

X. New Picture-Winged *Drosophila* From Hawaii¹

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INTRODUCTION

Approximately 50 percent of the species of Hawaiian *Drosophila* have maculations of some sort in the wing and many are highly ornate. These obviously comprise numerous species groups and with the present state of our knowledge, it is possible to set up rather few clear-cut species complexes. It becomes obvious that species complexes can not be established on external morphological characters alone. It appears that convergence and parallelism of characters has occurred frequently in the native *Drosophila*. Dr. Hampton L. Carson has been conducting intensive comparative studies of the chromosome sequences of picture-winged species and he is building a phylogeny based upon analyses of the chromosomal inversions (Carson, Clayton and Stalker, 1967). Also, his conclusions have been corroborated by K. Y. Kaneshiro based upon his comparative studies of phallic structures of picture-winged species. The major purpose of the present paper is to describe the new species which have been used (and will be used) for these studies.

This study deals with some of the complexes of picture-winged species which have the labella fleshy, not armed with spines, processes or with a sclerotized black rim on the margin. One group, the *adiastola* complex, is characterized by having the front basitarsus of the male broad and flattened laterally (fig. 9d, Hardy, 1966:216) and the wings predominantly brown to black with hyaline spots (figs. 28b, 29a and 30c). Also a large heterogeneous grouping consisting of several complexes of flies is characterized by having a prominent subbasal brown mark on wing, an apical and basal spot in cell R_1 , a large spot over m crossvein, and usually large, often confluent, spots at apices of veins R_{2+3} , R_{4+5} , and M_{1+2} . Many species have a narrow to broad mark near middle of cell R_1 (*pilimana*-like) and many have a complete band across wing at level of m crossvein (*hawaiiensis*-like).

Also, a small group (*semifuscata* complex) of modified mouthparts species is being treated which have the entire front portion of the wing from the margin over the m-cu crossvein brown, lacking hyaline marks; the thorax reddish brown to black in ground color, rather densely pollinose, not polished black or yellow to rufous with brown vittae.

We are also including one new species (*inciliata*) of the *haleakalae* complex (black rim on labellum, polished black with pale apex on scutellum, apex of wing brown to black and a brown mark on m crossvein); and two strange species,

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hamifera n. sp. and *primaeva* n. sp., which fit none of the known groups. The latter is not a picture-wing, although the entire wing is colored brownish yellow and a faint indication of a brown mark is present over m crossvein. It is included here since it is a highly significant species from the standpoint of phylogenetic studies, and appears to represent the most primitive species which has been studied to date.

We have made considerable progress in gaining an understanding of the picture-winged species. Detailed ecological and behavioral studies have demonstrated that the majority of the species of these groups breed in rotting bark, fruits, flowers and leaves of several genera, and many species of Lobelliaceae (predominantly *Clermontia*). Also, it is now possible to predict fairly accurately where flies will be found and the collection techniques have been drastically revised. The most successful techniques are use of special baits and visually searching out flies in their resting or congregating places. Sterilized banana baits seeded with yeasts which have been isolated from rotting *Clermontia* bark are strongly attractive to many of the species. These are smeared on tree trunks and limbs in special environments which can be determined only by highly trained field personnel. The baits, if properly aged, are usually effective within minutes after they are put out and the flies are collected individually by "popping" a vial over each fly. They fly up directly into the vial and experienced collectors capture a high percentage of the flies they go after.

The visual techniques is unique for our situation here. We have learned that the adults frequent certain types of habitats in the forest: underside of branches which extend in a horizontal, or more or less horizontal, position; main trunks of trees; *Cibotium* fern fronds; etc. Under adverse dry conditions, adults may hide in cracks in bark or in "pockets" formed by abnormal branches or roots. These flies are exceptionally well camouflaged and are extremely difficult to see in their natural environment. They are most readily "spotted" in profile. Collecting these flies requires very keen eyesight, much knowhow and considerable luck.

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D. pilimana-like and *D. hawaiiensis*-like Complexes

The *D. pilimana*-like species treated here are characterized by having three brown spots in cell R_1 , one at base of cell, one near middle, and one at apex; by having one spot each at apices of veins R_{2+3} , R_{4+5} and M_{1+2} (or with these marks fused together over the wing apex); and one spot over the m crossvein, as in figure 3b. Vein R_{1+2} lacks a brown marking in the median portion. Also, by having the mesonotum predominantly brown, cinereous to yellow-grey vittate and front tarsi and usually tibiae of the male conspicuously ciliated (figs. 3a and 24b).

The previous concept of *pilimana* in the literature included a complex of species. The cytological studies of Dr. Hampton L. Carson, and the cross mating and genetic isolation experiments performed in the laboratory have demonstrated

that several distinct species belong in this complex and it appears evident that each of the major Hawaiian Islands may have a distinct species of the *pilimana* complex. Typical *pilimana* is apparently confined to the Island of Oahu.

The *D. hawaiiensis*-like species are characterized by having a subbasal brown spot, large confluent spots at apices of veins R_{2+3} , R_{4+5} and M_{1+2} and with a transverse band across the middle of the wing at the level of the m crossvein (fig. 6c) or at least with a spot in the middle of vein R_{1+2} and over the m crossvein (fig. 23b). The front tarsi and usually tibiae of the male are conspicuously ciliated as in figure 6a and 7a.

Members of these groups of species are readily attracted to baits seeded with yeasts isolated from rotting *Clermontia* bark. The best techniques for collecting these flies is by use of baits and by use of the visual technique described in the introduction.

No host associations have been made and the breeding habits in the field are not known for any of the *pilimana*-like and *hawaiiensis*-like species. Several of the species have, however, been established in laboratory cultures and do well on Wheeler-Clayton medium (Wheeler and Clayton, 1965, *Drosophila* Information Service 40:98).

This is obviously not a natural grouping and probably several species groups are included in this concept. This treatment is only one of convenience to bring together the species which have a pattern of wing markings similar to that of *pilimana* and *hawaiiensis*. When more complete genetic studies have been made, it is probable that only a few of these species will be considered in the *pilimana* complex and *hawaiiensis* complex. It is also possible that species which are found to be genetically closely related may come from both the *pilimana*-like species and from the *hawaiiensis*-like species as treated in this study.

Key to *D. pilimana-hawaiiensis* complexes

1. Wing with transverse band across middle at level of m crossvein or with spot in middle of R_{1+2} (figs. 7c, 12b and 21c) 26
 *D. hawaiiensis*-like species.....
- 2(1). Not as above (figs. 1b, 3b and 24c)..... *D. pilimana*-like species..... 2
- 2(1). Front tibia of male with dorsal ciliation (figs. 1a, 2a and 3a) 6
 Front tibia lacking ciliation. Front basitarsus with clumps of black hairs in various arrangements or lacking ciliation (figs. 9a, 16a and 17a) 3
- 3(2). Front basitarsus with clumps of black hairs in various arrangements (figs. 9a, 9c and 16a) 4
 Front tarsi lacking ciliation (fig. 17a). Each palpus with two yellow hair-like bristles arising on ventroapex, one of these is much longer than the palpus (fig. 17c). Mesonotum rufous, tinged faintly with brown but not distinctly vittate. Wings with a faint brown mark before middle of Cell R_1 (fig. 17b)..... Maui *prostopalpis* n. sp.
- 4(3). Front basitarsus with a fascicle of long black hairs near middle of basitarsus (fig. 9e) Molokai, Maui *fasciculisetae* Hardy

	Front basitarsus with a line of dorsal hairs at base or a clump of hairs just before apex (figs. 9a and 16a)	5
5(4)	Basitarsus with a line of about six long black dorsal hairs near base (fig. 9a)	
	Maui	<i>lineosetae</i> n. sp.
	Basitarsus with a clump of dorsal hairs just before apex (fig. 16a)	
	Maui	<i>pilatisetae</i> n. sp.
6(2)	Cell R ₁ with a brown marking near middle	7
	Cell R ₁ lacking brown markings except at extreme base and at apex (figs. 1b and 25d). (Note that due to the sexual dimorphism in the wing of <i>punahua</i> , the males would fit here while the females would fit above; key is based on males)	18
7(6)	Crossvein r-m not covered by an isolated brown spot (figs. 4b, 24c and 26b). Thorax marked with brown at least on disc of scutellum, except in <i>vesciveta</i> . Preapical dorsal bristle of front tibia much smaller than first oral bristle	8
	Crossvein r-m covered by an isolated brown spot (fig. 26f). Thorax entirely rufous. Preapical dorsal bristle of front tibia large, almost equal to first oral bristle (fig. 26e)	
	Hawaii	<i>ochracea</i> Grimshaw
8(7)	At least disc of scutellum marked with brown. Preapical dorsal bristle of front tibia conspicuous, at least equal in size to apical ventral bristle	9
	Thorax entirely rufous. Preapical dorsal bristle of front tibia tiny, about half the size of the apical ventral bristle and scarcely differentiable from the short setae on the tibia. Ornamentation of front legs as in figure 26a and wings marked as in figure 26b	
	Maui	<i>vesciveta</i> n. sp.
9(8)	Mesonotum yellow in ground color with or without brown vittae. Pleura all yellow or with a small brown spot below wing base	10
	Mesonotum brown in ground color with cinereous to yellow-gray pollinose vittae. Pleura conspicuously marked with brown to black	13
10(9)	Brown spot in cell R ₁ elongate, half as long as cell and equal in length to M ₁₊₂ between r-m and m crossveins. Wing long and slender, rather pointed. (Questionable placement, only female definitely known)	
	Lanai, Oahu?	<i>lanaiensis</i> Grimshaw
	Not as above	11
11(10)	Mesonotum rufous, faintly tinged with brown but not with distinct vittae. Disc of scutellum brown	12
	Mesonotum with prominent dark brown to black vittae. Scutellum with a brown stripe on each side, yellow down the middle. Front legs as in figure 24g	
	Hawaii	<i>engyocharacea</i> Hardy
12(11)	Basal third of front tibia bare of cilia; cilia of front basitarsus curled (fig. 24b). Subbasal wing spot large and conspicuous, filling basal cells to r-m crossvein; r-m about opposite end of vein R ₁	
	Hawaii	<i>sproati</i> n. sp.
	Front tibia ciliated to base; cilia of basitarsus straight or nearly so (fig. 19a). Subbasal wing spot small and r-m situated well beyond apex of R ₁ (fig. 19b)	
	Kauai	<i>sejuncta</i> n. sp.

- 13(9) Subbasal wing spot small, extending scarcely into basal portion of cell R_2 and not involving r-m crossvein (fig. 22c and 3h) 14
 Subbasal spot large and conspicuous, extending into the upper portion of cell M_2 and involving the r-m crossvein (fig. 3b) 17
- 14(13) Basal portion of front tibia devoid of long cilia (figs. 3g, 8a, 13a). Subbasal wing spot prominent (fig. 3h). Entire hind margins of terga 2-5 brown 15
 Cilia on front tibia extending to base of segment. Subbasal wing spot reduced to a narrow streak of brown (fig. 22c). Terga entirely yellow on sides, apical brown bands narrow, not reaching lateral margins (fig. 22b) Maui *sodomae* n. sp.
- 15(14) Front tibia and tarsus with long, straight, dorsal cilia, the hairs are two or more times longer than the preapical dorsal bristle. Front basitarsus about one-half as long as the tibia (fig. 3g) Oahu *pilimana* Grimshaw
 Cilia of front legs short, those on tibia are shorter than preapical dorsal bristle; those on tarsus are curved. Preapical dorsal bristle large, two times apical ventral bristle. Front basitarsus about two-thirds as long as the tibia (fig. 8a) 16
- 16(15) Hind tarsi brown to black. Second spot on vein R_{2+3} at middle of cell R_1 brown and almost directly above m crossvein (fig. 13b). Spots at apices of veins R_{2+3} , R_{4+5} and M_{1+2} not confluent (fig. 13b) Maui *orphanopeza* n. sp.
 All tarsi yellow. Second spot on vein R_{2+3} at about basal two-fifths of cell R_1 and distinctly in front of m crossvein (fig. 8b). Entire apex of wing brown (fig. 8b) Maui, Lanai *limitata* n. sp.
- 17(13) Apical half to two-fifths of front tibia devoid of long hairs (fig. 5b). Pleura almost all dark brown to black. Pollinose vittae on mesonotum indistinct (fig. 5a) Kauai *glabriapex* n. sp.
 The dorsal cilia on front tibia extend almost to the preapical dorsal bristle (fig. 3a). Pleura conspicuously marked with yellow and yellow-grey vittae distinct on mesonotum (fig. 3c) Maui *discreta* n. sp.
- 18(6) Front with a dense patch of setae on each side. Proclinate bristle small, anterior reclines not discernible and posterior reclines and ocellars rudimentary, scarcely larger than surroundings setae (fig. 20b) Hawaii *setosifrons* n. sp.
 not as above 19
- 19(18) Front tibia with long dorsal cilia from base to preapical dorsal bristle 20
 Front tibia with cilia only on the apical two-thirds or only on the basal one-fourth to one-third 23
- 20(19) Front basitarsus one-half as long as tibia and with three dorsal cilia (fig. 25b). Only median brown vitta distinct, lateral markings rather faint and interrupted at the suture Oahu *uniseriata* n. sp.
 Basitarsus nearly two-thirds as long as tibia and with about twelve dorsal cilia. Three dark brown vittae extend entire length of meso-

	notum	21
21(20)	Wing with a small brown spot on cell R_2 distinctly beyond level of m crossvein. Subbasal wing spot large, extending to r-m crossvein. Crossvein r-m about opposite end of vein R_1 . Lower face, clypeus and lower margin of gena brown to black. Palpal bristle elongate, yellow, hair-like, much longer than segment (fig. 11a)	
	..... Hawaii	<i>macrothrix</i> n. sp.
	No such spot in R_2	22
22(21)	Apical bristle on palpus about equal in length to segment. Crossvein r-m situated well beyond end of R_1 (fig. 2c). Mesonotum with three broad, brown vittae (fig. 2b)	Hawaii
	.....	<i>digressa</i> n. sp.
	Palpi of male devoid of distinct bristles; a moderately strong apical bristle is present in the female. Crossvein r-m situated opposite end of R_1 . Mesonotum with four narrow brown vittae	
	..... Oahu	<i>purahua</i> Bryan
23(19)	Front tibia with only two anterior or dorsal cilia just before apex or with ciliation extending over the apical two-thirds (figs. 15a and 83a, Hardy, 1965:253)	24
	Front tibia with a row of 5-6 long dorsal hairs on basal one-fourth to one-third and basitarsus with short erect dorsal hairs extending the entire length (fig. 1a)	Hawaii
	.....	<i>basisetae</i> n. sp.
24(23)	Front tibia with only two long dorsal or anterior cilia just before the apex	25
	Front tibia with numerous long dorsal and anterior ciliation extending over the apical two-thirds (fig. 83a, Hardy, 1965:253). Mesonotum with submedian brown vittae extending the entire length and with a brown vitta on each side	Oahu
	.....	<i>distinguenda</i> Hardy
25(24)	Front tibia with two prominent preapical anterior cilia and tarsus with three long straight anterodorsal cilia evenly arranged down the segment (fig. 5a)	Hawaii
	.....	<i>paucipuncta</i> Grinstead
	Front tibia with two erect cilia on the dorsal surface just before the preapical dorsal bristle and tarsus with numerous long black hairs extending down the anterodorsal and posterodorsal surfaces	
	..... Oahu	<i>inedita</i> Hardy
26(1)	Front tibia of male lacking long ciliation	27
	Front tibia with long dorsal ciliation	31
27(26)	Front basitarsus flattened laterally with a dense clump of strong dorsal hairs extending over the apical half of the segment	
	..... Oahu	<i>tarphytrichia</i> Hardy
	Front basitarsus not flattened on apical half. Ciliation extends over entire length of the segment	28
28(27)	Mesonotum yellow except for a dark brown vitta down the middle. Crossvein r-m situated at middle of cell 1st M_2 and surrounded by a small brown spot. Front tarsi with very sparse ciliation (fig. 22a)	
	..... Oahu	<i>spaniothrix</i> n. sp.
	Not as above	29
29(28)	Mesonotum with a broad yellow vitta down the middle, hind portion	

- yellow in ground color. Propleura yellow. Cilia of front basitarsus long at base, gradually shortened toward the apex (fig. 6a).....
- Oahu *gradata* n. sp.
 Thorax almost entirely dark brown to black with a rather faint narrow grey median vitta on mesonotum 30
- 20(29) Spot in middle of R_{1+2} situated basad of spot on R_{2+3} (fig. 144b, Hardy, 1965:376) Kauai *musaphila* Hardy
 Spot in middle of R_{1+2} situated directly below spot on R_{2+3} (fig. 108b, Hardy, 1965:229) Hawaii *hawaiiensis* Grimshaw
- 31(26) Crossvein r-m situated at or near middle of cell 1st M_{2+3} , penultimate and antepenultimate sections of vein M_{1+2} equal in length (measured to break opposite m-cu crossvein), a prominent isolated brown spot present on r-m crossvein. Elongate anterodorsal and posterodorsal cilia extend over front tarsus and entire tibia (fig. 7a, 10a and 12a) except in *silvarentis* (fig. 21c) 32
- Crossvein r-m situated well before middle of 1st M_{2+3} , if an isolated brown spot is present on r-m (*flexipes*) the front femur and tibia are strongly bent (fig. 4a). Cilia of front tibia usually not as above 36
- 32(31) Median portion of cell R, brown (figs. 12b and 21c) 33
- Cell R, hyaline except at apex and base (fig. 10b). Mesonotum rufous with four brown vittae as in figure 10c Maui *liophallus* n. sp.
- 33(32) Thorax brown to black in ground color, densely greyish pubescent on mesonotum and with four brown vittae on mesonotum. Disc of scutellum brown 34
- Thorax rufous in ground color. Mesonotum with faint brown median vitta. Scutellum entirely rufous. Aedeagus toothed (fig. 12d) Maui *odontophallus* n. sp.
- 34(33) Palpi, except for moderately strong apical bristle, not covered with long setae (figs. 7f and 21a) 35
- Palpi with a long, slender apical bristle and covered with long setae (fig. 7b). Front tibia and tarsus with long anterodorsal and posterodorsal ciliation. Maui *hirtipalpus* n. sp.
- 35(34) Legs dark brown to black with only a single row of cilia on the posterodorsal surface of the front tibia and tarsus (fig. 21b) 36
- Hawaii *silvarentis* n. sp.
 Legs mostly yellow to light brown with two rows of cilia extending down the anterodorsal and posterodorsal surfaces of the front tibia and tarsus (fig. 21f) Maui, Molokai *villitibia* Hardy
- 36(31) Brown marking at or near middle of cell R_1 narrow, usually about equal in length to the m crossvein (figs. 4c, 14b and 18b) 38
- Brown marking in cell R_1 elongate, equal to half the length of the cell and equal or slightly longer than the section of vein M_{1+2} between the r-m and m crossveins (fig. 27b) 37
- 37(36) Front tibia with dorsal cilia from about apical two-fifths to the pre-apical dorsal bristle (fig. 68a, Hardy, 1965:225). Mesonotum with three brown to black vittae extending the full length. Scutellum brown to black on the disc Hawaii *conspicua* Grimshaw

- Front tibia with a row of dorsal and anterodorsal ciliation extending the entire length of the segment (fig. 27a). Mesonotum yellow in ground color with three brown to black vittae extending the full length (fig. 27c) Maui *virgulata* n. sp.
- 38(36) Front femur and tibia normal in shape, not contorted 39
- Front femur and tibia conspicuously flexed (fig. 4a). Femur narrowed at apex, tibia narrowed at base and with a dense brush of black dorsal hairs at base. Crossvein r-m covered with a brown spot (fig. 4b) Oahu *flexipes* n. sp.
- 39(38) Front tibia and tarsus devoid of ciliation except for four long black hairs at the base of the tibia (fig. 171d, Hardy, 1965:428). Vein M_{2+4} with a broad brown streak extending nearly four-fifths its length (fig. 171c, Hardy, 1965:428) Hawaii *prolaticilia* Hardy
- Front tibia and tarsus with at least three and usually numerous long cilia extending throughout each segment (fig. 109a, Hardy, 1965: 301; 14a and 18a). Vein M_{2+4} without brown markings 40
- 40(39) The transverse band across middle of wing at level with m crossvein is parallel-sided (fig. 14b), the mark in cell R_1 is not broader than the rest of the band. Precapical dorsal bristle of front tibia prominent, about two times longer than the ventral bristle 41
- The brown mark in cell R_1 is two or more times broader than the mark near middle of vein R_{4+5} forming a brown triangle which connects with the brown band over the m crossvein (fig. 18b). Precapical dorsal bristle of tibia minute, smaller than the ventral bristle. 44
- 41(40) Front tibia with only three or four long cilia on the dorsal surface and three on the basitarsus (fig. 109a, Hardy, 1965: 301) Oahu *hexachaetae* Hardy
- Front tibia and basitarsus with numerous dorsal cilia extending the entire length of each segment 42
- 42(41) Coxae and femora dark brown to black. Crossband situated at apical three-fifths of wing Kauai *villosipedis* Hardy
- Legs yellow. Crossband near middle of wing 43
- 43(42) Dorsal surface of front basitarsus densely covered with curled cilia arranged in three rows (fig. 61b, Hardy, 1965:208) Hawaii *ciliaticrus* Hardy
- Basitarsus with a single complete row of about six anterodorsal cilia and with two or three rather inconspicuous dorsal cilia at middle of segment (fig. 14a) Maui *orthofuscia* n. sp.
- 44(40) Costal fringe extends one-half the distance between apices of R_{1+5} and M_{1+2} . Palpi, mouthparts, coxae, femora brown Maui *recticilia* n. sp.
- Costal fringe longer, about three-fourths the distance between apices of R_{1+5} and M_{1+2} . Palpi, mouthparts, coxae, femora yellow. Oahu n. sp. or pale specimens of above?

Drosophila basisetae n. sp. (Figs. 1a-e)

This species appears closely related to *paucipuncta* Grimshaw and is differentiated by the characteristics of the front leg; by having five to six long black

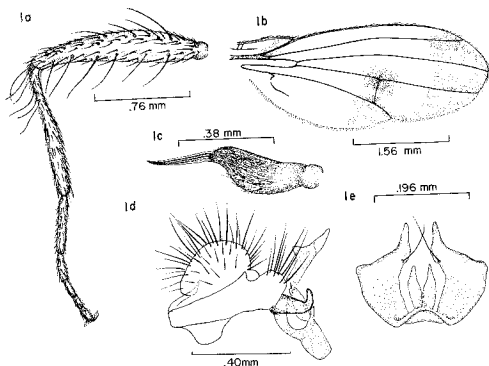


FIG. 1. *Drosophila basisetae* n. sp.: a. front tibia and tarsus; b. wing; c. palpus; d. male genitalia (lateral); e. hypandrium (ventral).

dorsal hairs near the base of the front tibia and lacking long ciliation on the front basitarsus. Compare figures 1a and 15a. Also, the pleura are yellow except for a streak of brown across the upper portion of the mesopleura and each palpus has several, apparently three or four, closely appressed long, yellow setae at the apex (fig. 1c).

Male. Head: Front dark brown below the level of the proclinate bristles, upper portion yellow on the orbits and down the middle and yellow-brown with a golden sheen in the submedian areas. Face slightly raised down the median portion and projected slightly on the epistomal margin. Clypeus, palpi and mouth-parts yellow. Labella fleshy. Mentum setose on apical two-fifths to one-half. Each palpus has a clump of closely appressed, moderately long yellow setae at the apex (fig. 1c). Anterior reclinate bristles small, less than two times longer than the setae down the sides of the front and situated half-way between the proclimates and the upper reclimates. Upper reclinate and ocellar bristles about equal in size. Proclimates equal to the upper bristle of the oral margin. Third antennal segment yellow-brown, second brown on the dorsum. Arista with about ten dorsal rays and four ventral in addition to the small apical fork and with the inner surface setose over most of the length. **Thorax:** Predominantly yellow, tinged with brown on the mesonotum and distinctly brown, tinged with yellow on the disc of the scutellum. Pleura yellow except for a narrow rim of brown along upper margin of each mesopleuron. Anterior sternopleural bristles about opposite the second supraalar. Lower humeral bristle about two-thirds as long as upper. Anterior sternopleural

bristle two-thirds to three-fourths as long as posterior. *Legs*: Yellow except for brown apical tarsomeres. Front tibia with six moderately long black dorsal hairs on basal one-fourth to one-third and about four fine anterodorsal, brownish yellow hairs at base. Front basitarsus about half as long as tibia and with short erect dorsal hairs over most of its surface (fig. 1a). Preapical dorsal bristle of front tibia small, shorter than the ventral apical bristle. *Wings*: Subhyaline with the apical spots on veins R_{2+3} , R_{1+2} and M_{1+2} confluent with a large, rather dumbbell shaped mark over the m crossvein and a prominent subbasal spot (fig. 1b). The r-m crossvein is situated just before the apex of vein R_1 . The costal fringe extends approximately three-fifths the distance between the apices of veins R_{2+3} and R_{1+2} . The third costal section is slightly over four times longer than the fourth. *Abdomen*: First tergum and base of second clear yellow. Anterolateral margins of terga 3-6 yellow, abdomen otherwise subshining dark brown to black. Genitalia as shown in figures 1d and 1e. The shape of the aedeagus (fig. 1d) and hypandrium (fig. 1e) would place this species in the *paucipuncta* group. The apical sensilla are minute.

Length: body, 4.6 mm.; wings, 5.6 mm.

Female: Similar to male except for sexual characters. Ovipositor has not been studied.

Length: same as in male.

Holotype male, allotype female and four paratypes (two of each sex) from Mountain House above Naalehu, Hawaii, 2750' elevation, December 19, 1967. Holotype collected by K. Y. Kaneshiro, allotype collected by J. Tenorio and paratypes collected by H. L. Carson, G. Ota, and K. Y. Kaneshiro. Also one paratype male, Olan Forest Reserve, Hawaii, November 26, 1965 (J. K. Fujii).

Type and allotype in B. P. Bishop Museum, paratypes in the University of Hawaii collection.

