

Studies in the Fruit Flies of the Philippine Islands, Indonesia, and Malaya Part I. Dacini (Tephritidae-Diptera)¹

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THIS PAPER DEALS with the fruit flies of the tribe Dacini occurring in the Philippine Islands, Indonesia, and Malaya. It is based largely upon the material which was collected in these areas as part of the biological control of the Oriental fruit fly (*Dacus dorsalis* Hendel) project in Hawaii. This has been a co-operative project conducted by various agencies in the Territory of Hawaii, the University of California, and the United States Department of Agriculture, Bureau of Entomology and Plant Quarantine. The taxonomic studies have dealt with the fruit fly species which have been encountered by the field men while searching for parasites which might be effective against the species which occur in Hawaii. The material from three major areas of the Pacific and southeast Asia has been treated in this one paper, as the fruit fly faunas of these regions show such close affinities. By this combination a much more complete picture can be given of the evident migratory routes, speciation, and patterns of variation. In this respect the study has been especially valuable in gaining a better understanding of the *Dacus* (*Strumeta*) *dorsalis* complex of species. To make this paper more complete and usable, keys and descriptive information are given to the known genera and subgenera and to all the (recognizable) species known to occur in the Philippines, Indonesia, and Malaya.

The collections, consisting of many thousands of specimens, were made almost en-

tirely by N. L. H. Krauss and Q. C. Chock, the Territory of Hawaii Board of Agriculture and Forestry, and F. E. Skinner and G. Angalet, U. S. Department of Agriculture. We are greatly indebted to these men for the thorough sampling they made of the Dacini occurring in the areas where the exploratory work was being conducted. The phenomenal success which has been achieved in the biological control of the Oriental fruit fly in Hawaii is a direct result of the work done in Malaya by N. L. H. Krauss. During the period from April, 1948, to May, 1949, he sent in several hundreds of thousands of puparia (predominantly *Dacus dorsalis*) to the Board of Agriculture and Forestry, and from this material the three species of *Opius* parasites (*O. oophilus* Fullaway, *O. vandenboschi* Fullaway, and *O. longicaudatus* (Ashmead)—parasites of eggs, young larvae, and mature larvae, respectively; this is also the order of their importance as parasites of *Dacus dorsalis*) were recovered which have effected such a marked reduction in the populations of *D. dorsalis* throughout the Hawaiian Islands.

The generic and subgeneric concepts and the terminology are the same as those used by Hardy (1951). We do not approve of the splitting of *Dacus s.l.* into genera based only upon single chaetotaxic and secondary sexual characters; we consider these units as subgenera.

Some of the Walker types of *Dacus* in the British Museum (Natural History) collection were studied by Dr. K. L. Knight (Malaria and Mosquito Control Unit No. 1, U. S. Naval Air Station, Jacksonville, Florida) in September, 1946, and his notes (in the U. S. National Museum) were made available to us

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by Dr. Alan Stone. The information which he supplied has helped us place some of Walker's inadequately described species and has been a great help to this study. We are very appreciative of this assistance and also of the wholehearted co-operation given us by Dr. Stone and Dr. R. H. Foote of the U. S. Department of Agriculture, Division of Insect Detection and Identification.

KEY TO THE GENERA AND SUBGENERA
OF DACINI

1. Mesonotum with transverse depression or furrow connecting lateral sutures. Basal section of vein M_{1+2} deeply incurved into cell 1st M_2 (Fig. 30*d*). Fourth section of costa (cell R_2) not over 0.5 as long as third section (cell Sc), and vein $Cu_1+1st A$ abbreviated. Sides and hind margins of each humerus sloping gradually into remainder of mesonotum so there is no distinct demarcation of the callus. Front femora with two to four spines beneath (fig. 30*e*)..... **Monacrostichus** Bezzi
 - Not as above (the front femora of a few species of *Callantra* may be spined)... 2
2. Abdominal terga conspicuously wider than long, segments one to four at least twice as wide as long..... 3
 - Abdominal terga as long as wide.....
 - Callantra?** (**Polistomimetes**) Enderlein
3. Antennae very elongate; second and third segments combined about equal to vertical length of head, and length of entire antenna greater than combined length of front and face. First antennal segment equal in length to second and at least 0.5 as long as face (Fig. 1*c*). Abdomen strongly clavate and petiolate (Fig. 2*c*), with a prominent hump on each side of first segment; first segment parallel sided or narrower at its apex than at its base. Abdomen strongly arched from a lateral view, and suture between segments three and four markedly concave. Ovipositor tubular in shape..... **Callantra** Walker
 - Antennae comparatively short, first segment usually not over 0.5 as long as second and less than 0.25 as long as face; entire antenna usually about equal to or shorter than front. Abdomen not strongly petiolate, first segment tapered from base to apex, usually about twice as wide at apex as at base; with no well-developed tubercles and not noticeably arched in side view. Suture between segments three and four straight or nearly so. Ovipositor usually flattened dorsoventrally.....
 - **Dacus** Fabricius s. l. 3a
 - 3a. Scutellum with one pair of bristles. 3b
 - Scutellum with two pairs of bristles. 3e
 - 3b. Prescutellar bristles absent..... 3c
 - Prescutellars present..... 3g
 - 3c. Anterior supraalar bristles present. 3d
 - Anterior supraalars absent.....
 - **Dacus** (**Daculus**) Speiser
 - 3d. Third abdominal tergum of male with a row of cilia on each side.....
 - **Dacus** (**Neodacus**) Perkins
 - Third tergum without rows of cilia..
 - **Dacus** (**Nesodacus**) Perkins
 - 3e. Prescutellar bristles present..... 3f
 - Prescutellar bristles absent.....
 - **Dacus** (**Paradacus**) Perkins
 - 3f. Third abdominal tergum of male ciliated and a supernumerary lobe present in male wing.....
 - **Dacus** (**Zeugodacus**) Hendel
 - Third tergum without rows of cilia and no supernumerary lobe in male wing. **Dacus** (**Paratridacus**) Shiraki
 - 3g. Third abdominal tergum of male ciliated..... **Dacus** (**Strumeta**) Walker
 - Third tergum not ciliated.....
 - **Dacus** (**Gymnodacus**) Munro

CALLANTRA Walker

Callantra Walker, 1860, Linn. Soc. London, Proc. 4: 154.

Mellessis Bezzi, 1916, Bul. Ent. Res. 7: 114.

Callantra Hendel, 1914, Wien Ent. Zeit. 33: 74.

On the basis of the material which has been studied to date this appears to be a distinct genus. It can be distinguished from *Dacus* s. l. by the following characters. The antennae are much more elongate, the second and third segments combined are about equal to the vertical length of the head (Fig. 2*b*); in *Dacus* the two segments combined are about 0.5 or 0.6 as long as the head. In *Callantra* the first antennal segment is elongate and equal to the second and nearly equals the visible portion of the palpi; in *Dacus* the first segment is much shorter than the second and is scarcely over 0.25 as long as the visible palpi. In *Callantra* the abdomen is strongly clavate and petiolate, and a prominent hump is present on each side of the petiole (base of first segment). The flies are markedly wasp-like in appearance. The abdomen is strongly arched from a lateral view and is hollowed out beneath. The ovipositor is cylindrical instead of flattened dorsoventrally, as is usual in *Dacus*. *Callantra* also has no prescutellar bristles and no supernumerary lobe in the wing of the male.

Malloch (1939*a*: 410) considers this a subgenus of *Dacus*, and it is entirely possible that, when the group has been studied in detail throughout its geographic range, most of the above characters will intergrade with *Dacus*.

GENOTYPE: *Callantra smieroides* Walker.

Nine species of *Callantra* are known from the regions covered in this study. Just two, however (*C. smieroides* Walker and *C. longicornis* (Wiedemann)), were represented in the collections studied, and as the original descriptions of some of the species do not give enough information it has not been possible to devise a satisfactory key to the species at this time.

The following have also been recorded from these regions:

C. axana Hering, 1938, Deut. Ent. Ztschr., 410, pl. II, fig. 4. Type locality: Key Island.

C. bioculata (Bezzi), 1919, Philippine Jour. Sci. 15(5): 437-438, pl. II, fig. 4. Type locality: Luzon, Philippine Islands.

C. conopsoides (de Meijere), 1911, Tijdschr. v. Ent. 54: 378-380. Type locality: Java. Misspelled "*Conopsoides*" by Bezzi, 1919, Philippine Jour. Sci. 15(5): 438, 440.

C. nummularia (Bezzi), 1919, Philippine Jour. Sci. 15(5): 441-442, pl. II, fig. 6. Type locality: Luzon, Philippine Islands.

C. pedunculata (Bezzi), 1919, Philippine Jour. Sci. 15(5): 439-440, pl. II, fig. 5. Type locality: Luzon, Philippine Islands.

C. splendida Perkins, 1938, Roy. Soc. Queensland, Proc. 49: 136-137. Type locality: Java.

C. subsessilis (Bezzi), 1919, Roy. Soc. Queensland, Proc. 49: 435-436, pl. II, fig. 3. Type locality: Panay, Philippine Islands.

Callantra longicornis (Wiedemann)

Fig. 1

Dacus longicornis Wiedemann, 1830, Auss Zweifl. Ins. 2: 524.

Bactrocera vespoidea Doleschall, 1859, Natuurk. Tijdschr. Nederland. Indië 17: 123.

This species fits in a distinct group of *Callantra* distinguished by the presence of a pair of strong spines on the underside of the front femora near their apices (Fig. 1*d*). We know of only one other named species (*C. conopsoides* (de Meijere)) which possesses this character. We do, however, have on hand an apparently unnamed species from India which has these spines. *C. longicornis* is closely related to *C. conopsoides* (de Meijere), but it differs from de Meijere's description as follows: The legs are almost entirely yellow to rufous, not with the femora and tibiae chiefly blackish brown; the face has a moderately small brown to black spot in each antennal furrow, not with black markings on the oral

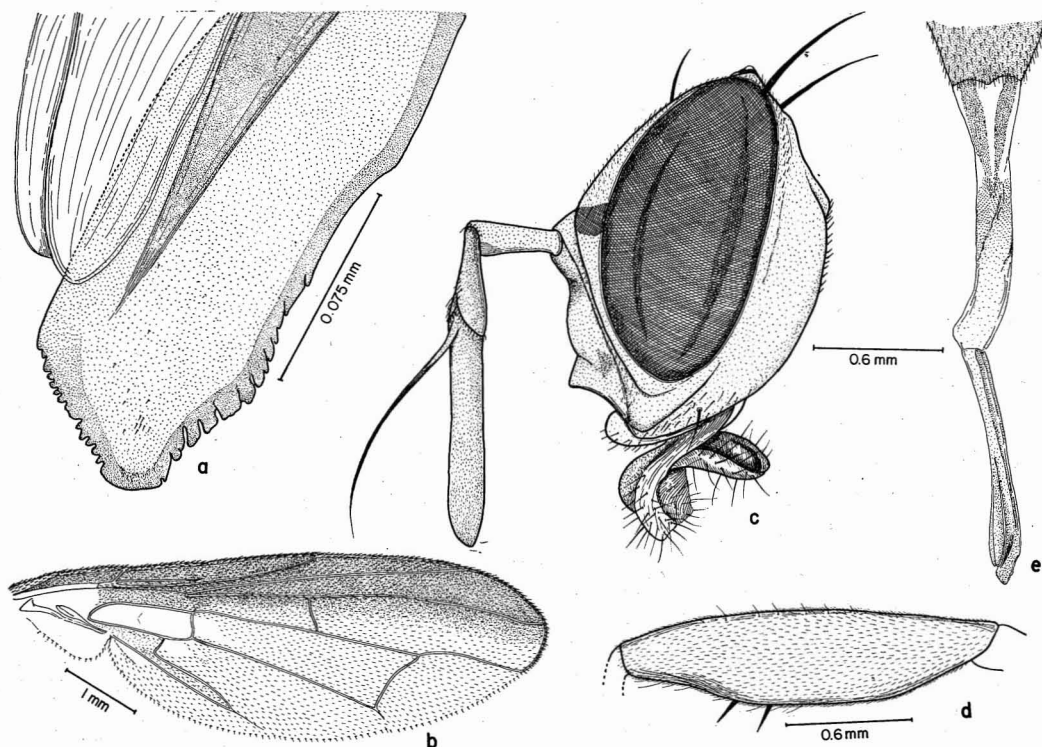


FIG. 1. *Callantra longicornis* (Wiedemann). *a*, Apex of piercer; *b*, wing; *c*, lateral view of head; *d*, front femur; *e*, extended ovipositor.

margin; the thorax is chiefly rufous, not dark reddish brown to blackish brown; the abdomen is without distinct black crossbands, except for a narrow band across the base of the fifth tergum; also, the wings are apparently much more intensely fumose in *longicornis*.

The female has not been adequately described. The color is predominantly rufous and the body rather thickly covered with fine yellow pile, except for the gray pile on the pleura. *Head*: Front scarcely longer than wide, with no dark markings except for a moderately large velvety black spot on each side of the lower margin (to the sides of the lunule). No inferior fronto-orbital bristles and only one small pair of superior fronto-orbitals are present. The frontal calli are clearly defined and extend about 0.5 the length of the front. The face has a brown spot in each antennal furrow. The antennae are yellow to brownish red, and

the proportions are typical of the genus. The occiput is entirely yellow. *Thorax*: The yellow transverse stripe over each mesopleuron is narrow, scarcely as wide as the notopleural callus. The yellow on the mesopleura continues onto the sternopleura for a short distance; it also continues over the notopleura and along the lateral sutures, extending 0.33 of the way across the mesonotum on each side and interrupted by red coloration in the median portion. No postsutural yellow vittae are present on the mesonotum. The scutellum is yellow with a brownish-red band across its base. One pair of scutellar bristles and three pairs of supraalars are present. Prescutellars are lacking. *Legs*: Entirely pale except for a brown tinge on the undersurface of the hind femora. Two strong black spines are present on the underside of each front femur (Fig. 1*d*). *Wings*: Entirely pale yellow to brown fumose.

The first two costal cells are yellow brown and are densely covered with microtrichia. The brown costal band is very broad throughout its length; it extends through most of cell R_5 (Fig. 1*b*). No brown fumosity is present in the cubital area. The narrowed portion of the cubital cell is about 1.66 as long as that portion from the apex of the cell to the wing margin. *Abdomen*: Strongly petiolate and typical of the genus as we have defined it above. Chiefly reddish, slightly tinged with brown, marked with black only at the base of the fifth tergum and with a brown to black vitta extending longitudinally over the median portion of this segment. The apex of the second tergum has a moderately broad band of gray pubescence. The abdomen is strongly convex above and hollowed out below; the basal segment of the ovipositor is almost completely hidden within this hollow. *Ovipositor*: Very short, when fully extended (Fig. 1*e*) it measures approximately 3.67 mm. The basal segment measures about 1.15 mm. long by 1.0 mm. wide at its widest point. The spiracles are situated 0.25 mm. from the anterior lateral margins of the segment. The inversion membrane is 1.35 mm. long by 0.23 mm. wide at its widest point. The rasper extends to within 0.52 mm. of the base of the segment. The piercer is very strangely developed, differing from any that we have studied in that the apical portion is flattened laterally. The apex is serrated, and no preapical setae are visible (Fig. 1*a*). The piercer measures about 1.17 mm. long by 0.13 mm. wide at its widest point.

Length: Body, 8.0–10.0 mm.; wings, 7.0–7.5 mm.

TYPE LOCALITY: Java. The type of *vespoides* was from Amboina.

Type in the Universitetets Zoologiske Museum, Copenhagen.

The female described here is labeled "Ambon 2.08"; this is a different spelling for Amboina, and the specimen was probably collected by F. Muir.

Callantra smieroides Walker

Fig. 2

Callantra smieroides Walker, 1860, Linn. Soc. London, Proc. 4: 154.

Callantra smicroides Bezzi, 1916, Bul. Ent. Res. 7: 120.

This species has been adequately described by Malloch (1939*a*: 411), except for a few details, but has not been figured. It is apparently most closely related to *Callantra solomonensis* (Malloch) (1939*b*: 236) but is distinguished by its predominantly black abdomen and antennae and dark-colored legs; it also lacks the prominent hump on the fifth abdominal segment (Fig. 2*c*) which is characteristic of *solomonensis* (see Malloch *loc. cit.*, 238, fig. 2). His figure is of a female specimen, and the hump is even more pronounced in the male specimen which we have on hand.

Malloch apparently had but one female specimen before him, and a few details can be clarified. He described the thorax as chiefly brownish black; in the large series at hand the mesonotum and scutellum are reddish, tinged with brown, blackened just before the scutellum and behind the humeri. The pleura are dark reddish brown to black except for the yellow hypopleura and the vertical stripe on the mesopleura. The metanotum is black except for the brownish-red median portion. The hind femora and tibiae are dark brownish, the others are rufous tinged with brown. The wings are as shown in Figure 2*a*. *Abdomen*: The first tergum is brown to black with a narrow yellow band at the apex, the extreme lateral margins of the first segment are yellow. The second tergum is reddish tinged with black, slightly yellowish along the apical margin; this apical portion is covered with fine gray pubescence. The remainder of the terga are black, except for the yellow apex of the fifth and a large yellow spot in the middle of the hind margin of the fourth tergum. The sterna each have a row of rather long black hairs along their apical margins. *Ovipositor*: The visible portion, beyond the

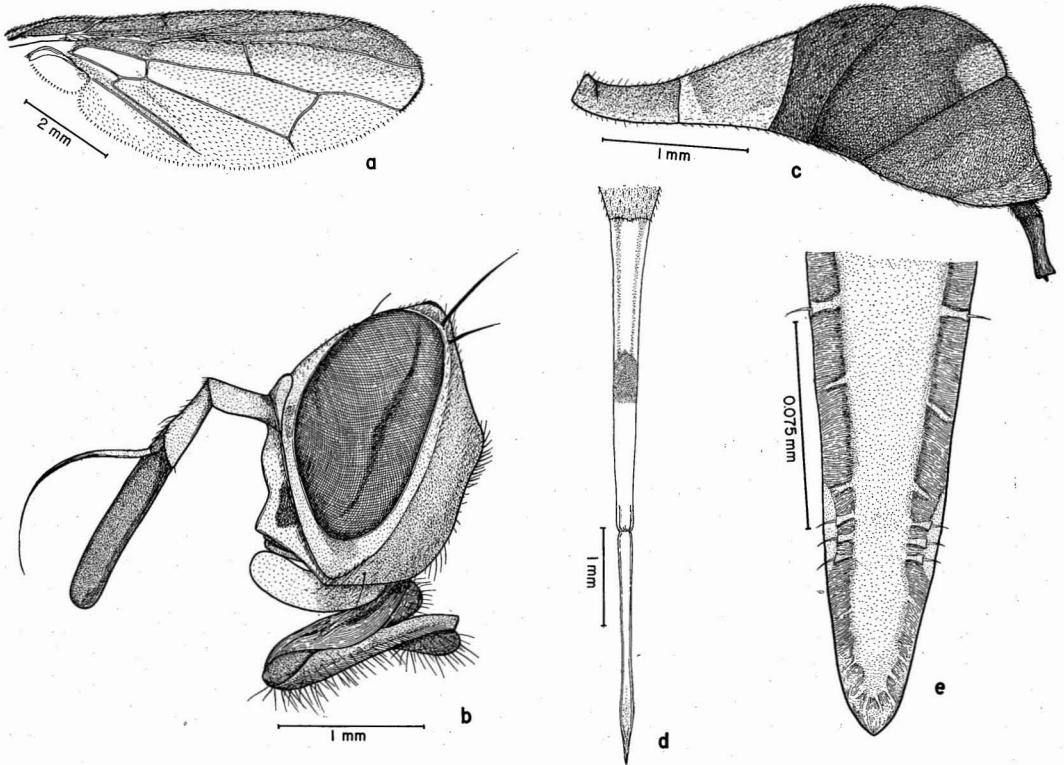


FIG. 2. *Callantra smieroides* Walker. *a*, Wing; *b*, lateral view of head; *c*, lateral view of abdomen; *d*, extended ovipositor; *e*, apex of piercer.

apex of the abdomen, is shorter than the length of the fifth segment. The basal segment of the ovipositor is largely concealed in the concave underportion of the abdomen. The extended ovipositor is 7.8 mm. long (Fig. 2*d*). The base is about 2.0 mm. long; the rasper segment is about 3.2 mm. long and the piercer is 2.6 mm. The rasper occupies the median portion of the eighth segment; it is 0.56 mm. long and is situated about 1.32 mm. from the base of the segment and about 1.32 mm. from the apex. The scales of the rasper are sharply pointed. The piercer is straight sided to the apex of the oviduct, and beyond this it tapers to a sharp point. The opening of the oviduct is situated about 0.56 mm. from the tip of the piercer. At its broadest point the piercer is about 0.19 mm. in width. The preapical setae are very tiny and

are not visible except under high magnification (Fig. 2*e*).

Length: Body, 9.0–10.0 mm.; wings, 8.0–9.0 mm.

TYPE LOCALITY: Makassar.

Type in the British Museum.

Several hundred specimens have been studied from Tamparuli, Borneo, Jan. to June, 1951, ex *Luffa acutangula* and cucumber (F. E. Skinner and G. Angalet).

Opius angaleti Fullaway may be a parasite of this species; it has been reared from fruits infested with both this species and *Dacus* (*Zeugodacus*) *hageni* de Meijere.

CALLANTRA? (POLISTOMIMETES)

Enderlein, n. comb.

Polistomimetes Enderlein, 1920, Zool. Jahrb. Syst. 43: 358.

The exact position of these wasp-like flies is unknown, but the group may possibly be a subgenus of *Callantra*. Enderlein's brief description states that the abdominal segments are as long as wide, the abdomen is slightly less attenuated (stalked) than in *Callantra* and not swollen, globose ("Kugelig angeschwollen"). The first antennal segment is as long as wide and the second is about 2.5 times as long as wide, otherwise as in *Callantra*. This brief definition does not fit *Polistomimetes* satisfactorily within our concept of *Callantra*. This may possibly be a *Dacus* related to the subgenus *Neodacus* Perkins. Hering (1941: 2) included it under *Callantra* in his key.

GENOTYPE: *Polistomimetes minax* Enderlein.

KEY TO ALL KNOWN SPECIES OF
CALLANTRA? (POLISTOMIMETES)

1. Head and thorax clear yellow, face unmarked. Costal band yellow except for a dark-brown spot at apex of vein R₃. Cell R₃ not narrowed in apical portion. Third tergum of abdomen with a poorly developed, faint, median longitudinal vitta. Basal half of ovipositor strongly swollen (ellipsoid). (India) ***minax*** (Enderlein)
- Front margin of face black. Costal band brown in apical half of costal cell (cell R₂) and through apex of wing; band expanded at apex, extending to upper portion of m crossvein, through apical third of cell M₂. Cell R₃ strongly narrowed in apical third. Terga three to five with a broad black median vitta. Ovipositor base not swollen, straight sided. (Sumatra) ***infestus*** (Enderlein)

Callantra?* (*Polistomimetes*) *infestus
(Enderlein)

Polistomimetes infestus Enderlein, 1920, Zool. Jahrb. Syst. 43: 359.

This is distinguished from the only other known species in this group by the characters given in the key.

Length: Body, 9.0 mm.; wings, 8.0 mm.
TYPE LOCALITY: Deli, Sumatra.
Type possibly in the Museum f. Naturkunde, Stettin.
We have not seen this species.

DACUS (DACULUS) Speiser

Daculus Speiser, 1924, Beitr. Tierk. Konigsberg, 140.

This subgenus differs from *D.* (*Strumeta*) by lacking prescutellar and anterior supraalar bristles. It has not been recorded from the area covered in this report, but on the evidence we now have it appears that *Dacus discipennis* Walker (from Moluccas) probably belongs here.

GENOTYPE: *Dacus oleae* (Gmelin).

Dacus* (*Daculus*) *discipennis
Walker, n. comb.

Dacus discipennis Walker, 1861, Linn. Soc. London, Proc. 5: 294.

This species appears to be very close to *D.* (*Daculus*) *murrayi* (Perkins) from Australia; both have broad costal bands and cubital streaks in the wings, the band fills all of cell R₃. The only difference which we can find, from the original description of *discipennis*, is that the mesonotum is all black except for the two postsutural yellow vittae. In *murrayi* the mesonotum is chiefly rufous with a faint tinge of brown in the ground color; it is obviously a much paler species.

Dr. K. L. Knight examined a specimen of *discipennis* in the British Museum and supplied enough details for us to place it under *Daculus*. He confirmed that the prescutellar and anterior supraalar bristles are lacking and that the third abdominal segment of the male has cilia on the sides.

TYPE LOCALITY: Batchian, Moluccas.

Dr. Knight said the type (female) was not in the British Museum ("at least not labeled so"). One male specimen "labeled *discipennis*

in what is probably Walker's handwriting, data: Moluccas, Buchan. C. W. Saunders, B. M. 1868-4."

We have not seen this species.

DACUS (GYMNODACUS) Munro

Dacus (*Gymnodacus*) Munro, 1938, Roy. Soc. London, Proc., ser. B, Tax. 7(5): 117.

This subgenus is distinguished from *D. (Strumeta)* only by the lack of rows of cilia on each side of the third abdominal tergum of the male.

GENOTYPE: *Dacus mesomelas* Bezzi.

Dacus (*Gymnodacus*) *calophylli* (Perkins and May)

Asiadacus calophylli Perkins and May, 1949, Queensland Univ., Dept. Biol. 2(14): 16-18, fig. 8.

Dacus (*Gymnodacus*) *calophylli* (Perkins and May) Hardy, 1951, Pacific Sci. 5(2): 130, figs. 6a-b.

This species has been adequately described and figured in the above references. This is the first time it has ever been recorded outside the type area.

TYPE LOCALITY: Cairns, Queensland.

Type at the University of Queensland.

Sixteen specimens are on hand from Singapore, Malaya, May, 1949, ex *Calophyllum inophyllum* (N. L. H. Krauss).

DACUS (NEODACUS) Perkins

Neodacus Perkins, 1937, Roy. Soc. Queensland, Proc. 48(9): 58.

Asiadacus Perkins, 1937, Roy. Soc. Queensland, Proc. 48(9): 57.

Dacus (*Neodacus*) Perkins, Hardy, in press, Wash. Ent. Soc., Proc.

The subgenus *Neodacus* differs from *Dacus* (*Strumeta*) only by lacking prescutellar bristles.

GENOTYPE: *Dacus* (*Neodacus*) *newmani* (Perkins).

Dacus (*Neodacus*) *bakeri* (Bezzi)

Chaetodacus bakeri Bezzi, 1919, Philippine Jour. Sci. 15(5): 426-428.

Dacus (*Neodacus*) *bakeri* (Bezzi) Hardy, in press, Wash. Ent. Soc., Proc.

This species has been adequately described in the references cited above. It is differentiated from other *Dacus* (*Neodacus*) which have the costal band expanded into a large apical spot by having the mesonotum extensively marked with black and with just two postsutural yellow vittae.

TYPE LOCALITY: Davao, Mindanao, host unknown.

Type in the U. S. National Museum.

We have not seen this species.

DACUS (NESODACUS) Perkins, n. comb.

