VII. Taxonomic and Distributional Studies of Nearctic and Neotropical Drosophilidae

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During the past several years we have been engaged in a large scale study of the Drosophilidae of the Caribbean region. Our field collectors, financed largely by the National Science Foundation, have been Dr. William B. Heed (principal collector), Dr. Marvin Wasserman, Dr. H. L. Carson, and Mr. Hugo Hoenigsberg. Additional material has been collected for us by Dr. Th. Dobzhansky, Dr. C. Pavan, Dr. Danko Brncic, and Mrs. Marta Breuer, to whom we are greatly indebted. We have also had the use of some 6000 pinned specimens belonging to the United States National Museum, and we are grateful to Dr. C. H. Curran who graciously permitted us to borrow a number of specimens, including types, from the collection of the American Museum of Natural History.

These various collections have resulted in the finding of a great many undescribed species of Drosophila, of other genera of Drosophilidae, and other acalyptrate Diptera. In addition, information concerning the geographical distribution of many species has been tremendously increased. Some of the new species are being described in this paper, with occasional remarks on the taxonomy and distribution of other species.

A few undescribed species of Drosophila are still being found in North America, and I am taking this occasion to describe a few of them.

In view of the difficulties in taking care of laboratory cultures of many of our more exotic species, I want to express my sincerest gratitude to Mrs. Mary Budd for her loyal assistance. Mr. Peter Thompson kindly prepared the description of one of the new species and the figures for it, and the wing photographs were made by Dr. Frances Clayton.

The type specimens have been desposited in the Drosophila Type and Reference Collection of The University of Texas unless it is stated that they are the property of another museum.

Genus Drosophila

Subgenus *Siphlodora*

Drosophila flexa Loew

Drosophila flexa Loew, 1865. Berl. Ent. Zeit. 9:182 (Cent. VI, No. 89).
Drosophila subsigmoides Patterson and Mainland, 1944. Univ. Texas Publ. 4445:26. New Syn.

D. flexa was described from Cuba, *subsigmoides* from Mexico; our collections indicate that both names refer to the same, widespread species. We have been unable to detect any differences in the male genitalia of island and mainland specimens, and since the species cannot as yet be raised in culture in the laboratory we are forced to assume that only one species is concerned. The following summary of distribution includes, in addition to our own records, the reports of some of our collaborators in South America. *D. flexa* is now known from: Mex-

ico, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Brazil, and Cuba, Haiti, and Puerto Rico.

Subgenus *Hirtodrosophila*

Drosophila alabamensis Sturtevant

Drosophila alabamensis Sturtevant, 1918. Jour. N. Y. Ent. Soc. 26:38.

The holotype ♀ from Kushla, Alabama (AMNH) has been re-examined, and we now feel confident that we have collected this species from a number of localities: Austin, Texas (Oct., Nov.), Carlinville, Ill. (Aug., Sept.), Equality, Ill. (Sept.), Lithium, Mo. (June), Mongomery Co., Va. (Max Levitan, coll., April), Algonquin Park, Ont. (D. D. Miller, coll.). I have also seen a specimen from E. Lansing, Mich. (April). Williams and Miller (1952) report a specimen, as *alabamensis*-like, from Lincoln, Nebr. (May); their identification was probably correct.

Subgenus *Pholadoris* Sturtevant

Okada (1956) uses for this subgenus the name *Paradrosophila* Duda, 1924, in which Duda placed a number of species with prescutellar bristles. A type species was designated by Sturtevant in 1927, who chose one of the species included by Duda, *Drosophila pictipennis* Kertesz 1901. Although many of the species placed in *Paradrosophila* by Duda are co-subgeneric with the species now included in *Pholadoris*, it seems fairly certain that *pictipennis* is not co-subgeneric, and hence the only species which can logically be included in *Paradrosophila* are those which are, in turn, co-subgeneric with *pictipennis*.

We have not seen *pictipennis* Kertesz; however, Duda (1923. Ann. Mus. Nat. Hung. 20:43) reports briefly on the type ♀ in the Budapest museum, bearing the label "N.-Guinea, Biró, 1898", and later (1924. Arch. f. Naturg. 90A3: 206) gives some descriptive notes in his key and a photograph of the wing (Pl. IV, Fig. 59), characterizing the species as follows: wing very narrow, intensely black along the costa and especially broadly so on the basal and apical thirds, and with a large black cloud over the posterior crossvein; thorax yellow to brownish; proclinate orbital at most as long as posterior reclinate; anterior reclinate midway between the other two or closer to the proclinate. The photograph of the wing shows that it is not unusually narrow but the intense darkening is as described. The costal index appears to be near 3.0.

Drosophila (Pholadoris) latifasciaeformis Duda

Drosophila (Paradrosophila) latifasciaeformis Duda, 1940.

Synonyms are: *D. finitima* var. *gracilipes* Duda, *D. mirim* Dobzhansky and Pavan, *D. baeomyia* Wheeler. (See discussion in Burla, H. 1954. Rev. Suisse de Zool. 61:115 ff.).

There is evidence that this species is expanding its territory rather rapidly. Duda described it from specimens collected in 1913 in Uganda, Africa, and Burla *(op. cit.)* found it common in the region of the Ivory Coast. *D. mirim* was found in the State of Sao Paulo, Brazil in 1943, and the first records from Mexico were made by us in 1947. In 1948 we found it for the first time in the United States

where we have found it from Florida to South Carolina. Our more recent collecting shows that it is widely distributed throughout the Caribbean region: Cuba, Jamaica, Puerto Rico, St. Lucia, St. Kitts, Barbados, El Salvador, Nicaragua, Honduras, Costa Rica, Panama, Colombia, Trinidad, and Venezuela. It is also known from Peru and, as stated above, from Brazil.

Subgenus *Sophophora*
saltans group

Drosophila pulchella Sturtevant

Drosophila bellula Williston, 1896, not *bellula* Bergroth, 1894.
Drosophila pulchella Sturtevant, 1916. Ann. Ent. Soc. Amer. 9:327.

The type (AMNH collection) is a male in fair condition and clearly belongs to the saltans group. It is most similar to both *subsaltans* Magalhaes and *parasaltans* Magalhaes, having a light body color, but shows small differences from both of them as shown in the following comparisons:

pulchella—arista with 8 branches; middle orbital ¼ posterior; subcarinal hairs long and numerous; pleura pale.

parasaltans—arista with 10 branches; middle orbital ½ posterior; subcarinal hairs moderately long and numerous; sternopleura distinctly darkened above.

subsaltans—arista with about 12 branches; middle orbital 4/10 posterior; subcarinal hairs scanty, short, often absent; pleura more uniformly discolored.

The type was from the island of St. Vincent, B. W. I.; we have not yet taken this species in our own collecting.

Subgenus *Drosophila*
tripunctata group

Drosophila trifiloides Wheeler, new species.

External characters of imagines.

♂, ♀. Arista with 6 dorsal and 3 ventral branches in addition to the fork. Front tan, orbits and ocellar triangle paler; face and cheeks tan, clypeus a little darker. Proclinate orbital about 5/6 length posterior reclinate; anterior reclinate thin, about ¼ length proclinate. Carina broad, rounded, not sulcate; one prominent oral, the 2nd ⅓–½ as long; palpi with a strong subapical bristle, directed outward, and 3 others spaced along outer side. Face sometimes with slight whitish pollinosity.

Mesonotum tan, scutellum darker. Acrostichal hairs in 6 rows; no prescutellars; basal scutellars divergent. Pleura paler than mesonotum; halteres pale. Posterior sternopleural stout and black, anterior one only 0.6 as long. Legs pale; 1st femur with 2 strong bristles on inner side, and about 4 on outer side. Base of hind tarsus with only pale bristles below.

Abdomen light tan with apical bands and median spots as shown in Figure 1. In the ♀, tergites 2–4 have narrow apical bands, medianly interrupted, 5 has a still narrower band plus a poorly outlined median spot, and 6 has only a large black median spot, variable in shape but more or less rounded. In the ♂ tergite 5

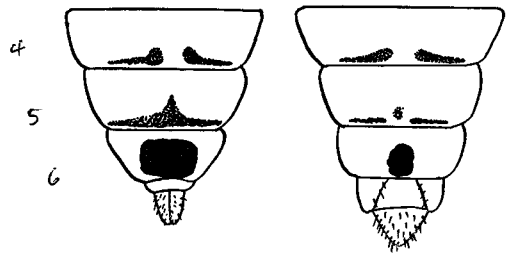


FIG. 1. *Drosophila trifiloides*, abdominal pattern of posterior tergites. Male, left; female, right.

has the band extended forward in the middle, and 6 has a large black median spot, usually somewhat rectagular but sometimes with the anterior margins more rounded.

Wings hyaline; posterior crossvein with a narrow light brown cloud, the anterior crossvein dark but without cloud. Costal index 3.4–4.1; 4th vein index 1.3–1.4; 5x index about 1.0; 3rd costal section with the small black bristles on the basal half.

Body length (live specimen), ♂, 2.6 mm., wing, 2.0 mm.; ♀, 3.2 mm., wing, 2.8 mm.

Other characteristics, relationship, and distribution.

Internal features.—Spermatheca elongate, pear-shaped (Fig. 9). Ventral receptacle with 60 or more coils. Testes pale whitish.

Eggs.—With 3 filaments, the anterior pair thin, pale, about ⅘ the egg length; the single large posterior filament is longer than the egg, this filament and the operculum both sclerotized, tan.

Puparia.—Tan; posterior spiracles pale, parallel and rather long; anterior spiracular horns short, about ⅙ length of the body, with about 12–14 pale branches.

Chromosomes.—These are described in detail by Clayton and Wasserman (this bulletin).

Distribution.—This species has been collected by us only twice: H50.10b, La Lima, Honduras, March 1954, W. B. Heed; H192.39A, Rionegro, near Bucaramanga, Colombia, September 1956, H. L. Carson, M. Wasserman, and H. Hoenigsberg.

Types.—Holotype male and 9 paratypes of both sexes, Rionegro, Colombia.

Relationship.—*D. trifiloides* apparently belongs in subgroup III of the tripunctata group of the subgenus Drosophila. The egg filaments suggest a relationship with *trifilum* from which it differs in many respects (one prominent oral, unclouded anterior crossvein, abdominal banding pattern, etc.). Using the key of Frota-Pessoa (1954) the species keys to the vicinity of *albicans* from which it is distinct in many characters including the egg filaments.

Notes.—The male genitalia were examined by Dr. Frota-Pessoa who reported as follows (comparing with *trifilum*): conical gonopophyses with bristles are absent; the cut in the midline of the posterior border of the hypandrium is narrower and deeper, and the bristles of the hypandrium are closer together. The clasper has 5–6 primary teeth, usually with the 6th separated from the others by a gap, the row followed by a cluster of long pale bristles.

repleta group

Drosophila aureata Wheeler, new species.

External characters of imagines.

♂, ♀. Arista usually with 3 dorsal and 2 ventral branches in addition to the fork. Front golden brown, rather velvety, turning more reddish on dead specimens, the orbits and ocellar triangle grayish brown pollinose. Antennae light brown; carina exceptionally broad below, shallowly sulcate, light brown; antennal foveae and palpi pale tan, clypeus dark brown. Cheeks pollinose tan, rather broad; 2 strong orals. Eyes medium red with short pale pile. Proclinate orbital nearly as long as posterior reclinate, the anterior reclinate about ¼ as long.

Acrostichals 4–6 rowed between the dorsocentrals, irregularly 8 rowed just anterior to them; no prescutellars. Anterior scutellars convergent. Mesonotum with dense pollinosity, dark golden to golden brown, with a few irregularly shaped darker brown spots: a pair anteriorly, one at the inner edge of each transverse suture, a median posterior stripe between middle acrostichal rows, and a few other less obvious marks. Scutellum golden brown pollinose, much darker on the basal lateral sides. Pleura brown but with an intense grayish, rather metallic, sheen when viewed from most angles. Halteres pale. Anterior sternopleural 0.6 length posterior, the middle one scarcely evident. Legs tan to light brown, femora sometimes a little darker. Inner surface of 1st femur of both sexes with a row of 8–10 widely spaced stiff bristles which are distinctly shorter and thicker than usual. Male 1st tarsus with very numerous short recurved hairs, their length generally less than the diameter of the tarsus.

Abdominal tergites with large dull black bands occupying most of the area, interrupted medianly with yellow, the two colors strongly contrasting; the bands are a little narrowed before reaching the angle, then expand into solid black lateral areas. Male genital arch dark; sternites pale.

Wings hyaline, the 1st vein darkened. First costal section with one strong bristle at apex; 3rd section with the small black bristles on the basal ½. Costal index about 3.1; 4th vein index about 1.8; 5x index about 0.9.

Body length (live flies), ♂, 3.0 mm.; wing, 2.5 mm.; ♀, 3.7 mm.; wing, 3.0 mm.

