

VII. New Picture-Winged *Drosophila* From Hawaii, Part II. (Drosophilidae, Diptera)¹

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The picture-winged species of *Drosophila* are now better known than any other of the major groups of Hawaiian drosophilids. These flies have received special attention because of their large size, relative ease in rearing in artificial media and handling in the laboratory, and their ornate wings and other elaborate morphological characters. These have proved ideal animals for evolutionary studies and the main efforts of our research have been centered on these flies for several years. Specialized technics have been perfected which are highly effective for collecting picture-winged species. New species are still being discovered frequently as we get into unsurveyed, or incompletely surveyed areas and as we find new host plants and breeding sites for the flies.

The following new species have come to our attention during recent field work and names are needed for use in reports of cytological, behavioral, or ecological studies. They are being treated by species groups which are based upon chromosomal similarities supported by morphological characteristics, especially those of the male copulatory organs.

The drawings have been prepared by Miss Geraldine Oda; we greatly appreciate this valuable assistance.

DISTINGUENDA SPECIES GROUP

Drosophila divaricata n.sp. (figs. 1a-d)

This species is intermediate between *distinguenda* Hardy and *inedita* Hardy and the salivary chromosomes are alike (Carson and Stalker, 1969, and this bulletin) in all three of these. *D. divaricata* has the leg ornamentation and wing markings similar to *distinguenda* and has the thoracic markings of *inedita*. This cannot be a hybrid, however, since we have a series of uniformly marked F₁ individuals from the same wild female which show similar markings. All three of these species live in the same environment and have been collected in the same valley. It should be noted that *inedita* on the basis of leg ornamentation and general facies would appear closely related to *paucipuncta* Grimshaw, from Hawaii. The two, however, fit in completely different species groups on the basis of the chromosomes and male genitalia and the external similarities are misleading.

¹ Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Journal Series No. 1239. This work was financed by National Institutes of Health Grant No. GM-10640.

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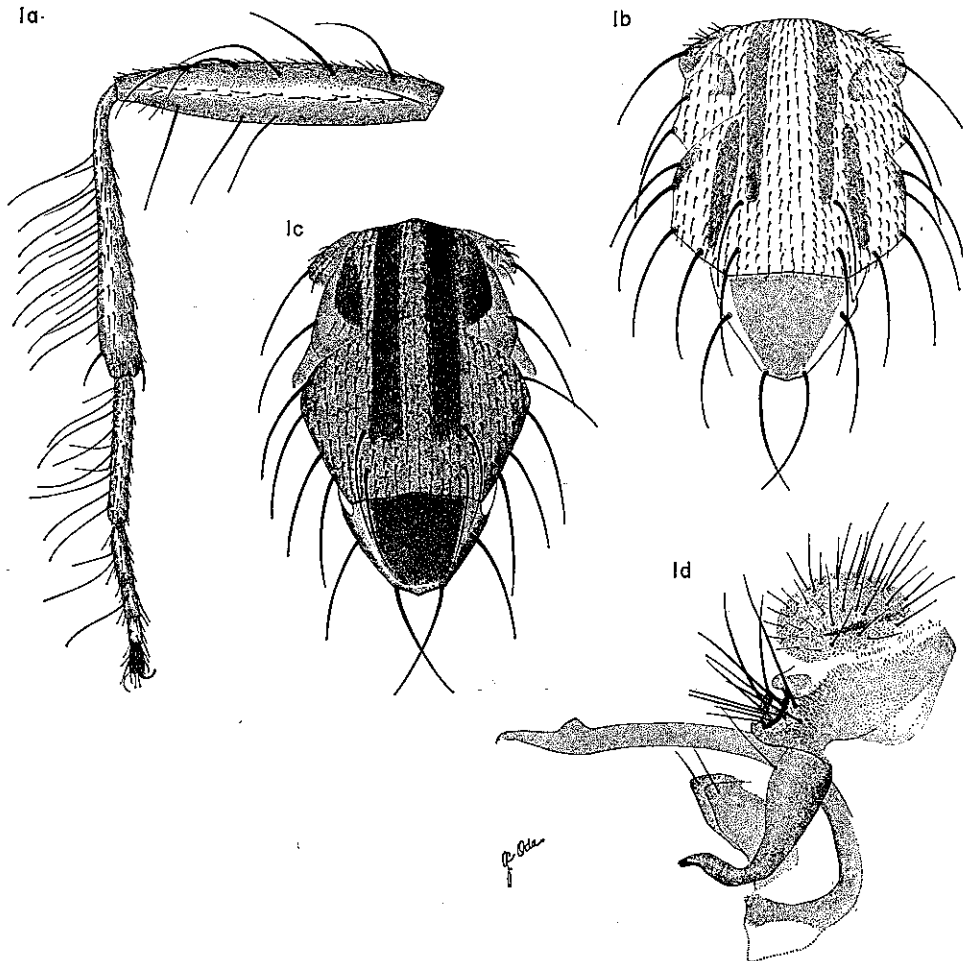


FIG. 1. *Drosophila divaricata* n.sp.: a, front leg, lateral; b, thorax, dorsal; d, male genitalia. *D. distinguenda* Hardy: c, thorax, dorsal.

In the key to species of picture-wings (Hardy and Kaneshiro, 1968:176), this would run in the second part of couplet 24 with *distinguenda* on the basis of the ciliation of the front tibiae. It is differentiated from this species by having dark brown to blackish vittae on the mesonotum (fig. 1b) with the submedian vittae widely separated by a width equal to four or five rows of acrostichal setae and comparatively short, ending opposite the anterior dorsocentral bristles. In *distinguenda* the markings are rather faint, the submedian vittae are close together (fig. 1c), separated by about two rows of acrostichal setae, and fade out on the posterior portion of mesonotum between the anterior and posterior dorsocentral bristles. Also the upper portion of each humerus is brown and the dorso-anterior portion of each mesopleuron and dorsal portion of each pteropleuron is marked with dark brown to black in *divaricata*, while in *distinguenda* the humeri and pleura are entirely yellow. We find no other characters for separating these.

The ornamentation of the front legs is like that of *distinguenda* with about nine

erect, fine, anterodorsal cilia arranged from about basal fourth to just before a level with preapical dorsal bristles, also about nine long dorsal cilia arranged over median portion of tibia as in figure 1a. The front basitarsus has about a dozen long, black, dorsal cilia arranged in two irregular rows. Male genitalia as in figure 1d.

Length: body, 4.7 mm; wings, 4.8–5.0 mm.

FEMALE. Fitting description of male except for sexual characters.

Holotype male and 5 paratypes, 3 males, two females, Makaleha Valley, Oahu, 1800 ft., April 26, 1969, reared from F₁ progeny of iso-female (A. H. Kuniyuki), collection #M39R23. An allotype has not been designated since the female specimens on hand have the wings torn.

Type in B. P. Bishop Museum, paratypes in collections of U. S. National Museum and University of Hawaii.

HAWAIIENSIS SPECIES GROUP

Drosophila gymnobasis n.sp. (figs. 2a-d)

Fitting near *silvarentis* Hardy and Kaneshiro and according to Dr. H. L. Carson the metaphase chromosome differ from *silvarentis* but the salivary chromosomes are the same in the two species. In the key to picture-winged species (Hardy and Kaneshiro, 1968:177) it would run in couplet 35 to *silvarentis* by having the coxae and femora brown to blackish and with only a single row of cilia on anterodorsal surface of front tibia. It differs from *silvarentis* by having irregular rows of moderately long, erect hairs over dorsal surface of tibia, rather than having a single row along anterodorsal surface; by the front tibia having six to seven long anterodorsal hairs and lacking long cilia dorsobasally (fig. 2a), rather than with fourteen erect hairs in anterodorsal row, plus several long, curved, dorsobasal cilia (fig. 2b); face all or predominantly black, rather than black only on lower median portion and otherwise yellow; posteroventral portions of head slightly gibbose behind genal bristle and anterior sternopleural bristle well developed; about two-thirds as long as posterior bristle and with several black bristle-like setae in area between anterior and posterior bristles. In *silvarentis* the lower margin of the head is not noticeably swollen, the anterior sternopleural bristles are rudimentary, one-third-one-fourth as long as posterior bristles and with few inconspicuous setae between the bristles. Also in *gymnobasis* the hyaline marking just beyond level with m crossvein is continuous over wing through cell 2nd M₂ to the margin, the lower apical margin of second M₂ is hyaline (fig. 2c). The apical portion of cell 2nd M₂ along the wing margin is usually infuscated with brown in *silvarentis* (fig. 2d), some specimens on hand, however, have the hyaline marking continuous across wing to hind margin, so this character would not be reliable. Otherwise fitting the description of *silvarentis*. Male genitalia very similar to *silvarentis*.