Nesodacus Perkins, 1937, Roy. Soc. Queensland, Proc. 48(9): 57.

This subgenus is most closely related to *Dacus* (*Neodacus*), differing only in the absence of a row of cilia on the sides of the third abdominal tergum of the male. It also is close to *Dacus* (*Dacus*), differing only in having a supernumerary lobe in the wing of the male. It is differentiated from *Dacus* (*Strumeta*) by the absence of prescutellar bristles and by the absence of cilia on the third tergum of the male. This genus was not represented in the specimens which were studied, but a key to the species is included to make this paper more complete. The species *longicaudatus* (Perkins) is known only from the type female, and there is some question as to whether it belongs in *Dacus* (*Nesodacus*) or *Dacus* (*Neodacus*).

GENOTYPE: *Chaetodacus atrichus* Bezzi.

KEY TO ALL THE KNOWN SPECIES OF DACUS (NESODACUS)

1. Costal band not expanded at wing apex. (Philippine Islands) 2
- Costal band enlarged apically, forming a

- large spot in apex of wing. (Malaya) . . .
 **longicaudatus** (Perkins)
2. Abdomen entirely black.
 **ablepharus** (Bezzi) 3a
- Abdomen reddish, with black crossbands
 **atrichus** (Bezzi) 2a
- 2a. Front black spotted. Face of male entirely black, that of female with two lateral spots and a median black spot just below antennae; smaller species, body 4.5–5.0 mm.
 **atrichus atrichus** (Bezzi)
- Front without spots. Face of female with just two black spots [male unknown]. Larger species, body 6.0 mm.
 **atrichus var. davaoanus** (Bezzi)
- 3a. A black crossband present at vertex. Face of both sexes with a broad black band across lower portion.
 **ablepharus ablepharus** (Bezzi)
- No complete band across vertex. Face of female [male unknown] with two black spots.
 **ablepharus var. mindanaus** (Bezzi)

DACUS (PARADACUS) Perkins, n. comb.

Paradacus Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 143.

This subgenus is very similar to *D. (Zeugodacus)* except that prescutellar bristles are absent. There appear to be just three described species which fit in *Paradacus*. Hering's placement (1952b: 266) of *Zeugodacus pendleburyi* Perkins under this combination was probably an error. [See under *Dacus (Zeugodacus) pendleburyi*.] *Paradacus minimus* Hering (*loc. cit.*) should very probably also belong in *Zeugodacus*.

GENOTYPE: *Paradacus fulvipes* Perkins.

KEY TO ALL KNOWN SPECIES OF
 DACUS (PARADACUS)

1. Mesonotum with three postsutural yellow

vittae. Wings with a brown transverse marking in median portion. (Moluccas)
 **perplexus** Walker

Mesonotum with two postsutural yellow vittae. Wings without transverse markings
 2

2. Abdomen chiefly pale reddish brown, third tergum black only along anterior margin and slightly darkened on sides; fourth and fifth terga all rufous except for indistinct discolorations on sides. Crossvein m slightly infuscated. (Borneo)
 **fulvipes** (Perkins)

Third to fifth terga black with a yellow submedian spot on each side. The m crossvein not infuscated. (Lesser Sunda Islands) **minimus** (Hering)

Dacus (Paradacus) fulvipes
 (Perkins), n. comb.

Paradacus fulvipes Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 143–144, fig. 8.

This species is apparently closely related to *D. minimus* (Hering) and is separated by the paler coloring of the abdomen and the slightly fuscous m crossvein, as stated in the above key. There are probably other more satisfactory characters for separating these, but they are not evident in the original descriptions. Perkins' wing photograph is very poor and is of little value in distinguishing his species.

Length: Body, 6.0–6.5 mm.; wings, 5.5–6.0 mm.

TYPE LOCALITY: Bettolan, N. Borneo.

Type in the Selangor Museum.

This species is known only from the type male.

Dacus (Paradacus) minimus
 (Hering), n. comb.

Paradacus minimus Hering, 1952, Naturf. Gesell. in Basel, Verhandl. 63: 42–43, fig. 1.

From Hering's discussion of this it would appear to fit just as well in *Dacus (Zeugodacus)*

as in *D. (Paradacus)*. His unique specimen possessed a strong hair on the right side of the mesonotum in the position of the pre-scutellar bristles; this was lacking, however, on the left side. It seems to be very close to *D. fulvipes* (Perkins) and is separated by its predominantly black abdomen and by the lack of fuscation along the m crossvein.

Length: Wing, 4.9 mm.

TYPE LOCALITY: Reo, West Flores.

Type in the Naturhistorischen Museum, Basel.

This species is known only from the type female.

Dacus (Paradacus) perplexus Walker

Fig. 3

Dacus perplexus Walker, 1862, Linn. Soc. London, Proc. 6: 14.

Paradacus perplexus Walker, Perkins, 1939, Queensland Univ., Dept. Biol. 1(10): 33-34, pl. 1, fig. 3.

This species is readily distinguished from all known Dacinae by the unusual wing markings (Fig. 3*d*). The following description is supplemental to that given by Perkins. *Thorax:* The three yellow vittae on the mesonotum are very broad and extend to the hind margin of the mesonotum on the specimen at hand. Perkins indicated that the lateral vittae extended to the inner posterior supraalar bristles and that the median vitta was short. On our specimen, the median stripe begins at the scutellum; it is slightly wider at this point than the area normally set off by the pre-scutellar bristles; it is strongly narrowed as it extends anteriorly beyond the suture and blends into a very narrow rufous line which

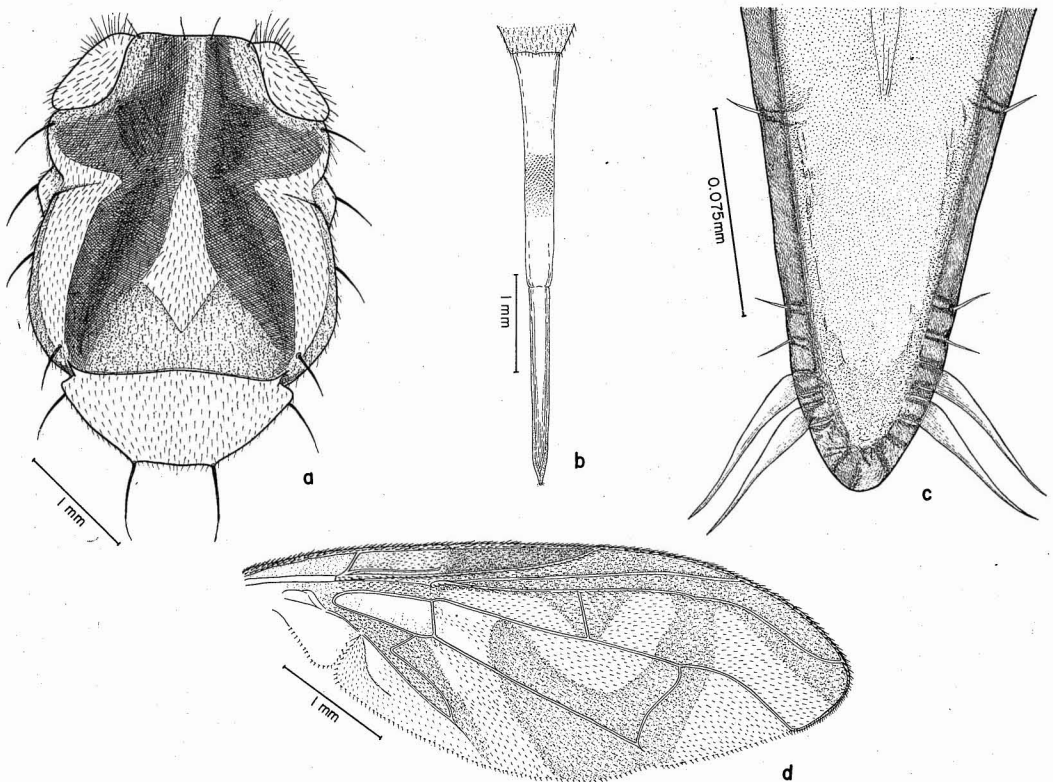


FIG. 3. *Dacus (Paradacus) perplexus* Walker. *a*, Mesonotum; *b*, extended ovipositor; *c*, apex of piercer; *d*, wing.

extends to the front margin of the mesonotum (Fig. 3a). The mesonotum and scutellum are densely covered with moderately long yellow pile. *Wings*: As in Figure 3d. The costal cells and the radial cell are entirely yellow, the second section of the costa is densely covered with microtrichia. Cell M is slightly yellowish, especially around its margins. The narrowed portion of the cubital cell is about 1.25 times as long as that portion from the apex of the cell to the wing margin. *Abdomen*: Almost all rufous with a rather faint brown vitta extending longitudinally over the median portion of terga three to six. *Ovipositor*: The basal segment, *in situ*, is about equal in length to the fifth abdominal segment, as viewed from above. The extended ovipositor (Fig. 3b) is about 6.63 mm. long. The piercer is about 2.08 mm. long by 0.26 mm. wide at its widest point. The apex is rather blunt, and two pairs of long and two pairs of short preapical setae are present; the elongate pair are situated about 0.025 mm. from the apex (Fig. 3c). The opening of the oviduct is situated about 0.26 mm. from the apex. The inversion membrane measures about 2.47 mm. by 0.47 mm. at its widest point. The rasper extends to within about 1.35 mm. from the base of the segment. The basal segment (seventh) is 2.08 mm. long by 1.56 mm. wide at its widest point. The spiracles are situated about 0.4 mm. from the anterior corners of the segment.

Length: Body, 10.0–11.0 mm.; wings, 9.0 mm.

TYPE LOCALITY: Gilolo.

The type was not designated and is probably the female specimen mentioned by Perkins (*loc. cit.*) which is in the Australian National Museum, Melbourne; this had been labeled, by Walker, "*Dacus implexus*." The single specimen in the British Museum is a male; Walker's description was based upon a female.

The female specimen described above is labeled "Halamaheira, T. Barbour."

DACUS (PARATRIDACUS) Shiraki

Paratridacus Shiraki, 1933, Taihoku Imp. Univ., Faculty Sci. and Agr., Mem. 8(2): 109–110.

Dacus (*Paratridacus*) Shiraki, Hardy, 1951, Pacific Sci. 5: 140.

This subgenus is differentiated from *Dacus* (*Zeugodacus*) only by secondary sexual characters in the males; the males lack the row of cilia on each side of the third abdominal tergum and the supernumerary lobe in the wing.

GENOTYPE: *Dacus* (*Paratridacus*) *expansens* Walker.

Dacus (*Paratridacus*) *expansens* Walker

Dacus expansens Walker, 1859, Linn. Soc. London, Proc. 3: 114.

Bactrocera garcimiae Bezzi, 1913, Indian Mus., Mem. 3: 97.

Dacus yayeyamanus Matsumura, 1916, Thousand Ins. of Japan, Addit. 2: 412.

This species has been adequately described and figured by Hardy (1951: 140–142).

TYPE LOCALITY: "Aru Islands" (Aroe Islands).

Type in the British Museum (Natural History).

A series of typical *expansens* are on hand from the following localities. Philippine Islands: Luzon, Sept.–Oct., 1947 (Q. C. Chock); Bataan, Oct., 1947 (L. T. Karganilla).

Dacus (*Paratridacus*) *expansens melanius* n. subsp. Fig. 4

The specimens which we have seen from Malaya are consistently darker in color than are the typical *D. expansens*. The subspecies *melanius* is distinguished by having the mesonotum extensively blackened. In the fully hardened (colored) specimens the area between the lateral yellow vittae is entirely black, except for a brief interruption, just behind

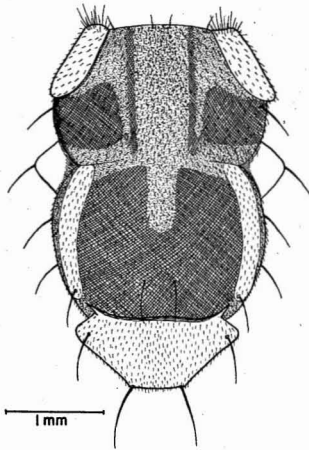


FIG. 4. *Dacus (Paratridacus) expandens melanius* n. subsp. Mesonotum.

the suture, caused by a yellowish vitta which extends from this point to the anterior margin of the mesonotum. The area just in front of the suture, on each side, has a moderately large black spot which continues to the humerus. The inner margin of each of these black spots is produced into a vitta which extends to the anterior margin of the mesonotum at the outer scapular bristle (Fig. 4). In other details this subspecies appears to conform with the typical *expandens*.

Holotype male and allotype female, Singapore, Malaya, May, 1949, ex fruit of *Garcinia dulcis* (N. L. H. Krauss); 75 paratypes, 25 males and 50 females with the following data: same as type; Kuala Lumpur, Feb.-Mar., 1949, ex *Garcinia dulcis* (N. L. H. Krauss).

Type, allotype, and a series of paratypes deposited in the U. S. National Museum. The remainder of the paratypes are being distributed to the following collections: British Museum, Bernice P. Bishop Museum, Hawaiian Sugar Planters' Association, the University of Hawaii.

DACUS (STRUMETA) Walker

Strumeta Walker, 1856, Linn. Soc. London, Proc. 1: 33.

Dasyneura Saunders, 1841, Ent. Soc. London, Trans. 3: 60 (nec Rondani, 1840).

Chaetodacus Bezzi, 1913, Indian Mus., Mem. 3: 93.

Dacus (Marquesadacus) Malloch, 1932, Bernice P. Bishop Mus., Bul. 98: 145.

Sinodacus Zia, 1936, Chinese Jour. Zool. 2: 157. New synonymy. See discussion under *Dacus (Strumeta) hochii* (Zia).

Dacus (Strumeta) Walker, Hardy, 1951, Pacific Sci. 5: 142.

The members of this subgenus are characterized by one pair each of scutellar, pre-scutellar, and anterior supraalar bristles, a row of cilia on each side of the third tergum of the male, and a supernumerary lobe in the wing of the male.

GENOTYPE: *Dacus (Strumeta) umbrosus* Fabricius.

KEY TO SPECIES AND VARIETIES OF DACUS (STRUMETA)

1. Wings with one or more complete crossbands (Figs. 10*b* and 22*a*) 2
Wings without complete crossbands, with not more than infuscations over crossveins 3
2. Wings with 3 complete crossbands and a distinct costal band (Fig. 22*a*) (widespread through the southwest Pacific) **umbrosus** Fabricius
Wings with one crossband and without a distinct costal band (Fig. 10*b*) (Solomon Islands, New Britain, Micronesia, Malaya) **frauenfeldi** Schiner
3. Wings infuscated only on costal margin and through cubital area; costal band may be enlarged into an apical spot . . . 7
Wings with brown infuscations over one or both crossveins 4
4. Mesonotum with no postsutural yellow vittae. (Malaya) . . . **tillyardi** (Perkins)
Mesonotum with 3 yellow vittae 5
5. The r-m crossvein with a distinct brown infuscation. Costal band broad and not strongly expanded at apex but extending

- to vein M_{1+2} . Two pairs of inferior fronto-orbital bristles present. (Flores)
 **persignatus** (Hering)
- The r-m crossvein clear or very faintly infuscated. Costal band expanded into a large apical spot, extending only about halfway through cell R_5 . Three pairs of inferior fronto-orbital bristles present. . . 6
6. Face with a transverse band of black. (Java) **transtillum** (Hering)
- Face with the usual black spots in antennal furrows. (Widespread)
 **cucurbitae** Coquillett
7. Mesonotum with no postsutural yellow vittae. 8
- Mesonotum with yellow vittae. 9
8. Costal band greatly expanded into a large brown spot which fills apical fourth of the wing. Face with a transverse band of black across middle. (China, Indonesia) **hochii** (Zia)
- Costal band not enlarged. Face with the usual black spots. (Java)
 **obscuratus** de Meijere
9. Mesonotum with 3 postsutural yellow vittae. Wings with a large apical spot. (Java) **apicalis** de Meijere
- Mesonotum with 2 postsutural yellow vittae. 10
10. Face with a black transverse band. (Formosa, Borneo, Malaya) . . . **cilifer** Hendel
- Face without such a band. 11
11. Face with the usual black spots in antennal furrows or entirely brown to blackish. 12
- Face entirely yellow. 13
12. Humeri and postalar calli joined by a broad yellow band. Costal band extends to vein M_{1+2} and expanded in wing apex. (Philippine Islands) . **continuus** (Bezzi)
- Humeri and postalar calli not joined by a yellow band. Costal band not extending to vein M_{1+2} 14
13. Mesonotum chiefly or entirely rufous with yellow marks. Costal band extending to vein M_{1+2} . Wings of males with a peculiar bulla developed above cubital vein (Fig. 16*d*). (Philippine Islands and Malaya) **mcgregori** (Bezzi)
- Mesonotum black except for yellow markings. Wings probably not as above. (Java) **impunctatus** de Meijere
14. Costal band very broad, extending along top edge of vein R_{4+5} filling all or almost all of cell R_3 15
- Costal band scarcely, if at all, extending into cell R_3 , except at wing apex . . . 16
15. Face brown to black, obscuring spots in antennal furrows, front and middle femora and abdomen blackish. (Malaya) **nigrotibialis** var. *lata* (Perkins)
- Face, all femora, and abdomen chiefly yellow to rufous. (Philippine Islands) **limbiferus** (Bezzi)
16. Front and middle femora chiefly or entirely yellow. Postsutural yellow vittae on mesonotum extending to or beyond inner supraalar bristles. Shining areas on fifth tergum rufous. 19
- Front and middle femora chiefly brown to black. Postsutural yellow vittae ending in front of inner supraalar bristles. Shining areas on fifth tergum black. 17
17. Face largely yellow, with distinct black spots which extend to oral margin (Fig. 15*b*). Abdomen marked with yellow at least on second tergum, and yellow vittae on mesonotum not strongly narrowed behind except in *pectoralis* Walker . . 18
- Face brown to black, therefore the black spots in antennal furrows not clearly defined. Abdomen all black, and yellow

- vittae on mesonotum pointed posteriorly (Fig. 18*a*). (Malaya).....
nigrotibialis (Perkins)
18. Facial spots small, not reaching oral margin. Abdomen black except for a pale band on apex of second tergum. Mesonotum with 3 longitudinal, gray pollinose stripes. (Aroe Island) *pectoralis* Walker
 Facial spots large, extending to oral margin. Abdomen chiefly yellow to rufous (Fig. 15*c*). Mesonotum with 2 gray stripes (Fig. 15*a*). (Philippine Islands).....
luzonae n. sp.
19. Abdomen entirely rufous. Wings with apical spot. Front about as broad as one eye. (Southeast Asia) *latifrons* (Hendel)
 Abdomen with brown to black markings. Wings without apical spot. Front narrower..... 20
20. Ovipositor trilobed at apex (Fig. 21*c*). (Malaya)..... *propinquus* n. sp.
 Ovipositor normal, not trilobed (Fig. 20*b*)..... 21
21. Median portion of mesonotum yellow to rufous..... 22
 Median portion of mesonotum black. 23
22. Tibiae fulvous. Third section of costa (stigma) about 1.5 times as long as second section (Fig. 11*a*). Ovipositor very elongate, over 9.0 mm. extended; apex trilobed (Fig. 11*c*). Large species, body 8.0–9.0 mm. (Indonesia, Solomon Islands, New Britain) .. *froggatti* (Bezzi)
 Front and hind tibiae brown to black. Third costal section scarcely longer than second (Fig. 5*a*). Ovipositor short and stubby, about 3.5 mm. extended. Apex of piercer sharp pointed (Fig. 5*d*). Smaller species, body 6.0–6.4 mm. (Malaya).....
arecae n. sp.
23. *In situ*, basal segment of ovipositor (measured from above) slightly longer than fifth abdominal segment; extended ovipositor approximately 6.0 mm. (Malaya, Phillipine Islands, Indonesia).....
pedestris (Bezzi)
 Basal segment of ovipositor about 0.75 as long as fifth abdominal segment; extended ovipositor not more than 4.7 mm. 24
24. Ovipositor very abruptly tapered beyond opening of oviduct (Fig. 17*b*). (Borneo).....
muiri n. sp.
 Ovipositor not as above..... 25
25. Extended ovipositor 4.5–4.7 mm., apex narrowed to a slender point (Fig. 8*a*). Postsutural yellow vittae on mesonotum broad, parallel-sided, and extending slightly beyond inner supraalar bristle. At least middle tibiae all yellow.....
dorsalis Hendel 25*a*
 Ovipositor very short, fully extended 2.9–3.4 mm., apex tapered gradually and comparatively broad (Figs. 6*a*, 9*a*). Yellow vittae on mesonotum wedge-shaped, ending before inner supraalar bristles. Tibiae all discolored with brown.... 26
- 25*a*. Costal band not extending below vein R_3 except at apex of wing. (Widespread over Orient and Pacific)..... *dorsalis dorsalis* Hendel
 Costal band extending along underside of vein R_3 throughout its length. (From the Philippines to Malaya).
 .. *dorsalis* var. *occipitalis* (Bezzi)
26. Basal segment of ovipositor (1.1 mm.) longer than inversion membrane (0.91 mm.) or piercer (0.91 mm.). Piercer broader (0.18 mm. wide) (Fig. 9*a*), and rasper extending to within 0.15 mm. of base of inversion membrane. Apical third of each femur brownish and humeri bordered with red. (Philippine Islands)....
dorsaloides n. sp.
 Basal segment (1.0 mm.) shorter than inversion membrane (1.21 mm.) or piercer

er (1.2 mm.). Piercer narrower (0.13 mm. wide) (Fig. 6a) and rasper extending to within 0.36 mm. of base of inversion membrane. Femora yellow to rufous and humeri bordered with black. (Philippine Islands)..... *cognatus* n. sp.

Dacus (*Strumeta*) *apicalis* de Meijere

Dacus apicalis de Meijere, 1911, Tijdschr. v. Ent. 54: 376.

This species appears to be distinguished from other *Strumeta* which occur in this region by having three postsutural yellow vittae, the crossveins without infuscation, and the costal band enlarged into a large apical spot.

TYPE LOCALITY: Sindanglaja, Java.

Type in the Zoologisch Museum, Amsterdam.

We have not seen this species.

Dacus (*Strumeta*) *arecae* n. sp.

Fig. 5

This species is very similar to *D. dorsalis* Hendel, differing chiefly in its smaller size and consistently paler color. The short, stubby ovipositor will readily distinguish the species. The anterior median portion of the mesonotum is yellow to rufous in *arecae* and is black in *dorsalis*. The thorax is marked with yellow brown to brown but usually has no black markings on the specimens of *arecae* which are at hand. The portions of the pleura and metanotum which are black in *dorsalis* are yellow brown in *arecae*. The third section of the costa (stigma) is distinctly shorter in *arecae* than in *dorsalis*. In *arecae* the second costal section measures 21 marks on our ocular micrometer, whereas the third section measures approximately 25 marks (Fig. 5a). In *dorsalis* the second measures 21 and the third about 35 (Fig. 8a). This species is also close to *D. froggatti* (Bezzi) (refer to discussion under that species).

MALE. *Head*: Front rufous to yellow with no frontal spots. Two pairs of inferior fronto-

orbital bristles and one pair of superior fronto-orbitals are present. The occiput is chiefly yellow, just faintly discolored with a brownish tinge on the hind portion. The black facial spots are large and are quadrate to oval in shape. The third antennal segment is dark brown at the apex and on the outside surface and is slightly longer than the face. All the head bristles are black. *Thorax*: The front margin of the mesonotum is polished yellow. A broad yellow to rufous vitta extends from inside the outer scapular bristles to just beyond the suture. The vitta is slightly interrupted medianly by a faint brown line extending from the suture to just before the inner scapular bristles. The median pale vitta is bordered on the sides by a line of brown which runs from the dark spots behind the humeri to the outer scapular bristles (Fig. 5b). A narrow yellow vitta also extends from the posterior margin of the mesonotum, between the prescutellar bristles, to a point just before the suture, indistinctly connecting with the

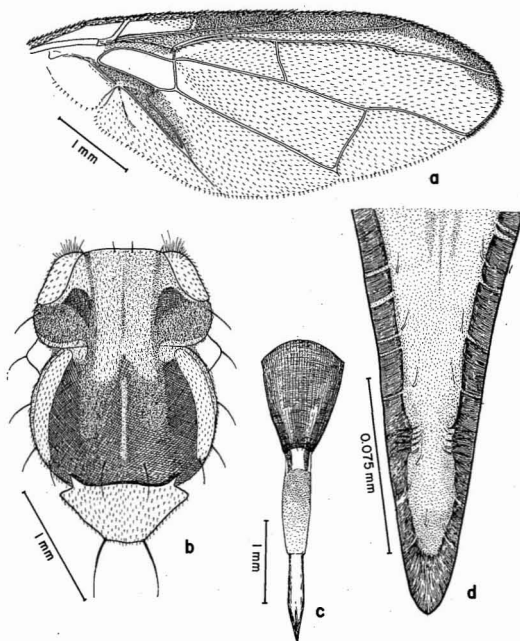


FIG. 5. *Dacus* (*Strumeta*) *arecae* n. sp. a, Wing; b, mesonotum; c, extended ovipositor; d, apex of piercer.

broad pale vitta over the front portion. The dark colors on the thorax vary from pale brown to blackish brown but are not jet black as in *dorsalis*. *Legs*: The coxae and trochanters are yellowish tinged with brown. The front and hind tibiae are brown to black. The middle pair are yellow on their apical halves. The femora are yellow except for a large brown spot on the outside dorsal surface of the apical third of each front femur. *Wings*: As in *dorsalis* except for the shorter third costal section (stigma) (Fig. 5a). The costal cells are hyaline, and the costal band is not attenuated at apex (refer to discussion under *D. froggatti* (Bezzi)). *Abdomen*: As in *dorsalis*, but the markings are more brown in color.

Length: Body, 6.0–6.4 mm.; wings, 5.1 mm.

FEMALE. As in the male except for genital characters. *Ovipositor*: The exposed portion of the ovipositor is slightly shorter than the fifth abdominal segment. The extended ovipositor (Fig. 5c) measures 3.5 mm. in length. The basal segment is approximately 1.3 mm. long by 1.0 mm. wide at its broadest point. The spiracles are situated about 0.31 mm. from the base of the segment, measured on the lateral margins. The inversion membrane is about 1.2 mm. long by 0.3 mm. wide at its widest point. The rasper extends to within 0.26 mm. of the base of the segment. The piercer is about 1.0 mm. in length by 0.21 mm. wide at its widest point. The apex of the oviduct is about 0.23 mm. from the tip of the piercer. The preapical setae are small and inconspicuous, the four pairs are equal in size (Fig. 5d), and the distal setae are approximately 0.07 mm. from the tip of the piercer. In *dorsalis* the distal two pairs of setae are much more strongly developed than are the proximal pairs.

Holotype male, allotype female, and 29 paratypes, 19 males and 10 females: Singapore, Malaya, May, 1949, ex fruit of *Areca catechu*. Also, four paratypes, two males and two females, Beranang, Selangor, Malaya, June, 1948, ex *Areca catechu*. One male specimen is also on hand from Singapore, May,

1949, ex *Canarium odoratum*; it is not being designated as a paratype.