Drosophila digressa n. sp. (Figs. 2a-e)

We are unable to relate this to any known species of *Drosophila* in the key (Hardy, 1964:84); it would run imperfectly near *megasticta* (couplet 37) but it obviously fits close to nothing in this section of the key. The wing markings differ from all known species of Hawaiian *Drosophila* by having a small spot of brown at the middle of vein R_{1+2} but lacking a brown mark in the middle of cell R_1 (fig. 2c). This species shows some resemblance to *engyochracea* Hardy and *punalua* Bryan, but the details of the wing and thoracic markings are very different and the ornamentation on the legs is distinctive. It should be noted that because of the continuation of the brown marking from the m crossvein over the middle of vein R_{1+2} this species would not fit well beyond couplet 21 of the key.

Male. Head: The front is yellow in ground color, tinged with golden brown through the interfrontal areas. The upper portion of the occiput is brown covered with grey pollen, the remainder is pale yellow-white as are the genae and the face. The palpi are yellow, tinged with brown, each has a long slender bristle at the apex equal in length to the upper reclinate bristles of the front. The clypeus is pale yellow, the mouthparts are yellow. The mentum has about four setae arranged from the middle to the apical third of the segment. The first oral bristle is strong, equal or larger than the proclinate bristle of the front, the second oral

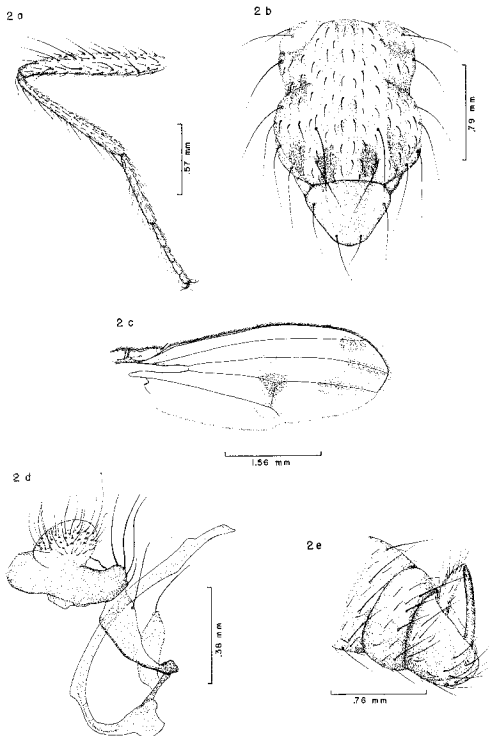


FIG. 2. *Drosophila digressa* n. sp.: a, front leg; b, mesonotum; c, wing; d, male genitalia; e, ovipositor.

is rather short seta-like, scarcely half as long as the third. The lower reclinate bristle is about two-thirds as long as the proclinate and is situated slightly above the latter. The face is just slightly raised along the median portion, flattened below just before the epistoma. *Thorax*: Yellow in ground color with three broad vittae extending down the mesonotum (fig. 2b) and with a dark brown to black spot covering the posterodorsal portion of each mesopleuron. The scutellum has a large dark brown spot over the disc, the margins are yellow. The metanotum is yellow. A small spot of brown is present on the upper portion of each pteropleuron beneath the wing base and a narrow line of brown extends along the posterodorsal margin of each sternopleuron. The border of the posterior spiracle is brown. *Legs*: Pale yellow except for a faint tinge of brown near apices and bases of hind tibia. The front tibia has twelve to fifteen cilia arranged in two irregular rows down the dorsal surface from near the apical one-fourth to the base of the segment (fig. 2a). The preapical dorsal bristle is about equal in length to the apical ventral bristle. The front basitarsus is elongate, approximately two-thirds as long as the tibia and bears about eleven long black cilia arranged in two irregular rows down the entire length of the subsegment. The second tarsomere bears two dorsal cilia and the third bears one. The hind tibiae are indistinctly banded, by the faint marking of brown near the base and another just before the apex of the segment. *Wings*: Largely hyaline with brown spots at the apices of veins R_{2+3} , R_{4+5} and M_{1+2} , a large dumbbell shaped brown mark over the m crossvein which extends as a fainter marking through the middle of cell R_5 across vein R_{4+5} into the lower portion of cell R_6 . The subbasal wing spot is rather small (fig. 2c). The r-m crossvein is situated near the basal fourth of cells 1st M. and beyond a point just opposite the tip of vein R_1 . The third costal section is over four 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 wing is slightly pointed at the apex. *Abdomen*: Predominantly brown with large lateral spots on the terga; the brown coloring on the posterior margins of each tergum extends along the lateral margin to the base of each segment. The genitalia are as in figure 2d. The aedeagus is narrow and quite elongate, the parameres are covered with minute setae and each having an elongate apical sensillum (fig. 2d).

Length: body, 5.0 mm.; wings, 5.75 mm. One paratype measures 4.0 mm. for the body and 4.15 for the wings.

Female: Similar to male, except for sexual characters. The ovipositor is elongate, about two times longer than the cerci, entirely black and blunt at apex (fig. 2e).

Holotype male, Bird Park, Kilauea, Hawaii, August 24, 1965 (K. Y. Kaneshiro). Allotype female, Upper Olaa Forest, Hawaii, July 28, 1966, J13B4 (K. Y. Kaneshiro). Two paratypes, both males, from Upper Olaa Forest, Hawaii, collected November 26, 1965 and July 28, 1966 (J. K. Fujii and K. Y. Kaneshiro).

Type and allotype in B. P. Bishop Museum, paratypes in the University of Hawaii collection.

Drosophila discreta n. sp. (Figs. 3a-f)

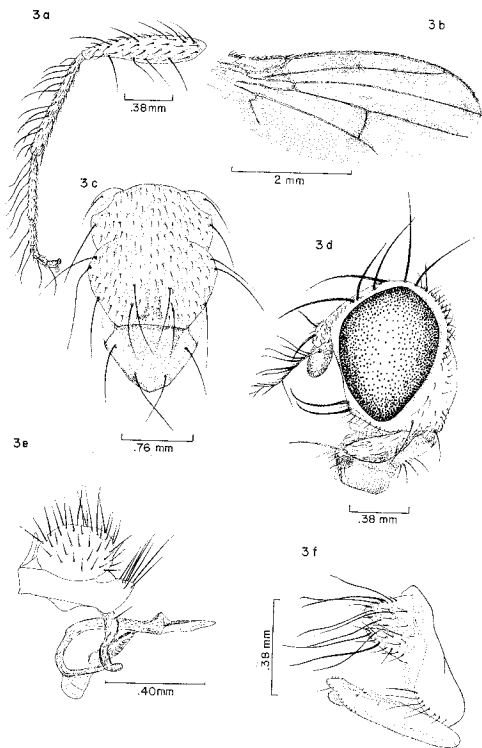
This species runs to *pilimana* Grinshaw and has been included in the previous concept of that species (Hardy, 1965:415). Dr. Hampton L. Carson has demon-

stated that it is cytologically distinct. *D. discreta* is differentiated from *pilimana* by having the subbasal wing spot larger, extending into cell 1st M_2 and extending over the r-m crossvein (fig. 3b) rather than the subbasal spot being comparatively small, extending over the upper edge of the base of cell R_6 but not extending to the r-m crossvein (fig. 3h). The other wing spots are more prominent in *discreta*, especially the submedian spot in cell R_1 (fig. 3b). The second oral bristle is strong in *discreta*, subequal in length to the first bristle and two or three times longer than the upper setae of the oral margin. In *pilimana*, this bristle is about half the length of the first bristle and about one-half longer than the other setae. The front basitarsus of *discreta* is more elongate than in *pilimana*, being about two-thirds as long as the tibia rather than approximately one-half as long. Also, the front tibia of *discreta* has about 18 long, dorsal cilia extending to about the basal one-sixth of the segment (fig. 3a) rather than approximately 12-14 cilia ending at about the basal third of the segment (fig. 3g) as in *pilimana*. The median yellow-grey pollinose vitta on the mesonotum of *discreta* is narrow compared to that of *pilimana*, being about half the width of the brown vittae (fig. 3c) rather than about equal in width (fig. 3i).

The females very closely resemble those of *fasciculisetae* but are differentiated by the pale colored antennae and palpi.

D. discreta would also fit near *limitata* n. sp. from Maui but have longer hairs on the front tibiae and tarsi as in figure 3a, by the large subbasal spot on the wing extending to the base of the r-m crossvein (fig. 3b), by the small preapical dorsal bristles of the front tibiae of *discreta* (compare figs. 3a and 8a); the differences in the male genitalia (figs. 3e and 8e) and the chromosomal differences as being discussed by Dr. Carson.

Male. Head: Shaped as in other members of this complex. The front is dark brown on the lower portion, lighter brown above a level with the proclinate bristles. The orbits are covered with yellow-brown pollen. The vertex and upper occiput are brown, tinged with yellow, the remainder of the occiput is yellow. The genae, except for a pale brown spot below each eye margin, the clypeus, palpi and mouth parts are pale yellow. The face is white, raised down the median portion and vertical as seen from direct lateral view. The second oral bristle is large, subequal to the first and two or three times longer than the oral setae. Each palpus has a thin yellow-brown apical bristle, subequal in length to second oral. The anterior reclinate bristle is three-fourths to four-fifths as long as the proclinate but is much thinner; this bristle is situated slightly above the proclinate. The first antennal segment is yellow, the second and third are brown, tinged with yellow. The arista usually has nine to ten dorsal rays and three ventral rays in addition to the rather small apical fork. The inner surface of the arista has six or seven prominent setae on the apical half. *Thorax:* Predominantly brown in the ground color of the dorsum with yellow markings around the margins and mostly yellow on the pleura with brown markings across the upper portions of the mesopleura, sternopleura, pteropleura and on the hypopleura and metapleura. The metanotum is yellow to rufous, tinged lightly with brown on the sides and sometimes on the upper margin. The scutellum has a large brown spot extending over the disc, the margins and ventral portion are yellow. The anterior dorsocentral bristles are situated just slightly behind a line drawn between the second supraalar bristles.



The pattern of markings on the mesonotum are as in figure 3c. These consist of a pair of rather broad submedian brown stripes extending most of the length of the mesonotum and a pair of lateral brown stripes extending to the posterior margin from behind the suture; these are separated by rather narrow yellow-grey vittae. *Legs*: Entirely yellow, except for slight discolorations of brown before the apices of the hind tibiae. The front basitarsus is rather elongate, about two-thirds as long as the tibia and the ornamentation is as in figure 3a. About 18 rather long erect dorsal cilia are present extending from just below the preapical dorsal bristle to about the basal sixth of the segment; these are mostly arranged in pairs. About a dozen long dorsal cilia extend over the entire length of the basitarsus and one preapical pair each is located on tarsal subsegments 2-4 (fig. 3a). *Wings*: The markings are as in figure 3b. The subbasal brown mark is especially large and distinctive. The costal fringe extends nearly three-fourths the distance between the apices of veins R_{2+3} and R_{4+5} . The third costal section is 3.5 times longer than the fourth. *Abdomen*: Dark brown except for prominent yellow-grey spots covering the anterolateral portions of each tergum. The genitalia are as shown in figure 3e. The ninth tergum is narrow and is developed into a truncate protrusion at the ventral portion. Each of the parameres has a minute apical sensillum.

Length: body, 4.7 mm.; wings, 5.0 mm.

Female: Fitting the description of the male except for sexual differences and resembling very closely the females of *fusciculisetae* but differing by having the

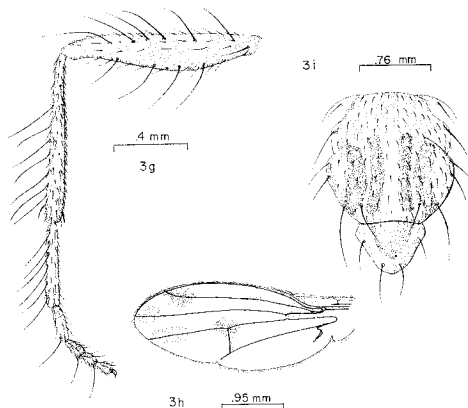


FIG. 3. *Drosophila discreta* n. sp.: a, front leg; b, wing; c, mesonotum; d, head; e, male genitalia; f, ovipositor. *Drosophila pilimana* Grinshaw: g, front leg; h, wing; i, mesonotum.

antennae and palpi paler in color (yellow, to yellow tinged with brown, rather than brown to black). This is best seen in living or freshly killed specimens. The ovipositor is as in figure 3f.

Length: body, 5.4 mm.; wings, 5.8 mm.

This species is in culture. Holotype male, Waikamoi, Maui, February 1, 1964, S27.5 (H. T. Spieth). Allotype female, same locality, 4200', June 28, 1965, C125.1 (H. L. Carson). The type series is taken from cultures nos. C125.1C, C104.1, PM29 and FA-1. These were established from iso females collected at Waikamoi, Maui, 4200' elevation.

The species has been collected at Waikamoi, Kipahulu Valley, Puu Kukui and Keanae. It has been taken on many different occasions from October, 1964, to October, 1966, by the following collectors: H. L. Carson, H. T. Spieth, K. Y. Kaneshiro, J. P. Murphy, J. K. Fujii, and D. E. Hardy.

Type, allotype and a series of paratypes in the B. P. Mishop Museum. Paratypes in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila flexipes n. sp. (Figs. 4a-d)

This unusual species would run to *ciliaticrus* Hardy because of the markings on the wing and because of the ciliated front tibiae. The two species are apparently not related, however. It is obviously much more closely related to *punalua* Bryan. The development of the front legs, however, is very different (fig. 4a), the wing markings differ strikingly, the head is differently shaped and it also differs in other respects.

Male. Head: Almost square as seen in direct lateral view, the anterior portion of the front is not produced, and the face is vertical. The front is yellow in ground color along the eye orbits and with a narrow, less distinct line of yellow extending two-thirds the length of the front beyond the median ocellus. The lower margin of the front is also yellow in ground color, tinged with brown on the sides. The remainder is brown, tinged with black in the upper interfrontal areas. The orbits and the ocellar triangle are densely yellow-grey pollinose. The upper portion of the occiput is tinged with brown. The remainder of the occiput is yellow, covered with yellowish pollen. The genae, clypeus, palpi and mouthparts are yellow. The face is white, faintly tinged with yellow. The apical bristle on the palpus is small, about two times longer than the setae on the outside surface of the segment. The second oral bristle is small, seta-like, slightly larger than the other setae of the vibrissal row. The first bristle is large, equal or slightly longer than the proclinate bristles of the front. It should be noted in one paratype the seta which is present immediately above the strong bristle on the oral margin is bristle-like, slightly larger than the second bristle of the oral margin. The anterior reclinate bristle is approximately equal in size to the proclinate and is situated above the latter. The third antennal segment is yellow-brown except for the yellow base, the second segment is yellow except for the dark-brown dorsal surface, the basal segment is yellow. The aristae appear to be unusual, in all specimens studied they extend laterad across the front of the eyes and each has nine to ten dorsal and about eight ventral rays in addition to the small apical fork, and the inner surface is

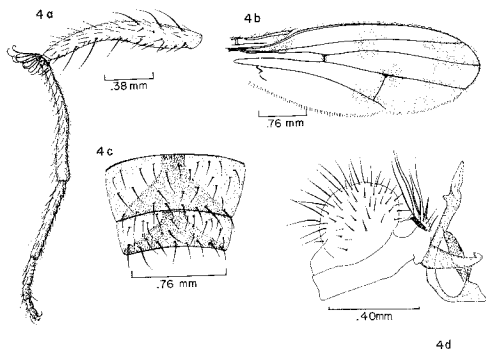


FIG. 4. *Drosophila flexipes* n. sp.: a, front leg; b, wing; c, pattern of marks on abdominal segments; d, male genitalia.

setose along its entire length. *Thorax*: Predominantly yellow with four brown vittae extending down the mesonotum, rather similar to the figure of *gradata* and as in that species the median, posterior and lateral portions of the mesonotum are yellow in ground color, covered with yellowish pollen and the scutellum is discolored with brown in the median portion, broadly yellow on the margins. The pleura are largely yellow in ground color, tinged with brown through the middle portion of each mesopleuron; the upper portion of each sternopleuron and pteropleuron and on the metapleuron above the spiracle; the rim of the spiracle is brown to black. *Legs*: Entirely yellow, each front femur is rather strongly narrowed and distinctly curved downward on the apical portion. The front tibia is narrowed toward the base and almost arcuate on the dorsal surface (fig. 4a). The front basitarsus is slender and elongate, about four-fifths as long as the tibia. The front tibia is flattened on the dorsal surface, has a dense clump of black hairs at its extreme base and has an abundance of long hairs extending down the anterodorsal surface, a row of densely placed shorter hairs down the posterodorsal surface, and with scattered short erect hairs over the dorsal surface on the apical half of the segment. The front basitarsus has an abundance of moderately long erect cilia over the posterodorsal, anterodorsal and dorsal surfaces. The second and third tarsomeres each have a few scattered dorsal hairs. The preapical dorsal bristle of the front tibia is small, not differentiated from the other setae. *Wings*: Marked as in figure 4b. The mark in the middle of cell R_1 extends rather wedge-shaped into the posterior portion of cell R_2 and is indistinctly joined to the large spot extending over the m crossvein but is not directly in line with this spot. The r-m

crossvein is situated well beyond the apex of vein R_1 and near the basal two-fifths of cell 1st M_2 , also the isolated brown spot over the r-m crossvein is distinctive. *Abdomen*: Predominantly yellow with a large dark brown to black, almost triangular mark, in the middle of each segment and with the extreme lateral margin of each tergum brown to black (fig. 4c). The genitalia are as shown in figure 4d. The preapical protuberance of the aedeagus is narrow and quite distinctive. The parameres are narrow, each with a minute apical sensillum.

Length: body, 4.0 mm.; wings, 4.5 mm.

Female unknown.

Holotype male, Niu. Oahu, 800', August 21, 1965, C142.4 (H. L. Carson). Four paratypes, two same data as type; one Mount Kaala, Oahu, collected in trap, April 22, 1965 (K. Y. Kaneshiro); and one from Palikea, Oahu, May 11, 1966 (K. Y. Kaneshiro).

Type in the B. P. Bishop Museum, paratypes in the collections of the U.S. National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila glabriapex n. sp. (Figs. 5a-d)

This species differs from *pilimana* and other members of this complex by having the apical two-fifths of the front tibia devoid of cilia (fig. 5b) and the ciliation is not confined to the median portion of the segment. It also differs by having the pleura almost entirely dark brown to black and the yellow-grey vittae on the mesonotum very thin, scarcely differentiable (fig. 5a). The wing markings are like those of *discreta*. The large subbasal spot differentiates both from typical *pilimana*.

Male. Fitting most details of other members of this complex. *Head*: The antennae are brown, faintly tinged with yellow, and the palpi are brownish yellow. The clypeus is yellow, tinged faintly with brown on the sides. The second oral bristle is one-half to two-thirds as long as the first. *Thorax*: Predominantly brown, a very narrow yellow-grey median vitta extends almost the entire length of the mesonotum, this is about equal in width to the space between the rows of acrostichal setae. A very faint indication of a grey vitta is also present on each side, in line with each dorsocentral row (fig. 5a). The propleura are yellow, tinged lightly with brown. The remainder of the pleura are dark brown to black, narrowly marked with yellow along the sutures. *Legs*: Colored as in other members of this complex. The front tibia has about a dozen dorsal cilia which extend from just beyond the middle to about the basal one-sixth of the segment (fig. 5b); these are mostly arranged in pairs. The front basitarsus is about half as long as the tibia and has 13-14 long black dorsal cilia extending over the apical five-sixths of the segment, most of these are arranged in pairs. The second tarsal segment has two pairs of long cilia. Segments three and four each have 3-4 dorsal cilia at or near the apex. *Wings*: I see no significant differences in wing markings or venation between *glabriapex* and *discreta* (refer to fig. 3b). *Abdomen*: Marked as is typical of this complex, predominantly brown with yellow-grey pollinose anterolateral margins on the terga. The genitalia are as shown in figure 5c. The aedeagus of *glabriapex* is very similar to that of *pilimana* with the preapical pro-

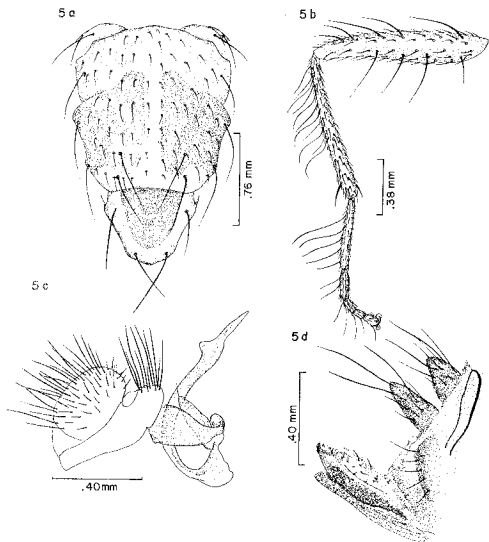


FIG. 5. *Drosophila glabriapez* n. sp.: a, mesonotum; b, front leg; c, male genitalia; d, ovipositor.

tubercle of the aedeagus slightly different (fig. 5c). Each of the parameres is rounded at its apex and has a minute apical sensillum.

Length: body, 4.0 mm.; wings, 4.5 mm.

Female: Closely resembling *discreta* but differentiated by the predominantly brown to black pleura and by the indistinct submedian vittae on the mesonotum. The ovipositor is as in figure 5d.

Length: body, 4.5 mm.; wings, 5.0 mm.

Holotype male, Mohihi Stream, Kokee, Kauai, May 16, 1966 (J. P. Murphy). Allotype female, same locality as type, July 18, 1966, J7B (K. Y. Kaneshiro). Twenty-two paratypes, 20 males and 2 females, from the following localities in

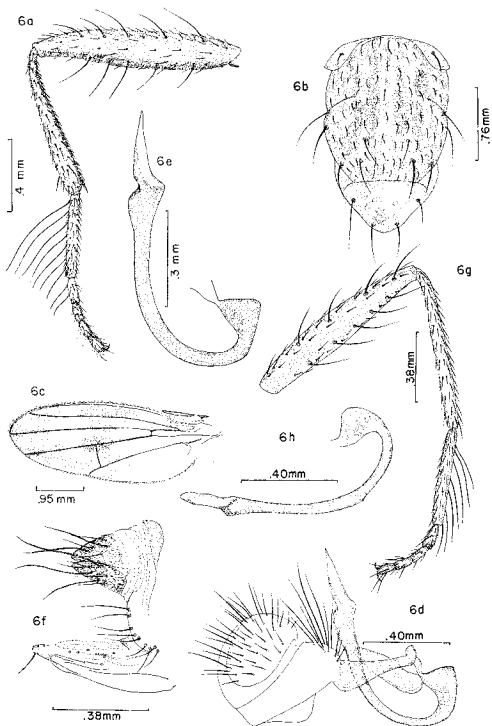


FIG. 6. *Drosophila gradata* n. sp.: a, front leg; b, mesonotum; c, wing; d, male genitalia; e, aedeagus; f, ovipositor. *Drosophila hawaiiensis* Grimbaw: g, front leg; h, aedeagus.

the Kokee region of Kauai: same data as type; June 1966–July 7, 1967 (J. P. Murphy and K. Y. Kaneshiro); Kokee, 3600', June 23, 1964 (H. L. Carson), Halemanu Valley, 4000'; no date given (K. Y. K. Y. Kaneshiro and J. K. Fujii).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

This species has been collected almost entirely on baits; one specimen was collected on a slime flux on an "Ohia" tree (*Metrosideros collina*). The species has not been reared and is not in culture.

Drosophila gradata n. sp. (Figs. 6a–f)

This species fits very close to *hawaiiensis* Grimshaw and was included in the previous concept of that species (Hardy, 1965:299). It is apparent now that we have a complex of species close to *hawaiiensis*, the typical species is apparently restricted to the island of Hawaii. *D. gradata* is differentiated from *hawaiiensis* by the distinct gradation of the cilia on the front basitarsus of the male; these hairs are elongate at the base of the segment and gradually become shorter toward the apex (fig. 6a). In *hawaiiensis* the cilia are all nearly equal in length (fig. 6g). Also, *gradata* is a paler colored species, with a broad yellow vitta extending down the middle of the mesonotum and with the hind portion of the mesonotum yellow and the pleura conspicuously marked with yellow; the propleura are all yellow. In *hawaiiensis* the thorax is almost entirely dark brown to black with a rather faint narrow grey vitta extending down the middle of the mesonotum and with the hind portion of the mesonotum brown to black in ground color, covered with grey pollen. The pleura are all black.

Male. Head: The front is predominantly dark brown, often tinged with black in the upper interfrontal areas. The eye orbits are yellow in ground color covered with yellow-grey pollen. The vertex and the ocellar triangle are dark brown to black covered with grey pollen. The upper occiput is yellow-brown in the median portion, yellow on the sides and lower portions. The genae, clypeus, palpi and mouthparts are yellow, a small spot of brown is present at the lower margin of each eye. The apical bristle of the palpus is about equal in length to the second oral bristle. The face is white, with a faint tinge of yellow, and is distinctly raised down the median portion. The antennae are predominantly dark brown to black, the first segment is yellow and the second is tinged with yellow on the lower portion and the apex. The arista has six dorsal and three ventral rays in addition to the apical fork. The second oral bristle is three-fourths as long as the first. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. *Thorax:* The mesonotum is yellow with prominent brown to black markings forming a pattern of four vittae, which are separated by a very narrow line of yellow on each side, in line with the dorsocentral bristles; the posterior portion of the mesonotum and the scutellum are yellow in ground color densely covered with yellow pollen (fig. 6b). The metanotum is predominantly brown, tinged with yellow in the median portion, yellow on the sides. The propleura are yellow and yellow markings are present on the posteroventral portions of the sternopleura, over the pteropleura, the hypopleura, metapleura

and along the hind margin of each sternopleuron. The dorsal portion of the scutellum is yellow except for a faint tinge of brown medianly; the posteromedian portion is brown in ground color. *Legs*: Yellow in the type except for a faint tinge of brown on the coxae. In some specimens the femora are faintly tinged with brown. The legs are not ornate except for the densely ciliated tarsi. The long hairs are arranged over the dorsal surface of the first two tarsomeres as in figure 6a, with the longest hairs at the base of the basitarsus and gradually reducing in length to the apex of the second joint. The preapical dorsal bristle of the tibia is almost equal in length to the ventral apical bristle. The front basitarsus is about one-half as long as the tibia. *Wings*: The venation and markings are very similar to those of *hawaiiensis* (fig. 6c). We see no difference which would separate these. *Abdomen*: Similar to *hawaiiensis* with the brown to black posterior band on each tergum extending along the lateral margin so that the yellow lateral spots are isolated and do not extend to the margin and the lateral margins are broadly black. The genitalia are as shown in figure 6d. The aedeagus is similar to that of *hawaiiensis* in that the preapical protuberance is insignificant, it is differentiated from *hawaiiensis* by the deep depression at the preapical end (compare figs. 6e and 6h). The parameres of *gradata* and *hawaiiensis* are indistinguishable.

