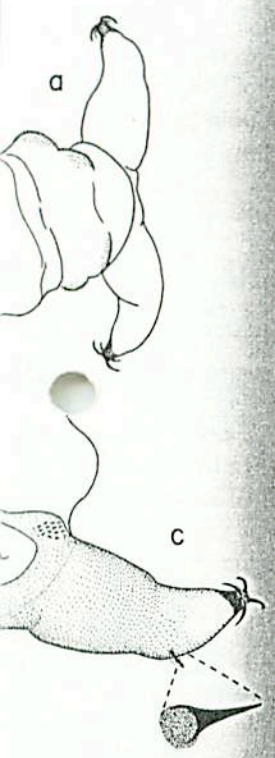

pupa, posterior end, dorsal; e,

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e.
tes on *warreni* biology

dorsally and ventrally
see in the white larva,
are present on dorsal
piracles not externally
very short, with three
der the openings, the
ar tube (fig. 125e).

very evident on the

Hardy & Delfinado 1980

puparium (fig. 125a). Anterior spiracles conspicuous, borne on flattened disc, rimmed with about 14 to 15 digits (fig. 125d).

This species was easily reared in the laboratory using seaweed as a medium in gallon jars. Eggs hatched in about 24 hours; the larval period was eight to nine days; the pupal period was ten to thirteen days; and the complete life cycle from egg to adult required from 19 to 23 days.

Family MILICHIIDAE

Small, usually dull to shiny black flies, sometimes with the dorsum of male abdomen metallic silver. Rather closely resembling some Agromyzidae but differentiated by having the postocellar bristles parallel or convergent, not divergent; costa twice broken, rather than with only the break before end of $Sc + R_1$; mesopleura lacking bristles (in Hawaiian species); abdomen usually with only four visible terga (counting the fused basal portion as one); and female ovipositor rather weakly sclerotized and retractile (fig. 145d), not with the seventh segment heavily sclerotized, tubular, nonretractile.

In addition to the above, usually well-developed oral vibrissae are present. The front with bristles on almost the entire length of orbits, anterior frontoorbitals convergent. Interfrontalia with two series of converging setae. Proboscis usually long and geniculate. Antennae short, third segment rounded. Subcosta weakly developed, not reaching costa, fused with R_1 before apex or ending at base of wing incision at second costal break in Hawaiian species. Cells M and Cu small. Abdomen short and broad with few, if any, bristles.

The adults are usually collected hovering in bright sunlight, or swarming over manure, decaying vegetation, freshly cut grass or freshly turned soil, or on vegetation in the sun. The larvae apparently feed largely as scavengers in manure and decaying organic matter. In other regions some species are blood sucking ectoparasites of birds; some live in close association with ants while others are associated with predatory insects and spiders. The biology of milichiids has been summarized by Sabrosky (1959:317).

The genital characteristics have been discussed by Hennig (1939b).

Key to Hawaiian Milichiidae

1. Head narrow in lateral view, slightly rounded ventrally; genae narrow, scarcely equal to 1–2 rows of eye facets in width (fig. 146a). Mouthparts short, labella extending only slightly beyond palpi. Costa with a deep incision just before apex of $Sc + R_1$. Subfamily Milichiinae. 2

Head comparatively broad, usually just slightly

higher than long, ventral margin straight and genae well developed (fig. 145a). Mouthparts long and geniculate, usually about two times longer than palpi. Costa lacking a prominent incision before Sc + R_1. Subfamily Madizinae. 5

2(1). Hind margin of eye incised at middle (fig. 149a). Body and front subshining to polished black, or with dorsum of abdomen silvery. Two pairs of strong inferior fronto-orbital bristles. **Milichiella** Giglio-Tos. 3

Eye not incised on hind margin. Front and body gray pollinose. No inferior fronto-orbital bristles, but with a pair of convergent interfrontal bristles just above antennae. . . . . **Milichia orientalis** Malloch.

3(2). Thorax, sides and apex of abdomen polished black; terga mostly opaque brown pollinose. Wings milky white. Halteres yellow. . . . . **lacteipennis** Loew.

Thorax subshining, gray-brown pollinose; dorsum of abdomen (male) brilliantly silvered. Wings not milky. Halteres black. 4

4(3). Abdomen of male entirely silvery above. Apices of terga sparsely setose, only one complete row on each of terga 3–5 or sometimes two irregular, incomplete rows on each. Each cercus with an elongate wavy bristle at apex (fig. 149b). . . . . **longiseta** n.sp.

Abdominal terga marked with brown across apices. Apical half of fifth tergum and most of basal segment (1 + 2) rather densely setose. Terga 3–4 with two distinct rows of setae over apices. A short straight bristle on each cercus (fig. 147b). Oahu. . . . . **circularis** Aldrich.

5(1). Pteropleura lacking bristles. Arista pubescent. Hind tibiae may be flattened laterally, but not strongly expanded and much narrower than femora. 6

Pteropleura with 1–2 short bristles. Front lacking the M-shaped mark. Arista bare. Hind tibia strongly flattened and expanded, about equal in width to femur, especially in the male (fig. 145c). . . . . **Leptometopa beardsleyi** n.sp.

6(5). Front with a pair of gray interfrontal [illegible]ae marking

off a velvety black M (fig. 142a). Hind tibiae compressed laterally. Crossvein r-m situated at middle of cell 1st M_2. **Desmometopa** Loew. 7

Front entirely dull black. Hind tibiae not flattened. Crossvein r-m situated near apical three-fourths of cell 1st M_2. . . . . **Neophyllomyza** Melander, sp.?

7(6). Head higher than long (fig. 142b), not narrowed anteriorly in lateral view. Genae not with a polished black stripe below eye margin. Pleura with not more than a shining area on front portion of each sternopleuron. Palpi yellow to rufous except at apices. 8

Head as long as high, narrowed anteriorly as seen from side (fig. 144c). Each gena with a polished black line along upper edge. Propleura and anterior portions of meso and sternopleura polished black. Palpi black except for narrow yellow bases. Middle and hind tarsi mostly yellow. . . . . **tarsalis** Loew.

8(7). Genae yellow, not densely gray pollinose; sternopleura with a shining area anteriorly. Tarsi yellow. Male palpi greatly enlarged (fig. 143c). 9

Genae densely gray pollinose obscuring the ground color; mesonotum and scutellum gray with a golden or golden-brown sheen. Pleura entirely gray pollinose. Tarsi brown. Male palpi not enlarged. . . . . **inaurata** Lamb.