The type, allotype, and a series of paratypes are in the U. S. National Museum. The remainder of the paratypes are in the following collections: Bernice P. Bishop Museum, Hawaiian Sugar Planters' Association, Territorial Board of Agriculture and Forestry, and the University of Hawaii.

Dacus (*Strumeta*) *cilifer* Hendel

Dacus cilifer Hendel, 1912, Suppl. Ent. 1: 15, pl. 1, fig. 1.

This species is distinguished by the black transverse band across the face, the all-black abdomen, and by the elongate ovipositor, the basal segment of which is equal in length to abdominal segments three to five. It has been adequately described by Hendel and by Shiraki (1933: 71–73).

Length: Body, 4.0–6.5 mm.; wings, 3.5–6.0 mm.

TYPE LOCALITY: Formosa. Host, *Momordica cochinchinensis* Sprengel.

Type in the Deutsches Entomologisches Institut.

We have not seen this species. Perkins (1938: 127) recorded it from North Borneo and Malaya.

Dacus (*Strumeta*) *cognatus* n. sp.

Fig. 6

This species is very close to *D. dorsalis* Hendel and can be separated satisfactorily only by the ovipositors. If the specimens are fully hardened, the markings of the mesonotum and abdomen appear to be distinctive. The postsutural yellow vittae on the mesonotum are wedge-shaped and end slightly before the inner supraalar bristles. The area around the inner supraalar is yellow brown and contrasts with the bright-yellow coloring of the vittae. In *dorsalis* the vittae are broad, parallel sided, and the inner supraalars are included within their boundaries. The sides

of the abdomen of *cognatus* are extensively blackened, the tibiae are all discolored with brown, and the specimens are consistently smaller than *dorsalis*. The ovipositor is distinctly shorter and the apex is broader than in *dorsalis* (cf. Figs. 6*b*, 8*c*, and refer to measurements of the ovipositors of both species). The female specimens can readily be distinguished by the comparatively broad apex of the ovipositor.

FEMALE. The front is parallel sided and is unspotted. It is about twice as long as wide. There are two pairs of inferior frontal orbital bristles present; sometimes a weak third pair is present. The black spots on the face are large and oblong in shape. The first two antennal segments are rufous; the third segment is yellow brown. The third segment is less than three times as long as wide and about equal in length to the face. **Thorax:** Predominantly black with fine, short, yellow pile on the dorsum and gray pile and pubescence on the sides. The mesonotum has a pair of broad gray submedian vittae; otherwise it is chiefly shining black. The lateral yellow vittae are wedge-shaped and rather strongly tapered posteriorly. The scutellum is all yellow except for a narrow band of black across its base. **Legs:** The femora are almost entirely yellow to rufous; the front pair has a brown spot near the apex of the upper surface. The tibiae are discolored with brown; the tarsi are yellow except for the brownish, discolored apical subsegments. **Wings:** Very similar to those of *dorsalis*. We have been unable to find any distinctive differences in the venation or the wing maculation. **Abdomen:** Broad black bands are present on the basal portions of terga one and two. A broad median vitta extends longitudinally from the base of tergum three to the apex of five; the sides of three to five are almost all black. The basal band on segment three is strongly narrowed, often interrupted, on each side of the median vitta. **Ovipositor:** The basal portion, *in situ*, is about 0.75 as long as the fifth abdominal segment. The ovipositor is very short; when fully extended (Fig.

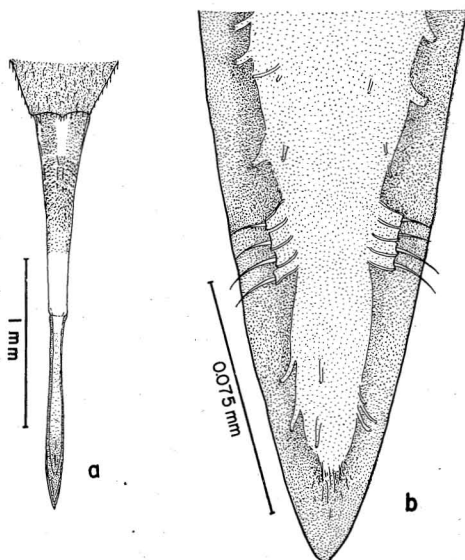


FIG. 6. *Dacus (Strumeta) cognatus* n. sp. a, Extended ovipositor; b, apex of piercer.

6*a*), it measures approximately 3.4 mm. The piercer is evenly tapered to its apex, not slender pointed as in *dorsalis*. The preapical setae are very tiny and inconspicuous. The four pairs are approximately equal in size. The piercer measures about 1.2 mm. long by 0.13 mm. wide at its widest point. The oviduct extends to within 0.28 mm. of the apex. The preapical setae are situated approximately 0.08 mm. from the apex. The inversion membrane measures 1.21 mm. long by 0.28 mm. wide at its widest point. The rasper extends to within 0.36 mm. of the base of the segment. The basal portion of the ovipositor measures about 1.0 mm. by 0.96 mm. The spiracles are situated approximately 0.21 mm. from the anterior lateral margin of the segment.

MALE. As in the female except for sexual characters.

Length: Body, 6.0–6.5 mm.; wings, 5.5–5.8 mm.

Holotype female, allotype male, and 22 paratypes, 10 female and 12 males from Los Baños, Philippine Islands, July 3–19, 1921, "Forest School," some are labeled ex *Eugenia* sp.? (F. X. Williams); 2 males same locality as type, June, 1925 (C. E. Pemberton).

The type and allotype and a series of paratypes are being deposited in the U. S. National Museum. The remainder are being distributed among the following museums and collections: Hawaiian Sugar Planters' Association, Bernice P. Bishop Museum, and the University of Hawaii.

Dacus (Strumeta) continuus
(Bezzi), n. comb.

Fig. 7.

Chaetodacus continuus Bezzi, 1919, Philippine Jour. Sci. 15(5): 424-425, pl. 1, fig. 6.

This species is readily distinguished by having the humeri and notopleura connected by a yellow band; by the chiefly pale coloration and the presence of three narrow brown to black vittae extending down the mesonotum; also by having the costal band extending along the wing margin to vein M_{1+2} . The specimens at hand are teneral, the wing maculations are very faint or lacking, and the thoracic markings are pale. The facial markings are also distinctive in this species; the spots consist of a brown to black vertical streak in each antennal furrow, extending to

the oral margins and about half as long as the face.

The species has been adequately described by Bezzi except for the details of the ovipositor. *Ovipositor*: The exposed portion of the basal segment (*in situ*) is slightly less than 0.5 as long as the fifth abdominal segment. The extended ovipositor (Fig. 7a) measures about 4.32 mm. The piercer measures 1.5 mm. long by 0.13 mm. wide at its widest point. The preapical setae are small and inconspicuous. Three pairs are situated about 0.04 mm. from the apex, and one pair is displaced basally (Fig. 7b). The opening of the oviduct is situated about 0.3 mm. from the apex of the piercer. The inversion membrane is about 1.5 mm. long by 0.23 mm. wide at its widest point. The rasper extends to within 0.4 mm. of the base of the segment. The basal segment is about 1.32 mm. long by 0.96 mm. wide, and the spiracles are located about 0.34 mm. from the anterior lateral margins of the segment.

Length: Body, 6.0 mm.; wings, 5.0 mm.

TYPE LOCALITY: Antique Prov., Batbatan Island, Philippine Islands.

Bezzi said the type was in his collection. His collection is in the Museo Civico di Storia Naturale, Milan, Italy.

A series of specimens are on hand from Mt. Makiling, Laguna, P. I., Sept. 9, 1935 (F. C. Hadden).

Dacus (Strumeta) cucurbitae Coquillett

Dacus cucurbitae Coquillett, 1899, Ent. News 10: 129.

This species was taken in large numbers in all the areas covered by this report. It is a serious pest of cucurbitaceous plants throughout much of the southwest Pacific. *D. cucurbitae* is readily distinguished from other *Strumeta* by the brown markings along the m and r-m crossveins and by the moderately large apical spot formed by the expansion of the costal band; also by its predominantly rufous color and by the presence of three yellow vittae on the mesonotum. The species has

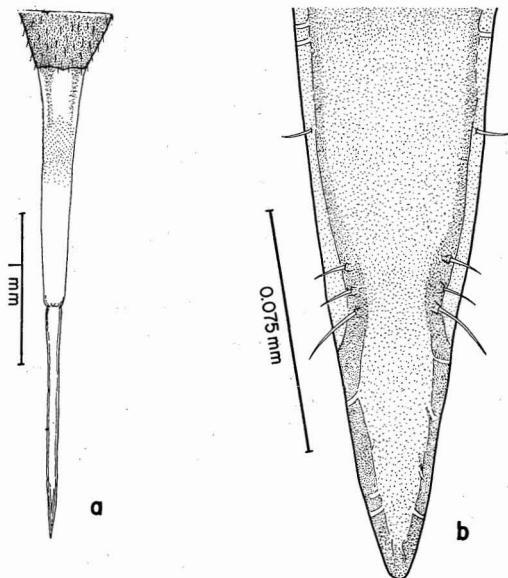


FIG. 7. *Dacus (Strumeta) continuus* (Bezzi). a, Extended ovipositor; b, apex of piercer.

been adequately described and figured by Hardy (1949: 185).

The specimens from the Philippines and Borneo exhibit considerable variations in the development of the scutellar bristles. A number of specimens have been studied which possessed four well-developed scutellar bristles. These would fit the concept of *Dacus* (*Zeugodacus*) (genus *Zeugodacus* of other authors). Many specimens have the outer scutellars small but definitely present. Other specimens have three scutellars present, and the typical specimens have but two. I have also seen these same variations in specimens from India.

Many thousands of specimens have been seen from the following localities.

Philippine Islands: Dumaguete City, Negros, Oriental Prov., Negros, Apr., 1950, ex *Momordica charantia* L. and *Luffa cylindrica* Roem. (F. E. Skinner); Cebu City, Cebu, July, 1950, ex *Momordica charantia* L. (F. E. Skinner); Luzon, Sept.-Oct., 1947 (Q. C. Chock); Del Monte, Mindanao, Jan., 1950, ex cucumber (F. E. Skinner); Davao, Mindanao, Mar.-Aug., 1950, ex cucumber and *Momordica charantia* L. (F. E. Skinner); Panglani, Mindanao, Feb.-Sept., 1950, ex *Momordica charantia* L. and ex "Ampalayo" (F. E. Skinner); Camatayan, Misamis Oriental, Mindanao, Dec., 1949, ex *Trichosanthes* sp. (F. E. Skinner); Gamalang, Davao Prov., Mindanao, Sept., 1950, 1,000 feet, ex *Luffa cylindrica* Roem. and *Momordica charantia* L. (F. E. Skinner); Padada, Davao Prov., Mindanao, May, 1950, 100 feet, ex *Momordica charantia* L. (F. E. Skinner); Sasa, Davao Prov., Mindanao, Aug., 1950, ex watermelon and muskmelon (F. E. Skinner); Pasay, Feb., 1947 (Q. C. Chock); Batangas, Aug., 1947 (Q. C. Chock).

Borneo: Tamparuli, Jan.-June, 1951, ex *Luffa acutangula* ("Potola"), cucumber, *Momordica charantia*, *Lagenaria leucantha*, *Artocarpus integrus*, *Baccaurea angulata*, guava, and mango (F. E. Skinner and G. Angalet); Tuaran, Jan.-June, 1951, ex cucumber, *Solanum*

sp., *Momordica charantia*, *Artocarpus integrus*, mango, carambola, and *Eugenia javanica* (F. E. Skinner and G. Angalet); Mengetel, June, 1951, ex *Averrhoa carambola* and mango (G. Angalet); Papar, Nov., 1950-Jan., 1951, ex *Luffa acutangula* and *Momordica charantia* (F. E. Skinner); Kota Baru, May, 1951, ex *Eugenia javanica*, guava, and papaya (G. Angalet); Kota Belud, June, 1951, ex *Dracontomelum dao* and *Cucurbita maxima* (G. Angalet); Jesselton, July, 1951, ex *Luffa acutangula* and mango (G. Angalet).

Malaya; Kuala Lumpur, Apr., 1948-Mar., 1949, ex *Benincasa cerifera*, *Momordica charantia*, cowpea pods, and *Trichosanthes anguina* (N. L. H. Krauss); Singapore, Apr., 1949, ex wax gourd (N. L. H. Krauss); Titi, Negri Sembilan, June, 1948, ex *Momordica charantia* (N. L. H. Krauss); Serdang, Selangor, June, 1948-Feb., 1949, ex cucumber, *Luffa cylindrica*, and *L. acutangula* (N. L. H. Krauss).

The following parasites were reared from this species: from Malaya—*Opius fletcheri* Silvestri, *Spalangia* spp.?, and *Tachinaephagus* spp.?.; from Borneo—*Opius vandenboschi* Fullaway, *O. angaleti* Fullaway, *Spalangia* spp.?, *Syntomosphyrum indicum* Silvestri, *Pachycrepoides dubius* Ashmead, and *Trybliographa daci* Weld; from the Philippine Islands—*Opius fletcheri* Silvestri, *O. longicaudatus* (Ashmead), *Spalangia* sp.?, and *Pachycrepoides dubius* Ashmead.

Dacus (*Strumeta*) *dorsalis* Hendel

Figs. 8, 15e

Dacus dorsalis Hendel, 1912, Suppl. Ent. 1: 18.

The typical form of *dorsalis* will be discussed in more detail in a study which is underway on the *dorsalis* complex of species. The Malayan, Philippine, and Borneo specimens show considerable variation in the width of the costal band, and the majority fit the variety *occipitalis* (Bezzi) more closely than they do the typical form. The species is closely related to *D. pedestris* (Bezzi) and is best separated by comparing the ovipositors.

As discussed under *pedestris*, the following characteristics will usually distinguish *dorsalis*: The shorter ovipositor (cf. Figs. 8b, 20a, refer to discussion under *pedestris*); the narrower costal band, not extending below vein R_3 except at the wing apex, and the more consistently pale occiput, coxae, trochanters, and front and middle tibiae.

Length: 6.0-8.0 mm.

TYPE LOCALITY: Formosa.

Type in Deutsches Entomologisches Institut.

Numerous specimens are in the collection from the following localities and hosts.

Malaya: Kuala Lumpur, June, 1948-Apr., 1949, ex *Averrhoa carambola*, *Eugenia* sp. ("Jambu ayer"), *Eugenia jambos*, *Eugenia malaccensis*, and *Solanum verbascifolium*; Malacca, Feb., 1949, ex *Eugenia* sp.; Serdang, Selangor, Sept.-Nov., 1948, ex *Averrhoa carambola* and *Averrhoa bilimbi*; Penang, March, 1949, ex *Averrhoa carambola*; Mandai, Singapore, May, 1949, ex *Averrhoa carambola*; Singapore, May,

1949, ex *Garcinia* sp., *Eugenia* sp.?, *Areca catechu*, and *Canarium odoratum*; Kuala Klawa, Negri Sembilan, June, 1948, ex fruit of "Terong pipit."

Philippine Islands: Mintal, Mindanao, May, 1950, ex *Chrysophyllum cainito* L. (F. E. Skinner); Gamalang, Mindanao, Sept., 1950, ex *Solanum* sp. (F. E. Skinner); Tagoloan, Mindanao, Dec., 1949 (Skinner); Bago, Mindanao, Feb., 1950 (Skinner); Manambulan, Mindanao, Feb., 1950, ex pomelo (Skinner); Toril, Davao Prov., Mindanao, Feb., 1950, ex pomelo (Skinner).

Java: Bogor, ex *Averrhoa carambola* and *Capsicum annuum* Linn., July, 1951.

Borneo: Tamparuli, Jan.-May, 1951, ex *Ficus*, citrus, guava, mango, and carambola (F. E. Skinner and G. Angalet); Papar, Nov., 1950-Feb., 1951, ex carambola and mandarin orange (Skinner and Angalet); Mengetel, June, 1951, ex *Averrhoa carambola* and mango (G. Angalet); Tuaran, Apr., 1951, ex *Artocarpus integra*, mango, carambola, and papaya (F. E. Skinner); Kota Baru, May, 1951, ex *Baccaurea angulata*.

The following parasites were reared from this species: Malaya—*Opius incisi* Silvestri, *O. oophilus* Fullaway, *O. vandenboschi* Fullaway, *O. longicaudatus malayensis* Fullaway, *Pachycrepoideus dubius* Ashmead, *Tachinaephagus* spp.?, *Syntomosphyrum indicum* Silvestri, *Spalangia* spp.?, *Galesus* sp.?, Diapriidae and Cynipidae, genera and spp.?; from Java and Borneo—*O. longicaudatus* (Ashm.), *O. oophilus* Fullaway, *O. vandenboschi* Fullaway, *O. incisi* Silvestri, *O. makii* Sonan, *Trybliographa daci* Weld, *Syntomosphyrum indicum* Silv., Encyrtidae genus and sp.?, *Spalangia* sp.?, *Bracon* sp.?, and *Pachycrepoideus dubius* Ashm.

Dacus dorsalis var. *occipitalis* (Bezzi)

Chaetodacus ferrugineus var. *occipitalis* Bezzi, 1919, *Philippine Jour. Sci.* 15(5): 423.

This variety is distinguished from typical *dorsalis* by the broader costal band in the wing. The band ordinarily extends distinctly below vein R_3 nearly halfway through the top por-

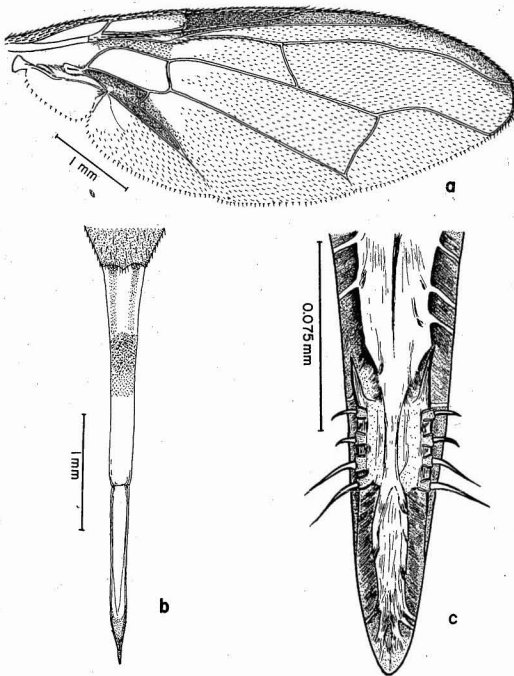


FIG. 8. *Dacus (Strumeta) dorsalis* Hendel. a, Wing; b, extended ovipositor; c, apex of piercer.

tion of cell R_3 . The anterior sclerite of each propleuron, the coxae, and tibiae are usually discolored with brown to black as in *pedestris*, and the occiput is predominantly rufous as in typical *dorsalis*. The genitalia of both sexes appear to be identical with those of typical *dorsalis*.

This is apparently the common form of the *dorsalis* complex which occurs in the Philippine Islands, and it was thought that it represented a geographically distinct subspecies. It is now obvious that the ranges of typical *dorsalis* and *dorsalis occipitalis* overlap in Malaya, and on the basis of this geographic intergrading it is probably best that *occipitalis* be considered a variety. The extension of the costal band beneath vein R_3 is somewhat variable and is much more distinct in some specimens than in others. It appears to be much more constant in specimens from the Philippines than in those from other areas.

Length: 7.0–8.0 mm.

TYPE LOCALITY: Los Baños, Luzon, Philippine Islands.

Bezzi recorded the type as being in Professor C. F. Baker's collection (University of the Philippines). A specimen in the U. S. National Museum labeled "Mt. Makiling, Luzon, Baker, 1497" is evidently a cotype.

The many thousands of specimens which have been studied from Malaya have shown considerable variation in the width of the costal band and in the intensity of the discoloration of the front and middle coxae and the anterior portion of the propleura. So much intergradation is evident that it does not appear practical to attempt to separate *occipitalis* from the typical *dorsalis* in this region. The data recorded under *dorsalis* will also pertain to the variety *occipitalis*. In most of the series examined, specimens fitting both forms were present.

Dacus (Strumeta) dorsaloides n. sp.

Fig. 9

This species is very close to *D. dorsalis* Hendel and to *D. cognatus* n. sp. and is best

differentiated by the characteristics of the female ovipositor. The bright-yellow postsutural vittae are similar to those of *cognatus*, they are narrowed behind and do not reach the inner supraalar bristles, but the area of the mesonotum outside the vittae is rufous or brownish yellow, not black as in the related species. The tibiae are also discolored with brown as in *cognatus*, but the humeri are bordered by rufous, not black. It differs from both *dorsalis* and *cognatus* by having the apical third of each femur discolored with brown. The females are readily distinguished from *dorsalis* by the very short, stubby ovipositor. They can be grouped with *cognatus* by the comparatively broad, gradually tapered apex (cf. Figs. 6a, 9a). It differs from both *dorsalis* and *cognatus* (as well as all other Dacinae which we have studied) by having the basal segment of the ovipositor longer than the inversion membrane or the piercer. It is further distinguished by the details of the ovipositor as given below.

FEMALE. Head: The front is approximately twice as long as wide; there are two pairs of inferior frontal orbital bristles and one pair of superior frontal orbitals. No brown spots are present at the bases of the frontal bristles.

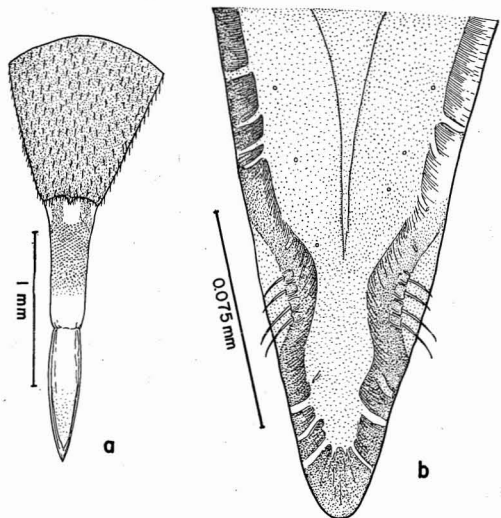


FIG. 9. *Dacus (Strumeta) dorsaloides* n. sp. a, Extended ovipositor; b, apex of piercer.

The median portion of the front is discolored with brown. The face has an oval black spot in each antennal furrow. The third antennal segment is brown and is approximately four times as long as wide. *Thorax*: Chiefly black with the postsutural yellow vittae as described above and with the front margins of the mesonotum reddish around the humeri. The mesonotum is rather densely covered with gray pollen. The scutellum is entirely yellow except for a narrow band of black at its base. The mesopleural stripe is just slightly wider than the notopleural callus. *Legs*: The femora are predominantly yellow; the apical third to two fifths are discolored with brown. The tibiae are all brownish. *Wings*: As in *dorsalis*. We find no differences in the venation or the wing coloration. *Abdomen*: Very similar to that of *dorsalis* with broad black basal bands on terga one to three and with a median longitudinal black vitta extending from three over five. The sides are not extensively blackened as in *cognatus*. *Ovipositor*: *In situ* the basal portion of the ovipositor is not quite 0.75 as long as the fifth abdominal segment. The ovipositor is very short; when fully extended it measures approximately 2.92 mm. The basal segment is about 1.1 mm. long by 1.0 mm. wide at its widest point. The spiracles are situated about 0.1 mm. from the base of the segment, measured to the anterior lateral margins. The inversion membrane measures 0.91 mm. by 0.26 mm. The rasper extends to within 0.15 mm. of the base of the segment. The piercer tapers gradually to the apex; it is rather broad and blunt at the tip. The piercer measures approximately 0.91 mm. by 0.18 mm. The oviduct opens about 0.21 mm. from the apex. The preapical setae are about 0.05 mm. from the apex. There are two moderately long and two tiny setae present (Fig. 9b).

Length: Body, 6.0 mm.; wings, 5.5 mm.

MALE. As in the female, except for the sexual characters.

Holotype female, allotype male, and four paratypes, one male and three females, from Makiling, Philippine Islands, Feb. 21, 1921,

ex fallen fruit of *Sideroxylon macranthum* Merr. (F. X. Williams).

The holotype and allotype are being deposited in the U. S. National Museum, the paratypes are in the Hawaiian Sugar Planters' Association, Bernice P. Bishop Museum, and the University of Hawaii collections.

Dacus (*Strumeta*) *frauenfeldi* Schiner

Fig. 10

Dacus frauenfeldi Schiner, 1868, Reise Novara, Dipt., 262.

Dacus albistrigatus de Meijere, 1911, Tijdschr. v. Ent. 54: 377, pl. 20, fig. 33.

This species is very distinctive and is distinguished from all other known *Strumeta* by the well-developed transverse band through the middle of the wing and the very oblique r-m crossvein (Fig. 10b), by the lack of a distinct costal band, by the large triangular black mark on the scutellum, and by the broad gray vittae extending longitudinally down the middle of the mesonotum (Fig. 10a). The postsutural yellow vittae are strongly narrowed posteriorly.

From de Meijere's original description and figure it is obvious that Hendel's synonymy is correct. Perkins (1938: 128) says that the costal band (in de Meijere's drawing) is too dark and conspicuous to be *frauenfeldi*. We believe it is just an error on the artist's part; the shading along the costal margin should represent faint yellowish fumosity. The descriptions by de Meijere and Perkins (*loc. cit.*) are adequate except for the details of the ovipositor.

Ovipositor: The basal portion (*in situ*) is about equal to or slightly shorter than the fifth abdominal segment. The extended ovipositor (Fig. 10c) measures about 3.7 mm. The piercer is 1.2 mm. long by 0.15 mm. wide at its widest point. The oviduct opens about 0.17 mm. from the apex of the piercer. The preapical setae (Fig. 10d) are situated about 0.05 mm. from the apex. The inversion membrane is 1.4 mm. by 0.25 mm., and the

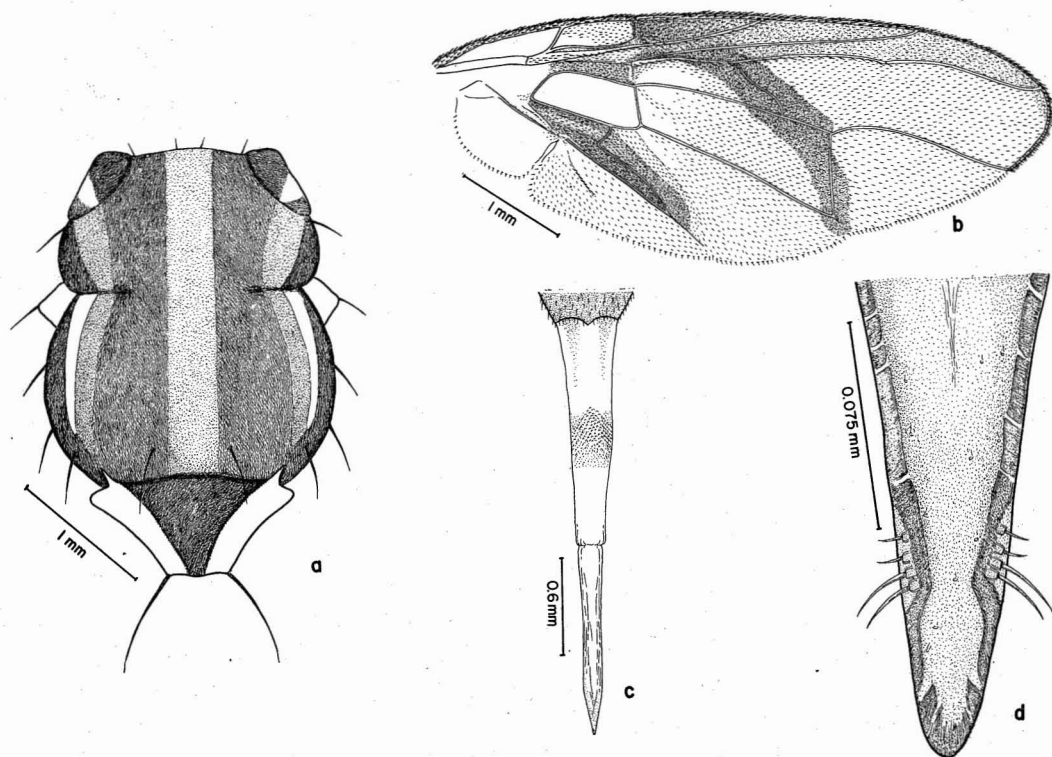


FIG. 10. *Dacus (Strumeta) frauenfeldi* Schiner. *a*, Mesonotum; *b*, wing; *c*, extended ovipositor; *d*, apex of piercer.

rasper extends to within 0.54 mm. of the base of the segment. The basal segment is about 1.11 mm. long by 0.99 mm. wide at its widest point.

