

## THE BIBIONIDAE (Diptera) OF THE PHILIPPINES<sup>1</sup>

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No thorough study of Bibionid flies has ever been done in the Philippine Islands, and this proves to be an extremely interesting group which exhibits a high degree of endemism. The previous knowledge on this family was based upon the studies of Malloch (1928), Edwards (1929), and Hardy (1950, 1958). We have had an opportunity of studying a large series of specimens from the collections of the B. P. Bishop Museum<sup>3</sup>, Honolulu; Noona Dan Expedition 1960-61, Zoologiske Museum, Copenhagen; U. S. National Museum, Washington, D. C.; British Museum (Nat. Hist.), London; Field Museum of Natural History, Chicago; and the Museum of Comparative Zoology, Cambridge, Mass. We appreciate the privilege of having studied these valuable collections. The drawings were prepared by Ali Navvab, graduate student, University of Hawaii.

Twenty-seven species are now known from the Philippines; only 11 have been previously recorded. Eleven species are being described as new.

### KEY TO GENERA KNOWN FROM THE PHILIPPINES

1. Radial sector furcate (fig. 2a); legs simple.....**Plecia** Wiedemann  
Radial sector simple, not furcate (fig. 25a); front tibia with large apical spurs or with 2 or more sets of spines (fig. 1a, 22b) ..... 2
2. Front tibia produced apically to form 2 spurs (fig. 1a) — (only 1 species, *flavissimus* Brunetti) ..... **Bibio** Geoffroy  
Front tibia with a ring of spines at apex and with 1 or more series of spines on segment (fig. 22b) ..... **Dilophus** Meigen

### Genus **Bibio** Geoffroy

*Bibio* Geoffroy, 1762, *Hist. Abr. Ins.* 2: 568.

Type species: *Tipula hortulana* Linnaeus.

The members of this genus are characterized by the presence of a pair of prominent spurs at the apices of the tibiae (fig. 1a). This genus is best developed in temperate climates and is poorly represented in the tropics. Only 1 species is known from the Philippines.