Length: body and wings, 4.5 mm. In paratype specimens the length of the body and wings varies from 4.0 mm to 4.75 mm.

Female. Fitting the description of the male except for sexual characters. The bristle at the apex of the palpus is, however, distinctly shorter, much shorter than the second oral bristle. The ovipositor is shaped as in figure 6f.

Holotype male, allotype female from a culture. The original stock was collected at Kupua Valley (Niu Section), Oahu, August 30, 1965, C144.2A (H. I. Carson). Paratypes about 75 specimens, sexes rather evenly distributed from the following localities on the island of Oahu: Opauala, March-May, 1959, some collected in methyl eugenol traps (D. E. Hardy and W. C. Mitchell); Maunawili, December, 1950, in protein hydrolysate bait trap (P. L. Gow); Waianae, December 10, 1949, "ex trap" (G. Mainland); Palikea, May 11, 1966 (K. Y. Kane-shiro); Haleanau Valley, Mount Kaala, April 21, 1949, in banana trap (G. Mainland) and "Manoa Valley" 1947, no collector given, probably taken by G. Mainland.

Type, allotype and a series of paratypes in the B. P. Bishop Museum, paratypes in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila hirtipalpus n. sp. (Figs. 7a-f)

This species is closely related to *villitibia* and was for a short time included in the concept of that species until chromosomal evidence showed that actually two species were involved. Both species can be collected in the same areas and even in the same mironiche. *D. hirtipalpus* is differentiated from *villitibia* by having the palpi covered with moderately long setae and with the apical bristle long and hair-like rather than the palpus being covered with short setae and the apical bristle only moderately strong and straight (compare figs. 7b and 7f). Ciliation on the front tibiae and tarsi are similar in both species (fig. 7a.)

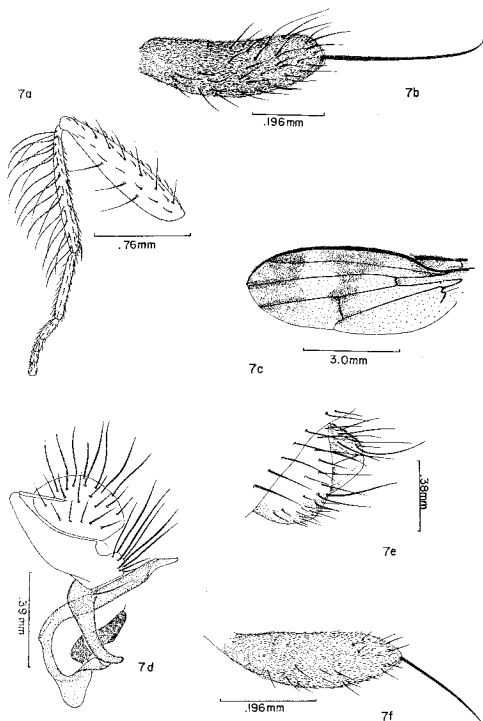


FIG. 7. *Drosophila hirtipalpus* n. sp.: a, front leg; b, palpus; c, wing; d, male genitalia; e, ovipositor. *Drosophila villitibia* Hardy: f, palpus.

Male. Head: Front brown to dark brown with yellow pollinose margins around the orbits. Face yellow, tinged with brown; clypeus, palpi and mouthparts light brown, tinged with yellow. Labella fleshy. Mentum setose on apical two-thirds. Each palpus has a long, hair-like apical bristle slightly longer than the segment and is covered with moderately long setae (fig. 7b). Anterior reclinate bristle about one-half the length of the posterior reclinate and situated closer to the proclinate than to the upper reclinate. Second and third antennal segments brown, tinged with yellow. Arista with seven to eight dorsal rays and four to five ventral rays in addition to the apical fork. *Thorax:* Predominantly brown in ground color with four indistinct dark brown to black longitudinal vittae. Mesonotum densely yellow pollinose. The sternopleura and pleura are distinctly marked with dark brown to black markings. Anterior sternopleural bristles about two-thirds as long as the posterior sternopleurals. Lower humeral bristles just slightly shorter than upper humerals. Scutellum dark brown to black on disc. *Legs:* Coxae and femora brown to dark brown, tibiae and tarsi brown, tinged with yellow. Ciliation on front tibiae and tarsi similar to that of *villitibia*, long cilia extending down each anterodorsal and posterodorsal surface (fig. 7a). Front basitarsus about three-fifths as long as tibia. *Wings:* Similar to *villitibia*. Costal fringe ends near the middle of the distance between the apices of veins R_{2+3} and R_{4+5} . Crossvein r-m is situated about middle of cell 1st M_2 and is covered by an isolated brown spot (fig. 7c). Wing markings and venation are as in figure 7c. *Abdomen:* Dark brown with a large oval-shaped spot covering the sides of the terga. Genitalia are very similar to those of *villitibia* and are as shown in figure 7d.

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

Female. Fitting the description of the male except for sexual characters. The ovipositor is as in figure 7e.

Holotype male, allotype female and paratypes all taken from laboratory culture number J66C4. Original female collected on February 22, 1967, Waikamoi, Maui (J. P. Murphy).

Type, allotype and some paratypes in the B. P. Bishop Museum. Other paratypes deposited in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

***Drosophila limitata* n. sp. (Figs. 8a-f)**

Because of the rather small subbasal brown mark on the wing, this species would fit near typical *pilimana*. It is readily differentiated, however, by the short cilia on the front tibiae and tarsi, by the large preapical dorsal bristle of the front tibia (Fig. 8a); by the more elongate basitarsi of the front legs and by the position of the second brown mark on vein R_{2+3} . Also the face is distinctly yellow. The ciliation of the front legs rather closely resembles that of *ciliaticrus* but the wing characters and other details are distinctly different; *ciliaticrus* has a continuous brown band across the middle of the wing, etc. The overall shape of the aedeagus (fig. 8e) is quite different from that of *pilimana*, it most closely resembles that of *ochracea*. The apical sensillum of the parameres is much thicker and longer than that of *pilimana*. For comparison of leg and wing characters refer to figures 4g and 4h. As pointed out by Dr. Carson (1967, Proc. Nat. Acad. Sci. 57(5):1280-1285) this species is very distinctive cytologically.

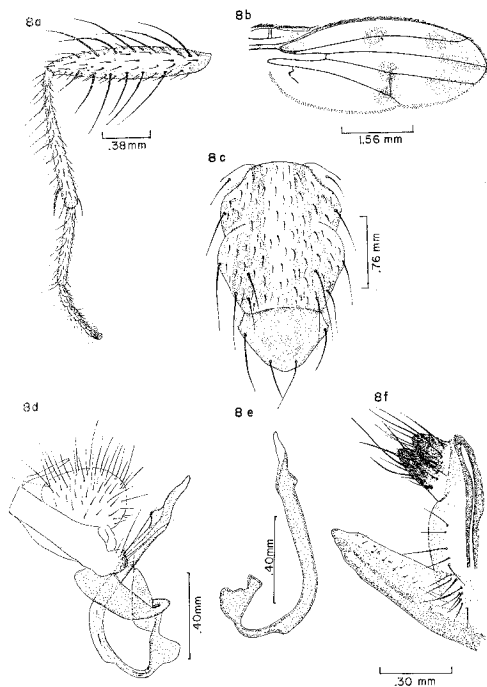


FIG. 8. *Drosophila limitata* n. sp.: a, front leg; b, wing; c, mesonotum; d, male genitalia; e, aedeagus; f, ovipositor.

Male. Similar in most respects to *pilimana*. *Head:* The front is brownish yellow in ground color covered with yellow-brown pollen. The front is lighter in color, yellow faintly tinged with brown, on the anterior margin rather than darker in color as in other members of this complex. The antennae are yellow, tinged with brown over the third. The face is yellow-white; the clypeus, palpi and mouth parts are yellow. The bristle at the apex of each palpus is dark brown to black, about equal in length to the second oral bristle. The second oral is about two-thirds as long as the first and approximately two times longer than the setae of the vibrissal row. *Thorax:* The pattern of the cinereous markings on the mesonotum is as in figure 8c. The median vitta is approximately equal in width to the submedian brown vittae. The pleura are conspicuously marked with yellow especially over the propleura, the lower portion of the mesopleura, across the hypopleura. The metanotum is brown to black on the sides, yellow in the median portion. *Legs:* The front basitarsi are about two-thirds as long as the tibiae, and each has about 8-10 sets (anterodorsal, dorsal, and posterodorsal) of cilia extending almost the full length down the dorsal surface. The preapical dorsal bristle of the tibia is large, two times longer than the ventral apical bristle and conspicuously longer than the dorsal cilia. The cilia are comparatively short, shorter than the preapical dorsal bristle, and are rather closely placed over the anterodorsal, dorsal and posterodorsal surfaces of the tibiae and tarsi (fig. 8a). The cilia on the tarsi are curved at their apices. The dorsal hairs on the front tibia extend from near the preapical dorsal bristle to the basal one-sixth to one-seventh of the segment (fig. 8a). *Wings:* The markings are similar to those of *pilimana* except that the spots at the apices of the veins are usually confluent and fill up the entire wing apex (fig. 8b). *Abdomen:* As in other members of this complex. The genitalia are as shown in figure 8d. The aedeagus has a distinctive shape (fig. 8e), each of the parameres has a thick and elongate apical sensillum. The ninth tergum is covered with minute setae.

Length: body, 4.5 mm; wings, 5.0 mm.

Female. Differentiated from *pilimana* by the yellow-white face; by having a grey vitta extending down each side of the mesonotum in line with the dorso-central row; and by having the entire apex of the wing covered by a brown mark similar to that of the male (fig. 8b), rather than having isolated spots at the ends of the veins. The ovipositor plates are blunt at apices, shaped as in figure 8f.

Length: as in the male.

The specimens in stock culture vary in size from body and wing length of 3.8 mm to 5.0 mm.

Holotype male, and allotype female from Keanae Valley, Maui, 1500', July 21, 1965, stock C134.4A and E. Respectively (H. L. Carson). Paratypes are at hand mostly from the same culture as the type. This species is established in laboratory stock. Specimens are also in the paratypes series from Haclaau, Maui, June 16, 1966, G80B6, (K. Y. Kaneshiro), and Ridge above Kipahulu Valley, Maui, June 21, 1967 (K. Y. Kaneshiro).

Type, allotype and some paratypes in the B. P. Bishop Museum. Remainder of the paratypes in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

***Drosophila lineosetae* n. sp. (Figs. 9a-d)**

This species fits close to *fasciculisetae* Hardy, but is separated by the differences in the ornamentation of the front tarsi as shown in figures 9a and 9c. *D. lineosetae* also fits near *pilatisetae* n.sp. but is differentiated by having a line of about six long black dorsal hairs near the base of the front basitarsus rather than having a clump of dorsal hairs before the apex of that tarsomere (fig. 16a).

Male. Head: Front brown, orbits yellow, tinged with brown. Vertex and upper occiput brown to black covered with brownish grey pubescence. Lower portion of occiput, genae, except for a narrow black rim along the eye margin and a narrow line down the vibrissal row, face and clypeus yellow. Palpi, mentum and labella brown, tinged with yellow. Palpi broad, scarcely over two times longer than wide, and with a fine apical bristle which is approximately equal in length to the anterior reclinate bristle which is hair-like. Mentum with few scattered hairs on apical third. Anterior reclinate bristles two-thirds to three-fourths as long as the proclينات and situated distinctly above the latter. Two strong bristles present at the upper portion of each vibrissal row. First antennal segment brown, second brown on dorsal portion. Arista with seven dorsal and three ventral rays in addition to the apical fork, and with setae along the apical two-thirds of inner surface. **Thorax:** Predominantly yellow in ground color with four brown vittae extending down the mesonotum, these are separated by yellow-grey pollinose vittae. Each pleuron with dark brown to black markings on upper portion of sternopleuron, mesopleuron and pteropleuron. Disc of scutellum dark brown to black, margins yellow. Metanotum brown on the apical tarsomeres. Front tibiae lacking ciliation. The preapical dorsal bristle is scarcely larger than the apicoventral bristle. Front basitarsus about three-fifths as long as tibia, with approximately six long black bristles arranged in a line near base of segment, as in Figure 9a. Remainder of basitarsus lacking ciliation except for one anterodorsal hair at apex. Other tarsomeres with anterodorsal cilia. **Wings:** Predominantly hyaline, faintly tinged brownish yellow with a prominent subbasal brown spot extending across wing into basal portion of cell R_5 , a faint indication of a brown spot is also present in the median portion of cell R_1 , this is probably variable; in one of the paratypes there is no indication of this mark; with another dark brown spot broadly covering apices of veins R_{2+3} , R_{4+5} and M_{1+2} , and with a prominent rather dumbbell shaped mark over the m crossvein. The costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5} . The r-m crossvein is situated near the basal one-fourth of cell 1st M_2 (fig. 9b). **Abdomen:** Predominantly dark brown to black, yellow in ground color and covered with yellow-grey pollen on the anterolateral margins of each tergum. Genitalia are as shown in figure 9c. The ninth tergum is narrow and is covered with minute setae only at the dorsal and ventral portion. The parameres are quite rounded at the apex, each having a minute apical sensillum.

Length: body and wings, 4.5 mm.

Female. Fitting the description of male except that the wing is more intensely

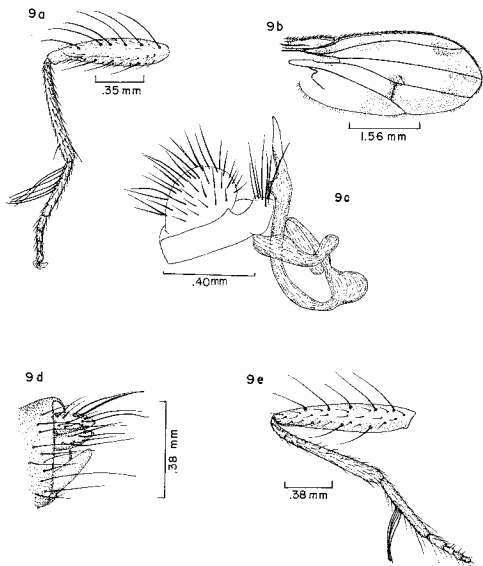


FIG. 9. *Drosophila lineosetae* n. sp.: a, front leg; b, wing; c, male genitalia; d, ovipositor. *Drosophila fasciculisetae* Hardy: e, front leg.

distinct than in male. Ovipositor short, extending scarcely beyond apices of cerci (fig. 9d).

Length: body and wings, 5.25–5.4 mm.

Holotype male and allotype female and two male paratypes, Haelaau Valley (Puu Kukui), Maui, January 23–24, 1967, J57 (J. P. Murphy and K. Y. Kanehiro).

Type in B. P. Bishop Museum, paratypes in the University of Hawaii collection.

***Drosophila liophallus* n. sp. (Figs. 10a-e)**

This species appears closely related to *villitibia* and to *odontophallus* n. sp., but is readily differentiated from these by having cell R_1 hyaline except at the extreme apex and at the base (fig. 10b), and by having the mesonotum rufous in ground color with four longitudinal brown vittae as shown in figure 10c.

Male. Head: Fitting the description of *odontophallus* except that the lower portion of the front is more distinctly flattened; the palpi are much shorter and thicker, scarcely over two times longer than wide, rather than three to four times longer than wide, and are yellow-brown, rather than yellow; and the apical bristle of the palpus is short and black, about equal in thickness but much shorter than the second oral bristle. **Thorax:** Yellow in ground color with four longitudinal brown to black vittae on the mesonotum arranged as in figure 10c. The posterior edge of each humerus is dark brown and a large dark brown spot is present on each side just behind the humerus. The scutellum is entirely yellow, the metanotum is predominantly yellow with a brown spot on each upper lateral margin. The pleura are pale yellow except for a spot of dark brown to black on the upper edge of each mesopleuron, a spot on the upper pteropleuron, a very narrow streak of brown to black on the posterior border of sternopleuron; and except for a brown to black border around each posterior spiracle. The extreme base of the halter is brown to black, the apical portion is yellow. **Legs:** Entirely yellow, the ciliation of the front legs is as in figure 10a, with approximately 12 elongate black hairs down each of the posterodorsal and anterodorsal surfaces of the tibia and 18 to 20 shorter dorsal hairs extending the full length of the segment. The basitarsus has 5, 7 and 5 hairs respectively on the posterodorsal, dorsal and anterodorsal surfaces; the second tarsomere has one anterodorsal, two dorsal, and one posterodorsal hair. **Wings:** Marked as in figure 10b, similar in most respects to that of *odontophallus* but with cell R_1 clear except at the apex and at the base. Also the r-m crossvein is situated slightly before the middle of cell 1st M_2 making the basal section of vein M_{1+2} slightly shorter than the penultimate section of that vein. **Abdomen:** Similar to that of *odontophallus* with prominent yellow anterolateral margins on the terga. The genitalia are as shown in figure 10d. The ninth tergum narrow, covered with minute setae; the aedeagus with a distinct preapical protuberance, the parameres each with a minute apical sensillum.

Length: body, 5.0 mm; wings, 5.5 mm. Paratype specimens vary from 4.0 to 5.0 mm for the body and 4.5 to 5.5 mm for the wings.

Female. Fitting the description of the male except for sexual characters. Also cell R_1 is tinged with brown through the median portion somewhat like that of *odontophallus* but not so distinctly marked. The ovipositor is as in figure 10e.

The size range is similar to that of the male.

Holotype male, Auwahi, Maui, 3700', July 25, 1966, J10G17 (H. L. Carson). Allotype female same locality, August 27, 1965, J7.3C (K. Y. Kaneshiro). Twenty-one paratypes, 17 males, 4 females, same locality and dates as type and allotype, collected mostly on sodom apple bushes (H. L. Carson, K. Y. Kaneshiro, J. K. Fujii).

Type, allotype and some paratypes in the B. P. Bishop Museum. Other paratypes in the collections of the U. S. National Museum, British Museum (Natural

History), and the University of Hawaii.

***Drosophila macrothrix* n. sp.** (Figs. 11a-d)

Fitting close to *digressa* n. sp. but apparently not closely related. The types of

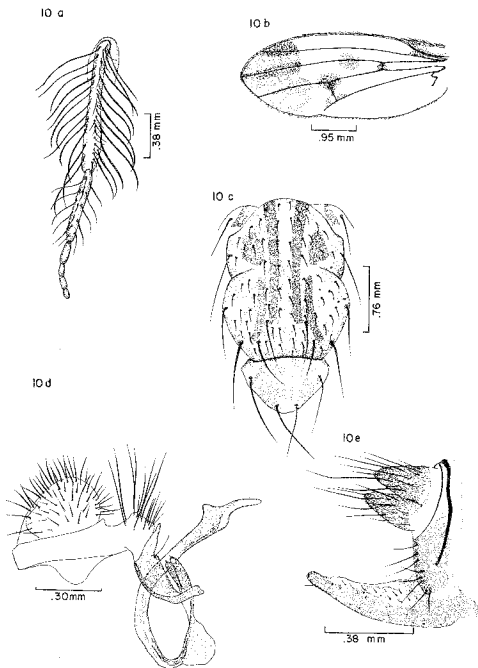


FIG. 10. *Drosophila liophallus* n. sp.: a, front leg (dorsal); b, wing; c, mesonotum; d, male genitalia; e, ovipositor.

both species were collected at the same locality and on the same date. *D. macrothrix* is differentiated by having the extra spot in the wing situated at about the apical third of cell R_2 and distinctly beyond a level with the brown mark over the m crossvein, also the brown mark over m is not dumbbell shaped, but is expanded on the lower portion and extends along vein M_{1+2} , the apical bristle of the palpus is much more elongate than in *digressa* and the dorsal surface of the front tibia is bare except for one row of long black anterodorsal cilia extending almost to the preapical dorsal bristle (fig. 11b), rather than having the dorsal surface setose and two irregular rows of long cilia on the tibia as in *digressa* (fig. 3a). The arrangements of the dorsal cilia is quite different in the two species as shown in figures 11b and 3a. Also the markings of the pleura are distinctive, *macrothrix* has just a narrow streak of brown along the upper margin of each mesopleuron but has a prominent pale brown spot over the posterodorsal portion of each sternopleuron. Note, also the clypeus and lower margin of the face are dark brown, tinged with black.

Male. Fitting the description of *digressa* in most respects and excepting the characters pointed out above. *Head:* The upper portion of the face is yellow, the lower one-third to one-half is brown, tinged with black. The palpi are yellow, the apical bristle is yellow, tinged with brown and is very elongate and curled, equal in length to almost two times the length of the palpus (fig. 11a). The second and third antennal segments are brown, tinged with black. *Thorax:* The brown vittae on the mesonotum are not as broad as in *digressa*, the median band does not noticeably expand on the posterior margin of the segment and does not fill the area between the dorsocentral bristles. Also, the lateral vittae are much narrower and are slightly interrupted at the suture. The median portion of the scutellum is dark brown to black, this coloring extends over the apex of the sclerite, in *digressa* it is yellow. *Legs:* The front tibia has about ten long anterodorsal cilia extending from the base of the segment to just before the preapical dorsal bristle, two-three posterodorsal cilia are situated just before the preapical dorsal bristle and two dorsal hairs situated just in front of the preapical dorsal bristle; the front basitarsus has seven anterodorsal, long, black cilia extending the full length of the subsegment plus three posterodorsal cilia at apical third and one dorsal cilia at the apex. The second and third tarsomeres each have one anterodorsal cilia (fig. 11b). *Wings:* The wing markings are as in figure 11c. The subbasal spot is larger than that in *digressa* and extends almost to the r-m crossvein. The r-m crossvein is more basad in position than in *digressa*, situated approximately opposite the end of vein R_2 rather than slightly beyond that vein and with the basal section of vein M_{1+2} slightly shorter than the apical section of vein M_{3+4} , rather than being distinctly longer than this section as in *digressa*. The genitalia are as shown in figure 11d. The anal plates are almost quadrate in shape viewed laterally; the ninth tergum only sparsely covered with minute setae. The aedeagus has a comparatively elongate basal apodeme; each of the parameres has a minute apical sensillum.

Length: body and wings, 4.5 mm.

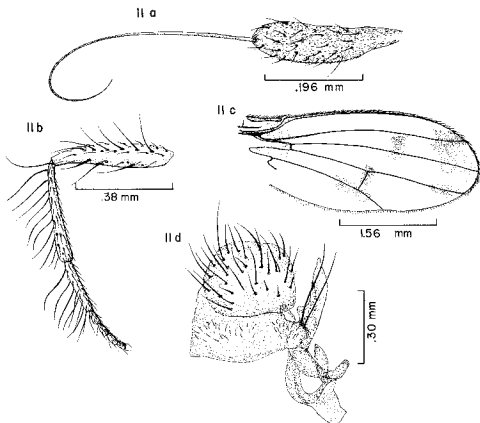


FIG. 11. *Drosophila macrothrix* n. sp.: a, palpus; b, front leg; c, wing; d, male genitalia.

Female unknown.

Holotype male, Bird Park, Kilauea, Hawaii, August 24, 1965, G5.2 (K. Y. Kaneshiro).

Type in the B. P. Bishop Museum.

***Drosophila odontophallus* u. sp. (Figs. 12a-e)**

This species is closely related to *villitibia* Hardy but is readily differentiated by having the thorax rufous in ground color with a pale brown median vitta extending the entire length of the segment and by the entirely rufous scutellum. In *villitibia* the thorax is brown in ground color, densely grey pubescent and with four brown vittae on mesonotum; also the disc on the scutellum is brown. The toothed aedeagus of *odontophallus* (fig. 12d) is also distinctive.