Length: Body, 6.0–7.0 mm.; wings, 5.5–6.0 mm.

TYPE LOCALITY: Stuart Islands.

Type probably in Vienna.

Perkins (*loc. cit.*) recorded this species from Malaya. We have not seen specimens from the areas covered in this report. We have a good series on hand from Rabaul, New Britain, Nov., 1949, ex "Aila," *Psidium guajava*, and mango (N. L. H. Krauss); Utragal, Woleai Island (Caroline), July 28, 1946, ex *Eugenia* (R. G. Oakley); Dublon, Truk, Feb., 1948 (K. L. Maehler); Kwajalein, Apr., 1948 (K. L. Maehler).

***Dacus (Strumeta) froggatti* (Bezzi)**

Fig. 11

Chaetodacus froggatti Bezzi, 1928, Dipt. Fiji

Islands, 101. Change of name for *Dacus zonatus* Froggatt (1911) nec *zonatus* Saunders (1841).

Strumeta? moluccensis Perkins, 1939, Queensland Univ., Dept. Biol. 1(10): 17–18, pl. 1, fig. 12. New synonymy based upon a study of specimens from Indonesia, New Britain, New Guinea, and the Solomon Islands.

Perkins separated *froggatti* from *moluccensis* by its having the "mesonotum mostly black in front of the suture," as distinguished from "mostly red in front of the suture" in *moluccensis*. His description also indicates that *froggatti* has no "complete black band along the anterior border of the third abdominal tergite" and *moluccensis* has a narrow black band. No specimens have been seen which have the anterior median portion of the mesonotum black (his specimens must have been discolored), and the black basal band on the

third tergum appears to be complete on all mature specimens.

This species seems to fit closest to *D. arecae* n. sp. It is distinguished by its larger size; all fulvous tibiae; elongate third costal section of the wing (Fig. 11a); by the much more elongate, strongly developed ovipositor (Fig. 11b) and the trilobed piercer (Fig. 11c). Perkins' description of the ovipositor was quite misleading; he said its proportions are as follows (measured from below, except for the fifth tergum): "length of basal segment: greatest width: apex of basal segment: length of 2nd segment: median length of 5th tergite. —40:24:9:29:20." It is obvious that Perkins' measurements were made *in situ* with the inversion membrane ("2nd segment") just partly extruded. We have relaxed the ovipositor. It is very elongate (Fig. 11b); when fully extended it measures about 9.46 mm. The

piercer is approximately 3.17 mm. long by 0.25 mm. wide at its widest point. The apex is trilobed (Fig. 11c). Two pairs of moderately long and two pairs of short preapical setae are present; the distal pair is about 0.06 mm. from the apex of the piercer. The opening of the oviduct is situated about 0.23 mm. from the apex. The inversion membrane is about 3.87 mm. long by 0.44 mm. wide at its widest point. The rasper extends to within 1.25 mm. of the base of the segment. The basal segment is 2.42 mm. long by 1.79 mm. wide measured across its hind margin. The spiracles are situated 0.6 mm. from the anterior lateral margins of the segment.

The males have not previously been described; they fit the description of the female in most details. The following notes are supplemental to Perkins' description. *Head*: The front is parallel sided, is about 1.5 times as long as wide and about 0.8 as wide as one eye. *Thorax*: The mesopleural stripe is rather broad, is slightly wider than the notopleural callus, and is continuous onto the upper portion of the sternopleuron. The dark markings on the mesonotum are usually indistinct or lacking, the top of the thorax is predominantly brownish red. *Wings*: As in Figure 11a. The costal and basal cells are distinctly yellow fumose. The costal band extends through much of cell R_3 but is yellow in this cell. The brown band is confined to the wing margin. *Abdomen*: Chiefly rufous or brownish red with a narrow brown to black band across the base of the third tergum. The narrow brown to black median vitta is variable; in some specimens it is well defined and extends over terga three to five; in others it is interrupted, or just a portion of it may be present on the fifth tergum.

Length: Body, 8.0–10.0 mm.; wings, 7.5–8.5 mm.

TYPE LOCALITY: Bainka, Russell Group, Solomon Islands.

Lectotype (designated by Perkins) in collection of the Council for Scientific and Industrial Research, Canberra, Australia.

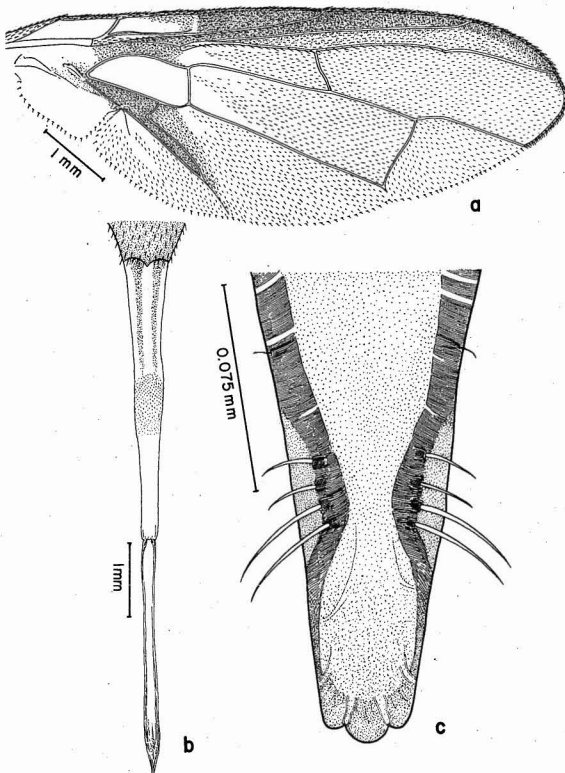


FIG. 11. *Dacus (Strumeta) froggatti* (Bezzi). a, Wing; b, extended ovipositor; c, apex of piercer.

We have studied a series of specimens from Amboina, Jan., 1908–May, 1909 (F. Muir); from Rabaul, New Britain, Oct.–Nov., 1949, ex "Aila," *Inocarpus edulis* (N. L. H. Krauss); Guadalcanal, Nov., 1944 (C. O. Berg); Tenaru River, Guadalcanal, Jan., 1945 (G. E. Bohart); Solomon Islands, July–Aug., 1909 (W. W. Froggatt).

***Dacus (Strumeta) hochii* (Zia), n. comb.**

Fig. 12

Sinodacus hochii Zia, 1936, Chinese Jour. Zool. 2: 157.

Callantra (Sinodacus) hochii (Zia), Hering, 1952, Naturf. Gessell. in Basel, Verhandl. 63: 43.

This species has been considered as belonging to a distinct subgenus (genus of authors) under *Callantra*. It appears to us that this should be treated under *Dacus (Strumeta)*. The abdomen is more noticeably stalked than in most *Strumeta*, but in other details (as given under our concept of *Callantra*) it more nearly fits *Dacus (Strumeta)*: The antennae are typical of this group; the first abdominal segment is broader at its apex than at its base, and the lateral humps are not unusually strong; the abdomen is not as strongly arched, and the sclerite between segments three and four is straight. Zia defined her *Sinodacus* as having no prescutellar bristles (based apparently upon one specimen). The material which we have studied, from the type locality, has prescutellars. Hering (1952a: 43) said that his specimens, from Sumatra, had a prescutellar on one side but not on the other.

The species is readily recognized by the absence of postsutural yellow vittae on the mesonotum, by the large brown spot covering the apical portion of the wing (Fig. 12), and by the transverse black band across the face. The mesonotum is chiefly rufous with no black markings and with a small yellow spot in the median portion just behind the suture.

Length: Body and wings about 7.0 mm.

TYPE LOCALITY: Hainan, China.

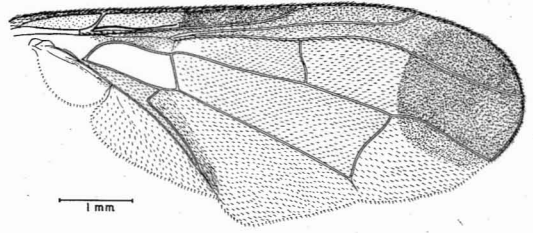


FIG. 12. *Dacus (Strumeta) hochii* (Zia). Wing.

Location of type not known by us.

Hering (1952a: 43) recorded this from Sumba Island and Java. We have not seen it from this region. Our specimen is from Hainan Island, S. China, No-doa, Tan-Hsien District, Mar. 18–22, 1935 (F. K. To).

***Dacus (Strumeta) impunctatus*
de Meijere**

Dacus impunctatus de Meijere, 1914, Tijdschr. v. Ent. 57: 188–189.

This species appears to fit very close to *D. mcgregori* (Bezzi). From the original description it seems to differ by having the thorax predominantly black. If it is a distinct species it no doubt lacks the peculiar bulla on the wing which is so distinctive of *mcgregori*.

Length: Body, 4.0 mm.; wings, 3.5 mm.

TYPE LOCALITY: Semarang, Java.

Type in the Zoologisch Museum, Amsterdam.

We have not seen this species.

***Dacus (Strumeta) latifrons*
(Hendel), n. comb.**

Fig. 13

Chaetodacus latifrons Hendel, 1915, Mus. Nat. Hungarici, Ann. 13: 425–426.

This species is readily recognized by its all-rufous abdomen; by its broad front (approximately as broad as one eye and just slightly longer than wide) (Fig. 13a), and by having the costal band rather narrow but expanded at the apex (Fig. 13b); also by the very distinctive trilobed apex of the ovipositor.

D. froggatti (Bezzi) and *D. propinquus* n. sp. are the only other *Strumeta* which we have studied which have this type of ovipositor. The species has been adequately described by Hendel and by Shiraki (1933: 63-66) except for the details of the ovipositor.

Ovipositor: The basal portion (*in situ*) is about equal or slightly shorter than the fifth abdominal segment. The extended ovipositor (Fig. 13d) is 4.26 mm. long. The piercer measures about 1.56 mm. long by 0.18 mm. wide at its widest point. The preapical setae are very small and inconspicuous and are situated about 0.13 mm. behind the trilobed apex (Fig. 13c). The oviduct opens about 0.26 mm. from the apex. The inversion membrane is short and broad; it is about equal in length to the piercer (1.56 mm.) and measures about 0.5 mm. at its broadest point. The rasper extends to within 0.5 mm. of the base of the segment. The basal segment is slightly wider than long, 1.14 mm. by 1.17 mm. measured across the broadest point. The spi-

acles are situated about 0.28 mm. from the anterior corners of the segment.

Length: Body, 6.0-7.0 mm.; wings, 5.0-6.0 mm.

TYPE LOCALITY: Formosa.

Type in the Deutsches Entomologisches Institut, Berlin.

On Formosa it has been recorded from *Solanum incanum* L. and *S. indicum* L.

A large series is on hand from the following localities and hosts in Malaya: Kuala Lumpur, June-Aug., 1948, ex chilli, *Solanum verbascifolium*, *S. sarmentosum*, *Baccurea motleyana*, and Ponderosa tomato (N. L. H. Krauss); Serdang, Selangor, Mar., 1949, ex tomato (N. L. H. Krauss).

Opius incisus Silvestri were reared from some of this material.

Dacus (Strumeta) limbiferus
(Bezzi), n. comb.

Fig. 14

Chaetodacus ferrugineus var. *limbiferus* Bezzi, 1919, Philippine Jour. Sci. 15(5): 424.

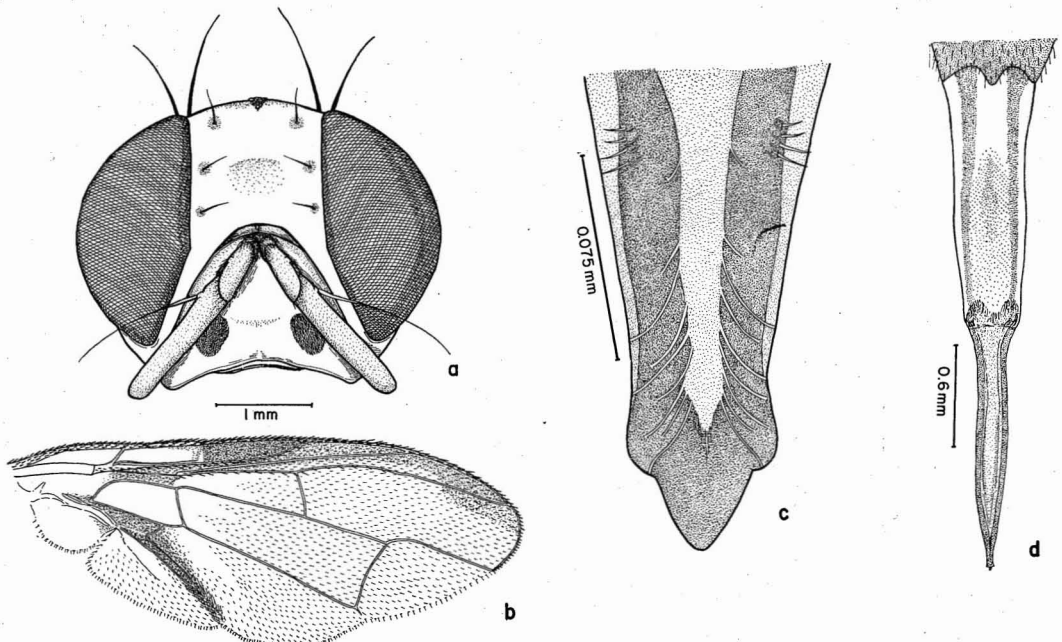


FIG. 13. *Dacus (Strumeta) latifrons* (Hendel). a, Front view of head; b, wing; c, apex of piercer; d, extended ovipositor.

Strumeta pedestris var. *limbiferus* (Bezzi) Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 126.

This is a very distinct species from *dorsalis* or any of the related forms. It is readily distinguished by the very broad costal band in the wings (Fig. 14a), by the extremely long ovipositor (Fig. 14b), and by the broadly blackened apices of the femora. It has not been adequately described in the literature.

MALE. *Head:* The front is about 1.5 times as long as wide, the median portion is discolored, and indistinct spots are present at the bases of the frontal bristles. Two pairs of inferior and one pair of superior fronto-orbital bristles are present. The face has a large, oblong black spot on each side. The third antennal segment is dark reddish brown to black and is about equal in length to the face. *Thorax:* Mesonotum chiefly black, with two broad, postsutural yellow bands and a pair of submedian, gray pollinose vittae extending the full length. The scutellum is all yellow except for a narrow band of black across its base. *Legs:* Femora largely yellow, with brown to black discolorations on their apical portions; these areas are more extensively blackened ventrally. The front and middle tibiae are yellow, colored with brown at their bases. The hind tibiae are chiefly reddish brown. The basal joints of the tibiae are yellow, the apices are brown. *Wings:* Hyaline, except for the broad costal band and the cubital streak. The first two costal cells are devoid of microtrichia except at the apical portion of the second. The costal band is dark brown and extends through all of cell R_3 , crosses over vein R_{4+5} at the wing apex, and extends about halfway through cell R_5 (Fig. 14a). The cubital streak fills the basal portion of cell M_4 . The attenuated portion of the cubital cell is three times as long as the distance from the apex of the cubital cell to the wing margin. The supernumerary lobe is distinctly developed. *Abdomen:* The second and third terga have black bands across their bases. Terga three

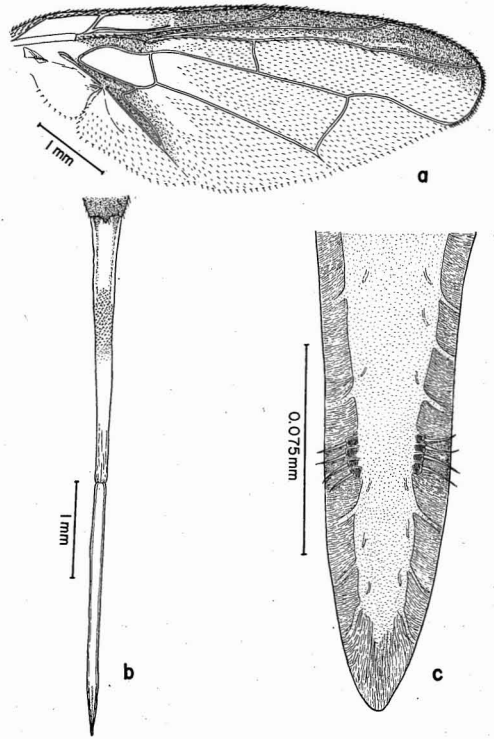


FIG. 14. *Dacus (Strumeta) limbiferus* (Bezzi). a, Wing; b, extended ovipositor; c, apex of piercer.

to five have a broad, black median vitta extending longitudinally from the cross band on three to about the middle of five. The terga all have black markings on the sides.

Length: Body, 6.5–7.0 mm.; wings, 6.0 mm.

FEMALE. Fitting the description of the male in most details. The narrowed portion of the cubital cell is less than two times as long as the distance from the apex of the cell to the wing margin. *Ovipositor:* The basal segment is about 1.5 times as long as segment five. The ovipositor is elongate and slender (Fig. 14b); when fully extended it measures about 6.8 mm. The piercer measures about 2.33 mm. long by about 0.15 mm. wide at its widest point. The preapical setae are very tiny and are difficult to discern except under high power (Fig. 14c). The setae are situated about 0.075 to 0.1 mm. from the apex of the piercer, and the opening of the oviduct is about 0.21

mm. from the apex. The inversion membrane (eighth segment) is 2.55 mm. long by 0.23 mm. wide at its widest point. The rasper extends to within 0.67 mm. of the base of the segment. The basal portion of the ovipositor is 1.92 mm. long by 1.17 mm. wide at its widest point. The spiracles are situated 0.4 mm. from the base of the segment, measured on the lateral margins.

Length: Body, 6.5–7.3 mm.; wings, 6.0–6.5 mm.

TYPE LOCALITY: Panay, Antique Province, Batbatan Island, Philippines.

Location of type: Bezzi said it was in his collection. According to Horn and Kahle (1935) his collection went to the Museo Civico di Storia Naturale, Milan.

A large series of specimens have been studied from the following localities in the Philippines, all reared from *Dracontomelum dao* fruit; Madhum, Mindanao, Aug., 1950 (F. E. Skinner); Penal Colony, Davao, Mindanao, Aug., 1950 (Skinner); Bugo, Mindanao, Jan., 1950 (Skinner); Pangi, Mindanao, Sept., 1950 (Skinner); Gamalang, Mindanao, Sept., 1950 (Skinner); Lawayon, Davao, Mindanao, Mar., 1950 (Skinner).

The following parasites were reared from this species in the Philippine Islands: *Opius longicaudatus* var., *O. skinneri* Fullaway, *O. fletcheri* var., *Pachycrepoides dubius* Ashmead, *Galesus* sp.?, *Spalangia* sp.?, and Encyrtidae genus and sp.?

Dacus (Strumeta) luzonae n. sp.

Fig. 15

This species runs to *Dacus nigrotibialis* (Perkins) in Perkins' key (1938: 122) because of the brown to blackish front and middle femora. It differs from this species in having the face largely yellow, not dark brown to black; by having the abdomen conspicuously marked with yellow, not chiefly or entirely dark colored; by having the basal segment of the female ovipositor shorter than the fifth abdominal segment, not longer; and by having the yellow vittae on the mesonotum broader,

not pointed as in *nigrotibialis* (Fig. 15a).

This species is very closely related to *D. dorsalis* Hendel, and only slight structural differences have been found by which they can be separated. The r-m crossvein is straight and is distinctly shorter than in *dorsalis*. The crossvein is approximately equal in length to the basal section of vein M_{1+2} and is slightly less than half as long as the section of M_{1+2} from the r-m to the m crossveins (Fig. 15d). In *dorsalis* the r-m is curved; it is about 0.33 longer than the basal section of M_{1+2} and about 0.66 as long as that section from r-m to m (Fig. 15e). The ovipositor is very similar in the two species but apparently is slightly smaller in *luzonae*. This species differs considerably from *dorsalis* in coloration and is easily distinguished by a number of characteristics. *D. luzonae* has the front and middle femora predominantly brown to black, not all yellow; the postsutural yellow vittae on the mesonotum end just before the inner supraalar bristles (Fig. 15a), not beyond them; the facial spots are much more enlarged and extend to the oral margins (Fig. 15b); the sides of the abdomen are more extensively blackened, and a large black spot is present on each side of the fifth tergum (Fig. 15c). The pollinosity of the mesonotum is also arranged in a definite pattern (Fig. 15a), not evenly distributed over the mesonotum as in *dorsalis*, and the supraalar areas of the mesonotum are black, outside of the yellow vittae, not rufous.

MALE AND FEMALE. Head: Front nearly twice as long as wide with indistinct brownish spots present at the bases of the bristles. The facial spots extend over the lower one half to three fifths of the antennal grooves, are broadened on their lower portions, and extend to the lower corner of the face (Fig. 15b). The second antennal segment is nearly twice as long as the first. The third segment is 2.5 times as long as the second and is dark brown to black. The hind portion of the occiput is brown to black. *Thorax:* The mesonotum is predominantly black, with the gray pollinose areas set off into a roughly H-shaped pattern

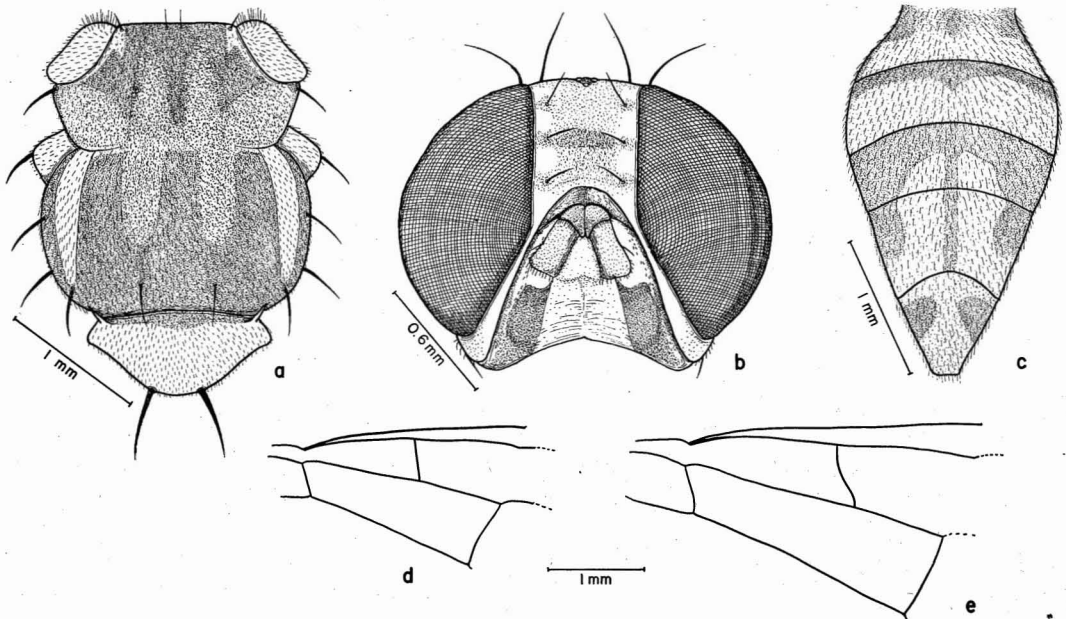


FIG. 15. *a-d*, *Dacus (Strumeta) luzonae* n. sp. *a*, Mesonotum; *b*, front view of head; *c*, abdomen; *d*, median portion of wing. *e*, *D. dorsalis* Hendel, median portion of wing.

by shiny black lines extending longitudinally. The yellow postsutural vittae narrow slightly posteriorly (Fig. 15*a*). The scutellum is all yellow except for a narrow band of black across its base. The metanotum is entirely dark, reddish brown to black. *Legs*: The front femora are almost entirely brown to black, yellowed only at their bases and apices. The middle femora are yellow on the basal one third to one half and on the extreme apices; they are otherwise brown. The hind femora are brown on the apical third, otherwise yellow. The tibiae are dark brown to black. The tarsi are yellow except for the brownish apical subsegments. *Wings*: Appearing to fit typical *dorsalis* in all respects. The costal band is well developed but does not extend below vein R_3 except at its apex. *Abdomen*: Like that of *dorsalis* except for the large spots on the fifth tergum and for the more extensively blackened lateral margins (Fig. 15*c*). *Ovipositor*: The extended ovipositor is approximately 4.0 mm. in length. The piercer is 1.27 mm. long by 0.2 mm. wide at its widest point. The preapical

setae are situated about 0.07 mm. from the tip of the piercer, and the opening of the oviduct is 0.23 mm. from the tip. The inversion membrane is 1.43 mm. by 0.26 mm.; the rasper extends to within 0.52 mm. of the base of the segment. The basal segment (seventh abdominal) is about 1.28 mm. by 1.0 mm.; the spiracles are situated about 0.23 mm. from the base of the segment, measured on the side margins.

Length: Body, 6.0–7.0 mm.; wings, 5.0–6.0 mm.

Holotype male, allotype female, and eight paratypes (three males and five females) from Luzon, Philippine Islands, Oct., 1947 (Q. C. Chock). Host unknown.

The type and allotype are being deposited in the U. S. National Museum. The paratypes are being distributed in the following collections: Bernice P. Bishop Museum, Territorial Board of Agriculture and Forestry, Hawaiian Sugar Planters' Association, and the University of Hawaii.

Dacus (Strumeta) mcgregori
(Bezzi), n. comb.

Fig. 16

Chaetodacus mcgregori Bezzi, 1919, Philippine Jour. Sci. 15(5): 426, pl. 1, fig. 7.

This species is distinguished from all other *Dacus* (*Strumeta*) known from the Philippines by its all-yellow face, by the peculiar bulla on the male wing developed above the cubical vein (Fig. 16*d*), and by the unusually short antennae (Fig. 16*b*).