Length: body, 3.5–3.7 mm; wings, 4.0 mm.

FEMALE. Fitting description of male, except for sexual characters.

Holotype ♂, allotype ♀ and 23 paratypes, 11 ♂, 12 ♀, Auwahi, Maui, 2800 ft., August 5–7, 1969 (H. L. Carson and K. Y. Kaneshiro), F₁ generation reared in laboratory, collection #M64G 1–2.

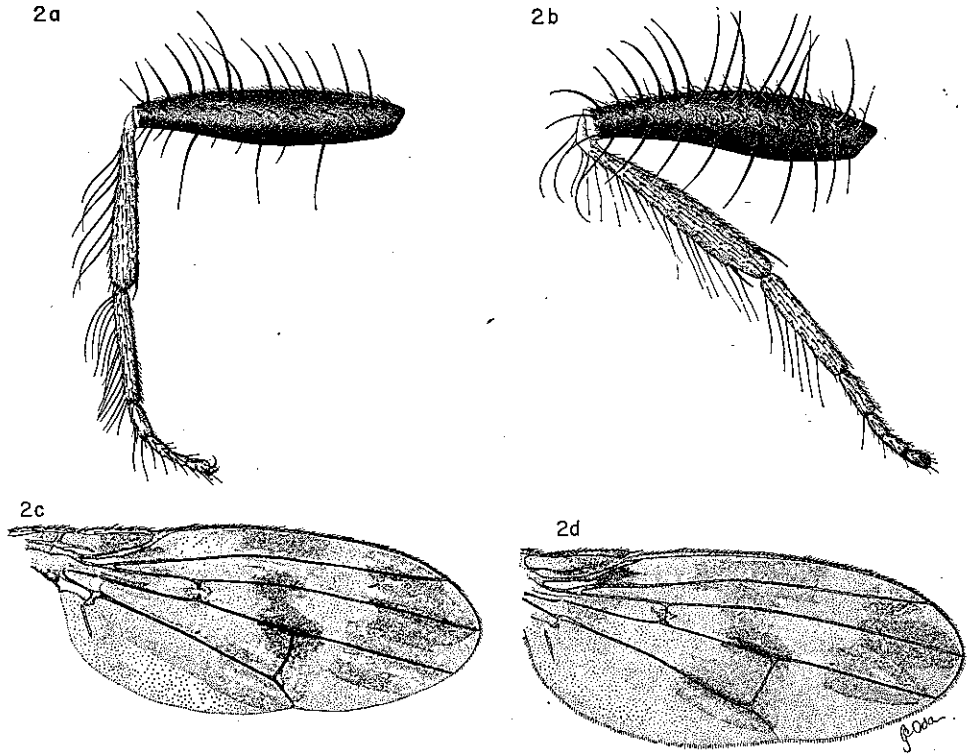


FIG. 2. *D. gymnobasis* n.sp.: a, front leg, lateral; c, wing. *D. silvarentis* Hardy and Kaneshiro: b, front leg; d, wing.

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

Modification of couplet 35, Hardy and Kaneshiro, 1968:177:

- 35 (34). Legs dark brown to black with a single row of long cilia on anterodorsal margin of front tibia 35A
 Legs mostly yellow to yellow-brown with two rows of long cilia extending full length of tibia and tarsus of front leg of male (refer Hardy, 1965:507, fig. 209A).....Molokai, Maui
 *villitibia* Hardy
- 35A. Front basitarsus of male densely ciliated, with three irregular rows of moderately long erect hairs over dorsal surface; front tibia with seven long anterodorsal hairs and lacking long cilia dorsobasally (fig. 2a).....Maui..... *gymnobasis* n.sp.
 Front basitarsus with only one, anterodorsal row of long cilia and front tibia with fourteen erect hairs along anterodorsal surface plus several long, curved, dorsobasal cilia (fig. 2b)
Hawaii.....*silvarentis* Hardy and Kaneshiro

Drosophila heedi n.sp (figs. 3a-d)

This species runs in the *hawaiiensis* complex of species by having a complete crossband over the middle of the wing and lacking long ciliation on the front tibia of the male. Because of the dark colored femora and coxae and black lower portion of face it would fit closest to *musaphila* Hardy from Kauai, it is differentiated from this species by having a distinct brown spot on the r-m crossvein; basal portion of cell R_1 beyond apex of vein R_1 subhyaline; last section of vein M_{1+2} one-half longer than penultimate section; face predominantly black; and cilia on front basitarsus showing a distinct gradation from very long at the base to short at apex (fig. 3b). *D. musaphila* lacks a distinct spot on r-m; has a brown marking extending into basal R_1 ; last section of vein M_{1+2} is one-third longer than penultimate section; face yellow-white except for brown to black rim above mouth; and with the cilia on basitarsus all approximately the same length. By the ornamentation of the front legs this would appear close to *gradata* Hardy and Kaneshiro, it differs by having the front, antennae, face and mouthparts, black rather than having front yellow to rufous on orbits and on lower half, face entirely yellow-white, antennae brown, tinged with rufous and mouthparts largely rufous. Also the r-m crossvein is covered by a small brown spot and is situated well beyond a level with apex of vein R_1 , just before middle of cell 1st M_2 (fig. 3c).

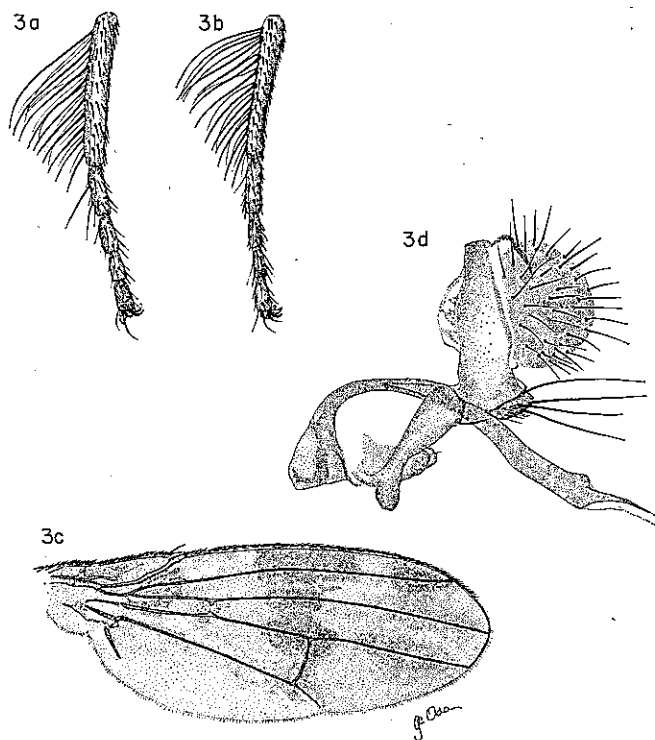


FIG. 3. *D. gradata* Hardy and Kaneshiro: a, front leg, lateral; *D. heedi* n.sp.: b, front leg, lateral; c, wing; d, male genitalia.

The gradation of the cilia on the front basitarsus is even more pronounced than in *gradata* (refer to figures 3a and 3b). The coloration of the mesonotum is also very different in the two, in *heedi* the ground color is dark brown to black with a narrow gray median vitta extending the entire length, rather than having a broad yellow vitta down middle of mesonotum, etc.; as in *gradata*.

