

reciprocal crosses of *euronotus* to *melanica* and *melanura*, as well as the *paramelanica-euronotus* cross, were all incompatible (Table 1, 1-5). But in the *euronotus-paramelanica* cross (6), 27 of the 63 mass matings yielded 225 offspring for an average of about 0.35 offspring per tested pairs, indicating the presence of a large amount of sexual isolation.

TABLE 1

Shows results from crosses between *euronotus* and *melanica*, *melanura* and *paramelanica*

Crosses ♀      ♂		Number tested	Number of offspring	Females	Males
<i>P<sub>1</sub></i> matings					
1.	<i>melanica</i> × <i>euronotus</i> .....	580	0	.....	.....
2.	<i>euronotus</i> × <i>melanica</i> .....	700	0	.....	.....
3.	<i>melanura</i> × <i>euronotus</i> .....	60	0	.....	.....
4.	<i>euronotus</i> × <i>melanura</i> .....	40	0	.....	.....
5.	<i>paramelanica</i> × <i>euronotus</i> .....	710	0	.....	.....
6.	<i>euronotus</i> × <i>paramelanica</i> .....	630	225	115	110
<i>Inbred and backcrosses</i>					
7.	<i>F<sub>1</sub></i> × <i>F<sub>1</sub></i> .....	27 ♀ + 16 ♂	0	.....	.....
8.	<i>euronotus</i> × <i>F<sub>1</sub></i> .....	10 ♂ ♂	0	.....	.....
9.	<i>paramelanica</i> × <i>F<sub>1</sub></i> .....	19 ♂ ♂	0	.....	.....
10.	<i>F<sub>1</sub></i> × <i>euronotus</i> .....	15 ♀ ♀	41	18	23
11.	<i>F<sub>1</sub></i> × <i>paramelanica</i> .....	29 ♀ ♀	745	309	356

The *euronotus/paramelanica* hybrids were as light in color as *paramelanica* and very sensitive to ether. They were inbred, and also backcrossed to their parental forms (Table 1, 7-11). In the inbred test 27 females and 16 males were mated together, but failed to produce offspring. The backcrosses of the *F<sub>1</sub>* males to *euronotus* and *paramelanica* females both failed to produce offspring (8, 9), obviously due to the sterility of the males, as dissections showed that their testes did not contain mature sperm. The backcrosses of the *F<sub>1</sub>* females to *euronotus* and *paramelanica* males were both fertile, giving 41 and 745 offspring, respectively. Thus the first cross was much less fertile than the second, producing less than three offspring per tested female. The *F<sub>2</sub>* flies (1st backcross generation) were inbred, but the cross to *euronotus* failed to produce progeny, due, in all probability, to the development of mold in the culture. The flies from the cross to *paramelanica* went very well in inbred both in the first and second backcross generations.

The conclusion to be drawn from the results from these cross-tests is that the closest relative of *euronotus* in the group is the subspecies *paramelanica*.

# XI. THE DROSOPHILIDAE OF THE NEARCTIC REGION, EXCLUSIVE OF THE GENUS *DROSOPHILA*

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## INTRODUCTION

In the United States the Drosophilidae comprise the third largest family of acalyptate Diptera, exceeded in the number of species only by the Ephydriidae and Chloropidae. The present account is an attempt to summarize the Nearctic genera and species of the family, exclusive of those of the genus *Drosophila*, in such a manner as to make their identification possible by the non-specialist. Many changes have been made in the systematics of this family since the last major revision (Sturtevant, 1921), and it is believed that a summary at this time may be of considerable benefit to the many students of evolution who deal primarily with the species of *Drosophila*. At the present time investigators in this field are placing increasing importance on natural populations, ecological relationships, food habits, and related fields. In many of these studies species of other genera are often encountered and may well be of importance in our understanding of population competition.

In the hope of making identification of the relatives of *Drosophila* easier, entirely new keys to the genera and species have been prepared from actual specimens and from stocks maintained by the Texas laboratory and from additional material borrowed from other interested persons. The terminology has been kept as non-technical as possible but some knowledge of the Diptera, especially *Drosophila*, is expected.

Following the generic key, the respective genera are discussed in alphabetical order, with keys to the known North American species as well as additional information concerning their distribution, natural history, internal morphology and some comments on methods of rearing.

The area covered by this summary corresponds most nearly to the continental United States, although species from northern Mexico and from Canada are included. A few extra-limital species have been included when specimens were available for adequate study but for most Central American species the papers of Duda (1925, Costa Rica; 1927, South America) and Malloch (1924a, 1926, Costa Rica, Panama) will be of value.

Members of the genus *Drosophila* have been excluded for several reasons. Keys to the North American species have been published rather recently (Sturtevant, 1942; Patterson, 1943) and, although there are imperfections in these keys and they fail to include more recently described species, they are fairly adequate for the present. Further, the genus is so large that a detailed summary comparable to the present one is an extremely imposing task, one which the writer hopes to accomplish within the coming year.

Many of the observations recorded here were made while the author held a Gosney Fellowship at the California Institute of Technology and he

wishes to express his gratitude for the honor. Dr. A. H. Sturtevant has been especially helpful in lending his extensive collection of *Drosophilidae* for study and has added considerably to the following keys by his suggestions. Other workers, too numerous to mention, have also contributed specimens of various genera for our use.

The type specimens of the thirteen new species described in the present paper have been deposited in the *Drosophila* Type and Reference Collection of The University of Texas, Austin, except in the few cases which are noted in the text. In this treatment of the family 20 genera are reported from the area and 45 named species are recognized, not including 13 which are described as new. In addition, 14 species are included without formal naming, thus giving a total of 72 species, exclusive of the genus *Drosophila*.

### DIAGNOSIS OF THE FAMILY

At the time of Sturtevant's 1921 monograph this group was treated as a subfamily, the *Drosophilinae*, of the family *Muscidae*. Since then, the various subfamilies have generally been accorded family rank and many of them have, in fact, been divided into several families. As a consequence it seems wise to indicate now the limits of the family *Drosophilidae* as interpreted by the writer and a majority of present-day Dipterists. The family may be defined as follows:

Acalyptrate Diptera with bare mesopleura, twice-broken costa, rudimentary subcosta (auxiliary vein), typically with 3 orbitals, the anterior pair proclinate, the others reclinate, and with the post-vertical bristles (postocellars) convergent though sometimes quite small. Sternopleurals are typically present, the vibrissae are usually developed, the proclinate orbital is not nearer the eye margin than the anterior reclinate, and the disc of the scutellum is bare although in a few species there are a few marginal hairs in addition to the usual four scutellars. The arista may be bare, pubescent or plumose, the 2nd basal and discal cells of the wing may be confluent or separated, the anal vein may be present or absent, and the costal margin is not usually spinulose. In many species the eyes are bright red in life, and the eggs often possess anterior filaments. The size range is quite extreme, from less than 1 mm. to 7 mm. or perhaps larger.

It is to be noted that this diagnosis excludes from the family certain genera often included within it. One of the more recent works dealing with the family as a whole is that of Seguy (1934) who recognizes three subfamilies as follows: **Curtonctinae**, containing only *Curtonotum*; **Diastatinae**, with *Diastata*, *Tryptochaeta* and *Euthychaeta*; and **Drosophilinae**, with all the usual drosophiloid genera but also including the aberrant *Cryptochaetum*. All of the genera of the first two groups, except *Tryptochaeta*, have bristled mesopleurae and are often segregated into a single family. *Tryptochaeta*, belonging with this group, has the proclinate orbital placed nearer the eye margin than is the anterior reclinate, and also differs in several internal characters from the usual *Drosophila* pattern.

*Cryptochaetum* is a genus of parasitic flies with a number of aberrant characters and has been placed in a variety of families by different writers. The present trend is to place it in a family of its own, the *Cryptochaetidae*. More recently, Seguy (1951) has adopted the general conclusions reached above, listing separately the families *Drosophilidae*, *Diastatidae* and *Cyrtotonidae*, but includes, however, *Cryptochaetum* in the *Drosophilidae*.

A more restrictive arrangement of the family is given by Brues and Melander (1945) who divide the *Drosophilidae* into four subfamilies as follows: **Camillinae**, eg., *Camilla*; **Steganinae**, eg., *Stegana*; **Amiotinae**, eg., *Amiota*, *Sinophthalmus*, *Orthostegana*; and **Drosophilinae**, with a number of miscellaneous genera. This arrangement, while limiting the family more nearly in accord with the writer's viewpoint, still includes *Camilla* whose bristly mesopleura, lack of sternopleurals and other unique characters have led other workers to segregate it into a family *Camillidae*.

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

#### KEY TO THE NEARCTIC GENERA OF DROSOPHILIDAE

1. Arista plumose, with several dorsal branches and usually one or more ventral branches basal to the terminal fork ..... 7
- Arista bare, pubescent, or with a single long dorsal branch near base with the main axis pubescent and not bifurcate apically ..... 2
2. Arista with one long dorsal branch basally; no prescutellars; face rather flat; wings dusky, especially along costal edge, the crossveins clouded ..... **CLADOCHAETA** p. 180
- Arista bare or pubescent along its length; prescutellars present; other characters not entirely as above ..... 3
3. No proclinate orbital; face carinate between antennae and noticeably protuberant below, with shining white pruinose areas; shining black species with middle and hind knees and tarsi yellow; size 1.8 mm. .... **CINDERELLA** p. 180
- Proclinate orbitals present; otherwise not as above ..... 4
4. Face distinctly carinate; mesonotum with spotted pattern ..... 6
- Face flat, not carinate, or with at most a low median ridge which does not even simulate a nose-like carina; mesonotum unicolorous or with faint spotted appearance ..... 5
5. Anterior frontal bristles rather convergent; propleurals absent; mesonotum reddish brown, without spots; wings with dark pattern in cells and on veins ..... **PSEUDIASTATA** p. 192
- Anterior orbitals clearly proclinate; propleurals absent; mesonotum dull, dark brownish black with faintly indicated spots around hair bases; wings without pattern ..... **CACOXENUS** p. 173

6. No differentiated sutural bristle just anterior to transverse suture; legs well marked with dark bands; wings with dark clouds on crossveins ..... **SINOPHTHALMUS** p. 208
- Sutural bristles well developed; legs not banded or with at most faint bands apically on femora and basally on tibiae; wings unmarked ..... **GITONA** p. 183
7. Postvertical bristles greatly reduced in size, much smaller than anterior reclinate orbital, often appearing nearly absent; propleurals usually present ..... 8
- Postverticals well developed, usually as large as or larger than anterior reclinate orbital; propleurals present or absent ..... 14
8. Face flat, without a true carina ..... 9
- Face carinate, at least above ..... 10
9. Mostly small species (1.0–2.5 mm.); costa reaching 4th vein; 3rd costal section without thorn-like warts below; propleurals absent; prescutellars present or absent ..... **DIATHONEURA** p. 182
- Mostly large species (2.5–6.5 mm.); costa reaching 3rd vein or slightly beyond; 3rd costal section usually with thorn-like warts on under side ..... **LEUCOPHENGIA** p. 184
10. Anterior reclinate orbital placed anterior to proclinate and as long or longer than the latter, the proclinate pair rather convergent, sometimes strongly so; no prescutellars; acrostichal hairs in 8 rows or less ..... **CHYMYMYZA** p. 173
- Anterior reclinate orbital placed well behind proclinate and usually weaker than the latter, the proclinate pair noticeably convergent; prescutellars strong; acrostichals in 8 or more rows ..... 11
11. Middle tibiae with a series of stout black bristles on basal outer half or less; 3rd costal section with small thorn-like warts on under side; wings often strongly bent down at sides ..... **STEGANA** p. 211
- Middle tibiae without such extra basal bristles; costa with or without warts on 3rd section; wings seldom bent down at sides ..... 12
12. Mesonotal hairs and bristles arising from spots; legs largely pale yellow with faint bands apically on femora and basally on tibiae ..... **CITONA** (part) p. 183
- Mesonotum usually unicolorous yellow, brown or black; if somewhat spotted then the legs are conspicuously banded ..... 13
13. Front large, densely haired anterior to ocelli; discal and 2nd basal cells confluent; never with milky white areas on face and humeri ..... **RHINOLEUCOPHENGIA** p. 193
- Front sparsely haired; discal and 2nd basal cell separated by a colored crossvein; many species with milky white areas on face and humeri and below wing bases ..... **AMIOTA** p. 166
14. Prescutellars strong, distinctly larger than the usual acrostichal hairs ..... 15
- No prescutellars, the hairs in this position not enlarged ..... 18
15. Posterior reclinate orbital much closer to inner vertical than it is to the proclinate orbital; acrostichals in 10 or more rows ..... 16
- Posterior reclinate orbital usually obviously closer to proclinate than to inner vertical; if, rarely, it is about midway between them, then there are fewer than 10 acrostichal rows ..... 17
16. Large vibrissae followed by a row of short, weak bristles; abdomen with distinct pattern ..... **LEUCOPHENGIA** (part) p. 184
- Large vibrissae followed by a row of long, stout bristles; abdomen pale tan to brownish, without pattern ..... **GENUS X** p. 216
17. Face flat, not carinate; one strong sternopleural; anal vein and cell practically absent; in our species with wings heavily clouded, especially along anterior half ..... **CLASTOPTEROMYIA** p. 180
- Face more or less obviously carinate; usually with 2–3 sternopleurals; anal vein present or not; wings various ..... **DROSOPHILA** (part)
18. Fore femora, tibiae and metatarsi dark brown to black, contrasting with the pale yellow to white apical tarsal joints; other legs pale; carina low between antennae, often bulbous below; anterior reclinate orbital small, placed slightly in front of and to the side of the proclinate ..... **NEOTANYCASTRELLA** p. 192
- Fore legs usually similar to the others in coloration; other characters not entirely as above ..... 19

19. Anterior dorsocentrals placed far forward, nearly level with the transverse suture, the distance between them usually less than that between the anterior and posterior ones ..... 20  
 Anterior dorsocentrals (excluding any extra ones) well behind suture, closer to posterior ones than to each other, or at least about equally close to them ..... 21
20. Distal costal incision exceptionally deep, the costa greatly enlarged basal to the incision, black in color and protruding beyond wing margin; apical scutellars crossed; acrostichals in about 4 rows; front rather flat; small dark species with complex mesonotal pattern ..... **DETTOPTOMYIA** p. 182  
 Distal costal incision not deep nor the costa enlarged; apical scutellars widely divergent; acrostichals in about 8 rows; front about twice as broad as long, the orbits separated from the ocellar triangle by a V-shaped depression; small yellow species ..... **MICRODROSOPHILA** p. 189
21. Acrostichals in 2 or 4 rows both between dorsocentrals and in front of them; rather slender species ..... **SCAPTOMYIA** p. 194  
 Acrostichals in 6 or more rows at the level of the anterior dorsocentrals ..... 22
22. Semi-shining flies with rather uniformly brownish to blackish mesonotum, scutellum and upper pleurae, the lower pleurae and under surfaces, including legs, pale whitish to yellowish, strongly contrasting with the dark upper parts; distal costal incision usually pronounced; posterior notopleural bristle farther above notopleural suture than anterior bristle ..... **MYCODROSOPHILA** p. 190  
 Not entirely as above; if the mesonotum is uniformly dark then the under surfaces are not contrastingly paler; posterior notopleural about as near suture as is the anterior one ..... 23
23. Front often longer than wide, usually with a noticeably enlarged frontal triangle reaching nearly to antennal bases; cheeks usually protruding far in front of eyes, the oral margin deeply incised medianly, semi-circular and turned up toward carina; proboscis exceptionally long when extended; arista usually with a single ventral branch basal to the fork; face strongly carinate; some ♂♂ of *Z. dispar* with head and eyes grotesquely extended and pointed laterally ..... **ZYGOTHRICA** p. 213  
 Not entirely as above; front usually as wide as long or nearly so; rarely with a distinct frontal triangle extending beyond ocellar area; if the arista has but a single ventral branch then the carina is limited to upper part of face ..... **DROSOPHILA**

### AMIOTA Loew

1862. Berl. ent. Zeit., 6:229.

Genotype: *A. humeralis* Loew.

? = *Phortica* Schiner, 1862. Wien. ent. Monat., 6:433.

Most authorities seem agreed that *Amiota* and *Phortica* are synonymous, and according to Malloch and McAtee (1924) Schiner's publication appeared several months after that of Loew, and hence *Amiota* should be used. European workers, however, have not accepted *Amiota* as valid and use *Phortica*. The type of the latter, *variegata* (Fallén), is distinct in many characteristics from *humeralis* and its closest relatives, and I feel that ultimately they will be separated into different genera. However, the group of species concerned is very poorly understood at present, taxonomically, so that for the present it seems best to place *Phortica* as a subgenus, as was first suggested by Sturtevant (private communication). Further, I do not feel that *Sinophthalmus* Coq. is actually generically distinct from the species of *Phortica* and may eventually have to be placed in that group but I have not taken such a step in the present work.

We have, then, two subgenera as follows:

Subgenus **Amiota** Loew

Type: *A. humeralis* Lw.

Small to large species with uniformly dark brown, black or tannish yellow thorax, the abdomen with or without some yellowish areas. Legs usually uniformly pale, not obviously banded. Middle orbital bristle well developed, usually at least  $\frac{2}{3}$  length proclinate. Last section of 5th vein longer than posterior crossvein (5X index 1.0 or higher). Most species with milky white areas on face, on humeri and below wing bases. Examples: *minor* Malloch (U.S.), *alboguttata* Wahlberg (Europe, ? U.S.), *lacteoguttata* Portchinsky (Europe), *rufescens* Oldenberg (Europe), and *nigrescens* n. sp. (U.S.).

Subgenus **Phortica** Schiner, new comb.

Type: *A. variegata* Fall.

Mostly large species with complex pattern of grayish or darker lines and marks on mesonotum and abdomen. Legs distinctly banded. Middle orbital bristle small, less than  $\frac{1}{2}$  length proclinate. Never with the milky white spots as in subgenus *Amiota*. Posterior crossvein longer than last section of 5th vein (5X index usually 0.5–0.8). Examples: *oldenbergi* Duda (Europe), *africana* Malloch (Africa), *varipes* Duda (Sumatra), *annulata* Malloch (Australia), *maculiceps* de Meijere (Sumatra, Formosa), and *albavictoria* Patterson and Mainland (Mexico, U.S.).

Whereas the members of *Phortica* show considerable variation in morphology, those of *Amiota* are so similar superficially that an adequate systematic treatment is extremely difficult. The following account is far from final and an extensive study of male genitalia of many specimens, including European species, is a necessity.

The only record of larval habitat known to the writer is given by Seguy (1934) for the European *variegata*, whose larvae were found in sap of the weeping willow tree. Most species have the habit of flying into one's eyes and ears, in the manner of *Hippelates* (Chloropidae), and can be quite annoying at times. We have collected most of our specimens by sweeping a net around our heads although in extremely dry situations in the southwest species will come to banana-baited traps in fair numbers. We have never succeeded in rearing any member of the genus in the laboratory.

