

Taxonomy and Distribution of the Oriental Fruit Fly and Related Species¹ (Tephritidae-Diptera)

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Since the discovery of the oriental fruit fly, *Dacus (Strumeta) dorsalis* Hendel, in Hawaii, May 10, 1949, this species has received a great deal of attention and is now much better known than any other fruit fly from the oriental or Pacific regions. It also appears that there has been more confusion in the past with regard to the taxonomy of this species than with any other from these areas. *D. dorsalis* is rather variable in coloration and size but perhaps no more so than any other species of *Dacus* which has such wide geographic and ecologic ranges. The variations in this species have been carefully observed because of the opportunity we have had of studying hundreds of thousands of specimens (both laboratory reared and field collected) from numerous areas throughout its range. It now appears that the color markings of *dorsalis* are quite constant for individuals of the same age and habitat. Much of the confusion which has existed in the naming of this species has been brought about by the pale forms, and those which have atypical markings on the body. In the past a number of the important structural details have been overlooked and the identifications were based largely upon color characters. Because of this the species has often been misidentified and a number of other species have been included under the name *dorsalis*.

NOMENCLATURE

Much confusion still exists in the literature regarding the naming of the oriental fruit fly. It was originally named *Musca ferruginea* Fabricius (1794 : 342) and has been widely treated under the name *ferrugineus* in combination with various generic names: *Chaetodacus*, *Bactrocera*, *Strumeta*, and *Dacus*. The early workers evidently considered a wide range of variations in their concepts of this species. Froggatt (1909 : 81) said "it is in regards to coloration and size a very variable species, running from black in the thorax, and even the body, to reddish brown." Hendel (1912 : 18) first considered the dark forms as a distinct species when he described *Dacus dorsalis*, distinguishing it from *ferrugineus* by the black marking on the mesonotum. Most of the workers have considered *dorsalis* as a melanistic variety of *ferrugineus*: Bezzi (1916 : 104); Miyake (1919 : 88); Senior-White

¹Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Journal Series No. 1066.

(1924 : 7); Hendel (1927 : 28); Shiraki (1933 : 61); Zia (1937 : 119); Munro (1939 : 101); Pruthi (1945 : 27) and Hering (1952a : 42). Hering (1952b : 264) used *dorsalis* as a species name. Perkins (1938 : 123) considered *ferrugineus* and *dorsalis* as distinct species separated by the presence of black markings on the mesonotum of the latter and the absence of them on the former. The taxonomic studies of this complex conducted at the University of Hawaii (since 1948) have established that *ferrugineus* and *dorsalis* (as used in the past) are the same species and in view of the large numbers of individuals studied I see no logical reason for considering the pale and dark colored specimens as distinct varieties. There has been considerable insistence that two distinct forms do occur in India and Pakistan. These have never been demonstrated in the many thousands of specimens which our parasite explorers sent in from all over India and Pakistan, in my own observations in those countries, or in the specimens which I have borrowed for study from the Indian Museum and the government of India. In most cases where pale forms were present the individuals showed signs of tenacity. At the request of the Imperial Entomologist, Dr. H. K. Munro studied this question (1939 : 101-105). He examined the available material (a small series, only 39 specimens) and concluded that only one species was present and that the color variations he saw "from pale (brown) to blackish specimens" was normal from the species. Although he used the name *dorsalis* as a variety in the Indian populations he admitted that he had found no varietal characters except possibly the more blackened fore tibiae in specimens of the typical form from Formosa. I have found this character too variable to be of any value.

Other workers, excepting Dr. Alan Stone, U. S. Department of Agriculture, have apparently overlooked the fact that the name *ferrugineus* is not available for use. Fabricius described his species under the combination *Musca ferruginea* (1794). This name is preoccupied by *Musca ferruginea* Scopoli (1763).

The first synonym of *ferrugineus* Fabricius is *Dacus conformis* Doleschall (1859 : 78). This is preoccupied by *Dacus conformis* Walker (1857 : 34).

The next name which has been considered for the oriental fruit fly is *Dacus ferrugineus* var. *mangiferae* Cotes (1893 : 17). This name got into the literature quite by accident. Cotes had a series of specimens reared from mangoes, from Tirhoot, N. Bihar, which he said "proved to be identical with a specimen in the Museum [Indian] Collection previously identified by Mons. J. M. F. Bigot as closely allied to the species *Dacus ferrugineus* Fabr., they were therefore provisionally named *Dacus ferrugineus* var. *mangiferae*. They have since been compared by Mr. O. E. Janson with specimens in the British Museum and identified as belonging to the species *Dacus ferrugineus* Fabr." No description was given by Cotes but he did publish a figure of the adult fly and the puparium. Even though his material cannot be recognized from his figures the variety name *mangiferae* was validated by the publication of his indication. The original figure

could represent *D. dorsalis* Hendel [*ferrugineus*], *D. zonatus* (Saunders), or possibly other species. There is no indication of a costal band, apical spot, or well developed cubital streak; the wing maculations were either left off the original drawing or were lost in the reproduction. This probably accounts for Hendel (1927 : 28) considering *mangiferae* as a synonym of *zonatus*. Maxwell-Lefroy (1906 : 191 and 1907 : 227) used Cotes' original figures under the name *Dacus ferrugineus* and made no mention of *mangiferae*. Bezzi (1913 : 96) treats this as a variety of *ferruginea* distinguished by the paler coloring and by the shape of the abdomen which he said "is pointed at the end and distinctly narrower than the thorax." He admits that "it is very probable that this variety is based only on bred specimens, its pale coloring and peculiar abdomen shape depending only on immaturity." Dr. I. M. Newell (then University of Hawaii) checked the Indian Museum collection, in 1949, and located Cotes' cotypes under the name "*Dacus biguttatus* Bezzi n. sp." This evidently was just a cabinet name and was not published by Bezzi. Through the cooperation of Drs. S. L. Hora and M. L. Roonwal, (Indian Museum) I had the opportunity to study a pair of cotypes, a male and a female, from the Cotes series. The female was marked "figured" and is evidently the specimen from which Cotes' drawings were made. It was obvious that these were general specimens of *dorsalis* and no variation from the normal was evident, except that due to immaturity. The narrowed abdomen mentioned by Bezzi was probably caused by shrinkage, due to killing before the integument had hardened. In accordance with the present rules of Zoological Nomenclature the name *mangiferae* would be available, even though it was disregarded by its author. Fortunately the "Copenhagen Decisions on Zoological Nomenclature" (1953 : 26) covered this type of problem under "Recognition of the Principle of Conservation." Provisions were made to limit the law of priority to preserve any well known name which has been in general use for a considerable period (Refer: International Code, 1961, Art. 23b). Since the name *dorsalis* has become so well established in the economic, as well as the taxonomic, literature there would be no question of its preference.

The name *Dacus incisus* Walker (1860 : 323) has been of questionable status but its position has now been clarified (Hardy 1959 : 175). Bezzi (1916 : 105) and Hering (1938 : 5) considered this a subspecies of *ferruginea* Fab. If these conclusions were correct *incisus* would have priority over *dorsalis*. I recently studied the type of *incisus* in the British Museum collection and found it to be quite distinct from *dorsalis*. It fits nearer to *Dacus nigrotibialis* (Perkins) (from Malaya), the front femora are all black—the middle legs are missing—; the hind femora are black on the apical third and the face has a black band connecting the lateral spots.

The oriental fruit fly has been treated in the literature under a variety of generic names. It was first described under *Musca* (Fabricius, 1794 : 342) then transferred to *Dacus* (Fabricius; 1805 : 297). Doleschall (1859 :

122) described *Bactrocera conformis* Doleschall (syn. of *ferrugineus* Fabricius). Bezzi (1913 : 95) used the combination *Bactrocera ferruginea* Fabricius, yet in the same paper (pp. 89, 93) he proposed *Chaetodacus* as a new genus, with *ferrugineus* as its type. In 1916 (p. 104), and in later publications, Bezzi consistently used *Chaetodacus ferrugineus*. This combination has also been used commonly by other authors. Perkins (1937 : 54, and 1938 : 123–125) revised the Australian and oriental Dacinae and listed both names *dorsalis* and *ferrugineus* as distinct species under the generic name *Strumeta*. The combination of *ferrugineus* or *dorsalis* with *Strumeta* has also been used by Hering (1938 : 5, 1952a : 42, and 1952b : 264). I am convinced that the correct combination of names for this fly should be *Dacus (Strumeta) dorsalis* Hendel (see Hardy, 1949 : 181).

I have had an opportunity to study the Dacinae rather thoroughly over many years and have seen representatives (usually in very large series) of a great share of the genera, subgenera and species which occur throughout the Orient and Pacific. In view of my findings, it seems illogical to split *Dacus s. l.* into a large number of genera based only upon secondary sexual characters and single chaetotaxic characters. In the large series of specimens which we have studied, so much intergradation between some of these groups has been observed that the whole classification scheme seems of questionable value. For the most part, however, the characters are constant for the average individuals, with the aberrations appearing in a small enough portion of the population that it causes no confusion, except possibly where uniques, or few specimens are available for study. I prefer to treat these groups as subgenera under the genus *Dacus* (Hardy, 1951 and 1955). I do not approve of genera (of Dacini) based upon characters found only on the males, or upon the presence or absence of certain pairs of bristles, unless accompanied by other significant differences (common to both sexes).

DESCRIPTION OF DORSALIS

(Fig. 1a—f and 11e)

The oriental fruit fly may be briefly described as follows: *Dacus (Strumeta)* (those *Dacus s. l.* which possess one pair each of scutellar, prescutellar, and anterior supraalar bristles; a supernumerary lobe in the wings of the male (Fig. 1a) and rows of cilia on the third abdominal tergum of the male (Fig. 1f)), which have a large, oval to oblong black spot on each side of the face. The front one and one-half times wider than long and with two pairs of inferior fronto-orbitals and one pair of superior fronto-orbital bristles present (Fig. 1e). The mesonotum chiefly black or distinctly marked with black (in fully hardened specimens) and with a pair of broad postsutural yellow vittae (Fig. 1d). The scutellum all yellow, except for a narrow band of black at its base. Wings largely clear with the costal cells hyaline and with a well developed costal band extending to the wing tip about half way through cell R_5 , the band is not expanded at the apex and