Male. Head: The front is predominantly brown, tinged with yellow in the ground color, the eye orbits and the area immediately below the median ocellus are yellow. The interfrontalia are covered with brown pollen, the eye orbits are yellow-grey pollinose and a very narrow yellow-grey line extends from the ocellar triangle down the median portion of the front. The vertex and upper occiput are dark brown covered with grey pollen, the ocellar triangle is dark

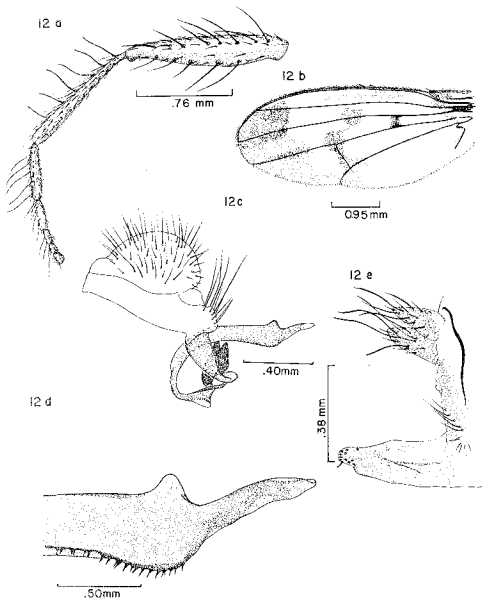


FIG. 12. *Drosophila odontophallus* n. sp.: a, front leg (dorsal); b, wing; c, male genitalia; d, analagus (apical one-third); e, ovipositor.

brown to black, grey pollinose. The lower occiput and genae are pale yellow, a dark brown spot is present at the lower margin of each eye. The face is white. The clypeus, palpi and mouthparts are yellow. Each palpus has a slender pale brown bristle at the apex; this is about equal in length to the second oral bristle. The second oral is about three-fifths as long as the first. The anterior reclinate bristle is approximately two-thirds as long as the proclinate and is situated

distinctly above the latter. The face is distinctly raised down the median portion, slightly flattened below. The antennal grooves are prominent. The arista has about eight dorsal and three ventral rays, in addition to the apical fork; the inner surface is setose to about the basal fourth of the joint. *Thorax*: Predominantly rufous in the ground color of the dorsum with a faint indication of a broad brown median vitta and with faint tinges of brown in the area laterad of the dorsocentral row; also the hind margin of each humerus is brown and a faint spot of brown is situated in the area immediately behind the humerus. The sternopleura are predominantly brown to black, the propleura are yellow, the other sclerites are yellow in ground color indistinctly marked with brown. The metanotum is reddish brown in ground color, covered with grey pollen. The lower humeral bristle is subequal to the upper. The anterior sternopleural bristle is about two-thirds to three-fourths as long as the posterior bristle and several prominent bristle-like setae are situated between the two main bristles on the upper portion of each sternopleuron. *Legs*: Yellow, tinged with brown on the coxae, tarsi and on the femora and tibiae of the hind legs. In some specimens the hind legs are almost entirely brown, tinged rather faintly with yellow; in others the legs are almost entirely yellow, these specimens may be teneral. The dorsal surface of the tibia and the first three tarsomeres are densely ciliate, the cilia extends to the base of the front tibia. The arrangement of the cilia over the tibia consists of about six elongate black hairs down the posterodorsal surface, ten shorter dorsal hairs, and five elongate anterodorsal hairs. The basitarsus has six elongate black hairs on each of the anterodorsal and posterodorsal surfaces and six shorter hairs on the dorsal surface. The second tarsomere has a 3-2-3 arrangement of the long hairs and the third has a 1-1-1 arrangement (fig. 12a). The preapical dorsal bristle on the tibia is rather small, about equal in size to the apicoventral bristle. The basitarsus is just slightly over one-half the length of the tibia. *Wings*: Marked as in figure 12b. The subbasal wing spot is prominent, filling the apical half of the second costal cell and extending transversely across the wing into the basal portion of cell 1st M_2 . The r-m crossvein is situated at the middle of cell 1st M_2 . The costal fringe ends about half-way between the apices of veins R_{2+3} and R_{4+5} . *Abdomen*: The posterior and median portions of the terga are dark brown, the anterolateral portions are yellow. The genitalia are as shown in figure 12c. The aedeagus is very distinctive in that the ventral surface below the prominent preapical protuberance is "toothed" (fig. 12d). Also, the parameres are densely setose on the apical one-third, each with a minute apical sensillum.

Length: body, 5.0 mm; wings, 5.75 mm. The paratypes range from 4.7 to 5.0 mm for the body and 5.0 to 5.75 mm for the wings.

Female. Fitting the description of the male except for sexual characters. Also the dark marking in cell R_1 is more extensive, filling the entire cell from just beyond the base to the apex. The ovipositor is as in figure 12e.

Holotype male from Auwahi, Maui, August 27, 1965, collected on Sodom apple bush (*Solanum sodomaeum* L.), G7.3 (J. K. Fujii), allotype female from July 26, 1966, J101D2 (J. Grossfield). Ten paratypes, all males same data as type and allotype (H. L. Carson, K. Y. Kaneshiro and J. Grossfield).

Type and allotype in the B. P. Bishop Museum, paratypes in the collections of

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

***Drosophila orphnopeza* n. sp. (Figs. 13a-d)**

This species fits very close to *D. limitata* and these are obviously closely related. They are, however, cytologically distinct species and have been discussed by Dr. Carson (1967, Proc. Nat. Acad. Sci. 57(5):1280-1285). Dr. Carson says this belongs in the primitive chromosome group "like *villosipedis*." The specimens upon which the cytological studies were made are taken from the same locality and on the same date as *limitata*. *D. orphnopeza* can be separated from *limitata* by the dark brown to black hind tarsi of both sexes, and by the position of the second spot on vein R_{3+4} ; in *orphnopeza* this is located at the middle of cell R_1 and is directly above the m crossvein (fig. 13b). Also the front basitarsus has 5-6

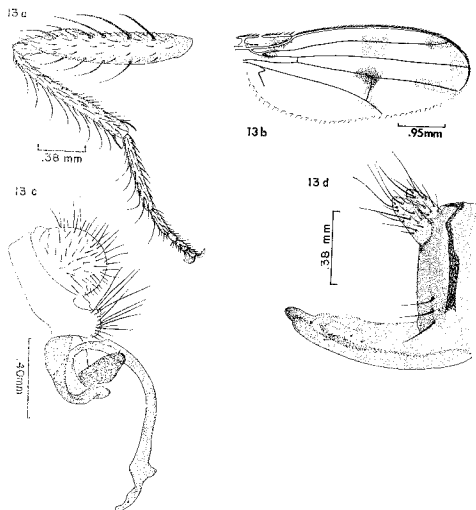


FIG. 13. *Drosophila orphnopeza* n. sp.: a, front leg; b, wing; c, male genitalia; d, ovipositor.

sets of curved dorsal cilia which do not extend to base of tarsomere (fig. 13a), and the spots at the apices of veins R_{2+3} , R_{4+5} and M_{1+2} are not confluent as in figure 8b. The male genitalia are as in figure 13c. Differences in the male genitalia will readily differentiate these two species (cf. figs. 13c and 8e).

Length: body, 4.5 mm; wings, 5.2 mm.

Female: Fitting the description of the male except for sexual characters. The best characters for differentiating the females would be the position of the second spot on vein R_{2+3} and the darkened hind tarsi. The ovipositor is as in figure 13d.

Length: body, 4.5-4.7 mm; wings, 5.2-5.4 mm.

Holotype male, Waikamoi, Maui, September 22, 1966, J31C, (J. P. Murphy). Allotype female, Keanae Valley, Maui, 1500', July 21, 1965, C134.4D (H. L. Carson). Sixteen paratypes, 9 males and 7 females, Keanae Valley, Maui, 1500', July 21, 1965, C134.4D (H. L. Carson); Waikamoi, Maui, September, 1966-August, 1967 (J. P. Murphy and K. Y. Kaneshiro); Puu Kukui Trail, West Maui, June 16, 1966, G80B (K. Y. Kaneshiro).

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

***Drosophila orthofascia* n. sp. (Figs. 14a-d)**

This species fits very close to *ciliaticrus* Hardy but is differentiated by the ornamentation of the front legs of the male. In *ciliaticrus* the dorsal surface of the basitarsus is densely covered with curled cilia arranged in three rather distinct rows. In *orthofascia* only one complete row of straight black cilia is present on the basitarsus (fig. 14a). It also shows relationship to *recticilia* but the details of the wing markings, body coloration, and ornamentation of the legs will readily differentiate these as pointed out in the key above; also the palpi are different.

Male. Head: The front is colored as in other members of this complex, opaque brown over the interfrontal areas, paler along the eye orbits. The upper third to two-fifths of the occiput is discolored with brown to black, the lower portion is yellow. The face is yellow-white, is raised in the upper portion, distinctly flattened above the epistoma. The clypeus and the mouth parts are yellow, faintly tinged with brown, the palpi are predominantly yellow, faintly brown on the bases and at the apices. One prominent apical bristle is present on the palpus, this is equal in length to the proclinate bristle of the front. The second oral bristle is well developed, two-thirds to three-fourths as long as the first. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated distinctly above the latter. The antennae are brown, tinged with yellow. The arista has seven or eight dorsal and three ventral rays in addition to the apical fork and the inner surface bears setae on the apical half to three-fifths. *Thorax:* Chiefly brown in ground color, rather densely covered with yellow-grey pollen; with four rather indistinct brown vittae extending down the mesonotum. The disc of the scutellum is brown, the margins are yellow. The propleura are yellow, the sternopleura are black except for a narrow yellow rim along the posterior margin. The other sclerites are marked yellow and brown. The metanotum is brown, tinged with rufous. *Legs:* Yellow, except for a faint tinge of brown on the coxae and on the apices of the hind tibiae. The preapical dorsal bristle of the front

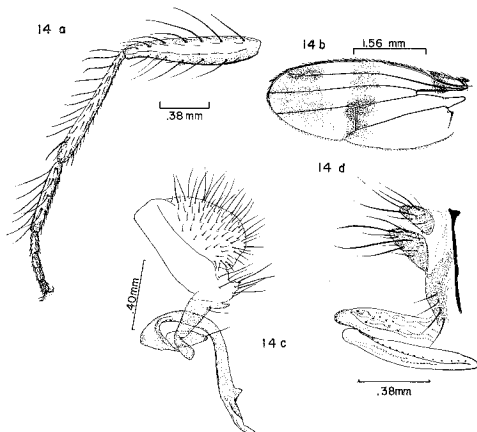


FIG. 14. *Drosophila orthofascia* n. sp.: a, front leg; b, wing; c, male genitalia; d, ovipositor.

tibia is well developed, distinctly longer and stronger than the apical ventral bristle and the dorsal surface of the tibia is densely covered with erect black cilia extending to the base of the segment. These hairs are approximately equal in length to the preapical dorsal bristle. The front basitarsus is about three-fifths as long as the tibia. The type has six straight black anterodorsal cilia extending almost the full length of the segment and three less conspicuous black dorsal cilia arranged at the middle of the segment. This arrangement obviously is variable; on paratype specimens the number of anterodorsals vary from five to eight with six being apparently the typical number; the number of dorsal cilia range from 0 to three, the average being two. *Wings*: Marked as in figure 14b. The marking in the middle of cell R₁ is approximately equal in width to the remainder of the transverse band across the middle of the wing. The basal section of vein R₄₊₅ is about equal in length to the r-m crossvein and the basal section of vein M₁₊₂ is about one-half as long as the penultimate section of that vein. *Abdomen*: Dark brown to black on the posterior and lateral margins and down the median portion of each tergum with a prominent yellow spot on each side of the segment. The genitalia are as in figure 14c. The aedeagus with a pronounced preapical proturbance, each paramere with a minute preapical sensillum (fig. 14c).

Length: body, 4.5 mm; wings, 5.3 mm.

Female: Fitting the description of the male except for sexual characters. The ovipositor is as in figure 14d.

Holotype male, Auwahi, Maui, 3700', July 29, 1965, collected on sodom apple bush, G7.2 (K. Y. Kaneshiro). Allotype female same data as type, labelled "G7.2D." Thirty-seven paratypes, 33 males, 4 females, same data as type except some collected July 26, J10G (H. L. Carson).

Type, allotype and some of the paratypes in the B. P. Bishop Museum, remainder of paratypes in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

***Drosophila paucipuncta* Grimshaw (Figs. 15a-c)**

Drosophila paucipuncta Grimshaw, 1901, Fauna Hawaiiensis 3(1):62; Hardy, 1965, Insects of Hawaii, 12:404, figures 160a-c.

This species has previously been known only from female specimens, collected at Olaa, Hawaii, in 1895. A series of specimens on hand from Pawaina, Hawaii, June-July 1965, 3000', collected on *Clermontia* yeast bait, C129.5 (H. L. Carson) and from Honaunau Forest Reserve, Hawaii, February 3, 1966, G25B14 K. Y. Kaneshiro) appear to be this species; the male has not been previously described.

The coloration of the thorax seems to vary considerably, typically the thorax is predominantly rufous with a rather faint tinge of brown on the mesonotum and most specimens would key along with the female in couplet 119 of the key to Hawaiian *Drosophila* (Hardy, 1965:100). Some specimens on hand have the mesonotum completely dark colored and would run to couplet 97 of the key. It differs readily, however, from anything in this section of the key by lacking

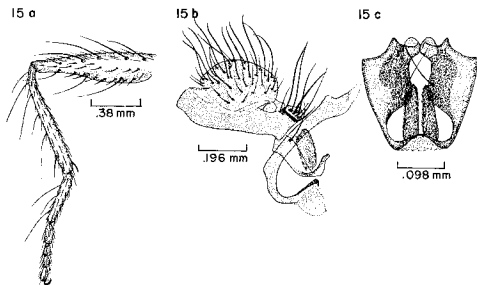


FIG. 15. *Drosophila paucipuncta* Grimshaw: a, front leg; b, male genitalia (lateral); c, hypandrium (ventral).

modifications of the labella as well as by other details. In Dr. Carson's phylogeny based on the chromosomes, it fits near *uniseriata* n. sp. and based on morphological characters it does show resemblance to this species. The differences are pointed out in the discussion under *uniseriata*. The male fits the description of the female in most respects. The front tibia lacks ciliation except for two prominent preapical hairs on the anterior surface. The preapical dorsal bristle is small, about equal in size to the apical ventral bristle. The front basitarsus is slightly less than half as long as the tibia and has three long straight anterodorsal cilia evenly arranged down the subsegment. The second and third tarsomeres each have one long anterodorsal cilia (fig. 15a). The face is pale yellow. Brown markings at apex of wings are usually confined to spots at tips of veins. The genitalia are as shown in figures 15b and 15c. The anterior gonapophyses are densely setose on the apical two-thirds, and the inner surface of the hypandrium just below the paramedian spine is also setose. The ninth tergum is gradually narrowed on the dorsal portion.

***Drosophila pilatisetae* n. sp. (Figs. 16a-c)**

The wing markings are rather similar to those of *pilimana* and the species appears most closely related to *fasciculisetae* Hardy and to *lineosetae* n. sp. and is differentiated by having a clump of dorsal black hairs situated just before the apex of the front basitarsus (fig. 16a).

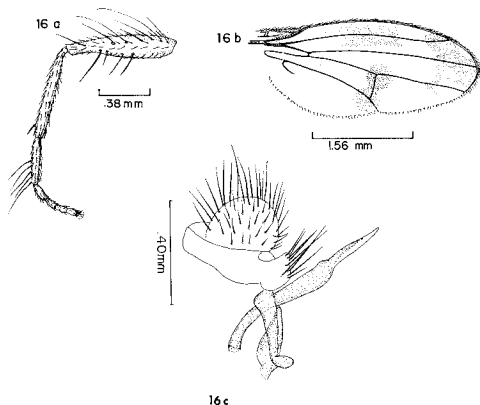


FIG. 16. *Drosophila pilatisetae* n. sp.: a, front leg; b, wing; c, male genitalia.

Male. Head: Front brown, tinged with yellow, yellow along the orbits; upper vertex and occiput brown to black in ground color, remainder of occiput and the genae yellow; face white, raised down the median portion. Clypeus brown, tinged with yellow. palpi and mouthparts yellow, tinged faintly with brown. The labella are fleshy. The mentum has scattered setae on the apical half, the apical bristle on the palpus is almost as long as the proclinate bristles of the front and at least three-fourths as long as the palpus. The second seta of the vibrissal row is the strongest and is almost equal in size to the palpal bristle. Third antennal segment is brown, tinged faintly with yellow. The second segment is brown over the dorsal portion. The aristae are comparatively short and have only five dorsal rays and two ventral rays in addition to the apical fork, the inner surface of the arista has about five moderately long hairs on the apical half. Anterior reclinate bristles about three-fifths as long as the proclينات and situated distinctly above the latter. *Thorax:* Yellow in ground color with four indistinct brown vittae on the mesonotum. The submedian stripes are separated by the yellow ground color and extend to slightly beyond the posterior dorsocentral bristles. The side stripes are represented by a dark brown to black spot before the suture and an elongate black mark behind the suture extending to just before a level with the posterior dorsocentrals and these are separated from the submedian vittae by a narrow yellow-grey line of pollen extending down each dorsocentral row. Scutellum clear yellow. Pleura predominantly yellow, tinged with brown in the ground color on the upper portion of the meso-, sterno- and pteropleura. Lower humeri entirely yellow, lower bristle three-fourths as long as upper. Anterior sternopleural bristle approximately three-fourths as long as the posterior. *Legs:* Entirely yellow, except for brown apical tarsomeres. Front tibiae lacking ciliation and with the preapical dorsal bristle rather small, extending just to the apex of the segment. Front basitarsus about half as long as tibia and with a prominent preapical dorsal clump of black hairs as in figure 16a. *Wings:* Predominantly subhyaline with large confluent spots of brown at apices of veins R_{2+3} , R_{4+5} and M_{1+2} , a large spot over the m crossvein which expands into the surrounding cells, a prominent subbasal spot which extends from the wing margin through the base of cell R_5 and a rather faint brown spot in the middle of cell R_1 and along the median portion of vein R_{2+3} ; the latter is almost one-third as long as vein R_{2+3} and nearly two times longer than the m crossvein (fig. 16b). The r-m crossvein is situated near the basal fourth of cell 1st M_2 . *Abdomen:* Tinged with yellow at the base and otherwise dark brown, brownish yellow covered with grey pollen on the anterior corners of the terga. Genitalia are as in figure 16c. The shape of the preapical protuberance of the aedeagus would place this species in the *hawaiiensis* group. The parameres have scattered short setae on the apical end in addition to the apical sensillum.

Length: body and wings, 4.4 mm.

Female unknown.

Holotype male, G81H Waikamoi, Maui, June 17, 1968 (J. K. Fujii).

Type in the B. P. Bishop Museum.

***Drosophila prostopalpis* n. sp. (Figs. 17a-d)**

This species has *pilimana*-like markings in the wing except that the submedian

marking in R_1 is more faint. It is differentiated from all other species in this general grouping by lacking ornamentation on the front tibiae and tarsi, by the long slender palpi each bearing two yellow hair-like bristles from the ventral apical portion (fig. 17c).

Male. Head: Predominantly yellow except for the reddish brown eyes and black ocellar triangle. Front, yellow covered with golden pubescence faintly tinged with brown on the lower portion. Clypeus, palpi and mouthparts yellow. The smaller of the two yellow subhyaline hairs on each palpus is slightly longer than the proclinate bristles of the front and the longer of the two hairs is about one-third longer than the elongate, slender palpi; the latter are nearly five times longer than wide and are covered with short black setae (fig. 17c). The mentum

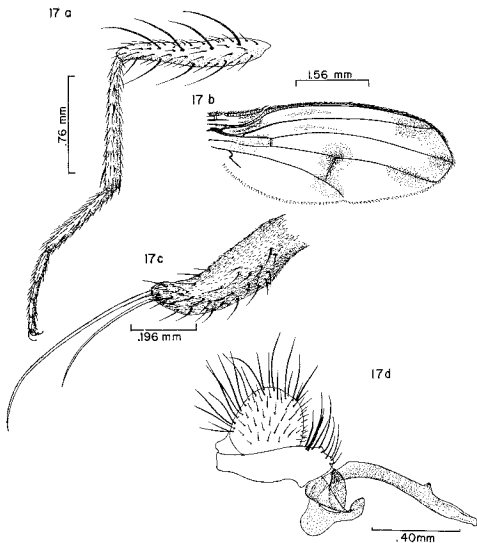


FIG. 17. *Drosophila prostopalpis* n. sp.: a, front leg; b, wing; c, palpus; d, male genitalia.

has scattered black setae on the apical one-third to one-fourth. The labella are fleshy. Third antennal segment largely brownish yellow, basal portion yellow; second segment brown on dorsum. Arista with eight dorsal and three ventral rays in addition to the small apical fork and with short setae on inner surface on apical three-fifths. Anterior reclinate bristle about two-thirds as long as proclinate and situated distinctly above the latter. *Thorax*: Rufous, tinged with brown on the mesonotum, lighter yellow in the ground color in the area down each dorsocentral line, but not distinctly vittate. Scutellum rufous, tinged faintly with brown down the dorsum, ventral portion and metanotum clear yellow. Pleura yellow except for a tinge of brown along upper margin of each mesopleuron. Humeri yellow, faintly tinged with brown on hind margins. Lower humeral bristle about three-fourths as long as upper and anterior sternopleural bristle about three-fourths as long as posterior. Halteres pale yellow. *Legs*: Entirely yellow, not ornate (fig. 17a). Front basitarsus about three-fifths as long as tibia. Preapical dorsal bristle on front tibia moderately developed, slightly larger than ventral bristle. *Wings*: Subhyaline, faintly tinged yellow-brown and with large isolated brown spots at apices of Veins R_{2+3} , R_{4+5} , and M_{1+2} ; also, a brown spot over m crossvein; a large subbasal brown spot which fills the basal cells to the r-m crossvein as in figure 17b; and with a rather indistinct brown marking before the middle of cell R_1 . *Abdomen*: Largely brown; yellow over the first tergum and on anterolateral margins of terga 2-6. Genitalia are as shown in figure 17d. Aedeagus about two times wider at the apical two-thirds than the basal one-third. Parameres with minute apical sensilla.

Length: body, 4.8 mm; wings, 5.5 mm.

Female unknown.

Holotype male, Puu Kukui, Maui, January 26, 1966 (J. P. Murphy).

Type in the B.P. Bishop Museum.

***Drosophila recticilia* n. sp. (Figs. 18a-e)**

This species is close to *ciliatricus* Hardy and *orthofascia* n. sp. but is readily differentiated by the broad mark in cell R_1 which extends as a wedge-shaped mark into the upper portion of cell R_2 , connecting with the brown band on the m crossvein (fig. 18b); by the poorly developed preapical dorsal bristle on the front tibia which is distinctly smaller than the ventral apical bristle; and by having two rows of long straight cilia on the front basitarsus (fig. 18a). It is closely related to *silvarentis* n. sp. (see discussion under that species).

Male. Head: The front is opaque brown in the interfrontal areas, faintly tinged with yellow to rufous in the ground color. The eye orbits are yellow in ground color, faintly tinged with brown and rather densely covered with yellow-grey pollen. The vertex and upper occiput are dark brown to black in ground color, covered with dense grey pollen. This extends over and around the ocellar triangle ending in a point about half way down the middle of the front. The face is entirely white, the median portion is slightly raised and is vertical as seen from lateral view. The clypeus is brown, the palpi and mouthparts are yellow, tinged with brown. Each palpus has a series of three or four bristle-like setae along the outside edge of the apex. The apical bristle is the strongest but the other setae are

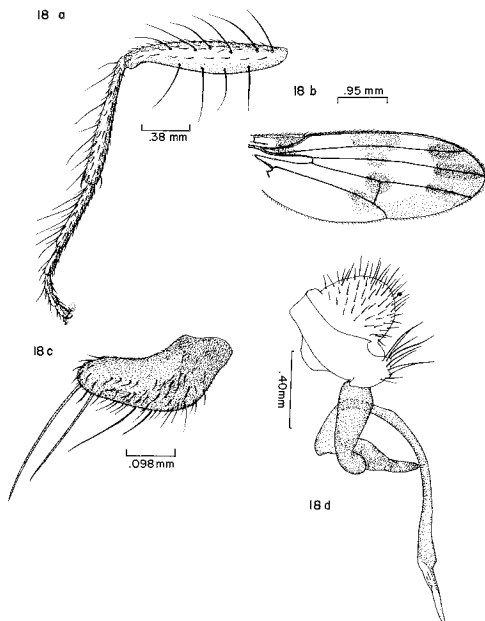


FIG. 18. *Drosophila recticilia* n. sp.: a, front leg; b, wing; c, palpus; d, male genitalia; e, ovipositor.

much more developed than is usual (fig. 18c). The occiput is largely brown to black in ground color, only the lower portion behind the genae and the margins are yellow. A narrow border of brown extends along the lower margin of each eye. *Thorax*: Predominantly brown to black in ground color rather densely yellow-grey pollinose over the dorsum, mostly grey on the sides. The humeri,

lateral margins of the mesonotum and scutellum are yellow in ground color. Typically yellow vittae are not clearly indicated on the mesonotum, the ground color is completely obscured by the yellow-grey pollen; four rather indistinct brown pollinose stripes are present; the median pair extends just beyond the anterior dorsocentrals and the lateral marks extend from behind the suture to a point opposite the posterior dorsocentrals. The entire hind portion of the mesonotum is densely yellow-grey pollinose. In some specimens, a rather distinct yellow vitta extends down the median portion and a faint yellow line extends down the mesonotum in line with the dorsocentral bristles; these specimens may be slightly teneral. The scutellum is brown in ground color on the disc, yellow on the sides. The metanotum is dark brown to black, densely covered with grey pollen. The pleura are predominantly dark brown to black, marked with yellow along the lower margin of the mesopleuron and over the pteropleuron. The lower humeral bristle is about two-thirds as long as the upper. The anterior sternopleural bristle is about three-fourths as long as the posterior. *Legs*: Mostly yellow, distinctly tinged with brown on the coxae and faintly tinged with brown on the femora and just before the apices of the hind tibiae. Some specimens have the front femora predominantly brown, others have the legs entirely yellow. The dorsal surfaces of the front tibiae and first two tarsomeres are densely covered with long erect cilia. Those on the tibiae are arranged in three irregular rows, those on the tarsi are in two rows; the cilia on the tibiae extend to the base of the segment (fig. 18a). The preapical dorsal bristle of the tibia is minute, smaller than the apical ventral bristle and hardly differentiated from the small setae. *Wing*: Marked as in figure 18b. Characterized by the wedge-shaped mark extending into the middle of the wing from the middle of the third costal section (18b). The subbasal wing spot is large and conspicuous and fills the apical three-fifths of the second costal cell. The costal fringe extends just slightly beyond the middle of the distance between veins R_{2+3} and R_{4+5} . The entire wing apex is brown. *Abdomen*: Dark brown to black in the median, posterior, and lateral portions of the terga leaving a large yellow spot on each side, as is typical of other species of this complex. The genitalia are as in figure 18d. The aedeagus is like that of the *hawaiiensis*-group in that it is narrow and elongate and the preapical protuberance is small or almost absent. The parameres, each with a minute sensillum are rather elongate (fig. 18d).

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

Female. Fitting the description of the male except for sexual differences. The ovipositor is as in figure 18e.

It should be noted that this species was included in the original concept of *ciliaticrus* (Hardy, 1965:207). The specimen recorded as a paratype male from Olinda, Maui, is a specimen of *recticilia*.

It should also be noted that a population from Oahu cannot at present be differentiated from *recticilia*, except that the specimens are typically more pale, the palpi, mouthparts and legs are yellow and the costal fringe appears to be longer. The specimens are not being included in the type series and this population will have to be studied in more detail to learn whether or not it is a distinct or sibling species.

Holotype male, Waikamoi, Maui, June 17, 1966, G81C (J. P. Murphy). Allo-

type female, same locality, Sept. 12, 1965 (J. P. Murphy). A series of about 50 paratypes predominantly males are on hand, same locality as type, collected June 1965 to November 1966, G8.1, G81C, G81H, J33C and HH10.41 (J. P. Murphy, J. K. Fujii, H. L. Carson, K. Y. Kaneshiro, D. E. Hardy, and W. B. Heed). Specimens have also been collected from Kipahulu Valley, Maui, August 1967 (H. L. Carson, K. Y. Kaneshiro).