9(8). Genae of both sexes comparatively broad, about equal in height to the third antennal segment. Palpi of male rather slender, about four times longer than wide and not much wider than third antennal segment (fig. 143a). . . . . **singaporensis** Kertész.

Genae narrower, scarcely three-fifths the width of third antennal segment. Male palpi very broad, about two times longer than wide and much wider than third antennal segment (fig. 143c). . . . . **tristicula** Hendel.

Subfamily Madizinae

Characterized [illegible] lacking an incision at second costal break in wing. Head only slightly high[illegible] than long (in Hawaiian species) with lower margin straight

and produced anteriorly, and genae well developed, equal in width to five or more rows of eye facets (fig. 143c). Labella elongate, equal in length to lower margin of head, and with the vibrissa rather weak compared to Milichiinae (figs. 146a, 149a).

Three genera occur in Hawaii: *Desmometopa* Loew, *Leptometopa* Becker, and *Neophyllomyza* Melander.

Genus **DESMOMETOPA** Loew

Desmometopa Loew, 1866, Berl. Ent. Z. (1865) 9:184. Type-species, *Agromyza m-atrum* Meigen, by subsequent designation (Hendel, 1903:251), = *sordida* (Fallén).

Members of this genus are differentiated from other small dull black flies in Hawaii by the shape of the head (fig. 142b), elongate, geniculate mouthparts, and by the presence of a velvety black M on the front (fig. 142a).

Four species occur in Hawaii.

There are many reports in the literature of *Desmometopa* living in close association with predaceous flies, bugs, and spiders (Ref. Hennig, 1937:16-17). Some have been observed to be phoretic in the adult stage on asilid flies and reduviid bugs riding along on the backs of their hosts until a prey is captured; "whereupon they proceed, in company with the predator, to sup the exudations from the wounds of the victim" (Colyer and Hammon, 1951:238). Some species feed in spider webs on the prey captured by the spiders; the latter habit has been observed in Hawaii.

The larvae are reported to feed as saprophytes and are especially associated with dung and carrion.

The collections of *Desmometopa* are preponderantly females; male specimens are very scarce.

Desmometopa inaurata Lamb (figs. 142a-d)

Desmometopa inauratum Lamb, 1914, Trans. Linn. Soc. Lond. (2)16:363. Type-locality: Seychelle Islands.

Common on all the main Hawaiian Islands from sea level to 4000 ft. Records in the University collection date back to 1947.

Immigrant. Widespread.

Biology. A scavenger, probably breeds in an assortment of rotting organic materials. They have been bred from chicken manure and from rotting snails. One specimen was reared from a larva found inside a *Drosophila* pupa in decaying *Cheirodendron* leaves (Mt. Kaala, Oahu).

This species fits near *ciliata* Hendel, but according to C. W. Sabrosky (pers. comm.) the two are distinct. It is differentiated from other Hawaiian *Desmometopa* by having the genae and pleura densely gray pruinose and the mesonotum and scutellum gray with a rather distinct golden or golden-brown sheen. Ground color of genae brown to black; palpi black apically and yellow

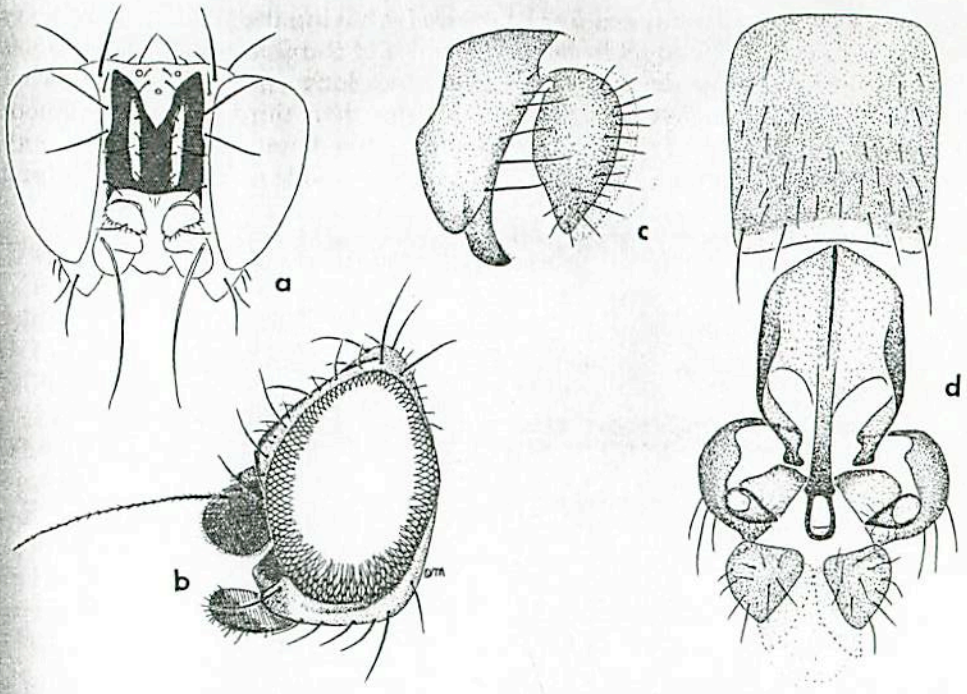

Figure 142—*Desmometopa inaurata* Lamb: a, head, frontal view; b, head, lateral; c, male genitalia, lateral; d, male genitalia, ventral.

to rufous basally, not enlarged in males; legs all dark, brownish to black; and male genitalia as in figures 142c,d. Fifth sternum of male longer than wide, hind margin straight. Surstyli sharp pointed. Head as in figures 142a,b.

Length: body and wings, 2.4-2.7 mm.

Desmometopa singaporensis Kertész (figs. 143a,b)

Desmometopa singaporensis Kertész, 1899, Természetr. Füz. 22:194. Type-locality: Singapore.

Oahu, Hawaii, probably on other Hawaiian Islands.

Immigrant. Oriental region and probably widespread over southeast Asia and the Pacific.

According to C. W. Sabrosky (pers. comm.), the species we have been calling *palpalis* de Meijere in Hawaii (Hardy, 1952:474) is actually *singaporensis* Kertész; he has studied the type series. It was first recorded in Hawaii as *m-nigrum* (Zetterstedt) and later as *tarsalis* Loew, determined by Aldrich, reared from hen manure, March 1916 (Illingworth, 1926b, 1929b).