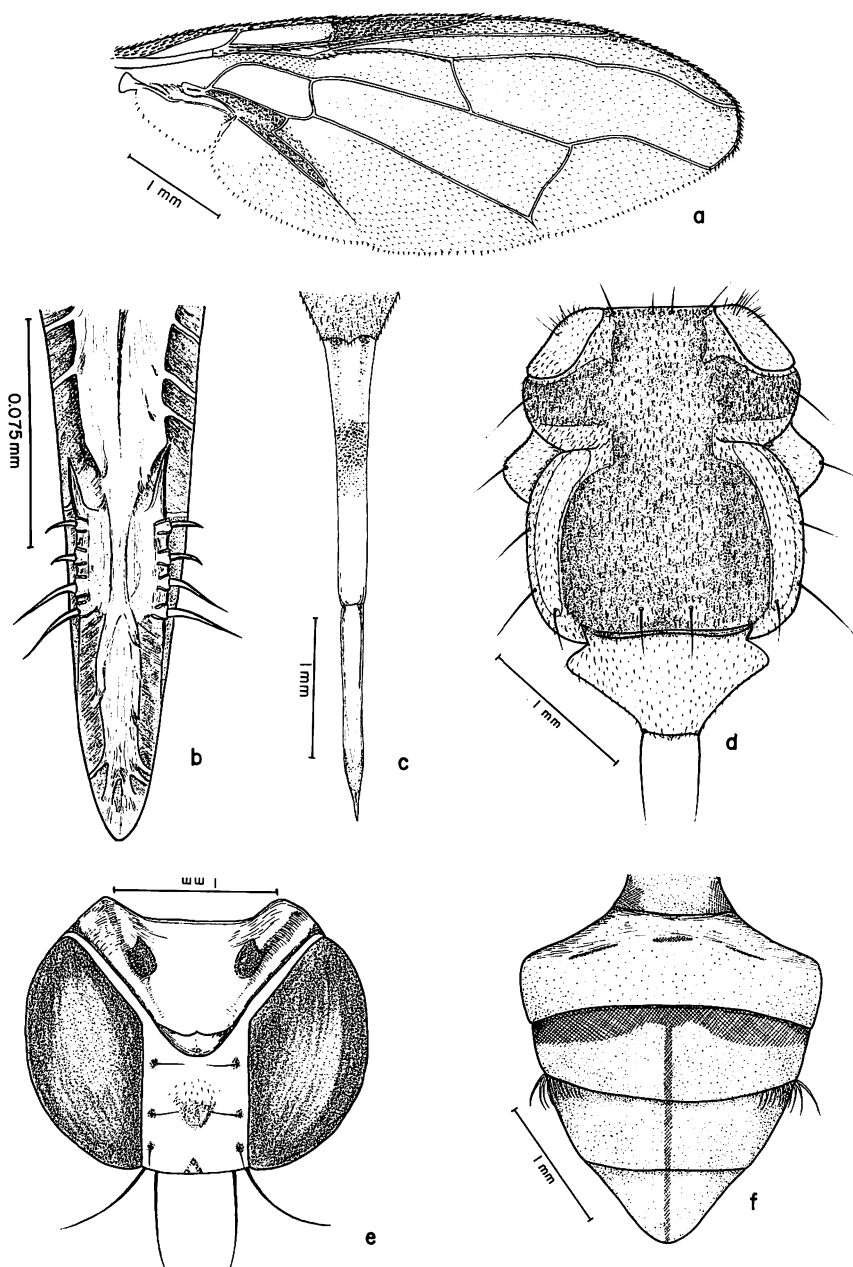


FIG. 1. a. wing; b. apex of ovipositor; c. ovipositor, last two segments; d. thorax, dorsal view; e. head, front view; f. abdomen of male.

usually does not extend into cell R_3 except at the wing margin (in the typical form) (Fig. 1a). The cubital streak distinct, but narrow and not filling more than one-half of the base of cell M_4 . In the male the narrowed portion of the cubital cell is about two times longer than that portion from the apex of the cell to the wing margin, in the female it is about equal in length to this portion. The femora predominantly yellow, sometimes slightly brownish to black at their apices, especially on the hind pair. The front and hind tibiae yellow-brown to brown and the middle pair yellow with brownish bases. The abdomen chiefly rufous with a narrow black band at the bases of terga two to three and a median black vitta extending longitudinally over terga three to five (Fig. 1f). The fourth and fifth terga with a spot of black at each anterior lateral margin. Distinctive genital characters have been found only in the females. The microscopic (oil immersion) characteristics of the tip of the male aedeagus appear to be significant but not practical to use diagnostically. The ovipositor is distinctive and the characteristics are most useful in separating the species of this complex. In *dorsalis* it is slender and sharp pointed (Fig. 1c). The basal segment, when viewed, *in situ*, from above, is about three-fourths as long as the fifth abdominal segment. When fully extended the ovipositor measures about 4.5–4.7 mm. The piercer measures approximately 1.5 mm. by .19 mm at its widest point. Two pairs of moderately long and two pairs of tiny preapical setae are present, situated well before the apex (.07 mm.) (Fig. 1b). The inversion membrane is about 1.8 mm. by .29 mm. at its widest point. The rasper extends to within .67 mm. of the base of the segment. The basal segment of the ovipositor (7th abdominal segment) is 1.38 mm. long by 1.1 mm. measured across its base. The spiracles are situated .3 mm. from the anterior lateral margins of the segment.

Length: body, 6.0–8.0 mm.; wings, 5.3–7.3 mm.

Type locality: Formosa

Type in the Deutsches Entomologisches Institut, Eberswalde, D. D. R.

Distribution: Widespread throughout India, Burma, Ceylon, Thailand, Indochina, Indonesia, the Philippines, Formosa, Ryukyu Islands, Micronesia, South China and Hawaii.

Hosts: This species has a very wide host range and apparently attacks almost all types of fleshy fruits. In Hawaii alone it has been recorded from at least 125 different hosts. The bulk of the material received from the field has been reared from Carambola, *Eugenia* spp., mango, and guava.

VARIETIES AND SUBSPECIES OF DORSALIS

The following varietal and subspecific combinations have been proposed for the oriental fruit fly.

Dacus ferrugineus* var. *mangiferae Cotes, 1893, Ind. Mus. Notes 3(1): 17–18, Fig.

A supposedly pale variety, based only upon teneral specimens and not a valid variety.

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

This is a distinct species and is discussed below under the species related to *dorsalis*.

Chaetodacus ferrugineus dorsalis (Hendel), Bezzi, 1916, Bull. Ent. Res. **7**: 104.

This is the so-called dark colored form of the oriental fruit fly, I see no advantage to considering these specimens as a distinct variety. As discussed above, the name *dorsalis* replaces the preoccupied name *ferrugineus*.

Chaetodacus ferrugineus incisus (Walker), Bezzi, 1916, Bull. Ent. Res. **7**: 105.

Bezzi separated *incisus* from the typical form by its having the thorax entirely black, except for the usual yellow markings, and the scutellum with a rather distinct dark colored spot at the apex. In his key he says "a distinct darkish spot [is present] at the end of the scutellum." In his description he says "the spot at the end of the scutellum is not defined, but in certain lights is rather distinct and pellucid," Bezzi's mention of a scutellar spot is misleading, I find no such spot on the specimens I have studied. In specimens of other fruit flies in which the scutellum was pellucid (due to immaturity) I have seen an illusion of discoloration (in some lights) due to the visibility of the dark colored metanotum beneath, or to the septum within the scutellum. As discussed above, *incisus* has been found to represent a distinct species from *dorsalis*.

Chaetodacus ferrugineus var. **versicolor** Bezzi, 1916, Bull. Ent. Res. **7**: 105. **New synonym** of *Dacus dorsalis* Hendel.

Bezzi said this is "very like typical *ferrugineus*, but at once distinguished by the coloration of the scutellum; this is darkened in the middle and at the end, and bears two broad yellowish spots, one on each side, but this coloration is sometimes faintly developed, the scutellum being pellucid perhaps as a result of immaturity." He also says that "in the wings the dark costal border is not complete, and even sometimes wanting." I have examined a cotype and other specimens in the British Museum (Natural History) determined by Bezzi as *Chaetodacus ferrugineus* var. *versicolor*. I have also studied numerous specimens from the type locality and many other localities in Ceylon and South India. This is obviously just an aberration of *dorsalis* and there is no reason to consider it a distinct variety. The characteristics of the scutellum noted by Bezzi are due to tenacity. The costal band varies from obsolete beyond the fourth costal section to completely brown, depending upon the maturity of the individual. Bezzi's specimens evidently were all teneral.

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

This is a distinct species and is discussed below under the species related to *dorsalis*.

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

This variety is distinguished from typical *dorsalis* by the broader costal band in the wing. The band extends along the underside of vein R₃ nearly half way through the upper portion of cell R₂ (Fig. 2). This is the common form of *dorsalis* which occurs in the Philippines and I had considered it a geographically distinct subspecies until I found it overlapping with the typical form in Malaya and Indonesia. So much intergradation is evident in the Malayan specimens that it is not practical to attempt to separate *occipitalis* from *dorsalis* in this region.

Chaetodacus ferrugineus tryoni Froggatt, Bezzi, 1928, Diptera of the Fiji Islands, London, 101.

This was an error on Bezzi's part. *Dacus (Strumeta) tryoni* (Froggatt) is a distinct Australian species, not related to *dorsalis*.

Chaetodacus ferrugineus var. **okinawanus** Shiraki, 1933, Mem. Fac. Sci. Agr., Taihoku Imp. Univ. 8(2): 62; 1968, Smiths. Inst. U. S. Nat. Mus. Bul. 263: 23, pl. 9, Figs. 1-16. **New synonym** of *Dacus (Strumeta) dorsalis* Hendel.

Shiraki's variety was based upon supposed differences in the shapes of the palpi and the antennae. I have studied these characteristics in detail throughout large series and feel that the slight differences depicted by Shiraki are completely insignificant. Variations in the amount of shrinkage which has occurred in the segments, degree of teneralty and particularly the angle from which they are viewed would account for the differences seen by Shiraki.

DACUS (STRUMETA) SPECIES RELATED TO DORSALIS

The following characteristics delimit the *dorsalis* complex of species, according to my concept, based largely upon characters which would be usable in the field.

Head: Front about one and one-half to two times longer than wide and with two pairs of inferior fronto-orbital bristles and face with two black spots. *Thorax*: Humeri yellow. Mesonotum predominantly black or distinctly marked with black (in mature specimens) and with two post-sutural yellow vittae. The scutellum is yellow except for a narrow band of black across its base. The humeri and postalar calli are not joined by a yellow band. *Wings*: First two costal cells devoid of microtrichia except in the apices of the second cell. Costal band moderate to broad and not expanded at the wing apex. No transverse marks in wings. *Abdomen*: Predominantly rufous, with a black band across the base of the third tergum and with a black vitta extending longitudinally down the middle of at least terga three and four.

Sixteen known species belong in this complex.

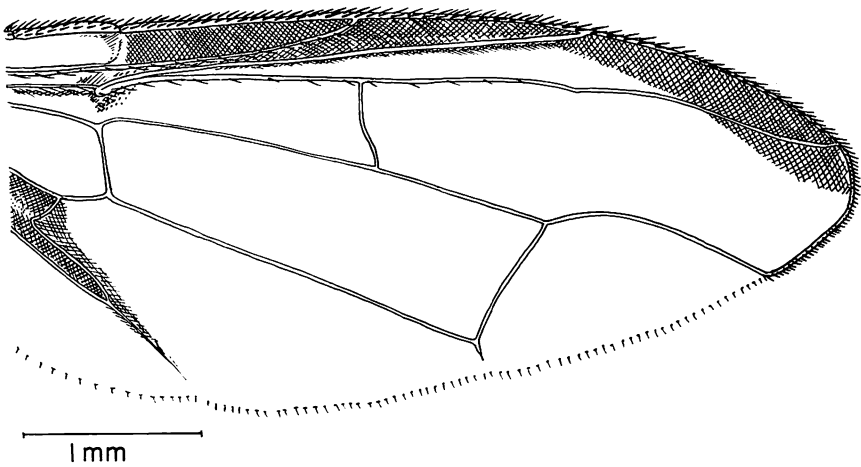


FIG. 2. *D. dorsalis* var. *occipitalis* Bezzi: wing.