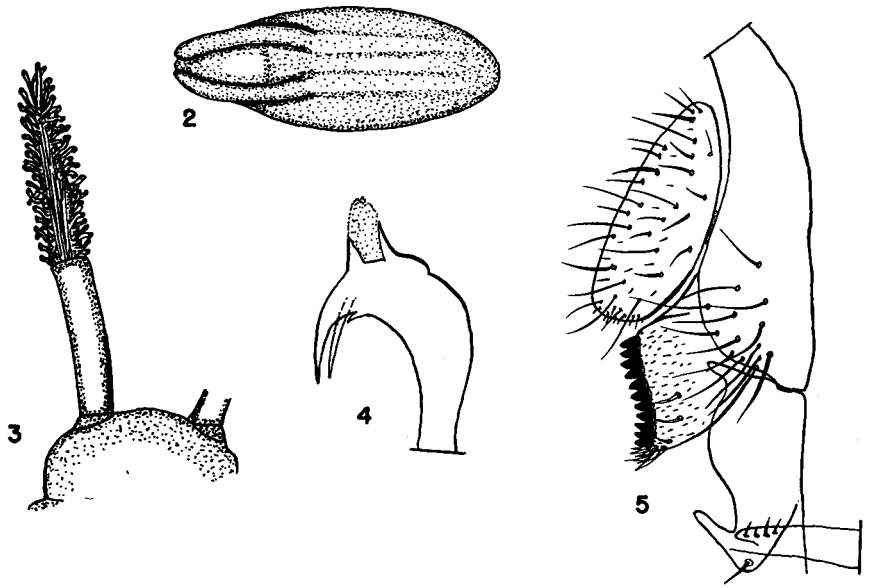
Internal characters of imagines.

Spermatheca with very small, slightly sclerotized center; ventral receptacle of medium length, with about 13–15 tight coils basally, more irregularly tangled distally. Ovipositor with about 18 coarse, pale teeth, a long apical bristle, and the usual ventral one (opposite tooth No. 7), plus two secondary bristles. Anterior Malpighian tubes with the common stalk about ¼ their total length; common stalk of posterior pair shorter, the ends apposed but without continuous lumen. Testes pale lemon yellow, irregularly formed into about 3½ coils; sperm pump slightly bulbous below but without true diverticula. Genital arch of male, with some of the attached pieces as shown in Figure 5; penis (Fig. 4) with two stout diverging spines, and an apical non-sclerotized sac-like process arising from sclerotized protuberances. Anal plate with only a slight connection to the genital arch.

Other characteristics, relationship, and distribution.

Eggs.—With only two filaments (Fig. 2), the usual posterior ones, which are always closely appressed to the opercular region.

Puparia.—Pale tan; anterior spiracles (Fig. 3) appearing rather feathery, with many short branches on a central stalk; horn plus spiracle equals half length body; posterior spiracles short, surrounded by two rows of fleshy processes whose surfaces bear numerous minute spines.



FIGS. 2–5. *Drosophila aureata.* FIG. 2, egg; FIG. 3, anterior spiracle of puparium; FIG. 4, head of penis, profile view; FIG. 5, genital arch, clasper, and attached pieces.

Chromosomes.—These are described by Clayton and Wasserman (this bulletin).

Relationship.—*D. aureata* appears to be an aberrant member of the repleta group of the subgenus Drosophila.

Distribution.—We have collected this species in Mexico (San Andres Tuxtla, Vera Cruz), El Salvador (San Salvador, and Laguna de Zapotitan), Costa Rica (San Jose), Panama (Cerro La Campana), and Trinidad. Collectors were W. B. Heed, H. L. Carson, and M. Wasserman.

Types.—Holotype male and 8 paratypes of both sexes, from stock No. H180.42, which originated from a collection of 13 individuals taken from a slime flux of a large willow tree, San Jose, Costa Rica, Aug. 1956. The other specimens were taken at banana-baited traps.

pallidipennis group

The species *pallidipennis* consists of two subspecies, *D. pallidipennis pallidipennis* Dobzhansky and Pavan from South America, and *D. p. centralis* Patterson and Mainland, known only from Mexico. Patterson and Dobzhansky (1945) reported that crosses between the two subspecies produced fertile F_1 females and

sterile males. Our more recent collecting has shown that the species is generally distributed throughout Central America. We have made a number of crosses between the various strains in the laboratory, including one from Tingo Maria, Peru, the results of which are shown in Table 1. The stock from Peru appears to be the only one representing the subspecies *pallidipennis*, all other strains being quite interfertile and representing *centralis*. Although all possible crosses have not been completed, it is apparent from the table that only four crosses between the subspecies gave the same results as those reported by Patterson and Dobzhansky, while two crosses produced no F_1 adults and two others produced sterile females as well as males. Finally, in the three cases where the cross was made reciprocally, different results were obtained when the Peruvian parent was the female and when it was the male.

TABLE 1

Crosses between strains of *D. pallidipennis*

♂ ♀	62.58 Salv.	91.25 Colo.	191.48 Colo.	1804.3 Mexico	2263.21 Mexico	29.27 Salv.	183.17 Panama	2373.5 Peru
62.58	X	F	F	F			F	F ♀ S ♂
91.25	F	X	F		F	F	F	Few F_2 larvae, died
191.48	F	F	X	F	F		F	F_1 sterile ♂, ♀
1804.3	F		F	X	F	F		
2263.21		F	F	F	X	F	F	
29.27		F		F	F	X		
183.17	F	F	F		F		X	F_2 larvae, 1 pupa, no adults
2373.5	F_1 sterile ♂, ♀	F ♀ S ♂	F ♀ S ♂		F ♀ S ♂			X

F = fertile, producing an F_2
S = sterile

calloptera group

In the excellent summary of this group by Burla and Pavan (1953) five, possibly six, species were recognized; we have seen additional material of all of them, and have records of two new species. With some exceptions, the known distributions of the species are shown in Fig. 6. *D. quadrum* is not shown, since most of the localities are farther south in Brazil; *calloptera*, *schildi*, and *atrata* are also well known from southern Brazil. *D. calloptera* has the most extensive distribution: from Tamazunchale, S. L. P., Mexico, to Sao Paulo, Brazil; it occurs on Trinidad but on the islands of the West Indies it is replaced by *ornatipennis*, which we have taken in Cuba, Jamaica, Puerto Rico, Haiti, St. Kitts, and St. Lucia. We are still unable to say whether *schildi* and *poecila* are one or two species but our collections indicate that there is only one widely distributed species, known from Costa Rica, Panama, Colombia, Venezuela, Trinidad, and Brazil.

D. atrata has been known only from Brazil; Dr. Wasserman collected 15 individuals at Caripe, Venezuela, where both *calloptera* and *schildi* were taken

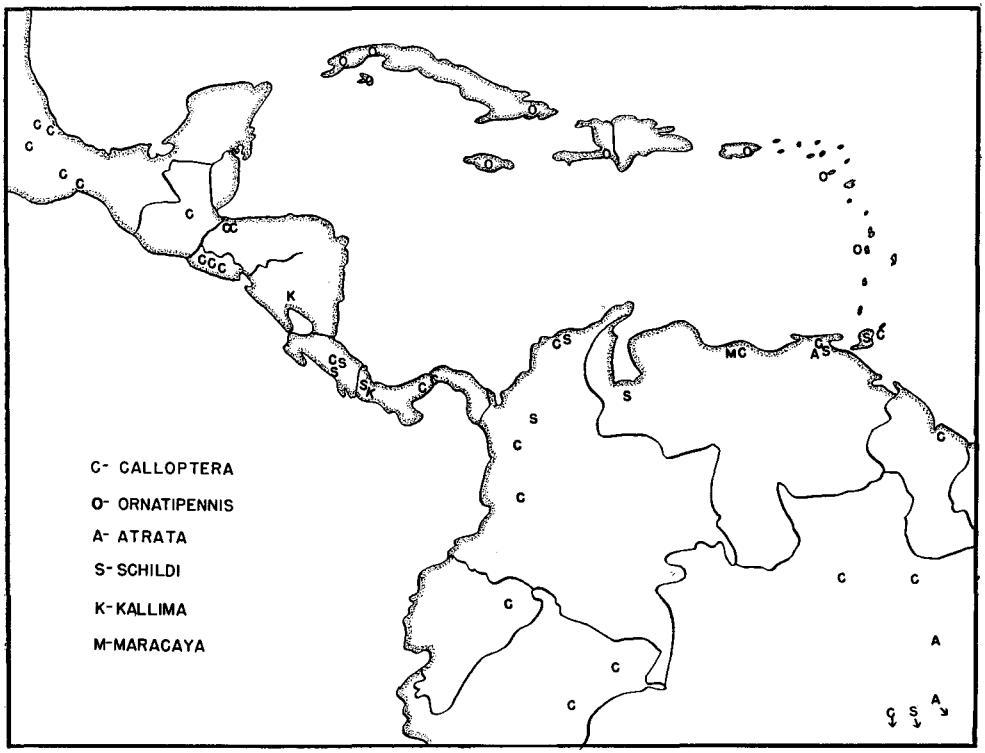


FIG. 6. Geographic distribution of members of the calloptera group. *D. quadrum* is not shown. nor are most Brazilian records of *calloptera*, *atrata*, and *schildi*.

simultaneously. Previous records of *D. quadrum* are from the State of Sao Paulo, Brazil, to Rio Grande do Sul; we can report three additional specimens, from the USNM collection: 2, Perene, Peru (R. C. Shannon); 1, Surukum, Venezuela (P. Anduze.)

We have been able to maintain *schildi* in culture for only about three generations, but *calloptera*, *ornatipennis*, and *atrata* have been maintained with comparative ease. Stocks of these three species have been tested for interfertility, with the results shown in Table 2. We obtained no hybrids between species, but all crosses between strains of *calloptera* were successful.

TABLE 2

Crosses between strains of the calloptera group

		calloptera			*atrata*	*ornatipennis*
♀	74.3	181.16	192.11	203.21	203.23	2378.2
♂	Costa Rica	Panama	Colombia	Venezuela	Venezuela	Cuba
74.3	X	F	F	F	S	S
181.16	F	X	F	F	S	S
192.11	F	F	X	F	S	S
203.21	F	F	F	X	S	S
203.23	S	S	S	S	X	S
2378.2	S	S	S	S	S	X

F = fertile, producing an F_2
S = sterile; no F_1

Drosophila kallima Wheeler, new species.

External characters of imagines.

♂, ♀. Most similar to *schildi*, differing most obviously in the wing pattern (Fig. 7). Front whitish yellow, brown around ocelli and bases of verticals; proclinate orbital ⅔ length posterior reclinate; anterior reclinate thin, hairlike, about ⅙ posterior. Face, antennae, clypeus except base, and palpi except base, all pale yellowish; bases of clypeus and palpi brown; proboscis brown with pale labellum. Arista with 7 dorsal and 4 ventral branches in addition to the fork. One strong oral; cheeks narrow, brown below eye becoming grayish yellow posteriorly.

Mesonotum dull reddish brown with a pattern of pale tan to whitish pollinose spots, streaks and blotches. Generally there is a poorly defined pale area on anterior ⅔ between dorsocentral rows, within which there are 3 medium large brown blotches; from this a thin irregular median line continues to scutellum. About 6 pale marks laterad of dorsocentral rows. Acrostichal hairs in 4 rows between anterior dorsocentrals, irregularly 6-rowed in front; one or more bristles in dorsocentral rows enlarged, an especially prominent one just anterior to edge of transverse suture.

Scutellum dark brown with 5 gray pollinose areas: one at base on each side and 3 apical ones which may be partly fused. Basal scutellars divergent. Pleura mottled with dark brown, tan and gray pollinose areas, not organized into a describable pattern. Anterior sternopleural 0.7 length posterior; middle bristle thinner but of about same length as anterior one. Halteres with brownish discoloration on front surfaces.

Legs brown, especially coxae and femora; tibiae paler with a tendency toward basal and subapical darker bands; tarsi pale. Hind metatarsus with 2 large, 1 smaller, stout black bristles among the pale ones basally below.

Abdomen with pattern of dark dull brown apical bands, expanded in the middle and at lateral margins, the large paramedian basal areas thus formed being grayish pollinose, sometimes almost metallic. Anal plates and ovipositor of female pale.

Wings as in Figure 7. Vein 2L with spur veins as in *schildi* and *quadrum*. Costal index 3.1–3.3; 4th vein index 1.3–1.4; 5x index about 0.7.

Body length (pinned female) 3.2 mm., wing, 4.0 mm.; males smaller.

Other characteristics, relationship, and distribution.

Male clasper with 7–9 primary teeth followed by a cluster of pale hairs going around onto lower side, and with 4–5 long bristles in secondary position; genital arch with a single strong bristle just above attachment of clasper, and 2 bristles on heel area; lower tip of anal plate with a cluster of small bristles. Ovipositor slender, pointed, with about 17 primary teeth, 6 secondary teeth, and 4–5 pale bristles near tip. Spermatheca, as observed in cleared preparation of pinned specimen, dark, shaped about as in Figure 17.

Distribution and types.—Holotype male, 9 paratypes of both sexes, plus 7 additional specimens, from Hacienda Santa Maria de Ostuma, about 11 klm. north of Matagalpa, Nicaragua, June 1954, W. B. Heed collector. Two specimens (USNM) labelled Panama, Volcan Chiriqui Prov., 9-XII-1952, F. S. Blanton.

Relationship.—Belongs to the calloptera group of the subgenus Drosophila.