Holotype, allotype, and some paratypes in the B. P. Bishop Museum; the remainder of the paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

***Drosophila sejuncta* n. sp. (Figs. 19a-c)**

This species has wing markings rather similar to *pilimana* and fits in the *engyochracea* complex of species and appears closely related to *sproati* n. sp. from Hawaii. *D. sejuncta* is differentiated from *sproati* by having the front tibia ciliated to the base; the cilia of the front basitarsi straight or nearly so (fig. 19a); the subbasal wing spot small and r-m crossvein situated well beyond apex of vein R_1 (fig. 19b).

Male. Head: Front brown, golden brown pollinose, yellow in the ground color along the orbits. Upper median portion of occiput brown to black, remainder yellow. Genae yellow with a small brown spot just below the posteroventral margin of the eye. Face yellow-white, only slightly raised down the median portion. Clypeus and mouthparts yellow, labella fleshy. Palpi brownish yellow, each with a slender hair-like bristle at the apex. This is equal in length to the upper bristle on the oral margin. Third antennal segment brown, tinged with yellow basally, and second segment brown on the dorsal surface. Arista with nine dorsal and three ventral rays, in addition to the apical fork and with about five prominent setae on the inner surface, on anterior half. Anterior reclinate bristle two-thirds as long as proclinate and situated distinctly above latter. *Thorax:* Yellow, tinged faintly with brown in the brown color of the dorsum, paler down the median portion and with faint indications of vittae laterally. Hind margin of each humerus tinged with brown. Disc of scutellum dark brown, margins and venter yellow. Pleura yellow except for a small spot of brown below wing base and another at posterodorsal margin of mesonotum. Metanotum rufous. Lower humeral bristle about three-fourths as long as upper, and anterior sternopleural approximately three-fourths as long as posterior bristle. *Legs:* Entirely yellow. Front tibia with two rows of dorsal cilia extending from base to preapical dorsal bristle. Preapical bristle strong, nearly two times longer than ventral bristle. Front basitarsus approximately three-fifths as long as tibia and with numerous short slightly curved cilia extending down the dorsal and anterodorsal surface (fig. 19a). *Wings:* Principally subhyaline with brown confluent spots at apices of veins R_{2+3} , R_{4+5} , and M_{1+2} , a large brown spot over m crossvein, a small brown spot in the middle of cell R_1 opposite m crossvein and a moderately small brown subbasal spot as in figure 19b. Crossvein r-m situated distinctly beyond the end of Vein R_1 and near basal third of cell 1st M_2 . *Abdomen:* Predominantly brown to black, yellow with yellow-grey pollinosity on anterolateral margins of terga. Genitalia are as shown in figure 19c.

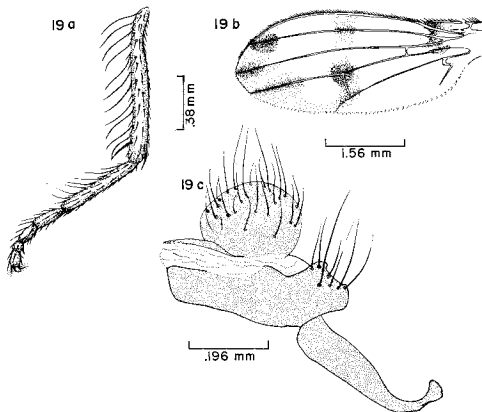


FIG. 19. *Drosophila sejuncta* n. sp.: a, front leg; b, wing; c, male genitalia.

Length: body and wings, 5.0 mm.

Female unknown.

Holotype male, Kokee, Kauai, December 28, 1966, berry patch flat, J52C (J. P. Murphy).

Type in the B. P. Bishop Museum.

***Drosophila setosifrons* n. sp. (Figs. 20a-c)**

This remarkable species would run imperfectly to the genus *Nudidrosophila* in the key to Hawaiian Genera but has distinct proclinate bristles and rudimentary upper reclinate and ocellar bristles. It should be noted that *Nudidrosophila* is apparently not a good genus. It is based on male characters and is probably not more than a species complex of strangely developed *Drosophila* which are characterized by lacking reclinate, proclinate or ocellar bristles on the head; by having microscopic pubescence or scales over the front; by having a series of fine laterally directed recumbant hairs on each side of the ocellar triangle and no preapical dorsal bristle on the front tibia.

D. setosifrons differs from all known *Drosophila* by having a dense patch of black setae borne on a slight swelling on each side of the front, by having the

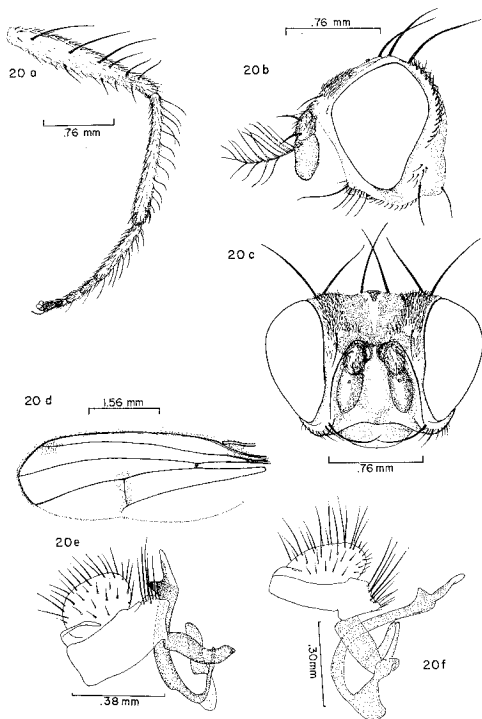


FIG. 20. *Drosophila setosifrons* n. sp.: a, front leg; b, head; c, dorsal view of front; d, wing; e, male genitalia. *Drosophila pilimanae* Grunshaw: f, male genitalia.

upper reclinate and ocellar bristles tiny, scarcely differentiable from the surrounding setae (fig. 20c).

Male. Head: Slightly higher than long, with compound eyes narrowed on lower portions (fig. 20b). Front broadly yellow on the sides, brown in the median portion except for a small yellow triangle extending below the ocelli. The patches on the front and the arrangement of the bristles is as in figure 20c. The inner vertical bristles are comparatively small, approximately three-fifths as large as the outer. Occiput yellow, except for a tinge of brown on upper margin and in upper median area. Front yellow, face yellow-white, tinged with brown on the epistomal margin and slightly raised down the median portion but flattened and gently protruded on lower margin. Clypeus and palpi yellow, mouthparts brown except for yellow base of haustellum. Labellum fleshy. Mentum setose just before apex. Palpi lacking apical bristles and with only scattered short, black setae along upper margins. Antennae predominantly brown to black, first segment and base of third yellow. Arista with nine dorsal and four ventral rays in addition to the apical fork and setose along inner margin on apical half. Upper oral bristles strong, nearly two times longer than the proclinate bristles of the front, second oral bristle about equal in size to proclimates. *Thorax:* Chiefly yellow, mesonotum with four brown vittae, the lateral pair are indistinctly interrupted at the suture. Scutellum dark brown on the disc, yellow on margins and on venter. Pleura mostly yellow, brown along the upper margin of each mesopleuron and tinged with brown on the upper portion of each sternopleuron and over the hypopleuron and metapleuron. Also the metanotum is yellow-brown. Anterior dorsocentral bristles situated about opposite the second pair of supraalar. Humeri yellow, lower bristle about three-fourths as long as upper. Anterior sternopleural bristle about two-thirds as long as posterior. Halteres yellow, marked with brown on their bases. *Legs:* Chiefly yellow, tinged with brown on apices of tibiae and on mid and hind femora and with apical tarsomeres dark brown. Front tibia with moderately long slightly curled cilia extending from base to just before preapical dorsal bristle. Preapical dorsal bristle of tibia short, subequal to apicoventral bristle. Front tarsi with moderately long dorsal cilia extending the full length of the segments. The basitarsus is approximately three-fifths as long as the tibia (fig. 20a). *Wings:* Predominantly hyaline with a prominent subbasal brown spot extending through the apical portion of the costal cell and through the base of cell R_1 . Also, with a brown spot at apex of vein R_{2+3} filling the apical portion of cell R_1 . A large brown spot over the m crossvein and a small mark over the r-m crossvein. Wings long and slender, nearly four times longer than wide. Third costal section five times longer than fourth and costal fringe extending just beyond the middle of distance between apices of veins R_{2+3} and R_{4+5} . Last section of vein M_{1+2} equal in length to penultimate section. See figure 20d. *Abdomen:* First segment and base of second tergum yellow. The genitalia are as shown in figure 20c. The aedeagus has a prominent preapical protuberance; parameres are rounded at the apex and each with a minute preapical sensillum.

Length: body, 5.5 mm; wings, 6.2 mm.

Female unknown.

Holotype male, Fern Forest, Kilauea, Hawaii, July 17, 1964 (L. H. Throckmorton).

Type in the B. P. Bishop Museum.

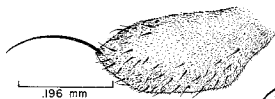
A female specimen on hand from Olaa, Forest Reserve, Hawaii, 3775', September 3, 1965 (K. Kaneshiro) fits all of the characteristics of the male except for wing markings, and except for sexual characters. Also, the head bristles are normal. The wings differ by having a complete cross band at a level with the m crossvein, and having pale brown spots at apices of veins R_{4+5} and M_{1+2} . This may be an unusual case of dimorphism but we are not considering this female as part of the type series.

***Drosophila silvarentis* n. sp. (Figs. 21a-e)**

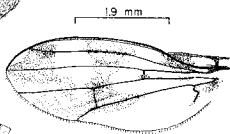
This species is closely related to *hawaiiensis* Grimshaw and *recticilia* n. sp. It is readily differentiated from *hawaiiensis* by having long cilia extending the entire length of the tibia (fig. 21b); and from both *hawaiiensis* and *recticilia* by having an isolated brown spot on the r-m crossvein (fig. 21c), and by having the legs mostly brown to dark brown. In *recticilia* there are two rows of long cilia on the front basitarsus but only one row in *silvarentis* (figs. 21b and 18a).

Male. Head: The front is dark brown to black, densely covered with grey pollen around the eye orbits, the vertex, and the upper occiput. The upper half of the face is white, dark brown to black on the lower half. The clypeus and palpi are brown, the mouthparts are brown, tinged with yellow. Each palpus has a moderately strong apical bristle about two-thirds the length of the first oral bristle and is scattered with short black setae along the lower margins (fig. 21a). The antennae are dark brown to black, the arista having seven to eight dorsal rays and four ventral rays in addition to the apical fork, and the anterior surface is sparsely covered with short hairs. Two strong vibrissae are present on the lower angles of the face. **Thorax:** Predominantly dark brown to black in ground color, densely grey pollinose over the anterodorsal portion and sides of the mesonotum. The mesonotum around each lateral pair of dorsocentral bristles is marked with yellow, but otherwise yellow vittae are not indicated, four rather indistinct brown pollinose stripes are present, the median pair extends just beyond the anterior dorsocentral and the lateral pair extend from behind the suture to a point just beyond the posterior dorsocentrals. The scutellum is dark brown to black in ground color on the disc, yellow on the margins. The pleura and sternopleura are dark brown to black with no conspicuous yellow markings. The anterior sternopleural bristle is about one-half as long as the posterior. **Legs:** Mostly dark brown to black on the femora and coxae, and brown to light brown on the tibiae and tarsi. There are about 17 to 19 strong bristles on the posterodorsal surface and about 11 to 13 on the posteroventral surface of the front femur. The cilia on the tibia and tarsus are arranged in a single row on the anterior surface; the cilia extend from the base of the tibia down to the apex of the second tarsomere (fig. 21b). The preapical dorsal bristle of the front tibia is approximately equal to the apical ventral bristle. **Wings:** Marked as in figure 21c. A small isolated brown spot is present on the r-m crossvein which is situated slightly toward the apex of the wing rather than immediately beneath the break in the costa. The costal fringe extends just slightly beyond the middle of the distance between veins R_{2+3} and R_{4+5} . **Abdomen:** Very similar pattern to that of *recticilia* except

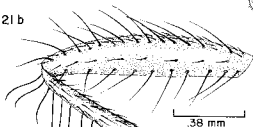
21 a



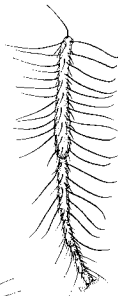
21 c



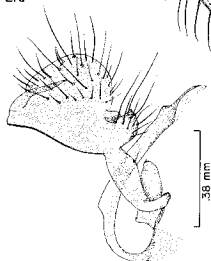
21 b



21 f



21 d



21 e

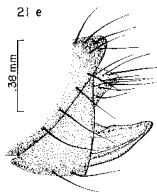


FIG. 21. *Drosophila silvarentis* n. sp.: a, palpus; b, front leg; c, wing; d, male genitalia; e, ovipositor. *Drosophila villinibia* Hardy: f, front leg.

that brown markings are darker and the yellow spot is covered with grey pollen. The genitalia are as in figure 21d. The shape of the aedeagus would definitely place this species in the *hawaiiensis* species group. Parameres rounded at apex, each with a minute sensillum.

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

Female. Fitting the description of the male except for sexual differences. The ovipositor is as in figure 21c.

Holotype male, allotype female and a few paratypes taken from laboratory culture from iso-female line K18A1. Original female collected at Humuula Saddle, Hawaii, July 13, 1967 (W. B. Heed). Other paratypes collected on same date and locality (R. Iwamoto).

Type, allotype and a few paratypes in the B. P. Bishop Museum. Other paratypes distributed in the following collections, U. S. National Museum, British Museum (Natural History), University of Texas Genetics Foundation, and the University of Hawaii.

Drosophila sodomae n. sp. (Figs. 22a-e)

This species belongs in the *pilimana* complex and fits nearest to *limitata* n. sp. It is differentiated by having the dorsal cilia extended all the way to the base of the front tibia (fig. 22a) rather than having the basal portion of the tibia devoid of cilia; by having the sides of the abdominal terga entirely yellow, rather than with a broad brown apical band extending into the lateral margins as in *limitata*; by having the subbasal wing spot reduced to just a narrow strip of brown (fig. 22c), also by having the brown markings of the mesonotum more faint and the spots at the apices of veins R_{2+3} , R_{4+5} , and M_{1+2} not so distinctly fused together.

Male. Head: Predominantly yellow, brown on the upper median portion of the occiput and over the ocellar triangle, the upper portion of the front is tinged with brown and a small brown spot is present at the lower margin of each eye. The face is yellow-white, is slightly raised down the median portion and flattened on the lower margin above the epistoma. The clypeus, palpi and mouthparts are yellow, except for the upper portions of the labella which are brown to black. The apical bristle on each palpus is about equal in length to the second oral bristle. The second oral bristle is about two-thirds as long as the first. The antennae are yellow with a faint tinge of brown on the upper portion of the second segment. The arista has seven or eight dorsal and three ventral rays in addition to the apical fork. About six erect setae are present on the inner portion of the outer half of the arista. The anterior reclinate bristle is about three-fifths as long as the proclinate and is situated well above the latter. *Thorax:* Rather densely yellow-grey pollinose, more distinctly grey on the dorsum with the brown color showing through rather faintly. On the mesonotum are four rather faint brown vittae as in figure 22b. The disc of the scutellum is brown in ground color over the basal two-thirds of the median portion, the margins are broadly yellow. The pleura are predominantly yellow with faint brown markings on the upper portions of the mesopleura, sternopleura, and pteropleura. The median portion of the metanotum is brown in ground color. The anterior dorsocentral bristles are opposite the

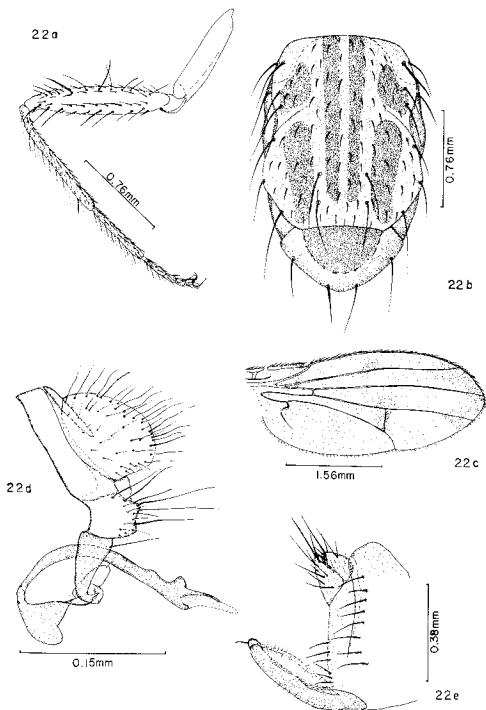


FIG. 22. *Drosophila sudornae* n. sp.: a, front leg; b, mesonotum; c, wing; d, male genitalia; e, ovipositor.

second supraalar. The lower humeral bristle is subequal to the upper, and the anterior sternopleural bristle is three-fourths to four-fifths as long as the posterior bristle. The halteres are pale yellow. *Legs*: Entirely pale yellow. An abundance of erect dorsal cilia extend the entire length of the front tibia, these hairs are mostly straight and are approximately equal in length to the preapical dorsal bristle. The preapical bristle is about one-half longer than the apical ventral bristle on the tibia. The front basitarsus is approximately three-fifths as long as the tibia. The first three tarsomeres have an abundance of cilia extending over their dorsal surfaces; these hairs are mostly straight and are about equal in length to those on the tibia (fig. 22a). *Wings*: The brown spots are rather small compared to most members of this complex (fig. 22c), the subbasal spot is reduced to a narrow transverse streak extending from the apex of the second costal section to the base of cell R_2 . The second spot in cell R_1 is situated slightly before the middle of the cell and distinctly before a line drawn from the m crossvein. The spots at the apex of the wing are not completely fused. The basal section of vein R_{1+5} is about equal in length of the m crossvein and the r-m crossvein is situated near the basal third of cell 1st M_2 . The third costal section is almost four times longer than the fourth and the costal fringe extends two-thirds the distance between the apices of veins R_{2+3} and R_{1+5} . *Abdomen*: Predominantly yellow with a narrow brown band along the posteromedian portion of each segment, extending in a narrow band across the median part of each tergum, with the sides of the terga entirely yellow. The genitalia are as in figure 22d. Aedeagus with a prominent preapical protuberance, basal apodeme broad. Parameres broad with sensilla about one-half as long as the segments, and preapical in position.

Length: body and wings of type, 4.4 mm; length of other specimens ranging from that of type to 5.3 mm.

Female. Fitting the description of the male except for sexual characters. The ovipositor is as in figure 22e.

Holotype male and allotype female from Auwahi, Maui, August 27, 1965, collected on Sodom apple bush (*Solanum sodomaeum* L.) (K. Y. Kaneshiro). Seven paratypes, four males and three females, same data as type (K. Y. Kaneshiro and J. K. Fujii); also September 27, 1965, J16.3 (J. K. Fujii) and July 25, 1966, J10G (H. L. Carson).

Type and allotype in B. P. Bishop Museum, paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

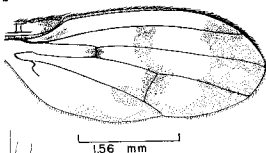
***Drosophila spaniothrix* n. sp. (Figs. 23a-c)**

This species would run to *aglaia* Hardy in the key to *Drosophila* (1965) but is not related to this species. It is readily differentiated by the differences in wing venation and markings, and by having only one (median) dark brown vitta on the mesonotum and having three longitudinal streaks of brown over the pleura. The fourth costal section is much shorter than in *aglaia*, the third section is slightly over four times longer than the fourth, rather than about 2.3 times longer. The wing markings would differ by having the entire apical fork brown and with this marking connecting along the wing margin with brown mark over m crossvein

23 a



23 b



23 c

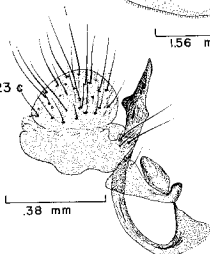


FIG. 23. *Drosophila spaniothrix* n. sp.: a, front leg; b, wing; c, male genitalia.

and also by having a complete band present across middle of wing (fig. 23b). The wing markings and venation are very similar to those of *villitibia* except that the mark in the middle of cell R_1 is very faint. It differs from any of the species which have the r-m crossvein situated at the middle of cell 1st M_2 by lacking ciliation on the front tibiae and having only a few cilia scattered over the front tarsi (fig. 23a).

Male. Head: Predominantly yellow, front pale yellow down the sides and down the median portion. Mouthparts entirely yellow, labella fleshy. Apical bristles on palpus yellow-brown, slender, rather hair-like and approximately equal in length to the proclinate bristles of the front. Mentum with six or eight black preapical setae on each side. Anterior reclinate bristles three-fourths as long as proclinate and situated distinctly above the latter. The upper oral bristle rather strong, almost as long as the proclinate bristles of the front. **Thorax:** Predominantly yellow. Mesonotum with a dark brown median vitta extending the entire length, this is expanded posteriorly and with the sides faintly tinged with brown but not distinctly vitate. Hind margins of humeri brown. Scutellum brown on the disc with the margin broadly yellow. Pleura yellow with three lines of brown extending longitudinally. Lower humeral bristle subequal to the upper and anterior sternopleural bristle about three-fourths as long as posterior. **Legs:** Yellow, tinged with brown just before apices of hind tibiae and with apical tarsomeres yellow-brown.

Front tibiae lacking ciliation and with the preapical dorsal bristle rather small, about equal in size to the apicoventral bristle. Front basitarsus almost three-fifths as long as the tibia and devoid of cilia except for one anterodorsal hair near basal two-fifths and three to four anterior and anterodorsal hairs just before the apex. Other tarsomeres each with two to four long dorsal and anterodorsal hairs (fig. 23a). *Wings*: Subhyaline with a large brown mark covering the entire apex and extending along margin connecting with a broad mark over the m crossvein and this in turn connected with a mark extending across cells R_5 , R_3 and into R_1 . The mark in cell R_1 is faint. A prominent subbasal spot is present and a spot is present on the r-m crossvein (fig. 23b). The r-m crossvein is situated in the middle of cell 1st M_2 and the penultimate and antipenultimate sections of veins M_{1+2} are equal in length. *Abdomen*: Predominantly brown dusted with grey-brown pollen, with the anterolateral margins of terga 2-6 yellow in ground color, covered with grey pollen. Genitalia are as shown in figure 23c. Each paramere somewhat pointed at apex and with a minute apical sensillum.

Length: body and wings, 4.25 mm.

Female unknown.

Holotype male, Pupukea, Oahu, June 11, 1961 (H. L. Carson).

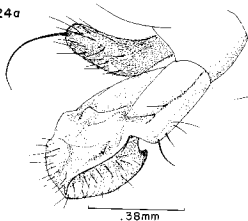
Type in the B. P. Bishop Museum.

Drosophila sproati n. sp. (Figs. 24a-e)

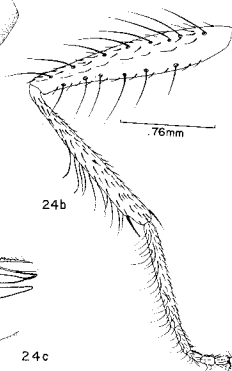
This remarkable species fits near *engyochracea* Hardy but the two do not appear to be closely related. *D. sproati* is readily differentiated by lacking dorsal cilia on the basal third of the front tibia and having curled cilia on the front tarsus; rather than having the dorsal cilia extending to the base of the segment and the cilia of the tarsus straight (figs. 24b and 24g); by having the palpi three or more times longer than wide and entirely yellow, rather than about two times longer than wide and blackened at the apices (figs. 24a and 24f); the subbasal wing spot large and conspicuous as in figure 24c, and the r-m crossvein situated almost opposite the end of vein R_1 ; and by having the disc of the scutellum brown and the brown marking on the mesonotum rather variable not so distinctly defined as in *engyochracea*. The genitalia differ as in figures 24d and 24i. For comparison of the wing markings compare figure 24c with figure 87d (Hardy, 1965:261).