KEY TO KNOWN SPECIES BELONGING IN THE DORSALIS COMPLEX

1. Costal band very broad, extending through all or nearly all of cell R_3 , usually along the top margin of vein R_{4+5} for its full course (Fig. 10a).....2
- Costal band narrower, extending below vein R_3 only on the costal margin, except in *dorsalis* var. *occipitalis* (Bezzi) in which it extends slightly into the upper portion of cell R_3 (Fig. 2).....4
2. First two costal cells yellowish fumose. Femora entirely yellow to rufous.....3
- First two costal cells hyaline. Femora broadly blackened at their apices. Ovipositor as in Figs. 10b and 10c. Philippine Islands *limbiferus* (Bezzi)
3. Mesonotum chiefly black. Apical half of second costal cell filled with microtrichia. Ovipositor short and stubby. (Figs. 5a and 5b), as seen from above (*in situ*), the basal segment is not over one-half as long as the fifth abdominal segment...Australia *bryoniae* (Tryon)
- Mesonotum largely brownish red with a pair of submedian black vittae. Microtrichia present only at the extreme apex of the second costal section. Ovipositor very elongate (Figs. 13a and 13b), *in situ* the basal segment is equal or longer than the fifth abdominal segment...Indonesia, Solomon Islands, New Britain..... *moluccensis* (Perkins)
4. Front and middle femora chiefly or entirely yellow. The postsutural yellow vittae on the mesonotum extend to or beyond the inner supraalar bristles. The shining areas on the fifth tergum are rufous.....5

- Front and middle femora extensively brown to black. The postsutural yellow vittae end in front of the inner supraalar bristles. The shining areas on the fifth tergum are black...
Philippine Islands.....*luzonae* Hardy and Adachi
5. Mesonotum rufous except for a black median longitudinal vitta and a black spot in front of the scutellum (Fig. 6a). Ovipositor as in Figs. 6a and 6b...Australia.....*cacuminatus* (Hering)
Mesonotum without a median black vitta.....6
 6. First costal cell yellow fumose. Extreme apex of ovipositor indistinctly trilobate (Fig. 17b), ovipositor also as in Fig. 17a...New Britain, New Guinea.....*rutilus* (Hering)
Costal cells hyaline. Ovipositor not as above.....7
 7. Mesonotum all black except for the usual yellow marks.....10
Mesonotum largely rufous, especially in the anterior median portion, with submedian longitudinal black markings.....8
 8. Area of mesonotum behind each humerus black (Fig. 3a). Front and middle tibiae and apices of front largely brown to black. Ovipositor as in Figs. 3b and 3c...Malaya
.....*arecae* Hardy and Adachi
Area of mesonotum behind each humerus yellow to rufous. Front and middle tibiae and all femora yellow.....9
 9. Submedian vittae of mesonotum narrow, demarking a broad yellowish band extending the full length of the mesonotum. *In situ* the visible portion of the ovipositor (dorsal view) is scarcely half as long as the fifth segment. The longitudinal black vitta not extending over the fifth tergum. Ovipositor as in Figs. 4a and 4b...Australia.....*breviacleus* Hardy
Mesonotal vittae more broad, median portion discolored, blackish posteriorly. *In situ* the ovipositor is equal or longer than the fifth abdominal segment. The median vitta on the abdomen extends over the fifth tergum. Ovipositor as in Figs. 12a and 12b...Australia.....*mayi* Hardy
 10. Ovipositor distinctly trilobed at apex (Fig. 16c)...Malaya.....
.....*propinquus* Hardy and Adachi
Ovipositor normal, not trilobed.....11
 11. *In situ* the basal segment of the ovipositor (measured from above) is slightly longer than the fifth abdominal segment. The extended ovipositor measures approximately 6.0 mm., Figs. 15a and 15b...Malaya, Philippine Islands, Indonesia.....
.....*pedestris* (Bezzi)
The basal segment (*in situ*) is about one-half to three-fourths as long as the fifth segment. The extended ovipositor does not measure more than 4.7 mm.....12
 12. Ovipositor abruptly tapered beyond the opening of the oviduct,

- Figs. 14a and 14b...Borneo.....*muiri* Hardy and Adachi
Ovipositor not as above.....13
13. Cubital streak broad, filling all of the base of cell M_4 up to the apex of the m-cu crossvein. Ovipositor as in Figs. 9a and 9b...Australia..... *endiandrae* (Perkins and May)
Cubital streak comparatively narrow, occupying only the lower portion of cell M_4 and extending scarcely to the base of the m-cu crossvein (Fig. 1a).....14
14. The extended ovipositor measures 4.5–4.7 mm.; the apex is narrowed to a slender point (Fig. 1c). The postsutural yellow vittae on the mesonotum are broad and parallel sided, and extend slightly beyond the inner supraalar bristles (Fig. 1d). At least the middle tibiae are all yellow...widespread throughout the southern oriental regions and much of the southwest and western Pacific and Hawaii...*dorsalis* Hendel.....14a
The ovipositor is very short, when fully extended it measures 2.9–3.4 mm. The apex is tapered gradually and is comparatively broad (Figs. 7b and 8a). The yellow vittae on the mesonotum are wedge-shaped and end before the inner supraalar bristles (Fig. 7a) The tibiae are discolored with brown.....15
- 14a. Costal band not extending below vein R_3 except at wing apex...widespread over the orient and Pacific.....*dorsalis dorsalis* Hendel
Costal band extending along the underside of vein R_3 throughout its length...from the Philippines to Malaya.....
.....*dorsalis* var. *occipitalis* (Bezzi)
15. The basal segment of the ovipositor (1.1 mm.) is longer than the inversion membrane (.91 mm.) or the piercer (.91 mm) (Fig. 8a). The piercer is more broad (.18 mm. in width) (Fig. 8b), and the rasper extends to within .15 mm. of the base of the inversion membrane. The apical third of each femur is brownish and the humeri are bordered with red...Philippine Islands
.....*dorsaloides* Hardy and Adachi
The basal segment (1.0 mm.) is shorter than the inversion membrane (1.21 mm.) or the piercer (1.2 mm.) (Fig. 7b). The piercer is narrower (.13 mm. wide) (Fig. 7c) and the rasper extends to within .36 mm. from the base of the segment. The femora are yellow to rufous and the humeri are bordered by black...Philippine Islands.....*cognatus* Hardy and Adachi

Dacus (Strumeta) arecae Hardy and Adachi (Fig. 3a–d)

Dacus (Strumeta) arecae Hardy and Adachi, 1954, Pac. Sci. **8**(2): 161.

This species is very similar to *D. dorsalis*, differing chiefly in its smaller size and consistently paler color. The anterior median portion of the mesonotum is yellow to rufous, with brown to black submedian marks extending longitudinally (Fig. 3a). The portions of the pleura which are

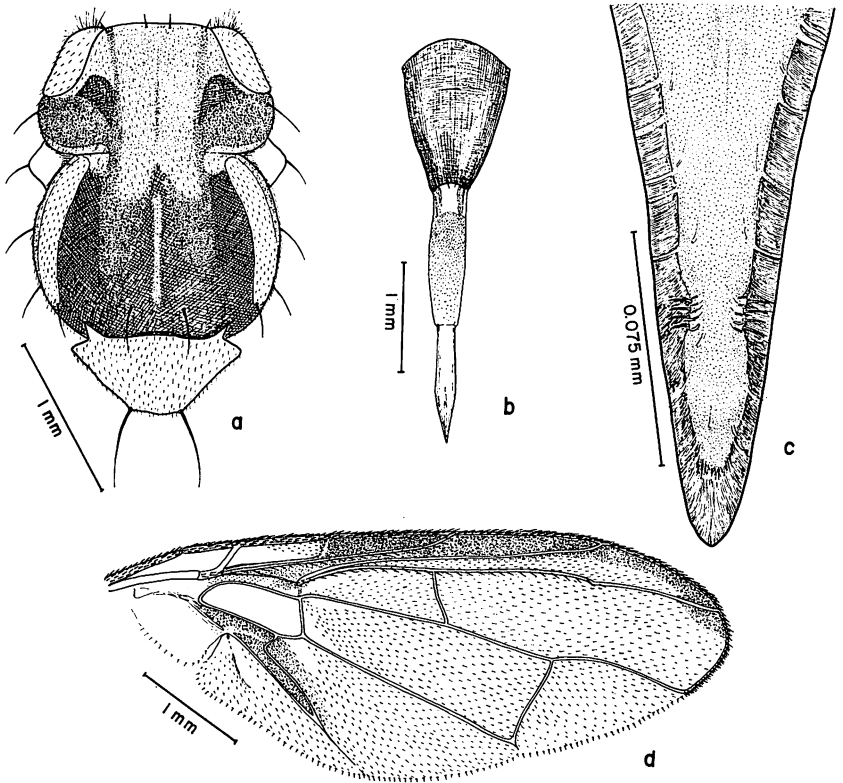


FIG. 3. a. thorax, dorsal; b. ovipositor, full length; c. apex of piercer; d. wing.

black in *dorsalis* are yellow-brown in *arecae*. The wings (Figs. 3d) are similar to *dorsalis*, the third section of the costa (stigma) is distinctly shorter in *arecae* than in *dorsalis*, being about one-fifth longer than the second costal section and approximately three-sevenths longer than the second in *dorsalis*. The short stubby ovipositor of the female (Fig. 3b) is also characteristic. The extended ovipositor measures about 3.5 mm. The preapical setae on the piercer are small and inconspicuous, the four pairs are equal in size (Fig. 3c) and the distal pair is situated approximately .07 mm. from the tip of the piercer.

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

Type locality: Singapore.

Type in the United States National Museum.

Distribution: Known only from Malaya.

Hosts: All specimens, except one, have been reared from *Areca catechu* L. One specimen was labeled ex *Cananga odorata* (Lam.), this may have been an error.

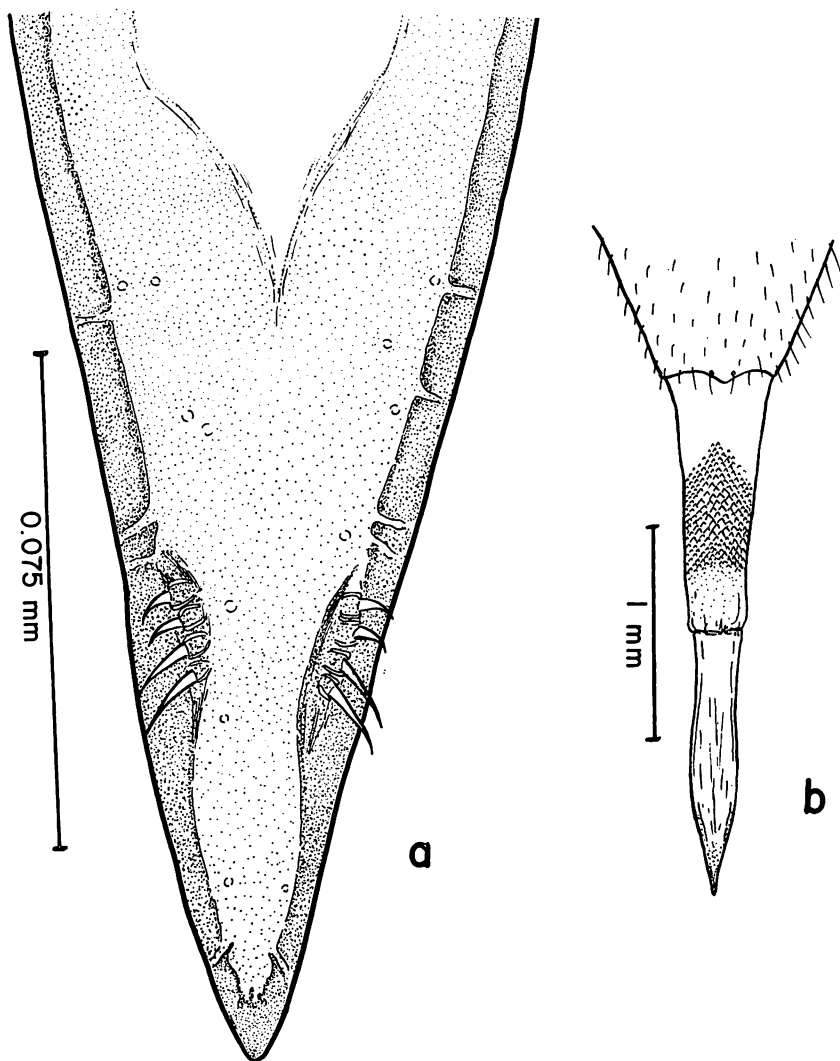


FIG. 4. a. apex of piercer; b. ovipositor, last two segments.