Drosophila maracaya Wheeler, new species.

External characters of imagines.

♂, ♀. Similar to *calloptera,* but with an entirely different wing pattern (Fig. 8), the 5th vein with a spur vein. Arista with 6 dorsal and 4 ventral branches in addition to the fork. Front, antennae, face and clypeus whitish yellow, ocellar area, orbits and bases of verticals a little darker; clypeus brownish at base. Palpi dark tan; cheeks narrow, grayish brown, darker behind.

Mesonotum mottled, dark brown with golden brown pollinose blotches and spots, the appearance varying with the viewing angle; in general the anterior

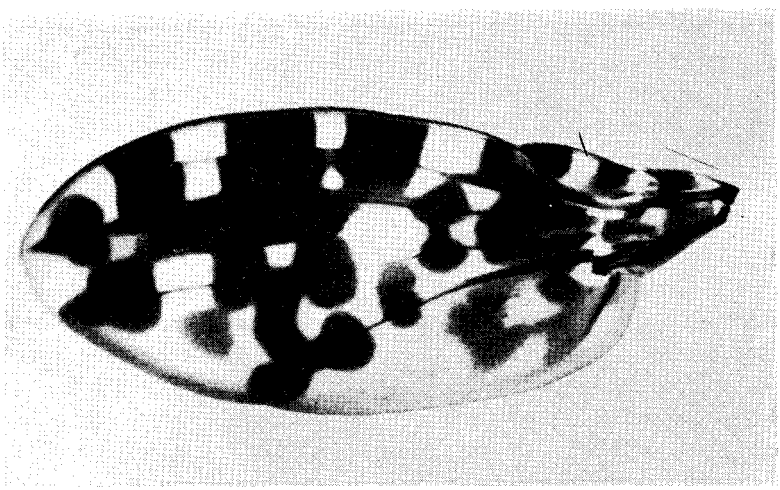


FIG. 7. *Drosophila kallima,* photograph of wing.

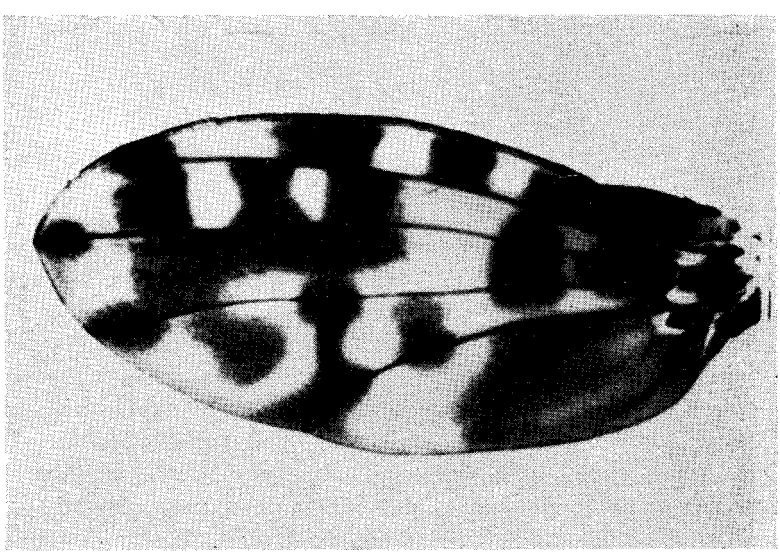


FIG. 8. *Drosophila maracaya,* photograph of wing.

⅓ is golden with a partial median brown streak, but which appears dark brown to black when seen from behind; posteriorly and laterally there are a number of golden brown spots and blotches. Scutellum broadly brown except on sides where it is more tan. Acrostichal hairs rather sparse, irregularly 6-rowed; no prescutellars; an enlarged bristle near inner edge of transverse suture. Basal scutellars divergent. Pleura dark brown to blackish brown, pollinose. Posterior sternopleural stout and long, the other two equal in size, about 0.6 length posterior. Halteres tan.

Legs mostly brown, including coxae; tibiae paler, tarsi grayish yellow. Base of hind metatarsus below with 2 bristles darker than the others. Abdomen with dark brown apical bands with median extensions, leaving paired tan basal markings. Male tergite 2 mostly brown, 3, apical band with large median expansion, 4–5, with narrower expansions, the band of 5 thicker; 6 all dark brown; all bands form solid lateral areas. Female as in male, but tergite 6 with small paired basal tan areas, 7 all dark; anal plates and ovipositor tan.

Wings as in Figure 8, vein 2L lacking spur veins but 5L with a spur in the large dark spot before posterior crossvein. Third costal section with the small black bristles on the basal 0.4; costal index about 3.4; 4th vein index about 1.2; 5x index about 0.6.

Body length (pinned female) up to 3.5 mm., wing, 3.2 mm.; ♂ smaller.

Relationship.—Belongs to the calloptera group of the subgenus Drosophila.

Distribution and types.—Holotype ♂, 9 paratypes of both sexes, Rancho Grande, near Maracay, Venezuela, Nov. 1956, M. Wasserman collector.

melanderi group

Drosophila ordinaria Coquillett

Drosophila ordinaria Coquillett, 1904. Proc. Ent. Soc. Wash. 6:190.

An examination of the holotype female showed that this rare species belongs to the melanderi species group, and is quite similar in appearance to both *melanderi* and *magnafumosa*. The type, in the U.S. National Museum collection, is from the White Mountains, N. H., and I have examined a second specimen, in the Museum of Comparative Zoology, from St. John's County, Quebec. Sturtevant (1921:86) lists a specimen from Chester, Mass.

The melanderi group now consists of the following species: *melanderi* Sturtevant, *magnafumosa* Stalker and Spencer, *ordinaria* Coquillett, all from North America, *cameraria* Haliday (=*pallida* Zetterstedt) from Europe, and *makinoi* Okada from Japan. As far as known, all the species are mushroom feeders and are poorly attracted to fruit baits; they also show many morphological similarities to the subgenus Hirtodrosophila.

polychaeta group

Drosophila polychaeta Patterson and Wheeler

Drosophila polychaeta Patterson and Wheeler, 1942. Univ. Texas Publ. 4213:102.

Our original specimens came from the wharfs at Galveston, Texas. The species has since been reported from various widely scattered localities, including the Netherlands, Liverpool (on ships from west Africa and Malaya), Hawaii, and Guam, and I have seen specimens from Saipan and Guam (Marianas) and

Koror (Palau). New American records are: 1, Cativa, Colon Prov., Panama; 6, Cocos Island, Wafer Bay. Cocos is a small island belonging to Costa Rica, nearly midway between the latter and the Galapagos Islands. These 7 specimens are in the U. S. National Museum collection.

canalinea group

Recent collections have shown that there are perhaps 6–8 species in Central and South America that are related to *canalinea* Patterson and Mainland. We have not succeeded in culturing most of these, but hybridization tests between the seven stocks which we did have available showed that three species were present in the laboratory. The results of these tests are given in Table 3. The geographic origins of the stocks used are as follows:

canalinea: H50.31 La Lima, Honduras
H101.7 Palmira, Colombia
H188.21 Santa Marta, Colombia
canalinioides: H38.6 San Salvador, El Salvador
H66.7 San Salvador, El Salvador
H181.55 Barro Colorado Island, Canal Zone
paracanalinea: H129.19 El Yunque, Puerto Rico

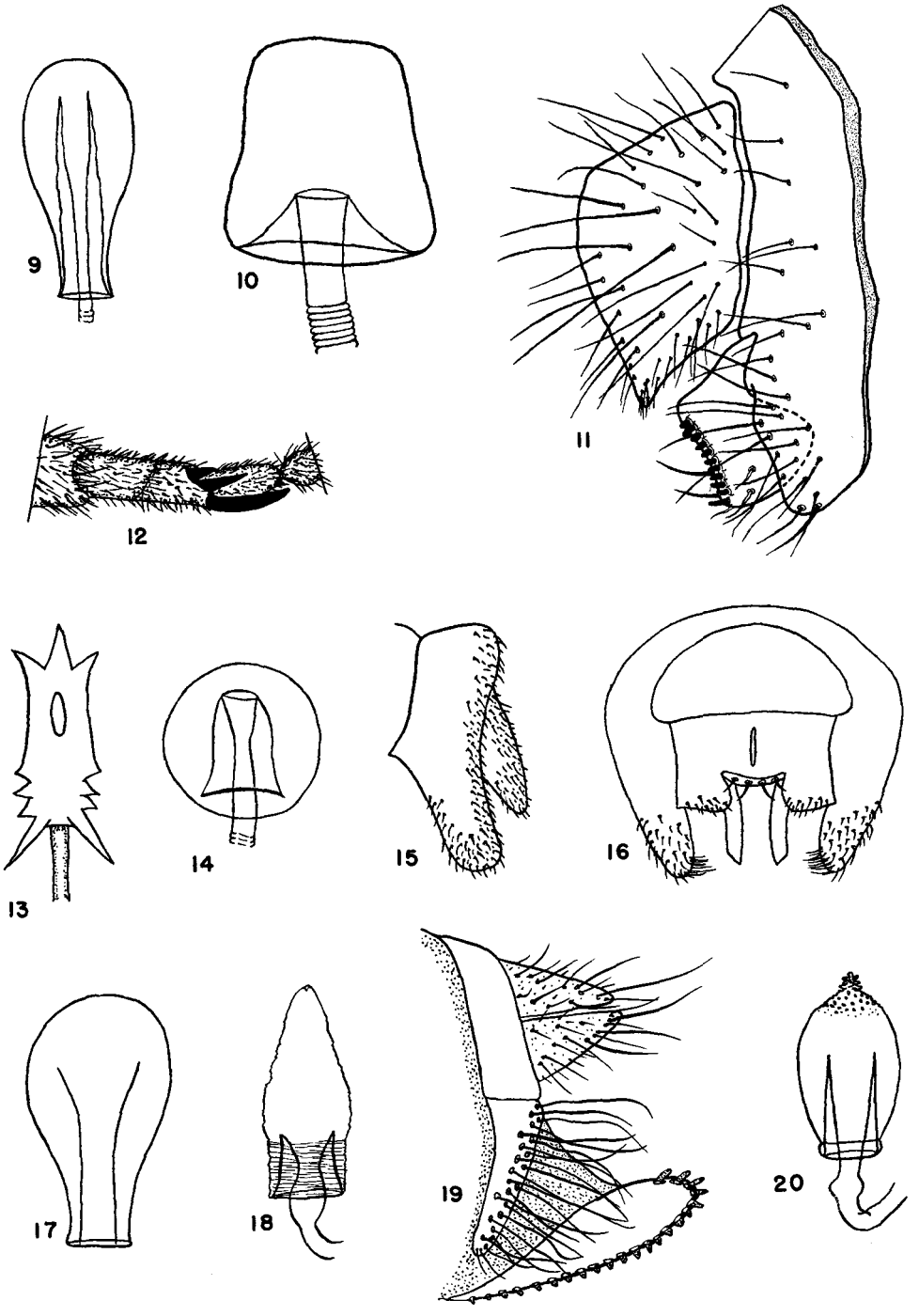
As the table shows, intraspecific crosses are fully fertile, and interspecific crosses are sterile with the single exception of *canalinea* ♀ (50.31) × *paracanalinea* ♂ (129.19). The cross was made by mass matings of about 10 ♂, 10 ♀; the first attempt yielded three F_1 males which were backcrossed to parental females and proved to be fertile. The cross was made again and watched more closely. The cross produced an estimated two dozen larvae from which only seven pupae developed; from these only three F_1 males emerged, the remaining pupae undergoing an internal degeneration. These males were similarly backcrossed to parental females and proved to be fertile.

TABLE 3

Results of crosses between members of the *canalinea* complex

	Intraspecific Cross ♀ ♂		Interspecific Cross ♀ ♂		Cross ♀ ♂	
canalinioides	38.6 × 66.7	F	38.6 × 50.31	S	50.31 × 38.6	S
	38.6 × 181.55	F	38.6 × 101.7	S	50.31 × 66.7	S
	66.7 × 38.6	F	38.6 × 129.19	S	50.31 × 181.55	S
	66.7 × 181.55	F	66.7 × 50.31	S	50.31 × 129.19	few
	181.55 × 38.6	F	66.7 × 101.7	S	101.7 × 38.6	S
	181.55 × 66.7	F	66.7 × 129.19	S	101.7 × 66.7	S
			181.55 × 50.31	S	101.7 × 181.55	S
canalinea	50.31 × 101.7	F	181.55 × 101.7	S	101.7 × 129.19	S
	101.7 × 50.31	F	181.55 × 129.19	S	129.19 × 38.6	S
	188.21 × 101.7	F	129.19 × 181.55	S	129.19 × 66.7	S
			129.19 × 50.31	S	129.19 × 101.7	S

F = fertile F_1 produced
S = sterile; no F_1



FIGS. 9–20. FIG. 9, *D. trifiloides*, spermatheca; FIG. 10, *D. paraguttata*, spermatheca; FIG. 11, *D. paraguttata*, genital arch and clasper; FIG. 12, *Laccodrosophila heedi*, part of front tarsus, ventral view, diagrammatic; FIG. 13, *D. sticta*, head of penis, ventral view; FIG. 14, *D. sticta*, spermatheca; FIG. 15–16, *Pseudiastata* sp. from Cuernavaca, Mexico, genital arch and genitalia from below; FIG. 17, *D. kallima*, spermatheca; FIG. 18, *D. canalinioides*, spermatheca; FIG. 19, *D. canalinioides*, female genitalia showing paragenital fringe, semi-diagrammatic; FIG. 20, *D. paracanalinea* and *canalinea*, spermatheca.

