are distinctive to most *Alloscaptomyza*, do not appear to be present. The parameres are parallel to the aedeagus (fig. 239b). The aedeagus is slender, sharp-pointed. Molokai and possibly Lanai ..... **aberrans** n. sp.

Scaptomyza (Alloscaptomyza) aberrans new species (fig. 239a–b).

This species fits near *S. fuscifrons* Hackman but is differentiated by the very different development of the male genitalia; by having the ninth tergum comparatively broad, longer than the anal plates, and lobate on the posteroventral margins (fig. 239a). The parameres are parallel to the aedeagus and the aedeagus is slender and sharp-pointed (fig. 239b). The median lobes which are developed on the ninth sternum of *fuscifrons* and most of the other species of *Alloscaptomyza* are apparently lacking.

MALE. *Head:* About one-third higher than long, tapered ventrally as seen in direct lateral view. At the broadest point the width of the gena is about one-fourth the eye height. Front entirely opaque black; gray on the orbits and on the ocellar triangle. The occiput is dark brown to black on the upper four-fifths, covered with gray pollen; the extreme lower portion is yellow. The hind portion of each gena is yellow, the anterior portion is tinged with brown. The face is black except for a tinge of yellow on the upper portion. The clypeus is dark brown to black. The palpi are yellow; each has one small black apical bristle plus several black setae near the apex. One moderately strong bristle is present on the upper edge of each vibrissal row; this is almost equal in size to the upper reclinate bristles of the front. The face is distinctly carinate. The anterior reclinate bristles are about one-half as long as the proclinates and are situated opposite the latter. The first two antennal segments are yellow, tinged slightly with brown on the dorsal portions; the third segment is dark brown. The arista has three or four dorsal and one ventral ray in addition to the rather small apical fork. *Thorax:* Brown to black, tinged faintly with rufous in the ground color of the pleura, and covered with gray pollen except for a faint indication of a median brown vitta which extends from the posterior margin of the mesonotum half the distance between the two pairs of dorsocentral bristles. Four rows of acrostichal setae are present on the mesonotum. The anterior dorsocentrals are situated slightly in front of a line drawn between the first supraalars. The humeral bristle is about equal to the posterior notopleural bristle. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Yellow except for a tinge of brown on the apices of the tarsi. The front tibiae and tarsi are rather densely covered with short erect setae. The front basitarsus is about one-third as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.6 times longer than the fourth and the costal fringe extends two-thirds to three-fourths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate

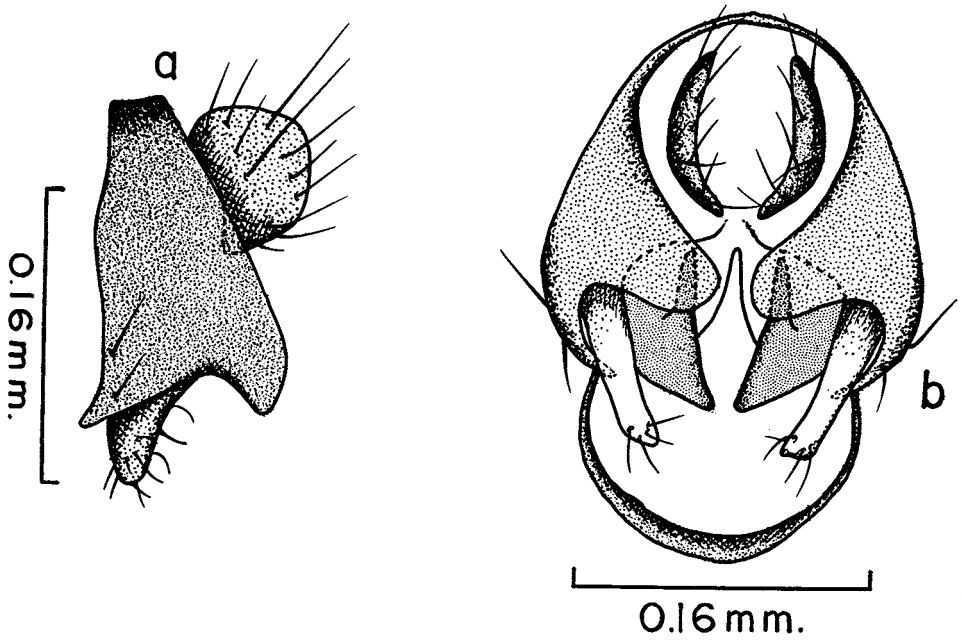


Figure 239—*Scaptomyza* (*Alloscaptomyza*) *aberrans* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

section. The last section of vein M_{3+4} is one-half to two-thirds longer than the m crossvein. *Abdomen:* Brown, tinged with yellow on the bases of the terga. The anal plates are about as high as long. The ninth tergum is rather broad, longer than the anal plates, and distinctly lobate on each posteroventral margin (fig. 239a). The claspers are simple but readily visible from a lateral view. The parameres are parallel to the aedeagus; the latter is slender, sharp-pointed (fig. 239b). The median lobes of the ninth sternum, which are characteristic of most species of *Alloscaptomyza,* are not discernible in this species and are evidently rudimentary.

Length: body, 2.2 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Holotype male: Waikolu, Molokai, December 18, 1925 (E. H. Bryan, Jr.); allotype female: Kamiloloa, Molokai, 3,200 feet, December 23, 1925, on *Metrosideros* (E. H. Bryan, Jr.); seven male paratypes: same data as type and as allotype, some specimens collected on *Pipturus* and some on *Coprosma* (O. H. Swezey and E. H. Bryan, Jr.). One female specimen on hand from Lanaihale, Lanai, 3,200 feet, June, 1953 (D. E. Hardy), appears to belong here.

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum and the University of Hawaii.

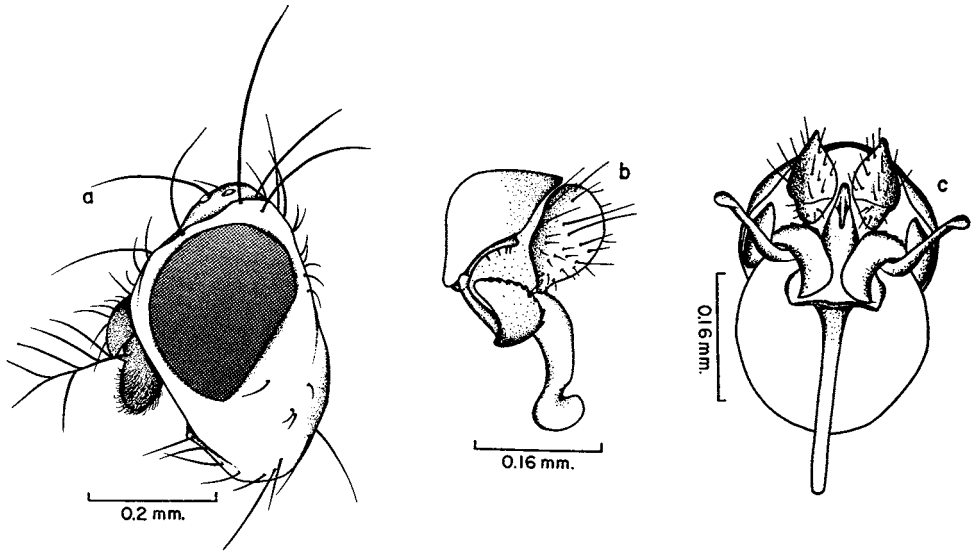


Figure 240—*Scaptomyza* (*Alloscaptomyza*) *buccata* Hackman: **a,** head, lateral; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

Scaptomyza (Alloscaptomyza) buccata Hackman (fig. 240a–c).

Scaptomyza (*Alloscaptomyza*) *buccata* Hackman, 1962, Notul. Ent. 42:39.

Endemic. Maui (type locality: Haleakala Crater). I have studied the type series and a large series of specimens from Haleakala Crater and also specimens from Molokai, Lanai, Oahu, and Hawaii. The latter four are new island records.

Type in the B. P. Bishop Museum.

This species is differentiated from other known *Alloscaptomyza* by its very broad genae (fig. 240a), the yellow front, genae, and legs, and by the characteristics of the male genitalia as shown in figure 240b–c.

The front is typically all yellow except for a discoloration of brown to black along each eye orbit and on the ocellar triangle; the ocellar triangle and the eye orbits are densely gray pollinose, the genae are one-third to one-half the length of the vertical diameter of the eye (fig. 240a), measured at a level with the genal bristle. The front margin of each gena is strongly oblique. The anterior reclinate bristle is three-fifths to two-thirds as long as the proclinate and is situated opposite or slightly in front of the latter. The palpi are entirely yellow. The face is yellow except for a very faint tinge of brown at the lower margin. One strong bristle is present at the upper edge of each vibrissal row. The third antennal segment is dark brown. The arista has three or four dorsal rays and one ventral ray in addition to the apical fork. The thorax is dark reddish brown in ground color, covered with gray pollen. Four rather irregular rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The lateral margins of the scutellum

are yellow and the sternopleura and hypopleura are yellow-brown. The anterior sternopleural bristle is nearly two-thirds as long as the posterior bristle. The legs are entirely yellow. The third costal section of the wing is slightly less than three times longer than the fourth and the last section of vein M_{1+2} is not quite two times longer than the penultimate section. The costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The abdomen is dark brown, tinged with rufous, and covered with gray-brown pollen. The anal plates are nearly two times higher than long and are distinctly pointed ventrally. The ninth tergum is strongly narrowed over the dorsal portion and is expanded on each side ventrally. The claspers are rudimentary, represented by a thin sclerite situated ventrad to the sides of the ninth tergum. A heavily sclerotized knob-like process is developed on each side of the ninth sternum; these are rather clasper-like in appearance but arise from each side of the aedeagus (fig. 240b). The aedeagus is prominent. The ventral aspects of the genitalia are as in figure 240c.

Length: body, 1.8–2.0 mm.; wings, 2.2–2.3 mm.

The female has not previously been recorded. It fits the description of the male except for genital characters.

Scaptomyza (Alloscaptomyza) cerina new species (fig. 241a–b).

This species fits near *S. buccata* Hackman because of the large swollen genae. It differs strikingly from *buccata* by having the thorax and abdomen entirely yellow.

MALE. *Head:* Entirely pale yellow including the appendages, except for the dark reddish brown compound eyes and a tinge of brown in the area surrounded by the ocelli. The eye orbits and the ocellar triangle are yellow-white, the interfrontal and median portions of the front have a distinct golden sheen. At its widest point each gena is slightly over one-half as high as the compound eye. The lower median portion of the face is flat; a very slight carina is developed on the upper median portion. The apical bristles on the palpi are small, about equal in size to the acrostichal setae on the mesonotum. The uppermost bristle of the vibrissal row is about equal in size to the proclinate bristles of the front. The anterior reclinate bristles are about half as long as the proclinates and are situated about opposite the latter. The arista has four dorsal and one ventral ray in addition to the medium-sized apical fork. *Thorax:* Entirely pale yellow. Four rows of acrostichal setae extend over the anterior half of the mesonotum. The anterior dorsocentral bristles are situated in front of a line drawn between the first supraalars. The humeral bristle is about equal to the anterior notopleural bristle. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely pale yellow. The front basitarsus is approximately one-half as long as the tibia. *Wings:* Entirely hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends almost one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.75 times longer than the penultimate section. *Abdomen:* Entirely yellow. The anal plates are about as high as long; the ventral portions

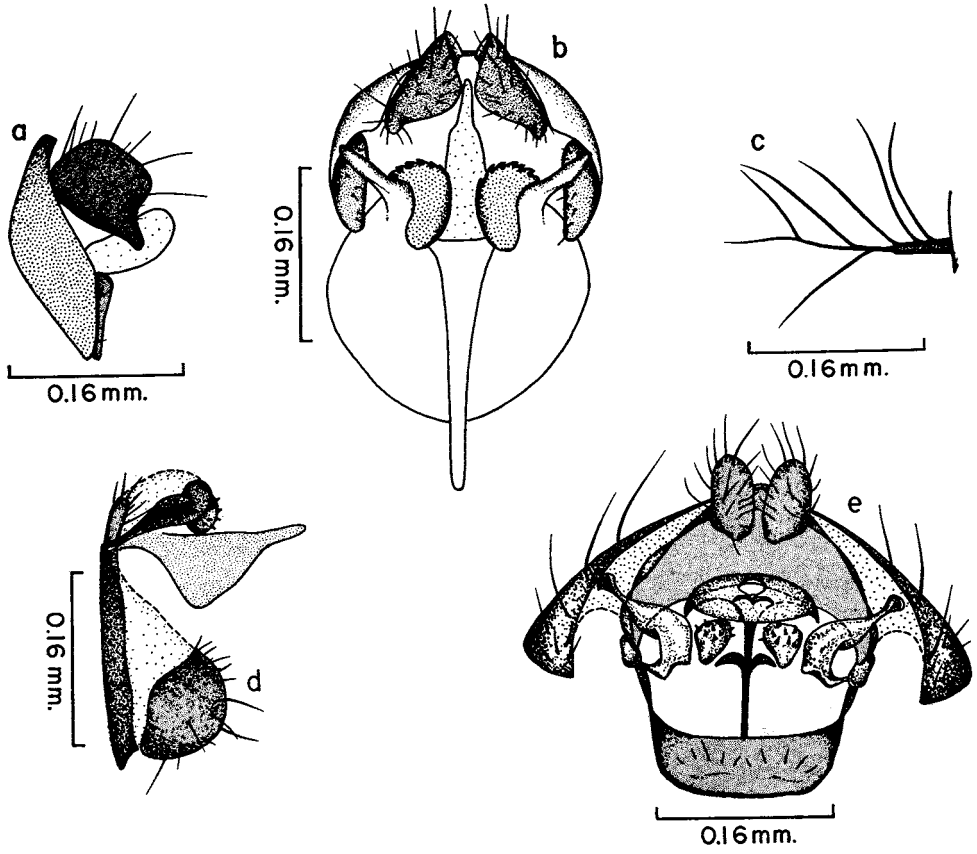


Figure 241—*Scaptomyza* (*Alloscaptomyza*) *cerina* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral. *S* (*A.*) *fuscifrons* Hackman: **c,** arista; **d,** male genitalia, lateral; **e,** male genitalia, ventral.

are distinctly rostrate. The ninth tergum is narrowed over the dorsal portion, about equal in length to the anal plates in the median portion, and attenuated at the apex. The claspers are slender, scarcely visible in direct lateral view (fig. 241a). The aedeagus is blunt at the apex; the appendages of the ninth sternum at the base of the aedeagus are large, heavily sclerotized, curved and dentate around the outside margins (fig. 241b).

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Holotype male and allotype female: Maunahui, Molokai, July, 1952 (D. E. Hardy). Four paratypes (one male, three females): from the following localities in the mountains of Molokai—same as type; Manawainui Valley, July, 1952 (D. E. Hardy); Puu O Kaehe, 3,700 feet, July, 1953 (D. E. Hardy); and Puu Kolekole, July, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Alloscaptomyza) fuscifrons Hackman (fig. 241c–e).

Scaptomyza (Alloscaptomyza) fuscifrons Hackman, 1962, Notul. Ent. 42:41.

Endemic. Kauai (type locality: Nualolo Valley) and Oahu. The latter is a new island record.

Type in the B. P. Bishop Museum.

This species resembles *S. mutica* n. sp. because of the dark-colored front, face, and antennae. It is differentiated by the much narrower genae, the longer rays on the arista, the yellow legs, and by the male genitalia. It also closely resembles *S. aberrans* n. sp., but the genitalia are very differently developed (fig. 241d–e).

A tiny predominantly dark-colored species. The front is entirely black in ground color, rather densely covered with gray pollen on the sides and over the ocellar triangle, and yellow-gray pollinose in the median portion. The antennae are dark brown to black. The arista has four dorsal and one ventral ray in addition to the apical fork (fig. 241c). The genae and face are entirely dark brown to black. The palpi are dark brown. Measured at a level with the genal bristle, the gena is about one-fifth as high as the eye. The thorax is dark brown to black in ground color, rather densely covered with gray pollen. Four rows of acrostichal setae are present. The legs are entirely yellow. The front basitarsus is slightly over one-third as long as the tibia. The third costal section of the wing is 2.18 times longer than the fourth, and the costal fringe extends approximately one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. Abdomen dark brown to black. The anal plates are higher than long and are slightly pointed ventrally. The ninth tergum is straight-sided, rather narrow, scarcely over one-half as long as the anal plate, and is rounded on the ventral margins. The claspers are small but are visible from a lateral view and extend beyond the ventral margins of the tergum (fig. 241d). The median pair of lobes which arise from the ninth sternum are smaller and less conspicuous than in most species (fig. 241e).

Length: body, 1.6 mm.; wings, 1.8 mm.

Scaptomyza (Alloscaptomyza) longisetosa Hackman (fig. 242a–d).

Scaptomyza (Parascaptomyza) longisetosa Hackman, 1959, Acta Zool. Fennica 97:44, fig. 18.

Scaptomyza (Alloscaptomyza) longisetosa Hackman, 1962 Notulae Ent. 42:41.

Endemic. Molokai (type locality: Manawainui Valley), Maui, and Hawaii.

Type in the B. P. Bishop Museum.

This species fits near *fuscifrons* Hackman but is differentiated by its larger size and predominantly yellow head and body. The species has been previously known only from the female. The following descriptive notes are based upon

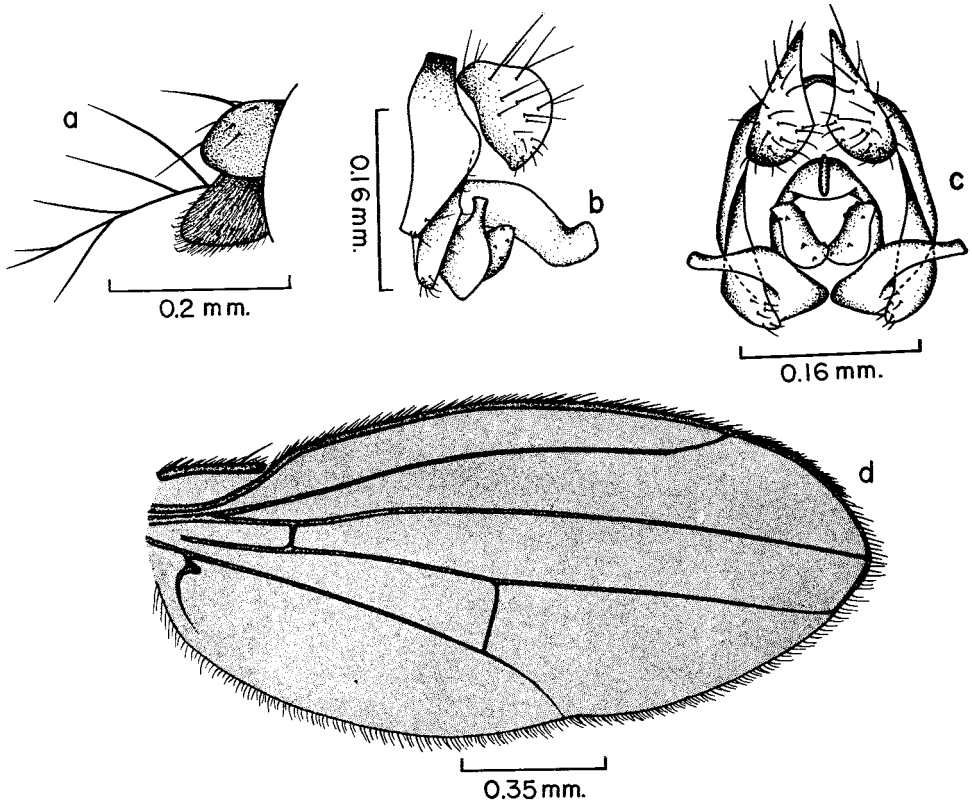


Figure 242—*Scaptomyza* (*Alloscaptomyza*) *longisetosa* Hackman: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral; **d,** wing.

the type female supplemented with other specimens from Molokai and Maui.

Predominantly yellow species, tinged faintly with brown. The width of the head is greater than the length of the thorax (the comparison is about 73 to 65). The front is predominantly dull brownish yellow, the orbits and the area surrounding the ocellar triangle are gray pollinose; the remainder of the front is sparsely gray pollinose. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated opposite the latter. The first two antennal segments are yellow, tinged faintly with brown. The third segment is dark brown to black. The arista has three or four (three in the type) dorsal and one ventral ray in addition to the small apical fork (fig. 242a). The inner surface of the arista has several short hairs on the apical portion. A slight but distinct keel extends down the median portion of the face. This portion and the lower margin of the face are brown. Also, the extreme lateral margins of the face next to the eye are brown; the lateral furrows are yellow, tinged with brown. The genae are yellow-brown; a black border extends along each vibrissal row. The strong bristle at the upper edge of each vibrissal row is about equal in size to the genal bristle.

The palpi are yellow, faintly tinged with brown; each has two short, apical bristles. The frontal bristles are moderately strong; the proclinate bristles are just slightly shorter than the strong bristle at the upper edge of each vibrissal row; the upper reclinate, the ocellar, and the postocellar bristles are approximately equal in size to the anterior pair of dorsocentrals; the inner vertical bristles are about equal in size to the apical scutellars; and the outer verticals are about equal to the secondary scutellars. The thorax is predominantly yellow, tinged faintly with brown on the dorsum and sides; the sternopleura and hypopleura are pale yellow. The mesonotum is gray pollinose, with faint traces of a median linear pattern on the females. Four rows of acrostichal setae extend to about level with the anterior pair of dorsocentral bristles, and two irregular rows extend a short distance posterior to the anterior dorsocentrals. Each humerus has one moderately strong bristle. The anterior sternopleural bristle is about three-fifths as long as the posterior bristles. The wings are subhyaline, very faintly infuscated, but with no distinct markings. The costal fringe extends approximately two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about three times longer than the fourth, and the last section of vein M_{1+2} is 1.63 times longer than the penultimate section (fig. 242d). The anal plates are about as high as long and are not pointed ventrally. The ninth tergum is rather broad and is slightly pointed on the anteroventral margin. The claspers are very narrow basally, and each extends into an apical lobe which protrudes well beyond the tergum. A paramere extends horizontally across the middle of each clasper (fig. 242b). A black, oblong, dentate sclerite is present on each side of the aedeagus. For details of the ventral aspects of the genitalia refer to figure 242c. The ovipositor plates of the female are small, weakly sclerotized.

Length: body, 2.2–2.4 mm.; wings, 2.5–2.7 mm.

Scaptomyza (Alloscaptomyza) mutica, new species (fig. 243a–b).

This species fits near *S. buccata* Hackman because of the well-developed genae and the similarity in the male genital characters. *S. mutica* is readily differentiated by having the front, genae, face, and legs dark-colored, as well as by the genital characters shown in figure 243a–b.

MALE. *Head:* Entirely brown to black except for the red eyes, covered with gray pollen. The genae are strongly developed; measured at a level with the genal bristle, each is approximately one-half the vertical length of the eye. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated about opposite the latter. The clypeus is brown. The palpi are reddish brown; each has two apical bristles of subequal size. One strong bristle is present at the upper edge of each vibrissal row. The antennae are entirely dark brown to black, tinged lightly with yellow on the apical portion of the second segment. The arista has three or four rather short dorsal rays and one ventral ray in addition to the small apical fork. *Thorax:* Entirely dark brown to black in ground color, covered with gray pollen. Four irregular rows of acrostichal setae are present. The anterior

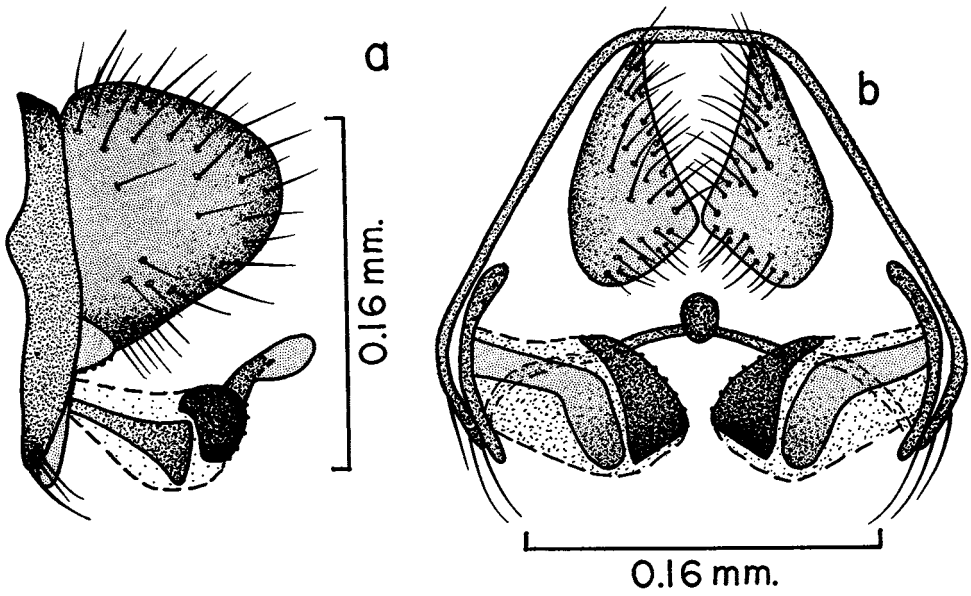


Figure 243—*Scaptomyza* (*Alloscaptomyza*) *mutica* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

dorsocentral bristles are slightly in front of a line drawn between the first (anterior) supraalars. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* The coxae and femora are brown, covered with gray pollen. The tibiae and the tarsi are yellow, tinged lightly with brown. The front basitarsus is approximately one-third as long as the tibia and is two times longer than the second tarsal segment. *Wings:* Entirely hyaline. The third costal section is 2.50–2.65 times longer than the fourth section, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.65–1.80 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black, covered with gray-brown pollen. The anal plates are about as long as high and are vertical on the ventral margin. The ninth tergum is very slender, slightly enlarged ventrally, and attenuated on the anteroventral portion. The claspers are narrow, not plainly visible. The other details of the genitalia are similar to those of *buccata* and are as in figure 243a–b.

Length: body, 1.8 mm.; wings, 2.1 mm.

FEMALE. Fitting the description of the male except for sexual characteristics.

Length: body, 2.1 mm.; wings, 2.3–2.5 mm.

Holotype male and allotype female: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Twenty-one paratypes (sexes about evenly distributed) from the following localities on Maui: predominantly same collection data as type, June–August, 1952, June, 1953, and August, 1958 (D. E. Hardy, C. R. Joyce, and W. C. Mitchell); Koolau Gap, Haleakala Crater, June, 1952

(D. E. Hardy); and near Puu Nianiau, East Maui, April 24, 1945, on *Sophora* (E. C. Zimmerman).

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Alloscaptomyza) semiflava new species (fig. 244a–b).

The male genitalia show rather close relationship to *S. aberrans* n. sp. The pale yellow ventral half of each pleuron and the yellow median portion of the front, as well as other details, will separate *semiflava.*

MALE. *Head:* The median portion of the front and the interfrontal areas are dull yellow; the eye orbits and the ocellar triangle are brown to black in ground color covered with gray pollen. The upper two-thirds of the occiput is tinged with brown and covered with gray pollen. The genae and the lower occiput are pale yellow. At its broadest point the gena is approximately one-fourth the eye height. The face is yellow, tinged with brown on the lower portions. A distinct carina extends down the middle of the face. The clypeus is yellow-brown. The palpi are yellow, faintly tinged with brown. Each has a short black apical bristle. One moderately strong bristle is present at the upper edge of each vibrissal row. This is approximately equal in length to the proclinate bristles of the front. The anterior reclinate bristles are about one-half as long as the proclinates and are situated opposite the latter. The first two antennal segments are brownish yellow. The third segment is dark brown. On the type the arista has four dorsal rays on one arista and six on the other in addition to the rather small apical fork. Other specimens in the series have three to four dorsal rays on the arista. I believe that the female specimen from Iao Valley, Maui, which Hackman (1962:42) designated as *Alloscaptomyza* "species Z," is also this species. His specimen had only one arista with just two apparent dorsal rays. It is possible, however, that the apical portion is damaged and that three dorsal rays should be present on this specimen. *Thorax:* The mesonotum is brown, tinged faintly with rufous in the ground color, and densely covered with gray pollen. The upper half of each pleuron is brown, tinged with yellow. The sternopleura and hypopleura are clear yellow. On the type, the scutellum is yellow, tinged faintly with brown on the disc. In other specimens, the disc of the scutellum is brown, tinged faintly with yellow. Four rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated about halfway between the first supraalar and the suture. The humeral bristles are almost equal in length to the presuturals. The anterior sternopleural bristle is nearly three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is about one-third as long as the tibia. *Wings:* Subhyaline. The third costal section is three times longer than the fourth, and the costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately two times longer than the penultimate section.

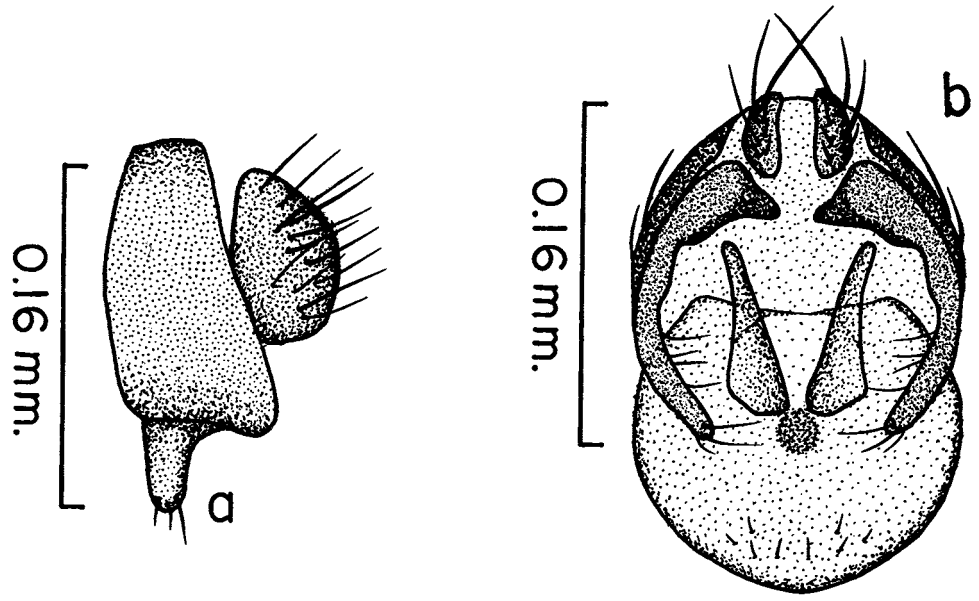


Figure 244—*Scaptomyza* (*Alloscaptomyza*) *semiflava* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Abdomen: Brown, tinged faintly with yellow. The anal plates are about as high as long. The ninth tergum is slightly narrowed over the dorsal portion; in the median portion it is approximately two times longer than the anal plates; the posteroventral margins are gently produced, broadly rounded (fig. 244a). The claspers are prominent, the hind margin is concave. The parameres are parallel to the aedeagus and ventral lobes are not visible on the ninth sternum (fig. 244b).

Length: body, 1.6 mm.; wings, 1.9 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 1.42 mm.; wings, 1.60 mm.

Holotype male and allotype female: Mount Kaala, Oahu, April, 1952 (M. S. Adachi). Six paratypes (two males and four females): from the following localities—Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy); Mauna Hui, Molokai, July, 1952 (D. E. Hardy); Iao Valley, Maui, June, 1952 (D. E. Hardy); Makamakaole, Maui, June, 1952 (D. E. Hardy); and Holua, Haleakala Crater, Maui, June, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and at the University of Hawaii.

Scaptomyza (Alloscaptomyza) stramineifrons Hackman (fig. 245a–b).

Scaptomyza (*Alloscaptomyza*) *stramineifrons* Hackman, 1962, Notulae Ent. 42:41.

Endemic. Oahu (type locality: Palehua).

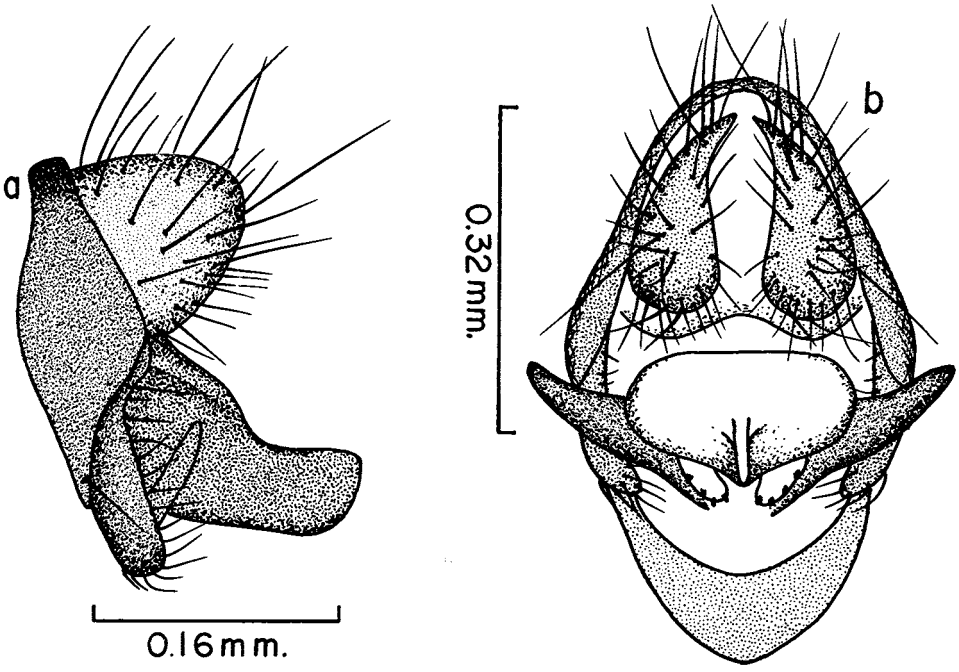


Figure 245—*Scaptomyza* (*Alloscaptomyza*) *stramineifrons* Hackman: a, male genitalia, lateral; b, male genitalia, ventral.

Type in the B. P. Bishop Museum.

This species is differentiated from other known *Alloscaptomyza* by having six rows of acrostichal setae as well as by the male genital characters as shown in figure 245a–b. The head and its appendages are entirely yellow except for the red eyes, the pale brown ocellar triangle, and the tinge of brown on the upper occiput. The front is yellow-gray pollinose. The genae are narrow, measured at a level with the genal bristle; they are less than one-sixth as high as the eye. The arista (taken from the allotype specimen) has three dorsal and one ventral ray in addition to the large apical fork. The anterior reclinate bristle is one-half to three-fifths as long as the proclinate and is situated opposite the latter. The thorax is entirely yellow, rather densely yellow-gray pollinose. Six irregular rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) pair of supraalars. The anterior sternopleural bristle is three-fifths as long as the posterior bristle. The legs are entirely yellow. The front basitarsus is about two-fifths as long as the tibia. The third costal section is two times longer than the fourth, and the costal fringe extends approximately three-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The abdomen is yellow-brown. The male genitalia are as in figure 245a–b.

Length: body and wings, 2.1–2.3 mm.

Subgenus **BUNOSTOMA** Malloch

Bunostoma Malloch, 1932, B. P. Bishop Mus. Bull. 98:218–219.
Scaptomyza (*Bunostoma*) Malloch, Hackman, 1959, Acta Zool. Fennica 97:16.

This subgenus is characterized by usually being predominantly polished black, having two to four rows of acrostichal setae, two pairs of dorsocentral bristles; (except in the aberrant species *cnecosoma* n. sp., which has three), one humeral bristle (a small secondary bristle or seta present only in *xanthopleura* n. sp. and *cnecosoma* n. sp.), two to three ventral rays on the arista basad of the apical fork, and a large ocellar triangle extended onto the front to a level to or near the proclinate bristles. The head is about as high as long and the anterior reclinate bristles are tiny. The palpus has two apical bristles of subequal length. The hind trochanter has a clump of black ventral setae. The male genitalia are characteristic in development as in figures 251a, 252b, and 253c. The ninth sternum is greatly developed, and strong parameres extend beside the aedeagus. The ovipositor blades are small and poorly developed.

One species, *Bunostoma brasiliensis* Frota Pessoa (1946), was described from Brazil. The species is obviously not a *Bunostoma*, however; it has eight rows of acrostichal setae, etc. According to Dr. M. R. Wheeler, in correspondence, it belongs in the genus *Neotanygastrella* Duda.

The typical species, from the Marquesas, differs from that from Hawaii by having a mound-like elevation over the entire width of the lower portion of the face. This tapers downward to the epistoma and gradually narrows into a slender interantennal carina above. In the Hawaiian species a distinct carina extends down the middle of the face, and a slight depression separates the carina from the epistoma.

Type of subgenus: *Bunostoma flavifacies* Malloch.

Key to Known Species of Scaptomyza (Bunostoma) Malloch from Hawaii

1. Acrostichal setae arranged in two rows 2
   Acrostichals in four rows 6

2(1). Femora brown, or at least distinctly tinged with brown. Male genitalia as in figure 247a–b. Maui and Hawaii . . . . . **bryanti** Hackman.
   Legs entirely yellow 3

3(2). Pleura entirely dark brown to black. No secondary bristles present on the humerus 4
   At least the sternopleura and hypopleura are yellow, and the mesopleura are yellow, tinged with brown. The claspers are short and broad, the male genitalia are as in figure 253b–c. A prominent secondary seta is present on the humerus. Oahu . . . . **xanthopleura** n. sp.

4(2). Claspers square at apices, as wide as long (fig. 252a). Ninth tergum not extended on inner apices. Oahu ..... **varifrons** (Grimshaw).

Claspers wider than long, ninth tergum extended on the inner apices in *anomala* n. sp. (fig. 246a) 5

5(4). Ninth tergum with a prominent projection on each posteroventral margin; this extends in front of the clasper (fig. 246b). Claspers about two times as wide as long. Aedeagus lacking a subbasal hook (fig. 246a). Kauai, Maui, and Lanai ..... **anomala** n. sp.

Ninth tergum lacking such a projection. Claspers about four times wider than long. Aedeagus with a hook-like projection near the base (fig. 250c). Kauai ..... **hamata** n. sp.

6(1). Entirely pale yellow species. Ninth tergum rather narrow, scarcely longer than the anal plates (fig. 248a). Ventral aspects of genitalia as in figure 248b. Oahu ..... **cnecosoma** n. sp.

At least dorsum of thorax dark brown to black. Ninth tergum rather broad, about two times longer than anal plates (figs. 251a and 249a) 7

7(6). Pleura yellow. Male genitalia as in figure 249a–b. Ventral margins of ninth tergum strongly oblique. Maui ..... **confusa** n. sp.

Thorax entirely brown, tinged faintly with yellow on the pleura. Ventral margins of ninth tergum nearly vertical (fig. 251a). Hawaii, Oahu, and probably Maui ..... **palmae** n. sp.

Scaptomyza (Bunostoma) anomala new species (fig. 246a–c).

This species fits near *S.* (*B.*) *hamata* n. sp., but the male genitalia are very different as shown in figures 246a–b and 250c–d.

MALE. *Head:* The lower portion of the front is yellow, the area between the ocellar triangle and the eye orbits is brownish red; in some specimens the entire upper portion of the front is brown, tinged with black. The ocellar triangle extends approximately level with the anterior reclinate bristles. The anterior reclinates are tiny, less than one-half as long as the proclinates, and situated slightly above the latter. The antennae are yellow; a faint tinge of brown is present on the dorsal surface of the second segment. The arista has five dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely shining black, rather lightly gray to gray-brown pollinose. Two rows of acrostichal setae are present on the mesonotum. The anterior dorsocentral bristles are situated almost in line with the suture. The anterior sternopleural bristle is almost one-half as long

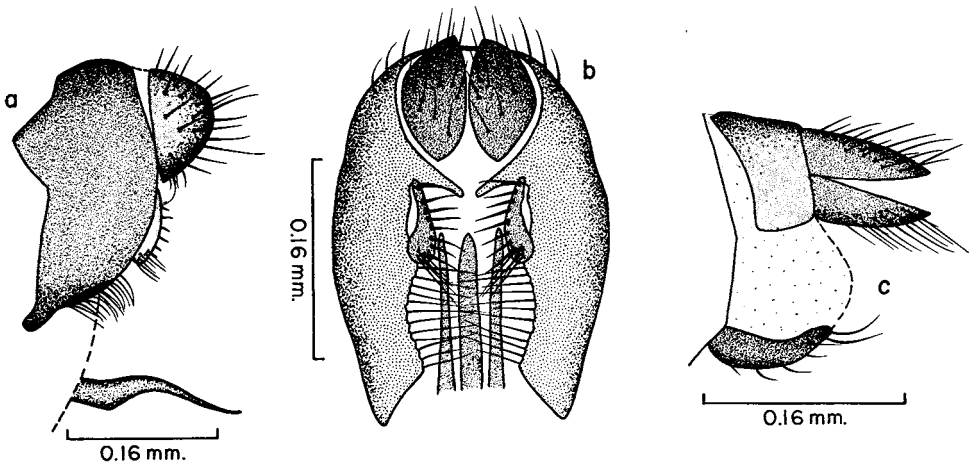


Figure 246—*Scaptomyza* (*Bunostoma*) *anomala* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral; **c**, female genitalia.

as the posterior bristle. Halteres yellow. *Legs:* Entirely yellow; the front basitarsus is about one-third as long as the tibia and approximately two times longer than the second tarsal segment. *Wings:* Hyaline. The third costal section is about three times longer than the fourth, and the costal fringe extends almost one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Polished black, rather faintly gray pollinose, especially on the basal four terga. The male genitalia are as in figure 246a–b. The claspers are wider than long and densely covered with short setae. A prominent projection extends from each inner apex of the ninth tergum and in front of the clasper (fig. 246b).

Length: body, 1.8–2.0 mm.; wings, 2.0–2.2 mm.

FEMALE. Fitting the description of the male except for sexual characters and except for being slightly larger. The outline of the ocellar triangle extends almost to the anterior margin of the front. The area of the front between the ocellar triangle and the eye orbits is predominantly shining brown to black. The ovipositor plates are tiny, as in figure 246c.

Length: body and wings, 2.3–2.5 mm.

Holotype male and allotype female: Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy). Approximately 100 paratypes (both sexes about evenly represented): from the following localities—same as type; Nualolo Valley, Kauai, 3,400 feet, July, 1952, and August, 1953 (D. E. Hardy); Mohihi River, Kauai, 3,500 feet, August, 1953 (D. E. Hardy); Alakai Swamp, Kauai, 4,000 feet, August, 1953 (D. E. Hardy); Halemanu Swamp, Kauai, August, 1953 (D. E. Hardy); Kalalau Lookout, Kauai, 4,000 feet, August, 1953 (D. E. Hardy); Kawaikoi Stream Kauai, 3,700 feet, August, 1953 (D. E. Hardy); Kaunuohua Ridge, Kauai, 4,000 feet, August, 1953 (D. E. Hardy); Kainamanu, Kauai, 2,000 feet, July, 1952 (D. E. Hardy); Poomau Valley, Kauai, 3,400 feet, July, 1952 (D. E. Hardy);

Kumuwela, Kauai, August 16, 1925, on *Pipturus* (O. H. Swezey); trail from Kokee to Kalalau, Kauai, August 15, 1925 (O. H. Swezey); Kula Pipeline, Maui, March 15, 1932 (O. Bryant); Kanaha Stream, Maui, 800 feet, Dec. 23, 1928 (E. H. Bryan, Jr.); Puu Nianiau, Maui, April, 1954 (M. Tamashiro); Haiku, Maui, February 22, 1929, in pineapple field (no collector given); Lanaihale, Lanai, 3,200 feet, June, 1953, and January, 1962, collected on vegetation (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Bunostoma) bryanti Hackman (fig. 247a–b).

Scaptomyza (Bunostoma) bryanti Hackman, 1959, Acta Zool. Fennica 97:48, fig. 29.

Endemic. Maui and Hawaii (type locality: Kula Pipeline). This species is rather common on the wet slopes of Haleakala, Maui, at elevations between 4,000 and 5,000 feet.

Type in the B. P. Bishop Museum.

This species is differentiated from other known Hawaiian *Bunostoma* which have two rows of acrostichal setae by having the femora discolored with brown, the area between the ocellar triangle and the eye orbits dark brown to black, and the male genitalia as shown in figure 247a–b.

A predominantly shining brown to black species, rather densely gray pollinose, especially on the thorax. The lower portion of the front is yellow to rufous, the portion between the eye orbits and the ocellar triangle is orange-brown to brown. The ocellar triangle is slightly longer than in *varifrons* (Grimshaw) and extends to a level approximately opposite the proclinate bristles. The anterior reclinates are small, less than one-half as long as the proclinates, and situated just slightly above the latter. The antennae are yellow, tinged with brown on the dorsal surfaces of the segments. The face, genae, palpi, and mouthparts are yellow. Each palpus has two apical bristles of subequal size. The clypeus is tinged with brown. Two moderately strong bristles are present at the upper edge of each vibrissal row. The thorax is shining black, rather densely grayish pollinose. The two rows of acrostichal setae extend from the anterior margin posteriorly to a level approximately opposite the second (posterior) supraalar bristles. The anterior dorsocentral bristles are situated just slightly behind the suture. The legs are predominantly dark-colored; the femora are brown, the coxae, tibiae, and tarsi are yellow, tinged with brown. The anal plates are slightly more than two times higher than long and are not pointed ventrally. The ninth tergum is broad, just slightly narrowed over the dorsal portion, and distinctly attenuated ventrally into a moderately slender anteroventral lobe on each side; this is densely covered with long hairs (fig. 247a). The claspers are almost square in shape; the apical portion is densely covered with short spines. From a ventral view the genitalia are as in figure 247b.

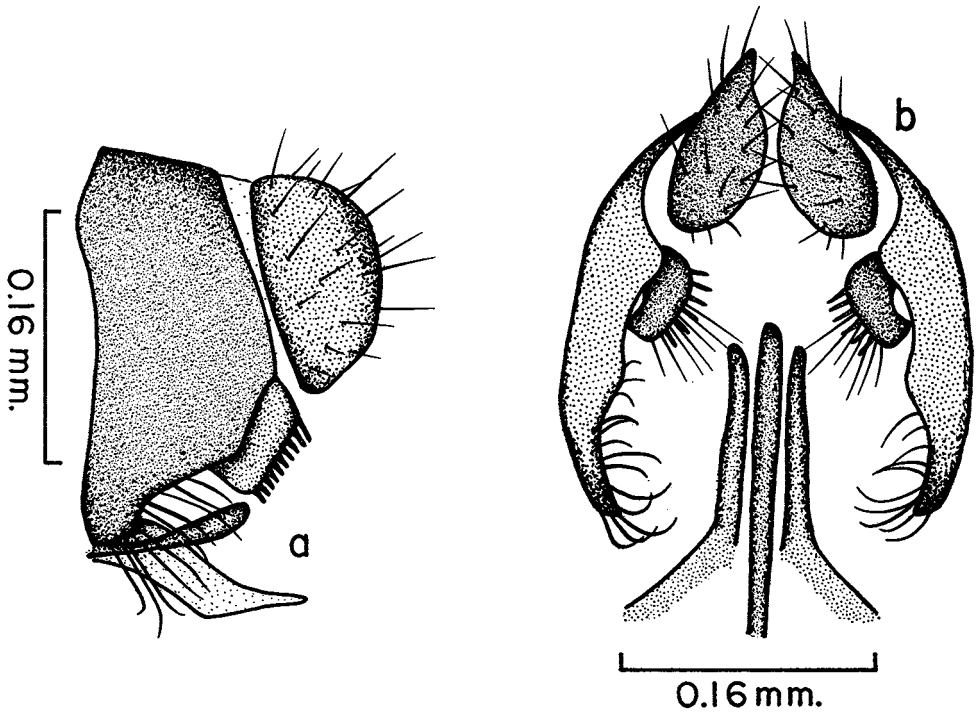


Figure 247—*Scaptomyza* (*Bunostoma*) *bryanti* Hackman: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

Length: body, 2.1 mm.; wings, 2.5 mm.

Scaptomyza (Bunostoma) cnecosoma new species (fig. 248a–b).

This species is readily differentiated from all other known *Bunostoma* by being entirely pale yellow, by having three pairs of dorsocentral bristles, and by the distinctive male genital characters (fig. 248a–b). This is an aberrant species, intermediate between the subgenera *Bunostoma* and *Rosenwaldia*, with the well-developed extra dorsocentral bristle of the latter and the head shape and arista of the former.

MALE. *Head:* Entirely yellow (including the appendages) except for the red compound eyes and for a faint tinge of brown in the area bordered by the ocelli. The head is just slightly higher than long; the longest diameter of the eye is vertical. The front is golden yellow in the median portion and yellow-gray on the orbits and on the ocellar triangle. The gena, measured at the lower margin of the eye from the vibrissal row to the eye margin, is about equal in width to three or four rows of eye facets. The uppermost bristle of the vibrissal row is approximately equal in size to the upper reclinate bristles of the front. One moderately strong apical bristle is present on each palpus. The face is distinctly

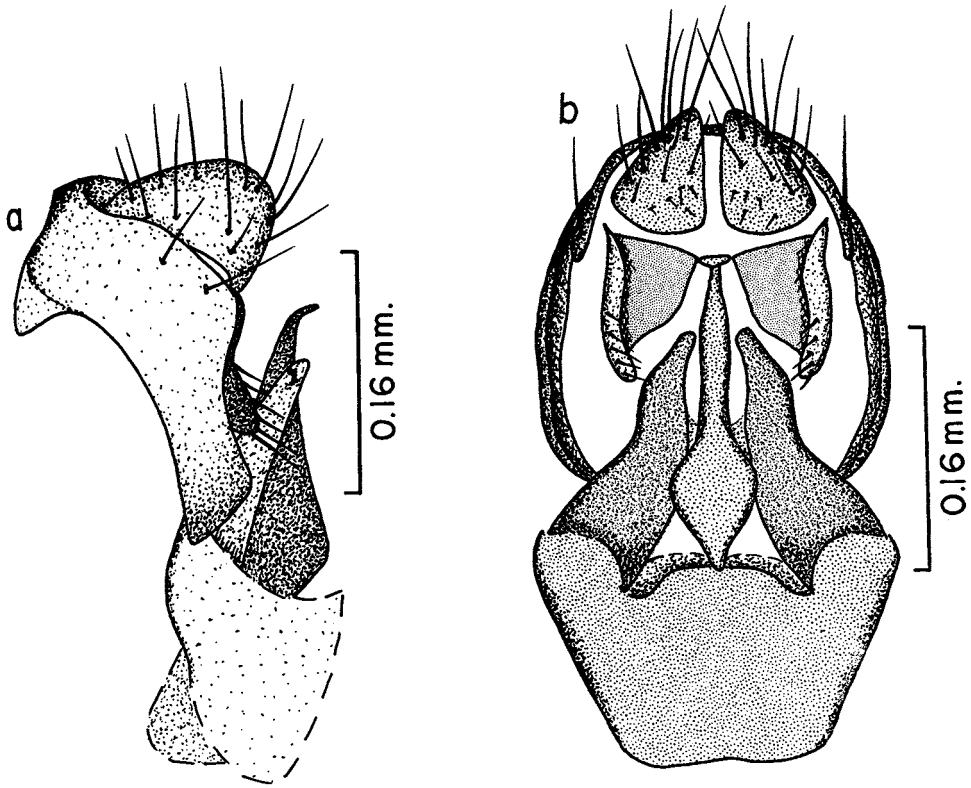


Figure 248—*Scaptomyza* (*Bunostoma*) *cnecosoma* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

carinate. The anterior reclinate bristles are nearly three-fifths as long as the proclinates and are situated slightly above the latter. The arista has three dorsal and two ventral rays in addition to the apical fork. *Thorax:* Entirely pale yellow. Four rows of acrostichal setae are present. An extra pair of well-developed dorsocentral bristles are situated at the suture; also an enlarged presutural seta is present in each dorsocentral row, this one-half to nearly two times larger than the other setae of the mesonotum. The median pair of dorsocentral bristles are situated about opposite the first supraalars. The anterior pair of dorsocentrals are approximately three-fifths as long as the median pair, and the median bristles are about two-thirds as long as the posterior pair. One strong humeral bristle is present. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely pale yellow except for a faint tinge of brown at the apices of the tarsi. The front basitarsus is about two-fifths as long as the tibia. *Wings:* Subhyaline, faintly infuscated with yellow. The third costal section is 3.4 times longer than the fourth, and the costal fringe extends approximately one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Entirely

yellow. The anal plates are almost as long as high; the ventral margins are not lobate. The ninth tergum is rather slender, about equal in length to the anal plates, and slightly attenuated apically. The claspers are rather inconspicuous, distinctly dentate on the hind margins (fig. 248a). The parameres are well developed and are conspicuous from a lateral as well as from a ventral view. The aedeagus is slender, slightly enlarged apically (fig. 248b).

Length: body, 1.55 mm.; wings, 1.80 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor is fleshy, not noticeably sclerotized.

Length: body and wings, 1.9–2.0 mm.

Holotype male: near Waimanalo, Oahu, May, 1952 (D. E. Hardy). One paratype male: Nuuanu, Oahu, April 21, 1918, *ex* vegetable garden (E. H. Bryan, Jr.). Allotype female and four male paratypes: from Laysan Island, Hawaii, June 17, 1962 (J. W. Beardsley).

Type and allotype in the B. P. Bishop Museum. Paratypes in the Hawaiian Sugar Planters' Association and the University of Hawaii collections.

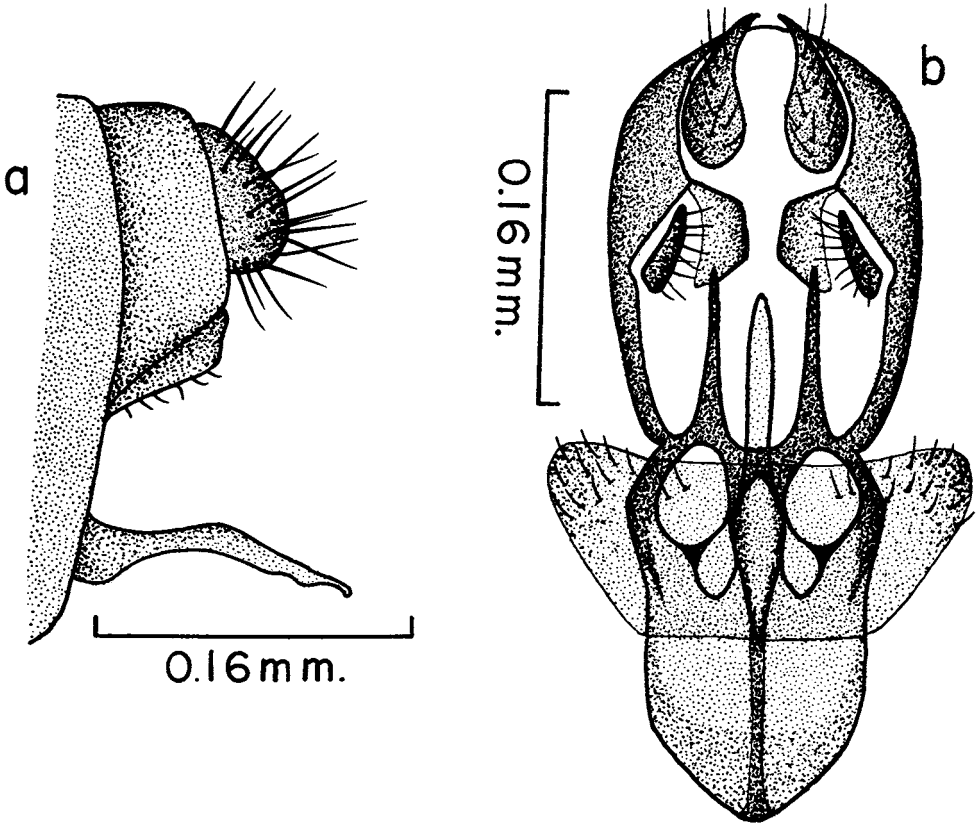


Figure 249—*Scaptomyza* (*Bunostoma*) *confusa* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Scaptomyza (Bunostoma) confusa new species (fig. 249a–b).

This species very closely resembles *S. (B.) xanthopleura* except that four distinct rows of acrostichal setae are present on the mesonotum. I see no other ways to differentiate the two species, and *confusa* may be a subspecies or possibly a synonym of *xanthopleura*. The genitalia are as in figure 249a–b.

Length: body, 1.8 mm.; wings, 2.0 mm.

FEMALE. Unknown.

Holotype male and one male paratype: from Puu Kukui, Maui, 3,000–4,500 feet, June, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Scaptomyza (Bunostoma) hamata new species (fig. 250a–d).

This species fits near *S. anomala* n. sp., but the genitalia are very different as shown in figures 246a–b and 250c–d. It is readily separated by the short broad claspers of the male and the hook-like projection at the base of the aedeagus.

MALE. *Head:* The lower half of the front, below a level with the proclinate bristles, is pale yellow; the portion between the ocellar triangle and the eye orbits is yellow, tinged with brown, and covered with yellow-brown pollen. The ocellar triangle and the upper eye orbits are dark brown to black; the orbits are covered with gray-brown pollen. The ocellar triangle is shining on the front and median portion, pruinose on the sides; the triangle extends approximately to a level with the anterior reclinate bristles. The anterior reclinate bristle is tiny, slightly less than one-half as long as the proclinate, and situated distinctly above the latter. The genae, face, mouthparts, and palpi are pale yellow. Each palpus has two apical bristles of subequal size. Two moderately strong bristles are present at the upper edge of each vibrissal row. The antennae are entirely yellow; the arista has four dorsal rays and two ventral rays in addition to the apical fork (fig. 250a). *Thorax:* Entirely dark brown to black, covered with gray pollen on the sides, and brownish gray on the dorsum. Two rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly behind the suture. The humeral bristle is approximately equal in size to the postalar bristle. The anterior sternopleural bristle is about one-half the size of the posterior bristle. *Legs:* Entirely yellow; the front basitarsus is approximately one-fourth as long as the tibia and about one-half longer than the second tarsal segment (fig. 250b). *Wings:* Hyaline. Third costal section three times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Shining brown to black in ground color, gray-brown pollinose on the first four terga. The male genital characters are as in figure 250c–d. The claspers are approximately four times wider than long; the aedeagus has a prominent ventral hook near its base.

Length: body, 1.8 mm.; wings, 2.0 mm.

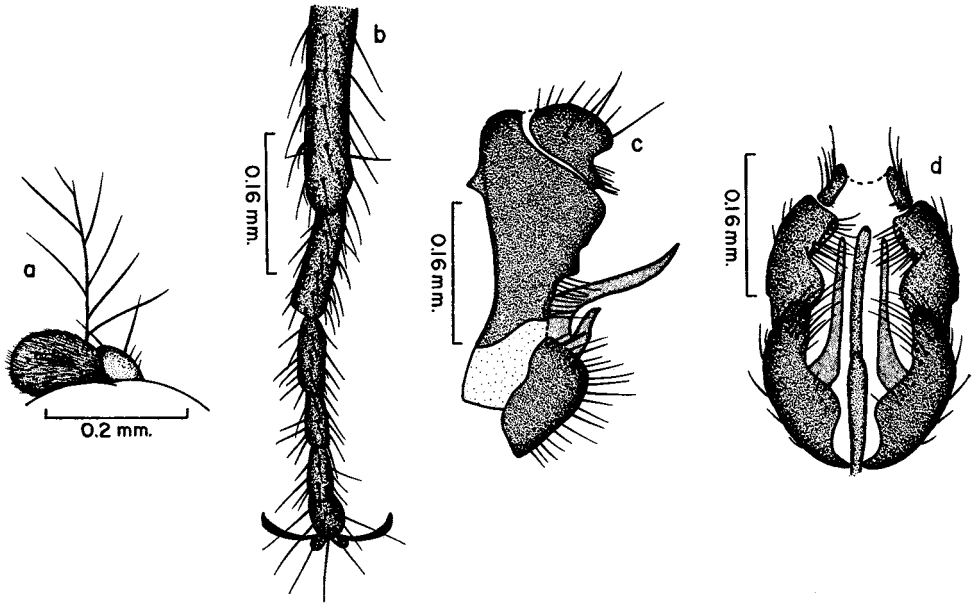


Figure 250—*Scaptomyza* (*Bunostoma*) *hamata* n. sp.: **a,** antenna; **b,** front tarsus; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

FEMALE. Fitting the description of the male except for the sexual characters. I see no way to separate the female from that of *anomala*, and an allotype is not being designated.

Holotype male: Halemanu Swamp, Kauai, August, 1953 (D. E. Hardy). Nineteen paratypes (predominantly males) from the following localities in the Kokee area of Kauai: same as type; Nualolo Valley, August, 1953, 3,400 feet (D. E. Hardy); and Waipoo Falls, August, 1953 (D. E. Hardy).

Type and some paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Bunostoma) palmae new species (fig. 251a–e).

This species fits near *S.* (*B.*) *confusa* n. sp. by having four rows of acrostichal setae on the mesonotum. It is readily differentiated by having the entire thorax yellow-brown and the ventral margins of the ninth tergum nearly vertical. The genitalia differ in other respects as shown in figures 249a–b and 251a–b.

MALE. *Head:* Almost square as seen from direct lateral view; the front is slightly oblique. The front is entirely yellow, except for a tinge of brown to black on the orbits above the proclinate bristles. The ocellar triangle is brown, gray pollinose on the sides. The ocellar triangle extends scarcely beyond a level with the upper reclinate bristles. The occiput is brown, tinged with yellow on the upper two-thirds, pale yellow below. The genae, face, clypeus, palpi, and mouth-

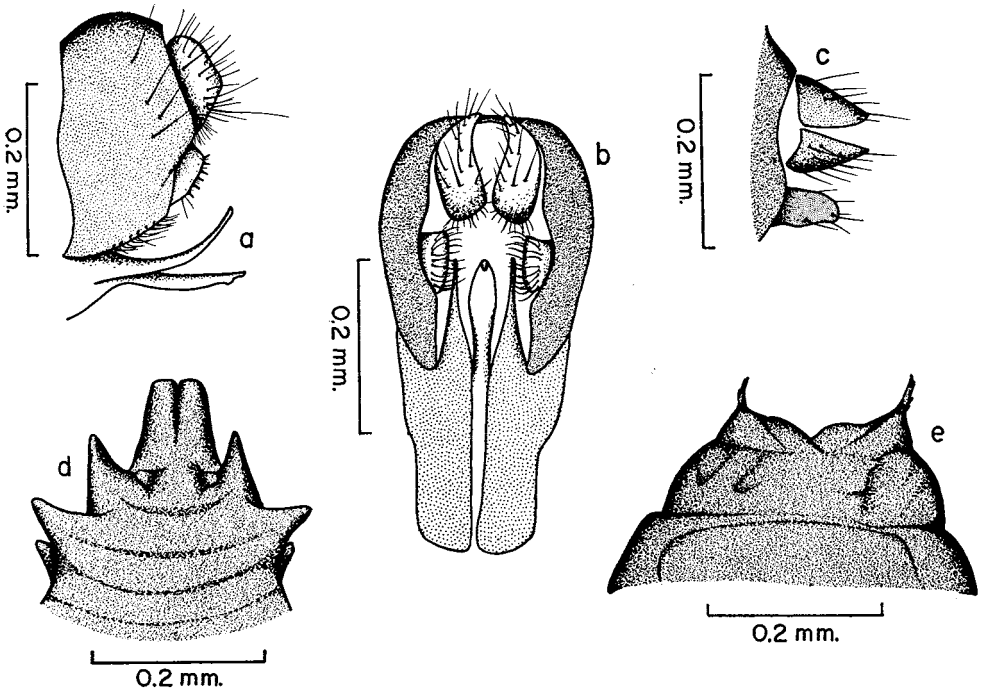


Figure 251—*Scaptomyza (Bunostoma) palmae* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral; **c,** female genitalia; **d,** posterior end of puparia; **e,** anterior end of puparia.

parts are yellow. The gena, measured at the lower margins of the eye, is rather narrow, less than one-eighth the vertical diameter of the eye. The face has a rather prominent keel extending down the median portion. The palpus has one small apical bristle plus two black setae on the outside surface. Two moderate bristles are present on the upper edge of each vibrissal row; these are equal or slightly larger than the genal bristle. The anterior reclinate bristle is about one-half as long as the proclinate and is situated just slightly above the latter. The antennae are yellow, tinged faintly with brown on the dorsal surface of the second segment. The arista has four dorsal and two ventral rays in addition to the rather small apical fork. *Thorax:* Entirely brown, tinged with yellow, and covered with yellow-gray pollen. Four distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about halfway between the first supra-alars and the suture. One strong humeral bristle is present. The anterior sternopleural bristle is one-half to three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front tibiae and tarsi have erect setae extending down the dorsal surfaces. The front basitarsus is approximately one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices

of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Entirely brown, tinged with yellow on the sides of the first four terga. The anal plates are two times higher than long. The ninth tergum is broad; the ventral margin is slightly oblique. The claspers are short and narrow, four or more times longer than wide (fig. 251a). The parameres and aedeagus are plainly visible from a lateral view. As seen from a ventral view the aedeagus is flattened, almost oar-shaped on the apical portion. Refer to figure 251b for the ventral aspects of the genitalia.

Length: body and wings, 1.8–2.0 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor blades are distinctly developed, slender, slightly longer than the anal plates (fig. 251c).

Length: body, 2.10 mm.; wings, 2.25 mm.

The posterior end of the puparium has eight prominent tubercles around the base of the short breather tubes (fig. 251d). The anterior end of the puparium is shaped as in figure 251e.

Holotype male and allotype female: "reared from palm," Volcano, Hawaii, April 26, 1916 (J. F. Illingworth). Seventeen paratypes (seven males, ten females): from the following localities—same as type; Glenwood, Hawaii, December 23, 1914, reared from native plant, 4,000 feet (J. F. Illingworth); Mt. Kaala, Oahu, April, 1946 (W. W. Wirth), and April, 1953 (D. E. Hardy); Tantalus, Oahu, December, 1904, January, 1905 (W. M. Giffard), and August, 1952 (D. E. Hardy); Castle Trail, Oahu, September, 1931, on *Hibiscus* (E. H. Bryan, Jr.); and "Honolulu Mts.," Oahu, 1,800 feet (no date or collector given). Also one specimen, in poor condition (sex not known), from Nr. Puu Luau, E. Maui, 5,500 feet, on *Metrosideros*, April 29, 1945 (E. C. Zimmerman), appears to belong here, but is not being designated as a paratype. Also two male paratypes, "Ex flowers native plants," 4,200 feet, Hawaii, April 26, 1916 (probably collected in the Kilauea area), (J. F. Illingworth).

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Bunostoma) varifrons (Grimshaw) **new combination** (fig. 252a–b).

Drosophila varifrons Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :71.

Scaptomyza (*Bunostoma*) *cordigera* Hackman, 1959, Acta Zool. Fennica 97:47. **New synonym.**

Endemic. Oahu (type locality: Kaala Mountain). I have studied the type and have compared a series of specimens from Mount Kaala and from other Oahu areas in both Waianae and Koolau mountains.

Type in the British Museum (Natural History).

This species is related to *S.* (*B.*) *anomala* n. sp. and is differentiated by the genital characters of the male. The square clasper (fig. 252a) and black apical projections at the inner edges of the ninth tergum will readily separate *varifrons.*

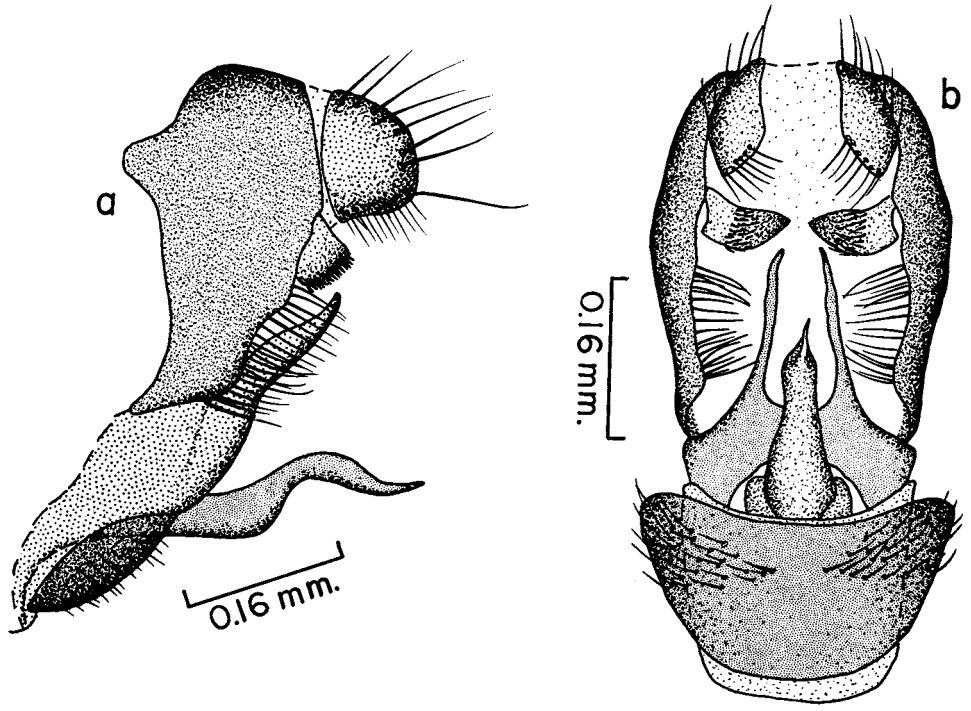


Figure 252—*Scaptomyza* (*Bunostoma*) *varifrons* (Grimshaw): **a**, male genitalia, lateral; **b**, male genitalia, ventral.

A predominantly polished black species closely resembling other *Bunostoma* which have the thorax entirely dark-colored and the legs yellow. I am unable to find any diagnostic characters for separating the species except those of the male genitalia. The face, genae, palpi, and mouthparts are pale yellow. Each palpus has two subequal apical bristles. The antennae are yellow. The lower portions of the front, below the level with the proclinate bristles, is yellow; the eye orbits above the proclinate bristles and the ocellar triangle are shining black, and the area between the ocellar triangle and the orbits is brownish red. The vertex is pruinose on each side of the ocellar triangle. Hackman, in the original description of the type female of *cordigera*, used the length of the frontal triangle as a diagnostic character, indicating that the triangle extends to a level with the "anterior proclinate" bristles. (I presume he means the proclinate bristles.) In the female specimens, the outline of the triangle, not necessarily the blackened portion, extends approximately level with the proclinate bristles. In the male, however, it is slightly shorter. In the female the third antennal segment is often tinged with brown. For the details of the genital characters, refer to figure 252a–b.

Length: body, 2.0–2.2 mm.; wings, 2.2–2.5 mm.

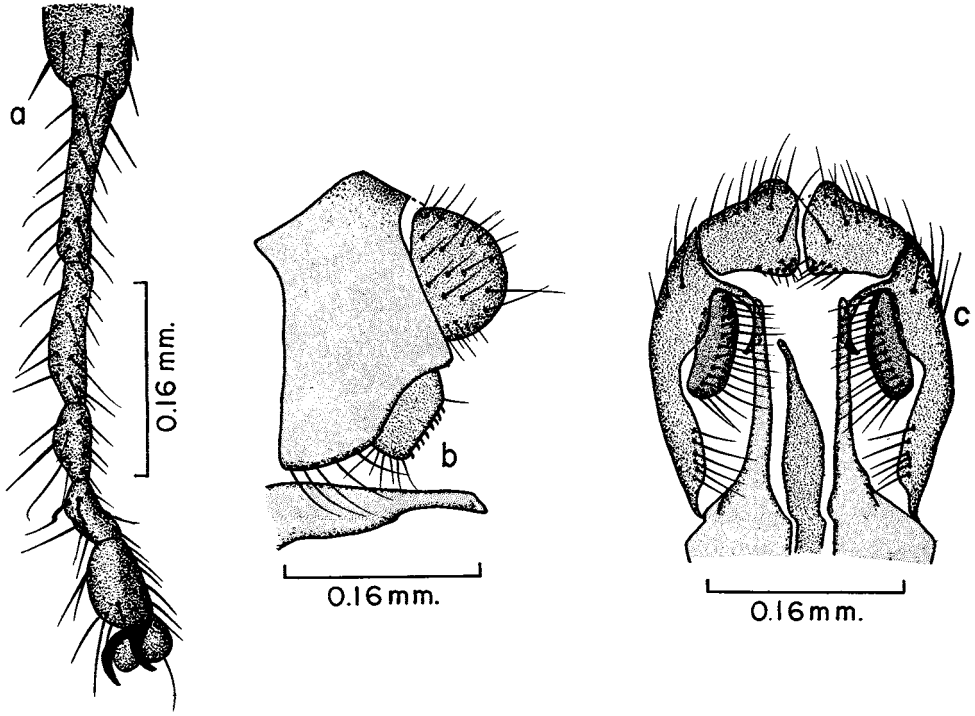


Figure 253—*Scaptomyza* (*Bunostoma*) *xanthopleura* n. sp.: **a,** front tarsus; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

Scaptomyza (Bunostoma) xanthopleura new species (fig. 253a–c).

This species is readily recognized from all other known Hawaiian *Bunostoma* by having the pleura yellow. Also the male genitalia are distinctive as shown in figure 253b–c.

MALE. *Head:* The lower portion of the front is yellow; the portion between the ocellar triangle and the eye orbits is yellow, tinged with brown, and densely covered with yellow-brown pollen. The eye orbits and the ocellar triangle are shining black, lightly gray-brown pollinose, except for the sides of the ocellar triangle which are distinctly pruinose. The ocellar triangle extends to a level approximately opposite the proclinate bristles. The anterior reclinate bristle is scarcely over one-third as long as the proclinate and is situated just slightly above the latter. The antennae are yellow, tinged faintly with brown on the dorsal surfaces. The arista has four dorsal and two ventral rays in addition to the apical fork. *Thorax:* Dark shining brown to black on the dorsum, covered with gray-brown pollen; almost entirely yellow on the pleura and on the sides, tinged with brown on the upper portions of the mesopleura and pteropleura. Two rows of acrostichal setae are present. The anterior dorsocentral bristles are situated near the suture. A distinct secondary bristle (seta) is present on the lower portion of each humerus; this is almost one-half as long as the humeral

bristle. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow; the front tarsi are densely covered with erect dorsal setae (fig. 253a). The basitarsus is about one-third as long as the tibia. *Wings:* Entirely hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends approximately one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately two times longer than the penultimate section. *Abdomen:* Shining brown to black, dusted with gray-brown pollen on the first four terga. The claspers are short, nearly three to four times wider than long (fig. 253b). The inner apical edge of the ninth tergum is developed inwardly on each side into a flap-like structure extending behind the claspers as in figure 253c. The aedeagus is straight or nearly so, not strongly curved, and lacks a ventral hook-like process.

Length: body, 1.8 mm.; wings, 2.0 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor blades consist of a pair of tiny black lobes which are scarcely visible *in situ*.

Holotype male and allotype female: Kolekole Pass, Oahu, July, 1958, reared from bracket-type fungus (K. Sakimura). Twelve paratypes (seven males, five females): from the following localities—same data as type; Maunawili, Oahu, February, 1953 (D. E. Hardy); Mount Kaala, Oahu, April, 1949 (G. B. Mainland); Waimanalo, Oahu, January 22, 1951 (D. E. Hardy); Honolulu, Oahu, February 21, 1951 (R. Vandenbosch); Waianae, Oahu, June, 1949 (D. E. Hardy); Waipio, Oahu, February 14, 1953 (C. P. Hoyt); one specimen labeled only "Honolulu, Oahu"; and Waipio, Oahu, May, 1955, light trap (J. Beardsley).

One female specimen on hand from Kawaikoi Stream, Kauai, 3,700 feet, August, 1953 (D. E. Hardy), appears to belong here but is not being designated as a paratype.

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and University of Hawaii.

Scaptomyza (Bunostoma) species A.

Hackman, in his discussion of the subgenus *Bunostoma* (1959:47), referred to an undescribed species represented by a single male specimen from Hilo, Hawaii, which differed from other Hawaiian *Bunostoma* by having four rows of acrostichal setae. He indicated that the male genitalia were similar to those of *B. australis*. The genital preparation was, however, accidently lost, and he did not describe this species. He did indicate that it was closely allied to "*cordigera*" (= *varifrons* (Grimshaw)) from Oahu. Four female specimens are on hand which agree with *varifrons* except that they have four rows of acrostichal setae on the mesonotum. I have not seen a male which fits here (pleura black); the specimens from Maui which have four rows of acrostichal setae differ by having the pleura yellow.

Subgenus **EXALLOSCAPTOMYZA new subgenus**

(From the Greek *ex,* out of or from, combined with *alloscaptomyza.* Gender feminine.)