Dacus (Strumeta) breviaculeus Hardy (Fig. 4a-b)

Dacus (Strumeta) breviaculeus Hardy, Pac. Sci. 5(2): 145-148, Figs. 12a-c.

This is a comparatively pale species easily differentiated from *dorsalis* by the largely yellow to rufous mesonotum, with only a pair of narrow brown to black submedian vittae and by the very short ovipositor (Fig. 4b). It more closely resembles *D. arecae* than any other known species but is differentiated by having the area behind each humerus yellow to rufous, not black, and by the all yellow femora and front and middle tibiae. In

arecae the front and middle tibiae and the apices of the front femora are largely brown to black. *D. breviaculeus* also fits near *mayi* Hardy and is best differentiated by the details of the ovipositor and by the coloration of the mesonotum and abdomen. The broad yellow-red median band which extends the full length of the mesonotum, the lack of a brown to black median vitta over abdominal segment five and the very short ovipositor will separate it. The visible portion of the ovipositor, *in situ* (viewed from above), is about half as long as the fifth abdominal segment. When fully extended (Fig. 4b) the ovipositor measures approximately 2.5 mm. Two moderately large and two tiny preapical seate are present on the piercer (Fig. 4a); the distad pair are about .05 mm. from the tip.

Length: body, 6.0 mm.; wings, 5.2 mm.

Type locality: Near Atherton, Queensland

Type in the United States National Museum.

Distribution: Known only from Queensland, Australia.

Hosts: Predominantly *Glochidion harveyanum* Domin. A few specimens have been reared from guava (*Psidium guajava* L.).

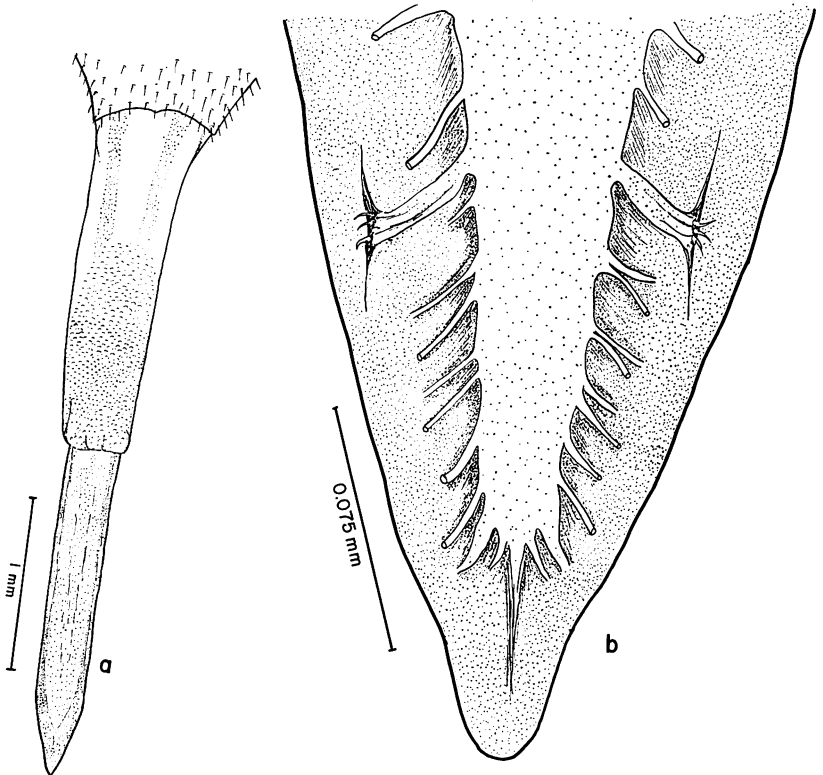


FIG. 5. a. ovipositor, last two segments; b. apex of piercer.

Dacus (Strumeta) bryoniae (Tryon) (Fig. 5a-b)

Chaetodacus bryoniae Tryon, 1927, Proc. Roy. Soc. Queensland **39**(14): 192.

Dacus (Strumeta) bryoniae (Tryon), Hardy, 1951, Pac. Sci. **5**(2): 148-149, Figs. 13a-b.

This species belongs in the group which has a broad costal band extending through all or nearly all of cell R_3 and the first two costal cells yellow fumose. It appears to be closest to *D. moluccensis* (Perkins). It differs by having the mesonotum chiefly black and the apical half of the second costal cell filled with microtrichia; also the ovipositors are strikingly different as shown in Figs. 5b and 13b. This species is comparatively large, chiefly black bodied, and is easily differentiated from all other *Strumeta* by the broad costal band and by the characteristic development of the ovipositor. *Ovipositor*: Short and inconspicuous. *In situ*, the visible portion is shorter than the fifth abdominal segment. When fully extended (Fig. 5a) it measures approximately 5.3 mm.; and is very broad compared to its length. The preapical setae on the piercer are tiny and inconspicuous (Fig. 5b), visible only under oil immersion. There appear to be three pairs of setae, the most distad pair is approximately .2 mm. from the apex of the piercer.

Length: body, 7.8-8.0 mm.; wings, 7.0-7.2 mm.

Type locality: Blackall Range, Brisbane District, Australia.

Type in the Queensland Museum.

Distribution: Known from Queensland and New Guinea.

Hosts: *Bryonopsis lacinosa* (L.) (= *Bryonia lacinosa*). All of the specimens which I have seen have been reared from this host. Tryon said it is also associated with *Melothria cunninghamii* (F. Muell.), May (1953: 50) also recorded it from *Melothria maderaspatana* (L.): *Passiflora foetida* L. and *P. suberosa* L., and (1963: 74) from *Capsicum* sp.

Dacus (Strumeta) cacuminatus (Hering) (Fig. 6a-c)

Strumeta cacuminata Hering, 1941., Ann. Mus. Nat. Hung. **34**: 46-47.

Chaetodacus dorsalis Tryon, nec. Hendel, 1927, Proc. Roy. Soc. Queensland, **38**(14): 194-196 (also listed, p. 195, as var. *major* Tryon).

Strumeta solani Perkins and May, 1949, Univ. Queensland Dept. Biol. **2**(14): 14-16.

Dacus (Strumeta) cacuminatus Hering, Hardy, 1951, Pac. Sci. **5**(2): 149-152, Figs. 14a-e.

This species has been treated many times in the Australian literature and much confusion has centered around its nomenclature. It has been commonly known as the "Solanum fly" because of its apparent host specificity for two species of *Solanum*. It has appeared in the literature under the specific names *dorsalis*, *ferrugineus*, *tryoni*, and *solani*. The name *solani* was used by a number of the early workers (Jarvis, 1922 and 1926; Froggatt, 1924; Perkins and Hardy, 1925) in a varietal sense under the names *Dacus tryoni* and *Dacus ferrugineus*. The species was long misnamed in the litera-

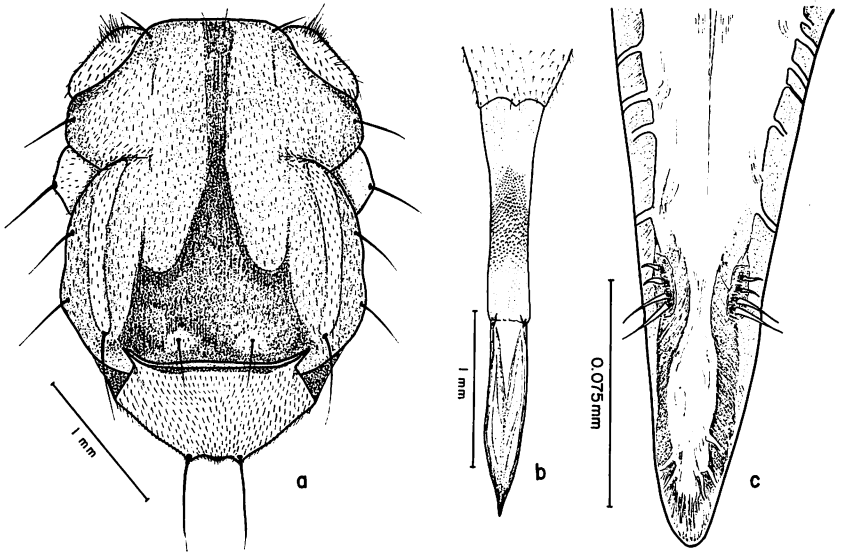


FIG. 6. a. thorax, dorsal; b. ovipositor, last two segments; c. apex of piercer.

ture as the oriental fruit fly until Hering (1941) pointed out that it was a distinct species and described it as *cacuminatus*. His description was apparently overlooked by the Australian workers and the species was again described as new under the name *Strumeta solani* by Perkins and May (1949). *D. cacuminatus* is readily differentiated from all other species in the *dorsalis* complex by the presence of a black longitudinal vitta extending down the middle of the mesonotum (Fig. 6a). In other respects it is rather similar to *dorsalis* except that the ovipositor characters are distinctive (see Figs. 6b and 6c). *Ovipositor*: *In situ*, the visible portion of the ovipositor is about equal in length to the fifth abdominal segment. When fully extended (Fig. 6b) it measures approximately 3.7 mm. The preapical setae on the piercer are inconspicuous, two moderately long and two short setae are developed (Fig. 6c). The most distad pair is approximately .07 mm. from the apex of the piercer.

Length: body, 6–7 mm.; wings, 5.5–6.4 mm.

Type locality: Brisbane, Australia.

Type in the Hungarian National Museum.

Distribution: This species has been recorded from numerous localities in Australia. It is especially common throughout Queensland.

Hosts: The species is associated with two common species of wild tobacco in Australia, *Solanum verbascifolium* L. and a *S. auriculatum* Ait. One specimen has been seen which was labeled “ex *Rhipogonum papuanum*” White, this is probably an error. May (1953 : 50) also recorded it from

Capsicum frutescens L. (an unconfirmed record); *C. frutescens* var. *grossum* Bail.; *Lycopersicon esculentum* (an uncommon host) and *Solanum seafortianum* Andr.

Dacus (Strumeta) cognatus Hardy and Adachi (Fig. 7a-c)

Dacus (Strumeta) cognatus Hardy and Adachi, 1954, Pac. Sci. **8**(2): 162.