Drosophila canalinea Patterson and Mainland

Drosophila canalinea Patterson and Mainland, 1944. Univ. Texas Publ. 4445:50.

This species is widely distributed throughout the Neotropical region. We have material from Mexico, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Trinidad, Ecuador, and Brazil. The only collection of canalinea-like flies from the Caribbean islands was on Puerto Rico, but this stock showed nearly complete reproductive isolation from *canalinea* and is being described as a new species, *D. paracanalinea.*

Drosophila canalinioides Wheeler, new species.

External characters of imagines.

♂, ♀. Arista with 5–7 dorsal branches, 3 ventral ones and a terminal fork. Front dull blackish brown with strong pollinose gray to brown areas along orbits, two large spots anteriorly, and on the large ocellar triangle, the latter extended anteriorly to ptilinal suture, gradually narrowing. Proclinate orbital ¾ length posterior reclinate; anterior reclinate tiny. Antennae blackish with pale yellow apices on 2nd and 3rd segments. Carina broad, rounded; face yellowish gray, clypeus and cheeks black, the latter with grayish pollen; palpi and proboscis black. One prominent oral.

Mesonotum dull, with complex, somewhat variable, pattern of dark brown and pale tannish brown areas with many of the bristles and hairs which arise within the pale areas showing dark spots at their bases; the resulting pattern resembles that of *canalinea* plus scattered *repleta*-type spots. Acrostichal hairs in 8 rows; no prescutellars. Anterior scutellars convergent. Scutellum black with grayish brown pollen on each basal angle and broadly over apex. Pleura dull black with mottled grayish pruinescence when viewed from certain angles. Halteres pale, darkened at base. Anterior sternopleural about ¾ posterior one, a middle one scarcely differentiated.

Legs mostly black, with annulated tibiae and yellow tarsi. Femoral-tibial junction pale; tibiae with basal and apical black areas, paler in the middle, the pale portion faint on 1st leg, larger on 2nd and still larger on 3rd. Male 1st tarsus with a series of about 14 long recurved hairs along inner side, their length nearly equalling tibial diameter. Base of hind tarsus with pale bristles below.

Abdominal tergites with broad apical bands, interrupted medianly, the interruptions becoming progressively narrower on posterior tergites; the bands are wide next the interruption, then narrow, then widen again to form solid lateral areas. The basal yellow area on each side with whitish to silvery pruinosity when viewed from most angles. Circumanal tergite of ♀ with a prominent "paragenital fringe" of about 24 long slender bristles on each side (Fig. 19); as far as known, a similar sort of fringe occurs on the females of all species of the *canalinea* group, but has not yet been seen on species of any other group.

Wings light brown, paler posteriorly; apex of 1st costal section a bit enlarged, black, with 2 bristles; 3rd costal section with the small black bristles on the basal ⅘. Posterior crossvein with a moderately narrow black cloud, the anterior one with a small cloud. Costal index about 2.2; 4th vein index about 1.6; 5x index about 0.9.

Body length, live ♂, about 3.2 mm., wing, 2.6 mm.; female, about 3.8 mm., wing, 2.6 mm.

Internal characters of imagines.

Ventral receptacle long with many tight coils; spermatheca (Fig. 18) pale tan, elongate but narrowed apically, most of the surface with fine wrinkles except basally with numerous fine sulci. Ovipositor with about 23 primary teeth, longer than usual, and 4 slender secondary bristles. Posterior Malpighian tubes apposed at the tips, without a continuous lumen. Testes orange (young ♂ ♂) to rusty red (older ♂ ♂); sperm pump with two long thick, somewhat tangled, posterior diverticula. Clasper with a slightly curved row of about 10 teeth, the lower 2–3 distinctly more pointed; penis shaped nearly as in *canalinea*.

Other characteristics, relationship, and distribution.

Eggs.—With 4 filaments, the anterior pair short and thin, the posterior pair thicker and longer, nearly ⅔ the egg length.

Larvae.—The larvae skip, but infrequently.

Puparium.—Dark tan; anterior spiracular horns short, about equalling the distance between their bases, bearing 9–10 branches. Posterior spiracles rather long, pale, parallel.

Chromosomes.—The chromosomes are described by Clayton and Wasserman (this bulletin).

Distribution.—Our collectors have taken this species rather commonly in El Salvador (San Salvador, Santa Tecla), and on Barro Colorado Island, Canal Zone. The U.S. National Museum collection has specimens from: Costa Rica (San Mateo), Panama (Patino Point, San Carlos, Barro Colorado Island, Loma Borracha, Tocumen), and Venezuela (Carife).

Types.—Holotype ♂ and 9 paratypes (♂, ♀) from stock No. H66.7 from San Salvador, El Salvador, Sept. 1956, W. B. Heed, collector. This stock originated from 6 individuals collected by Dr. Heed from bracket fungus.

Drosophila paracanalinea Wheeler, new species.

This new species is quite similar in appearance to *canalinea*, but a side-by-side comparison of living individuals of a stock from Puerto Rico with individuals of *canalinea* (Honduras stock) shows some fairly reliable differences:

canalinea	*paracanalinea*
1. mesonotum dull; ground color dark brown	1. slightly shining; brownish black
2. eyes very dark red	2. brighter red
3. abdominal bands dark brown, the yellow areas pronounced	3. blacker bands, yellow areas not pronounced
4. sternites pale, grayish	4. sternites darker
5. ♀ circumanal tergite pale below, with *ca.* 7 hairs in paragenital fringe	5. this tergite dark below, with *ca.* 9 hairs in paragenital fringe

Dissections of male and female genitalia show small, possibly not significant differences: clasper of *canalinea* with usually 9 primary teeth *vs. paracanalinea*

with usually 10; spermatheca (Fig. 20) of *paracanalinea* generally more irregularly warty over the apical ½, and the inner duct usually a little shorter.

The chromosomes also differ, and are described by Clayton and Wasserman (this bulletin).

Distribution.—Collected by Dr. W. B. Heed in El Yunque, Caribbean National Forest, Puerto Rico, January 1956, and at the Agricultural Experiment Station, Rio Piedras, Puerto Rico, February 1956.

Types.—Holotype ♂, and 9 paratypes (♂, ♀), from El Yunque, Puerto Rico.

Drosophila annularis Sturtevant

Drosophila annulata Williston, not Fallén.
Drosophila annularis Sturtevant, 1916. Ann. Ent. Soc. Amer. 9:327.

A female labelled Type, from the collection of the American Museum of Natural History, is headless and a portion of the abdomen is missing; it clearly shows, however, the *canalinea*-like pattern on the mesonotum and legs, and has an especially well-developed paragenital fringe, the hairs being longer and more numerous than on any other specimen we have seen. The apex of the 1st costal section is enlarged and strongly blackened, but the crossveins show no clouding at the present time. On the remaining part of the abdomen one can see that the midline stripe (interruptions) are strongly grayish to silvery pruinose. We conclude that this species is distinct from any we have collected, and that the various published records of this species from Central and South American localities are to be viewed with suspicion.

Drosophila panamensis Malloch

Drosophila panamensis Malloch, 1926. Proc. U.S.N.M. 68 (21):28.

This species is probably best placed as an aberrant member of the canalinea group. We have examined the type in the USNM, and a single ♀, AMNH collection, also from Barro Colorado Island, Canal Zone. The general appearance is not that of *canalinea*, having a golden yellow face and front (the latter with a V-shaped brown mark on the type), and a different sort of mesonotal pattern. The female has, however, a paragenital fringe, a rather typical abdominal pattern and leg markings. The wing is quite dark, with still darker clouds over the crossveins; the 3rd costal section has the small black bristles reaching all the way to the 3rd vein, and the 4th vein clearly bends toward the 3rd at its apex.

fenestrarum group (Subgenus uncertain)

Drosophila basdeni Wheeler, new species.

=*Scaptomyza sp. B*, Wheeler, 1952. Univ. Texas Publ. 5204:197, 208.

External characters of imagines.

♂. Front tannish yellow, the orbits paler, less than half width of head. Anterior reclinate orbital about ⅓ proclinate, ¼ posterior reclinate. Antennae pale yellow, 2nd segment with 4 stout bristles, 3rd small; arista with 5 dorsal and 2 ventral branches in addition to the fork. Face whitish yellow, low, a carina scarcely indicated; cheeks whitish, very narrow. Vibrissa thin, 2nd oral about ¾ as long and placed rather far behind 1st. Palpi pale with a strong apical bristle.

Mesonotum and scutellum pale tan, rather shiny; acrostichal hairs in four rows; no prescutellars. Apical scutellars cruciate and bent somewhat upright. Two nearly equal humerals; posterior sternopleural large, the other two thin, middle one longer than 1st. Pleura tan, a trifle darker on mesopleura. Legs wholly yellowish.

Abdominal tergites blackish, distinctly shining; tergites 1–2 paler. Halteres pale. Sternites pale. Wings clear, rather narrow and somewhat pointed. Two prominent bristles at distal costal break; 3rd costal section with the small black bristles on the basal 5/8. Costal index about 3.2; 4th vein index about 2.0; 5x index about 1.9. Anal vein greatly reduced.

Body length (pinned specimen) about 2.1 mm.; wing, 1.9 mm.

Distribution and types.—Holotype ♂ (USNM), E. Lansing, Mich., May 4, 1949, Ryoji Namba collector. Paratype ♂, Mohawk Park, Ohio, May 10, 1937, H. D. Stalker collector.

Relationship.—This new species belongs to the fenestrarum species group and is the first member of the group to be reported from North America. It is quite distinct from any of the Palaearctic species: *fenestrarum* Fallén, *forcipata* Collin, and *acuminata* Collin.

Collin (1952) gives the following features of the fenestrarum group: acrostichals irregularly 4–6 rowed; facial carina small; middle sternopleural longer than anterior one; arista with 2 ventral branches basal to the fork; male fore metatarsus ventrally with an apical tuft of long pale hairs, and with a less obvious tuft on the 2nd joint; male hypopygia generally rather large. Collin has pointed out that the group occupies a somewhat isolated position in the genus. Hackman (1954) comments that many features, including those of the genitalia, suggest a relationship with some of the species of *Scaptomyza*, and is of the opinion that a new subgenus should be erected for the group. Little is known of the food habits of the species of this group, but since Basden (1954) reports taking both *fenestrarum* and *forcipata* by sweeping over watercress (*Nasturtium microphyllum*) in Scotland, a position intermediate between *Drosophila* and *Scaptomyza* is again indicated.

The holotype specimen of *basdeni* was compared with the Palaearctic species by Mr. E. B. Basden of Edinburgh who has graciously permitted the use of his notes. He states that *basdeni* is most similar to *acuminata*, especially in the form of the genital arch and the lack of large claspers. *D. acuminata* also shows, according to Basden, the following obvious differences: tergites with more obvious apical bands; cheeks pale brownish; palpi blackened; frons broader; mesonotum tannish brown but darker posteriorly and on scutellum; much of the pleura darkened ; wings broader; 3rd costal section with stronger bristles on the basal 1/4; etc. In both *fenestrarum* and *forcipata* the thoracic and abdominal color is subject to considerable variability.

Subgenus **Drosophila** (unclassified species)

Drosophila carsoni Wheeler, new species.

External characters of imagines.

♂. Front dull reddish brown, the orbits and enlarged ocellar triangle darker brown, well-marked, posterior orbits around verticals much paler. Middle orbital

small, ¼ posterior, proclinate strong, about ⅔ length of posterior reclinate. Antennae brown, 3rd segment darker. Arista with 4 dorsal and 2 ventral thin branches in addition to the terminal fork; there are up to 7 thin lateral branches, more prominent than is usual. Face tan; carina of moderate size, a bit flattened on top. Cheeks, palpi and proboscis pale tan, clypeus darker, especially medianly. Palpi of ♂ quite bristly, with numerous thin long hairs and bristles, thickest around apex. 1st oral strong, 2nd thinner, about ½ length 1st. Cheeks rather broad, especially broad and bristly behind. Inner and outer verticals strong; a 3rd vertical, just behind outer one and bent inwardly, small.

Mesonotum subshining brown to dark brown, lighter far anteriorly and on humeri; pleurae diffusely browned, paler over sutural area between sterno- and mesopleura. Acrostichal hairs 6-rowed, a bit irregular; usually a few enlarged hairs anteriorly in dorsocentral row. No prescutellars; anterior scutellars divergent. Three humerals, upper one small, middle one large, lower one strong, about ⅔ length middle one. Two stout sternopleurals, anterior one about ⅚ length posterior.

Legs pale tan, rather long and slender. Bristles of 1st femur prominent: about 4 on lower side, 5 on outer side of which the apical one is strongest and placed further dorsad. Preapicals on all tibiae; a strong apical on 2nd, no apicals evident on 1st or 3rd tibiae. Halteres pale.