Male genitalia as in figure 3d, fitting in the *hawaiiensis* subgroup (Kaneshiro, 1969) and differentiated from *gradata* by not having a depression on the aedeagus in region of preapical protuberance (figures 3d with 6e, Hardy and Kaneshiro, 1968:190).

Length: body and wings, 3.5 mm.

FEMALE. Unknown.

Holotype male and 22 paratypes, all males, Pohakuloa, Hawaii, 6200 ft., Jan. 17-18, 1970, collected on rotting bark of *Myoporum* (W. B. Heed, S. Montgomery and B. Ward).

Type and some of the paratypes in the B. P. Bishop Museum, other paratypes in the collections of the U. S. National Museum, British Museum (Nat. Hist.), and the University of Hawaii.

This species is named after Dr. W. B. Heed who has been one of the principle investigators for the past seven years on the project dealing with the Evolution and Genetics of Hawaiian Drosophilidae. His ecological studies have made most important contributions to our understanding of the evolution of the native species.

Modification key *hawaiiensis* complex, couplets 29-30
(Hardy and Kaneshiro 1968:176-177)

- 29(28). Face black, at least along lower margin; coxae and femora dark colored mostly brown to black..... 29A
Face yellow to white; coxae and femora yellow 30
- 29A. With a distinct brown spot on r-m crossvein; basal portion of cell R_1 beyond apex of vein R_1 subhyaline; last section of vein M_{1+2} one-half longer than penultimate section; face predominantly black; cilia on front basitarsus gradated (fig. 3b)
.....Hawaii..... *heedi* n.sp.
Lacking a distinct spot on r-m; with a brown marking extending in basal R_1 ; last section of the vein M_{1+2} one-third longer than penultimate section; face yellow-white except for brown to black rim above mouth; cilia on basitarsus all approximately same length.....Kauai..... *musaphila* Hardy
30. Mesonotum predominantly brown to black in ground color, not with a yellow median vitta. Cilia on dorsal surface of basitarsus approximately equal in length....Hawaii *hawaiiensis* Grimshaw
Mesonotum with a pair of brown submedian vittae, rather widely separated by yellow background. Cilia of front basitarsus graduated, long at base, becoming shorter toward apex (fig. 3a).....Oahu..... *gradata* Hardy and Kaneshiro

ODONTOPHALLUS SPECIES GROUP
Drosophila psilophallus n.sp. (figs. 4a-e)

In the key by Hardy and Kaneshiro (1968:177) this runs to *liophallus* in couplet 32. The species shows rather close relationship to *odontophallus* Hardy and Kaneshiro because of the ornamentation of the front legs of the male, the presence of a dark spot over the m crossvein, and by having m crossvein situated well beyond apex of vein R₁. Also, Carson (this bulletin), shows that chromosomally it is homosequential with *odontophallus*. Dr. F. Clayton (this bulletin) has found differences in the metaphase chromosomes; *psilophallus* has 6 rods and *odontophallus* has 5 rods and a dot.

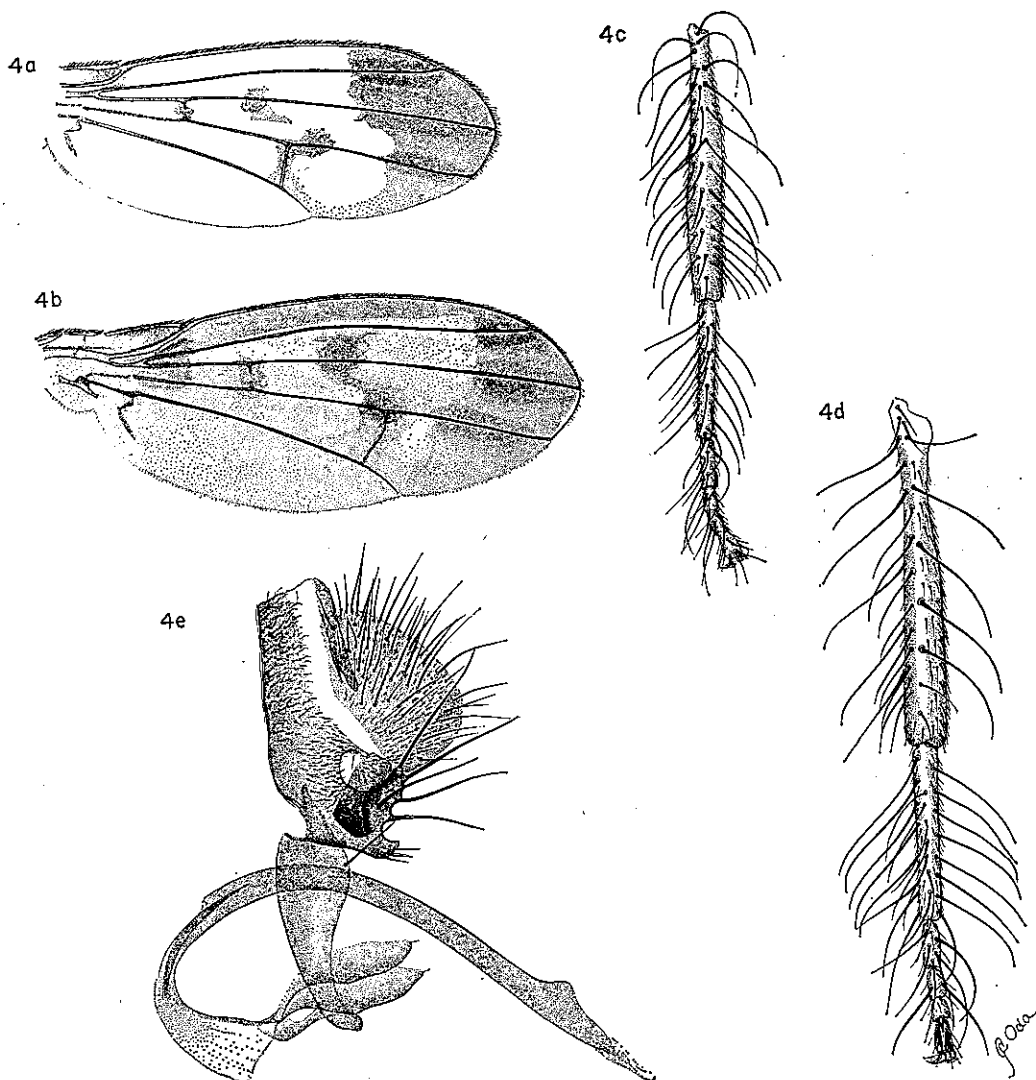


FIG. 4. *D. psilophallus* n.sp.: a, wing; c, front leg, dorsal; e, male genitalia. *D. odontophallus* Hardy and Kaneshiro: b, wing; d, front leg.

D. psilophallus differs from *odontophallus* by lacking ventral teeth on the aedeagus of the male; by having no dark mark in middle of cell R_1 and the wing markings are quite different as shown in figures 4a and 4b. It also differs from *odontophallus* by having the face mostly dull yellow-white with the lower margin brown to blackish and the antennae brownish yellow, rather than the face being entirely white and the antennae predominantly black; the ciliation over the dorsal surface of the front tibiae and tarsi of male much more dense, with nine-fifteen long cilia on each anterodorsal and posterodorsal surface, plus 11 conspicuous hairs down dorsal row, rather than about 6 long cilia in each of the anterodorsal and posterodorsal rows (c.f. figs. 4c and 4d); also r-m crossvein situated near basal two-fifths of cell 1st M_2 , rather than at middle of cell; and wing markings differing as in figures 4a and 4b.

Male genitalia very similar to those of *liophallus* (cf. fig. 4e with fig. 10d Hardy and Kaneshiro 1968:200).

Length: body, 3.5–4.0 mm; wings, 3.3–4.2 mm.

FEMALE. Fitting description of male except for sexual differences.

Holotype male and 3 male paratypes Kaunala Gulch, Pupukea, Oahu, July 30, 1969 (H. L. Carson—one paratype collected by F. Clayton), collection #M60. Allotype female, Pupukea, Oahu, July 6, 1969 (F. Clayton) collection #M50L1.