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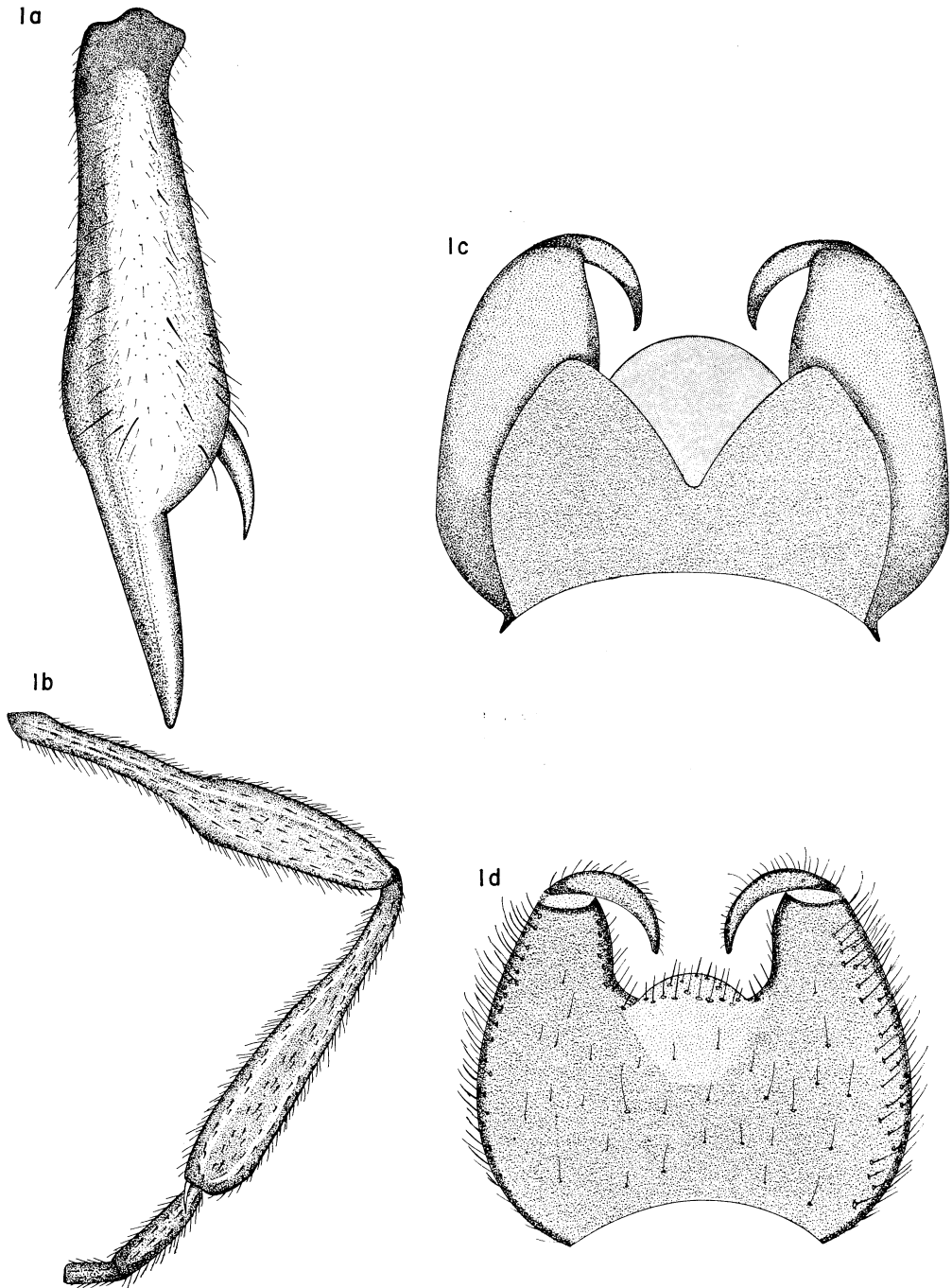


Fig. 1. *Bibio flavissimus* Brunetti: a, front tibia; b, hind leg; c, ♂ genitalia, dorsal; d, ♂ genitalia, ventral.

**Bibio flavissimus** Brunetti Fig. 1a-d.

*Bibio flavissimus* Brunetti, 1925, *Rec. Ind. Mus.* 27: 448.—Edwards, 1929, *Notul. Ent.* 9: 78.

This species was described from ♀ specimens collected at Cherrapunji, Assam, India. Edwards, *loc. cit.*, described what he considered to be the ♂ from the Philippines. Male specimens have apparently not been taken in Assam, and since it has not been possible to make careful comparisons with specimens from India, it is possible that a different species may exist in the Philippines. The ♀ specimens from the Philippines fit Brunetti's description perfectly and they certainly would appear to be that species.

This is also quite obviously the same species which Bezzi (1917: 108) reported from Mount Banahao, Luzon, as *B. rubicundus* Wulp. The 2 species are superficially alike. *B. rubicundus* (from Java and the Malay Peninsula) is readily differentiated from *flavissimus* by having the inner spur of the front tibia nearly equal in length to the outer and by having the femora of the ♀ black at the apices. In *flavissimus* the inner spur is short compared to the outer (fig. 1a) and the femora of the ♀ are entirely rufous. Edwards, *loc. cit.*, stated that Bezzi's record of *rubicundus* from the Philippines was incorrect. Also, we have studied the ♀ specimens which Bezzi had recorded from the Philippines (U. S. Nat. Mus. Coll.) and they are the same as that species which Edwards considered to be *flavissimus* Brunetti.