Mostly black, moderately gray pollinose species fitting near *tristicula* Hendel by having the palpi of the males greatly enlarged. Also, the genae yellow and the pleura gray except for a shining area on anterior portion of each ster-

nopleuron. It is differentiated from *tristicula* by having the genae of both sexes much broader, about equal in height to width of third antennal segment and the male palpi rather slender, about four times longer than wide, somewhat ensiform, ending acutely and not much wider than third antennal segment (fig. 143a). The palpi of the male specimens on hand are yellow, speckled with brown to black. The fifth sternum of the male is as wide as long, with the hind

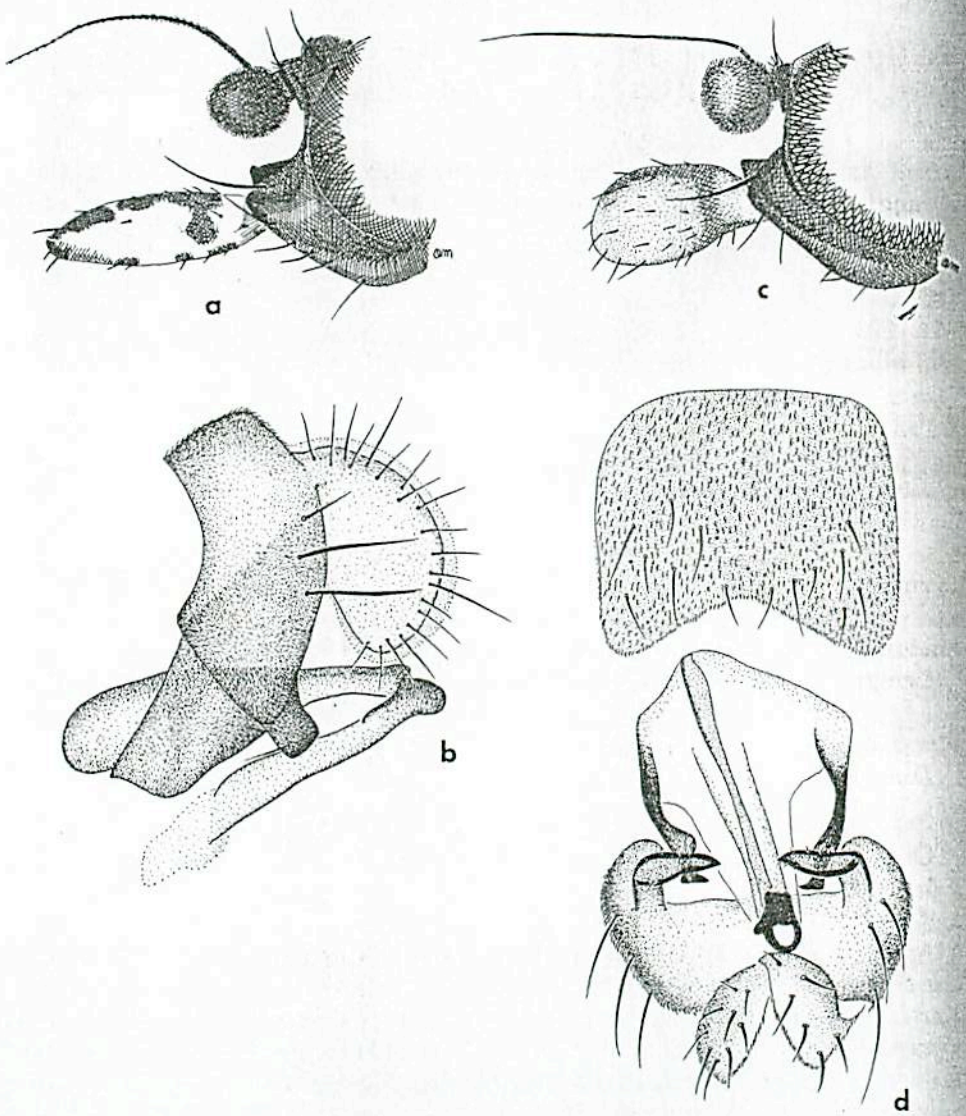

Figure 143—*Desmometopa singaporensis* Kertész: a, head, anteroventral portion; b, male genitalia, lateral. *D. tristicula* Hendel: c, head, anteroventral portion; d, male genitalia, ventral.

margin straight. The surstyli are slender, sharp pointed; the other details of the genitalia are as in figure 143b.

Length: body and wings, 2.5–2.7 mm.

Desmometopa tarsalis Loew (figs. 144a–c)

Desmometopa tarsalis Loew, 1866, Berl. Ent. Z. (1865):184. Type-locality: Cuba.

Widespread over all of the Hawaiian Islands.

First recorded as *m-nigrum* (Zett.), reared from hen manure, on Oahu, March, 1916 (Illingworth, 1926b).

Immigrant. Nearctic, Cuba, West Indies, Panama.

Biology. A scavenger, it has been reared from chicken manure in Hawaii.

This species has probably been commonly misidentified in the literature. The concepts of Hennig (1937:44), Hendel (1914:96), Bezzi (1928:162) probably refer to a complex of species.

Predominantly subshining black flies, characterized from other Hawaiian species by having the head about as long as high, narrowed anteriorly as seen in lateral view, with the lower margin elongate, equal in length to eye width and strongly produced anteriorly (fig. 144c); by having the genae narrow, black, gray pollinose with a polished black line on upper edge, along eye