One species is known from Hawaii, "*Drosophila mauiensis* Grimshaw," which does not fit in any of the subgenera which have been proposed to date, and it appears necessary to erect a new subgenus to contain this species. In Hackman's key (1959:8), it runs to *Hemiscaptomyza* Hackman. However, it differs from Hackman's diagnosis of *Hemiscaptomyza* in a number of ways: especially, by lacking the bristle-like spine on the hind trochanter and by having the female ovipositor plates fused on both ends with an oblong opening between (fig. 254e); by the more posteriorly placed upper reclinate bristles; the more closely spaced anterior and posterior reclinate bristles; the very short rays on the arista; the short anterior dorsocentral bristles; the very short sternopleural bristles (in general, the body bristles are considerably shorter than normal, less than half as long as is typical for *Scaptomyza*); and by the male and female genital characters as shown in figure 254c–f. Some or possibly all of these characters may be of subgeneric importance or they may be merely specific characters. This is differentiated from other *Scaptomyza* in Hawaii by having two well-developed humeral bristles, as well as by the details mentioned above. The species closely resembles a *Drosophila,* and has, of course, been confused in that genus in the past. It is differentiated by having only four rows of acrostichal setae.

Type of the subgenus: *Drosophila mauiensis* Grimshaw.

Scaptomyza (Exalloscaptomyza) mauiensis (Grimshaw) **new combination**
(fig. 254a–f).

Drosophila mauiensis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :67.

Endemic. Maui (type locality: Iao Valley), Molokai, Kauai, Hawaii, and Oahu (the latter four are new island records).

Type in the British Museum (Natural History). I have studied the type, the allotype, and one homeotypic male from Keanae, Maui, July, 1953 (C. R. Joyce); also a series of specimens from several localities on the above-mentioned islands. Some specimens have been collected in *Ipomoea* blossoms.

A small, dark-colored species differentiated from all other known Hawaiian *Scaptomyza* by the subgeneric characters given above, particularly by the very short rays on the arista (fig. 254a) and short head and body bristles. The front is almost entirely black, covered with gray-brown pollen especially down the orbits and around the ocellar triangle; the extreme lower margin of the front is yellow. Measured from the upper ocelli to the front margin, the front is slightly longer than wide. The anterior reclinate bristle is one-half to three-fifths as long as the proclinate and is situated one-half to three-fifths the distance between the proclinate and the upper reclinate bristles. The face is yellow with a slight tinge of brown and has a strong but narrow carina down the median portion. The palpi are yellow, devoid of distinct bristles, but with a few black setae around

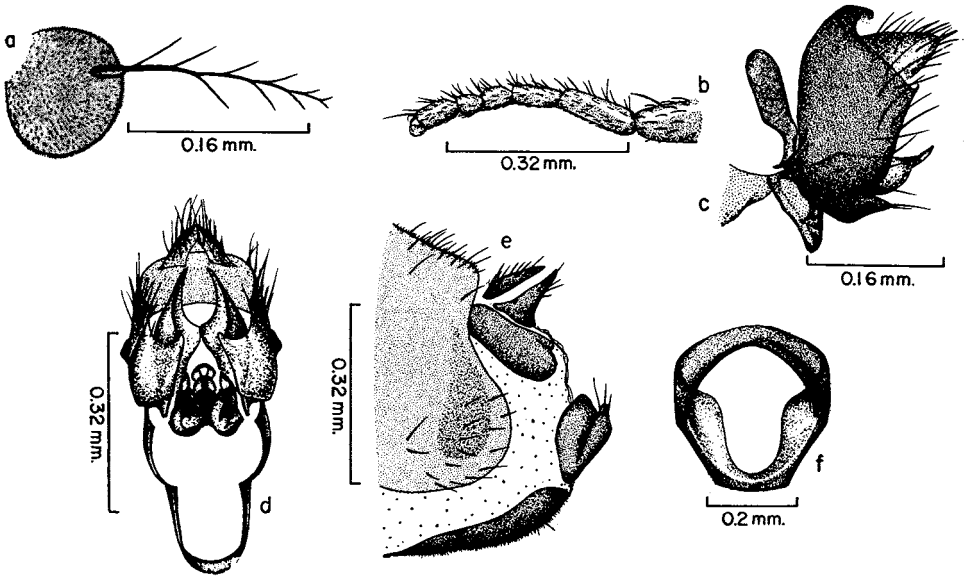


Figure 254—*Scaptomyza* (*Exalloscaptomyza*) *mauiensis* (Grimshaw): **a,** antenna; **b,** front tarsus; **c,** male genitalia, lateral; **d,** male genitalia, ventral; **e,** female genitalia, lateral; **f,** ventral of female ovipositor.

the ventral margin. One black bristle is present at the upper edge of each vibrissal row; this is about equal in size to the anterior reclinate bristle. The antennae are brown, tinged with yellow on the first two segments. The arista has four to five short dorsal and two ventral rays in addition to a small apical fork; the longest hairs of the arista are about one-third to one-fourth the width of the third antennal segment (fig. 254a). The head bristles are small compared to those of other *Scaptomyza*. The thorax is entirely dark brown to black, moderately covered with brownish gray pollen. The dorsocentral bristles are rather short, only three to four times longer than the acrostichal setae; the anterior pair is situated about opposite the first pair of supraalars. Four rows of acrostichal setae extend almost the full length of the mesonotum. Two pairs of humeral bristles are present; the lower bristle is three-fifths as long as the upper. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle, both are small, rather inconspicuous; the larger of the two is about the same size as the vibrissal bristle. The halteres are bright yellow. The femora are dark brown to black. The hind tibiae are yellow-brown; the other tibiae and all tarsi are yellow. The front tarsus has rows of short, erect hairs on the dorsal surface; the length of the hairs is less than the width of the tarsus. The basitarsus is about one-third as long as the tibia (fig. 254b). The wings are entirely hyaline. The veins are yellow, very faintly tinged with brown. The costal fringe extends one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 2.6 times longer than the fourth. The last section of vein M_{1+2} is 1.44

times longer than the penultimate section. The last section of vein M_{3+4} is about one-third longer than the m crossvein. The abdomen is subshining, lightly brownish pollinose. The first two terga are brown; the third tergum is largely brown and yellow, lightly tinged with brown on the apex and in the middle; terga four to six are entirely yellow. The sternum and the visible portion of the genitalia are yellow, except for a light tinge of brown on the cerci. The genitalia are very distinctive as shown in figure 254c–d. In the male the anal plates are rather narrow—only about one-third as wide as the ninth tergum. The claspers are produced into a slender posteriorly directed lobe, a lobate process on each side of the aedeagus projects beyond the bases of the claspers, and the aedeagus is very elongate. The female ovipositor plates are heavily sclerotized (fig. 254e), black in color, and are fused on each end leaving an oval opening between (fig. 254f).

Length of male: body, 1.60–1.80 mm.; wings, 1.75–2.00 mm.

Length of female: body, 2.00–2.25 mm.; wings, 2.20–2.40 mm.

Subgenus PARASCAPTOMYZA Duda

Parascaptomyza Duda, 1924, Arch. Naturgesch. 90 A (3) :203.

Hendel (1928) placed *Parascaptomyza* as a synonym of *Scaptomyza*, and Duda (1935:49) treated it as a subgenus of *Scaptomyza*. There has been much confusion in the past concerning the placement of this group due largely to the different interpretations of the type species, *Drosophila graminum* Fallén. (Refer to Duda 1935:55–58; Collin, 1953:148–149; and Frey, 1954:19.) Hackman (1955 and 1959) has revised the concepts of *Parascaptomyza* and has placed the group on a firm basis as a subgenus of *Scaptomyza*.

According to Hackman's diagnosis (1959:14), the members of this genus are characterized by having one prominent humeral bristle, the acrostichal setae arranged in two to four rows, the ventral branches of the arista varying from zero to two (usually one or two branches present), distinct paralobes of male genitalia (secondary claspers) present, and the ovipositor guides weakly developed and rarely (*latifrons* Malloch) with marginal teeth.

In view of the unusual range of differences found in the male genitalia of members of the genus *Scaptomyza* in Hawaii, I am accepting only *Scaptomyza pallida* Zetterstedt under the subgenus *Parascaptomyza*. In dealing with Hawaiian species it does not appear to be practical to use the presence or absence of secondary claspers (paralobes) as a subgeneric character. In various species of our *Trogloscaptomyza*, varying degree of development of secondary lobes are found arising from the anal plates (figs. 263d, 266d, and 277b) and from the posteroventral margins of the ninth tergum (figs. 270a, 281b, and 292c). I am not using the commonly employed term "secondary clasper" in referring to these lobes, but would prefer to use this term only for those distinctly clasper-like lobes (such as found in *pallida*) which bear strong spines (fig. 255b).

In dealing with the Hawaiian species, I would modify the concept of *Parascaptomyza* to include those species which have a ventral ray in addition to the apical fork on the arista, the head about as high as long and not wider than the thorax, only two rows of acrostichal setae present, and, also, the male genitalia with a conspicuous secondary clasper which bears heavy spines (fig. 255b).

Type of the subgenus: *Drosophila pallida* Zetterstedt (= *Scaptomyza disticha* Duda).

Scaptomyza (Parascaptomyza) pallida (Zetterstedt) (fig. 255a–d).

Drosophila pallida Zetterstedt, 1847, Dipt. Scand. 6:2571.

Scaptomyza disticha Duda, 1921, Jahresh. d. ver. f. Schles. Insektenk. Breslau 13:64.

Scaptomyza graminum of authors, *nec* Fallén.

Probably common on all the islands. The earliest collection record is from the Kilauea area, Hawaii, 1925.

Immigrant. A cosmopolitan species, widely distributed throughout the world.

Type locality: Scandinavia.

Type at Lund, Sweden.

As discussed by Hackman (1959:41–42), this species has been badly confused in the literature. Most of the American authors and several Europeans have treated this under the name *Scaptomyza graminum*. Hackman points out that "Fallén's type series of *graminum* contained two species, a mainly saprophagous one with two rows of acrostichal hairs (= *pallida* Zett. = *disticha* Duda) and a leafmining one with four rows (*graminum* Fallén *sensu* Collin). Unfortunately a co-type belonging to the latter species was selected as a lectotype by Collin. If a specimen of the former species had been selected, much confusion would had [*sic*] been avoided." Hackman said that the identity of *Drosophila pallida* with *disticha* Duda (*graminum* Frey, 1954, nec Fallén) had recently been confirmed by Basden "who has selected a lectotype of *pallida*. Zetterstedt's name *pallida* has priority over *disticha* Duda, 1921. There is, however, another still older name to be considered: Seguy (1934) lists *Diastata claripennis* Macquart, 1835, as a synonym of *graminum* = *pallida* Zett., but this identification has not been confirmed by genital preparations, and it seems to me unwise to introduce the name *claripennis* and I am using the name *pallida* Zetterstedt."

As noted by Hackman (1959:42) and others, *S.* (*P.*) *pallida* occurs in a gray and a yellow form, with the gray form occurring predominantly through the temperate and northern regions and the yellow form being predominantly tropical in distribution. Stalker (1945) has shown experimentally that the color differences are at least partially dependent upon temperature. Specimens from Hawaii are predominantly yellow, rather lightly covered with gray pollen. They have been collected from sea level to 8,000 feet elevation, but I see no differences in coloration. Some specimens are darker than others, but there seems no consistency which can be tied in with elevation. The arista has four dorsal and one ventral ray in addition to the apical fork (fig. 255a). The front is predominantly

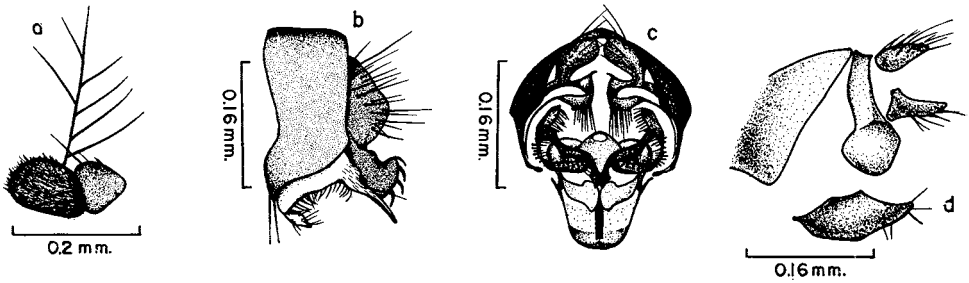


Figure 255—*Scaptomyza* (*Parascaptomyza*) *pallida* (Zetterstedt) : **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral; **d,** female genitalia.

yellow. The orbits and the area surrounding the ocellar triangle are tinged with brown in ground color, covered with gray pollen. The face is yellow and has a distinct median keel. The palpi are yellow; each has a moderately strong apical bristle. The strong bristle at the upper edge of each vibrissal row is about equal in size to the upper reclinate bristles. The thorax is yellow, tinged with brown in the ground color, more darkly tinged in some specimens than in others. The thorax is predominantly gray pollinose; a subshining, faintly pollinose vitta extends the entire length of the mesonotum between the acrostichal rows. Two rows of acrostichals extend the entire length of the mesonotum. The median area and the sides of the mesonotum are more distinctly brown in color and the areas between the acrostichal rows and the dorsocentral rows are distinctly paler in color. The abdomen is predominantly yellow to rufous, tinged with brown. Segments five and six are polished black. The male genitalia are as in figure 255b–c. Well-developed secondary lobes are present on the ventral aspects of the anal plates. Each clasper has a well-developed apicoventral lobe, and the inner margin is densely haired. Each clasper bears a strong spine-like projection on the dorsoapical edge. The female ovipositor is sclerotized, brown, about three-fourths to four-fifths as long as the lower margin of the seventh tergum, pointed at apex, and with several short teeth around the apex (fig. 255d) .

Length: body, 2.0–2.5 mm.; wings, 2.3–2.7 mm.

Subgenus **ROSENWALDIA** Malloch

Rosenwaldia Malloch, 1935, B. P. Bishop Mus. Bull. 114:195.

This subgenus would have previously fit the concept of *S.* (*Trogloscaptomyza*) Hackman; but, as has been pointed out in a recent paper by Hackman (1962:33–39) , this appears to represent a distinct group of closely related species which is distinguished by a strong presutural dorsocentral bristle and a head which is characteristically flattened, longer than high, and with the front and the eyes strongly oblique (fig. 257a) . The arista has two dorsal rays, and the type of the subgenus possesses one short ventral ray (this is lacking in the Hawaiian species).

Two to four rows of acrostichal setae are present, and the mesonotum usually has dark stripes along the dorsocentral rows. The genital characters in both sexes are similar to those of *Trogloscaptomyza*.

The type of the subgenus was described from the Marquesas Islands. Six Hawaiian species fit in this subgenus: *finitima* n. sp., *mediopallens* Hackman, *striatifrons* Hackman, *abrupta* Hackman, *mitchelli* Hackman, and *aloha* Hackman. A key to the species was presented by Hackman (1962:34–36).

Type of the subgenus: *Rosenwaldia kaavae* Malloch.

KEY TO THE KNOWN SPECIES OF SCAPTOMYZA (ROSENWALDIA) MALLOCH IN HAWAII

1. Acrostichal setae arranged in two rows. Mesonotum with a broad pale gray median vitta between the dorsocentral rows and continuing on to the scutellum. Hawaii ..... **mediopallens** Hackman.
Acrostichal setae in four rows. Mesonotum pattern not as above 2

2(1). Front with a distinct dark median stripe extending from the ocellar triangle to the front margin. Eye orbits grayish, rather pale. Mesonotum with a narrow, slightly darker median vitta. Male genitalia as in figure 259b–c. Kauai ..... **striatifrons** Hackman.
Front lacking a distinct dark median stripe continuous onto the ocellar triangle. Mesonotum not distinctly vittate as above. Male genitalia differing from above 3

3(2). Front entirely yellow or reddish, including the orbits, and usually the ocellar triangle 4
Upper portion of front brown to black. Male genitalia as in figure 256a–b. Maui ..... **abrupta** Hackman.

4(3). Claspers large, two times longer than the anal plates, and distinctly longer than high (figs. 256c and 258b). Pleura and palpi yellow. Extra dorsocentral bristles well developed 5
Claspers smaller than anal plates and about as high as long (fig. 257b). A dark brown longitudinal band extends over the upper half of each pleuron. Oahu ..... **finitima** n. sp.

5(4). Apical portion of clasper comparatively slender as in figure 256c. Aedeagus attenuated at apex. Molokai ..... **aloha** Hackman.

Clasper concave on hind margin, apical portion rather broad (fig. 258b). Aedeagus blunt at apex (fig. 258c). Maui and Hawaii..... **mitchelli** Hackman.

Scaptomyza (Rosenwaldia) abrupta Hackman (fig. 256a–b).

Scaptomyza (Trogloscaptomyza) abrupta Hackman, 1959, Acta Zool. Fennica 97:37, fig. 6.

Scaptomyza (Rosenwaldia) abrupta Hackman, 1962, Notulae Ent. 42:36.

Endemic. Maui (type locality: Haleakala Crater). Known only from the type. Type in the B. P. Bishop Museum.

Fitting near *S. mitchelli* Hackman but differentiated by the male genitalia as shown in figure 256a–b and by having the upper portion of the front dark-colored.

This species is similar to *S. (R.) striatifrons* Hackman and differs mainly in body coloration and male genital characters. The head is less flattened than in *striatifrons*; the longest diameter of the eye forms about a 30° angle with the frontal plane. The black ground color of the ocellar triangle extends over the area immediately surrounding the triangle, the anterior median portion of the front is orange with a faint tinge of brown, the lower two-thirds to three-fourths of the orbits are gray. The occiput is predominantly brown to black in ground color; only the lower one-third to one-fourth is yellow. The antennae are yellow, tinged with brown on the second segment. The arista has two dorsal rays plus the large apical fork. The palpi are yellow; each has two unequal apical bristles. The width of the gena is equal to about one-sixth or one-seventh of the eye height. The strong bristle at the upper edge of each vibrissal row is about equal in size to the anterior reclinate bristle. Three pairs of dorsocentral bristles are present; the presutural bristles are about half the size of the postsutural bristles. A narrow, brown vitta extends down each dorsocentral row, and the posterior third of the mesonotum is pale brown in ground color covered with gray pollen. Four rows of presutural acrostichal setae are present; two rows extend between the posterior two pairs of dorsocentral bristles. The humeral bristle is about equal in size to the anterior notopleural bristle. The pleura and the metanotum are predominantly brown, tinged with yellow in the ground color, and rather densely gray pollinose. The legs are entirely yellow except for the brown to black apical joints of the tarsi. The wings are hyaline. The costal fringe ends about one-fourth to one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about three times longer than the fourth, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section. The abdomen is yellow-brown, more distinctly yellow at the bases of the terga. The ninth tergum of the male is about two times longer than the cerci (longitudinal length), tapers gradually on the ventral portion, and has a short appendage produced on the posteroventral edge (fig. 256a). The claspers are developed rather similarly to those of *striatifrons*, except that the upper portion is much larger than the lower (fig. 256b).

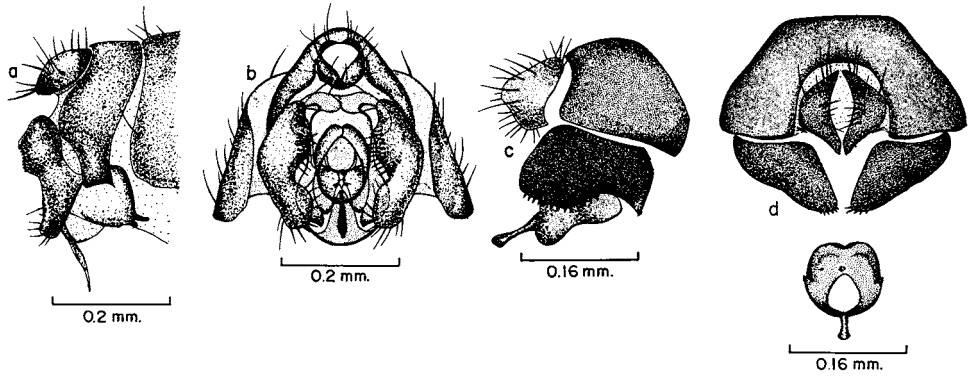


Figure 256—*Scaptomyza* (*Rosenwaldia*) *abrupta* Hackman: **a,** male genitalia, lateral; **b,** male genitalia, end view. *S.* (*R.*) *aloha* Hackman: **c,** male genitalia, lateral; **d,** male genitalia, ventral (the aedeagus has been drawn away from the other parts).

Scaptomyza (Rosenwaldia) aloha Hackman (fig. 256c–d).

Scaptomyza (*Trogloscaptomyza*) *aloha* Hackman, 1959, Acta Zool. Fennica 97:35, fig. 7.

Scaptomyza (*Rosenwaldia*) *aloha* Hackman, 1962, Notulae Ent. 42:37.

Endemic. Molokai (type locality: Puu Alii). Known only from the type locality.

Type in the B. P. Bishop Museum.

This species fits closest to *S.* (*R.*) *mitchelli* Hackman but is differentiated by having the ocellar triangle, vertex, and upper occiput entirely yellow rather than black; the second bristle of the vibrissal row is subequal to the first bristle; the palpus of the male is slightly darker at the apex and in the female brown to black on the apical half; and the male genitalia also differ as in figure 256c–d.

An almost entirely yellow species with a faint tinge of brown in the ocellar triangle and down each dorsocentral row. The abdomen is yellow, tinged with brown. The shape of the head and the head chaetotaxy are similar to those of other species in this complex. The male palpi are predominantly yellow, tinged with brown at the apices. The anterior dorsocentral bristles are well developed, about equal in size to the humeral bristles. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The wings are hyaline. The costal fringe ends a short distance beyond the tip of vein R_{2+3}. The third costal section is 4.24 times longer than the fourth, and the last section of vein M_{1+2} is 1.42 times longer than the penultimate section. The male genitalia are as in figure 256c–d. The claspers are broad, not strongly concave on their inner margins.

Length: body, 2.3 mm.; wings, 2.9 mm.

The female differs from the male by having the third antennal segment dark brown to black, the palpi predominantly black, the vittae on the mesonotum more distinct, and the last two terga of the abdomen dark brown to black.

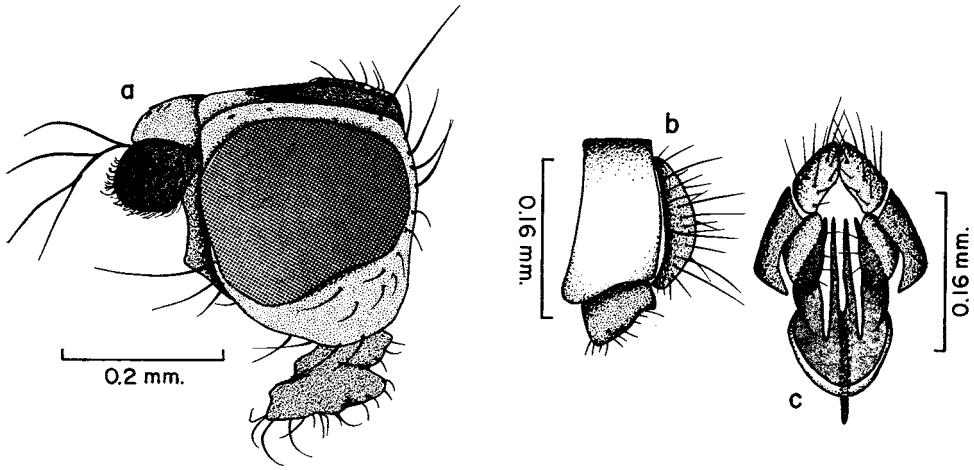


Figure 257—*Scaptomyza* (*Rosenwaldia*) *finitima* n. sp.: **a,** head; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

Scaptomyza (Rosenwaldia) finitima new species (fig. 257a–c).

A small somewhat aberrant species in that the extra pair of dorsocentral bristles are not well developed; the head, however, is typical *Rosenwaldia* in shape (fig. 257a). This species fits near *S. aloha* Hackman and *mitchelli* Hackman but is differentiated by the comparatively small claspers of the male, by the broad brown band extending longitudinally across the upper edge of each pleuron, by the brown palpi, as well as by the markings of the front.

MALE. *Head:* Strongly flattened, the eyes very distinctly oblique (fig. 257a). The front is entirely pale-colored, the median portion is yellow, the orbits are gray-white, and the anterior margin is ivory-white. The ocellar triangle is yellow-gray, faintly tinged with brown in ground color. The anterior portion of the gena is very narrow; measured from the vibrissal row to the eye margin, it is scarcely as wide as two rows of eye facets; the hind portion of the gena, measured at a level with the genal bristle, is broad, nearly two-thirds the vertical diameter of the eyes. The face is yellow on the sides, faintly brown in the median portion on the keel, and brown to black on the lower margin. The palpi are brown. One moderately strong bristle is present at the upper edge of each vibrissal row. The first two antennal segments are ivory-white. The third segment is brown. The arista has two dorsal rays in addition to the large apical fork (fig. 257a). *Thorax:* Entirely yellow except for a broad band of brown extending longitudinally the entire length of the thorax along the upper half of each pleuron. The acrostichal setae are arranged in four rows. The anterior dorsocentral bristles are situated opposite the suture. The extra pair of dorsocentral bristles characteristic of *Rosenwaldia* is rather poorly developed, and is represented on each side by a strong presutural seta approximately two times longer than the other setae of the mesonotum. The anterior sternopleural bristle is about three-

fifths as long as the posterior bristle. *Legs:* Yellow, tinged faintly with brown on the tibiae and tarsi. The front basitarsus is one-half as long as the tibia. *Wings:* Hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Yellow-brown, darker posteriorly. The anal plates are two times higher than long and are subacutely pointed ventrally. The ventral margins of the anal plates are not lobate. The ninth tergum is straight-sided, about 1.5 times longer than the anal plates. The claspers are small, scarcely over half the size of the anal plates, and about as high as long. Each clasper is developed into a short point on the posterobasal portion; the apex is blunt (fig. 257b). The ventral aspects of the genitalia are as in figure 257c.

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. The head is missing from the specimen at hand. Fitting the description of the male except for sexual characters.

Length: body, 1.75 mm.; wings, 2.00 mm.

Holotype male: Mount Kaala, Oahu, April, 1953 (D. E. Hardy). Allotype female: same locality and date as type (C. P. Hoyt).

Type and allotype in the B. P. Bishop Museum.

Scaptomyza (Rosenwaldia) mediopallens Hackman (fig. 258a).

Scaptomyza (Trogloscaptomyza) mediopallens Hackman, 1959, Acta Zool. Fennica 97:34, fig, 1.

Endemic. Hawaii (type locality: Kaula Gulch). Known only from the type and allotype specimens.

Type and allotype in the B. P. Bishop Museum.

This species is differentiated from other known Hawaiian *Rosenwaldia* by having only two rows of acrostichal setae. It is further characterized by having the thorax entirely yellow except for a broad, brown, longitudinal vitta extending the entire length on each side just outside the dorsocentral rows, and by the male genital characters (fig. 258a).

The head is nearly square as seen in lateral view. The eyes are slightly higher than long; the longest diameter of the eye forms an angle of about 30° with the frontal plane. The lower margin of the head (genal) is slightly longer than the upper (frontal) margin. The front is about as wide as long and is entirely yellow. The upper reclinate bristles are situated at about the middle of the front; the lower reclinates are small, about half as long as the proclinates, and situated approximately opposite the latter. The remainder of the head and appendages are clear yellow except for a tinge of brown in the ocellar triangle, along the upper orbits, the upper portion of the occiput, and on the palpi. Each palpus has one black, apical bristle. The arista has two dorsal rays in addition to the large apical fork. A broad, pale yellow vitta extends down the median portion of the mesonotum over the scutellum, very much like that of members of the subgenus *Tantalia*. The sides of the scutellum are brown, the brown mark-

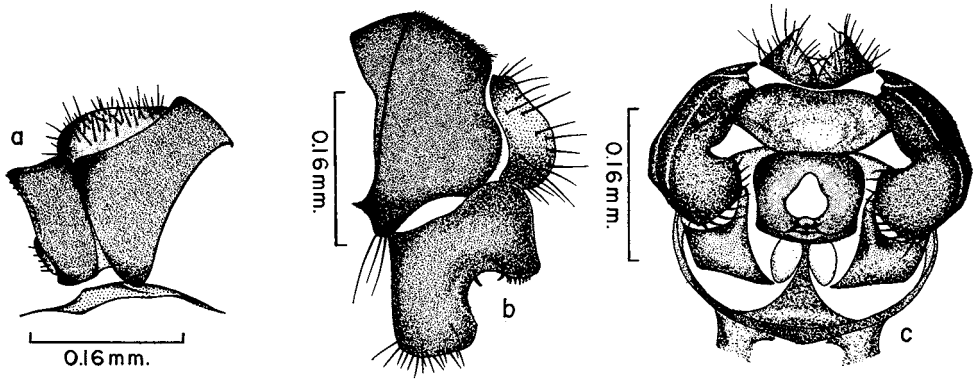


Figure 258—*Scaptomyza* (*Rosenwaldia*) *mediopallens* Hackman: **a,** male genitalia, lateral. *S.* (*R.*) *mitchelli* Hackman: **b,** male genitalia, lateral; **c,** male genitalia, ventral.

ing extending continuous with those on the mesonotum. The anterior dorsocentral bristles are almost as strong as the presutural bristles. The legs are entirely yellow. One humeral bristle is present. The upper margin of each pleuron is faintly tinged with brown. The wings are hyaline. The costal fringe fades out about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about 3.1 times longer than the fourth, and the last section of vein M_{1+2} is 1.63 times longer than the penultimate section. The male claspers are broad, rectangular in shape as seen from a lateral view, and each possesses a series of short teeth along the upper three-fifths of the apical margin; a small apicoventral appendage is apparently present on each clasper. The ninth tergum is broad, about two-thirds as long as high as seen in lateral view (fig. 258a).

Length: body, 2.0 mm.; wings, 2.2–2.4 mm.

Scaptomyza (Rosenwaldia) mitchelli Hackman (fig. 258b–c).

Scaptomyza (*Trogloscaptomyza*) *mitchelli* Hackman, 1959, Acta Zool. Fennica 97:35, figs. 4–5.

Endemic. Maui (type locality: Paliku, Haleakala Crater). Common in the wet portion of Haleakala Crater. Also, specimens which appear to belong here are on hand from Humuula, Hawaii, August, 1946 (E. C. Zimmerman).

Type in the B. P. Bishop Museum.

This species is related to *S.* (*R.*) *aloha* Hackman, from Molokai, but is differentiated by having the palpi entirely pale in both sexes and the male genitalia differently developed.

The head shape and chaetotaxy of the head are very similar to those of other species of this complex; a secondary black bristle is developed, however, near the upper portion of each vibrissal row, and this is approximately equal in size to the anterior dorsocentral bristles. The lower half of the front is yellow, the upper portion is predominantly rufous; the orbits and the area immediately surrounding the ocellar triangle are gray. The ocellar triangle is black in ground

color covered with gray pollen. The vertex and occiput are brown to black in ground color covered with gray pollen; the remainder of the head is yellow, including the mouthparts, but excluding the reddish brown compound eyes. The palpi are pale yellow; each has two unequal black bristles at the apex. The mesonotum is yellow except for a faintly brown vitta extending down each dorsocentral row. The acrostichal setae are arranged in four presutural rows and two postsutural rows. The presutural dorsocentrals are about one-half as long as the postsutural dorsocentrals. The humeral bristle is about equal in size to the anterior notopleural. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The legs are entirely yellow except for the brown apical joints of the tarsi. The wings are hyaline. The costal fringe extends about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.48 times longer than the fourth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The abdomen is predominantly brown, tinged with yellow on the sides and bases of the terga. The male genitalia are as in figure 258b–c.

Length: body, 2.00 mm.; wings, 2.50–2.75 mm.

The female specimens have the third antennal segment tinged with brown. The presutural dorsocentrals are much smaller than in the male, one-third to one-fourth as long as the posterior dorsocentral bristles, and scarcely over two times longer than the surrounding setae on the mesonotum.

Scaptomyza (Rosenwaldia) striatifrons Hackman (fig. 259a–c).

Scaptomyza (*Trogloscaptomyza*) *striatifrons* Hackman, 1959, Acta Zool. Fennica 97:36, figs. 2, 3, and 11.

Endemic. Kauai (type locality: Waialae Stream, Kokee area). This species is known only from the Kokee region of Kauai.

Type and allotype in the B. P. Bishop Museum.

This species is differentiated from related species by having a distinct, dark brown to black median vitta extending from the ocellar triangle to the anterior margin of the front and by having the male genitalia as in figure 259b–c.

The head is quadrate in shape as seen from lateral view; the eyes are distinctly longer than high (fig. 259a). The front is about as wide as long, is predominantly golden, tinged with brown; a brown to black stripe extends the entire length down the median portion from the ocellar triangle to the front margin; the orbits and the area surrounding the ocellar triangle are gray. The upper reclinate bristles are situated at about the upper two-fifths of the front (measuring from the upper ocelli to the front median margin). The lower reclinate bristles are small, about one-half the length of the proclinates, and situated distinctly above the latter. The antennae are yellow with a tinge of brown on the upper portion of the second segment; in the female the antennae are more distinctly tinged with brown. The arista has two dorsal rays situated near the base plus a large apical fork. The palpi are black; each has two apical bristles. The strong bristle at the upper portion of each vibrissal row is about equal in size to the upper recli-

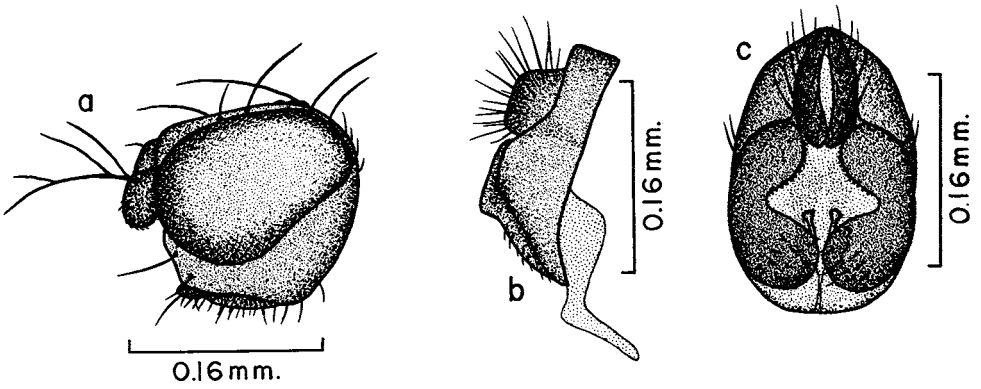


Figure 259—*Scaptomyza* (*Rosenwaldia*) *striatifrons* Hackman: **a**, head; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

nate bristle. The mesonotum is yellow, tinged lightly with brown; a faintly brown median vitta is present, and a brown vitta also extends down each dorsocentral row. The anterior dorsocentral bristles are about equal in size to the presuturals and are situated slightly in front of a line drawn between the latter. The scutellum is yellow-brown. One humeral bristle is present. The pleura are yellow, tinged with brown on the upper portions. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. The legs are yellow, except for the brown apical joints of the tarsi. The wings are entirely hyaline, long and slender, nearly three times longer than wide. The costal fringe extends about one-third to one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.2 times longer than the fourth, and the last section of vein M_{1+2} is 1.45 times longer than the penultimate section. The abdomen is brown; the bases of the terga are narrowly yellow. The ninth tergum of the male is produced ventrally into a pointed lobe extending beyond the ventral apices of the claspers as seen in lateral view (fig. 259b). The claspers are somewhat boomerang-shaped, strongly concave on their inner margins; the inner surface has about eight moderately strong teeth on the dorsal half; the ventral portion of the clasper is distinctly larger than the dorsal portion (fig. 259c).

In the female the antennae are tinged with brown.

Length of male: body, 2.00 mm.; wings, 2.50–2.75 mm. Length of female: body, 2.40 mm.; wings, 2.75–2.95 mm.

Subgenus **TANTALIA** Malloch

Tantalia Malloch, 1938, Proc. Haw. Ent. Soc. 10 (1) :53.
Scaptomyza (*Tantalia*) Malloch, Hackman, 1959, Acta Zool. Fennica 97:12.

The group was named after Mt. Tantalus, Oahu.

As pointed out by Hackman, this subgenus is very close to *Trogloscaptomyza* in having one humeral bristle, the ovipositor guides weakly sclerotized and not dentate, and the male genitalia lacking secondary claspers (fig. 263a). All of the species which have been seen to date, with the exception of *T. varipicta* n. sp., have four rows of presutural acrostichal setae. The aristae are characteristic: two strong dorsal rays plus a deep apical fork are present; the branches of the apical fork are about equal in size to the dorsal rays and longer than the stem of the arista. The basal scutellar bristles appear to be slightly more anterior in position than in other drosophilids which have been observed (fig. 260d). The species at hand are further characterized by a white, longitudinal stripe over the scutellum and continuing on to at least the posterior portion of the mesonotum; sometimes the broad, white stripe extends the entire length of the mesonotum between the dorsocentral bristles. The hind margin of the eye is oblique, so that the lower portion of the occiput is about one-half as wide as the eye, and the eyes are distinctly longer than high. Two pairs of postsutural dorsocentrals are present; the anterior pair is strong and is situated very near the suture. The mesonotum has four rows of presutural acrostichals in all of the known species except *varipicta* n. sp. In the latter six rows of presuturals are developed; posterior to the anterior dorsocentral bristles the acrostichal setae become more sparse with only two rows extending through the area between the posterior and anterior dorsocentral bristles. The scutellum is evenly tapered posteriorly. The genitalia of both sexes are somewhat similar to those of *Trogloscaptomyza* but the male structures show very distinct differences (figs. 260e, 261b, and 263a).

The antero- and posterodorsal rows of hairs on the costa are rather long and conspicuous, especially at the wing apex, where they are about four times the width of the costa. Malloch, in the original description, treated *Tantalia* in the group of genera with four rows of acrostichal setae and said that it differed from any of them in having the anterior pair of dorsocentrals as strong as the posterior pair and situated at or very close to the suture, "the scutellum convex, narrowed behind and a little longer than its basal width with the basal pair of bristles close to the base, longer than the dorsocentrals and about 1.5 times as long as the apical pair which latter are at the tip and rather closely placed; the presutural bristle is also longer and stronger than usual; the prescutellar pair of acrostichals are undeveloped; and in the two dark spots on the costal margin of the wing between the apices of the first and second veins there are crossveins connecting the latter with the costal vein, while in the dark spot at the apex of the second vein there is a short spur vein on the hind side of the vein." I do not believe the bristle characters mentioned by Malloch, with the possible exception of the placement of the basal scutellars, are of particular importance. Also the wing characters mentioned pertain only to the subgenotype.

All of the known species have been collected sweeping the ground litter in the rain forests; they probably breed in decaying vegetation.

Type of subgenus: *Tantalia albovittata* Malloch.

KEY TO KNOWN SPECIES OF TANTALIA MALLOCH

1. Wings hyaline, or but slightly smoky, and lacking extra crossveins 2
Wings spotted, cell R_1 with two crossveins (fig. 260b). Oahu ..... **albovittata** Malloch.

2(1). Abdomen predominantly or entirely yellow, no brown to black crossbands 3
Abdomen with broad brown to black bands at apices of segments 5

3(2). Abdomen with brown spots on sides of terga. Male genitalia as in figures 261b–c. Pleura entirely yellow. Molokai ..... **brunnimaculata** n. sp.
Abdomen entirely yellow. Male genitalia as in figure 262a, c. Upper portion of each pleuron marked with brown 4

4(3). Median portion of mesonotum inside dorsocentral rows white with a longitudinal brown vitta extending down the middle. A brown vitta extends through the middle of the front. Male genitalia yellow and as in figure 262c. Maui ..... **gilvivirilia** n. sp.
Median section of mesonotum inside dorsocentral rows yellow with a very faint discoloration of brown down the middle. Front pale, faintly discolored below ocelli. Male genitalia black, as in figure 262a. Hawaii ..... **flavida** n. sp.

5(2). Front of male predominantly golden, of female white, with no black streak extending down the middle. Basal portion of male clasper extending into a rather long, pointed lobe, inner surface of clasper with scattered setae along margin. The parameres are divergent (fig. 263d). Median portion of mesonotum yellow in the males, densely white pollinose in the females. Kauai ..... **varipicta** n. sp.
Front of both sexes with a black stripe down the middle. Upper portion of clasper not strongly lobate, the development of the upper inner margin is short and blunt. Inner surface of the clasper is thickly setose and the clasper is differently shaped as in figure 263a. The parameres are parallel to the aedeagus (fig. 263b). The mesonotum has a subshining brown to black vitta down the middle. Hawaii ..... **nigrosignata** n. sp.

Another apparently new species represented only by three female specimens is at hand from the island of Maui. It would run to *varipicta* in the above key but cannot be correctly placed until the males are seen.

Scaptomyza (Tantalia) albovittata Malloch (fig. 260a–g).

Tantalia albovittata Malloch, 1938, Proc. Haw. Ent. Soc. 10 (1) :53.

Endemic. Koolau and Waianae mountains, Oahu (type locality: Waiahole, Oahu).

Type in the B. P. Bishop Museum.

This is a very beautiful little species readily recognized from all other Hawaiian drosophilids by the striking wing markings and venation (fig. 260b). The head and antennae are entirely white except for a black spot at each upper hind margin of the front, a black spot in the ocellar triangle, and the black palpi; the eyes are red. The hind margin of the eye is very oblique so that the eye is almost two times longer than wide. The lower reclinate bristle is situated slightly above the proclinate bristle (fig. 260a). The mesonotum has a broad white stripe extending its entire length between the dorsocentral rows; the area bordering each side of this stripe is gray. Four rows of acrostichal setae are present before

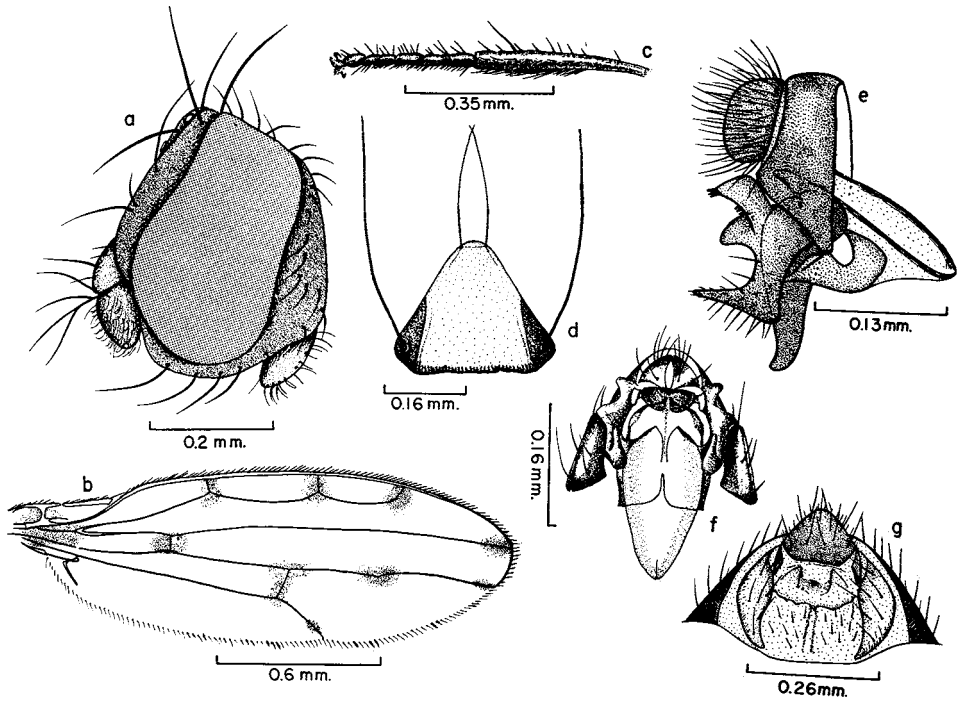


Figure 260—*Scaptomyza* (*Tantalia*) *albovittata* (Malloch): **a,** head; **b,** wing; **c,** front tibia and tarsus; **d,** scutellum, dorsal; **e,** male genitalia, lateral; **f,** male genitalia, ventral; **g,** apex of female abdomen, ventral.

the anterior dorsocentral bristles. Two rows are present between the anterior and posterior dorsocentral bristles. The hind portion of the mesonotum before the scutellum is bare. The scutellum is entirely white except for a brown stripe on each side. The basal bristles are situated slightly in front of the anterior corners of the scutellum (fig. 260d). The sides of the mesonotum are pale brown to black. Pleura pale yellow except for a brown to black spot in the middle of the metapleura and a black spot in the upper portion of each mesopleuron. Legs entirely yellow; each front femora has a row of strong posteroventral bristles extending the entire length. The wings are hyaline with eight brown spots arranged as follows: two in cell R_1 (the third costal section); one at apex of vein R_{2+3}; one at apex of vein R_{4+5}; one at r–m crossvein; one at m crossvein; one in middle of last section of vein M_{1+2}; and one at apex of vein M_{1+2}. A crossvein extends through each of the spots in cell R_1 and a short appendix is present near the apex of vein R_{2+3}. The front tibiae and tarsi have numerous erect setae extending down the dorsal surface (fig. 260c) in the male. The abdomen is yellow with broad brown bands across the apices of the segments. The ovipositor plates of the female are weakly sclerotized and scarcely developed (fig. 260g). The anal plates are heavily sclerotized. The male genitalia are as in figure 260e–f. The ninth sternum is developed into three lobes at apex. The upper lobe has several short teeth at apex and several near the middle. The aedeagus is large, well developed, and protruded ventrally well beyond the ninth sternum.

Length: body, 1.5–1.6 mm.; wings, 1.6–2.0 mm.

Tantalia albovittata lives in the wet areas in the mountains and in the deep valleys. It is almost always collected on piles of vegetation, usually ti [*Cordyline terminalis* (L. Kunth)], along the trails. The fly makes short hoppy flights, apparently staying close to the ground most of the time.

Scaptomyza (Tantalia) brunnimaculata new species (fig. 261a–c).

A predominantly yellow species characterized by the brown to black spots on the sides of the abdomen, by the all-yellow pleura, and by the male genital characters as described and figured below.

MALE. *Head:* Eyes red, about two times longer than wide. Front, face, genae, and margins of mouth white; occiput yellow-white. The hind corners of the vertex are brown, and the ocellar triangle is brown. The area around the triangle and extending down the median portion of the front is yellow-white. The anterior reclinate bristle is very tiny and is situated well behind the proclinate bristle about halfway between the proclinate and the posterior reclinate bristles. The antennae are white, lightly tinged with yellow. The second segment has two rather strong dorsal bristles plus numerous small black setae. The arista is typical for the genus (fig. 261a). The mouthparts are pale yellow; the palpi are black and armed with two or more stout bristles at apex. The lower margin of each gena is faintly tinged with brown, and a thin line of brown extends along the margin. The face has a small carina extending down the median portion. *Thorax:* Entirely yellow in ground color except for a brown discoloration extend-

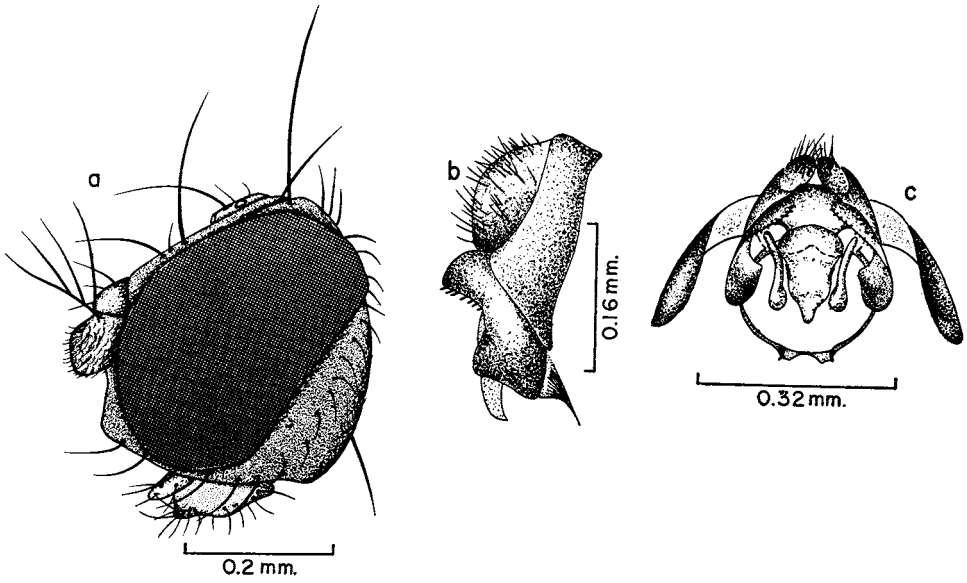


Figure 261—*Scaptomyza* (*Tantalia*) *brunnimaculata* n. sp.: **a,** head; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

ing down each side of the mesonotum. Mesonotum with a broad white streak extending the entire length down the median portion; this is continuous on to the scutellum and the scutellum is also white except for the brown lateral margins. Four rows of acrostichal setae are present in line with the anterior dorsocentral bristles. In front of this area six irregular rows are present, and behind this two rows extend to just behind the posterior dorsocentrals; the hind portion of the mesonotum in front of the scutellum is bare. The anterior dorsocentrals are situated just slightly behind the suture. Each humerus has one strong and one weak bristle. The pleura are entirely yellow. Each sternopleuron has two strong black bristles. The halteres are yellow, tinged with brown on the knobs. The metanotum is entirely pale yellow with a very slight tinge of brown on each side. *Legs:* Entirely yellow; front and middle tibiae and tarsi with numerous short erect hairs extending down the dorsal surfaces and each with a preapical dorsal bristle. Front femora each with a row of moderately strong posteroventral bristles. *Wings:* Dusky; the third costal section about three times longer than the fourth. The costal fringe of thick setae extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}, and the anterodorsal and posterodorsal hairs on the costa are very well developed and extend around the apex to below vein R_{4+5}. The fourth costal section, between veins R_{2+3} and R_{4+5}, is nearly two times longer than the fifth section. The section of vein M_{1+2} between the r–m and m crossveins is slightly over half as long as the ultimate section of M_{1+2}. The m crossvein is thickened and black; it is about two

times thicker than any of the surrounding veins. The last section of vein M_{3+4} is just slightly longer than the m crossvein. *Abdomen:* Entirely yellow except for a small brown spot on each side of tergum two, a moderate-sized brown spot on each side of terga three and four, and a large brown spot on each side of the sixth tergum. Genitalia entirely yellow. The ninth tergum is rather broad, slightly expanded ventrally, and oblique on ventral margins. The claspers are bilobed: the basal lobe has a comb-like row of teeth along the edge (fig. 261b); the apical lobe is broad, truncate at the apex. The aedeagus is broad and extends ventrally beyond the lower margin of the ninth sternum much as in *albovittata*. The ventral aspects of the genitalia are as in figure 261c.

Length: body and wings, 1.9 mm.

FEMALE. Fitting the description of the male rather closely. The mesonotum has just four rows of acrostichals extending over the anterior portion and two rows on the posterior half. The abdomen has a moderately large brown spot on each side of terga two to five and one on each anterior lateral margin of the sixth tergum. The sides of the seventh tergum are almost entirely brown. The ovipositor and anal plates are entirely yellow.

Length: body and wings, 2.22 mm.

Holotype male: Puu O Kaeha, Molokai, 3,700 feet, July, 1953 (D. E. Hardy). Allotype female: Hanalilolilo, Molokai, 4,000 feet, August, 1953 (M. Tamashiro). Four paratypes (three females and one male): from Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy).

Type and allotype in B. P. Bishop Museum. Two paratypes in United States National Museum and two in the University of Hawaii collection.

Scaptomyza (Tantalia) flavida new species (fig. 262a–b).

This species appears related to *gilvivirilia* n. sp. but differs by having the median portion of the mesonotum and the face yellow, and by the different genitalia as shown in figure 262a–b and c–d.

MALE. *Head:* The hind margin of the eye is rather sharply oblique on the lower two-thirds; the occiput at its widest point is about one-third as wide as the eye, and the eye is less than one-half longer than wide. The orbits and most of the vertex are white. The median portion of the front is yellow, very faintly tinged with brown. The sides of the vertex are dark brown to black, and the ocellar triangle is brown to black. The occiput is brown on the upper portion below the vertex and yellow below. The genae and face are white; the former has a row of moderately strong bristles along its lower margin, and the latter has a distinct carina down the middle. The antennae are predominantly dark-colored in the type. The first segment is yellow-brown, the second is largely so verging into black on the apical portion. The third segment is dark brown to black. In a paratype on hand the antennae are mostly yellow. The aristae are typical for the genus, similar to the figure of *T. albovittata*. The lower reclinate bristle is small and is situated distinctly behind the proclinate bristle. *Thorax:* Chiefly yellow in ground color with a tinge of brown on the sides of the mesonotum

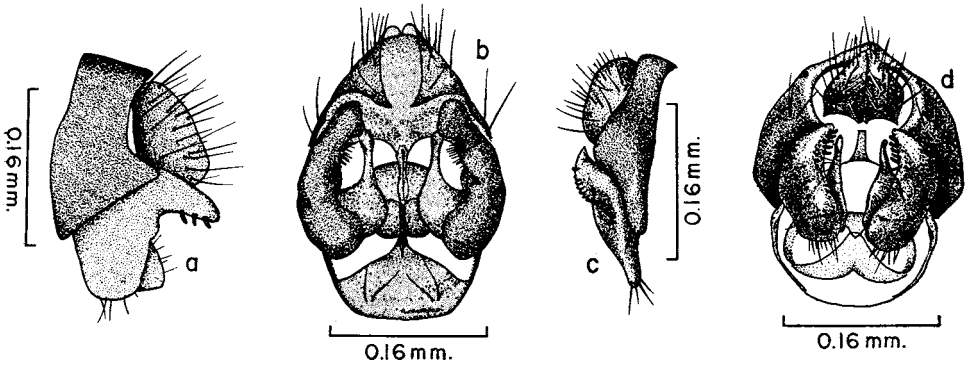


Figure 262—*Scaptomyza* (*Tantalia*) *flavida* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral. *S.* (*T.*) *gilvivirilia* n. sp.: **c,** male genitalia, lateral; **d,** male genitalia, ventral.

and on the upper portion of each pleuron. The median portion of the mesonotum, almost the entire length between the dorsocentral areas, is clear yellow, lightly dusted with gray; the portion behind the posterior dorsocentrals is densely gray so that the pollen obscures the ground color. Four rows of acrostichal setae extend from about the anterior dorsocentrals to the front margin of the mesonotum; behind the anterior dorsocentrals two rows of acrostichals extend to about opposite the postalar bristles. The area directly in front of the scutellum is bare. The scutellum is densely white pollinose except for the brown lateral margins. The basal scutellar bristles are situated just slightly anterior to the anterior corners of the scutellum. Only one distinct bristle is present on each humerus. The metanotum and the halteres are entirely yellow. *Legs:* Entirely yellow; front and middle tibiae and tarsi with erect short setae over the dorsal surfaces. All tibiae with preapical dorsal bristles. *Wings:* Faintly smoky. The third costal section is three times longer than the fourth, and the fourth is two times longer than the fifth. The costal fringe of stout setae extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately two times longer than the penultimate section. The m crossvein is distinctly thickened, nearly two times thicker than the surrounding veins. The last section of vein M_{3+4} is about one-third longer than the m crossvein. *Abdomen:* Entirely yellow (except for the genitalia), very faintly tinged with brown in the middle of the apical portion. Each tergum has a row of moderately strong black bristles extending around the posterior margin; the dorsal surface of the abdomen is rather thickly covered with short suberect brown to black hairs. The genitalia are entirely black and appear to show relationship with *brunnimaculata*; however, the aedeagus and the appendages of the ninth sternum are quite different in development (fig. 262a–b). Also, the claspers are densely ciliate along the entire inner margin. The aedeagus is directed posteriorly and is sharply attenuated toward its tip. The ninth sternum has a pair of rather long slender lobes at the apex; these extend to the tip of the aedeagus. The genitalia also

show rather close relationship to *T. gilvivirilia* n. sp., but the claspers are more lobate, acute at apices, and bear a series of distinct bristles below the apex, in contrast to the clasper being blunt, rounded at apex, and with three to four thick peglike spines below apex (fig. 262c).

Length: body, 1.85 mm.; wings, 2.00 mm.

The female has not been associated with the male. A specimen is on hand from the island of Hawaii which has the third antennal segment dark brown to black. However, the abdomen is banded with brown at the apices of the segment, and the thorax is predominantly brown. The yellow strip down the median portion, between the dorsocentral rows, is divided by a brown vitta down the middle. The upper portions of the pleura are brown. The front has a dark brown stripe extending down the middle about as wide as the ocellar triangle. It is probable that this represents a distinct species, and it is not being considered as a paratype.

Holotype male, and one male paratype: Kahuku Ranch, Hawaii, 3,000 feet, July, 1953 (D. E. Hardy). The female specimen noted above is from Kaiholena Ridge, Hawaii, August, 1952, 2,300 feet (D. E. Hardy).

Type in the B. P. Bishop Museum.

Scaptomyza (Tantalia) gilvivirilia new species (fig. 262c–d).

This species is rather closely related to *T. flavida* n. sp. but is distinguished by the all-yellow genitalia and by the yellow third antennal segment. The claspers of the male are very differently shaped, are blunt and rounded at apices, with three to four short peglike spines situated just below the apex (fig. 262c).

MALE. *Head:* Rather similar to *flavida* and fitting that description in most details. The front is predominantly white, slightly yellowish down the median portion. The corners of the vertex and the ocellar triangle are brown. The occiput, genae, and face are white; the latter has a slight carina down the middle. The second antennal segment is tinged lightly with brown on the upper portion. The third is entirely yellow. The aristae are typical for the genus and as figured for *T. albovittata*. The lower reclinate bristle is very tiny and is situated distinctly above the proclinate bristle (about one-third the distance between the proclinate and the upper reclinate). *Thorax:* Chiefly yellow in ground color. The sides of the mesonotum are brown, and the upper portions of the pleura are tinged with brown. The broad yellow stripe down the mesonotum is moderately covered with white pollen; on the hind portion of the mesonotum the pollen is dense enough to obscure the ground color. Four rows of acrostichal setae are present on the front half of the mesonotum beyond the anterior dorsocentrals; two rows are present on the hind portion from just behind the anterior dorsocentrals to the posterior dorsocentrals. The scutellum is white except for the brown lateral margins, and the basal bristles are situated slightly anterior to the front corners of the scutellum. The metanotum is yellow, and the halteres are yellow. *Legs:* Entirely yellow, the front and middle tibiae and tarsi with erect setae on the dorsal surface, and all tibiae with preapical dorsal bristles, as is typical for the genus. *Wings:* The third costal section is slightly more than three times longer

than the fourth and the fourth costal section about two times longer than the fifth. The last section of vein M_{1+2} is not quite two times longer than the penultimate section, and the last section of vein M_{3+4} is scarcely one-fourth longer than the m crossvein. The m crossvein is distinctly thicker than the surrounding veins. The costal fringe extends approximately one-fourth the distance between the tips of veins R_{2+3} and R_{4+5}. *Abdomen:* Entirely yellow, including the genitalia. The genitalia are as described above and as shown in figure 262c–d. The claspers are not as distinctly bilobed as in most species. The posterior lobes of the ninth sternum are truncate at apices, and the aedeagus is attenuated and rather slender at the apex.

Length: body, 1.8 mm.; wings, 2.0 mm.

FEMALE. Fitting the description of the male in most respects; the front, however, has a distinct yellow-brown vitta extending down the middle about the width of the ocellar triangle. Also the median strip from the mesonotum, between the dorsocentral rows, is white on the sides and subshining yellow down the middle. (It should be noted that in the male this is also the case except that the sides are not so densely pollinose; the median portion is less white and is slightly shining.) The genital portion as well as the abdomen is yellow and the ovipositor plates are poorly developed.

Holotype male and allotype female mounted together on two nadeln pierced through a piece of polyporus: from Haleakala, Maui, 1,200 feet (no date given) (F. W. Perry).

Type and allotype in the B. P. Bishop Museum.

Scaptomyza (Tantalia) nigrosignata new species (fig. 263a–b).

This species is somewhat similar to *T. varipicta* n. sp. from Kauai but is readily differentiated by the conspicuous black mark in the middle of the front; by the subshining brown to black vitta down the middle of the mesonotum; by the differences in the male genitalia as shown in figure 263a–b and as stated in the key above; and by the thickened, slightly infuscated, m crossvein in the wing.

MALE. *Head:* Similar in shape and development to other species of *Tantalia.* The hind margin of the eye is oblique, and the eye is about one-half higher than wide. The genae are rather narrow and the front portion protrudes beyond the margin of the eye; each gena has a row of moderately strong black bristles extending its entire length. The front is distinctly narrowed on the lower portion. The median portion, from behind the ocellar triangle to the front margin, is black; also, the sides of the vertex are dark brown to black. The orbits in the area between the vertical bristles and the median black mark are white. The upper reclinate bristle is situated at the middle of the front; the lower reclinate is very tiny and is situated slightly above the proclinate bristle. The face is pale yellow on the upper portion, white below. The epistoma is slightly swollen. The upper median portion of the face has a distinct carina down the middle. The lower occiput and the genae are white with a line of dark brown to black extend-

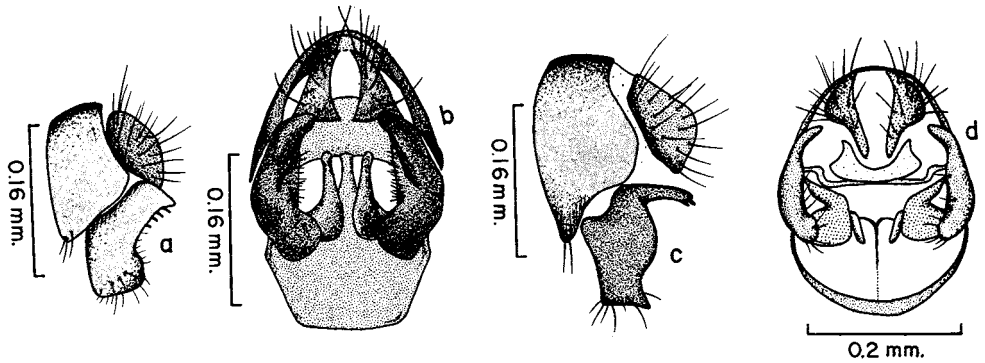


Figure 263—*Scaptomyza (Tantalia) nigrosignata* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral. *S. (T.) varipicta* n. sp.: **c,** male genitalia, lateral; **d,** male genitalia, ventral.

ing around the margin of each gena. Mouthparts are yellow, the front margin of the mouth is tinged with brown, and the palpi are black. The antennae are brown. The third segment is very small, not much bigger than the first and second combined, and extends scarcely over half the length of the face. The arista is typical for the genus and very similar to the figure of *albovittata. Thorax:* Mesonotum and upper portion of each pleuron dark brown in ground color, lower portion of each pleuron bright yellow. The mesonotum is broadly brown on the sides and has a subshining brown vitta extending down the median portion; on each side of the median vitta, between the acrostichals and the dorsocentrals, is a pollinose yellow vitta extending from the front margin to the posterior dorsocentral bristles. The hind median portion of the mesonotum, behind the posterior dorsocentrals, is white. The scutellum is predominantly white, with black lateral margins. The basal scutellar bristles are situated slightly behind the anterior corners of the scutellum. The anterior dorsocentral bristles are situated at the suture opposite the anterior notopleural bristles and just slightly behind the presutural bristles. Four distinct rows of acrostichals are present; these reduce to two indistinct rows over the hind portion of the mesonotum and extend to the posterior dorsocentral bristles. Halteres with yellow stems and brown knobs. Metanotum brown, tinged with yellow in the median portion. *Legs:* Entirely yellow. The posteroventral row of bristles on each front femur is rather strongly developed, and the erect setae on the front and middle tibiae and tarsi are conspicuous. *Wings:* Faintly fumose. Third costal section about three times longer than the fourth, and fourth section about two times longer than the fifth. The costal fringe of stout setae extends about one-third the distance between the tips of veins R_{2+3} and R_{4+5}. The ultimate section of vein M_{1+2} is nearly two times longer than the penultimate section, and the ultimate section of vein M_{3+4} is 1.5 times longer than the m crossvein. Both crossveins are very slightly infuscated, distinctly darker than the surrounding veins, and slightly thickened. *Abdomen:* Broadly yellow at the bases of the terga, with brown

bands at the apices. The brown bands on segments two to four completely cover the lateral margins of the terga; on segments five and six they are narrower and not expanded on the sides so that the sides of these terga are predominantly yellow. The male genitalia are entirely black. The hind margin of each clasper is concave so the clasper is indistinctly bilobate (fig. 263a). The hind margin of the clasper has a row of short teeth and small setae. The ventral portion of each anal plate is extended into a long, finger-like lobe. A pair of slender lobes (parameres) is developed on the posterior margin of the ninth sternum fitting just below the aedeagus and extending parallel with it (fig. 263b). The aedeagus is broad at base and sharply attenuated toward the apical portion.

Length: body, 1.7 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except that a rather broad white vitta extends down each submedian area just inside the dorsocentral line; these converge on the hind portion of the mesonotum. The median yellow-brown vitta extends almost to a level with the posterior dorsocentrals. All of the abdominal terga are broadly banded with dark brown to black at their apices. The anal plates are yellow-brown; the ventral portion of the ovipositor is pale yellow; the ovipositor plates are weakly developed.

Length: body and wings, 2.0–2.4 mm.

Holotype male and two paratype males: from Kohala Ditch Trail, Honokane Nui Str., Hawaii, August, 1956, collected sweeping ground litter along the trail (D. E. Hardy). Allotype female: Kohala Mts., Hawaii, May 24, 1917 (O. H. Swezey). Two paratype females: one same data as allotype; and one Keanakolu, Hawaii, slopes of Mauna Kea, 5,200 feet, October, 1952 (D. E. Hardy).

The type and allotype are in the B. P. Bishop Museum; one paratype is in the United States National Museum and the others in the collections at the University of Hawaii and the Hawaiian Sugar Planters' Association.

Scaptomyza (Tantalia) varipicta new species (fig. 263c–d).

This species differs from other *Tantalia* which lack brown markings in the wings by having broad bands of brown across the abdominal segments, the upper portions of the pleura marked with brown, the front of the male predominantly golden colored, and by the distinctive genitalia as shown in figure 263c–d.

MALE. *Head:* The hind margin of the eye is not as oblique as in *albovittata*, so the eye is scarcely more than one-half longer than wide. The front is predominantly golden yellow, the orbits are yellow-white, and the sides of the vertex are brown; the ocellar triangle is also brown. The lower reclinate bristle is small and is situated distinctly above the proclinate bristle. The position of the lower reclinate seems to vary somewhat in different specimens. The face and genae are white; the occiput is faintly tinged with yellow. The face is very slightly carinate in the middle. A row of six moderately strong bristles is present on each gena. The mouthparts are pale yellow. The palpi are black with several stout spines at apices. The antennae are faintly yellow; the third segment is very densely plumose, the second has two stout bristles and numerous short black

setae on the dorsal surface. The arista is typical for the genus and similar to the figure of *albovittata*. *Thorax:* Predominantly yellow in ground color; the sides and the posterior median portion of the mesonotum are brown, and the upper portions of the pleura are also marked with brown. The anterior dorsocentral bristles are situated just slightly behind the suture. The median portion of the mesonotum is largely yellow from the posterior dorsocentral bristles to the front margin. The hind portion, directly in front of the scutellum, is white, and the median portion is covered with a rather faint gray pubescence; in some specimens this is more distinct than in others, but in none of the specimens at hand is the yellow coloring obscured. Four rows of acrostichal setae are present at a level with the anterior dorsocentral bristles. Six irregular rows are present in front of these bristles, and the number reduces down to two rows extending over the hind portion of the mesonotum to a level with the posterior dorsocentrals. The area in front of the scutellum is bare. The scutellum is white with brown on the sides; the basal bristles are situated opposite the anterior corners. The halteres are yellow, tinged with brown on the knobs. The metanotum is yellow, tinged lightly with brown. *Legs:* Entirely yellow. Each tibia has a moderately strong subapical dorsal bristle; each front femur has a row of posteroventral bristles; and the middle and front tibiae and tarsi have numerous short erect setae extending over the dorsal surface. *Wings:* Nearly hyaline, very slightly smoky. The costal fringe of stout setae extends about one-fourth the distance between the tip of vein R_{2+3} and the tip of R_{4+5}. The third costal section is about three times longer than the fourth, and the fourth is two times longer than the fifth section. The m crossvein is not thickened and is not darker colored than the surrounding veins. The last section of vein M_{3+4} is approximately one-third longer than the m crossvein. *Abdomen:* Terga one to four are predominantly brown to black with rather narrow bands of yellow across the anterior margins. Terga five and six are predominantly yellow; only the narrow posterior margins are tinged with brown. The male genitalia are dark brown to black; the structures are as in figure 263c–d, and margins are produced as in figure 263c. The ninth tergum is nearly straight-sided. The clasper has a large basal lobe. The ventral aspects of the genitalia are as in figure 263d.

Length: body, 1.7–1.9 mm.; wings, 2.0–2.3 mm.

FEMALE. Apparently differing rather consistently from the male in the coloration of the front and in the placement of the lower reclinate bristles. The front is predominantly white with a yellow-brown streak extending down the middle from the lower ocellus to the bases of antennae. The lower reclinate bristles are situated opposite the proclinate bristles. In some specimens the lower reclinate is situated just slightly behind the proclinate. The size of each lower reclinate bristle varies somewhat; in the type it is about three-fourths as long as the proclinate bristle, in other specimens it is about half as long. The median portion of the mesonotum, the area bordered on each side by the inner edge of the suture, is more densely white pollinose than in the male; in most female specimens a broad strip down the median portion has the ground color

completely obscured by the white pollen. The front and middle tibiae and tarsi lack the erect hairs on the dorsal surfaces. Abdominal terga one to five are broadly brown at the apices and yellow along the anterior margins. The sixth tergum is largely yellow, sometimes with a small brown spot on each side, other times with the hind margin narrowly bordered with brown. The seventh tergum is brown on the sides. The ovipositor and anal plates are yellow. The ovipositor plates are poorly developed and inconspicuous.

Length: body, 1.9–2.2 mm.; wings, 2.2–2.5 mm.

Holotype male and allotype female: Kokee, Kauai, 3,600 feet, July, 1952, sweeping the ground litter in the rain forest (D. E. Hardy). Seventy paratypes (30 males and 40 females): from the following localities on Kauai—same as type; Nualolo Valley, 3,400 feet, August, 1953 (D. E. Hardy); Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy); Waipoo Falls, August, 1953 (D. E. Hardy); Kalalau Lookout, 4,000 feet, August, 1953 (D. E. Hardy); Poomau Valley, 3,400 feet, July, 1952 (D. E. Hardy); Waialae Stream, 3,600 feet, August, 1953 (D. E. Hardy); Halemanu Swamp, August, 1953 (D. E. Hardy); Head of Nualolo Valley, July, 1952 (D. E. Hardy); and Alakai Swamp, 3,800 feet, July, 1952 (D. E. Hardy).

Type, allotype, and a series of paratypes deposited in the B. P. Bishop Museum. The remainder of the paratypes deposited in the following: United States National Museum, British Museum (Natural History), and the University of Hawaii collection.

Scaptomyza (Tantalia) spp.

Two apparently new species are on hand, one each from Maui, and Hawaii, which are represented only by females. These have the abdominal terga banded with brown and the m crossvein thickened. These are not being described until males are discovered.

Subgenus **TROGLOSCAPTOMYZA** Frey

Parascaptomyza (*Trogloscaptomyza*) Frey, 1954, Results of the Norwegian Scientific Expedition to Tristan da Cunha, 1937–1938, No. 26:21.

The subgenus is characterized by having only one humeral bristle, the head nearly square as seen in lateral view, the male genitalia without secondary claspers, the ovipositor guides very weakly sclerotized and not dentate, and the arista without ventral rays and usually with only two dorsal rays in addition to the apical fork (fig. 271a). The costal fringe is typically short. Two pairs of postsutural dorsocentral bristles are present. One species, *S. levata*, has an enlarged presutural seta in each dorsocentral row approaching the three pairs of dorsocentral bristles characteristic of the subgenus *Rosenwaldia*; the head is, however, typical *Trogloscaptomyza*-like in shape. Typically two to four rows of presutural acrostichal setae are present. A large complex of species with six

distinct rows of presutural acrostichals occurs in Hawaii; in other respects, however, they fit typical *Trogloscaptomyza*. Outside of Hawaii, only one other species is known, *brevilamellata* (Frey) from Tristan da Cunha, the type of the genus.

Type of the genus: *Parascaptomyza* (*Trogloscaptomyza*) *brevilamellata* Frey.

KEY TO THE SPECIES OF TROGLOSCAPTOMYZA FREY KNOWN FROM HAWAII

1. Mesonotum not spotted 2
Thorax yellow, each seta and bristle of mesonotum with a pale brown spot at its base. Arista lacking an apical fork (fig. 332a). Male genitalia as in figure 332b–c. Maui and Hawaii ..... **spilota** n. sp.

2(1). Four rows of acrostichal setae present before the anterior dorsocentral bristles and sometimes with one or two misplaced setae outside the four distinct rows 3
Six distinct rows of acrostichal setae on the anterior half of the mesonotum 27

3(2). Palpi yellow, or, if faintly tinged with brown, the front is predominantly pale yellow and the mesonotal pattern is indistinct 4
Palpi brown to black on apical halves. Mesonotal pattern usually distinct 18

4(3). Thorax predominantly or entirely yellow to rufous or with not more than faint brown markings on the mesonotum 5
Mesonotum brown to black covered with gray or gray-brown pollen 10

5(4). Posterobasal portion of male clasper strongly lobate and armed with short black spines around the apex (fig. 228c); this is plainly visible *in situ*. Hawaii ..... **cyrtandrae** n. sp.
Claspers not as above, lacking such spines 6

6(5). Lobes of male clasper connected by a thin sheet over the outside portion (figs. 271b and 305a) 7
Claspers not as above 8

7(6). Male claspers with a well-developed basal lobe (fig. 271b). Mesonotum not vittate (some specimens from Maui may run here). Hawaii and Maui ..... **basiloba** n. sp.
No such lobe developed (fig. 305a). Longitudinal vittae distinct on the mesonotum. Molokai, Hawaii, and Lanai ..... **longipecten** Hackman.

8(6). Arista with a well-developed apical fork. Male genitalia as in figures 308a–b and 314a–b 9
Arista lacking an apical fork. Clasper broad at base, attenuated apically. Anteroventral margins of ninth tergum extended (fig. 288a–b). Maui ... **dubautiae** n. sp.

9(8). Very faint *Scaptomyza*-like markings present on the mesonotum. Male genitalia as in figure 314a–b. Hawaii, Maui, and possibly all the other main islands ..... **pallifrons** Hackman.
No markings on mesonotum. Male genitalia as in figure 308a–b; clasper with a large basal lobe developed. Molokai ..... **mimula** n. sp.

10(4). Claspers with a transparent sheet-like connection between the two lobes as in figures 271b and 305a 11
Male claspers lacking such a connection. Not as in above figures 12

11(10). Clasper with a posteroventral lobe developed (fig. 271b). Only a faint indication of longitudinal vittae present on the mesonotum. Hawaii and Maui ..... **basiloba** n. sp.
No such lobe present. *Scaptomyza*-like pattern distinct on the mesonotum. Molokai, Maui, Hawaii, and Lanai ..... **longipecten griseonigra** n. subsp.

12(10). Arista with a tiny inconspicuous apical fork (fig. 265a), or the fork may be lacking. Clasper of male with a slender basal lobe as in figures 265b and 302c, or the basal portion is broadly rounded as in figure 323b 13
Arista with a well-developed apical fork. Clasper with a basal lobe or a sharp point at base 16

13(12). Claspers distinctly bilobate, each with a slender basal lobe (figs. 265b and 302c) 14
Claspers broad, not bilobate (figs. 274a and 323b) 15

14(13). Basal lobe strongly developed, straight-sided, approximately equal in length to the remainder of the clasper (fig. 302c). Each anal plate developed into a prominent ventral lobe (fig. 302d). Maui ..... **latitergum** n. sp.
Basal lobe short and curved, about one-half as long as the remainder of the clasper (fig. 265b). Ventral margin of anal plate not extended (fig. 265c). Hawaii ..... **adunca** n. sp.

15(13). Anal plates scarcely higher than long and truncate ventrally as seen in lateral view. Ventral lobes of anal plates elongate as in figure 323c. Apex of clasper nearly vertical (fig. 323b). Maui. ..... **recta** n. sp.

Anal plates three to four times higher than long. Ventral lobes as in figure 274b. Clasper rounded apically and gently concave on hind margin (fig. 274a). Anteroventral margin of ninth tergum attenuated. Hawaii ..... **brachycerca** n. sp.