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

ORPHNOPEZA-LIMITATA SPECIES GROUPS

Drosophila atrimentum n.sp. (figs. 5a-d)

Near *D. orphnopeza* Hardy and Kaneshiro and fitting the description of that species in most respects. Differing by having the mentum, labella and clypeus black, rather than yellow; front basitarsus of male more densely ciliated, with several rows of erect cilia extending over dorsal portion the entire length of tarsomere, rather than having the cilia of basitarsus rather sparsely arranged with about five-six pairs of cilia but not reaching base of tarsomere (c.f. figs. 5a and 5c). The ornamentation of the front legs of the male is more similar to that of *murphyi* Hardy and Kaneshiro except that the basitarsal ciliation is much shorter, approximately equal in length to preapical dorsal bristle of front tibia and not so densely placed (fig. 5a). In *murphyi* the basitarsus is densely covered with long dorsal cilia which are distinctly longer than the preapical dorsal bristle of tibia (fig. 5b). Also in *atrimentum* the subbasal wing spot is comparatively small and does not extend to r-m crossvein, also the spot in middle of cell R_1 is directly above the brown mark on r-m crossvein. In *murphyi* the subbasal wing spot extends to r-m crossvein and the spot in middle of R_1 is slightly anterior to the mark over m crossvein.

Male genitalia very similar to those of *murphyi* and *orphnopeza*, cf. figs. 13c (Hardy and Kaneshiro, 1968:205), 6c (Hardy and Kaneshiro, 1969:46) and 5d.

Length: body, 3.7–4.0 mm; wings, 4.25 mm.

FEMALE. Fitting description of *orphnopeza* except for the blackish colored mentum and clypeus.

Holotype male, allotype female and 11 paratypes, 5 males, 6 females, labora-

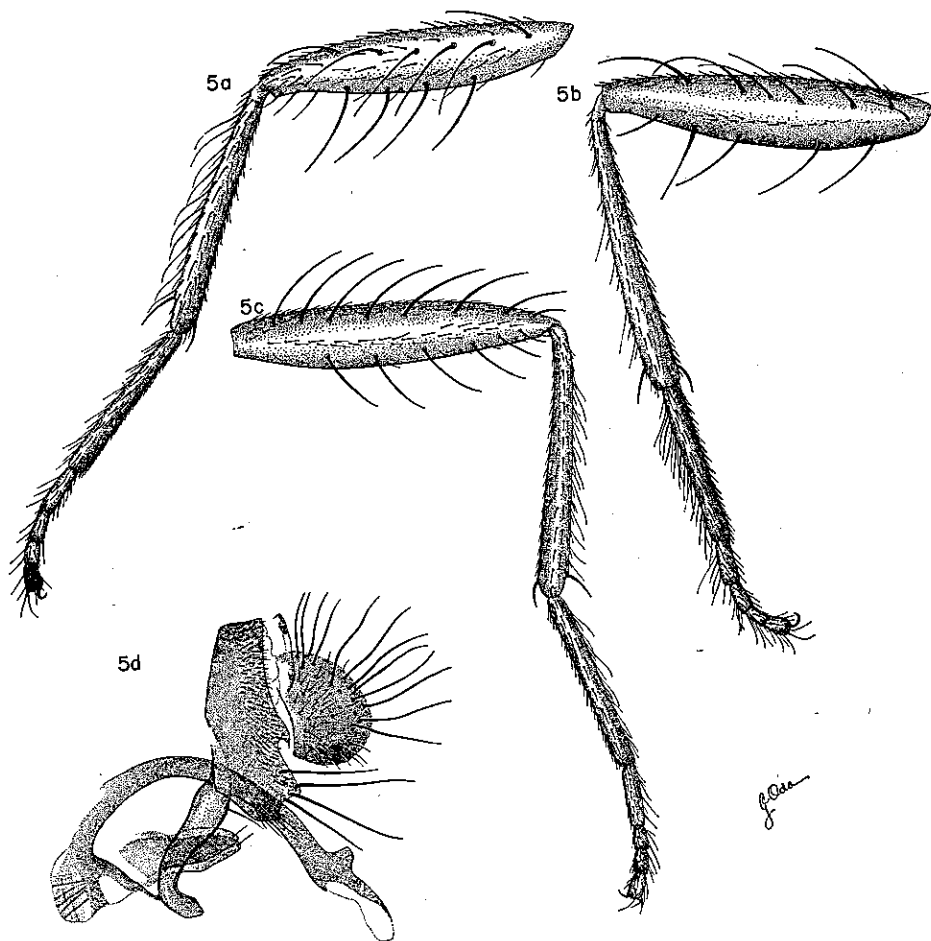


FIG. 5. *D. atrimentum* n.sp.: a, front leg, lateral; d, male genitalia. *D. murphyi* Hardy and Kaneshiro: b, front leg. *D. orphnopeza* Hardy and Kaneshiro: c, front leg.

tory reared F_1 generation, female collected Makaleha Valley, Oahu, 1800 ft., August 6, 1969 (F. Clayton). Collection #M63L5; except for one male field collected same locality as type, April 26, 1969 (A. H. Kuniyuki).

Type allotype and some paratypes in B. P. Bishop Museum, remainder of paratypes in collections of U. S. National Museum and University of Hawaii.

Dr. H. L. Carson has indicated that this is cytologically closely related to *orphnopeza* (this bulletin).

Drosophila sobrina n.sp. (figs. 6a-e)

Fitting near *limitata* Hardy and Kaneshiro but with distinctly different wing markings. The front basitarsus densely ciliated, with numerous rows of moderately long cilia over entire dorsal surface, these hairs are approximately equal in length of preapical dorsal bristle. Also the preapical dorsal bristle is comparatively small, scarcely larger than the ventral apical bristle of tibia. In *limitata* the dorsal