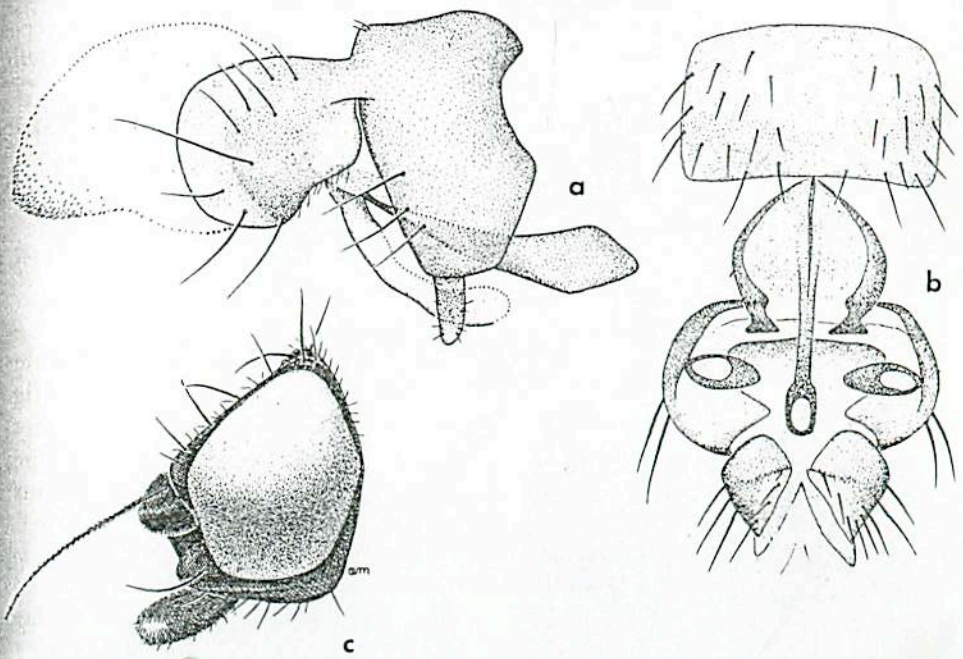

Figure 144—*Desmometopa tarsalis* Loew: a, male genitalia, lateral; b, male genitalia, ventral; c, head, lateral.

margin; by having a large polished black area over propleura and anterior portions of meso and sternopleura. The palpi black except for narrow yellow bases. Middle and hind tarsi mostly yellow. Fifth sternum of male wider than long and male genitalia as in figures 144a,b.

Length: body and wings, 2.2–2.4 mm.

Desmometopa tristicula Hendel (figs. 143c,d)

Desmometopa tristicula Hendel, 1914, Suppl. Ent. 3:96. Type-locality: Anping, Formosa.

Oahu, Kauai, and probably other Hawaiian Islands.

Immigrant. Apparently widespread over Pacific and Oriental regions.

Along with *singaporensis* this species has previously been determined as *palpalis* de Meijere in the Hawaiian literature.

Resembling *singaporensis* Kertész and differentiated by having the genae of both sexes comparatively narrow, scarcely three-fifths the width of the third antennal segment. Palpi of male very broad, expanded about twice as long as wide, rounded apically, and much broader than third antennal segment (fig. 143c). The male genitalia are as in figure 143d.

Genus **LEPTOMETOPA** Becker

Leptometopa Becker, 1903, Berl. Zool. Mus. Mitt. 2(3):188. Type-species, *rufifrons* Becker, by monotypy.

Hypaspistomyia Hendel, 1907, Wien. Ent. Ztg. 26:2401. Type-species, *coquilletti* Hendel, by monotypy.

Paramadiza Malloch, in Melander, 1913, Psyche, Camb. 20:169. Type-species, *Desmometopa halteralis* Coquillett, by monotypy.

Mallochiella Melander, 1913, Psyche, Camb. 20:169 (new name for *Paramadiza* Malloch). Type-species, *Desmometopa halteralis* Coquillett.

Desmometopina Curran, 1930, Bull. Amer. Mus. nat. Hist. (1931) 61:81. Type-species, *Agromyza latipes* Meigen, by original designation.

Only one species known, from the Leeward Hawaiian Islands.

Characterized from other Madizinae by having one or more small bristles on the pleurotergon; hind tibiae strongly flattened especially in the male (fig. 145c); epistoma broad and triangular; arista bare, in the Hawaiian species; front comparatively narrow, distinctly longer than wide, no interfrontal stripes and no M-shaped mark; also, the genae are consistently broad, equal to one-third or less the eye height and length (fig. 145a).

The larvae of some *Leptometopa* have been discussed by Hennig (1956).

Only one species known from the Hawaiian Islands.

Leptometopa beardsleyi Hardy and Delfinado, new species (figs. 145a–e)

Leptometopa n.sp. (det. by C. W. Sabrosky) Beardsley, 1966, Proc. Haw. Ent. Soc. 19(2):178. First recorded from Lisianski, Nihoa, Necker