♂. Entirely shining black except for yellow humeral ridges and halteres, and rufous tibial spurs. Pile on mesonotum yellow brown; that on underside of head, pleura, and on abdomen is yellow. Antenna with 8 flagellomeres, the last 2 are closely joined. Last segment of palpus is 2.5-3.0× longer than wide. Mesonotum polished black, microscopically rugose on sides. Yellow halteres are a distinctive feature. In this regard it should be noted that this species shows similarity to *B. imitator* Walker from Australia, Tasmania, and New Zealand; the 2 are superficially very much alike. *B. imitator* is differentiated by having the wings of both sexes more intensely tinged with yellow brown, distinctly brownish on anterior portion. Also by having the antennae of the ♀ entirely black and the femora of the ♀ dark reddish brown to black; also the palpi are entirely black. The wings of *flavissimus* are pale by comparison, distinctly yellow along the anterior margin and tinged faintly with yellow over the posterior portion. Scape and pedicel of antenna, the 2 basal and proximal portion of 3rd palpal segments, also femora of ♀ are yellow to rufous. Legs entirely black with a tinge of red in ground color, especially on femora. Tibial spurs rufous. Inner spur of front tibia short, about 1/4 as long as outer (fig. 1a). Hind tibia shaped as in fig. 1b. Basitarsus 4× longer than wide and 2× longer than 2nd tarsomere. Wings faintly tinged with yellow, distinctly yellow in costal cell and upper portion of cell R1. Stigma and anterior veins brown, posterior veins yellow, just slightly darker than wing membrane. The r-m crossvein about 2/3 as long as basal section of radial sector. Veins M<sub>2</sub> and M<sub>3+4</sub> evanesce before reaching wing margin. The ♂ genitalia are as in fig. 1c and 1d. We see nothing distinctive about them.

Length. Body 6.5 to 6.7 mm; wings 5.7-6.0 mm.

♀. Entirely yellow to rufous except for black tibiae and tarsi, the flagellomeres of antennae, last 2 and apical 1/2 of 3rd palpal segment, and ocellar triangle, which are black. Body pile entirely yellow, rather short compared to that of ♂. Wings more intensely yellow than in ♂, especially on anterior margin.

Brunetti recorded the length of the body of the female as 9.0 mm. The specimen from the Philippines measure 6.5 to 7.7 mm for the body; 7.0-7.3 mm for the wings.

Type locality: Cherrapunji, Assam. Type in the Zoological Survey of India collection. PHILIPPINES, Luzon: 4 ♀♀, 14 ♂♂, Mountain Province, Abatan, Buguias, 60 km S of Bontoc, 1800–2000 m, 6.V.1964, H. M. Torrevillas; MINDANAO: 1 ♀, Bukidnon, Mt. Katan-glad, 1480 m, 27–31.X.1959, L. W. Quate (BISHOP coll.)

### Genus *Plecia* Wiedemann

*Plecia* Wiedemann, 1828, *Ausser. Aweiff. Ins.* 1: 72.

Type species: *Hirtea fulvicollis* Fabricius.

This genus is differentiated from other Philippine Bibionidae by having the legs simple and the radial sector forked (fig. 2a). The ♂ genitalia are rather complexly developed and provide excellent characters for differentiating species. The genus is well represented throughout the tropics and constitute the great bulk of the family in the Philippines and surrounding regions.

Nineteen species are presently known from the Philippines—8 are new, only 6 species have been previously recorded.

