

VI. Notes on Hawaiian "idiomyia" (*Drosophila*)<sup>1,2</sup>

D. ELMO HARDY<sup>3</sup>

Fifteen species of *Drosophila* are now recognized which have an extra crossvein in cell R<sub>5</sub>. This has been previously treated as a generic character and on the basis of the extra crossvein the genus *Idiomyia* Grimshaw (1901: 50) was erected. This would appear to be a most excellent generic character, very distinctive and characteristic of only this group of Hawaiian species. These are the largest known species of *Drosophilidae* in the world, some have a wing expansion of 18–20 mm. *Idiomyia* has been synonymized with *Drosophila* by Carson, *et al.* (1967: 1284) and it has been demonstrated that, chromosomally, species of "Idiomyia" are closely related to other picture-winged *Drosophila* and the presence or absence of the extra crossvein has no validity as even a species group character.

The extra crossvein character apparently originated on the island of Maui, where seven known species possess this character; none is present on Kauai, five occur on Oahu, two on Hawaii and one on Molokai. Spur vein abnormalities are frequently found in field collected specimens of *Drosophila*, suggesting that there may be genetic variability for this character in nature and it should be possible to develop an "idiomyia" in the laboratory.

The drawings have been prepared by Miss Geraldine Oda, University of Hawaii.

Key to species of *Drosophila* possessing an extra crossvein in cell R<sub>5</sub> ("idiomyia")

1. Head normal in shape, front about as long as wide ..... 2  
 Head very short and broad, in the male the front is three times wider than long, and the eyes are strongly protuberant. In the female the front is about two times wider than long. The abdominal terga have bright yellow spots on the sides ..... Hawaii  
 ..... *heteroneura* (Perkins)
- 2(1). Extra crossvein in cell R<sub>5</sub> situated at, near, or beyond m crossvein. Abdomen of male lacking clavate hairs on posterior portion ..... 3  
 Extra crossvein situated far anterior to the norm, about half way between crossveins r-m and m (fig. 11c, Hardy, 1966: 220). Posterior portion of abdomen of male with long capitate or clavate hairs (fig. 11e, Hardy *op. cit.*) ..... Maui ..... *clavisetae* (Hardy)
- 3(2). Wings brown, with numerous small hyaline spots or with basal two-thirds and apex brown ..... 4  
 Wings predominantly hyaline, with brown markings on crossveins and at apex ..... 5

<sup>1</sup> Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Journal Series No. 1090.

<sup>2</sup> This work was made possible by NIH Grant GM10640.

<sup>3</sup> Department of Entomology, University of Hawaii.



- entirely yellow except for a slight tinge of brown on the apices. Scutellum rufous, tinged faintly with brown on sides ..... Maui  
 ..... *cyrtoloma* n. sp.
- 12(8). Front velvety black except for pale yellow lower margin. Palpi yellow, long, slender, straight sided densely black bristled at apex, about two times length of mentum. Extra crossvein in cell  $R_5$  situated distinctly before m crossvein. Scutellum brown to black ..... Hawaii ..... *silvestris* (Perkins)  
 ..... (*nigrifacies* Hardy is a synonym)
- Not as above, if the extra crossvein is well before m, the head is sharply pointed anteriorly and the other characters differ (*planitibia* Hardy) ..... 13
- 13(12). Head only slightly pointed, about as high as long (fig. 2c). Front tibiae not flattened or curved and the prominent cilia of front legs confined to dorsobasal portion of tibia. Scutellum rufous medianly, brown to black on sides ..... 14
- Head sharply pointed anteriorly, distinctly longer than high (ref. fig. 13a, Hardy, 1966: 226). Front tibia flattened dorsally and slightly curved and moderately long cilia extend the full length of the tibia and the basitarsus. Scutellum black on the disc, yellow on margin ..... Maui ..... *planitibia* (Hardy)
- 14(13). Femora mostly brown to black. Abdomen entirely black. Mesonotum predominantly brown to black ..... East Maui, Haleakala  
 ..... *obscuripes* (Grimshaw)
- Femora yellow with faint tinges of brown before apices and at bases. Abdomen yellow in background on bases and posterolateral margins of segments. Mesonotum rufous with tinge of brown on sides and sometimes on posterior portion ..... West Maui  
 ..... *hanaulae* n. sp.