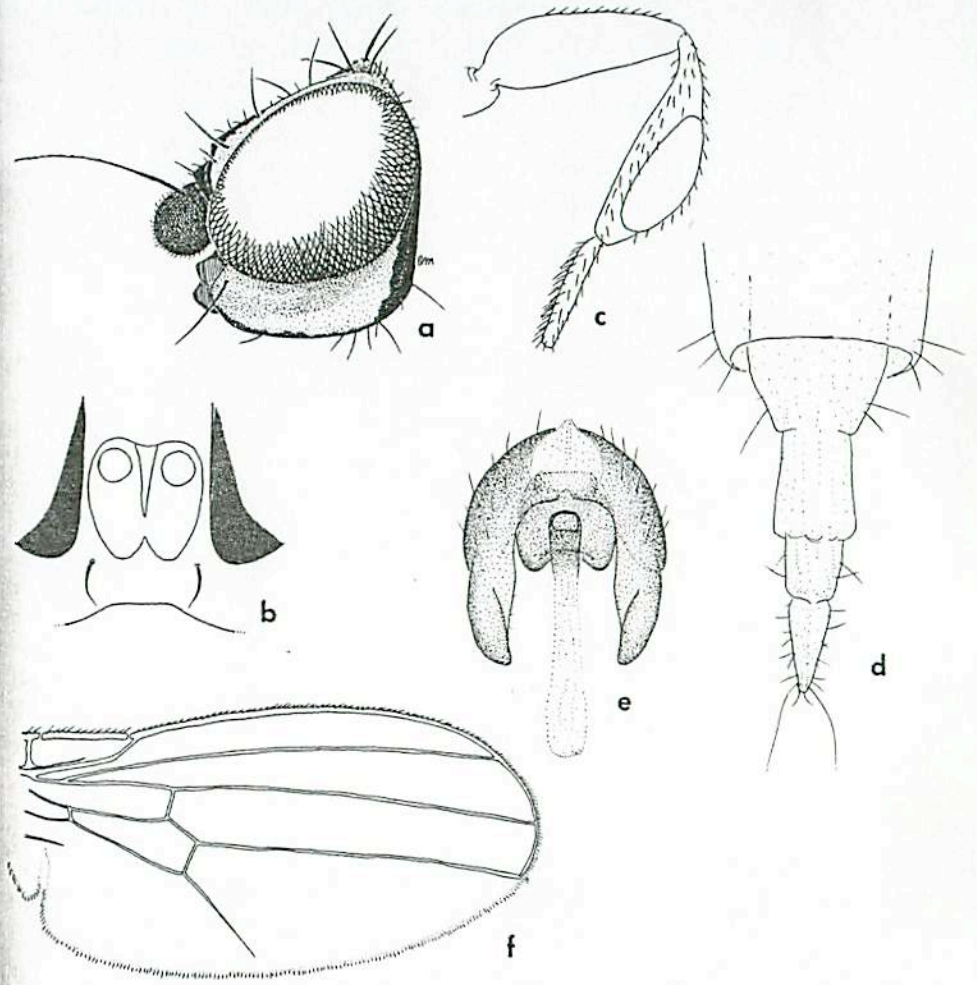

Figure 145—*Leptometopa beardsleyi* Hardy and Delfinado, n. sp.: **a**, head, lateral; **b**, face; **c**, hind leg; **d**, female ovipositor; **e**, male genitalia, ventral. *Neophyllomyza* sp?: **f**, wing.

This species runs to *coquilletti* Hendel (1937:48) and the head shape and general characteristics conform rather well with that species. It is readily differentiated by the all-black legs; the genae black in ground color completely silvery pollinose in the male, rather than having the lower margins of the genae rufous; the femora reddish-brown and the tibiae yellow. Also by having the scutellum gray pollinose, rather than polished black. The predominantly polished black pleura is also a diagnostic feature.

MALE. *Head*: Slightly higher than long, with the eyes almost circular and the genae broad, about one-third the height, or the length, of the eye (fig. 145a). The gena is entirely silvery pollinose (microscopically pubescent), except for a

edge bordering on the occiput. The oral vibrissae are represented by fine, rather inconspicuous setae along the oral margin. One prominent bristle is present on anteromedian margin of each gena. Two pairs each of superior and inferior fronto-orbital bristles present, the superior directed upward over the eyes with the upper slightly proclinate; the inferiors are directed inwardly. Front dark brown to black, tinged faintly with rufous in ground color on lower portion, subopaque, covered with dark brown pollen through median portion, silvery-gray along eye orbits. Ocellar bristles well developed, approximately equal in size to fronto-orbitals, postocellars just slightly smaller. The lunule (the portion of the face below the ptilinal suture) and the epistoma are yellow; the former is extended into a slender spine-like projection (keel) between the antennae (fig. 145b). The remainder of face is deeply sunken, yellow brown in color. Palpi yellow, tinged with brown at extreme apices and with a few stout setae on ventral margins and apices. Rostrum mostly black, labella tinged faintly with rufous and about equal in length to palpi. *Thorax:* Mesonotum and scutellum densely gray pollinose, with no indication of brown markings. Two pairs dorsocentral bristles, the posterior pair large, almost equal in size to outer post-alars, and with anterior pair small, only two-three times longer than the mesonotal setae, and located in line with the supraalars. Supraalars rather small, about equal to inner postalars. One small black bristle, about equal to anterior dorsocentrals, located in median portion of each pteropleuron. Sternopleuron with one black bristle on upper median margin. Pleura polished black except for gray pollen, microscopic pubescence over hind portion of each pteropleuron, upper hind and ventral portions of sternopleuron, and all of the meta and hypopleuron. Halteres with bright yellow knobs and rufous stems. *Legs:* Entirely black. Hind tibia rather strongly enlarged, convex on posterior margin and equal to slightly wider than the femur (fig. 145c). *Wings:* Milky white, with yellow veins and with the venation rather similar to most species of *Desmometopa.* The r-m crossvein is located approximately opposite the second costal break and at about median portion of cell 1st M_2. The m crossvein is located near basal two-fifths of the wing. The last section of vein M_{3+4} is almost three times longer than m crossvein and evanesces before reaching margin. The last section of vein M_{1+2} is very slightly upcurved toward apex. *Abdomen:* Black in ground color, gray-brown pollinose over most of the dorsum, polished black on extreme lateral margins of terga 3–5 and over apical portion of 5. The surstyli are broad and blunt, rounded at apices, about equal in length to epandrium. Other details of the genitalia as in figure 145e.

Length: body, 1.8–2.0 mm.; wings, 1.7 mm.

FEMALE. Fitting the description of male in most respects. With the genae slightly more broad, each is approximately two-fifths the eye height and silvery-gray only on anterior margin; remainder of the gena is submetallic, bronze-brown. The hind tibiae are not so enlarged as in male, slightly less than the width of the femur. Fifth tergum entirely polished except for narrow basal margin. Female ovipositor as in figure 145d.

Length: body, 2.5 mm.; wings, 2.2 mm.

Holotype male and allotype female, Lisianski Island, sweeping, September 18, 1964 (J. W. Beardsley). 86 paratypes, 64 males, 22 females from the following Leeward Hawaiian Islands, the majority of specimens same data as type: Nihoa, June 10, 1962, on *Portulaca,* and September 23–24, 1964; Southeast I., Pearl and Hermes Reef, September 16, 1964; and Necker September 23, 1964, all collected by J. W. Beardsley. This species very probably breeds in bird guano.

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

Genus **NEOPHYLLOMYZA** Melander

Neophyllomyza Melander, 1913, J. N.Y. Ent. Soc. 21:243. Type-species, *quadricornis* Melander, by original designation.

Fitting nearest to *Desmometopa* than to any other Madizinae known from Hawaii. It is readily differentiated by having the front entirely dull black; the hind tibiae not flattened laterally and crossvein r-m situated near apical three-fourths of cell 1st M_2. Also, the cubital cell is incomplete (fig. 145f) and the genae are very narrow with the eyes higher than long.

One unknown species recorded from Hawaii.

Neophyllomyza unnamed species (fig. 145f)

Two specimens on hand collected at Honolulu, Oahu, May 2–20, 1961–1965 (C. R. Joyce and J. W. Beardsley), was identified by C. W. Sabrosky as *Neophyllomyza* sp. This is differentiated from other Milichiidae in Hawaii by the characters given under the discussion of genus above. It is a small, completely black species including the halteres and all of the body appendages. In Melander's key (1914:243) it would run nearest to *quadricornis* Melander from the mainland U.S. except that the penultimate section of the fourth vein (M_{1+2}) is extremely short, only about one-seventh as long as the ultimate section and about one-third as long as the last section of vein M_{3+4} (fig. 145f). Also, the description says the mesonotum, as well as front, is sericeous black. In our specimens the mesonotum is subshining, rather lightly gray-brown pollinose, not noticeably sericeous.