MALE AND FEMALE. The front is slightly discolored in the median portion but has no spots at the bases of the bristles; it is approximately twice as long as wide. Two pairs of inferior fronto-orbitals and one pair of superior fronto-orbital bristles are present. The third antennal segment is brownish red, just slightly more than twice as long as wide and much shorter than the face (Fig. 16*b*). The

third segment is very slightly longer in the female than in the male. The face is straight or nearly so in profile. The face and the occiput are all yellow. **Thorax:** Entirely rufous or yellow except for the following brown to black areas: Narrow hind margin of scutellum, entire metanotum, and lower portion of metapleura, the hypopleura, the median portion of the pteropleura, the upper edge of the sternopleura, and the lower front corner of the mesopleura. The portion directly behind the humeri is yellow, the area between the humeri and the notopleura is chiefly rufous, not clear yellow. The two postsutural yellow vittae are tapered posteriorly and end at or slightly before the inner supraalar bristles. **Legs:** Yellow, with faint brownish discolorations on the hind tibiae. **Wings:** Chiefly hyaline. The costal band is comparatively narrow and extends to the apex of vein M_{1+2} ; the costal band does not extend into cell R_3 except at its apex. The first costal cell and the basal portion of cell R are faintly yellowish fumose but are bare of microtrichia. The second costal cell is covered with microtrichia. The r-m crossvein is straight and is less than 0.5 as long as that portion of vein M_{1+2} from the r-m to the m crossveins. The cubital streak is faint yellow brown and confined chiefly to the bulla in the male (Fig. 16*d*). In the male, the narrowed portion of the cubital cell is twice as long as that portion from the apex of the cell to the wing margin; in the female, of about equal length. **Abdomen:** Predominantly rufous. The second tergum has an indistinct stripe of black across the median basal portion. The third tergum has a complete band of black across its base. The third and fourth terga have a median black vitta extending longitudinally; this is sometimes interrupted by rufous on the hind portion of the fourth segment; the fourth tergum also has a large black spot at each anterior lateral margin. **Ovipositor:** Very short (Fig. 16*a*). The visible portion (*in situ*) is less than 0.5 as long as the fifth abdominal segment. The extended ovipositor measures about 2.4 mm. The piercer and the inversion membrane

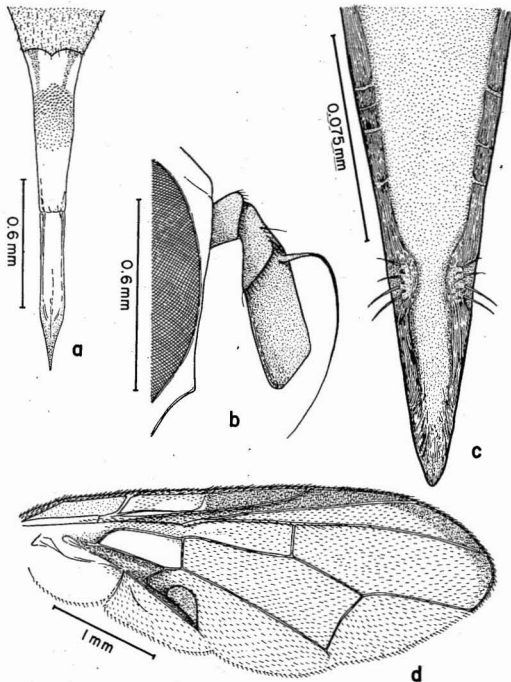


FIG. 16. *Dacus* (*Strumeta*) *mcgregori* (Bezzi). *a*, Extended ovipositor; *b*, antenna; *c*, apex of piercer; *d*, wing.

each measure about 0.78 mm.; the former is about 0.14 mm. at its widest point, and the latter is about 0.21 mm. The preapical setae are tiny and inconspicuous, visible only under high power (Fig. 16c); they are situated about 0.07 mm. from the apex of the piercer. The opening of the oviduct is located about 0.2 mm. from the apex. The rasper extends to within 0.15 mm. of the base of segment eight. The basal segment (seven) is 0.86 mm. long by 0.73 mm. wide at its widest point; the spiracles are situated about 0.18 mm. from the base of the segment, measured along the lateral margins.

Length: Body, 5.0–5.5 mm.; wings, 4.5–5.0 mm.

TYPE LOCALITY: Panay, Antique Prov., Batbatan Island, Philippine Islands.

Bezzi said the type was in his collection. According to Horn and Kahle (1935), his collection went to the Museo Civico di Storia Naturale, Milan.

No specimens have been seen from the Philippines, but a good series are on hand from Singapore, Malaya, May, 1949, ex *Gnetum gnemon* (N. L. H. Krauss).

Dacus (Strumeta) muiri n. sp.

Fig. 17

This species is very close to *D. dorsalis* and can be separated only by the ovipositor. The ovipositor is very broad compared to its length, and the apex is abruptly narrowed beyond the oviduct. (Compare Figs. 17b and 8c.)

FEMALE. Head: The front, measured from the lower ocellus to the antennae, is about 1.5 times as long as wide; it is approximately equal in width to one compound eye. Two pairs of inferior fronto-orbital bristles and one pair of superior fronto-orbitals are present. The large black spots on the face are oval in shape. The third antennal segment is discolored with brown and is approximately four times as long as wide. *Thorax:* Colored as in *dorsalis* except that the postsutural yellow vitæ end at, or slightly before, the inner supra-

alar bristles. *Legs:* The tibiae are all brownish red; the femora are yellow tinged with red; they are darker in color than is typical of *dorsalis*; the specimen at hand may be slightly discolored in this respect. *Wings:* Very similar in most respects to those of *dorsalis*, except that the costal band extends through a portion of cell R_3 throughout its length, as in the variety *occipitalis*. On the specimen at hand an extra crossvein is present in about the middle portion of cell R_3 ; this is present on both wings, but the specimen may be a freak in this regard. *Abdomen:* Very similar to *dorsalis* except that the third segment is almost entirely reddish brown to blackish on the dorsum. *Ovipositor:* When fully extended (Fig. 17a), the ovipositor measures approximately 4.31 mm. The piercer measures about 1.17 mm. by 0.28 mm. The apical portion is very abruptly narrowed beyond the oviduct (Fig. 17b). The distal setae are situated about 0.08 mm. from the apex of the piercer; two moderately large and two very small setae are present. The opening of the oviduct is located about 0.15 mm. from the apex. The inversion membrane is about 1.58 mm. long by 0.44 mm. wide at its widest point. The rasper extends to within about 0.42 mm. of the base

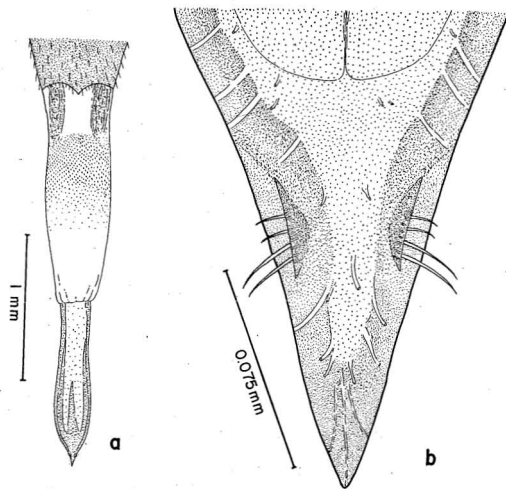


FIG. 17. *Dacus (Strumeta) muiri* n. sp. a, Extended ovipositor; b, apex of piercer.

of the segment. The basal portion of the ovipositor is 1.56 mm. long by about 1.4 mm. wide at its widest point. The spiracles are situated about 0.62 mm. from the anterior lateral margins of the segment.

Length: Body, 7.5 mm.; wings, 6.0 mm.

Male unknown.

Holotype female is labeled "Pontianak, Borneo, F. Muir." The type has been returned to the Hawaiian Sugar Planters' Association collection.

Dacus (Strumeta) nigrotibialis
(Perkins), n. comb.

Fig. 18

Strumeta nigrotibialis Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 129-130, fig. 7.

This species is readily recognized by its predominantly blackish coloration as stated in the key and as discussed in the comparison with *D. luzonae* n. sp. The species has been adequately described by Perkins except for the details of the ovipositor.

Ovipositor: The basal portion (*in situ*) is just slightly longer than the fifth abdominal segment. The extended ovipositor (Fig. 18*b*) measures approximately 4.37 mm. The piercer is 1.35 mm. long by 0.15 mm. wide at its widest point. The opening of the oviduct is situated about 0.25 mm. from the apex of the piercer, and the preapical setae are 0.07 mm. from the apex (Fig. 18*c*). The inversion membrane is 1.77 mm. by 0.26 mm., and the rasper extends to within 0.6 mm. of the base of the segment. The basal segment is 1.25 mm. by 1.0 mm., and the spiracles are situated 0.28 mm. from the anterior corners of the segment.

Length: Body, 6.0-7.5 mm.; wings, 5.5-6.0 mm.

TYPE LOCALITY: Larut Hills, Perak, Malaya. Type in the Selangor Museum.

We have studied two paratypes.

Dacus (Strumeta) nigrotibialis
var. *lata* (Perkins), n. comb.

Strumeta nigrotibialis var. *lata* Perkins, 1938,

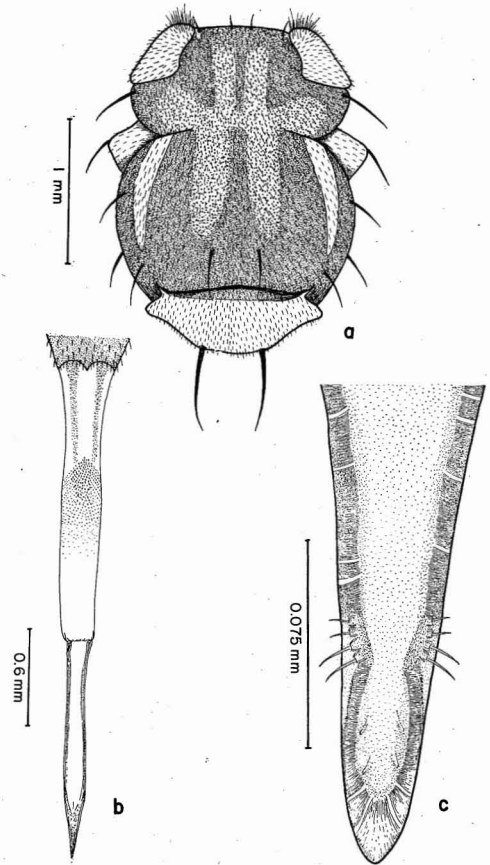


FIG. 18. *Dacus (Strumeta) nigrotibialis* (Perkins). *a*, Mesonotum; *b*, extended ovipositor; *c*, apex of piercer.

Roy. Soc. Queensland, Proc. 49(11): 130-132, fig. 3.

Perkins separates this from the typical form by the broader costal band, filling almost all of cell R_3 . He also says it differs by having the occiput fulvous, the postsutural yellow stripes broader, and by its larger size.

Length: Body, excluding ovipositor, 9.0 mm.; wings, 7.5 mm.

TYPE LOCALITY: Kedah Peak, Malaya.

Type in the Selangor Museum.

We have not seen this variety.

Dacus (Strumeta) obscuratus de Meijere

Dacus ferrugineus var. *obscurata* de Meijere, 1911, Tijdschr. v. Ent. 54: 373-374.

Dacus obscuratus de Meijere, 1914, Tijdschr. v. Ent. 57: 189.

This species apparently is related to *D. dorsalis* Hendel and differs by having no postsutural yellow vittae on the mesonotum. In this regard it would fit close to *D. tillyardi* (Perkins), but it lacks the infuscation along the crossveins.

Length: Body and wings, 5.0 mm.

TYPE LOCALITY: Enkhuizen Island, near Batavia, Java.

Type in the Zoologisch Museum, Amsterdam.

We have not seen this species.

***Dacus (Strumeta) pectoralis* Walker**
Fig. 19

Dacus pectoralis Walker, 1859, Linn. Soc. London, Proc. 3: 114 (nec *Dacus pectoralis* Walker, 1861, Ent. Soc. London, Trans. (n.s.) 5: 322, synonym of *Dacus (Dacus) bivittatus cucumaris* Sack).

This species has never been properly placed and has commonly been treated as a synonym of *D. bivittatus* (Bigot) (*armatus* of authors) based upon *D. pectoralis* Walker 1861 not 1859. Dr. K. L. Knight studied the type in the British Museum and supplied the details which have enabled us to place this as a *Strumeta* related to *D. nigrotibialis* (Perkins), *luzonae* n. sp., and *parvulus* Hendel. It is distinguished from the former by its chiefly yellow face and by having a pale band on the apex of the second abdominal segment. It is distinguished from *luzonae* by having the abdomen all black except for the pale band on the second segment, by having small facial spots and three pollinose stripes extending down the mesonotum. Aside from the sub-generic characters and the details referred to above, Dr. Knight reported that the scutellum is all pale; a pair of spots is present below the antennae; the wings are marked as in *dorsalis*; the legs are dark colored; the first tarsal segment is paler; the mesonotum is chiefly black with two postsutural yellow vittae. "The spe-

cies is really quite close to *dorsalis*. It is slightly larger, darker; abdomen marked differently."

D. pectoralis appears to be very close to *D. parvulus* Hendel (1912: 21–22) from Formosa and India (Philip, 1950: 32). From the original descriptions, from Dr. Knight's notes on the type of *pectoralis* and Shiraki's description of *parvulus* (1933: 54), we are unable to find satisfactory characters for separating these. They do appear to differ in size; the body length of *D. parvulus* is 4.0–5.0 mm., whereas that of *pectoralis* is 6.5 mm.; this range is, however, too slight to be of particular importance. A careful comparison of the two will be necessary before their relationship can be clearly understood.

Two males and one female are on hand which may possibly be *pectoralis*; they fit the descriptions in most details; they are briefly described as follows. *Head:* Two pairs of inferior fronto-orbital and one pair of superior fronto-orbital bristles are present. The front is twice as long as wide and is parallel sided. The facial spots are moderate in size, are as wide as the third antennal segment, and are oblong in shape. The third antennal segment is reddish brown and is about 3.5 times as long as wide. *Thorax:* The mesonotum is en-

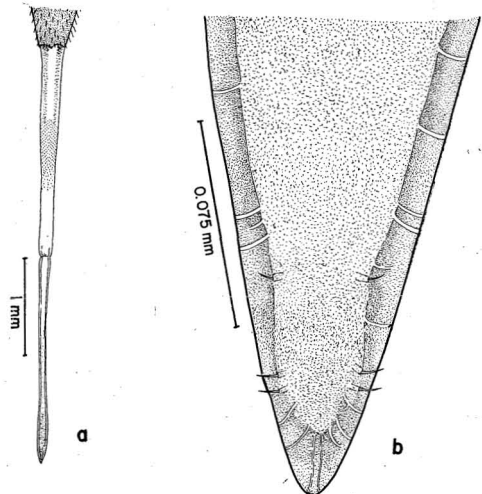


FIG. 19. *Dacus (Strumeta) pectoralis* Walker. a, Extended ovipositor; b, apex of piercer.

tirely black except for a very narrow, abbreviated, postsutural yellow vitta on each side. The humeri are black along their inner edges. *Legs*: The femora are chiefly rufous, the front pair is slightly discolored with brown; the others have brownish discolorations on the dorsal surfaces, near the apices. The front tibiae are yellow, the others are brown. *Wings*: The costal cells are faintly yellowish fumose. The second is almost entirely covered with microtrichia, only the basal portion is bare. The costal band is rather narrow, it does not extend into cell R_3 except along the wing margin, and is not expanded at the apex. *Abdomen*: All black except for a narrow yellow to rufous band at the apex of the second tergum. *Ovipositor*: (Fig. 19) The basal portion is equal in length to abdominal segments four and five.

Length: Body, excluding ovipositor, 7.0 mm.; wings, 6.5 mm.

TYPE LOCALITY: Aru Islands.

Type in the British Museum.

The specimens described above are from Amboina, Oct., 1907 (F. Muir).

Dacus (Strumeta) pedestris

(Bezzi), n. comb.

Fig. 20

Chaetodacus ferrugineus var. *pedestris* Bezzi, 1913, Philippin Jour. Sci. 8: 322.

This species is closely related to *D. dorsalis* Hendel and is often difficult to differentiate except by comparison of the ovipositors. The color characters which have been used to separate *pedestris* from *dorsalis* are somewhat variable and cannot be wholly relied upon. A series of specimens on hand from the Philippines and from Malaya appears to be *pedestris*, except that they do not always possess the broad black rings at the apices of the femora which were mentioned by Bezzi. Perkins (1938) does not refer to this character in his discussion of this species. Perkins said that *pedestris* differs from *dorsalis* "in having the occiput black, or very dark brown, with a

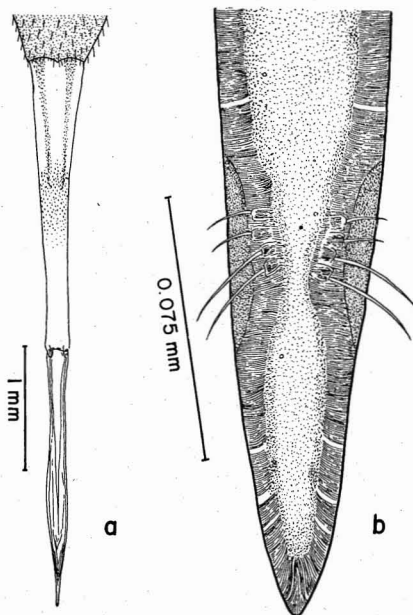


FIG. 20. *Dacus (Strumeta) pedestris* (Bezzi). a, Extended ovipositor; b, apex of piercer.

narrow fulvous border, the propleura mostly black, the coxae and trochanters either dark brown or black, fore and hind tibiae either dark brown or black, usually an oval patch on the outside of the fore femora and the postscutellum entirely black." The color of the occiput appears to be of little or no value in this case as it is often discolored with brown to black in *dorsalis*. The anterior sclerite of each propleuron is discolored with brown to black in the large majority of the specimens of *pedestris* on hand and is typically rufous or yellow in *dorsalis*. The yellow-brown to black anterior and middle coxae and trochanters of *pedestris* appear to be useful in separating the species. These segments are paler, usually clear yellow in *dorsalis*. The front and hind tibiae are predominantly dark brown to black in *pedestris*, and the middle pair are discolored with brown to black on the basal one third to one half. Typical *dorsalis* have the front and middle tibiae chiefly yellowish, the middle pair are narrowly discolored with brown to black near their bases, and the front pair often are discolored along the outside edges. The hind tibiae of *dorsalis* are more yellow

brown but vary considerably in the intensity of the discoloration and are often blackish. The black spot on the front femora is often present in *pedestris* but is not a constant character. The postscutellum varies from all black to rufous in the central portion and is apparently of no value in distinguishing *pedestris*.

The ovipositors of the two species are similar in shape and general characteristics but differ in length. The difference is readily detected by making measurements or by comparison of slide mounts. *In situ* the basal segment of the ovipositor is slightly longer than the fifth abdominal segment in *pedestris* and is approximately three fourths as long as this segment in *dorsalis*. The extended ovipositor is approximately 6.0 mm. long in *pedestris* and is 4.5–4.7 mm. in *dorsalis*. The piercer measures approximately 2.0 mm. in *pedestris* and 1.5 mm. in *dorsalis*. The inversion membrane is about 2.35 mm. long in *pedestris* and 1.7 mm. in *dorsalis*. The rasper extends to within about 0.88 mm. of the base of the segment in *pedestris* and to within about 0.52 mm. in *dorsalis*. The basal segment of the ovipositor is about 1.56–1.7 mm. long by about 1.0 mm. wide at the widest point in *pedestris*. In *dorsalis* the basal segment is 1.3–1.35 by 0.9 mm. The other details of the ovipositor are very similar in the two species (compare Figures 8a and 20a). The more elongate and slender basal segment of *pedestris* is very useful in separating these species.

Length: Body, 7.0–7.5 mm.; wings, 6.5 mm.

TYPE LOCALITY: Philippine Islands. No specific locality given.

The type was deposited in the C. F. Baker collection, University of the Philippines. A specimen is in the U. S. National Museum labeled "Mt. Makiling, Luzon, Baker" and "72."

Numerous specimens are in the collection at hand from the following localities and hosts:

Malaya: Balik Pulau, Panang I., Aug., 1948, ex methyl eugenol bait trap; Singapore, Dec., 1948 to May, 1949, ex *Achras sapota* (R. E. Holttum), *Artocarpus polyphema?*, *Arto-*

carpus dadab, and *Psidium guajava* (N. L. H. Krauss); Serdang, Selangor, Sept., 1948–March, 1949, on "Chiku fruit" (R. J. A. W. L.), ex lime "Limau Rapas," *Achras sapota*, *Nephelium lappaceum*, and tomato (N. L. H. Krauss); Kwantan, Pahang, Aug., 1948, ex *Psidium guajava* and chilli (N. L. H. Krauss); Kuala Lumpur, Aug.–Sept., 1948, ex chilli, carambola, and *Mangifera foetida* (N. L. H. Krauss); Malacca, Feb., 1949, ex *Psidium guajava* (N. L. H. Krauss); Serembar, Negri Sembilan, Feb., 1949, ex *Psidium guajava* (N. L. H. Krauss).

Philippine Islands: Mintal, Mindanao, Feb.–March, 1950, ex cashew, guava, breadfruit, carambola, and tomato (F. E. Skinner); Toril, Davao Prov., Mindanao, Feb., 1950 (Skinner); Lawayon, Mindanao, Sept., 1950, ex tomato (Skinner); Tagoloan, Mindanao, June, 1950 (Skinner); Los Baños, Laguna, July, 1930 (F. C. Hadden) and May, 1921 (F. X. Williams).

Borneo: Papar, Feb., 1951, ex mango (F. E. Skinner); Tamparuli, Jan., 1951, ex methyl eugenol traps (F. E. Skinner), and Buitenzorg, Java (F. Muir).

The following parasites were reared from this species: from Malaya—*Opius manii* Fullaway, *O. incisi* Silvestri, and *O. longicaudatus malayensis* Fullaway; from the Philippine Islands—*O. skinneri* Fullaway.

Dacus (*Strumeta*) *persignatus* (Hering), n. comb.

Strumeta persignata Hering, 1941, Arb. über Morph. u. Taxonom. Ent. 8(1): 27–28, fig. 1.

This species appears to be very closely related to *D. cucurbitae* Coquillett and is differentiated by having a very broad costal band which extends through all of cell R_3 around the wing margin to the apex of vein M_{1+2} , also by the brown infuscation extending from the costal band over the r-m crossvein and by the presence of just two pairs of inferior fronto-orbital bristles. Hering allies it to *D.*

apicalis de Meijere which differs by having a large apical spot in the wing, short yellow postsutural stripes, and by lacking infuscation over the crossveins.

Length: Wings, 5.5–6.0 mm.

TYPE LOCALITY: Flores.

Type in the Deutsches Entomologisches Institut.

We have not seen this species.

Dacus (Strumeta) propinquus n. sp.

Fig. 21

This species resembles *D. dorsalis* very closely and can be satisfactorily separated therefrom only by the structure of the ovipositor. The costal band is broader than in typical *dorsalis* but is just slightly more developed than in *dorsalis* var. *occipitalis* (Bezzi). The palpi in both sexes of *propinquus* appear to be comparatively more slender and parallel sided than in *dorsalis*, and the cubital cell is consistently shorter in all the specimens on hand; the narrowed portion of the cubital cell, compared to the portion from the apex to the wing margin, is about 37:20 (marks on our micrometer) in the female and about 38:15 in the male, as compared to 31:33 in the *dorsalis* female and 35:18 in the male. We do not feel, however, that these characters can be relied upon; they appear to be quite variable when studied through a long series of specimens. There appear to be some slight differences in the male genitalia. The peculiar trilobed apex of the ovipositor will distinguish this from all known related species. This is the first time we have seen this character in a *Dacus (Strumeta)* except for *D. froggatti* (Bezzi) and *D. latifrons* (Hendel); in this respect *propinquus* resembles *D. (Zeugodacus) trimaculatus* n. sp. (Fig. 29*d*).

In the senior author's preliminary reports (unpublished) on the fruit flies which were collected in Borneo in connection with the biological control of the Oriental fruit fly project, these specimens were confused under *dorsalis*. After more critical examination they were found to be a distinct species.

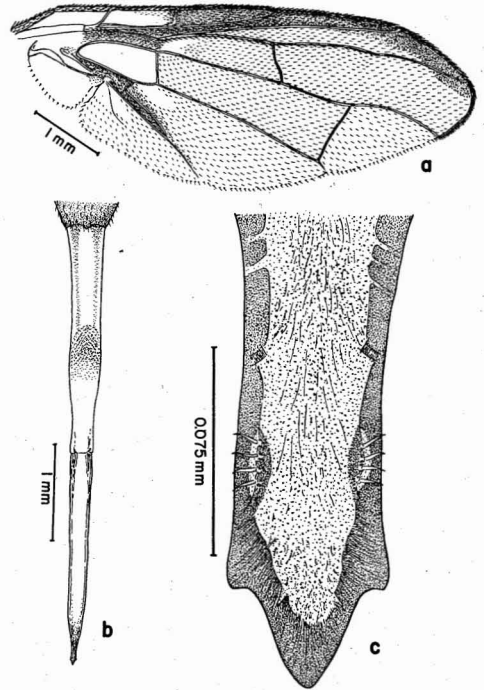


FIG. 21. *Dacus (Strumeta) propinquus* n. sp. *a*, Wing; *b*, extended ovipositor; *c*, apex of piercer.

FEMALE. Head: Front about 1.75 times as long as wide and with indistinct brownish spots at the base of the frontal bristles. There are two pairs of inferior fronto-orbital bristles and one pair of superior fronto-orbitals. The facial spots are large and oval in shape. The third antennal segment is slightly longer than the face; the hind portion of the occiput varies in coloration from entirely yellow rufous to brownish. **Thorax:** Mesonotum predominantly black; lightly gray pollinose; the postsutural yellow vittae are comparatively broad and extend to just beyond the inner supraalar bristles; the supraalar areas to the side of the yellow vittae are black. Scutellum all yellow except for a narrow band of black across the base. The metanotum is predominantly black, slightly reddish in the median portion. **Legs:** Femora chiefly yellow to rufous; the front pair have a black spot on the upper apical portion. The tibiae are reddish brown; the tarsi are yellow except for the brownish apical

subsegments. *Wings*: The costal band is comparatively broad and extends below vein R_3 along its entire length. The band is very slightly enlarged apically (Fig. 21*a*). The r-m crossvein is slightly curved, about 0.75 as long as that section of M_{1+2} between the r-m and the m crossveins and distinctly longer than the basal section of vein M_{3+4} (Fig. 21*a*). *Abdomen*: Yellow to rufous. It has a black band across the basal portion of segments two and three and a median black vitta extending longitudinally from the base of segment three to the apex of five. The sides of the abdomen are also somewhat blackened. *Ovipositor*: When fully extended (Fig. 21*b*) it measures approximately 6.57 mm. The piercer measures about 2.2 mm. by 0.23 mm. The apical portion is characteristically trilobate (Fig. 21*c*). The setae are small and inconspicuous; four equal-size setae are present, approximately 0.075 mm. from the apex of the piercer. The oviduct opens about 0.28 mm. from the apex. The inversion membrane measures approximately 2.36 mm. by 0.36 mm. The rasper extends to within 1 mm. of the base of the segment. The basal segment of the ovipositor (segment 7) is 2 mm. by 1.45 mm. measured across its base. The spiracles are situated 0.42 mm. from the base measured on the lateral margins of the segment.

