V. New Picture-Winged *Drosophila* From Hawaii, Part III (Drosophilidae, Diptera)[1]

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Five additional species of picture-winged *Drosophila* are being described here so that names will be available for use in other studies on evolution of Hawaiian Drosophilidae. The species of this large component of the native *Drosophila* fauna have received special attention and have been studied intensively over the past eight years. The species groups have been clarified and the systematics is now at an advanced stage. It is probably the first time so many data have been accumulated on such a large group of flies. We now have a great deal of information on approximately 110 species and are nearly to the point where all (or most) of the morphologically distinct species have been described. We have been narrowing down external species relationships to a finer and finer degree until we now can demonstrate cases of reproductively isolated populations which cannot be differentiated by external morphological characters.

In this paper we are dealing with the first examples of morphologically indistinguishable species which we have been able to demonstrate. Two of these (*formella* n.sp. and *villitibia* Hardy) seem to be exactly alike externally and two (*pullipes* n.sp. and *grimshawi* Oldenberg) seem to differ only by color characters. It is expected that in our future studies of the Hawaiian species we should be able to demonstrate all different stages of incipient speciation. It is probable, however, that subspecies differences in the Hawaiian populations will show up at the biochemical and chromosomal levels, and may not be manifest in external differences.

Drosophila formella n.sp.

(Fig. 1)

Fitting the description of *villitibia* Hardy in all respects. We find no morphological characters for separating this. The external appearance appears to be exactly the same as *villitibia*. They show distinct chromosomal differences. The metaphase chromosome has five rods and a dot whereas the typical *villitibia*, from Maui, has six rods. This difference has been confirmed by hybridization studies. The male hybrids are sterile. The male genitalia are as in figure 1.

Holotype male and 11 male paratypes, rainsheds, Puu Waawaa, Northwest slope of Hualalai, ca. 4000 feet, Hawaii, December 22, 1969, collection #M87 (K. Y. Kaneshiro and H. L. Carson).

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

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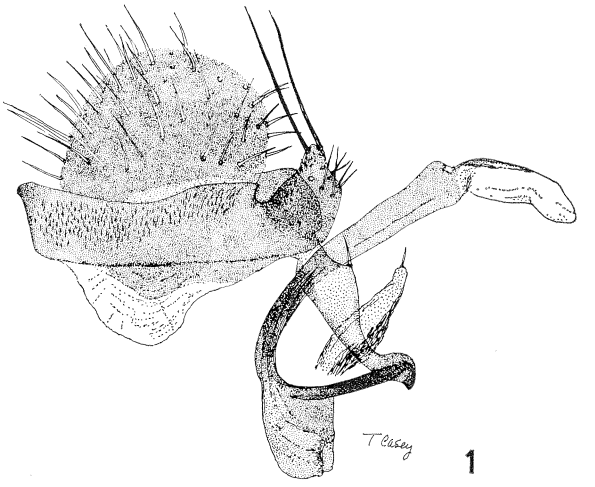

FIG. 1. *D. formella* n. sp.

Drosophila obatai n.sp.

(Fig. 2a-c)

Fitting close to *sodomae* Hardy and Kaneshiro, from Maui and Molokai and differing by having a comparatively broad dark brown or blackish subbasal wing spot (fig. 2b) which fills most of apical half of cell Sc, extending across wing broadly occupying base of cell R_3 through cell R_5 and into upper edge of M_2. In *sodomae* the subbasal spot is represented by a narrow brown streak occupying only extreme apex of Sc across to narrow base of R_3 and not extending into R_5 (fig. 22c, Hardy and Kaneshiro, 1968: 222). The costal fringe is more elongate in *obatai*, extending about five-sixths the distance between apices of veins R_{2+3} and R_{4+5} and in some specimens extending nearly to R_{4+5}. In *sodomae* the costal fringe extends about two-thirds the distance to R_{4+5}. Also the abdominal markings are black in *obatai*, rather than brown. The external male genitalia (fig. 2c) fit in the *orphnopeza* subgroup (Kaneshiro, 1969: 64). Otherwise fitting the description of *sodomae*.

The polytene chromosomes are homosequential with *sodomae*.