Key to the Nearctic species of *Amiota*

1. Disc of mesonotum uniformly brown, black or tan, without markings; legs not banded, usually unicolorous; 5X index 1.0 or higher; middle orbital bristle at least  $\frac{2}{3}$  length proclinate; many species with milky white areas on face, humeri and below wing bases ..... 2  
(Subgenus *Amiota*)
- Disc of mesonotum with pattern of grayish to blackish markings; legs strongly banded; 5X index 0.5–0.8; middle orbital smaller, less than half length proclinate; never with milky white areas as described .....  
(Subgenus **Phortica**). *albavictoria* Pat. & Main.
2. With milky white areas on lower face, humeral calli and below wing bases, though these may be partly faded on pinned specimens; small to large species, black, brown or tan ..... 3  
Definitely without such white areas; tannish to brownish flies; body length 2.0–2.5 mm., rarely larger ..... *minor* Malloch
3. Male hind femora with about 5 long yellow bristles near middle, these much longer than femoral diameter; small, black, slightly shining flies, the abdomen without yellowish areas ..... *setigera* Mall.
- Male hind femora lacking such outstanding bristles ..... 4

4. Prosternal plates dark brown to black, the color visible even when heavily pollinose; yellowish areas on abdomen often lacking or greatly reduced; small to moderately large blackish species  
Prosternal plates distinctly pale yellow; usually with considerable yellow areas visible on abdominal tergites; medium to large sized flies, blackish, brownish or tan in color 5
5. Cheeks rather broad, at their narrowest point as broad as width of 3rd antennal joint; cheeks pale behind, often whitish behind the rear of the eye; large species (4.0 mm.), black, with a small amount of yellow on 1st tergite *buccata* n. sp.  
Cheeks narrower, nowhere as broad as width of 3rd antennal joint; cheeks rarely noticeably paler behind, never whitish. 6
6. Arista with several rather long rays both above and below the main axis; 4th vein index 2.5 or less; rather small species (1.5-2.0 mm.), usually black with fairly dense pollinosity *humeralis* Loew  
Arista with 4-5 dorsal branches above, basally, usually shorter than width of 3rd antennal joint, and with no long branches below, the main axis short pubescent to tip; 4th vein index above 2.5; generally larger black flies (2-3 mm.) with mesonotum more shining, only lightly pollinose. 7
7. Very dark species with front, antennae, upper face, palpi and most of cheeks blackened; fore coxae and all femora dark, sometimes nearly black; mesonotum, scutellum and abdomen quite black *nigrescens* n. sp.  
Less noticeably black species, usually with the front lighter anteriorly, the face, palpi and cheeks brownish and the legs pale yellowish; thorax and abdomen black ? *alboguttata* Wahl. 8
8. Large yellowish to tannish flies (3 mm. or more); front tan, only the ocellar area blackish; usually all but apical tergites with yellowish apical bands 9  
Flies of medium size (up to 3 mm.), blackish to brownish black with the front black on its posterior half or more; usually with yellowish apical bands only on two basal tergites 10
9. The two most prominent central processes of ♂ genitalia (seldom visible externally) light brown, long and slender, bifid at or near tip *leucostoma* Loew  
Male genitalia with 4 prominent processes, evident externally, appearing as semi-curved rods, black in color *Species B*
10. Sternopleura pale yellowish; front narrow, the width at its narrowest point slightly less than length of proclinate orbital; 3rd vein strongly diverging from 4th just beyond anterior crossvein, converging toward apex *Species C*  
Sternopleura largely brownish; front broader, its width greater than length of proclinate; 3rd vein not so strongly bent *Species A*

#### ✓ *Amiota* (*Phortica*) *albavictoria* Patterson and Mainland.

*A. albavictoria* Pat. and Main., 1944. Univ. Tex. Publ. 4445:13.

The species was described from 2 males collected at La Placita near Jacala, Hidalgo, Mexico. The writer has since taken 8 specimens from Ramsey Canyon, Huachuca Mts., Ariz. This form has the habit of flying around one's head in the manner of *Amiota* and *Sinophthalmus*, and is quite similar in most respects to *S. pictus* Coq. In the latter species, however, the arista is wholly bare, lacking any branches, while in *albavictoria* there are 1-3 short dorsal branches near base, the main axis otherwise bare.

#### ✓ *Amiota* (*Amiota*) *humeralis* Loew.

*A. humeralis* Lw., 1862. Berl. ent. Zeit., 6:229 (Cent. II, No. 93).

The type of this species came from the District of Columbia. Dr. Sturtevant has recently examined the type and his notes have been used in placing the species in the key. However, it is still likely that two species are included here: the original from the eastern states and another form from



the mountains of the western states. I am unable to settle the point at present due to a scarcity of specimens from the east. It is not certain that the figure of the male genitalia figured by Hsu (1949, Pl. 1, fig. 5) applies to this species.

Eastern specimens in the collection of Dr. Sturtevant have been examined from Mass., N. J., and N. Y. The Texas collection has nearly 75 western specimens from the following localities: New Mexico: Cherry Creek near Silver City, Whitewater Camp near Glenwood, Magdalena Mts.; Arizona: Mt. Graham near Safford, Cave Creek in the Chiricahua Mts., Rustler Park, Ramsey Canyon in the Huachuca Mts., Madera Canyon, Tonto Creek near Payson, Mogollon Rim Road south of Flagstaff; Texas: Ft. Davis; California: Willow Creek Camp west of Arcata.

✓ *Amiota minor* (Malloch).

*Phortica minor* Mall., 1921. Ent. News, 32:312.

The type and two paratypes were taken by Malloch at Dubois, Ill. Published records indicate that the species is widespread over the eastern United States. Our most western records are from Nebraska, Washington (Lake Wenatchee, 6 at traps), Austin, Texas, and Vera Cruz, Mexico. Steyskal (private communication) reports it from Michigan.

The clasper of the male genitalia from a specimen from New Jersey has 4-5 long, stout, blunt teeth, like fingers on a hand, while a specimen from Austin, Texas has 7 such teeth.

✓ *Amiota setigera* Malloch.

*A. setigera* Mall., 1924. Bull. Brook. Ent. Soc., 19:51.

Malloch described the species from four specimens from Savoy, White Heath and Dubois, Illinois. One male was captured at sap exuding from an apple tree; the remainder were captured while flying around the collector's head. I know of no other published records of the species.

✓ *Amiota alboguttata* Wahlberg.

*A. alboguttata* Wahl., 1838. K. Vet. Akad. Handl., 22.

Loew stated that he had seen this European species from North America and Malloch and McAtee (1924) report it of general occurrence in the District of Columbia region but indicate that it is doubtful if the American species is actually the same as the European one. There are a number of records of the species going by this name, however, and I have compared specimens in Dr. Sturtevant's collection from Europe determined as *alboguttata* by Frey with specimens from New York and New Jersey and could see no superficial difference. An examination of the male genitalia is essential to settle the question and European specimens have not been available for this purpose.

✓ *Amiota leucostoma* Loew.

*A. leucostoma* Lw., 1862. Berl. ent. Zeit., 6:230 (Cent. II, No. 94).

Loew's types came from Pennsylvania. It is the common large yellow to brownish species of the eastern states. We have taken it in Va., Me., and

Mich. Specimens in Dr. Sturtevant's collection are from N. Y., N. J., and Mass. Steyskal (private communication) also reports it from Mich., and Malloch (1921) mentions it from Ill. Malloch and McAtee (1924) state that it is common around Washington, D. C., and believe that it is the same species as that described from Europe by Oldenberg as *rufescens*.

✓ ***Amiota nigrescens*, sp. nov.**

**External characters of imagines.**

♂, ♀. Arista with 3-4 branches dorsally near base, usually shorter than width of 3rd antennal segment, the main axis thickly clothed with short hairs to tip and lacking any outstanding ventral branches. Front dull black throughout, shining only on narrow orbits and ocellar triangle; 2nd antennal joint brown, 3rd much darker. Face dark above, pale below (the whitish area of lower face, humeri and wing bases rarely persisting on pinned specimens), clypeus black, palpi mostly dark brown. Vibrissae weak, single, followed by a single row of weak hairs. Cheeks quite narrow, their width about equal to that of a palpus, dirty yellow to brown in color. Middle orbital  $\frac{5}{6}$  length proclinate, nearly as long as posterior reclinate and twice as far from the latter as from the proclinate. Postverticals not evident, inner and outer verticals, and ocellars well developed.

Mesonotum and scutellum shining black, very faintly pollinose. Pleurae black except for white or pale areas dorsally on humeri and just below wing bases, the dark area pollinose except for a shiny area along anterior margin of mesopleura. Prosternum dark, pollinose. Acrostichals in about 10 irregular rows; prescutellars strong. Anterior dorsocentrals short, scarcely longer than prescutellars. Anterior scutellars divergent. One humeral, 2 strong notopleurals, presutural short and thin. Two strong sternopleurals, about equal in length. Halteres white, the basal joint dark.

Legs of darkest specimens with fore coxae and femora greatly darkened, nearly black, otherwise pale yellowish except for apical tarsal joints of all legs. On paler specimens the femora are discolored though not so blackish.

Abdomen shining black, rarely a bit yellowish on basal tergite. External ♂ genitalia as illustrated by Hsu (1949, Pl. I, fig. 9). Wings clear; costal index about 2.0; 4th vein index about 2.1; 5X index about 1.2.

Body length 2.0-2.6 mm., wings about 2.5 mm. (in pinned specimen).

*Distribution and types.*—As far as known this species is limited to mountains in the desert regions of the west. Although we have captured nearly 50 specimens of this species, we have at present in our collection 22 pinned specimens, one mounted whole on a slide, and slide mounts of the external male genitalia of two individuals.

**Holotype**, ♂, No. 2164.7, from Slide Rock Campground, Oak Creek Canyon, Coconino National Forest, south of Flagstaff, Arizona, collected June, 1951 by the writer. *Paratypes* as follows: Arizona: 4, same data as holotype, Tonto Creek near Payson (11, one on slide), Long Valley, near Pine (2); New Mexico: Cherry Creek Camp, near Silver City (5). Slides

of ♂ genitalia from specimens from Oak Creek Canyon, and from Tonto Creek, Ariz.

*Relationship*.—Belongs to the subgenus *Amiota*, resembling *humeralis* in most superficial characters. However, the dark legs and male genitalia indicate that it is not closely related to any other species known to us.

*Amiota buccata*, sp. nov.

*External characters of imagines.*

♂, ♀. Arista long, with about 3–4 long dorsal, basal branches, their length about equal to width of 3rd antennal segment, the remainder of the main axis with rather numerous shorter hairs both above and below and laterally; arista blackish except for the main axis basal to the distal long branch, this area being pale and covered with rather thick pale hair. Antennae tan, 3rd joint darker, flattened, its length about twice its width. Front dark brownish black, dull except for the shining black ocellar triangle and orbits. Carina a rather low ridge, not nose-like. Face brownish above, broadly milky-white below to vibrissae. Clypeus and palpi black; proboscis brownish, paler basally. Posterior cheeks milky white or pale, this area extending well around to rear of head, usually leaving the middle of cheek below center of eye brown, the brown area about as long as length of 3rd antennal joint. Proclinate and posterior reclinate orbitals about equal in length, the anterior reclinate about  $\frac{1}{2}$  their length. Postverticals very small. Second (sometimes third) oral bristle most prominent, about twice length 1st and following ones. Cheeks rather broad, about  $\frac{1}{6}$  eye diameter.

Mesonotum, scutellum and pleurae shining black, overlaid with thin grayish pollinosity; upper surface of humeral callus and sub-alar area milky white. Acrostichal hairs in about 10 irregular rows; prescutellars strong, nearly as long as anterior dorsocentrals, the latter about half length posterior pair. Interval between dorsocentrals of each side about equal to distance between bases of two prescutellars. Anterior scutellars divergent, posterior pair cruciate. One strong humeral; 2 strong sternopleurals, the anterior only slightly shorter than posterior. Two small propleurals above base of fore coxae. Halteres white. Presutural bristle small and inconspicuous.

Prosternum dark brown. Legs uniformly pale yellowish; preapicals weak; no prominent bristles on hind femora. Abdomen uniformly shining black, or with yellowish areas on 1–2 basal tergites. Wings hyaline, without markings. Distal costal break without strong bristles. Third costal section with short, black bristles on its basal  $\frac{3}{4}$ . Discal and 2nd basal cells clearly separated. 3rd and 4th veins weakly convergent apically. Costal index about 2.3–2.4; 4th vein index about 2.0; 5X index 1.0–1.1.

Length body, ♂, 3.4 mm. or more, wings about 3.6 mm. (in pinned specimen). Body length, ♀, about 4.5 mm., wings 5.0 mm.

The external ♂ genitalia are quite similar to that of the specimen from Kingston Canyon, Nevada figured by Hsu (1949, Pl. I, fig. 7) except that the present specimens show only 7 large teeth on the clasper and the finger-like process on the lower portion of the clasper is smaller.

*Distribution and types.*—This species is known only from mountains in central and southern Arizona and New Mexico. **Holotype**, ♂, No. 2170.5, from Mill Canyon, Magdalena Mts., near Magdalena, New Mexico, taken by the writer in June, 1951. *Paratypes* as follows: New Mexico: 6, with the same data as the holotype, Cherry Creek Camp near Silver City (4); Arizona: Long Valley in Coconino National Forest (2), Mogollon Rim Road south of Flagstaff (4).

#### **Amiota species A.**

This is apparently an undescribed species but we have had too few specimens available to settle the point. In Dr. Sturtevant's collection there are specimens from N. Y., N. J., and Mass., and the writer has taken two individuals from the San Francisco River, south of Reserve, N. Mex., which cannot be separated from the eastern specimens. The general appearance is much like that of *humeralis* but is a larger fly (usually about 3 mm.), has the prosternal plates distinctly yellow, thus contrasting with the rather shiny black mesonotum, and finally has considerable yellow areas on the basal 2-3 tergites. The specimens from New Mexico were taken at traps.

#### **Amiota species B.**

This undescribed species is quite similar to *leucostoma* in being a rather large yellow fly. The external and internal ♂ genitalia are quite different, however. We have captured less than a dozen specimens of this form in the northern tip of Maine.

#### **Amiota species C.**

This is apparently an undescribed species, known to us from a single specimen collected from Lake Hall, near Tallahassee, Florida, in June, 1950 by Dr. T. C. Hsu. A brief description follows.

Mesonotum and scutellum jet black, shining, very thinly pollinose. Abdomen black with yellow on 2-3 basal tergites. Front quite narrow, the orbits converging toward antennae, the width at narrowest point slightly less than length of proclinate orbital bristle. Arista with long thin branches above and below. Palpi pale; cheeks pale, very narrow. Fore coxae, all legs and sternopleura pale yellow. 3rd vein noticeably diverging from 4th just beyond anterior crossvein, then converging again, the costal index about 1.5. Body length about 2.5 mm. in pinned specimen.

#### **Amiota barretti (Johnson), new comb.**

*Stegana barretti* Johnson, 1921. *Psyche*, 28:59.

Johnson described this species from a single female captured at Amecameca, state of Mexico, Mexico, a town near the base of Popocatepetl. From the description one can conclude that this fly was largely black, with the typical milky white areas, about 3.5 mm. in length. It cannot be placed in the key to species.

**CACOXENUS** Loew

1858. Wien. ent. Monatschr., 2:217.

Genotype: *C. indagator* Loew.

= *Paragitona* Kröber, 1912. Zeit. wissen. Insek., 8:235. (Type: *P. obscura* Kröber = *C. indagator* Lw.)  
? = *Gitonides* Knab, 1914. Insec. Inscit. Monstr., 2:165.

In August, 1951, the writer captured 24 specimens which appear to belong to this genus. The localities and number of specimens are as follows: Dungeness River, Olympic Nat. Forest, Wash. (4); Lake Wenatchee, Wash. (17); Tyee Springs near Carson, Wash. (2); Polally Forest Camp, Mt. Hood Nat. Forest, Ore. (1). All of these were taken by sweeping over muddy ground along streams or lakes, and all were males. I have been unable to decide whether these represent an undescribed species or not, and no specific name is being applied to them at present.

In working with the above specimens, it became apparent that the genus as understood by Duda, Hendel and Seguy is not at all the same as the group discussed by Melander (1913). The situation is also complicated by the fact that some authorities place the genus in the Milichidae (as does the Zoological Record at present), while others insist it belongs to the Drosophilidae. Hendel (1933) states that he first placed it in the latter family in 1917 and it is certain that the specimens available to the writer belong here, and are obviously related to the *Amiota-Phortica* assemblage. Also belonging to this group are: *indagator* Loew (Europe), *exiguus* Duda (Europe), *punctatus* Duda (Formosa; according to Hendel, *op. cit.*, = *Gitonides perspicax* Knab from the Pacific area), *inquillinus* Hendel (Europe), and *argyreator* Frey (Finland). The other species going under this generic name is *C. semiluteus* Loew from Cuba. Dr. Sturtevant, who has examined the type at Harvard, states (private communication) that this fly has the disc of the scutellum hairy and mesopleurae bristled, thus removing it from the family.

Several species of the genus are believed to be parasites. *C. indagator* has been reared from nests of several Hymenoptera, e.g., *Osmia* and *Chalicodoma*. Kröber (1912), however, believes that the larvae feed on the pollen which is carried into the cells by the bee. *Gitonides perspicax* Knab has been reared several times from larvae feeding upon mealybugs of the genus *Pseudococcus*.

**CHYMOMYZA** Czerny

1903. Zeithschr. Hym. Dipt. 3:199.

Genotype: *C. fuscimana* (Zetterstedt).

Most members of this genus are not readily attracted to banana-baited traps but are found around peeled areas on tree trunks, especially aspen, alder, fir and pine, in our experience. They do not seem to be attracted to slime flux exudations, however. We have had considerable success in raising these species in the laboratory where it has been observed that non-

yeasted food is preferable. All the species observed have the habit of constantly waving the wings. Courtship is usually very simple, the males often flying rapidly to the female and attempting copulation without any true courtship other than wing-waving. The males use the spiny fore femora to hold on to the wings of the female, and they have also been observed fighting among themselves, using the front legs like boxers.