Male. Head: Similar in most respects to members of the *pilimana* complex. The genae, face, clypeus, palpi and mouthparts are entirely yellow except for a dark discoloration on the dorsal surface of each labellum. The front is entirely golden brown, slightly paler along the eye orbits. The palpi are rather slender, about three times longer than wide and equal in length to the mentum (fig. 24a). The apical bristle of the palpus is about equal in length to two-thirds of the segment. The second oral bristle is moderately strong, in the type it is about three-fourths as long as the first bristle; in some other specimens the two are subequal. The lower reclinate bristle is two-thirds to three-fourths as long as the proclinate and is situated distinctly above the latter. The first antennal segment is yellow, the second and third are brown, tinged with yellow on the ventral portions. The arista has three ventral and seven or eight dorsal rays in addition to the apical

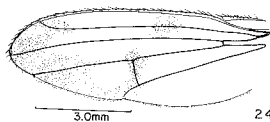
24a



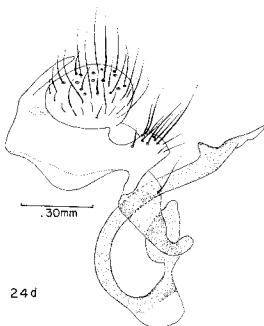
24b



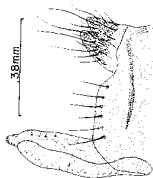
24c



24d



24e



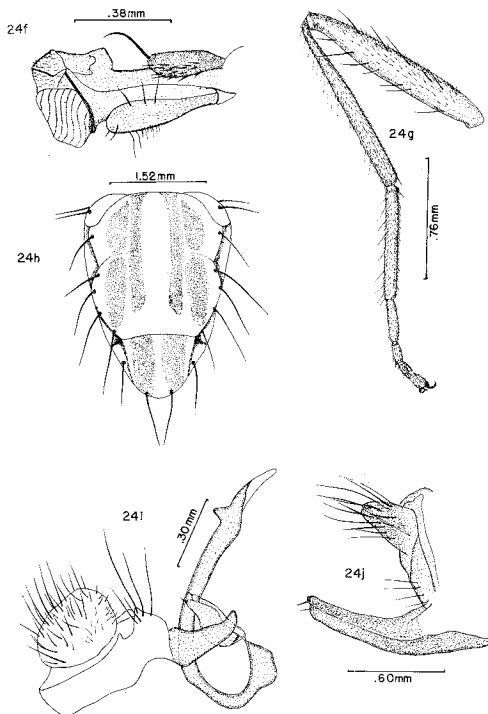


FIG. 24. *Drosophila sproati* n. sp.: a, palpus and mouthparts; b, front leg; c, wing; d, male genitalia; e, ovipositor. *Drosophila engyochruea* Hardy: f, palpus and mouthparts; g, front leg; h, mesonotum; i, male genitalia; j, ovipositor.

fork, also about seven prominent setae are arranged on the inner apical half of the arista. *Thorax*: Predominantly yellow. The pleura, metanotum, sides and median portion of mesonotum, and margins and ventral portion of scutellum are yellow. Typically the mesonotum has four rather indistinct brownish vittae arranged one on each side of the dorsocentral row. The color of the mesonotum is obviously variable in this species, in some specimens brown vittae are distinctly developed very similar to those of *engyochracea*, in other specimens they are completely lacking and the entire mesonotum is rufous, very faintly tinged with brown. The disc of the scutellum is dark brown to black. 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 except for preapical discolorations of brown on the tibiae, and a faint tinge of brown on the tarsi. Fifteen to 20 erect dorsal cilia are located on the front tibia arranged from just below the preapical dorsal bristle to about the basal third of the segment, these are arranged in two irregular rows. The cilia are about equal in length to the preapical dorsal bristle and the bristle is approximately equal to the ventral apical bristle. The first three tarsomeres have an abundance of moderately long curled cilia arranged over the anterodorsal, dorsal and posterodorsal surfaces (fig. 24b). The front basitarsus is about two-thirds as long as the tibia. *Wings*: Marked as in figure 24c. The subbasal brown mark is large and conspicuous, involving the r-m crossvein and extending into the upper portion of the base of cell 1st M_2 . The spots at apices of veins R_{1+2} and M_{1+2} are confluent and this coloring extends over the entire apical portion of cell 2nd M_2 . The costal fringe extends slightly beyond the middle of the distance between the apices of veins R_{2+3} and R_{4+5} . *Abdomen*: The first segment and the bases of the second tergum are yellow, faintly tinged with brown. The remainder of the terga are dark brown to black with prominent yellow-grey lateral spots on the anterior margins. The genitalia are as shown in figure 24d. Aedeagus with a prominent preapical protuberance, parameres with minute apical sensilla.

Length: body, 6.0 mm; wing, 6.4 mm.

Female. Fitting the description of the male except for sexual characters. The ovipositor is as in figure 24e.

Length, as in male.

Holotype male and allotype female from Puulaalau, Kohala Mountains, Hawaii, 3,500-4,000', August 29-30, 1966 (K. Y. Kaneshiro) collected at baits in rain forest, rainfall over 200" per year.

Approximately 100 paratypes, 80 ♂♂ and 20 ♀♀ same locality as type. (K. Y. Kaneshiro, H. L. Carson, J. K. Fujii and D. E. Hardy) (Collected August 4, and 29-30, 1966). Specimens are also present from the following localities on the island of Hawaii, Kilauea, July 17, 1964, and March 16, 1966, collected at bait (W. B. Heed); Upper Olaa Forest, February 2, 1966-July 28, 1966 (K. Y. Kaneshiro and J. P. Murphy); and Pawaina, 3000', July 16, 1965 (H. L. Carson).

Type, allotype and a series of paratypes in the B. P. Bishop Museum. Other paratypes distributed in the following collections, U. S. National Museum, British Museum (Natural History), University of Texas Genetics Foundation, and the University of Hawaii.

It is with pleasure that we name this species after Mr. William K. Sproat the

superintendent of the Kohala Ditch, Kohala Sugar Co. Mr. Sprout has spent much of his lifetime in the Kohala region and knows these mountains better than any other person. He has always been intensely interested in the plants and animals and has given assistance to a great many biologists over the years. His wholehearted cooperation has been of tremendous help to us in studying the insects of this interesting region.

***Drosophila uniseriata* n. sp. (Figs. 25a-g)**

This species shows considerable resemblance to *D. paucipuncta* Grimshaw. The wing markings, the cilia on the front tarsi, the body size, and some of the body markings are similar. The ornamentation of the front tibia is very different in the two; *paucipuncta* has two rather weak preapical anterodorsal cilia and lacks the complete row present in *uniseriata*, also the predominantly brown scutellum and the distinct brown median vitta on the mesonotum will readily differentiate *uniseriata*. According to Dr. Carson's study, the chromosome banding is very similar to that of *paucipuncta* and the genitalia also show close relationship. It also resembles *distinguenda* Hardy, but is a much smaller species, body 4.25 mm rather than 6.5 mm; has a broad brown median vitta down the mesonotum rather than two submedian vittae; has just a single row of anterodorsal cilia on the front basitarsus and seven anterodorsal cilia evenly spaced the entire length of the tibia plus one dorsal hair at the base. *D. distinguenda* has approximately 12 long hairs scattered over the dorsal, anterodorsal and posterodorsal surfaces of the front basitarsus and about a dozen long hairs are arranged on the dorsal surface of the tibia from about the basal third to the apical one-fourth of the segment. Also the apical wing cloud is much larger in *distinguenda*, extending about two-thirds the distance from the apex to the m crossvein; in *uniseriata* the mark extends just slightly over one-third this distance.

Male. Head: The front is brown, tinged with rufous in the ground color, the eye orbits are yellow. The upper median portion of the occiput is brown, the remainder of the occiput, the genae, face, clypeus, palpi and mouthparts are yellow. The palpi are slender, over four times longer than wide and each has a clump of prominent setae on the outside surface of the apex (fig. 25a). The face is just slightly raised in the median portion, the lower part, above the epistoma, is flattened. The antennae are yellow-brown, the basal segment and the lower portion of the second are yellow. The arista has 8 or 9 dorsal and 4 or 5 ventral rays in addition to the tiny apical fork. The inner surface of the arista is setose over the apical two-thirds. **Thorax:** Rufous in ground color with a prominent brown median vitta extending the entire length of the mesonotum and with indistinct faint markings of brown on the sides (fig. 25c). Scutellum brown to black on the disc and over the apex and ventral portions, yellow on the posterolateral margins. The metanotum is entirely yellow. The pleura are yellow except for a brown mark on the anterior portion of the mesopleuron and a slight discoloration of brown on the metapleuron. The rim of the posterior spiracle is brownish yellow. The lower humeral bristle is subequal to the upper and the anterior sternopleural bristle is two-thirds as long as the posterior bristle. Several prominent setae are present between the two bristles. **Legs:** Entirely yellow, front tibia with a row of about seven evenly spaced anterodorsal cilia extending almost

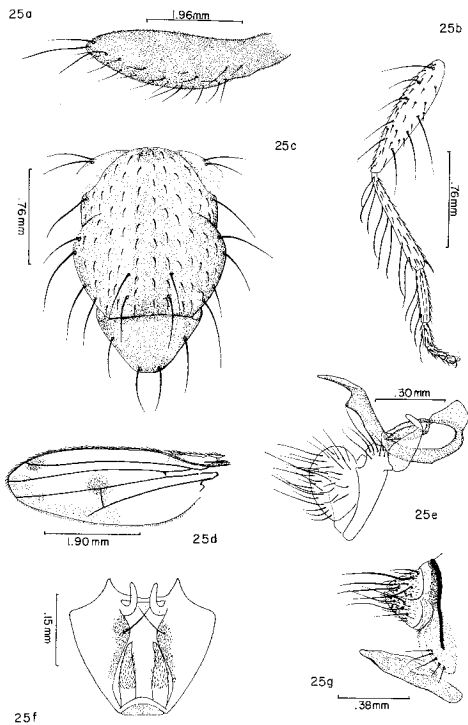


FIG. 25. *Drosophila uniseriata* n. sp.: a, palpus; b, front leg; c, mesonotum; d, wing; e, male genitalia; f, hypandrium (ventral); g, ovipositor.

the full length of the segment and one dorsal cilium at the base. The preapical dorsal bristle of the front tibia is about equal in development to the apical ventral bristle. The front basitarsus is about two-fifths as long as the tibia and has three long, black, evenly spaced cilia. The second tarsomere has one long black antero-dorsal cilium (fig. 25b). *Wings*: Marked with brown at the apex, over the m cross-vein and also with a subbasal spot as in figure 25d. The third costal section is about six times longer than the fourth and the costal fringe extends nearly two-thirds the distance between the apices of veins R_{2+3} and R_{4+5} . The r-m crossvein is situated just beyond a level with the apex of vein R_1 and near the basal one-fourth of cell 1st M_2 . *Abdomen*: The first tergum is entirely yellow except for a faint tinge of brown over the median portion. The second is yellow along the basal one-third to one-half of the segment, brown on the posterior and extreme lateral margins. The other terga are brown on the posterior and lateral margins and in the medium portion. The coloring of the terga is somewhat variable; in some paratype specimens the anterior border is entirely yellow. The genitalia are as shown in figures 25e and 25f. They are very similar to those of *paucipuncta*. The shape of the parameres and the apical portion of the aedeagus are quite different and will readily differentiate the two. As in *paucipuncta*, the apical three-fourths of the parameres and the inner surface of the hypandrium just below the paramedian spine (fig. 25f) are densely setose.

Length: body, 4.0 mm; wings, 4.5 mm.

Female. Fitting the description of the male except for sexual characters. The palpi lack the conspicuous clump of apical setae and the apical bristle is stronger than in the male, about equal in size to the first oral bristle. The ovipositor is as in figure 25g.

Length: body, 4.25 mm; wings, 4.7 mm.

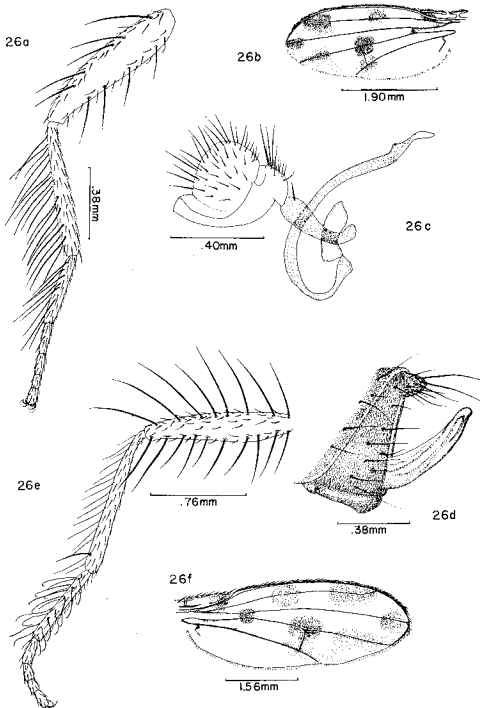
Holotype male and allotype female, Kupaua Valley, Niu section, Oahu, 800', August 21, 1965, C144.5A (H. L. Carson). Thirty paratypes, 25 males same date as type. This species is in culture.

Type, allotype and some paratypes in the B. P. Bishop Museum. Remainder of the paratypes in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

Drosophila vesciseta n. sp. (Figs. 26a-d)

This species would run to *ochracea* Grimshaw because of the all rufous thorax; the two, however, are not related. *D. vesciseta* is readily differentiated by the lack of an isolated brown spot over the r-m crossvein and a different arrangement of the wing markings as shown in figures 26b and 26f; by having the basal section of vein R_{4+5} shorter than the m crossvein, rather than distinctly longer; by the rudimentary preapical dorsal bristle of the front tibia (compare figures 26a and 26e); by the all black palpi; ornamentation of the front legs (fig. 26a); differences in genitalia and other details.

Male. Head: Entirely pale colored, except for a tinge of brown on the upper portion of the occiput. The front is golden yellow covered with silver-white pruinosity as seen in direct lights. The genae, eye margins, and major portion of the occiput are yellow; the face is white, faintly tinged with yellow. The clypeus and rostrum are yellow. The labella and palpi are black, the latter are rather



broad, about two times longer than wide. The face is rather flat, just slightly raised down the median portion and as seen from lateral view is concave on the lower portion just before the epistomal margin. The second oral bristle is about two-thirds as long as the first. 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, faintly tinged with brown. The arista has about ten dorsal and three to four ventral rays, in addition to the small apical fork, the basal half of the arista is yellow. *Thorax*: Entirely rufous. The lower humeral bristle is sub-equal in length to the upper. The anterior sternopleural bristle is three-fourths to four-fifths as long as the posterior bristle. The anterior dorsocentral bristle is two-thirds to three-fourths as long as the posterior and is situated approximately opposite the second supraalar. The entire thorax is rather densely yellowish pollinose, the ground color is faintly subshining. *Legs*: Entirely yellow except for a faint tinge of brown on the apices of the tarsi. The front tibia has moderately long dorsal cilia extending the entire length of the segment from the preapical dorsal bristle to the base. The preapical dorsal bristle is rudimentary, barely differentiated from the small setae of the tibia. The front basitarsus is about three-fifths as long as the tibia and has a rather dense cluster of long black hairs situated over the apical four-fifths of the dorsal surface (fig. 26a). The other tarsomeres are devoid of long setae. *Wings*: The brown spots are large and conspicuous. The subbasal spot extends to the m crossvein. The second spot on vein R_{2+3} is situated slightly before the middle of cell R_1 and is not in line with the spot over the m crossvein. The spots at the apices of veins R_{4+5} and M_{1+2} fuse together over the apex of the wing (fig. 26b). The third costal section is approximately three times longer than the fourth and the costal fringe extends three-fifths the distance between the apices of veins R_{2+3} and R_{4+5} . The basal section of vein R_{4+5} is rather short, slightly less than the length of the m crossvein. *Abdomen*: Sub-

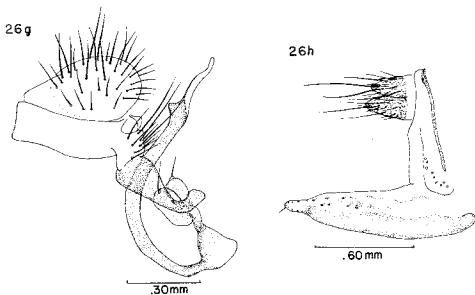


FIG. 26. *Drosophila vespiseta* n. sp.: a, front leg; b, wing; c, male genitalia; d, ovipositor. *Drosophila ochracea* Grimshaw: e, front leg; f, wing; g, male genitalia; h, ovipositor.

shining black at the apices of the terga, yellow on the anterior halves of the segments except for brown to black coloration extending anteriorly over the median portion of each tergum. The genitalia are as shown in figure 26c. The aedeagus resembles that of *hexachaetae* Hardy and is probably a closely related species.

Length: body, 3.75 mm; wings, 4.0 mm.

Female. Fitting the description of the male except for sexual characters. The ovipositor is as in figure 26d.

Holotype male, allotype female and two male paratypes from Keanae Valley, Maui, 1500', July 21, 1965, collected on *Clermontia*, C134.1 (H. I. Carson). Also three male and five female paratypes from Kolea Stream, Maui, 1600', August 30, 1967 (M. S. Carson).

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

Drosophila virgulata n. sp. (Figs. 27a-c)

This species belongs in the *hawaiiensis* complex and fits near *conspicua* Grimshaw from the Island of Hawaii. It differs strikingly from this species by having the wings pointed at the apices (fig. 27b); with a narrow brown band across the wing at level with the m crossvein; the band is less than the width of cell R_4 (fig. 27b); by having the brown mark in the middle of cell R_1 not connected with the subbasal brown mark in the wing, the front tibia ciliated to the base (fig. 27a); two strong humeral bristles present; and the genitalia differ in the shapes of the parameres and the aedeagus (fig. 27d). *D. conspicua* has the wings rounded apically; the band across the wing is broad, about two times the width of cell R_4 and the mark in cell R_1 connects with the subbasal mark over the r-m crossvein (in the males); front tibia with dorsal ciliation on apical two-fifths.

Male. Head: Largely yellow, except for brownish red eyes, yellow-brown vertex and upper occiput; front golden pollinose with a very faint tinge of brown on interfrontalia, yellow along the orbits and down the middle. Clypeus, palpi and mouthparts yellow. Labella fleshy. Mentum with scattered setae over apical half. Apical bristle of palpus rather slender, equal to length of segment. First antennal segment yellow; second brown on dorsum; third yellow-brown. Arista with eight dorsal and four ventral rays in addition to apical fork and with scattered short setae on inner surface extending over about the apical two-thirds. Anterior reclinate bristles about two-thirds as long as proclinate and situated opposite the latter. First oral bristle strong, slightly longer than proclinate. *Thorax:* Mesonotum with three prominent brown vittae extending the full length. Disc of scutellum yellow-brown, margin and venter, also metanotum, yellow. Pleura yellow except for large dark brown mark over upper mesopleuron and for a small brown mark below wing base. Extreme base of halter brown, remainder yellow. Anterior dorsocentral bristles opposite second supraalar. Lower humeral bristle two-thirds to three-fourths as long as upper. Anterior sternopleural bristle three-fourths as long as posterior. *Legs:* Yellow, except for faint tinge of brown on posteroapical portion of each hind femur, also the apical tarsomeres are brown. Front tibia with long dorsal cilia extending entire length of

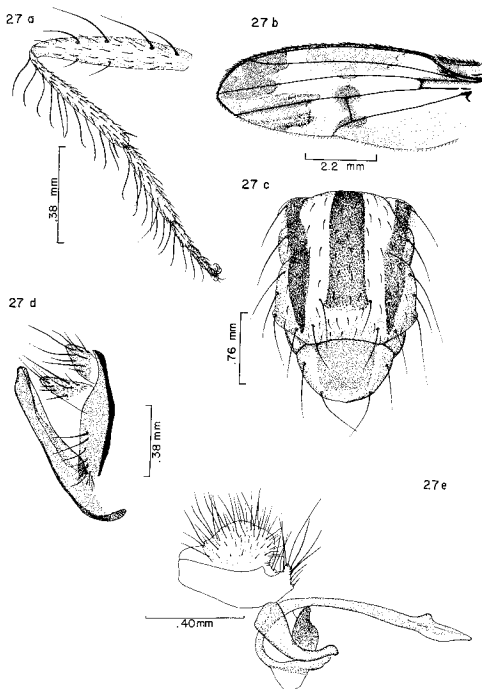


FIG. 27. *Drosophila virgulata* n. sp.: a, front leg; b, wing; c, mesonotum; d, male genitalia; e, ovipositor.

segment and long dorsal cilia extend over first three tarsomeres (fig. 27a). Basitarsus three-fifths as long as the tibia. *Wings*: Predominantly subhyaline, marked as in figure 27b. Third costal section slightly over four times longer than fourth and costal fringe extends half the distance between apices of veins R_{3+4} and R_{1+2} . Crossvein r-m near basal fourth of cell 1st M_2 . *Abdomen*: Yellow tinged with brown on first two segments, otherwise dark brown to black except for a large yellow mark on anterolateral margins of each tergum. Genitalia as in figure 27d. The ninth tergum is setose over the entire surface, the ninth sternum (hypandrium) is elongate about two times as long as wide. The parameres are broad at the base, coming to a point at the apical end with a short sensillum arising from the apex, and densely setose on the apical one-third.

Length: body, 4.5 mm; wings, 5.5 mm.

Female. Similar to male except for sexual differences, also the dark mark in cell R_1 does not connect with the subbasal mark. Ovipositor prominent and straight sided (fig. 27e).

Length: body, 5.0 mm; wings, 5.7 mm.

Holotype male, allotype female and 14 paratypes, six males, eight females, Waikamoi, Maui, September 22, 1966, J31C1 (J. P. Murphy). Also one female specimen same locality, August, 1958 (D. E. Hardy) which had been included in the paratype series of *D. disjuncta* Hardy. One male and one female, same data as type "I", generation" are teneral. The last three specimens are not being designated as paratypes.

Type, allotype, and some paratypes in the B. P. Bishop Museum. Remainder of the paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

Drosophila adiastrata species group

This complex of species is characterized by having the wings predominantly brown covered with numerous hyaline spots as in figures 28b, 29a, 30c, by having the front basitarsus of the male flattened laterally (fig. 23a, Hardy, 1965:134), and by having a prominent preapical posterior bristle, which is typically much stronger than the other bristles of the femur and which is usually curved, present on the front femur of the male.

It is apparent that species of this complex breed in rotting roots, leaves and bark of *Clermontia*, *Cyanea*, and probably other Lobeliaceae. They are readily attracted to yeasts cultured from rotting Lobeliads.

This complex includes *adiastrata*, *spectabilis*, *peniculipedes* and at least three new species.

Key to *adiastrata* species group

1. Cell R_1 with hyaline marks beyond base as in Figures 28b, 29a, and 30c. At least face, palpi and mouthparts and usually legs yellow 2
- Anterior margin of wing entirely brown except for a spot in the base of cell R_1 and one at base of second costal cell (fig. 9b, Hardy, 1966: 216). Entire body and appendages almost entirely dark brown to black. Maui, Molokai *spectabilis* Hardy

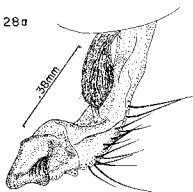
- 2(1) Entire wing marked with dark brown and hyaline spots as in figures 28b and 30c 3
 Basal three-fifths of wing hyaline with faint brownish yellow markings (fig. 29a) Hawaii *ochrobasis* n. sp.
- 3(2) Mesonotum with a broad median vitta extending the entire length. Face entirely yellow to white 4
 Median brown vitta not extending beyond suture in male, anterior portion of mesonotum yellow. Sides of face black along eye margins in both sexes and eye orbits brown to black over the front. Mentum setose almost to its base (fig. 30a). Wings, as in figure 30c and 30d. Hawaii *setosimentum* n. sp.
- 4(3) Mesonotum with four yellow vittae, a narrow brown vitta extends down each dorsocentral line (fig. 28g). Front predominantly yellow. Wings as in figure 28b 5
 Mesonotum brown with two yellow, white pollinose vittae. No brown vitta down the dorsocentral line. Front brown. Wings as in figure 162b (Hardy, 1965:409) Maui *peniculipedis* Hardy
- 5(4) Mentum setose almost to its base (fig. 28a). Cell R_1 of male with a single hyaline spot (about as wide as length of m crossvein) which extends across wing into cell 1st M_2 and with a large sub-apical hyaline spot in cell R_2 which continues across wing into 2nd M_2 (fig. 28b) Molokai *cilifera* n. sp.
 Mentum setose only near the apex (fig. 28f). Two hyaline spots near base of R_1 ; or if a small brown spot dividing the spot is absent, the hyaline mark measures two times the length of m crossvein. Maui, Lanai *adiastola* Hardy

Drosophila cilifera n. sp. (Figs. 28a-e)

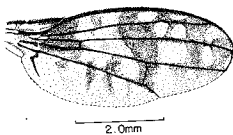
This species fits near *adiastola* and has been confused in this concept. It is differentiated by having the mentum densely setose almost to its base (fig. 28a) and by the differences in wing markings as shown in figure 28b compared to figure b (Hardy, 1965:134); the presence of a single comparatively narrow hyaline spot near the base of cell R_1 , only two distinct spots in cell 1st M_2 , and the presence of a large preapical hyaline spot in cell R_2 and the lack of a distinct hyaline spot on the apex of cell R_1 will differentiate *cilifera*. In *adiastola* the mentum is setose only near the apex (fig. 28f); cell R_1 has two hyaline spots near the base, four in some specimens, a single long spot which is two times longer than the length of the m crossvein, also three or four hyaline spots in cell 1st M_2 , no preapical spot in cell R_2 , and a prominent apical spot in cell R_1 .

Male. Head: The front is yellow on the lower portion, yellow-brown above a level with the proclinate bristles, the vertex and upper occiput are brown, the lower portion of the occiput, the genae, clypeus, palpi and mouthparts are pale yellow. The face is white, tinged with yellow. The face is almost flat, just very slightly raised in the upper median portion, the outside surface of each palpus is densely covered with short black setae; the apical bristle is very short, scarcely differentiated from the setae. The cilia on the mentum are as in figure 28a. No

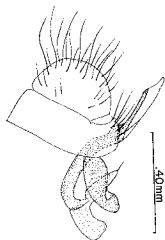
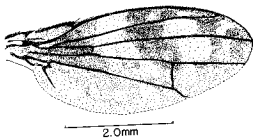
28a



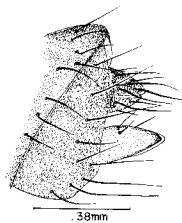
28c



28b



28d



28e

strong oral bristles are present, the strongest is approximately equal in size to the anterior reclinate bristle, two rows of setae are present on the upper portion of the oral margin. The anterior reclinate bristle is about half to three-fifths as long as the proclinate and is situated slightly above the latter. The antennae are yellow. The arista has about eight dorsal and three ventral rays in addition to the apical fork. Just a few short inconspicuous setae are present on the inner surface of the arista at about the apical fourth. *Thorax*: Fitting the description of *adiastola*. With four distinct yellow vittae extending down the mesonotum, separated by

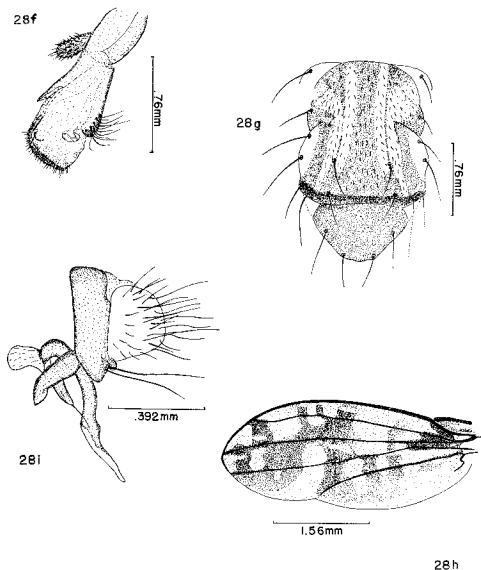


FIG. 28. *Drosophila cilifera* n. sp.: a, mouthparts; b, wing of male; c, wing of female; d, male genitalia; e, ovipositor. *Drosophila adiastola* Hardy: f, mouthparts; g, mesonotum; h, wing of female; i, male genitalia.

a thin brown line extending down each dorsocentral row. With the propleura and the sternopleura yellow except for a brown to black spot on the anterior margin of the latter and with the mesopleura, pteropleura and metapleura largely brown to black. The metanotum is reddish brown in the median portion, yellow on the sides. *Leg.*: All yellow with a faint tinge of brown before the apices of the tibiae. The structural details of the front legs appear to be identical to those of *adiastola*. We are unable to find any differences. *Wings*: Almost entirely brown with large hyaline markings as in figure 28b. *Abdomen*: Predominantly black marked with yellow on the sides of the terga. The yellow markings are more conspicuous on the basal and apical segments. The genitalia are as shown in figure 28d. They are almost indistinguishable from those of *adiastola* (fig. 28i). The overall shape of the aedeagus and elongate basal apodeme of the aedeagus are characteristic of the *adiastola* group.