The Philippine *Plecia* fall into 3 distinct complexes of species based upon ♂ genital characters. The *parva* complex, which is characterized by having the 9th tergum and sternum fused, is unknown from any other region and probably is endemic to the Philippines. This group includes *parva*, *affiniparva* n. sp., and *pulliparva* n. sp. The *fulvicollis-bakeri* complex, which is characterized by having a large heavily sclerotized median projection fitting dorsad of the claspers and sloping into the genital chamber and also by having the posterolateral margins of the 9th sternum projected or, as in the case of *aruensis* Edwards and *bakeri* Malloch, with a pair of prominent submedian lobes on hind margin of sternum (fig. 4a) often hiding the claspers (fig. 3a), and posterolateral margins of sternum rounded. This complex extends into Indonesia and includes *aruensis* Edwards, *bakeri* Malloch, *cana* Hardy, *fulvicollis* (Fabricius), *zamboanga* Hardy, *exechia* n. sp. *jubata* n. sp., and *platyura* n. sp. (The body coloring of the latter species is very different; it is entirely dark-colored rather than having the thorax entirely orange). *P. aruensis*, *exechia* and *platyura* are related to *bakeri* and characterized by having the posterolateral lobes more submedian in position (fig. 3a). *P. aruensis* and *bakeri* would appear to form a separate species group, quite distinctive from *fulvicollis* and related species; the latter are characterized by the heavily sclerotized median development on the hind margin of the sternum (fig. 10b). *P. aruensis* has no median process but shows relationship to *bakeri* which has a slight development of a median process; and *bakeri* shows relationship to *platyura* n. sp. and to *exechia* n. sp. which have the median process well developed (fig. 3a, 4a, 15b and 9c). The *varians-ruficornis* complex, which is characterized by having distinctly developed submedian lobes on the hind margin of the 9th sternum (these are sometimes hidden beneath the claspers), by the large conspicuous claspers and by the comparatively slender, rather forcipate posterolateral projections of the sternum. This complex includes *varians* Edwards, *ruficornis* Edwards, *diversa* Hardy, *recavaterga* n. sp., *malayaensis* Hardy, and *mayoensis* Hardy. This complex is represented in Indonesia, Borneo and Malaysia.

## KEY TO PLECIA, BASED ON MALES

1. 9th tergum and sternum fused (*parva* complex of species) (fig. 14a, b); small species... 2  
9th tergum and sternum distinctly separated; typically larger species ..... 4
- 2 (1). At least mesonotum entirely orange; median process of 9th sternum deeply cleft (fig. 14a).....*parva* Malloch  
Thorax dark brown to black, densely pollinose; median process of 9th sternum varied ..... 3
- 3 (2). Median process of 9th sternum divided apically and widely divergent, submedian projections each bearing a ventral spine (fig. 2b) .....*affiniparva* n. sp.  
Median process not divided but with a median longitudinal groove from tip to near base, submedian projection toothed at apex and lacking such a spine (fig. 16b).....*pulliparva* n. sp.
- 4 (1). Thorax dark brown to black, densely gray pollinose; 9th sternum with a broad flat-topped projection on median margin (fig. 6) ..... *cana* Hardy  
At least mesonotum predominantly or entirely orange; if 9th sternum has a broad median process thorax entirely orange..... 5
- 5 (4). Pleura brown to black; posterolateral margins of 9th sternum forcipate (fig. 12b); lobes of 9th tergum nearly quadrate in shape, truncate at apices (fig. 12a) ..... *malayaensis* Hardy  
Thorax entirely dull orange except possibly in *exechia* n. sp. which may have brown or blackish discolorations on pleura, but sternum not forcipate (fig. 9c); genitalia not as above ..... 6
- 6 (5). 9th sternum forcipate or with lobate posterolateral margins, posterolateral lobes widely separated (fig. 13b) ..... 7  
Posterolateral margins broadly rounded and with a pair of closely placed submedian projections on hind margin of sternum (fig. 3a, 4a) ..... 16
- 7 (6). Projections on posterolateral margins of sternum slender stemmed, enlarged at apices; claspers large and broad (fig. 13b) .....*mayoensis* Hardy  
Not as above..... 8
- 8 (7). Projection of posterolateral margins of 9th sternum short and thick, about as long as claspers or extending slightly beyond apices of claspers and median process (fig. 7b and 21a)..... 9  
Projections of posterolateral margins more elongate, about 2× as long as claspers and usually about equal in length to remainder of segment. .... 12
- 9 (8). Lateral projections of 9th sternum without an inwardly directed process ..... 10  
Lateral projections of sternum each with an inwardly directed process..... 11
- 10 (9). Median projection on 9th sternum simple, truncate, slightly expanded apically (fig. 21a); posterolateral processes of sternum simple..... *zamboanga* Hardy  
Median projection of 9th sternum with a prominent apical lobe on each side (fig. 7b). Posterolateral margins, bilobate (fig. 7c.).....*diopsa* n. sp.
- 11 (9). Posterolateral lobes densely haired (fig. 11b). Median projection of 9th sternum trilobed, the inner processes of lateral projections truncate (fig. 11b).....*jubata* n. sp.  
Posterolateral lobes of sternum not densely haired (fig. 10b). Median projection of 9th sternum bilobed, the inner processes of lateral projection pointed (fig. 10a) ...  
..... *fulvicollis* (Fabricius)
- 12 (8). Claspers short, as wide as long (fig. 5b and 8b); lateral projections of 9th sternum tapered distally (fig. 8a) or submedian lobes lacking on sternum (fig. 5b)..... 13  
Claspers at least 2× longer than wide; lateral projections of 9th sternum broadly rounded or expanded apically as seen in lateral view..... 14