Key to the Nearctic species of *Chymomyza*

1. All legs yellow; wings somewhat whitish at tip ..... 2  
Fore femora, tibiae and one or more tarsal joints dark, other legs paler; wings whitish at tip or not ..... 4
2. Wings with a pattern of 3 dark areas, one at apex of 1st vein, one across middle and posterior crossvein, and one below apex of 2nd vein; wing tip white ..... *amoena* (Loew) ..... 3  
Wings without the described pattern though the costal cell is dark and there may be a black spot near wing tip ..... 3
3. Wings with a distinct black spot just below and beyond apex of 2nd vein; oral margin black, strongly contrasting with the pale yellow face and antennae ..... ? *distincta* (Egger) ..... 3  
Wings without the described apical black spot, with only the costal cell darkened; oral margin discolored but not black and contrasting with the face ..... *Species A*
4. Wings clear, the costal cell not darkened; anal plates and ventral lamellae of ♂ noticeably enlarged, the former quite long-haired, the latter chitinized and strongly protruding posteriorly; converging proclinate orbitals situated only slightly nearer the anterior reclinate than the posterior reclinate or equidistant between them; fore metatarsus black, the apical 4 joints pale ..... *caudatula* Olden. ..... 5  
Costal cell darkened; male genitalia often prominent but not so remarkably elongated; proclinate orbitals usually much nearer anterior reclinate than posterior ones ..... 5
5. Basal one or two segments of fore tarsi black, the remaining apical joints contrastingly whitish or yellowish ..... 7  
Fore tarsal segments all dark or becoming gradually paler apically without a strong contrast between dark and light joints ..... 6
6. Fore coxae of ♂ heavily long-haired along inner surface; fore legs of ♂ usually dirty brown, becoming paler apically, those of ♀ generally much darker with only the apical joint pale; larger species, usually 3-3.5 mm. ..... *coaxata* n. sp. ..... 8  
Fore coxae of ♂ not long-haired; all segments of fore tarsi dark on both sexes; smaller species, 2-2.5 mm. ..... *aldrichi* Stvt. ..... 8
7. Only fore metatarsus black to brown, the 4 apicals pale ..... 8  
Two basal tarsal joints dark, the 3 apicals pale ..... 9
8. Wings whitish at tip; ♂ fore femora with stout row of spinous bristles along inner edge, becoming longer basally, the longest ones distinctly longer than the tibial diameter ..... *procnemis* (Will.) ..... 9  
Wing tip not whitish; ♂ fore femora with a row of short, rather thin spines along inner edge, none of them as long as tibial diameter ..... *procnemoides* n. sp.
9. Front shining black with iridescent pollinosity, paler near antennae; mesonotum and scutellum shining black with similar pollinosity; face pale yellow ..... *mexicana* Whlr. ..... 9  
Front tan, the orbits and ocellar triangle darker brown; mesonotum and scutellum dark blackish brown, subshining, with light pollinosity; face yellow above, brown along oral margin ..... *Species B*

✓ *Chymomyza amoena* (Loew)

*Drosophila amoena* Lw., 1862. Berl. ent. Zeit., 6:230 (Cent. II, No. 96).

The type material came from the District of Columbia. Sturtevant (1921) lists it from most of the eastern states. The distributional limits, according to our collections, are: Minn., Nebr., Utah, Ariz., Texas, and

several places in Mexico. Judd (1949) reports two specimens from Ontario, Canada.

*C. amoena* is attracted to traps quite commonly and can easily be reared on laboratory food. I know of no record reporting this species from peeled tree trunks but Sturtevant (*op. cit.*) states that it has been bred from walnut and butternut husks and from acorns.

✓ ***Chymomyza procnemis* (Williston).**

*Drosophila procnemis* Will., 1896. Tr. Ent. Soc., London, Pt. 3:412.

At least two species are being confused under this name. Williston's species has the tip of the wing whitish but the more common species of the United States lacks this character and differs in several other respects. It is therefore being described below as new.

The types of *procnemis* were from the West Indies and it seems to have mainly a subtropical distribution. The writer has examined material from Cuba, Mexico, Fla., Ala., south and west Texas, and specimens from Oahu, Hawaii sent to us by Mrs. Sarah B. Pipkin and by D. E. Hardy. One specimen labelled Algonquin, Ill., 6.1.94 (U. S. National Museum collection) seems also to be this species. It is fairly certain, however, that most northern records for *procnemis* are applicable to the following species. True *procnemis* comes to traps readily and can be easily reared in the laboratory.

✓ ***Chymomyza procnemoides*, sp. nov.**

External characters of imagines.

♂, ♀. Arista with about 3 dorsal and 2 ventral branches in addition to the terminal fork. Front largely pale yellowish tan, orbits and ocellar triangle more shining but not appreciably darker. Antennae yellow, 3rd joint no darker, 2nd joint with 1-2 strong bristles. Face pale tan, becoming grayish brown along oral margin and distinctly blackish around bases of first one or two oral bristles on males, on some females scarcely darker here. Clypeus, palpi and proboscis pale yellow. Cheeks pale yellow except on vibrissal area, very narrow at this point, broader behind, its width at narrowest point about 1/12 greatest eye diameter. All orals stout, the 2nd about  $\frac{3}{4}$  length 1st. Proclinate orbital about  $\frac{1}{4}$  length anterior reclinate, the latter about as long as posterior reclinate; proclinate somewhat convergent. Postverticals minute.

Mesonotum, scutellum and pleurae uniformly pale tan, the notopleural region sometimes a bit darker. Acrostichals in 8 irregular rows just before anterior dorsocentrals; no prescutellars. One strong humeral; a small propleural present just above fore coxae. Anterior sternopleural nearly  $\frac{2}{3}$  length posterior one. Halteres white. Fore femora, tibiae and metatarsi black, legs otherwise pale yellowish. Inner edge of ♂ fore femora with a row of 6-10 short, stout spines. Abdomen shining black, the genital area paler.

Wing with costal cell and costal vein dark, otherwise clear hyaline and lacking a whitish area at tip. Distal costal break with one stout bristle, the ventral one shorter and thinner; 3rd costal section with heavy spines along

its basal  $\frac{4}{5}$ . Costal index about 1.5-1.6; 4th vein index about 2.6; 5X index about 3.0.

Length body, ♂, 2.0 mm., wings, 2.0 mm. (in pinned specimen). Body length, ♀, 2.5 mm., wings, 2.2 mm.

*Distribution*.—This species is known certainly from Texas, N. Mex., Ariz., Minn., Mich., Ind., Ill., Va., and N. Y. In addition, it is likely that many northern records for *procnemis* are applicable to this species.

*Types*.—**Holotype**, ♂, No. 2152.6, from Whitewater Campground, Glenwood, N. Mex., 6.8.51, collected by the writer. *Paratypes*: New Mexico: 5, with same data as holotype, Silver City (2); Arizona: Ramsey Canyon, Huachuca Mts. (1), Cave Creek, Chiricahua Mts. (1), Patagonia (8), Madera Canyon, Coronado National Forest (1); Texas: Austin (1), Dallas (2: A. H. Sturtevant); New York, N. Y. (1: A. H. Sturtevant); Michigan: Battle Creek (1: J. M. Aldrich, USNM); Indiana: La Fayette (1: J. M. Aldrich, USNM); Illinois: Urbana (1: J. M. Aldrich, USNM); Virginia: Dead Run, Fairfax Co. (1: R. C. Shannon, USNM).

*Notes*.—In comparison with *procnemis*, the present species is usually a little smaller, lacks the whitish area at wing tip, has the lower part of the face of males distinctly darkened, sometimes present also on females, and the row of stout bristles along inner edge of fore femora of males shorter than the tibial diameter. The external male genitalia (anal plate, genital arch, clasper) of the two are practically the same (see fig. 7, Pl. II, Hsu, 1949), but the internal sclerotized processes of the two differ in several details.

This species comes to traps rather poorly, our largest collection being 13 specimens from a single locality. It is extremely difficult to raise in the laboratory; only once have we succeeded in getting an F<sub>1</sub> generation and these flies failed to breed further.

✓ ***Chymomyza aldrichi* Sturtevant.**

*C. aldrichi* Stvt., 1916. Ann. Ent. Soc. Am., 9:325.

= *C. tetonensis* Wheeler, 1949. Univ. Tex. Publ. 4920:163. New Syn.

The writer believed *tetonensis* to be distinct from *aldrichi* since the description of the latter implied that only the basal tarsal segment of the fore legs was dark. However, I have compared a paratype in Dr. Sturtevant's collection and Mr. Willis Wirth has kindly examined the holotype in the collection in the National Museum, and on both the entire fore tarsi are dark. Thus *tetonensis* must be considered a synonym.

*C. aldrichi* was described from Idaho. Collectors from this laboratory have taken it in the following states: Calif. (northern), Ore., Wash., Ida., Wyo., Utah, Colo., Ariz., and N. Mex. Although a number of these specimens were attracted to traps, most were captured from peeled areas on trees, mainly aspen, fir and pine. In addition, we have a stock of this species from Itasca Park, Minn., collected by Dr. H. T. Spieth, who found the larvae in bark of *Populus grandidentata* and *P. tremuloides*, and we have examined a specimen from Caratunk, Maine (A. H. Sturtevant, Aug.,



1950). This species can be raised on laboratory food but requires constant care.

It should be pointed out that the figure of the external male genitalia of *tetonensis* (Hsu, 1949, Pl. II, fig. 5) is referable to *aldrichi*, while the figure labelled as *aldrichi* was apparently a misidentification and we do not know to which species it belongs.

#### ✓ *Chymomyza caudatula* Oldenberg.

*C. caudatula* Old., 1914. Arch. f. Naturg., 80 A 2:14.

This European species has been previously reported from Washington. I have not seen European specimens but Melander and Sturtevant seem agreed that our form is the same. We have collected it in the following states: Calif. (northern), Ore., Wash., Wyo., Utah., and Ariz. It seems to have a boreal distribution also, for Steyskal (private communication) reports it from Michigan and I have examined a specimen from Maine in the USNM collection. The species can be raised in the laboratory, but like many other species, it has such a long larval and pupal life that mortality is rather high. It is attracted to banana traps in small numbers, most of our specimens being captured either on damaged trees or at windows.

*Internal characters.*—Spermathecae with small, dense black centers; parovaria only slightly smaller. Ventral receptacle a short blunt tube bent back on itself at about the middle, the basal half with a large lumen, the distal half with a very narrow lumen. Testes of aged male yellowish orange, roughly V-shaped with a narrow basal arm and a broader distal arm, much like that in *Drosophila victoria* (see Patterson, 1943, fig. 11). The paragonia are also similar to those of the latter species and in one specimen examined these structures contained large numbers of sperm. Ejaculatory sac with no apparent diverticula, the vas deferens from testis to ejaculatory sac unusually long and thick, especially basally, thicker than in any other species we have examined. On the basis of the internal characters and certain external features, this species seems to be unrelated to any other species known to us.

#### ✓ *Chymomyza mexicana* Wheeler.

*C. mexicana* Whlr., 1949. Univ. Tex. Publ. 4920:162.

This species is known only from the type from Puebla, Mexico. A specimen from Pacific Grove, Calif. (*Species B*, below) is quite similar.

#### ✓ *Chymomyza coxata*, sp. nov.

*External characters of imagines.*

♂, ♀. Arista with about 3 dorsal, 2 ventral branches in addition to the terminal fork; 2nd antennal joint with 2 strong bristles and numerous smaller ones. Front tan, orbits grayish pollinose, ocellar triangle blackish. Antennae tan, darker on outer sides; face tan, becoming more or less dirty gray below along oral margin; face not carinate. Cheeks yellowish white, their width 1/10 to 1/12 greatest diameter of eyes. Row of oral bristles

strong, the 2nd oral a little over half length 1st. Palpi pale yellow, without outstanding bristles; proboscis pale. Orbitals arranged as usual in the genus, the proclinales converging somewhat, the anterior reclines placed well in front of them; procline about  $\frac{5}{8}$  length anterior reclinate, this about  $\frac{3}{8}$  length posterior reclinate, the latter about midway between anterior reclinate and inner vertical; a small hair usually present between procline and posterior reclinate. Postverticals small.

Acrostichals in 8 rows just anterior to 1st dorsocentrals; no prescutellars. Anterior scutellars weakly divergent or straight. One strong humeral. A small hair just above base of fore coxa. Two strong sternopleurals, the anterior one about  $\frac{3}{4}$  length posterior. Mesonotum usually tannish brown with indistinct median blackish area, the entire disc covered with thin grayish pollinosity. In some individuals the blackish area is more extensive and may rarely cover most of the disc. Notopleural area usually darker than dorsum, meso- and sternopleurae pale tan. Basal joints of halteres discolored, the knob whitish. Abdominal tergites uniformly black, faintly shining under a light pollinosity.

Prosternum, fore coxae and trochanters and all of 2nd and 3rd legs uniformly pale yellow; fore femora, tibiae and metatarsi black, the next tarsal segment usually about as dark as the 1st, the remaining joints becoming increasingly paler towards tip, the apical one thus more or less yellowish. Fore coxae and femora of female as usual; fore coxae of male quite densely haired and bristled along their length on inner side; fore femora also heavily armed with hairs and bristles along inner surface, a row of about 10 especially stout spines fitting against tibia when legs are bent, the spines of this row about as long as tibial diameter.

Wings clear, the costal cell darkened. Third costal section with heavy bristles along its basal  $\frac{3}{5}$ . Distal costal break with one strong bristle, the ventral one distinctly shorter and thinner. Costal index 2.0-2.2; 4th vein index 2.3-2.5; 5X index 3.3-3.5.

Length body, male: 2.8 mm.; wings: 2.6 mm. (in pinned specimen).

Female, body: 3.2 mm.; wings: 2.8 mm.

#### Internal characters of imagines.

Spermathecae with dark sclerotized centers and thick stalks, their point of origin noticeably posterior to bases of spermathecae. Ventral receptacle rather short, with about two loops wound as in *Hirtodrosophila*, the basal portion about twice as thick as remaining 9/10. Attached by muscle and tracheae to the dorsal surface of the vagina is a large, roughly bi-lobed sac, faintly greenish-brown in color, apparently comparable to the similar structure reported by Wheeler (1947) in members of the *willistoni* group of *Drosophila*.

Testes irregularly coiled, with about 2 large, pale yellow inner coils and 2-3 thin, pale outer coils; paragonia large. Sperm pump brownish in color, without diverticula.

**Other characteristics, relationship and distribution.**

*Eggs and puparia.*—Eggs not greatly different from the usual *Chymomyza* type, greatly flattened at the micropylar end, with 6 strong but short filaments on each side, all bent strongly toward micropyle. Pattern of follicle cells distinct, resulting in numerous irregular longitudinal furrows on the surface. Puparia as usual, 3.5–4 mm. in length, the posterior spiracles strongly divergent and black at tip.

*Distribution and types.*—Known from 19 specimens collected in the higher mountains of Colorado and Wyoming, and their descendants raised in the laboratory. **Holotype**, ♂, No. 2057.2, from about 30 miles north of Durango, Colo., collected by the writer Aug., 1950. *Paratypes* as follows: Colorado: 9, with the same data as the holotype; Wyoming: Teton Pass, Targhee National Forest (2), Gros Ventre Road, east of Moose (8). One paratype ♂, from Colorado, is being placed in the National Museum collection.

*Notes.*—None of the wild specimens came to traps. The Colorado collection was made from aspen trees rather recently felled and partially peeled by beavers. The specimens from Gros Ventre Road, Wyo., were found on an aspen blown over by wind, while those from Teton Pass were taken from aspen which had been peeled by the writer in order to attract members of the genus. At all localities, *C. aldrichi* was taken at the same aspen trees.

It is possible to raise this species in the laboratory but it is difficult since the long larval life usually results in the culture medium becoming hard and moldy before the larvae are ready for pupation. A single generation in the laboratory takes a month or longer. This species is not obviously related to any other North American species.

**✓ *Chymomyza ? distincta* (Egger).**

*Drosophila distincta* Egger, 1862. Verh. zool. bot. Ges., 12.

Ten male specimens of what may be this European species were taken by the writer and Wm. Heed from partially peeled fir logs and chips at the Dungeness Fork Forest Camp, Olympic National Forest about 10 miles south of Sequim, Wash., Aug., 1951. Although these specimens trace to *distincta* in the available keys, a comparison with the original description or with determined European specimens has not been possible so the name must remain tentative.

A brief description of these flies is as follows: mesonotum, scutellum, front and upper face pale tannish, lower face with a broad black band above oral margin; cheeks pale; abdomen black except basally. All legs pale yellow, fore femora of ♂ with a dense series of stout bristles along inner edge, many of which are longer than the tibial diameter. Wings with costal cell blackish, tip whitish, and with a distinct black cloud in submarginal cell just below and beyond apex of 2nd vein. External male genitalia not especially large but noticeably long haired.

European writers imply that the apical wing cloud is sometimes absent in *distincta*; this might easily be true on teneral individuals or it might be a female characteristic. On all of the above males the cloud is quite distinct.

**Chymomyza species A.**

This unnamed species is known from two specimens collected at Timagami, Ontario, Canada (1. IX. 1932, A. W. A. Brown. USNM collection). It is a pale tan species with the abdomen somewhat darker. The costal cell is darkened and the wing tip whitish, the wings without other markings. All legs are uniformly pale yellowish tan.

**Chymomyza species B.**

This species is known at present from a single specimen from Pacific Grove, California (A. H. Sturtevant). It may be characterized briefly as follows: mesonotum and scutellum sub-shining blackish brown, front tan, the orbits and ocellar triangle shining, darker. Face yellowish centrally, brown along oral margin. Fore femora, tibiae and 2 basal tarsal joints blackish. Fore femora of male with a row of short, stout spines on inner edge, 15-18 in number, none as long as tibial diameter. Costal cell brown.

**v CINDERELLA Steyskal**

1949. Bull. Brooklyn Ent. Soc. 44:134-137.

Genotype: *C. lampra* Steyskal.

This, the only described species in the genus, is not known to belong to this family. It is represented by a single ♀ from Ada, Okla. (July) and, according to Steyskal (1949), keys to the Drosophilidae in all the more common family keys. As he points out, the shining black body surface is not Drosophiline and the outstanding character of this group, the presence of a proclinate orbital bristle, is lacking. It possesses, however, convergent postverticals, strong preapical tibial bristles, bare mesopleura, and the eight acrostichal rows and thoracic bristles are as usual in this family. His figure of the wings shows the costal index to be about 2.7.

**v CLADOCHAETA Coquillett**

1900. Proc. U. S. Nat. Mus., 22:263.

Genotype: *C. nebulosa* Coq.

This is the only member of the genus found in our area and is primarily a tropical species which reaches into Florida. Sturtevant (1921) lists it from Florida, Mexico (Vera Cruz), Porto Rico and Cuba. I have examined his specimens from the latter locality. Currán (1928) reports it from St. Croix Island, of the Virgin Islands. The types were collected in Porto Rico.

**v CLASTOPTEROMYIA Malloch**

1924. Proc. Biol. Soc. Wash., 37:31.

Genotype: *C. inversa* (Walker).

This genus has recently been reviewed in detail by Frota-Pessoa (1947) who places *Diathoneura* as a synonym. I have discussed briefly the difficulties of this treatment under that genus.

Key to the Nearctic species of *Clastoptomyia*

1. Mesonotum with an indistinct darker central stripe and traces of similar faint stripes between the former and the lateral margins; 4th vein index about 1.5; 5X index but little more than 1.0 ..... *floridana* Malloch  
Mesonotum uniformly tannish, without any indication of darker longitudinal stripes; 4th vein index about 2.0; 5X index 1.5 or higher ..... *inversa* (Walker)

✓ ***Clastoptomyia floridana* Malloch.**

*C. floridana* Mall., 1924. Proc. U.S. Nat. Mus., 66:10.

✓ This species is known only from the types from Florida.

✓ ***Clastoptomyia inversa* (Walker).**

*Drosophila inversa* Walk., 1861. Tr. Ent. Soc. London, 5:331.