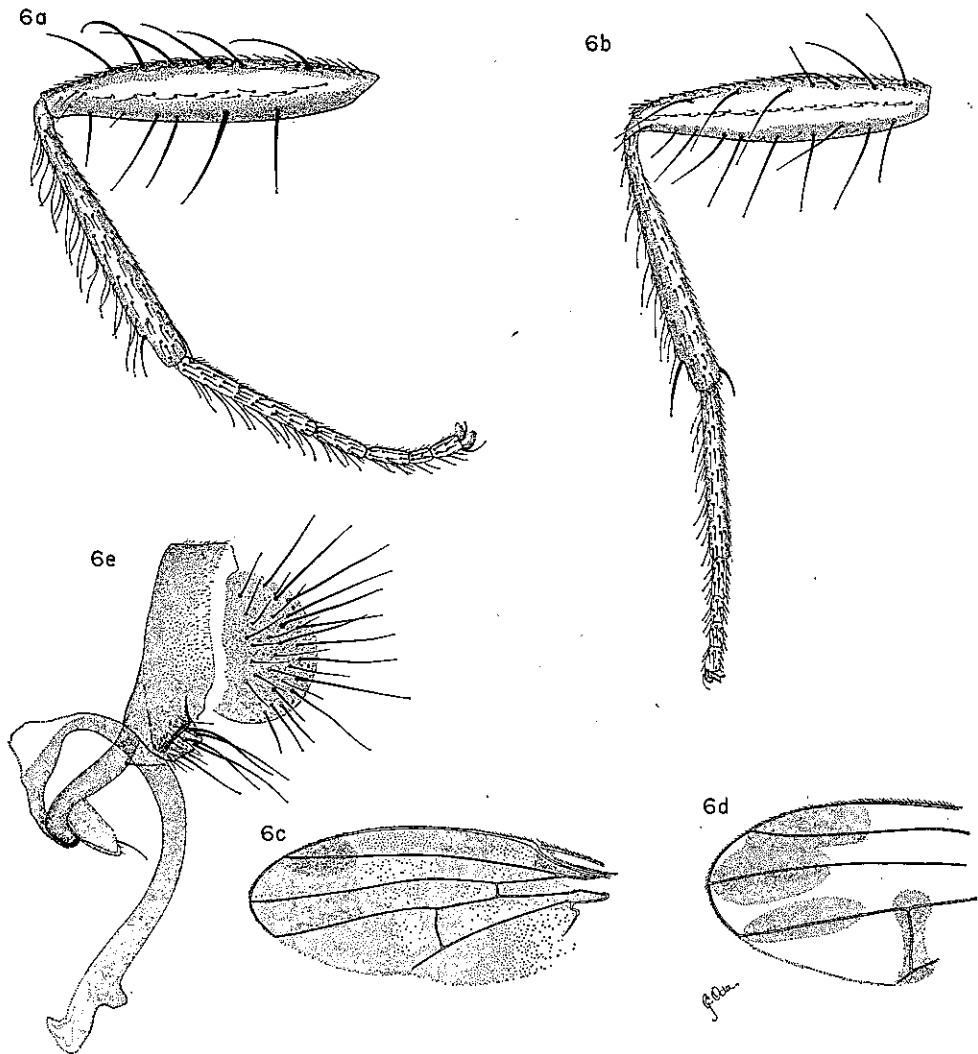


FIG. 6. *D. sobrina* n.sp.: a, front leg. lateral; c, wing; e, male genitalia. *D. limitata* Hardy and Kaneshiro: b, front leg; d, apex of wing.

cilia of the front basitarsus are arranged in two irregular rows, the hairs are distinctly shorter than the rather large preapical bristle and the bristle is nearly two times longer than the apical ventral bristle of the tibia (c.f. figs. 6a and 6b). Also the yellow median vitta extending the full length of the mesonotum is comparatively narrow in *sobrina*, scarcely wider than the space between two rows of acrostichal setae while in *limitata* this median vitta is broad, occupying the width of four rows of acrostichal setae. In *sobrina* the brown mark across apex of wing is straight along the basal margin (fig. 6c), rather than being indented or concave along vein M_{1+2} (fig. 6d); the subbasal wing spot is comparatively large in *sobrina* the brown mark extends along base of vein R_{4+5} to r-m crossvein, rather than being comparatively small, not extending to r-m; and the r-m crossvein is

situated about opposite end of vein R_1 , rather than being well beyond apex of R_1 , near basal third of cell 1st M_2 in *limitata*.

Male with three strong bristles on upper margin of each vibrissal row, female with two strong bristles.

Male genitalia (fig. 6e) not fitting the characteristics of the *ochracea* subgroup (which includes *ochracea* and *limitata*) as described by Kaneshiro (1969); rather they are intermediate to those of the *ochracea* subgroup and the *orphnopeza* subgroup.

Length: body and wings, 3.5–3.7 mm.

FEMALE. Similar to the male except for sexual characters.

Holotype male and allotype female Lulumahu Falls, Oahu, 1050 feet, May 16, 1968 (H. L. Carson).

Type and allotype in B. P. Bishop Museum.

Key to orphnopeza-limitata complexes of species

Couplet 16 to the Hardy and Kaneshiro key (1968:175) should be revised as follows:

- 16(15). Mentum yellow, clypeus and labella yellow to rufous, tinged lightly with brown 16A
 Mentum, labella and clypeus black..... Oahu..... *atrimentum* n.sp
- 16A. Veins R_{2+3} , R_{4+5} and M_{1+2} each with an isolated brown spot at apex. Brown spot in cell R_1 situated at or slightly before middle of distance between apices of veins R_1 and R_{2+3} , and above the m crossvein 16B
 Apical wing spots confluent, spot in cell R_1 situated distinctly before middle, near basal two-fifth of distance between apices of R_1 and R_{2+3} and distinctly before m crossvein 16C
- 16B. Front basitarsus of male densely ciliated over dorsal surface, the cilia arranged in numerous rows covering entire dorsal surface of basal two tarsomeres.....Hawaii.....
*murphyi* Hardy and Kaneshiro
- Front basitarsus with a half dozen pairs of cilia arranged on dorsal surface, the long hairs do not extend to the base of the tarsomere.....Maui.....*orphnopeza* Hardy and Kaneshiro
- 16C. Brown mark over apex of wing with a medium concavity on basal margin, with a hyaline indentation extending along vein M_{1+2} (fig. 6d). Subbasal wing spots small, not extending along base of vein R_{4+5} . Crossvein r-m situated well beyond apex of vein R_1 , at basal third of cell 1st M_2Maui.....
*limitata* Hardy and Kaneshiro
- Brown apical mark straight along basal edge, not indented along M_{1+2} (fig. 6c). Subbasal wing spot comparatively large, the brown mark extending along base of R_{4+5} to r-m crossvein. Crossvein r-m situated opposite apex of R_1Oahu.....*sobrina* n.sp

PLANITIBIA SPECIES GROUP

Drosophila ingens n.sp. (figs. 7a-c)

In the key to species of *Drosophila* possessing an extra crossvein in cell R_5 (Hardy 1969:72) this runs to *melanocephala* (Hardy). The two species are remarkably similar, both are large, almost totally black with the anterior margin of the male wing strongly arched. Except for the difference in ornamentation of the front legs, we see no morphological characters for separating these. The genetic studies however indicate that they are distinct species. Dr. Carson has reported that this is highly distinctive cytologically, with three fixed inversions different from *melanocephala*. It is differentiated from *melanocephala* by lacking long erect dorsal hairs at apex of front basitarsus of the male and also lacking long cilia on other tarsomeres. Also the cilia at base of front tibia are much more densely arranged in several irregular rows extending over entire dorsobasal portion and are distinctly graduated from base over about basal third of tibia rather than having only one row of anterodorsal cilia at the base of the tibia and not distinctly graduated (c.f. figs. 7a and 7b). Wing as in figure 7c. We find no other characteristics for separating these.

Length: body, 6.7–7.0 mm; wings, 7.0–7.25 mm.

FEMALE. Fitting description of *melanocephala*.

Holotype male: Hanaula, Maui, 4000 ft., August 13–14, 1969 (K. Y. Kanehiro) collection #M66. Allotype female: Haelaau, W. Maui, July 31, 1968

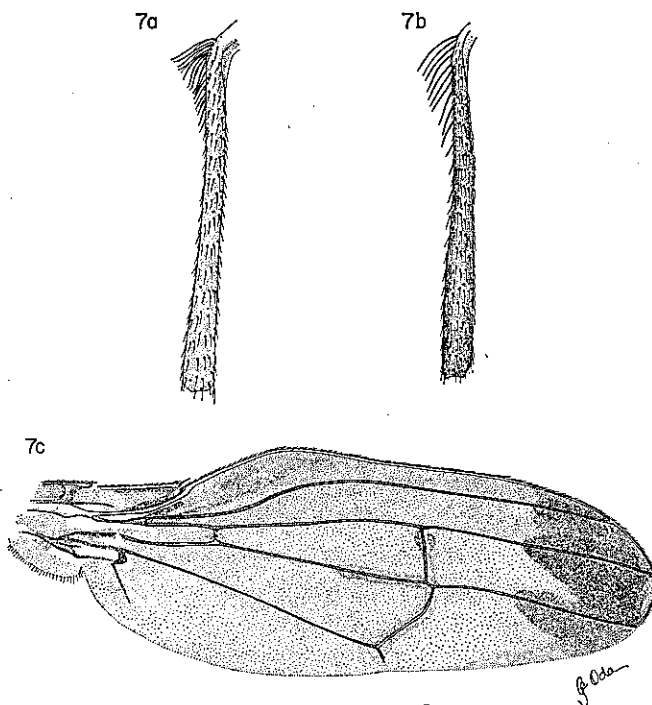


FIG. 7. *D. ingens* n.sp.: a, front tibia, lateral; c, wing. *D. melanocephala* (Hardy): b, front tibia.

(J. P. Murphy) #M3C11. Six paratypes, all males, all same locality as type, July 9–10, 1968 except one Kaulalewelewe, W. Maui, July 16, 1969 (K. Y. Kaneshiro).