Length: body and wings, 4.6 mm.

Female. Similar in most respects to the male except for sexual characters, the apical bristle on the palpus is slightly better developed, however, and the wing markings are quite different. The latter are quite similar to *adiastola*. Compare figures 28c and 28h. The females of the two species are readily differentiated by the conspicuously setose mentum as described under the male. The ovipositor is as in figure 28e.

Holotype male, Kawela intake, Molokai, 3600', November 17, 1964, (H. T. Spieth). Allotype female Kcahiakalio, Molokai, 2800', July 15, 1963 (D. E. Hardy). Two male paratypes, one same as allotype, the other south of Hanalei-ilo, Molokai, March 3, 1966, G31C1 (J. P. Murphy).

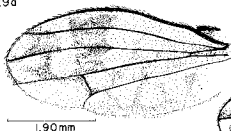
Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the U. S. National Museum and the University of Hawaii.

***Drosophila ochrobasis* n. sp. (Figs. 29a-d)**

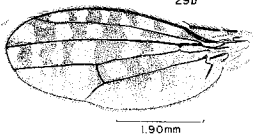
This species appears most closely related to *setosimentum* but the striking differences in wing markings (figs. 29a and 30c) will readily differentiate these. Also, *ochrobasis* differs as noted in the following discussion.

Male. Fitting the description of *setosimentum* except that the eye margins are blackened on the upper orbits, the lower portion of the front is yellow, very faintly tinged with brown on the sides and the eye margins on the sides of the face are yellow. The markings of the thorax are very similar in the two differing mainly by having the large dark brown spot extending over the posterodorsal portion of each sternopleuron of *ochrobasis*, covering the area occupied by and behind the sternopleural bristles. The sternopleura are yellow except for a very narrow brown mark along the posterior margins. The legs of *ochrobasis* are predominantly yellow, tinged with brown, distinctly lighter in color than in *setosimentum*. Approximately the basal three-fifths of the wing is predominantly pale with faint transverse streaks of brown through the basal portion of cell R_5 , through cell 1st M_2 and through cell M_4 (fig. 29a). The apical two-thirds of the wing is predominantly dark brown with a large hyaline spot at the apex of cell 1st M_2 and with the hyaline spot at the apex of cell R_1 continuous with a band extending across cells R_3 and R_5 . Cell 2nd M_2 is entirely brown, the apices of cells R_3 and R_5 are

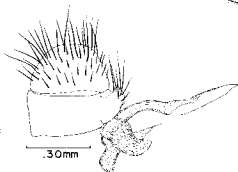
29a



29b



29c



29d

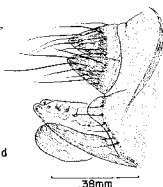


FIG. 29. *Drosophila ochrobasis* n. sp.: a, wing of male; b, wing of female; c, male genitalia; d, ovipositor.

hyaline. The other details are as in *setosimentum*. Genitalia are as in figure 29c. They are very similar to those of *setosimentum*.

Length: body and wings, 4.6 mm.

Female. Very similar to the female of *setosimentum*. Can be distinguished by the slight differences in the wing markings (compare figs. 29b and 30d). The ovipositor is as in figure 29d.

Length: same as in male.

Holotype male, Puu Hualalai, 5550', collected by sweeping in a large lava tube, June 13, 1966 (W. B. Heed). Allotype female, Kipuka No. 9, Saddle Road, Hawaii, December 28, 1967, I.22G4 (H. L. Carson). Paratypes from same locality as allotype collected by H. L. Carson, M. P. Kambyseilis and C. Kanapi.

***Drosophila setosimentum* n. sp. (Figs. 30a-f)**

This species is readily differentiated from other members of the *adiastola* complex by having the median brown fascia on the mesonotum abbreviated, not extending anterior to the suture so that the anterior portion of the mesonotum is entirely yellow; also by having the sides of the face black along the eye margins

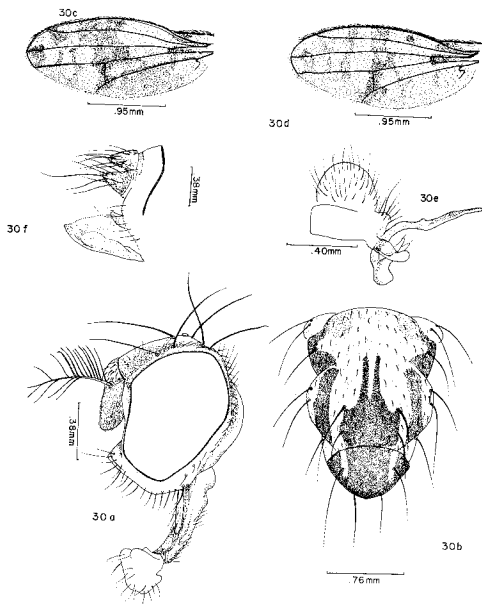


FIG. 30. *Drosophila setosimentum* n. sp.: a, head; b, mesonotum; c, wing of male; d, wing of female; e, male genitalia; f, ovipositor.

and the lower lateral margins of the front and the eye orbits dark brown to black. The brown to black front legs and tarsi, the very prominent median portion of the face, and the presence of a grey pollinose vitta down the middle of the mesonotum and the distinctive wing markings will differentiate this species.

Male. Head: The front is yellow in the anteromedian portion, opaque brown above. The sides of the front including the eye orbits are opaque brown, blackish

in ground color. Discoloration continues on to the extreme lateral margins of the face near the eye. The face is white, the median portion is conspicuously gibbose. The prominent carina down the middle of the face extending between the bases of the antennae is very distinctive of this species. The lower lateral margins of the face are rather prominent and bear two rows of short bristle-like setae on the upper portion of the oral margin (fig. 30a). The eyes are truncate on lower margin. The palpi are densely black setose on the outer surfaces, the apical bristle is minute, scarcely two times larger than the setae. The mentum is densely setose over most of its length, similar to that of *ciliifera*. The first antennal segment is yellow, the second is yellow on the ventral portion, brown on the dorsum, the third segment is brown, tinged faintly with yellow in ground color. The arista has about eight dorsal and three ventral rays in addition to the apical fork. The anterior reclinant bristle is scarcely over half as long as the proclinate and is situated just slightly above the latter. Head shaped as in figure 30a, median portion of front rather densely white pollinose as seen in indirect light. *Thorax*: Scutellum brown to black except for a thin line of yellow on each side which is continuous with the yellow band extending down each side of the mesonotum. The pleura are yellow except for a permanent brown to black spot covering most of the mesopleuron and extending to the upper portion of the pteropleuron. The metanotum is yellow except for a faint tinge of brown on the median portion. *Legs*: The front pair are predominantly brown to black, faintly tinged with yellow in the ground color. The tarsi of all the legs are brown to black, the coxae, femora and tibiae of the middle and hind legs are yellow, faintly tinged with brown on the femora. The modifications of the front legs are similar to those of *adiastola*. I see no structural differences. The tarsi and the tibiae are distinctly flattened on the posterior surfaces. The basitarsus has a row of seven or eight erect anterior cilia extending the full length of the tarsomere and also a less conspicuous row of five to six shorter anterodorsal cilia down the subsegment. The preapical posterior bristle of the front tibia is curved, and distinctly stronger than the posterodorsal bristles. *Wings*: Marked as in figure 30c. *Abdomen*: Predominantly dark brown to black, tinged with yellow down the median portion of the dorsum and on the sides of the posterior segments. The genitalia are as in figure 30e. They are characteristic of the *adiastola* group, the basal apodeme of the aedeagus is elongate, the parameres are narrow with a fine apical sensillum.

Length: body, 5.0 mm.; wings, 4.7 mm.

Female. Fitting the characteristics of the male except for sexual characters and except for differences in wing markings. The wing markings are as in figure 30d. The ovipositor is as in figure 30f.

Holotype male, and allotype female from Awini Camp, Kohala Mountains, Hawaii, 2000' (?), August 2, 1966, J17 (J. K. Fujii). Paratypes, approximately 75 specimens, predominantly males, same data as type. It should be noted these were collected feeding on the rotting bark of a large *Clermontia* bush. (Collected by K. Y. Kaneshiro, J. K. Fujii, and D. E. Hardy). Also about 25 paratypes, both sexes represented, from the following localities on the island of Hawaii: Puu Laa laau, Kohala Mountains, 3350-4000', August 29, 1966 (J. K. Fujii and K. Y. Kaneshiro); Upper Olaa Forest, Hawaii, August 1952-February 1966 (K. Y. Kaneshiro, D. E. Hardy and W. B. Heed); Olaa Forest Reserve, 3775', September

3, 1965 (F. Kamiya); Kilauea Ranger Station, July 15, 1965 (L. H. Throckmorton and R. M. Brown).

Type, allotype and a series of paratypes in the B. P. Bishop Museum. Remainder of the paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

Drosophila semifuscata complex of species

The species of this complex are characterized by having the entire wing infuscated but with the anterior margin brown, with this marking occupying most of the cell R_5 , extending around the wing apex and in most species extending into cell R_3 and over the m crossvein. These are moderately dull colored species, with the thorax reddish brown to black in ground color, densely grey pollinose; not polished black and not with brown vittae on a yellow background.

Most of the specimens of this complex have been collected only by using visual techniques. They are extremely cryptic and difficult to see, we have rarely collected specimens by netting and to date have found no attractant which will lure them. No host information has been obtained and we have no idea where they breed. They are collected by looking for them on the undersides of overhanging (usually vertical) limbs. *D. aethostoma* n. sp. has been collected on *Clermontia*, but has not been reared from this host. *D. acanthostoma* has been collected hiding in crevices in the bark of *Myrica faya* trees. *D. anoplostoma* specimens have been collected on the bark of *Myoporum sandwichensis* tree.

Key to the *semifuscata* species group

- 1 Male with an elongate forked projection on the apex of the labellum (fig. 32a). Front basitarsus flattened laterally, densely setose on inner surfaces. Posterior median portion of mesonotum covered with long hair. Anterior dorsocentral bristle small, about one-fourth the size of, and situated just slightly in front of the posterior bristle, two-thirds the distance from the second supraalar bristle to the first postalar. Lower humeral bristle weak.....
 - Kauai *aethostoma* n. sp. 2
 - Not as above
- 2(1) Labellum with three large black incurved spine-like bristles on upper edge (fig. 31a). Oral bristles small, seta-like
- Hawaii *acanthostoma* n. sp.
- Labellum lacking bristles or curved spines. Oral bristles well developed
- 3
- 3(2) Thorax, abdomen, coxae, femora all black in ground color
- Maui *anoplostoma* n. sp.
- Mesonotum reddish brown, pleura rufous, tinged with brown. Legs rufous, abdomen predominantly yellow Maui *semifuscata* Hardy

Drosophila acanthostoma n. sp. (Figs. 31a-d)

This species is differentiated from other members of this complex by having

three large black incurved spine-like bristles on the upper edge of the labellum of the male (fig. 31a). And by having the oral bristles of the male small, seta-like. We are unable to differentiate the females from those of *anoplostoma* n. sp.

Male. An almost entirely black species. *Head:* Black in ground color, colored with grey-brown pollen on the front, grey pollinose on the face, upper occiput and vertex; with a faint tinge of yellow on the lower eye orbits and in the upper antennal furrows. The clypeus is yellow on the lower lateral margins and is otherwise black, it is comparatively narrow. The palpi are brown. The mouthparts including the mentum are shining black, tinged with rufous. In some paratype specimens, the mentum is yellow, tinged with brown. The mentum is bare except for about four scattered pale hairs just before the apex. The labellum has three strong spine-like bristles near the upper margin and the dorsal edge is

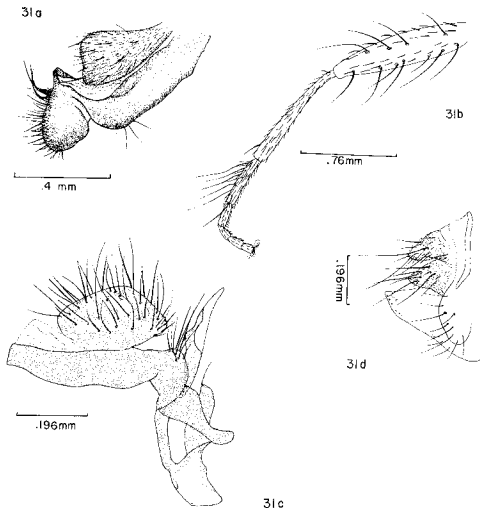


FIG. 31. *Drosophila acanthostoma* n. sp.: a, mouthparts and palpus; b, front leg; c, male genitalia; d, ovipositor.

heavily sclerotized (fig. 31a). Each palpus is strongly expanded on the apical portion and almost truncate, scarcely over one-half longer than wide, and with a small apical bristle which is about equal in size to the setae on the lower occiput and one small preapical bristle, the palpus is rather densely setose. The oral vibrissae are all about equal in size, no strong bristles are present on the upper portion. In a few paratypes, one or two of the uppermost setae of the vibrissal row are slightly stronger than the others but they are still small compared to the normal. The anterior reclinate bristle is three-fourths to four-fifths as long as the proclinate and is situated opposite the latter. The antennae are black, covered with grey pollen and pubescence. The arista has five or six dorsal and two or three ventral rays in addition to the apical fork. *Thorax*: Shining black in ground color, rather densely grey pollinose. No vittae or markings are present on the mesonotum, the lower humeral bristle is approximately three-fourths as long as the upper. The anterior dorsocentral bristles are approximately three-fourths as long as the posterior bristles and are situated opposite the second supraalar. The halteres are yellow. *Legs*: The coxae and femora are brown to black, tinged with yellow in the ground color and with the apices of the femora yellow. The tibiae and tarsi are yellow, the front tibia is not ornate although the outside surface is densely covered with short erect setae. The preapical dorsal bristle is approximately equal in size to the apical ventral bristle. The front basitarsus is just slightly over half as long as the tibia and the entire dorsal surface is densely covered with moderately long black cilia. The second tarsomere has five long black cilia and the third has two (fig. 31b). *Wings*: Very similar to those of *aethostoma* except that the brown marking on the anterior portion of the wing is much more complete and extends to cell R_5 and is continuous over the r-m and m crossveins. *Abdomen*: Entirely shining black in ground color, rather densely brownish grey pollinose. The genitalia are as in figure 31c. The basal apodeme of the aedeagus is elongate and almost rectangular in shape. The parameres are rounded at the apex and each has a moderately long dorsoapical sensillum.

Length: body, 4.0 mm.; wings, 4.3 mm.

Female. Fitting the description of the male except for sexual characters, also two prominent bristles are present in the upper portion of the vibrissal row. The palpi are normal in shape, not enlarged apically and one rather strong apical bristle is present, this is approximately equal in size to the lower reclinate bristles of the front. The ovipositor is as in figure 31d.

Length: body and wings, 4.5–4.75 mm.

Holotype male, Forest above Paauilo, Hawaii, 3200', August 24, 1965, collected on trunk of *Myrica faya* (K. Y. Kaneshiro). Allotype female, same data as type, August 25, 1965, G6.1 (K. Y. Kaneshiro). Forty-five paratypes, 28 males, 17 females, predominantly same data as type (K. Y. Kaneshiro, J. K. Fujii and D. E. Hardy). Some specimens have been collected at Bird Park, Kilauea, Hawaii, July 17–18, 1964–August 5, 1965 (L. H. Throckmorton and K. Y. Kaneshiro).

This species also is apparently present on Maui. Three male specimens are on hand from Auwahi, Maui, 3000', June 17, 1965–August 27, 1965 (D. E. Hardy and K. Y. Kaneshiro) collected in the same habitat as specimens *D. anoplostoma* n. sp. These three specimens are not being designated as paratypes.

Type, allotype, and a series of paratypes in the B. P. Bishop Museum. The re-

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

***Drosophila aethostoma* n. sp. (Figs. 32a-f)**

This species is readily differentiated from others which have the anterior portion of the wing brown, by the elongate forked projection from the apex of the labellum in the male (fig. 32a), by the flattened front basitarsi of the male, by having the posteromedian portion of the mesonotum covered with moderately long hair, rather than short setae; the anterodorsal bristles are small, about one-fourth the size of the posterior bristles and situated just slightly in front of the latter, two-thirds the distance from the second supraalar bristle to the first postalar; and by the weak lower humeral bristles, as well as in other details.

Because of the long extension from the labellum and the small anterodorsal bristles on the mesonotum, this species would resemble *adventitia* Hardy, from Kauai, but the development on the labellum, and the modifications of the legs and wing markings are very different. *D. adventitia* has the wings faintly but completely infuscated; the process on the labellum is not forked (figure 24a, Hardy, 1965:137); the front basitarsi are not flattened and each has three prominent anterior cilia at apical third of tarsomere.

Male. Head: The front is brown to black, rather densely grey pollinose. The lower margin of the front and the eye orbits below the proclinate bristles are yellow, tinged with brown. The upper interfrontal areas, the vertex, and the upper half of the occiput are black, densely grey pollinose. The lower portion of the occiput is yellow-brown in ground color, covered with grey pollen. The genae are extremely narrow. The space between the eye margin and the vibrissal row is scarcely more than the width of one row of eye facets, except on the hind portion of the gena (fig. 32b). The lower margin of the eye is rather truncate (fig. 32b). The oral vibrissae are very weak, setae-like on the upper portion, and become stronger as the row proceeds posteriorly towards the genal bristles. The face is mostly yellow-brown, tinged with black and is densely covered with grey pollen. A small keel extends down the median portion almost three-fourths its length. The lower portion is flat. The third antennal segment is black, the second is brown to black on the dorsal portion, yellow below. The first segment is yellow, tinged lightly with brown. The third segment is comparatively short and thick, scarcely one-fourth to one-third longer than wide. The arista has six dorsal and three ventral rays in addition to the apical fork. The clypeus is brown to black and appears to be poorly developed compared to other species. It is inconspicuous, difficult to see without clearing the mouthparts. The palpi are yellow, tinged faintly with brown and the mouthparts are yellow, except for a brown to black tinge on the apical portion of the mentum. The mentum is polished, devoid of setae except just before the apex. The apical portion of each labellum is extended into a forked projection which bears spines and projections at the tips of these arms, as in figure 32a. The anterior reclinate bristle is about two-thirds as long as the proclinate and is situated just slightly above the latter. One prominent apical bristle on each palpus about equal in length to proclinate bristles of the front, also a secondary, rather prominent bristle is situated just before the apex on

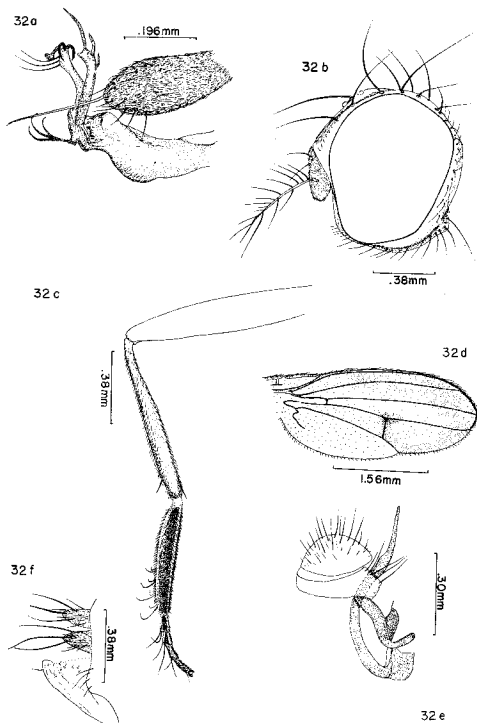


FIG. 32. *Drosophila aethostoma* n. sp.: a, mouthparts; b, head; c, front leg; d, wing; e, male genitalia; f, ovipositor.

the outside surface. This is equal in size to the lower proclinate bristles. *Thorax:* Predominantly brown to black in ground color, rather densely grey pollinose on the sides and anterior margin of the mesonotum, the pleura and over the metanotum. With the grey pollen extending down the median portion, fading into the brown pollinosity just beyond the suture; with the pollen extending from the sides along the margins of the suture and with a grey longitudinal vitta down each side the entire length of the mesonotum in line with the dorsocentral bristles. The scutellum is black, lightly grey pollinose on the disc, yellow on the margins. The pleura are brown to black except for a band of yellow extending along the lower margin of each mesopleuron, over the median portion of the pteropleuron to the posterior spiracle. The spiracle is yellow. The halteres are yellow, tinged faintly with brown at their bases. The lateral margins are yellow from the humerus across the notopleuron. The median portion of the mesonotum is distinctly flattened, in most specimens slightly depressed in the middle; the posteromedian portion is densely haired, these hairs are approximately equal in length to the anterior dorsocentral bristles. The anterior dorsocentral bristles are about one-third as long as the posterior bristles and are situated just slightly in front of the latter, about two-thirds the distance from the second supraalar bristles to the first postalar bristle. The space between the dorsocentral bristles is equal to approximately the distance between two rows of acrostichal setae. The lower humeral bristle is poorly developed, in the type, it is one-third to one-fourth as long as the upper bristle and approximately two times longer than the other setae on the humerus. In some of the paratypes, the lower bristle is so tiny that it cannot be differentiated from the setae. *Legs:* The coxae and femora are predominantly brown to black, tinged with rufous and with the apices of the femora yellow. The tibiae are yellow, the front tarsi are brown, tinged lightly with yellow, and other tarsi are yellow, tinged faintly with brown. The front tibia is slightly arcuate on the inner surface. It is devoid of long cilia but the posterior surface is densely covered with short erect yellow setae. The preapical dorsal bristle is about equal in size to the ventral apical bristle. The front basitarsi are rather elongate and are strongly flattened laterally, they are three-fourths as long and equal in width to the tibia. The inner surface of each basitarsus is very densely covered with erect setae which are equal in width or slightly longer than the width of the segment. The posterior surface is also densely covered with short erect setae. The basitarsus also has about five or six dorsal cilia on the apical portion of the tarsomere. A pair each of moderately long black cilia are present on tarsomeres 2-4 (fig. 32c). *Wings:* Entirely infuscated but distinctly brown on the anterior margin through about the middle of cell R_3 and around the apex of the wing, also brown over the m and the r-m crossveins (fig. 32d). The third costal section is almost five times longer than the fourth, and the costal fringe ends at about two-fifths the distance between the apices of veins R_{2+3} and R_{4+5} . The r-m crossvein is situated just slightly beyond a level with the end of vein R_1 and the basal section of vein R_{4+5} is about equal in length to the m crossvein. *Abdomen:* Entirely black covered with grey-brown pollen and with a narrow grey-white band on the posterior edge of each tergum. The genitalia are as shown in figure 32e. Aedeagus elongate with a broad but shortened basal apodeme. Parameres with dorsoapical sensilla arising from a slight protrusion of the dorsoapical portion.

Length: body, 3.2 mm.; wings, 3.75 mm.

Female: Fitting the general description of the male, the oral vibrissae are, however, well developed; the second bristle is strong, equal in size to the proclinate bristles of the front. Also, the genae are not strongly narrowed as in the male. In the front median portion the distance from the eye margin to the vibrissal row would equal three to four rows of eye facets. The lower humeral bristle is also moderately developed, about half as long as the upper bristle. The ovipositor is as in figure 32f.

Holotype male and allotype female, Alakai Swamp, Kauai, 4000', June 22, 1966, G84B, collected on limbs of *Clermontia* (K. Y. Kaneshiro). Twenty-two paratypes, 18 males and four females from the following localities in the Kokee region of Kauai: same data as type; Koaie-Waialae, 4125', July 21 and July 19, 1966, G83B, reared from *Clermontia* stems (D. E. Hardy, K. Y. Kaneshiro); Alakai Trail, June 1964 (I. H. Throckmorton).

Type, allotype and a series of paratypes in the B. P. Bishop Museum. The remainder of the paratypes in the U. S. National Museum, British Museum (Natural History) and the University of Hawaii collection.

***Drosophila anoplostoma* n. sp. (Figs. 33a-c)**

This species is obviously very close to *semifuscata* Hardy and the only differences we find is in body and leg coloration. *D. anoplostoma* is almost entirely black. The entire thorax is black in ground color, rather densely covered with grey pollen. In *semifuscata* the mesonotum is brown, tinged with yellow and the pleura are yellow, very faintly tinged with brown. The legs of *anoplostoma* are black except for the yellow tarsi and the yellow apices of the tibiae and femora and for a faint tinge of brown in the ground color of the tibiae. In *semifuscata*, the legs are entirely yellow. The ornamentation of the front basitarsi is as in *semifuscata* and as in figure 33a. The face is entirely black, in *semifuscata* the median portion of the face is yellow, tinged with brown. The palpi are brown, in *semifuscata* they are yellow. The mouthparts are dark brown to black, tinged with yellow. In *semifuscata* they are yellow, tinged with brown. The mouthparts of *anoplostoma* are as in figure 33b. The male genitalia are as in figure 33c. The abdomen of *anoplostoma* is entirely black, covered with grey pollen. In *semifuscata* the abdomen is predominantly yellow discolored with brown at the apices of the segments.

Length: body, 3.6 mm.; wings, 3.9 mm.

Female. Fitting the description of the male except for sexual characters. Also two strong bristles are developed on the upper portion of each vibrissal row. These are almost equal in size to the lower humeral bristle.

Length: body, 3.8 mm.; wings, 4.2 mm.