This species has a rather extensive distribution: in the New England area of the east, south to New Jersey, Maryland and Virginia, across the northern states where it is known from Indiana, Illinois and Minnesota, and reappears in the west where it is rather common in southern California. I have seen specimens in the collection of Dr. A. L. Melander from Bellingham, Wash., and Steyskal (private communication) reports that he has specimens from Mich. and British Columbia.

The species is remarkable in that the larvae live as ectoparasites on nymphal spittle insects of the genus *Clastoptera* (Cercopidae). Some doubt has been expressed by Malloch and others concerning this habit, inferring that the fly larvae probably utilize the froth material for food rather than the nymphs themselves. The observations of the writer and Dr. Sturtevant have convinced us that the larvae feed directly on the *Clastoptera* nymphs; in examining spittle masses for larvae they were invariably found lying on the abdominal dorsum of the nymph with the mouthparts inserted between two adjacent tergites, usually the 3rd from the rear. The posterior spiracles are surrounded by a large bubble. We were never able to rear larvae to adults when the nymphs were removed from the spittle mass, and eggs and larvae placed on standard *Drosophila* food failed to develop.

The eggs, about 0.85 mm. long, are evenly rounded, elongate, and show no visible follicle cell markings. There are no terminal filaments but at one end is a tiny knob, presumably the micropyle. According to Sturtevant (unpublished notes) and my own observations, the older larvae have the black ventral hooklets aggregated into small areas that lie on the surface of rounded button-like projections, one such area on each side of the six anterior abdominal segments. In crawling, these buttons are used as feet, each pair in turn being projected on the end of a "leg," giving a general impression much like that of the use of pseudopods by caterpillars. There are about 20 hooklets to each button.

The host cercopid for *inversa* in the eastern United States seems always to be *Clastoptera obtusa* which is usually found on the alder (*Alnus* sp.). In California, *Clastoptera lineaticollis* serves as host and is found on a variety of plants, including species of *Baccharis*, *Artemisia*, *Senecio*, *Alnus*, etc. A summary of the known host plants is given by Doering (1942). A

similar habitus has been described for *C. paradoxa* Lamb, the nymphal cercopids living on casuarine trees in Trinidad.

♂ **DETTOPSOMYIA** Lamb

1914. Tr. Linn. Soc. London, 2 ser., 16:349.

Genotype: *D. formosa* Lamb.

This genus shares with *Mycodrosophila* the exceptionally deep cleft at the apex of the subcostal vein, but differs noticeably in the complex pattern of the mesonotum and smaller size. The only species in our region is probably an introduction.

✓ **Dettopsomyia nigrovittata** (Malloch).

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

Described from Australia by Malloch, this small dark species with an intricate mesonotal pattern was reported by Wheeler (1951) from California. A colony was apparently established in a rotting area on a large stem of a banana tree at Monrovia, Calif., and it seems likely that it is a rather recent introduction. The species can be raised on standard *Drosophila* food but requires constant attention.

*Internal characters.*—Spermathecae large with large sclerotized centers, narrower at base, broadly swollen just before apex, their central channels large; parovaria much smaller, with hollow centers. Ventral receptacle quite long and tightly coiled. Testes light brownish-orange with 7 colored loose outer coils and a long slender inner tube which is only slightly coiled; parogonia large. Ejaculatory sac with two short, blunt, thick diverticula. Anterior Malpighian tubes free, their common stalk about  $\frac{1}{3}$  their total length, the posterior pair apposed at the tips but without a continuous lumen, their common stalk a little less than half their total length. Both pairs are shorter than in typical *Drosophila*.

The eggs are quite small with 4 short filaments. The puparia are pale yellowish-tan, each anterior spiracle with about 9 branches, most of them as long as the spiracular stalk, the latter plus its branches nearly  $\frac{1}{4}$  length of puparium. Posterior spiracles weakly divergent apically. Length 2 mm.

**DIATHONEURA** Duda

1924. Arch. Naturg. 90 A 3:180.

Genotype: *D. taeniatipennis* Duda.

Fruta-Pessoa (1947) placed this group as synonymous with *Clastopterymyia* Malloch after comparing a series of species and additional published descriptions. As indicated in his summary of this joint group, there is considerable variation among the various species and it may yet be discovered that two or more genera are being included in it. In this connection it seems of interest that Malloch (1934a), in discussing *Diathoneura*, states that he is "convinced from an examination of Duda's papers

that he placed in *Diathoneura* a number of species that belong . . ." to the genus *Calopterella* Coq. (= *Diastata* auct.; see remarks in introduction). Of the species which I have seen, referable to this portion of the family, typical *Clastopteromyia* possess a rather well-developed pair of postvertical bristles, while the supposed species of *Diathoneura* have these bristles greatly reduced in size, nearly absent; whether this separation will always hold I do not know. For the present, it seems best to include the genus in the key by the use of this character to enable its users to identify material which will not run to the genus *Clastopteromyia*.

We have seen a specimen of an undescribed species from Coatepec, Vera Cruz, Mexico (D. L. Lindsley; Sturtevant collection) which keys here. It is likely that other species will be found since many are described from Costa Rica and other neotropical regions.

### ✓ GITONA Meigen

1830. Syst. Besch., 6:129, 215.

Genotype: *G. distigma* Meigen.

The type species has been reared from flowers of *Sonchus oleraceus* and is believed to be aphidophagous. According to Seguy (1934), two African species have equally interesting food habits, *G. lesnei* developing within injured capsules of cotton plants, and *G. paolii* apparently living on the mealybug *Pseudococcus sacchari*. None of the three American species has been found to be carnivorous, although one of them, *bivisualis*, has not been reared and hence might have such habits. Both *G. americana* and *sonota* live in species of cacti. Both *americana* and *bivisualis* have been raised on laboratory food for one generation but they seem loathe to mate and deposit eggs under these conditions.

#### Key to the Nearctic species of *Gitona*

1. Arista rather long pubescent or short plumose, the hairs several times longer than the diameter of the main axis; legs with darker bands apically on femora and basally on tibiae; pleurae with rather distinct longitudinal stripe; ♂ genitalia with a tooth-bearing clasper; eyes, in life, iridescent yellowish green below, purplish yellow above . . . . . *bivisualis* Pat.
- Arista quite short pubescent, the hairs scarcely longer than diameter of main axis; legs pale, without bands; pleurae lacking longitudinal stripe; ♂ genitalia without clasper, but with a single tooth on lower margin of genital arch; eyes, in life, yellowish green throughout . . . . . 2
2. Second complete tergite with dark apical band interrupted in middle and laterally, leaving the dark marginal band unconnected with the median one; 4th vein index about 3.9; width of 3rd antennal segment about 2/3 its length . . . . . *americana* Pat.
- Second complete tergite with dark apical band interrupted only in mid-line, the marginal area broadly connected with the median portion; 4th vein index about 3.0; 3rd antennal segment broad and flat, its width about 1/2 its length . . . . . *sonota* Whlr.

### ✓ *Gitona americana* Patterson.

*G. americana* Pat., 1943. Univ. Tex. Publ. 4313:33.

This is a widely ranging species, known from Florida, Oklahoma, Texas, New Mexico, Arizona, California and Mexico. In central Texas it breeds

in the ripe fruits and rotting stem sections of *Opuntia lindheimeri*, and uses related species of the "*platyopuntia*" group in other areas. The eggs are similar in structure to those of *Sinophthalmus pictus* (Fig. 1). The species comes to banana-baited traps in moderate numbers.

✓ ***Gitona bivisualis* Patterson.**

*G. bivisualis* Pat., 1943. Univ. Tex. Publ. 4313:35.

This species has been taken at traps in several localities in central Texas; all other known records are as follows: Arizona: Parker (2), Patagonia (12); California: Borrego State Park (1), Kernville (3); Sonora, Mexico (1); Soledad, Cienfuegos, Cuba (1; collected by J. I. Townsend). The larval habits of this form are not known. The eggs are similar to those of *americana*.

✓ ***Gitona sonoita* Wheeler.**

*G. sonoita* Whlr., 1949. Univ. Tex. Publ. 4920:158.

The two types came from near Patagonia, Ariz., where they were attracted to traps. The other known records are: Mangus Canyon near Silver City, N. Mex. (1, at trap); Austin, Texas (8), reared from a rotting specimen of the cactus, *Echinocereus caespitosus*. This cactus is a fairly common plant of the limestone hilltops of the Edward's Plateau in central Texas. On the higher deserts of west Texas, New Mexico and Arizona the Rainbow Cactus, *Echinocereus rigidissimus*, is rather common and may be the host plant in these areas.

✓ **LEUCOPHENGA Mik**

1886. Wiener Entomolog. Ztg. :317.

Genotype: *L. maculata* (Dufour).

This is apparently the second largest genus in the family with more than 100 described species over the world. The tropical areas, *e.g.*, central Africa, Central and South America and the islands of the Pacific are especially rich in species while temperate regions have relatively few species. Until now, only two species have been reported from the U.S., *varia* and *maculosa*, but recent collections by members of the Texas laboratory in the mountains of the west have turned up four other species, one of them described previously from Mexico. These four differ from the usual species in having rather well developed postvertical bristles and the costa apparently reaching the apex of the 4th vein, though weak beyond the 3rd. Of the various segregates which have been suggested for the family (cf. Sturtevant, 1921, p. 59), these aberrant species would most likely trace to *Neoleucophenga* Oldenberg, and one of our new species (*trisphenata*) is quite similar to *N. quinquemaculata* (Strobl), the type of that group.

As far as is known, all members of the genus are fungus breeders, and the majority of the species have been collected from fungi. In our own collections, placing putrid fungi in bait cans has increased the number of specimens considerably, but in times of severe drought, when it may be



assumed that the usual feeding sources are absent or nearly so, these flies will come to banana-baited traps fairly readily. None of the species seems easily reared in laboratory vials, however, and they usually become stuck in the food within a few minutes.

*Key to the Nearctic species of Leucophenga*

1. Postvertical bristles minute, much smaller than orbitals ..... 2  
Postverticals well developed, nearly as large as proclinate orbital ..... 5
2. Wings clear, without clouds; palpi black; abdomen yellow with a central and two lateral blackish longitudinal stripes ..... *paludicola* Pat. and Main.  
Wings with dark clouds along some longitudinal veins or on crossveins or both ..... 3
3. Wings clouded at apex of 2nd vein and over both crossveins ..... *maculosa* (Coq.)  
Wings clouded at apex of 2nd vein but without clouds on crossveins ..... 4
4. Abdomen largely yellow with a pattern of dark bands; palpi pale yellow ..... *varia* (Walker)  
Abdomen largely black, the basal tergites with narrow yellow areas basally; palpi black ..... *bimaculata* (Loew)
5. Mesonotum with four dark longitudinal stripes, sometimes poorly defined, fading behind; scutellum blackish on basal  $\frac{2}{3}$ , the apex yellowish; marginal cell with 3 clouds: one at costal break, one near middle of marginal cell and one over apex of 2nd vein ..... *pulexerrima* Pat. and Main.  
Mesonotum tan, without markings, or with spots at bases of hairs and bristles, these sometimes fused into an irregular median stripe; scutellum pale basally; marginal cell with 1-2 clouds ..... 6
6. Arista with dorsal branches only, none below main axis; hairs and bristles arising from punctate spots but lacking a pattern; meso- and pteropleurae largely discolored ..... *gutata* n. sp.  
Arista with several ventral branches; mesonotum uniformly pale tan or the bristles arising from spots which are largely fused in midline to form an irregular stripe; pleurae pale or with at most a narrow stripe ..... 7
7. Mesonotum with median longitudinal stripe, irregular in outline; mid-frontal area with dark brown areas separated by a pale line; pleurae often with a faint darker stripe; "knees" darkened; abdominal pattern distinct ..... *trisphenata* n. sp.  
Mesonotum uniformly pale tan; front uniformly tannish to brownish; pleurae pale; "knees" pale; abdominal pattern scarcely evident ..... *montana* n. sp.

***Leucophenga maculosa* (Coquillett).**

*Drosophila maculosa* Coq., 1895. Proc. Acad. Nat. Sci. Phila. :317.

This species is easily recognized by the large, flat, broad palpi, and the distinct black clouds over crossveins, just before tip of 2nd vein, and at apex of 1st vein extending posteriorly to 4th vein. It is widely distributed over the eastern half of the U.S., and is fairly common within the area bounded by New York and Minnesota on the north, Nebraska and Kansas to Texas on the west. It is more common in the southeastern states. Other published records are as follows: Lake Tahoe, Nevada (Patterson, 1943); Cuba, Haiti, Peru (Sturtevant, 1921); Argentina (Malloch, 1934a); Karabab, British Guiana (Curran, 1934). The types were from Florida.

***Leucophenga varia* (Walker).**

*Drosophila varia* Walk., 1849. List Dipt. Ins. :4.

This is primarily a species of the southeastern states, the types being from Georgia. We have seen specimens from as far north as Massa-

chusetts, as far west as Nebraska and Texas, and as far south as Neuvo Leon, Mexico. Our collections indicate that it is a much commoner species than is *maculosa*.

The internal structure of this species has not been described in detail. Dissections reveal the following:

Testes of aged male dark lemon yellow with about 3 outer coils and 2-3 inner, irregularly twisted coils. Ejaculatory sac simple, without diverticula. Vas deferens, leading to sperm pump, much broader and stouter than in *Drosophila*. Spermathecae elongate, longer than wide, with long, narrow, irregularly annulate sclerotized centers; their stalks are thick with a short S-shaped bend at the point of attachment with the chitinized central tube. Parovaria elongate oval, rather thin-walled and with a large central cavity, their size equal to or slightly surpassing that of spermathecae. Ventral receptacle a highly coiled series of loops closely appressed to vagina near base of oviduct.

✓ ***Leucophenga paludicola* Patterson and Mainland.**

*L. paludicola* Pat. and Mainl., 1944. Univ. Tex. Publ. 4445:514.

This species was described from 20 specimens from Patzcuaro, Mich., Mexico. We know of no additional records. *L. ornativentris* Kahl from Bolivia is also said to possess unmarked wings and a yellowish abdomen with three longitudinal black bands, but has yellow palpi and is much smaller, being only slightly over 2.0 mm. in length.

✓ ***Leucophenga bimaculata* (Loew).**

*Drosophila bimaculata* Lw., 1865. Berl. ent. Zeit., 9.

This species was described from Cuba, and is included here since we have taken a single specimen in Oaxaca, Mexico.

✓ ***Leucophenga pulcherrima* Patterson and Mainland.**

*L. pulcherrima* Pat. and Main., 1944. Univ. Tex. Publ. 4445:14.

This species was described from four specimens from Jacala, Hidalgo, Mexico. We have since taken it at four localities in western United States as follows: New Mexico: Cherry Creek Campground near Silver City (5), Whitewater Campground near Glenwood (7); Arizona: Cave Creek in the Chiricahua Mts. (1), Mogollon Rim Road south of Flagstaff (2). These were collected in June, July and August. The above specimens agree with the description and the type except that the male is described as having the palpi and 3rd antennal joints black (the female is not described for these characters) while in the present series these structures are pale in both sexes. However, the description points out that considerable color variation existed in the Mexican series, with a light phase, a dark phase (described), and intermediates. There may well be two species concerned here.

*Leucophenga trisphenata*, sp. nov.

## External characters of imagines.

♂, ♀. Front pale yellowish tan, ocellar triangle and mid-frontal area burnt blackish, on most specimens with a fainter yellowish line running anteriorly along midline from ocelli. Antennae pale tan, 3rd joint slightly darker apically. Face yellowish, flat, not at all carinate. Cheeks, clypeus, proboscis and palpi pale yellow, the latter with 5-6 strong ventral bristles, none apical. One strong vibrissa. Cheeks narrow, scarcely 1/10 greatest eye diameter.

Arista with about 5 dorsal and 2-3 ventral branches in addition to the terminal fork. Anterior reclinate orbital about as long as proclinate, about  $\frac{3}{4}$  length posterior reclinate, the latter closer to inner vertical than to proclinate. Postverticals convergent, rather well-developed, at least  $\frac{2}{3}$  length proclinate orbitals.

Mesonotum basically yellowish-brown, heavily pollinose, each hair and bristle arising from a darker brown spot, these partly fused to form an irregular longitudinal stripe in midline, darkest anteriorly, often roughly bifurcate posteriorly; on darkest specimens this central stripe gives the appearance of three consecutive wedge-shaped marks for which the species has been named. A less distinct stripe visible on each side, darkest above humeri. Scutellum yellowish-brown, densely pollinose, slightly darker centrally; anterior scutellars divergent. Prescutellars well-developed, as large as anterior dorsocentrals, the latter close to posterior pair. Acrostichals in about 10 very irregular rows. The presutural, single large humeral, 2 notopleurals and 2 sternopleurals strong. Humeri pale yellow, without spots. Pleurae pale tan, an indistinct darker brown stripe just below notopleural suture and a stronger one across middle of mesopleura and pteropleura. Two small propleural hairs. Anterior sternopleural  $\frac{5}{6}$  length posterior one. Halteres pale. Legs, including all coxae and prosternum, pale yellow except for small black "knees" apically on mid- and hind-femora and basally on these tibiae.

Abdomen yellow, each tergite except the first with a broad apical dark brown band; on segments 3, 4 and 5 a similar band extends in the midline to the base of the previous segment and the transverse bands expand broadly at the angle of the tergites forming solid lateral areas.

Wings with diffuse brown clouds over apices of 1st, 2nd, and 3rd veins as well as over both crossveins; the marginal cell is faintly clouded just beyond the distal costal break, becomes gradually darker distally, culminating in the broad, dense cloud at apex of 2nd vein. Distal costal break with two terminal bristles, the dorsal one longer; 3rd costal section with heavy bristles on all but its distal  $\frac{1}{6}$ ; the "thorns" on underside of this section much smaller than is usual in the genus. 3rd and 4th veins parallel at end. Costa weak beyond 3rd vein but visible to 4th. Discal and 2nd basal cells separated by a weak crossvein. Costal index about 2.7; 4th vein index about 0.8. Length body, 4 to 5 mm. (in pinned specimen); wings, about 5 mm.

*Distribution and types.*—This species is known at present by 33 individuals collected by the writer from 7 localities in New Mexico and Arizona. All are being considered types. **Holotype**, ♂, No. 2161.8, from Horse Thief Basin Recreation Area, Prescott National Forest, about 25 miles, airline, south of Prescott, Ariz., collected June 18, 1951 by the writer. *Paratypes* as follows: Arizona: Horse Thief Basin (5), Tonto Creek, Payson (5), Mogollon Rim Road (11), Rustler Park, Chiricahua Mts. (3), Mt. Graham, Safford (1); New Mexico. Whitewater Campground, Glenwood (6), Cherry Creek Campground, Silver City (1). One paratype, from Horse Thief Basin, Ariz., is being deposited in the U. S. National Museum.