16(12). Male clasper with a large basal lobe and a rather slender apical lobe as in figure 272a. Hawaii. **bilobata** n. sp.

Not as above 17

17(16). Ventral margins of anal plates extended in capitate lobes (fig. 315b). Male claspers as in figure 315a. Hawaii ..... **paralobae** n. sp.

Ventral margins of anal plates not extended (fig. 280b–c). Claspers blunt, rounded at apices, and with a sharp spine-like point at the base and a comb-like row of long teeth on the inner hind margin (fig. 280b). Maui ..... **ctenophora** n. sp.

18(3). Clasper of male extended into a long drawn-out point at the apex (fig. 311a). Legs tinged with black especially on the femora. Hawaii, Maui, Molokai, and Oahu ..... **obscuricornis** (Grimshaw).

Not as above 19

19(18). Middle and hind femora of male each with elongate anteroventral setae (fig. 337b). Clasper with a median lobe on the hind margin as in figure 337d. Hawaii and Maui ..... **umbrosa** n. sp.

Middle and hind femora lacking long setae. Male genitalia not as above 20

20(19). Thorax yellow, usually with pale brown vittae extending down the mesonotum 21

Thorax brown to black, densely gray pollinose 25

21(20). Costal fringe short, extending not over one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. Last section of vein M_{1+2} about two times longer than the penultimate section. Male genitalia as in figures 293a, 301a, and 322a 22

Costal fringe extending two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. Last section of

vein M_{1+2} is 1.4 times longer than the penultimate section. Hawaii. (This species has not been definitely placed but appears to fit here.) . . **monticola** (Grimshaw).

22(21). Mesonotum entirely yellow, not vittate. Male clasper strongly concave on hind margin (fig. 322a). Hawaii . . . . . **recava** n. sp.

Mesonotum with pale brown vittae. Male genitalia not as above 23

23(22). Front and face yellow. Male genitalia as in figures 283a–b and 293a–b 24

Anterior portion of the front dark brown to black. Third antennal segment brown. Ventral margins of the anal plates flattened (fig. 301b). Claspers rather slender (fig. 301a). Kauai . . . . . **kauaiensis** Hackman.

24(23). Male claspers with a prominent basal lobe and with an acute point at the apex (fig. 293a). Ventral margins of anal plates not bent downward (fig. 293b). Kauai . . . . . **fastigata** n. sp.

Male claspers broad and blunt (fig. 283a). Ventral margins of anal plates bent downward (fig. 283a–b). Maui . . . . . **decepta** n. sp.

25(20). Male clasper developed into a pointed basal lobe. Aedeagus large, protuberant and attenuated at apex (fig. 339a). Anal plates lobate ventrally (fig. 339b). Kauai . . . . . **vagabunda** n. sp.

Not as above 26

26(25). Male genitalia as in figure 295c–d. Median portion of front yellow to rufous. Mesonotal ground color usually gray in the female. Hawaii, Molokai, and Maui . . . . . **inaequalis** (Grimshaw).

Male genitalia as in figure 295a–b. A median brownish marking usually extends to the anterior margin of the front. The ground color of the mesonotum is yellow-brown in both sexes. Kauai . . . . **hardyi** Hackman.

27(2). Wings with three to four transverse brown marks across cell R_3 and with a series of brown spots along the sides of the last section of vein M_{1+2} (fig. 320c). Male genitalia as in figure 320d–f. Maui . . . . **punctivena** n. sp.

Not as above 28

28(27). Tibiae banded with brown; femora dark brown to black. Pleura each with two brown longitudinal vit-

tae. Male genitalia as in figure 342d–e. Upper bristle of vibrissal row unusually large. Costal fringe elongate. Kauai ..... **waialealeae** n. sp.

Tibiae not banded, or, if faintly so, the body is entirely dark brown to black and the genitalia are very different from the above (refer to figures 285a–b and 324c–d) 29

29(28). Wings each with a small brown spot confined to the apex of vein R_{4+5} (fig. 268a). Male genitalia as in figure 268b–c. Hawaii ..... **apiciguttula** n. sp.

Not as above. If brown markings are present the entire wing apex is brown and the femora are spinose ventrally (fig. 328b) 30

30(29). Front femora each with the normal row of posteroventral bristles but lacking ventral spines. Wings lacking a brown spot on the apex 31

Front femora densely spinose on posteroventral surfaces (fig. 328b). Wings each with a pale brown spot on apex (fig. 328c). Hawaii ..... **scoloplichas** n. sp.

31(30). Thorax opaque, yellow to rufous, or brown to black, densely gray pollinose. Legs yellow. Front not silvery .. 32

Thorax polished black. Legs predominantly dark brown to black. Front silvery pollinose. Male genitalia as in figure 269d–e. Kauai. ..... **argentifrons** n. sp.

32(31). Thorax pale yellow, with three narrow dark brown vittae extending the full length of the mesonotum, plus two short, lateral postsutural vittae, and also with an elongate black mark above each humerus. Last section of vein M_{1+2} is 1.15 times longer than the penultimate section. Front entirely yellow. Four moderately strong bristles present in each vibrissal row. The abdominal terga yellow, each with a shining black band over the posterior edge; this is narrowly interrupted with yellow in the middle (fig. 336b). Male genitalia as in figure 336c–d. Kauai ..... **uliginosa** n. sp.

Not with the above combination of characters. Last section of vein M_{1+2} longer than above 33

33(32). Thorax predominantly or entirely yellow, or, if yellow, tinged with brownish; the anal plates are fused with the inner portion of the ninth sternum (fig.

277b). A brown median vitta is present in *univitta* n. sp., or three faint vittae are present in *trivittata* n. sp. 34

Thorax dark brown to black, densely gray pollinose 61

34(33). Mesonotum with one to three brown vittae extending the full length (these may be rather faint in *trivittata* n. sp.). Clasper with an obtuse basal lobe (figs. 334b and 338a). Arista lacking an apical fork 35

Not as above 36

35(34). Three pale brown vittae extend longitudinally down the mesonotum. Ventral margins of anal plates strongly lobate and directed anteriorly (fig. 334d). Claspers slender, shaped as in figure 334b. Anteromedian margin of ninth tergum concave (fig. 334c). Kauai ..... **trivittata** n. sp.

One dark brown vitta present on the mesonotum. The ventral margins of the anal plates not lobate (fig. 338b). Clasper broad and blunt (fig. 338a). Anteromedian margin of ninth tergum not concave. Oahu and Kauai ..... **univitta** n. sp.

36(34). Ninth tergum not produced on posteroventral margin ... 37

Ninth tergum developed into a sharp point on the posteroventral margin. Anal plates strongly lobate (fig. 299d). Claspers as in figure 299c. Maui and Molokai ..... **intricata** n. sp.

37(36). Costal fringe rather elongate, extending one-half the distance between the apices of veins R_{2+3} and R_{4+5}. Anal plates rather slender, ventral portions greatly extended as seen in lateral view and distinctly separated from the ninth tergum. Claspers as in figure 286a–b. Ninth tergum unusually narrow. Molokai ..... **diaphorocerca** n. sp.

Costal fringe short, extending about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. Anal plates not developed as above 38

38(37). Basal portion of clasper with two lobes, one sharp-pointed and bearing a strong apical tooth, and one blunt lobe bearing three apical teeth (fig. 321c). Posteromedian margin of clasper with an inwardly developed lobe (fig. 321d). Anal plates pointed ventrally as in figure 321d. Oahu ..... **quadridentata** n. sp.

Not as above 39

39(38). Claspers of male divided into two approximately equal-sized apical lobes (fig. 273a). Kauai ..... **bipars** n. sp.
Not as above 40

40(39). Ninth tergum of male strongly elevated, about as high as long and equal in size to the clasper (fig. 303a). Ventral margins of the anal plates not bent downward (fig. 303b). Oahu, Hawaii, and Kauai .. **levata** n. sp.
Not as above. If the anal plates are elevated the ventral margins are bent downward (fig. 267b) 41

41(40). Posteroventral portions of anal plates elevated and devoid of setae except for two short hairs on the raised portion (fig. 267a). Ventral margins bent downward and flattened (fig. 267b). Claspers shaped as in figure 267a. Palpi yellow. Kauai ..... **anechocerca** n. sp.
Not as above 42

42(41). Anal plates each with a dense tuft of setae in the median portion, otherwise nearly bare. Claspers as in figure 316a. Kauai ..... **penicula** n. sp.
Anal plates evenly setose 43

43(42). Ventral portion of anal plate, as seen in direct lateral view, pointed, rostrate, or developed into a rounded lobe which extends over the bases of the claspers (figs. 275b and 319a). The aedeagus is usually large and conspicuous, and often with a dorsal or ventral lobe (fig. 304a), or a pair of strong appendages arise on the sternum beneath the aedeagus (fig. 294c), or the claspers are shaped as in figures 275b and 325a 44
Anal plate not as above, usually bent downward at the apex. Other genital characters different from above ... 49

44(43). Male clasper with a short basal lobe which bears numerous inwardly curved setae; this basal lobe is connected to the apical lobe by a line extending on the inner side of each clasper. It is also joined by a transparent continuation of the hind margin of the apical lobe (fig. 275b). No apical fork present on the arista (fig. 275a). Oahu ..... **camptochaites** n. sp.
Not as above 45

45(44). Clasper not concave on hind margin, and lacking basal lobes. Aedeagus with prominent ventral lobes or with accessory appendages arising from the sternum on the under side of the aedeagus (figs. 294b and

319a) 46

Clasper at least slightly concave on hind margin and with one or two basal lobes (figs. 279a and 325a). Aedeagus lacking ventral lobes and with no conspicuous accessory appendages developed 47

46(45). Ventral portion of anal plate developed into a blunt lobe which extends over the base of the clasper. Aedeagus with a pair of ventral lobes. Clasper longer than high (fig. 319a). Kauai ..... **protensa** n. sp.

Ventral portion of anal plate developed into an acute, hairy point. A pair of appendages arises on the sternum beneath the aedeagus. Claspers about as high as long (fig. 294b). Molokai, Maui, and Hawaii ..... **hackmani** n. sp.

47(45). Face and palpi yellow. Male genitalia as in figures 304a and 325a 48

Median and lower portions of face black, palpi black. Male genitalia as in figure 279a–b. Oahu and Maui ..... **cryptoloba** n. sp.

48(47). Clasper with long and conspicuous setae on the hind margin. Aedeagus large and conspicuous, with a prominent preapical dorsal lobe (fig. 304a). Hawaii ..... **lobifera** n. sp.

Clasper lacking such setae (fig. 325a). Aedeagus short and thick, inconspicuous, and lacking such a lobe. Kauai ..... **rostrata** n. sp.

49(43). Three strong bristles, plus about three smaller setae present on each ventral margin of the ninth tergum. Clasper with a rounded basal lobe and with teeth along the entire hind margin (fig. 264a). Ventral portion of each anal plate flattened (fig. 264b). Oahu ..... **acronastes** n. sp.

Not as above 50

50(49). A pair of conspicuous parameres extend horizontally or diagonally, crossing the median portion of the clasper (fig. 312b). Ninth tergum narrow, produced on anteroventral margin. Each clasper with a pair of smooth basal or subbasal lobes (fig. 312a). Aedeagus large and protuberant. Maui ..... **ochromata** n. sp.

Not as above. Parameres longitudinal in position, not crossing the claspers 51

51(50). Clasper with a slender pectinate basal lobe (fig. 310a). Hawaii ..... **multidenta** n. sp.
Claspers not as above 52

52(51). Clasper with a prominent basal lobe which bears two small, black, preapical points on the ventral surface (fig. 276a). The ventral margins of the anal plates are flat and pointed, shaped as in figure 276b. Maui ..... **concinna** n. sp.
Not as above 53

53(52). Aedeagus inconspicuous, not protruded beyond the claspers. Male claspers strongly dentate on hind margins and/or the ventral margins of the anal plates are fused with the ninth sternum on the dorsal portion of the genital chamber (fig. 277b). The ventral margins of the ninth tergum with one or more rows of well-developed setae 54
Aedeagus large, conspicuously protruding beyond apices of claspers. Claspers weakly dentate. Anal plates not fused to sternum. Ventral margins of ninth tergum sparsely setose 58

54(53). Ventral margins of the anal plates connected with sclerotized arms extending from the ninth sternum as in figure 277b 55
Ventral margins of the anal plates not joined with the sternum 56

55(54). Hind margin of clasper gently curved and armed with large conspicuous teeth as in figure 321a. Only one row of setae along the ventral margin of the ninth tergum. Molokai, Maui, and Hawaii . . **pusilla** (Grimshaw).
Hind margin of clasper minutely dentate on basal half, clasper-shaped as in figure 277a–c. Ninth tergum with two rows of setae on the ventral margin. Kauai ..... **connata** n. sp.

56(54). Front entirely yellow. Ninth tergum rather broad, 1.5 to 2.0 times longer than the anal plates. Anal plates pointed ventrally. Well-developed setae are present in the ventral row extending on each side of the ninth tergum. Clasper with strong teeth on the hind margin as in figure 289a 57
Median portion of front black, orbits yellow. Ninth tergum narrow, not as long as the anal plates. Anal plates blunt ventrally. Only minute setae are present

on the ventral margins of the ninth tergum. Claspers shaped as in figure 298a. Kauai ..... **innotabilis** n. sp.

57(56). The plate of the sternum that lies on the dorsal portion of the genital chamber has the posterior margin gently concave (fig. 289b). Kauai, Molokai (?) .. **dubia** n. sp.

The posterior margin of the sternal plate is rather deeply concave (fig. 269b). Hawaii .. **apponopusilla** n. sp.

58(53). Clasper with a transparent subbasal lobe which covers over a smaller inner lobe which is setose around the apex (fig. 279a). Clasper truncate or nearly so at the apex. Aedeagus large, often strongly bent anteriorly as in figure 279b. Oahu and Maui .... **cryptoloba** n. sp.

Not as above 59

59(58). Aedeagus truncate at apex as seen from a ventral view (fig. 307b). Clasper with a small subbasal lobe (fig. 307a). Maui ..... **mediana** n. sp.

Not as above 60

60(59). Head flattened, slightly longer than high, the eyes rather strongly oblique (fig. 327a). Anterior dorsocentral bristles situated on a level with the suture. A broad brown vitta is present on the upper portion of each pleuron. Third antennal segment brown. Male genitalia as in figure 327b. Oahu ... **scoliops** n. sp.

Head not flattened, slightly higher than long. No brown vittae present on the pleuron. Third antennal segment yellow. Male genitalia as in figure 287b–c. Maui ..... **domita** n. sp.

61(33). Ninth tergum lobate, or with a strong articulated appendage on the posteroventral margin (figs. 270a and 330a) 62

Ventral margin of ninth tergum vertical or nearly so, or oblique toward the anteroventral margin and not produced on the posteroventral margin..... 71

62(61). Ninth tergum with a strong, sharp-pointed, distinctly articulated posteroventral lobe (fig. 270a); this is plainly visible *in situ* and is about equal in length to the claspers. Anal plates lobate ventrally (fig. 270b). Hawaii ..... **articulata** n. sp.

Not as above 63

63(62). Lobes of ninth tergum each with a dense clump of long hairs (fig. 330a). Ventral lobes of anal plates elongate

and slender (fig. 330b). Claspers straight-sided, not dentate. Maui ..... **setosiloba** n. sp.

Not as above. If the ventral margins of the anal plates are elongate they are usually more broad and enlarged apically 64

64(63). The projection of the ninth tergum is sharp-pointed and partially divided from the remainder of the tergum. The ventral margins of the anal plates are lobate as in figures 266d and 281c. If the apical fork of the arista is tiny the male clasper has elongate setae on the hind margin (fig. 266c) 65

Arista with a tiny inconspicuous apical fork. Claspers lacking long setae. If the projection of the ninth tergum is partially divided from the remainder of the tergum, the lobe is blunt (fig. 313b) 66

65(64). Arista with a well-developed apical fork (fig. 281a). Clasper lacking long setae (fig. 281b). Maui and Hawaii ..... **cuspidata** n. sp.

Arista with a tiny apical fork (fig. 266a). Clasper with long setae on the hind margin (fig. 266c). Maui ..... **affinicuspidata** n. sp.

66(64). Ninth tergum very broad, nearly as long as high (fig. 313b). Anterodorsal margin of tergum with a broad U-shaped concavity in the middle (fig. 313c). Anal plates extended into long slender ventral lobes (fig. 333b) 67

Not as above. Anterior margin of tergum not concave. Anal plates slender only in *setiger* n. sp. 68

67(66). Posteroventral margin of ninth tergum bilobate. Claspers two times longer than wide, each with several long setae at the middle of the hind margin (fig. 333a). Hawaii ..... **tenuata** n. sp.

Ninth tergum produced on each side into a rather slender posteroventral lobe. Clasper scarcely longer than wide (fig. 313b). Maui ..... **ostensa** n. sp.

68(66). Ninth tergum with a row of prominent setae along the lower hind margin; the posteroventral margin is developed into two small lobes (fig. 329b). The ventral margins of anal plates long and slender (fig. 329c). Hawaii ..... **setiger** n. sp.

Not as above 69

69(68). Process on posteroventral margin of ninth tergum broad and blunt (figs. 292c and 317b) 70

Process on ninth tergum acute at apex (fig. 340b). Kauai and Oahu ..... **varia** n. sp.

70(69). Process on ninth tergum partially or completely articulated at base. Clasper about three times longer than wide, conspicuously toothed on the hind margin (fig. 292c). Ventral lobes of anal plates not expanded (fig. 292d). Hawaii, Maui, and Molokai ... **exigua** (Grimshaw).

Process not divided at base. Claspers short and broad, scarcely one-half longer than wide, and each with a small point at base and lacking conspicuous dentation (fig. 317b). Lobes of anal plates expanded (fig. 317c). Hawaii ..... **photophilia** n. sp.

71(61). Arista with a well-developed apical fork, or, if intermediary, the aedeagus is prominently protruded beyond the claspers and the clasper has a subbasal swelling (fig. 331a) 72

Apical fork of arista tiny (fig. 290a), inconspicuous, or absent. Claspers rather broad (figs. 290b, 297a, and 300a) 86

72(71). Anal plates slender, pointed ventrally, and with long setae at the tips (fig. 335c). Aedeagus large, fleshy, with a tumescence on each side. Parameres transverse, the tip of each fitting across the middle of the clasper. Each clasper with a rounded basal lobe as in figure 335b. Apical fork of arista well developed (fig. 335a). Hawaii ..... **tumidula** n. sp.

Not fitting the above. If the anal plates appear rostrate in lateral view, the tips are bent downward and the ninth tergum is densely setose on the ventral margins (figs. 318a and 341b) 73

73(72). Ventral aspects of anal plates strongly lobate, capitate at apices (fig. 315b). Claspers of male drawn out into slender apices and pointed at bases (fig. 315a). Six irregular rows of acrostichal setae are present on the mesonotum of the male. Hawaii ..... **paralobae** n. sp.

Not as above 74

74(73). Clasper with a spine-like process developed on the hind margin (fig. 278b). Sometimes the claspers are not plainly visible because of the densely setose ventral aspects of the ninth tergum 75

Claspers lacking such a process 77

75(74). Ventral portions of the ninth tergum densely setose (fig. 318a). Clasper with a semimembranous basal lobe. Ventral lobes of the anal plates narrowed 76

Ventral portions of the anal plates sparsely setose. Clasper lacking such a basal lobe. Apex of clasper and ventral lobes of anal plates broad (fig. 278b–c). Hawaii ..... **cornuta** n. sp.

76(75). Ventral portions of ninth tergum very densely setose, hiding the claspers from lateral view. Apical lobe of clasper pointed (fig. 318a). Aedeagus sharp-pointed (fig. 318b). Molokai ..... **phryxothrix** n. sp.

Ventral portions sparsely setose, by comparison with the above. Claspers plainly visible from a lateral view; the apex is blunt (fig. 324a). Apex of aedeagus obtuse. Maui ..... **robusta** n. sp.

77(74). The anterolateral margins of the ninth tergum are developed into broad rounded lobes so that the anteromedian margin of the tergum is concave (fig. 326b–c). Clasper broad at the base, somewhat attenuated apically (fig. 326b). Oahu ..... **rotundiloba** n. sp.

Anterior margin of ninth tergum straight or nearly so, or clasper with a prominent sharp-pointed basal lobe (fig. 285a) 78

78(77). Clasper with a large basal lobe as in figures 272a and 285a 79

Clasper not conspicuously lobate at base, sometimes a small subbasal lobe (fig. 331a) 80

79(78). Basal lobe of clasper broad, wider than apical lobe (fig. 272a). Anterior margin of ninth tergum straight. Anal plates broad and blunt on ventral margins (fig. 272b). Hawaii ..... **bilobata** n. sp.

Basal lobe pointed, narrower than apical lobe. Anterolateral margins of ninth tergum expanded (fig. 285a). Anal plates pointed as seen from ventral view (fig. 285b). Maui ..... **devexa** n. sp.

80(78). Clasper with about six large, conspicuous teeth extending along the hind margin. Anal plates raised on the posteroventral portion (fig. 284a). Kauai ..... **dentata** n. sp.

Not as above. Claspers with inconspicuous teeth 81

81(80). Clasper very broad, as wide as long, toothed along the

ventral margin (fig. 291a). Kauai ..... **evexa** n. sp.
Not as above 82

82(81). Aedeagus large, thickened, and conspicuously protruded beyond the claspers. Clasper with a subbasal lobe on hind margin (fig. 331a). Molokai, Maui ..... **silvicola** n. sp.
Not as above. If aedeagus is prominent, a lobe is not present on the clasper 83

83(82). Anal plates three times higher than long (fig. 306a). Kauai ..... **mecocerca** n. sp.
Not as above 84

84(83). Anterior reclinate bristle situated well above the proclinate. Apical fork of arista moderate in size (fig. 341a). Ninth tergum densely haired on the posteroventral margins. Claspers slender and pointed (fig. 341b). Maui, Hawaii, and Molokai ..... **villosa** n. sp.
Anterior reclinate bristle situated opposite the proclinate. Apical fork of arista large (fig. 323d). Ninth tergum with just a few setae on the ventral portion. Claspers broad and blunt 85

85(84). Legs yellow. Costal fringe very short, extending about one-fifth to one-sixth the distance between the apices of veins R_{2+3} and R_{4+5}. Clasper with a subbasal tooth on the inner margin, best seen from a ventral view (fig. 296b). Aedeagus conspicuous, fleshy, extended beyond the claspers. Hind margins of claspers dentate (fig. 296a). Kauai. ..... **inermis** n. sp.
Legs yellow, tinged with brown, The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. Aedeagus not enlarged or conspicuous. Hind margin of clasper not noticeably dentate (fig. 323e). Maui ..... **retusa** n. sp.

86(71). Mesonotum with a distinct brown, median vitta. Anal plates pointed ventrally (fig. 297b). Clasper two times wider at base than at apex (fig. 297a). Hawaii ..... **infurcula** n. sp.
Thorax black, rather densely gray pollinose, and no brown vitta present on the mesonotum. Anal plates blunt ventrally (figs. 274b and 300b). Clasper nearly as broad at apex as at base (fig. 300a) or distinctly concave on the hind margin (fig. 274a) 87

87(86). Claspers concave on the hind margin. Anal plates near-

ly four times higher than long (fig. 274a), ventral margins not produced (fig. 274b). Six irregular rows of acrostichal setae present on the mesonotum. Hawaii. ..... **brachycerca n. sp.**

Claspers broad and blunt (figs. 290b and 300a). Anal plates less than two times higher than long, ventral margins produced (figs. 290c and 300b). Six distinct rows of acrostichal setae present 88

88(87). Legs predominantly black. Anterior reclinate bristle situated above the proclinate. Ventral surface of each anal plate flat and broad, almost equal in width to the clasper (fig. 300b). Maui and Hawaii ..... **isopedon n. sp.**

Legs yellow, tinged slightly with brown. Anterior reclinate bristle about opposite the proclinate. Ventral portion of each anal plate narrow, not strongly flattened (fig. 290c). Maui, Hawaii, Kauai (?), and Oahu (?) ..... **eurystylata n. sp.**

Scaptomyza (Trogloscaptomyza) acronastes new species (fig. 264a–b).

Fitting in the group of species which has the thorax predominantly yellow, six distinct rows of acrostichal setae, and a well-developed fork at the apex of the arista. It is differentiated from other species of this group by having three prominent bristles plus about three smaller setae present on each side of the ventral margin of the ninth tergum (fig. 264a), and also by having a rounded basal lobe on the male clasper and the entire hind margin of the clasper dentate. The prominent bristles of the ninth tergum are plainly visible *in situ*.

MALE. *Head:* The front is yellow except for the brown to black ground color of the orbits and the ocellar triangle; the orbits and ocellar triangle are gray pollinose. The occiput is yellow except for a tinge of brown in the ground color of the upper portion. The genae, face, clypeus, palpi, and mouthparts are pale yellow. A very faint discoloration of brown is present on the lower margin of the face. The median portion of the face is gently convex. The uppermost bristle of the vibrissal row is almost equal in size to the upper reclinate bristles of the front. The anterior reclinate bristles are scarcely over one-third as long as the proclinates and are situated just slightly above the latter (two-fifths to one-half the distance between the proclinates and the upper reclinates). The antennae are yellow. The arista has two dorsal rays in addition to the well-developed apical fork. *Thorax:* Entirely yellow except for a faint tinge of brown in the ground color of the upper portion of the pleuron, the hind portion of the mesonotum, and over the disc of the scutellum. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the

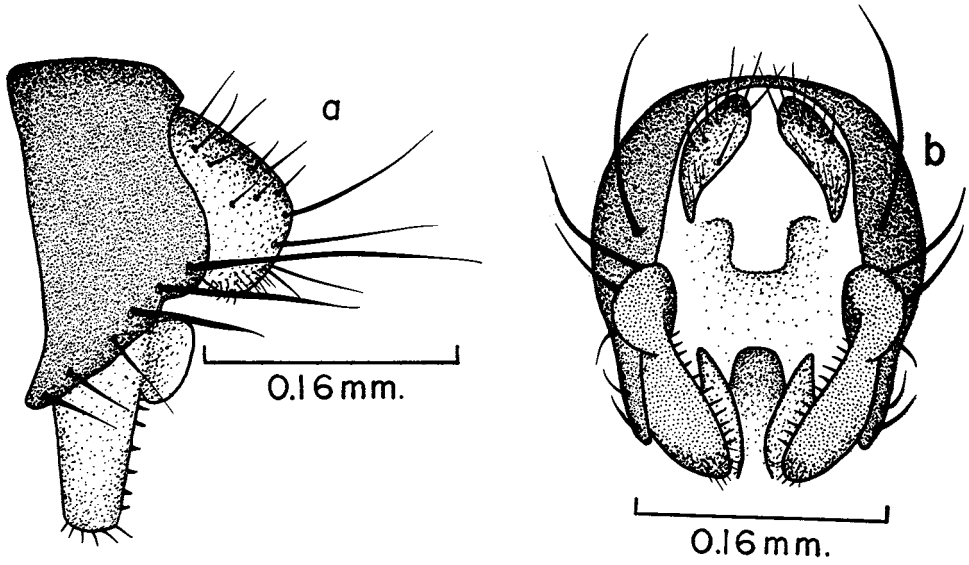


Figure 264—*Scaptomyza* (*Trogloscaptomyza*) *acronastes* n. sp.: a, male genitalia, lateral; b, male genitalia, ventral.

first supraalars. The humeral bristle is about equal in size to the presuturals. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* Yellow except for a faint tinge of brown at the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.3 times longer than the fourth. The costal fringe extends scarcely over one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is almost two times longer than the penultimate section. *Abdomen:* Almost entirely brown, yellow at the anterior corners of the terga. The anal plates are nearly two times higher than long; the posterior margins are arched; the ventral portion of each anal plate is flattened, rather triangular in shape (fig. 264b). The ninth tergum is straight-sided; six or more rather strong setae are present on each ventral margin (fig. 264a). Each clasper has a rounded basal lobe and the hind margin is completely dentate; the dentations extend on the inner side of the basal lobe. The ventral aspects of the genitalia are as in figure 264b.

Length: body, 1.5 mm.; wings, 1.8 mm.

FEMALE. Unknown. The female specimens are probably being confused with one of the other species of this complex which occur on Mount Kaala.

Holotype male and two male paratypes: from Mount Kaala, Oahu, April, 1953, collected near the summit at elevation from 3,000 to 4,000 feet (D. E. Hardy). One male paratype: same locality, November, 1946, collected in a banana trap (G. B. Mainland).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

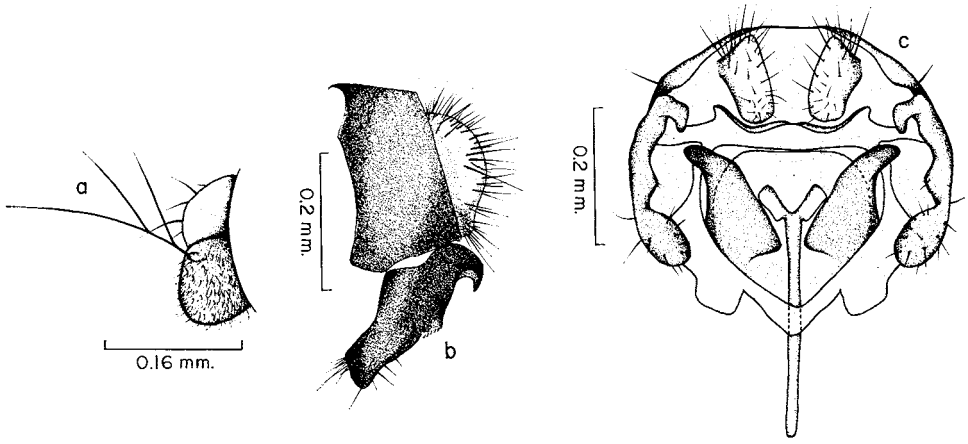


Figure 265—*Scaptomyza* (*Trogloscaptomyza*) *adunca* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) adunca new species (fig. 265a–c).

Except for the characters of the male genitalia I see no way to differentiate this from *S. latitergum* n. sp., and *adunca* may possibly be a subspecies. The male genitalia, however, are distinctly different. The basal lobe on the clasper is short and curved, about one-half as long as the remainder of the clasper (fig. 265b), rather than being elongate, straight-sided, and approximately equal in length to the remainder of the clasper. Also, in *adunca,* the ventral margins of the anal plates are not extended (fig. 265c); in *latitergum* the ventral aspects of the anal plates are lobate (fig. 302d). The arista often lacks the apical fork (fig. 265a). For other characteristics refer to the description of *latitergum.*

Length: body of male, 2.2 mm., body of female, 2.5 mm.; wing of male, 2.5 mm., wing of female, 2.8 mm.

Holotype male, allotype female, and eight paratypes (all females): Keanakolu, Hawaii, Kaula Gulch, 7,000 feet, October 29, 1952 (C. P. Hoyt). Also five male paratypes: Puu Kihe, Hawaii, 8,000 feet, October, 1952 (D. E. Hardy); and Puu Kalapa, Hawaii, 8,000 feet, on *Sophora,* October, 1952 (D. E. Hardy).

Type, allotype, and three paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) affinicuspidata new species (fig. 266a–d).

This species fits close to *S. cuspidata* n. sp. and is differentiated by the differences in the male genitalia; the most striking difference is the presence of long setae on the hind margin of the male clasper (fig. 266c).

MALE. *Head:* Almost as long as high as seen in direct lateral view. The front is yellow on the lower third (in the area anterior to the proclinate bristles) and

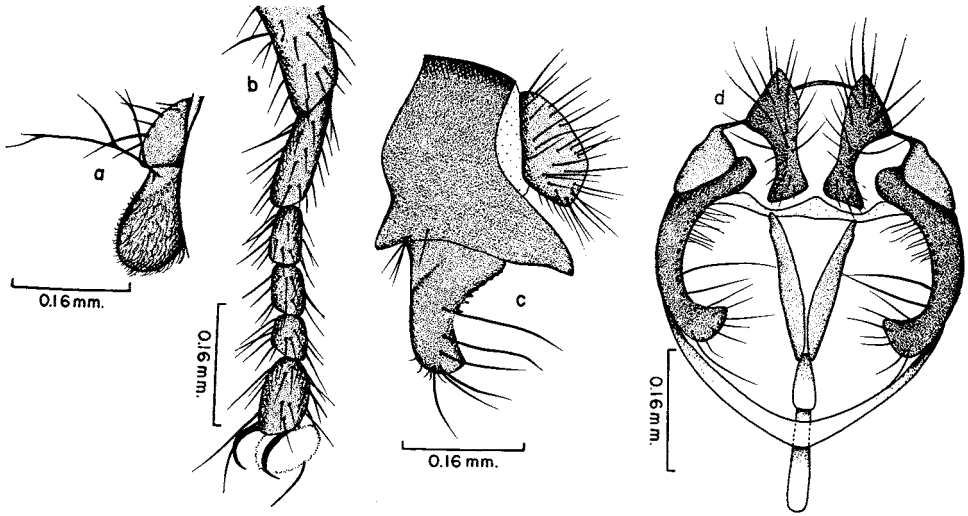


Figure 266—*Scaptomyza (Trogloscaptomyza) affinicuspidata* n. sp.: **a,** antenna; **b,** front tarsus; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

is dull black above except for a narrow line of yellow extending along the eye orbits to about level with the upper reclinate bristles. The occiput is black, lightly covered with gray pollen except for the yellow ventral margin. The genae, face, palpi, and mouthparts are pale yellow. The clypeus is yellow, faintly tinged with brown. The anterior reclinate bristles are about one-half as long as the proclinates and are situated well above the latter (about two-fifths the distance between the proclinates and upper reclinates). The first two antennal segments are yellow; the third segment is yellow-brown. The arista has two dorsal rays and a small apical fork (fig. 266a). *Thorax:* Almost all black, covered with gray pollen; the lower portion of each humerus, a spot on the anterior portion of each side of the mesonotum inside each humerus, and the area surrounding each mesonotal spiracle are yellow. The halteres are pale yellow; the extreme apex of the scutellum is yellow, and the wing base is also tinged with yellow. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated in front of a line drawn between the first supraalars. The humeral bristles are equal in size to the presuturals. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* Yellow except for the brown apices of the tarsi. The leg segments are comparatively short and thick, especially those of the front legs. The front legs are as in figure 266b. The front basitarsus is about one-fifth as long as the tibia. *Wings:* Faintly infuscated with brown. The third costal section is 4.5 times longer than the fourth and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Dark brown to black, covered with gray-brown pollen. As seen from a direct lateral view the anal

plates are about one-half higher than long. The ventral margins of the anal plates are lobate; the lobes are rather strongly flattened and bent downward into the hind portion of the genital chamber (fig. 266d). The posteroventral margin of the ninth tergum is lobate, rather sharply pointed as in figure 266c. The claspers are slender, and each has a row of long setae on the posterodorsal margin (fig. 266c). The ventral aspects of the genitalia are as in figure 266d.

Length: body, 2.7 mm.; wings, 3.3 mm.

FEMALE. Fitting the description of the male except for genital characters; also the front legs are not as shortened.

Length: body, 2.7 mm.; wings, 2.9 mm.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, August, 1958, collected in banana bait trap (D. E. Hardy). Allotype female: Haelaau, Maui, 5,300 feet, December 18, 1928, on *Lobelia gloria-montis* (E. H. Bryan, Jr.). Two male paratypes: same data as allotype.

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) anechocerca new species (fig. 267a–b).

This species fits in the group which has six rows of acrostichal setae and the body mostly yellow. It appears to be closely related to *S. levata* and is differentiated by having the ventral margins of the anal plates bent downward and flattened as in figure 267b and also by the differences in the claspers and other details of the genitalia as shown in figure 267a–b.

MALE. *Head:* Entirely yellow (including the appendages) except for the red compound eyes, the brown area immediately surrounded by the ocelli, and a faint tinge of brown on the lower margins of the face. The eye orbits and the ocellar triangle are yellow-gray pollinose. The median portion of the face is slightly raised. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristles are rather small (less than half as long as the proclinates and situated about halfway between the proclinates and upper reclinate bristles). *Thorax:* Entirely yellow. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated halfway between the first supraalars and the suture. The anterior sternopleural bristle is one-half as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is slightly less than one-third as long as the tibia. *Wings:* Entirely hyaline. The third costal section is 3.5 times longer than the fourth and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is nearly two times longer than the penultimate section. *Abdomen:* Yellow, faintly tinged with brown in the median portion. The anal plates are elevated on the posteroventral portions, and the ventral margins are bent anteriorly and flattened as seen from a ventral view (fig. 267b). The ninth tergum is rather broad and straight-sided. The claspers are blunt at

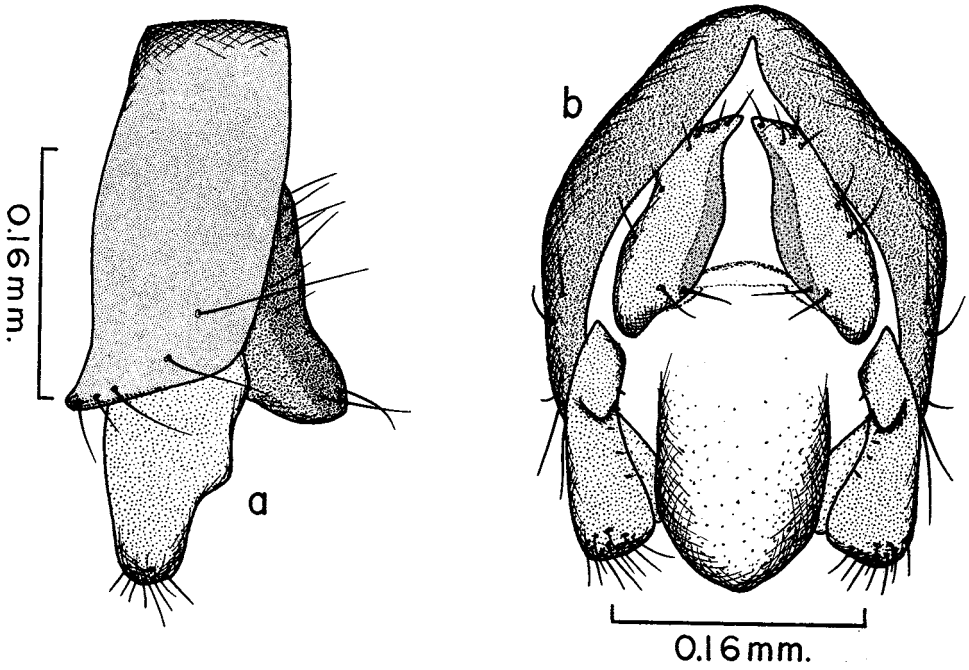


Figure 267—*Scaptomyza* (*Trogloscaptomyza*) *anechocerca* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

apices and are distinctly dentate near the basal portion (fig. 267a). The ventral aspects of the genitalia are as in figure 267b.

Length: body, 1.6 mm.; wings, 1.9 mm.

FEMALE. Unknown.

Holotype male: Kalalau Lookout, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). Two male paratypes: from the following localities: Poomau Valley, Kauai, 3,000 feet, July, 1952 (D. E. Hardy); and Alakai Swamp, Kauai, 3,800 feet, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) apicigutulla new species (fig. 268a–c).

This species is readily differentiated from all other known Hawaiian *Scaptomyza* by having a small brown spot confined to the apex of vein R_{4+5} (fig. 268a); also the male genitalia are distinctive (fig. 268b).

MALE. Small, dark brown to black species, rather densely covered with gray pollen. *Head:* Quadrate as seen from lateral view. The front is slightly wider than long and is dark brown to black in ground color, gray pollinose around the ocellar triangle and down the orbits, leaving a velvety black or brown V in the middle of the front; the lower margin of the front is yellow. The lower reclinate

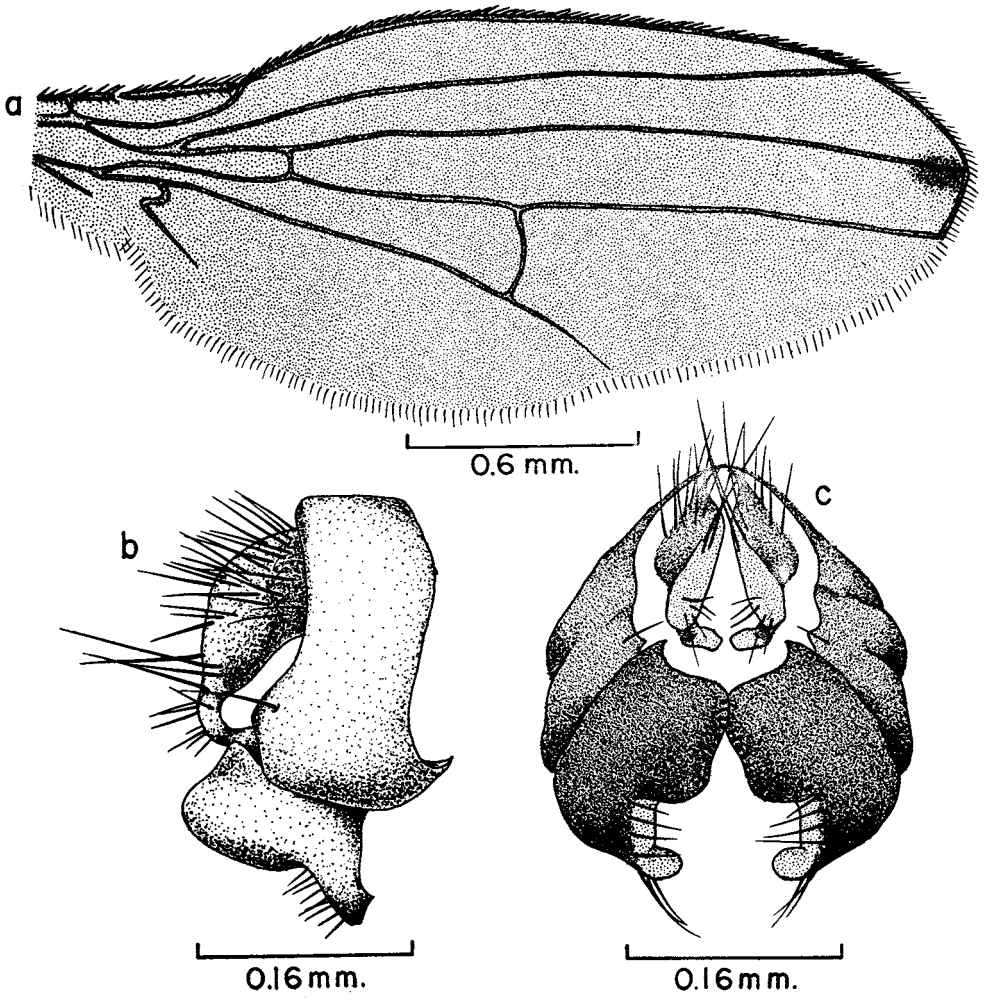


Figure 268—*Scaptomyza* (*Trogloscaptomyza*) *apicigutulla* n. sp.: a, wing; b, male genitalia, lateral; c, male genitalia, ventral.

bristle is about three-fifths as long as the proclinate and is situated opposite the latter. The upper reclinate bristle is situated at the middle of the front (measured from the upper ocelli to the front median margin). The vertex and the upper three-fourths of the occiput are dark brown to black in ground color, rather densely gray pollinose. The lower fourth of the occiput, the genae, and the face are yellow, except for a faint tinge of brown on the lower portion of the latter and for a tinge of brown along each vibrissal row. The gena, measured from the eye margin to the vibrissal row, is rather narrow, about equal in width to two to three rows of eye facets. The second bristle of the vibrissal row is about three-fifths as long as the first. The palpi are dark brown to black; each has a

strong, black, apical bristle (which is almost equal in size to the genal bristles) and one smaller subapical bristle. The median portion of the face is flattened on the lower third, slightly carinate on the upper two-thirds. The clypeus is tinged with brown. The labella are yellow with a narrow brown rim along the upper edges. The antennae are brown to black, tinged with yellow. The arista has two dorsal rays plus a moderately large apical fork; the inner surface of the arista has three short hairs situated near the median portion. *Thorax:* Predominantly brown to black in ground color, tinged faintly with yellow, and rather densely gray pollinose. The type male appears to be slightly teneral and exhibits more yellow in the ground color than is probably typical for the species. In the fully hardened allotype the brown or black coloration is dominant except for the clear yellow lower portion of each humerus. The anterior dorsocentral bristles are situated behind the suture and distinctly in front of a line drawn between the first pair of supraalars. Six rows of acrostichal setae are present over the anterior half of the mesonotum, and four rows extend between the anterior and posterior dorsocentral bristles. The humeral bristle is strong, equal in size to the presutural bristle. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Almost entirely yellow, tinged with brown on the apices of the tarsi. I see no distinctive features on the legs. *Wings:* Entirely hyaline except for a small brown spot at the apex of vein R_{4+5} (fig. 268a). The costal fringe ends about one-sixth the distance between the tips of veins R_{2+3} and R_{4+5}. The third costal section is 3.67–3.7 times longer than the fourth costal section and the last section of vein M_{1+2} is 1.6 times longer than the penultimate section. The last section of vein M_{3+4} is about 1.5 times longer than the m crossvein. *Abdomen:* Brown to black in fully hardened specimens, tinged faintly with yellow in the ground color. The genitalia are as in figure 268b and c. The claspers are divided into two lobes: a blunt, rounded posterior lobe with numerous small black teeth along the inner surface, and a narrower anterior lobe which is fringed with long hairs along its hind margin.

Length: body, 1.8 mm.; wings, 2.4 mm.

FEMALE. Fitting the description of the male except for the sexual differences. As mentioned above, the allotype is a fully hardened specimen and is consistently darker in coloration than is the male. The wings of the female seem to be faintly tinged with brown. The anal plates are dark brown, the remainder of the genitalia is yellow.

Length: body, 2.2–2.4 mm.; wings, 2.5–2.9 mm.

Holotype male: north slope Hualalai, Hawaii, *circa* 5,000 feet, July, 1953 (D. E. Hardy). Allotype female: Kahuku Ranch, Hawaii, 3,000 feet, July, 1953 (D. E. Hardy). One paratype female: same data as type.

Type and allotype in the B. P. Bishop Museum. Paratypes in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) apponopusilla new species (fig. 269a–b).

This species is closely related to *S. pusilla* (Grimshaw), and I see no way to

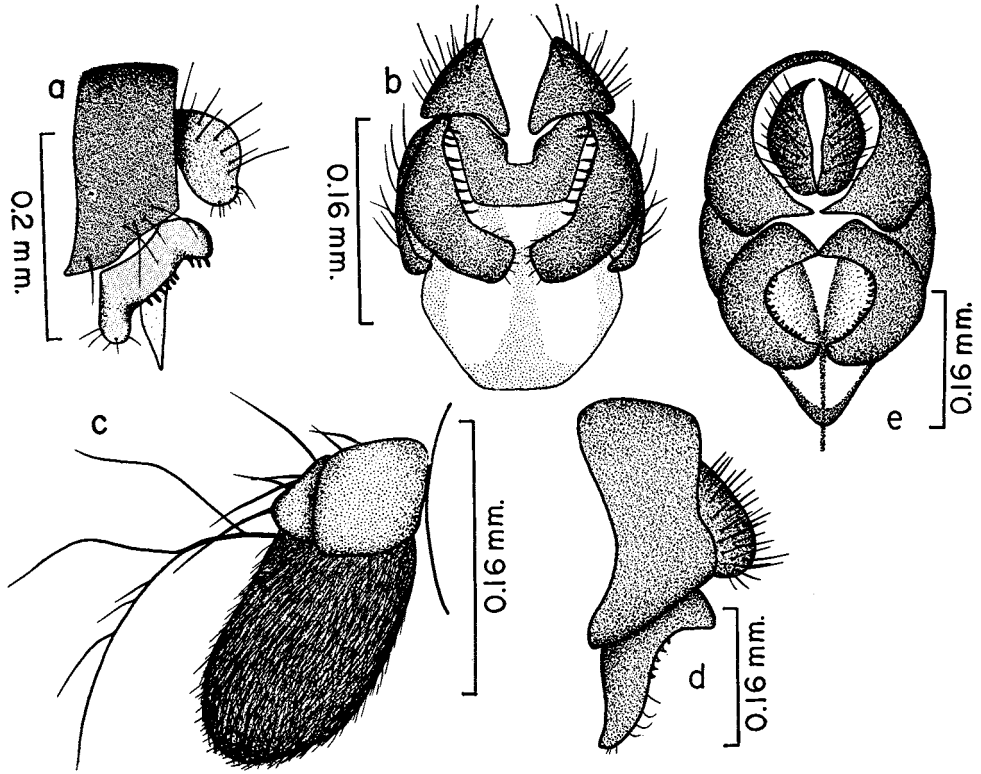


Figure 269—*Scaptomyza* (*Trogloscaptomyza*) *apponopusilla* n. sp.: **a,** male genitalia, lateral; **b,** ventral view of ninth sternum and anal plates. *S.* (*T.*) *argentifrons* n. sp.: **c,** antenna; **d,** male genitalia, lateral; **e,** male genitalia, ventral.

separate them except by the characteristics of the ventral aspects of the male genitalia. In *apponopusilla* the ventral aspects of the anal plates are pointed, distinctly separated from the rather short ninth sternum (fig. 269b), rather than being continuous with the ninth sternum as in *pusilla* (fig. 321b). This is also related to *dubia* n. sp. but is differentiated by having the hind margins of the sternal plate (which lies in the upper portion of the genital chamber) rather deeply concave (fig. 269b).

MALE. Fitting the descriptions of *pusilla* and *dubia* except for the genital characters as pointed out above and as shown in figure 269a–b. The females cannot be separated from related species.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Six paratypes (all males): from the following localities on Hawaii—same as type; Keanakolu Trail, 4,500 feet, October 28, 1952 (C. P. Hoyt); Kilauea, August, 1958, collected in light trap (J. W. Beardsley); and Upper Olaa Forest, July, 1953 (D. E. Hardy).

Type and one paratype in the B. P. Bishop Museum. The remainder of the

paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) argentifrons new species (fig. 269c–e).

This species is readily differentiated from all other known *Trogloscaptomyza* in Hawaii by being entirely polished black and by having the front silvery pollinose.

MALE. *Head:* Entirely black in ground color except for the reddish brown eyes. The front is nearly two times wider than long and is entirely silvery pollinose except for a narrow, shining black area extending down each orbit. The upper reclinate bristles are situated at about the middle of the front; the lower reclinates are tiny, about half as long as the proclinates, and situated distinctly above the latter. A moderately strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the upper reclinate bristle. The face has a distinct carina extending down the median portion, and the lateral margins, bordering on the eyes, are very narrow, inconspicuous. Each palpus has a short, black, apical bristle and a smaller black, subapical bristle. The mouthparts are entirely black except for the labellum which is yellow. The antennae are dark brown to black; the arista has two dorsal rays in addition to the large apical fork (fig. 269c). *Thorax:* Entirely polished black, gray-brown pollinose on the sides, and faintly pollinose on the dorsum. Six rows of acrostichal setae extend over the anterior half of the mesonotum; these are somewhat difficult to discern because of the shining black ground color; about four irregular rows of acrostichals extend behind the anterior pair of dorsocentrals. The anterior dorsocentrals are situated about opposite the first (anterior) pair of supraalars. Only one humeral bristle is present. The anterior sternopleural bristle is one-half to three-fifths as long as the posterior bristle. The halteres are yellow. *Legs:* The coxae and femora are black, the tibiae are yellow, tinged lightly with brown, and the tarsi are yellow. The posteroventral bristles of the front femura are short; the longest bristles are about equal to the width of the femur. The legs are not ornate; no conspicuous cilia or long, erect hairs are present. The front basitarsus is about one-third as long as the tibia. *Wings:* Hyaline, with no brown markings. The third costal section is 3.42 times longer than the fourth, and the costal fringe extends one-third to two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.84 times longer than the penultimate section. The last section of vein M_{3+4} is about 1.4 times longer than the m crossvein. *Abdomen:* Entirely polished black. Very faintly pollinose. The genitalia are developed as in figure 269d–e. The claspers are very large and conspicuous, somewhat boomerang-shaped, and strongly toothed along the upper margin.

Length: body, 2.0–2.3 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for sexual details. The ovipositor is very weakly sclerotized, largely fleshly, and yellow in color.

Length: body, 2.30–2.60 mm.; wings, 2.50–2.75 mm.

Holotype male and allotype female: Nualolo Valley, Kauai, July, 1952, 3,400 feet (D. E. Hardy). Thirty-two paratypes (20 males and 12 females): from the following localities—same data as type; and Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are being deposited in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) articulata new species (fig. 270a–b).

This species fits in the complex which is characterized by having the body dark-colored, covered with gray pollen, and with six rows of acrostichal setae on the mesonotum. It is differentiated from other known species by having a strong and distinctly articulated lobe developed at the posteroventral portion of the ninth tergum and also by other genital characters as shown in figure 270a–b.

MALE. *Head:* The head is slightly higher than long; the longest diameter of the eye is vertical. The lower margin of the front is yellow, the upper portion is brown to black in ground color, the eye orbits and the ocellar triangle are densely gray pollinose, and the area between is velvety black. The occiput is almost all reddish brown in ground color, covered with gray pollen; only the extreme lower margin is yellow. The genae, palpi, and mouthparts are pale yellow-white. The clypeus is faintly tinged with brown. Each palpus has a small apical bristle plus a subapical black seta on the outside surface. The face is white; the median portion is distinctly carinate. One moderately strong bristle is present at the upper edge of each vibrissal row. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated opposite the latter. The antennae are yellow. The arista has two strong dorsal rays in addition to the large apical fork. *Thorax:* Entirely brown to black in ground color, covered with gray pollen, and with a rather distinct median vitta extending down the mesonotum. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated in front of a line drawn between the first supra-alars. The anterior sternopleural bristle is one-half to three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Hyaline. The third costal section is three times longer than the fourth and the costal fringe extends slightly more than one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Entirely dark brown, tinged faintly with rufous in ground color, and covered with gray-brown pollen. The anal plates are as long as high (as seen in direct lateral view), and the ventral margins are lobate. A strong, sharp-pointed, articulated lobe arises on each side of the posteroventral portion of the ninth tergum (fig. 270a). The claspers are broad and blunt, toothed on their posterior margin. The ventral aspects of the genitalia are as in figure 270b.

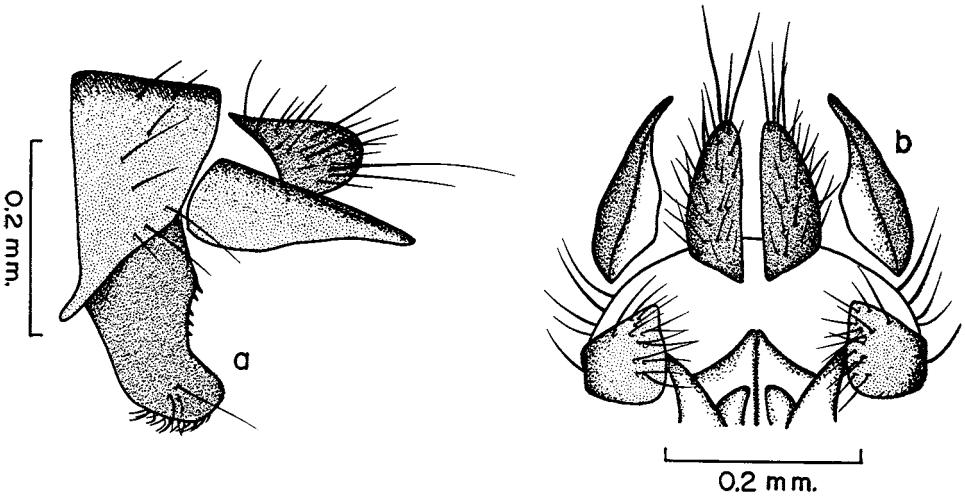


Figure 270—*Scaptomyza* (*Trogloscaptomyza*) *articulata* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Length: body, 1.8–2.0 mm.; wings, 2.2 mm.

FEMALE. Fitting the description of the male except for sexual characters and except that a faint indication of a brown vitta is present down each dorsocentral line, and the face is distinctly tinged with brown on the lower portion.

Length: body, 2.0 mm.; wings, 2.5 mm.

Holotype male: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy). Allotype female: Kaula Gulch, Hawaii, 7,000 feet, August, 1952 (D. E. Hardy). Twenty-five paratypes (predominantly males): same data as type and allotype; Kalua Kauka, Hawaii, 5,500 feet, October, 1952 (D. E. Hardy); Bird Park, Kilauea, Hawaii, July, 1953 (D. E. Hardy); and one Puu Kolekole, Molokai, July, 1952 (D. E. Hardy).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) basiloba new species (fig. 271a–c).

This species is very closely related to *S.* (*T.*) *longipecten* Hackman and can be separated only by the characteristics of the male genitalia; these differ as shown in figures 271b, c and 305a, c. *S. basiloba* has a well-developed basal lobe on each clasper, and the bridge-like portion connecting the two arms of the clasper is much narrower than in *longipecten*.

MALE. *Head:* Nearly quadrate as seen in lateral view; the compound eye is slightly higher than long. The front is about as wide as long, predominantly yellow, tinged with rufous on the upper portion, with a slight tinge of brown in the orbits, and tinged with brown in the area surrounding the ocellar triangle;

the latter two regions are rather densely gray pollinose. The ocellar triangle is black. The upper reclinate bristles are situated on about the upper two-fifths of the front. The lower reclinate bristle is small, about half as long as the proclinate, and situated approximately opposite the latter. The upper two-thirds of the occiput is brown to black in ground color; the lower third is clear yellow. The genae and face are pale yellow: the latter has a slight carina down the middle; the former are rather narrow, about one-sixth as wide as the eye height. The strong bristle at the upper edge of each vibrissal row is about equal in size to the upper reclinate bristles. The palpi and mouthparts are entirely yellow; each palpus has a moderately strong, black bristle at the apex and several black preapical setae. The antennae are entirely yellow; the second segment has three short, black, dorsal bristles. The arista has two dorsal rays in addition to the apical fork (fig. 271a) and has three, short hairs on the inner margin. *Thorax:* Predominantly reddish, tinged with brown in ground color. The mesonotum and scutellum are brown, covered with gray pollen; a brownish red vitta extends longitudinally just inside each dorsocentral row from the anterior margin to about opposite the first (anterior) pair of supraalar bristles. The notopleural areas and the sides of the scutellum are also yellow to rufous, tinged with brown. The metanotum is brown, tinged faintly with rufous, and the pleura are yellow to rufous, tinged faintly with brown. The humeri are brown, tinged with red in the ground color; the strong bristle is about equal in size to the presutural bristle. The mesonotum has four rows of acrostichal setae which extend posteriorly to about opposite the second (posterior) pair of supraalar bristles; two rows of acrostichal setae extend posteriorly beyond this point. At a level with the presutural bristles, six irregular rows of acrostichals are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first pair of supraalars. The anterior sternopleural bristle is one-half to three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical joints of the tarsi. I see no distinctive features on the legs. *Wings:* Hyaline. The costal fringe extends about one-fifth to one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.93 times longer than the fourth section, and the last section of vein M_{1+2} is two times longer than the penultimate section. *Abdomen:* Brown, tinged faintly with rufous in the ground color. The ninth tergum is rather long compared to its width (approximately three-fourths as long as wide as seen in lateral view); the tergum terminates in a blunt point at the anteroventral edge (fig. 271b). As in *longipecten*, a thin, sheet-like bridge connects the dorsal and ventral portions of each clasper; each clasper is distinctly lobate basally. The inner edge of each clasper is armed with moderately strong teeth on about the upper two-thirds, very similar to those of *longipecten*. The anal plates are narrowed ventrally (fig. 271c).

Length: body, 2.00 mm.; wings, 2.45 mm.

FEMALE. Fitting the description of the male in most respects; however, the upper portion of the front is distinctly darkened in the middle, and the mesonotum is more completely blackened in the ground color, with only faint indica-

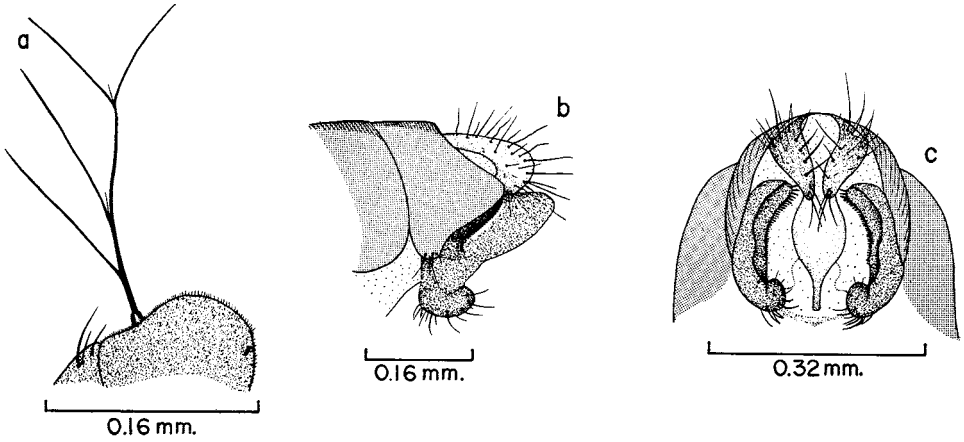


Figure 271—*Scaptomyza (Trogloscaptomyza) basiloba* n. sp.: **a,** arista; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

tions of the vittae extending over the anterior half. The coloration of the abdomen is obviously somewhat variable. In the type the first two segments are predominantly brown with segments three to five almost entirely yellow, tinged with brown; in other specimens the abdomen is more completely brown, tinged lightly with yellow. The ovipositor is developed as in other species of this subgenus.

Length: body, 2.4 mm.; wings 2.7 mm.

Holotype male, allotype female, and eight paratypes (three males and five females): from Pauahi, Hawaii, 4,300 feet, August, 1952, collected in dense treefern jungle (D. E. Hardy); and one male from near Humuula, Hawaii, August 3, 1946, on *Acacia koa* (E. C. Zimmerman).

NOTE: Two males from Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy), fit here by genital characters; but the thorax and abdomen are yellow with three faint brown longitudinal vittae down the mesonotum; this may represent a subspecies. These are not being included in the type series.

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the collections of the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) bilobata new species (fig. 272a–b).

This species has the body dark-colored, six rows of acrostichal setae, and the arista with a well-developed apical fork. It is differentiated from other species in this complex by having a large basal lobe developed on each clasper (fig. 272a).

MALE. *Head:* Approximately as high as long; the eyes are slightly oblique in position. The lower third of the front, below a level with the anterior reclinate bristles, is yellow; the upper portion is black. The orbits and ocellar triangle

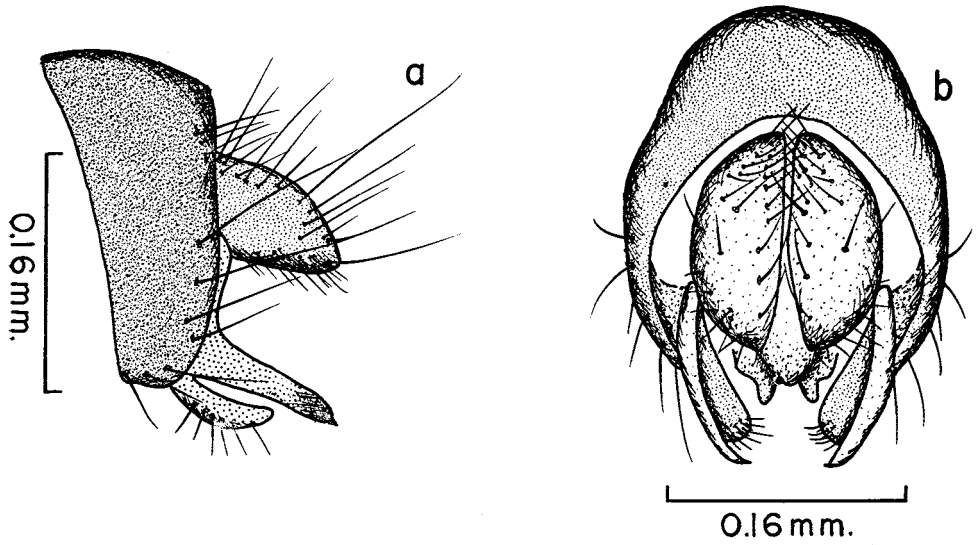


Figure 272—*Scaptomyza* (*Trogloscaptomyza*) *bilobata* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

are densely gray pollinose, the area between is dull black. The upper three-fourths of the occiput is dark brown to black covered with gray pollen; the lower portion is yellow. The genae, face, clypeus, palpi, and mouthparts are pale yellow. Each palpus has two apical bristles. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the outer vertical bristle. The anterior reclinate bristles are about one-half as long as the proclinates and are situated opposite the latter. The antenna is yellow. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely dark brown to black in ground color, covered with gray pollen except for a tinge of yellow on the lower portion of each humerus. The mesonotum has six irregular rows of acrostichal setae on the anterior portion. The anterior dorsocentral bristles are situated about opposite the first supraalars. The humeral bristle is almost equal in size to the presutural bristle. The anterior sternopleural bristle is nearly three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.2 times longer than the fourth, and the costal fringe extends about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Entirely brown covered with gray-brown pollen. The anal plates are nearly two times higher than long; the ventral margin is vertical in lateral view. As seen from below the ventral portions are flattened. The ninth tergum is rather broad, approximately two times longer than the anal plates, and straight-sided; the ventral margins are slightly oblique. The claspers are large and conspicuous, the well-

developed basal lobe is present, and the apical portion is rather slender, with prominent teeth extending between the two lobes as in figure 272a. The ventral aspects of the genitalia are as in figure 272b. The aedeagus is large and fleshy. The parameres extend almost horizontally.

Length: body, 2.0 mm.; wings, 2.4 mm.

FEMALE. Fitting the description of the male except that six distinct rows of acrostichal setae are present on the anterior half of the mesonotum.

Holotype male and allotype female: Kaula Gulch, north slopes of Mauna Kea, 7,000 feet, August, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) bipars new species (fig. 273a–b).

This species fits in the group which has the body yellow and six rows of acrostichal setae on the mesonotum. It is differentiated from all other known *Trogloscaptomyza* by having the apical portion of the male clasper divided into two equal-sized lobes (fig. 273a).

MALE. *Head:* The front is tinged with brown to black in the ground color of the eye orbits and the ocellar triangle and yellow-brown in the median portion. The orbits and the ocellar triangle are gray pollinose. The occiput is yellow except for a tinge of brown on the upper portion. The genae are pale yellow. The upper two-thirds of the face is pale yellow; the lower portion is tinged with brown. The clypeus is brown, faintly tinged with yellow. The palpi are pale brown. The face is slightly carinate down the median portion. The antennae are yellow-brown. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is three-fifths as long as the proclinate and is situated slightly above the latter. *Thorax:* Entirely yellow except for a slight tinge of brown on the upper portion of each pleuron. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The anterior sternopleural bristle is slightly over half as long as the posterior bristle. *Legs:* Yellow, tinged faintly with brown at the apices of the tibiae and on the tarsi. *Wings:* Hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is almost two times longer than the penultimate section. *Abdomen:* Yellow, tinged faintly with brown. The genitalia are yellow-brown. The anal plates are slightly longer than high as seen from direct lateral view; the ventral margins are strongly flattened and extend into the back portion of the genital chamber. The ninth tergum is rather broad over the dorsal portion, slightly attenuated ventrally, and with a transverse row of rather conspicuous setae on each ventral portion. The claspers are strongly bilobed as in figure 273a. The ventral aspects of the genitalia are as in figure 273b.

Length: body, 1.6 mm.; wings, 1.9 mm.

FEMALE. Unknown.

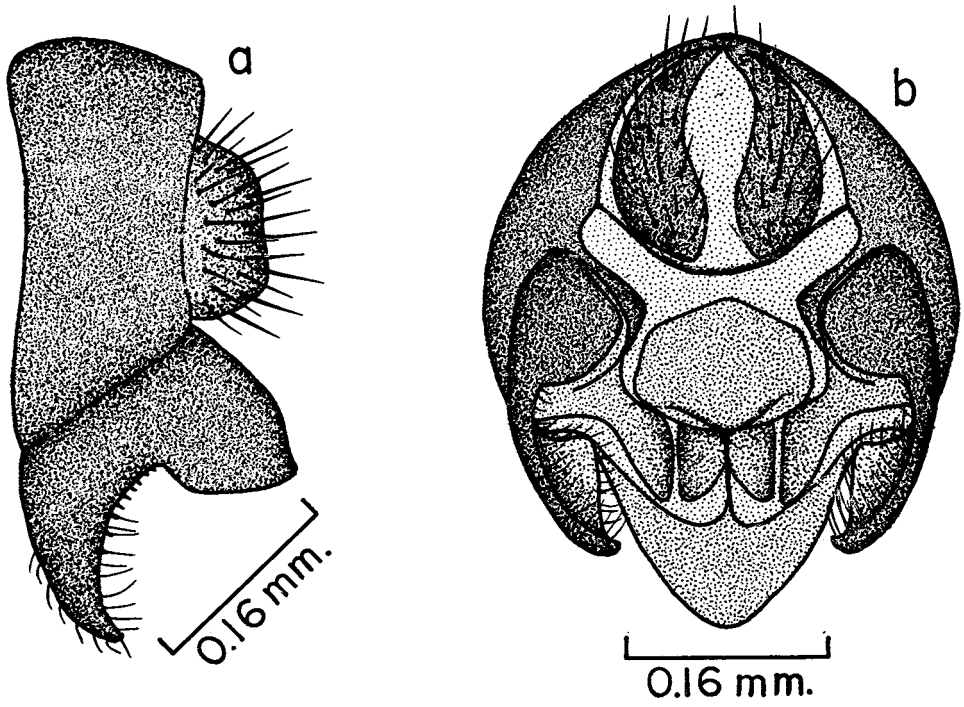


Figure 273—*Scaptomyza* (*Trogloscaptomyza*) *bipars* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

Holotype male: Alakai Swamp, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). One paratype male: Kokee, Kauai, 3,600 feet, July, 1942 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) brachycerca new species (fig. 274a–b).

Because of the dark-colored body, the presence of four rows of acrostichal setae in the male, and the poorly developed apical fork on the arista, this species fits near *S. latitergum* n. sp. and *adunca* n. sp. It is readily differentiated, however, by the characteristics of the male genitalia as shown in figures 274a, 265a, and 302c. The important diagnostic features are the very short anal plates and the concave hind margin of the male clasper.

MALE. *Head:* The lower one-third to one-fourth of the front is yellow. The remainder of the front (including the eye orbits to a level slightly below the proclinate bristles) is entirely black, is gray pollinose on the ocellar triangle and on the orbits, and velvety black in the area between the orbits and the ocellar triangle. The anterior reclinate bristles are slightly over one-half as long as the proclinates and are situated distinctly above the latter. The genae are yellow; measured in the median portion, each is about equal in width to three rows of

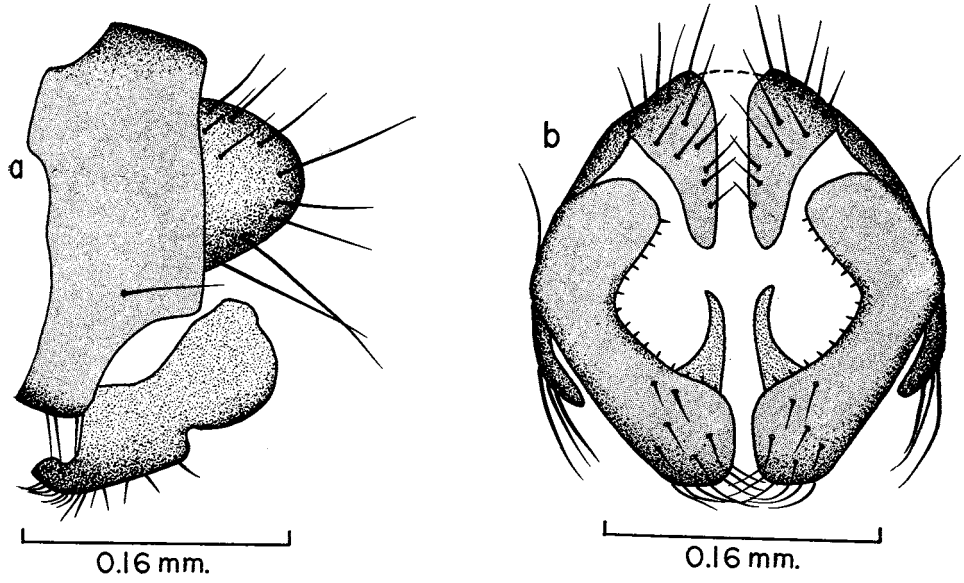


Figure 274—*Scaptomyza* (*Trogloscaptomyza*) *brachycerca* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

eye facets. The face is yellow with a faint tinge of brown on the lower portion. The clypeus is brown, the palpi are yellow. The antennae are yellow, faintly tinged with brown on the dorsal surface. The arista has two dorsal rays and a tiny inconspicuous apical fork. *Thorax:* Entirely dark brown to black covered with gray pollen and with no distinct brown vittae on the mesonotum. Four rows of acrostichal setae are present, with an indication of six irregular rows on some specimens. The anterior dorsocentral bristles are situated just slightly behind the suture. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. The front basitarsus is approximately one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is approximately four times longer than the fourth, and the costal fringe extends about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Dark brown to black, tinged with rufous in ground color, and colored with gray-brown pollen. The anal plates are about four times higher than long. The ninth tergum is straight-sided and is tapered to a point on the anteroventral margin. The claspers are shaped as in figure 274a; the posterior margin is conspicuously dentate and is concave (fig. 274b). The ventral aspects of the genitalia are as in figure 274b.

Length: body, 2.15 mm.; wings, 2.50 mm.

FEMALE. Fitting the description of the male except that six distinct rows of acrostichal setae are present and the third antennal segment is brown.

Length: body, 2.5 mm.; wings, 2.7 mm.

Holotype male and allotype female: Kaula Gulch, Hawaii, 7,000 feet, August, 1952 (D. E. Hardy). Twelve paratypes (five males and seven females) from following localities on Hawaii: same as type; Puu Kalapa, 3,000 feet, collected on *Sophora*, October, 1962 (D. E. Hardy); Kilauea, February and August, 1919, and October, 1929, on *Silene* (O. H. Swezey); Humuula, 7,600 feet, July, 1936, on *Myporum* (E. H. Bryan, Jr.); near Humuula, August, 1946, on *Chenopodium* (E. C. Zimmerman); and Hookomo, August, 1935, on *Sophora* (R. L. Usinger).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) camptochaites new species (fig. 275a–c).

Fitting in the group which has the thorax yellow, six rows of acrostichal setae, and no apical fork on the arista; the apical fork is represented by a minute seta. The species is readily differentiated by the details of the male genitalia as shown in figure 275b–c. The strong curved setae at the base of the clasper and the transparent hind margin of the apical lobe of the clasper are distinctive features.

MALE. *Head:* The front, including the ocellar triangle and the vertex but excluding the area immediately surrounded by the ocelli, is entirely golden yellow. The area surrounded by the ocelli is dark brown to black. The occiput is tinged faintly with brown on the upper portion. The genae, face, and clypeus are yellow. The palpi are dark brown to black. The face is slightly convex in the median portion. One strong bristle is present at the upper edge of each vibrissal row; this is about equal to the upper reclinate bristles of the front. The anterior reclinate bristle is about two-fifths as long as the proclinate and is situated distinctly above the latter. The first two antennal segments are yellow except for a tinge of brown on the dorsal portion. The third segment is brownish yellow. The arista has two dorsal rays; the apical fork is represented by a microscopic hair present on the dorsal surface as in figure 275a. *Thorax:* Predominantly yellow, tinged with brown on each side immediately behind the humerus and along the upper portion of each pleuron. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The humeral bristle is equal to the anterior notopleurals. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown at the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is 3.8 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section. *Abdomen:* Entirely brownish yellow. The anal plates are two times higher than long and are subacutely pointed ventrally; the ventral margins are not lobate. The ninth

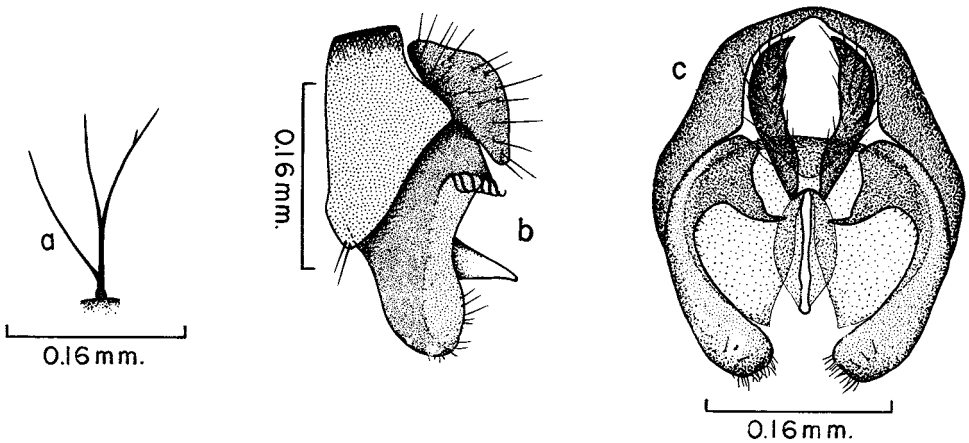


Figure 275—*Scaptomyza* (*Trogloscaptomyza*) *camptochaites* n. sp: **a,** arista; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

tergum is slightly expanded ventrally, is oblique on the ventral margin, and bears no conspicuous setae. The claspers are bilobate with a transparent extension of the hind margin of the apical lobe connecting with the basal lobe as in figure 275b. The basal lobe has numerous strong inwardly curved setae along the postero-ventral margin. The development of the clasper is somewhat like that of *S. basiloba* n. sp. and *longipecten* Hackman, but the genitalia are distinctly different in these species. The ventral aspects of the genitalia are as in figure 275c.