- 13(12). Claspers rather small, rounded; no submedian lobes present on 9th sternum (fig. 5b).  
Lateral projections of sternum scarcely over 1/3 as long as remainder of segment  
..... **brachystylata** n. sp.  
Claspers large, very broad, more or less truncate. Submedian lobes of sternum well  
developed but may be hidden by claspers as seen in direct ventral view (fig. 8b).  
Lateral projections of sternum as long as remainder of segment..... **diversa** Hardy
- 14(12). Lateral projections of 9th sternum tapered distally, and submedian lobes rounded  
(fig. 17b) each lobe of 9th tergum with a median concavity on hind margin (fig.  
17a) ..... **recaviterga** n. sp.  
Lateral projections of 9th sternum flattened laterally; broadly rounded or expanded  
apically (fig. 18d and 20c). Tergum not as above.....15
- 15(14). Submedian processes of sternum small, triangular; lateral projections broadly round-  
ed at apices (fig. 18d) ..... **ruficornis** Edwards  
Submedian processes broadly rounded; lateral projections expanded apically (fig.  
20c) ..... **varians** Edwards
- 16(6). Claspers small, not visible from a ventral view; genitalia as in fig. 3a ... **aruensis** Edwards  
Claspers plainly visible from a ventral view.....17
- 17(16). Median process of 9th sternum well developed, conspicuous, plainly visible from a  
ventral view and split apically (fig. 9c) ..... **exechia** n. sp.  
Median process of 9th sternum not visible from a direct ventral view. ....18
- 18(17). Median process of 9th sternum small and rounded (fig. 4b) and lacking secondary  
lobes on posterolateral processes of sternum..... **bakeri** Malloch  
Median process of 9th sternum large, rectangular (fig. 15d); posterolateral processes  
each with a small lobe developed on dorsal margin, as seen in lateral view (fig.  
15c), ..... **platyura** n. sp.

**Plecia affiniparva** Hardy and Delfinado, new species      Fig. 2 a-c.

This species belongs in the *parva* complex because of the completely fused 9th tergum and sternum of the ♂. It is related to *pulliparva* because of the entirely dark colored thorax, but is readily differentiated by having the median process of the 9th sternum divided apically and widely divergent, as in fig. 2b. Also by having a prominent spine-like process developed on each of the submedian lobes of the sternum near the apical 1/4 and by the other developments of the genitalia as shown in fig. 2b and c. The claspers are very slender and completely or nearly hidden at sides of median projection; these are visible only in a lateral view (fig. 2c).