Holotype male, allotype female and 11 paratypes, 6 females, 5 males, collected 0.7 miles N.W. of Puu Pane, Waianae Mts., Oahu, #P73Q4F, March 7, 1971 (S. L. Montgomery). Also four male paratypes, Puulu Valley, near Puu Pane, Oahu, reared from rotting *Dracaena* stems, February 30, 1970 (S. L. Montgomery).

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

In appreciation for the important contributions he has made to our studies of Hawaiian *Drosophila* we are pleased to name this species after Mr. John K. Obata. Mr. Obata is a local school teacher who is a well trained botanist and an enthusiastic field man. He knows the trails and endemic plants of Oahu exceptionally well and has worked closely with our collectors. He has been directly responsible

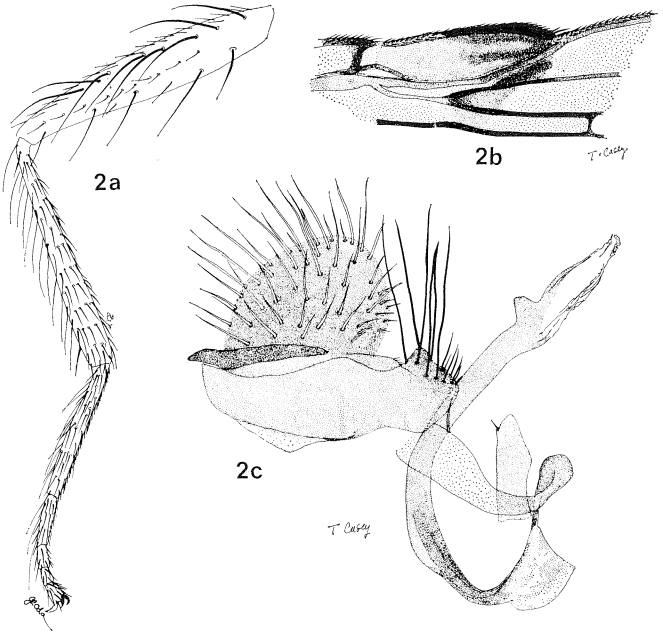

FIG. 2. *D. obatai* n. sp.; a, front leg; b, wing; c, genitalia.

for discovering many new habitats and new species of flies and for obtaining a great deal of host association information on our native species.

Drosophila pullipes n.sp.

(Fig. 3)

Fitting very near *grimshawi* Oldenberg and we find no morphological characters for differentiating it. The only differences we find are that the legs are entirely black and the pleura are black except for a narrow rufous mark along lower edge of each mesopleuron onto the pteropleuron, the ground color is almost obscured by dense gray pollen; the sternopleuron is entirely black in ground color. In typical *grimshawi* the tibiae, tarsi and broad apices of femora are yellow and the propleura and most of the sternopleura, also the hypopleura, are pale yellow.

The type male has been crossed with virgin females of typical *grimshawi* (Stock #G1), from Maui, and the hybrids are sterile.

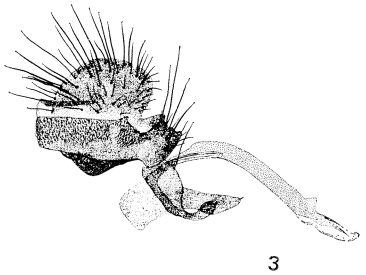

FIG. 3. *D. pullipes* n. sp.

Holotype male, Honokane Nui Valley, Kohala Ditch Trail, Kohala Mts., Hawaii, 1100 feet elevation, August 11, 1970, collection #PT50B2 (K. Y. Kaneshiro). Allotype female, Pololu Stream, N. Kohala Mts., Hawaii, June 12, 1968 (H. L. Carson).

One female specimen on hand collected North of Pawaina, Kona, Hawaii, 3000 feet, July 14, 1953 (D. E. Hardy) may belong here but the coloration is more similar to that of typical *grimshawi*, the legs are only slightly darker than is normal for this species, and it is not being designated as an allotype.

Type and allotype in B. P. Bishop Museum.

Drosophila reynoldsiae n.sp.