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

This species apparently is restricted to the mountains of West Maui and *melanocephala* is restricted to the slopes of Haleakala on East Maui.

PUNALUA SPECIES GROUP

Drosophila paucicilia n.sp. (figs. 8a-h)

Fitting in the *punalua* complex of species very near *basisetae* Hardy and Kaneshiro because of the wing and body markings, the arrangement of the cilia on the front tibia and by having the closely appressed apical bristles on palpi (fig. 8e). The similarity to *basisetae* is very close and the only differences we find for differentiating these is that *paucicilia* is smaller and has fewer cilia at base of front tibia of male and fewer rows of acrostichal setae. The front tibia has two long black posterodorsal cilia just before the base and two long black dorsobasal cilia (figs. 8a and 8b). There are no differentiable fine cilia along the anterodorsal surface of the tibia. In *basisetae* the tibia has five or six long black posterodorsal cilia arranged in a row down the basal third of the segment (figs. 8c and 8d) in addition to the two dorsobasal cilia and also has five or six fine anterodorsal cilia on basal portion of segment. *D. paucicilia* has only six rows of acrostichal setae over hind portion of mesonotum, measured at a level with the anterior dorsocentral bristles. *D. basisetae* has eight-ten irregular rows of acrostichal setae on the posterior portion of the mesonotum.

MALE. Head: Front brown, covered with golden pollen. Anterior reclinate bristles small, about one-third as long as proclimates and situated halfway between the proclimates and the upper reclimates. Lower margin of face dark brown to black in ground color. In *basisetae* the lower margin of the face is tinged faintly with brown. Palpi and mouthparts entirely yellow except for a narrow brown rim at base of each labellum. The palpi each with a clump of closely appressed bristles at apex (fig. 8e). **Thorax:** Yellow to rufous with a faint tinge of brown on dorsum but no distinct brown markings except a narrow band along upper edge of each mesopleuron to wing base and a more faint, rather broad, longitudinal marking of brown at level with median portion of mesonotum but interrupted over posterior two-thirds of that sclerite, extending over upper pteropleuron and metapleuron. **Legs:** Entirely yellow. Femora slender, tibiae as noted above and with cilia as in figures 8a and 8b; also with the preapical dorsal bristle distinct but short, approximately equal in length to apicoventral bristle. Tarsi devoid of cilia, basitarsus approximately three-fifths as long as tibia. **Wings:** Predominantly subhyaline, with a small subbasal spot, a large dumb-bell shaped mark over m crossvein and with apex dark brown (fig. 8g). **Abdomen:** As is typical of most species in this complex with the first tergum and basal portion of second yellow and with other terga yellow except for brown to black apices and a narrow mark of brown through median portion. Male genitalia as in figure 8h. Fitting in the *paucipuncta* subgroup as discussed by Kaneshiro (1969).

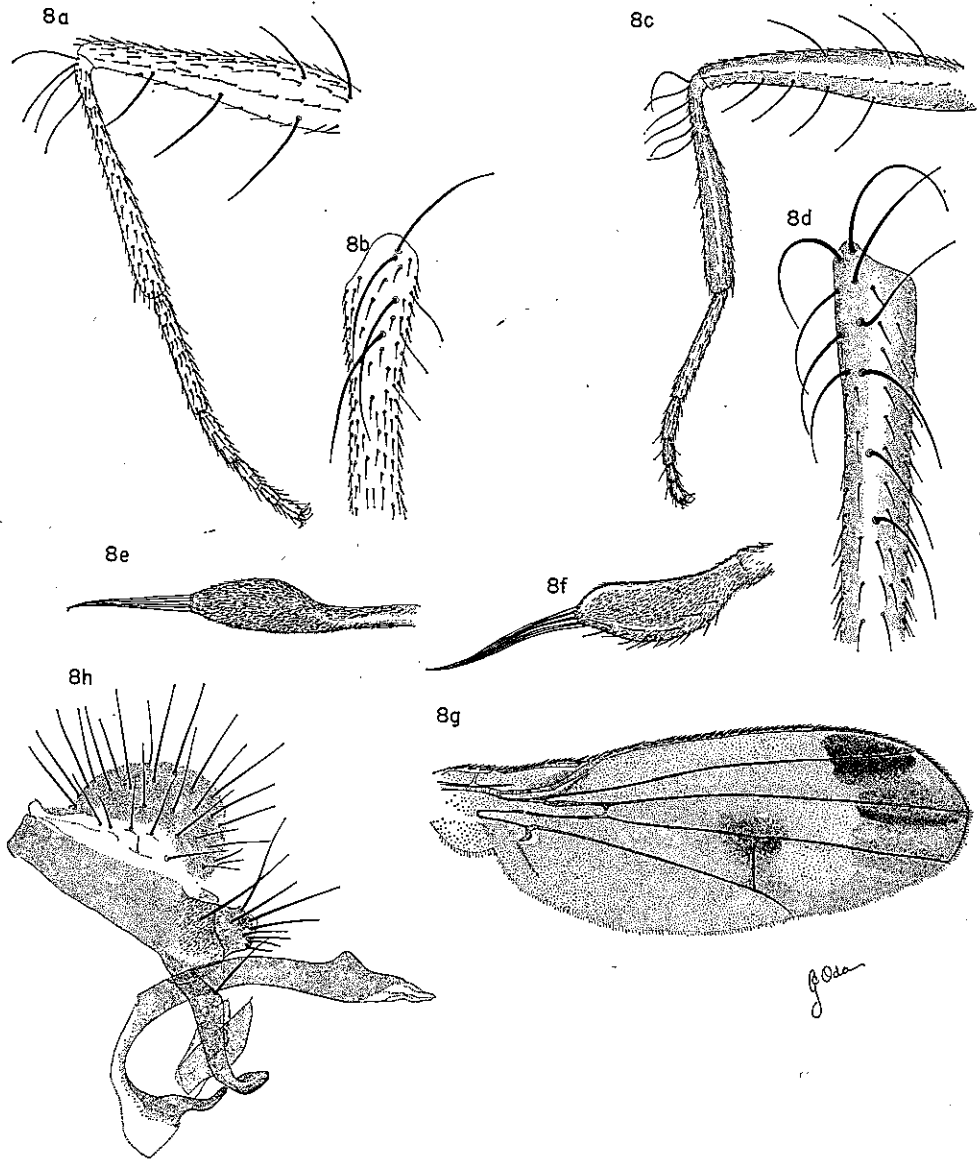


FIG. 8. *D. paucicilia* n.sp.: a, front leg, lateral; b, base of front tibia, dorsal; e, palpus; g, wing; h, male genitalia. *D. basisetae* Hardy and Kaneshiro: c, front leg; d, base of front tibia, f, palpus.

Length: body, 3.2 mm; wings, 3.5 mm.

Female unknown.

Holotype male and 3 male paratypes from valley near Waialua, Waianae Mts., 1600 ft., March 1, 1970 (S. Montgomery).

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

VESCISETA SPECIES GROUP

Drosophila alsophila n.sp. (figs. 9a-b)

This species fits in the complex of picture-wings characterized by having the thorax predominantly rufous, a prominent dark brown spot in middle of cell R_1 , also apical bristle of palpus small, rather poorly developed. It would run in the same species group with *vesciseta* Hardy and Kaneshiro, *assita* Hardy and Kaneshiro and *pisonia* n.sp. but is readily differentiated from any of these by lacking long cilia on basal third to two-fifths of the front tibia of the male and having the cilia of the front legs very differently developed (fig. 9a), also by the presence of a prominent brown marking extending through middle of cell M_4 to wing margin (fig. 9b). The palpi and labella are yellow as in *assita* except for a tinge of brown around the dorsal margin of each labellum. Antennae yellow, tinged with brown over dorsal portion and with a faint tinge of brown over third segment, rather than being pale yellow as in *assita*. Wing markings rather similar to those of *vesciseta* except for the dark marking in cell M_4 , also the median spot in cell R_1 is more prominent as in figure 9b. Front tibia of male with short, erect hairs arranged in several irregular rows over apical one-third of segment and with one row continuing basad over anterodorsal surface on basal third of tibia. Basitarsus densely covered with several irregular rows of short erect hairs over dorsal surface (fig. 9a). Basitarsus approximately one-half as long as tibia. The male genitalia would fit in the *vesciseta* subgroup as described by Kaneshiro, 1969.