#### *Drosophila cyrtoloma* n. sp. (figs. 1a-b)

The genetic studies have demonstrated that what I had previously considered to be *Idiomyia perkinsi* (*Idiomyia* is a synonym of *Drosophila*, and *perkinsi* is preoccupied under this combination and has been changed to *neoperkinsi* Hardy and Kaneshiro, 1968: 261), is actually a species complex. Two species on Maui and one on Molokai have been demonstrated to be genetically distinct. In the previous treatment by Hardy (1965: 556) no specimens had been seen from Molokai except for the type male in the British Museum (Natural History) which is labelled "Molokai Mts. above 4000'." We have since collected a large series of specimens in the mountains of East Molokai which is probably typical *neoperkinsi*. That species is characterized by having longer, more dense black hair on dorsobasal portion of front tibia (fig. 1b), the longest hairs are nearly three times the width of the tibia. Also, by having longitudinal preapical dark brown to black streaks on each of the anterior and posterior surfaces of the front femora, the posterior surfaces of the middle femora and the anterior surfaces of the hind. Also, the bases of the femora are broadly brown. The specimens of *neoperkinsi*

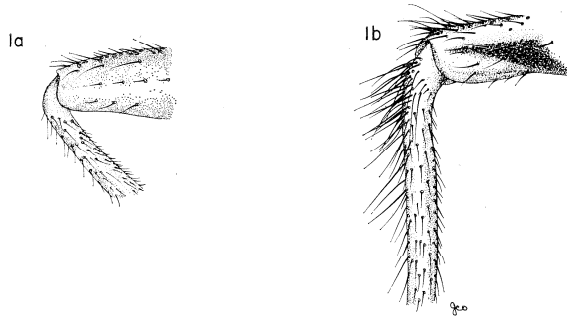


FIG. 1. *Drosophila cyrtoloma* n. sp. a, front tibia of male; *D. neoperkinsi* Hardy and Kaneshiro, b, front tibia of male.

on hand have a broad brown marking on each side of the mesonotum in the area of and lateral to the dorsocentral bristles, also the sides of the scutellum are entirely black. *D. cyrtoloma* is differentiated by having the front tibia sparsely setose on the posterobasal portion as in figure 1a, the longest setae are not much longer than the width of the tibia. The femora are entirely yellow, except for a slight tinge of brown on the apices. The mesonotum is not so distinctly blackened as in the specimens of *neoperkinsi* on hand and the scutellum is rufous, tinged lightly with brown on the sides. I see no other characteristics for separating these species. The characters of the wing and the genitalia are apparently identical. This species is highly distinctive in that it has extra heterochromatin on all chromosomes, an absolutely unique feature which was discovered by Dr. Frances E. Clayton and no other species or strain has this amazing feature.

Fitting the description of *neoperkinsi* in other respects, this is apparently the most common species on the Island of Maui, it is very abundant in the Waikamoi region on the slopes of Haleakala, but according to cytological studies, it appears probable that two or more sibling species may occur, and I am designating only specimens from collection no. L86 (Waikamoi) which have been studied cytologically and from collection nos. L7, L8, and L13, from Kipahulu Valley, which have been proved by laboratory crossing to be conspecific with the series from Waikamoi. In the female, the face, genae, and occiput (except for upper median portion) are yellow to rufous, with a tinge of brown in the area occupied by the oral vibrissae, also the mentum is rufous and the palpi are brown, tinged with rufous.

Holotype male "L86" and allotype female "L86Q3", Waikamoi, Maui, June 28-29, 1968 (S. K. Ochikubo), also five paratype males same data (some collected by K. Y. Kaneshiro). The testes of the males of this series have been dissected out and the chromosomes studied by Dr. Francis E. Clayton. Also ten paratypes, nine males, one female, from Kipahulu Valley, Maui, 4000'-6000', August 16-19, 1967, "L7, L8, L13" (H. L. Carson and R. Iwamoto). This series was proved by laboratory crossing to be conspecific with the specimens from Waikamoi.