Length: Body, 6.5–7.0 mm.; wings, 6.0–6.5 mm.

MALE. Fitting the description of the female in all respects except for the genital characters and the secondary sexual characters as given in the introduction above.

Holotype female, allotype male, and 23 paratypes (8 males and 15 females), from Tagap, North Borneo, 2,000 ft. elev., ex *Garcinia* sp.?, "Acab-bacob," Jan., 1951 (F. E. Skinner); Singapore, Apr., 1949, ex *Garcinia laeana* (N. L. H. Krauss); Makiling, Philippine Islands, Feb., 1921, ex *Sideroxylon* (F. X. Williams).

The type, allotype, and a series of paratypes are being deposited in the U. S. National Museum collection. The remainder of the

paratypes are in the following collections: Bernice P. Bishop Museum, Hawaiian Sugar Planters' Association, British Museum (Natural History), and the University of Hawaii.

Dacus* (*Strumeta*) *tillyardi
(Perkins), n. comb.

Strumeta tillyardi Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 131–132, fig. 6.

This species is distinguished from all related *Strumeta* by lacking postsutural yellow vittae. Perkins (*op. cit.*, p. 122) in his key to the species places this with *mcgregori* as having no markings on the wings except the costal band and the cubital streak. In his figure and in his description he indicates that both the r-m and the m crossveins are infuscated. His key is also misleading in that he keys both *mcgregori* and *tillyardi* as having the "scutellum not entirely yellow." This would indicate to us that it probably has an apical black spot or a median discoloration. He was referring instead to the narrow band of black across the base of the scutellum. This character is of questionable value; almost all fully hardened specimens of Dacini possess this.

Length: Body, 6.0–6.5 mm.; wings, 5.0–5.5 mm.

Known only from the female so there is some question as to its true subgeneric position.

TYPE LOCALITY: Selangor, Malaya.

Type probably in the Selangor Museum.

We have not seen this species. A specimen is on hand (labeled "Ambon, 2–08," probably collected by F. Muir) which fits near *tillyardi*. It probably is an undescribed species, but inasmuch as the specimen is teneral it is not being named at this time. The specimen is predominantly pale; the mesonotum is reddish brown, and the abdomen is all rufous. The only transverse marking on the wing is a faint infuscation along the r-m crossvein. The costal band is faintly infuscated and does not extend beyond the tip of vein R_{4+5} .

Dacus (Strumeta) transtillum
(Hering), n. comb.

Strumeta transtillum Hering, 1952, *Treubia* 21(2): 265-266, fig. 1.

This appears to be closely related to *D. cucurbitae* Coquillett but is readily separated by the black transverse band across the face and by the narrow costal band in the wing; the band does not extend into cell R_3 except at the apex.

Length: Wing, 5.3 mm.

We have not seen this species; it is known only from the type female.

TYPE LOCALITY: Idjen, E. Java, host unknown.

Type in the Leiden Museum.

Dacus (Strumeta) umbrosus Fabricius
Fig. 22

Dacus umbrosus Fabricius, 1805, *Syst. Antl.*, 274.

Dacus fascipennis Wiedemann, 1819, *Zool. Mag.* 1(3): 28.

Bactrocera fasciatipennis Doleschall, 1856, *Natuurk. Tijdschr. v. Nederland. Indië* 10: 412.

Dacus conformis Walker, 1857, *Linn. Soc. London, Proc.* 1: 34.

Dacus frenchi Froggatt, 1910, *Linn. Soc. N. S. Wales, Proc.* 35: 866 (specimens from Java, not New Caledonia).

This species is readily recognized by the presence of three transverse bands across the wing (Fig. 22a), by the all-yellow or rufous scutellum, and by the presence of just two pairs of inferior fronto-orbital bristles. It is closely related and is possibly conspecific with *D. frenchi* Froggatt (1909: 92). Bezzi (1919: 417) and others have considered *D. frenchi* to be a synonym of *D. umbrosus* Fabricius. Perkins (1939: 13) regarded them as distinct species which can be separated on the basis of size, color of abdomen, and by the position of the r-m crossvein. The writers have not studied specimens from New Cale-

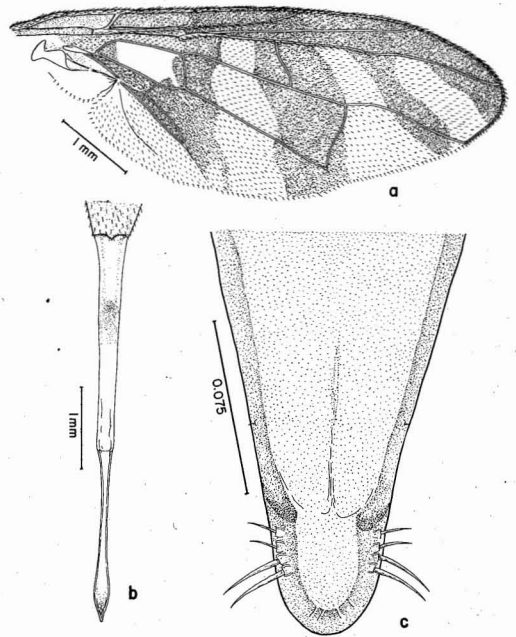


FIG. 22. *Dacus (Strumeta) umbrosus* Fabricius. a, Wing; b, extended ovipositor; c, apex of piercer.

donia or New Hebrides so cannot confirm Perkins' conclusions. Specimens of *Dacus umbrosus* are on hand, however, from a wide range extending from Malaya through the Netherlands Indies, the Philippines, New Guinea, and New Britain. Specimens from the Philippines possess the black lateral markings on abdominal terga three and four which, Perkins says, distinguish *frenchi*. They range in size, however, from about 7.0 to 8.0 mm. for the males, instead of 8.5-9.5 mm. The writers have not been able to detect significant differences in the position of the r-m crossvein and doubt the taxonomic importance of the slight degree of difference in *umbrosus* and *frenchi* which has been noted by Perkins.

The ovipositor has not been described previously. The visible portion of the ovipositor is about equal in length to the fourth and fifth abdominal segments; the basal segment is equal in length to the fifth. The extended ovipositor (Fig. 22b) is approximately 6.7 mm.

long. The basal segment is 1.8 mm. long by 1.2 mm. wide at its broadest point. The inversion membrane measures approximately 2.8 mm. by 0.36 mm. The rasper extends to within 0.88 mm. of the base of the segment. The piercer is about 2.1 mm. long by 0.21 mm. wide at its widest point. The tip of the oviduct is very near the apex of the piercer; it extends to the proximal pair of setae or about 0.05 mm. from the apex of the piercer. The two distal pairs of setae are much stronger than the proximal pair and extend to or beyond the tip of the piercer. The apex of the piercer is characteristically rounded (Fig. 22c).

TYPE LOCALITY: Sumatra.

Type in the Zoologisk Museum, Copenhagen.

A large series of specimens are in the present collection from the following localities and hosts.

Malaya: Kuala Lumpur, Feb., 1948–Feb., 1949, ex *Artocarpus polyphema* and *A. integrifolia* and in citronella traps (N. L. H. Krauss); Malacca, Feb., 1949 (no host) (Krauss); Serdang, Selangor, June, 1948, ex *Artocarpus integrifolia* (Krauss).

Philippine Islands: Mintal, Mindanao, Feb., 1950, ex jakfruit (F. E. Skinner); Dumaguete City, Negros Oriental Prov., Apr., 1950, ex jakfruit (F. E. Skinner); Los Baños, July, 1921 (F. X. Williams and F. C. Hadden).

Borneo: Tamparuli, Jan.–Aug., 1951, ex *Momordica charantia* and *Artocarpus integra* and trapped by methyl eugenol bait (G. Angalet and F. E. Skinner).

The following parasites were reared from this species: from Malaya—*Opius* sp.?, *Tachinaephagus* spp.?, *Trybliographa daci* Weld, *Pseudeucoila* sp.?, and *Palinothrix* sp.?; from Borneo—*O. angaleti* Fullaway.

DACUS (ZEUGODACUS) Hendel

Dacus (*Zeugodacus*) Hendel, 1927, in Lindner, Die Fliegen der Palaeark. Reg. 49, Trypetidae: 26.

Zeugodacus Hendel, Shiraki, 1933, Taihoku Imp. Univ., Faculty Sci. and Agr., Mem. 8, Ent. 2: 78.

Zeugodacus Hendel, Perkins, 1937, Roy. Soc. Queensland, Proc. 48(9): 55, and 1938, 49(11): 137.

This subgenus is differentiated from *Dacus* (*Strumeta*) only by the presence of four scutellar bristles rather than two.

GENOTYPE: *Dacus* (*Zeugodacus*) *caudatus* Fabricius.

KEY TO SPECIES OF DACUS (ZEUGODACUS)

1. Two postsutural yellow vittae on mesonotum 2
 - Three postsutural yellow vittae on mesonotum 3
2. Face black. (Celebes) . . . **terminifer** Walker
 - Face yellow, with the usual black spots in antennal furrows. (Malaya) **pendleburyi** (Perkins)
3. Wings hyaline, except for costal band and cubital streak (except possibly for a brownish spot at apex of vein M_{3+4}) 6
 - The m crossvein infuscated 4
4. Face entirely yellow. Front femora chiefly reddish brown. Anterior median portion of mesonotum black. (Philippine Islands) **mundus** (Bezzi)
 - Face with the usual black spots. Front femora chiefly or entirely yellow to rufous. Anterior median portion of mesonotum brownish red 5
5. Costal band greatly enlarged apically, entire apical fourth of wing, through cell M_2 , infuscated; infuscation continuing over m crossvein and extending basad along vein M_{3+4} . (Celebes) **emittens** Walker
 - Costal band not so enlarged and not contiguous with infuscation on m crossvein

- and without infuscation along M_{3+4} . (Java).....**caudatus** Fabricius
6. Humeral and notopleural calli joined by a broad yellow band. (Philippine Islands).....**tetrachaetus** (Bezzi)
- Not as above.....7
7. Scutellum all yellow, or with but a narrow band of black at base.....8
- Scutellum with a black spot at apex or with a broad black basal band extending almost 0.5 its length.....11
8. Face shining black. (Java).....
-**limbipennis** Macquart
- Face chiefly yellow.....9
9. Face with a black spot in each antennal furrow.....10
- Face with a transverse band of black across lower portion (Fig. 26a). (Java, Malaya)....**maculipennis** (Doleschall)
10. Costal band dilated into a distinct apical spot (Fig. 25b). (Widespread over the Orient and southwest Pacific).....
-**hageni** de Meijere
- Costal band not expanded. (Borneo)....
-**diaphoropsis** (Hering)
11. Scutellum with a black spot at apex. Femora chiefly yellow.....12
- Scutellum with a broad black basal band. Legs predominantly brown to black. (Timor).....**timorensis** (Perkins)
12. Costal band not markedly expanded at apex (Fig. 29c). Humeral calli black bordered, at least apically. If costal band is slightly expanded, median portion of face is black.....13
- Costal band dilated into a large spot in apex of wing. Humeral calli surrounded by a reddish area. (Philippine Islands).
.....**pubescens** (Bezzi)
13. Black facial spots in antennal furrows

extend to oral margin, connected on median portion of face by a black mark extending through transverse furrow. Costal band slightly dilated apically. (Malaya).....**maculatus** (Perkins)

Facial spots not extending to oral margin, not connected in middle of face, if median portion of face is black the spot is isolated (Fig. 29b). Costal band not at all expanded.....14

14. Costal band very narrow and extending only to apex of vein R_{4+5} . Front portion of mesonotum, between the humeri, reddish. Larger species, body 8.0-9.5 mm. (Philippine Islands). **trimaculatus** n. sp.

Costal band rather broad, extending halfway through cell R_5 at apex of wing. Front portion of mesonotum black. Smaller species, body, 5.0-5.5mm. (Philippine Islands).....**scutellinus** (Bezzi)

Dacus (Zeugodacus) caudatus Fabricius

Fig. 23

Dacus caudatus Fabricius, 1805, Syst. Antl., 276.

This species has often been erroneously recorded from many world areas (including the Philippines) where it apparently does not occur. It is obvious that most of the references to *D. caudatus* in the literature should actually pertain to *D. hageni* de Meijere. To clarify this situation, we feel that it is appropriate to discuss *caudatus* with the Philippine Dacini. It is differentiated from *hageni* by the presence of a brown cross band extending over the m crossvein (Fig. 23c). Refer to our notes under *D. (Zeugodacus) hageni* de Meijere. It appears to fit the characteristics of *hageni* other than for the wing and the ovipositor (Fig. 23b).

Ovipositor: The exposed portion, *in situ*, is slightly longer than the combined lengths of segments four and five. The extended ovipositor (Fig. 23a) measures about 5.5 mm. The piercer measures about 1.8 mm. by 0.21

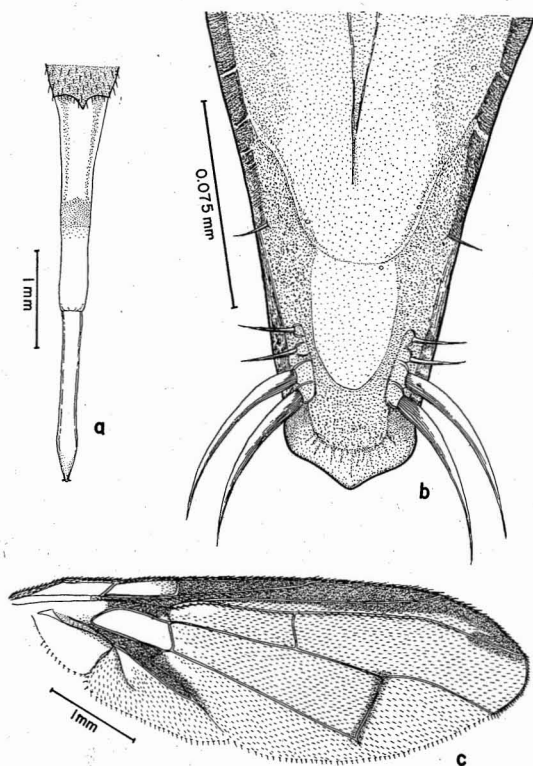


FIG. 23. *Dacus (Zeugodacus) caudatus* Fabricius. a, Extended ovipositor; b, apex of piercer; c, wing.

mm. at its widest point. The oviduct opens about 0.15 mm. from the apex, and a median groove extends from the opening almost to the tip. The preapical setae are situated very close to the apex, within about 0.02 mm.; the two distal pairs of setae are large and extend well beyond the apex of the piercer; the two proximal pairs are tiny. The apex is broad and indistinctly trilobed (Fig. 23b). The inversion membrane (eighth segment) is about 2.2 mm. long by 0.42 mm. wide at its widest point; the rasper extends to within 1.1 mm. of the base of the segment. The basal segment (segment seven) is about 1.53 mm. long by 1.35 mm. wide at its widest point. The spiracles are situated about 0.18 mm. from the anterior corners of the segment.

Length: Body, 7.0–8.5 mm.; wings, 6.5–7.5 mm.

TYPE LOCALITY: Java.

Type in the Zoologisk Museum, Copenhagen.

This species was not represented in the collections sent in by the collectors connected with the biological control of fruit flies program. We have examined specimens from Java (from the Zoologisches Museum der Universität Berlin) and a series of specimens submitted by the U. S. Department of Agriculture which had been intercepted at Hoboken, N. Y., infesting seeds of *Macrozania macrocarpa* from Indonesia (J. M. Adams).

Dacus (Zeugodacus) diaphoropsis
(Hering), n. comb.

Zeugodacus diaphoropsis Hering, 1952, *Treubia* 21(2): 268–269, fig. 2.

This species appears to be most closely related to *D. hageni* de Meijere and is distinguished by having the costal band of uniform width, not expanded at the apex. It has been adequately described by Hering, except for genital characters.

Length: Wings, 6.4 mm.

TYPE LOCALITY: Samarinda, Borneo.

Type in the Leidener Museum.

It is known only from the type male.

***Dacus (Zeugodacus) emittens* Walker**
Fig. 24

Dacus emittens Walker, 1860, *Linn. Soc. London, Proc.* 4: 152.

Dacus chrysotoxus Hendel, 1912, *Suppl. Ent.* 1: 24.

This species is related to *D. caudatus* Fabricius. It is distinguished by the greatly expanded costal band, filling all the apical fourth of cell M_2 , continuing as a transverse band across the m crossvein and also as a longitudinal mark along vein M_{3+4} . Dr. K. L. Knight studied the specimens in the British Museum collection and informed us that there was no specimen labeled as type but that five specimens were present from the type locality, "data: Celebes nr. Macassar,

A. R. Wallace, B. M. 1858-42." He found two species present in this series, two males and two females of the species which we take to be *emittens*, and one which appears to be a *Dacus* (*Strumeta*) related to *dorsalis* Hendel. Walker mentioned the extensive wing infuscation in his description and referred to a number of varieties designated by Greek letters, his "Var. e male" lacked these markings. Perkins (1939: 29) says the species possesses short but distinct black humeral bristles.

A female specimen at hand apparently belongs here, although the wing maculations differ in some respects from the typical form. On our specimen the infuscation over the m crossvein does not extend along vein M_{3+4} , and the r-m crossvein is slightly infuscated (Fig. 24a). The costal cells are pale yellow, and the apical half of the second costal cell is covered with microtrichia; this character has not been mentioned in previous descriptions. Our specimen does not possess the black humeral bristles mentioned by Perkins

(*loc. cit.*); a moderately well-developed yellow-red humeral is present on the right side, this is absent (or broken off?) on the left. Our specimen also has no black bands over the abdominal segments, but the basal portion of the third tergum is brown. A brown longitudinal vitta is present over only about three fourths of the fifth tergum. Walker's description of the abdomen was rather vague, i.e., "a black middle band, behind which there is a slight longitudinal black line." Hendel, in his description of *chrysotoxus*, states that the first tergum had black bases and that a black median line extended over terga four and five.

Ovipositor: Very elongate, extended (Fig. 24b) it measures 7.26 mm. The piercer is about 2.13 mm. long by 0.21 mm. wide at its widest point. Two large and two small preapical setae are present (Fig. 24c). The distal pair are situated about 0.02 mm. from the apex. The opening of the oviduct is about 0.15 mm. from the apex of the piercer. The inversion membrane is about 3.0 mm. long by 0.83 mm. wide at its widest point. The rasper is situated about 1.27 mm. from the base of the segment. The basal segment is 2.13 mm. long by 1.48 mm. wide measured across its hind margin. The spiracles are located about 0.31 mm. from the anterior lateral margins of the segment.

Length: Body, 9.0-10.0 mm.; wings, 8.5-9.5 mm.

TYPE LOCALITY: Makassar, Celebes.

Cotypes are in the British Museum and in the Australian National Museum, Melbourne.

Hendel's specimen was from Formosa. The specimen discussed above is labeled "Amboina, F. Muir."

Dacus (*Zeugodacus*) *hageni* de Meijere Fig. 25

Dacus hageni de Meijere, 1911, Tijdschr. v. Ent. 54: 375.

Dacus caudatus var. *nubilus* Hendel, 1912, Suppl. Ent. 1: 16. New synonymy.

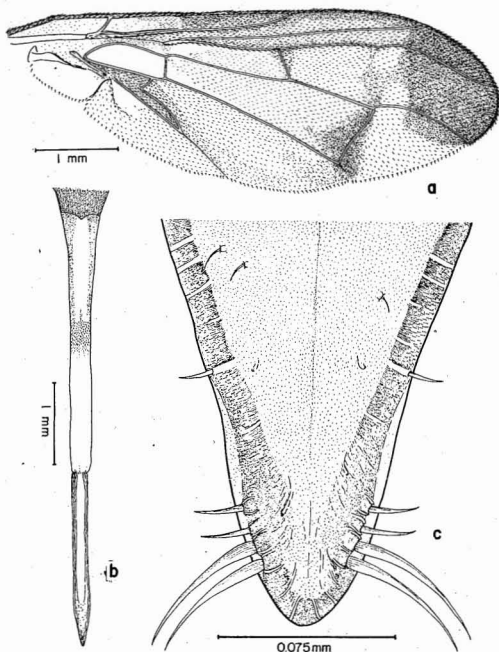


FIG. 24. *Dacus* (*Zeugodacus*) *emittens* Walker. a, Wing; b, extended ovipositor; c, apex of piercer.

Zeugodacus caudatus Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 139.

Zeugodacus nubilus heinrichi Hering, 1941, Siruna Seva 3: 11. New synonymy.

Zeugodacus bezzianus Hering, 1941, Arb. über Morph. u. Taxonom. Ent. 8(1): 26. New synonymy based upon a comparison of large series of specimens from Formosa and India.

It seems obvious that *D. nubilus* is synonymous with *D. hageni* de Meijere. We find no way of distinguishing these on the basis of the original description of *hageni*. Bezzi (1916: 109) and Perkins (1938: 138) indicated that *hageni* could be separated from *nubilus* by the presence of two (not three) pairs of inferior fronto-orbital bristles. We have found this character not entirely reliable for distinguishing this species. A large series of

specimens on hand from the Philippines has predominantly just two pairs. Often individuals are seen which have two pairs on one side of the front and three on the other.

We see no advantage in maintaining Hering's *heinrichi*, certainly not as a subspecies. A fair share of the specimens examined from Borneo and the Philippines fit typical *heinrichi*, but so many intergrades are seen that it does not seem practical to separate the specimens according to these color variations. Hering says that *heinrichi* differs from Formosan *nubilus* by being larger in size (the large series we have studied averages about the same as typical *hageni*). He separated it by its having a narrower central reddish-brown stripe down the mesonotum, narrower than the distance between the prescutellar bristles; by having the black submedian stripes running together behind the central postsutural

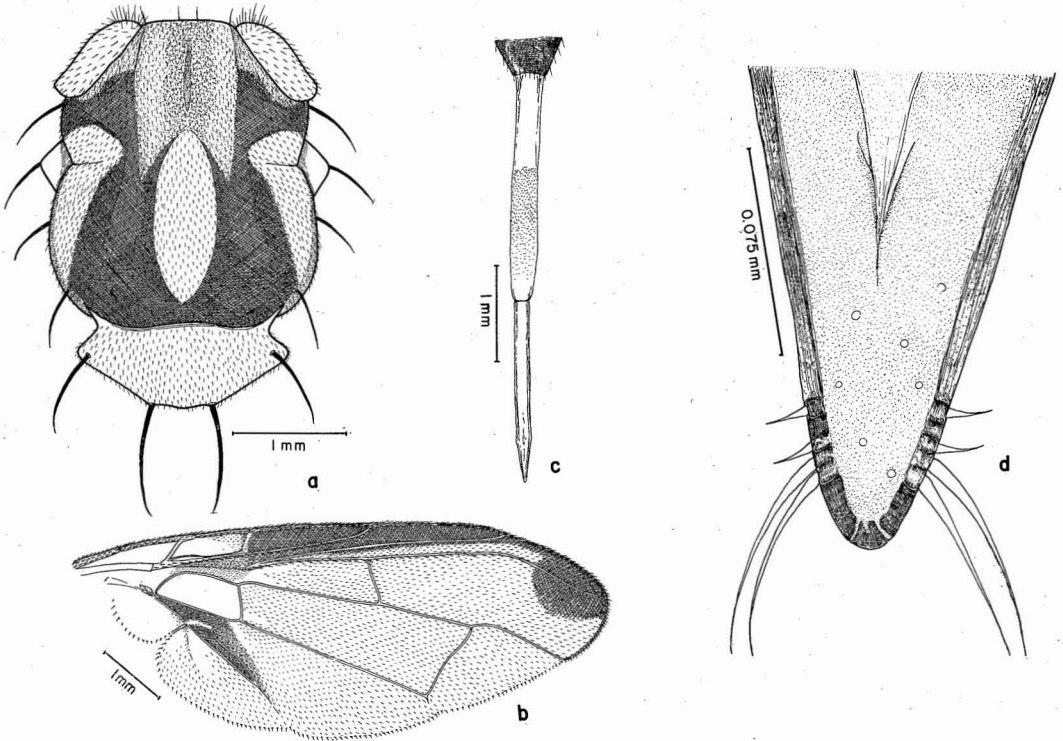


FIG. 25. *Dacus (Zeugodacus) hageni* de Meijere. *a*, Mesonotum; *b*, wing; *c*, extended ovipositor; *d*, apex of piercer.

yellow vitta and by having the black spots on the sides of abdominal terga four and five and the band on tergum three narrower than in the typical form. These characters seem to vary a great deal throughout the region covered in this study.

This species is closely related to *D. caudatus* Fabricius, and it is probable that most of the references to *caudatus* in the literature actually pertain to *hageni*. We are indebted to Dr. E. M. Hering for supplying information concerning the characteristics of *caudatus*, based upon the typical form from Java. *D. hageni* is a very widespread species and is obviously quite variable in coloration. Typical *hageni* differ from *caudatus* by lacking the brownish infuscation over the m crossvein and by having the femora all rufous or yellow, usually not brown to black at the apices (this varies considerably throughout the range of the species). The ovipositors are very different in the two species (compare Figs. 23*b* and 25*d*). Perkins (1938: 138), in his key to the species of *Zeugodacus*, distinguishes *nubilus* from *caudatus* by its lack of lateral frontal spots. The presence or absence of spots or discolorations at the bases of the frontal bristles does not appear of particular value in separating these two species.

D. hageni is distinguished from other *Dacus* (*Zeugodacus*) by having the costal band expanded into a large spot in the wing apex (Fig. 25*b*); by the all-yellow scutellum; by the three yellow vittae on the mesonotum; and by usually having three pairs of inferior fronto-orbital bristles.

Head: The facial spots are moderately large and circular in shape, the spots vary considerably in size. The front has no distinct brown spots at the bases of the bristles. The front usually has three pairs of inferior fronto-orbital bristles. Specimens from Claveria and Gamalang, Mindanao, are predominantly atypical in that the great majority have two pairs of inferior fronto-orbitals. The sides of the abdomen are also more blackened than in the typical form. *Thorax:* The postsutural yellow

vittae are broad and conspicuous. The median yellow vitta nearly fills the space between the prescutellar bristles; the median vitta narrows gradually anteriorly. The anterior median portion of the mesonotum is largely rufous in the space marked off by the outer scapular bristles. This rufous coloration extends posteriorly, narrowing behind, to the suture; it is often interrupted longitudinally by a narrow, shiny brown to black line extending down the middle from the median yellow vitta to the anterior margin of the mesonotum (Fig. 25*a*). The areas between the vittae and behind the humeri are black. *Wings:* As in Figure 25*b*, the apical spot varies considerably in size. *Legs:* The front two pairs of coxae are yellow, and the hind pair is brownish. The femora are chiefly yellow to rufous, sometimes with brown to black apices, and the tibiae are brown to black. The specimens from this region fit the subspecies (or variety) *femorialis* (Hendel, 1934: 11) (described from China) as the front femora usually possess a brown to black dorsal spot near their apices and the middle and hind pairs are usually brownish at the apices. This character apparently varies considerably, especially in teneral specimens, and is of questionable value. *Abdomen:* The bases of terga one to three are black, and three to five have a broad black vitta extending longitudinally down the middle. The lateral margins of the terga are usually blackened. *Ovipositor:* The basal segment is nearly twice as long as the fifth abdominal segment. The extended ovipositor is about 6.0 mm. in length (Fig. 25*c*). The basal segment measures about 1.6 mm. long by 1.2 mm. wide at its widest point. The spiracles are situated about 0.26 mm. from the base, measured on the side. The inversion membrane is about 2.1–2.4 mm. long by 0.4 mm. wide at its broadest point. The rasper extends to within about 1.0 mm. of the base of the segment. The piercer is about 1.8–2.0 mm. in length by 0.26 mm. in width (measured at the base). The tip of the oviduct is about 0.3 mm. from the apex

of the piercer. The setae are situated just before the apex of the piercer; the distal two pairs are strongly developed and extend well beyond the tip of the piercer (Fig. 25*d*); the proximal pair is small and inconspicuous.