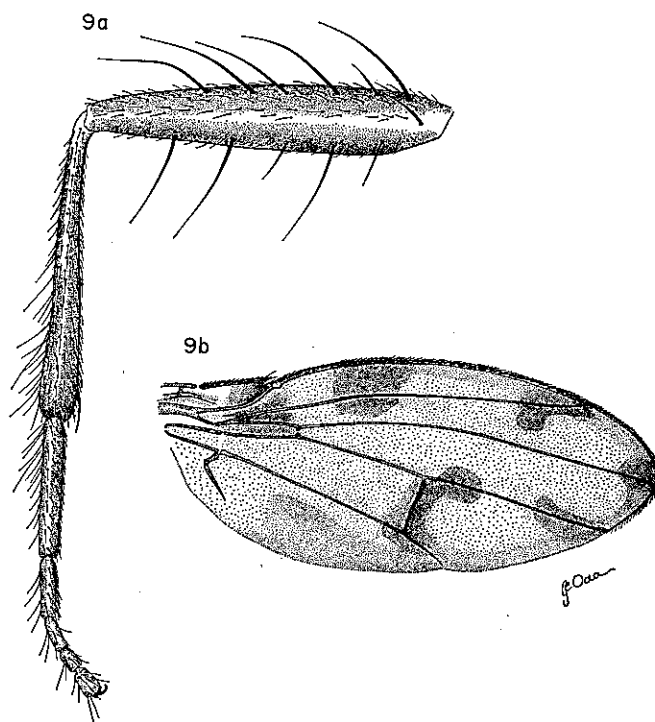


FIG 9. *D. alsophila* n.sp.: a, front leg, lateral; b, wing.

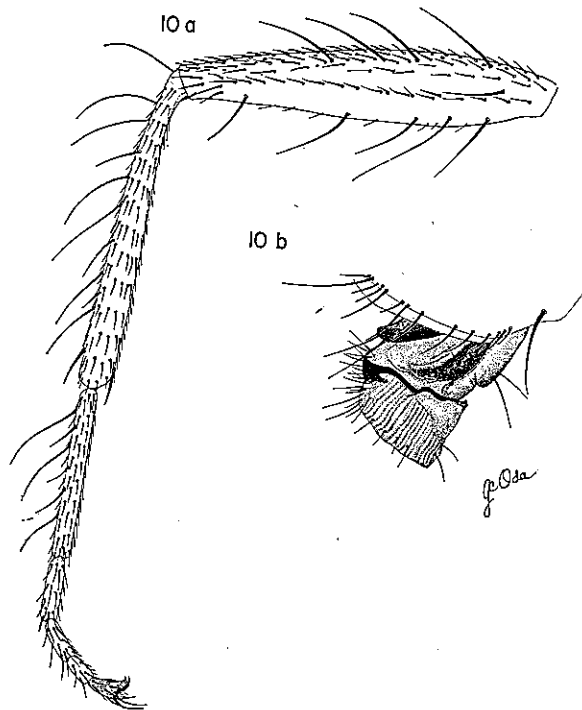


FIG. 10. *D. ambochila* n.sp.. a, front leg, lateral; b, mouthparts.

Length: body, 4.0 mm; wings, 4.7 mm.

Female unknown.

Holotype male: Laupahoehoe Stream, NE slope of Mauna Kea, *Metrosideros* Rain Forest, 2500 feet, Jan. 6, 1970 (K. Y. Kaneshiro).

Type in B. P. Bishop Museum.

Drosophila ambochila n.sp. (figs. 10a-b)

Because of the body coloration, wing markings, and the rudimentary preapical dorsal bristle of front tibia, this would fit near *vesciseta* Hardy and Kaneshiro. It is differentiated by lacking posterodorsal cilia on the front tibia of the male; by having only four dorsal cilia on front basitarsus (fig. 10a), rather than a dense clump of dorsal cilia; the palpi reddish brown and labella yellow except for a narrow polished black basal rim (fig. 10b), rather than palpi and labella black; also the apices of the abdominal terga are more narrowly rimmed with black than in *vesciseta*.

MALE. Head: Front reddish brown, with a golden sheen over median portion, as seen in indirect light. Face white, very slightly raised down median portion. Lower superior fronto-orbital bristles situated slightly above inferior fronto-orbitals. Antennae yellow, tinged with brown on dorsum of second and over most of third segment. Arista with seven dorsal and three ventral rays in addition to apical fork, also with prominent setae along apical half of inner margin. **Thorax:** Yellow, lacking brown markings except for a faint streak of brown through me-

dian portion of each mesopleuron, extending over upper portion of pteropleuron. *Legs*: Yellow with a row of moderately long, erect, black cilia extending entire length on anterodorsal surface and tarsi lacking long cilia except for four on dorsum of first tarsomere (fig. 10a). *Wings*: With a rather prominent subbasal spot on anterior margin extending approximately to r-m crossvein; a prominent spot in middle of cell R_1 extending across most of cell R_3 and with isolated brown spots at apices of veins R_1 , R_{2+3} and R_{4+5} ; and with a large, rather dumb-bell shaped spot over m crossvein. The spot in cell R_1 is situated distinctly before a level with the mark over m crossvein. *Abdomen*: Predominantly yellow, first tergum entirely yellow, other terga each with a narrow black band on posterior margin and a streak of black through median portion. Male genitalia fitting in *vesciseta* subgroup as discussed by Kaneshiro (1969).

Female unknown.

Length: body and wings, 3.3–3.5 mm.

Holotype male and one male paratype from Gulch between Puu Hapapa and Puu Kanehoa, Waianae Mts., Oahu, Feb. 2–14, 1970 (S. Montgomery).

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

Drosophila montgomeryi n.sp. (figs. 11a-b)

Fitting near *pisonia* n.sp., from the Island of Hawaii, but differing by having a narrow, pale brown vitta on each side of mesonotum behind suture and just outside dorsocentral bristles; by having the genae entirely yellow; the postero-dorsal cilia on front tibia extending only over basal two-thirds of the segment; the basal margin of labellum red, tinged with brown. The front is reddish brown with a golden sheen on upper two-thirds, rufous faintly tinged with brown on

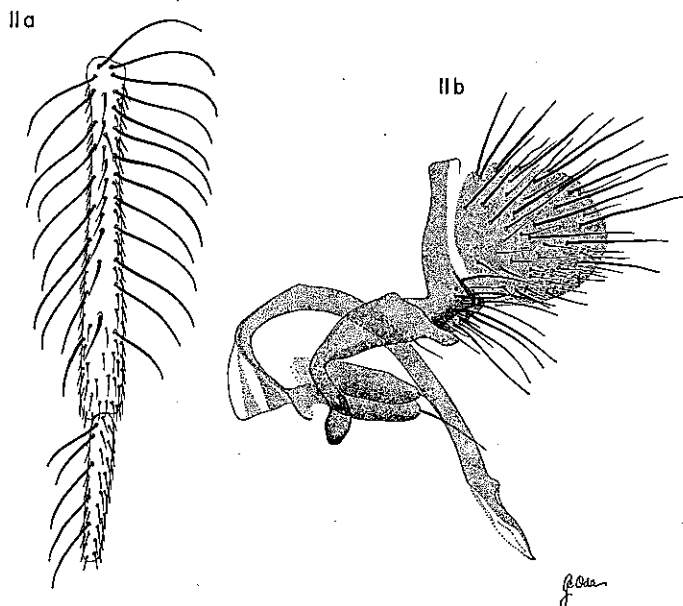


FIG. 11. *D. montgomeryi* n.sp.: a, front leg, dorsal; b, male genitalia.