✓ ***Leucophenga guttata*, sp. nov.**

*External characters of imagines.*

♂, ♀. Arista with 5 or 6 branches above and none below, the main axis not clearly bifurcate at tip; antennae pale tan, 3rd joint no darker. Front tan, dully pollinose, the orbits paler pollinose. Face, cheeks, palpi and proboscis yellowish tan, the face flat. One pair of strong vibrissae followed by a sparse row of small hairs. Cheeks very narrow, scarcely  $1/10$  greatest eye diameter. The two anterior orbitals about  $3/4$  length posterior reclinate. Ocellars, verticals and postverticals strong.

Disc of mesonotum tan, heavily pale pollinose, each hair and bristle arising from a tiny brown spot, these not pollinose; scutellum entirely tan, pollinose. Acrostichals in about 10 very irregular rows; prescutellars about as long as anterior dorsocentrals. Anterior scutellars divergent. Pleurae mostly tan, weakly darker across meso- and pteropleurae, these also densely pollinose. One strong humeral; two strong sternopleurals of about equal length. Legs uniformly pale tan.

Abdomen mostly pale tan with dense gray pollinosity, with faint darker markings mainly in the form of a slender longitudinal stripe in midline and dark lateral margins. On darker specimens the apical 3-4 tergites show darker apical bands, their width about equal to that of the median stripe.

Wings marked with dark clouds in costal cell and over apex of 1st vein, over apical  $3/4$  of marginal cell and spreading across 2nd vein into submarginal cell, around apex of 3rd vein, and over both crossveins; wing blade dusky. Costa visible between 3rd vein and 4th vein. Costal index about 2.5; 4th vein index about 1.6; 5X index about 1.0.

*Distribution and types.*—This species is known at present from eight individuals collected by the writer in mountains in Arizona. **Holotype**, ♂, No. 2155.18, from Rustler Park, Chiricahua Mts., Arizona, captured June 12, 1951. *Paratypes* as follows: 3, with the same data as the holotype; 4, from Kehl Springs Campground, Mogollon Rim Road near Payson, Ariz.

✓ ***Leucophenga montana*, sp. nov.**

*External characters of imagines.*

♂, ♀. Arista with about 6 branches above and 3-4 below, basal to the small terminal fork. Front pollinose tan, the orbits paler pollinose. An-

tennae, face and cheeks tan, palpi and proboscis yellowish; face flat. Cheeks very narrow, scarcely  $1/10$  greatest eye diameter. Vibrissae strong, 2nd oral usually about  $1/3$  but variable in the present series. Anterior reclinate orbital about  $3/4$  length proclinate,  $2/3$  length posterior reclinate, its base twice as far from the latter as from the proclinate; ocellars and verticals strong, postverticals well developed, nearly as long as middle orbital; usually with a small hair between the two reclimates of each side.

Acrostichals in about 12 very irregular rows; prescutellars strong, equal to or longer than anterior dorsocentrals. Anterior scutellars divergent. Disc of mesonotum and scutellum yellowish tan, the hairs and bristles black. Pleurae tannish yellow, as are all legs. One humeral, one presutural, two notopleurals, two sternopleurals, these nearly equal in length. Halteres pale yellow.

Abdomen tan with darker discoloration, variable in intensity and not forming any pattern, the only consistent marking being black areas on the lateral angles of the 1st complete tergite.

Wings of darkest individuals with clouds over apex of 1st vein and in costal cell, extended posteriorly, in apical  $2/3$  of marginal cell and continued well into submarginal cell, at apex of 3rd vein and over both cross-veins. On paler specimens (perhaps tenerals) the cloud of the marginal cell is limited to the apex of the 2nd vein. Costa visible between apices of 3rd and 4th veins. Costal index 2.5-2.8; 4th vein index about 1.4; 5X index 0.7-0.9.

*Distribution and types.*—This is apparently a species of Northwest. Our specimens have come from California and Oregon. **Holotype**, ♂, No. 2194.6, from Shevlin City Park, Bend, Oregon, collected by the writer in August, 1951. *Paratypes* as follows: Oregon: 13, with the same data as the holotype; California: Aspen Valley, near the edge of Yosemite National Park, July, 1951 (5). Two individuals from Lake Tahoe, Calif., June, 1948, were probably also of this species but were misidentified as *Rhinoleucophenga*. They are discussed under that genus.

#### ✓ MICRODROSOPHILA Malloch

1921. Ent. News, 32:312.

Genotype: *Drosophila quadrata* Sturtevant.

As indicated by Sturtevant (1942), *Incisurifrons* Duda is a synonym of this genus. It is a small genus, only three species being known certainly to belong here. The diverging posterior scutellar bristles are quite distinct on the genotype but the character is not known for the other species.

It should be pointed out that *Hopkinsomyia* Malloch (1934b) is very likely the same as this genus, and its genotype, *H. convergens* Malloch, from Samoa, is, from the description, not strikingly different from *quadrata*, discussed below.

**Microdrosophila quadrata** (Sturtevant).

*Drosophila quadrata* Sturtevant, 1916. Ann. Ent. Soc. Amer., 9:341.

The types came from Alabama, and the species is known from Ga., Fla., Miss., Ill., Ind., and Texas. The species comes to banana-baited traps rather rarely and hence is uncommon in collections.

The writer captured 8 individuals by sweeping at the Aldrich Farm, Austin, Texas in Oct. and Nov., 1950. These were kept alive for some time in the laboratory. Females laid a large number of eggs, mostly deposited on the glass sides of the vial rather than on the food surface, but the larvae all died shortly after hatching. The eggs possess two terminal filaments, quite thin and about  $\frac{2}{3}$  the length of the egg itself, but these filaments, unlike those of any other species reported, fuse a short distance beyond the egg tip and appear as a single filament beyond this point. No amount of pressure on a cover-glass preparation could separate the filaments although, under high power, the two tips were visible separately, one distinctly shorter than the other. The follicle cell markings were exceptionally pronounced.

A dissection of a female revealed the following: spermathecae with simple tubular non-sclerotized centers, the parovaria quite similar in appearance but a bit smaller. Ventral receptacle tightly wound back and forth as in *Hirtodrosophila*, with about 6-7 transverse loops. Sperm were visible in the latter but not in the spermathecae.

**MYCODROSOPHILA** Oldenberg

1914. Arch. Naturg., 80 A 2:4.

Genotype: *M. poecilogastra* (Loew).

= *Paramycodrosophila* Duda, 1925. Ann. Mus. Nat. Hung., 22:225. New Syn.

Duda (1925) described two species from Costa Rica under the generic name *Paramycodrosophila*: *P. costaricana* (p. 225) and *poeciloptera* (p. 226). Nowhere was this stated to be a new genus but he later (1927) indicated that he had erected such a genus so that the above citation must serve as generic reference. In 1927 he stated that this genus differed from *Mycodrosophila* in possessing two pairs of dorsocentrals (rather than one) and a dull mesonotum with some degree of longitudinal stripes (rather than a uniformly shining black surface). However, examples are available which illustrate every type of intermediate condition between them so that it seems best to include all of the species concerned in *Mycodrosophila*.\*

Members of the genus *Mycodrosophila* are fungus forms so far as known and are frequently taken on shelf fungi of the *Polyporus* type. *M. dimidiata*, the common species in the United States, can be raised on laboratory food without great difficulty.

\**Paramycodrosophila poeciloptera* Duda (1925, p. 226) from Costa Rica is, from the description, clearly not a member of this genus. His account, including a figure of the wing, agrees in all essential details with the description of *Drosophila schilkei* Malloch (1924a, p. 10), also from Costa Rica, a species related to *D. colloptera* Schiner.

The following key includes all of the species known from North America including the islands of the Caribbean since species from the latter area will very likely also be found in Mexico.

Key to the North American species of *Mycodrosophila*

1. Both crossveins heavily clouded; all femora, mid- and hind-tibiae dark brown; acrostichal hairs in 8 irregular rows; size up to 4 mm. .... [ *Paramycodrosophila punctipennis* Duda. Costa Rica. Genus very doubtful].
- Crossveins not clouded; legs pale yellow or with at most faint rings on femora; acrostichal hairs in 6 rows; size below 3 mm. .... 2
2. Mesonotum light brown or yellowish brown with two darker stripes between or on dorsocentral rows .... 3
- Mesonotum unicolorous, more or less shining black to brown, without noticeably darker longitudinal stripes .... 4
3. Mesonotum light brown with 2 darker stripes just within dorsocentral rows; lower pleurae and all legs pale yellow; abdomen shining brown with some yellowish areas visible basally near angle of tergites .... *mexicana* (Whlr.)
- Mesonotum light yellow with 2 brown converging stripes; brownish stripes just above humeri, along notopleural suture and across sternopleura; legs pale yellow, femora sometimes with darker median bands; abdominal tergites with complex pattern of yellowish areas .... [ *Paramycodrosophila costaricana* Duda. Costa Rica].
4. Wings with blackish color at costal break continued below as a broad band reaching anal cell; small dark clouds around apices of 2nd and 3rd veins, less distinct cloud on 4th vein .... [ *M. projectans* (Stvt.) West Indies, Haiti].
- Wings lacking the described band, with at most a small diffuse darkening near base of marginal cell .... 5
5. Anterior dorsocentrals undeveloped; scutellum with thick, velvety black pile .... *dimidiata* (Loew).
- Anterior dorsocentrals more or less developed, distinctly larger than the surrounding acrostichal hairs; scutellum shining or only faintly pollinose .... 6
6. Abdominal tergites mostly black, yellow areas present only on 5th and 6th segments, but variable; wings nearly clear; mesonotum light brown, scutellum darker, front lighter .... [ *M. pleuralis* (Williston). West Indies].
- Some yellow areas on all abdominal tergites except apical one; wings with a faint diffuse brown area in marginal cell just below distal costal break; mesonotum, scutellum and front dark chestnut brown .... [ *M. thoracis* (Williston). West Indies].

***Mycodrosophila dimidiata* (Loew).**

*Drosophila dimidiata* Lw., 1862. Berlin. ent. Zeit., 6:230 (Cent. II. No. 95).

This is a widely distributed species over most of the United States, our most western records being from Colorado. It has been recorded from most of the states east of the Rocky Mountains. It is attracted to banana-baited traps to only a small degree but can be reared on standard laboratory food rather easily.

***Mycodrosophila mexicana* (Wheeler).**

*Paramycodrosophila mexicana* Whlr., 1949. Univ. Tex. Publ. 4920:164.

This species is known only from the flies originally collected by Dr. G. B. Mainland from a bracket fungus on a willow tree near Jacona, Michoacan, Mexico in August, 1942.

## NEOTANYGASTRELLA Duda

1925. Ann. hist.-nat. Mus. hung., 22:201, 203.

Genotype: *N. tricoloripes* Duda.

This genus was recently reviewed by Frota-Pessoa and Wheeler (1951). One species is known from Mexico but two species from Costa Rica, not definitely assigned to this genus, may belong here (*Drosophila bicoloripes* Malloch, *D. nigricosta* Malloch).

## Neotanygastrella leucopoda (Wheeler).

*Chymomyza leucopoda* Wheeler, 1949. U. Tex. Publ. 4920:161.

The only specimen of this species was taken by the writer near Morelia, Michoacan, Mexico in August, 1947. A related species, *N. brasiliensis* (Frota-Pessoa) has been reared from larvae found in decaying fruit of *Artocarpus integrifolia* (Moraceae) in Brazil.

## PSEUDIASTATA Coquillett

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

Genotype: *P. nebulosa* Coq.

This genus has recently been reviewed by Sabrosky (1951) who summarizes the generic characters and gives figures of the male genitalia for several species. He points out that the anterior frontal bristles are convergent, suggestive of the Milichiidae, and the genus may run to that family in some keys.

Although information concerning the larval habits of the type species is lacking, larvae of other species are predacious on the pineapple mealybug, *Pseudococcus brevipes*. According to Quayle (1938) this mealybug occurs primarily on pineapples and bananas in the tropical regions of both hemispheres, and also on sugar cane in both Florida and Louisiana.

Sabrosky states that the adults of the various species are virtually indistinguishable on superficial characters, the striking wing pattern being too variable for diagnosis. The following key to the two species known to occur in North America is taken from his account of the visible male genitalia.

## Key to the Nearctic species of Pseudiasata

1. Males with 9th tergite strongly produced ventrad on each side as a genital forceps, each lobe obviously longer than broad and not tapering, the sides approximately parallel up to the somewhat rounded apex; in anterior aspect, flanking the midline, are two thumb-like processes, each of which bears three distinct bristles ..... *nebulosa* Coq.
- Males with the 9th tergite strongly produced below on each side, the genital forceps so formed being approximately as broad as long, not tapering, and distinctly subtruncate; in anterior aspect, the two processes flanking the midline are relatively short and acute, without bristles ..... *pseudococcivora* Sabr.



*Pseudiasata nebulosa* Coquillett.

*P. nebulosa*, Coq., 1908. Proc. Ent. Soc. Wash., 9:148.

The type was taken at a light on Plummer's Island, Maryland. Sabrosky (*op. cit.*) has identified a specimen from Perry, Georgia as probably belonging to this species.

*Pseudiasata pseudococcivora* Sabrosky.

*P. pseudococcivora* Sabr., 1951. Bull. Ent. Res., 41:624.

This species was described from ten specimens from Panama Canal Zone and one intercepted in quarantine at Laredo, Texas entering from Mexico. Sabrosky believes that this is the species which was introduced into the Hawaiian Islands for the control of the pineapple mealybug.

✓ *RHINOLEUCOPHENGHA* Hendel

1917. Deutsche. ent. Zeit., Berlin, 1917:44.

Genotype: *R. obesa* (Loew).

Hendel established the genus for his new species *pallida* from Peru. Loew described *Drosophila obesa* from Texas and this species was redescribed by Johnson in 1913 as *Phortica hirtifrons* from Florida. Later, Sturtevant (1918) established the genus *Pseudophortica* for *obesa* and placed *hirtifrons* as a synonym. Malloch and McAtee first stated that *pallida* was also a synonym of *obesa* and placed *Pseudophortica* as a synonym of *Rhinoleucophenga*.

Whether *pallida* Hendel and *obesa* Loew are the same species is still open to question. Duda (1927), having compared a specimen of *pallida* determined by Hendel, concluded that the two were distinct. In a more recent study of the genus, Malogolowkin (1946) concluded that they were the same, recorded *obesa* from Brazil, and figured the wing and male genitalia of the Brazilian form. Using specimens from Nevada and Colorado, Hsu (1949) examined the male genitalia and found considerable difference between these specimens and the figure of Malogolowkin (*op. cit.*). He concluded that since *obesa* was described from Texas, the Brazilian form could not be *obesa*. However, we have reason to think that the specimens used by Hsu were misidentified; among our preserved material we have found two specimens from Lake Tahoe, California identified by the field collectors as *obesa* but which, on closer examination, prove to be referable to *Leucophenga montana*, n.sp., described earlier in this article. Further, the male genitalia of the specimen figured by Hsu (Pl. II, fig. 4) are remarkably similar to that of *L. pulcherrima* (Pl. III, fig. 1). Finally, we have since captured a large number of specimens, presumably of *obesa*, in Texas, and these show the tooth-bearing clasper as do the flies from Brazil. We have not yet established that the Texas and Brazilian species are the same, but at present it seems probable. However, should it be shown that the two are distinct, then it is likely that *pallida* would be the genotype.

✓ **Rhinoleucophenga obesa** (Loew).

*Drosophila obesa* Loew, 1872. Berl. ent. Zeit., 16:102 (Cent. X, No. 85).

The species was described from specimens collected in Texas by Belfrage. We have taken specimens sporadically in central Texas, but our largest collections have been made in Limpia Canyon, Davis Mts., Texas, where, for example, we captured 42 individuals at traps in June, 1951. However, these specimens have a distinctly darker abdomen than others we have seen and may represent a new species. *R. obesa* seems to be widespread over the southeastern states, from Va. and Fla. to Okla. and Texas. Patterson (1943) records 20 specimens from Michoacan, Mexico as an undetermined species of the genus; this was a misidentification, and the species was later (Patterson and Mainland, 1944) described as *Leucophenga paludicola*.

We were able to secure a few eggs of the form from the Davis Mts., Texas, and reared these through to adults. The eggs were laid on the glass sides of the containers; their structure was remarkably similar to that of *Sino-phthalmus pictus* (fig. 1), but were white rather than pale brown.

Costa Lima (1935) reports that the Brazilian *R. obesa* lives as a parasite on the coccid *Aclerta campinensis*. It is tempting to postulate some correlation here between the parasitic mode of life and the type of egg known to be present in *S. pictus*, in our *obesa*, and at least some species of *Gitona* (which also has parasitic members). As is described later, *S. pictus* has habits of egg and larval deposition which make it seem possible, at least, that it has parasitic larvae; larvae of *obesa* from this country have not been found nor have those of *Gitona bivisualis*. The possibility of parasitic larvae in these forms should be carefully looked for.

✓ **SCAPTOMYZA** Hardy

1849. Proc. Berwickshire Naturalists Club:349.

Genotype: *S. graminum* (Fallen).

Most of the species of this genus have leaf-mining larvae although there are apparently some exceptions. As a whole, they are attracted to banana bait only slightly but general sweeping in grass and weeds of various sorts will often turn up certain species in enormous numbers. We have found that many species can be raised in the laboratory if non-yeasted food is used; some species, however, will not deposit eggs on standard laboratory food.

The genus was established by Hardy for *Drosophila graminum* Fallén and *D. flaveola* Meigen, and the first of these was selected as type in 1910 by Coquillett. Since then, over fifty species and varieties have been described by various workers over the world, and the resulting confusion is scarcely equalled in any other genus. It is becoming apparent that many specific names are synonyms, many so-called varieties are good species, a number of species are referable to other genera, and, finally, that much past work on the genus is wholly unreliable. Dr. O. Duda at one time con-

sidered the genus tenable at most as a subgenus of *Drosophila* but at the same time proposed dividing it into two subgenera: *Parascaptomyza*, for the forms with two acrostichal rows (considered by him as all being color variants of *graminum*), and subgenus *Scaptomyza* Hardy, for those forms with four acrostichal rows. Hendel (1928) pointed out, however, that the typical subgenus, *Scaptomyza* Hardy, must contain *graminum*, and that *Parascaptomyza* Duda must become a synonym of that name. Hendel then established a new genus, *Scaptomyzella* (misprinted *Scaptomyzetta*), for the species with four acrostichal rows, and placed *Scaptomyza* Duda nec Hardy as a synonym. Malloch (1932) argued that one genus might well contain all of these forms since, on the basis of the American species, *adusta* Loew would scarcely fit either of the proposed divisions, and *vittata* Coquillett would certainly deserve still another subdivision.

The writer is of the opinion that we know far too little about the genus to warrant erection of subgenera. There are, however, a number of natural groups which can be recognized but these are probably best considered as species groups. As in *Drosophila* there are a number of species which do not logically belong in any such group and I have refrained from establishing monotypic groups for such species except for *S. graminum* which is quite well known.

The following species groups may be recognized:

### 1. *graminum* species group

Only member, *S. graminum*.

Blackish to yellowish species; 2 acrostichal rows; long apical scutellar bristles; one strong humeral; one ventral branch on arista basal to terminal fork; no wing spot; pale palpi; small parovaria. This species is easily reared in the laboratory.