This species is closely related to *dorsalis* and can be satisfactorily separated only by the details of the ovipositors. If the specimens are fully hardened the markings of the mesonotum and abdomen appear to be distinctive but it is not felt that they can be wholly relied upon. The postsutural yellow vittae on the mesonotum are wedge-shaped (Fig. 7a) and end slightly before the inner supraalar bristles. The area around the inner supraalars is yellow-brown, contrasting with the bright yellow coloring of the vittae. In *dorsalis* the vittae are broad, parallel sides, 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 I have seen have been consistently smaller than *dorsalis*. The ovipositor is distinctively shorter and the apex is more broad than in *dorsalis* (c.f. Figs. 7c and 1b and refer to the measurements of the ovipositors of both species). The female specimens can readily be distinguished by the comparatively broad apex of the ovipositor. The basal segment of the ovipositor *in situ* is about three-fourths as long as the fifth abdominal segment. The ovipositor is short (Fig. 7b), when fully extended it measures approximately 3.4 mm. The piercer is evenly tapered to its apex (Fig. 7c). The preapical setae are tiny and inconspicuous. The four pairs are approxi-

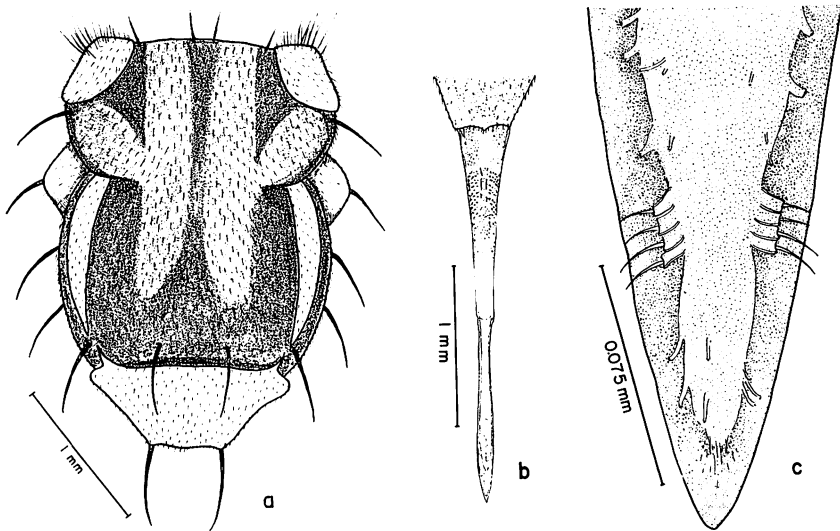


FIG. 7. a. thorax, dorsal; b. ovipositor, last two segments; c. apex of piercer.

mately equal in size and the distad pair is situated about .08 mm. from the tip.

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

Type locality: Los Banos, Philippine Islands.

Type in the United States National Museum.

Distribution: Known only from Luzon, Philippine Islands.

Hosts: Some of the specimens in the type series were labeled ex *Eugenia* sp.? No host information was given on the other specimens

Dacus (Strumeta) dorsaloides Hardy and Adachi (Fig. 8a–b)

Dacus (Strumeta) dorsaloides Hardy and Adachi, 1954, Pac. Sci. **8**(2): 167, Fig. 9a–b.

This species is very close to *D. dorsalis* Hendel and to *D. cognatus* Hardy and Adachi and it is best differentiated by the characteristics of the ovipo-

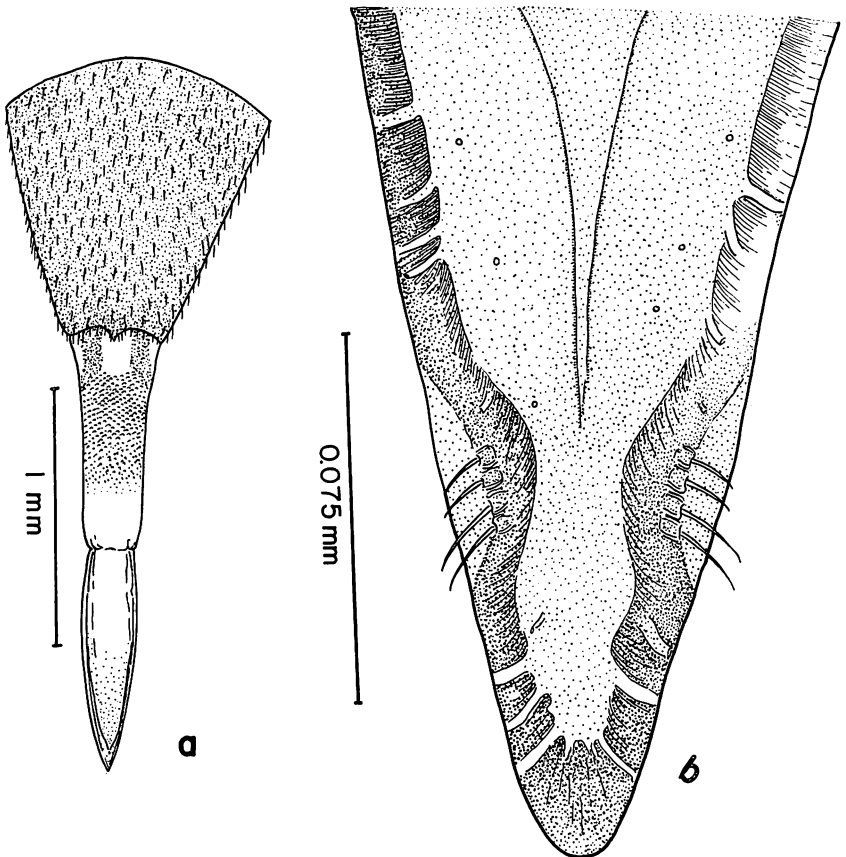


FIG. 8. a. ovipositor, full length; b. apex of piercer. *Dacus (S.) endiandrae* (Perkins and May)

sitor. 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 that species. The tibiae are 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. This is especially distinctive because of the basal segment being longer than the inversion membrane or the piercer. *In situ*, the basal portion is not quite three-fourths as long as the fifth abdominal segment. When fully extended, the entire ovipositor (Fig. 8a) measures approximately 2.92 mm. The piercer tapers gradually to the apex and is rather broad and blunt at the tip (Fig. 8b). Two moderately long and two tiny preapical setae are present, the distad pair is situated approximately .05 mm. from the tip.

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

Type locality: Makiling, Philippine Islands.

Type in the United States National Museum.

Distribution: Known only from Luzon, Philippine Islands.

Host: It has been reared only from the fruits of *Planchonella macranthum* (Merr.).

Dacus (*Strumeta*) *endiandrae* (Perkins and May) (Fig. 9a–b)

Strumeta endiandrae Perkins and May, 1949, Univ. Queensland, Dept. Biol. 2(14): 9–10.

Dacus (Strumeta) endiandrae (Perkins and May), Hardy, 1951, Pac. Sci. 5(2): 152–154, Figs. 15a–b.

In general characteristics and coloration this species is much like *dorsalis* and is evidently the nearest thing to this species that occurs in Australia. *D. endiandrae* is distinguishable from *dorsalis* by the very broad cubital streak and by the more elongate cubital cell in the wing. Comparison of the ovipositors show close relationship but specific differences are evident. The piercer is shorter in *endiandrae*, the setae are farther from the apex of the piercer, and the scales of the rasper extend nearer to the base of segment eight than they do in *dorsalis* (c.f. Figs. 9a and 1c). The cubital streak fills all of the basal portion of cell M_4 , extending as far as the apex of m-cu crossvein. *In situ*, the basal segment of the ovipositor extends about as far as the length of the fifth tergum. When fully extended (Fig. 9a) the ovipositor measures approximately 3.6 mm. in length. Two moderately long and two short preapical setae are situated on the piercer (Fig. 9b). The distad pair is about .06 mm. from the tip.

Length: body, 5.8–6.5 mm.; wings, 5.1–5.9 mm.

Type locality: No type or type locality was designated in the original description. The specimens were from Cairns and Mossman, Queensland.

Location of cotypes: University of Queensland.

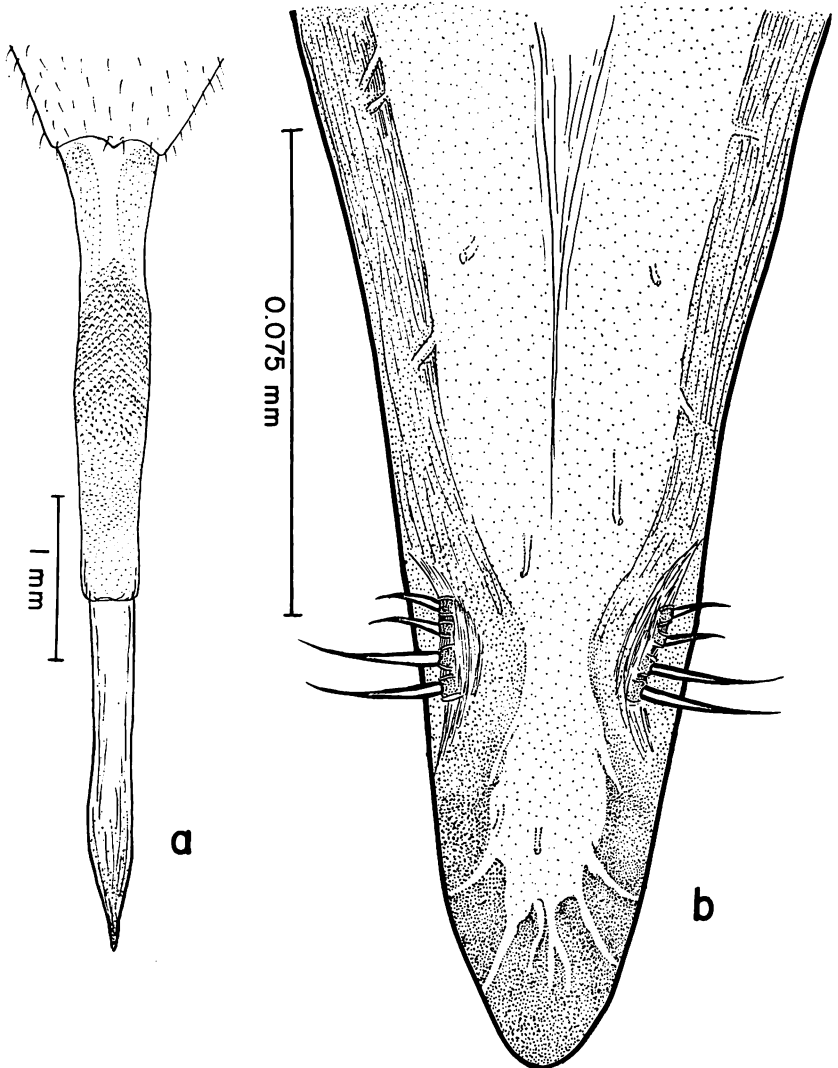


FIG. 9. a. ovipositor, last two segments; b. apex of piercer.

Distribution: Evidently widespread throughout Queensland.

Hosts: The cotypes were reared from *Endiandra discolor* Benth. and *Cryptocarya erythroxylon* Maid. and Betche. I have recorded this from the following hosts: *Endiandra tooram* Bail., *Beilschmiedia obtusidolia* (F. Muell.), and *Acmena macrocarpa* C. T. White. May (1953 : 51) also recorded it from *Cananga odorata* (Lam.) and *Endiandra* sp.