Type male from Auwahi, Maui, 3700', July 25, 1966, J10G (H. L. Carson). Allotype female same locality as type, June 18, 1965 (K. Y. Kaneshiro). Six paratypes all males, all same data as type and allotype, this series was collected on the limbs of *Myoporum* trees and on sodom apple bushes.

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

Drosophila haleakalae complex

Species of this group are characterized by having the body brown to black, the apices of the wing marked with brown, the apex of the scutellum usually with a yellow-white spot, the labellum of the male with a black rim and the legs lacking ornamentation. Also, a striking characteristic of the *haleakalae-fungicola-polita* complex of species is the presence of a rather dense clump of thick bristle-like setae on each posterolateral corner of the mesonotum (fig. 34a) between the postalar bristles.

Members of this complex are apparently all fungivores.

Drosophila inciliata n. sp. (Figs. 34a-c)

This species appears to fit nearest to *venusta* Hardy, but runs imperfectly past

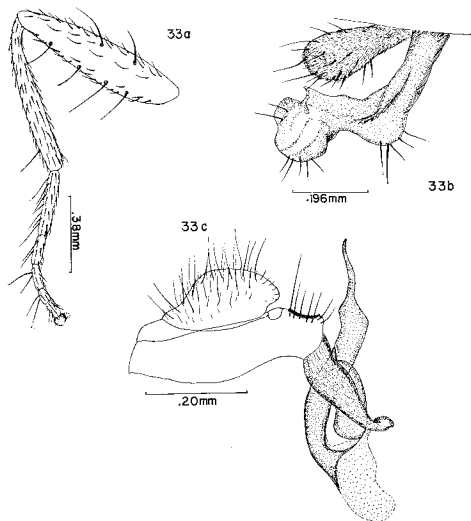


FIG. 33. *Drosophila anoplostoma* n. sp.: a, front leg; b, mouthparts; c, male genitalia.

couplet 80 (Hardy, 1965:93) since the sternopleura are chiefly black, not yellow, etc. The prominent dark brown spot occupying the apical third of the wing, the presence of only one humeral bristle and the elongate front basitarsi are very similar to *venusta*. *D. inciliata* differs by having the upper two-thirds of the front black, not yellow; the sternopleura and hypopleura dark brown to black, sometimes tinged with yellow; the scutellum not entirely black (in some specimens with a faint tinge of yellow on the apex), lacking a conspicuous yellow spot at the apex, mesonotum polished black, not brown. Also the brown marking on the m crossvein is very slight, not pronounced as in *venusta* and not extending along vein M_2+4 .

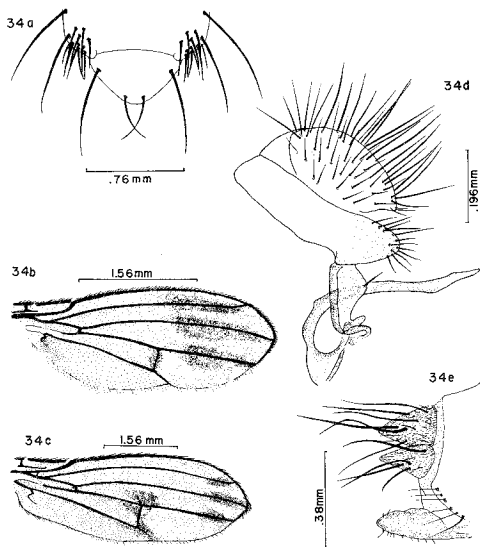


FIG. 34. *Drasophila inciliata* n. sp.: a, hind corner of mesonotum; b, wing of male; c, wing of female; d, male genitalia; e, ovipositor.

Male. Head: The upper two-thirds of the front is polished black. The vertex and upper three-fifths of the occiput are black. The lower one-third of the face, the parafacilia, genae, lower two-fifths of occiput, clypeus, palpi, mouthparts and the antennae are yellow. The face is white, tinged faintly with yellow. The latter is almost flat, just slightly raised in the upper median portion. The apical bristle on the palpus is about equal in length to the bristles on the upper part of the vibrissal row. A short bristle is also present on each palpus just before the apex on the outside surface and scattered black setae are present around the apex and on the apical half of the outside surface. The mentum is bare except for four pale hairs in the middle just before the apex and for two yellow-brown setae on each side. The two uppermost bristles of the vibrissal row are rather well-developed, about equal in length to the anterior reclinate bristles of the front. In addition to the bristles, two irregular rows of setae are present on the upper sides of the oral margin. The anterior reclinate bristles are about two-thirds as long as the proclimates and are situated distinctly above the latter. The second antennal segment has two prominent dorsal bristles, these are equal in size to the anterior reclinates. The arista has approximately nine dorsal and three ventral rays in addition to the apical fork. The inner surface of the arista is setose over most of its length. Only the basal one-third to one-fourth is bare. *Thorax:* Entirely shining black, grey pubescent on the sides, over the scutellum and the hind margin of the mesonotum and the metanotum. The apex of the scutellum is very faintly tinged with red. In some paratypes, the sternopleura are rufous, tinged with brown to black. In some the scutellum is entirely black, in others a small but distinct rufous spot is present at the apex. Only one humeral bristle is present. This is equal in size to the presutural and approximately equal to the anterior dorso-centrals. The anterior sternopleural bristle is about one-third as long as the posterior bristle. The anterior dorsocentrals are situated just slightly behind a line drawn between the first supraalars. The halteres are pale yellow. *Legs:* Entirely yellow, lacking ornamentation. The front basitarsus is slender, almost four-fifths as long as the tibia. The preapical dorsal bristle of the front tibia is just slightly larger than the apical ventral bristle. *Wings:* A dark brown mark extends over the apical third and the m crossvein is narrowly marked with brown (fig. 34b), the wing is otherwise lightly infuscated. The third costal section is four times longer than the fourth and the costal fringe extends half of 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 of cell 1st M_2 . *Abdomen:* Polished black, grey-brown pollinose over the first tergum and over the median portion of the second. The genitalia are as in figure 34d. The anal plates are attached to the ninth tergum at the anterior portion, and are pointed at the ventral portion where they are covered with short setae. The aedeagus has no preapical protuberance as in most of the picture-winged species.

Length: body, 4.0 mm; wings, 4.3 mm. The male paratypes range from 4.0 mm for the body and 4.4 mm for the wing, up to 4.5 mm for the body and 5.0 mm for the wing.

Female. Fitting the description of the male in most respects. Differing by having the sides of the clypeus, the apices of the palpi and the third antennal segment brown, the apical wing marking smaller, occupying only about the apical one-

sixth of the wing and the brown marking over the m crossvein very prominent, well developed, forming a brown streak of brown which extends into the median portion of cell R_5 (fig. 34c). The ovipositor blades are as in figure 34e.

Length: body, 5.2 mm; wings, 5.8 mm. The female paratypes range from the size of the allotype down to 4.0 mm for the body and 4.5 mm for the wing.

Holotype male, Waikamoi, Maui, 4000', July 23, 1965 (D. E. Hardy). Allotype female same data as type, July 8, 1965 (K. Y. Kaneshiro). Thirteen paratypes, 8 males, 5 females, same locality as type, collected July 1964–October 1965 (L. H. Throckmorton, J. P. Murphy, D. E. Hardy, H. L. Carson and H. T. Spieth).

Type and allotype in the B. P. Bishop Museum, paratypes in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

Miscellaneous Species

Drosophila hamifera n. sp. (Figs. 35a-h)

This species obviously fits very close to *D. (Hypenomyia) varipennis* (Grimshaw) and it would appear that Grimshaw was possibly correct in setting *Hypenomyia* as a distinct genus. In light of the extraordinary range of divergence of morphological characters found in the Hawaiian species, however, we feel that it is best to treat this, at least temporarily, as nothing more than another unusual species group of *Drosophila*. *D. hamifera* will not run to *Hypenomyia* in the present key (Hardy, 1965:31) since the key character used was the clumping of the oral bristles in two distinct rows and *hamifera* has only one row of oral bristles. It does have in common with *varipennis* the very strange development of the front tibia of the male (fig. 35c), the predominantly brown wings, with marked sexual dimorphism, and the unusual spade-like development of the male aedeagus (fig. 35g). In the key (Hardy, 1965:83) this species would run to couplet 34 and could be included by modifying this couplet to read as follows:

- 34(31) Wing predominantly brown, with numerous hyaline spots (Hardy, 1965, figs. 23b and 126b) or with the costa strongly arched and with transverse hyaline marks across the wing (fig. 35e) in the male and the female wings almost entirely pale brown (fig. 35d). Front basitarsus of male flattened laterally (fig. 35b) 35
 Wings predominantly hyaline, etc. former couplet 35
 35(34) Wings irregularly spotted (figs. 28b, 29a and 30c), costa not arched. Front tibia without strong dorsal hook. Oral bristles poorly developed *adiastola* complex of species
 (Refer to treatment of this group.)
 Wings of male with transverse hyaline bands and with the costa strongly arched (fig. 35e), in the female almost entirely pale brown (fig. 35d). Front tibia of male with a strong dorsal hook (fig. 35c). Three strong, equal-sized oral bristles (fig. 35a) Maui
 *hamifera* n. sp.

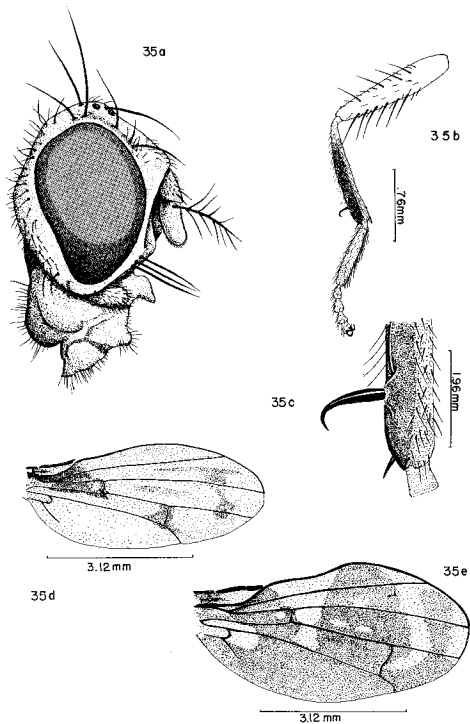
D. hamifera is readily differentiated from *varipennis* by having only three strong bristles in a single row on each side of the oral margin (fig. 35a) rather

than having a dense clump of bristles arranged in two rows on each side; by having the costal margin strongly arched and with hyaline streaks extending transversely across the wing from the costal margin (fig. 35e). Rather than having the anterior portion of the wing entirely brown and with a longitudinal streak, hyaline mark and a few scattered spots through cell R_5 as in figure 217e (Hardy, 1965:524). Also the face of *hamifera* is principally brown to black whereas that of *varipennis* is entirely yellow, the third antennal segment is entirely brown to black in *hamifera* and is yellow in *varipennis*. The species also differ in other details.

Male. Head: The lower half of the front is yellow, the eye orbits above the reclinate bristles is brown to black in ground color, covered with grey pollen. The upper interfrontal areas are golden brown. The ocellar triangle is black covered with light grey pollen. The occiput is black, the sides, around the eye margins are black in ground color covered with grey pollen. The coloration extends onto the genae bordering the lower margin of the eye. The sides of the occiput, except the margins are yellow and a narrow streak of yellow extends through the middle of each gena, the oral margin is black. The upper portion of the face is yellow, the lower half to two-thirds is black in ground color, densely grey pollinose, the face is slightly raised down the median portion. Three strong oral vibrissae are present on each side, these are equal in size (fig. 35a). The clypeus and the mentum are brown. The latter has numerous setae just before the apex and a few scattered setae near the basal third. The palpi are yellow and densely setose. Each palpus has a small inconspicuous apical bristle, scarcely two times larger than the setae. The labella are rather ornately developed, setose along the lower surface and with the apical portion produced into flat, blunt processes on the upper surface (fig. 35a). The anterior reclinate bristles are about two-thirds as long as the proclinate and are situated distinctly above the latter. The first two antennal segments are yellow, tinged with brown. The third segment is dark brown, tinged with yellow at its base. The arista has six or seven dorsal and three ventral rays in addition to the apical fork. The inner surface of the arista is bare.

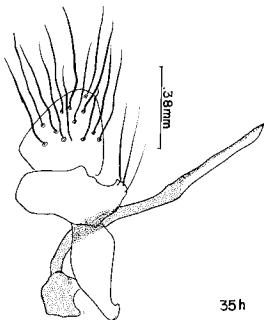
Thorax: The mesonotum is yellow to rufous in ground color, brown on the sides and in the posteromedian portion between the dorsocentral bristles, the latter mark extends as a brown median vitta to a level approximately opposite the hind margins of the humeri. The scutellum is brownish yellow. The pleura are predominantly brown to black, tinged with rufous. The metapleura and metanotum are rufous. The anterior dorsocentral bristles are situated approximately in line with the second supraalar. The two humeral bristles are approximately equal in size. The anterior sternopleural bristle is subequal in size to the posterior bristle and a prominent bristle like seta is present between these. The halteres are brown on their bases, yellow on their apices.

Legs: Predominantly black, the apices of the femora, the narrow bases of the tibiae and the median portion of the middle and hind tibiae are yellow, also the middle and hind tarsi are yellow. The front tibiae are comparatively short and thick. The dorsal surface is smooth and polished; a row of fine rather short yellow-brown anterodorsal cilia extend from the base of the segment to about opposite the hook. The preapical dorsal bristle is represented by a strong hook as in figure 35c. The front basitarsus is about two-thirds as long as the tibia and is distinctly flattened laterally somewhat similar to

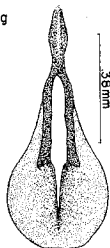


that of the *adiastola* complex of species. The flattened portion has numerous short erect setae on the posterior surface and about three or four short anterodorsal cilia near the apical third of tarsomere. The ventral surface of the basitarsus is densely covered with short black bristles. *Wings*: The costal margin is greatly arched, the wing is broadest at a level with the m crossvein. A large hyaline spot extends from near middle of cell R_1 to near the basal portion of the cell. This extends across cells R_3 , R_5 and 1st M_2 . Another transverse hyaline streak extends across the wing from the apex of cell R_1 to the median portion of cell 2nd M_2 and a hyaline streak extends across the apices of cells R_3 and R_5 . A small round hyaline spot is present in cell R_3 just before the r-m crossvein and two small hyaline spots are present in cell R_5 just before a level with the m crossvein (fig. 35e). The r-m crossvein is situated well beyond the apex of vein R_1 , almost at

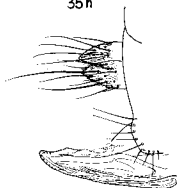
35f



35g



35h



.38mm

FIG. 35. *Drosophila hamifera* n. sp.: a, head; b, front leg; c, hook on front leg; d, wing of male; e, wing of female; f, male genitalia; g, aedeagus; h, ovipositor.

the middle of cell 1st M_2 and the basal section of vein M_{1+2} is almost as long as the penultimate section of that vein. The third costal section is slightly over three times longer than the fourth and the costal fringe extends about half the distance between the veins R_{4+5} and R_{5+6} . *Abdomen*: Entirely shining black in ground color covered with brown pollen. The genitalia are as shown in figure 35f and 35g. The apex of aedeagus is flattened and is rounded as seen in dorsal view (fig. 35g). The parameres are rudimentary and their presence can be detected only by the presence of the apical sensilla which are normally present on well-developed parameres.

Length: body, 6.2 mm; wings, 6.5 mm.

In the paratype specimens, the body length varies from 6.2–6.7 mm.

Female. Fitting most of the description of the male except for sexual characters. The occiput is predominantly rufous, tinged with brown in the ground color along the upper lateral margins, the thorax is almost entirely brown, tinged with rufous, and with a very narrow yellow-grey pollinose vitta extending down each dorso-central line. The legs are paler colored than in the male. The femora are entirely yellow except for tinges of brown on the apices. The front tibia is dark brown to black except for the yellow base and except for a tinge of yellow in the median portion. The middle and hind tibiae are as in the male. The wing markings are very different from that of the male. The wings are almost entirely pale brown and with markings as in figure 35d. The subbasal spot is dark brown and extends almost to the r-m crossvein. The ovipositor is as in figure 35h.

Holotype male, Waikamoi, Maui, March 11, 1966, G34A (W. B. Heed). Allotype female same locality, June 28, 1965, C125.29 (H. L. Carson). Fourteen paratypes, 8 males, 6 females, mostly from the same locality as type, September 1962–April 1966, some collected on *Clermontia*, bearing collection numbers S65.6B, G41A, G51A, G12.2 and C125.29 (H. T. Spieth, W. B. Heed, J. P. Murphy, H. L. Carson, and K. Y. Kaneshiro). Specimens also have been collected at Paliku, Haleakala Crater, 6500', July 25, 1963 (D. E. Hardy) and Puu Kukui Trail, Maui, August 4, 1964, 4400', collected on *Lobelia* (probably *Clermontia*), C110.1 (H. L. Carson).

Type and allotype in the B. P. Bishop Museum. Paratypes in the collections of the U. S. National Museum, British Museum (Natural History), and the University of Hawaii.

***Drosophila primaeva* n. sp. (Figs. 36a-c)**

This species resembles *quasianomalipes* Hardy, the two occur in the same habitat, and this has been referred to in field notes and in genetic studies (unpublished) as "sp. nr. *quasianomalipes*." The two are apparently not related; *primaeva* differs in a number of important respects. The oral vibrissae are very strong (fig. 36a), the uppermost bristle is equal in size to the upper fronto-orbital bristles; two or more secondary vibrissae are also well-developed; in the *anomalipes* complex of species and *quasianomalipes* the uppermost bristle is usually about equal in size to the lower fronto-orbitals. The labellum of *primaeva* has a heavily sclerotized black rim around the apex (as in *polita-haleakalae* complex); in the *anomalipes* complex the dorsobasal margin is narrowly sclerotized but the apical portion of the labellum is entirely fleshy. The males of *D. primaeva* also

possess the following distinctive features: Bristle at apex of palpus long and slender, about equal in length to the segment; arista with only two ventral rays; front coxae lacking clumps of black setae or spines and femora without unusual chaetotaxy; front tibiae are straight, not bent, and lacking the peculiar apico-ventral process which is distinctive of the *anomalipes* complex; wings uniformly tinged brownish yellow, very slightly darker along the m crossvein, but lacking distinct brown markings; genitalia with well-developed parameres, elongate basal apodeme of the aedeagus, dense clump of short erect setae at ventral portion of the cerci, elongate apical portion distad of the preapical protuberance and setae confined to the posteroventral part of the ninth tergum. In the *anomalipes* complex the palpal bristle is short, the arista has three or four ventral rays, the front

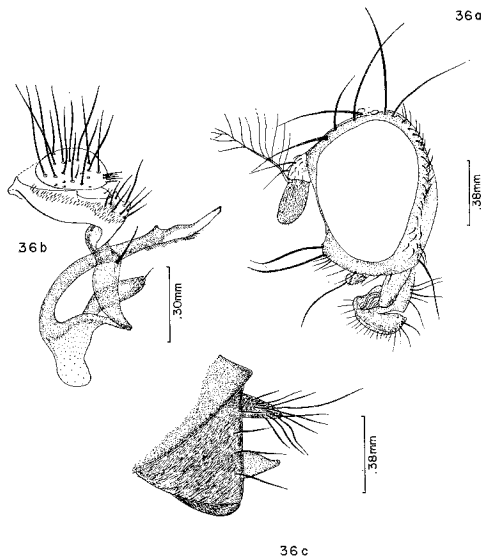


FIG. 36. *Drosophila primaeva* n. sp.: a, head; b, male genitalia; c, ovipositor.

coxae and femora have distinctive arrangements of black bristles or setae, the anterior surface of the front tibia is arcuate and the apicoventral portion is raised into a distinctive striated knob; wings distinctive, marked with brown; and genitalia with small parameres, short basal apodeme of very elongate and narrow aedeagus, cerci without a dense clump of erect setae at the ventral portion, portion of aedeagus distal to preapical protuberance very much shortened, and long setae found throughout the ventral margin of the ninth tergum.

From preliminary cytological studies which have been made by H. D. Stalker (unpublished), it is possible that this species may be a representative of one of the most primitive of *Drosophila* in Hawaii. One arrangement in chromosome 5 closely resembles the sequence in certain mainland species.

Male. Front entirely opaque brown pollinose, faintly tinged with yellow, especially along the sides, predominantly bare, with a few scattered short black setae on the anterior portion and with short black setae along the orbits on the lower half of the front. Ocellar triangle and upper median portion of occiput dark brown to black, tinged with yellow on the type and some other specimens, and in some cases entirely black in ground color, covered with grey-brown pollen. Sides and lower portion of occiput, genae and face yellow. Clypeus, palpi and mouthparts yellow, except for the conspicuous black rim at apex of each labellum (fig. 36a). The mentum has about eight prominent black setae just beyond the middle. Antennae yellow-brown, darker dorsally. Aristae each with about eight dorsal and two ventral rays in addition to the rather small apical fork; inner surface of arista bare. Lower reclinate bristles less than one half as long as the proclimates and situated distinctly above the latter. As noted above the oral vibrissae are strong (fig. 36a). The lower lateral margins of face slightly produced, at bases of upper vibrissae. *Thorax:* Entirely rufous, tinged faintly with brown on the dorsum and covered with yellow pubescence. Anterior dorsocentral bristles situated about opposite the second supraalar. Lower humeral bristles large, about three-fourths as long as the upper. Anterior sternopleural bristle about four-fifths as long as the posterior and with a prominent bristle between the two which is approximately half as long as the anterior. *Legs:* Yellow, lacking ornamentation. *Wings:* Evenly tinged yellow-brown, slightly darker over the m crossvein. Third costal section 4.5 times longer than the fourth and costal fringe extending slightly over half the distance between apices of veins R_{2+3} and R_{4+5} . *Abdomen:* Predominantly yellow, black on apices of terga and brown to black down the median portions of terga 3-5. Genitalia are as shown in figure 36b. The cerci have a small clump of short erect setae at the ventral portion. Aedeagus with a prominent preapical protuberance and with very short setae on the ventral surface just below the preapical protuberance. The basal apodeme is large and elongate making for a small phallosomal index and the parameres are well developed with a fine apical sensillum.

Length: body, 4.6-5.0 mm; wings, 4.9-5.6 mm.

Female. Fitting the description of the male except for sexual differences. Mesonotum and disc of scutellum more distinctly tinged with brown. Labellum not rimmed and apical bristles of palpi only about half as long as segment. Ovipositor is as in figure 36c.

Length: body and wings, 5.7-6.1 mm.

Holotype male, Mohihi Stream, Kokee, Kauai, 4000', June 25, 1965 (K. Y. Kaneshiro). Allotype female, Mohihi, Kauai, September 6, 1965 (J. K. Fujii) (F₁ reared in laboratory). Eighteen paratypes, eight males, 10 females from the following localities in the Kokee-Alakai Swamp area of Kauai: same as type and allotype, December 29, 1965 (K. Y. Kaneshiro and D. E. Hardy); Kokee, Kauai, August 27-30, 1959, banana bait trap (J. W. Beardsley); Berry Flat trail, May 10, 1967 (K. Y. Kaneshiro); Alakai Swamp, July 10, 1928 (E. H. Bryan Jr.); and Keaku Cave, July 12, 1928, 4600' (E. H. Bryan Jr.).

Type, allotype and some paratypes in the B. P. Bishop Museum. The remainder of the paratypes deposited in the collections of the U. S. National Museum, British Museum (Natural History) and the University of Hawaii.

Miscellaneous Notes on Picture-Winged Species

Drosophila neogrimshawi NEW NAME

Idiomya grimshawi Bryan 1934:435, preoccupied by *Drosophila grimshawi* Oldenberg, 1914:23.

As pointed out by Hardy, 1965:539, the only character for differentiating *Idiomya* Grimshaw from typical *Drosophila* Fallén has been the presence of an extra crossvein in cell R₅. It has now been clearly demonstrated by Carson, *et al.*, 1967:1284, that this is not a generic character and it has been necessary to sink *Idiomya* as a synonym of *Drosophila*. Carson has found that two species presently in the genus *Idiomya* are chromosomally closely related to a very distinct group of *Drosophila* species near *D. adiantola*. Also, based on *D. grimshawi* whose polytene chromosome sequences were chosen as an arbitrary standard, he found that *I. perkinsi* differs from the former by only 11 inversions whereas *D. adiantola* is 17 inversions away.

Drosophila neoperkinsi, NEW NAME

Idiomya perkinsi Grimshaw, 1901:51, preoccupied by *Drosophila perkinsi* Grimshaw, 1901:59. The latter is now placed in the combination *Grimshawomyia perkinsi* (Hardy, 1965:538)

Drosophila silvestris (Perkins), NEW COMB.

Idiomya silvestris Perkins, 1910, Fauna Hawaiana 3(6):700.

I. nigrifacies Hardy, 1965, Insects of Hawaii, 12:550. NEW SYNONYM

Idiomya nigrifacies was based upon the male sex and *silvestris* upon the female; after obtaining progeny from a single wild female, it became clear that these are synonyms.

We are proposing *Drosophila subsilvestris* NEW NAME for *D. silvestris* Basden, 1954:630.

Drosophila neopicta, NEW NAME

Idiomya picta Grimshaw, 1901:55, preoccupied by *Drosophila picta* Zetterstedt, 1847:2567.

Drosophila nigra Grimshaw

Drosophila (Hypenomyia) reburra Hardy, 1965:522, NEW SYNONYM.

D. nigra was based upon the female and *reburra* upon the male; we have since associated the sexes.

Drosophila hexachaetae Hardy

Drosophila neglecta Hardy, 1965:383, NEW SYNONYM

In the original description, it was noted that *neglecta* is very closely related to *hexachaetae* but apparently differs by having the thorax predominantly brownish yellow and by the position of the three cilia on the anterodorsal surface of the front tibia. It has been found that the color of the thorax is quite variable, ranging from yellow to brownish yellow. The position of the three cilia on the anterodorsal surface of the front tibia is also variable. Upon inspection of this character in the progeny from a single female, it was found that there are typically three cilia which are arranged in varying positions along the anterodorsal portion of the segment. They may be equidistant from each other, or two may be closer to the apex with one close to the base. In a few specimens, there are four cilia arranged along the segment.

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