Length: body, 1.50 mm.; wings, 1.75 mm.

In general details this would appear to be closely related to *S. univitta* n. sp., which is from the same habitat, but the genitalia show that the two are not related.

FEMALE. Unknown.

Holotype male: Konahuanui, Oahu, April 9, 1943, 2,600–3,000 feet, beating shrubbery (E. C. Zimmerman).

Type in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) concinna new species (fig. 276a–b).

This species has the thorax yellow, six rows of acrostichal setae, and a well-developed fork at the apex of the arista. It is differentiated from other species in this complex by the development of the male genitalia as shown in figure 276a–b. The distinctive development of the basal lobe on the clasper, and the flat-pointed ventral margins of the anal plates will readily differentiate this.

MALE. *Head:* About as high as long, almost square as seen in direct lateral view. The eye orbits above the proclinate bristles and the ocellar triangle are brown to black in ground color covered with gray pollen. The front is otherwise yellow, tinged with brown in the areas between the ocellar triangle and the orbits. The occiput is tinged with brown in the ground color of the upper four-fifths,

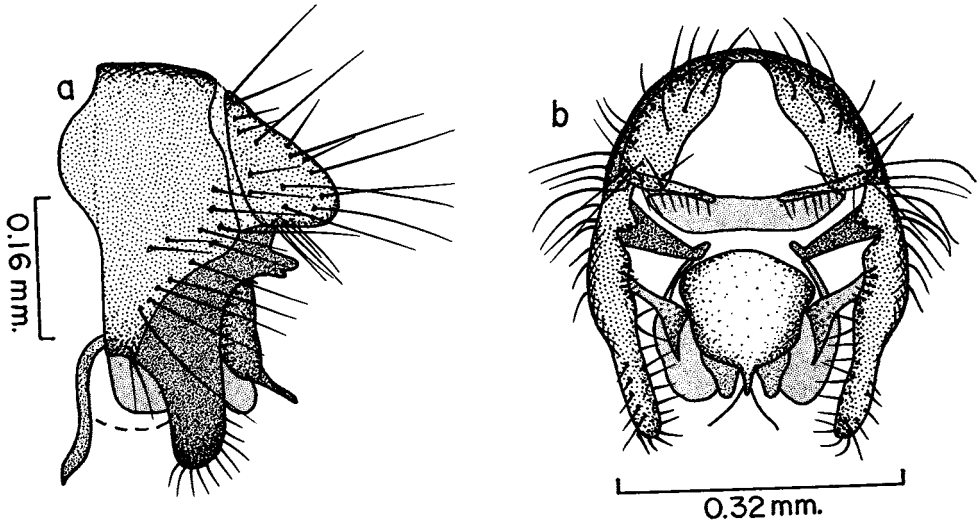


Figure 276—*Scaptomyza* (*Trogloscaptomyza*) *concinna* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

yellow on the lower margin. The gena is pale yellow; the face is yellow-white on the sides and on the upper portion and tinged with brown on the lower margin. The clypeus is pale yellow-brown. The palpi are yellow, tinged faintly with brown. The first two antennal segments are yellow except for a tinge of brown on the dorsal surface of the second; the third segment is brownish yellow. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about one-half as long as the proclinate and is situated just slightly above the latter. *Thorax:* Entirely yellow except for a tinge of brown over the mesopleura, the upper pteropleura, and the metapleura. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentrals are situated halfway between the first supraalars and the suture. The humeral bristle is equal in size to the anterior notopleural bristle. The anterior sternopleural bristle is three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.8 times longer than the fourth, and the costal fringe extends scarcely one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section. The last section of vein M_{3+4} is almost two times longer than the m crossvein. *Abdomen:* Yellow-brown. As seen from direct lateral view, the anal plates are about one-half higher than long and the ventral margin is truncate; from a ventral view the lower margins are flattened, triangular in shape. The ninth tergum is almost straight-sided, one-half to two-thirds longer than the anal plates, and with moderately well-developed setae along the ventral margins. The clasper has a conspicuous basal lobe which has two blunt preapical teeth on the underside and a small subbasal point on

the upper side. The apical portion of the clasper is gently tapered, obtuse at the tip, and dentate on the hind margin (fig. 276a). The aedeagus is thick, bulbous, and terminates in a short slender point. The ventral aspects of the genitalia are as in figure 276b.

Length: body, 2.1 mm; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for sexual characters. The abdomen is largely yellow, tinged lightly with brown. The sixth and seventh terga and the anal plates are dark brown.

Length: body, 2.2 mm.; wings, 2.6 mm.

Holotype male and allotype female: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Four paratypes (one male and three females): same locality as type, June, 1952, and June, 1953 (M. Tamashiro, C. R. Joyce, and D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) connata new species (fig. 277a–c).

This species fits near *S. pusilla* (Grimshaw) because of its general appearance, the six rows of acrostichal setae, and by having the anal plates fused to the plate of the sternum which lies on the dorsal portion of the genital cavity (fig. 277b). The male genitalia differ from those of *pusilla* as shown in figures 277b and 321a and b. *S. connata* also has the body typically discolored with brown.

MALE. *Head:* The front is brown in the ground color of the eye orbits and the ocellar triangle, yellow on the extreme anterior margin, and yellow to golden brown in the areas between the ocellar triangle and the eye orbits. The orbits and the ocellar triangle are densely gray pollinose. The upper portion of the occiput is tinged with brown to black. The genae are yellow. The upper portion and sides of the face are yellow, the lower margin is tinged with brown. The clypeus and the palpi are yellow-brown. The antennae are yellow-brown. The arista has two dorsal rays in addition to the large apical fork. Each anterior reclinate bristle is approximately one-half as long as the proclinate and is situated slightly above the latter. *Thorax:* Typically the thorax is almost entirely brownish yellow with only the sternopleura and hypopleura lacking a discoloration of brown. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline, very faintly infuscated with yellow-brown. The third costal section is 3.2 times longer than the fourth and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is nearly two times longer than the penultimate section. *Abdomen:* Yellow, faintly tinged with brown at the bases of the terga, and brown at the apices. The anal plates are just slightly

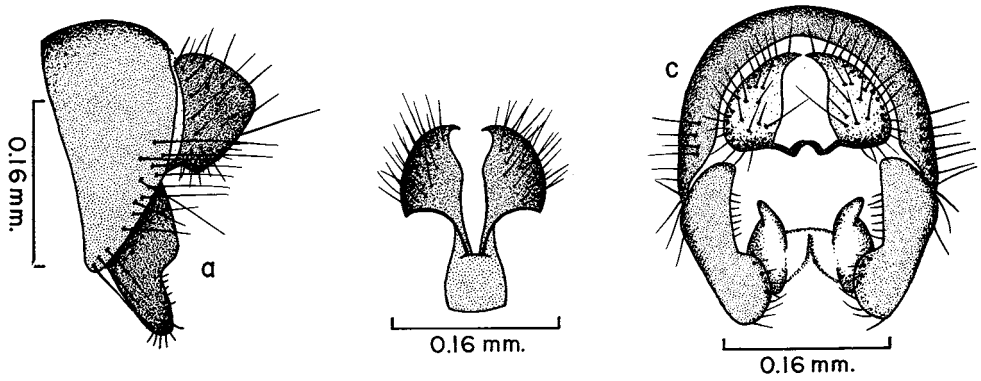


Figure 277—*Scaptomyza* (*Trogloscaptomyza*) *connata* n. sp.: **a**, male genitalia, lateral; **b**, ventral view of anal plates and sternal plate; **c**, male genitalia, ventral (slightly tilted forward).

higher than long when viewed from direct lateral view; the ventral margins are extended and unite with the portion of the ninth sternum which fits on the dorsal portion of the genital chamber (fig. 277b). The ninth tergum is broad across the dorsal portion, gradually narrowed ventrally, and with approximately two rows of setae along each ventral margin (fig. 277a). The claspers are comparatively simple, thickened at base, attenuated to a blunt lobe at the apex, and with rather inconspicuous dentations along the posterior margin. The details of the ventral portions of the genitalia are as in figure 277b–c.

Length: body, 1.70 mm.; wings, 1.90 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 1.75 mm.; wings, 2.00 mm.

Holotype male and allotype female: Kalalau Lookout, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). About 100 paratypes (sexes about evenly represented): from the following localities in the Kokee area of Kauai—same as type; Kokee, 3,600 feet, July, 1952 (D. E. Hardy); Alakai Swamp, 3,800 feet, July, 1952 (D. E. Hardy); Koaie Stream, August, 1953 (D. E. Hardy); Mount Waialeale Trail, 4,500 feet, August, 1953 (D. E. Hardy); Nualolo Valley, 3,400 feet, August, 1953 (D. E. Hardy); Poomau Valley, 3,400 feet, July, 1952 (D. E. Hardy); Waipoo Falls, August, 1953 (D. E. Hardy); Kaunuohua Ridge, 4,000 feet, August, 1953 (D. E. Hardy); Kainamanu, 3,800 feet, July, 1952 (D. E. Hardy); and Halemanu Swamp, August, 1953 (D. E. Hardy).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) cornuta new species (fig. 278a–c).

This species fits near *S. silvicola* n. sp. by having six rows of acrostichal setae, the body dark brown to black covered with gray-brown pollen, the arista with a

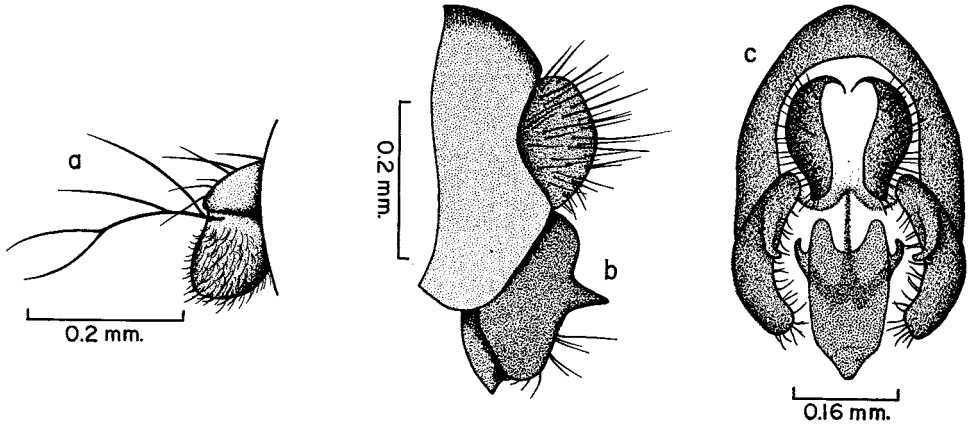


Figure 278—*Scaptomyza (Trogloscaptomyza) cornuta* n. sp.: **a**, antenna; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

well-developed apical fork, and the aedeagus prominent. The male genitalia differ strikingly from those of *silvicola*; *cornuta* is most readily differentiated by the presence of a strong horn-like development at the middle of the hind margin of the clasper (fig. 278b).

MALE. *Head:* The front is entirely black in ground color except for a narrow brownish yellow rim along the lower margin. The eye orbits and the ocellar triangle are gray pollinose; the median portion of the front is dull black. The occiput is entirely brown covered with gray pollen except for the extreme lower portion, which is yellow. The genae, palpi, and mouthparts are yellow. The face is yellow, tinged with brown on the median keel and on the lower margin. The clypeus is yellow-brown. The apical bristle on the palpus is about equal in size to the proclinate bristles of the front; the subapical bristle is approximately equal to the anterior reclinates. One strong bristle is present at the upper edge of each vibrissal row. The anterior reclinate bristles are about one-half as long as the proclinates and are situated approximately opposite the latter. The antennae are yellow-brown on the first two segments, dark brown on the third segment. The arista has two dorsal rays in addition to the large apical fork (fig. 278a). *Thorax:* Entirely brown covered with gray-brown pollen. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about midway between the first supraalars and the suture. The anterior dorsocentral bristle is approximately one-half as long as the posterior bristle. *Legs:* Yellow, tinged faintly with brown on the femora and tarsi. The front basitarsus is about one-third as long as the tibia. *Wings:* Subhyaline, faintly tinged with yellow-brown. The third costal section is four times longer than the fourth, and the costal fringe extends one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.67 times longer than the penultimate section. *Abdomen:* Entirely dark brown, covered with gray-brown pollen. As seen from a direct

lateral view, the anal plates are about two times higher than long; the ventral margins are lobate and extend behind the genital chamber as seen from a ventral view. The ninth tergum is comparatively broad, not narrowed dorsally, and is rounded on the ventral margin. The clasper is rather broad, subacutely pointed apically, and with a sharp hornlike development on the posteromedian margin (fig. 278b). The aedeagus is prominent and plainly visible from a lateral view. The ventral aspects of the genitalia are as in figure 278c.

Length: body, 2.2 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.3 mm.; wings, 2.7 mm.

Holotype male and allotype female: Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) cryptoloba new species (fig. 279a–b).

A small pale-colored species having six rows of acrostichal setae and a well-developed apical fork on the arista. It fits into the group of species which has the aedeagus large and conspicuous and is differentiated by the development of the claspers of the male. A moderately large transparent subbasal lobe covers over a small setose inner lobe; it is also differentiated by the shape of the claspers and other genital characters as shown in figure 279a–b.

MALE. *Head:* The front is entirely yellow except for a tinge of brown to black in the area bordered by the ocelli. The orbits and the ocellar triangle are gray pollinose; the median portion of the front is yellow-gold. The upper third of the occiput is tinged with brown and is densely gray pollinose; the lower portion is yellow. The genae, clypeus, sides of the face, and mouthparts are yellow. The median and lower portions of the face are dark brown to black. The face is gently convex medianly. The palpi are dark brown. The uppermost bristles of the vibrissal row are strong, approximately equal to the ocellar bristles. The anterior reclinate bristles are nearly three-fifths as long as the proclinates and are situated distinctly above the latter. Antennae entirely yellow. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Yellow, with a faint tinge of brown on the upper edge of each pleuron. Six distinct rows of acrostichal setae are present on anterior half of the mesonotum. The anterior dorsocentrals are situated slightly in front of a line drawn between the first supraalars. The humeral bristle is equal to the anterior notopleural. The anterior sternopleural bristle is nearly three-fifths as large as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.4 times longer than the fourth, and the costal fringe extends slightly over one-third the distance between the apices of vein R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Yellow, tinged rather faintly with brown. The anal plates are about three times higher than long; the ventral margins are not lobate. The ninth tergum is straight-sided, about one-half to two times longer than the anal

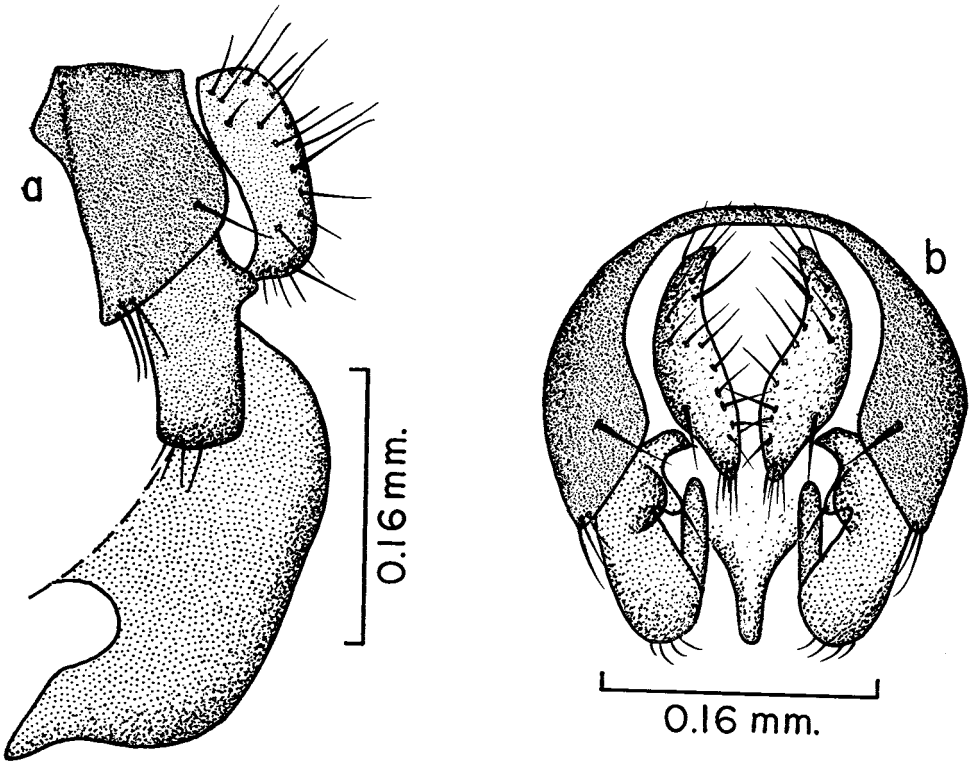


Figure 279—*Scaptomyza* (*Trogloscaptomyza*) *cryptoloba* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

plates, and slightly oblique on the ventral margin. The claspers are developed as mentioned above and as shown in figure 279a–b. The parameres are vertical in position. The aedeagus is large and fleshy.

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters; also, the face is not so extensively blackened.

Holotype male: Mount Tantalus, Oahu, May, 1949 (D. E. Hardy). An allotype female is not being designated since there is a possibility of confusion with *S. quadridentata*. About twenty-five paratypes (predominantly males): from the following localities on Oahu—same as type, one collected March 24, 1907 (no collector given); Mount Kaala, 4,000 feet, May, 1920 (O. H. Swezey), and June, 1953 (M. S. Adachi and D. E. Hardy); Tantalus, August, 1954 (D. E. Hardy); Konahuanui Trail, August, 1953 (D. E. Hardy); Manoa Valley, February, 1952 (D. E. Hardy); Kaluanui, October, 1934 (E. H. Bryan, Jr.); Pupukea, April, 1952 (M. S. Adachi); Waiahole, March 28, 1915 (O. H. Swezey); Paomoho Trail, 1,700 feet, May, 1953 (D. E. Hardy); Waialae Iki, May 2, 1920 (O. H. Swezey); Palolo Ridge, April, 1947 (no collector given); Kamokuiki Valley, April 8, 1934, "larva

in frase on leaf of *Charpentiera*" (O. H. Swezey). Also 15 additional paratypes (5 males and 10 females): from Puu Kukui, Maui, 3,000–4,500 feet, June, 1953 (D. E. Hardy).

Type, allotype, and series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) ctenophora new species (fig. 280a–c).

This species fits near *S. obscuricornis* (Grimshaw) by having four rows of acrostichal setae, the body brown to black and gray pollinose, the arista with a well-developed apical fork, and no prominent basal lobe on the male clasper. It differs strikingly from *obscuricornis* by the characteristics of the male genitalia as shown in figure 280b–c. The broadly rounded apical lobe of the clasper, the sharp spinelike point at the base, and the presence of a comblike series of teeth on the inner hind margin of each clasper will best differentiate *ctenophora* (fig. 280b).

MALE. *Head:* The front is predominantly yellow-rufous, tinged faintly with brown in the areas between the ocellar triangle and the eye orbits. The eye orbits and the ocellar triangle are predominantly black in ground color, densely gray pollinose. The lower third of the occiput, the genae, face, clypeus, palpi, mouthparts, and antennae are pale yellow. In the median portion the gena is equal in width to three or four rows of eye facets. Each palpus has two apical bristles which are subequal in size. The arista has two dorsal rays in addition to the prominent apical fork. The anterior reclinate bristle is tiny, two-fifths to one-half as long as the proclinate, and situated slightly above the latter. *Thorax:* Brown, tinged with black in the ground color of the mesonotum, the mesopleura, the metapleura, and the metanotum and covered with gray pollen. The mesopleura and hypopleura are yellow. No vittae are present on the mesonotum. Four rows of acrostichal setae are present. The anterior dorsocentral bristles are situated just slightly behind the suture. The anterior sternopleural bristle is one-half to three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. The front basitarsus is comparatively short, slightly less than one-fourth as long as the tibia (fig. 280a). *Wings:* Hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends scarcely more than one-fifth the distance between the apices of vein R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Predominantly yellow to rufous, tinged with brown, especially down the median portion and on the apical half of the sixth tergum. The genitalia are dark brown to black except for a distinct tinge of yellow on the claspers; these are very conspicuous *in situ*. The anal plates are two times higher than long and are subacutely pointed ventrally but not drawn out into ventral lobes. The ninth tergum is rather broad, almost straight-sided, and slightly tapered on the anteroventral margin. The claspers each have a sharp point at

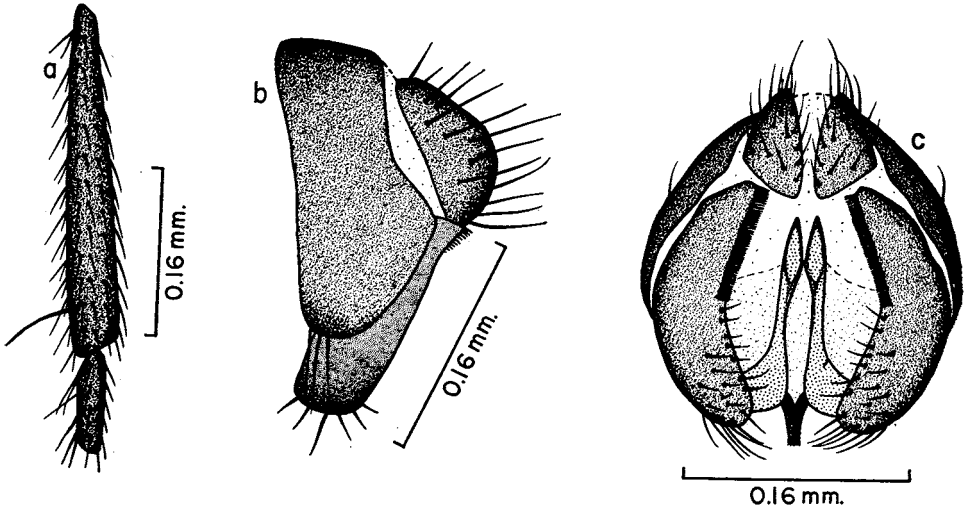


Figure 280—*Scaptomyza* (*Trogloscaptomyza*) *ctenophora* n. sp.: a, front tibia and basitarsus; b, male genitalia, lateral; c, male genitalia, ventral.

the base and are blunt and rounded apically (fig. 280b). Each has a row of long, closely placed comb-like teeth on the inner hind margin; this is best seen from a ventral view (fig. 280c).

Length: body, 1.9 mm.; wings, 2.2 mm.

FEMALE. Fitting the description of the male except for sexual characters; also, very faint brown vittae are present on the mesonotum.

Length: body, 2.2 mm.; wings, 2.5 mm.

Holotype male, allotype female, and five paratypes (four males and one female): Paliku, Haleakala Crater, Maui, 6,500 feet, August, 1958, and June, 1953 (allotype and one paratype) (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) cuspidata new species (fig. 281a–c).

This species is closely related to *S. exigua* (Grimshaw) and is distinguished by the large apical fork on the arista (fig. 281a) and by the sharp-pointed projection from each ventral margin of the ninth tergum of the male (fig. 281b). It differs from *affinicuspidata* n. sp. by having the face of the male white, the arista with a well-developed apical fork, and the claspers lacking long setae (fig. 281c).

MALE. Fitting the description of *S. exigua* in most details. The apical fork of the arista is well developed (fig. 281a). The anterior reclinate bristle is tiny, slightly less than one-half as long as the proclinate, and is situated opposite the

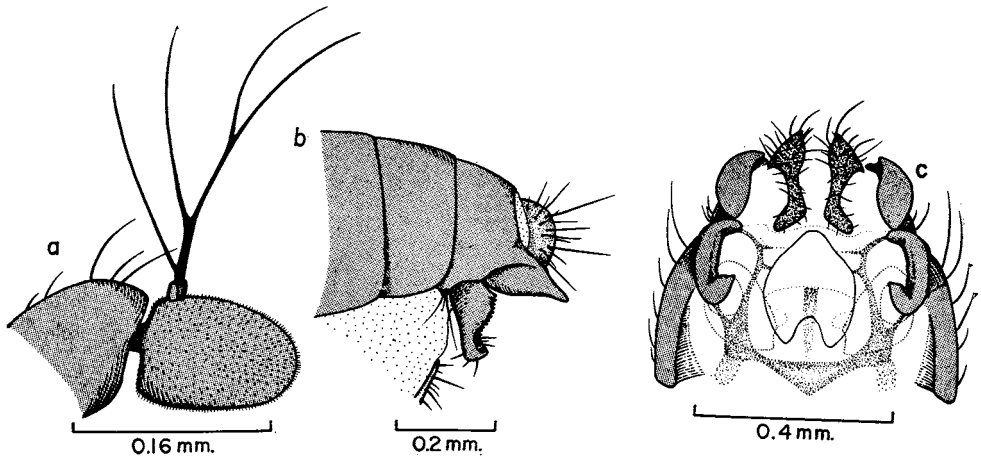


Figure 281—*Scaptomyza* (*Trogloscaptomyza*) *cuspidata* n. sp.: **a**, arista; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

latter. The front is predominantly brown to black in ground color, gray pollinose on the orbits and along the sides of the ocellar triangle, leaving a velvety brown or black V-shaped mark in the middle of the front; the lower margin of the front is yellow. The face is white. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The wings and other details, except the genitalia, are as in *exigua*. The ninth tergum of the male is produced into a sharp-pointed, vertically directed process on each posteroventral corner (fig. 281b). The claspers are rather similar to those of *exigua*, and I see no differences in the ventral aspects of the genitalia (fig. 281c).

Length: body, 1.75–2.25 mm.; wings, 2.00–2.30 mm.

FEMALE. Fitting the description of the male except for sexual characters, and except that the face is yellow-white. The anal plates are dark brown to black. The remainder of the genitalia is bright yellow.

Length: body, 2.0–2.7 mm.; wings, 2.3–2.8 mm.

Holotype male and allotype female: from Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). About 100 paratypes (sexes approximately even in distribution): from the following localities—Same as type, June to August, 1952, 1953, and 1958 (D. E. Hardy and W. C. Mitchell); Upper Olaa Forest, Hawaii, August, 1952 (D. E. Hardy and W. C. Mitchell); Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy); Puu Kihe, Hawaii, 8,000 feet, October, 1952 (D. E. Hardy); Kahuku Ranch, Hawaii, 3,000 feet, July, 1952 and 1953 (D. E. Hardy); Bird Park, Hawaii National Park, Hawaii, July, 1953 (D. E. Hardy); Kulani, Hawaii, 5,200 feet, July, 1952 (D. E. Hardy); Kaula Gulch, Hawaii, 7,000 feet, August, 1952 (D. E. Hardy); and Pauahi, Kona, Hawaii, 4,300 feet, August, 1952 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The

remainder of the paratypes in the following collections: United States National Museum; British Museum (Natural History); Hawaiian Sugar Planters' Association; Dr. W. Hackman, Helsinki, Finland; and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) cyrtandrae new species (fig. 282a–d).

This species fits in the complex which is characterized by having only four rows of acrostichal setae and a yellow body. It fits near *S. pallifrons* Hackman and *mimula* n. sp., but the claspers of the male are strikingly different. *S. cyrtandrae* is readily differentiated by the very strongly lobate posterior portion of the male clasper, which is armed with short black spines around the apex (fig. 282c).

This species lives in close association with native *Cyrtandra*, apparently going through the entire life cycle among the hairs on the leaves. The larvae are rather sluggish and apparently feed on exudate from the hairs on the undersides of the leaves. The larvae appress their mouthparts closely to the hairs of the leaf and remain in one position for long periods of time.

The pupal cases are stuck tightly onto the surface of the leaf.

MALE. *Head:* Nearly quadrate, just slightly higher than long (fig. 282a). The eyes are distinctly oblique. The head is predominantly yellow-white, is tinged with brown on the extreme upper portion of the front, on the upper half of the occiput, and is dark brown on the ocellar triangle; the entire front and occiput are covered with gray pollen. The gena, measured in the median portion, is about equal in width to four or five rows of eye facets. The face has a rather distinct carina down the upper median portion. The clypeus, palpi, and mouthparts are pale yellow. Each palpus has a moderately strong apical bristle. One strong bristle is present at the upper edge of each vibrissal row; this is approximately equal in size to the outer vertical bristle of the front. The anterior reclinate bristle is rather small (approximately one-half as long as the proclinate) and is situated distinctly above the latter. There seems to be some variation in the position of the anterior reclinate bristle; on some specimens it is higher on the front than on others. The antennae are entirely yellow-white. The arista has two dorsal rays in addition to the apical fork; the apical fork is rather deep, the branches are approximately two-thirds as long as the stem of the arista. *Thorax:* Entirely yellow except for a faint tinge of brown on the posteromedian portion and sometimes a faint brown vitta extending down the middle the entire length of the mesonotum. Four rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about opposite the first (anterior) pair of supraalars. One humeral bristle is present. The anterior sternopleural is approximately one-half as long as the posterior bristle. *Legs:* Entirely pale yellow. Each front tibia and tarsus has numerous short erect dorsal setae extending the entire length of the segment. The basitarsus is approximately one-third as long as the tibia and approximately one-fourth longer than the second tarsal segment (fig. 282b). *Wings:* Entirely hyaline. The third costal section is 2.4 times longer than the fourth, and the costal fringe extends just slightly beyond the apex of vein R_{2+3}.

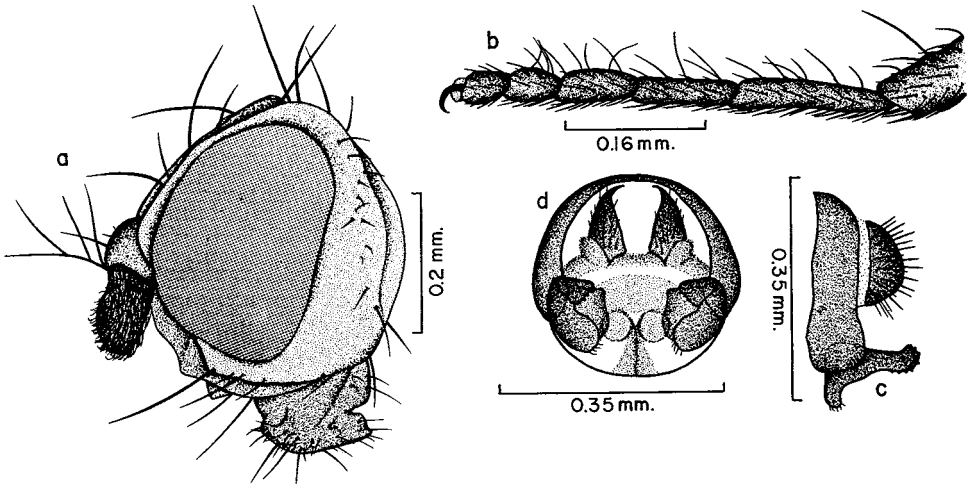


Figure 282—*Scaptomyza* (*Trogloscaptomyza*) *cyrtandrae* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

The last section of vein M_{1+2} is 1.6–1.8 times longer than the penultimate section. *Abdomen:* Entirely or predominantly pale yellow, sometimes faintly tinged with brown on the apices of the terga. The anal plates are approximately as high as long. The ninth tergum is almost parallel-sided and is slightly expanded ventrally. The posterior margin of the clasper is extended into a prominent lobe which has conspicuous black spinules around the apex (fig. 282c); these protude beyond the margins of the genitalia and are conspicuous *in situ.* The ventral aspects of the genitalia are as in figure 282d.

Length: body, 1.8–2.0 mm.; wings, 2.2 mm.

FEMALE. Fitting the description of the male except for genital characters. A rather distinct pale brown median vitta is usually present on the mesonotum. The abdomen is completely pale yellow except for the light brown anal plates. The ovipositor is fleshy; no sclerotized blades are present.

Holotype male and allotype female: from Napau Crater, Hawaii, 2,900 feet, July, 1956 (D. E. Hardy). About 75 paratypes (both sexes): from the following localities in the Kilauea section of Hawaii—same as type; Upper Olaa Forest, 4,000 feet, August, 1952, July, 1953, and July, 1956 (D. E. Hardy and W. C. Mitchell); Crater Road, Kilauea, Hawaii, 3,300 feet, June, 1918 (W. M. Giffard). A large series was collected on leaves of *Cyrtandra* at Thurston Lava Tube, Hawaii National Park, August, 1957, and December, 1962 (J. W. Beardsley), and April, 1962 (H. A. Bess).

The type, allotype, and a series of paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Assocation, and the University of Hawaii.

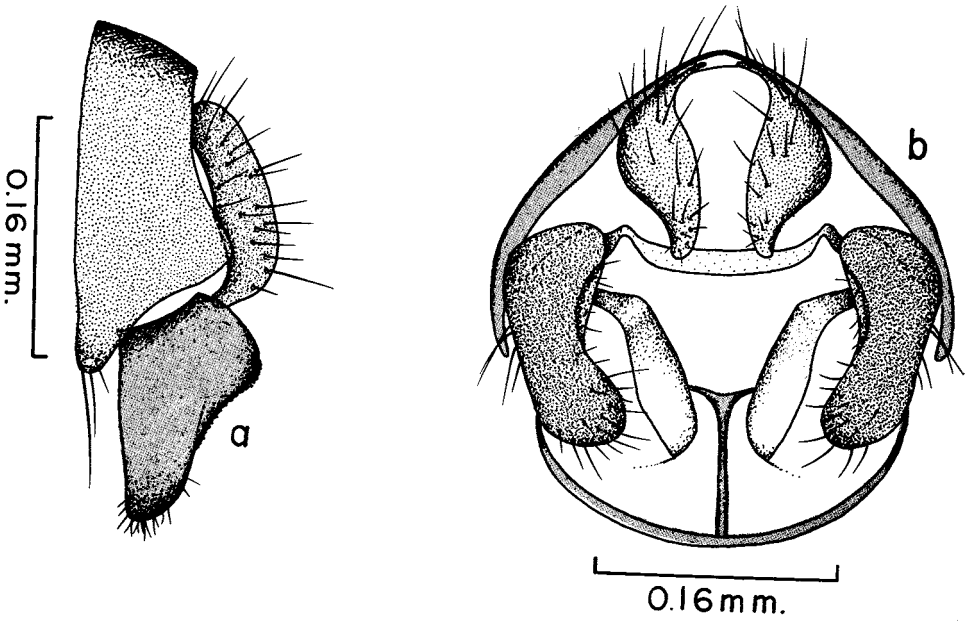


Figure 283—*Scaptomyza* (*Trogloscaptomyza*) *decepta* n. sp: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) decepta new species (fig. 283a–b).

This species fits in the complex which has four rows of acrostichal setae, a distinct *Scaptomyza*-like pattern on the mesonotum, and a well-developed fork at the apex of the arista. In the key it fits near *S. fastigata* n. sp., but the two do not appear closely related. *S. decepta* is readily differentiated by the development of the male genitalia as shown in figure 283a–b.

MALE. *Head:* The eye orbits and the ocellar triangle are gray, faintly tinged with brown in ground color. The front is otherwise yellow with a bronze sheen in the interfrontal areas. The upper half to two-thirds of the occiput is yellow-brown in ground color and covered with gray pollen. The lower occiput, genae, face, clypeus, and antennae are pale yellow. The palpi are dark brown to black. Two moderately strong bristles are present on the upper edge of each vibrissal row. The face has a slight carina extending down the median portion. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is slightly over half as long as the proclinate and is situated about opposite the latter. *Thorax:* Yellow with pale brown vittae extending down the mesonotum as is typical of many species of *Scaptomyza*. Four rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about halfway between the first supraalars and the suture. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The pleura are yellow except for a tinge of brown extending through the upper portion. *Legs:* Yellow, tinged with

brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is 3.7 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Yellow, tinged faintly with brown. The genitalia are yellow-brown. The anal plates are two or more times higher than long and are bent downward slightly on the ventral margins (fig. 283b). The ninth tergum is rather slender, slightly expanded ventrally, and at the narrowest portion it is but slightly longer than the anal plates. The claspers are broad basally and gradually tapered to the apex (fig. 283a). The ventral aspects of the genitalia are as in figure 283b.

Length: body, 1.8 mm.; wings, 2.1 mm.

FEMALE. Unknown.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy). Two male paratypes: Kula Pipeline, Maui, March–April, 1932, 4,500 feet (O. Bryant).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) dentata new species (fig. 284a–b).

This species fits in the complex which is characterized by having the body dark-colored, six rows of acrostichal setae on the mesonotum, and the arista with a well-developed apical fork. It is differentiated from other known species by having strong dentations along the posterior margin of each clasper of the male (fig. 284a).

MALE. *Head:* The front is almost entirely dark-colored, the extreme lower margin is tinged with yellow; the eye orbits and the ocellar triangle are black covered with gray pollen, and the area between is brown in ground color covered with brown pollen. The occiput is brown covered with gray pollen, except for the extreme lower margin. The genae and face are entirely yellow. The clypeus is dark brown, tinged with black. The palpi are brown, tinged with yellow. One strong bristle is present on the upper edge of each vibrissal row. The antennae are yellow except for a tinge of brown on the dorsal surface of the second segment. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about one-half as long as the proclinate; it is situated distinctly above the latter and about two-fifths the distance between the proclinate and the upper reclinate bristles. *Thorax:* Dark brown, covered with gray pollen on the dorsum and brown, tinged with rufous on the sides. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about halfway between the first supraalar and the suture. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow, except for the brown apical segments of the tarsi. The front basitarsus is scarcely one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third section of costa is 3.4 times longer than the fourth, and the costal fringe extends almost one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein

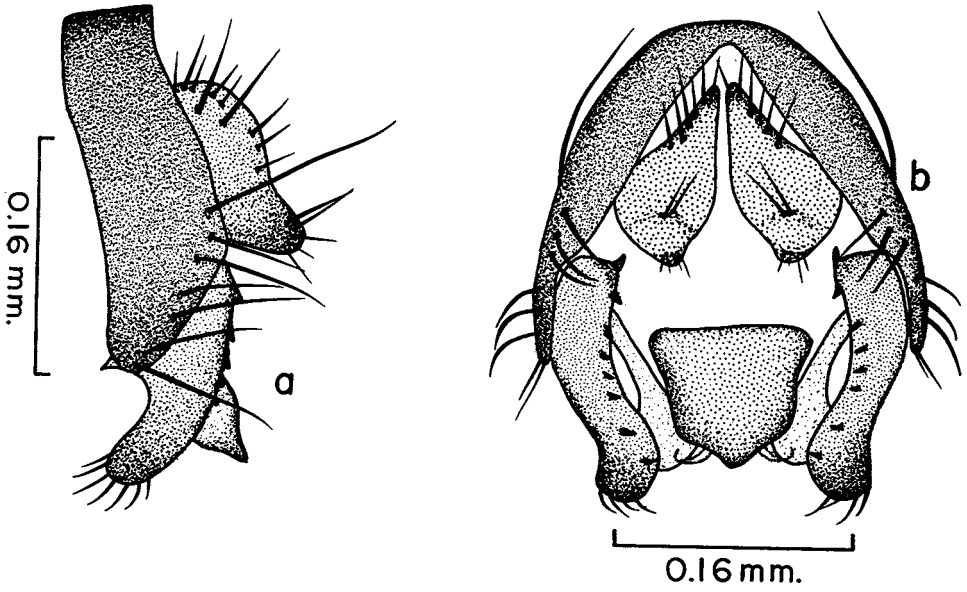


Figure 284—*Scaptomyza* (*Trogloscaptomyza*) *dentata* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

M_{1+2} is two times longer than the penultimate section. *Abdomen:* Entirely brown, faintly tinged with yellow, and covered with gray-brown pollen. As seen from direct lateral view the anal plates are nearly two times higher than long and are subacutely pointed ventrally. The ventral margins are not bent downward. The ninth tergum is straight-sided, narrowed on the anteroventral margin, and with a row of moderately strong setae along the hind margin. The claspers are nearly straight-sided; each has a series of strong teeth along the hind margin (fig. 284a). The ventral aspects of the genitalia are as in figure 284b.

Length: body, 1.75 mm.; wings, 2.00 mm.

FEMALE. The female has not been definitely associated with the male.

Holotype male: Alakai Swamp, Kauai, 3,800 feet, July, 1952 (D. E. Hardy). One male and one female specimen which appear to belong here are on hand from Nualolo Valley, Kauai, 3,400 feet, July, 1950 (D. E. Hardy); however, the genitalia show some rather slight differences and until a larger series is examined, I cannot be sure that they are the same species. These specimens are not being designated as paratypes.

Type in the B. P. Bishop Museum. The specimens from Nualolo are in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) devexa new species (fig. 285a–b).

This species fits close to *S. bilobata* n. sp. but is differentiated by the genital characters of the male. The basal lobe on the clasper is pointed, it is narrower

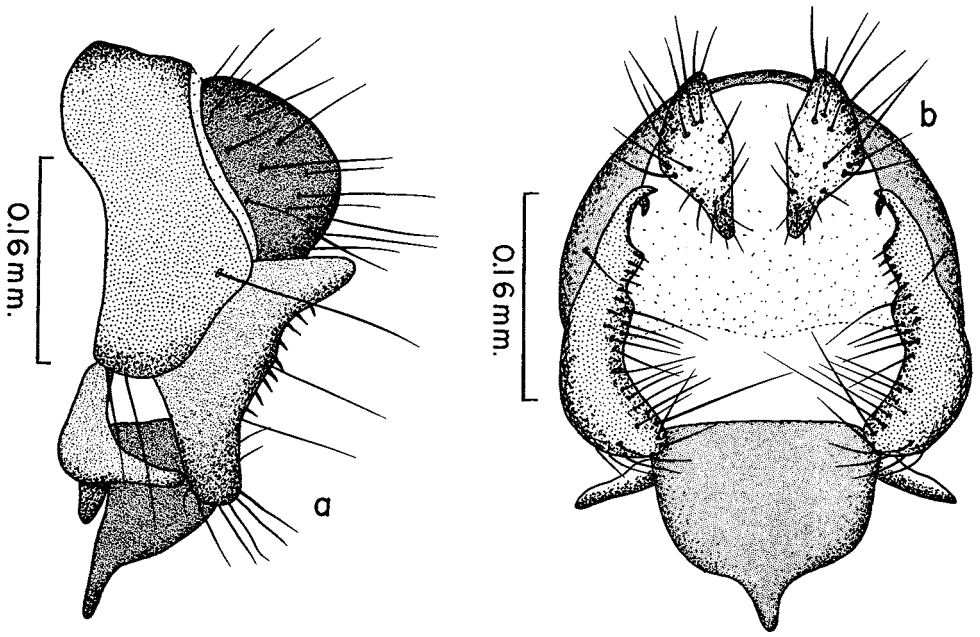


Figure 285—*Scaptomyza* (*Trogloscaptomyza*) *devexa* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

than the apical lobe, and the anterior margins of the ninth tergum are expanded as in figure 285a. Also, the anal plates are pointed on the ventral margins (fig. 285b).

MALE. *Head:* Entirely dark brown to black, including the appendages and excepting the red compound eyes. The eye orbits and the ocellar triangle are gray pollinose, the area between is opaque black. The anterior reclinate bristles are two-thirds as long as the proclinates and are situated opposite the latter. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely dark brown to black in ground color, covered with gray pollen, and with a faint indication of a brown vitta extending down the median portion of the mesonotum. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated distinctly in front of a line drawn between the first supraalars. The anterior sternopleural bristle is three-fifths as long as the posterior bristle. *Legs:* Coxae, femora, and the tibiae brown, faintly tinged with yellow. The tibiae are yellow-brown; the middle and hind tibiae are faintly banded, darker brown at bases and just before apices. In the latter respect they would fit near *waialealeae* n. sp., but the genitalia are strikingly different and the two are not related. The front basitarsus is elongate (compared to that of most species of *Scaptomyza*) and is about three-fifths as long as the tibia. *Wings:* Subhyaline with a very faint infuscation of yellow-brown. The third costal section is four times longer than the fourth, and the

costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Brown to black, covered with gray-brown pollen. As seen from direct lateral view the anal plates are slightly higher than long and are long setose on the apicoventral portion. The ventral margins are pointed as shown in figure 285b. The ninth tergum is nearly straight-sided; the ventral margin is rather sparsely setose. The clasper has a pointed basal lobe and a rather blunt apical lobe and is shaped as in figure 285a. The aedeagus is rather prominent, thick, and bulbous. The ventral aspects of the genitalia are as in figure 285b.

Length: body, 2.50 mm.; wings, 2.85 mm.

FEMALE. Fitting the description of the male except for sexual characters. Also the legs are not distinctively marked with brown.

Length: body, 2.35 mm.; wings, 2.70 mm.

Holotype male and allotype female: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Eleven paratypes (four males and seven females): from the following localities on Maui—same as type (some specimens collected by C. R. Joyce); Haleakala, July 16, 1919, 6,200 feet (no collector given); and Waikamoi, 4,000 feet, July, 1956 (D. E. Hardy and R. Namba).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) diaphorocerca new species (fig. 286a–b).

This species has a yellow thorax, six rows of acrostichal setae, and a well-developed fork at the apex of the arista. It is differentiated from other species in the complex by having the costal fringe well-developed and extending one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The slender displaced anal plates, the narrow ninth tergum, and the distinctive claspers as shown in figure 286a will readily differentiate this species.

MALE. *Head:* The front is yellow to rufous, yellow on the orbits, and tinged faintly with brown in the interfrontal areas. The ocellar triangle is brown to black in ground color and covered with gray pollen. The upper half of the occiput is brown, also covered with gray pollen. The lower occiput, the genae, face, palpi, and clypeus are yellow. The face has a very faint discoloration of brown down the middle of each lateral furrow. The median carina is moderately developed. The anterior reclinate bristles are about three-fourths as long as the proclinates and are situated about opposite the latter. The first two antennal segments are yellow, tinged with brown on the dorsal surfaces. The third segment is brown to black. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely yellow. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated distinctly in front of a line drawn between the first supra-

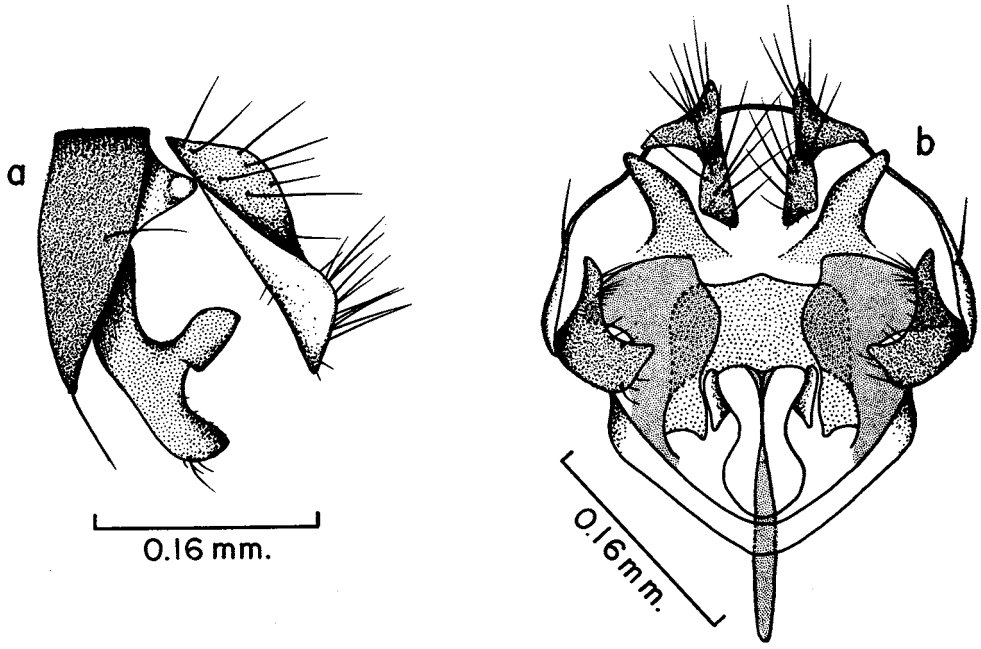


Figure 286—*Scaptomyza* (*Trogloscaptomyza*) *diaphorocerca* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

alars. The humeral bristle is about equal in size to the anterior notopleural bristle. The anterior sternopleural bristle is two-thirds as long as the posterior bristle. *Legs:* Yellow, tinged faintly with brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.75 times longer than the fourth, and the costal fringe extends one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Yellow, tinged with brown. The anal plates are four or more times higher than long. The ventral portions are greatly extended as seen in direct lateral view (fig. 286a). The tergum is narrow, scarcely longer than the anal plates, and each clasper has a large median lobe on the hind margin as in figure 286a. The ventral aspects of the genitalia are as in figure 286b.

Length: body, 2.00 mm.; wings, 2.25 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.10 mm.; wings, 2.25 mm.

Holotype male: Hanalilolilo, Molokai, 4,000 feet, August, 1953 (D. E. Hardy). Allotype female and two paratypes (one male and one female): Puu Kolekole, Molokai, July, 1959 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the University of Hawaii collection.

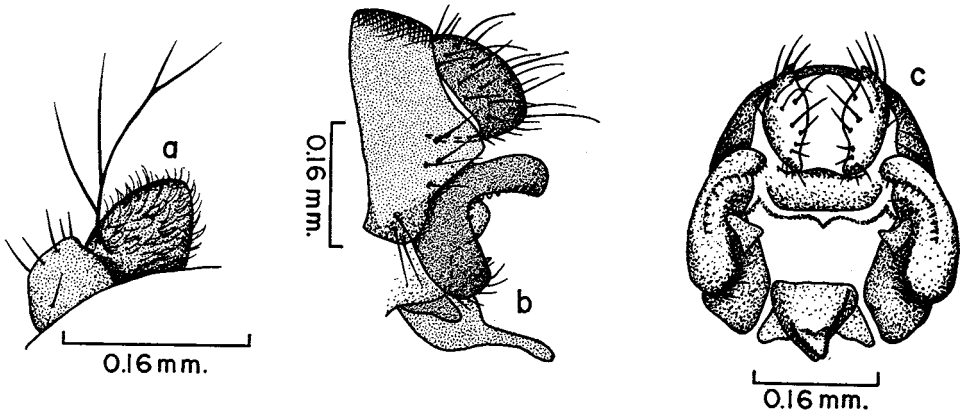


Figure 287—*Scaptomyza (Trogloscaptomyza) domita* n. sp.: **a**, antenna; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) domita new species (fig. 287a–c).

This species fits near *S. scoliops* n. sp. in the key, but the two are not related. The head shape, development of the bristles of the head and thorax, coloring of the body, and the structures of the male genitalia are very different as shown in figures 287b and 327b. *S. domita* is differentiated from related species by having the basal portion of the clasper lobate, approximately equal in size to the apical portion (fig. 287b).

MALE. *Head:* Just slightly higher than long. The front is entirely yellow, covered with yellow-gray pollen on the orbits and on the ocellar triangle. The occiput is tinged with brown on the upper half, yellow below. The genae, face, clypeus, palpi, and antennae are yellow. The face has a very slight convexity in the median portion. Two moderately strong bristles are present on the upper portion of each vibrissal row. The arista has two dorsal rays in addition to the moderately developed apical fork (fig. 287a). The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated just slightly above the latter. *Thorax:* Entirely yellow to rufous. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the first supra-alars. The anterior sternopleural bristle is about half as long as the posterior bristle. *Legs:* Yellow except for a slight tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Entirely yellow, tinged very faintly with brown. As seen from direct lateral view the anal plates are two times higher than long. The ventral margins are slightly bent downward into the back part of the genital chamber (fig. 287c). The ninth tergum is expanded slightly on the ventral por-

tion and almost devoid of setae along the ventral margins. The clasper has a moderately strong basal lobe which is almost equal in length to the apical lobe (fig. 287b). The aedeagus is large, protruberant, and terminates in a slender point. The ventral aspects of the genitalia are as in figure 287c.

Length: body, 2.00 mm.; wings, 2.40 mm.

FEMALE. Fitting the description of the male except for sexual characters. The female closely resembles *hackmani* n. sp., but the apical fork of the arista is distinctly smaller.

Length: body, 2.50 mm.; wings, 2.85 mm.

Holotype male, allotype female, and four paratypes (one male and three females): Kula Pipeline, Maui, 4,500–5,000 feet, March 15, 1932 (O. Bryant).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) dubautiae new species (fig. 288a–b).

This species fits in the complex which has four rows of acrostichal setae and the body yellow with a distinct *Scaptomyza*-like pattern on the mesonotum. It is differentiated from other known species in this complex by lacking an apical fork on the arista and by the distinctive shape of the male genitalia as shown in figure 288a–b.

MALE. *Head:* About as long as high, almost square as seen in direct lateral view. The front is yellow with a faint tinge of reddish brown in the interfrontal areas lateral to the ocellar triangle. The orbits are pale yellow; the ocellar triangle is brown to black in ground color, covered with gray pollen. The upper three-fourths of the occiput is brown to black in ground color, covered with gray pollen. The lower occiput, genae, face, palpi, and antennae are yellow; the latter are faintly rufous. The clypeus is yellow, tinged faintly with brown. The palpus has a moderately strong apical bristle, plus several black setae near the apex. The face is very gently convex in the median portion. The arista has two dorsal rays and no apical fork. The anterior reclinate bristle is about one-half as long as the proclinate and is situated about opposite the latter. *Thorax:* Yellow with narrow pale brown vittae extending down the mesonotum as is distinctive of many species of *Scaptomyza*. A faint brown stripe extends down the median portion of the scutellum. Four rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about halfway between the first supraalars and the suture. The humeral bristle is about equal in size to the anterior notopleural. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is 2.5 times longer than the fourth, and the costal fringe is very short, extending just slightly beyond the apex of vein R_{2+3}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Yellow, tinged with brown. The anal plates are nearly two times higher than long; the ventral margins are bent downward.

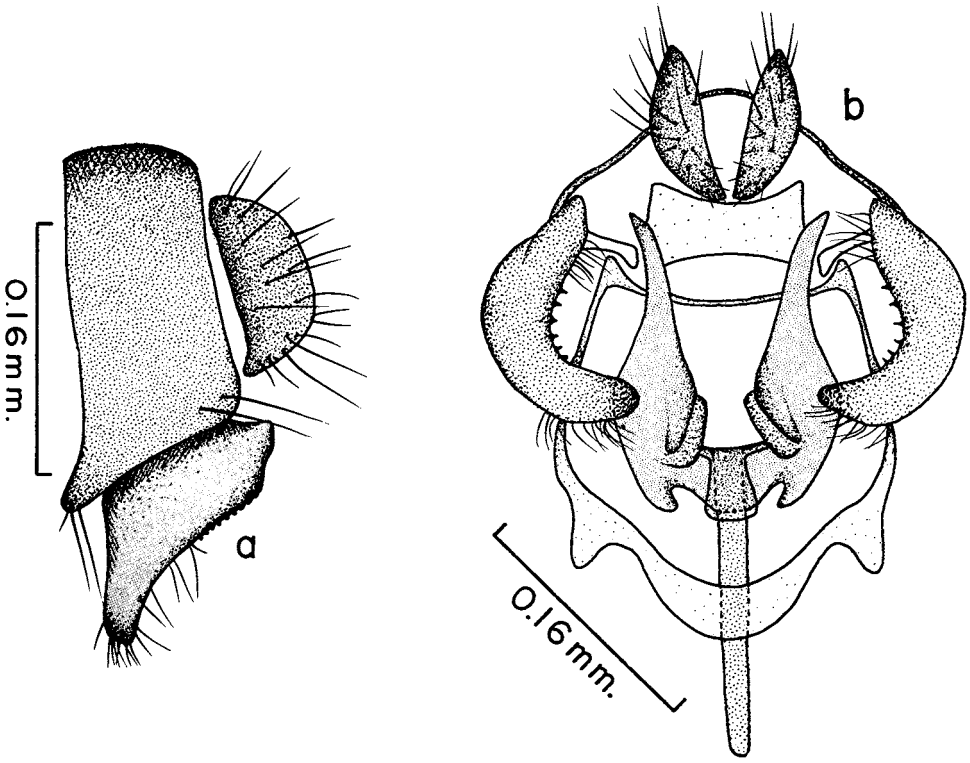


Figure 288—*Scaptomyza* (*Trogloscaptomyza*) *dubautiae* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

The ninth tergum is almost straight-sided, nearly two times longer than the anal plates, and with the anteroventral portion attenuated. The claspers are broad at their bases, attenuated apically, and with moderately strong teeth along the oblique hind margin (fig. 288a). The ventral aspects of the genitalia are as in figure 288b.

Length: body, 1.9 mm.; wings, 2.2 mm.

FEMALE. Unknown.

Holotype male: near Puu Nianiau, East Maui, 6,500 feet, collected on *Dubautia*, April 24, 1943 (E. C. Zimmerman).

Type in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) dubia new species (fig. 289a–b).

This species fits very close to *S. apponopusilla* n. sp., and the only distinctive feature that I can find is in the shape of the sternal plate that lies on the dorsal portion of the genital chamber. In *dubia* the posterior margin is almost straight, just slightly concave (fig. 289b); in *apponopusilla* the posterior margin is distinctively concave as shown in figure 269b.

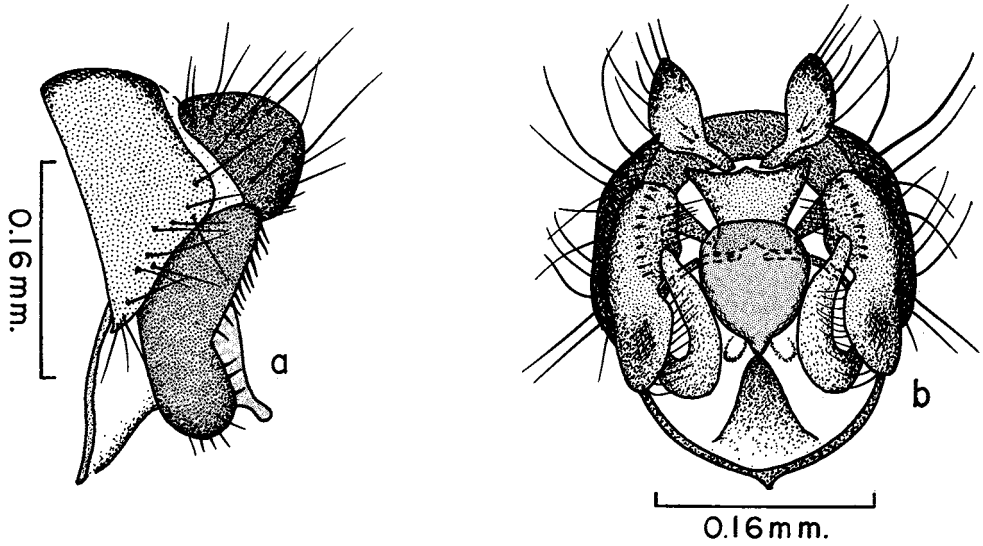


Figure 289—*Scaptomyza* (*Trogloscaptomyza*) *dubia* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

MALE. *Head:* The eye orbits and the ocellar triangle are tinged with brown to black in ground color, covered with gray pollen; the front is otherwise yellow. The occiput is brown to black except for the yellow ventral margin. The gena is yellow; the face is predominantly so; only the lower margin is tinged with brown. The clypeus is yellow-brown. The palpi are yellow. The antennae are entirely yellow except for a faint tinge of brown on the dorsal surface of the second segment. The anterior reclinate bristle is about one-half as long as the proclinate and is situated slightly above the latter. The arista has two dorsal rays, situated near the base, in addition to the apical fork. *Thorax:* Entirely yellow except for a faint tinge of brown along the upper portion of each pleuron. The mesonotum has six rows of acrostichal setae on the anterior half. The anterior dorsocentrals are situated slightly in front of a line drawn between the first supraalars. The anterior sternopleural bristle is nearly three-fifths as long as the posterior bristle. *Legs:* Yellow except for a tinge of brown on the tarsi. The front basitarsus is one-fourth to one-fifth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.6 times longer than the fourth, and the costal fringe extends approximately one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.75 times longer than the penultimate section. *Abdomen:* Yellow at the bases of the terga and brown at the apices. The genitalia are very similar to those of *apponopusilla* and are as is shown in figure 289a–b.

Length: body, 1.7 mm.; wings, 2.0 mm.

FEMALE. Fitting the description of the male except for sexual characters and except that the third antennal segment is tinged with brown.

Length: body, 1.9 mm.; wings 2.1 mm.

Holotype male and allotype female: Alakai Swamp, Kauai, 3,800 feet, July, 1952 (D. E. Hardy). Eleven paratypes (eight males and three females): from the following localities on Kauai—same as type, July, 1952, and August, 1953; Mount Waialeale Trail, 4,500 feet, August, 1953 (D. E. Hardy); Kokee, 3,600 feet, July, 1952 (D. E. Hardy); Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy). Also one male specimen is one hand from Puu Kolekole, Molokai, July, 1952 (D. E. Hardy), which appears to belong here but it is not being designated as a paratype.

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) eurystylata new species (fig. 290a–c).

A gray pollinose species having six distinct rows of acrostichal setae and fitting rather near *S. retusa* n. sp. but differing by lacking a conspicuous apical fork on the arista and by the details of the male genitalia as shown in figure 290b–c. It is also near *isopedon* n. sp., but the differences in the male genitalia, leg, and antennal coloring, and the position of the anterior reclinate bristles will differentiate it.

MALE. *Head:* Predominantly black, covered with gray pollen. The extreme lower part of the front is yellow; the portion of the front between the ocellar triangle and the eye orbits is dull gray-black. The ocellar triangle and orbits, vertex, and occiput are rather densely gray pollinose. The genae are yellow, tinged with black on the hind portions. The face is yellow with a faint tinge of brown on the lower portion. The clypeus is pale brown. The palpi are yellow; each has two apical bristles. The antennae are yellow, except for a faint tinge of brown on the dorsal surfaces. The arista has two dorsal rays and the apical fork is very tiny (fig. 290a) or may be completely lacking. The anterior reclinate bristle is about one-half as long as the proclinate and is situated about opposite or slightly above the latter. *Thorax:* Dark brown to black in ground color, densely gray pollinose; no indications of brown vittae are present on the mesonotum. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated just slightly behind the suture. The anterior sternopleural bristle is nearly two-fifths as long as the posterior bristle. *Legs:* Entirely yellow, tinged faintly with brown. The front basitarsi are about one-fourth as long as the tibiae. *Wings:* Hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black covered with gray-brown pollen. As seen from direct lateral view the anal plates are distinctly higher than long. The ninth tergum is broad; the ventral margins are not noticeably flattened and are comparatively slender. The claspers are short and thick, just slightly longer than wide, and rounded at the apices (fig. 290b). The claspers lack dentations except for an inconspicuous row of teeth

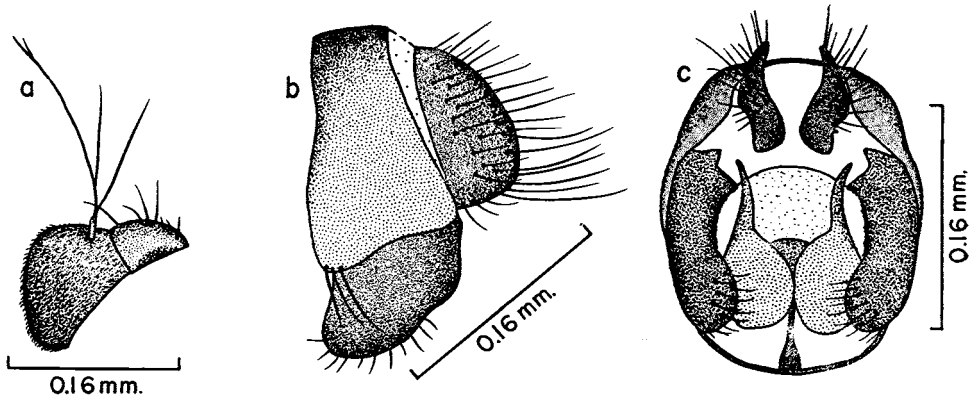


Figure 290—*Scaptomyza* (*Trogloscaptomyza*) *eurystylata* n. sp.: **a**, antenna; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

along the inner apical margin. As seen from a ventral view, the anal plates are strongly flattened. The ventral aspects of the genitalia are as in figure 290c.

Length: body, 1.8 mm.; wings, 2.0 mm.

FEMALE. The female fits the description of the male except for sexual characters. The third antennal segment is, however, predominantly brown, and the lower portion of the face is distinctly tinged with brown to black.

Length: body, 2.0 mm.; wings, 2.2 mm.

Holotype male: Paliku, Haleakala Crater, 6,500 feet, June, 1953 (D. E. Hardy). Allotype female: Waikamoi, Maui, 4,000 feet, July, 1956 (R. Namba). Forty paratypes (sexes about evenly distributed): from the following localities—same data as type and as allotype; Kula Pipeline, 4,500–5,000 feet, April 19, 1932 (O. Bryant); Olinda, 4,500 feet, April 8, 1932 (O. Bryant); Keanakolu, Hawaii, 5,200 feet, October, 1952 (D. E. Hardy); and Kaula Gulch, Hawaii, 7,000 feet, August, 1952 (D. E. Hardy).

One male from Kokee, Kauai, August, 1955 (J. W. Beardsley), appears to belong here but is not being designated as a paratype; one male from Oahu, no locality or date given (Bridwell coll.), is placed here with a "?" since the male claspers seem more distinctly dentate than normal.

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and University of Hawaii.

Scaptomyza (Trogloscaptomyza) evexa new species (fig. 291a–b).

This species fits in the complex characterized by having six rows of acrostichal setae, the body dark-colored, and a well-developed fork present at the apex of the arista. It is differentiated from other known species by the short broad claspers of the male as shown in figure 291a–b.

MALE. *Head:* The front is entirely dark brown to black except for a tinge

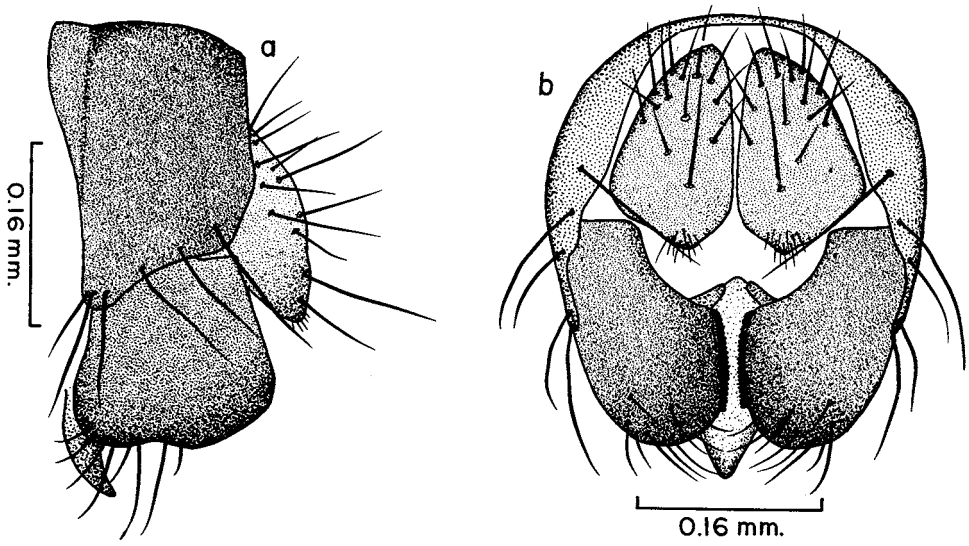


Figure 291—*Scaptomyza* (*Trogloscaptomyza*) *evexa* n. sp.: a, male genitalia, lateral; b, male genitalia, ventral.

of yellow in the ground color of the lower one-third. The genae and face are entirely yellow; the latter is very gently carinate in the upper median portion. The clypeus is yellow, tinged faintly with brown. The palpi are dark brown. One moderate bristle is present on the upper edge of each vibrissal row. The anterior reclinate bristle is situated just slightly above the proclinate. The first two antennal segments are yellow, tinged with brown dorsally; the third segment is dark brown to black. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Dark brown to black on the mesonotum and scutellum, with a faint tinge of yellow to rufous in the ground color, and rather densely gray pollinose. The pleura are yellow, lightly tinged with brown. Six rows of acrostichal setae are present. The anterior dorsocentrals are situated slightly in front of a line drawn between the first supraalars. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Damaged on the specimen at hand. *Abdomen:* Brown to black, covered with gray-brown pollen, and tinged with yellow in the ground color of the basal portion. As seen from a lateral view, the anal plates are about three times higher than long and are subacutely pointed ventrally. The ninth tergum is broad, straight-sided. The claspers are about as broad as long and distinctly dentate along the upper ventral margin (fig. 291a). As seen from a ventral view the anal plates bend downward at their tips (fig. 291b). The aedeagus extends slightly beyond the apices of the claspers.

Length: body, 1.8 mm.; wings, 2.1 mm.

FEMALE. Unknown.

Holotype male: Poomau Valley, 3,400 feet, July, 1952 (D. E. Hardy). Type in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) exigua (Grimshaw) **new combination** (fig. 292a–d).

Drosophila exigua Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :72.

Endemic. Hawaii (type locality: Kilauea), Maui, and possibly Molokai.

Type in the British Museum (Natural History). I have examined the type and have designated a series of homeotypes from the type locality.

Grimshaw allied this species to *Drosophila obscurifrons* Grimshaw (from Molokai) and pointed out several slight color differences which supposedly differentiated it. I have studied the type of both of these species and do not feel that they are related, even though they look superficially alike. Unfortunately, however, *D. obscurifrons* was based upon a female specimen, and, although I have not definitely clarified the status of this species, I feel that it is probably a true *Drosophila*. *S. exigua* fits very close to *cuspidata* n. sp., and the two are obviously very closely related. The only satisfactory characters which I can find for separating these is the small apical fork on the arista (fig. 292a) and the development of the projection on the ventral margin of the ninth tergum of the male. In *exigua* it is blunt, rounded at apex, and projects horizontally (fig. 292c), while in *cuspidata* the projection is sharp-pointed and extends vertically (fig. 281b). In Hackman's key (1959:12) both species would run near *longipecten* Hackman, but the male genitalia are distinctly different. The blunt projection on the ninth tergum is partially or completely divided from the remainder of the tergum by a line across its base.

The following description is based upon the type male (from Kilauea, Hawaii), supplemented by numerous other specimens from Hawaii and Maui. Grimshaw's allotype female was labeled "Kona, Hawaii." I cannot be sure that it is the same species as the type. *S. exigua* is a moderately small, predominantly black species, rather thickly covered with gray pollen. The front is mostly black in ground color and yellow on the anterior edge above the antennae; the entire front is rather densely gray pollinose. The face and genae are yellow, the former moderately swollen down the median portion. One strong bristle is present at the upper portion of each vibrissal row; the second bristle of the row is about one-half the size of the first. Palpi yellow; each has two black apical bristles. The anterior reclinate bristle is one-half to three-fifths as long as the proclinate and is situated distinctly above the latter. The antennae are yellow, tinged with brown on the third segment. The arista has two dorsal rays in addition to the apical fork; the latter is small, usually inconspicuous (fig. 292a). The thorax is black in ground color, densely covered with gray pollen. An indistinct brown vitta extends the entire length down the middle of the mesonotum. Six rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first pair of supraalars. The humeral bristle is strong. The anterior sterno-

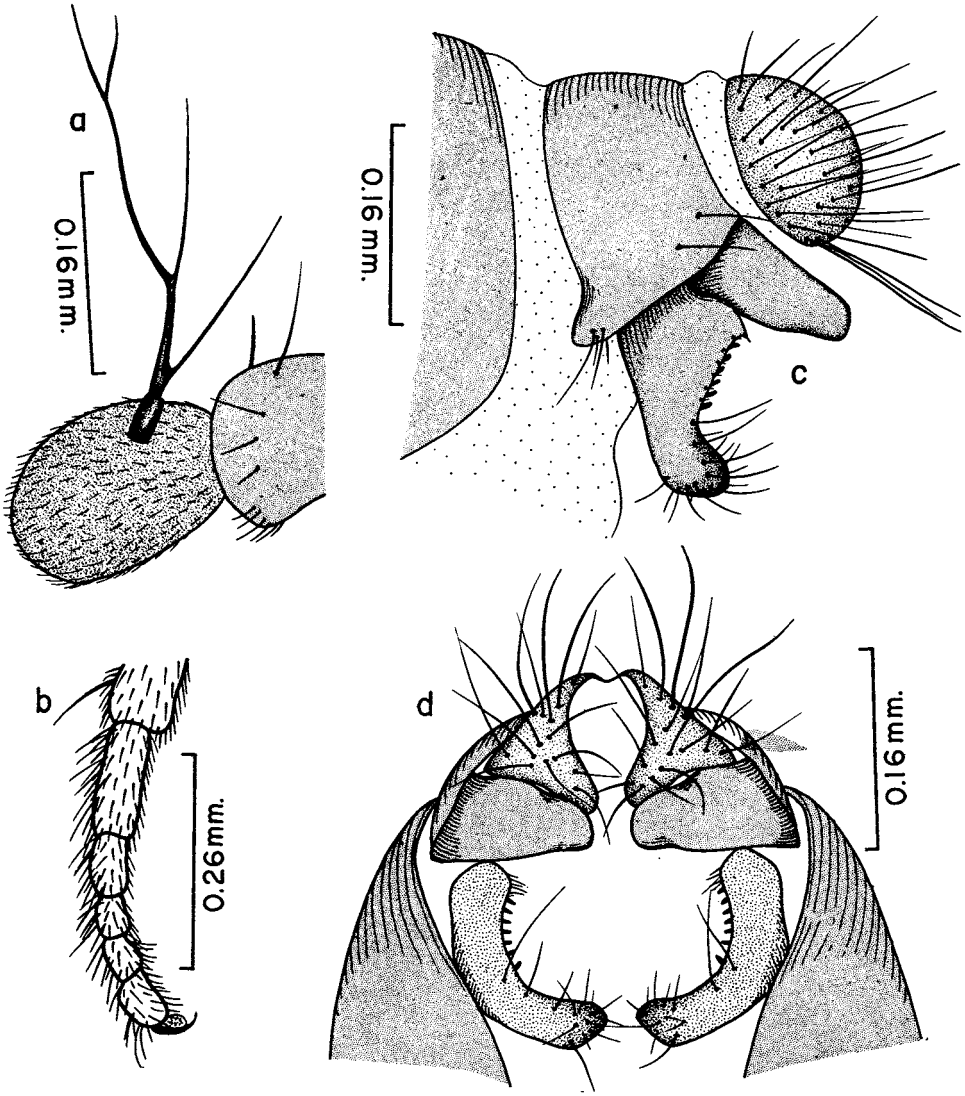


Figure 292—*Scaptomyza* (*Trogloscaptomyza*) *exigua* (Grimshaw): **a,** antenna; **b,** front tarsus; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

pleural bristle is about one-half as long as the posterior bristle. The legs are predominantly yellow, brown to black at the apices of the tarsi. I see no distinctive features on the legs. The wings are entirely hyaline, and the costal fringe ends slightly beyond the apex of vein R_{2+3}. The third costal section is nearly four times longer than the fourth, and the last section of vein M_{1+2} is 1.55 times longer than the penultimate section. The abdomen is brown to black,

tinged slightly with rufous in the ground color, and lightly covered with gray pollen. The male genitalia are as in figure 292c–d.

Length: body, 1.8–2.3 mm.; wings, 2.0–2.5 mm.

Scaptomyza (Trogloscaptomyza) fastigata new species (fig. 293a–b).

This species fits in the group which is characterized by having four rows of acrostichal setae and distinct *Scaptomyza*-like markings on the mesonotum. It fits very near *S. kauaiensis* Hackman but is readily differentiated by having the front and antennae yellow and the claspers of the male with a well-developed basal lobe and an acute point at the apex (fig. 293a).