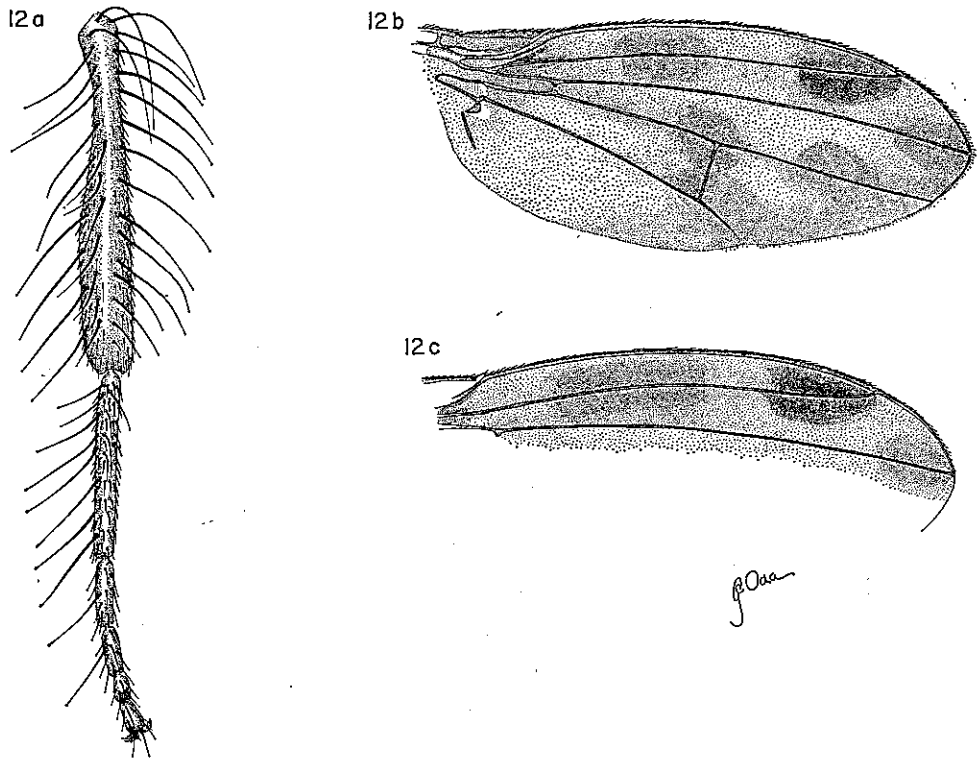


FIG. 12. *D. pisonia* n.sp.: a, front leg, dorsal; b, wing. *D. assita* Hardy and Kaneshiro: c, anterior margin of wing.

lower portion. In *pisonia* the front is entirely brown, tinged with yellow to rufous. The second antennal segment of *montgomeryi* is yellow, tinged with brown on posterodorsal surface and the third segment is brown on the apex, yellow basally. In *pisonia* the antennae are entirely brown. Otherwise fitting the description of *pisonia* and other species of this complex. Ciliation of front tibia and basitarsus as in figure 11a.

Male genitalia (fig. 11b) fitting in *vesciseta* subgroup as discussed by Kaneshiro (1969); however, the anal plates are about one-fifth longer than wide rather than being wider than long (c.f. figs. 11b and 26c, Hardy and Kaneshiro, 1968: 232, and 1c, Hardy and Kaneshiro, 1949:40).

Holotype male and three male paratypes from Gulch between Puu Hapapa and Puu Kanehoa, Waianae Mts., Oahu, Feb. 2 and 14, 1970, collected in the same habitat as *ambochila* n.sp. (S. Montgomery).

Type in B. P. Bishop Museum, paratypes in collections of U. S. National Museum and University of Hawaii.

This species is named after Mr. Steven Montgomery, graduate student in entomology, University of Hawaii, who is a very energetic field worker, has collected a number of new species and added many new host and distribution records.

Drosophila pisonia n.sp. (figs. 12a-c)

Fitting very near *assita* Hardy and Kaneshiro but differing by having the antennae dark colored, rather than pale yellow; the front entirely brown, tinged faintly with yellow on lower margin, rather than being yellow to rufous on lower margin; the mark in middle of cell R_1 being almost quadrate, equal in length to apical spot on vein R_{2+3} , rather than being elongate as in *assita* (compare figures 12b and 12c). The anterodorsal cilia on the front basitarsus are equal or slightly longer than the dorsobasal cilia on front tibia, whereas in *assita* they are distinctly shorter. This is also close to *montgomeryi* n.sp. but differs by having the long posterodorsal cilia on front tibia of male extending the full length of the segment; the front basitarsus with a 5-6 long black anterodorsal cilia (fig. 12a); each gena with a brown to black mark below eye margin; and mesonotum lacking brown marks. Otherwise fitting the description of other species of this complex.

Length: body and wings, 3.75 mm.

FEMALE. Fitting characters of male except for primary and secondary sexual characters. The ovipositor blades are slender, about two times longer than cerci.

Holotype male, allotype female and 5 male paratypes, Pololo Stream, Kohala Mts., Hawaii, Jan. 13, 1970, on rotting *pisonia*, 1400 ft., (H. L. Carson and K. Y. Kaneshiro) collection #M95. This has been bred from *Pisonia* stems, in the laboratory. Type and allotype in B. P. Bishop Museum. Paratypes in U. S. National Museum and Univ. of Hawaii collections.

Key to *vesciseta* species group

Modification of couplet 8 of the key by Hardy and Kaneshiro (1968:174). This couplet should read as follows:

- 8(7). Thorax usually conspicuously marked with brown to black, at least disc of scutellum marked with brown. Preapical dorsal bristle of front tibia well developed, considerably stronger than apicoventral bristle of tibia 9
 Thorax entirely rufous, or with not more than a faint streak of brown on mesonotum outside the dorsocentrals or along upper edge of mesopleuron. Preapical dorsal bristle of front tibia small, poorly developed, often not differentiable from dorsal setae 9A
- 9A. Front tibia of male with long dorsal ciliation extending the full length of segment (figs. 10a, 11a, and 12a) 9B
 Front tibia bare of long cilia on basal two-fifths (fig. 9a)
Hawaii..... *alsophila* n.sp.
- 9B. Front tibia of male with a row of strong posterodorsal cilia 9C
 Front tibia lacking posterodorsal cilia; with a complete row on anterodorsal surface and front basitarsus with four dorsal cilia. Palpi reddish brown. Labella yellow except for a narrow shining black basal rimOahu..... *ambochila* n.sp.
- 9C. Labella and palpi yellow. Posterodorsal surface of front tibia with a complete row of 9-12 long cilia extending from base at least two-thirds the length of the segment, and front basitarsus

- with 3-6 evenly spaced, long, dorsal cilia, not arranged in a clump 9D
- Labella and palpi black, front tibia with only four long erect posterodorsal cilia extending from middle of segment to apical one-fifth and with the dorsal surface of basitarsus densely covered with a clump of long black cilia arranged in three irregular rows Maui..... *vesciseta* Hardy and Kaneshiro
- 9D. Antennae predominantly reddish brown to blackish. Front largely brown or reddish brown, not marked with yellow. Spot in middle of cell R_1 square, equal in length to or shorter than the apical spot on vein R_1 (fig. 12b) 9E
- Antennae and lower portion of front pale yellow. Spot in middle of R_1 elongate, $1\frac{1}{2}$ longer than apical spot on R_1 . Anterodorsal cilia on front basitarsi distinctly shorter than dorsobasal cilia of tibiae Hawaii..... *assita* Hardy and Kaneshiro
- 9E. Mesonotum entirely rufous, lacking brown markings. Gena with a brown to black mark below eye margin. Posterodorsal row of cilia on front basitarsus extending from base to pre-apical dorsal bristle. Basal margin of labellum black Hawaii..... *pisonia* n.sp.
- Mesonotum with a streak of brown on each side behind suture and just outside dorocentral bristles. Gena entirely yellow. Posterodorsal cilia on front tibia extend over basal $\frac{2}{3}$ of segment. Basal margin of labellum red, tinged with brown..... Oahu..... *montgomeryi* n.sp.

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