Abdominal tergites subshining brown to blackish brown, sometimes paler; two basal segments paler, remaining ones often somewhat paler in midline.

Wings clear; two strong bristles at apex of 1st costal section; 3rd section with the small black bristles on the basal ⅔. Costal index about 3.5; 4th vein index about 1.4; 5x index about 0.9–1.0.

Body length to 3.5 mm., wing about 3.5 mm.

Female: Usually paler than male, abdominal tergites often more tan with diffuse brownish apical bands with median interruptions. Palpi less bristly. Body length to 4.0 mm., wing about 4.0 mm.

Other characteristics, distribution, and types.

Eggs.—With 4 very thin filaments about equal to egg length.

Chromosomes.—The metaphase and salivary gland chromosomes are described by Clayton and Wasserman (this bulletin).

Distribution.—About 25 individuals have been captured, from 10 states as follows: Maine, Vermont, New York, Ohio, Tennessee, Missouri, Wisconsin, South Dakota, Colorado, and New Mexico. Male genitalia of specimens from Wisconsin and Colorado have been compared; they agree in all respects.

Types.—Holotype male, Mellen, Wisconsin, July 1952, H. L. Carson collector; 9 paratypes from: Mellen, Wisconsin, Steelville, Missouri, Espanola, New Mexico, and Pagosa Springs, Colorado.

Drosophila sticta Wheeler, new species.

External characters of imagines.

♂, ♀. A pale tan to yellowish tan species with unmarked wings and a spotted abdominal pattern. Head yellowish tan, including front, face, cheeks, palpi, antennae, and proboscis. Proclinate orbital about ⅝ posterior reclinate, middle or-

bital minute. Arista with 4–5 dorsal and 2 ventral branches in addition to the fork. Carina broad, rather bulbous, not sulcate. One strong oral, the 2nd about ⅜ its length, thin. Orbits and ocellar triangle only slightly differentiated.

Mesonotum tan, thinly pollinose, not shiny. Acrostichal hairs in about 6 rows, sometimes more irregular; no prescutellars. Basal scutellars widely divergent. Two humerals, nearly equal. Anterior sternopleural thin, about ⅔ length posterior one; a middle one present, small. Pleura yellowish tan; halteres pale. Legs pale without unusual bristling.

Abdomen tan, subshining, with small dark brown markings apically on tergites, rather irregularly formed into a series of paired spots (Fig. 21); there is variation in the shape of the larger paramedian spots and considerable variation

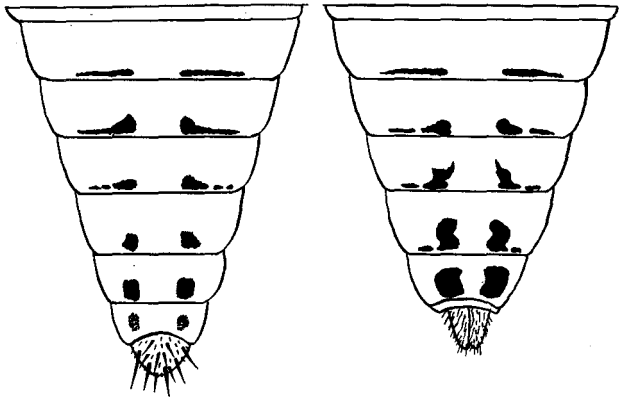


FIG. 21. *Drosophila sticta*, abdominal pattern. Male, left; female, right.

in the extent to which the various lateral markings are broken up into spots. Female with sub-anal spines—a pair of small sclerotized spines just below lower base of anal plates and above base of ovipositor.

Body length (live flies), ♀, 2.5 mm., wing, 2.2 mm.; males smaller.

Other characteristics, relationship, and distribution.

Eggs.—With 4 slender filaments, tending to be irregularly bent and twisted at tips; posterior pair about ⅗ egg length, anterior pair a little shorter.

Puparia.—Anterior spiracles with 25–30 long white branches; stalk of anterior spiracle about ⅕ length of puparium; posterior spiracles pale, rather long, divergent or parallel.

Internal features.—Posterior Malpighian tubes apposed at their tips but without a continuous lumen. Ventral receptacle spirally coiled, of medium length; spermatheca (Fig. 14) dark, round, with a strong ridge at base; ovipositor with blunt tip. Testis pale yellow; sperm pump with 2 short blunt diverticula. Clasper (forceps) with 8–9 teeth, plus strong marginal bristles; head of penis (Fig. 13) with 3 strong spines distally, 2 basally, and 3 smaller ones on each side.

Distribution.—D. sticta has been collected in Nicaragua (El Recreo), El Salvador (Santa Tecla, Laguna Alegria), Honduras (Lancetilla), and Colombia (Palmira, Rionegro). Collectors at Rionegro, Colombia were H. L. Carson, M. Wasserman, and H. Hoenigsberg; all other localities were collected by Dr. W. B. Heed.

Types.—Holotype male, 9 paratypes of both sexes, from stock No. H51.15 from Lancetilla, Honduras, collected in April 1954.

Relationship.—Belongs to the subgenus Drosophila, but cannot be placed satisfactorily in any of the established species groups. Dr. Frota-Pessoa has examined the male genitalia and reports that the ring of the hypandrium is present but it is of a different shape than in any of the species groups possessing such a ring (Malogolowkin, 1953, lists these groups: quinaria, tripunctata, cardini, guarani, calloptera, macroptera, rubrifrons, testacea, and pallidipennis). In other features this new species does not agree too well with any of these groups. Its position in the subgenus thus remains undecided.

Chromosomes.—The chromosomes are discussed in detail by Clayton and Wasserman (this bulletin).

Drosophila paraguttata Peter Thompson, new species.

External characters of imagines.

♂, ♀. A medium-sized, dark tan species with a pair of light spots on the mesonotum, known only from Jamaica, B.W.I. Arista with 4 dorsal and 2 ventral branches in addition to the fork; front and orbits uniformly dark tan, ocellar area darker. Proclinate orbital about equalling length of posterior reclinate; anterior reclinate about half length proclinate. Antennae somewhat darker than front; face, cheeks, and clypeus grayish tan, palpi darker. Carina broadened below, cuneate; one strong oral, the 2nd about ⅓ its length. Pseudotracheae of labellum 8/8 (♂), 9/9 (♀).

Mesonotum dark tan, faintly striped, with a pair of light spots just anterior to and medial to transverse suture, and with less conspicuous light spots at bases of posterior supra-alars and medial to humerus. Scutellum uniformly dark tan. Acrostichal hairs in 8 rows; no prescutellars; anterior scutellars convergent. Anterior sternopleural thin, about 0.8 length posterior. Legs pale gray.

Wings faintly brownish, most obviously so in marginal and submarginal cells; crossveins unclouded. Third costal section with the small black bristles on the basal ⅜; 2 bristles of equal size at apex of 1st section. Costal index about 2.0; 4th vein index about 1.8; 5x index about 1.3.

Abdominal tergites pale grayish tan at base and diffusely banded at apex, the apical bands of the basal tergites interrupted in midline.

Body length, ♂, 2.9 mm., wing, 2.8 mm.; ♀ 3.8 mm., wing, 3.0 mm. The foregoing description was prepared from living material.

Internal characters of imagines.

Ventral receptacle with 12–15 tight coils; spermatheca (Fig. 10) small. Testes pale yellow with about 5 coils; ejaculatory bulb without diverticula. Genital arch and clasper as in Figure 11; clasper large, bearing a primary row of 12 teeth, 2 large marginal bristles, and a line of 6 pale bristles from upper side to below margin.

Other characteristics, relationship, and distribution.

Eggs.—With 4 filaments about 1.5 times the egg length.

Puparia.—Amber; posterior spiracles pale, slightly divergent; anterior spiracle with 10 branches, the horn plus branches about 1/7 length of body.

Chromosomes.—The metaphase chromosomes, described by Clayton and Wasserman (this bulletin), consist of 5 pairs of rods and one pair of dots.

Distribution and types.—Holotype male and 9 paratypes of both sexes, from stock No. H136.34 which originated from flies collected by Dr. W. B. Heed near Bath, Jamaica, B.W.I., February 1956.

Relationship.—Belongs to the subgenus Drosophila, possibly close to the dreyfusi group.

Drosophila castanea Patterson and Mainland

Drosophila castanea Patterson and Mainland, 1944. Univ. Texas Pub. 4445:51.

This species has now been collected over a wide area, from Mexico to Colombia and Venezuela. Intraspecific crosses have been made between 13 geographic strains: Mexico (2), El Salvador (3), Costa Rica (5), Colombia (2), and Venezuela (1). Of the 24 crosses attempted, including reciprocals, only one failed to produce fertile F_1 resulting in an F_2. Figure 22 illustrates many of these crosses; solid lines represent fertile crosses, and the dotted line represents the cross: Medellin, Colombia ♀ × Huatusco, Mexico ♂. Two *castanea* females were received in the laboratory from Medellin and when they failed to establish stocks each was mated to males from the Huatusco culture. One female died shortly thereafter, but the other produced many F_1 flies. These failed to produce an F_2 on inbreeding and were then backcrossed to the Huatusco parent stock. The backcross

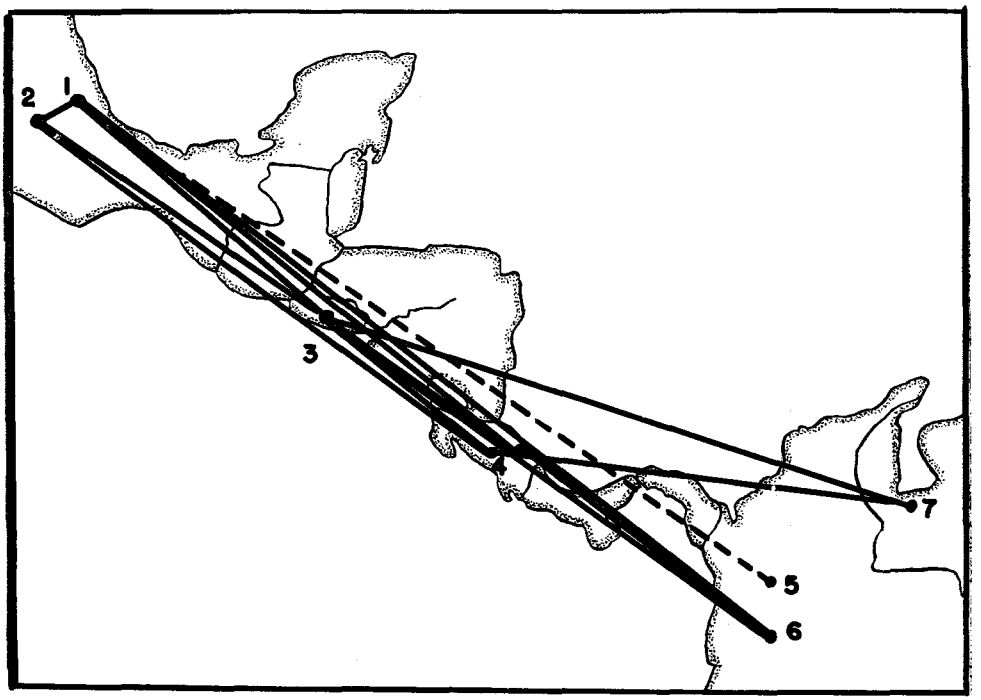


FIG. 22. Crosses between geographic strains of *Drosophila castanea*. Localities are: 1, Huatusco, Mexico; 2, Atlixco, Mexico; 3, El Salvador (3 stocks); 4, Costa Rica (5 stocks); 5, Medellin, Colombia; 6, Palmira, Colombia; 7, Merida, Venezuela. Solid lines show crosses producing fertile F_1; the dotted line shows the cross which produced sterile F_1.

was also sterile, indicating that both F_1 males and females were sterile. As is shown in the figure, however, *castanea* from Palmira, Colombia, crossed readily to several other stocks, producing fertile offspring.

Drosophila suturalis Wheeler, new species.

External characters of imagines.

♂, ♀. This new species simulates *Zapriothrica dispar* (Schiner) but it appears to be a case of convergent evolution rather than phylogenetic kinship. Front broad, dull tan to orange-brown, the ocellar area and elongated orbits darker brown, the latter a bit shiny. Head bristles rather short and stout, ocellars arising from outside the ocellar area on a level with the anterior ocellus. Proclinate orbital far forward, 0.9 length posterior reclinate, the middle orbital hairlike, midway between the other two. Antennae, face, cheeks, clypeus, palpi and proboscis pale tan; arista with short branches, about 8 dorsal and 5 ventral, progressively shorter toward apex. Carina broad, rather low, rounded, the foveae deep. One prominent oral; cheeks broad, nearly half eye-height; eyes rather small, dark red with long thick pile.

Mesonotum long and narrow, dark blackish brown; acrostichal hairs in 4 rows; no prescutellars. Posterior dorsocentrals in usual position, anterior pair far forward, at transverse suture, about ⅔ length posterior ones. Scutellum colored as mesonotum, basal bristles convergent to parallel. Pleura pale tan, contrasting with the dark mesonotum; sternopleurals hairlike, short, the anterior one 0.8 length posterior. Halteres pale. Legs pale tan; tarsi long and slender; empodium and pulvilli small.