MALE. *Head:* The front is entirely yellow; the eye orbits and the ocellar triangle are gray pollinose. The area immediately surrounding the ocelli is dark brown to black. The occiput is yellow, except for a tinge of brown in the ground color on the upper portion. The genae, face, and clypeus are yellow-white. The palpi are dark-brown. The median portion of the face is slightly carinate. The two basal segments of the antennae are yellow. The apical segment is yellow-white. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is scarcely over half as long as the proclinate and is situated distinctly above the latter. *Thorax:* Largely yellow on the sides; brown in the ground color of the dorsum except for the pair of submedian yellow-gray vittae extending the full length of the mesonotum; also, the extreme lateral margins of the mesonotum, scutellum, and all of the humeri are yellow. A faint tinge of brown is present along the upper portion of each pleuron. The metanotum is reddish brown. Four distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first pair of supraalars. The humeral bristle is approximately equal in size to the anterior dorsocentrals. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front tibiae and tarsi have numerous erect dorsal setae. The front basitarsus is slightly less than one-third as long as the tibia. *Wings:* Subhyaline. The third costal section is three times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Brown; yellow on the anterior corners of segments two to five. The anal plates are about one-half higher than long, densely short setose, and subacute ventrally, but the ventral margin is not lobate. The ninth tergum is straight-sided, about one-half longer than the anal plate, and almost devoid of setae on the ventral margins. The clasper has a conspicuous dentate basal lobe and is produced into a slender point at the apex as in figure 293a. The ventral aspects of the genitalia are as in figure 293b.

Length: body, 1.8 mm.; wings, 2.1 mm.

FEMALE. Fitting the description of the male except for sexual characters and except for having the lower margin of the face discolored with brown. The

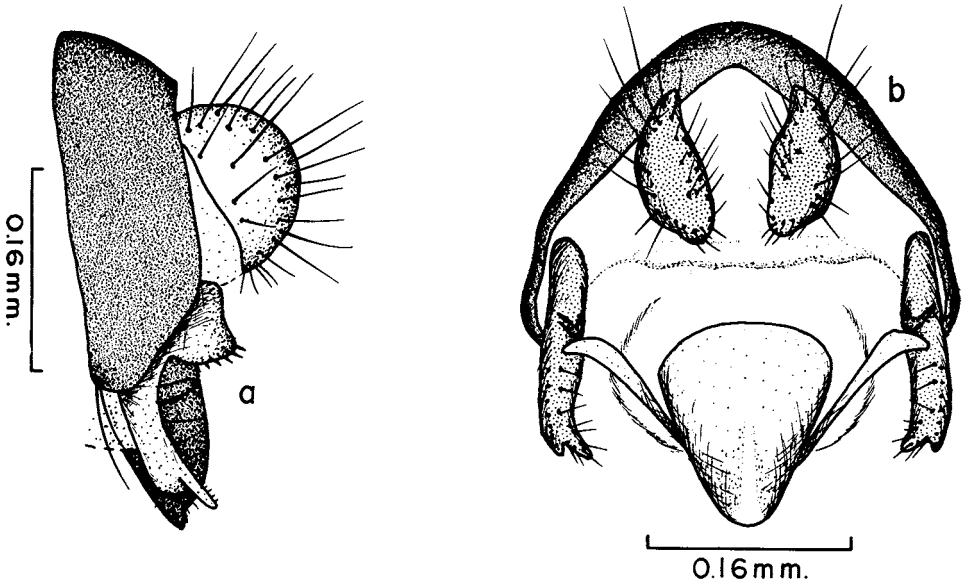


Figure 293—*Scaptomyza* (*Trogloscaptomyza*) *fastigata* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

brown markings along the upper edge of the mesopleuron are more distinct than in the male.

Length: body, 2.0 mm.; wings, 2.3 mm.

Holotype male: Kawaikoa Stream, Kauai, 3,700 feet, August, 1953 (D. E. Hardy). Allotype female: Alakai Swamp, Kauai, 4,000 feet, August, 1953 D. E. Hardy). Three male paratypes: two, Waialae Stream, Kauai, 3,600 feet, August, 1953; one, same locality as allotype, 3,800 feet, July, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and University of Hawaii.

Scaptomyza (Trogloscaptomyza) hackmani new species (fig. 294a–c).

This species fits in the complex which has six rows of acrostichal setae, the thorax yellow, and the aedeagus of the male large, conspicuous and protruded beyond the apices of the claspers. It fits near *S. lobifera* but the male genitalia are very differently developed as shown in figures 294b and 304a.

MALE. *Head:* Predominantly yellow species. Approximately quadrate as seen in lateral view. The head and appendages are almost entirely yellow, except for the reddish brown eyes and the brown apices of the palpi. The ocellar triangle is faintly tinged with brown. The front is predominantly golden; the area surrounding the ocellar triangle and the orbits is pale yellow-gray. The genae and face are white; the latter is slightly raised in the median portion. The genae are about equal in width to four or five rows of eye facets. The lower reclinate

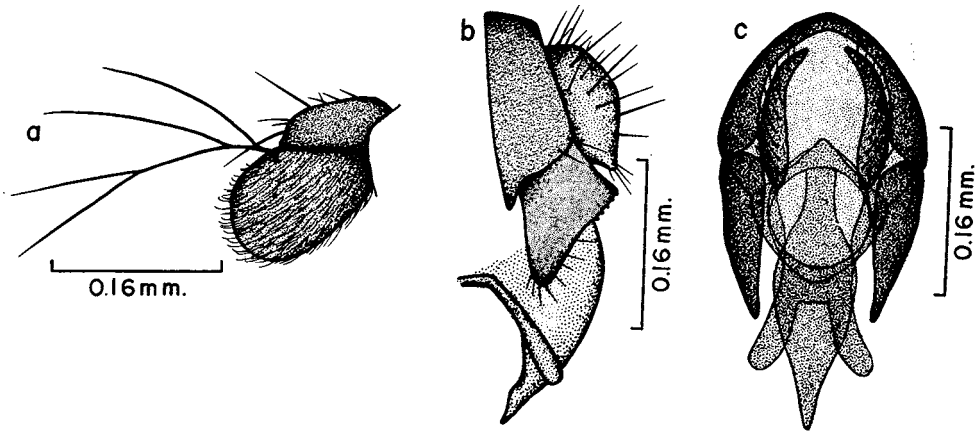


Figure 294—*Scaptomyza* (*Trogloscaptomyza*) *hackmani* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

bristle is about two-fifths to one-half as long as the proclinate and is situated approximately opposite the latter. One strong bristle is present at the upper edge of each vibrissal row, and this is approximately equal in size to the upper reclinate bristles; the secondary bristle of the vibrissal row is about three-fifths as large as the first bristle. Each palpus is brown on its apical one-third to one-half and possesses one moderately strong apical and one shorter preapical bristle. The antennae are entirely yellow, except for a very faint tinge of brown on the dorsum of the second segment. The arista has two strong dorsal rays plus the large apical fork. *Thorax:* Entirely yellow, except for a faint tinge of brown along the upper edge of each mesopleuron. The anterior dorsocentral bristles are situated just behind the suture, distinctly in front of a line drawn between the first pair of supraalars. Six rows of presutural acrostichal bristles are present over the anterior portion of the mesonotum, and four rows extend through the area between the anterior and posterior dorsocentral bristles. The humeral bristle is strong, almost as long as the presutural bristle. The anterior sternopleural bristle is well developed, about two-thirds as long as the posterior bristle. *Legs:* Entirely yellow, except for a tinge of brown on the tarsi; I see no characteristic in the legs which make them distinctive from other *Scaptomyza. Wings:* The costal fringe ends just slightly beyond the tip of vein R_{2+3}. The third costal section is approximately three times longer than the fourth, and the last section of vein M_{1+2} is nearly two times longer than the penultimate section. *Abdomen:* Predominantly yellow, often tinged with brown at the apices of the terga. The genitalia are brown to black and are distinctively developed as in figure 294b–c. The anal plates are pointed ventrally. The claspers are rather truncate at their apices, and each is produced into a point on the anteroventral margin. The aedeagus is prominent and extends beyond apices of claspers.

Length: body, 1.8–2.0 mm.; wings, 2.1–2.3 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.2 mm.; wings, 2.5 mm.

The species is named after Dr. W. Hackman, Helsinki, Finland, who is the leading authority on the *Scaptomyza*.

Holotype male and allotype female: Puu Kolekole, Molokai, 3,600 feet, July, 1952 (D. E. Hardy). About 100 paratypes (sexes evenly distributed): from the following localities—same as type, July, 1952, and July, 1953 (D. E. Hardy and M. Tamashiro); Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); Puu Alii, Molokai, 4,200 feet, July, 1953 (M. Tamashiro); Hanalilolilo, Molokai, 4,000 feet, August, 1953 (D. E. Hardy); Pauahi, Kona Coast, Hawaii, 4,300 feet, August, 1952 (D. E. Hardy); Kalua Kauka, Hawaii, 5,500 feet, October, 1952 (D. E. Hardy); Keanakolu, Hawaii, 4,500 feet, October 28, 1952 (C. P. Hoyt); Kaiholena, Kohala Mountains, Hawaii, 2,300 feet, August, 1952 (D. E. Hardy); Honokane Nui Stream, Kohala Ditch Trail, Hawaii, August, 1956 (D. E. Hardy); Puu Kukui, Maui, 3,000–4,500 feet, June, 1953 (D. E. Hardy); Makamakaole Valley, Maui, June, 1953 (D. E. Hardy); Waikamoi, Maui, 4,000 feet, June, 1956 (D. E. Hardy); and Kula Pipeline, Maui, 4,500 feet, March, 1932 (O. Bryant).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and University of Hawaii.

Scaptomyza (Trogloscaptomza) hardyi Hackman (fig. 295a–b).

Scaptomyza (Trogloscaptomyza) hardyi Hackman, 1959, Acta Zool. Fennica 97:39, figs. 14 and 16.

Endemic. Kauai (type locality: Waialae Stream). Known only from the Kokee, Mt. Waialeale–Alakai Swamp region of Kauai.

Type in the B. P. Bishop Museum.

This species fits in the complex which is characterized by having the head quadrate in profile, the eyes distinctly higher than long, four rows of acrostichal setae, two pairs of dorsocentral bristles, and the palpi predominantly dark brown to black. It fits near *S. inaequalis* (Grimshaw), but the male genitalia are strikingly different (fig. 295a and c), and the body coloration also differs as pointed out in the above key. The front is entirely yellow, except for a faint median discoloration extending from the ocellar triangle to the anterior margin. The orbits and the area surrounding the ocellar triangle are gray pollinose. The area bordered by the ocelli is dark brown to black. The upper two-thirds of the occiput is brown; the lower portion is yellow. The face and genae are pale yellow. The palpi are dark brown to black; each has a moderately strong apical bristle and several black setae around the outer margin. The antennae are yellow, tinged with brown on the dorsum of the second segment. The arista has two dorsal rays in addition to the large apical fork. The pleura are predominantly yellow to rufous, tinged with brown along the upper portions. The mesonotum is predominantly brown, tinged lightly with yellow in the ground color, with a pair of sub-

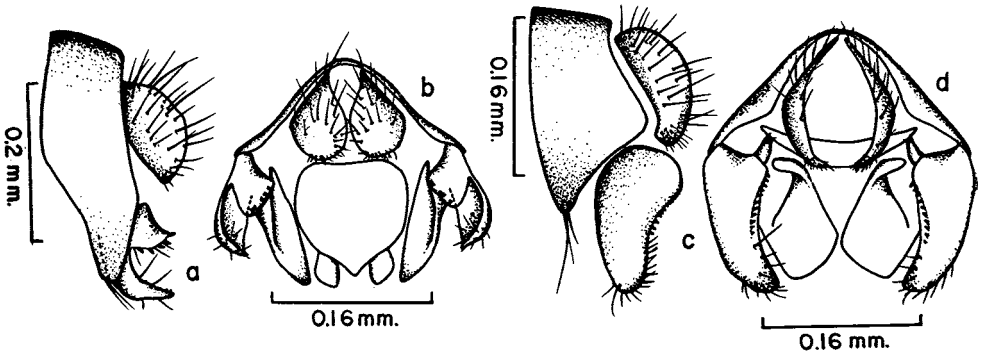


Figure 295—*Scaptomyza* (*Trogloscaptomyza*) *hardyi* Hackman: **a**, male genitalia, lateral; **b** male genitalia, ventral. *S.* (*T.*) *inaequalis* (Grimshaw): **c**, male genitalia, lateral; **d**, male genitalia, ventral.

median longitudinal yellow vittae setting off the "*Scaptomyza* pattern." Four rows of presutural acrostichal setae are present. The anterior dorsocentrals are situated opposite the first pair of supraalars. The humeral bristles are approximately equal in size to the presuturals. The scutellum is brown in the middle of the disc, yellow, tinged with brown on the sides. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The legs are entirely yellow except for the brown apical joints of the tarsi. *Wings:* Subhyaline, very faintly infuscated. Third costal section 3.43 times longer than the fourth, and the last section of vein M_{1+2} is 1.8 times longer than the penultimate section. The male genitalia are as in figure 295a–b.

Length: body, 2.0 mm.; wings, 2.5 mm.

Scaptomyza (Trogloscaptomyza) inaequalis (Grimshaw) **new combination**
(fig. 295c–d).

Drosophila inaequalis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :69.

Scaptomyza (*Trogloscaptomyza*) *hawaiiensis* Hackman, 1959, Acta Zool. Fennica 97:39. **New synonymy.**

Endemic. Hawaii (type localities: of *inaequalis*, Kona; of *hawaiiensis*, Kaula Gulch), Molokai, and Maui.

Type of *inaequalis* in the British Museum (Natural History). The type of *hawaiiensis* is in the B. P. Bishop Museum. I have studied both types and have designated homeotypes. On the type of *inaequalis* in the British Museum (Natural History), the broad, distinctively shaped male claspers are clearly visible *in situ*.

Fitting in the complex of species which is characterized by having the head approximately quadrate, the compound eyes higher than long, four presutural rows of acrostichal setae and two pairs of dorsocentral bristles, and the palpi black on the apical halves. In the key it runs near *hardyi* Hackman, but the

genitalia are very different (fig. 295a, c) and the coloration of the body is also distinctive. The front is predominantly rufous, tinged faintly with brown; the orbits and the area surrounding the ocellar triangle are gray. The ocellar triangle, vertex, and upper three-fourths of the occiput are dark brown to black in ground color, covered with gray pollen. The lower fourth of the occiput, the genae, and the face are pale yellow. The antennae are yellow, tinged with brown on the upper edges. The arista has two dorsal rays in addition to the apical fork. The thorax is predominantly brown in ground color. The mesonotum has three brown longitudinal vittae separated by a broad yellow vitta. The latter is faintly tinged with brown and extends longitudinally just inside each dorsocentral row from the anterior margin and fades out gradually beyond the anterior dorsocentral bristles. The anterior dorsocentrals are situated slightly in front of a line drawn between the first pair of supraalars. Four distinct rows of presutural acrostichal setae are present. The humeral bristles are almost equal in size to the dorsocentrals. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The legs are entirely yellow except for the brown apical joints of the tarsi. The wings are hyaline. The third costal section is three times longer than the fourth, and the last section of vein M_{1+2} is 1.73 times longer than the penultimate section. The male genitalia are as in figure 295c–d; they are similar is most respects to those of *kauaiensis* Hackman.

Length: body, 2.0 mm.; wings, 2.5 mm.

Scaptomyza (Trogloscaptomyza) inermis new species (fig. 296a–b).

This species fits near *S. retusa* n. sp. by having six rows of acrostichal setae, the body dark-colored, the arista with a well-developed apical fork, and the claspers of the male genitalia broad and rounded at the apices. It differs from *retusa* by having the legs yellow, the costal fringe very short, and the aedeagus conspicuous, well-developed, and extended beyond the claspers (fig. 296a). Also, the hind margin of each clasper is dentate, and a basal spinelike process is present on each inner margin (fig. 296b).

MALE. *Head:* Dark brown to black except for the yellow-brown lower portion of the front and yellow genae and lower portion of the occiput; also the sides of the face are yellow. The lower portion of the face is brown to black; the median carina is tinged with brown. The clypeus is dark brown, the palpi are brown, tinged with yellow. The anterior reclinate bristle is tiny, scarcely over one-half as long as the proclinate, and situated about opposite the latter. One strong bristle is present at the upper margin of each vibrissal row. The first two antennal segments are brownish yellow; the third segment is dark brown. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely brown, covered with gray pollen, tinged with yellow to rufous in the ground color of the pleura. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated in front of a line drawn between the first supraalars. The anterior dorsocentral bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow, except for a tinge of brown on the apices of the tarsi.

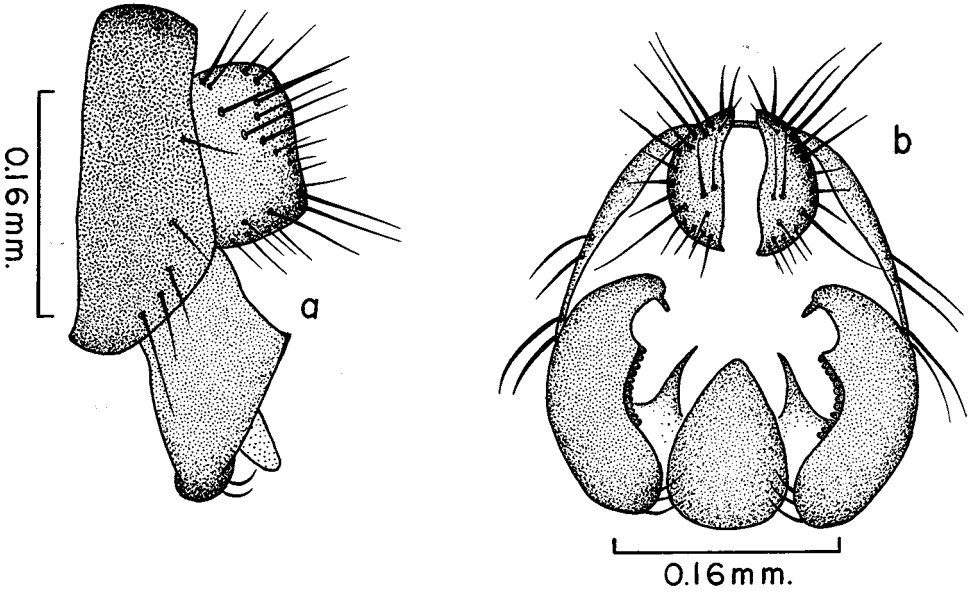


Figure 296—*Scaptomyza* (*Trogloscaptomyza*) *inermis* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

The front basitarsus is about one-third as long as the tibia. *Wings:* Hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends about one-sixth to one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is nearly two times longer than the penultimate section. *Abdomen:* Entirely brown, tinged with yellow. The anal plates are nearly two times higher than long as seen in lateral view (fig. 296a). The ventral margins are lobate as in figure 296b. The ninth tergum is almost straight-sided and not narrowed over the dorsal portion. A few setae are arranged along the ventral margin. The claspers are rather broad and blunt at apices, with distinct teeth along the hind margin, and with a subbasal spine which is visible from a ventral view (fig. 296b). The aedeagus is thickened and extends beyond the apices of the claspers. The ventral aspects of the genitalia are as in figure 296b.

Length: body, 1.8 mm.; wings, 2.1 mm.

FEMALE. Unknown. A complex of species whose females apparently all look alike occurs in the Kokee area of Kauai, and I have not been able to associate the female with the male in *inermis*.

Holotype male: Nualolo Valley, Kauai, July, 1952, 3,400 feet (D. E. Hardy). Three male paratypes: two same data as types; and one Kokee, Kauai, 3,600 feet, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum; paratypes in the United States National Museum and the University of Hawaii collection.

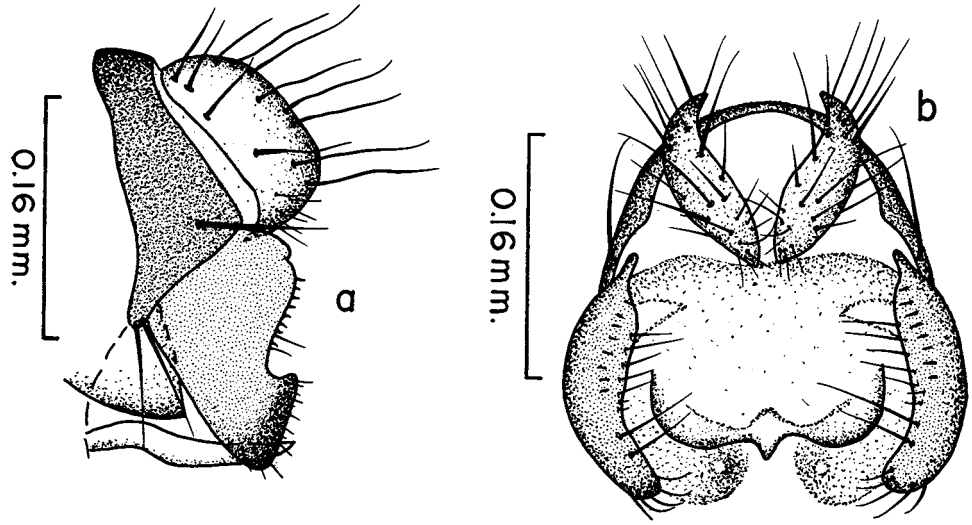


Figure 297—*Scaptomyza* (*Trogloscaptomyza*) *infurcula* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) infurcula new species (fig. 297a–b).

This species fits in the group which has six rows of acrostichal setae on the mesonotum, the body dark-colored, and the apical fork of the arista rudimentary. It fits near *S. eurystylata* n. sp. but is differentiated by having a distinct brown median vitta on the mesonotum, by having the anal plates pointed ventrally (fig. 297a), and the claspers broad at the base and attenuated apically.

MALE. *Head:* The front is predominantly yellow-brown in ground color, the lower margin is yellow, tinged with brown; the orbits are densely gray pollinose, and the ocellar triangle is densely yellow-gray pollinose; the area between the ocellar triangle and the orbits is velvety black. The upper two-thirds of the occiput is brown, covered with gray pollen; the lower portion is yellow. The genae, face, clypeus, and mouthparts are yellow. The palpi are black on the apical two-thirds. Each palpus has a short apical bristle plus two small subapical bristles. One strong bristle is present at the upper edge of each vibrissal row. The gena, measured at the lower margin of the eye, is about equal in width to two or three rows of eye facets. The face has a very slight rise down the median portion. The antennae are brown, except for a tinge of yellow on the first two segments. The arista has two dorsal rays and no apical fork. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated just slightly above the latter. *Thorax:* Dark brown to black in the ground color of the dorsal portion, yellow-brown on the sides. The entire thorax is rather densely gray pollinose except for a broad brown vitta extending down the median portion of the mesonotum. Also the sides of the mesonotum are gray-brown pollinose. Six distinct rows of acrostichal setae are present on the anterior portion of the

mesonotum. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the first supraalars. One strong humeral bristle is present, this equal in size to the outer vertical bristles. The lower half of each humerus is yellow; the upper portion is tinged with brown. The sternopleura and the propleura are yellow, faintly tinged with brown. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is one-third to two-fifths as long as the tibia. *Wings:* Hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends almost one-third the distance between the apices of vein R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Entirely brown, faintly tinged with yellow in the ground color. The anal plates are nearly two times higher than long; the ventral margins are subacutely pointed. The ninth tergum is rather narrow over the dorsal portion and is expanded ventrally; the ventral margin is oblique. The claspers are broad basally, rather bluntly pointed apically, and the hind margin is dentate as in figure 297a. The ventral aspects of the genitalia are as in figure 297b.

Length: body, 1.7 mm.; wings, 2.0 mm.

FEMALE. Unknown.

Holotype male and two male paratypes: from Kilauea, Hawaii, February, 1919 (O. H. Swezey), and August, 1958, collected in light trap (J. W. Beardsley).

Type in the B. P. Bishop Museum. Paratypes in the collections of the Hawaiian Sugar Planters' Association and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) innotabilis new species (fig. 298a–b).

A predominantly yellow species possessing six rows of acrostichal setae, which fits near *S. apponopusilla* n. sp., but differs by having the median portion of the front black, the ninth tergum of the male narrow and not as long as the anal plates, the anal plates blunt ventrally, and only minute setae on the ventral margins of the ninth tergum (fig. 298a).

MALE. *Head:* The front has an opaque black vitta extending down each side in the area between the ocellar triangle and the eye orbit; these fuse together on the anterior median margin of the front. The eye orbits are yellow covered with gray pollen. The ocellar triangle is yellow-brown, covered with gray pollen; the area bordered by the ocelli and the postocellar bristles is brown in ground color. The upper third of the occiput is brown to black, covered with gray pollen. The lower portion of the occiput, the genae, and upper and lateral portions of the face are yellow; the lower margin of the face is brown. The clypeus and the palpi are yellow-brown. The face has a moderately strong carina extending down the median portion. The second antennal segment is yellow except for a tinge of brown over the dorsal portion. The basal portion of the third is yellow, the apical two-thirds is brown. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about one-half as long as the proclinate and is situated slightly above the latter. *Thorax:* Entire-

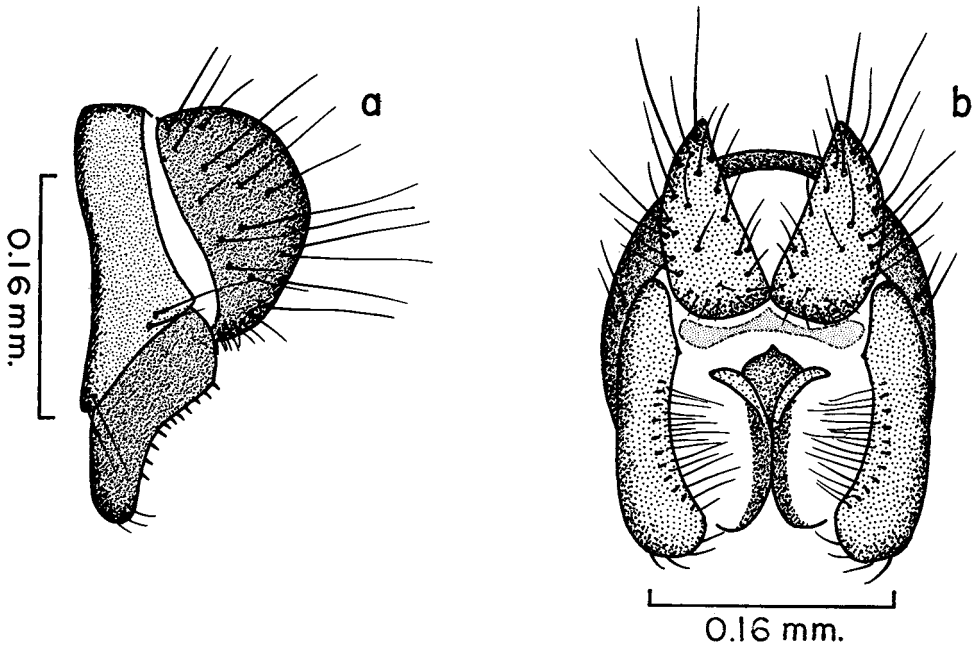


Figure 298—*Scaptomyza* (*Trogloscaptomyza*) *innotabilis* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

ly yellow except for a tinge of brown over the upper half of each pleuron. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first pair of supraalars. The anterior sternopleural bristle is slightly over half as long as the posterior bristle. *Legs:* Yellow with a tinge of brown on the femora and the apices of the tarsi. The front basitarsus is approximately one-half as long as the tibia. *Wings:* Hyaline. The third costal section is 4.2 times longer than the fourth, and the costal fringe extends scarcely one-sixth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Brown, tinged with yellow on the anterior corners of the terga. The anal plates are about one-half higher than long; the ventral margins are not produced and are obtuse as seen in ventral view (fig. 298b). The ninth tergum is narrow—equal to, or slightly less than, the length of the anal plates—and with minute setae along the ventral margin. The clasper is blunt at apex and has a row of conspicuous teeth along the hind margin as in figure 298a. The ventral aspects of the genitalia are as in figure 298b.

Length: body, 2.0 mm.; wings, 2.3 mm.

FEMALE. Fitting the description of the male except for sexual characters, and except that the dark markings on the front are not so conspicuous on the specimen at hand.

Length: body, 2.1 mm.; wings, 2.4 mm.

Holotype male: Alakai Swamp, Kauai, July 10, 1928 (E. H. Bryan, Jr.). Allotype female: same locality 3,800 feet, July, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) intricata new species (fig. 299a–d).

A comparatively large, predominantly yellow species readily differentiated from other *Trogloscaptomyza* with six rows of acrostichal setae by the peculiar development of the male genitalia as shown in figure 299c–d. In the latter regard the species is similar to *S. affinicuspidata* n. sp., but the yellow thorax and head will differentiate it.

MALE. *Head:* Almost as long as high, the front and the lower margin of the head almost parallel. The lower third of the front is yellow; the eye orbits are yellow, covered with yellow-gray pollen. The ocellar triangle is black in ground color, covered with gray pollen. The area between the triangle and the eye orbits is reddish brown to yellow-brown. The upper half of the occiput is dark brown in ground color, covered with gray pollen; the lower portion is yellow. The genae, face, clypeus, palpi, and mouthparts are pale yellow. Measured in the median portion, the gena, from the vibrissal row to the eye margin, is about equal in width to three or four rows of eye facets. The median portion of the face is gently carinate. Each palpus has an apical plus a subapical bristle. The anterior reclinate bristles are tiny, scarcely over one-third as long as the proclinates, and situated well above the latter, and halfway between the proclinates and the upper reclinates (fig. 299a). The first two antennal segments are yellow; the third segment is brown to black. The arista has two dorsal rays in addition to a rather large apical fork. One moderately strong bristle is present at the upper edge of each vibrissal row; this is equal in size to the upper reclinate bristles. *Thorax:* Entirely yellow lacking brown or gray markings. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) supraalars. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* Entirely yellow; the front basitarsus is very short, about one-fifth or one-sixth as long as the tibia (fig. 299b). *Wings:* Dusky, hyaline. The third costal section is 4.5 times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Yellow-brown, covered with gray-brown pollen. As seen from a lateral view, the anal plates are rather narrow, approximately three times higher than long. The ventral margins are bent downward, and they are developed into lobate portions which extend into the back portion of the genital chamber and are plainly visible only from a ventral view (fig. 299d). The ninth tergum is expanded ventrally and produced into a sharp-pointed lobe on each posteroventral margin. The claspers are bilobate; the basal portion is dentate, and the apical lobe has strong setae along the hind margin (fig. 299c). Parameres are

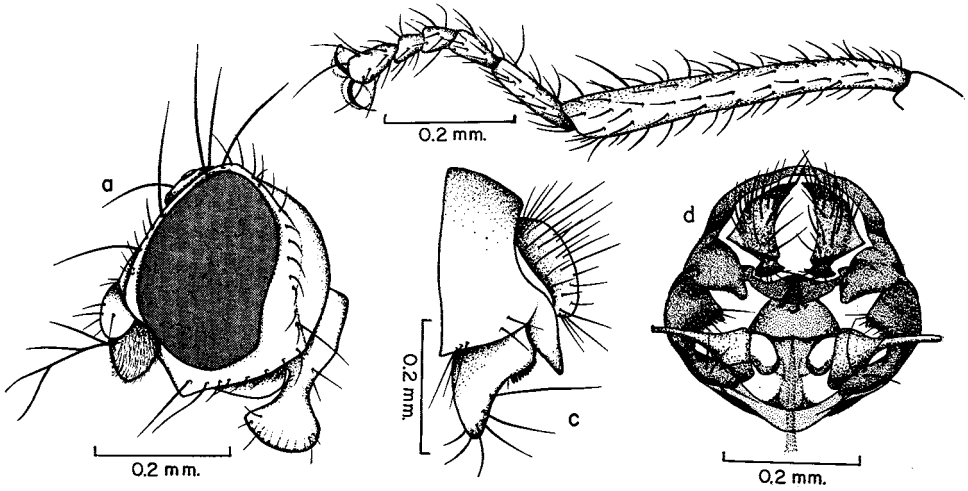


Figure 299—*Scaptomyza* (*Trogloscaptomyza*) *intricata* n. sp.: **a,** head; **b,** front tibia and tarsus; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

very well developed and often extend horizontally across the median portion of each clasper. The ventral aspects of the genitalia are as in figure 299d.

Length: body, 2.3 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for genital characters.

Length: body, 2.5 mm.; wings, 2.8 mm.

Holotype male and allotype female: Waikamoi, Maui, 4,000 feet, August, 1958 (D. E. Hardy). Twenty-seven paratypes (10 males and 17 females): from the following localities on Maui—same as type, some collected June 25, 1920 (E. H. Bryan, Jr.); Kula Pipeline, 4,200 feet, July, 1956 (D. E. Hardy); Haipuaena, June 29, 1920 (E. H. Bryan, Jr.); Honomanu, June 23, 1920 (E. H. Bryan, Jr.); Mt. Eke, 5,000 feet, August, 1918 (Rock coll.), Ridge above Haelaau, 3,000–3,600 feet, December 19, 1920 (E. H. Bryan, Jr.); Olinda, May 13, 1926, on koa (O. H. Swezey); and Puu Kukui, 3,000–4,500 feet, June, 1953 (D. E. Hardy). Also three male paratypes: from the following localities on Molokai—Puu Kolekole, March 23, 1929, on *Dubautia* (O. H. Swezey), and July, 1952 (M. Tamashiro); and Puu Alii, 4,200 feet, July, 1953 (D. E. Hardy).

Type, allotype, and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) isopedon new species (fig. 300a–b).

This species fits very close to *S. eurystylata* n. sp. but differs by being slightly larger, having the legs predominantly black, the anterior reclinate bristles placed distinctly above the proclinates, and the ventral surface of each anal plate broad and flattened (fig. 300b).

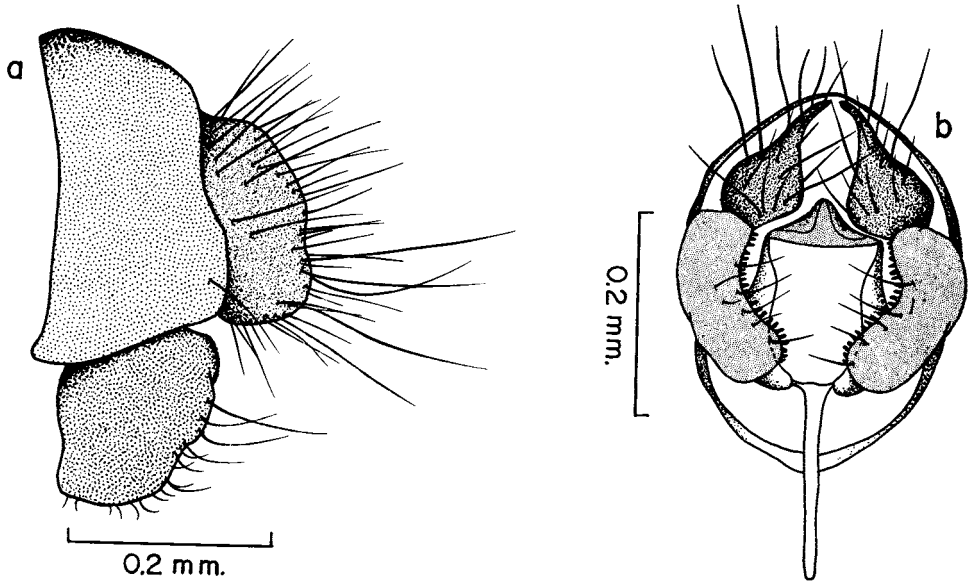


Figure 300—*Scaptomyza* (*Trogloscaptomyza*) *isopedon* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

MALE. Closely fitting the description of *eurystylata*, differing by the characters note above. *S. isopedon* is almost totally black including the face, genae, front, antennae, and legs. The head and body are rather densely gray pollinose. The legs of the type are almost entirely black. One of the paratypes, which is obviously a teneral specimen, has the legs predominantly yellow-brown. As seen in a lateral view (fig. 300a) the genitalia are very similar to those of *eurystylata* n. sp. (fig. 290b). As seen from a ventral view (fig. 300b) the anal plates are greatly flattened and expanded on the under portion; each is approximately equal in size to the clasper.

Length: body, 2.2 mm.; wings, 2.5 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.5 mm.; wings, 2.8 mm.

Holotype male and allotype female: Koolau Gap, Haleakala Crater, Maui, June, 1952 (D. E. Hardy). Fourteen paratypes (seven males, seven females): from the following localities—same as type; Paliku, Haleakala Crater, 6,500 feet, June, 1953 (C. R. Joyce); and Kaiholena, Kohala Mountains, Hawaii, 4,000 feet, August, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) kauaiensis Hackman (fig. 301a–b).

Scaptomyza (*Trogloscaptomyza*) *kauaiensis* Hackman, 1959, Acta Zool. Fennica 97:40, fig. 17 and 32.

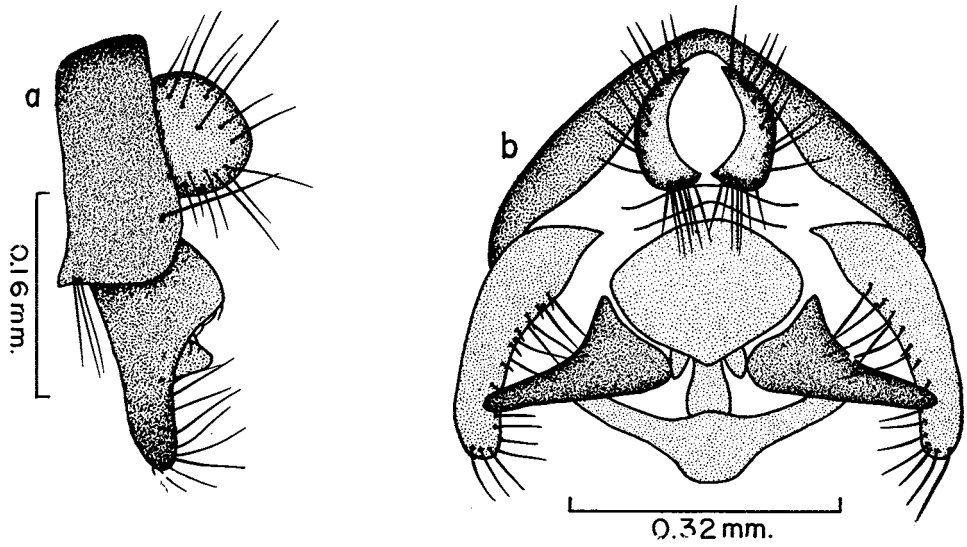


Figure 301—*Scaptomyza* (*Trogloscaptomyza*) *kauaiensis* Hackman: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Endemic. Kauai (type locality: Kawaikoi Stream). Known only from the type locality.

Type in the B. P. Bishop Museum.

This species seems related to *S.* (*T.*) *inaequalis* (Grimshaw) but is differentiated by the blackened face and front of the male, by the consistently paler body coloration, and by the male genitalia (fig. 301a–b). It is also close to *fastigata* n. sp., but the male genitalia and the head coloring are different. The lower third of the front is black, the upper portion predominantly yellow, tinged slightly with brown; the orbits and the area immediately surrounding the ocellar triangle are gray. The face is predominantly black, yellow only in the lateral depressions. Palpi black, each with one moderately strong apical bristle plus numerous short, black setae around the margins. Antennae rufous, tinged with brown. Each arista has two strong dorsal rays in addition to the large apical fork. The upper reclinate bristles are situated near the middle of the front. The lower reclinates are small, hairlike, about one-half to two-fifths as long as the proclinates, and situated distinctly above the latter. The thorax is yellow to rufous, with three pale brown vittae extending longitudinally down the mesonotum, a pale brown mark behind each humerus, and with a brown longitudinal vitta extending over the upper edge of each pleuron. The scutellum is entirely yellow; the metanotum is brown on the sides. The anterior pair of dorsocentral bristles are situated distinctly in front of a line drawn between the first pair of supraalar bristles. The wings are hyaline. The third costal section is 3.6 times longer than the fourth. The last section of vein M_{1+2} is two times longer than the

penultimate section. The anal plates are nearly as high as long. The claspers are gradually attenuated to a blunt apex and are inconspicuously dentate (fig. 301a). The ventral margins of the anal plates are expanded, and the parameres are broad and nearly horizontal in position (fig. 301b).

Length of male: body, 2.30 mm.; wings, 2.65 mm. Length of female: body, 2.35 mm.; wings, 2.75 mm.

Scaptomyza (Trogloscaptomyza) latitergum new species (fig. 302a–d).

This species fits near *S. exigua* (Grimshaw) because of the tiny inconspicuous apical fork on the arista. The male genitalia of the two are striking different (compare figs. 292c and 302c).

MALE. *Head:* Almost as long as high; the eye is oval and distinctly oblique. The lower half of the front is yellow; the upper portion is brown to black densely covered with gray pollen. The occiput is predominantly dark brown to black, densely gray pollinose; only the lower portion is yellow. The gena is yellow; measured directly below the lower hind margin of the eye, it is comparatively broad, equal to eight or ten rows of eye facets. The gena is distinctly narrowed anteriorly; the front portion is equal to four or five eye facets. Face entirely yellow, distinctly carinate down the median portion. The clypeus is yellow, tinged faintly with brown. The palpi and mouthparts are yellow. Each palpus has a moderate apical and also a subapical bristle. One moderately strong bristle is present at the upper portion of each vibrissal row; this is approximately equal to the upper reclinate bristle of the front. Antennae entirely yellow. Arista with two dorsal rays and an inconspicuous apical fork (fig. 302a). The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated distinctly above the latter. *Thorax:* Densely gray pollinose, with a faint indication of a brown vitta along each dorsocentral row; on some specimens this is more distinct than on the others. The anterior dorsocentral bristles are situated in front of the first supraalars. The humeral bristle is about equal in size to the presutural bristle. Four rows of acrostichal setae are present. The anterior sternopleural bristle is almost three-fifths as long as the posterior bristle. *Legs:* Almost entirely yellow, brown on the apical segments of the tarsi. The front basitarsus is rather short, slightly less than one-third as long as the tibia, and about one-half longer than the second tarsal segment (fig. 302b). *Wings:* Hyaline. The third costal section is 3.3 times longer than the fourth, and the costal fringe extends scarcely over one-sixth the distance from the apex of veins R_{2+3} to R_{4+5}. The last section of vein M_{1+2} is 1.25 times longer than the penultimate section. *Abdomen:* Dark brown to black, rather lightly gray pollinose, subshining on the apical segments. The claspers of the male are strongly developed, plainly visible *in situ*. As seen from a lateral view the anal plates are not much higher than long, and the ninth tergum is broad, almost as long as high, with the ventral margin truncate. As seen from a ventral view each anal plate is extended into a prominent ventral lobe (fig. 302c). Each clasper has a slender pointed apical lobe extend-

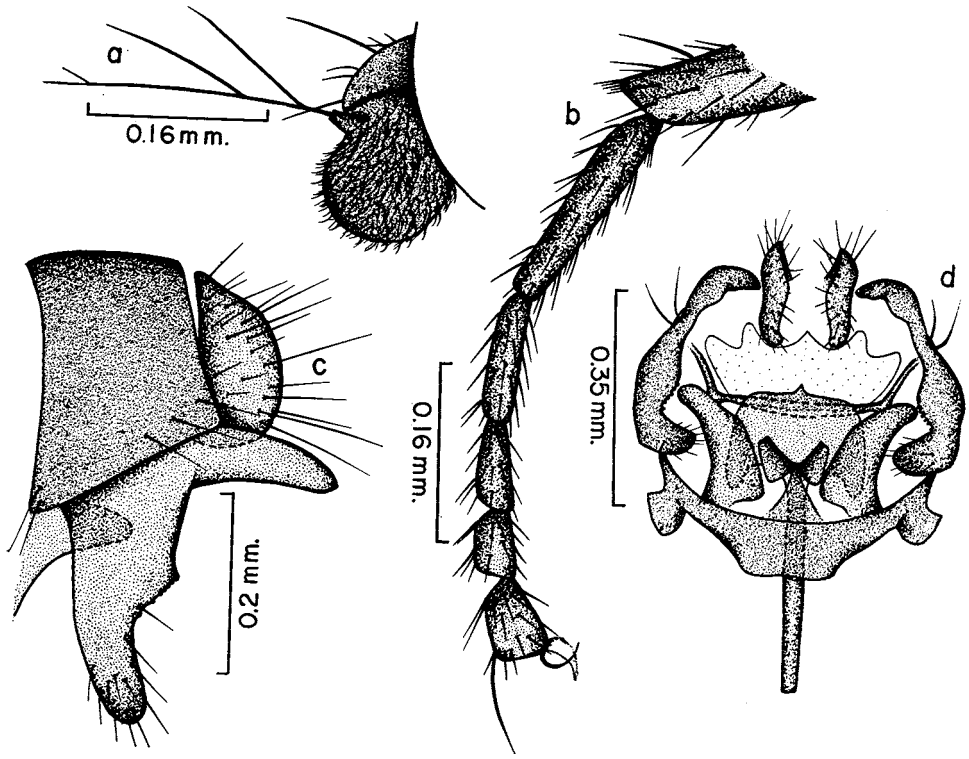


Figure 302—*Scaptomyza (Trogloscaptomyza) latitergum* n. sp.: **a**, antenna; **b**, front tarsus; **c**, male genitalia, lateral; **d**, male genitalia, ventral.

ing beyond the apices of the anal plates and a broad ventral lobe which is dentate on its inner surface (fig. 302d).

Length: body, 2.80 mm.; wings, 3.00 mm.

FEMALE. Similar to the male but with the third antennal segment brown, the upper two-thirds of the front dark-colored, and distinct brown vittae present on the mesonotum. The ovipositor is fleshy; the blades are vestigial, as is characteristic of members of this subgenus.

Length: body, 3.20 mm.; wings, 3.35 mm.

Holotype male and allotype female: Haleakala Crater, Maui, July 6, 1958, collected on silversword (L. W. Quate). Sixteen paratypes (ten females and six males): all collected in Haleakala Crater, mostly on flower of silversword, *circa* 8,000 feet, some same data as type, and others August, 1918 (O. H. Swezey), and August, 1956 (D. E. Hardy); and Paliku, Haleakala Crater, June, 1952 (D. E. Hardy).

Holotype and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

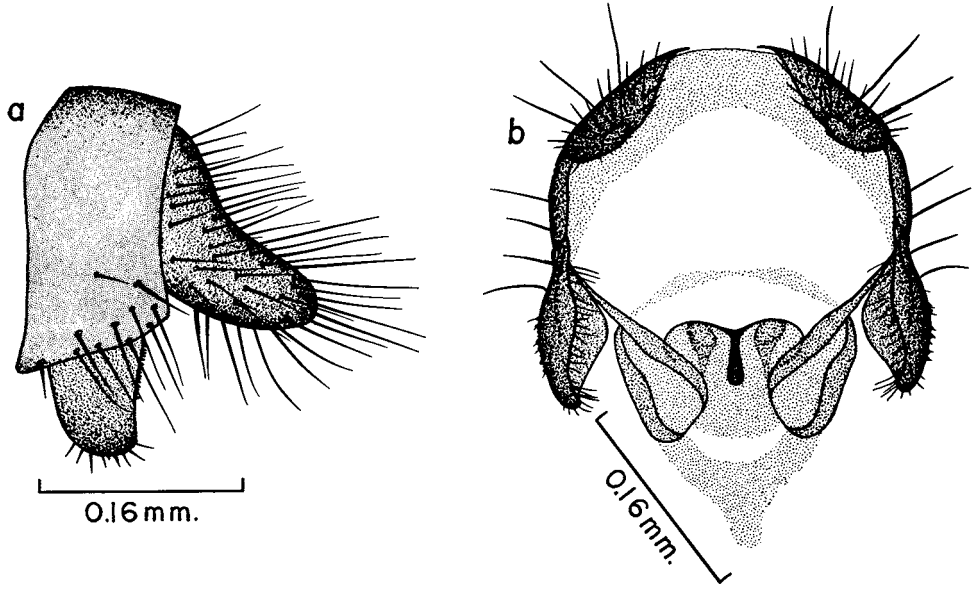


Figure 303—*Scaptomyza* (*Trogloscaptomyza*) *levata* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) levata new species (fig. 303a–b).

This species fits in the complex which has six rows of acrostichal setae and the thorax entirely yellow. It is differentiated from other members of this group by having the anal plates distinctly elevated and each extended into a lobelike portion which is approximately equal in size to the clasper (fig. 303a).

MALE. *Head:* Entirely yellow except for a faint tinge of brown on the dorsal surface of each third antennal segment, the brown to black apices of the palpi, and a tinge of brown at the lower margin of the face (specimens from Kauai have a dark brown spot on each side of lower margin of face). Each palpus has one moderately strong plus one small apical bristle; the large bristle is two-thirds as long as the bristles at the upper portion of each vibrissal row. The anterior reclinate bristle is approximately one-half as long as the proclinate and is about opposite the latter. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely yellow except for a line of brown along the upper margin of each mesopleuron (this is much more distinct on specimens from Kauai). Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated in front of a line drawn between the first supraalars. An enlarged presutural seta is present in each dorsocentral row; this is about two times larger than the surrounding setae. The anterior sternopleural bristle is approximately two-thirds as long as the posterior bristle. *Legs:* Entirely yellow except for the brown apical segments of the tarsi. The front basitarsus is approximately one-fourth as long as the tibia. *Wings:* Dusky hyaline. The third costal section is

slightly over three times longer than the fourth, and the costal fringe extends approximately one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 2.4 times longer than the penultimate section. *Abdomen:* Reddish yellow, tinged faintly with brown. The anal plates are as long as high, shaped as in figure 303a, with the ventral margin vertical. The ninth tergum is straight-sided, slightly tapered on the anteroventral margin, and with two irregular rows of rather strong setae on each side near the ventral margin. The claspers are broad and blunt; each has a row of short teeth on the hind margin. The ventral aspects of the genitalia are as in figure 303b.

Length: body, 1.5 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters. Also, the last section of vein M_{1+2} is just two times longer than the penultimate section.

Length: body, 1.8 mm.; wings, 2.0 mm.

Holotype male: Mt. Tantalus, Oahu, May, 1950 (D. E. Hardy). Allotype female and five paratypes (one male and four females): same locality as the type, 1,300 feet, December, 1904, and August, 1905 (W. M. Giffard). Also one male paratype: Kaiholena, Kohala Mountains, Ditch Trail, Hawaii, 2,000 feet, July, 1953 (D. E. Hardy). Also 18 paratypes (5 males and 13 females): from the following localities on Kauai: Poomau Valley, 3,400 feet, July, 1952 (D. E. Hardy); Kokee Valley, August, 1953 (D. E. Hardy); and Halemanu Swamp, August, 1953 (D. E. Hardy).

Type and allotype and some paratypes in the B. P. Bishop Museum. Paratypes are also in the collections of the United States National Museum, the British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) lobifera new species (fig. 304a–b).

This species fits near *S. hackmani* n. sp. because of the enlarged aedeagus, predominantly yellow coloring, and by having six rows of acrostichal setae. It differs from *hackmani* by having the palpi yellow and the genitalia very differently developed as shown in figures 294b and 304a.

MALE. Small predominantly yellow species. *Head:* Entirely yellow except for a tinge of brown in the ground color of the ocellar triangle and a faint tinge of brown on the upper occiput. The antennae, palpi, and mouthparts are yellow. Each palpus has one moderately strong apical bristle. Two prominent bristles are present on the upper edge of each vibrissal row. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about one-half as long as the proclinate and is situated slightly above the latter. *Thorax:* Entirely yellow, except for a faint tinge of brown along the upper edge of each mesopleuron and for a very faint indication of three pale brown vittae down the mesonotum. The posteromedian portion of the mesonotum and the disc of the scutellum are faintly tinged with brown in ground color. The anterior dorsocentral bristles are situated about opposite the first pair of supraalars. Six distinct rows of acrostichal setae are present. A secondary humeral bristle (seta)

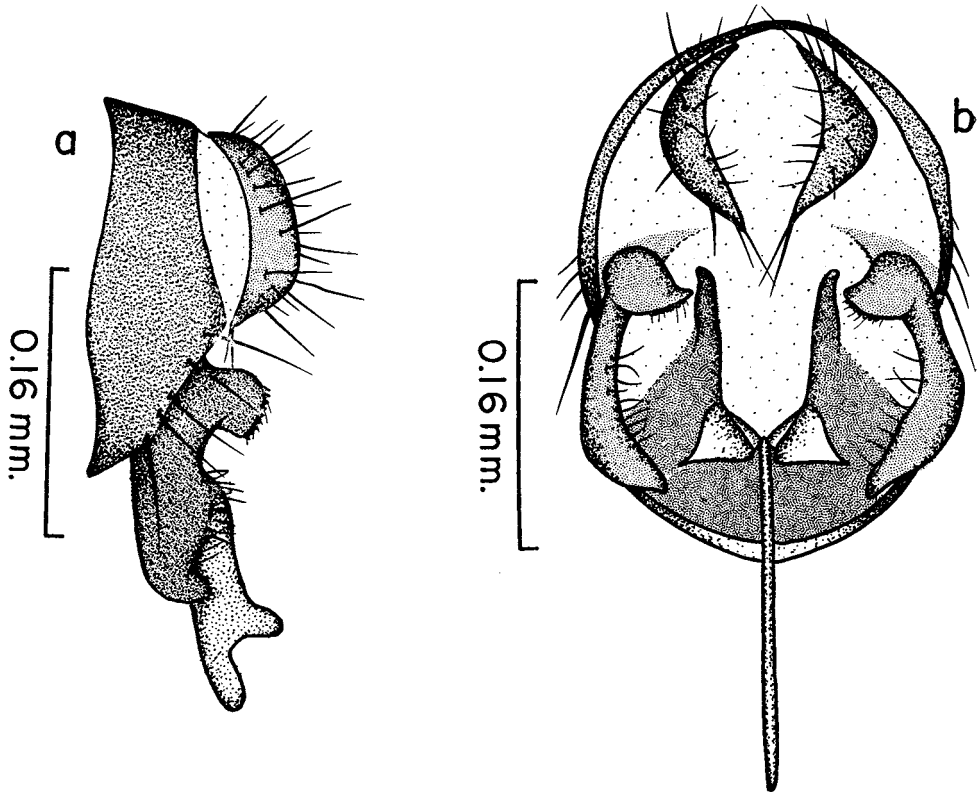


Figure 304—*Scaptomyza* (*Trogloscaptomyza*) *lobifera* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

is much more developed than in most *Trogloscaptomyza*; it is one-third to one-half as long as the humeral bristle. *Legs:* Entirely yellow, similar to those of most *Trogloscaptomyza*. The front basitarsus is approximately one-third as long as the tibia. *Wings:* Hyaline. The third costal section is approximately three times as long as the fourth, and the costal fringe extends one-fourth to one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section. *Abdomen:* Mostly brown, marked with yellow on the bases of the terga. The anal plates are three or four times higher than long, pointed ventrally, and each has prominent setae at the apex. The ninth tergum is rather broad, gently tapered to the anteroventral margin on each side. The claspers are distinctly curved, indistinctly bilobate, and with moderately long setae along the inner margin. The aedeagus is enlarged, conspicuous, and has a distinct dorsoapical lobe (fig. 304a). From ventral view the genitalia are as in figure 304b.

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.0 mm.; wings, 2.2 mm.

Holotype male and allotype female: north slope Hualalai, Hawaii, 4,000–6,000 feet, July, 1953 (D. E. Hardy). Nineteen paratypes (13 males and 6 females): from the following localities on the island of Hawaii—same as type; Bird Park, Kilauea, March, 1946 (W. W. Wirth), and July, 1953, and 1956 (D. E. Hardy); Kahuku Ranch, 3,000 feet, July, 1953 (D. E. Hardy); and Niulii, May 19, 1917 (O. H. Swezey).

Type and allotype in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), the Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) longipecten Hackman (fig. 305a–c).

Scaptomyza (Trogloscaptomyza) longipecten Hackman, 1959, Acta Zool. Fennica 97:37, figs. 8 and 9.

Endemic. Molokai (type locality: Puu Kolekole) and Maui. This species is fairly common in the wet Paliku section of Haleakala Crater on Maui and in the rain forests of the mountain tops on Molokai.

Type in the B. P. Bishop Museum.

This species fits fairly close to *S. (T.) pallifrons* Hackman because of the yellow palpi and predominantly pale yellow coloration in the typical form. The male genitalia are strikingly different in the two as shown in figures 305a and 314a. The dark-colored orbits, ocellar triangle, and vertex, and the distinct brown tinge on at least the posterior portion of the mesonotum of *longipecten* will also differentiate it from *pallifrons*. Specimens of *longipecten* from Haleakala, Maui, subspecies *griseonigra* n. subsp., are predominantly darker in color than the typical specimens from Molokai. The thorax is black in ground color, and the dorsum is densely gray except for three longitudinal brown vittae.

S. longipecten fits in the complex of species which is characterized by having four rows of presutural acrostichal setae and two pairs of dorsocentral bristles, and the head quadrate in shape, with the eye distinctly higher than long as seen in direct lateral view. The front is rufous to yellow; the orbits and the area surrounding the ocellar triangle are faintly brown in ground color, densely gray pollinose. The ocellar triangle is black. The lower reclinate bristle is about three-fifths as long as the proclinate and is situated approximately opposite the latter. The antennae are yellow; the arista has two dorsal rays in addition to the apical fork. Palpi yellow, with two unequal apical bristles. The thorax is typically rufous, tinged faintly with brown and with a distinct *Scaptomyza*-like pattern on the mesonotum (a pale brown median vitta bordered on each side by a yellow to rufous vitta, covered with gray pollen, which extends longitudinally just inside the dorsocentral rows). The posterior third, and sides of mesonotum, also the disc of the scutellum are pale brown. The pleura are yellow to rufous, tinged faintly with brown. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. The legs are yellow, except for the brown apical joints of the tarsi. The wings are hyaline; the venation is similar to that of other species of this complex. The abdomen is typically yellow, tinged with brown. In

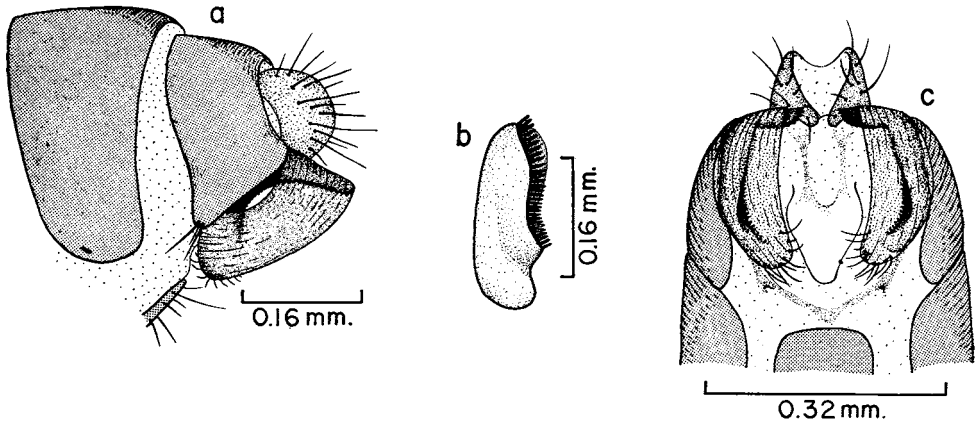


Figure 305—*Scaptomyza* (*Trogloscaptomyza*) *longipecten* Hackman: **a**, male genitalia, lateral; **b**, inside view of dorsal arm of male clasper; **c**, male genitalia, ventral.

the Maui specimens the abdomen is predominantly brown, covered with gray-brown pollen. The genitalia are very distinctively developed and are very similar in most respects to those of *S.* (*T.*) *basiloba* n. sp. (figures 271b, c, and 305a, c). Each clasper is strongly concave on the inner margin but has a sheetlike plate extending from the dorsal to the ventral arms, uniting the two bridgelike (fig. 305a). The inner surfaces of the claspers possess a row of numerous long, blunt, teeth (fig. 305b). The anal plates are extended, and rather long and slender on their ventral margins (fig. 305c).

Length: body, 2.0–2.2 mm.; wings, 2.4–2.7 mm.

Scaptomyza (Trogloscaptomyza) longipecten griseonigra new subspecies.

Specimens from the island of Maui are consistently dark in color; the thorax is black covered with rather dense gray pollen, and three faint brown longitudinal vittae extend down the mesonotum. The genitalia appear to be identical with those of typical *longipecten*, and I see no way of differentiating them except by color. The female specimens have distinct brown vittae down the mesonotum.

Hackman, in the original description of *longipecten*, mentioned a gray male specimen from Holua, Maui, which agreed with *longipecten* in the genitalia, but the mesonotal color was distinctly different. He said that it obviously belongs to this species, however.

Holotype male, allotype female: from Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Twenty-five paratypes (15 males and 10 females): predominantly same locality as type, June, 1952, and June, 1953 (D. E. Hardy and C. R. Joyce); Olinda, Maui, 4,500 feet, April, 1932 (O. Bryant); Puu Luau, Maui, April 28, 1945, 5,500 feet (E. C. Zimmerman); and Holua, Haleakala Crater, 6,500 feet, June, 1953 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The

remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) mecocerca new species (fig. 306a–b).

This species fits in the complex which is characterized by having the body dark-colored, six rows of acrostichal setae on the mesonotum, and the arista with a large apical fork. It is differentiated from other known species by the elongate anal plates as shown in figure 306a.

MALE. *Head:* The front is entirely dark-colored, the eye orbits and the ocellar triangle are gray pollinose, the area between is velvety black. The occiput is brown, covered with gray pollen except for the yellow lower portion. The genae are yellow; the upper and lateral portions of the face are yellow; the lower margin and the lower median portion are brown to black. The clypeus and the palpi are pale brown. The first two antennal segments are yellow, tinged with brown; the third segment is brown to black. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter, about two-fifths the distance between the proclinate and the upper reclinate bristle. *Thorax:* Entirely gray pollinose, brown to black in ground color on the mesonotum; the upper half of each pleuron is brown, faintly tinged with rufous, and the lower half is yellow. The metanotum is brown, tinged with rufous. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristle is situated just slightly in front of a line drawn between the first supraalars. In addition to the large humeral bristle, two small setae are present on each humerus; these are approximately equal to the acrostichal setae. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely pale yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-third as long as the tibia. *Wings:* Entirely hyaline. The third costal section is 3.3 times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.66 times longer than the penultimate section. *Abdomen:* Entirely brown, faintly tinged with yellow to rufous, and covered with gray-brown pollen. The anal plates are about three times higher than long and are not bent downward at their apices (fig. 306a). The ninth tergum is nearly straight-sided and is subacutely pointed on the anteroventral margin; a few scattered setae occur along the ventral margin of the tergum. Each clasper is rather thick at the base and somewhat attenuated on the anteroventral portion (fig. 306a). The ventral aspects of the genitalia are as in figure 306b.

Length: body, 1.80 mm.; wings, 2.15 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.00 mm.; wings, 2.30 mm.

Holotype male and allotype female: Kaunuohua Ridge, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). Twelve paratypes (six males and six females):

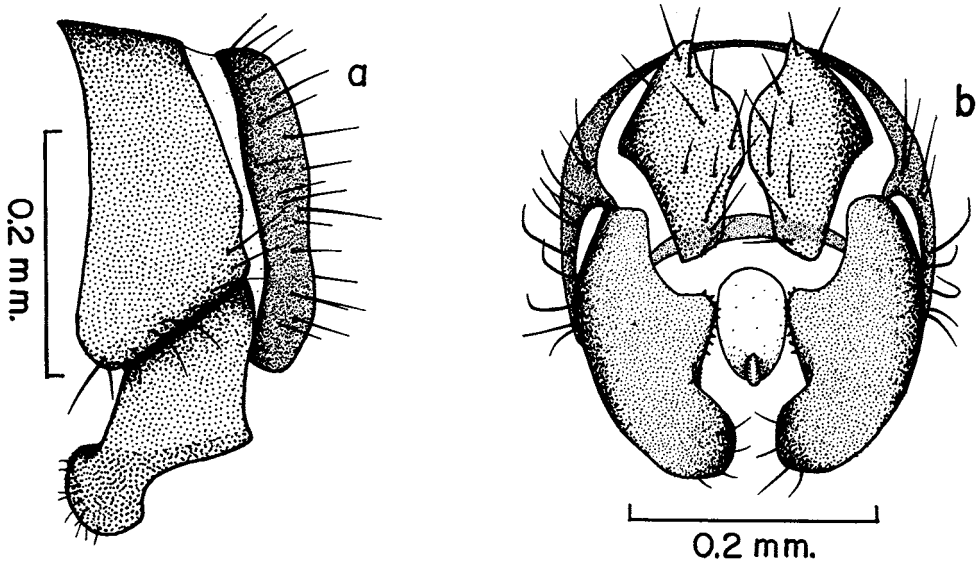


Figure 306—*Scaptomyza* (*Trogloscaptomyza*) *mecocerca* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

from the following localities in the Kokee area of Kauai—same as type; Kokee, 3,600 feet, July, 1952 (D. E. Hardy); Alakai Swamp, 3,800–4,000 feet, July, 1952, and August, 1953 (D. E. Hardy); and Nualolo Valley, 3,400 feet, August, 1952 (D. E. Hardy). Also from Kokee, a series of seven females which appear to belong here but are not being designated as paratypes.

Type and allotype in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) mediana new species (fig. 307a–b).

The genital characters of the male show close relationship to *S. silvicola* n. sp., but *mediana* differs by being almost entirely yellow rather than dark brown to black covered with gray pollen, with the anal plates bent downward at their apices, and the aedeagus square at the tip (fig. 307b).

MALE. *Head:* The front is golden except for the eye orbits, which have a faint tinge of brown to black in the ground color and are covered with gray pollen, and the ocellar triangle, which is black in ground color and gray pollinose. The upper two-thirds of the occiput is brown, covered with gray pollen; the lower portion is yellow. The genae are yellow; the face is yellow-white except for a brown discoloration along the lower portion. The clypeus is brownish yellow, and the palpi are dark brown. The strong bristle at the upper edge of each vibrissal row is equal to the upper reclinate bristle of the front. The lower reclinate is tiny, scarcely one-half as long as the proclinate, and is situated about opposite

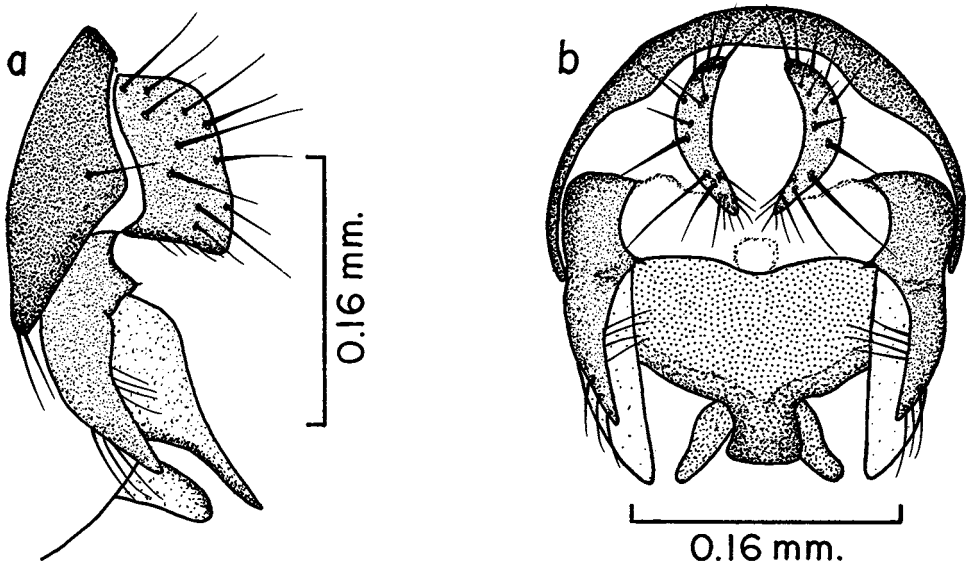


Figure 307—*Scaptomyza* (*Trogloscaptomyza*) *mediana* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

the latter. The first antennal segments are yellow; the third is brown, tinged with yellow. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely yellow except for a very faint tinge of brown along the upper edge of the mesopleuron and the upper portion of the sternopleuron. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated about halfway between the first pair of supraalars and the suture. The anterior sternopleural bristle is one-half as long as the posterior bristle. *Legs:* Entirely yellow, except for a tinge of brown on the apices of the tarsi. The front basitarsus is scarcely one-fourth as long as the tibia. *Wings:* Hyaline. The third costal section is 3.8 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.8 times longer than the penultimate section. *Abdomen:* Entirely brownish yellow. The anal plates are two times higher than long and are bent downward at their apices. The ninth tergum is narrow over the dorsal portion, expanded on the sides, and slightly attenuated ventrally. The claspers are rather slender, distinctly pointed, and each has a small subbasal lobe (fig. 307a). The aedeagus is large and protruded, appearing sharply pointed in a direct lateral view and is distinctly truncate as seen from a ventral view (fig. 307b).

Length: body, 1.6 mm.; wings, 1.9 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 1.8 mm.; wings, 2.1 mm.

Holotype male, allotype female, and 12 paratypes (2 males and 10 females): Waikamoi, Maui, 4,000 feet, July, 1956 (R. Namba and D. E. Hardy).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) mimula new species (fig. 308a–b).

This species resemble *S. pallifrons* Hackman but is readily differentiated by lacking markings on the mesonotum and by the very different male genitalia (fig. 308a).

MALE. Small, almost entirely yellow species. *Head:* Nearly quadrate as seen in direct lateral view, almost entirely yellow except for the reddish brown eyes and a faint tinge of brown in the ocellar triangle. The front is about as wide as long, predominantly golden yellow, yellow-gray around the ocellar triangle and down the orbits. The lower reclinate bristle is tiny, hairlike, about half as long as the proclinate bristle, and situated distinctly above the latter and about one-third the distance between the proclinate and the upper reclinate bristle. One moderately strong bristle is present at the upper edge of each vibrissal row; this is about equal in size to the upper reclinate bristle. The face and genae are white, tinged with yellow. The former is very slightly raised down the median portion. The palpi are entirely yellow; each has a moderate-sized black apical bristle and a smaller preapical bristle. The antennae are clear yellow; the arista has two dorsal rays plus the small apical fork. *Thorax:* Entirely yellow with no indications of dark markings or *Scaptomyza*-like patterns on the mesonotum. The anterior dorsocentral bristles are situated just behind the suture, distinctly in front of a line drawn between the first pair of supraalar bristles. Four rows of acrostichal setae are present on the anterior half of the mesonotum. The humeral bristle is almost equal in size to the presutural bristle. The anterior sternopleural bristle is almost one-half as long as the posterior bristle but is thin and hairlike. *Legs:* Entirely yellow except for the discolorations of brown on the apices of the tarsi. The front tarsi have numerous short, erect hairs over the dorsal surface. The front basitarsus is about one-third as long as the tibia. *Wings:* Hyaline. The costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.75 times longer than the fourth, and the last section of vein M_{1+2} is 1.76 times longer than the penultimate section. *Abdomen:* Entirely yellow except for brown to black markings on the genitalia. The ninth tergum is yellow in the dorsomedian portion, brown to black on the sides. The tergum is rather narrow, scarcely longer than the anal plates, and the anteroventral corner bears two stout spinelike processes. The claspers are bilobed; the posterior lobe has fine serrations along its hind margin (fig. 308a). Other details of the genitalia are as in figure 308a–b.

Length: body, 1.6–1.8 mm.; wings, 1.7–2.0 mm.

FEMALE. Fitting the description of the male except for sexual differences. The anal plates are brown.

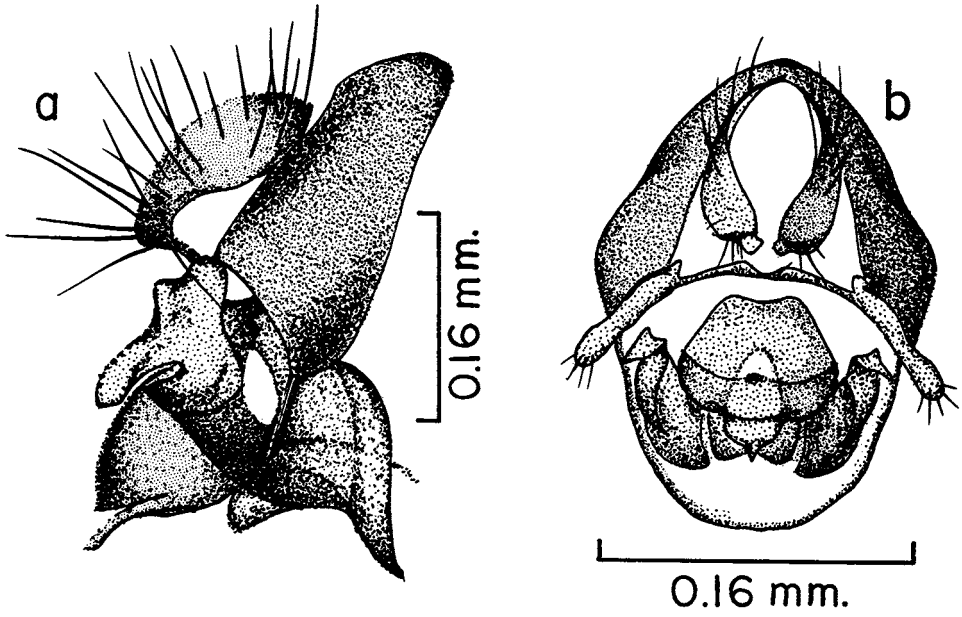


Figure 308—*Scaptomyza* (*Trogloscaptomyza*) *mimula* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

Holotype male: Puu Kolekole, Molokai, 3,600 feet, July, 1952 (D. E. Hardy). Allotype female: same data as type (M. Tamashiro). Twelve paratypes (five males and seven females) : same data as type and allotype.

Type and allotype in the B. P. Bishop Museum. The paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) monticola (Grimshaw) **new combination** (fig. 309a–c).

Drosophila monticola Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :69.

Endemic. Hawaii (type locality: Mt. Hualalai, Kona).

Type in the British Museum (Natural History).

I have studied the type male and allotype female but have not been able to find other specimens which fit here. It may not be possible to place this species accurately until the male genitalia are studied. It seems to fit very close to *S. kauaiensis* Hackman and apparently differs by having the antennae and front all yellow, the palpus with three bristles at the apex (fig. 309a), the costal fringe extending about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}, and the last section of vein M_{1+2} much shorter than in *kauaiensis* (only about 1.4 times longer than the penultimate section).

The following notes are based upon the type in the British Museum. Entirely

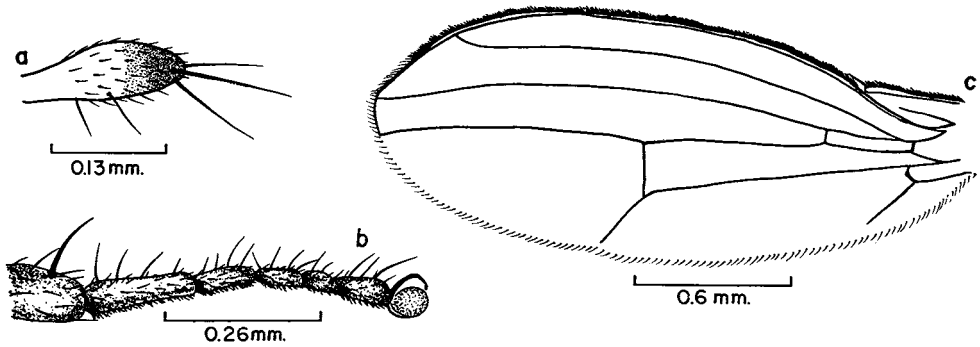


Figure 309—*Scaptomyza* (*Trogloscaptomyza*) *monticola* (Grimshaw): **a,** palpus of allotype female; **b,** front tarsus of type male; **c,** wing of type male.

yellow to rufous species except for some markings of pale brown on the mesonotum and the abdomen. The head is entirely yellow except for the reddish brown eyes. The antennae are yellow. The arista has two dorsal rays in addition to the apical fork. The palpi are black at their apices, and each has three moderately strong apical bristles (fig. 309a). The thorax is entirely rufous. In the type the median portion of the mesonotum is obscured by the nadel but there appears to be two rather faint brown vittae on each side in line with the dorsocentral bristles. In the female specimen pale brown bands are distinctly present down each dorsocentral line, and a slight discoloration of brown is present on the mesonotum behind each humerus. Four rows of acrostichal setae are present. The legs are entirely yellow. The front basitarsus is short, slightly less than one-third as long as the tibia, and about one-half longer than the second tarsal segment (fig. 309b). The tarsus has short erect setae over the dorsal surface. The wings are hyaline. The third costal section is nearly five times longer than the fourth, and the costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately 1.4 times longer than the penultimate section. (fig. 309c). The abdomen is predominantly yellow to rufous; the posterior lateral margin of each segment is tinged with brown. The male genitalia are shining dark brown to black.

Length: body, 2.5–3.0 mm.; wings, 3.0–3.5 mm.