Further specimens will have to be collected before this species can be placed.

Length: body, 1.25 mm.

Subfamily MILICHIINAE

Characterized by having a deep cleft formed at the second costal break with vein Sc ending on inner edge of cleft and the lobe formed by the incision overlapping base of R_1. Head much higher than long, with genae very narrow, scarcely visible in lateral view (in Hawaiian species), and equal in width to 1–2 rows of eye facets. Labella short, inconspicuous, fleshy.

Two genera have been recorded from Hawaii, *Milichia* Meigen and *Milichiella* Giglio-Tos.

Genus **MILICHIA** Meigen

Milichia Meigen, 1830, Syst. Beschr. europ. Zweifl. Ins. 6:131. Type-species, *speciosa* Meigen, by subsequent designation (Westwood, 1840:151).
Lobioptera Wahlberg, 1847, K. Svenska Vet.-Akad. Ofvers.-Förh. 4:259. Type-species, *ludens* Wahlberg, by monotypy.

Characterized by having the hind margin of the eye straight, not incised and the postocellar bristles convergent, usually cruciate. Also, in the Hawaiian species, with no strong inferior fronto-orbital bristles, with the bristles of the vibrissal rows extending only to lower margin of face (fig. 146a), and the body densely gray and brown pollinose.

Only one known species in Hawaii.

Milichia orientalis Malloch (figs. 146a,b)

Milichia orientalis Malloch, 1913, Insecutor Inscit. menst. 1:109. Type-locality: Guam.

Oahu, Hawaii, Nihoa, Necker, and Gardner islands. First recorded from Oahu, March, 1915 (Bryan, 1923b:290).

Immigrant. Guam.

Biology. Specimens were bred from barley seed by Illingworth (Bryan 1923b:290) and from "swiftlet guano which was composed almost entirely of dry insect fragments, and from a mixture of rodent food and rodent droppings" on Guam (Bohart and Gressitt, 1951:98).

An all black, moderately gray pollinose species separated from other Hawaiian species by the generic characters given above. The head, from lateral view, is as in figure 146a. The fifth sternum of the male is longer than wide with a rather deep concavity in middle of hind margin. Male genitalia as in figure 146b.

Length: body, 3.0–4.0 mm.; wings, 2.75–3.2 mm.

Genus **MILICHIELLA** Giglio-Tos

Milichiella Giglio-Tos, 1895, Ann. Soc. Ent. Fr. 64:367. Type-species, *Tephritis argentea* Fabricius, by monotypy. Misidentified, = *tosi* Becker.
Ophthalmomyia Williston, 1896, Trans. Ent. Soc. Lond. 1896:426. Type-species, *Lobioptera lacteipennis* Loew, by monotypy.

Readily differentiated by the prominent incision in the hind margin of the eye (fig. 149a) and by the parallel postocellar bristles. In the Hawaiian species the inferior fronto-orbitals are strong and the bristles of the vibrissal rows extend over the lower half to three-fifths of the face.

Three species occur in Hawaii.

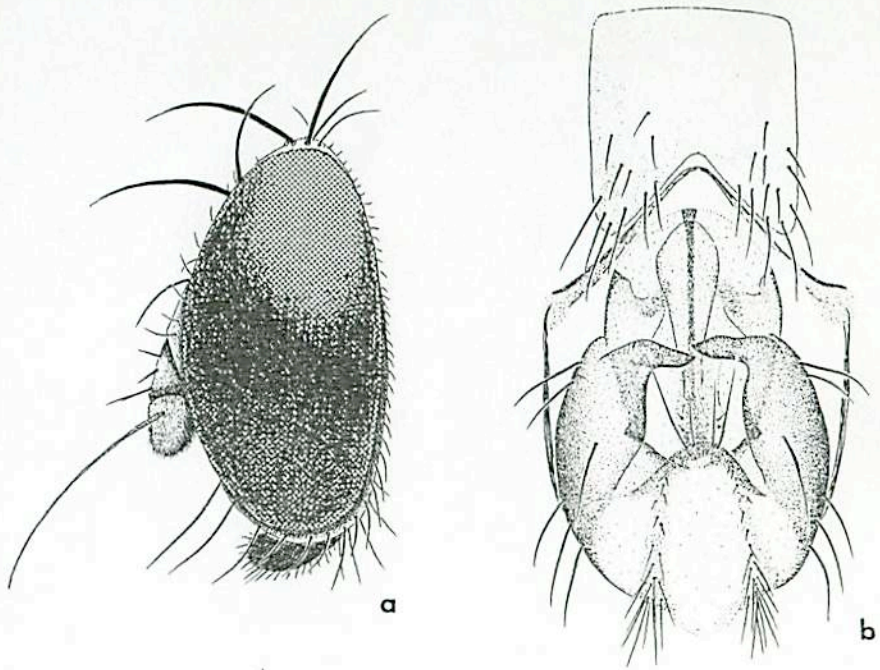

Figure 146—*Milichia orientalis* Malloch: a, head; b, male genitalia, ventral, showing fifth sternum.

Milichiella circularis Aldrich (figs. 147a,b)

Milichiella circularis Illingworth, 1929, Proc. Haw. Ent. Soc. 7:254 *Nomen nudum.*
Milichiella circularis Aldrich, 1931, Proc. Haw. Ent. Soc. 7:397. Type-locality: "pineapple fields in Hawaii."

Endemic? Oahu. First collected in September, 1926.

Biology. Probably a scavenger, breeding in decaying vegetation. It has been collected near compost piles. Known only from males, collected in swarms.

Characterized by having the abdomen of the male predominantly silvery on the dorsum but opaque brown on apices of terga 3–5 and over median portion of 1 + 2. Also, the arrangement of the setae on the terga is distinctive: the first tergum (1 + 2) is mostly setose; 2 and 3 have two distinct rows across apices and 5 is rather densely setose over apical half. Each cercus has a straight black bristle at apex; this is short compared to *longiseta* n.sp. (figs 147b, 149b). The other genital characters are as in figure 147b. The fifth sternum is about as long as wide and has a shallow concavity on hind margin (fig. 147a). The fourth sternum is one-fourth longer than wide and gradually narrowed basally.