Abdomen dark blackish brown, becoming tan laterally; male genital arch and anal plates tan, the latter noticeably elongated ventrally; female anal plates pale, ovipositor dark tan with exceptionally strong teeth apically.

Wings hyaline; 1st costal section with several stout short bristles, the longest one at apex; costa beyond the break weakly pectinate. Costal index about 2.6; 4th vein index about 1.5; 5x index about 1.2.

Body length (pinned female) about 3.0 mm., wing, 2.4 mm.; ♂ smaller.

Distribution and types.—Known only from 45 specimens taken from a single *Monstera* flower, Turrialba, Costa Rica, July 29, 1956; collectors were W. B. Heed, H. L. Carson, and M. Wasserman who reported that the flies moved very fast for Drosophilids. We were not able to establish a culture, but a few eggs were observed, and possessed one pair of very short filaments. Holotype male, and 9 paratypes of both sexes, from Turrialba, Costa Rica.

Relationship.—Of uncertain affinity, possibly related to the subgenus Phloridosa.

Drosophila tibialis Wheeler, new species.

External characters of imagines.

♂, ♀. This species simulates *Zapriothrica dispar* (Schiner) and *D. suturalis*, described above, but is probably not closely related to either. Front orange-tan, ocellar triangle and elongated orbits gray pollinose; head bristles strong; proclinate orbital slightly shorter than posterior reclinate, middle orbital ⅔ length

proclinate and only slightly nearer it than posterior one. Antennae and face tan; arista with 3 dorsal and 1 ventral branches in addition to the often irregular terminal fork. Carina high, narrow and long, rounded; one strong oral. Cheek narrow, a bit brownish; clypeus pale brown, darker on sides; palpi tan; proboscis pale with darkened labellum. Eyes dark red with thin pile.

Mesonotum long and narrow, dark brown pollinose, a little lighter above humeri; dorsocentrals in the usual position. Acrostichal hairs 6-rowed; no prescutellars. Scutellum darker than mesonotum, basal bristles divergent. Pleura nearly as dark as mesonotum, the sutures all paler; anterior sternopleural half length posterior, a middle one not developed. Halteres brownish. Legs, including coxae, pale tan except for hind tibiae which are dark brown to black, but variable in intensity. Front femur thick, the inner side with a row of stubby bristles, the distal 4–5 of which arise from small tubercles.

Abdomen uniformly dark blackish brown, pollinose, though some individuals show narrow basal tan areas on the tergites. Wings weakly smoky throughout; 3rd costal section with the small black bristles on the basal ⅓. Costal index about 3.7; 4th vein index about 1.2; 5x index 0.9.

Body length (pinned female) about 3.2 mm., wing, 2.5 mm.; ♂ a trifle smaller. The eggs have two pairs of thin filaments.

Distribution and types.—Holotype male, 9 paratypes and 16 other specimens, Turrialba, Costa Rica, Oct. 1955, W. B. Heed collector, from flowers of *Dimerocostus* (Zingiberaceae); an additional 18 specimens, Cerro La Campana, Panama, Aug. 1956, from flowers of *Costus* (same family).

Drosophila reticulata Wheeler, new species.

External characters of imagines.

♂, ♀. The wing of this very beautiful fly is shown in Figure 23, and is sufficiently unusual that a new genus is suggested. Many other features, however, are not so bizarre, and we doubt if this species is more than subgenerically distinct.

Arista with 6 dorsal and 2 ventral branches in addition to the fork; front broad, dull yellowish white, strongly sloping so that it and the face are continuous; head bristles normal; proclinate orbital ⅔ length posterior reclinate, the middle orbital minute. Antennae tan, 3rd joint elongate; face whitish yellow, carina evenly rounded. One prominent oral; cheek of medium width, brown below eye, creamy yellow posteriorly; clypeus pale, rather large. Palpi elongate and pointed, black at base, white at apex, the separation between the two colors nearly longitudinal. Eyes elongate oval with long white pile.

Mesonotum rather tan to brown with shining bluish reflection; acrostichal hairs 4-rowed, sparse and thin, difficult to see; no prescutellars. Basal scutellars divergent; dorsocentrals normal. Pleura whitish with 5 brown spots, variable in intensity: just below and behind humerus, on lower middle of mesopleura, on upper sternopleura, below wing base, and over posterior spiracle. Halteres pale. Legs, including coxae, pale yellow but the "knees" darkened, and front femur with a small brown mark on inner side just beyond middle.

Abdomen of female with broad apical bands expanded in the middle to base of previous tergite where they form narrow basal bands; remaining areas pale

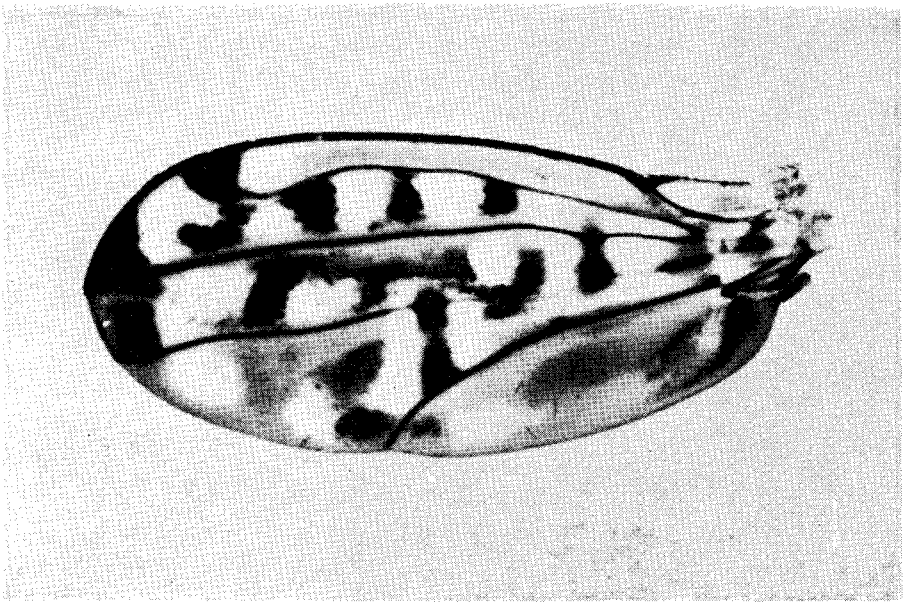


FIG. 23. *Drosophila reticulata*, photograph of wing.

yellowish; laterally the apical bands gradually disappear but the basal ones become a little larger. In the male the apical bands of the basal tergites continue to the sides, the basal bands are smaller, and tergite 6 has no basal band.

Wings glassy and wrinkled, with the pattern shown in Figure 23; the darker spots in submarginal and posterior cells produced as bullae. Apex of 1st costal section with two bristles; 3rd section with the small black bristles on the basal 2/5–1/2. Costal index about 2.8; 4th vein index about 1.7; 5x index about 1.2.

Body length (pinned female) about 3.0 mm., wing, 3.3 mm.; ♂ smaller.

Internal characters of imagines.

Anterior Malpighian tubes with the common stalk 1/3 their total length; posterior tubes with their tips apposed, but without a continuous lumen. Ventral receptacle short, with 2–3 tight coils basally, remainder uncoiled. Spermathecae with very small chitinized centers, the surrounding glandular portion unusually large and frothy in appearance. Parovaria long and elliptical. Eggs with 2 pairs of filaments, the anterior pair 2/3 egg length, posterior pair 3/4 egg length; in the ovaries examined there was but a single developed egg in each ovary.

Distribution and types.—Holotype male, and 3 paratypes, Medellin (30 klm. northwest), Colombia, 8000 ft., Nov. 1955, W. B. Heed collector. Other paratypes as follows: 3, Bucaramanga, Colombia; 2, Rionegro, Colombia; 4, Rancho Grande, near Maracay, Venezuela. Eight specimens from Ecuador differ slightly in wing pattern are not being considered paratypes.

GENUS CHYMOMYZA

Chymomyza bicoloripes (Malloch)

Drosophila bicoloripes Malloch, 1926. P. U. S. N. M. 68 (21):31.

The generic combination used here has never been made officially although it has been used in an article on the moldy rot of rubber trees in Costa Rica (J. B.

Carpenter. 1954. Plant Disease Reporter 38(5): 334–337), the determination of the flies being credited informally to Dr. W. W. Wirth. Carpenter reports that the species has been found constantly associated with active moldy rot lesions and saprophytic colonies of the mold *Ceratostomella fimbriata*, and it was suspected that the flies were primarily responsible for the spread of the mold.

There has been some confusion concerning the type locality. Dr. Paul H. Arnaud, U.S.D.A., has been very helpful in settling this question. The type (♂) bears the labels: "Las Cascadas, Canal Zone, Panama"; "A. H. Jennings Collector"; and "Type No. 28467, USNM." Dr. Arnaud states that "I am inclined to believe that somehow Malloch incorrectly stated the type locality as Higuito, San Mateo, Costa Rica (P. Schild) both with the original description and in the type book."

Dr. Arnaud reports that the USNM collection possesses, in addition to the type (which we have seen), 30 specimens from La Francia, Costa Rica, 11 from Turrialba, Costa Rica, and 4 from Panama. Our own field collectors have taken this species on Barro Colorado Island, Canal Zone, "off fresh cut log," and at Villavicenico, Colombia, in August and September.

Malloch's species is clearly a *Chymomyza* although it is unusual in having a strong black cloud over the posterior crossvein and in lacking a row of femoral spines. *Chymomyza maculipennis* Hendel (1936. Ann. Naturhist. Mus. Wien. 47:97) from the Amazon region of Brazil is, judging from the description, most likely the same species. However, he describes the pleura as lighter than the mesonotum, and we are unable to interpret satisfactorily his description of the 2nd vein as "*winkelig gebrochen.*"

Chymomyza mexicana Wheeler

Chymomyza mexicana Wheeler, 1949. Univ. Texas Publ. 4920:162.

The description was based upon a male from Puebla, Mexico. We have now seen five additional specimens as follows: 4, Santa Maria de Ostuma, Nicaragua, June 1954 (W. B. Heed); 1, Volcan Boqueron, El Salvador, 4500 feet, July 1954 (W. B. Heed). The present specimens do not agree exactly with the description, especially the pigmentation pattern of the front, but we believe that they are conspecific.

Genus Cladochaeta

Cladochaeta nebulosa Coquillett

Cladochaeta nebulosa Coquillett, 1900. P. U. S. N. M. 22:264.

This species is apparently quite widespread on both the mainland and the islands of the Caribbean region. We have seen 18 specimens from the USNM collection, including the type from Puerto Rico, from Mexico (Vera Cruz, Tampico), Panama (Ft. Clayton, Darien Pr.), and Puerto Rico (many localities). Our collectors have saved more than 50 specimens, from Mexico (San Luis Potosi); El Salvador (San Salvador, Santa Tecla, Laguna de Zapotitan); Nicaragua (El Recreo); Colombia (Medellin, Bucaramanga); Trinidad (Sangre Grande); Venezuela (Merida); St. Lucia; Jamaica; Haiti (Kenscoff); and Cuba (Santiago de Cuba). It has also been recorded from Florida and from the Virgin Islands (St. Croix).

We have never been successful in culturing this species in the laboratory.

GENUS NEOTANYGASTRELLA

Neotanygastrella nigricosta (Malloch), new comb.

Drosophila nigricosta Malloch, 1926. Proc. U. S. Nat. Mus. 68 (21):30.

I have examined the type female from Costa Rica (U.S.N.M.) and a second female from El Recreo, Nicaragua (June 1954, W. B. Heed). There can be no doubt about the generic reference, although the anterior reclinate orbital is a little larger than usual, the face less bulbous below, and the legs all yellow. The large postverticals and absence of femoral spines serve to separate it from *Chymomyza* which it superficially resembles. The very dark costal and marginal cells are quite distinctive.

Neotanygastrella antillea Wheeler, new species.

External characters of imagines.

♂, ♀. Similar in general appearance to *leucopoda* and *boliviensis* (see Frota-Pessoa and Wheeler, 1951), differing most obviously as follows: 2nd antennal joint black. 3rd whitish yellow; palpi yellow; face with a shiny brownish black longitudinal stripe bordered by white on each side, the broad whitish areas beginning beneath the antennae and continuing down around the cheeks which gradually become black posteriorly.

Front velvety black, strongly whitish pruinose posteriorly when viewed from certain angles; ocelli on a raised prominence, placed rather far forward, nearly equidistant between postverticals and ptilinal suture. Anterior reclinate orbital small, about ⅓ length proclinate and placed slightly to the side of and anterior to the latter. Arista with 4 dorsal and 2 ventral branches in addition to the fork. Clypeus dark, small; proboscis dark apically.

Mesonotum dark brown to blackish, rather shiny but with thin gray pollen when seen from the side. Scutellum black, velvety, with yellowish apex. Pleura and prosternum dark brown. First legs with white coxae, trochanters, and 4 apical tarsal segments, and with black femora, tibiae and metatarsi. Coxae of 2nd legs also black, remainder of legs yellow.