Scaptomyza (Trogloscaptomyza) multidenta new species (fig. 310a–b).

This species fits in the complex which is characterized by having six rows of acrostichal setae on the mesonotum and the body entirely yellow. It is differentiated from any known *Trogloscaptomyza* by having a long slender basal lobe on the male clasper as shown in figure 310a.

MALE. *Head:* Entirely yellow, including the appendages, except for the reddish brown eyes, a tinge of brown to black in the ground color of the ocellar triangle, and a faint tinge of brown on the upper portion of the occiput and along the lower margin of the face. The median portion of the front is golden

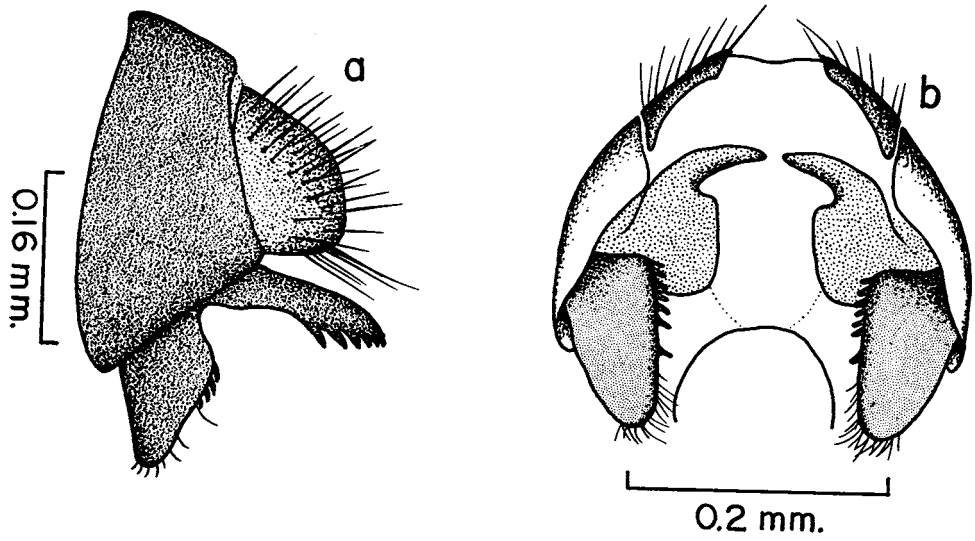


Figure 310—*Scaptomyza* (*Trogloscaptomyza*) *multidenta* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

yellow; the orbits are yellow-gray. The ocellar triangle is covered with gray pollen. The gena, measured at the lower margin of the eye, is equal in width to about four rows of eye facets. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about one-third to two-fifths as long as the proclinate and is situated about opposite the latter. *Thorax:* Entirely yellow, with no indications of vittae on the mesonotum. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristle is situated just behind the suture. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Entirely yellow, except for a tinge of brown on the apices of the tarsi. The front basitarsus is one-fourth to one-fifth as long as the tibia. *Wings:* Hyaline. The third costal section is 3.4 times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer than the penultimate section. *Abdomen:* Entirely yellow, except for a tinge of brown on the posterior portion. The genitalia are dark brown. The anal plates are slightly higher than long and are subacutely pointed on the ventral margins. The ninth tergum is comparatively broad; the ventral margin is oblique, slanted to the anteroventral corner (fig. 310a). The clasp-ers are distinctly bilobed, a slender basal lobe has strong dentations along the hind margin, and the apical lobe is comparatively short, subacutely pointed, and with dentations along the hind margin (fig. 310a). The ventral aspects of the genitalia are as in figure 310b.

Length: body, 2.0 mm.; wings, 2.3 mm.

FEMALE. Fitting the description of the male except that the third antennal segment and the palpi are tinged with brown; also, a tinge of brown is present along the upper edge of each mesopleuron. The abdomen is entirely yellow except for a faint tinge of brown on the basal portions of the terga. The anal plates are brown, tinged with rufous.

Length: body, 2.0 mm.; wings, 2.3 mm.

Holotype male: Pauahi, Kona Coast, Hawaii, 4,300 feet, August, 1952 (D. E. Hardy). Allotype female and two female paratypes: same locality and collector as type, August, 1956.

Type and allotype in the B. P. Bishop Museum collection. Paratypes in the United States National Museum and the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) obscuricornis (Grimshaw) **new combination** (fig. 311a–b).

Drosophila obscuricornis Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :71.

Endemic. Molokai (type locality: "Molokai Mountains"), Maui, Oahu, and Hawaii.

Type in the British Museum (Natural History). I have studied the type and have designated homeotypes from Puu Kolekole, Molokai, and from Upper Olaa Forest, Hawaii.

This species resembles *S. exigua* (Grimshaw) but is very readily differentiated by the characteristic male genitalia (fig. 311a), the dark-colored legs, and by having only four rows of acrostichal setae on the mesonotum.

A moderately small, predominantly brown to black species, covered with gray pollen. The head is quadrate as seen in lateral view. The front is predominantly black in ground color, yellow on the anterior margin, and gray on the orbits and surrounding the ocellar triangle; a velvety V-shaped mark extends through the middle of the front. The lower reclinate bristle is approximately three-fifths as long as the proclinate and is situated distinctly above the latter. The vertex and the upper two-thirds of the occiput are black in ground color, covered with gray pollen. The lower occiput, the genae, and most of the face are yellow; the lower margin of the face is brown to black, and the slight carina down the middle of the face is tinged with brown on the ridge. One strong bristle is present at the upper edge of each vibrissal row; the second bristle is about three-fifths to two-thirds as long as the first. The palpi are brown to black; each possesses a moderately strong apical bristle, approximately equal in size to the proclinate bristles of the front. The thorax is brown to black, tinged faintly with yellow in the ground color, and rather densely gray pollinose. No longitudinal vittae are present on the mesonotum. Four rows of acrostichal setae extend over the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first pair of supra-alars. The humeral bristles are strong and about equal in size to the presutural bristles. The anterior sternopleural bristle is about two-thirds as long as the

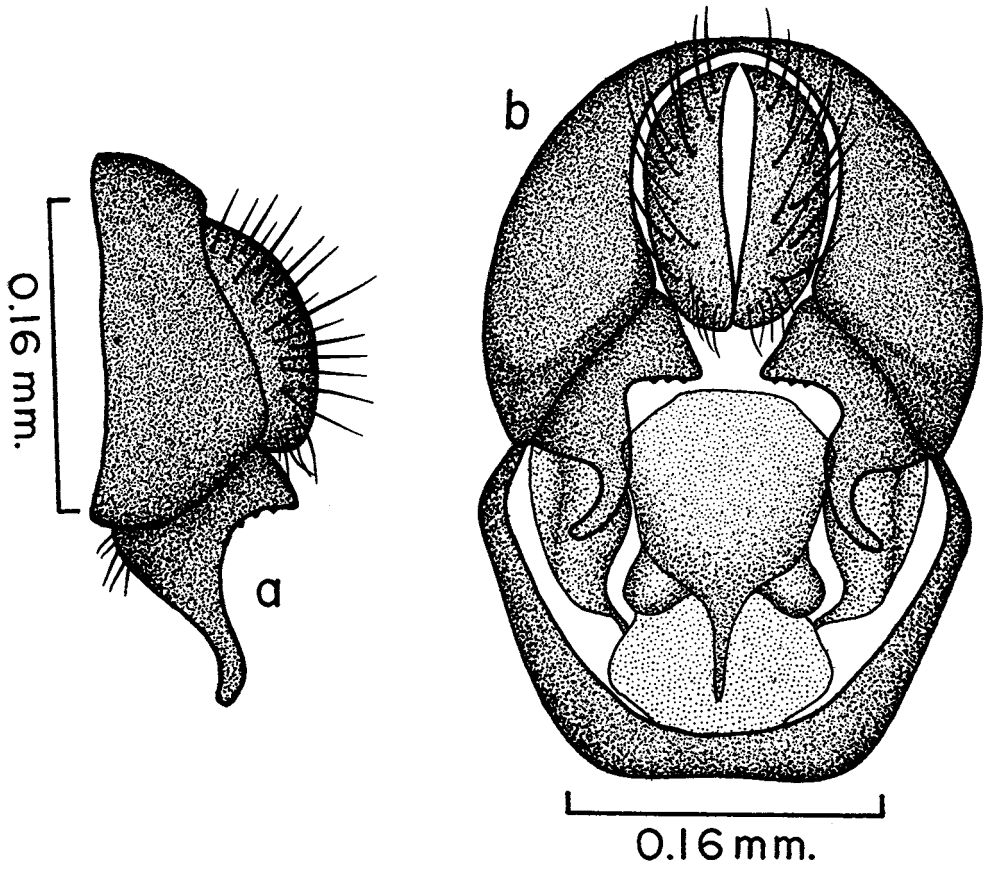


Figure 311—*Scaptomyza* (*Trogloscaptomyza*) *obscuricornis* (Grimshaw): **a**, male genitalia, lateral; **b**, male genitalia, ventral.

posterior bristle. The legs are yellow, tinged with black, especially on the femora. The wings are entirely hyaline; the costal fringe ends a short distance beyond the apex of vein R_{2+3}. The third costal section is 3.15 times longer than the fourth, and the last section of vein M_{1+2} is 1.7 times longer than the penultimate section. The abdomen is entirely dark brown covered with gray pollen. The genitalia are brown to black. The ninth tergum is comparatively short, about one-third to one-half longer than the anal plates. The claspers are thickened at bases and terminate in a distinct hooklike process (fig. 311a). The ventral aspects of the genitalia are as in figure 311b.

Length: body, 1.7 mm.; wings, 2.0 mm.

The female fits the description of the male except for sexual characters. I see no distinctive features in the female, and it would probably be difficult to impossible to separate it from closely related species.

Scaptomyza (Trogloscaptomyza) obscurifrons (Grimshaw) **new combination.**
Drosophila obscurifrons Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :72.

Endemic. Molokai (type locality: Molokai Mountains, 5,000 feet, August and September, 1893).

Type in the British Museum (Natural History).

I have studied the type in the British Museum. It is labeled "male," but is, however, a female specimen, and it is impossible to differentiate this species without a study of the male genitalia. Following are descriptive notes based upon the type. A rather small dark brown species. The front is entirely brown in ground color, gray-brown pollinose along the eye orbits and over the frontal triangle (reaching the anterior margin of the front), and brown to velvety black pollinose in the region between the orbits and the frontal triangle. The face is brown, and a prominent keel extends down the median portion; the lower edge and the extreme lateral margins of the face, also the genae, are yellow. The palpi are yellow; each has a moderately strong bristle, plus one weak bristle near the apex. The basal segments of the antennae are yellow-brown; the apical segment is dark brown to black. The arista has two dorsal rays (situated on the basal third of the stem) in addition to the apical fork. One strong bristle is present at the upper edge of each vibrissal row. The thorax is dark brown to black in ground color, rather densely gray-brown pollinose; there is no indication of brown vittae on the mesonotum. The acrostichal setae are arranged in six irregular rows. The femora and tarsi are yellow, tinged faintly with brown. The tibiae are entirely yellow. The front basitarsus is about two-fifths as long as the tibia. The wings are faintly grayish fumose, the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}, and the third section of the costa is 4.5 times longer than the fourth. The fifth costal section is slightly over half as long as the fourth. The last section of vein M_{1+2} is 1.5 times longer than the preceding section. The abdomen is dark brown to black in ground color and rather densely covered with gray pollen on the dorsum. The ovipositor is not visible; the blades are obviously weakly sclerotized.

Length: body, 2.2 mm.; wings, 2.5 mm.

Scaptomyza (Trogloscaptomyza) ochromata new species (fig. 312a–b).

This species is closely related to *S. intricata* n. sp. but is differentiated by lacking ventral lobes on the anal plates, by having the aedeagus large and protuberant, and by other genital characters as shown in figure 312a–b.

MALE. *Head:* All yellow except for the dark brown lower margin of the face, the black ocellar triangle, and a tinge of brown in the ground color of the occiput. The head is approximately square as seen in lateral view, slightly higher than long, with the front rather distinctly oblique. The genae are narrow; measured in line with the genal bristle, the gena is scarcely one-sixth to one-seventh as high as the eye. The anterior reclinate bristles are small, scarcely over one-half as long as the proclinates, and situated about opposite the latter. The eye orbits

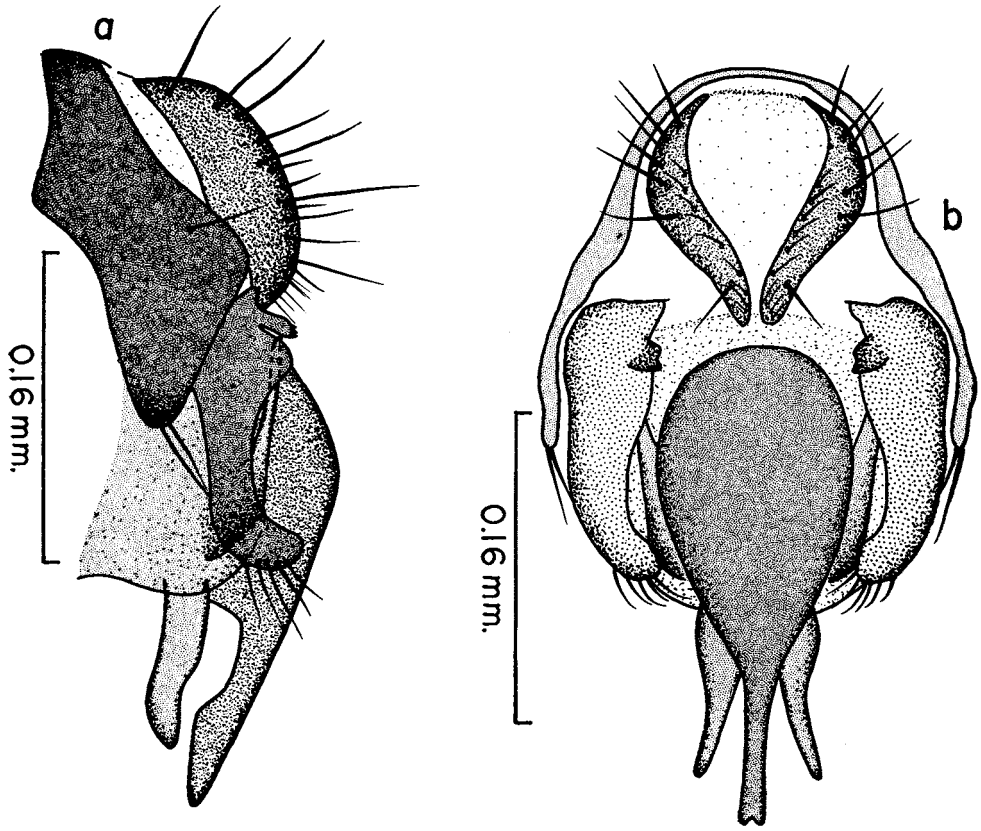


Figure 312—*Scaptomyza* (*Trogloscaptomyza*) *ochromata* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

are yellow; the portion of the front between the orbits and the ocellar triangle is gold-colored. One strong bristle is present at the upper edge of each vibrissal row. The antennae are entirely yellow. The arista has two dorsal rays (situated near the base) in addition to the large apical fork. *Thorax:* Entirely yellow. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of the first supraalars. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is one-fourth to one-fifth as long as the tibia. *Wings:* Dusky hyaline. The third costal section is three times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is nearly two times longer than the penultimate section, and the last section of vein M_{3+4} is approximately two times longer than the m crossvein. *Abdomen:* Entirely yellow. The anal plates are nearly three times higher than long and are not lobate ventrally. The ninth tergum is rather narrow; the anteroapex is rather

elongate. The male claspers are distinctly bilobate, and a paramere from the ventral aspects of the genitalia extends horizontally across the median portion of each clasper (fig. 312a). The aedeagus is very large and protuberant. The ventral aspects of the genitalia are as in figure 312b.

Length: body, 1.42 mm.; wings, 1.80 mm.

FEMALE. Fitting the description of the male except for sexual characters. The females are very similar to those of *hackmani* n. sp. except that the apical fork of the arista is smaller.

Length: body, 1.6 mm.; wings, 2.0 mm.

Holotype male and allotype female: Waikamoi, Maui, 4,000 feet, August, 1958, and July, 1956 (D. E. Hardy). Ten paratypes (four males and six females): same as allotype (D. E. Hardy and R. Namba); Kula Pipeline, Maui, 4,200 feet, July, 1956 (D. E. Hardy and R. Namba); and Nr. Puu Luau, E. Maui, 5,500 feet, beating shrubbery, April 18, 1945 (E. C. Zimmerman).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the collections of the United States National Museum, the British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) ostensa new species (fig. 313a–d).

This species fits near *S. exigua* (Grimshaw) and *varia* n. sp. by being dark-colored covered with gray pollen, having six rows of acrostichal setae, a poorly developed apical fork on the arista, and a posteroventral projection on the ninth tergum of the male. It differs by having the projection of the tergum slender, the ventral margins of the anal plates extended into long, pointed projections, the ninth tergum much broader, and the male claspers differently shaped as shown in figure 313b.

MALE. *Head:* The lower third of the front is yellow; the upper portion is brown to black in ground color, covered with gray pollen on the orbits and on the ocellar triangle and velvety black between. The occiput is brown to black in ground color and is covered with gray pollen except for the yellow lower margin. The genae, face, palpi, and mouthparts are pale yellow. The clypeus is yellow, tinged faintly with brown. Each palpus has an apical bristle, plus a slightly smaller subapical bristle. One moderately strong bristle is present at the upper edge of each vibrissal row. The anterior reclinate bristle is tiny, scarcely one-half as long as the proclinate, and situated distinctly above the latter, approximately two-fifths the distance between the proclinates and the upper reclinates. The antennae are entirely yellow. The arista has two dorsal rays in addition to a very small inconspicuous apical fork (fig. 313a). *Thorax:* Dark brown to black in ground color, densely gray pollinose. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated just slightly behind the suture. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Yellow, except for a tinge of brown on the apical third of the mid and hind femora, and for a faint tinge of brown on the tibiae and tarsi. The front basitarsus is about one-fourth as long as the

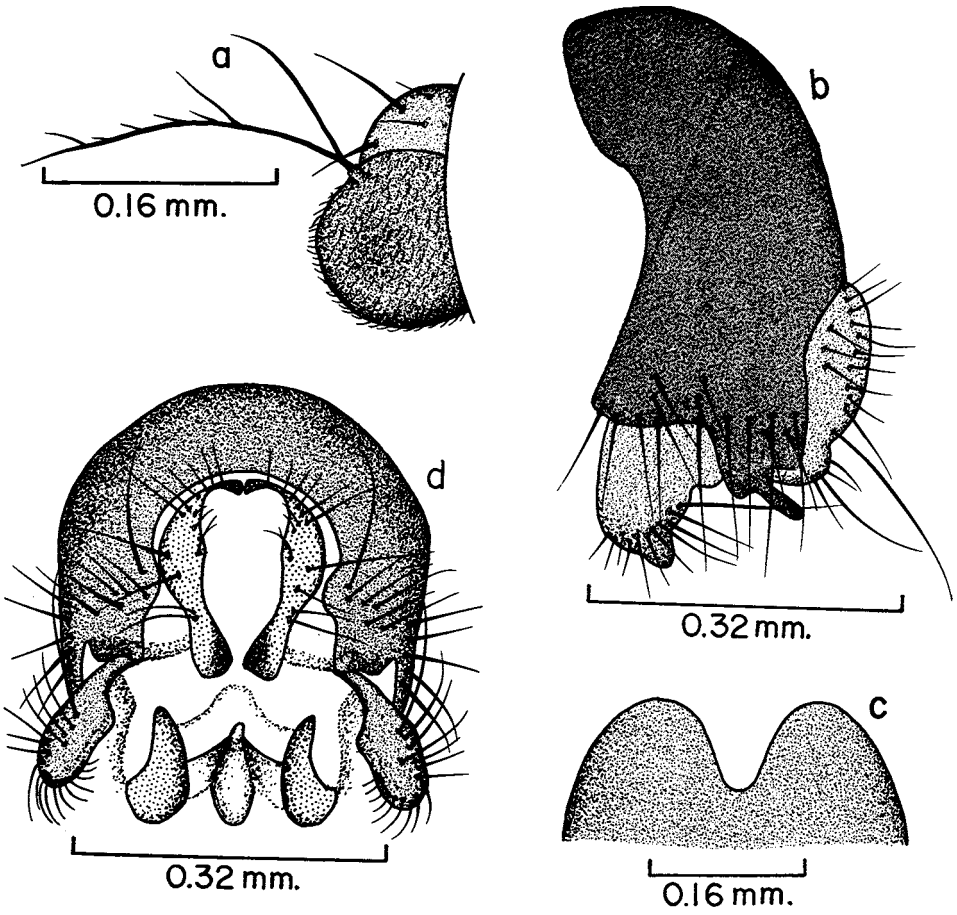


Figure 313—*Scaptomyza (Trogloscaptomyza) ostensa* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** anterodorsal margin of ninth tergum; **d,** male genitalia, ventral.

tibia. *Wings:* Entirely hyaline. The third costal section is 3.4 times longer than the fourth, and the costal fringe extends scarcely one-sixth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.64 times longer than the penultimate section. *Abdomen:* Entirely yellow-brown, covered with yellow-brown pollen. As seen from a lateral view, the anal plates are about three times higher than long; the ventral margins of the anal plates are greatly prolonged into long slender points which extend into the back portion of the genital chamber, as seen from a ventral view (fig. 313d). The ninth tergum is short and broad, scarcely higher than long, shining brown, and readily seen *in situ;* the posteroventral margin is developed into a slender lobe on each side, and the anterodorsal margin of the tergum has a distinct U-shaped cleft in the middle (fig. 313c). The claspers are short and blunt, shaped as in figure 313b,

and lacking dentation. The aedeagus is not protruded; the parameres are slender and sharp-pointed.

Length: body, 2.00 mm.; wings, 2.30 mm.

FEMALE. Fitting the description of the male except for sexual characters; also, the third antennal segment is brown on the dorsum and around the apex.

Length: body, 2.25 mm.; wings, 2.50 mm.

Holotype male: Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (C. R. Joyce). Allotype female and two male paratypes: same locality and date as type (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) pallifrons Hackman (fig. 314a–b).

Scaptomyza (*Trogloscaptomyza*) *pallifrons* Hackman, 1959, Acta Zool. Fennica 97:38, figs. 10 and 13.

Endemic. Hawaii (type locality: Kaula Gulch), and Maui. Possibly also occurs on Molokai and Kauai.

Type in the B. P. Bishop Museum.

This species fits in the complex which is characterized by having only four rows of presutural acrostichals and two pairs of dorsocentral bristles and the head quadrate in profile. Because of the all-yellow palpi, it fits near *S.* (*T.*) *longipecten* Hackman but is differentiated by the very different genitalia of the male (figs. 305a and 314a).

Almost completely pale-colored species, dark brown to black only on the apex of the abdomen and on the genitalia. As seen in lateral view the head is as high as long, and the eye is slightly higher than long. Front predominantly golden yellow; gray around the ocellar triangle and down the orbits. The front is about as wide as long. The ocellar triangle is brown, covered with gray pollen. The posterior reclinate bristles are situated at the middle of the front. The anterior reclinates are small, hairlike, scarcely half as long as the proclinates, and situated slightly above the latter. Palpi yellow, each with one apical bristle. Antennae yellow; arista with two dorsal rays in addition to the large apical fork. The thorax is predominantly yellow; the mesonotum is lightly gray pollinose and very indistinctly marked with faint, brown, longitudinal vittae (*Scaptomyza* pattern). The acrostichal setae are arranged in four presutural rows and two postsutural rows. The anterior dorsocentral bristles are situated approximately opposite the first (anterior) pair of supraalars. The anterior sternopleural bristle is hairlike, yellow-brown in color, and about one-half to three-fifths as long as the posterior bristle. The legs are entirely yellow except for the brown apical joints of the tarsi. The wings are hyaline. The costal fringe extends about one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 2.9 to 3.1 times longer than the fourth section, and the last section of vein M_{1+2} is 1.76 times longer than the penultimate section. The abdomen is yellow, tinged faintly with brown; the fifth tergum is brown to black on the apical two-thirds,

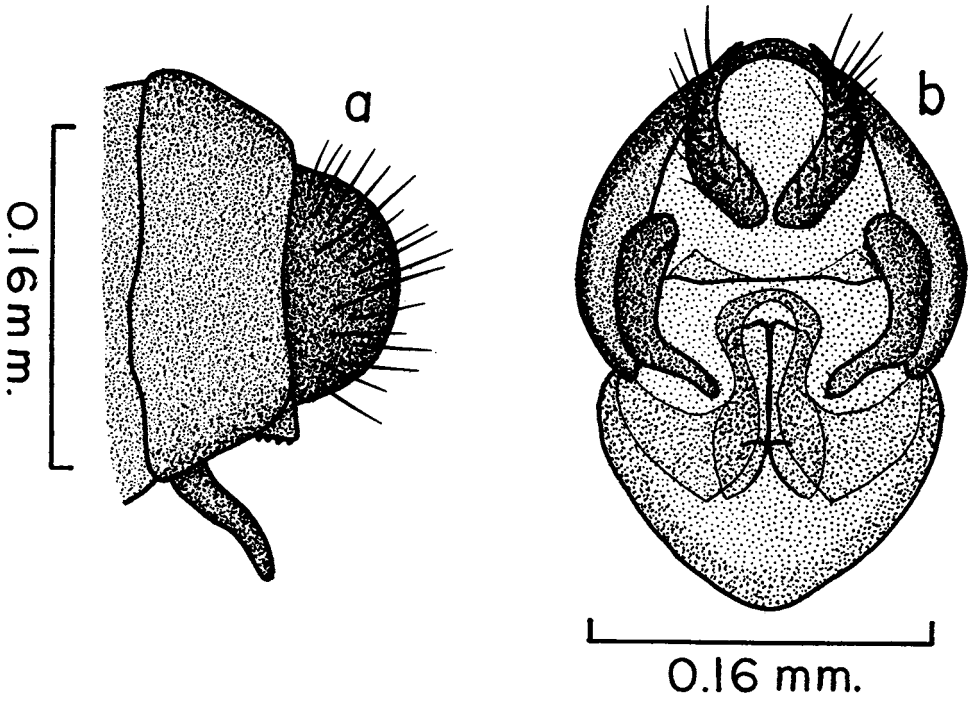


Figure 314—*Scaptomyza* (*Trogloscaptomyza*) *pallifrons* Hackman: a, male genitalia, lateral; b, male genitalia, ventral.

and the sixth tergum and genitalia are entirely dark brown to black. In the female the ovipositor is fleshy, entirely yellow; the anal plates are black. The male genitalia are as in figure 314a–b.

Length of male: body, 2.00 mm.; wings, 2.30–2.50 mm. Length of female: body, 2.20–2.50 mm.; wings, 2.75–3.10 mm.

Scaptomyza (Trogloscaptomyza) paralobae new species (fig. 315a–b).

This species fits intermediate between those which have six rows of acrostichal setae and those which have four rows. The males have six irregular rows and the females have six distinct rows. It fits in the group which has the body dark-colored, covered with gray pollen, and the apical fork of the arista well developed. It is readily differentiated from other known species by the development of the male genitalia, by the lobate ventral margins of the anal plates (fig. 315b), and by the slender attenuated apical margins of the claspers (fig. 315a).

MALE. *Head:* The median portion of the front (below the ocellar triangle) is pale yellow; the eye orbits (above the proclinate bristles) and the ocellar triangle are black in ground color, densely gray pollinose. The upper interfrontal areas are dull black. The occiput is brown to black in ground color, covered with gray pollen, and yellow only on the lower margin. The genae, lateral mar-

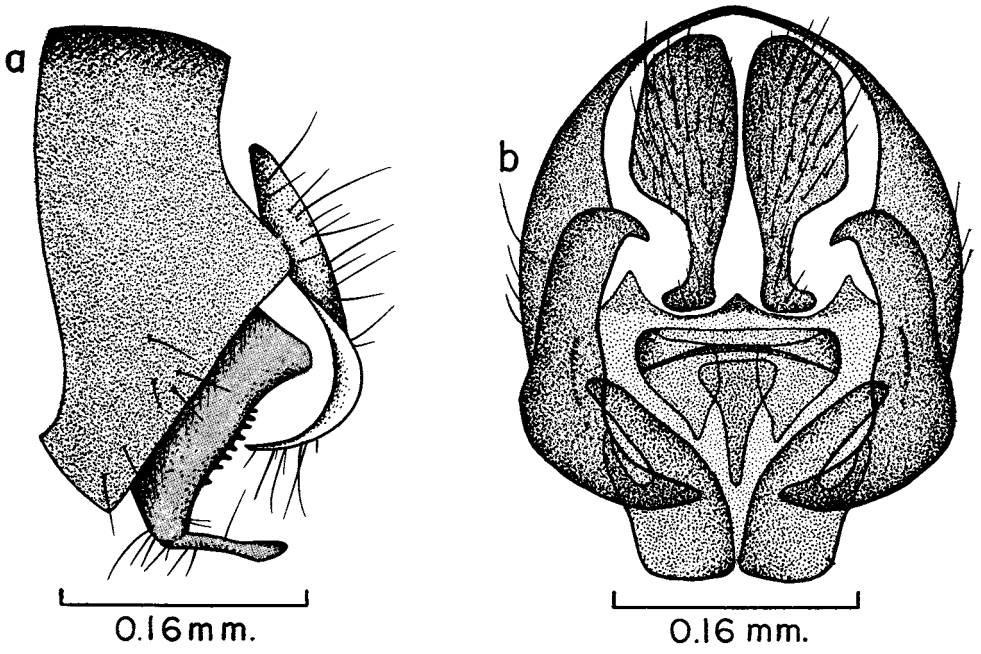


Figure 315—*Scaptomyza* (*Trogloscaptomyza*) *paralobae* n. sp.: **a**, male genitalia, laterial; **b**, male genitalia, ventral.

gins of the face, palpi, and the mouthparts are pale yellow. The median portion of the face, down the sides of the keel, are discolored with brown; the lower portion is tinged with black. The clypeus is yellow-brown. One moderately strong bristle is present at the upper edge of each vibrissal row; this is subequal to the upper reclinate bristles. The basal two antennal segments are yellow, tinged with brown on the dorsal surface; the third segment is brownish yellow. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is nearly three-fifths as long as the proclinate and is situated opposite the latter. *Thorax:* Entirely gray pollinose, with a faint indication of a brown vitta extending down the mesonotum, brown in the ground color of the dorsum, and yellow-brown on the sides. Six irregular rows of acrostichal setae are present on the anterior portion of the mesonotum. The anterior dorsocentral bristles are situated just slightly behind the suture. The humeral bristle is about equal in size to the anterior notopleural bristles. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the apices of the tarsi. The front basitarsus is about one-third as long as the tibia. *Wings:* Entirely subhyaline. The third costal section is 3.3 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.66 times longer than the penultimate section. *Abdomen:* Entirely

brown, faintly tinged with yellow in the ground color, and covered with gray-brown pollen. As seen from a direct lateral view, the anal plates are nearly four times higher than long; as seen from below, each ventral margin is lobate and strongly capitate (fig. 315b). The ninth tergum is slightly narrowed over the dorsal portion and is expanded ventrally. Each clasper is pointed at the base and extended into an attenuated point at the apex (fig. 315a). The hind margin is conspicuously dentate.

Length: body, 2.0 mm.; wings, 2.3 mm.

FEMALE. Fitting the description of the male except for sexual characters, and except that six distinct rows of acrostichal setae are present on the mesonotum.

Length: body, 2.1 mm.; wings, 2.5 mm.

Holotype male, allotype female, and one paratype male: Pauahi, Kona slopes of Mauna Loa, Hawaii, 4,300 feet, August, 1956 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. The paratype is in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) penicula new species (fig. 316a–b).

This species fits in the complex which has the body principally yellow and six rows of acrostichal setae on the anterior half of the mesonotum. It is differentiated from other known species of *Trogloscaptomyza* from Hawaii by having a dense clump of setae in the median portion of the hind margin of each anal plate of the male (fig. 316a). Also, the other genital characters are distinctive as shown in figure 316a–b.

MALE. *Head:* The front is faintly tinged with brown in the ground color of the eye orbits and more distinctly brown in ground color on the ocellar triangle; both of these areas are rather densely gray pollinose. The anterior margin of the front is yellow, the median portion is yellow-red, and the remainder is bronze. The upper third of the occiput is tinged with brown in ground color, covered with gray pollen; the lower portion is yellow. The genae are pale yellow-white. The face is pale yellow on the upper portion and on the sides and is tinged with brown on the lower margin. The median portion of the face is carinate. The clypeus is yellow, tinged lightly with brown; the palpi are pale brown. The anterior reclinate bristle is about one-half as long as the proclinate and is situated distinctly above the latter. *Thorax:* Entirely yellow except for a faint tinge of brown on the upper portion of each pleuron and with the mesonotum and scutellum faintly brownish tinged. Six distinct rows of acrostichal setae are present on the anterior portion of the mesonotum. The anterior dorsocentral bristles are situated about halfway between the first supraalars and the suture. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline, very faintly infuscated. The third costal section is 3.7 times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the pe-

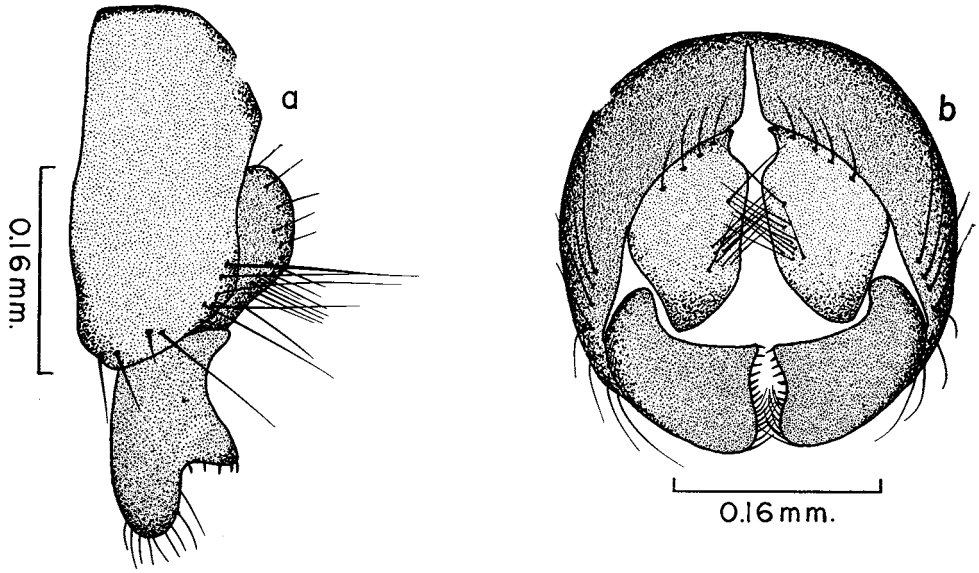


Figure 316—*Scaptomyza* (*Trogloscaptomyza*) *penicula* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

nultimate section. *Abdomen:* The terga are yellow-brown at the bases and brown at the apices. The anal plates are nearly two times higher than long and almost devoid of setae except for a dense clump near the middle of the hind margin. The ninth tergum is nearly straight-sided; a row of strong setae is present along each ventral margin. The claspers are shaped as in figure 316a; a small median lobe bears conspicuous teeth along the ventral surface. The ventral aspects of the genitalia are as in figure 316b.

Length: body, 1.7 mm.; wings, 2.0 mm.

FEMALE. Unknown. At present the females cannot be separated from other closely related species.

Holotype male: Alakai Swamp, Kauai, 3,800 feet, July, 1952 (D. E. Hardy). Nine male paratypes: from the following localities on Kauai—same as type; and Kokee, 3,600 feet, July, 1952 (D. E. Hardy).

Type and two paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) photophilia new species (fig. 317a–c).

This species fits near *S. exigua* (Grimshaw) but differs by having the male claspers short and broad, scarcely one-half longer than wide and with a small point at the base, and lacking conspicuous dentation on the hind margins; also, the posteroventral process on the ninth tergum is not divided at the base (fig. 317b), and the lobes of the anal plates are expanded (fig. 317c).

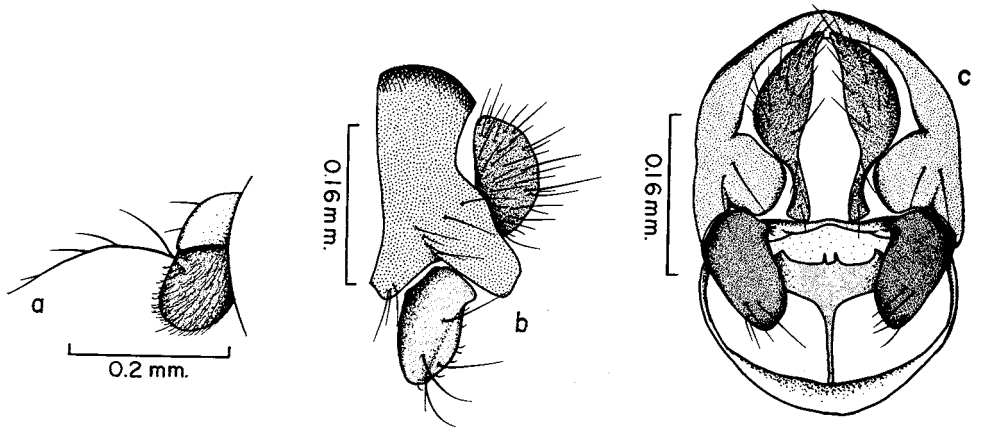


Figure 317—*Scaptomyza (Trogloscaptomyza) photophilia* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

MALE. *Head:* Slightly higher than long; almost entirely black in ground color except for the red eyes. The front is gray pollinose on the orbits and on the ocellar triangle and dull black between. The genae are yellow, tinged with brown; the face is black in ground color except for a tinge of yellow in the upper portion. The face and genae are densely gray pollinose. The clypeus is dark brown to black; the palpi are yellow, tinged with brown. Each palpus has one bristle at the apex and one subapical bristle. One strong bristle is present at the upper edge of each vibrissal row. The gena, measured at the lower margin of the eye, is equal in width to about three or four rows of eye facets. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated distinctly above the latter. The first two antennal segments are brown, tinged with yellow; the third is dark brown to black. The arista has three dorsal rays, which become progressively smaller toward the apex, in addition to the tiny apical fork (fig. 317a). *Thorax:* Entirely gray pollinose lacking distinct brown vittae on the mesonotum; the ground color of the dorsum is black except for a tinge of yellow on the lower portion of each humerus; the ground color of the pleura is dark brown to black. Six distinct rows of acrostichal setae extend over the anterior half of the mesonotum. The anterior dorsocentral bristles are situated about opposite the first supraalars. The humeral bristle is about equal in size to the anterior notopleural. The anterior sternopleural bristle is approximately one-half as long as the posterior bristle. *Legs:* Yellow, except for a tinge of brown on the coxae and on the apices of the tarsi. The front basitarsus is approximately one-third as long as the tibia. *Wings:* Hyaline. The third costal segment is approximately 4.3 times longer than the fourth, and the costal fringe extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about two times longer than the penultimate section. *Abdomen:* Entirely dark brown, covered with gray-brown pollen. As seen

from a lateral view the anal plates are about two times higher than long. The ventral margins are extended into slender lobes which are expanded at their apices as in figure 317c. The ninth tergum is developed into a broad, blunt posteroventral lobe on each side. The claspers are short and broad; each has a small basal point (fig. 317b). The ventral aspects of the genitalia are as in figure 317c.

Length: body, 1.75 mm.; wings, 2.00 mm.

FEMALE. The female has not been associated with the male. One headless specimen is on hand from the same series as the type and paratypes, but it is not being designated as the allotype.

Holotype male and four male paratypes: from Kilauea, Hawaii, August, 1958, collected in light trap (J. W. Beardsley).

Type and one paratype in the B. P. Bishop Museum. The other paratypes are in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) phryxothrix new species (fig. 318a–b).

A moderately large, dark-colored species having six rows of acrostichal setae on the mesonotum and a well-developed fork at the apex of the arista. It fits near *S. robusta* n. sp. but is differentiated by having the ventral portions of the ninth tergum very densely setose and hiding the claspers, by having the apical lobe of the clasper pointed (fig. 318a), and the aedeagus sharp-pointed (fig. 318b).

MALE. *Head:* Approximately square as seen in direct lateral view. The front is black in ground color except for a faint tinge of yellow-brown on the extreme lower margin and along the eye orbits. The front is entirely dull gray pollinose. The upper half of the occiput is dark brown to black in ground color, covered with gray pollen. The lower portion is yellow. The genae are pale yellow; the face is predominantly so, with a faint tinge of brown on the lower sides of the carina. The clypeus is yellow, tinged with brown. The palpi are yellow. The third antennal segment is dark brown to black except for a tinge of rufous in the ground color of the basal portion. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated slightly above the latter. The face has a sharp carina in the middle. *Thorax:* Dark brown, faintly tinged with rufous in the ground color, and covered with gray pollen. The lower edges of the humeri and the propleura and also the lower hind corners of the mesopleura are yellow. Six distinct rows of acrostichal setae extend over the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The humeral bristle is equal in size to the anterior notopleural bristle. The anterior sternopleural bristle is nearly three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the tarsi and the apices of the hind femora, and with faint indications of preapical and prebasal brown bands on the hind tibiae; the front basitarsus is one-third as

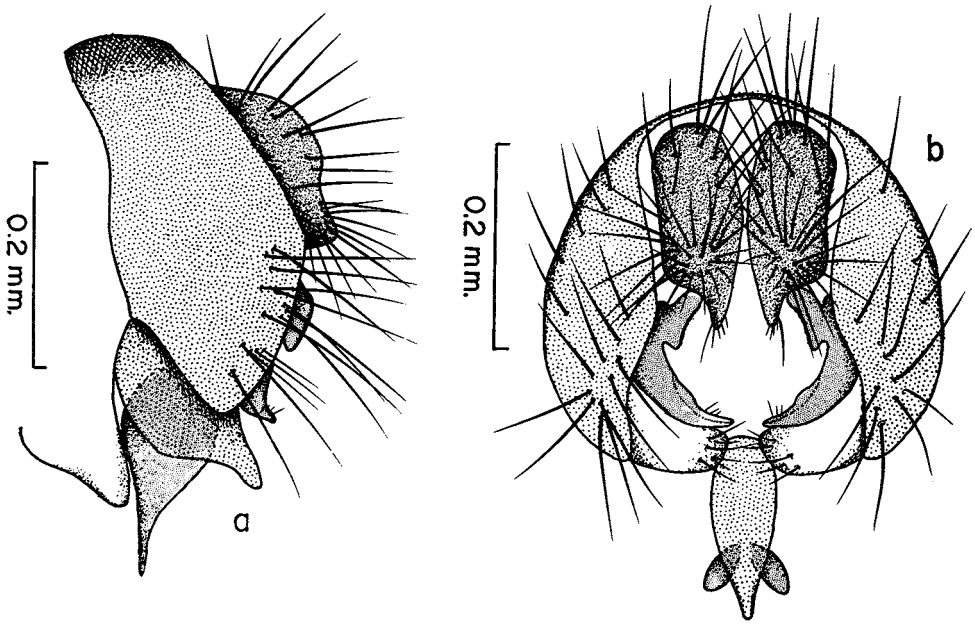


Figure 318—*Scaptomyza* (*Trogloscaptomyza*) *phryxothrix* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

long as the tibia. *Wings:* Faintly infuscated with brown. The third costal section is four times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.4 times longer than the penultimate section. *Abdomen:* Brown, covered with gray-brown pollen. The anal plates are approximately three times higher than long; as seen from a lateral view they are very densely setose on the ventral portion. The ventral margins of the anal plates are lobate (fig. 318b). The ninth tergum is gradually expanded ventrally and is densely setose over the ventral portions. The claspers are scarcely visible because of the dense setae on the ninth tergum (fig. 318a); each clasper has a rounded semi-membranous basal lobe, a rather slender pointed median lobe, and a pointed apical lobe. The aedeagus is sharp-pointed. The ventral aspects of the genitalia are as in figure 318b.

Length: body, 2.7 mm.; wings, 3.2 mm.

FEMALE. Unknown.

Holotype male: Hanalilolilo, Molokai, July, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) protensa new species (fig. 319a–b).

This species fits in the complex which has the body yellow and six rows of acrostichal setae on the mesonotum. It is differentiated from other species of

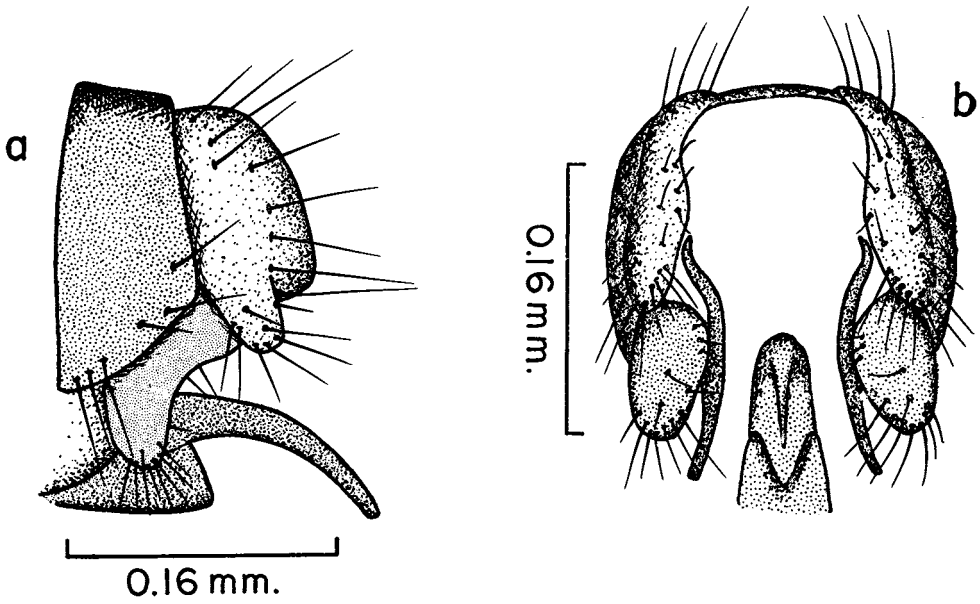


Figure 319—*Scaptomyza* (*Trogloscaptomyza*) *protensa* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

this group by having the ventral portion of the anal plate developed into a rounded lobe which extends over the bases of the claspers (fig. 319a) and by the conspicuous aedeagus with a bilobed ventral process (fig. 319b).

MALE. *Head:* Entirely yellow (including the appendages) except for the red eyes, the brown apices of the palpi, and a tinge of brown in the area surrounded by the ocelli. The front is yellow-gray on the sides and on the ocellar triangle. The apical half of the palpus is brown. The face is gently carinate down the median portion. The arista has two dorsal rays in addition to the large apical fork; the fork is unusually large for a *Trogloscaptomyza*, almost equaling that of species of *Tantalia*. *Thorax:* Entirely yellow except for a transverse line of brown along the upper margin of each mesopleuron. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated just behind the suture. The anterior sternopleural bristles are about three-fifths as long as the posterior bristles. *Legs:* Yellow except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is 3.2 times longer than the fourth, and the costal fringe extends almost one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about two times longer than the penultimate section. *Abdomen:* Yellow, tinged lightly with brown at the apices of terga two to five. The anal plates are about two times higher than long and shaped as in figure 319a. The ninth tergum is comparatively broad; the ventral margin is oblique. The claspers are small, rather simple in development, and setose around

the apex. The aedeagus is large; a well-developed pair of ventral lobes arises near the base (fig. 319a). The ventral aspects of the genitalia are as in figure 319b.

Length: body, 1.80 mm.; wings, 2.10 mm.

FEMALE. Fitting the description of the male except for sexual characters. The apices of the abdominal terga are tinged with brown.

Length: body, 2.00 mm.; wings, 2.25 mm.

Holotype male and allotype female: Poomau Valley, Kauai, 3,400 feet, July, 1952 (D. E. Hardy). Twenty-three paratypes (9 males and 14 females): from the following localities in the Kokee section of Kauai—same as type; Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy); Waiakoali Valley, 3,700 feet, August, 1953 (D. E. Hardy); Nualolo Valley, 3,400 feet, July, 1952, and August, 1953 (D. E. Hardy).

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) punctivena new species (fig. 320a–f).

This species is readily recognized by the unusual markings through the apical portion of cell R_3 and along the last section of vein M_{1+2} (fig. 320c). It seems to fit the characters for typical *Drosophila* except for the arista (fig. 320a) and genital characters (fig. 320d–f).

MALE. An entirely dark brown to black species, rather densely gray pollinose. *Head:* Almost square as seen in direct lateral view. The edge of the face is just slightly visible beyond the eye margin, and the width of the gena is almost one-fourth the eye height. The eyes are oval; the lower posterior margin is oblique. The eyes are densely covered with very short pubescence, scarcely visible above the margin of the facets. The front is slightly wider than long, the lower one-fourth to one-third is yellow, and the remainder is black. A broad stripe of gray extends down each orbit, and the area around the ocellar triangle is gray; the area between these gray marks is velvety black. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The occiput is predominantly black, densely covered with gray pollen. The genae and face are yellow-white. The face is distinctly concave, with a very slight carina in the upper median portion. Two moderately strong bristles are present in each vibrissal row. The palpi are yellow; two black apical bristles are present in addition to several black setae around the apical portion. The mouthparts are yellow-brown; the labellum does not appear to be ornate. The basal two antennal segments are yellow; the third segment is brown, tinged with yellow at its base. The second segment has two short bristles, plus several black setae on the dorsal portion. Each arista has just one dorsal ray, plus a large apical fork (fig. 320a). *Thorax:* Entirely black, covered with gray pollen. The anterior dorsocentral bristles are strong, equal in size to the presutural bristles, and situated slightly in front of a line drawn between the first pair of supraalars. Six

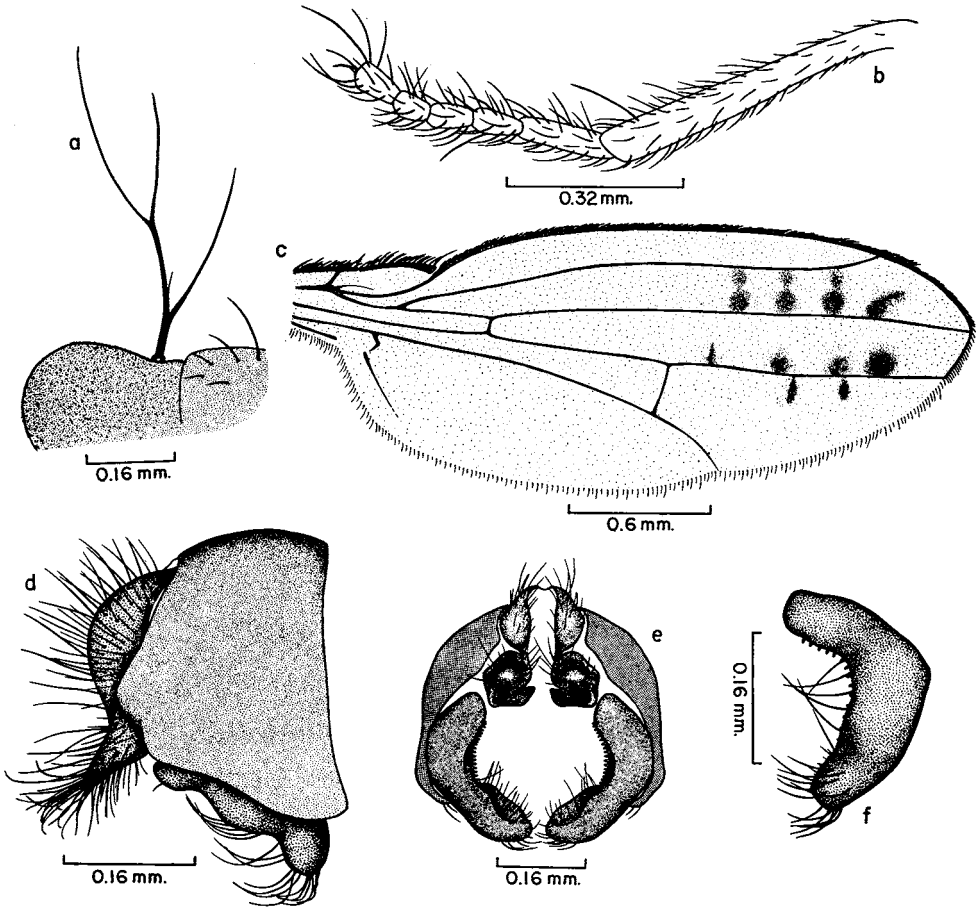


Figure 320—*Scaptomyza (Trogloscaptomyza) punctivena* n. sp.: **a,** antenna; **b,** front tibia and tarsus; **c,** wing; **d,** male genitalia, lateral; **e,** male genitalia, ventral; **f,** male clasper.

rows of acrostichal setae are present. Only one strong bristle is present on each humerus; the secondary bristle is represented by a seta approximately equal in size to the acrostichal setae. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Almost entirely dark brown to black. The trochanters and the extreme apices and bases of the tibiae are yellow, tinged lightly with brown. The front femora are about 3.5 times longer than wide; the posterior surface is rather thickly covered with black setae in addition to the row of short bristles along the posteroventral and posterodorsal surfaces. The front tibiae have rather numerous short, erect hairs along the posterior and dorsal surfaces. The front tarsi are rather thickly covered with short, erect, black hairs over the dorsal, anterior, and posterior surfaces; the basitarsi are very short, about one-fourth as long as the tibia, and about two times longer than the second tarsal segment (fig. 320b). The hind basitarsus is about one-half as long

as the tibia. *Wings:* Evenly infuscated; faintly brownish yellow, with three or four brown, transverse marks across the apical portion of cell R_3; with four or five small brown spots along the upper margins of the last section of vein M_{1+2}; and two brown, appendix-like marks on the underside of the last section of vein M_{1+2} (fig. 320c). The costal fringe extends one-fourth to one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is four times longer than the fourth, and the last section of vein M_{1+2} is 1.5 times longer than the penultimate section. The last section of vein M_{3+4} is about 1.5 times longer than the m crossvein. *Abdomen:* Dark brown, lightly gray pollinose; the posterior borders of the terga are black. The genitalia are strikingly different from any which I have seen in the Drosophilidae. The ninth tergum is very broad; from a lateral view it is as long as wide and is many times longer than the short anal plates. The anal plates are greatly reduced in length, but the lower portion of each is developed into a pointed lobe (fig. 320d). The claspers are large, boomerang-shaped, with short teeth along the inner surface (fig. 320e–f). The aedeagus is large and fleshy.

Length: body, 2.75 mm.; wings, 3.00 mm.

FEMALE. Unknown.

Holotype male: Haleakala, Maui, "edge of forest near Kaunae D.," May 22, 1917, 5,800 feet (collector not given, probably collected by P. H. Timberlake).

Type in the Hawaiian Sugar Planters' Association collection.

Scaptomyza (Trogloscaptomyza) pusilla (Grimshaw) **new combination** (fig. 321a–b).

Drosophila pusilla Grimshaw, 1901, Fauna Hawaiiensis 3 (1) :70.

Endemic. Molokai (type locality: "on the mountains, 3,000 feet, in September, 1893"), Maui, and Hawaii. Grimshaw also indicated a specimen from Haleakala, Maui, as a variety of *pusilla*; it is probable that this is a distinct species. In fact, it seems evident that Grimshaw had two species in the series of specimens which he studied from Molokai.

Type in the British Museum (Natural History).

It has not been possible to place correctly this species from the original description, and, without dissecting the type male, I cannot be absolutely certain that my concept is correct. There are several species found in the mountains of Molokai which superficially resemble one another; at least two are exceptionally close and except for the differences in coloration of the palpi and presence or absence of the slight discoloration of brown along the top of the mesopleuron, I see no way to separate them except by genital characters. The type male of *pusilla* has the palpi all yellow and lacks a pale brown mark along the upper edge of each mesopleuron. Another species on hand compares in all respects with the type except that it has the palpi brown to black at the tips and does have a faint brown mark along the upper edge of each mesopleuron; I am naming this *hackmani* n. sp. In the original description, Grimshaw described the palpi as being "yellow with somewhat darkened tips." It is possible that he may have

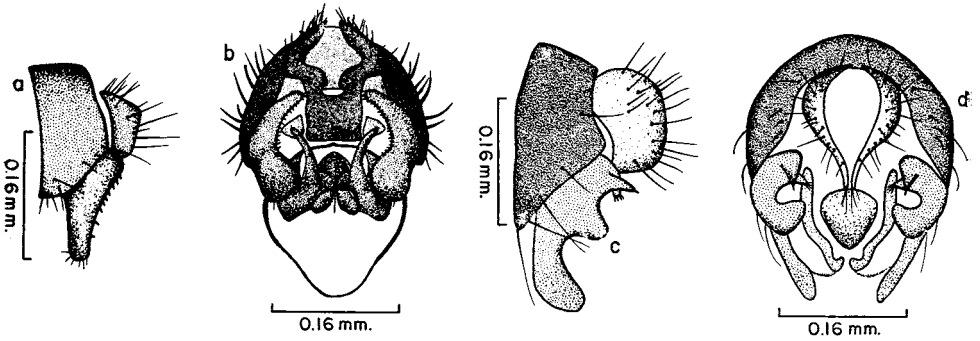


Figure 321—*Scaptomyza* (*Trogloscaptomyza*) *pusilla* (Grimshaw): **a,** male genitalia, lateral; **b,** male genitalia, ventral. *S.* (*T.*) *quadridentata* n. sp.: **c,** male genitalia, lateral; **d,** male genitalia, ventral.

had both these species before him. The male genitalia of *pusilla* differ from those of *hackmani* by having the claspers comparatively slender and the aedeagus not protruded (figs. 294b and 321a).

The species I am assuming to be *pusilla* is common in the mountains of Molokai; I have numerous specimens from Puu Kolekole, Puu O Kaeha, and Manawainui Valley at elevations from 3,000 to 3,700 feet.

It should be noted that specimens from the island of Hawaii are atypical in that the palpi are tinged with brown and the third antennal segment is brown. I see no differences, however, in the male genitalia.

This species superficially resembles *S. mimula* n. sp. but is readily differentiated by the distinctive features of the male genitalia (fig. 321a–b). It also differs by possessing six rows of presutural acrostichal setae.

Small, predominantly yellow flies. The head is about as high as long as seen from direct lateral view. The front is about as wide as long, the median portion is golden yellow, and the area surrounding the ocellar triangle and the orbits is gray. The lower reclinate bristle is small, hairlike, and inconspicuous, about one-half as long as the proclinate, and situated distinctly above the latter (about one-third the distance between the proclinate and the upper reclinate bristle). The ocellar triangle, the vertex, and the upper occiput are yellow, tinged with brown; sometimes a faint tinge of brown extends down the orbits onto the sides of the front. The lower occiput, the genae, and the face are pale yellow-white; the latter has a very faint tinge of brown along the lower margin; the face is slightly carinate down the median portion. The genae are narrow and about equal in width to three rows of eye facets. One moderately strong bristle is present at the upper portion of each vibrissal row; the second bristle is about one-half as long as the first. One apical and one smaller preapical bristle are present on each palpus. The palpi are yellow. The thorax is entirely yellow with no dark markings. The anterior dorsocentral bristles are situated slightly behind the suture in front of a line drawn between the first pair of supraalars. Six rows of

acrostichal setae are present on the anterior portion of the mesonotum; posterior to the anterior pair of dorsocentrals, two to four irregular rows of acrostichals extend to a level with the postalar bristles. The humeral bristle is well developed and about equal in size to the presutural bristle. The anterior sternopleural bristle is small, about one-third as long as the posterior bristle. The legs are yellow except for the brown apical segments of the tarsi. The front legs are similar to those of other *Scaptomyza* (*Trogloscaptomyza*); the tarsus has numerous short, erect hairs down the dorsal surface, and the basitarsus is one-third as long as the tibia. The wings are hyaline. The costal fringe extends just slightly beyond the apex of vein R_{2+3}. The third costal section is three times longer than the fourth, and the last section of vein M_{1+2} is about two times longer than the penultimate section. The abdomen is predominantly yellow; the terga are slightly tinged with brown at their apices. The genitalia are dark brown to black. The ninth tergum is about two times longer than the anal plates and is tapered gently to a point on each anteroventral margin; the ventral portion possesses numerous short hairs. The claspers are prominent; each is blunt at apex and has a comblike series of teeth on the basal two-thirds of the posterior surface (fig. 321a). The ninth sternum is produced into a sharp-pointed lobe on each side of the aedeagus (fig. 321b). As seen from end view the anal plates are fused ventrally with the dorsal portion of the ninth sternum (fig. 321b).

Length: body, 1.5 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male in most respects. The orbits, the area surrounding the ocelli, the vertex, and the upper occiput are more distinctly tinged with brown. The third antennal segment is slightly brown. Also, the apices of the abdominal terga are more distinctly tinged with brown. The anal plates are yellow-brown; the remainder of the genitalia is yellow and fleshy.

Length: body, 2.0–2.3 mm.; wings, 2.4–2.7 mm.

Scaptomyza (Trogloscaptomyza) quadridentata new species (fig. 321c–d).

A small yellow species characterized by having six rows of acrostichal setae on the mesonotum and differentiated from other species in this complex by the distinctive genitalia of the male as shown in figure 321c–d.

MALE. *Head:* Slightly higher than long; the front is distinctly oblique as seen in direct lateral view. The front is yellow, covered with yellow-gray pollen on the eye orbits and immediately surrounding the ocellar triangle, and golden between these areas. The area surrounded by the ocelli is tinged with black. The upper third of the occiput is yellow-brown covered with gray pollen; the remainder is pale yellow. The genae, sides and upper portions of the face, clypeus, and mouthparts are pale yellow. The lower margin of the face is brown to black. The palpi are brown. The face is moderately convex in the median portion. The upper bristle of the vibrissal row is about equal in size to the proclinate bristles of the front. The anterior reclinate bristles are approximately one-half as long as the proclinates and are situated distinctly above the latter. The first two antennal segments are yellow, tinged with brown on the dorsal surface. The

third segment is brown, tinged with yellow on its base. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely yellow, covered with yellow-gray pollen, and with a tinge of brown extending through the mesopleura and the upper pteropleura. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated just slightly in front of a line drawn between the first (anterior) supraalars. The humeral bristle is about equal in size to the anterior notopleural bristles. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is approximately one-fourth as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.4 times longer than the fourth, and the costal fringe extends slightly over one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 2.1 times longer than the penultimate section. *Abdomen:* Brown; yellow on the basal margins of the terga, especially on the posterolateral margins. The genitalia are conspicuously pale yellow. The anal plates are about three times higher than long. The ventral margin of each anal plate is attenuated to a narrow point (fig. 321d). The ninth tergum is oblique on the ventral margin, tapered toward the anteroventral corner. Each clasper has two basal lobes, one bearing a thick black spine at the apex and the other bearing three black apical spines; the clasper also has a median lobe on the hind margin, the inner surface of this extended laterally into the genital chamber. The apical portion of the clasper is broadly rounded (fig. 321c). The ventral aspects of the genitalia are as in figure 321d.

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters. Also, the last section of vein M_{1+2} is not quite two times as long as the penultimate section.

Length: body, 1.8 mm.; wings, 2.1 mm.

Holotype male: Mount Kaala, Oahu, collected on *Metrosideros* sp., April 26, 1952 (L. D. Tuthill). Allotype female: same locality as type, April, 1953 (D. E. Hardy). Twenty paratypes (7 males and 13 females): from the following localities on Oahu—same as type; Puu Kanehoa, June, 1960, in light trap (E. J. Ford, Jr.); Waipio, February, 1953 (C. P. Hoyt); Manoa Valley, June, 1950– April, 1953 (D. E. Hardy).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) recava new species (fig. 322a–b).

This species appears to be related to *S. monticola* (Grimshaw), but, since the male genitalia of the latter species have not been studied, it is impossible to be sure of the relationship. Based upon a study of the type of *monticola*, it appears that these are readily differentiated by the characteristics of the wing venation. In *recava* the costal fringe is very short, and the last section of vein M_{1+2} is two

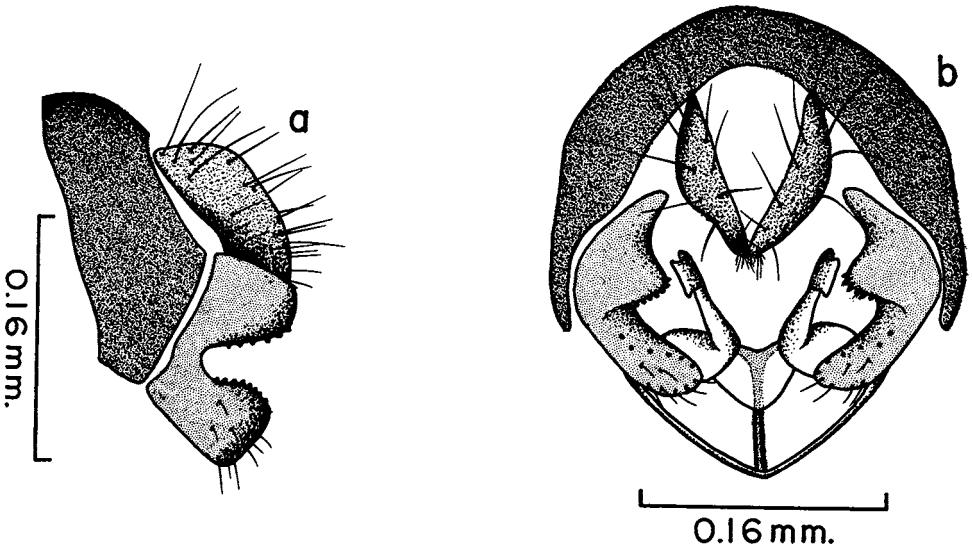


Figure 322—*Scaptomyza* (*Trogloscaptomyza*) *recava* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

times longer than the penultimate section. In *monticola* the costal fringe extends two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}, and the last section of vein M_{1+2} is 1.4 times longer than the penultimate section.

MALE. A small, almost all-yellow species. *Head:* Nearly square as seen in direct lateral view; the eyes are slightly oblique in position. The front is entirely yellow, golden yellow in the median portion, and yellow-gray on the orbits and the ocellar triangle (except for the area immediately surrounded by the ocelli which is brown to black in ground color). The occiput, genae, face, clypeus, and mouthparts are yellow. The palpi are brown to black. The face has a small median keel. One moderately strong bristle is present at the upper edge of each vibrissal row. Each palpus has two small apical bristles. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated slightly above the latter. The antennae are yellow. The arista has two dorsal rays in addition to the large apical fork. *Thorax:* Entirely yellow. Four distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated just slightly behind the suture. One strong humeral bristle is present. The anterior sternopleural bristle is almost three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for a slight tinge of brown on the apical segments of the tarsi. The front, tibia, and tarsus have short erect setae extending down the dorsal surface. The front basitarsus is approximately one-fourth as long as the tibiae. *Wings:* Hyaline. The third costal section is 3.5 times longer than the fourth, and the costal fringe extends one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times

longer than the penultimate section. *Abdomen:* Yellow, with a faint tinge of brown on the apices of the terga. The anal plates are about two times higher than long; the ventral margins are not extended. The ninth tergum is straight-sided; the ventral margin is slightly oblique. The claspers are strongly concave on the posterior margin and divided into two distinct lobes as in figure 322a. The ventral aspects of the genitalia are as in figure 322b.

Length: body, 1.7 mm.; wings, 2.0 mm.

FEMALE. Fitting the description of the male except for genital characters.

Length: body, 2.0 mm.; wings, 2.2 mm.

Holotype male: Kilauea, Hawaii, August, 1956 (D. E. Hardy). Allotype female; Bird Park, Kilauea, July, 1956 (D. E. Hardy). One male paratype: from Kilauea, August, 1958, collected in light trap (J. W. Beardsley).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) recta new species (fig. 323a–c).

This species fits in the complex which has four rows of acrostichal setae, the body dark-colored and covered with gray pollen, and the palpi yellow. It fits near *S. brachycerca* n. sp. and is differentiated by having the anal plates scarcely higher than long and truncate ventrally as seen in lateral view. Also, the claspers are very differently shaped with the ventral margins nearly vertical (fig. 323b).

MALE. *Head:* Almost as long as high as seen from direct lateral view. The lower one-third of the front, below a level with the proclinate bristles, is yellow; the upper portion is black, covered with gray pollen on the orbits and on the ocellar triangle, and opaque in the interfrontal areas. The upper three-fourths of the occiput is brown to black in ground color, densely covered with gray pollen. The lower occiput, the genae, the face, clypeus, palpi, and the antennae are pale yellow. The face has a slight carina down the median portion. The palpus has a short apical bristle and several black setae near the apex. The uppermost bristle of the vibrissal row is strong, about equal to the upper reclinate bristles of the front. The anterior reclinate bristles are about one-half as long as the proclinates and are situated about opposite the latter. The arista of the type has one dorsal ray and no distinct apical fork; the fork is represented by a tiny dorsal setae near the apex (fig. 323a). *Thorax:* Entirely dark brown to black in ground color, densely brown pollinose, and with a very faint indication of the *Scaptomyza*-like pattern on the mesonotum. Four rows of acrostichal setae are developed. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The humeral bristle is about equal in size to the presutural bristle. The anterior sternopleural bristle is about three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the tarsi. The front basitarsus is about one-fifth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is nearly four times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.46 times longer than the penul-

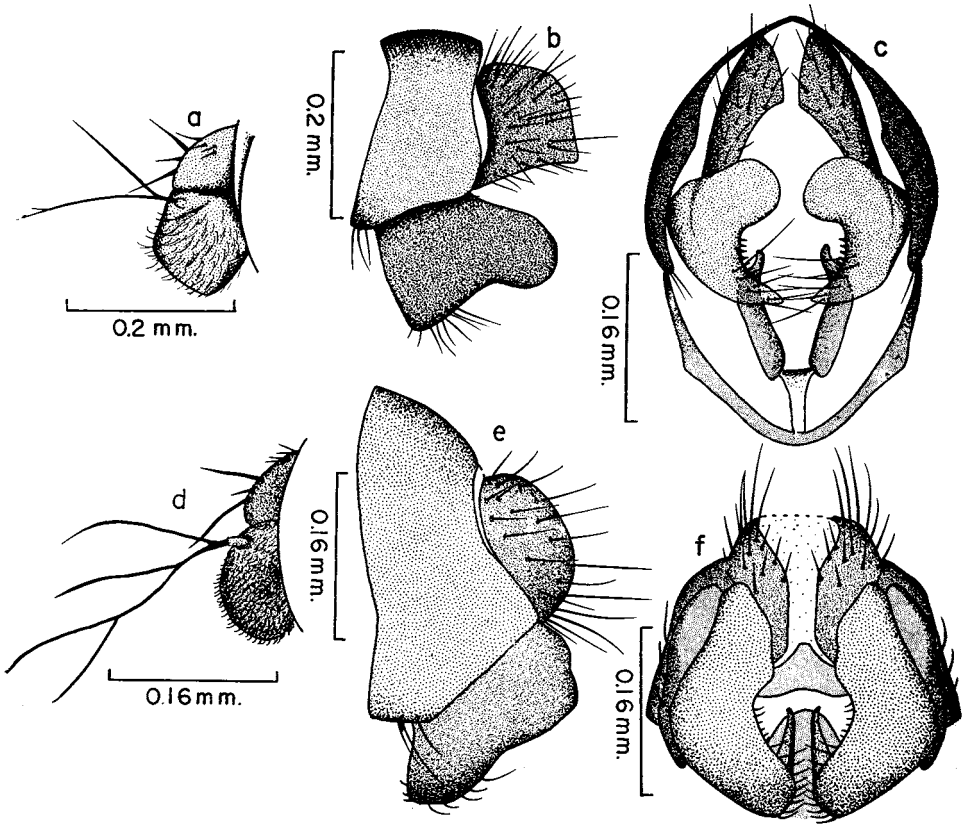


Figure 323—*Scaptomyza (Trogloscaptomyza) recta* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral. *S. (T.) retusa* n. sp.: **d,** antenna; **e,** male genitalia, lateral; **f,** male genitalia, ventral.

timate section. The last section of vein M_{3+4} is about one-third longer than the m crossvein. *Abdomen:* Entirely dark brown to black, covered with gray-brown pollen. The anal plates are scarcely higher than long; as seen from direct lateral view the ventral margins are vertical. The ventral portion of each anal plate is lobate (fig. 323c). The ninth tergum is straight-sided; the ventral margin is almost vertical and is very sparsely setose along the anteroventral edge. The claspers are broad and blunt, rounded on the posterobasal portion, and vertical along the hind margin (fig. 323b). The ventral aspects of the genitalia are as in figure 323c.

Length: body, 2.15 mm.; wings, 2.50 mm.

FEMALE. The allotype is somewhat discolored due to the greasing of the body. It appears, however, to fit the general characteristics of the male, except that the third antennal segment is dark-colored, brown to black. Also the clypeus and the palpi appear to be dark-colored. The arista has two dorsal rays.

Length: body, 1.80 mm.; wings, 2.00 mm.

Holotype male and allotype female: Puu Kukui, Maui, December 20, 1928, collected on *Wilkesia grayana* (O. H. Swezey).

Type and allotype in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) retusa new species (fig.323d–f).

This species fits close to *S. villosa* n. sp. by being predominantly gray pollinose, having six rows of acrostichal setae, and the apical fork of the arista well developed. It is readily differentiated by the characters of the male genitalia as shown in figures 323e–f and 341b–c. Also the anterior reclinate bristles are differently situated on the front, and the apical fork of the arista is much larger in *retusa* (fig. 323d).

MALE. *Head:* Like that of *villosa*, except that the anterior reclinate bristles are located opposite the proclinates and the fork of the arista is as in figure 323d. The genae are also slightly narrower, being scarcely wider than two rows of eye facets measured in the median portion. The palpi are distinctly tinged with brown on the apices. *Thorax:* Densely gray pollinose with no indication of brown vittae on the mesonotum. Six rows of distinct acrostichal setae are present. The anterior dorsocentral bristles are situated distinctly in front of a line drawn from the first supraalars. No distinct secondary setae are present on the humerus. The anterior sternopleural bristle is two-thirds as long as the posterior bristle. *Legs:* As in *villosa*. *Wings:* Hyaline. The third costal section is 4.5 times longer than the fourth, and the costal fringe extends over one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Dark brown to black, covered with gray-brown pollen. As seen from direct lateral view, the anal plates are two times higher than long. The ninth tergum is almost straight-sided; the ventral margin is slightly tapered anteriorly. The claspers are large, blunt at apices, and shaped as in figure 323e. As seen from a ventral view the ventral margins of the anal plates are distinctly lobate (fig. 323f).

Length: body, 2.3 mm.; wings, 2.7 mm.

FEMALE. The female has not been definitely associated; however, two specimens are on hand which agree with the male. They are no doubt this species, but they are not being designated as part of the type series.

Holotype male: Kula Pipeline, 4,200 feet, July, 1956 (D. E. Hardy). The two mentioned female specimens are from Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1952, and June, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum. The female specimens mentioned are in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) robusta new species (fig. 324a–d).