At least fifty additional specimens are at hand. These are not being designated as part of the type series since there is a possibility of two sibling species being involved. Type, allotype, some paratypes in the B. P. Bishop Museum. Other

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

*Drosophila hanaulae* n. sp. (figs. 2a-d)

A population on hand from the mountains of West Maui appears to be distinctive. According to Dr. Hampton L. Carson, the salivary chromosomes differ from other species of this complex. It has been temporarily treated in our field and laboratory studies as "light *neoperkinsi* like." The species resembles *neoperkinsi* Hardy and Kaneshiro, but has the mesonotum and scutellum predominantly rufous rather than predominantly black, and the costa of the male is only slightly curved (fig. 2a). In *neoperkinsi* the costa is strongly arched (refer to Hardy, 1965: 557, fig. 231b). *D. hanaulae* fits closest to *obscuripes* (Grimshaw) based upon external morphological characters. It differs by having the femora yellow with faint tinges of brown before apices and at bases, by having the mesonotum and scutellum predominantly rufous, tinged with brown on sides and by having abdomen predominantly yellow to rufous, brown on apices of first two terga and tinged with brown on medium portions of terga 1-3. In *obscuripes* the femora are mostly brown to black, the abdomen entirely black and the mesonotum predominantly brown to black. Dr. Carson (*in litt.*) has indicated that the chromosomal differences between *hanaulae* and *obscuripes* are quite considerable "in fact, no other species on Maui has the chromosomal conditions of *hanaulae*."

**MALE. Head:** Front golden, tinged with brown. Vertex, upper occiput, ocellar triangle and an extension on each side through area occupied by fronto-orbital

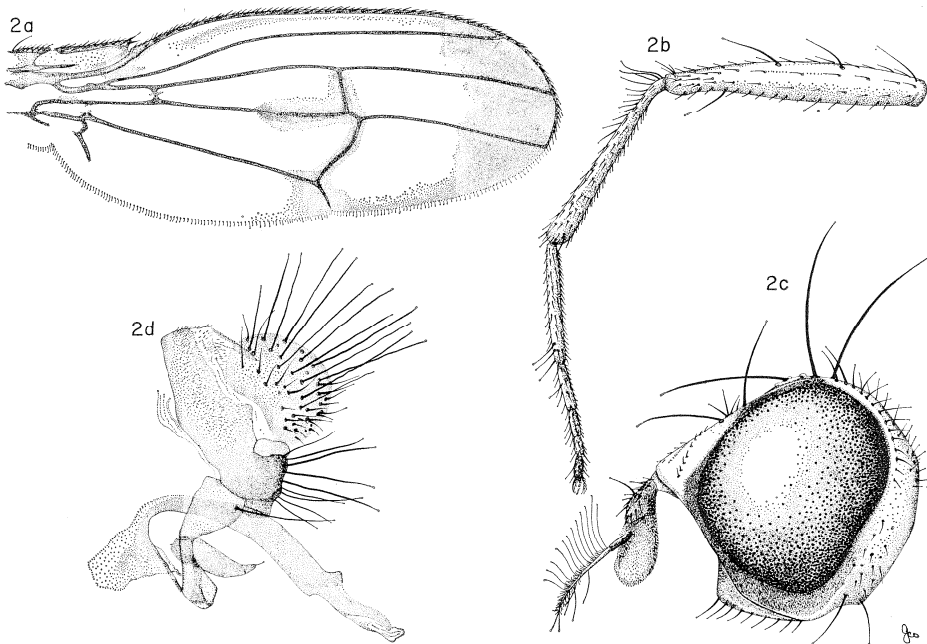


FIG. 2. *D. hanaulae* n. sp. a, wing; b, front leg of male; c, head; d, male genitalia.