Abdomen uniformly dark brown to black; 1st tergite and part of 2nd yellowed. Anal plates of female yellow, those of male rather small, yellow. Halteres whitish. Wings clear. Costal index about 1.4; 4th vein index about 3.8; 5x index about 1.8.

Body length (pinned specimen), ♀, about 2.5 mm.; wing, 2.0 mm.; male slightly smaller.

Distribution and types.—Holotype male and 6 paratypes of both sexes from Jamaica, British West Indies, collected February 1956, by Dr. W. B. Heed. Approximately 50 additional specimens were taken by Dr. Heed in the Montego Bay area of Jamaica in July 1957.

Neotanygastrella ornata Wheeler, new species.

External characters of imagines.

♂, ♀. Similar to *tricoloripes* Duda but with mesopleura velvety black and strongly contrasting with the pale tan sternopleura, and with more extensive

darkening on the mesonotum. Arista with 4 dorsal and 2 ventral branches in addition to the fork. Front velvety black, whitish pruinose behind when seen from most angles. Antennae pale tan. Face bulbous below, with a broad black median stripe, narrowly yellow along sides; clypeus black, palpi yellow, cheeks yellow becoming black behind. One strong oral. Postverticals strong; anterior reclinate orbital ½ length proclinate and placed lateral of and slightly anterior to the latter.

Mesonotum basically tan with a broad blackish central stripe between the dorsocentral lines, widening anteriorly to reach humeri; it is also black above and in front of the wing base thus leaving an irregular, winding yellow area from humerus (and fore coxa) upwards and then back to dorsocentrals. Acrostichals irregularly 8-rowed; no prescutellars. Basal scutellars parallel. Scutellum velvety black with white tip. Postscutellum dark brown, this color continued laterally to around haltere base; haltere pale. Legs yellow except: fore coxae whitish, fore femur, tibia and metatarsus black, the 4 apical joints white.

Abdomen black, a bit velvety, the basal two tergites paler. Wings clear; 3rd costal section with the small black bristles on the basal ⅔. Costal index about 1.3; 4th vein index about 3.6; 5x index about 2.4.

Body length (pinned specimen), ♀, 2.0 mm.; wing, 2.0 mm.; males a little smaller.

Distribution and types.—Holotype male and one paratype female, from Merida, Venezuela, collected in October 1956, by Dr. Marvin Wasserman.

Neotanygastrella tricoloripes Duda

Neotanygastrella tricoloripes Duda, 1925. Ann. Mus. Nat. Hung. 22:224.

Duda's specimens came from Costa Rica; our own collections have shown that this species is widely distributed: Honduras, Costa Rica, Panama, Colombia, Trinidad, Peru, Brazil, and Puerto Rico (El Yunque). Judging from the 70+ specimens in our collection, we are unable to find any consistent differences from *N. brasiliensis* (Frota-Pessoa), but a careful comparison of male genitalia has not yet been made.

Neotanygastrella chymomyzoides Duda

Neotanygastrella chymomyzoides Duda, 1927. Arch. Naturg. 91A 11–12 (1925):71.

The species was described from specimens from Peru and Bolivia; I have examined one specimen (American Museum of Natural History) labelled "Cotypus" from "Bolivia-Mapiri." We have preserved about 180 specimens of this species and have noticed that while most of the specimens show the typical color pattern of the front legs (metatarsus black, apical joints pale), about 30 of them have all of the fore tarsi dark. The significance of this is not yet known. In the following distributional list, starred countries are those from which dark-legged specimens were taken: El Salvador, Nicaragua, Honduras, Costa Rica,* Panama,* Colombia,* Venezuela, Trinidad, Brazil,* Ecuador,* Peru,* and St. Lucia (B. W. I.).

Genus Dettopsomyia

Dettopsomyia formosa Lamb

Dettopsomyia formosa Lamb, 1914. Trans. Linn. Soc. London 16:350.

This very small, pretty species is apparently quite widespread. Lamb's material came from the Seychelles, and it is also known from Hawaii, the Palau and Solomon Islands, Yap, and the Philippines. We can now report it from Central America where Dr. Heed collected about 70 specimens as follows: El Salvador (Santa Tecla, Laguna de Zapotitan); Honduras (La Lima). Collections were made in March and May, 1954. Live specimens from El Salvador were kept in the laboratory for a short while; the eggs had 4 short filaments, each about ⅓ the egg length.

Genus Clastopteromyia

Clastopteromyia superba (Sturtevant)

Drosophila superba Sturtevant, 1916. Ann. Ent. Soc. Am. 9:342.

I have examined the type from Guatemala (USNM collection); it agrees quite well with the 11 specimens taken by our collectors. Localities are: El Salvador (San Salvador, Santa Tecla, Laguna de Zapotitan); Honduras (Lancetilla); Costa Rica (Turrialba, La Lola); Colombia (El Recuerdo). We have also examined 3 specimens (USNM) from the Panama Canal Zone.

The description states that only a single pair of dorsocentrals is present; on our specimens when the anterior dorsocentrals are missing, one can still detect the empty socket, indicating that two pairs are normally present.

Clastopteromyia longipennis Malloch

Clastopteromyia longipennis Malloch, 1926. Proc. U. S. Nat. Mus. 68:34.

The type, from Costa Rica, shows that the very dark brown prosternum, which contrasts strongly with the pale legs, is a very distinctive feature. We have 10 specimens from: El Salvador (San Salvador), Honduras (Lancetilla), Costa Rica (San Isidro de General), and Canal Zone (Barro Colorado Is.). One individual, from Trinidad, appears to be an undescribed species very closely related to *longipennis*.

Clastopteromyia guttipennis (Duda)

Diathoneura guttipennis Duda, 1925. Ann. Mus. Nat. Hung. 22:171; 1927. Arch. Naturg. 91A 11 (1925):91.

Clastopteromyia guttipennis, Frota-Pessoa, 1947. Sum. Brasil. Biol. 1:36.

Duda described the species from 2 ♂♂, 1 ♀ from Costa Rica and later recorded 1 ♂, 1 ♀ from Peru. We have seen a single specimen from Almirante, Bocas del Toro, Panama (USNM) which we identify as *guttipennis* although it shows these small differences: marginal cell of wing with an additional white spot, rather small, nearly in line with the posterior crossvein (thus between the two prominent white stripes of the wing); halteres somewhat darkened and

palpi definitely brownish; face and orbits without noticeably whitish areas along edge.

Clastopteromyia bomplandi (Malloch)

Diathoneura bomplandi Malloch, 1934. Dipt. Patag. Chile 6:438.

Clastopteromyia bomplandi, Frota-Pessoa, 1947. Sum. Brasil Biol. 1:18.

We have a single specimen, from San Salvador, El Salvador, which extends the known distribution considerably. Malloch's type and paratype came from Bompland, Argentina, and Frota-Pessoa reports it from Brazil. The species is quite similar to *taeniatipennis* Duda from Costa Rica, but the latter has considerable darkening along the leading edge of the marginal cell, and the other dark areas are much more prominent than in *bomplandi*.

Clastopteromyia aberrans Wheeler, new species.

The species described here differs from the typical members of the genus in (1) the absence of posterior scutellar bristles and (2) the presence of only two rows of acrostichal hairs. In other respects it appears to be fairly closely related to other members of this genus. The highly marked wings are rather similar to those of *guttipennis* and *borgmeieri*.

♂, ♀. Head a little broader than thorax, front longer than broad, light brown but darker in front and more tannish behind; orbits rather long, subshining, rest of front pollinose. Middle orbital small, at most ¼ length proclinate and placed nearly to the side of the latter; proclinate about ⅚ length posterior reclinate. Ocellars long; post-verticals long, about ⅔ length ocellars; inner verticals unusually long, the outer ones only about half their length. Antennae light brown; 2nd segment with 2 stronger bristles; 3rd segment small, with thick pale hairs. Arista with 4–5 dorsal branches, 2 ventral branches, in addition to the fork.

Face whitish yellow with a diffuse dark brown mark centrally just above clypeal margin; face not wholly flat, but with a low median ridge which disappears at the dark central mark. Vibrissa single, the following oral hairs inconspicuous. Cheek very narrow, pale along eye, narrowly darkened along lower margin. Clypeus tan to brown; palpi elongate, blackish, with a stout apical bristle.

Mesonotum subshining brown with a pair of semi-distinct tannish longitudinal stripes which disappear posteriorly, the stripes located just within the dorsocentral rows, leaving a median darker stripe. Acrostichal hairs in two sparse rows (about 8 hairs per row) placed on the median dark stripe; no prescutellars. Two pairs of dorsocentrals, both well-developed, the anterior ones rather far forward, just behind transverse suture; some hairs of dorsocentral row more developed, especially one just anterior to transverse suture. Scutellum brown; basal bristles quite long, in the usual position; no apical scutellars. Pleura all brown; 1 humeral; 1 long presutural; 2 notopleural; no propleurals or mesopleurals; 2 sternopleurals, the anterior one about 0.6 length posterior. Knob of haltere white, the basal joints darkened.

Legs long and slender; 2nd and 3rd femora dark brown to black, and 3rd tibiae often somewhat darkened, the rest of the legs tan to light brown. An api-

cal bristle visible on 2nd tibia, a preapical present on all three. Abdomen slender, uniformly shining black.

Wings with striking color pattern of dark brown and white areas (Fig. 24). Costa reaches 4th vein; 2nd vein somewhat undulating; apices of 3L and 4L bend backwards to reach costa. Anal angle wholly absent. Costal index about 1.7; 4th vein index about 1.4; 5x index about 0.8 (unusually low due to the long posterior crossvein). Dr. Heed, the collector, records in his field notes that the flies wave their wings like members of the genus *Chymomyza.*

Distribution and types.—Holotype male and 3 paratypes, from Kenscoff, Haiti (4000 feet), collected February 1956, by Dr. W. B. Heed.

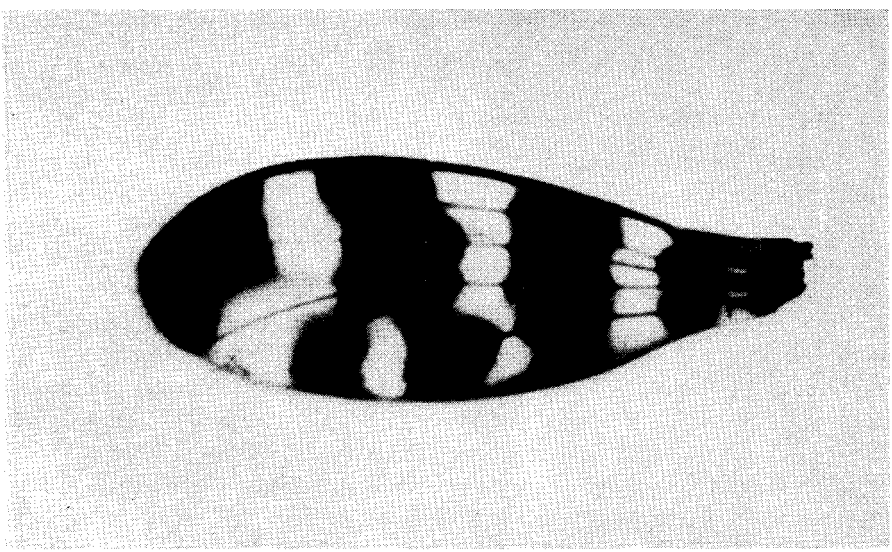


FIG. 24. *Clastopteromyia aberrans*, photograph of wing.

Clastopteromyia albinota Wheeler, new species.

External characters of imagines.

♂, ♀. A very distinctive species, with pale yellow to milky white mesonotum, scutellum, front and face, but dark brown abdomen and pleura, the latter with a narrow longitudinal yellow stripe. Arista with 4–5 dorsal and 3 ventral branches in addition to the fork. Mesonotum, scutellum and front pale yellowish with a dull whitish surface, the whitish appearance less extreme on some individuals. Postverticals minute; proclinate and posterior reclinate orbitals equal in size, a middle one not evident. Second antennal joint yellow, 3rd darker. Face yellow to whitish, darker at vibrissal base and sometimes darkened more extensively. Palpi black; cheeks pale behind the vibrissal area, narrow.

Acrostichal hairs in 6 irregular rows; no prescutellars; 2 pairs of dorsocentrals; basal scutellars divergent. Scutellum rather rounded above, wholly pale yellow to whitish, including sides and underside. Pleura dark brown with a narrow pale stripe from base of 1st coxa, along meso-sternopleural suture to haltere base; halteres brown. Anterior sternopleural thin, about 0.6 length posterior one, a middle one not developed. Legs tan, 1st coxae usually, and all femora sometimes

darker. Base of hind metatarsus with two black bristles below. Abdomen dark brown, without pattern.

Wings uniformly brown. Costal index about 2.0; 4th vein index about 1.7; 5x index about 2.0.

Body length (pinned specimen), ♂ and ♀, about 2.0 mm.; wing, 2.0 mm.

Distribution and types.—Holotype male, Cerro La Campana, Panama (about 60 klm. SW Panama City), collected August 1956, by W. B. Heed, H. L. Carson, and M. Wasserman. Two paratypes, same data; 8 paratypes, Barro Colorado Is., Canal Zone. We have, in addition, about 35 specimens from: Nicaragua, Honduras, Costa Rica, Colombia, Venezuela, Trinidad, and Brazil.