♂. *Head*: Appendages black, with a tinge of red on antennae. Antennae with 7 flagellomeres. Last segment of the palpus about 3× longer than wide. *Thorax*: Brown to black in ground color, tinged with red on pleura and on sides of mesonotum. Entire thorax gray pollinose, the pollinosity very dense on mesonotum. Halteres entirely black. *Legs*: Dark brown to black, tinged with red in ground color of femora. (We find nothing distinctive about the legs). *Wings*: Evenly infuscated with brown. Vein  $R_{2+3}$  straight, entering costa at about an 80° angle to vein  $R_{4+5}$  and 2nd section of radial sector about 3/5 as long as vein  $R_{4+5}$  (fig. 2a). *Abdomen*: Entirely dark brown to black covered with black setae and dense gray-brown pubescence. The genitalia are as is discussed above.

Length: Body 3.0 mm; wings 3.7 mm.

Holotype ♂ (BISHOP 7771), Mindanao; Misamis Or., 20 km S of Gingoog, 500-700 m,

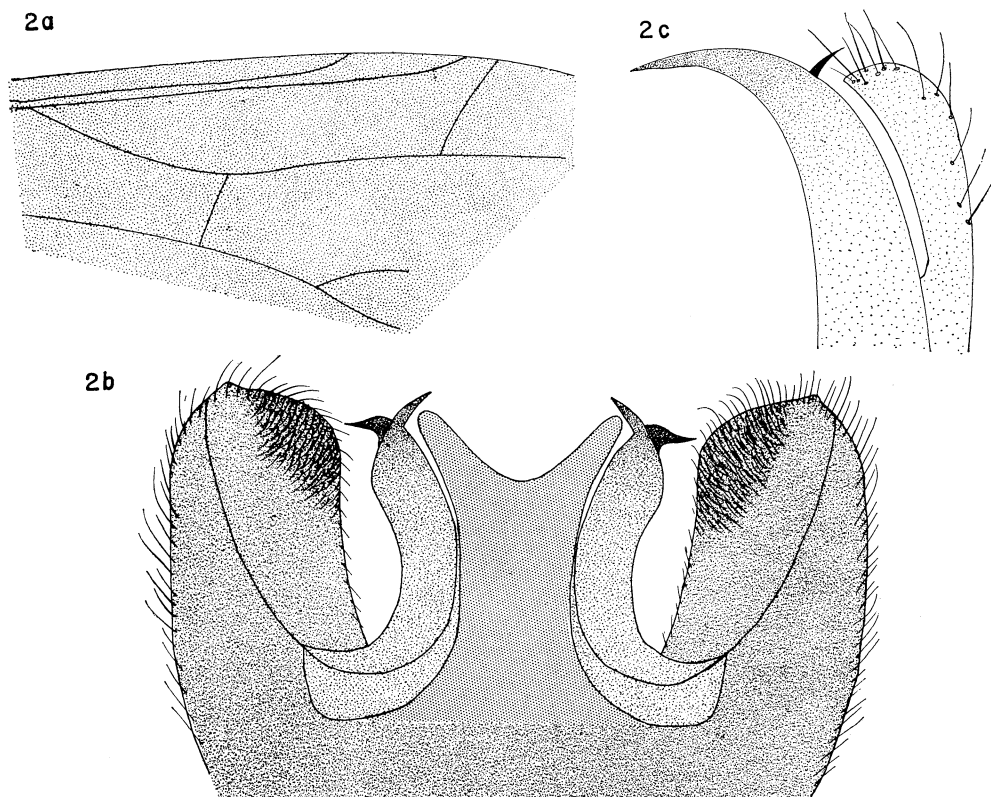


Fig. 2. *Plecia affini parva* n. sp.: a, anterior portion of wing; b, processes of 9th sternum, ventral; c, processes of 9th sternum, lateral.

20-24.IV.1960, H. M. Torrevillas. Paratypes: 3 ♂♂ from the following localities on Mindanao: Agusan, 10 km SE of San Francisco. 14.IX.1959, L. W. Quate; Misamis Or., Minalwang, 1050 m, 24.III.-4.IV.1961, H.M. Torrevillas; Zamboanga del Norte, Masawan-gundawan, 1260-1350 m, 3.VII.1958, in rain forest, H. E. Milliron.