This species fits near *S. cornuta* n. sp. because of the presence of a spine-like process on the hind margin of the male clasper and a concavity in the middle of the anterior margin of the ninth tergum (fig. 324b–c). It is readily differentiated

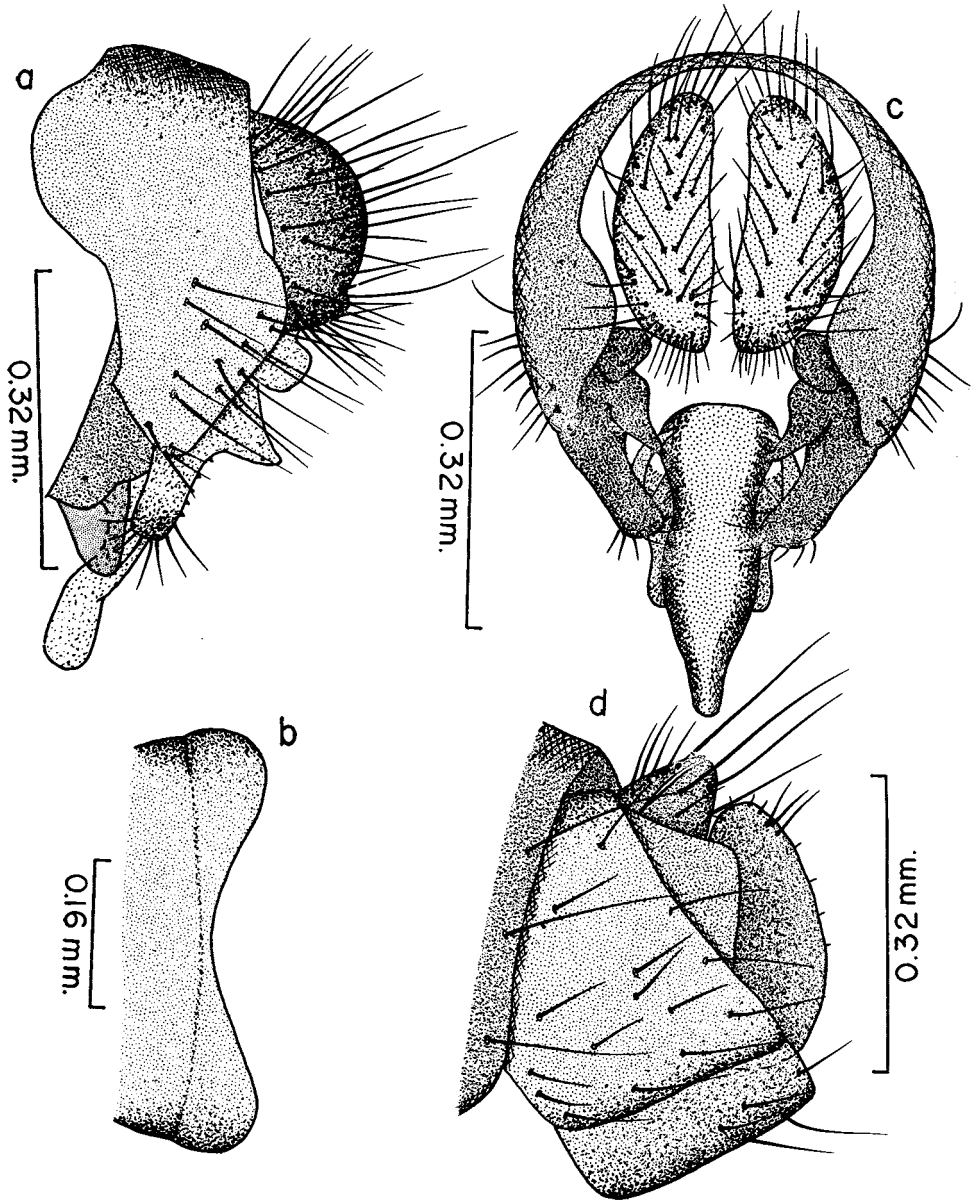


Figure 324—*Scaptomyza* (*Trogloscaptomyza*) *robusta* n. sp.: **a,** male genitalia, lateral; **b,** anteromedian margin of ninth tergum of male; **c,** male genitalia, ventral; **d,** female genitalia, lateral.

by the presence of a semimembranous basal lobe on the clasper and by having the ventral portions of the ninth tergum densely setose (fig. 324a). It would somewhat resemble *S. waialealeae* n. sp. because of the dark-colored femora and faint indications of brown bands on the middle and hind tibiae. The genitalia and other details are very different in these species, and they are not related.

MALE. *Head:* About one-fourth higher than long as seen in direct lateral view. The front is almost entirely opaque black, only the extreme lower margin is yellow, and the eye orbits and ocellar triangle are dusted with gray. The occiput is black, covered with gray pollen except for the yellow lower margin. The genae are yellow. The face is yellow down the hind margin and down the median carina, discolored with brown in the lateral concavities, and brown to black on the lower margins. The clypeus is brown. The palpi are yellow, tinged faintly with brown around the apices. Each palpus has a moderately strong apical bristle. The uppermost bristle of the vibrissal row is about equal in size to the upper reclinate bristles of the front. The face has a rather strong carina extending down the median portion. The antennae are dark brown to black except for yellow markings on the bases and apices of the first two segments. The arista has two dorsal rays in addition to the large apical fork; the inner surface of the arista has numerous short setae. The anterior reclinate bristle is nearly two-thirds as long as the proclinate and is situated slightly above the latter. *Thorax:* Almost entirely dark brown to black, covered with gray pollen; a tinge of rufous is present in the ground color of the lower portion of each humerus. Six rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated in front of a line drawn between the first supraalars. The humeral bristle is about equal in size to the anterior notopleural. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. *Legs:* The coxae and trochanters, bases of femora, and the median portions of the tibiae are yellow, very faintly tinged with brown; the apical halves of the femora are brown, and the mid and hind tibiae each has a faint indication of a brown band across the base and just before the apex of the segment. The tarsi are yellow, tinged with brown. The front basitarsus is slender compared to most *Scaptomyza*; it is nearly three-fifths as long as the tibia. *Wings:* Distinctly pale brown fumose. The third costal section is almost five times longer than the fourth, and the costal fringe extends scarcely one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.45 times longer than the penultimate section. *Abdomen:* Dark brown, covered with gray-brown pollen. As seen from direct lateral view the anal plates are about one-half higher than long. The ventral margins are lobate as in figure 324c. The ninth tergum has the anterior lateral margins broadly lobate on the type (represented by an extension of a semimembranous portion beyond the sclerotized margin); in the paratype male the hind margin is straight, there is no evidence of the semimembranous extension, and this character may be of no value. The anterior median margin of the ninth tergum is gently convex (fig. 324b). The ventral portion of the ninth tergum is rather densely setose on each side (fig. 324a). Each clasper has a semimembranous lobe (this may actually arise from the inner portion of the ninth tergum although it appears to be attached to the clasper). A strong spurlike process is present on the hind margin of the clasper, and the apical portion is blunt as in figure 324a. The ventral aspects of the genitalia are as in figure 324c.

Length: body, 2.9–3.2 mm.; wings, 3.7 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor blades are distinctly developed and rather heavily sclerotized along the outside edge (fig. 324d). This is distinctly different from other known *Trogloscaptomyza*.

Length: body and wings, 2.9–3.2 mm.

Holotype male, allotype female, and twenty paratypes (1 male and 19 females): from Paliku, Haleakala Crater, 6,500 feet, June, 1952, and June, 1953 (C. R. Joyce and D. E. Hardy). Also one female paratype: Koolau Gap, Haleakala Crater 7,000 feet, June, 1952 (D. E. Hardy).

Type, allotype, and some paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) rostrata new species (fig. 325a–b).

This species fits in the group which has the body predominantly yellow and six rows of acrostichal setae on the mesonotum. It appears closely related to *S. protensa* n. sp., but the male genitalia are very distinctive in development as shown by comparison of figures 319a–b and 325a–b.

MALE. *Head:* Entirely yellow (including the appendages) except for the red eyes, the brown area surrounded by the ocelli, and a tinge of brown in the ground color of the upper portion of the occiput. The eye orbits and the ocellar triangle are yellow-gray pollinose. The median portion of the front is golden yellow. The face is very slightly carinate down the median portion. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristles are about one-half as long as the proclinates and are situated slightly above the latter. *Thorax:* Entirely yellow except for a longitudinal streak of brown extending along the upper margin of each mesopleuron and for a faint tinge of brown on the metapleuron and the median portion of the pteropleuron. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The anterior sternopleural bristle is nearly three-fifths as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is approximately one-fourth as long as the tibia. *Wings:* Hyaline or nearly so. The third costal section is approximately three times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is approximately two times longer than the penultimate section. *Abdomen:* The terga are yellow at their bases and brown at their apices. The genitalia are pale yellow. The anal plates are nearly two times higher than long and distinctly rostrate ventrally (fig. 325b). The ninth tergum is rather broad, slightly expanded ventrally, and at its longest point is about two times longer than the anal plate; the ventral margins of the ninth tergum are sparsely setose. Each clasper has two obtuse basal lobes, is rather deeply concave on the posterior median margin, and the apical portion is slightly clavate, rounded at the tip (fig. 325a).

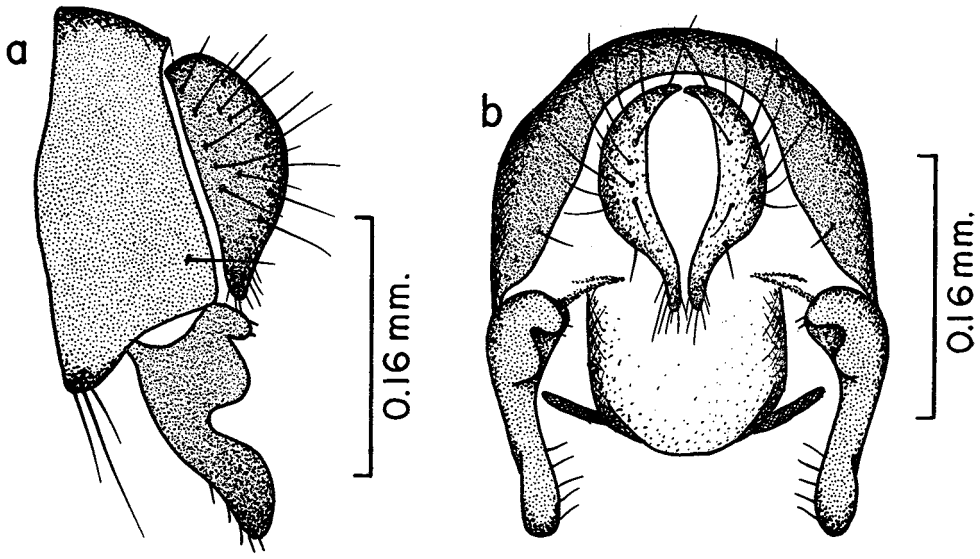


Figure 325—*Scaptomyza* (*Trogloscaptomyza*) *rostrata* n. sp.: **a**, male genitalia, lateral; **b**, male male genitalia, ventral.

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters and that the palpi are brown and the third antennal segment is discolored with brown. A faint discoloration of brown is present on each side of the mesonotum immediately behind the humerus.

Length: body, 1.8 mm.; wings, 2.0 mm.

Holotype male and allotype female: Kalalau Lookout, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). Forty-two paratypes (19 males and 23 females): from the following localities in the Kokee area of Kauai—same as type; Kokee, 3,600 feet, July, 1939 (E. C. Zimmerman), and July, 1952 (D. E. Hardy); Kokee Valley, August, 1953 (D. E. Hardy); Nualolo Valley, 3,400 feet, August, 1953 (D. E. Hardy); Poomau Valley, 3,400 feet, July, 1952 (D. E. Hardy); Halemanu, August 29, 1921, on *Euphorbia* (O. H. Swezey); Halemanu Swamp, August, 1953 (D. E. Hardy); Koaie Stream, August, 1953 (D. E. Hardy); Kawaikoi Stream, 3,700 feet, August, 1953 (D. E. Hardy); and Waipoo Falls, August, 1953 (D. E. Hardy).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and University of Hawaii.

Scaptomyza (Trogloscaptomyza) rotundiloba new species (fig. 326a–d).

An all-black species with six rows of acrostichal setae and a well-developed

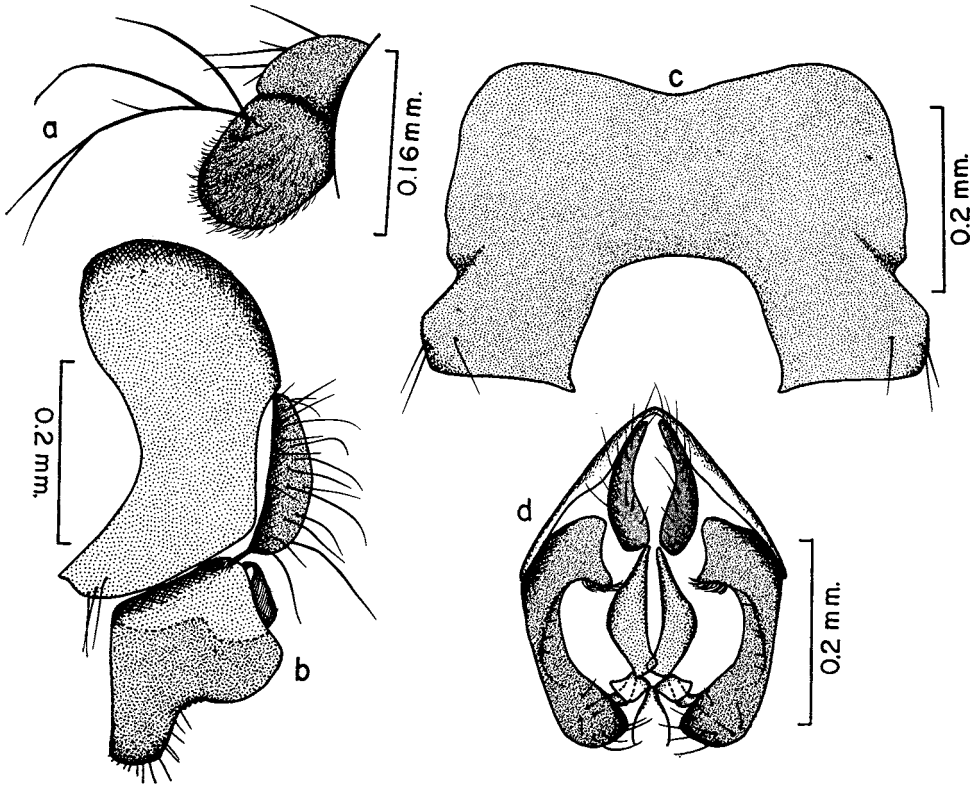


Figure 326—*Scaptomyza* (*Trogloscaptomyza*) *rotundiloba* n. sp.: **a**, antenna; **b**, male genitalia, lateral; **c**, anterior view of ninth tergum of male; **d**, male genitalia, ventral.

apical fork on the arista. It is differentiated from other known species in this complex by having the anterolateral margins of the ninth tergum broadly lobate with a concavity present on the anteromedian margin of the tergum (fig. 326c) and, also, by the development of the claspers and other genital characters as shown in figure 326b–d.

MALE. *Head:* Approximately one-third higher than long as seen in direct lateral view. The compound eyes are but slightly oblique; the greatest length is along the vertical axis. The front is entirely brown to black except for a tinge of yellow in the ground color of the lower portion. The occiput is brown and covered with gray pollen except for the yellow lower margin. The genae are yellow except for a thin line of brown along the vibrissal row. The sides and the upper portion of the face are yellow; the median portion as well as the lower margin is tinged with brown to black. The clypeus is brown; the palpi are black. The face is convex in the median portion. One strong bristle is present at the upper edge of each vibrissal row; this is equal to the proclinate bristles of the front. The anterior reclinate bristles are three-fifths as long as the

proclinates and are situated opposite the latter. The antennae are brown to black and are tinged with yellow on the basal and apical portions of the second segment. The arista has two dorsal rays in addition to a large apical fork (fig. 326a). *Thorax:* Entirely dark brown to black in ground color, covered with gray pollen. The mesonotum has six distinct rows of acrostichal setae extending over the anterior half. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first supraalars. The humeral bristle is subequal in size to the presutural. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow. The front basitarsus is long compared to most *Scaptomyza*: it is approximately one-half as long as the tibia. *Wings:* Entirely subhyaline. The third costal section is four times longer than the fourth, and the costal fringe extends almost two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.66 times longer than the penultimate section. *Abdomen:* Dark brown to black, covered with gray-brown pollen. From a lateral view the anal plates are two to three times higher than long. The ventral margins are distinctly lobate as seen in figure 326b. The ninth tergum is broad, the anteromedian margin is concave (fig. 326c), and the anterolateral margins are broadly lobate (fig. 326b). The claspers are broad at bases, rather attenuated apically, and densely setose on the inner apical portion. The ventral aspects of the genitalia are as in figure 326d.

Length: body, 2.0 mm.; wings, 2.3 mm.

FEMALE. Unknown.

Holotype male: Waiahole, Oahu, March 28, 1915 (O. H. Swezey).

Type in the Hawaiian Sugar Planters' Association collection.

Scaptomyza (Trogloscaptomyza) scoliops new species (fig. 327a–b).

This species fits near *S. hackmani* n. sp. by having six rows of acrostichal setae, the body predominantly yellow, and the aedeagus of the male large and conspicuous. It is readily differentiated by the shape of the head (fig. 327a), the rather strongly oblique eyes, the male genital characters as in figure 327b, and by other details. The head shape is similar to that of members of the subgenus *Rosenwaldia*, but only two dorsocentral bristles are present.

MALE. *Head:* Slightly longer than high, strongly flattened, with the eyes distinctly oblique as in figure 327a. The front is almost horizontal and is approximately equal in length to the lower margin of the head. The head is completely yellow except for the red eyes, a tinge of brown to black on the lower edge of the face and on the clypeus, and also for the brown palpi and third antennal segment. The area between the two upper ocelli is also brown. The ocellar triangle is pale yellow; the eye orbits, lower portion of the front, and the first two antennal segments are white, tinged with yellow. The area of the front on each side between the ocellar triangle and the eye orbits is gold, tinged faintly with brown. The anterior reclinate bristles are rudimentary, scarcely over one-fourth as long as the proclinates, and situated opposite the latter. One moderately strong bristle is present at the upper edge of each vibrissal row. The arista has two

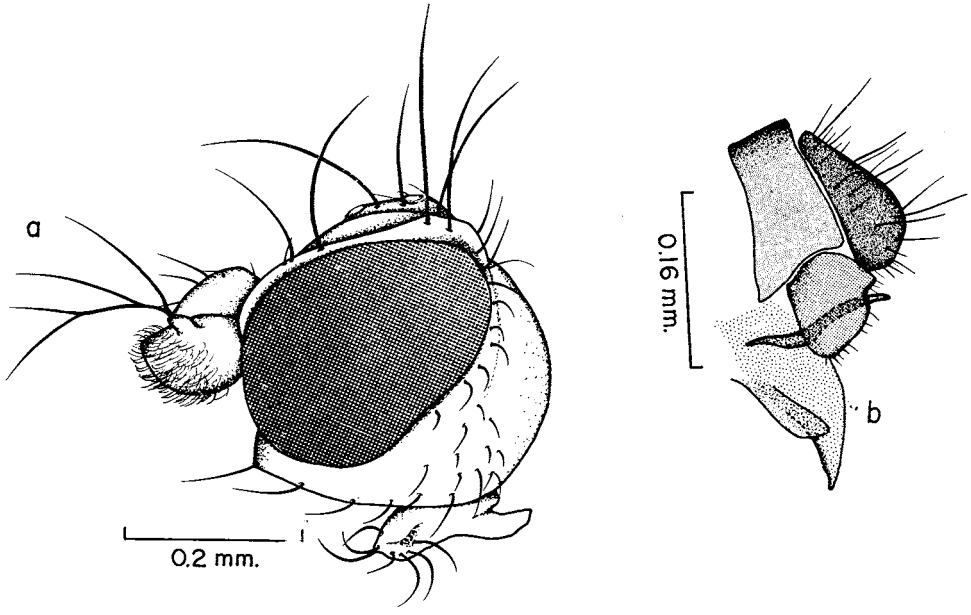


Figure 327—*Scaptomyza* (*Trogloscaptomyza*) *scoliops* n. sp.: **a**, head; **b**, male genitalia, lateral.

dorsal rays in addition to the large apical fork. *Thorax:* Entirely yellow except for a broad streak of brown extending on the upper edge of each pleuron. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated in line with the suture. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* Yellow except for a faint tinge of brown on the tibiae and tarsi. The front basitarsus is approximately one-third as long as the tibia and is two times as long as the second tarsal segment. *Wings:* Entirely hyaline. The third costal section is almost four times longer than the fourth, and the costal fringe extends about one-fourth the distance beyond the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about two times longer than the penultimate section. *Abdomen:* Predominantly dark brown to black, yellow on the first tergum and on the basal half of the second, and with the sternum mostly yellow. The aedeagus is very large and conspicuous, protruding beyond the other parts of the genitalia and readily visible *in situ*. The anal plates are nearly two times higher than long and are not pointed ventrally. The ninth tergum is almost straight-sided, slightly expanded ventrally. The claspers are rather short and broad; each has a small basal point on the posterior margin, and is rounded ventrally (fig. 327b).

Length: body, 1.80 mm.; wings, 2.00 mm.

FEMALE. Fitting the description of the male except for genital characters.

Length: body and wing, 2.15 mm.

Holotype male, allotype female, and one male paratype: Mount Kaala, Oahu, 3,000 feet, May, 1956 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) scoloplichas new species (fig. 328a–d).

This very distinctive species apparently belongs in *Trogloscaptomyza* but differs from all of the known species by having the front femora strongly spinose (fig. 328b) and the wings with a pale brown spot at the apex.

FEMALE. *Head:* Nearly quadrate as seen in lateral view, the genae protrude beyond the eye margins, and the face is prominent. The front is slightly wider than long, is predominantly black in ground color, and the anterior margin is yellow; the orbits and area surrounding the ocellar triangle are gray pollinose; the area between the ocellar triangle and the orbits is rather black. The lower reclinate bristles are small, scarcely one-half as long as the proclinates, and situated just slightly above the latter. The vertex and the upper two-fifths of the occiput are dark brown to black, densely gray pollinose. The lower occiput, the genae, and the face are yellow. The mouthparts, including the palpi, are yellow. Each palpus has one short apical bristle plus several black setae around the apical portion. The face has a strong carina down the median portion. One strong bristle is present at the upper edge of each vibrissal row. The basal two segments of the antennae are yellow; the third segment is brown to black. The second segment has two moderately strong dorsal bristles. The aristae typically have two dorsal rays situated on the median half and a strong apical fork (fig. 328a) ; one specimen on hand has three dorsal rays on one arista. *Thorax:* Mesonotum almost entirely brown to black in ground color, densely covered with gray-brown pollen, the margins densely gray pollinose. The scutellum is dark brown to black, yellow at the apex, densely gray pollinose. The humeri and pleura are yellow, gray pollinose. One strong humeral bristle is present. The metanotum is brown in ground color, densely gray pollinose. The anterior sternopleural bristle is about one-half as long as the posterior bristle. The halteres are yellow. Six rows of acrostichal setae are present. *Legs:* Entirely yellow, except for the apical two or three tarsal segments, which are black. The front femora are thickened, and each has a dense clump of stout black bristles extending down the posteroventral surface (fig. 328b) . Each front tibia is distinctly clavate on the apical two-fifths. The front tarsi are rather thickly haired (unusually so for female specimens) , the basitarsus is about two-fifths as long as the tibia, and the apical segment of the tarsus is rather strongly flattened laterally. *Wings:* Predominantly subhyaline, with the apical portion infuscated with yellow-brown (fig. 328c) . The costal fringe extends just slightly beyond the apex of vein R_{2+3}. The third costal section is 4.5 times longer than the fourth section. The last section of vein M_{1+2} is 1.47 times longer than the penultimate section. *Abdomen:* Shining black in ground color, rather densely gray pollinose. The apical portion and the genitalia are yellow. The ovipositor plates are reduced to very slight bumps on each side of the apex of the genitalia; these are covered with fine pile (fig. 328d) .

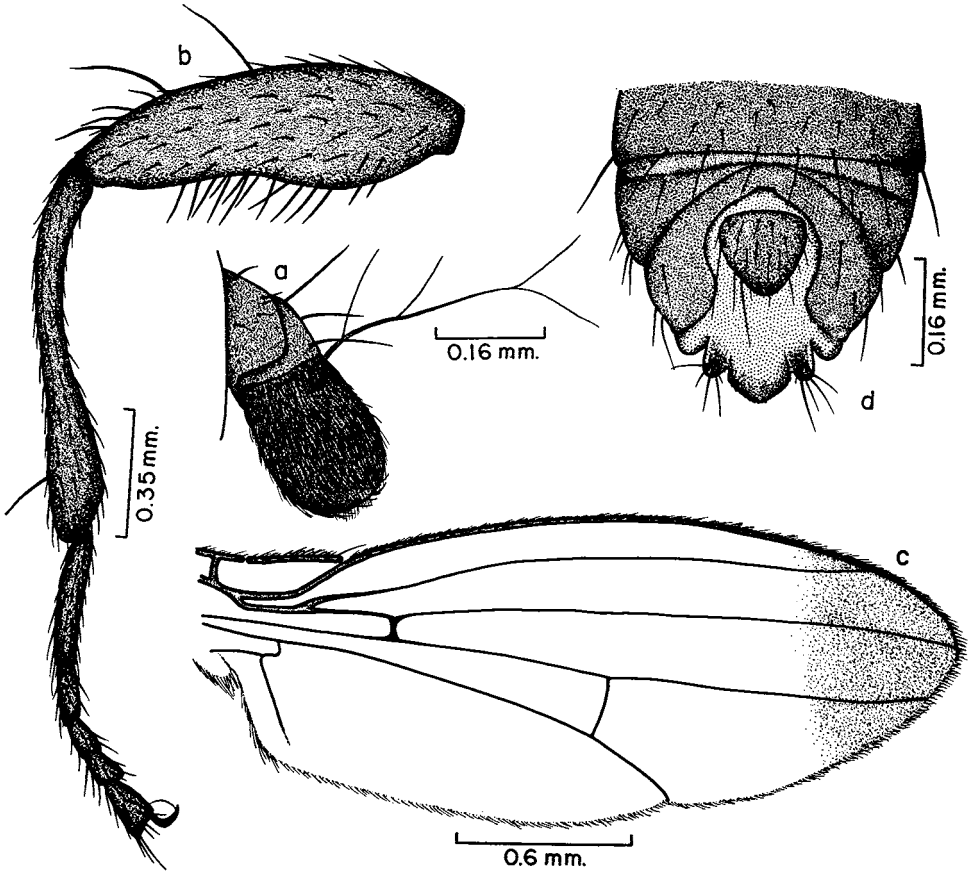


Figure 328—*Scaptomyza* (*Trogloscaptomyza*) *scoloplichas* n. sp.: **a,** antenna; **b,** front leg; **c,** wing; **d,** female genitalia.

Length: body, 3.4 mm.; wings, 3.8 mm.

MALE. Unknown.

Holotype female: Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy). Two female paratypes one same data as type; one Pauahi, Hawaii, August, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the United States National Museum and the University of Hawaii collections.

Scaptomyza (Trogloscaptomyza) setiger new species (fig. 329a–c).

This species fits in the complex which is characterized by having the body dark-colored, the mesonotum with six rows of acrostichal setae, the arista with a tiny inconspicuous apical fork, and the ninth tergum lobate on the postero-ventral margin. It fits near *exigua* (Grimshaw) and *varia* n. sp. but is readily

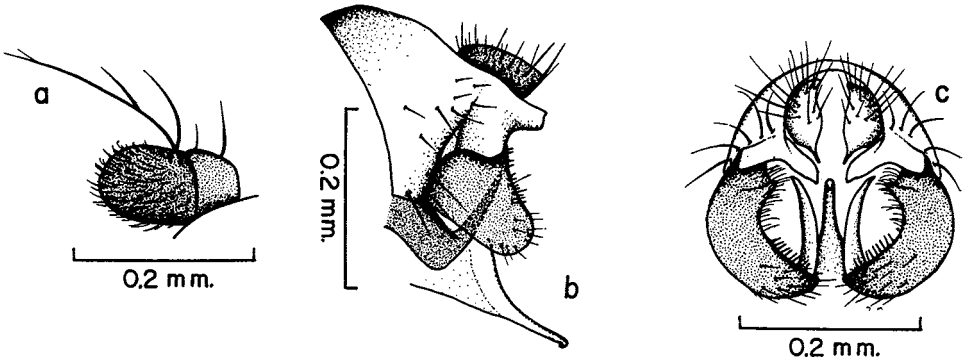


Figure 329—*Scaptomyza* (*Trogloscaptomyza*) *setiger* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

differentiated by having a row of prominent setae along the lower margin of the ninth tergum, the posteroventral margin of the tergum developed on each side into two small lobes as in figure 329b, and also, by the long slender margins of the anal plates (fig. 329c).

MALE. *Head:* The front (below a level with the proclinate bristles) is yellow; the upper portion is black, gray pollinose on the orbits and on the ocellar triangle, and velvety black between. The occiput is entirely brown to black, and covered with gray pollen except for the yellow ventral margin. The genae, face, clypeus, palpi, and mouthparts are yellow. One moderately strong bristle is present on the upper edge of each vibrissal row; this as approximately equal to the proclinate bristles of the front. The antennae are yellow, tinged with brown on the dorsal surface of the third segment. The arista has two dorsal rays and a tiny inconspicuous apical fork (fig. 329a). The anterior reclinate bristles are about three-fifths as long as the proclinates and are situated opposite the latter. *Thorax:* Entirely gray pollinose, dark brown to black in the ground color of the dorsum, and brown to black, tinged with yellow to rufous on the sides. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) supraalars. The anterior sternopleural bristle is one-half to three-fifths as long as the posterior bristle. *Legs:* Entirely yellow except for discolorations of brown at the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Brown, covered with gray-brown pollen. As seen from a lateral view, the anal plates are nearly two times higher than long, and the posterior margin is rather strongly oblique so that the greatest length of the plate is along the ventral margin. The ventral portions of the anal plates are attenuated into rather elongated points (fig. 329c). The ninth tergum is broad,

nearly three times longer than the visible portion of the anal plate as seen from lateral view, and with the posteroventral margin lobate as in figure 329b. A row of rather strong setae is present on each side of the ventral margin of the tergum. The claspers are rather broad and blunt and each has a row of small teeth along the hind margin. The ventral aspects of the genitalia are as in figure 329c. The aedeagus is developed into a slender point at the apex.

Length: body, 1.75 mm.; wings, 2.00 mm.

FEMALE. Fitting the description of the male except for sexual characters, and except that the front is entirely brown to black with a faint tinge of yellow on the lower portion; the antennae and palpi are also brown to black.

Length: body, 1.80 mm.; wings, 2.10 mm.

Holotype male and allotype female: Kilauea, Hawaii, August, 1958, collected in light trap (J. W. Beardsley). Seventeen paratypes (2 males and 15 females): same data as type except for one specimen from Kohala Mountains, upper Kamakua Ditch Trail, September 3, 1919 (O. H. Swezey).

Type, allotype, and some of the paratypes in the B. P. Bishop Museum. The remainder of the paratypes from the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) setosiloba new species (fig. 330a–b).

This species fits near *S. exigua* (Grimshaw) because of the presence of six rows of acrostichal setae, the gray pollinose body, the tiny (or absent) apical fork on the arista, and the development of a ventral lobe on each side of the ninth tergum. It is differentiated by having a dense clump of long hairs on each ventral lobe of the ninth tergum, by long, slender projections on the ventral margins of the anal plates (fig. 330b), and by the claspers, which are straight-sided, and not dentate (fig. 330a).

MALE. *Head:* Almost entirely dark-colored; yellow, tinged faintly with brown, only on the genae. The front is entirely black, covered with gray pollen. The face is tinged with black on the lower portion, yellow-brown above. The clypeus is brown, tinged faintly with yellow. The palpi are yellow-brown. The anterior reclinate bristle is approximately one-half as long as the proclinate and is situated slightly above the latter. One bristle is present at the upper edge of each vibrissal row. Each palpus has two small apical bristles. The antennae are predominantly dark brown to black; the second segment is tinged with yellow. The arista has two dorsal rays, and the apical fork is tiny or lacking. *Thorax:* Entirely black, densely covered with gray pollen. Six rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) supraalars. The anterior sternopleural bristle is approximately one-half as long as the posterior bristle. *Legs:* Yellow, tinged faintly with brown on the dorsoapical third of each front femur and on the apices of the tarsi. *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is

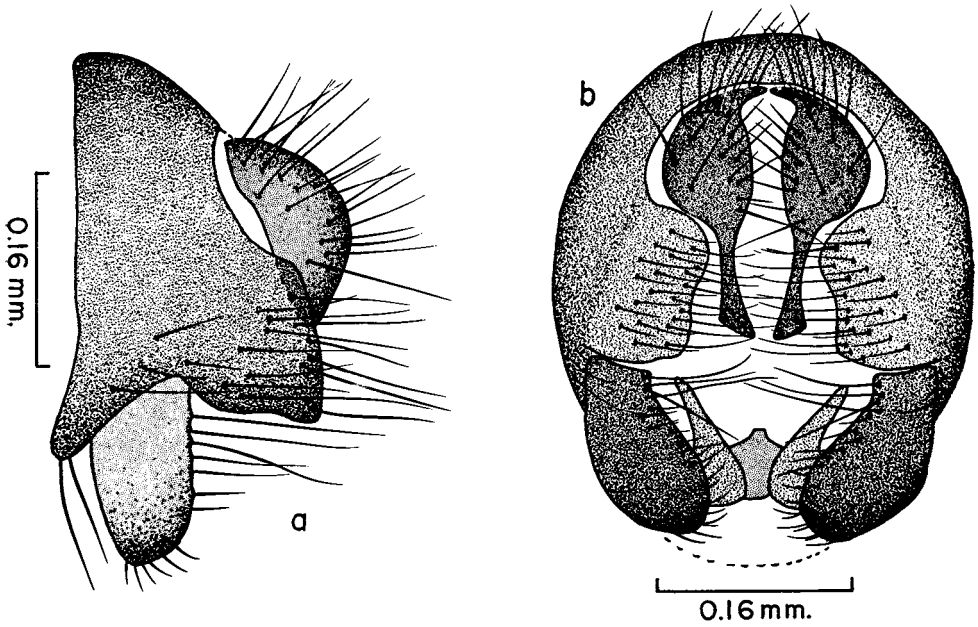


Figure 330—*Scaptomyza (Trogloscaptomyza) setosiloba* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

1.8 times longer than the penultimate section. *Abdomen:* Dark brown to black, covered with gray-brown pollen. As seen from a lateral view the anal plates are over two times higher than long. The ventral margins of the plates are greatly elongated and extend into the genital chamber behind the aedeagus (fig. 330b). The ninth tergum is developed into a subacute, densely hairy lobe on each posteroventral margin. The claspers are straight-sided, blunt at the apices, and not dentate (fig. 330a).

Length: body, 2.0 mm.; wings, 2.2 mm.

FEMALE. Fitting the description of the male except for sexual characters; also, the legs are more evenly tinged with brown.

Holotype male, allotype female, and one female paratype: from Paliku, Haleakala Crater, Maui, 6,500 feet, June, 1953 (D. E. Hardy). Also one male and two female paratypes: from Haelaau, Maui, 5,300 feet, on *Lobelia gloriamontis,* December 18, 1928 (E. H. Bryan, Jr.).

Type and allotype and one paratype in the B. P. Bishop Museum. Other paratypes in the United States National Museum and the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) silvicola new species (fig. 331a–b).

This species fits in the complex which is characterized by having the body dark brown to black, covered with gray pollen, six rows of acrostichal setae, and

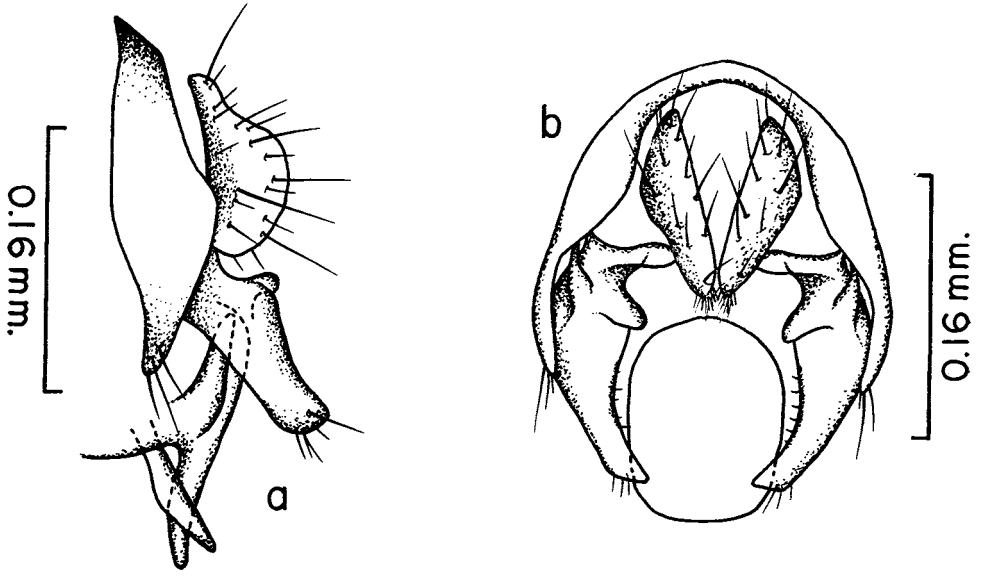


Figure 331—*Scaptomyza* (*Trogloscaptomyza*) *silvicola* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

a well-developed apical fork on the arista. It is differentiated from related species by the characteristics of the male genitalia as shown in figure 331a–b. The large protuberant aedeagus and the distinctive claspers will differentiate this.

MALE. *Head:* Entirely brown to black except for the red eyes and a triangle of yellow on each lower angle of the front extending along the extreme lateral margins of the face and along the upper portions of the gena. The upper median portion of the face is tinged with yellow. The front is entirely gray pollinose except for some gray-brown pollen on the lower margin. The genae are narrow; measured in the median portion, they are scarcely wider than two or three rows of eye facets. The clypeus and palpi are dark brown; each palpus has an apical and smaller subapical bristle. One strong bristle is present at the edge of each vibrissal row. The anterior reclinate bristle is about one-half as long as the proclinate and is situated just slightly above the latter. The first two antennal segments are yellow-brown; the third segment is dark brown to black. The arista has two dorsal rays in addition to the apical fork. *Thorax:* Entirely brown, covered with gray pollen, and with no indication of longitudinal vittae on the mesonotum. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated distinctly in front of the first supraalars. The anterior sternopleural bristle is nearly three-fifths as long as the posterior bristle. *Legs:* Entirely dusky yellow. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Hyaline. The third costal section is 4.3 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is two times longer

than the penultimate section. *Abdomen:* Brown, tinged with rufous in the ground color. The anal plates are nearly three times higher than long and are subacutely pointed ventrally. The ninth tergum is comparatively narrow over the dorsal portion, slightly expanded medianly, and attenuated on the antero-ventral margin. The claspers are rather slender; two small ventral lobes are present (fig. 331a). The aedeagus is large and protrudes well beyond the claspers. The ventral aspects of the genitalia are as in figure 331b.

Length: body, 1.6 mm.; wings, 1.9 mm.

FEMALE. Fitting the description of the male except for sexual characters. Also, the specimens on hand have a distinct reddish tinge in the ground color of the pleura.

Length: body, 2.0 mm.; wings, 2.3 mm.

Holotype male and allotype female: Upper Olaa Forest, Hawaii, August, 1952, and July, 1953 (D. E. Hardy and W. C. Mitchell). Fourteen paratypes (eight males and six females): from the following localities—same as type; Keauhou Ranch, Kilauea, Hawaii, July, 1953 (D. E. Hardy); Puu Kolekole, Molokai, July, 1952 (D. E. Hardy and M. Tamashiro); and Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy). It should be noted that the last mentioned specimen is aberrant because the anterior portion of the mesonotum is yellowish; it may be teneral.

Type, allotype, and some paratypes in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum, British Museum (Natural History), and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) spilota new species (fig. 332a–c).

This species is readily differentiated from all known Hawaiian *Trogloscaptomyza* by the spotted mesonotum.

MALE. *Head:* About one-fourth higher than long; the eyes are slightly oblique in position. The front, measured from the median ocellus to the anterior margin, is as wide as long and is entirely yellow and gray pollinose on the orbits above the proclinate bristles and on the ocellar triangle. The area bordered by the ocelli is dark brown. The upper two-thirds of the occiput is tinged with brown to black in ground color and rather densely gray pollinose; the lower portion is yellow. The genae, face, clypeus, palpi, and antennae are entirely yellow. The face has a slight carina extending down to the median portion. The arista has two rather short dorsal rays situated near the basal one-third, and no apical fork is developed (fig. 332a). The anterior reclinate bristle is two-thirds as long as the proclinate and is situated just slightly above the latter. *Thorax:* Entirely yellow, covered with yellow-gray pollen, and with a distinct pale brown spot present at the base of each seta or bristle of the mesonotum. Four distinct rows of acrostichal setae extend the full length of the mesonotum; near the anterior margin one or two misplaced setae are present. The anterior dorsocentral bristles are situated opposite the first supraalars. The humeral bristles are approximately equal in size to the anterior notopleural bristles. The anterior sternopleural

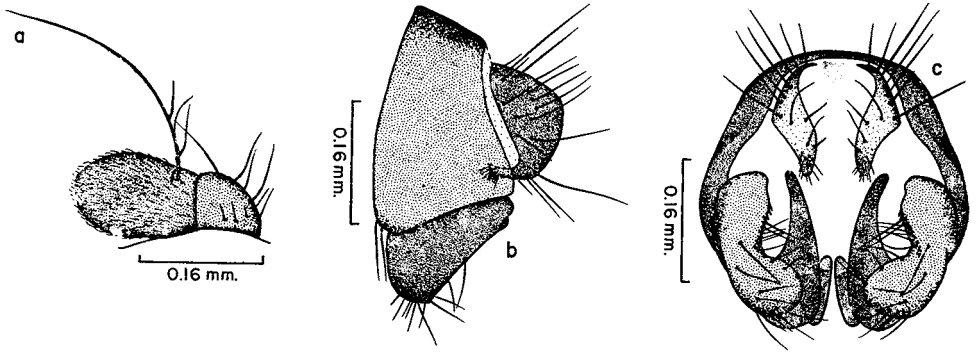


Figure 332—*Scaptomyza* (*Trogloscaptomyza*) *spilota* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

bristle is about two-thirds as long as the posterior bristle, and a prominent seta is present halfway between the two bristles; this is about three-fourths as long as the anterior bristle. *Legs:* Entirely yellow except for a faint tinge of brown at the apices of the tarsi. No prominent erect setae are present on the front tibiae and tarsi. The front basitarsus is almost two-fifths as long as the tibia. *Wings:* Rather distinctly infuscated with pale brown. The third costal section is 3.62 times longer than the fourth, and the costal fringe extends almost one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.44 times longer than the penultimate section. The last section of vein M_{3+4} is about equal or slightly shorter than the m crossvein. *Abdomen:* Entirely yellow, covered with yellow pollen. The genitalia are yellow. The anal plates are nearly two times higher than long; the ventral margins are slightly lobate as seen in ventral view (fig. 332c). The ninth tergum is expanded ventrally and very sparsely setose on the ventral margin. The claspers are short, blunt at apices, and dentate along the hind margin (fig. 332b). The ventral aspects of the genitalia are as in figure 332c.

Length: body, 2.40 mm.; wings, 2.75 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 2.70 mm.; wings, 2.90 mm.

Holotype male: Holua, Haleakala Crater, Maui, 6,500 feet, June, 1953 (C. R. Joyce). Allotype female: Haleakala, Maui, March 23, 1932, 7,300 feet, on *Cyathodes* (O. Bryant). One male paratype: same data as allotype; and one female paratype: Kilauea, Hawaii, October 11, 1929, collected on *Silene* (O. H. Swezey).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza tenuata new species (fig. 333a–b).

This species has the body dark-colored, six rows of acrostichal setae on the mesonotum, and the apical fork of the arista rudimentary. It fits near *S. ostensa*

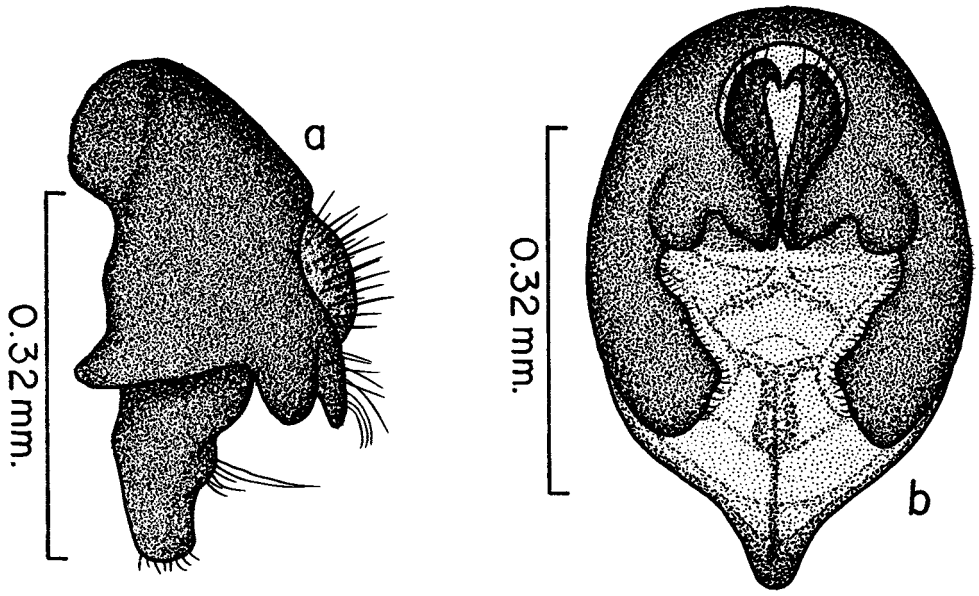


Figure 333—*Scaptomyza* (*Trogloscaptomyza*) *tenuata* n. sp.: **a,** male genitalia, lateral; **b,** male genitalia, ventral.

n. sp. but is differentiated by having the posteroventral margin of the ninth tergum bilobed, and the claspers are more elongate, and are differently shaped as shown in figure 333a.

MALE. *Head:* As seen from a lateral view the head is just slightly higher than long; the front is oblique. The front is black in ground color except for the yellow sides of the anterior margin. The orbits and the ocellar triangle are densely gray pollinose, and the area between is dull black. The occiput is black in the ground color of the upper four-fifths and is densely gray pollinose. The genae and face are pale yellow. The face has a strong carina extending down the median portion. The clypeus is dark brown. The palpi are yellow, tinged lightly with brown. The anterior reclinate bristle is approximately one-half as long as the proclinate and is situated opposite the latter. The arista has two dorsal rays in addition to the large apical fork. The third antennal segment is dark brown; the second is yellow, tinged with brown on the dorsal surface. *Thorax:* Dark brown to black in ground color (except for the yellow lower half of each humerus) and covered with gray pollen. Six distinct rows of acrostichal setae are present on the anterior portion of the mesonotum. The anterior dorsocentral bristles are situated about halfway between the first supraalars and the suture. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged faintly with brown on the apices of the tarsi. The front basitarsus is approximately one-third as long as the tibia. *Wings:* Subhyaline. The third costal section is 3.6 times longer than the

fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.55 times longer than the penultimate section. *Abdomen:* Entirely dark brown, covered with gray-brown pollen. As seen from a lateral view, the anal plates are about two times higher than long; the ventral margins are extended into long slender lobes which fit into the hind part of the genital chamber (fig. 333b). The ninth tergum is broad, expanded on the upper anterolateral margins, and with a broadly U-shaped concavity in the middle of the anterodorsal portion as in *ostensa*. The posteroventral margins are bilobate. The claspers are about two times longer than wide, blunt at apices, and each has a dense clump of long setae in the middle of the hind margin (fig. 333a). The ventral aspects of the genitalia are as in figure 333b.

Length: body, 2.3 mm.; wings, 2.7 mm.

FEMALE. Unknown.

Holotype male: Puu Kihe, north slope of Mauna Kea, Hawaii, 8,000 feet, October, 1952 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) trivittata new species (fig. 334a–d).

This species fits near *S. univitta* because of the vittate mesonotum. It is differentiated by three pale brown vittae rather than one dark brown vitta; by the lobate ventral margins of the anal plates (fig. 334d); and by the male claspers, which are slender and very differently shaped than those of *univitta* (compare figures 334b and 338a).

MALE. *Head:* The front is yellow except for a faint tinge of brown on the upper eye orbits and for brown in the ground color of the ocellar triangle; the eye orbits and the ocellar triangle are rather densely gray pollinose. The occiput is almost all dark brown to black, densely covered with gray pollen; only the extreme lower portion is yellow. The genae, face, and antennae are entirely pale yellow. The palpi are dark brown on the apical two-thirds. The anterior reclinate bristles are about half as long as the proclinates and are situated almost opposite the latter. The arista has two dorsal rays situated near the base, and no apical fork is present (fig. 334a). *Thorax:* The dorsum is yellow except for three rather faint brown longitudinal vittae. The pleura are brown except for a longitudinal band of yellow, extending through the median portion at a level with the lower margin of the mesopleuron, and for the yellow lower one-third of each sternopleuron. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of the first supraalars. The anterior sternopleural bristle is approximately three-fifths as long as the posterior bristle. *Legs:* Yellow, tinged with brown on the apices of the tarsi. The front basitarsus is approximately one-fifth as long as the tibia. *Wings:* Subhyaline. The third costal section is 4.5 times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section

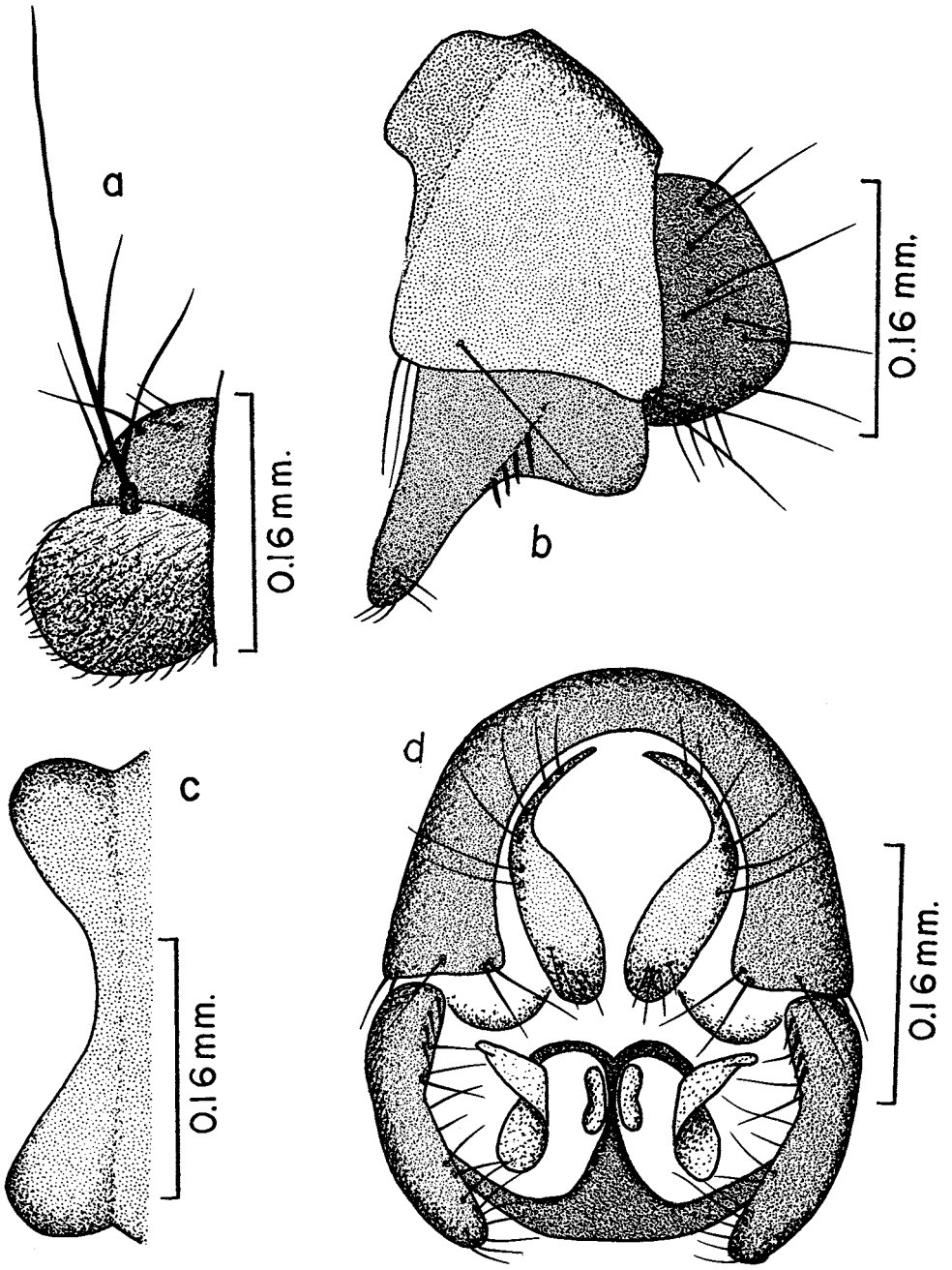


Figure 334—*Scaptomyza* (*Trogloscaptomyza*) *trivittata* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** anterodorsal margin of ninth tergum of male; **d,** male genitalia, ventral.

of vein M_{1+2} is 1.64 times longer than the penultimate section. *Abdomen:* Entirely dark brown, covered with gray-brown pollen. As seen from a lateral view the anal plates are nearly two times higher than long; the ventral margins are strongly lobate and extend into the upper portion of the genital chamber (fig. 334d). The ninth tergum is almost as long as high; the anterodorsal portions are produced and the anteromedian margin is concave (fig. 334c). The ventral margin of the ninth tergum is almost vertical. The clasper has a blunt basal lobe followed by about four strong teeth; the apical portion is rather slender (fig. 334b). The ventral aspects of the genitalia are as in figure 334d.

Length: body, 2.1 mm.; wings, 2.5 mm.

FEMALE. Unknown.

Holotype male: Alakai Swamp, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). One paratype male is on hand, same data as type. This lacks the vittae down the mesonotum, the dorsum is entirely yellow, and the specimen may be slightly teneral.

Type in the B. P. Bishop Museum. The paratype is in the University of Hawaii collection.

Scaptomyza (Trogloscaptomyza) tumidula new species (fig. 335a–c).

This species fits in the group which has six rows of acrostichal setae on the mesonotum, the body dark-colored, and covered with gray pollen, and the arista with a well-developed apical fork. It differs from other known species in this complex by having the ventral margins of the anal plate pointed (as seen in lateral view) and bearing long setae; by the large fleshy aedeagus, which has a prominent tumescence on each side; by having the parameres transverse in position, the tips fitting across the middle portion of each clasper (fig. 335c); and by having the claspers bilobed on the hind margins as in figure 335b.

MALE. *Head:* The front is almost all black, yellow only on the anterior margin in front of the proclinate bristles. The eye orbits and the ocellar triangle are gray pollinose; the area between is dull black. The occiput is brown to black, covered with gray pollen except for the yellow lower margin. The genae, face, and palpi are pale yellow. The clypeus is yellow-brown. The face has a moderate keel extending down the median portion. Two moderately strong bristles are present in the upper portion of each vibrissal row; the uppermost bristle is approximately equal in size to the upper reclinate bristles, and the lower is about equal to the proclinate bristles. The palpus has one apical plus one or two subapical bristles. The antennae are yellow, except for a tinge of brown over the dorsal and apical portion of the third segment. The arista has two dorsal rays in addition to the large apical fork; the rays of the fork are almost equal in length to the stem of the arista (fig. 335a), making the arista very similar to that of *Tantalia*. The anterior reclinate bristle is about one-half as long as the proclinate and is situated distinctly above the latter. *Thorax:* Mostly dark brown in ground color, rather densely covered with gray pollen; the lower half of each humerus is yellow; the extreme hind margin and the ventral portion of the

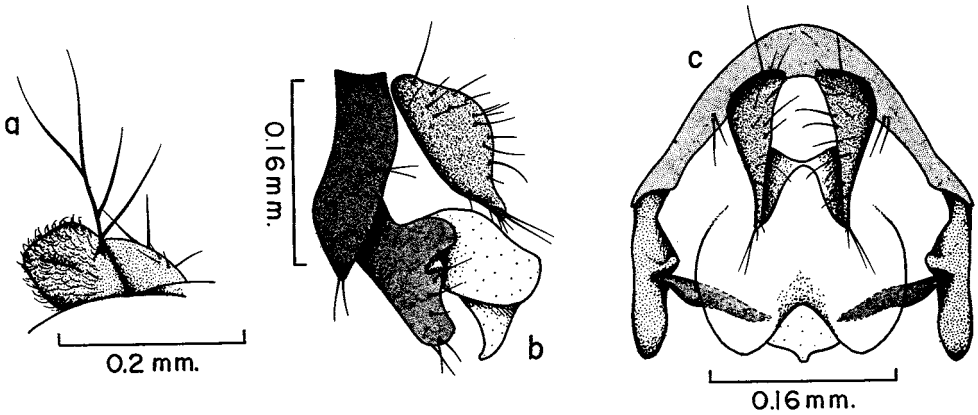


Figure 335—*Scaptomyza* (*Trogloscaptomyza*) *tumidula* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

scutellum are yellow, faintly tinged with brown. Six distinct rows of acrostichal setae are present on the anterior half of the mesonotum. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) supraalars. The humeral bristle is about equal in size to the presutural. The anterior sternopleural bristle is slightly over one-half as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown on the tarsi. The front basitarsus is slightly over one-fourth as long as the tibia. *Wings:* Subhyaline, very faintly infuscated. The third costal section is about four times longer than the fourth, and the costal fringe extends two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Entirely brown, covered with gray-brown pollen. The anal plates are about three times higher than long, the ventral margins are attenuated, and each is drawn out into a rather slender point as seen from direct lateral view. The ninth tergum is slender, about equal or slightly shorter than the anal plates. Each clasper has a blunt basal lobe and a median concavity on the hind margin into which the tip of the paramere fits (fig. 335b). The aedeagus is large and fleshy, developed into a distinct tumescence on each side (fig. 335c).

Length: body, 1.8 mm.; wings, 2.0 mm.

FEMALE. The female has not been definitely associated with the male. Two specimens are on hand from the same collection as that of the type; but, they differ by having the front entirely black as well as the palpi, lower face, and lower margin of each gena. Also the third antennal segment is dark brown to black. This is probably a different species. These specimens are not being designated as part of the type series.

Holotype male: Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956 (D. E. Hardy).

Type in the B. P. Bishop Museum.

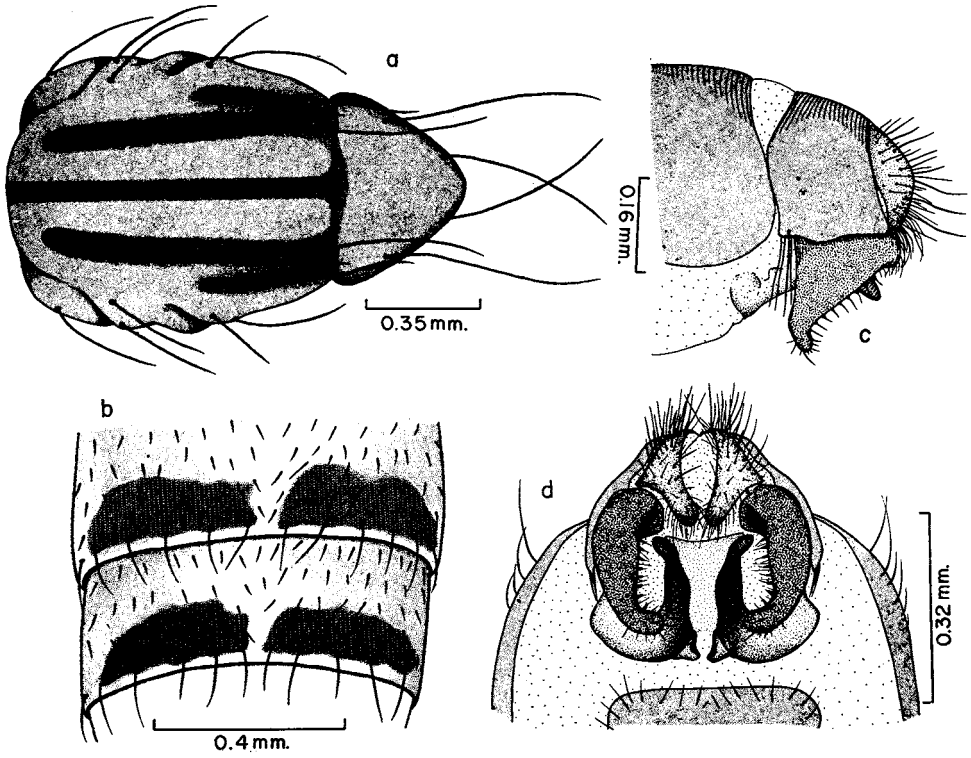


Figure 336—*Scaptomyza* (*Trogloscaptomyza*) *uliginosa* n. sp.: **a,** thorax, dorsal; **b,** two abdominal terga showing pattern of black bands; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) uliginosa new species (fig. 336a–d).

This species is readily differentiated from all other known *Trogloscaptomyza* by the markings of the mesonotum (fig. 336a) and of the abdomen (fig. 336b) as pointed out in the key. Also, the last section of vein M_{1+2} is just slightly longer than the penultimate section, four moderately strong bristles are present in each vibrissal row, and the genitalia are distinctive as shown in figure 336c–d.

MALE. A large, predominantly yellow species. *Head:* Entirely pale yellow (including the appendages) except for the reddish brown eyes, the black ocellar triangle, and the brown to black discoloration over the upper portion of the occiput and the sides of the vertex. The head is roughly quadrate in direct lateral view; the compound eyes are slightly higher than long. The front is entirely yellow; the orbits are yellow-gray. The front, measured from the median ocellus, is about as long as wide. The lower reclinate bristle is well developed, about three-fourths to four-fifths as long as the proclinate, and situated well above the latter (about two-fifths the distance from the proclinate to the upper reclinate bristle). Four strong bristles and two small, black setae are present in each vibrissal row. The upper bristle is about equal in size to the posterior reclinate bristles; the lower bristle is about equal to the anterior reclinate bristles. Each

palpus has two moderately strong apical bristles and one smaller preapical bristle, plus numerous black setae around the apex. The second antennal segment has three moderately strong dorsal bristles plus numerous black setae or small bristles over the dorsal portion. The arista has two dorsal rays in addition to the apical fork; the inner edge has several short, black hairs. *Thorax:* Entirely yellow, and covered with grayish yellow pollen except for the markings on the mesonotum (fig. 336a). The mesonotum has three rather narrow longitudinal vittae extending the entire length of the thorax except for a slight interruption of the lateral vittae at the anterior portion; a pair of lateral postsutural vittae which connect posteriorly with the vittae extending down each dorsocentral row; and, also, a narrow black line just above each humerus. A very faint tinge of brown is present along the upper edge of each mesopleuron, and the metanotum is predominantly brown. The anterior pair of dorsocentral bristles is situated just slightly behind a line drawn between the first pair of supraalars. In front of a line drawn between the first pair of supraalars, six rows of acrostichal setae are present; behind this line, four rows are present. Each humerus has one strong bristle. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle. A moderately developed bristle is also present about halfway between the anterior and posterior sternopleurals; this is about four-fifths as long as the anterior bristle. *Legs:* Entirely yellow except for the brownish apical segments of the tarsi. About twelve rather strong posteroventral bristles extend the entire length of the front femur; the posterodorsal surface has four bristles on the apical half plus one bristle just before the base of the segment. The tibiae and tarsi have no elongate hairs, although numerous short erect setae are present especially over the dorsal surfaces. The front basitarsus is short, one-third as long as the tibia. *Wings:* Entirely hyaline. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 4.4 times longer than the fourth section, and the last section of vein M_{1+2} is 1.15 times longer than the penultimate section. The last section of vein M_{3+4} is just slightly longer than the m crossvein. *Abdomen:* Yellow, with a broad shining black band across the posterior portion of each tergum; this is interrupted with yellow dorsomedially (fig. 336b). The genitalia are entirely black, contrasting with the predominantly yellow abdomen. The ninth tergum is moderately broad, about two times longer than the anal plates. The claspers are very conspicuous, and each is produced ventrally into a tapered point (fig. 336c); the inner margin of each clasper is armed with numerous short teeth. A pair of conspicuous parameres are developed, one on each side of the aedeagus (fig. 336d). The anal plates are rather narrow, somewhat produced at their ventral apices.

Length: body, 3.2 mm.; wings, 3.5 mm.

FEMALE. Unknown.

Holotype male: Kawaikoi Stream, Kauai, 3,700 feet, August, 1953 (D. E. Hardy). Collected sweeping in the wet, swampy vegetation along the stream.

Type in the B. P. Bishop Museum.

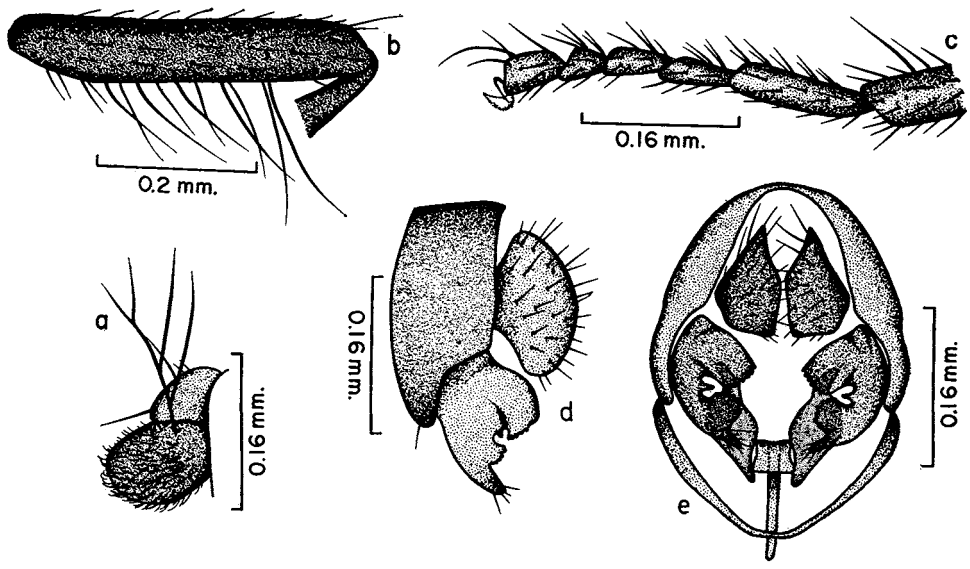


Figure 337—*Scaptomyza (Trogloscaptomyza) umbrosa* n. sp.: **a**, antenna; **b**, middle femur; **c**, front tarsus; **d**, male genitalia, lateral; **e**, male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) umbrosa new species (fig. 337a–e).

This species fits in the group which has four distinct rows of acrostichal setae and black palpi. It is differentiated by the presence of elongate anteroventral setae on the middle and hind femora (fig. 337b) and by the distinctive shape of the male claspers as shown in figure 337d.

MALE. *Head:* Approximately as long as high and the front and lower margins of the head almost parallel. Predominantly dark brown to black; yellow on the extreme lower portion of the occiput, on the genae, the upper two-thirds of the face, and along the eye margins at the sides of the face. The lower portion of the face is pale brown; the clypeus and palpi are yellow-brown to black. Each palpus has a moderately strong black apical bristle approximately equal in size to the upper reclinate bristle of the front. One moderately strong bristle is present at the upper edge of each vibrissal row. The ocellar triangle and the eye orbits along the sides of the front are brown to black in ground color, and covered with gray pollen. The interfrontal areas are opaque black; the extreme lower margin of the front is yellow, tinged with brown. The anterior reclinate bristle is small, about two-fifths to one-half as long as the proclinate, and is situated slightly above the latter. The antennae are predominantly brown, tinged with yellow to rufous. The arista has two dorsal rays and a prominent apical fork (fig. 337a). *Thorax:* Brown on the dorsum, covered with gray pollen; brownish yellow on the pleura. *Legs:* Yellow, faintly tinged with brown on the tarsi and on the tibiae. The front basitarsus is about one-fourth as long as the tibia and nearly two times as long as the second tarsal segment (fig. 337c). The middle

and hind femora have elongate anteroventral setae extending the entire length of the segment (fig. 337b). *Wings:* Entirely hyaline. The third costal section is nearly four times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.7 times longer than the penultimate section. *Abdomen:* Predominantly brown, faintly to distinctly tinged with yellow. The anal plates are about two times higher than long, and the ninth tergum is comparatively broad, and its length is greater than that of the anal plates. The claspers are distinctly bilobed with blunt teeth arranged around the inner margin as in figure 337d. The ventral aspects of the genitalia are as in figure 337e.

Length: body, 1.80 mm.; wings, 2.00 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor is non-sclerotized as in other *Trogloscaptomyza.*

Length: body, 2.15 mm.; wings, 2.50 mm.

Holotype male and allotype female: Kilauea, Hawaii, August, 1958, at light (J. W. Beardsley). Seventeen paratypes (nine males and eight females): from the following localities—same data as type; Upper Olaa Forest, Hawaii, 4,000 feet, July, 1953, and July, 1956 (D. E. Hardy); Kula Pipeline, Maui, 4,200 feet, July, 1956 (D. E. Hardy); and Waikamoi, Maui, 4,000 feet, July, 1956 (D. E. Hardy).

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), Hawaiian Sugar Planters' Association, and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) univitta new species (fig. 338a–b).

A predominantly yellow species having six rows of acrostichal setae on the mesonotum and lacking an apical fork on the arista. It is differentiated from other known species of this complex by the broad blunt claspers of the male (fig. 338a–b) as well as by other genital characters.

MALE. *Head:* About as long as high; the eyes are distinctly oblique. The eye orbits are dull yellow in ground color, rather densely covered with gray pollen. The ocellar triangle is brown to black in ground color, covered with gray pollen. The interfrontal areas are velvety brown; the anterior median portion of the front is yellow. The upper three-fourths of the occiput is yellow-brown, covered with gray pollen; the lower portion is pale yellow. The genae and face are pale yellow. The clypeus is brown and the palpi are black. One strong bristle is present at the upper edge of each vibrissal row; this is subequal to the upper reclinate bristle. The anterior reclinate bristles are about three-fifths as long as the proclinates and are situated slightly above the latter. The antennae are dark brown except for a tinge of yellow on the lower portions of the first two segments. The arista has two dorsal rays and no apical fork. *Thorax:* Predominantly yellow, covered with yellow-gray pollen. A distinct brown vitta extends down the median portion of the mesonotum and the scutellum. A short postsu-

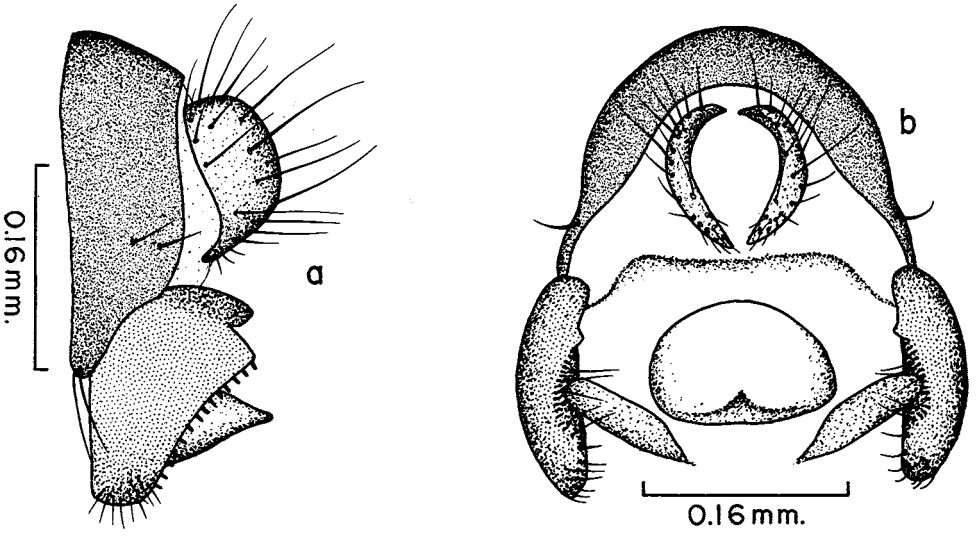


Figure 338—*Scaptomyza* (*Trogloscaptomyza*) *univitta* n. sp.: **a**, male genitalia, lateral; **b**, male genitalia, ventral.

tural streak of brown is also present on each side of the mesonotum. Six distinct rows of acrostichal setae are present on the anterior portion of the mesonotum. The anterior dorsocentral bristles are situated about halfway between the first supraalars and the suture. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow except for a tinge of brown at the apices of the tarsi. The front basitarsus is one-third to one-fourth as long as the tibia. *Wings:* Subhyaline with a faint tinge of brown along some of the veins. The third costal section is 3.8 times longer than the fourth, and the costal fringe extends just slightly over one-fifth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.87 times longer than the penultimate section. *Abdomen:* Yellow at bases and brown at apices of terga and covered with gray-brown pollen. The anal plates are two times higher than long; the ventral margins are not lobate. The ninth tergum is slightly expanded ventrally and has two or three short setae near each ventral margin as in figure 338a. The claspers are about as wide as long, subacutely pointed on the posterobasal margin, and blunt apically. The ventral aspects of the genitalia are as in figure 338b.

Length: body, 1.6 mm.; wings, 1.8 mm.

FEMALE. Fitting the description of the male except for sexual characters.

Length: body, 1.8 mm.; wings, 2.0 mm.

Holotype male and allotype female: Waialae Stream, Kauai, 3,600 feet, August, 1953 (D. E. Hardy). One male paratype: Konahuanui, Oahu, May 9, 1943, 2,600–3,000 feet, beating the shrubbery (E. C. Zimmerman).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

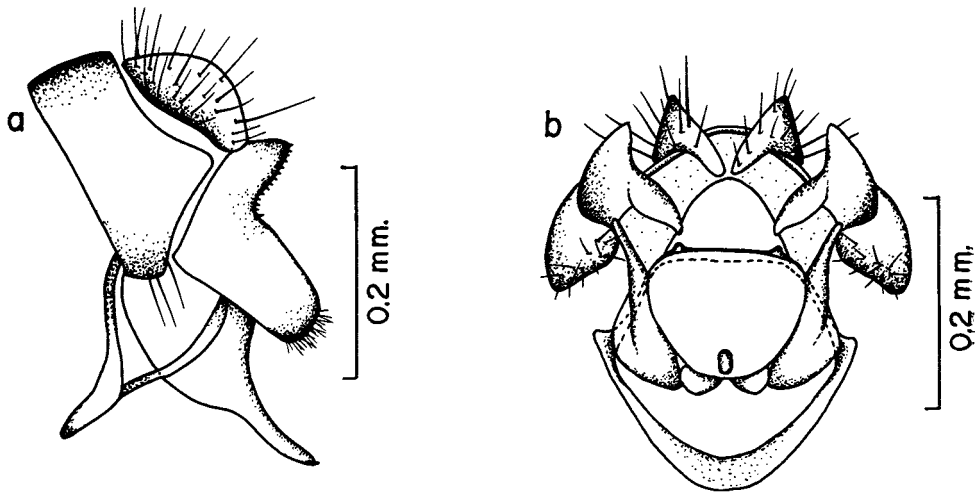


Figure 339—*Scaptomyza* (*Trogloscaptomyza*) *vagabunda* n. sp.: a, male genitalia, lateral; b, male genitalia, ventral.

Scaptomyza (Trogloscaptomyza) vagabunda new species (fig. 339a–b).

This species fits in the complex which is characterized by having four rows of acrostichal setae, a distinct *Scaptomyza*-like pattern on the mesonotum, and the body brown to black. It is differentiated from related species by having each clasper developed into a sharp point at its base and the aedeagus large, protuberant, and attenuated at the apex (fig. 339a–b).

MALE. *Head:* The lower third of the front is clear yellow. The eye orbits above the proclinate bristles, also the ocellar triangle, are brown to black in ground color, covered with gray pollen; the area between is dull brown. The occiput is brown, covered with gray pollen, except for the yellow ventral margin. The genae are entirely yellow. The face is yellow, tinged with brown on the lower median portion. The palpi are dark brown to black. The clypeus is yellow, tinged with brown. The antennae are entirely yellow. The arista has two dorsal rays in addition to the large apical fork. The anterior reclinate bristle is about three-fifths as large as the proclinate and is situated just slightly above the latter. *Thorax:* Entirely dark brown to black, covered with gray pollen; with rather distinct brown vittae, one median and one down each dorsocentral row, extending down the mesonotum. Four distinct rows of acrostichal setae are present. The anterior dorsocentral bristle is situated about halfway between the first supraalar and the suture. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Yellow, faintly tinged with brown, especially on the coxae and the femora. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Subhyaline, faintly tinged with yellow-brown. The third costal section is 3.5 times longer than the fourth, and the costal fringe extends about one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}.

The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Brown to black, covered with gray-brown pollen. The anal plates are nearly two times higher than long, and the ventral margins are rather distinctly lobate as seen from a ventral view (fig. 339b). The ninth tergum is nearly straight-sided, slightly expanded on the ventral margin. Each clasper has a well-developed, rather sharply pointed basal lobe; the apical portion of the clasper is broad and rounded (fig. 339a). The aedeagus is large and conspicuous, strongly attenuated at the apex. The ventral aspects of the genitalia are as in figure 339b.

Length: body, 1.8 mm.; wings, 2.1 mm.

FEMALE. Unknown.

Holotype male: Halemanu Valley, Kauai, August, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

Scaptomyza (Trogloscaptomyza) varia new species (fig. 340a–c).

This species fits near *S. exigua* (Grimshaw) and *cuspidata* n. sp. and shows definite relationship to both of these. It is nearest to *exigua* because of the poorly developed fork at the apex of the arista; but it is differentiated by having the projection at the posteroventral portion of the ninth tergum rather acute at apex and not divided at its base, and also by the much narrower ninth tergum (fig. 340b–c).