Length: Body, 7.0–9.0 mm.; wings, 6.5–8.0 mm.

TYPE LOCALITY: Tandjong Morawa, Serdang, Sumatra.

Type in the Leidener Museum.

Large numbers of specimens are in the present collection from the following localities and hosts.

Malaya: Kuala Lumpur, Nov., 1948–Apr., 1949, ex *Lagenaria vulgaris*, *Benincasa cerifera*, and cucumber (N. L. H. Krauss); Serdang, Selangor, Dec., 1948–Jan., 1949, ex cucurbit fruits and *Luffa cylindrica* (N. L. H. Krauss).

Borneo: Tamparuli, Jan.–June, 1951, ex *Luffa acutangula*, carambola, *Baccaurea angulata*, cucumber, *Lagenaria leucantha*, *Momordica charantia*, and *Artocarpus integra* (F. E. Skinner and G. Angalet); Mengetal, June, 1951, ex guava, mango, and *Averrhoa carambola* (G. Angalet); Turan, Apr.–May, 1951, ex carambola, *Luffa acutangula*, and *Momordica charantia* (G. Angalet); Kota Baru, April, 1951, ex *Baccaurea angulata* and guava (G. Angalet); Tiaran, May, 1951, ex *Eugenia javanica*; Telepok, May, 1951, ex *Eugenia javanica* (G. Angalet); Kota Belud, June, 1951, ex *Dracontomelum dao*, *Cucurbita maxima*, and an "unknown host" (G. Angalet); Jesselton, July, 1951, ex *Luffa acutangula* (G. Angalet); one labeled "W. Borneo, Telol Ayer (F. Muir)."

Philippine Islands: Los Baños, Mar.–June, 1925 (C. E. Pemberton); Gamalang, Mindanao, Aug.–Sept., 1950, ex *Luffa cylindrica* and *Trichosanthes* sp.? (F. E. Skinner); Bugo, Mindanao, Dec., 1949, ex "inidentified cucurbit" (F. E. Skinner); Davao, Mindanao, Mar., 1950, ex *Momordica cochinchinensis* and *Luffa acutangula* (F. E. Skinner); Claveria, Misamis Oriental, Mindanao, Jan., 1950, ex *Lagenaria* sp. (F. E. Skinner); Del Monte, Mindanao, Jan., 1950, ex cucumber (F. E. Skinner);

Aroman Expt. Sta., Cotabato, Sept., 1952 (H. Townes); Penal Colony, Davao, Mindanao, Aug., 1950, ex *Momordica cochinchinensis* (F. E. Skinner).

This species appears to be nearly free of parasites in the areas covered in this report. Of the many thousands of specimens which were sent in by the collectors in the field only 20 specimens of *Opius makii* Sonan were reared (from Mindanao, Philippine Islands, *D. hageni*, ex *Trichosanthes* sp.?). *Opius angaleti* Fullaway may possibly parasitize this species; it has been reared from fruits (in Borneo) infested with both *hageni* and *Callantra smieroides* Walker.

Dacus (*Zeugodacus*) *limbipennis* Macquart

Dacus limbipennis Macquart, 1843, Dipt. Exot. 2(3): 217.

Zeugodacus limbipennis Macquart, Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 140–141, fig. 2.

Zeugodacus atrifacies Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 140.

This species was redescribed by Perkins. The original description is very brief, and it is possible that Perkins' male specimen from Malaya may be quite a distinct species from Macquart's *limbipennis*. It agrees with the original description in having the face shining black with yellow margins. There are no other details in Macquart's description which are of much value in placing the species. In the event that these should prove to be distinct species, Perkins has proposed the name *atrifacies* for his specimen.

Dacus limbipennis (as defined by Perkins) resembles *D. terminifer* Walker because of the black face. It is distinguished from the latter by the presence of three postsutural yellow vittae on the mesonotum.

Length: Body, 5.5–6.0 mm.; wings, 5.0–5.5 mm.

TYPE LOCALITY: Java.

Type in Paris, according to Bezzi (1913: 74).

Perkins' specimen was from Bukit Kutu, Selangor. It is in the Selangor Museum. We have not seen this species.

Dacus (Zeugodacus) maculatus
(Perkins), n. comb.

Zeugodacus caudatus var. *maculatus* Perkins,
1938, Roy. Soc. Queensland, Proc. 49(11):
139-140.

This appears to be a distinct species rather than just a variety of *D. hageni* (*caudatus* of Perkins). Perkins' description is very incomplete, but *maculatus* seems to be distinctive because of the presence of a large black spot at the apex of the scutellum; because of the costal band not extending through the middle portion of cell R_3 and not strongly expanded into a large apical spot; because of the three postsutural yellow vittae and the yellow humeri; also by having the median portion of the face black. Perkins states, "The facial markings are in the form of two triangular black spots, whose apices reach the oral margin, and whose bases run along the transverse furrow of the carina, meeting in the middle."

TYPE LOCALITY: Bukit Kutu, Selangor.

Type in the Selangor Museum.

Known only from the type female.

Dacus (Zeugodacus) maculipennis
(Doleschall)
Fig. 26

Bactrocera maculipennis Doleschall, 1856, Natuurk. Tijdschr. Nederland. Indië 10: 412, pl. 2, fig. 1.

This species is readily distinguished from other *Zeugodacus* known from this region by the presence of a black transverse band across the median portion of the face (Fig. 26a). It resembles *hageni* in most other respects. *Dacus diffusus* Walker (1860: 153) appears to be closely related to *maculipennis*.

MALE. *Head*: Three pairs of inferior fronto-orbital bristles are present, the lower two pairs

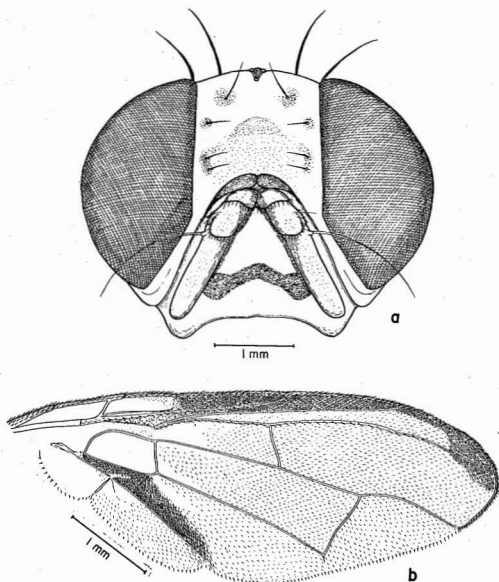


FIG. 26. *Dacus (Zeugodacus) maculipennis* (Doleschall).
a, Front view of head; b, wing.

are situated very close together. The front is rather broad, is almost as wide as one eye and about 1.25 times as long as wide. The front is slightly expanded on the lower portion, and indistinct brown spots are present at the base of the bristles. The antennae are rufous, with a brownish tinge in the ground color of the third segment. The third segment is four times as long as wide and is about equal in length to the face. *Thorax*: Predominantly black with the usual yellow areas, including three moderately broad postsutural yellow vittae; the median one is pointed on each end and extends from just behind the suture to the prescutellar bristles. The scutellum is yellow except for a very narrow black basal band. *Legs*: Chiefly yellow to rufous with discolorations of brown over the hind tibiae, on the ventral surfaces of the front tibiae, and on the apicodorsal surfaces of the front femora. *Wings*: The costal cells are hyaline and devoid of microtrichia except at the apex of the second cell. The costal band is comparatively narrow through most of its length but

is expanded into a distinct wing spot at the apex; the band does not extend into cell R_3 except near the apex of vein R_3 , and it extends through the upper two fifths of the apex of cell R_3 (Fig. 26b). The narrowed portion of the cubital cell is about four times as long as the distance from the apex of the cell to the wing margin. *Abdomen*: Chiefly rufous with black bands across the bases of terga two and three, with a narrow brown to black vitta extending down the median portion over segments three to five and with large brown to black spots on each anterior lateral margin of terga four and five. The submedian oval areas on the fifth tergum are rufous in ground color, are densely covered with pale pile, and are gray pollinose.

Length: Body, 7.5–8.0 mm.; wings, 7.0–7.5 mm.

We have no information on the female of this species.

TYPE LOCALITY: Java.

Type in Vienna, according to Bezzi (1913: 75).

We have seen this species from Singapore, Malaya, Mar., 1907 (F. Muir) and from Pa-soeroean, Java, Apr., 1914 (F. Muir).

Dacus (*Zeugodacus*) *mundus* (Bezzi), n. comb.

Fig. 27

Chaetodacus mundus Bezzi, 1919, Philippine Jour. Sci. 15(5): 429–431.

Zeugodacus tibialis Shiraki, 1933, Taihoku Imp. Univ., Faculty Sci. and Agr., Mem. 8(2): 96–98. New synonymy.

This species belongs in the *hageni* group and resembles that species very closely. It is distinguished from *D. hageni* de Meijere by having the posterior crossvein fumose; by its all-yellow face and by having no yellow markings on the mesonotum before the suture. It is differentiated from *D. caudatus* Fabricius by its all-yellow face and by the darker coloration on the front femora and the mesonotum.

This species has been adequately described and figured, except for female genital characters, by Bezzi and Shiraki (as cited above). It is obvious that *Zeugodacus tibialis* Shiraki is the same as *mundus*. Shiraki's description and figures fit this species in all details. Perkins' key (Perkins, 1938: 138), couplet 20, is misleading; it separates *mundus* from *tibialis* on the basis of whether or not the costal band is dilated to form an apical spot. The costal band is not noticeably dilated in *mundus* and is the same as Shiraki's figure (1933, pl. II, fig. 6) of *tibialis*.

Ovipositor: The visible ovipositor (*in situ*) is nearly equal in length to abdominal segments three to five combined (1.3–1.5 mm.). The extended ovipositor is about 6.0 mm. long. The basal segment is 2.25 mm. long. The inversion membrane is evidently about 2.25 mm. long (it could not be reverted in the specimen at hand), and the piercer is 1.5 mm. in length. The oviduct opens about 0.19 mm. from the apex, and the setae are very close to the tip of the piercer (Fig. 27).

TYPE LOCALITY: Luzon, Philippine Islands. Bezzi also recorded it from Panay and Mindanao.

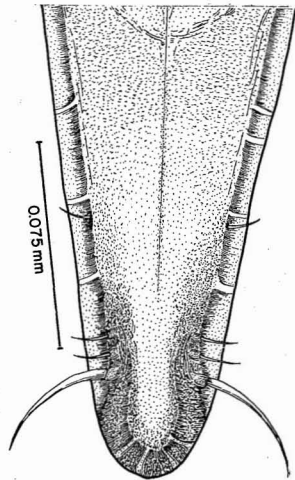


FIG. 27. *Dacus* (*Zeugodacus*) *mundus* (Bezzi). Apex of piercer.

A specimen in the U. S. National Museum labeled "Los Baños, P. I., Baker" and "1333" is apparently the type.

Shiraki's specimens of *tibialis* were from Kashoto and Taito, Formosa, ex *Cucurbita maxima* Duch.

A single female specimen was present in the collections from Bugo, Mindanao, P. I., Dec., 1949, ex "unidentified cucurbit" (F. E. Skinner). This specimen was reared from the same host material as a fairly large series of *D. hageni*. A specimen is also at hand from Los Baños, P. I., 1916 (F. X. Williams).

Dacus (Zeugodacus) pendleburyi
(Perkins), n. comb.

Zeugodacus pendleburyi Perkins, 1938, Roy. Soc. Queensland, Proc. 49(11): 141-142, fig. 4.
Paradacus pendleburyi (Perkins) Hering, 1952, Treubia 21(2): 266-267.

Hering placed this under *Paradacus* and described the allotype male as such. We believe it is obvious that he was incorrect in assuming that his specimen lacked prescutellar bristles; he said that because of the position of the pin through the prescutellar area he was unable to be sure of the presence or absence of these bristles. Perkins in the original description stated that prescutellars were present.

D. pendleburyi is readily distinguished from other *Zeugodacus*, known from this region, by having just two postsutural yellow vittae and the usual black spots in the antennal furrows of the face. It is similar to *D. timorensis* (Perkins) because of its dark brown to black legs and the broad black stripe across the base of the scutellum; it differs by the absence of the median postsutural yellow vitta. The wings are also distinctive in that they lack a cubital streak.

Length: Body, 7.0-7.5 mm.; wings, 5.5-6.0 mm.

TYPE LOCALITY: Selangor. Hering's allotype male is from Djampang, Tjiajunan.

Type in the Selangor Museum.

We have not seen this species. One spec-

imen on hand labeled "Los Baños, Laguna, P. I., July 7, 1930, F. C. Hadden" is very close to *pendleburyi* but has a broad, black longitudinal stripe over the scutellum and yellow to rufous femora.

Dacus (Zeugodacus) pubescens
(Bezzi), n. comb.

Fig. 28

Chaetodacus pubescens Bezzi, 1919, Philippine Jour. Sci. 15(5): 434, pl. 2, fig. 2.

Chaetodacus scutellatus Bezzi, 1916, Bul. Ent. Res. 7: 114 (nec Hendel, 1912, Suppl. Ent. 1: 20).

This species is related to *D. scutellinus* (Bezzi) and *trimaculatus* n. sp. by having a black spot at the apex of the scutellum. It is distinguished by the dilated costal band which forms an apical wing spot; by having three pairs of inferior fronto-orbital bristles, not two; also by having the humeri bordered by rufous, not black.

Head: Face with two rather small, round spots and with brownish spots at the bases of the frontal bristles. *Thorax:* The mesonotum has three broad yellow stripes behind the suture and two submedian stripes before the

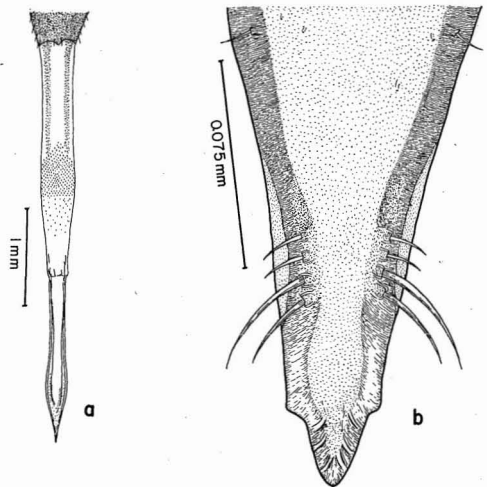


FIG. 28. *Dacus (Zeugodacus) pubescens* (Bezzi). a, Extended ovipositor; b, apex of piercer.

suture. The mesonotum has distinct black markings. *Legs*: Chiefly reddish yellow, the hind tibiae are brownish. *Wings*: (See Bezzi, *loc. cit.*, pl. 2, fig. 2) with a rather narrow costal band expanded into a moderately large spot at the apex. The cubital streak is broad and fills all the base of cell M_4 . A small brown spot is present at the apex of vein M_{3+4} . *Abdomen*: With black basal bands on the second and third terga and with a median longitudinal vitta extending over terga three to five; these latter segments are black on the sides.

Length: Body and wings, 8.0–8.5 mm.

The female has not been previously described. In most details it fits the description of the male as given in the original. The front is approximately 1.5 times as long as wide. The facial spots are elongate, pointed on their lower edges. The narrowed portion of the cubital cell is equal in length to vein $Cu_1+1st A$. *Ovipositor*: The basal portion when viewed from above (*in situ*) is approximately equal to the length of the fifth abdominal segment. The extended ovipositor (Fig. 28*a*) measures about 5.8 mm. The piercer is trilobed at apex (Fig. 28*b*) and has two long and two short preapical setae on each side; the distal pair is situated about 0.06 mm. from the apex of the piercer. The piercer measures about 1.74 mm. long by 0.18 mm. wide at its widest point. The opening of the oviduct is situated about 0.25 mm. from the apex of the piercer. The inversion membrane measures about 2.36 mm. long by 0.31 mm. wide, and the rasper extends to within 1.0 mm. of the base of the segment. The basal segment measures 1.69 mm. by 1.32 mm., and the spiracles are located 0.36 mm. from the anterior lateral margins of the segment.

TYPE LOCALITY: Laguna Province, Los Baños and Mt. Makiling.

We have studied a specimen in the U. S. National Museum labeled "Mt. Makiling (another spelling for Maquiling), Luzon (Baker)." This is probably the type. We have also seen it from Manila, 1909 (G. Compere),

and from Mt. Makiling, Laguna, Luzon, Jan. 26, 1921 (G. C. Ladrera).

Dacus (*Zeugodacus*) *scutellinus* (Bezzi), n. comb.

Chaetodacus scutellinus Bezzi, 1916, *Bul. Ent. Res.* 7: 113, pl. 2, fig. 11.

This species is related to *D. pubescens* (Bezzi) and to *D. trimaculatus* n. sp. It is considerably smaller than either of these species. It is differentiated from the former by lacking the two presutural yellow vittae and by not having the costal band expanded at the tip of the wing. It differs from *trimaculatus* in having the costal band comparatively broad and the mesonotum chiefly black. It has been adequately described by Bezzi (1919: 432–433) except for the characteristics of the ovipositor.

Length: Body and wings, 5.0–5.5 mm.

TYPE LOCALITY: Laguna Prov., Mt. Makiling, Luzon.

One female in the U. S. National Museum, labeled in red, from the type locality, is probably the type although it has never been marked as such.

This species was not represented in the collections at hand; the senior author has studied the above-mentioned female at the U. S. National Museum.

Dacus (*Zeugodacus*) *terminifer* Walker

Dacus terminifer Walker, 1860, *Linn. Soc. London, Proc.* 4: 152.

This species appears to fit closest to *D. pendleburyi* (Perkins) but is distinguished by its all-black face.

Dr. John Smart and Dr. K. L. Knight have re-examined the type and have supplied enough information so that it can be placed fairly accurately. The face is uniformly black, and the front has two pairs of inferior fronto-orbital bristles. Only two postsutural yellow vittae are present on the mesonotum, and the scutellum is yellow with a black basal band. The legs are chiefly brown to black with the

front and middle tibiae and bases of hind femora rufous. The abdomen is missing in the type.

Length: Body, 5.0 mm.

TYPE LOCALITY: Makassar, Celebes.

Type in the British Museum (Natural History).

Known only from the type female.

Dacus (Zeugodacus) tetrachaetus
(Bezzi), n. comb.

Chaetodacus tetrachaetus Bezzi, 1919, Philippine Jour. Sci. 15(5): 431-432, pl. 1, fig. 10.

This species is distinguished from other *Dacus (Zeugodacus)* by having a broad yellow band extending between the humeri and the notopleural calli. In this respect it is similar to *D. (Strumeta) continuus* (Bezzi). Bezzi allies the species to *D. mundus* (Bezzi), but it lacks the brown infuscation over the m crossvein.

The species was adequately described by Bezzi, except for the characteristics of the female. We have not seen this species.

Length: Body and wings, 6.5-7.0 mm.

TYPE LOCALITY: Panay, Antique Prov., Batbatan Island, Philippines.

Bezzi said the type was in his collection. This is in the Museo Civico di Storia Naturale, Milan, according to Horn and Kahle (1935).

Dacus (Zeugodacus) timorensis
(Perkins), n. comb.

Zeugodacus timorensis Perkins, 1939, Queensland Univ., Dept. Biol. 1(10): 30-31, pl. 1, fig. 2.

This species appears to be related to *D. scutellinus* (Bezzi) but is distinguished by the presence of a broad black band extending over the basal half of the scutellum and by the chiefly brown to black legs. Perkins' description seems to be adequate.

Length: Body, 6.0 mm.; wings, 5.5 mm.

TYPE LOCALITY: Koepang, Timor.

Type in the British Museum (Natural History).

We have not seen this species.

Dacus (Zeugodacus) trimaculatus n. sp.
Fig. 29

This species runs to *Dacus (Zeugodacus) scutellinus* (Bezzi) in Perkins' (1938: 138) and Bezzi's (1916: 113 and 1919: 420) keys to the species of Dacinae. It apparently resembles this species in many details but is considerably larger (8.0-9.5 mm. long as compared to 5.0-5.5 mm.). The front portion of the mesonotum, between the humeri, is reddish, not black. The costal band is very narrow through cell R_3 and ends at vein R_{4+5} ; not with a rather broad costal band which extends half-way through cell R_5 . Bezzi states (and figures) that veins R_{4+5} and M_{1+2} (third and fourth veins) are straight and parallel. In *trimaculatus* these veins are distinctly curved (Fig. 29c).

The species appears much more closely related to *D. hageni* de Meijere than to any other *Zeugodacus* which we have studied. The type series were taken in the same habitat and host as that species. The two resemble each other very closely but are distinguished by the narrow costal band (not enlarged at apex) of *trimaculatus*; by the presence of three facial spots and a black apical spot on the scutellum, as well as by the more elongate and differently developed ovipositor (cf. Figs. 25d and 29d).

The presence of the transverse, median black spot on the face suggests that this might fit near *D. maculipennis* (Doleschall), and in Perkins' key (*loc. cit.*) some specimens which have three pairs of inferior fronto-orbital bristles would run here. It is distinguished by having the face marked with three black spots (Fig. 29b), not a transverse black mark (Fig. 26a); by the apical black spot on the scutellum, the reddish anterior portion of the mesonotum, and by the narrow (not dilated) costal band.

FEMALE. *Head:* The front is slightly less than 1.5 times as long as wide; the median portion is discolored with brown, and a slightly brownish spot is present at the base of each

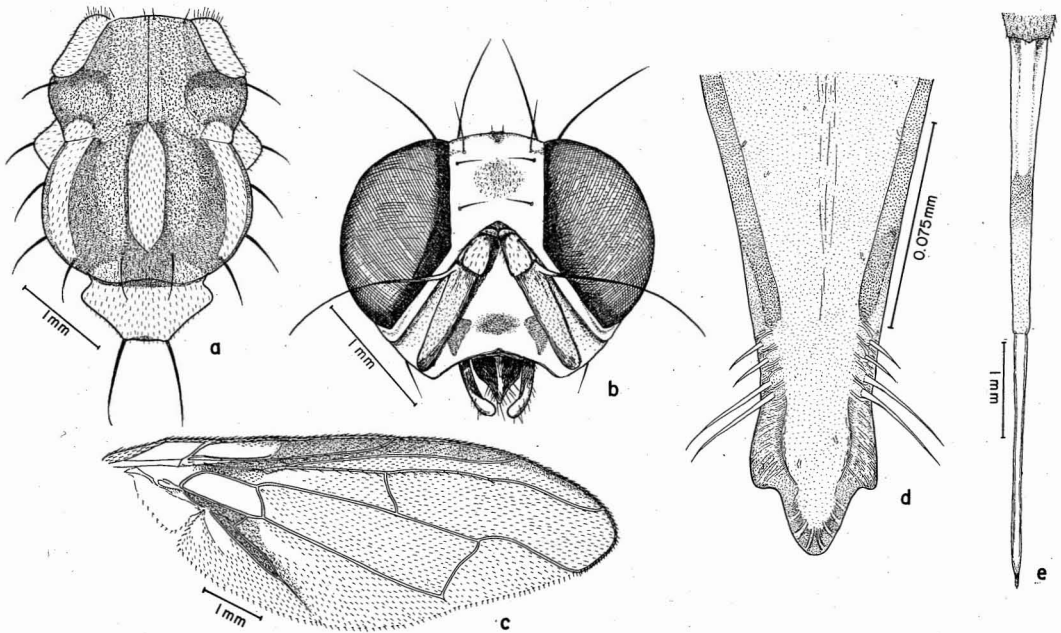


FIG. 29. *Dacus (Zeugodacus) irimaculatus* n. sp. *a*, Mesonotum; *b*, front view of head; *c*, wing; *d*, apex of piercer; *e*, extended ovipositor.

of the orbital bristles. There are usually two pairs of inferior fronto-orbital bristles present; sometimes three pairs are present. There is one pair of superior fronto-orbitals. The face has a transverse brown to black spot in the median portion which extends almost to the large black spots in the antennal furrows (Fig. 29*b*). The third antennal segment is brown to blackish and is slightly longer than the face. The occiput is chiefly yellow to rufous; the hind portion is brownish colored in some specimens. *Thorax*: Predominantly black on the dorsum with three broad, postsutural yellow vittae. The anterior portion of the thorax, between the humeri, is rufous. The mesonotum is covered with gray pollen; this is interrupted from the anterior end of the median yellow vitta to the anterior margin by a fine black vitta (Fig. 29*a*). The yellow mark on the upper portion of each sternopleuron is as broad or broader than the upper portion of the yellow transverse stripe on the mesopleura. The scutellum is largely yellow with a rather small black spot in the median por-

tion between the anterior pair of bristles. *Legs*: The femora are entirely yellow except for slight brownish discolorations on the dorsoapical portion of the front pair. The tibiae are brown to black. The tarsi are yellow except for the brownish apical subsegments. *Wings*: The costal band is moderately narrow and does not extend beyond the apex of vein R_{4+5} . The r-m crossvein is curved, is about 0.75 as long as the section of M_{1+2} between the r-m and the m crossveins, and is distinctly longer than the basal section of vein M_{3+4} . The m crossvein is also distinctly curved. The attenuated portion of the cubital cell is just slightly longer than that portion from the apex of the cell to the wing margin (Fig. 29*c*). *Abdomen*: The first and third terga have complete bands of black across their base; the second tergum has a large black spot in the median portion which extends transversely across the segment but does not attain the lateral margins; it is interrupted by rufous coloration toward the sides. A black vitta extends longitudinally down the median por-

tion from the black band on the third tergum to the apex of segment five. The extreme lateral margins of the terga are extensively blackened. *Ovipositor*: Long and conspicuous; the exposed basal portion (*in situ*) is equal in length to segments four and five. The extended ovipositor (Fig. 29e) is very elongate, measuring 8.32 mm. The piercer is 2.78 mm. by 0.21 mm. The apical portion is trilobate and has two pairs of strong bristles and two pairs of weak setae (Fig. 29d) situated approximately 0.05 mm. from the apex. The opening of the oviduct is 0.26 mm. from the apex. The inversion membrane is approximately 3.0 mm. long by 0.4 mm. wide at its widest point, the rasper extends to within about 1.4 mm. of the base of the segment. The basal segment of the ovipositor is 2.5 mm. by 1.2 mm., measured across the proximal margin of the segment. The spiracles are situated about 0.47 mm. from the base of the segment, measured on the lateral margins.