Dacus (Strumeta) limbiferus (Bezzi) (Fig. 10a-c)

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

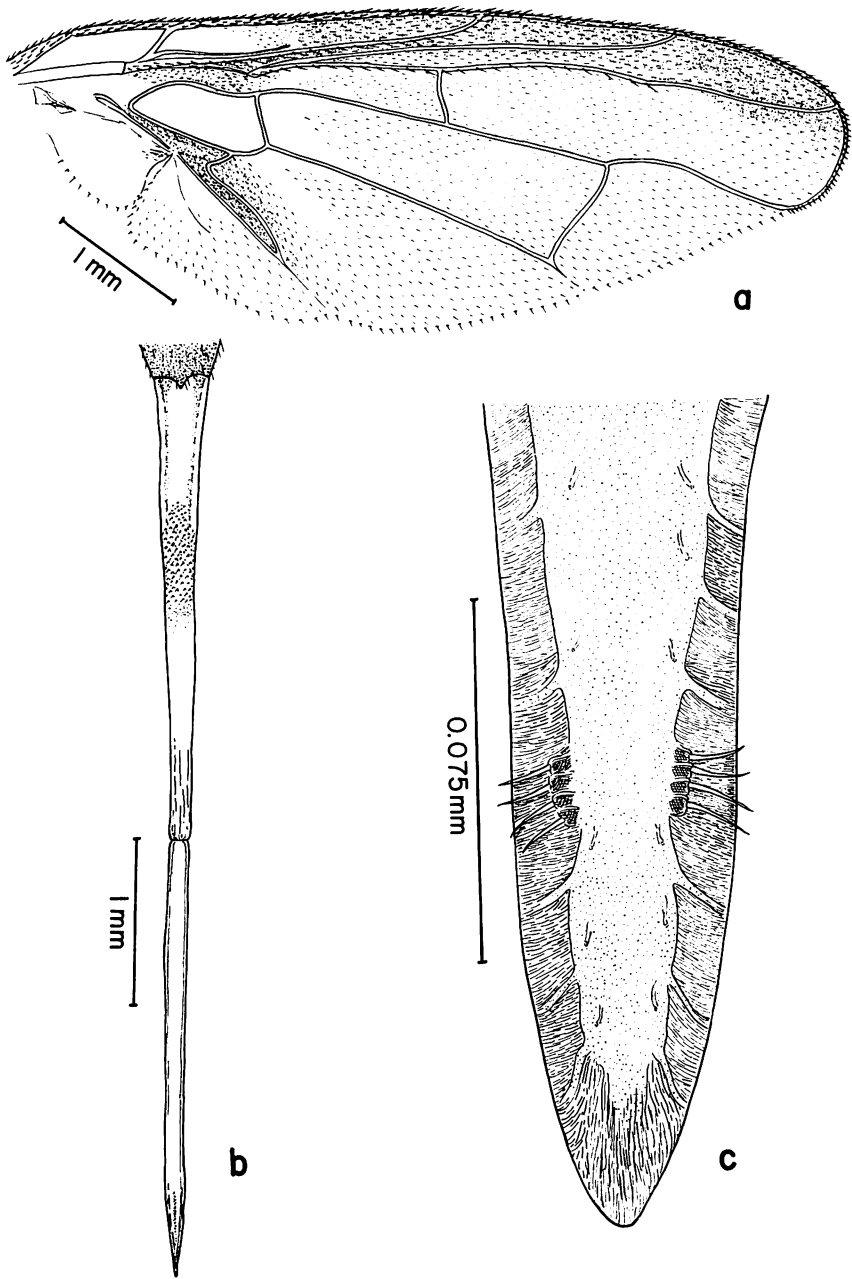


FIG. 10. a. wing; b. ovipositor, last two segments; c. apex of piercer.

Strumeta pedestris var. *limbiferus* (Bezzi), Perkins, 1938, Proc. Roy. Soc. Queensland, **49**(11): 126, Fig. 14a-c.

Dacus (*Strumeta*) *limbiferus* (Bezzi), Hardy and Adachi, 1954, Pac. Sci. **8**(2): 172.

This species is readily distinguished from *dorsalis* and related species by the broad costal band in the wings (Fig. 10a), by the elongate ovipositor (Fig. 10b), and the broadly blackened apices of the femora. It fits the description of *dorsalis* in most other details. The first two costal cells are hyaline and devoid of microtrichia except at the apical portion of the second cell. The costal band extends through all of cell R_3 and the cubital streak fills all of the basal portion of cell M_4 . The basal segment of the female ovipositor is about one and one-half times longer than segment 5 as seen from a direct dorsal view, *in situ*. When fully extended (Fig. 10b) the ovipositor measures about 6.8 mm. The piercer is slender and sharp pointed and the preapical setae are tiny and difficult to discern except under high power (Fig. 10c). The setae are situated about .075 to .1 mm. from the apex of the piercer.

Length: body, 6.5-7.3 mm.; wings, 6.0-6.5 mm.

Type locality: Panay, Antique Prov., Batbatan Island, Philippine Islands.

Location of type: Museo Civico di Storia Nat., Milano.

Distribution: Known from a number of localities on Mindanao and Panay, Philippine Islands.

Hosts: This species has been reared only from the fruit of *Dracontomelum dao* (Blanco).

Dacus (**Strumeta**) **luzonae** Hardy and Adachi (Fig. 11a-d)

Dacus (*Strumeta*) *luzonae* Hardy and Adachi, 1954, Pac. Sci. **8**(2): 174.

This species is closely related to *dorsalis* and is difficult to separate on the basis of structural differences. It differs considerably in coloration and is easily distinguished by a number of characteristics. It has the front and middle femora predominantly brown to black, rather than yellow; the post-sutural yellow vittae, on the mesonotum, end just before the inner supraalar bristles (Fig. 11a), rather than beyond them. The facial spots are much more enlarged and extend to the oral margins (Fig. 11b). The sides of the abdomen are more extensively blackened and a large black spot is present on each side of the fifth tergum (Fig. 11c). The pollinosity of the mesonotum is also arranged in a definite pattern (Fig. 11a), 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. 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. 11d). In *dorsalis* the r-m is curved, is about one-third longer than the basal section of M_{1+2} and about two-thirds as long as that section from r-

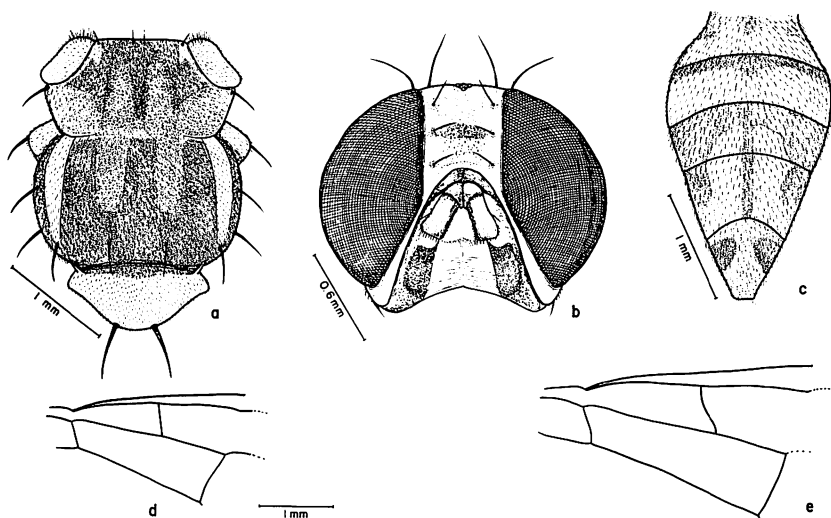


FIG. 11. a. thorax, dorsal; b. head, front view; c. abdomen; d. middle portion of wing; e. middle portion of wing of *D. dorsalis*, a for comparison.

m to m (Fig. 11e). The ovipositors are similar in the two species but appears to be consistently smaller in *luzonae*. The extended ovipositor measures approximately 4.0 mm. in length.

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

Type locality: Luzon, Philippine Islands.

Type in the United States National Museum.

Distribution: Known only from Luzon.

The host is unknown.

Dacus (Strumeta) mayi Hardy (Fig. 12a–b)

Strumeta bilineata Perkins and May, 1949, Univ. Queensland, Dept. Biol.

2(14): 7–8. This name is preoccupied in *Dacus* by *bilineatus* Walker, 1860, Proc. Linn. Soc. Lond. 4: 150.

Dacus (Strumeta) mayi Hardy, 1951, Pac. Sci. 5(2): 161–162, Figs. 20a–b.

This species is most closely related to *D. breviaculeus* Hardy and is distinguished by the more extensively blackened mesonotum; the posterior median portion is blackened rather than with narrow brown to black submedian vittae and a broad yellow to rufous band extending the full length of the mesonotum. *In situ* the visible portion of the ovipositor is equal or longer than the fifth abdominal segment, not scarcely one-half, as long as in *breviaculeus*, and the longitudinal black vitta on the abdomen extends over the fifth tergum, not ending at tergum four. The ovipositor is short and thick (Fig. 12a) and when fully extended measures 3.5–3.7 mm. Four pairs of tiny inconspicuous setae are present, all approximately equal in size (Fig. 12b). The distad pair is situated about .05 mm. from the apex.

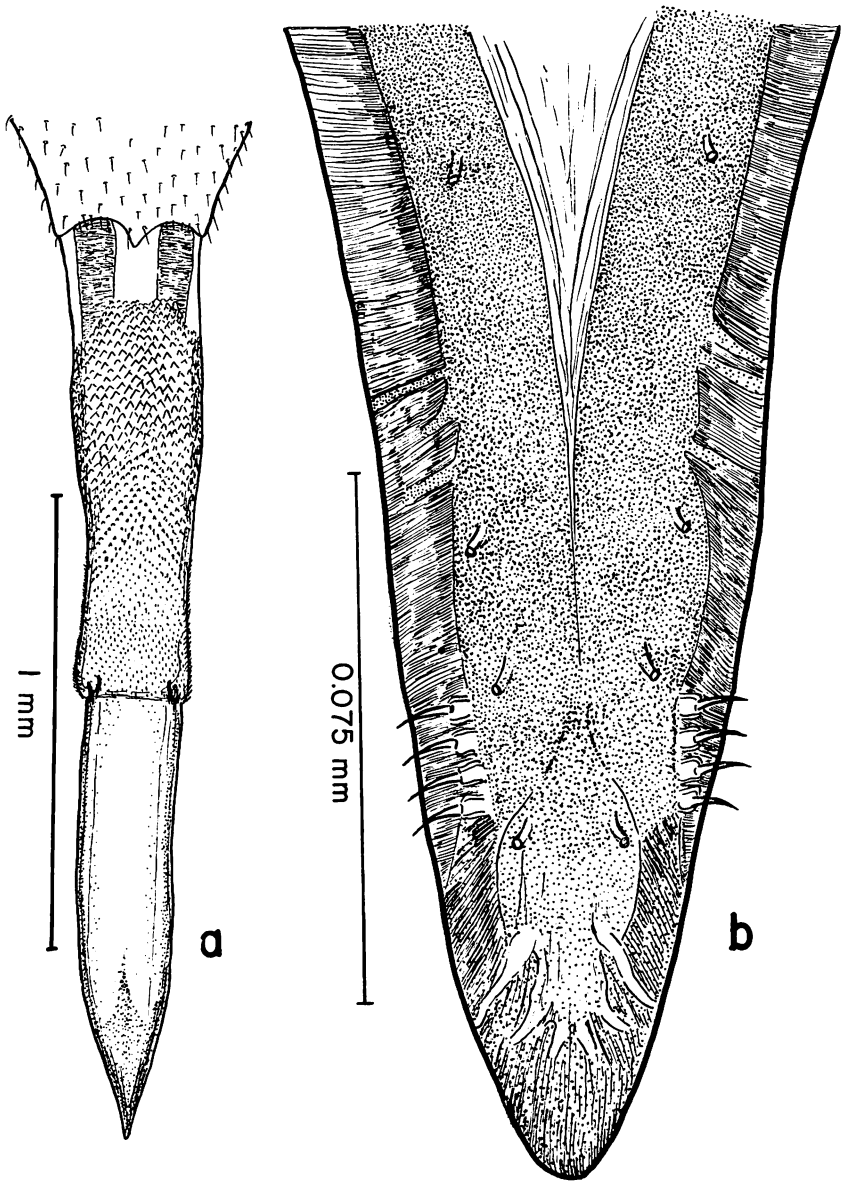


FIG. 12. *a*. last two segments; *b*. apex of piercer.

Length: body, 6.0–6.3 mm.; wings, 5.2–5.6 mm.

Type locality: Cairns, Queensland.

Type in the University of Queensland collection.

Distribution: Known only from Queensland.