bristles brown. Face and genae black. Head slightly pointed at the bases of the antennae and approximately as high as long (fig. 2c). Antennae black. Arista with eleven or twelve dorsal and three or four ventral rays in addition to the apical fork, and densely short-haired on inner surface. Palpi and mouthparts black. *Thorax*: Predominantly rufous, tinged with brown on the sides of mesonotum just outside the dorsocentral rows. Sides of scutellum brown. Propleura, prosternum, anterior two-thirds of each mesopleuron and median portion of each sternopleuron dark brown to black. Sides of metanotum tinged with brown. *Legs*: Predominantly yellow with the front coxae brown, tinged with yellow, and with faint tinges of brown at bases and apices of middle and hind femora and on bases and apices of hind tibiae. Front legs as in figure 2b. The long cilia on the front tibia confined to the basal portion. Basitarsus elongate, nearly two-thirds as long as tibia and with three erect setae at the apex. *Wings*: As in figure 2a. *Abdomen*: Predominantly yellow to rufous with apices of second tergum and median portions of terga 1-3 tinged with brown. Male genitalia as in figure 2d. I see nothing distinctive in the genital characters.

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

*FEMALE*. Fitting the description of the male in most respects. The ovipositor blades are rather elongate and slender, similar to those of other species of this complex.

Holotype male, Hanaula, West Maui, 4000', July 9-10, 1968, "L91" (K. Y. Kaneshiro). Allotype female, same locality and elevation, May 7, 1968, "L61C18" (J. P. Murphy). Sixteen paratypes, eleven males and five females, same data as type and allotype, one collected by S. Ochikubo. The metaphase chromosomes have been studied by Dr. F. E. Clayton and the salivaries by Dr. H. L. Carson.

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

#### *Drosophila nigribasis* NEW NAME (figs. 3a-b)

*Idiomya brunneipennis* Hardy, 1965, *Ins. of Hawaii* 12: 541, figs. 224a-d. Preoccupied in *Drosophila* by *brunneipennis* Malloch, 1923, *Proc. Linn. Soc. N. S. Wales* 48: 617.

This species has previously been known only from the males. Females have been seen but because of the striking sexual dimorphism they were not associated with *brunneipennis* and had been set aside as "n. sp. ? ♀ rel. *oahuensis*." The females have now been definitely associated with the males.

The female differs from the male by having the face, palpi, mentum, and front coxae yellow, not dark brown to black. The wings lack the large brown marking filling the basal two-thirds (Hardy, 1965: 542, fig. 224b) but have only a sub-basal dark brown mark from apical portion of second costal cell over r-m crossvein. A brown transverse band extends over extra crossvein in cell R<sub>5</sub>, and a streak of brown extends along vein M<sub>1+2</sub> for a short distance before m crossvein (fig.

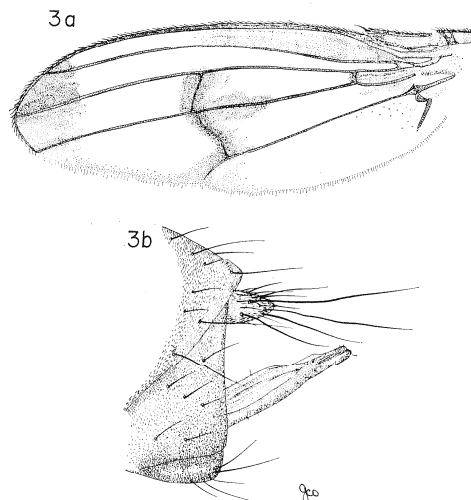


FIG. 3. *D. nigribasis* NEW NAME. a, wing; b, female ovipositor.

3a), in addition to the apical brown mark which is also present in the male. The ovipositor is rather long and slender, shaped as in figure 3b.

This species is present in both the Waianae and Koolau Mountains, Oahu.

#### REFERENCES CITED

- Carson, H. L., F. E. Clayton, and H. D. Stalker. 1967. Karyotypic stability and speciation in Hawaiian *Drosophila*. Proc. Nat. Acad. Sci. 57: 1280-1285.
- Grimshaw, P. H. 1901. Fauna Hawaiiensis 3(1): 51-73.
- Hardy, D. E. 1965. Insects of Hawaii, Diptera: Drosophilidae, Univ. Hawaii Press, 12: 814 pp.
- . 1966. Descriptions and notes on Hawaiian Drosophilidae, Univ. Texas Publ. Studies in Genetics, 6615: 195-244.
- and K. Y. Kaneshiro. 1968. New Picture-Winged *Drosophila* from Hawaii, Univ. Texas Publ. Studies in Genetics, 6818: 171-262.