Holotype and 1 paratype in the B. P. Bishop Museum. Two paratypes in the University of Hawaii collection.

***Plecia aruensis* Edwards** Fig. 3 a-b.

*Plecia aruensis* Edwards, 1925, *Treubia* 6 (2): 159, fig. 1.—Hardy, 1958, *Pacif. Sci.* 12 (3): 191, fig. 2 a-c.

Species with thorax entirely opaque orange. It appears to show relationship to *bakeri* Malloch because of the development of the lobes on the hind margin of the 9th sternum of the ♂. The genitalia are very different in the 2; *aruensis* is differentiated by having the claspers tiny, hidden above the projections from the hind margin of the sternum, as

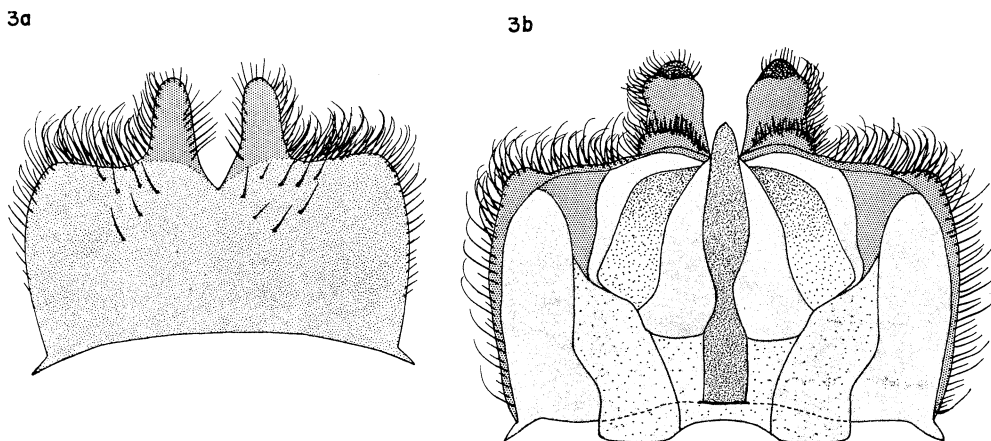


Fig. 3. *Plecia aruensis* Edwards: a, ♂ genitalia, ventral; b, 9th sternum, dorsal.

seen in ventral view. In *bakeri* the claspers are plainly visible from ventral view (fig. 4a) and are situated between the lobes of the sternum. The other details of the development of the 9th sternum and the structure surrounding the aedeagus differ strikingly in the 2 species (fig. 3a and 4a). Parameres are well developed, much more so than has been noted for other species. The claspers are rudimentary and appear as small hairy lobes situated at the bases of the dorsal portion of the lobes on the hind margins of the 9th sternum, these are visible only in dorsal view after the tergum has been dissected off (fig. 3b). For further description refer to Hardy (1958: 191).

Length: Body of ♂ 5.0–7.0 mm; ♀ 7.0–9.5 mm. Wings of ♂ 6.0–8.0 mm; ♀ 10.0–12.0 mm. Type locality: Aru Islands (Aroe). Type in the British Museum (Nat. Hist.).

This species has been recorded from a number of localities on New Guinea and from Aru and Buru Islands, also from New Britain. This has not previously been recorded from the Philippines.

PHILIPPINES. MINDANAO: 1 ♂, Agusan, 10 km SE of San Francisco, 12. XI. 1959, L. W. Quate (BISHOP coll.).

***Plecia bakeri* Malloch** Fig. 4 a–b.

*Plecia bakeri* Malloch, 1928, *Proc. Linn. Soc. N. S. W.* **53** (5): 605, fig. 7.—Hardy, 1958, *Pacif. Sci.* **12** (3): 192, fig. 3a–b.