(Fig. 4a-c)

By external characters this fits near *atrimentum* Hardy and Kaneshiro but comparison of the chromosomes places this near *sobrina* Hardy and Kaneshiro. In our key to the *orphnopeza-limitata* complex of species (Hardy and Kaneshiro, 1971: 161) this runs to *atrimentum* because of the brown to black clypeus, mentum and rim of labellum; also the bases of the palpi are dark colored, brown to blackish as in *atrimentum*. The species is characterized by having the wings narrowed on about apical half, distinctly pointed apically (fig. 4b). The wing is broadest at basal one-third-two-fifths and narrows rather sharply beyond apex of vein M_{3+4}. Also the arrangement of the dorsal cilia on the front tibia and tarsus of the male is distinctive. In *reynoldsiae* the front basitarsus has about five long, black, curled setae along anterodorsal surface over apical three-fifths of segment and about three curled setae before apex on posterodorsal surface. The second tarsomere has one or two strong, curled, anterodorsal setae and one on posterodorsal surface. The dorsal surface of the front tibia is covered with three rows of comparatively short, slightly curved setae extending to about basal sixth of segment, the setae are distinctly shorter than the preapical dorsal bristle (fig. 4a). In *atrimentum* two irregular rows of black cilia extend the entire length along the dorsal and anterodorsal surfaces, these are slightly curved, and are approximately equal in length to the preapical dorsal bristle. In other details we see no way to differentiate this from *atrimentum*. The front basitarsus is long and slender, approximately two-thirds as long as the tibia, the proportions are 5.5–8.0. External male genitalia (fig. 4c) fitting in *orphnopeza* subgroup (Kaneshiro, 1969: 64).

D. sobrina is readily differentiated by having the entire dorsal surface of the basitarsus and front tibia densely covered with black cilia.

Length: body, 5.0–5.5 mm; wings, 7.0 mm by 2.0 mm wide.

Holotype male, allotype female and 32 paratypes, 20 males, 12 females from East Makaleha Valley, Oahu, July 19, 1970, reared ex rotting *Reynoldsia* stems (S. L. Montgomery); 17 males, 12 females, Peacock Flats, Oahu, July 21, 1970, reared ex rotting *Reynoldsia* (S. L. Montgomery); one male, 2 females, Mokuleia, Kealia Trail, 300 ft. elevation, March 21, 1971, reared ex rotting *Reynoldsia* stems (S. L. Montgomery); and 1 female Kului Gulch, Oahu, 1200 ft., January 31, 1971, ex *Reynoldsia* stem (S. L. Montgomery).

Type, allotype, and some paratypes in B. P. Bishop Museum, other paratypes

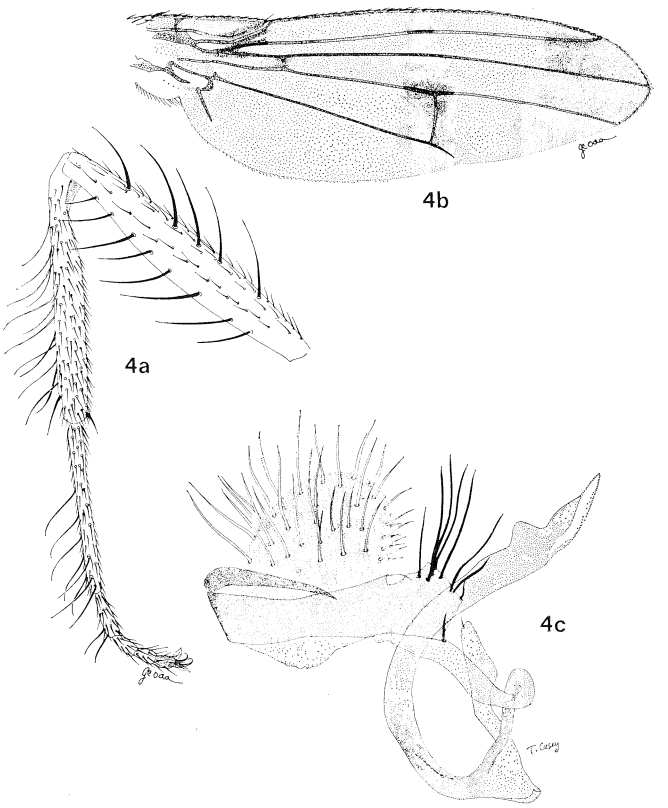

FIG. 4. *D. reynoldsiae* n. sp.; a, front tibia and tarsus; b, wing; c, genitalia.