Length: Body, excluding ovipositor, 8.0–9.5 mm.; wings, 7.7–8.5 mm.

MALE. Fitting the description of the female in most details; the narrowed portion of the cubital cell is about twice as long as the distance beyond the apex to the wing margin, and a well-developed supernumerary lobe is present.

Holotype female and allotype male, Penal Colony, Davao, Mindanao, Philippine Islands, Aug., 1950, ex *Momordica cochinchinensis* (F. E. Skinner). Sixty-four paratypes (sexes about evenly distributed): same data as type and Pangi, Mindanao, Philippine Islands, Mar., 1950, ex *Momordica charantia* (F. E. Skinner).

Type, allotype, and a series of paratypes deposited in the U. S. National Museum collection. The remainder of the paratypes are being deposited in the following collections: Bernice P. Bishop Museum, British Museum (Natural History), Territorial Board of Agriculture and Forestry, Hawaiian Sugar Planters' Association, and the University of Hawaii.

MONACROSTICHUS Bezzi

Monacrostichus Bezzi, 1913, Philippine Jour. Sci. 8: 322.

This is a well-defined genus readily distinguished from other Dacinae by the following characteristics: The presence of a transverse furrow or depression across the mesonotum, connecting the lateral sutures; a distinct transverse furrow across the middle of the face; the lack of inner orbital, postocellar, postvertical, or ocellar bristles; the lack of a line of demarcation around the sides and hind margins of the humeri; the lack of inner scapular bristles; the presence of a pair of stout spines near the apices of the front femora, below; the rather pointed scutellum; the elongate stigma or third costal section of the wing and the very short fourth section; the strongly incurved basal section of vein M_{1+2} , which greatly narrows the basal three fourths of cell 1st M_2 (Fig. 30d) and the abbreviated vein $Cu_1+1st A$.

The genus is related to *Callantra* by the elongate antennae (Fig. 30b) and the petiolate abdomen. Other workers have considered the mesonotal suture as being complete; we have found the suture to be interrupted in the median portion of the mesonotum (in all the specimens examined); the lateral sutures are connected by a transverse depression. The genus contains but one known species.

GENOTYPE: *Monacrostichus citricolus* Bezzi.

Monacrostichus citricolus Bezzi

Fig. 30

Monacrostichus citricola Bezzi, 1913, Philippine Jour. Sci. 8: 323.

A large, very conspicuous species, easily recognized by the generic characters given above. The following characteristics are supplemental to those which have been given under the generic discussion.

MALE. *Head*: Yellow to slightly reddish except for the reddish brown to black antennal

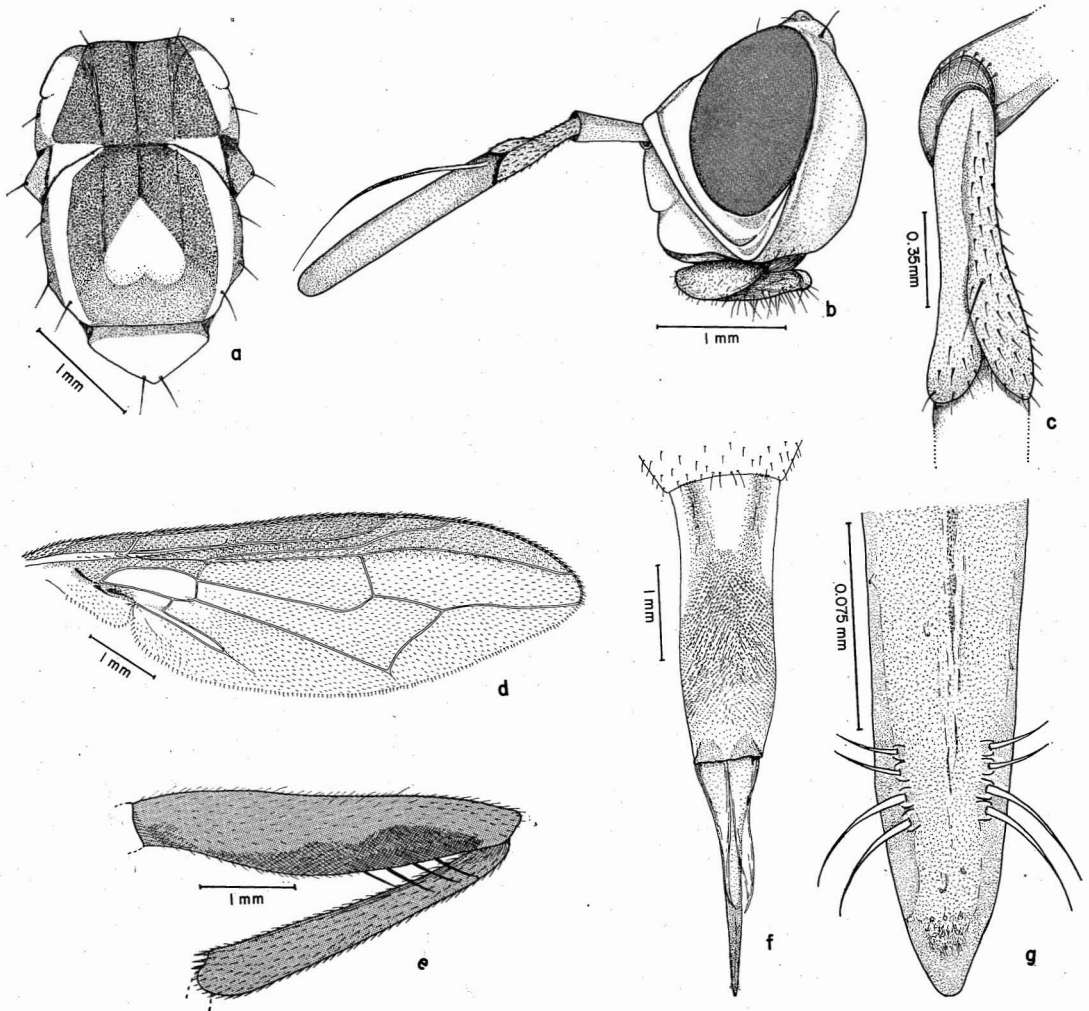


FIG. 30. *Monacrostichus citricolus* Bezzi. a, Mesonotum; b, lateral view of head; c, second segment of antenna; d, wing; e, front femur; f, extended ovipositor; g, apex of piercer.

grooves; a reddish-brown spot in the center of the face, just above the oral margin; a dark spot on the cheeks at the lower margin of each compound eye and another pair on the lower part of the front at about the middle of the eyes and opposite the bases of the antennae. The hind portion of the occiput is slightly discolored with reddish brown. The head is almost devoid of bristles, only the outer vertical bristles are well developed. The superior fronto-orbital bristles are rather poorly developed and inconspicuous, they are

about 0.5 as long as the vertical bristles, and are thin and hair-like. The ocellar bristles are less than one third as long as the verticals. The antennae are elongate, they are three times as long as the face and 1.33 times as long as the vertical length of the head. The first two segments are elongate, they are about equal in length, and the two combined are about two thirds as long as the third segment (Fig. 30b). The second antennal segment is very distinctly furrowed on the top margin, and at least an indication of the furrow ex-

tends almost the full length of the segment (Fig. 30c). This is very similar to the longitudinal seam on the second antennal segment which is characteristic of the Calyptratae. The second segment has a moderately strong bristle near the middle on the upper surface. The arista are rather short, they extend scarcely to the apices of the third segments; their bases are yellow, the apices are black. The face is chiefly yellow except for the discolorations mentioned above. The face has a rather prominent tumescence in the middle marked off by a moderate concavity above, just below the antennae, and a rather deep concavity on the lower third of the face (Fig. 30b). A distinct transverse furrow is present at this point on the face and is a characteristic feature of the genus and species. The antennal grooves are deep and very conspicuous compared to those of other Dacinae. *Thorax*: Chiefly dark brown to black on the dorsum with yellow markings on the mesonotum as follows: A broad vitta on each side extending from the hind margin of the mesonotum to just beyond the suture, ending in front of the suture at a point about opposite the front margin of the notopleural callus (the vitta extends transversely along the suture for a short distance); the anterior lateral margins from just beyond the front margins of the notopleural calli including the humeri, except for the front margins, and a triangular to heart-shaped spot in the middle on the hind third of the mesonotum (Fig. 30a). The scutellum is yellow except for a rather broad brownish band across the base. The yellow mark on each mesopleuron is expanded dorsally so that the entire top margin of the sclerite is yellow. The sternopleura each have a large yellow spot above, continuous with the mesopleural markings, and the ventral margin is yellowish. The metapleura are yellow, the metanotum is black. The mesonotum is lightly grayish pollinose with one median and two submedian narrow brown vittae extending down the back as far as the median yellow spot on the hind part of the mesonotum. The suture is continuous or

nearly so. In the specimens which have been studied it is actually narrowly interrupted in the middle of the mesonotum, although a slight depression does connect the two lines (Fig. 30a). The outer scapular bristles are strong, the inner are lacking. The humeral bristles are lacking, the anterior and posterior notopleurals and the three pairs of supraalar bristles are strong. The prescutellar bristles are lacking, and a single pair of apical scutellars are present. The halteres are yellow, lightly tinged with brown at their knobs. *Wings*: With a very broad yellow costal band, filling all the cells anterior to R_5 and extending a short way into this cell along the under side of the last section of vein R_{4+5} . The cubital streak is absent except for a brief yellow mark in the base of the cubital cell. The costal cells are densely covered with microtrichia, as is the section of cell R directly above cell M. The wing venation is very distinctive and will distinguish this species from all other Dacinae known to the writers. The third costal section (stigma) is very elongate, it is over three times as long as the fourth section, and is equal to the combined lengths of the first two sections. The r-m crossvein is located near the apex of the discal cell (1st M_2) at a point almost opposite the lower end of the m crossvein. The cell 1st M_2 is strongly narrowed at its basal three fourths and is expanded at its apical portion. The first section of vein M_{1+2} , from the fork to the r-m crossvein, is arcuate and is nearly four times as long as the second section. The second section of M_{1+2} , from the r-m crossvein to m, is just slightly longer than the r-m. The apical cell (R_5) is distinctly narrowed at the wing margin. The attenuated portion of the cubital cell is elongate and about equal in length to the basal part of the cell or to the length of cell M. Vein $Cu_1+1st A$ extends less than halfway to the wing margin (Fig. 30d). There is no evidence of a supernumerary lobe in the hind portion of the wing. *Legs*: Chiefly rufous, slightly discolored with brownish on the undersides of the femora, the coxae, and the

apical subsegments of the tarsi. The front femora each have a pair of strong black spines on the outer ventral surface near the apex. *Abdomen*: Very distinctly club-shaped, the first two segments are narrow and parallel sided and are just half as wide as the remaining segments. The first tergum is largely yellow with the apical portion brown to blackish. The second tergum is yellow except for a brown longitudinal band down the middle which connects with a broad transverse band near the apex of the segment forming a T. Terga three and four have brown to black bases and yellow apices. The fifth narrows rather abruptly into an acute point at its apex, it is yellow in the middle and at the apex and black on the sides and in the middle of the anterior margin. The venter is chiefly brownish. The third tergum is not ciliated. The genitalia have not been studied.

Length: Body, 9.5–10.0 mm.; wings, 8.6 mm.

FEMALE. Similar to the male except for sexual characters. The costal band is not so distinctly yellowed as in the male in the specimens at hand. The ovipositor is rather short (Fig. 30f), about 3.5 mm. long. The piercer is slender beyond the basal portion and is 1.20 mm. long by 0.07 mm. wide at the oviduct and 0.25 mm. wide at the base. The opening of the oviduct is about 0.42 mm. from the apex of the piercer. The flaps over the top of the egg channel are very conspicuous, they extend about two thirds the length of the segment and are on the dorsal surface of the piercer. There are four pairs of sub-apical setae on the piercer; the basal two pairs are tiny, scarcely one third as long as the apical setae. The apical two pairs are comparatively strong and extend almost as far as the tip of the piercer. The distance from the bases of the apical set of setae to the tip of the piercer is about 1.5 times greater than the length of the plate bearing the setae (Fig. 30g). The piercer is slightly flattened laterally and has a distinct convexity on the dorsal surface just below the middle. The rasper (eighth segment) is 1.30 mm. long, the in-

dividual spicules are sharp pointed (Fig. 30f) and extend to about 0.38 mm. from the base of the segment.

TYPE LOCALITY: Los Baños, P. I., reared from citrus.

Type in the U. S. National Museum.

The writers have studied specimens from the type locality (Baker); from Manila, Philippine Islands, ex lime (*C. aurantifolia*), Feb. 15, 1929 (A. M. M.), and Tagoloan, Mindanao, Philippine Islands, June, 1950 (F. E. Skinner).

SPECIES OF DOUBTFUL POSITION

Dacus absolutus Walker, 1862, Linn. Soc. London, Proc. 4: 22.

This species cannot be positively placed subgenerically as it is known only from the type female. However, with the additional information supplied by Dr. K. L. Knight, we feel that it may possibly be a *Neodacus*. He noted that it is larger than *dorsalis* and has the following characteristics: Anterior supraalar present; one pair of scutellar bristles; face spotted as in *dorsalis*; no median scutal stripe; wing with only very slight shading on first longitudinal vein, no other shading; scutellum all one color; yellow of humerus broken before the suture; a black transverse area on the second abdominal tergum as well as on the third.

Length: Body, "6 lines."

TYPE LOCALITY: Ceram.

Type in the British Museum.

Dacus areolatus Walker, 1861, Linn. Soc. London, Proc. 5: 295.

This species is a true *Dacus s. l.* according to Bezzi (1913: 67). Walker described it as having four black spots on the face in his latin description and as having two black spots in his English description. It is yellow brown; the mesonotum has two black stripes with two postsutural yellow vittae. The scutellum is yellow. The abdomen is short, not longer than the mesonotum, with a slender,

cylindrical ovipositor which is "as long as the preceding part." The legs are yellow. The wings have a brown costal band which is dilated toward the tip and have two transverse bands connected to the costal band.

Length: Body, 6.0 mm.

TYPE LOCALITY: Batchian.

Type in the British Museum.

Dacus diffusus Walker, 1860, Linn. Soc. London, Proc. 4: 153.

Walker described this species as having a black band on the face and as having two short, narrow black stripes on the mesonotum. The wings are "clouded with very pale brown about the veins." This may possibly be related to *D. (Zeugodacus) maculipennis* (Doleschall).

Length: Body, 8.0 mm.

TYPE LOCALITY: Makassar.

Type in the British Museum.

Dacus maculigera (Doleschall), 1859, Natuurk. Tijdschr. Nederland. Indië 17: 122 (Bactrocera).

This species has been considered as a synonym of *Dacus zonatus* (Saunders) by some authors, but the synonymy cannot be confirmed as we have not seen specimens from this area.

TYPE LOCALITY: Sarawak, Borneo.

Type in Vienna.

Dacus ritsemae Weyenbergh, 1869, Arch. Néerland. 4: 360, pl. 6, figs. 1-5.

TYPE LOCALITY: Java.

Bezzi (1913: 78) says "the type is in Amsterdam?"

Dacus strigifinis Walker, 1861, Linn. Soc. London, Proc. 5: 295.

This may not be a *Dacus*. Bezzi (1913: 80) questioned its generic position.

TYPE LOCALITY: Batchian.

Type in the British Museum.

REFERENCES

BEZZI, M. 1913. Indian trypaneids in the

collection of the Indian Museum. *Indian Mus., Mem.* 3: 1-175.

——— 1916. On the fruit flies of the genus *Dacus* (s.l.) occurring in India, Burma and Ceylon. *Bul. Ent. Res.* 7: 99-113.

——— 1919. Fruit flies of the genus *Dacus* sensu latiore (Diptera) from the Philippine Islands. *Philippine Jour. Sci.* 15(5): 411-442, 2 pls., 17 figs.

DE MEIJERE, J. C. H. 1911. Studien über Südostasiatische Dipteren VI. *Tijdschr. v. Ent.* 54: 373-385.

FROGGATT, W. W. 1909. *Report on parasitic and injurious insects*. Pt. 1-3 for 1907-08. 115 pp., 8 pls. New South Wales Department of Agriculture, Sydney.

HARDY, D. E. 1949. Studies in Hawaiian fruit flies. *Ent. Soc. Wash., Proc.* 51(5): 181-205, 59 figs.

——— 1951. The Krauss collection of Australian fruit flies. *Pacific Sci.* 5(2): 115-189, 84 figs.

HENDEL, F. 1912. H. Sauters' Formosa-Ausbeute. *Suppl. Ent.* 1: 13-24, 1 pl., 5 figs.

——— 1934. Schwedisch-Chinesische Wissenschaftliche Expedition nach den Nordwestlichen Provinzen Chinas, unter Leitung von Dr. Sven Hedin and Prof. Sü Ping-Chang. Insekten gesammelt vom Schwedischen Arzt der Expedition Dr. David Hummel 1927-1930. 13. Diptera 5. Muscaria Holometopa. *Arkiv för Zool.* 25A(21): 18, 3 figs.

HERING, E. M. 1941. Neue Dacinae und Trypetinae des zoologischen Museums der Universität Berlin. *Siruna Seva* 3: 1-32.

——— 1952a. Trypetidae von Sumba und Flores. *Naturf. Gesell. in Basel, Verhandl.* 63: 41-48.

——— 1952b. Fruchtfiegen von Indonesien. *Treubia* 21(2): 263-290, 16 figs.

HORN, W., and I. KAHLE. 1935. Über Entomologische Sammlungen Entomologen und Entomo-Museologie. *Ent. Beihefte aus Berlin* 4: 1-338.

MALLOCH, J. R. 1939a. The Diptera of the Territory of New Guinea. XI. Family Try-

- petidae. *Linn. Soc. N. S. Wales, Proc.* 44(3-4): 409-465, 2 pls.
- 1939*b*. Solomon Islands Trypetidae. *Ann. and Mag. Nat. Hist.* 4(11): 228-278, 2 pls.
- PERKINS, F. A. 1938. Studies in Oriental and Australian Trypanidae. Part 2. Adraminae and Dacinae from India, Ceylon, Malaya, Sumatra, Java, Borneo, Philippine Islands and Formosa. *Roy. Soc. Queensland, Proc.* 49(11): 120-144, 1 pl., 12 figs.
- 1939. Studies in Oriental and Australian Trypetidae. *Queensland Univ., Dept. Biol.* 1(10): 1-34, 1 pl.
- PHILIP, A. 1950. Description of one new species of *Strumeta* Walker (Trypetidae: Diptera) from Burma and a record of one far-eastern species of the genus from India. *Indian Jour. Ent.* 10(1): 31-32, 2 figs.
- SHIRAKI, T. 1933. A systematic study of Trypetidae in the Japanese Empire. *Tai-hoku Imp. Univ., Faculty Sci. and Agr., Mem.* 8 (Entomology 2): 1-509, 14 pls.
- WALKER, F. 1860. Catalogue of the dipterous insects collected at Makassar in Celebes, by Mr. A. R. Wallace, with description of new species. *Linn. Soc. London, Proc.* 4: 153.
- INDEX TO GENERA AND INFRAGENERIC CATEGORIES
- ablepharus* (Bezzi), *Dacus* (*Nesodacus*), 155
- absolutus* Walker, *Dacus*, 201
- albistrigatus* de Meijere, *Dacus*, 168
- apicalis* de Meijere, *Dacus* (*Strumeta*), 159, 161
- arecae* n. sp., *Dacus* (*Strumeta*), 160, 161, 170
- areolatus* Walker, *Dacus*, 201
- Asiadacus* Perkins, 154
- atrichus* (Bezzi), *Dacus* (*Nesodacus*), 155
- axana* Hering, Callantra, 149
- bakeri* (Bezzi), *Dacus* (*Neodacus*), 154
- bezzianus* Hering, *Zeugodacus*, 189
- bioculata* (Bezzi), Callantra, 149
- Callantra Hendel, 149
- Callantra Walker, 148, 149, 198
- calophylli* (Perkins and May), *Dacus* (*Gymnodacus*), 154
- caudatus* Fabricius, *Dacus* (*Zeugodacus*), 185, 186, 188, 189, 190
- Chaetodacus* Bezzi, 158
- chrysotoxus* Hendel, *Dacus*, 188
- cilifer* Hendel, *Dacus* (*Strumeta*), 159, 162
- citricolus* Bezzi, *Monacrostrichus*, 198
- cognatus* n. sp. *Dacus* (*Strumeta*), 161, 162, 167, 168
- conformis* Walker, *Dacus*, 184
- conopsoides* Bezzi, Callantra, 149
- conopsoides* (de Meijere), Callantra, 149
- continuus* (Bezzi), *Dacus* (*Strumeta*), 159, 164
- cucurbitae* Coquillett, *Dacus* (*Strumeta*), 159, 164, 182
- Daculus* Speiser, 148, 153
- Dacus* Fabricius, 148
- Dasyneura* Saunders, 158
- davaoanus* (Bezzi), *Dacus* (*Nesodacus*) *atrichus* var., 155
- diaphoropsis* (Hering), *Dacus* (*Zeugodacus*), 186, 187
- diffusus* Walker, *Dacus*, 192, 202
- discipennis* Walker, *Dacus* (*Daculus*), 153
- dorsalis* Hendel, *Dacus* (*Strumeta*), 160, 161, 162, 165, 167, 174, 177, 180, 182
- dorsaloides* n. sp., *Dacus* (*Strumeta*), 160, 167
- emittens* Walker, *Dacus* (*Zeugodacus*), 186, 187
- expandens* Walker, *Dacus* (*Paratridacus*), 157
- fasciatipennis* Doleschall, *Bactrocera*, 184
- fascipennis* Wiedemann, *Dacus*, 184
- frauenfeldi* Schiner, *Dacus* (*Strumeta*), 158, 168
- frenchi* Froggatt, *Dacus*, 184
- froggatti* (Bezzi), *Dacus* (*Strumeta*), 160, 169, 172
- fulvipes* (Perkins), *Dacus* (*Paradacus*), 155
- garcinia* Bezzi, *Bactrocera*, 157
- Gymnodacus* Munro, 148, 154
- hageni* de Meijere, *Dacus* (*Zeugodacus*), 186, 187, 189, 192
- heinrichi* Hering, *Zeugodacus* *nubilus*, 189
- hochii* (Zia), *Dacus* (*Strumeta*), 159, 171
- impunctatus* de Meijere, *Dacus* (*Strumeta*), 159, 171
- infestus* (Enderlein), Callantra (*Polistomimetes*), 153
- lata* (Perkins), *Dacus* (*Strumeta*) *nigrotibialis* var., 159, 178
- latifrons* (Hendel), *Dacus* (*Strumeta*), 160, 172
- limbiferus* (Bezzi), *Dacus* (*Strumeta*), 159, 173
- limbipennis* Macquart, *Dacus* (*Zeugodacus*), 186, 191
- longicaudatus* (Perkins), *Dacus* (*Nesodacus*), 154
- longicornis* (Wiedemann), Callantra, 149
- luzonae* n. sp., *Dacus* (*Strumeta*), 160, 174, 179
- maculatus* (Perkins), *Dacus* (*Zeugodacus*), 186, 192
- maculigera* (Doleschall), *Dacus*, 202
- maculipennis* (Doleschall), *Dacus* (*Zeugodacus*), 186, 192, 202
- Marquesadacus* Malloch, 158
- mcgregori* (Bezzi), *Dacus* (*Strumeta*), 159, 171, 176, 183
- melanius* n. subsp., *Dacus* (*Paratridacus*) *expandens*, 157
- Mellesis* Bezzi, 149
- mesomelas* Bezzi, *Dacus* (*Gymnodacus*), 154
- minax* (Enderlein), Callantra (*Polistomimetes*), 153
- mindanaus* (Bezzi), *Dacus* (*Nesodacus*) *ablepharus* var., 155
- minimus* (hering), *Dacus* (*Paradacus*), 155
- moluccensis* Perkins, *Strumeta*, 169
- Monacrostrichus* Bezzi, 148, 198
- mui* n. sp., *Dacus* (*Strumeta*), 160, 177
- mundus* (Bezzi), *Dacus* (*Zeugodacus*), 186, 193, 196
- murrayi* (Perkins), *Dacus* (*Daculus*), 153
- Neodacus* Perkins, 148, 154
- Nesodacus* Perkins, 148, 154

- newmani* (Perkins), *Dacus* (*Neodacus*), 154
nigrotibialis (Perkins), *Dacus* (*Strumeta*), 159, 174, 178, 179
nubilus Hendel, *Dacus* *caudatus* var., 189
nummularia (Bezzi), Callantra, 149
obscuratus de Meijere, *Dacus* (*Strumeta*), 159, 179
occipitalis (Bezzi), *Dacus* (*Strumeta*) *dorsalis* var., 160, 167
oleae (Gmelin), *Dacus* (*Daculus*), 153
Paradacus Perkins, 148, 155
Paratridacus Shiraki, 148, 157
parvulus Hendel, *Dacus*, 179
pedestris (Bezzi), *Dacus* (*Strumeta*), 160, 180
pedunculata (Bezzi), Callantra, 149
pendleburyi (Perkins), *Dacus* (*Zeugodacus*), 185, 194, 195
pectoralis Walker, *Dacus* (*Strumeta*), 160, 179
perplexus Walker, *Dacus* (*Paradacus*), 155, 156
persignatus (Hering), *Dacus* (*Strumeta*), 158, 182
Polistomimetes Enderlein, 148, 152
propinquus n. sp., *Dacus* (*Strumeta*), 160, 172, 182
pubescens (Bezzi), *Dacus* (*Zeugodacus*), 186, 194, 195
riisemae Weyenbergh, *Dacus*, 202
scutellinus (Bezzi), *Dacus* (*Zeugodacus*), 186, 195, 196
Sinodacus Zia, 158, 171
smicroides Bezzi, Callantra, 151
smieroides Walker, Callantra, 149, 151
solomonensis (Malloch), Callantra, 151
splendida Perkins, Callantra, 149
strigifinis Walker, *Dacus*, 202
Strumeta Walker, 148, 158
subsessilis (Bezzi), Callantra, 149
tillyardi (Perkins), *Dacus* (*Strumeta*), 158, 179, 183
transtillum (Hering), *Dacus* (*Strumeta*), 159, 184
tibialis Shiraki, *Zeugodacus*, 193
terminifer Walker, *Dacus* (*Zeugodacus*), 185, 192, 195
timorensis (Perkins), *Dacus* (*Zeugodacus*), 186, 194, 196
tetrachaetus (Bezzi), *Dacus* (*Zeugodacus*), 186, 196
trimaculatus n. sp., *Dacus* (*Zeugodacus*), 186, 194, 195
196
umbrosus Fabricius, *Dacus* (*Strumeta*), 158, 184
vespoides Doleschall, *Bactrocera*, 149
yayeyamanus Matsumura, *Dacus*, 157
Zeugodacus Hendel, 148, 165, 185
Zonatus Frogatt, *Dacus*, 169