### 2. *adusta* species group

Contains *S. adusta*, *paradusta* n.sp., and possibly *hirsuta*.

Yellowish to light brownish species; 4 acrostichal rows; apical scutellars short, bent upright; one humeral; 2 ventral branches on arista; with apical wing spot (only slightly indicated on *hirsuta*); pale palpi; small parovaria. *S. adusta* is easily reared; *paradusta* has not been reared; *hirsuta* is raised with difficulty.

### 3. *vittata* species group

Contains *S. vittata*, *paravittata* n.sp., species A, as well as *fuscinervis* and *nigripalpis*, two South American species described by Malloch.

Pale yellowish species with some longitudinal stripes; 2 acrostichal rows; apical scutellars short, bent upright; one humeral; 2-3 ventral branches on arista; no wing spot; blackish palpi; small parovaria. Species A is easily reared; *paravittata* has not been raised; *vittata* is unknown for this character.

4. *terminalis* species group

Contains *S. terminalis*, the undescribed species C, D and E, as well as *unipunctum* (Europe), *maculifera* (South America), etc.

Blackish species; 4 acrostichal rows; long apical scutellars; 2 humerals; 1-2 ventral branches on arista; with apical wing spot; palpi pale; small parovaria. As far as known, all species can be raised rather easily.

5. *montana* species group

Contains *S. montana*, *nigruccella*, *borealis* n.sp., *nigrita* n.sp., as well as *tetrasticha* (Europe), etc.

Blackish or yellowish species; 4 acrostichal rows; long apical scutellars; 2 humerals; one ventral branch on arista; no wing spot; palpi pale; parovaria very large, 2-6 times size of spermathecae; ovipositor large, blunt apically, with large, coarse teeth; male anal plate elongate dorso-ventrally, protruding below. None of these species has been reared in the laboratory.

Key to the Nearctic species of *Scaptomysa*

1. Acrostichals in 2 rows; 1 prominent humeral; wings without an apical spot. 2  
Acrostichals in 4 rows anterior to dorsocentrals; 1 or 2 humerals; wings with or without apical spot 5
2. Palpi yellow; apical and basal scutellars about equal in length; arista with 1 branch below basal to fork ..... *graminum* (Fall.)  
Palpi dark; apical scutellars about half length basals and bent strongly upright; arista with 2-3 ventral branches ..... 3
3. Mesonotal stripes prominent; ocellar darkening continued forward in a line to antennal bases; presutural dorsocentrals but little larger than other acrostichals ..... *paravittata* n. sp.  
Mesonotal stripes weak; ocellar darkening limited to the triangle; presutural dorsocentrals rather well developed ..... 4
4. Two nearly equal oral bristles on each side, their length about equal to length of proclinate orbital; presutural dorsocentral as long as anterior notopleural; terminal tergites quite dark, lateral areas of other tergites often much lighter; ♂ genitalia with about 3 conspicuous black spines on each side ..... *vittata* Coq.  
One pair of long orals, nearly twice length proclinate, 2nd oral barely half length 1st; presutural dorsocentral no stronger than humeral; lateral areas of tergites usually about as dark as terminal tergites; ♂ genitalia without spines ..... *Species A*
5. Wings with a dark cloud at apex of 3rd vein (but may be weak and scarcely noticeable on teneralis) ..... 6  
Wings completely lacking an apical cloud ..... 9
6. Apical scutellars about half length basals, bent strongly upright; 1 strong humeral; general color tannish, abdomen darker ..... 7  
Apical scutellars longer, directed posteriorly, their tips reaching about as far behind as those of basals; 2 strong humerals; brownish to blackish species ..... *terminalis* Lw., *Species C, D & E*.
7. Mesonotum mostly brown; apical wing spot small and indistinct ..... *hirsuta* Whlr.  
Mesonotum yellowish to pale brownish; wing spot distinct ..... 8
8. Scutellum and disc of mesonotum nearly unicolorous; arista with 4-5 dorsal branches basal to fork; palpi with very stout black bristles; ♂ anal plate with sparse thin hair ..... *adusta* (Loew).  
Scutellum distinctly darker than mesonotum; arista with about 3 dorsal branches; palpal bristles not exceptionally stout; ♂ anal plate densely covered with long hairs; posterior crossvein often with a slight cloud ..... *paradusta* n. sp.

9. Abdomen entirely yellow, noticeably contrasting with the gray pollinose metanotum; scutellum gray centrally, the lateral margins yellow ..... *Species F*  
Not colored as above, the abdomen as dark as or darker than thorax, or both pale yellow ..... 10
10. Posterior orbits with 1 or 2 extra orbital hairs between posterior reclinate orbital and inner vertical; ♂ anal plate noticeably elongate dorso-ventrally, protruding below; ♀ ovipositor large, blunt, with coarse teeth ..... 11  
No extra orbital hairs as described; ♂ anal plate and ♀ ovipositor as described or not ..... 12
11. Mesonotum, pleurae and abdomen dark gray to brown ..... *montana* Whlr.  
Mesonotum and pleurae pale yellow to tannish yellow, the abdomen the same or a bit darker ..... *nigrocella* Whlr.
12. Apical scutellars short, strongly bent upright; 1 strong humeral; arista with 2 ventral branches; knob of halteres gray; ♂ anal plate with an exceptionally dense, but nearly microscopic, cluster of fine hairs on ventral  $\frac{1}{4}$  ..... *hiruta* Whlr.  
Apical scutellars as long as basals or at least reaching about the same distance posteriorly; 2 humerals; arista with 1-2 ventral branches; knob of halteres whitish yellow; ♂ anal plate not as described ..... 13
13. Femora nearly black, tibiae and tarsi somewhat brownish, the fore coxae pale; mesonotum black, pollinose ..... *nigrita* n. sp.  
Legs nearly uniformly pale yellow; mesonotum yellow or grayish brown with browner median stripe ..... 14
14. Mesonotum and pleurae grayish brown to blackish brown with a faintly indicated median brown stripe; ♂ anal plate elongate dorsoventrally, protruding below ..... *borealis* n. sp.  
Entirely yellow species except for the shining black abdomen; ♂ anal plate not large and protruding ..... *Species B.*

### *Scaptomyza graminum* (Fallén).

*Drosophila graminum* Fall., 1823. Dipt. Succ., Geomyz. :8.

This species is widely distributed over the entire United States and has been reported from all the major areas of the world. We have examined specimens, including the ♂ genitalia, from Canada, Hawaii, Europe and Lebanon, and they agree with the form in this country. The biology of the species has been described by Frost (1924) and Stalker (1945) presents a redescription based on material from Missouri, and discusses its ecology, seasonal distribution, cytology and comparative genetics. Patterson (1943) describes the internal anatomy, eggs and puparia.

This species is exceedingly variable in color; specimens captured at identical times and localities may be quite pale, scarcely exhibiting any color pattern, while others may be nearly black. Stalker believes that the variation may be due to the season and the age of the flies. *S. graminum* may be raised in the laboratory with ease.

### *Scaptomyza adusta* (Loew).

*Drosophila adusta* Lw., 1862. Berl. ent. Zeit., 6:231 (Cent. II, No. 98).

This is a very common and widely distributed species over the eastern half of the continent, extending west into the foothills of the Rocky Mountains. The larvae are undoubtedly leaf miners for the most part but apparently other situations will serve; Malloch (1915), for example, obtained larvae and puparia from sap exuding from a mulberry tree at Urbana, Ill., and the writer has reared specimens from rotting cactus at Austin, Texas. *S. adusta* can be raised in the laboratory with comparative ease. Patterson

(1943) describes and figures the eggs, puparia and internal reproductive organs.

*Scaptomyza paradusta*, sp. nov.

**External characters of imagines.**

Front pale tan, orbits lighter, granulose, ocellar triangle not distinct, blackish between ocelli. Head bristles large. Proclinate and anterior reclinate orbitals with their bases at about the same level, the latter about  $\frac{2}{3}$  as long as the proclinate and nearly  $\frac{1}{2}$  length of posterior reclinate. Antennae pale tan, 2nd joint with several stout bristles; arista with about 3 dorsal and 2 ventral branches in addition to the terminal fork. Face pale whitish yellow; carina low, elongate, evenly rounded, ending above line of vibrissae. Vibrissae strong, 2nd orals weaker, about  $\frac{1}{2}$  as long as 1st orals. Palpi whitish yellow with about 2 moderately stout bristles and several smaller ones. Cheeks whitish yellow, their width about  $\frac{1}{4}$ – $\frac{1}{5}$  the greatest diameter of the eyes. Eyes bright red in life, with fine, dense, pale-colored pile.

Mesonotum light reddish brown overlaid with rather heavy whitish pollen, a slightly darker stripe between median acrostichal rows; scutellum similarly darkened. Acrostichal hairs in 4 rows anterior to the dorso-centrals, 2 rows between them. Apical scutellars shorter than basal ones and carried turned upwards; basal pair convergent. One strong humeral. Anterior sternopleural thin, about  $\frac{2}{5}$  length large posterior one.

Legs uniformly pale yellow. All tibiae with preapical bristles, a distinct apical present only on 2nd. Abdominal tergites brown, pollinose except on last complete one which is shining. Male anal plate covered with dense, long hairs; female anal plate relatively densely haired. Ovipositor not prominent, not heavily toothed. Wings with faint yellowish cast. A rather large blackish cloud at apex of 3rd vein. Posterior crossvein with faint but often distinct narrow cloud. Two strong bristles at distal costal break. 3rd costal section with heavy bristles on its basal  $\frac{1}{2}$ , these ceasing just before the apical cloud. Costal index 3.3–3.4; 4th vein index about 1.4; 5x index about 1.25.

Length body,  $\delta$ : 2.5 mm.; wings: 2.6 mm. (in pinned specimen).

Female, body length: 2.8 mm.; wings: 2.7 mm.

*Distribution and types.*—Known at present from 14 specimens from California and one from Arizona. **Holotype**,  $\delta$ , No. 2175.12, from Dark Canyon Forest Camp, San Bernardino National Forest, near Mt. San Jacinto, California, taken by the writer in sweeping in July, 1951. *Paratypes*: California: 4, from the same locality as the holotype, Alma (1), Pismo Beach (1), Aspen Valley near Yosemite National Park (1), and the following in the collection of Dr. A. H. Sturtevant: Berkeley (1), Pacific Grove (3), Charleton Flats near Pasadena (2); Arizona: Oak Creek Canyon south of Flagstaff (1).

*Notes.*—All of the above specimens were taken by sweeping and did not seem to be attracted to traps. We have not succeeded in getting females

to deposit eggs in the laboratory. This species simulates members of the genus *Chymomyza* in several respects, as does *S. hirsuta*. Males of these species have a large whitish triangular area medianly on the pregenital tergite as do many species of *Chymomyza*. More remarkable, however, is the habit of *paradusta* to wave the wings and spar with one another using the fore legs.

### ***Scaptomyza hirsuta* Wheeler.**

*S. hirsuta* Whlr., 1949. Univ. Tex. Publ. 4920:166.

Described from six specimens from Puebla, Mexico, we have since taken about 25 individuals by sweeping over *Rumex* sp. at Rustler Park, Chiricahua Mts., Ariz. A stock was established from these specimens but was lost by accident. In this species the front tibiae and tarsi are darkened and the flies wave their wings like *Chymomyza*. It is probably related to *paradusta*, described above.

*Internal characters.*—Testes of aged male deep yellow, with about  $1\frac{1}{2}$  large outer coils and a short, inner half-coil; paragonia large, U-shaped. Ejaculatory sac with two diverticula, each bifurcate near its base into two branches of unequal length, one about  $\frac{1}{3}$  the length of the other.

Spermathecae with heavily sclerotized centers, of moderate size; parovaria slender, as long as spermathecae but smaller; ventral receptacle large and thick basally, followed by a tight, tangled mass of irregular coils. The eggs have four very short filaments, and the follicle cell outline is very plain; length, about 0.5 mm.

### ***Scaptomyza vittata* (Coquillett).**

*Drosophila vittata* Coq., 1895. in Johnson, 1895. Proc. Acad. Nat. Sci. Phila. :318.

Coquillett described *vittata* from a single male taken by Mrs. Slosson at Charlotte Harbor, Florida. He later reported a specimen from Porto Rico but as indicated below, this was probably of a different species.

In examining a series of specimens determined as *vittata* it became apparent that two forms were concerned. Although the original description omits a number of characters that are critical in this genus, I believe that the form given this name in the key is the one described by Coquillett. However, due to the uncertainty, the other form is not being given a new name at present, but is referred to here as species A.

From among Dr. Sturtevant's specimens I was able to determine that the following localities were represented by true *vittata*: Kushla, Ala., Lakeland, Fla., Cuba and Costa Rica. Our laboratory has specimens from Miss., and, until recently, a living stock from Macon, Ga., collected by Dr. H. Stalker. The stock was not difficult to maintain, but was lost through accidental neglect. It was used to prepare the following description of internal characters.

#### **Internal characters of imagines.**

Testes with two thick, pale yellow outer coils, the inner portion lemon yellow, not distinctly coiled. Two ejaculatory sac diverticula of moderate length, each bifurcate at its apical third into branches of unequal length.

Spermathecae with oval, moderately sclerotized centers; parovaria round, about half size of former. Ventral receptacle very loosely and irregularly coiled, with an average of 10-15 coils.

The figure of the  $\delta$  genitalia given by Hsu (1949. Pl. III, fig. 6) is apparently referable to the following form, species A.

#### **Scaptomyza species A.**

As stated above, under *vittata*, specimens of this unnamed species have been confused with that one. Localities for this form represented among Dr. Sturtevant's specimens are as follows: Arlington, Va., Greenville, S.C., Kushla, Ala., and Costa Rica. A male specimen from Mexico was used by Hsu (1949) to illustrate the  $\delta$  genitalia of *vittata*. That specimen came from Puebla, and we have single individuals from Vera Cruz and the Federal District. This is very likely the form reported by Malloch and McAtee (1924) from Va. and Md., and may have been the one reported by Coquillett (1900) from Porto Rico since Sturtevant (1921) states that he examined the specimen and was unable to convince himself that it was the same as *vittata*.

#### **Scaptomyza paravittata, sp. nov.**

##### **External characters of imagoes.**

$\delta$ ,  $\varphi$ . Arista with about 8 branches, two below in addition to the terminal fork. Antennae pale tannish yellow; 2nd section with 2 large bristles and several smaller ones. Third antennal segment small. Front pale tan with a narrow central blackish stripe from postverticals across the ocellar triangle to base of antennae. Proclinate and anterior reclinate orbitals with their bases at about the same level; anterior reclinate about half length proclinate,  $\frac{1}{3}$  length posterior reclinate. Vibrissae well-developed, followed by an irregular series of fine hairs. Palpi black from near the base, with a strong bristle distally. Face, clypeus, cheeks and proboscis pale tannish yellow. Center of face lowly convex, without a distinct carina. Cheek width slightly less than half greatest diameter of eyes, the latter deep red.

Acrostichal hairs in two regular rows both between and in front of the dorsocentrals; no prescutellars. An additional presutural pair of dorsocentrals in line with the usual ones and separated from the median pair by a single hair; length of this anterior dorsocentral about  $\frac{1}{3}$  length median ones and diverging outward. Median dorsocentrals about as far forward of the posterior ones as the latter are from each other. One prominent humeral. Two prominent sternopleurals, the anterior one thinner and about  $\frac{2}{3}$  length posterior. Apical scutellar bristles about half length basal pair, bent upright and cruciate. Basal scutellars parallel or slightly divergent. Mesonotum pale tan with three longitudinal dark brown stripes as follows: a central stripe from anterior edge to scutellar apex, exactly delimiting the acrostichal rows; a lateral stripe on each side originating just above the humerus and continuing to just above wing base. Pleurae pale tan with a longitudinal stripe originating just below humerus and



continuing across base of halteres causing the two basal segments of this structure to be darkened, the terminal portion being pale. Pleurae below this stripe and all legs pale yellow. Preapicals on all tibiae, apicals evident only on 2nd tibiae. Males with a series of semi-erect hairs on fore tarsi, their length equal to or slightly less than thickness of tarsus.

Abdomen pale yellow with black bands as follows: on the first three tergites the bands appear only as discolored spots on either side of the midline but are present as solid black lateral areas; on remaining tergites the bands are distinct from either side of the median interruption, expanding broadly at the angle and becoming progressively larger and darker posteriorly. The male abdomen is less distinctly banded than the female. Ovipositor plates quite pale, only faintly chitinized, and bearing a few slender hairs and bristles; the plates are bluntly rounded posteriorly.

Wings clear, veins pale brownish. Two strong bristles at distal costal break. Third costal section with heavy bristles on its basal  $\frac{1}{4}$ . Costal index about 2.9-3.0; 4th vein index about 1.5; 5x index about 1.8.

Length body, male: 2.0 mm. (in preserved specimen), wings: 2.2 mm.; female body: 2.3 mm., wings: 2.6 mm.

#### Internal characters of imagines.

Testes pale yellow with 2 large, pale outer coils, 2 smaller, deeper yellow inner coils leading to an inner series of 3-4 tight, very small coils which join the duct. Ejaculatory sac with two long, thick, unbranched diverticula.

Spermathecae large, non-sclerotized, without a visible central cavity, their stalks quite short and ending bluntly; parovaria also blunt-tipped, with short stalks. Ventral receptacle of medium length, twisted back and forth, not noticeably coiled. Anterior Malpighian tubes much longer than posterior, their common stalks about  $\frac{1}{12}$  their total length; posterior tubes with their ends apposed but lacking a continuous lumen, their common stalk about  $\frac{1}{10}$  their total length.

#### Other characteristics, relationship and distribution.

*Eggs*.—White, with a decided wrinkled appearance; a thickened ridge runs along the midline nearly the entire length, branching just before the end to form two short filaments. Length about 0.6 mm.

*Puparia*.—Pale tannish yellow, weakly chitinized. Anterior spiracular horns extremely short, each with about 5-6 short branches; posterior spiracles tightly parallel. Length: 3.0 mm.

*Distribution and types*.—We have taken this species in rather large numbers (several hundred) by sweeping in the Pasadena area of southern California. Most came from two localities: the Arroyo Seco of Pasadena and South Pasadena, and a marshy area near Rosemead. **Holotype**, ♂, from Rosemead, California, collected by the writer Feb., 1954. *Paratypes* as follows: California: 10, from the same locality as the holotype, Pasadena (2), South Pasadena (2), the Arboretum, Arcadia (3).

*Notes*.—A number of larvae and puparia have been taken from water cress (*Nasturtium officinale*) in which they were living as leaf-miners.

Pupation occurred on the leaves at the edge of the mines. All the adults collected were taken by sweeping over this plant. Females will deposit eggs readily on the standard culture medium for *Drosophila* but it has not been possible as yet to raise the larvae to maturity.

It may be of interest to record that the locality mentioned above also yielded adults of *S. terminalis*, *graminum* and *montana*, both larvae and puparia of the latter being also found on the water cress.