Hosts: This species has been recorded from the following plants: *Prunus armeniaca* L.; *Planchonella australis* (R. Br.); *P. obovata* (R. Br.) (*Sideroxylon obovatum*); *P. pohlmaniana* (F. Muell.) and *Terminalia muelleri* Berth (an unconfirmed record). According to May (1963 : 69) it was reared from apricots at Warwick.

Dacus (Strumeta) moluccensis (Perkins) (Fig. 13a–b)

Strumeta? *moluccensis* Perkins, 1939, Univ. Queensland, Dept. Biol. 1(10): 17–18, pl. 1, Fig. 12.

Dacus (Strumeta) froggatti Hardy and Adachi, 1954, Pac. Sci. 8(2): 169, nec Bezzi, 1928.

This large species resembles *bryoniae* (Tryon) in many respects. It differs, however, by having the mesonotum largely brownish red with a pair of submedian blackish vittae, not chiefly black as in *bryoniae*. Also the second costal section has microtrichia only in the extreme apex and the ovipositor is nearly two times longer than in *bryoniae*. The piercer is trilobed at the apex and is very differently developed than in any of the related species (cf. Figs. 13a and 5a). The basal segment of the ovipositor, *in situ*, is equal or longer than the fifth abdominal segment. When fully extended (Fig. 13a), the ovipositor measures approximately 9.46 mm. The piercer is very distinctively shaped (Fig. 13b). It has two moderately long, and two short preapical setae, the distad pair is situated about .06 mm. from the tip.

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

Type locality: Buru, Moluccas.

Type female in the British Museum (Natural History).

Distribution: New Britain, Solomon Islands, Moluccas and Amboina.

Hosts: I have recorded it from *Inocarpus edulis* Forst. This is the only known host.

Dacus (Strumeta) muiri Hardy and Adachi (Fig. 14a–b)

Dacus (Strumeta) muiri Hardy and Adachi, 1954, Pac. Sci. 8(2): 177.

This species is closely related to *dorsalis* and can be separated only by the details of the ovipositor. The ovipositor is very broad compared to its length, and the apex is abruptly narrowed beyond the oviduct (cf. Figs. 14a and 1c). In body coloration and in other details it is similar to *dorsalis* except that the third abdominal segment is almost entirely reddish brown to black on the dorsum, and the postsutural yellow vittae on the mesonotum end at or slightly before the inner supraalar bristles. The ovipositor, when fully extended (Fig. 14a), measures approximately 4.3 mm. The piercer is very distinctive in shape (Fig. 14b). Two moderately large and two very

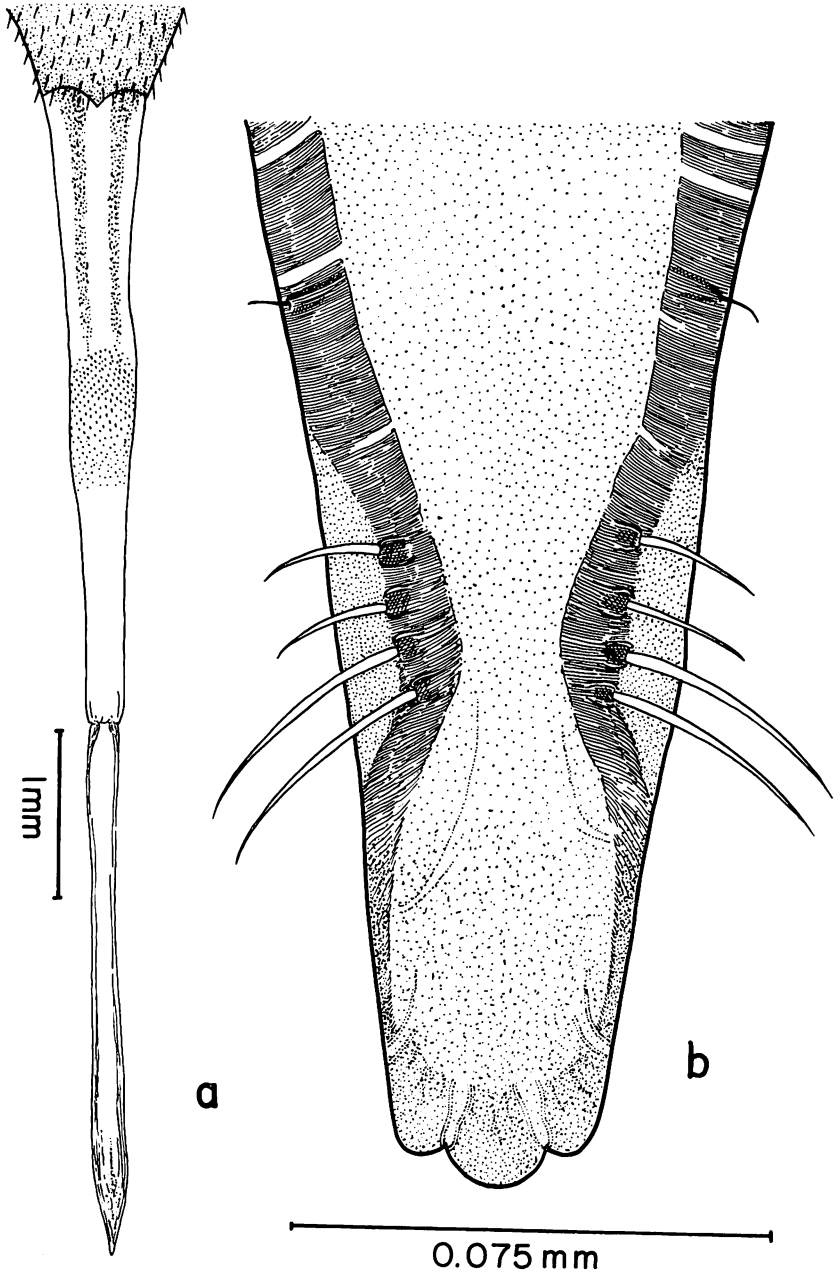


FIG. 13. a. ovipositor, last two segments; b. apex of piercer.

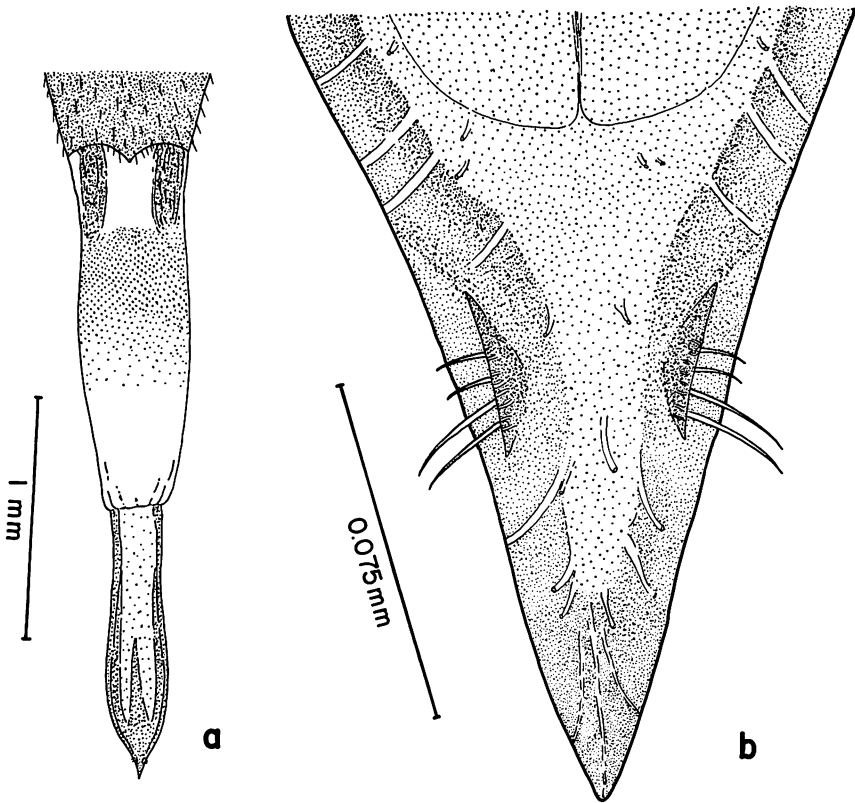


FIG. 14. a. ovipositor, last two segments; b. apex of piercer.

tiny preapical setae are present on the piercer. The distal pair is situated about .08 mm. from the tip.

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

Type locality: Pontianak, Borneo.

Type in the B. P. Bishop Museum, Honolulu.

Distribution: Known only from the type locality.

Host unknown.

Dacus (Strumeta) pedestris (Bezzi) (Fig. 15a-b)

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

Dacus (Strumeta) pedestris (Bezzi), Hardy and Adachi, 1954, Pac. Sci. **8**(2): 180, Fig. 20a-b.

This species is closely related to *dorsalis* and is often difficult to differentiate except by careful 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. The front and middle coxae and trochanters of *pedestris* are brown to blackish. These segments are more

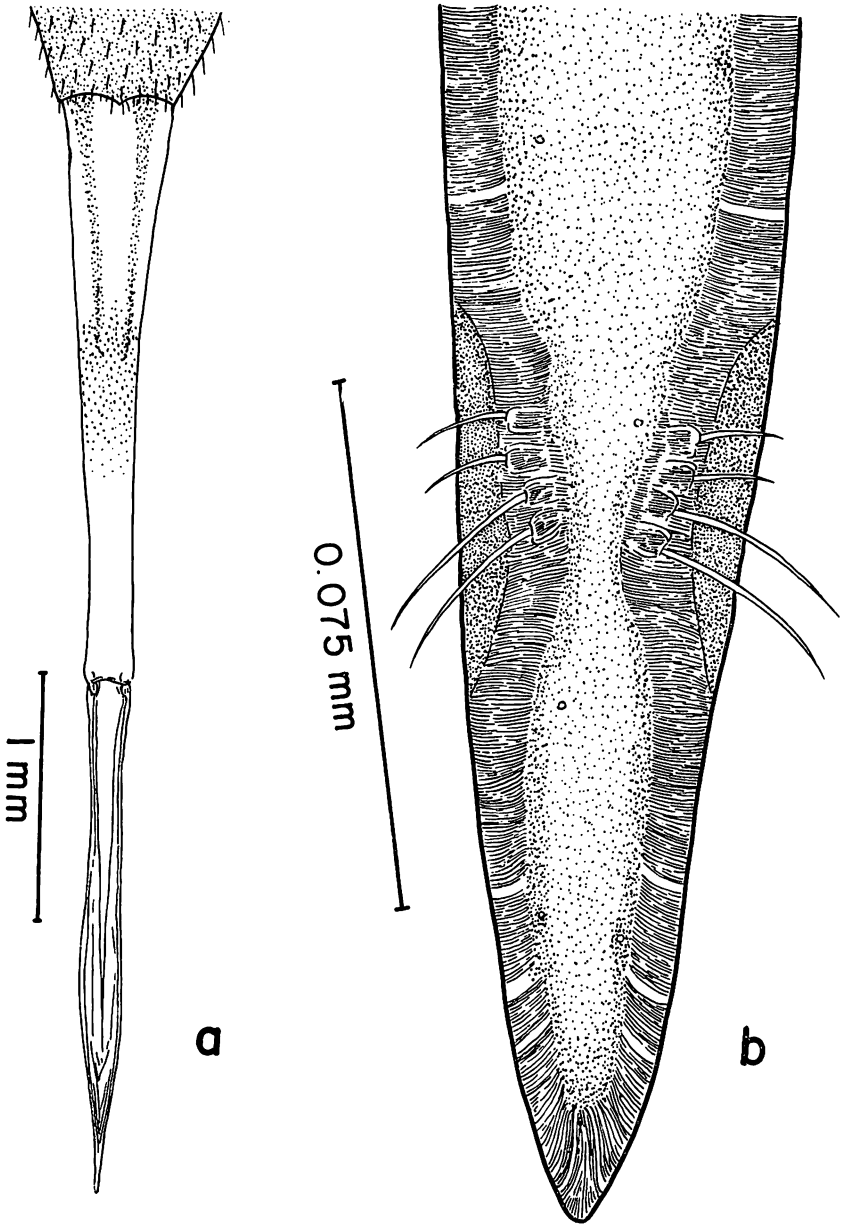


FIG. 15. a. ovipositor, last two segments; b. apex of piercer.

pale, usually clear yellow, in *dorsalis*. The front and hind tibiae are predominantly dark brown to black in *pedestris* and the middle pair is 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 is narrowly discolored with brown to black near the bases and the front pair often are discolored along the outside edges. 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 yellow to rufous in *dorsalis*. 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. When viewed from above, *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 (Fig. 15a) measures approximately 6.0 mm. in *pedestris* and about 4.5 mm. in *dorsalis*. The comparative length of each segment making up the ovipositor is also useful in separating these species.