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

Drosophila touchardiae n.sp.

(Fig. 5a-b)

Fitting in the *adiastola* complex of species by having the wings predominantly brown, covered with hyaline spots and having the front basitarsus of the male flattened laterally (refer Hardy and Kaneshiro 1968: 236 for key to the species of this complex). It fits nearest to *cilifera* Hardy and Kaneshiro because of the markings of the mesonotum. The wing markings differ from those of *cilifera* in that they are similar in the two sexes, showing no distinct dimorphism and with a brown mark in middle of the first hyaline portion near base of cell R_1, extending over into cell R_3 (fig. 5a) rather than having a large prebasal hyaline mark in each of cells R_1 and R_3 (fig. 28b, *loc. cit.*: 238). It differs by having the front legs mostly brown to black and middle and hind femora tinged with brown, rather than legs all yellow except for a faint tinge of brown before apices of tibiae. The narrow brown vitta extending down each dorsocentral line which is characteristic of *cilifera* is lacking in *touchardiae*, instead the anteromedian portion of the mesonotum of the male is entirely yellow to a level approximately with the suture

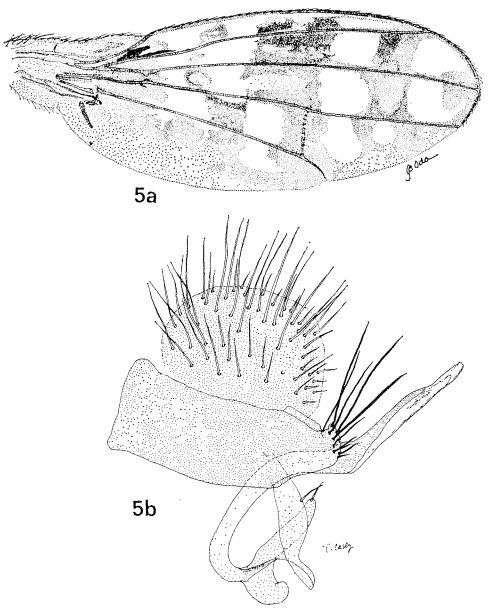

FIG. 5. *D. touchardiae* n. sp.; a, wing; b, genitalia.

and a broad yellow mark extends on each side in line with each dorsocentral row slightly beyond the anterior dorsocentral bristles. Front mostly brown, darkest on lower median portion below level with the lower fronto-orbital bristles. The face, genae and clypeus are brown, the mentum is rufous, tinged with brown. In *cilifera* the lower front is golden yellow, and the face, genae, clypeus and mouthparts are pale yellow. The mentum is setose almost to its base as in *cilifera*. The antennae are dark brown to black, in *cilifera* they are nearly yellow. The females seem consistently darker in color than the males, the mesonotum is almost entirely dark brown with a yellow vitta on each side in line with dorsocentral bristles and the middle and hind femora are more distinctly tinged with brown. External male genitalia (fig. 5b) fitting in *adiastola* subgroup (Kaneshiro, 1969: 60).

Holotype male and allotype female, Castle Trail, Oahu, 2100 ft., March 15, 1970 (S. L. Montgomery) collection #P12Q1. 17 paratypes, 9 males, 8 females mostly same data as type, some specimens from Pia Stream, Niu, Oahu, January 23, 1971, reared from rotting bark of *Touchardia* (S. L. Montgomery).

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

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Addendum

Drosophila goureaui Hardy, New Name

It has been brought to my attention by Mr. E. B. Basden, Institute of Animal Genetics, Edinburgh, that *mycetophila* Hardy (1965, Insects of Hawaii 12: 376) is preoccupied in *Drosophila* by *mycetophila* Goureau. He stated:

> "In 1865 Colonel C. C. Goureau published a second supplement to his "Les Insectes Nuisibles aux Arbes Fruitiers aux Plantes Potagéres . . .", a Paris pamphlet of 147 pages. On page 120 he described *Drosophila mycethophila* (spelt *mycetophila* on p. 141) from toadstools (champignons), . . .".
>
> I am proposing *goureaui* as a new name for *mycetophila* Hardy.