MALE. *Head:* The lower third of the front is pale yellow, the upper portion is black covered with gray pollen on the orbits and on the ocellar triangle, and velvety black between. The occiput is brown to black, covered with gray pollen except for the yellow lower margin. The genae, face, palpi, and mouthparts are yellow. The face is slightly convex in the median portion. The clypeus is brownish yellow. The first two antennal segments are yellow, the third is yellow-brown. The arista has two dorsal rays and a small apical fork (fig. 340a). A strong bristle is present at the upper edge of each vibrissal row; this is equal to the humeral bristle. The anterior reclinate bristle is about half as long as the proclinate and is situated approximately halfway between the proclinate and the upper reclinate bristles. *Thorax:* Entirely gray pollinose and dark brown to black except for a tinge of yellow on the lower humeri. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated in front of a line drawn between the first supraalars. The anterior sternopleural bristle is about one-half as long as the posterior bristle. *Legs:* Entirely yellow, except for a tinge of brown on the apices of the tarsi. The front basitarsus is about one-fourth as long as the tibia. *Wings:* Entirely hyaline. The third costal section is four times longer than the fourth, and the costal fringe extends about one-sixth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.6 times longer than the penultimate section. *Abdomen:* Entirely brown to black, covered with gray-brown pollen. As seen from lateral view, the anal plates are nearly two times higher than long. The ventral margins are lobate (fig. 340c). The ninth tergum is comparatively narrow over the dorsal

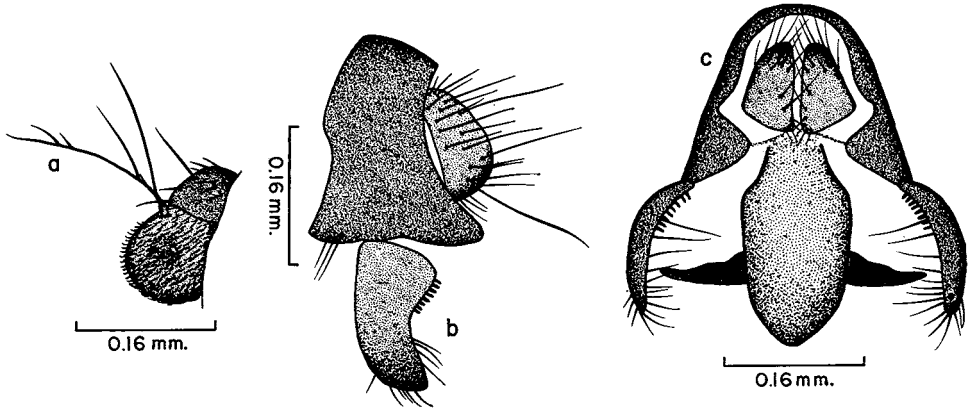


Figure 340—*Scaptomyza* (*Trogloscaptomyza*) *varia* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral.

portion and is expanded ventrally with an acute projection on the posteroventral margin. Each clasper is slightly arcuate and has six to eight rather strong teeth on the posterobasal margin (fig. 340b). The aedeagus is large and fleshy. From a ventral view the genitalia are as in figure 340c.

Length: body, 1.80 mm.; wings, 2.15 mm.

FEMALE. Fitting the description of the male except for sexual characters. An allotype is not being designated; the females at hand are being listed as paratypes.

Length: body, 2.10 mm.; wings, 2.40 mm.

Holotype male: Mount Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy). Four paratypes (one male and three females): Mount Kaala, Oahu, 3,900 feet, September, 1950, in banana bait trap (N. Morton); and April, 1952 (L. D. Tuthill).

Type in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Scaptomyza (Trogloscaptomyza) villosa new species (fig. 341a–d).

A gray pollinose species with six distinct rows of acrostichal setae and which fits near *S. retusa* n. sp. but is readily differentiated by the genital characters of the male. The diagnostic features are the dense clump of setae on each side of the ventral portion of the ninth tergum and the small narrow, pointed claspers (fig. 341b).

MALE. *Head:* Predominantly dark brown to black, covered with gray pollen. The front is entirely dark-colored; the area between the ocellar triangle and the eye orbits is velvety black. The anterior reclinate bristle is about three-fifths as long as the proclinate, is placed well above the latter, and approximately one-half between the proclinate and the upper reclinate bristles. The genae are yel-

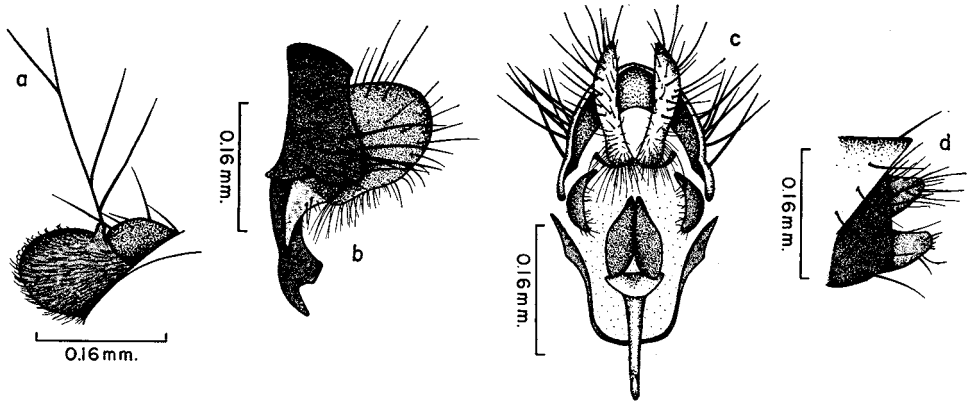


Figure 341—*Scaptomyza (Trogloscaptomyza) villosa* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral; **d,** female genitalia, lateral.

low except for a line of brown along the vibrissal row. In the median portion the gena is narrow, equal in width to three rows of eye facets. The face is predominantly yellow; the portion below the median keel is tinged with brown or black. The palpi are yellow. The antennae are dark brown, tinged with yellow on the first two segments. The arista has two dorsal rays and a moderate apical fork (fig. 341a). *Thorax:* Entirely dark brown to black in ground color, densely gray pollinose. The mesonotum has a faint indication of three brown vittae. Six distinct rows of acrostichal setae are present. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the first (anterior) supra-alars. Two rather prominent setae are situated on each humerus, one below and one above the bristle; these are nearly two times larger than the acrostichal setae. The anterior sternopleural bristle is three-fifths to two-thirds as long as the posterior bristle, and a well-developed intermediate seta is present; this is about two-thirds as long as the anterior bristle. *Legs:* Almost entirely brownish yellow, or distinctly tinged with brown on the mid and hind femora. The front basitarsus is approximately one-third as long as the tibia and nearly two times longer than the second tarsal segment. *Wings:* Hyaline. The third costal section is slightly over four times longer than the fourth, and the costal fringe extends approximately one-fourth the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5 times longer than the penultimate section. *Abdomen:* Entirely dark brown to black, covered with gray-brown pollen. As seen from direct lateral view, the anal plates are higher than long, subacutely pointed, and densely villose ventrally. The ninth tergum is rather narrow, straight-sided, and has a dense clump of setae on each side near the ventral margin. The claspers are small, rather slender, and sharp-pointed (fig. 341b). The aedeagus is usually conspicuously visible from a direct lateral view. As seen from a ventral view, the ventral margins of the tergum are somewhat lobate; the other aspects of the genitalia are as in figure 341c.

Length: body, 2.3–2.5 mm.; wings, 2.6–2.8 mm.

FEMALE. Fitting the description of the male except for sexual characters. The ovipositor blades are moderately developed (fig. 341d), much more so than is typical for *Trogloscaptomyza*.

Holotype male: Paliku, Haleakala Crater, Maui, June, 1952 (D. E. Hardy). Allotype female: Kulani, Hawaii, 5,200 feet, July, 1952 (D. E. Hardy). Seventeen paratypes (nine males and eight females): from the following localities—same as type, June, 1952, and June, 1953 (D. E. Hardy and C. R. Joyce); same as allotype, August, 1952 (W. C. Mitchell); and Kilauea, Hawaii, August, 1958, at light (J. W. Beardsley). Also one paratype male: Puu Kolekole, Molokai, 3,600 feet, July, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum. Paratypes in the following collections: United States National Museum, British Museum (Natural History), and University of Hawaii.

Scaptomyza (Trogloscaptomyza) waialealeae new species (fig. 342a–e).

This species differs from all other known *Trogloscaptomyza* by having the tibiae banded with brown, the femora dark brown to black, the pleura each with two brown longitudinal vittae, and by the peculiar development of the male genitalia (fig. 342d–e).

MALE. *Head:* About as high as long; the occiput is not strongly convex and is just slightly visible behind the margin of the eye as seen from lateral view. The front is yellow, tinged faintly with brown in the median portion; measured from the upper ocelli to the front median margin, the front is almost two times wider than long. The lower reclinate bristle is scarcely over one-half as long as the proclinate and is situated approximately opposite the latter. The vertex is yellow-brown, and the upper median portion of the occiput is tinged with brown. Each gena has a streak of brown along the lower margin, and the depressed areas of the face are tinged with brown. The median portion of the face is raised into a distinct keel. The clypeus is yellow, the palpi are brown, and the remainder of the mouthparts are yellow, tinged with brown. Each palpus has one moderately strong apical bristle and a medium-sized preapical bristle. The labella are not ornate. A large bristle is present on the upper edge of each vibrissal row; this is equal to or larger than the vertical bristles. The first two antennal segments are yellow, tinged lightly with brown on the upper portion; the second segment has three short dorsal bristles. The third segment is yellow-brown. The arista has three dorsal and no ventral rays (fig. 342a). *Thorax:* Entirely yellow to rufous except for two broad transverse stripes extending across the pleura. Six rows of acrostichal setae are present, and the anterior pair of dorsocentrals is situated slightly in front of a line drawn between the first pair of supraalar bristles. Each humerus has two bristles; the ventral bristle is scarcely over one-fourth as long as the dorsal bristle. The anterior sternopleural bristle is about two-thirds as long as the posterior bristle, and a moderately strong bristle-like hair is situated between the two main bristles; this is about two-thirds as long as

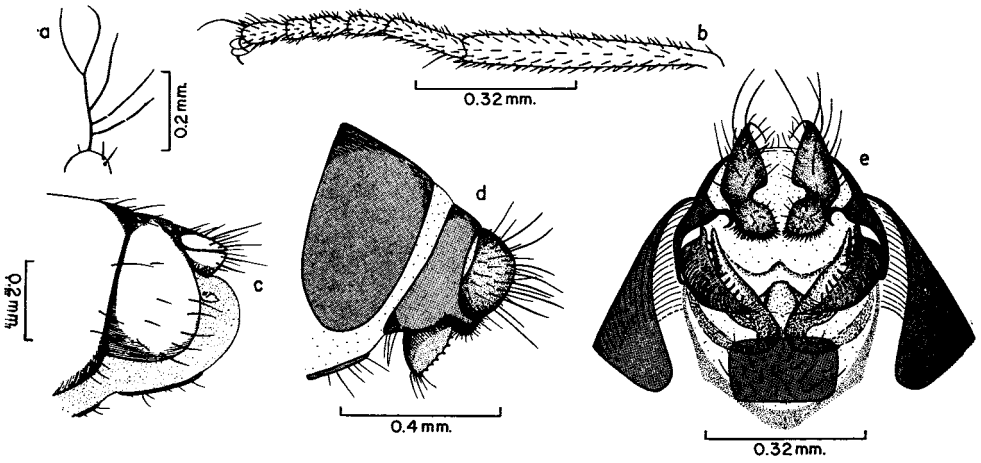


Figure 342—*Scaptomyza* (*Trogloscaptomyza*) *waialealeae* n. sp.: **a,** arista; **b,** front tibia and tarsus; **c,** female genitalia, lateral; **d,** male genitalia, lateral; **e,** male genitalia, ventral.

the anterior bristle. *Legs:* The coxae are brown, tinged faintly with yellow in the ground color. The trochanters are yellow. The femora are dark brown to black. The front femur is about four times longer than wide and has about five moderately strong bristles on each of the posterodorsal and posteroventral surfaces. The front tibiae and tarsi lack long ciliation, but the upper surfaces are densely covered with short, erect setae. The front basitarsus is short; the tibia is about 3.5 times longer than the basitarsus (fig. 342b). A pair of dark brown bands are present on all tibiae. *Wings:* Faintly infuscated, without distinct brown markings. The costal fringe extends approximately two-thirds the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.15 times longer than the fourth section, and the last section of vein M_{1+2} is 1.75 times longer than the penultimate section. The last section of vein M_{3+4} is approximately equal in length to the m crossvein. *Abdomen:* Predominantly dark brown to black covered with gray-brown pollen. The anterior margins of the terga are yellow to yellow-brown; this coloration is more pronounced on the basal segments. The anal plates are higher than long, slightly produced ventrally, with the lower margins very densely covered with short, black setae. The ninth tergum is slightly narrowed dorsally and expanded ventrally; the lower margins are truncate and bear only two inconspicuous hairs near the anteroventral corner. The claspers are prominent and extend conspicuously beyond the apices of the tergum; each clasper is acutely pointed and is serrated along the posterior margin (fig. 342d). The ventral aspects of the genitalia are as in figure 342e.

Length: body and wings, 2.75–3.25 mm.

FEMALE. Fitting the description of the male in most respects. The front tibiae and tarsi, however, do not have the conspicuous bristly setae over the dorsal surface. No functional ovipositor is present. The plates are reduced to very small,

narrow, sclerotized lobes at the sides of the membranous eighth sternum (fig. 342c).

Holotype male and allotype female: from Mt. Waialeale Trail, Kauai, 4,500 feet, August, 1953 (D. E. Hardy). Twenty-two paratypes (13 males and 9 females): from the following localities on Kauai—same data as type; Waialae Stream, 3,600 feet, August, 1953 (D. E. Hardy); and Alakai Swamp, Kauai, 4,000 feet, August, 1953 (D. E. Hardy). This species is found in the extremely wet portion of the island of Kauai, on or near Mt. Waialeale, which is reputed to be the wettest spot on earth.

Type, allotype, and some of the paratypes are in the B. P. Bishop Museum. The remainder of the paratypes are being distributed among the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Genus **TITANOCHAETA** Knab

Titanochaeta Knab, 1914, Insecutor Inscitiae Menstruus 2 (1):167.

It is probable that this genus should be treated as a subgenus of *Scaptomyza* Hardy on the basis of the lack of ventral rays on the arista; however, the group also possesses characters typical of *Drosophila*, and *Titanochaeta* would actually appear to fit between these two genera. The rather short head, approximately two times higher than long, is a distinctive feature of *Titanochaeta*; but, in this respect it would seem to fit near *Scaptomyza* (*Alloscaptomyza*) Hackman and, especially, to the species *stramineifrons* Hackman, which is characterized by having six rows of acrostichal setae. Members of *Titanochaeta* are characterized as follows: The head is equal to, or narrower than, the thorax, rather than distinctly broader. They lack ventral rays on the arista, rather than having one ventral ray basad of the apical fork. The front is slanted and distinctly oblique, rather than almost straight. The compound eyes are densely pilose (except in *vittiger* n. sp.) rather than bare or nearly so. The lower margin of the head is short, less than one-half as long as the front (except in *vittiger* n. sp.), rather than having the lower margin of the head approximately equal in length to the front. The female ovipositor (figs. 344e and 349b) is slender, sharp-pointed, and rather needle-like (except in *evexa*), rather than fleshy and not sclerotized. The front margins of the eyes usually extend over the edge of the face so that the sides of the face are obscured from lateral view (fig. 347a). *Titanochaeta* species are also typically gray pollinose, especially on the front and on the thorax. In addition to antennal characters, members of this genus differ from *Drosophila* by the shape of the head, by having the male claspers conspicuous and developed well beyond the edges of the ninth tergum, and by the sharp-pointed female ovipositor. [It should be noted, however, that *T. evexa* n. sp. poses an exception to the latter character (fig. 345d) and, even though it seems to be a typical *Titanochaeta* in other respects, it definitely is a borderline species.] The genae are straight-sided and

the anterior edge is indented behind the eye margin. The bristles of the head and thorax are slightly stronger than in most other drosophilids, but the size of the various bristles apparently vary somewhat from species to species; the length of the vertical bristles is often greater than the head length.

This is an endemic genus which has, for the most part, speciated by islands. The species whose habits are known are predators on spider eggs.

Type of the genus: *Titanochaeta ichneumon* Knab.

Key to Species of Titanochaeta

1. Penultimate section of vein M_{1+2} three or more times longer than m crossvein. Ultimate section of M_{1+2} not over 2.5 times longer than the penultimate. Last section of vein M_{3+4} distinctly longer than m crossvein. Crossveins not infuscated 2

Penultimate section of M_{1+2} about equal in length to the m crossvein. Ultimate section of M_{1+2} about five times longer than penultimate section. Last section of vein M_{3+4} about equal or slightly shorter than the m crossvein. The r–m and m crossveins distinctly infuscated (fig. 351b). Maui, Oahu, and Kauai ..... **swezeyi** Wirth.

2(1). Sides of scutellum with conspicuous setae in addition to the bristles. Both sternopleural bristles well developed, about equal in size 3

Scutellum lacking secondary setae. Anterior sternopleural bristle not over one-half as long as posterior bristle, except in *chauliodon* n. sp. 4

3(2). Thorax all yellow, abdomen predominantly so. Oahu, Hawaii, Molokai, Maui, and Lanai ..... **bryani** Wirth.

Mesonotum predominantly or entirely black covered with gray pollen. Scutellum black, abdomen predominantly so. Molokai, Hawaii ..... **setosiscutellum** n. sp.

4(2). Anterior sternopleural bristle strong, about equal in size to the posterior. Thorax of male rufous, tinged faintly with brown, dorsum of thorax predominantly brown to black. Basal rays of arista widely spaced (fig. 344a). Maui, Oahu ..... **chauliodon** n. sp.

Anterior sternopleural bristle not over one-half as long as posterior, usually small, hairlike 5

5(4). Mesonotum vittate; predominantly yellow with three

narrow brown vittae extending full length of mesonotum, plus an incomplete brown vitta on each side. Eyes inconspicuously pubescent. Thorax yellow except for the brown vittae on the mesonotum and a brown spot on the scutellum. Abdomen conspicuously marked with yellow. Larger species. Kauai . . . . . **vittiger** n. sp.

Predominantly black species. Mesonotum and scutellum entirely black in ground color. Eyes conspicuously pubescent. Smaller species 6

6(5). First two abdominal segments entirely yellow 8

Abdomen entirely black, except, sometimes, for a narrow yellow-white band at apex of second tergum 7

7(6). Abdomen shining black. Male genitalia yellow and as in figure 346c–d. Upper reclinate bristle situated near lower third of front (fig. 346a). Maui . . . . . **glauca** n. sp.

Abdomen dusted with gray. Male genitalia black and as in figure 350c–d. Upper reclinate bristle situated near middle of front (fig. 350a). Hawaii . . . **silvicola** n. sp.

8(6). Ninth tergum about two times higher than long and tapered ventrally. Each clasper with a projection just above the middle (figs. 347c and 348c) 9

Ninth tergum nearly two times longer than high, truncate ventrally. Claspers without such a projection (fig. 345b) but with strong bristles on the inner surfaces (fig. 345c). Molokai . . . . . **evexa** n. sp.

9(8). Male genitalia yellow; sides of abdomen brownish yellow; pleura largely brown. Male clasper with a strong spinelike process, as in figure 347b–c. Hawaii . . . . . **ichneumon** Knab.

Abdomen, including genitalia, predominantly shining black (except for the yellow basal segments); pleura entirely yellow. Male clasper with a small prominence in middle (fig. 348b–c). Kauai . . . . **kauaiensis** n. sp.

Titanochaeta bryani Wirth (fig. 343a–f).

Titanochaeta bryani Wirth, 1952, Proc. Haw. Ent. Soc. 14 (3) :417.

Endemic. Oahu (previously known only from the type locality: Manoa Valley) , Hawaii, Lanai, Molokai, and Maui.

Host: Predators on spider eggs.

Type in the collection of the Hawaiian Sugar Planters' Association.

In body coloration and in the details of the sternopleural bristles, this species

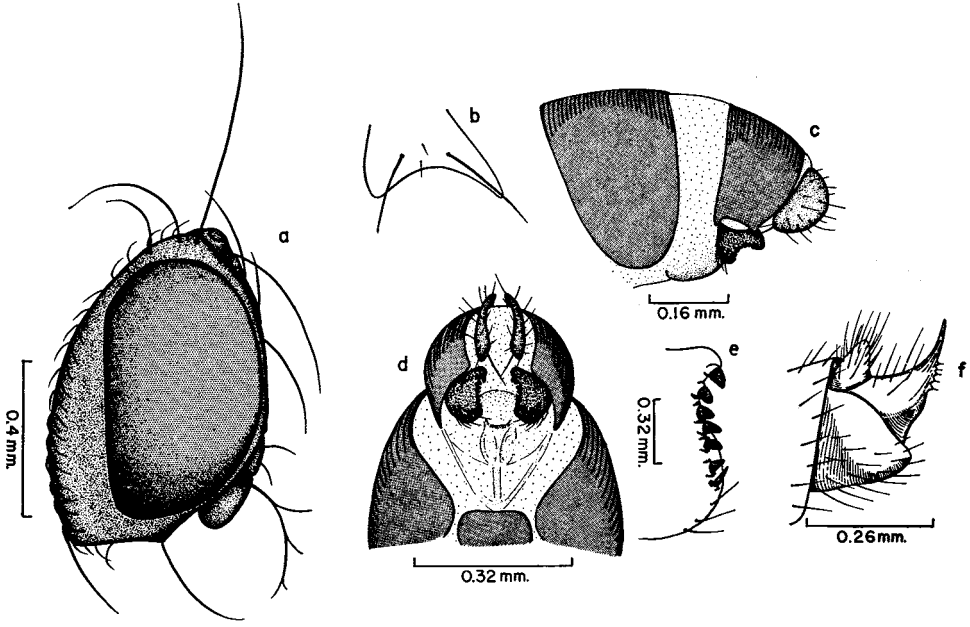


Figure 343—*Titanochaeta bryani* Wirth: **a,** head; **b,** sternopleuron; **c,** male genitalia, lateral; **d,** male genitalia, ventral; **e,** male clasper; **f,** female genitalia.

appears closely related to *T. swezeyi* Wirth; but the wing venation differs rather strikingly as pointed out in the key above. With regard to the wing venation, it more nearly resembles the other known species of *Titanochaeta* but differs from these in body coloration as well as in the development of the bristles on the sternopleura.

An entirely yellow to rufous species except for the brownish red eyes. The females sometimes have the mesonotum largely gray and the abdominal terga tinged with brown. The lower reclinate bristles are about one-half to two-thirds as long as the proclinates and are situated distinctly above the proclinate bristles. A row of erect yellow hairs extends down each orbit, and the median portion of the front has scattered suberect yellow hairs. The eyes are distinctly but sparsely pubescent. The antennae are small; the third segment extends approximately three-fifths the distance to the oral margin. Each arista typically has two dorsal branches plus a short apical fork; the branching toward the tip of the arista is somewhat variable. The face is rather strongly concave on the sides with a very slight carina down the middle. The lower portion of the head, below the eyes, is quite differently shaped than in the other known species of *Titanochaeta*; rather than being square-sided it slopes gradually from the edges of the face to a blunt point at the posteroventral portion of the head (fig. 343a). Thorax entirely subshining yellow. The anterior dorsocentral bristles are situated opposite the anterior supraalars. About eight rows of acrostichal setae extend over the

anterior half of the thorax, and about six rows extend over the posterior half. One large and one small bristle is present on each humerus. Scutellum with about five setae along each lateral margin in addition to the strong bristles. Halteres entirely yellow. Each sternopleuron with two strong bristles plus two to three erect, black setae (fig. 343b). The third costal section is 2.5 to 2.75 longer than the fourth section, and the fourth section is about 2.0 longer than the fifth. The ultimate section of vein M_{1+2} is 1.6 longer than the penultimate section, and the m crossvein is slightly less than one-third as long as the penultimate section of vein M_{1+2}. The last section of vein M_{3+4} is about two-thirds longer than the m crossvein. The legs are entirely yellow and are without ornamentation. The abdomen is yellow to rufous. The female ovipositor plate is rather slender and drawn out into a sharp slender point; the ventral surface has five distinct teeth on the basal half (fig. 343f). The male has rather simple claspers; each has short black teeth around the upper edge (fig. 343c, e). The ventral aspects of the male genitalia are as in figure 343d.

Length of type female: body, 2.00 mm.; wings, 2.15 mm.

Length of allotype male: body, 1.85 mm.; wings, 2.05 mm.

The above description was based on the type and allotype specimens and also on a series from two localities on Hawaii and two on Molokai. The specimen from Maui (Puu Kukui, 3,000–4,500 feet) is a female which differs by having the mesonotum largely gray pollinose and the abdominal terga brown.

Titanochaeta chauliodon new species (fig. 344a–e).

This species is readily differentiated from any known *Titanochaeta* by the prominent projection of the male clasper, which bears a strong black spine at the apex (fig. 344c); by the large apical fork on the arista (fig. 344a); and by the lack of secondary setae on the scutellum.

MALE. *Head:* About two times higher than long, predominantly yellow except for the reddish brown eyes. The eyes are short pubescent; each is distinctly narrowed on the lower half. A strong black bristle is present at the upper edge of each occipital row. The front is yellow-gray pollinose along the orbits and golden colored in the median portion. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The upper median portion of the face is slightly raised. One strong bristle is present at the upper edge of each vibrissal row, and each palpus has a strong apical bristle. The arista typically has two dorsal rays in addition to the large apical fork (fig. 344a). The upper branch of the apical fork is sometimes bifid, giving the appearance of a preapical ventral ray (fig. 344b). The palpi and mouthparts are yellow; the labella are fleshy. *Thorax:* Yellow, tinged lightly with brown in the ground color, especially on the mesonotum; densely covered with gray pollen. About eight rows of acrostichal setae are present. The anterior dorsocentral bristles are situated opposite the first pair of supraalars. Two strong humeral bristles are present. The anterior sternopleural bristle is about four-fifths as long as the posterior bristle. A moderately strong, erect hair is situated between the

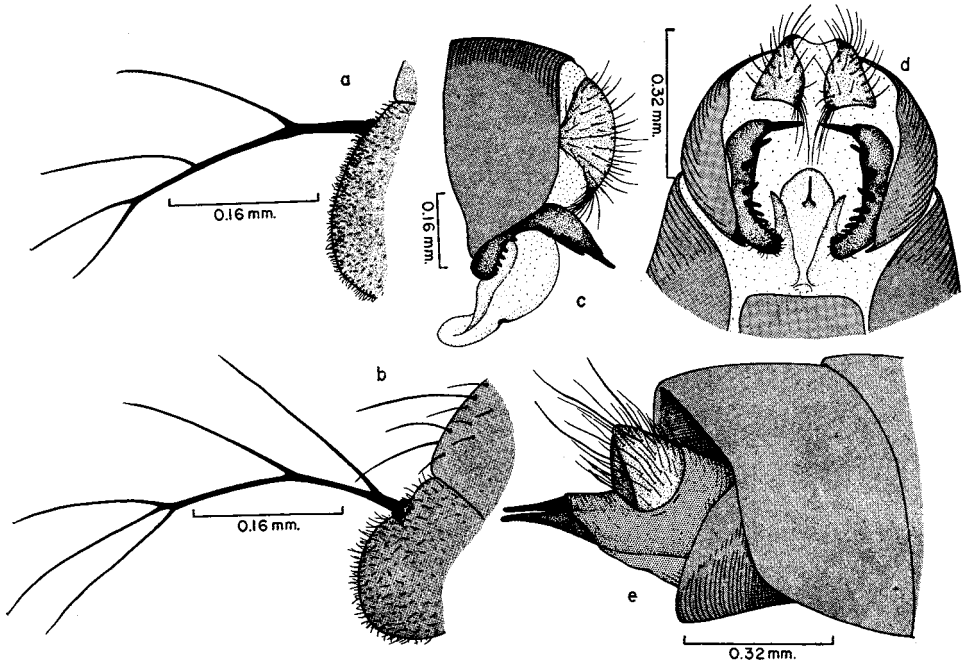


Figure 344—*Titanochaeta chauliodon* n. sp.: **a,** typical arista; **b,** atypical arista; **c,** male genitalia, lateral; **d,** male genitalia, ventral; **e,** female genitalia, lateral.

two bristles; this is almost one-half as long as the anterior bristle. *Legs:* Entirely yellow. All coxae with several black bristles or hairs extending down the posterodorsal surfaces. The legs are rather conspicuously setose. The posterodorsal and posteroventral bristles are well developed on the front femur. The front tibia lacks long ciliation but is covered with short, suberect setae. The tarsus is covered with short, erect setae, especially over the dorsal surface; the ventral surface is densely black pubescent. The front basitarsus is about one-third as long as the tibia. *Wings:* Entirely hyaline with no dark markings. The costal fringe extends about one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is 3.7 times longer than the fourth. The last section of vein M_{1+2} is 1.3 times longer than the penultimate section. The last section of vein M_{3+4} is about 1.6 times longer than the m crossvein. *Abdomen:* Yellow on the sides and on the apical segments, brown through the median portions of segments two to four. The ninth tergum is very well developed, equal or slightly longer than the sixth tergum, and about three times longer than the anal plates. The ventral margin of each anal plate is greatly extended into a long, densely pilose, finger-like projection. The ventral margins of the ninth tergum are not lobate and have no cilia or bristles around the margin. The tergum is plainly visible *in situ*. Each clasper is strongly developed, shaped somewhat like a boomerang, and with the upper portion projecting beyond the edges

of the tergum and terminating in a strong apical spine. The clasper also has a series of stout, black teeth extending along the ventral surface (fig. 344c–d). The ventral aspects of the genitalia are as in figure 344d.

Length: body, 3.4 mm.; wings, 3.6 mm.

FEMALE. Similar in most respects to the male except that the dorsum of the thorax is darker in color. The vertex, ocellar triangle, upper occiput, and upper portions of the orbits are brown to black in ground color, covered with gray pollen. Two moderately strong bristles are present on the upper edge of each vibrissal row, and two short, black bristles are present at the apex of each palpus. The mesonotum and the disc of the scutellum are predominantly brown to black in ground color. The abdominal terga are brown above, yellow on the sides. The ovipositor plates are slender, sharp-pointed, needle-like, and extend slightly beyond the apices of the anal plates (fig. 344e).

Length: body, 4.5 mm.; wings, 4.3 mm.

Holotype male: Waikamoi, Maui, 4,000 feet, July, 1956 (R. Namba). Allotype female: same locality and date as type (D. E. Hardy). Thirteen paratypes (seven males and six females): from the following localities on Maui—same as type (R. Namba and D. E. Hardy); Waikamoi, 4,500 feet, Jan. 1926 (O. H. Swezey); Kula Pipeline, Maui, May 25, 1930, on *Cibotium menziesii* (O. H. Swezey); Halehaku, June 16, 1920 (E. H. Bryan, Jr.); and Puu Kukui, *circa* 4,000 feet, June, 1953 (D. E. Hardy). Also one paratype female: from Mt. Tantalus, Oahu, May, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), the Hawaiian Sugar Planters' Association, and the University of Hawaii.

Titanochaeta evexa new species (fig. 345a–d).

This species is related to *T. ichneumon* Knab but is readily differentiated by the characteristics of the male genitalia. The ninth tergum is distinctly longer than high, is broad and truncate ventrally, and has a row of strong bristles along the ventral edge; also, the claspers lack the strong spurlike lobe on the outer surface (fig. 345b) which is characteristic of *ichneumon*; and the aristae are slightly different in the two species (figs. 345a and 347a).

MALE. *Head:* Shaped much as in *T. ichneumon* (fig. 347a) except that the edge of the face along the eye margin is slightly visible from a lateral view. The face, genae, lower portion of the front, and the lower half of the occiput are yellow; the upper portion of the occiput and the upper three-fourths of the front, except for yellow along the orbits, are brown to black in ground color, rather densely blue-gray pollinose. The ocellar triangle extends about two-thirds the length of the front. The eyes are densely pubescent. The upper reclinate bristle is strong, and slightly larger than the postocellar bristles. The proclinate frontal bristles are about equal in size to the upper vertical bristles. The lower reclinate bristles are very small, scarcely larger than the scattered setae on the lower por-

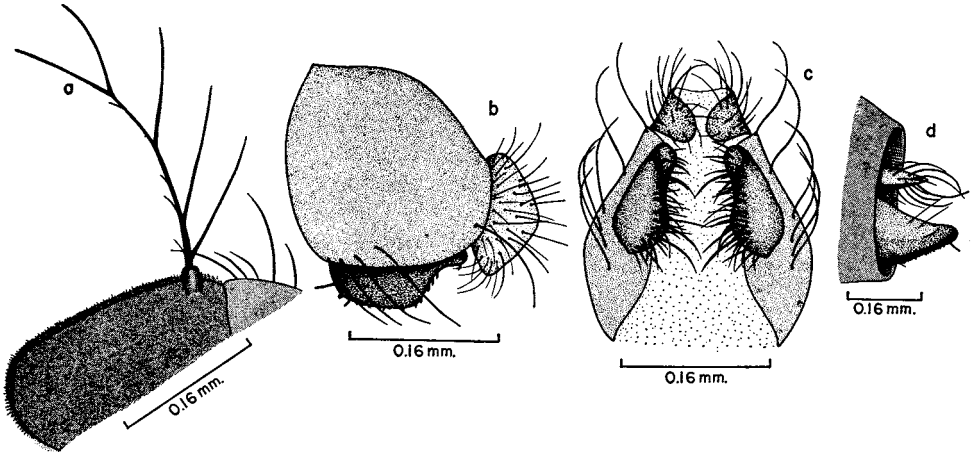


Figure 345—*Titanochaeta evexa* n. sp.: **a,** antenna; **b,** male genitalia, lateral; **c,** male genitalia, ventral; **d,** female genitalia, lateral.

tion of the front, and are situated about opposite the proclinate bristles. The face is moderately concave and has just a faint indication of a median carina. The antennae are entirely yellow. The second segment has one strong dorsal bristle plus numerous short, black dorsal setae. The third segment is two times longer than wide and extends nearly the full length of the face. The aristae have three strong dorsal rays each in addition to the apical fork, and short hairs are scattered down the anterior surface (fig. 345a). One strong and about four rather weak oral vibrissae and one strong genal bristle are present. The inner vertical bristles are very strong, and are about equal in length to the head. The mouthparts are entirely yellow. The palpi are small and rather inconspicuous; each has two short black setae plus a few fine hairs at apex. *Thorax:* Mesonotum and scutellum predominantly brown to black in ground color, densely blue-gray pollinose. The humeri (except for brown upper margin, the lateral margins of mesonotum, and the apex of scutellum,) are yellow. The pleura are entirely yellow, except for a faint spot of brown in the middle of the hypopleura. The metanotum is shining black, faintly gray pollinose. The halteres are yellow, tinged with rufous. The anterior dorsocentral bristles are situated opposite the anterior supraalars. One strong bristle is present on each humerus. Each sternopleuron has one strong bristle arising near the median portion and one medium-size bristle situated near the upper front corner; also, a strong black bristle is present at the ventral margin. *Legs:* Entirely yellow, segments not ornate. Middle coxa with two strong posterodorsal bristles and two strong dorsal bristles. Each front femur has two or three moderately long bristles and a row of fine hairs along the posterior ventral surface. All tibiae with rather weak preapical dorsal bristles; middle tibia with a strong ventral bristle at apex. Hind basitarsus about three-fifths as long as the tibia. *Wings:* Hyaline. The third costal

section is about three times longer than the fourth, and the fourth is approximately two times longer than the fifth section. The costal fringe extends about two-fifths the distance from the tip of vein R_{2+3} to vein R_{4+5}. The r–m crossvein is situated just slightly beyond the apex of vein R_1, and the penultimate section of vein M_{1+2} is about half as long as the ultimate section. The last section of vein M_{3+4} is about two-thirds as long as the penultimate section of M_{1+2}. *Abdomen:* First tergum entirely yellow, and the second predominantly so, narrowly brown at the base; segments five and six also yellow; segments three and four shining black, with a narrow gray band across the apices. Male genitalia entirely yellow, except for the brown margins of the claspers. Ninth tergum distinctly longer than wide, slightly narrowed posteriorly, and truncate on ventral margin; ventral margin with a transverse row of five to seven long bristles (fig. 345b). Claspers without a median prominence; the inner surface is densely covered with moderately long black bristles (fig. 345c).

Length: body, 2.0 mm.; wings, 2.3 mm.

FEMALE. Very similar to the male and fitting rather closely the description of the female of *ichneumon*. The female differs by having the anterior portion of the wing faintly brown fumose. The second abdominal segment is entirely yellow except for a small brown spot on each side. The third segment is shining brown to black except for a narrow margin of yellow. Segments four, five, and six are shining brown to black. The anal plates are yellow. The ovipositor is brown, tinged with yellow. The ovipositor is rather short and broad, roughly triangular (fig. 345d).

Length: body, 2.1 mm.; wings, 2.3–2.5 mm.

Holotype male and allotype female: Puu Kolekole, Molokai, July, 1952 (D. E. Hardy and M. Tamashiro). One paratype female: Manawainui Valley, Molokai, July, 1952 (D. E. Hardy); and one paratype female: Puu Alii, Molokai, July, 1953 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the United States National Museum and the University of Hawaii.

Titanochaeta glauca new species (fig. 346a–d).

This species is closely related to *T. silvicola* n. sp. from Hawaii but is readily differentiated by the shining black abdomen and yellow genitalia of the male; by the short, broad front, scarcely narrowed below; by having the lower reclinate bristle at a level with the proclinate, and the distance between the proclinate and the upper reclinate bristles much less than the distance between the upper ocelli; by having the first two antennal segments yellow and the third segment reddish brown; and, also, by having the arista differently developed, as in figure 346b. It also is near *ichneumon* Knab but differs by having the abdomen shining black and the third antennal segment larger.

MALE. *Head:* Shaped very much like that of *T. ichneumon*, as seen from lateral view. The portion of the head below the eyes is straight-sided, and the front margin of the gena is indented from the eye margin. The eyes are rather

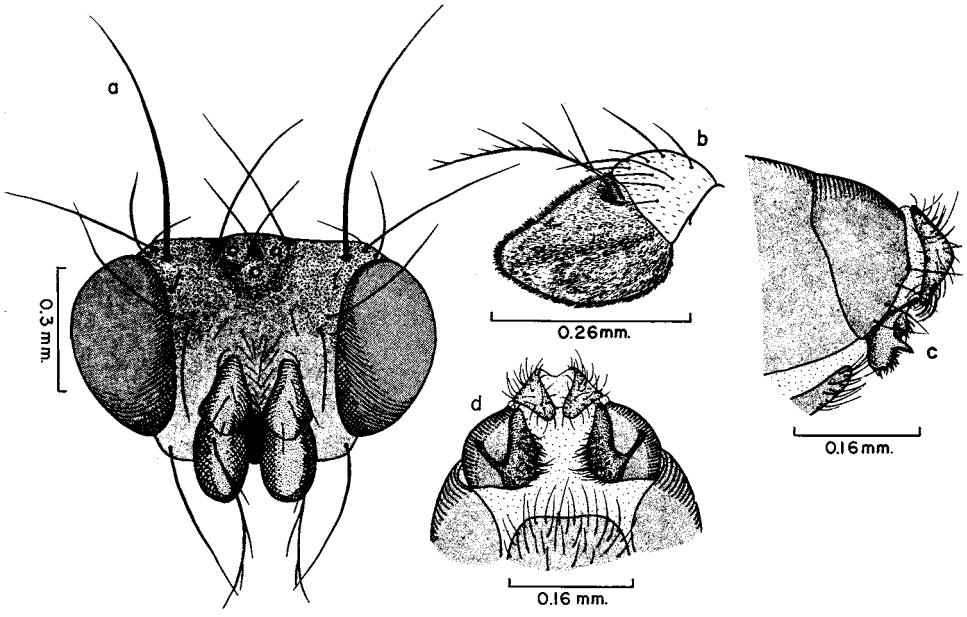


Figure 346—*Titanochaeta glauca* n. sp.: **a,** head, front view; **b,** antenna; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

thickly covered with moderately long yellow pubescence. The front is nearly two times wider than long (measured from the median ocellus to the front margin) and is just slightly narrowed on the lower portion; the ground color is predominantly dark brown, and the extreme lower portion of the front is yellow. The entire front is densely covered with gray pollen. The upper reclinate bristles are situated near the lower third of the front, and the distance between these and the proclinate bristles is distinctly less than the distance between the two upper ocelli. The lower reclinate bristles are about two-thirds as long as the proclinates and are situated opposite the latter. Several small erect hairs are situated in the orbital area, also in the lower median portion of the front, just above the antennae, and in the upper portion of the ocellar triangle. The face, genae, lower occiput, and mouthparts are pale yellow. The face is concave on the sides and slightly carinate down the middle. The upper two-thirds of the occiput is brown, tinged with yellow. The front view of the head is as in figure 346a. The first two antennal segments are yellow; the second has two moderately developed black bristles plus numerous black setae extending over the dorsal surface. The third segment is yellow, tinged with brown along the dorsal surface; it is rather large and flattened and extends almost to the oral margin. The arista has three moderately strong dorsal rays plus two or three very short dorsal branches (fig. 346b); there is no distinct apical fork. *Thorax:* Dark reddish brown in ground color, densely covered with blue-gray pollen. The anterior dorsocentral bristles are situated opposite the anterior supraalars. About eight

rows of acrostichal setae are present on the front portion of the mesonotum and extend approximately to the anterior dorsocentrals; over the hind portion the acrostichals are reduced to about six rows which end slightly before the hind pair of dorsocentral bristles. Each humerus has one strong and one weak bristle. The lateral margins of the humeri are yellow and are nearly devoid of pollen. The sternopleural bristles are as in *ichneumon,* with one weak bristle in the upper anterior corner and one strong bristle near the middle of the sclerite. The scutellum is colored the same as the rest of the thorax; no setae are present in addition to the strong bristles. The metanotum is entirely dark reddish brown to black and densely pollinose. The halteres are yellow. *Legs:* Entirely yellow. I see no distinctive features in the legs. The ventral bristle at the apex of the middle tibia is about two-thirds as long as the metatarsus. *Wings:* The third costal section is approximately two times longer than the fourth, and the fourth is 2.5 times longer than the fifth. The costal fringe of stout setae extends about one-third the distance between the apices of veins R_{2+3} and R_{4+5}. The ultimate section of vein M_{1+2} is about 2.0 times longer than the penultimate section, and the last section of vein M_{3+4} is 2.5 longer than the m crossvein. *Abdomen:* Shining black, very faintly gray pollinose. The second tergum has a narrow band of yellow at its apex. The first two terga and the sides of the abdomen are covered with black setae; the remainder of the abdomen is covered with yellow setae. The genitalia are yellow. The male genitalia show close relationship to those of *ichneumon,* but the shape of the claspers is quite different (fig. 346c) and the lateral projection from the clasper has small black microsetae on the inner surface. The clasper is about two times longer than wide, and the ventral surface is densely covered with stout incurved spines. The lateral prolongation is black, narrow, rather sharply pointed, and arises from just below the middle of the clasper (fig. 346c). The sixth sternum is covered with strong erect bristles (fig. 346d).

Length: body, 1.8 mm.; wings, 1.9 mm.

Holotype male: Iao Valley, Maui, August 8, 1918, on "Ohia Lehua" (O. H. Swezey).

Type in the Hawaiian Sugar Planters' Association collection.

Titanochaeta ichneumon Knab (fig. 347a–d).

Titanochaeta ichneumon Knab, 1914, Insecutor Inscitiae Menstruus 2 (1) :168.

Endemic. Hawaii. About two dozen specimens have been reared from spider egg cases at Mountain View (type locality) and Pahala, Hawaii, by O. H. Swezey and F. X. Williams, and one specimen has been seen from Kilauea, Hawaii. This has been recorded in our literature from Oahu, but these records are evidently erroneous and probably referred to *T. bryani* Wirth.

Host: Predaceous upon spider eggs; reared from egg sacs on sugarcane.

This species is characterized by the dark pruinose gray thorax, the entirely yellow first abdominal segments, the normal-sized third antennal segment, and the arista with two to four dorsal rays. It is most closely related to *T. glauca*

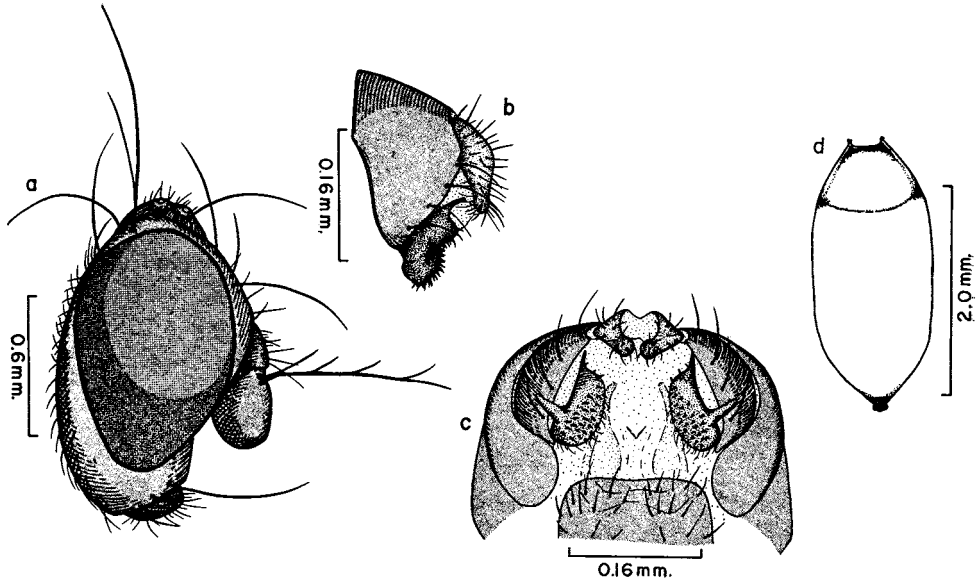


Figure 347—*Titanochaeta ichneumon* Knab: **a**, head, lateral; **b**, male genitalia, lateral; **c**, male genitalia, ventral; **d**, puparium.

n. sp. but is recognized by the yellow base of the abdomen and by the smaller third antennal segment.

Type in the United States National Museum.

In Wirth's comparison of this species with *T. swezeyi* Wirth, some the statements are misleading. He indicates that just one humeral and one sternopleural bristle are present; actually, each has a secondary bristle but the latter are rather small and are not well developed. He also indicates that the third antennal segment is dark-colored in *ichneumon*; actually, it varies from yellow to rufous and sometimes has the upper portion slightly tinged with brown. He also says that the wings have only one strong bristle at the end of the second costal section (first costal section of Wirth); actually, two distinct bristles are present at the second break of the costa. Also I am not sure how significant the smaller lower reclinate bristles would be in this case since the size of these is somewhat variable.

The following notes are based upon three topotypic specimens:

Front chiefly brown in ground color, yellow on the lower portion, densely covered with gray pollen. The lower reclinate bristles are situated slightly above the proclinate bristles. The vertical bristles are very strong; their length is slightly greater than the height of the head. The eyes are densely pubescent. The antennae vary from yellow to rufous; the third segment is tinged with brown above. The aristae are rather elongate and thickened, equal in length to about the width of the compound eye; each has two to four short dorsal rays on the basal half, plus a small apical fork (fig. 347a). The ground color of the thorax is largely yellow-brown, darker on the dorsum, and yellow on the sides of the

mesonotum and hind portion of pleura. The entire thorax is densely blue-gray pollinose. The mesonotum is thickly covered with suberect setae; eight rows of acrostichal setae are present at a level with the anterior dorsocentral bristles. The anterior dorsocentrals are situated about opposite the anterior supraalars. Each humerus has one strong and one weak bristle. Each sternopleuron has one rather weak bristle near the upper anterior corner and a rather strong bristle situated near the middle of the sclerite. The scutellum is bare except for the strong bristles. The legs are entirely yellow and are not ornate. The third costal section is about two and one-half times longer than the fourth. The fourth section is nearly two times longer than the fifth. Ultimate section of vein M_{1+2} two to two and one-half times longer than penultimate section. Last section of M_{3+4} two to two and one-half times longer than m crossvein. Abdomen predominantly brown, the first two segments yellow. Each clasper of the male genitalia is developed into a sharp spine on its outer edge (fig. 347b), and the ventral surface is rather densely covered with short thick spines (fig. 347c). The ninth tergum is not lobate. The sixth sternum is rather heavily sclerotized and densely bristled. The ovipositor plates are triangular in shape, moderately developed, the edges are entire, and each plate possesses about four or five short bristles at apex.

Length: body and wings, 1.7–1.9 mm.

NOTE: This is very probably the fly which Kirkaldy (1908:7) referred to as *Leucopis,* predaceous (parasitic) on the cane-hunting spider, *Pagiophalus atomarius* Simon (family Thomisidae). The puparium is abruptly narrowed on the anterior end and compressed dorsoventrally into a transverse anterior carina which is about one-third as wide as the greatest width of the puparium. The anterior spiracles are borne on the anterolateral angles of this carina, and each consists of five tubelike papillae arising fan-wise in a dorsoventral line. The posterior spiracles are situated on a rather strongly developed tubercle above the dorsoventral midline. The tubercle is about as wide as long. The distance between the spiracles is about half the distance between the anterior spiracles (fig. 347d).

Titanochaeta kauaiensis new species (fig. 348a–c).

This species is closely related to *T. ichneumon* but is differentiated by the differences in the male genitalia: the process on the inner edge of each clasper is short, not elongated (fig. 348b); also, the genitalia are shining black, rather than yellow; the mesonotum and scutellum are entirely black in ground color and the pleura all yellow. This species also fits the description of *evexa* rather closely, but the genitalia are very different.

MALE. *Head:* Eyes densely pubescent, narrowed on lower portion. The front margin of the eye expands over the margins of the face, as seen in direct lateral view, very similar in shape to the head of *ichneumon* (fig. 347a). The lower portion of the head is quadrate in shape as seen in lateral view and is about one-third as wide as the head through the median portion. One pair of very strong

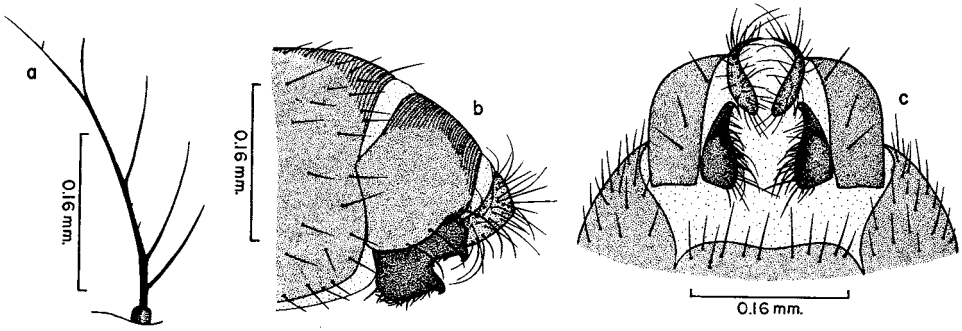


Figure 348—*Titanochaeta kauaiensis* n. sp.: **a**, arista; **b**, male genitalia, lateral; **c**, male genitalia, ventral.

oral vibrissae are present plus about four or five pairs of short black bristles. The genal bristle is moderately developed. The inner vertical bristles are about as long as the head. The upper reclinate bristles are slightly larger than the postocellars. The proclinate bristles are about two-thirds as long as the upper reclinates. The lower reclinate bristles are moderately developed, about two-thirds as long as the proclinates, and situated in line with the latter. The face, genae, lower occiput, and lower portion of front are clear yellow; the front is otherwise black in ground color, densely gray pollinose. The first two antennal segments are yellow, tinged lightly with brown on the upper portion; the second segment has one strong dorsal bristle plus numerous short black setae. The third segment is brown to black, densely gray pubescent, nearly two times longer than wide, and extends almost to the oral margin. The arista has four dorsal rays in addition to the short apical fork (fig. 348a). The face is rather strongly concave. The mouthparts are entirely yellow; the palpi are small, rather inconspicuous, and each has two small black bristles at apex. *Thorax:* Mesonotum and scutellum entirely dark brown to black in ground color, densely blue-gray pollinose. Humeri predominantly brown, pale-colored only along the lower margins. Pleura predominantly pale yellow, with a faint spot of brown in the middle of the upper mesopleuron, one in the upper pteropleuron, and one each in the middle of the hypopleuron and the metapleuron. The bristling is the same as in *evexa*. The metanotum is entirely brown to black, covered with gray pollen. The legs and wings are very similar to those of *evexa*, except that the costal fringe extends just slightly over one-third the distance between the tips of veins R_{2+3} and R_{4+5}. The third costal section is about 2.5 times longer than the fourth. *Abdomen:* First two segments yellow. Remainder of abdomen and genitalia shining black. The ninth tergum is nearly two times higher than long and is slightly tapered ventrally; the posteroventral margins of the tergum are lined with moderately strong bristles. From lateral view each clasper has a moderately strong median protuberance. The inner margin of each clasper is rather strongly concave on upper half (fig. 348b). The ventral aspects of the genitalia are as in figure 348c.

Length: body and wings, 1.9–2.0 mm.

FEMALE. Fitting the description of the male except for genital characters. The ovipositor is very similar to that of *evexa*. The females are separated from those of *evexa* and *ichneumon* by the completely black mesonotum, the predominantly black humeri, and also, by the entirely black abdominal segments four to six.

Holotype male: Alakai Swamp, Kauai, 5,000 feet, August, 1953 (D. E. Hardy). Allotype female: Halemanu Valley, Kauai, August, 1953 (D. E. Hardy). Nine paratypes (one male and eight females): from the following localities on Kauai—Kainamanu, 3,800 feet, July, 1952 (D. E. Hardy); Waialae Stream, 3,600 feet, August, 1953 (D. E. Hardy); Kokee, 3,600 feet, July, 1952 (D. E. Hardy); Nualolo Valley, 3,400 feet, July, 1952 (D. E. Hardy); and Mt. Waialeale Trail, 4,500 feet, August, 1953 (D. E. Hardy). These were all taken sweeping the ground cover in the rain forests.

Type and allotype in the B. P. Bishop Museum. The paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Titanochaeta setosiscutellum new species (fig. 349a–d).

This species is similar in appearance to *T. chauliodon* n. sp. from Maui. It is differentiated by having secondary setae along the sides of the scutellum, rather than being bare; the last section of vein M_{1+2} is 1.35 to 1.5 times longer than the penultimate section, rather than 1.15 times longer; and the arista has a small apical fork (fig. 349a), rather than a large apical fork (fig. 344a) or three branches at apex (fig. 344b). Since the females appear to be more distinctively marked than the males, I have picked a female as the type of the species.

FEMALE. A predominantly pale-colored species, marked with brown to black on the dorsum of the thorax and abdomen. *Head:* Almost two times higher than long as seen in direct lateral view; the lower margin of the head (gena) (measured from the strong bristle of the vibrissal row to the lower hind margin of the occiput) is approximately half as long as the front. The front is entirely golden yellow with but a slight tinge of brown along the upper orbits. The ocellar triangle, the portions of the vertex bordering the triangle, and the upper median portion of the occiput are dark brown to black in ground color, rather densely gray pollinose. The upper portion of the occiput is tinged with brown in ground color; the lower portion is entirely yellow. The genae, face, and mouthparts are pale yellow. One strong bristle is present at the upper portion of each vibrissal row; this is equal in size to the anterior dorsocentral bristle. Each palpus has one small, black, apical bristle and numerous yellow-brown setae around the margins. The face has a very slight carina down the median portion; the side margins are distinctly developed and are plainly visible in lateral view. The front, measured from the upper ocelli to the anterior median margin, is 1.5 times longer than wide. The upper reclinate bristles are situated just slightly below the lower ocellus. The lower reclinate bristles are about three-fifths to

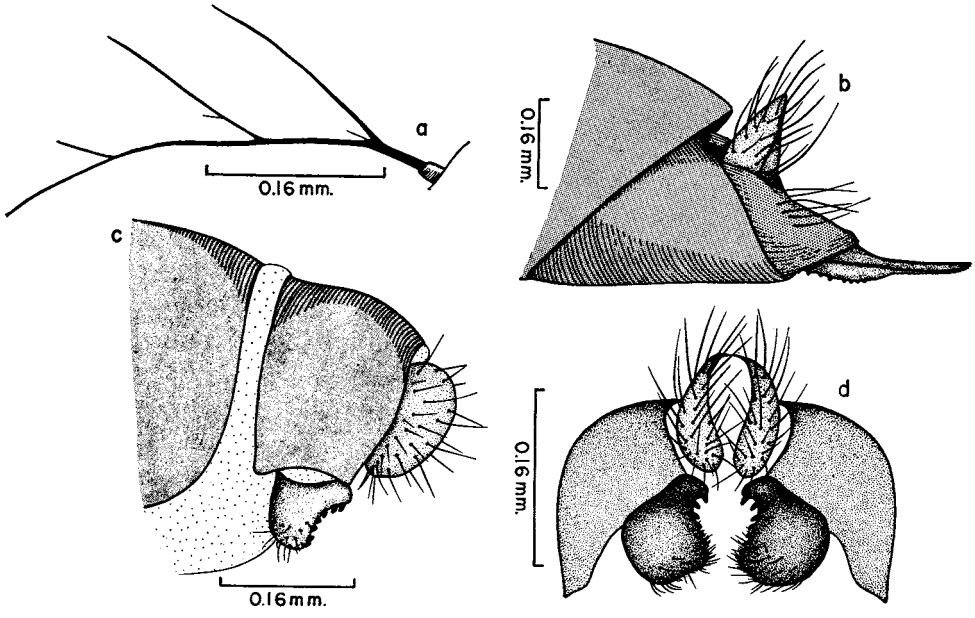


Figure 349—*Titanochaeta setosiscutellum* n. sp.: **a,** arista; **b,** female genitalia, lateral; **c,** male genitalia, lateral; **d,** male genitalia, ventral.

two-thirds as long as the proclinates and are situated distinctly above the latter. The antennae are yellow, tinged faintly with brown on the third segment; the second segment has two moderately strong dorsal bristles. The arista has two dorsal rays in addition to the apical fork (fig. 349a). *Thorax:* Predominantly yellow; dark brown to black on the dorsum of the scutellum, over the posterior half, and over the anterior median portion of the mesonotum. The dorsum of the thorax is rather densely gray pollinose, and the sides are yellow-gray pollinose. The anterior pair of dorsocentrals is situated approximately opposite the first (anterior) pair of supraalars. Six to eight rows of acrostichals extend over the anterior half of the mesonotum, and six irregular rows extend over the posterior half to just beyond the second pair of dorsocentrals. Two pairs of humeral bristles are present; the lower bristle is one-half to three-fifths as long as the upper. The anterior sternopleural bristle is approximately equal in size to the posterior bristle. A row of fine, brown to black hairs extends vertically over the posterior portion of each sternopleuron. *Legs:* Entirely yellow, thickly covered with short, black, recumbent setae. Each front and middle coxa has a row of long bristles extending over the dorsal and posterodorsal surfaces. The front basitarsus is about three-fifths as long as the tibia. The preapical dorsal bristle of the hind tibia is slightly less than one-third as long as the basitarsus. *Wings:* Entirely hyaline. The third costal section is 3.20–3.32 times longer than the fourth, and the costal fringe extends two-fifths to one-half the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is 1.5

times longer than the penultimate section. The last section of vein M_{3+4} is approximately 1.5 times longer than the m crossvein. *Abdomen:* The first tergum is yellow, tinged with brown in the median portion. Terga two to six are dark brown to black on the dorsum, yellow on the sides, and each has a narrow, white rim along the posterior margin. The ovipositor is slenderly pointed and is serrated ventrally, especially on the basal half (fig. 349b).

Length: body, 2.75–3.75 mm.; wings, 3.00–4.00 mm.

MALE. Two male specimens on hand from Hawaii National Park are obviously this species; they fit the females in most all respects except for sexual differences. The mesonotum is, however, predominantly rufous, brown to black on the posteromedian (prescutellar) and anteromedian portions, and faintly tinged with brown between the two marks. The front basitarsus is short, about one-third as long as the tibia. The dorsal portion of the abdomen is dark brown to black with a tinge of red in the ground color; the narrow apical margins of the terga are gray. The sides of the abdomen and the venter are yellow-red. The ninth tergum is dark brown to black. The remainder of the genitalia is yellow. From lateral view the tergum is about as long as high and nearly two times longer than the anal plates. The claspers are blunt at apices; each has seven, short, thick teeth along the upper margin (fig. 349c–d).

Length: body, 2.75 mm.; wings, 3.00 mm.

Holotype female: Puu Kolekole, Molokai, July, 1952 (M. Tamashiro). Allotype male: Hawaii National Park, Hawaii, 4,000 feet, August, 1952, at light (D. E. Hardy). Thirteen paratypes (1 male and 12 females): from the following localities—same as type, two taken July, 1953 (D. E. Hardy); Manawainui Valley, Molokai, July, 1952 (D. E. Hardy and M. Tamashiro); Puu Alii, Molokai, 4,200 feet, July, 1953 (D. E. Hardy); near edge of Waikolu Valley, Molokai, June 3, 1943 (N. L. H. Krauss); and Kilauea, Hawaii, August, 1958, in light trap (J. W. Beardsley).

Type, allotype, and one paratype in the B. P. Bishop Museum. The remainder of the paratypes are in the following collections: United States National Museum, British Museum (Natural History), and the University of Hawaii.

Titanochaeta silvicola new species (fig. 350a–e).

This species is closely related to *glauca* n. sp. but is readily differentiated by the gray pollinose abdomen, the narrower front, the difference in placement of the frontal bristles as shown in figures 346a and 350a, the all black male genitalia, and by other differences in genitalia as shown in figures 346c–d and 350d–e.

MALE. A predominantly black species, rather densely covered with gray pollen. *Head:* The front is predominantly black in ground color, yellow on the lower margin, and densely gray pollinose. A distinct indentation extends down each side of the front about halfway between the orbital bristle and the ocelli and nearly converges at the anterior margin of the front. The lower reclinate bristles are about one-half as long as the proclinates. The upper reclinate bristles are situated at the mid-line of the front, and the distance between the upper reclinate

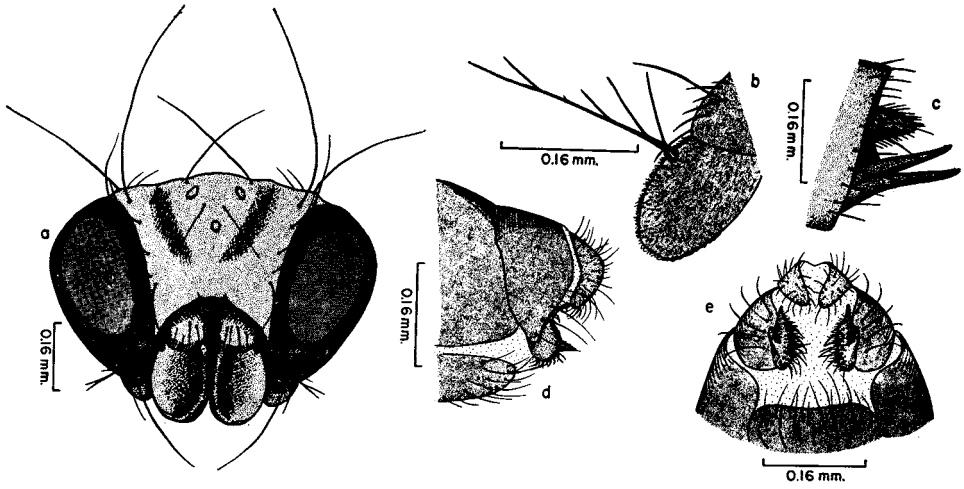


Figure 350—*Titanochaeta silvicola* n. sp.: **a,** head, frontal view; **b,** antenna; **c,** female genitalia, lateral; **d,** male genitalia, lateral; **e,** male genitalia, ventral.

and the proclinate bristles is about equal to the distance between the upper pair of ocelli. The occiput is brown except for the extreme lower margins. The genae are yellow. The face is yellow with a tinge of brown down the median portion and on the sides. The face is deeply concave on the sides with a slight carina down the median portion. The frontal view of the head is as in figure 350a. The first two antennal segments are yellow-brown; the third segment is dark brown to black. The arista has three dorsal rays and a tiny apical fork (fig. 350b). The mouthparts are entirely yellow. One strong bristle is present at the top of each vibrissal row; this is about equal in size to the ocellar bristles. *Thorax:* Black in ground color, densely blue-gray pollinose. The humeri are almost entirely black with only the extreme lateral margins tinged with yellow; only one humeral bristle is present. The acrostichal setae are arranged in about eight rows on the front portion of the mesonotum and in about six rows on the hind portion; the setae extend posteriorly to about opposite the posterior supraalar bristles. The sternopleural bristles are arranged as in *T. glauca* n. sp. The scutellum has no small setae on the sides. The metanotum is entirely black, densely gray pollinose. The halteres are yellow. *Legs:* Entirely yellow. I see no structural difference in the legs. *Wings:* Very faintly tinged with brown. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The third costal section is about two times longer than the fourth, and the fourth section is 2.5 times longer than the fifth. The penultimate section of vein M_{1+2} is slightly less than half the length of the ultimate section, and the last section of vein M_{3+4} is three times longer than the m crossvein. *Abdomen:* Subshining black in ground color, covered with gray pollen. The apex of the second tergum is narrowly yellow. The vestiture of the abdomen is predominantly black except for a clump of rather strong erect yellow-brown setae on each side of the first two terga and

for yellow setae over the dorsal portions of terga four to six. The genitalia are dark brown to black and show close relationship to *glauca* and to *ichneumon*. The lateral prolongations of the claspers are differently shaped as shown in figure 350d–e.

Length: body, 1.8 mm.; wings, 2.0 mm.

FEMALE. Fitting the description of the male in most respects. The ovipositor blades are slender and sharp-pointed as in figure 350c.

Length: body and wings, 1.9 mm.

Holotype male: Upper Olaa Forest, Hawaii, 4,000 feet, July, 1956, collected sweeping the ground litter in the fern jungle (D. E. Hardy). Allotype female and one paratype female: from Hawaii National Park, 4,000 feet elevation, collected at light, August, 1952 (D. E. Hardy).

Type and allotype in the B. P. Bishop Museum. Paratype in the University of Hawaii collection.

Titanochaeta swezeyi Wirth (fig. 351a–f).

Titanochaeta swezeyi Wirth, 1952, Proc. Haw. Ent. Soc. 14 (3) :415.

Endemic. Maui (type locality: Haiku). Previously known only from the type locality and from one female specimen from Mt. Tantalus, Oahu, which, Wirth said, "Agrees very well with the type series from Maui." One male from Puu Kapele, Kauai, February, 1916 (O. H. Swezey), and one female from Puu Kaua, Oahu, June 22, 1924, *ex* spider eggs (O. H. Swezey), seem to fit this species.

Host: Reared from spider egg masses (host spider not known).

Type in the United States National Museum.

This species is readily distinguished from all other known *Titanochaeta* by the very short penultimate section of vein M_{1+2} and by the infuscated crossveins. Its all-yellow color and the two strong sternopleural bristles ally it to *T. bryani* Wirth, but, as pointed out under that species, the two are quite distinct.

The following notes are taken from the original description. Predominantly subshining yellow, with face, cheeks, mesonotum, scutellum, and pleura whitish pruinose. The front more or less dull brownish yellow and the abdomen brownish above. Antenna entirely yellow, arista with only two or three rays. In the specimen at hand from Tantalus, the arista has only one dorsal ray in addition to the small apical fork (fig. 351a). The face is not as concave as that of *T. ichneumon*, and the median carina is distinct. The genae are about one-fifth the height of the eye in the male and slightly narrower in the female. The compound eyes are sparsely covered with short hairs. The lower reclinate bristle on the front is about three-fourths as long as the proclinate bristle. Each humerus has one strong and one weak bristle, and each sternopleuron has two strong bristles and a few fine hairs. Scutellum with four or five short hairs on each side. The wings are brownish hyaline; the veins are yellowish with the crossveins dark brown. The costal fringe extends about two-fifths the distance between the tips of veins R_{2+3} and R_{4+5}. Wirth's drawing of the wing (1952: fig. a) shows the costa ending at the apex of vein R_{4+5}; this is not correct, and in the specimens

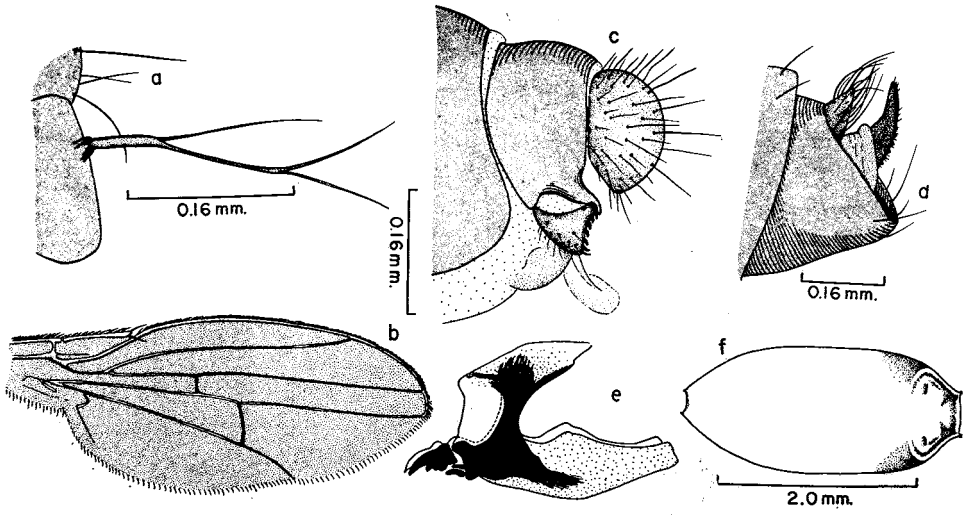


Figure 351—*Titanochaeta swezeyi* Wirth: **a,** arista; **b,** wing (copied from Wirth but with costa extended to $M_{1\ 2}$); **c,** male genitalia, lateral; **d,** female genitalia, lateral; **e,** cephalo-pharyngeal skeleton of larva (copied from Wirth); **f,** puparium.

at hand it extends to vein M_{1+2}. The third costal section is 2.8 times longer than the fourth (second and third sections of Wirth). The ultimate section of vein M_{1+2} is 3.8 times longer than the penultimate section. The m crossvein is slightly longer than the penultimate section of M_{1+2} and about three-fourths as long as the ultimate section of vein M_{3+4} (fig. 351b). Based upon the specimen from Kauai, the ninth tergum of the male is rather broad, not at all narrowed dorsally, and the claspers are short, triangular in shape, and each has six short teeth along the margin (fig. 351c). Based upon the female specimen from Oahu, the ovipositor plate is slender, is drawn out into a sharp point at apex, and has a series of short bristles and serrations along the ventral margin (fig. 351d).

Length: body, "about 3 mm., wing 2.7 mm.," quoted from Wirth.

In the female specimen from Tantalus the body and wings measure 2.3 mm.; but the specimen is teneral and the wings are somewhat crumpled and I cannot be sure of the exact measurement of the latter.

Wirth has adequately described the puparia and the larvae. The puparium is very similar to that of *ichneumon* but differs in the development of the posterior spiracles, which are not situated on a common tubercle as in that species (fig. 351f). The puparia of *swezeyi* and *bryani* are apparently very similar. The cephalopharyngeal skeleton of the larva is as in figure 351e.

Titanochaeta vittiger new species (fig. 352a–b).

This species is readily differentiated from other known Hawaiian *Titanochaeta* by the vittate mesonotum. Also, the eyes are nearly bare, and the lower margin of the head is almost as long as the front.

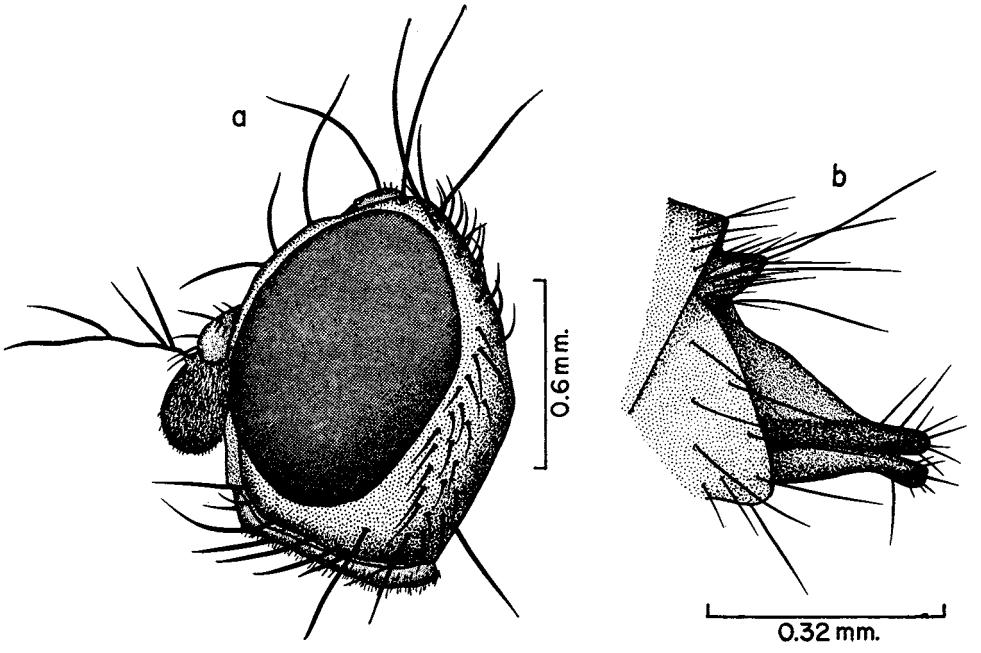


Figure 352—*Titanochaeta vittiger* n. sp.: a, head; b, female genitalia, lateral.

FEMALE. A predominantly yellow species marked with black on the dorsum of the thorax and abdomen. *Head:* Approximately 1.6 times higher than long as seen in lateral view (fig. 352a). Measured from the median ocellus to the front median margin, the front is as long as wide. The head is completely yellow, except that on each side of the vertex a brown discoloration extends posteriorly over the upper portion of the occiput, and another is found in the ocellar triangle. The anterior reclinate bristle is about four-fifths as long as the proclinate and is situated about two-fifths the distance from the proclinate to the upper reclinate bristle. The ocellar bristles are curved forward and are about equal in size to the outer vertical bristles. The postocellar bristles are approximately equal in size to the uppermost bristle of each vibrissal row. The antennae are entirely yellow. The second segment has several black bristles on the dorsal surface. The arista has two dorsal rays in addition to the apical fork; these are situated close together near the base (fig. 352a). Four or five moderately strong bristles are present in each vibrissal row; the uppermost bristle is the strongest. The mouthparts and palpi are entirely yellow; each palpus has a strong, black bristle at the apex. *Thorax:* Almost entirely yellow, with three narrow, dark brown vittae extending the entire length of the mesonotum, plus an interrupted vitta on each side. The median vitta expands posteriorly in front of the scutellum, filling all of the area between the posterior pair of dorsocentral bristles. A dark brown spot is present on each side behind the humerus, and a short brown vitta extends on

each side from just behind the suture to a point opposite the wing bases, where it joins the submedian vitta. The scutellum has a large dark-brown to black spot extending over the basal half. The anterior dorsocentral bristles are situated slightly in front of a line drawn between the second (posterior) pair of supraalars. About eight rows of acrostichal setae are present. Only one strong bristle is developed on each humerus. The anterior sternopleural bristle is about one-half as long as the posterior bristle. A secondary median bristle is rather well developed approximately halfway between the two sternopleural bristles and is almost equal in length to the anterior bristle. *Legs:* Entirely yellow except for the brown apices of the tarsi. Each front coxa has a row of about eight moderately strong bristles, plus numerous black setae extending down the dorsal surface. Femora rather slender; the posterodorsal and posteroventral bristles are moderately developed. The preapical dorsal bristle on the front tibia is developed and extends about half its length beyond the apex of the tibia. The front basitarsus is about one-half as long as the tibia and approximately two times longer than the next tarsal segment. Each middle and hind coxa has a row of black bristles extending down the anterodorsal surface. *Wings:* Entirely hyaline. The third costal section is five times longer than the fourth. The costal fringe extends about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5}. The last section of vein M_{1+2} is about 1.2 times longer than the penultimate section. *Abdomen:* Each tergum has a broad, dark-brown to black band across the posterior portion; the bases and sides of the terga are yellow. The sternum is entirely yellow. The ovipositor blades are rather slender, but are flat at the apices (fig. 352b).

Length: body and wings, 3.7 mm.

MALE. Unknown.

Holotype female: Kokee Valley, Kauai, August, 1953 (D. E. Hardy).

Type in the B. P. Bishop Museum.

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