#### **Scaptomyza terminalis (Loew).**

*Drosophila terminalis* Lw., 1863. Berl. ent. Zeit., 7:32 (Cent. III, No. 60).

The specific distinctions in the *terminalis* group are extremely confused. In the past any specimen with the combination of external characters cited earlier for the group has been called *terminalis*, a species described from Alaska. Intensive study has shown, however, that although specimens from various parts of the country (or other countries) appear to be identical in color and gross morphology, the details of the external genitalia and internal reproductive organs vary greatly. It would seem that we have in this group a situation comparable to that found in several Dipterous groups in which a number of species can be recognized by the male genitalia which otherwise had been considered a single, wide-spread species. The members of this group, fortunately, can be raised in the laboratory without great difficulty so that here we have an opportunity of testing the validity of species based solely or primarily on  $\sigma$  genitalia. This project will be started in the near future. At the present time, however, it seems best to indicate the form we believe to be true *terminalis*, to refrain from naming the other forms but to give some idea of their known distributions.

The types of *terminalis* came from Sitka, Alaska. The U.S. form most likely to be this species has been found by us along the Pacific coast, from Lower California of Mexico, the coasts of California, Oregon and Washington. Our most northern collection, from the Olympic Peninsula, Wash., is but little more than 750 miles, airline, from Sitka, and from our knowledge of the area, it seems nearly certain that the same form would continue up the coastal regions to Alaska. It should be pointed out, however, that should the above conclusion be shown to be in error, then the U.S. form should be called *apicata* Thomson, whose types came from San Francisco.

In addition to the west coast records, we have taken this species in two localities in Arizona: Oak Creek Canyon near Flagstaff and Patagonia. The characteristic features of the  $\sigma$  genitalia are: lower posterior corner of genital arch with a long pointed, chitinized "toe", usually visible on pinned specimens; clasper rather pointed below, with a row of about 8-10 strong blunt teeth; anal plate with a small cluster of about 10 thick, black bristles along lower edge, longer, thinner and more pointed than the teeth of the clasper.

#### **Internal characters of imagines.**

Testes of aged male bright lemon yellow with about  $1\frac{1}{2}$  large coils arranged like a corkscrew, no inner coils. Paragonia weakly S-shaped,

intertwined with testes. Ejaculatory sac with two short, thick diverticula, each bifurcate at about its middle with a long and a short branch.

Spermathecae with small sclerotized centers and thick stalks; parovaria not more than half the size of the former. Ventral receptacle a weakly bent tube basally, a tangled mass apically, without distinct coils.

*Notes.*—This species was rather common around Pasadena, Calif., where the writer has reared it from water cress (*Nasturtium officinale*).

#### **Scaptomyza species C.**

This is the form used by Hsu (1949) to illustrate the ♂ genitalia of *terminalis*. That specimen came from Caliente, Nevada. The genital arch of the male lacks the "toe", and the clasper is more truncate with the teeth arranged in two groups, 2-3 in the upper group, 9-10 in the lower group. We have no other records of this form.

#### **Scaptomyza species D.**

This form is known to us by several stocks taken in the mountains near Silver City, New Mexico, as well as a few specimens from Rustler Park, Chiricahua Mts., Ariz. The ♂ genitalia may be briefly characterized as follows: genital arch with a short blunt "toe", very weakly chitinized and not usually visible externally on pinned specimens, and with a dense cluster of long hairs just below the projection; clasper semi-elliptical, with a row of about 6 black teeth, rather long and slender and spaced rather far apart, plus a few pale bristles apically; anal plate without unusual characters.

#### **Scaptomyza species E.**

This is largely a hypothetical form; there are in the literature numerous references to *terminalis* from the New England states, and, on the basis of our experience, this may well represent still another form in the series. Unfortunately, we have not had specimens of such a form available for study.

#### **Scaptomyza montana** Wheeler.

*S. montana* Whlr., 1949. Univ. Tex. Publ. 4920:166.

Originally described from Glacier National Park, Montana, the writer has since found this species to be rather common in southern California where specimens were reared from larvae and pupae found on water cress (*Nasturtium officinale*). We have not, however, succeeded in raising the species in the laboratory. This is unfortunate for, as discussed below, completely yellow specimens are taken occasionally which may represent another species or may be nothing more than a yellow mutant of *montana*. There seems to be no way to settle this problem except by breeding experiments. In addition to the many individuals taken in the Pasadena area of California, we have taken this species near Crescent City, Calif., and along the Rogue River near Gold Beach, Oregon, and have examined specimens in Dr. Sturtevant's collection from Vashon, Washington, and from Palo Alto, Pacific Grove and Stanford University campus, California.

**Internal characters of imagines.**

Testes of aged male yellowish-orange, darkest basally, sac-like, not coiled. Paragonia S-shaped, longer than testes. Ejaculatory sac with two very long posterior diverticula each bifurcate shortly beyond its base and one or both of these branches again bifurcate shortly before its end, these latter bifurcations variable among different specimens; the right and left series of branches form a tangled mass on either side.

Spermathecae with oval, heavily sclerotized centers and thick stalks; parovaria round to oval, very large and balloon-like, six to eight times the size of the spermathecae, their stalks alone about as long as the total length of the spermathecae. Ventral receptacle rather short and folded back on itself about  $2\frac{1}{2}$  times in the manner of the *Hirtodrosophila*.

**Scaptomyza nigrocella** Wheeler.

*S. nigrocella* Whlr., 1949. Univ. Tex. Publ. 4920:167.

The specific status of this form is open to considerable doubt. It was described from a few specimens from Jasper, New York. The external male genitalia described by Hsu (1949) were quite similar to *montana*. More recently we have taken a number of specimens in California, along with many typical *montana*, and have compared these two color forms in every way possible, with the result that, except for the extreme color difference, they seem to be identical. Further, a re-examination of the New York specimens indicates that they are also the same as the western material. The situation is further complicated by the fact that in certain localities in northern California, as well as our extensive collection efforts at Lake Wenatchee, Wash., and Hood River, Ore., only the pale yellow form could be found. Further, I know of no record of the dark form from the eastern United States. It is a very intriguing problem which deserves continued study.

There is the possibility that this is the same as some European form, since pale yellow forms have been reported from there on numerous occasions. The names used most frequently for the European form are *flava* Fallén and *flaveola* Meigen. Collin (1911) who has examined Fallén's types, states that *flava* is a true *Drosophila*, and, finally, there seems to be considerable diversity of opinion as to just what *flaveola* Meigen really is. In view of all the foregoing, it seems impossible to settle the questions raised by these yellow specimens at present.

**Scaptomyza borealis**, sp. nov.**External characters of imagines.**

♂, ♀. Front pale tan, ocellar triangle and posterior orbits dark gray pollinose, anterior orbits and front yellowish. Proclinate and anterior reclinate orbital situated at about the same level or the reclinate farther forward, the latter about  $\frac{1}{2}$  length the other orbitals. No extra orbital hairs between posterior reclinate and inner vertical. Antennae pale yellow throughout. Arista with about 7 branches, only 1 below in addition to the terminal fork. 2nd antennal segment with 2-3 stout hairs. Face pale

whitish yellow, carina an exceedingly low ridge, not nose-like. Vibrissae strongly developed, the following orals thin, about  $\frac{1}{4}$  length 1st. Palpi pale yellow with about 2 strong apical bristles. Cheeks pale whitish yellow, their width about  $\frac{1}{3}$  greatest diameter of eyes, these dark red with light-colored pile.

Acrostichal hairs in 4 rows in front of the dorsocentrals, in 2 rows between them; no prescutellars. Apical scutellars about  $\frac{2}{3}$  length basal ones, reaching about the same distance posteriorly. Two humerals; posterior sternopleural large, anterior one thin, about  $\frac{1}{2}$  as long. Mesonotum and scutellum pale grayish brown, dull, pollinose, with a brownish narrow stripe between median acrostichal rows. Mesopleura and pteropleura similarly grayish brown, pollinose; sternopleura and hypopleura much more yellowish. Halteres pale. Legs pale yellowish, with the usual bristles.

Abdomen uniformly brown, faintly shining. Male anal plate large, protruding below; ovipositor plates large, yellow, with coarse marginal teeth. Anal plates of both sexes with long hair.

Wings clear, without an apical cloud. Two strong bristles at distal costal break; 3rd costal section with heavy spinules on slightly less than its basal half. Costal index about 3.5; 4th vein index about 1.3-1.4; 5x index about 1.8.

Length body, male (in pinned specimen), 2.5 mm.; wings, 2.8 mm. Female slightly larger than male.

*Distribution and types.*—This is probably a fairly common species across the northern portion of the United States, but we have seen relatively few specimens. **Holotype**, ♂, from Ossipee, New Hampshire, Aug. 4, 1950 (A. H. Sturtevant). *Paratypes* as follows: New Hampshire: Hanover (1, Sturtevant coll.); Massachusetts: Fall River (1, Stvt. coll.), Westport Factory (1); Vermont: Norwich (1, Stvt. coll.); Michigan: Detroit (1, G. Steyskal, in collection of H. Stalker).

### ***Scaptomyza nigrita*, sp. nov.**

#### **External characters of imagines.**

♂, ♀. Front yellowish orange, more yellowish anteriorly, the large ocellar triangle and broad orbits blackish with gray pollinosity. Anterior reclinate orbital placed slightly in front of the proclinate and about  $\frac{1}{3}$  its length, the posterior reclinate slightly longer and stronger than proclinate; not extra orbital hairs between posterior reclinate and verticals. Antennae tan, 2nd segment with several stout bristles. Arista with 3-4 dorsal branches and one below in addition to the terminal fork. Face pale yellow, carina quite low, scarcely evident. One prominent oral, the 2nd about  $\frac{1}{2}$  length 1st and much thinner. Cheeks yellowish, gray behind, the width about  $\frac{1}{3}$  greatest eye diameter. Palpi pale with a few short, stout hairs.

Mesonotum dark grayish brown, grayish pollinose, with a brown stripe between median acrostichal rows; scutellum and pleurae also brownish. Acrostichals in 4 rows anteriorly, in 2 rows posteriorly. Apical and basal scutellars reaching about the same distance behind. Two humerals, one strong sternopleural, the anterior one short and thin, scarcely  $\frac{1}{3}$

length of posterior one. Legs, especially femora, dark brown to black with fore coxae and all tibiae and tarsi somewhat more yellowish. Abdomen dark brown. Sternites black. Ovipositor plates dark tan with coarse, blunt teeth. Male anal plate elongate dorso-ventrally, protruding below.

Wings clear, without apical spot, the veins brown, the costa often noticeably darker. Distal costal break with 2 stout bristles; 3rd costal section with heavy spinules on its basal  $\frac{1}{2}$ . Costal index about 3.3; 4th vein index about 1.4; 5x index about 1.2.

Length body, about 2.5 mm. (in pinned specimens); wings, about 2.8 mm.

#### Internal characters of imagines.

Testes of aged male bright orange, with about  $11\frac{1}{2}$  large outer coils and  $1\frac{1}{2}$  inner coils, these a bit smaller but darker. Ejaculatory sac with two quite long posterior diverticula, greatly tangled, each bifurcate at about its distal  $\frac{1}{3}$ . Paragonia S-shaped.

Spermathecae with sclerotized centers, their stalks thick. Parovaria twice as large as spermathecae, elongate oval. Ventral receptacle with about 5 closely appressed loops, arranged as in *Hirtodrosophila*.

*Distribution and types.*—We have collected several hundred specimens in southern California, mostly from the Pasadena area, a few from Wyoming, and 18 from the mountains near Malad, Idaho. **Holotype**, ♂, from Pasadena, California, collected by the writer in sweeping in May, 1950. **Paratypes** as follows: California: Pasadena (10), Badger (1), Temecula (1); Wyoming: Kemmerer (1), Lander (2); Idaho: Malad (10).

*Notes.*—This species is not attracted to traps. Most of the specimens from Pasadena were taken in the writer's yard by sweeping over the lawn which, in addition to grass, contained considerable amounts of *Dichondra* and clover. Although neither larvae nor mines were found, it is believed that the clover was the host plant. We have not succeeded in raising this form in the laboratory. In addition to the localities mentioned above, Dr. Sturtevant has taken this species from Palo Alto and Truckee, Calif.

It is very difficult to describe the male genitalia. The clasper is quite large and its tooth-bearing margin is very wavy, nearly convoluted, with dense teeth, and with a dense cluster of long bristle-like teeth over its apical surface.

#### *Scaptomyza bipunctipennis*, sp. nov.

##### External characters of imagines.

♂. Arista with about four dorsal branches and usually one below, basal to the terminal fork. Front yellowish tan, brownish on ocellar triangle and usually on posterior orbits behind posterior orbital. Antennae, face, cheeks, palpi and proboscis pale whitish yellow, their bristles black. Carina rather low. One strong vibrissa, 2nd oral thin, usually about  $\frac{1}{2}$  length 1st; palpi with 2-4 stout bristles at tip. Orbitals all thin, proclinate about equal in length to posterior reclinate, anterior reclinate about  $\frac{1}{3}$  their length, its base about  $\frac{1}{3}$  nearer proclinate than posterior reclinate. Verticals,

post-verticals and ocellars long but thin. Cheeks broad, about  $\frac{1}{5}$  greatest eye diameter.

Acrostichal hairs in 4 rows anteriorly, 2-rowed between dorsocentrals with one or more hairs in dorsocentral rows enlarged. Presutural long; two humerals, the upper one longer; one strong sternopleural, the anterior one thin, scarcely  $\frac{1}{2}$  length posterior one. Mesonotum tan, pollinose, on darker specimens with a darker median stripe between the two central acrostichal rows, expanding onto scutellum to cover most of the disc. Pleurae pale tannish, darker along notopleural suture and with some discoloration on posterior portion of mesopleura and on pteropleura. Halteres pale. Apical scutellars about  $\frac{2}{3}$  length basals, directed posteriorly.

Abdomen, on darker individuals, uniformly pale brown, pollinose, semi-shining at some angles; on lighter specimens the darkening is present only on terminal tergites. All legs pale yellowish, with the apical tarsal joints a bit darker.

Wings clear except for a dense black cloud over apex of 3rd vein (fainter on tenerals), and, usually, with a smaller, less distinct cloud over apex of 4th vein. Two strong bristles at apex of 1st vein; 3rd costal section with heavy spinules on its basal  $\frac{2}{5}$ . Costal index about 3.8; 4th vein index about 1.2; 5x index about 1.2.

Male anal plate with many long bristles above and a row of shorter hairs below; genital arch bare above, with a dense row of long bristles along lower edge and a projection from the posterior margin extending inside beneath the anal plate; clasper rectangular, its distal margin straight and bearing a row of 12-16 short, black teeth and about 15 long pale marginal bristles.

Length body, 2.8-3.2 mm. (in pinned specimen); wings, about 3 mm.

♀. Similar to male but larger and paler. Abdomen, on all individuals seen, entirely pale tan with at most darker areas laterally on tergites; anal plates black, ovipositor brown, bluntly pointed. Apical cloud on 3rd vein much smaller than on males, sometimes barely visible; no cloud at apex of 4th vein. Length body, about 3.5 mm.; wing, about 3.3 mm.

#### **Internal characters of imagines.**

Testes with about  $1\frac{1}{2}$  bright orange coils, rather small; paragonia weakly U-shaped, large. Ejaculatory sac not seen. Spermathecae with large, densely sclerotized centers and thick stalks; parovaria small, no larger than the centers of the spermathecae. Ventral receptacle rather tightly but irregularly coiled into a tangled mass, the basal  $\frac{1}{4}$  (estimate) very thick, about six times the thickness of the apical portion. Anal plate long haired.

#### **Other characteristics, relationship and distribution.**

*Eggs*.—These possess four filaments, all short, the basal pair more or less bifurcate apically, in more extreme cases giving the appearance of 3 filaments on that side.

*Puparia*.—Stalks of anterior spiracles very short, with about six very short branches.

*Distribution and types.*—We have collected 22 specimens from four localities in Calif., Wash. and Ida. The two individuals from Malad, Idaho differ in several characters from the west coast specimens and are not being included in the type series. **Holotype**, ♂, No. 2179.8, from Prairie Creek Redwood State Park, south of Crescent City, California, taken by the writer in sweeping in July, 1951. *Paratypes* as follows: California: 3, with the same data as the holotype; Washington: Kalaloch (1), Bogachiel (2). In addition, we have a number of preserved specimens which are not being considered as types.

*Relationship.*—This is the only North American species known to us in which the apical wing cloud differs in the two sexes. It seems to be rather closely related to an undescribed species from Argentina, known to me by eight specimens from the collections of Prof Souza Lopes of the Instituto Oswaldo Cruz, and Dr. Blanchard of Buenos Aires. In this form the males have large, dense clouds over the apices of 3rd and 4th veins, often confluent, but females possess only the cloud over the apex of the 3rd vein. Malloch (1934) has described *S. dissimilis* from South America in which the wing spots are more extremely different in the two sexes, but in other respects this form does not seem to be closely related to the present one.

*Notes.*—All of the individuals captured by us were taken in sweeping among grass. However, we were able to raise them in the laboratory with some difficulty. Unfortunately, our stocks were lost due to a severe bacterial infection.

#### **Scaptomyza species B.**

This is apparently an undescribed species, known to us by a single male individual from Mohawk Park, Ohio (5/10/37; H. D. Stalker), in Dr. Stalker's collection. It is not obviously related to any of the species discussed in the present paper.

#### **Scaptomyza species F.**

Several individuals of this undescribed species were seen by the writer among the unsorted flies in the collection of Dr. A. L. Melander, Riverside, Calif., who had taken them at Sequoia Park, Calif., at about 5000 feet, and at Castle Rock, Wash. The abdomen is entirely yellow, the scutellum yellow laterally, the postnotum gray pollinose and noticeably contrasting with the abdomen.

### **SINOPHTHALMUS Coquillett**

1904. Proc. Ent. Soc. Wash., 6:190.

Genotype: *S. pictus* Coq.

This genus is represented only by the type species which is fairly widespread over the west. With the capture of additional material of *Amiota* (*Phortica*) *albavictoria*, it was noted that only a single character prevents



the present genus from coinciding exactly with *Phortica*: the bare arista. In other characters, *pictus* is remarkably similar to *albanivictoria*, and almost as close to *Amiota* (*Phortica*) *variegata* of Europe. Duda (1926) has remarked on the failure of the arista character to separate adequately the various genera in this portion of the family. Although I cannot agree with his conclusions, he says (*op. cit.*, p. 246) that it is questionable whether *Erima* Kertész and *Cacoxenus* Loew should be considered self-sufficient, and thinks it best to consider them only as subgenera of *Phortica* Schiner (= *Amiota* of the present paper), since *P. variegata* with its short-haired arista fits between *Cacoxenus* and *Erima* on the one hand (with a bare arista) and the long-haired species of *Phortica* on the other hand (e.g., *rufescens*). He states further that *Cacoxenus punctatus*, with a short-pubescent arista, is intermediate between *C. indagator* and the known species of *Phortica*. An examination of our specimens of *albanivictoria* shows that the number of dorsal branches of the arista may vary from one to three, adding support to the conclusion that the character of the arista may not be a valid point of generic separation. Although the present writer feels convinced that *Sinophthalmus* will ultimately have to be placed as a synonym of *Phortica*, there is no immediate advantage in doing so at the present.