Female. Unknown.

Length: body, 3.5–4.0 mm.; wings, 3.0–3.25 mm.

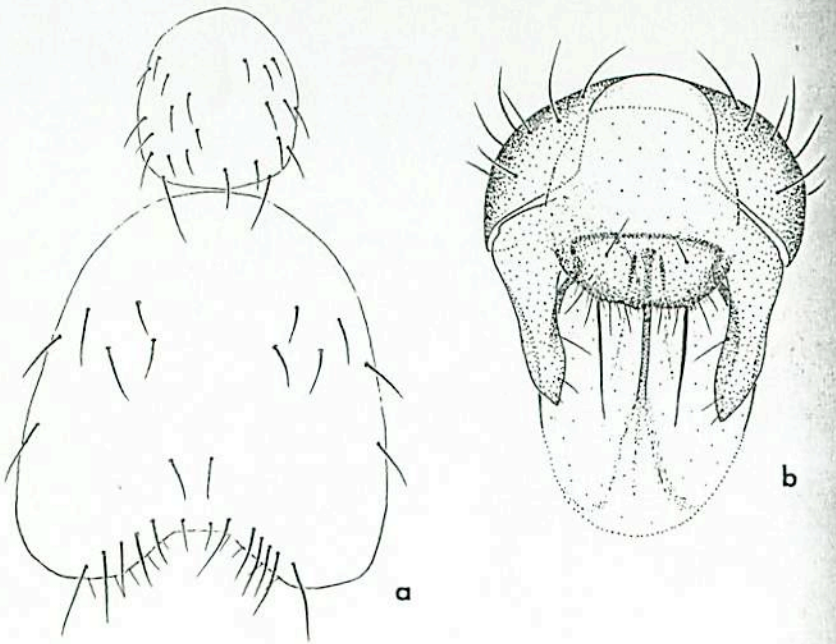

Figure 147—*Milichiella circularis* Aldrich: a, fifth sternum of male; b, male genitalia, dorsal.

Milichiella lacteipennis (Loew) (figs. 148a,b)

Lobioptera lacteipennis Loew, 1866, Berl. Ent. Z. (1865) 9:185. Type-locality: Cuba.

Milichiella nigrella Cole, 1912, Ann. Rpt. Laguna Mar. Lab. 1:162. Type-locality: California.

Common on all of the Hawaiian Islands, including Kure, Laysan, Midway, Pearl and Hermes Reef, and probably other Leeward Islands. First recorded from Hawaii by Grimshaw (1901:74) as *Ophthalomyia,* specimens collected by Perkins, Kona, Hawaii, August–September, 1892.

Immigrant. Widespread over Nearctic, Neotropical, Ethiopian, Oriental, Australian, and Pacific regions.

Biology. Evidently a scavenger: adults are common around manure and decaying organic matter. It has been bred from poultry manure on Oahu and from Guinea pig dung in Samoa (Malloch 1934b:326). Adults have been observed attracted to the Pentatomid bug, *Nezara viridula smaragdula* (Fab.) (Nakao, 1964).

The most common of *Milichiella,* easily recognized by the milky white wings; yellow halteres; and by having the thorax and sides and apex of abdomen polished black, and the abdominal terga mostly opaque brown pollinose and lacking silvery markings. Fifth sternum of male [illegible]r two times longer than

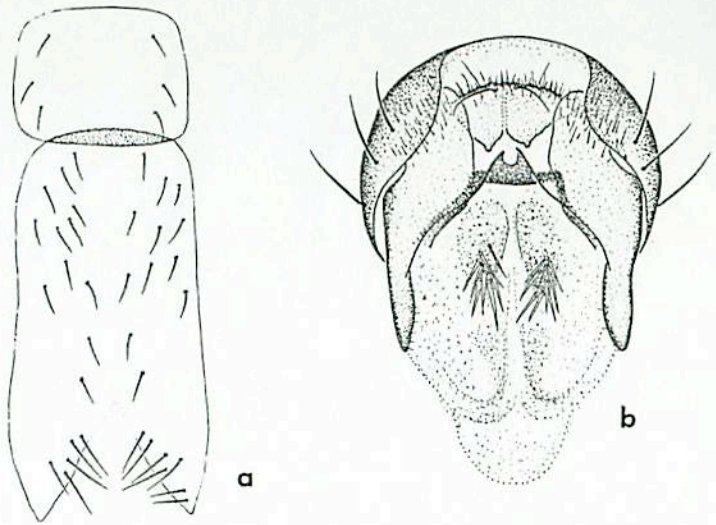

Figure 148—*Milichiella lacteipennis* (Loew): a, fifth sternum of male; b, male genitalia, dorsal.

wide, with a deep, narrow cleft in middle of hind margin (fig. 148a). Genitalia as in figure 148b.

Length: body, 3.5 mm.; wings, 3.0 mm.

Milichiella longiseta Hardy and Delfinado, **new species** (figs. 149a–c)

Belonging in the group of species which have the male abdomen entirely silvery on the dorsum. Differentiated from *circularis* Aldrich by the characters given under the latter species and in the key. It fits near *bakeri* Aldrich from the Philippines but that species has the calypters black with brown hairs, etc.

Male. Mostly black species except for the silvery dorsum of abdomen. *Head:* Shaped as in figure 149a. Three pairs inferior fronto-orbital bristles, the lower two pairs convergent, the upper pair proclinate. One pair of reclinate superior fronto-orbitals. The oral vibrissae continuous as a row up each side of lower two-thirds of face, along eye orbit. Front dull black except for a shining black line along each orbit and a narrow shining line down middle from lower ocellus nearly half the length of front, front rather strongly narrowed anteriorly. Antennae and palpi black, third segment of antenna brown, rather small, arista microscopically pubescent. Palpi with numerous black setae around apical margin. *Thorax:* Shining black in ground color, lightly gray-brown pollinose. The chaetotaxy is similar to that of other members of this genus, but the setae on the mesonotum are much stronger, more developed than *circularis;* a row of moderately strong bristle-like setae occurs from presutural bristle to dorsocentral row; these are approximately three times longer than surrounding setae; also [illegible]e other enlarged seta nearly two times longer than others is