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

Type locality: Mt. Makiling, Philippine Islands.

Type in U. S. National Museum.

Distribution: Known from numerous localities in Malaya, the Philippine Islands, and Borneo.

Hosts: I have recorded this species from the following: *Achras zapota* L., *Artocarpus champeden* (Lour.) (= *A. polyphema* Pers.); *A. dadah* Miq.; *Psidium guajava* L. (guava); *Nephelium lappaceum* L.; *Mangifera foetida* Lour. (mango); tomato, chile, cashew nuts, and carambola. The species obviously has a very wide host range.

Dacus (Strumeta) propinquus Hardy and Adachi (Fig. 16a–c)

Dacus (Strumeta) propinquus Hardy and Adachi, 1954, Pac. Sci. **8**(2): 182, Fig. 21a–c.

This species closely resembles *dorsalis* and can be satisfactorily separated only by the structures 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 of the specimens at hand. I 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. The peculiar trilobed development of the apex of the ovipositor (Fig. 16c) will distinguish this from *dorsalis* and other related species. In body coloration and other details it is rather similar to *dorsalis*. The costal band is comparatively broad and extends below vein R_3 along its entire length. The band is slightly enlarged at the apical portion (Fig. 16a). The ovipositor measures approximately 6.5 mm. when fully extended (Fig. 16b). The apical por-

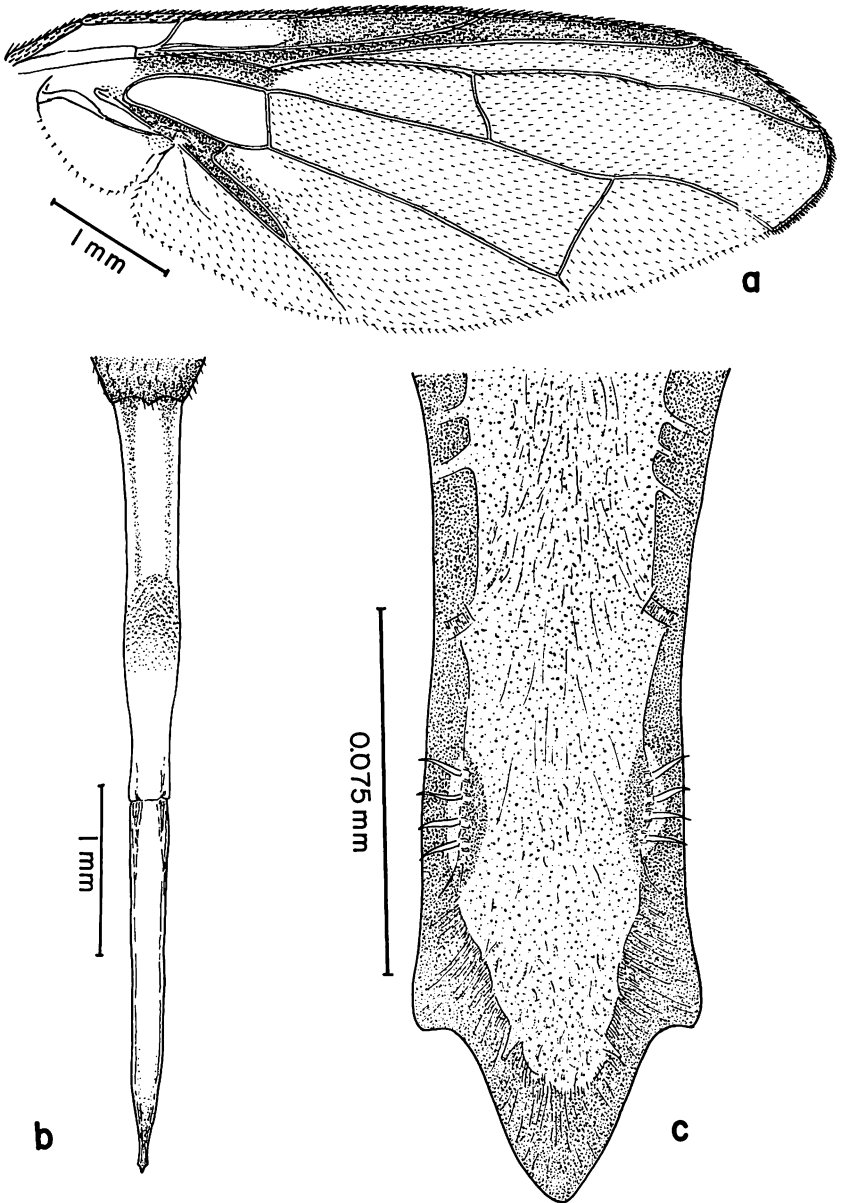


FIG. 16. *a.* wing; *b.* ovipositor, last two segments; *c.* apex of piercer.

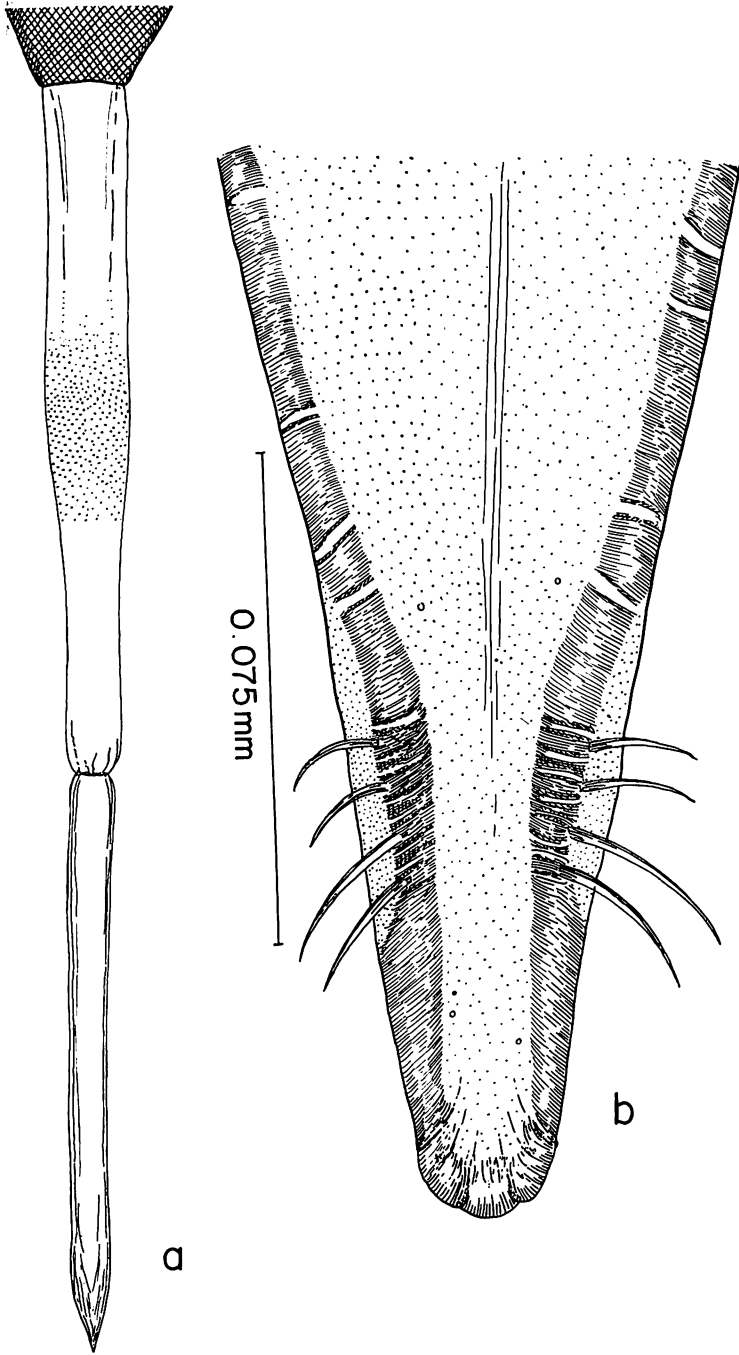


FIG. 17. *a.* ovipositor, last two segments; *b.* apex piercer

tion of the piercer is very characteristically shaped (Fig. 16c). The preapical setae are small and inconspicuous. Four equal-sized setae are present, approximately .075 mm. from the tip.

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

Type locality: Tagap, North Borneo.

Type in the United States National Museum.

Distribution: Known from Borneo, Singapore, and Makiling, Philippine Islands.

Hosts: The species has been reared from *Garcinia laeana*, in Singapore from *Garcinia* sp. ? (“Acab-bacob”) from North Borneo, and from *Sideroxylon* sp.?, Makiling, Philippine Islands.

Dacus (Strumeta) rutilus (Hering), n. comb. (Fig. 17a–b)

Strumeta rutila Hering, 1941. Ann. Mus. Nat. Hung. **34**: 45–46, Fig. 1

The fully matured specimens are very similar to *dorsalis* in body coloration and most other details. The majority of specimens which have been studied have a yellowish to yellowish-brown vitta extending down the middle of the mesonotum, but others are present which are predominantly black with a narrow subshining black vitta extending down the median portion the full length of the mesonotum. The median portion of the mesonotum is covered with a faint grey pruinosity except for the narrow, median vitta. *D. rutilus* can be readily distinguished from *dorsalis* by the distinctively yellow fumose first costal cell and by the very different shape and development of the ovipositors as shown in Figures 17b and 1b. The ovipositor differs from all known species of *Strumeta* by the development of the piercer. The extreme apex is indistinctly trilobate (Fig. 17b). The ovipositor has not previously been described. The species has been known only from the type male. *In situ* the visible portion is approximately equal in length to the fifth abdominal segment. The piercer is slender, sharp pointed, and is approximately 2.28 mm. long by .21 mm. wide. There are two long, and two short setae situated about .05 mm. from the tip. The oviduct opens approximately .2 mm. from the apex of the piercer. The inversion membrane is about 2.6 mm. long by .3 mm. at its widest point. The rasper extends to within 1.0 mm. of the base of the segment. The basal segment of the ovipositor is about 1.84 mm. long by 1.4 mm. at its widest point. The spiracles are situated about .5 mm. from the anterior lateral margins of the segment. When fully extended (Fig. 17a) the ovipositor measures about 6.72 mm.

Length: body, 6.5–7.5 mm.; wings, 6.0–6.3 mm.

Type locality: Lemien, New Guinea.

Type in the Hungarian National Museum.

Distribution and hosts; Previously known only from the type locality. I have seen specimens from Rabaul, New Britain, Oct.–Nov. 1949, ex *Inocarpus edulis* Forst. “aila” (N. L. H. Krauss).

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