#### ***Sinophthalmus pictus* Coquillett.**

*S. pictus* Coq., 1904, Proc. Ent. Soc. Wash., 6:190.

Coquillett described the species from 12 specimens from the mountains near Claremont and from Yosemite, Calif. We have since taken it at numerous localities in California, from Yosemite south, as well as from Nevada, Arizona and New Mexico. A single specimen was taken by the writer at Zacatecas, Mexico. *S. pictus*, like many species of *Amiota*, has the annoying habit of flying in and around one's eyes and ears.

Attempts to locate the breeding places of this species in California by the writer were unsuccessful; however, with an abundant supply of specimens available, several interesting observations were made. Dr. Sturtevant recalled having dissected females and finding living larvae within the vagina. He thought that perhaps the eggs had been retained too long, and hatched internally. Acting on his suggestion a number of females were brought into the laboratory and this problem investigated.

In *Drosophila*, eggs pass from the oviduct into the vaginal cavity, coming to rest with the micropyle quite near the openings of the spermathecae and ventral receptacle. In this position, several sperm enter the egg, and it is normally laid a short time thereafter. It has been observed that in some species, e.g., *Drosophila melanogaster*, if a female is forced to retain her eggs by withholding a proper food surface for normal deposition, an egg in the vaginal cavity will proceed to develop and eventually the egg will contain a fully-formed larva which will emerge from the chorion upon deposition.

However, in *S. pictus*, such retention of eggs and subsequent deposition of fully formed larvae appears to be the rule among wild individuals,

whereas females brought into the laboratory produce a distinctly different egg which must undergo the usual period of development outside the body of the mother.

Approximately three out of four females captured would, when the abdomen was gently squeezed with a forceps, extrude a fully-developed egg, the larva immediately emerging from the thin, whitish egg membrane. On standard *Drosophila* culture medium, most of these larvae would grow and pupate in about 5-6 days. An occasional female would extrude an incompletely-developed egg, also white in color, which would hatch normally within a day or two in vials. These could be reared to pupation. Dissections of these females revealed the following characteristics: spermathecae normal for the family, with sclerotized centers; parovaria on equally long stalks, with hollow centers; ventral receptacle apparently in the shape of a short, thick sac within which the lumen appeared highly coiled, although it could not be uncoiled by pulling; ovaries with relatively few eggs and egg vesicles, the left ovary (usually) smaller than the right and with about three eggs of moderate size and two smaller, undifferentiated ones visible; right ovary much the larger, and usually with about three large well-developed eggs, nearly as large as the single ones found in the vaginal cavity itself. One may suppose that under normal conditions, only one egg is matured at a time, and that it passes into the vagina and remains there, the larva developing meanwhile. When the appropriate food source is found, the larva-bearing egg is deposited, and the larva begins its outside life at once. These facts suggest that the usual medium is either bleeding trees, in which the bleeding time is quite short, or that the flies live as parasites on some other animal.

However, some females placed in vials without having the egg expelled artificially, would eventually deposit this egg, the larva crawling away from

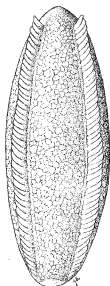


FIG. 1. Egg of *Sinophthalmus pictus*. Similar eggs are known in certain species of *Gitona* and *Rhinoleucophenga*.

it at once, and thereafter the females would lay eggs of an entirely different sort (fig. 1). These were tannish-brown in color, and possessed a pair of longitudinal "wings," fluted in appearance, on the sides of the rather flattened dorsal surface, this area being strongly marked with a raised pattern of darker brown fine ridges, roughly hexagonal in shape, though often coalescing somewhat, and not quite extending laterally to the bases of the wings. Eggs of this sort were often produced in numbers by a single female—as many as 7–11 in a short time—and were deposited on the food, on the sides of the vial, or on the cotton plugs. After a day or two these eggs would hatch, the larvae would begin to work in the food, many of them surviving to pupation. The adults resulting from such larvae were identical in every way with wild specimens and those reared from white eggs. Adults of both sexes were produced from both egg types.

***Sinophthalmus pictus gagei* Patterson and Mainland.**

*S. pictus gagei* Pat. and Main., 1944. Univ. Tex. Publ. 4445:12.

This subspecies was described from a male collected by G. B. Mainland in 1942, from the Gage Ranch in central Chihuahua, Mexico. The type specimen has apparently been lost but was figured in color by the describers (*op. cit.*, Pl. XI).

**STEGANA Meigen**

1830. Syst. Besch., 6:79.

Genotype: *S. coleoptrata* (Scopoli).

Our understanding of this genus is still quite unsatisfactory. There are at least three species in the U. S. but their correct names are not at all certain. Malloch and McAtee (1924) state that the two species known to them agree perfectly with two European species and assign these names to them, *viz.*, *coleoptrata* (Scopoli) and *curvipennis* (Fallén), considering *vittata* (Coquillett) a synonym of the latter. Malloch (1924b) gives a key to the New World species known to him, including several new species described briefly in synoptic form, and later (1924a) gave complete descriptions of these forms, once again reporting *curvipennis* and *coleoptrata* as American. The arrangement by the present writer seems to be the best one under the circumstances.

*Stegana barretti* Johnson, from Mexico, belongs to *Amiota* and is discussed under that genus.

*Key to the Nearctic species of Stegana*

- |   |                              |
|---|------------------------------|
| 1. Palpi largely or entirely black; 3rd antennal segment yellow or slightly discolored at tip; mesonotum yellow with more or less evident narrow black stripes; face pale yellow; apical scutellar bristles about $\frac{2}{3}$ length basal ones ..... <i>vittata</i> (Coq.) |                              |
| Palpi entirely yellow; 3rd antennal segment black .....   | 2                            |
| 2. Scutellum with white median stripe; mesonotum with about 6 brown stripes, the median pair sometimes fused .....  | ? <i>coleoptrata</i> (Scop.) |
| Scutellum uniformly brownish black, heavily pollinose; mesonotum dark brown, its stripes scarcely evident; legs yellow with blackish discoloration apically on femora and basally on tibiae; face yellow with dark stripe just above oral margin .....                        | <i>Sp. A</i>                 |

✓ *Stegana vittata* (Coquillett).

*Phortica vittata* Coq., 1901, Proc. U. S. Nat. Mus., 23:618.  
 ? = *Stegana curvipennis* (Fallen).

Coquillett described *vittata* from Avalon and Delaware Water Gap, New Jersey, and from New York. A comparison of his account and specimens which agree with it with the keys and notes on European species of Duda (1924) and Seguy (1934) reveals the following striking differences:

<i>vittata</i> (U.S.)	<i>curvipennis</i> (Europe)
1. Mesonotum and scutellum yellow, former with 4-7 narrow, black lines; abdomen yellow with some brown dorsally.	Thorax and abdomen black.
2. Legs yellowish with brown bands near apices of mid and hind femora.	Legs with 2nd femora brown.
3. Halteres yellow.	Halteres brown.

It seems fairly certain that two entirely different flies are concerned here. Accordingly I am recognizing *vittata* as the valid name for the U. S. species.

The geographic distribution for this species cannot be given with any certainty; the records of Sturtevant (1921) are for both this species and *coleoptrata*. These records are all eastern: from Main to Florida, west to Wisconsin. Mr. Geo. Steyskal (private communication) reports *curvipennis* from Michigan.

✓ *Stegana coleoptrata* (Scopoli).

*Musca coleoptrata* Scop., 1763. Ent. Carniol. :338.

The U. S. species going by this name is keyed on the characters given by Malloch (1924b) although, as with *vittata*, there is no assurance that this is the correct name for our species. The remarks of Duda and Seguy (*op. cit.*) on true *coleoptrata* indicate that their form may be different, possessing entirely yellow legs or with some slight darkening apically, the pleurae with a narrow brownish longitudinal stripe, the palpi brownish yellow, and the face whitish with a narrow brown band just above oral margin. According to Seguy the larvae of this small species live in wood, especially of poplar (*Populus* sp.), and the adults are attracted to the cut surfaces of oak and poplar.

The American species is known mainly from the eastern states (see above); Steyskal (private communication) reports it from Michigan, and Malloch (1921) records a female from Urbana, Ill.

***Stegana* species A.**

Two specimens taken by the writer in general sweeping in the Dungeness Fork Forest Camp, Olympic National Forest, about 10 miles south of Sequim, Wash. (Aug., 1951), differ from the eastern species in the characters given in the key. Additional specimens from Glacier Park, Mont., and from Mt. Baker and Mt. Vernon, Wash., have been seen in the collection of Dr. A. L. Melander. We have not been able to match these with any described species but do not feel that it is wise to describe them

as new at the present time. I know of no record where members of the genus have come to banana-baited traps.

✓ **ZYGOTHRICA** Wiedemann

1830. *Achias* Dipt., Genus 16:3.

Genotype: *Z. dispar* (Wiedemann).

The members of this genus are largely confined to Central and South America although Malloch has described a typical form from Samoa. Two species have been previously reported from Mexico and two new ones are described here. *Z. aldrichi* Stvt., known from Panama has been included in the key since it is likely that it also occurs farther north in Central America. The genus seems to be related to the subgenus *Hirtodrosophila* of *Drosophila* and, like that group, is attracted to fungi. As mentioned below, however, *Z. dispar* has been reared from flowers in Brazil.

*Key to the Nearctic species of Zygothrica*

- |   |                           |
|---|---------------------------|
| 1. Wings clear, without dark clouds .....   | 2                         |
| Wings with three large clouded areas .....  | <i>aldrichi</i> Stvt.     |
| 2. Head greatly extended laterally, the eyes conically produced; only two orbital bristles evident .....  | <i>dispar</i> (some ♂♂)   |
| Head normal in shape; three orbitals present .....  | 3                         |
| 3. Mesonotum brown .....  | <i>dispar</i> Wied.       |
| Mesonotum yellowish to tan with more or less distinct darker longitudinal stripes or markings .....   | 4                         |
| 4. Longitudinal stripes extending along entire length of mesonotum .....  | 5                         |
| Mesonotum with a broad brownish stripe on posterior ½ which is continued across scutellum to apex; a faint stripe lateral to the large median one of mesonotum .....  | <i>semistriata</i> n. sp. |
| 5. Mesonotum with 6 longitudinal stripes, the median pair sometimes partly fused; scutellum with broad central stripe from base to apex; vibrissae arising from blackish areas .....  | <i>poeiyi</i> (Stvt.)     |
| Mesonotum with 3 broad stripes and two faint lateral ones, the middle 3 completely fusing at about the level of the anterior dorsocentrals; scutellum with a subquadrate dark area basally, the periphery including apex, pale yellowish tan; face wholly pale yellow ..... | <i>scutellaris</i> n. sp. |

***Zygothrica aldrichi* Sturtevant.**

*Z. aldrichi* Stvt., 1920. Proc. U. S. Nat. Mus., 58:157.

Sturtevant described this species from 33 individuals taken by Busck along the Trinidad River, Panama, from a white toadstool. He also reports it from Trinidad, West Indies. It probably occurs in Mexico.

✓ ***Zygothrica dispar* (Wiedemann).**

*Achias dispar* Wied., 1830. Aussereurop. Zweif., 2:556 (Diopsidae).

This species was described from Brazil and is known from Panama, West Indies and Mexico. The strangely pointed heads of some males are quite remarkable in the family and deserve further investigation since Sturtevant (1920) points out that the head character is variable, some males having the rounded eyes and orbital bristles found in females. The species has been found in association with fungi on several occasions; how-

ever, Frota-Pessoa (private communication) states that he has reared adults from flowers of *Brunfelsia grandiflora* (Solanaceae) from the Botanical Garden in Rio de Janeiro, Brazil. He has kindly donated several of these specimens to our collection.

✓ *Zygothrica poeyi* (Sturtevant).

*Drosophila poeyi* Stvt., 1921. Carnegie Inst. Wash. Pub. 301:76.

Originally described from Havana, Cuba, the collectors from this laboratory have taken the species in the following states in Mexico: Mexico, Michoacan, Puebla, and Federal District. Most of these collections were made from fungi.

✓ *Zygothrica scutellaris*, sp. nov.

External characters of imagines.

♂. Arista with 3-4 dorsal branches and 1 branch below basal to the terminal fork. Front longer than wide, the orbits pale yellowish tan with a large semi-shining, light brown frontal triangle reaching to the lunule, bordered on either side by rather wide, blackish-brown stripes, paler anteriorly. Verticals, postverticals and ocellars long, orbitals thin, anterior reclinate about  $\frac{2}{3}$  length posterior reclinate and slightly nearer the latter than the proclinate one, all 3 in nearly a straight row. Antennae light tan, 3rd joint darker, rather large and thickly haired, 2nd segment with 1 stout dorsal bristle and several smaller ones. Face and cheeks pale tannish yellow; carina large, prominent, rounded; antennal grooves beside carina deep. Palpi and proboscis yellow. One strong vibrissa, other orals short. Cheeks about  $\frac{1}{4}$  greatest eye diameter; eyes red with short, inconspicuous, pale pile.

Acrostichals in about 8 irregular rows; no prescutellars. Anterior dorsocentrals close to posterior ones, scarcely  $\frac{2}{3}$  as long. Anterior scutellars convergent, nearly as long as apical pair. Two humerals, ventral one short; 2 sternopleurals, anterior one about  $\frac{1}{3}$  length posterior. Mesonotum light tannish yellow with dark brown longitudinal stripes as follows: one covering median 4 acrostichal rows, and one in each dorsocentral row, these three coalescing on posterior  $\frac{1}{2}$ - $\frac{1}{3}$  of mesonotum, this large brown area continuing onto scutellum forming a rectangular basal area on about half of the disc, the remainder of the scutellum pale yellow; there are less distinct stripes above the alar bristles and also anteriorly along upper side of humeri. Pleurae pale yellow, or with slight discoloration just below notopleural suture. Halteres and legs yellow; fore tarsi with many short, irregular, recurved hairs.

Abdomen yellow with black bands; 1st 2 tergites nearly all yellow, the next 2 with large, black, shining bands, covering the tergite centrally but narrowing laterally into pointed apical extensions of the bands which fail to reach the margin; the following tergite with a large, black, shining area only in middle, the next showing a still smaller median spot, while the genital arch is entirely black except on the lower apical corners.

Wings clear, unmarked. Bristles at distal costal break thin and fine, the dorsal one larger; 3rd costal section with heavy bristles along its basal  $\frac{3}{5}$  or a bit less; costal index about 2.5; 4th vein index about 1.5; 5x index about 0.6, the last section of the 5th vein being quite long.

Length body (in pinned specimens) : about 2.5 mm.

Length wing: 2.8 mm.

*Distribution and Types.*—**Holotype** male (No. 1344.10) from Laguna Patzcuaro, Mich., Mexico, collected by G. B. Mainland, 8-1-42. *Paratype* male (No. 1342.9) collected by G. B. Mainland at Desietro de los Leones, D. F., Mexico, 7-29-42.

✓ *Zygothrica semistriata*, sp. nov.

**External characters of imagines.**

♂. Arista with 4-5 dorsal branches, and 1 branch below basal to the terminal fork. Front light tannish-brown, lighter in midline and pale anteriorly, yellowish pollinose on orbits, blackened on ocellar triangle; no enlarged prominent frontal triangle. Antennae tannish, moderately long-haired, 3rd joint long, reaching about to oral margin. Carina very large, especially prominent below, rounded, the face on either side deeply sunken forming crypts in which the antennae lie. Carina tan above, distinctly blackened below and along the incised oral margin. One strong vibrissa arising at the lower edge of the antennal foveae. Cheeks broad below center of eye, nearly  $\frac{1}{2}$  greatest eye diameter; cheeks dirty yellow, a tannish area just below center of eye, the lower margin black. Palpi dark, with a long apical bristle. Anterior reclinate orbital thin, about  $\frac{1}{3}$  length proclinate and closer to the latter than to posterior reclinate.

Acrostichal hairs in 6 rows, in 4 rows between the dorsocentrals; no prescutellars. Anterior dorsocentrals  $\frac{3}{4}$  length posterior pair; the 4 scutellar bristles about equal in length. Two strong humerals, the upper one longer; 2 sternopleurals, the anterior a little more than half length posterior; no propleurals. Disc of mesonotum tan, densely pale pollinose, becoming dark brown between dorsocentrals and similarly darkened over most of scutellum, only the lateral bristle-bearing areas pale yellow; less distinct darker stripes between dorsocentrals and supra-alars. Pleurae largely tan, indistinctly brownish on sternopleurae. Halteres pale. Legs uniformly pale yellowish-tan. Fore tarsi with pairs of semi-erect hairs along outer surface as in many species of *Scaptomyza*; fore metatarsus with several longer hairs below. Distinct apicals on 2nd tibiae, preapicals on 3rd tibiae, 1st tibiae without either obviously present.

Abdomen yellow with black bands which cannot be described accurately from these pinned specimens. The bands appear to decrease in size on posterior segments but retain median extensions to the base of the tergites; the lateral areas are also darkened except on the pregenital tergite. Male anal plate rather sparsely long-haired, with an elongate projection below as figured for *Z. poeyi* (Hsu, 1949).

Wings with a uniform brownish tinge, veins dark. Distal costal break with 2 bristles, the dorsal one distinctly stouter. Third costal section with

heavy bristles along its basal  $\frac{1}{2}$  or slightly less. Costal index about 2.8; 4th vein index about 1.7; 5x index about 2.2.

Length body (in pinned specimens) : about 3 mm.

Length wing : 3.5 mm.

*Distribution and Types.*—Known from two males collected by the writer from fungus at Peña de Gato, Puebla, Mexico in Sept., 1947. From general sweeping in the same area 5 specimens of *Z. poeyi* were captured.

**Holotype** male and **paratype** male (No. 1800.7), from the above locality, in the collection of The University of Texas.

## GENUS X

This genus, apparently undescribed, is known to me by two specimens as follows: ♂, Kern Canyon, Calif., April, 1934 (Th. Dobzhansky), now in the collection of Dr. A. H. Sturtevant; ♀, mountains about 25 miles northwest of Las Vegas, Nev., June, 1948, collected by the writer. These specimens seem to represent the same species and are rather intermediate between *Leucophenga* and *Rhinoleucophenga*, simulating the latter more noticeably in size, color and general body build. The following brief description may facilitate its future recognition:

Large yellowish species; arista plumose with short ventral branches. All orbitals strong; postverticals large; vibrissae large followed by a row of long, stout bristles. Carina quite low, nearly absent; cheeks narrow. Anterior dorsocentrals short; strong prescutellars; 1 strong humeral; 2 sternopleurals. Wings large, costa reaching 4th vein but weak beyond 3rd; wing blade rather dark with clouds over both crossveins and weaker ones along distal half of 1st vein and at apices of 2nd and 3rd veins. Abdomen pale brownish to tan, without obvious banding. Body length, ♂, about 4.5 mm. in pinned specimen.

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