Genus Paraliodrosophila

Paraliodrosophila antennata Wheeler, new species.

External characters of imagines.

♂, ♀. Arista with 4 dorsal, 1 ventral branch in addition to the fork. Front dark brown to black, the large shiny frontal triangle gradually tapering to a point at the ptilinal suture; orbits also shiny, rest of front velvety brown. Second antennal joint whitish yellow, strongly contrasting with the dark front, and with the brown 3rd joint. Postverticals rather small; proclinate and posterior reclinate orbitals equal in size, the middle one about ⅓ as long. Face dark tan, the carina of moderate size, rather short; oral margin dark brown as is the area around the vibrissae; cheeks white posteriorly. One strong oral. Clypeus black, dull; palpi small, light brown.

Mesonotum dark brownish black, shining; acrostichal hairs in 6 rows, absent posteriorly from the level of posterior dorsocentrals. No prescutellars; basal scutellars convergent. Scutellum rather rounded, more pollinose than mesonotum. Anterior dorsocentral short, about ⅓ posterior. Pleura pale whitish yellow except for a narrow area above, which is velvety black beginning near base of 1st coxa and going to wing base. Basal joints of halteres brownish, the knob tan. Legs wholly yellow.

Abdomen with large dark bands, semi-shining, with creamy yellow areas; on both male and female tergites 1–3 are paler medianly, 4–5 are dark in the middle, leaving basal yellow areas on each side, that of 5 extended all the way laterally; remaining tergites dark, but all dark bands cease before reaching lateral edge, the edges thus all yellow. Anal plate of ♀ yellow; ovipositor pale, truncate, with dark teeth.

Wings hyaline, a little darkened below distal costal break. Small black bristles of 3rd costal section poorly differentiated, but occur on about the basal 0.6. Costal index 1.4; 4th vein index about 2.5; 5x index about 3.0.

Body length (pinned specimen), ♀, up to 2.2 mm.; wing, about 2.4 mm.; males smaller.

Distribution and types.—Holotype male and 9 paratypes, from near Bath, Jamaica, B. W. I., collected February 1956, by Dr. W. B. Heed. There are six additional specimens from the same locality.

Genus Amiota

The type species is *leucostoma* Loew, designated by Coquillett (1910. Proc. U. S. Nat. Mus. 37 (No. 1719): 505) and not *humeralis* as I have stated earlier (Wheeler, 1952. Univ. Texas Publ. 5204:166).

Amiota humeralis Loew

Amiota humeralis Loew, 1862. Berlin Ent. Zeit. 6:229 (Cent. II, No. 93).

An examination of the holotype female, in the collection of the Museum of Comparative Zoology at Harvard, shows that my earlier concept of this species was in error (Wheeler, *op. cit.*, p. 168). The specimen is in fair condition, but, aside from size, shows only one outstanding feature that may serve to recognize it: the front is noticeably golden pruinose when viewed from most angles. The only other species known to me with this character is *setigera* Malloch, of which we have 1 ♂ from Rutledge, Tenn. and 1 ♂ from Lithium, Mo. Of the 9 females from Lithium which we consider are the females of *setigera*, some show the pruinosity and others have it less developed. There is a possibility, then, that the male of *humeralis* is *setigera*, but for the present there seems to be no way to verify this.

Amiota steganoptera Malloch

Amiota steganoptera Malloch, 1926. Proc. U. S. Nat. Mus. 68:31.

This species seems not to have been recorded since its description, but we find that it has a very extensive distribution. It is easily recognized by the presence of thorn-like "warts" on the 3rd costal section, quite like those characteristic of *Leucophenga* and *Stegana*.

The type, from Higuito, San Mateo, Costa Rica (USNM) has been examined. We have seen 30 additional specimens as follows: 1, Saucier, Miss.; 1, Kushla, Ala.; 1, Blacksburg, Va.; Mexico; El Salvador; Nicaragua; Honduras; Costa Rica; Panama; Brazil; and Puerto Rico (Rio Grande). It should be mentioned that there are at least three undescibed species closely related to *steganoptera* occurring in Brazil.

Genus Pseudiastata

Sabrosky (1951) summarizes all that is known about this rare genus. All of the species so far recorded are quite similar to the type species, *nebulosa*, but there are obvious differences in male genitalia. Among the specimens loaned to us from the National Museum collection were four such individuals, and we borrowed another from the American Museum of Natural History. The latter, from Guatemala, is a female, and cannot be determined further. Two are males, and have been dissected and examined. One, from Cano Saddle, Gatun Lake, Panama, is *pseudococcivora* Sabrosky; the other male, from Cuernavaca, Mor. ,Mexico, has a genitalial arrangement not figured by Sabrosky. This genitalia is shown in Figures 15–16, but the species is not being named at the present time.

The remaining two specimens are females, and have an entirely different wing pattern; further, the 3rd vein is bristled, a character not previously known in the Drosophilidae. These are described below as a new species, *P. armata*.

Pseudiastata armata Wheeler, new species.

With the general appearance of *nebulosa*, but with clearly different wing pattern (Fig. 25). Many stout prescutellar bristles, the middle pair quite long and reaching to scutellar apex, the rest (about 6) only half this long. Fringe of calyp-

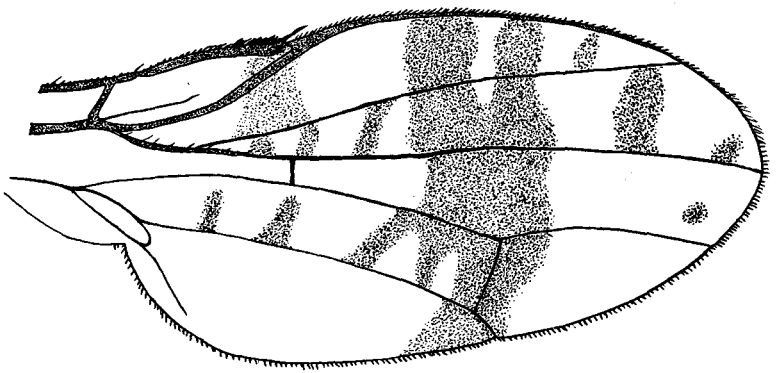


FIG. 25. *Pseudiastata armata*, wing.

ter especially long. Ovipositor with numerous pale hairs. All femora rather thick, the 3rd ones especially so, nearly globose. Third vein bristled, both above and below, from the bifurcation of 2L and 3L to just beyond the anterior crossvein, with about 6 bristles visible dorsally on the best-preserved wing, and 3 ventrally: 1 at the bifurcation, 1 just before anterior crossvein, and 1 about midway between the other two. Second wing of this specimen missing. On female 2, the wings are bent downward in such a way that the ventral surfaces cannot be studied, and the upper sides are considerably rubbed. However, on one wing there are 6 empty sockets dorsally plus 4 small bristles, the distal one just a little beyond the level of the posterior crossvein. It is apparent, therefore, that the actual distribution of these bristles is variable.

Distribution and types.—Holotype ♀, USNM collection, labelled "Mojinga Swamp; Ft. Sherman, C.Z." (Canal Zone, Panama); "6–17–52"; "F. S. Blanton Collector." Paratype ♀, same locality, collected 5–13–52.

GENUS LACCODROSOPHILA

Duda erected the genus for two species from Bolivia, and it seems not to have been recorded since. Since he did not designate a type species I am selecting his first species, *L. flavipes* Duda, as the type species.

Laccodrosophila flavipes Duda

Laccodrosophila flavipes Duda, 1927. Arch. Naturg. 91A 11 (1925):38.

Duda described the male only; we have a female (AMNH collection) with the following labels: "Minza Chica; V. Tungurahua; 3750 M.; Ecuad.; 2–14 IV, 1939; F. M. Brown."

The legs are all yellow; front and mesonotum black; pleura brownish black, subshining; antennae, face and palpi yellow. Postverticals large. Ocellars ap-

parently divergent, placed outside the ocellar triangle, in line with anterior ocellus; 3 orbitals extra thin, nearly equidistant from one another. Halteres yellowish white. Empodium and pulvilli unusually large. Front tarsi appearing to consist of but 4 joints (see Duda's figures 6 and 8) but as seen under higher magnification (120X) it can be observed that the apparent "metatarsus" consists of the fused 1st and 2nd joints, each of which bears a pair of stout black spines apically.

Two pairs of dorsocentrals, thin. Scutellum with marginal hairs, arising from the lower edge and upturned; both basal and apical scutellars arise from short black tubercles. Prescutellars present.

Duda described the male as having the 3 basal tergites black, 4th black at basal angles, otherwise reddish yellow, as is the 5th and 6th. On this female the tergites are yellow with narrow apical bands, broader at the angle. Anal plates yellow, long and flat; ovipositor long and hairy, of unusual shape and partly encased within a tubular sheath.

Wings pale, the posterior fringe long. First vein, dorsally, with 1–2 black bristly hairs just before its union with the costa.

Laccodrosophila atra Duda

Laccodrosophila atra Duda, 1927. Arch. Naturg. 91A 11 (1925):40.

Duda saw 4 ♂ ♂, 3 ♀ ♀ from Bolivia; we have a female which we tentatively identify with this spcies, from the vicinty of Bogota, Colombia (Nov. 1955, W. B. Heed), "off pink *Digitalis* flower." In this species the face is black as are the palpi and proboscis; abdomen shining black; arista with only a single dorsal branch plus the large fork. The scutellar margin is haired as in the former species, and the scutellars also arise from small tubercles. The legs are thicker, mostly black with yellowish tarsi. First tarsal joint of leg 1 with a very stout spine plus 7–10 smaller ones, the 2nd joint with a single smaller spine.

Laccodrosophila flavescens Wheeler, new species.

External characters of imagines.

♂, ♀. Quite similar to *flavipes*, differing primarily in the shape and color of the face and cheeks, and the much more yellowed abdomen. Face narrow with deep foveae separated by a strong ridge, the latter blackened, the foveae pale; the dark ridge is continuous with a dark structure on anterior surface of proboscis. Cheeks broad, the bristled area dark, the remainder tan (♀), shiny next the eye, becoming striated next to the bristled area; lower posterior corner dark reddish brown (♀), strongly rugulose, the creases parallel to lower cheek margin. In males, dark areas are more black, the non-striated portion of the cheek much darker than in females. Postverticals ⅔ length ocellars, latter long. Orbitals on the best preserved specimen flattened against head, proclinates mildly convergent, middle reclinates somewhat diverging, posterior reclinates inclined outward over the eye. One pair of strong orals.

Abdomen mostly yellow, wholly yellow on males, only the genital arch brownish; in females tergites 4–5 a little darker laterally, the apex shiny brown, including sides of sheath of ovipositor. Legs yellow, both sexes with 1st tarsal spines as in *flavipes*.

Wings broad, hyaline with yellow veins; apex of 1st vein a bit thickened and discolored at its union with costa, without hairs; costa somewhat pectinate, with small sparse black spines. Costal index about 1.3; 4th vein index about 2.0; 5x index about 0.9.

Body length (pinned female with extended ovipositor) about 4.5 mm.; wing, 4.0 mm.; ♂, 3.5 mm., wing, 3.7 mm.

Distribution and types.—Holotype ♂, 2 ♂, 1 ♀ paratypes, USNM collection, labelled: Pedregal, near Pobre Pena, Mexico, 14 Sept. 1942, W. F. Foshag; 1 ♀, USNM, L. Patzcuaro, Mich., Mexico, 29 Aug. 1945, W.F. Foshag.

Laccodrosophila heedi Wheeler, new species.

External characters of imagines.

♂, ♀. A shiny black species with broad cheek, unusually low costal index, and with the apex of 1st vein strongly blackened. Front black, rather shiny, with numerous small hairs; posterior reclinate orbital about 5/6 length proclinate, middle orbital ½ length posterior. Antennae and palpi dark tan; arista short, with one basal dorsal branch and one more distal ventral branch in addition to the fork. Face deeply sunken, without interfoveal ridge; one strong oral; oral margin, clypeus and cheeks black, the latter very broad, mostly shining, but with a shagreened quality on under side.

Mesonotum and scutellum black; acrostichals typical for this genus; prescutellars strong; scutellars tuberculate; scutellar margin typically haired. Pleura shining black; mesopleura with scattered small hairs on upper part (absent on *flavipes*, *flavescens*, and *atra*); legs mostly shining black including coxae. Tarsi of fore legs bearing three stout black spines (Fig. 12), fore tarsi black, other tarsi yellow except for blackened apical joint. Empodia and pulvilli large, pale.

Abdomen shining black; ♀ anal plate long, flat, yellow; ♂ anal plate not well observed but apparently pale. Wings hyaline, veins pale. Apex of 1st costal section, and apex of 1st vein enlarged and blackened.

Body length (pinned female with retracted ovipositor) 3.0 mm., wing, 2.5 mm. Male smaller. Costal index about 0.55, the 2nd costal section being only about half length 3rd; 4th vein index about 2.6; 5x index 2.0.

Distribution and types.—Holotype ♀, paratype ♂, from orchid flowers, orchid garden, Medellin, Colombia, Nov. 16, 1955, W. B. Heed collector.

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