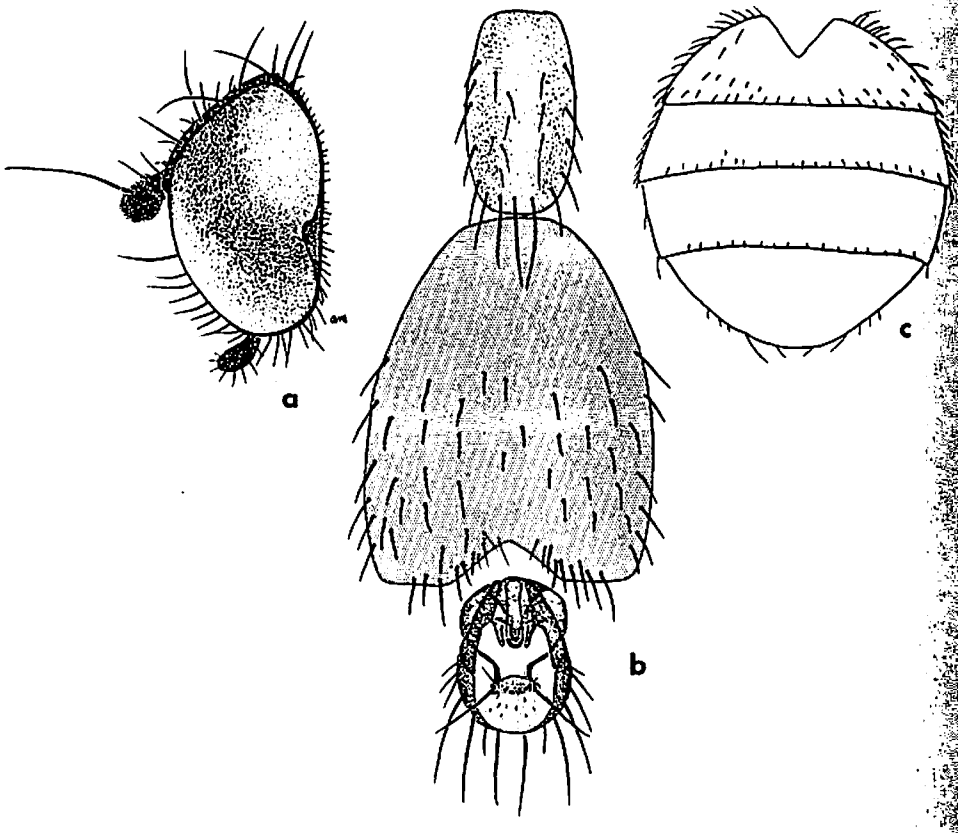

Figure 149—*Milichiella longiseta* Hardy and Delfinado, n. sp.: a, head; b, post abdomen of male, ventral; c, male abdomen, dorsal.

present in dorsocentral row behind suture. *Legs:* Black with a tinge of yellow on tarsi. *Wings:* Subhyaline, lightly fumose, venation similar to that of other *Milichiella,* with veins R_{4+5} and M_{1+2} slightly converged at apices. Calypters gray, margin brownish fringed with yellow hairs. *Abdomen:* Very broad, only slightly longer than wide and somewhat flattened on dorsum with entire upper portion brilliant silvery. First tergum sparsely setose on lateral margins with two or three irregular rows of setae extending over posterior lateral margins, reducing to one irregular row across median hind margin (fig. 149c). Terga 3–5 with only one complete row of black setae across hind margin, sometimes with two irregular, incomplete, rows. The fifth sternum is longer than wide, with a broad V-shaped cleft in middle of hind margin. Each cercus has a strong, slightly wavy bristle at apex; this is nearly three times longer than epandrium. The surstyli are enlarged, rounded at apices. Other details of the genitalia are as in figure 149b.

Length: body, 3.7 mm.; wings, 3.0 mm.

FEMALE. Unknown.

Holotype male, Honolulu, Oahu, September, 1951, sweeping (J. W. Beardsley). 47 paratypes, mostly collected swarming in bright sunlight from the following localities on Oahu: same as type, collected throughout most of the year, 1951–1968 (J. W. Beardsley, M. D. Delfinado, D. E. Hardy, J. Ikeda, S. Tanaka, R. H. Oshiro); hills behind Dillingham Air Force Base, November, 1970 (W. Gagné); and Kalihi, May, 1956 (H. Lau).

Type and paratypes in B. P. Bishop Museum. Paratypes also deposited in the U.S. National Museum, British Museum (Natural History), and University of Hawaii collection.

Family CRYPTOCHETIDAE

A small family of flies, about 16 known species for the world, which are important biological control agents. All of the species are parasitic upon scale insects of the family Margarodidae, subfamily Monophlebinae. They are readily differentiated by lacking aristae, having the third antennal segment very large (fig. 150a), large scutellum, short abdomen and short, broad wings (fig. 150b). The costa is broken near humeral crossvein and at apex of subcostal vein. Subcosta complete, extending to margin free of R_1, but faint. Cell Cu complete but cell M not closed. Front, vertex, mesonotum, and scutellum densely covered with short, erect setae and the bristles scarcely, if at all, differentiated.

Only one known genus, *Cryptochetum* Rondani.

Refer to Thorpe (1931) for a review of the family: taxonomy, biology, and economic importance. Also to Harrison (1959:328) for a discussion of family characters.

Genus **CRYPTOCHETUM** Rondani

Cryptochetum Rondani, 1875, Bull. Soc. ent. ital. 7:167 (as *Cryptochaetum,* p. 172). Type-species, *grandicorne* Rondani, by original designation.

Cryptochaetum; emend.

Lestophonus Williston, 1888, Insect Life 1:21. Type-species, *iceryae* Williston, by monotypy.

The only included genus, differentiated by the family characters given above.

It seems evident that the adults of certain species may be attracted to the eyes of large animals, and may possibly be of medical and veterinary importance in some areas. Lefroy (1909:633) reported an unknown species as being a very annoying fly in the jungle at Pusa, South India. A similar note is made by Bezzi (1919:241) concerning *C. fastidiosum* Bezzi in the Philippines. The label on the lectotype female of this species (ref. Delfinado, 1969:173) reads "Panay, Culasi/ May 1918/ McGregor/ in forest 500–1000 m./ a pest, flies into the inner corner of a person's eye." The authors found these flies extremely pestiferous in the mountains of Luzon and Mindanao at elevations of