Thorax entirely dull rufous. This fits near *aruensis* Edwards and is differentiated by the prominent claspers which are plainly visible from ventral view and which fit between the lobes which extend from the posterior margin of the 9th sternum (fig. 4a). The development of the 9th sternum is much different than in *aruensis* (fig. 3a and 4a). A row of conspicuous setae is present on each side of the distal portion of the tergum. The parameres are not as well developed in *bakeri* (fig. 4b) as in *aruensis*.



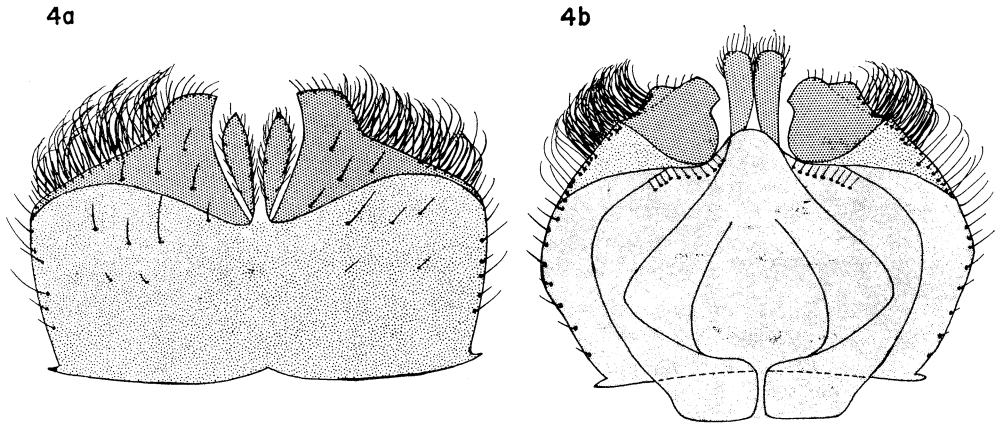


Fig. 4. *Plecia bakeri* Malloch: a, ♂ genitalia, ventral; b, 9th sternum, dorsal.

Length: Body and wings 6.0–7.5 mm.

Type locality: Luzon: Benguet, Baguio. Type in U. S. National Museum collection.

SPECIMENS EXAMINED. PHILIPPINES. Leyte: Tigbao. Luzon: Camarines Sur, Mt. Isarog, 750–850 m, 15–17.V.1963; Mt. Iriga, 500–600 m, 24.IV.1962, some taken in light trap, H. M. Torrevillas; Zool. Park, Baguio, 1350 m, 2–4.I.1966, D. R. Davis; and Acupan, Benguet, 14.VIII.–31.XII. no year given, C. S. Banks.

***Plecia brachystylata* Hardy and Delfinado, new species** Fig. 5 a-c.

This species appears rather closely related to *ruficornis* Edwards but is readily differentiated by the very short claspers, which are as long as wide rather than  $2 \times$  longer than wide; by lacking submedian lobes on the 9th sternum, in *ruficornis* these are rather prominent and fit close to the inner edges of claspers (fig. 18b); also by the comparatively short posterolateral projections of the sternum, these are about  $1/3$  the length of the remainder of the segment in *brachystylata* and are subequal to the remainder of the segment in *ruficornis*. Because of the short claspers the species keys near *diversa* Hardy but is separated by the striking differences in the development of the claspers and other genital characters, as shown in figures 5b and 8b.

♂. Thorax entirely orange. Knobs of halteres brown. Antennae brownish yellow, 7 flagellomeres present. Last segment of palpus about  $3 \times$  longer than wide. Legs rufous on coxae, trochanters and bases of femora, otherwise dark brown, densely black pilose. Wings infuscated with brown; this is more intense in the anterior portion. Vein  $R_{2+3}$  just slightly bent near its base and enters costa at about a  $65^\circ$  angle to vein  $R_{4+5}$ . 9th tergum with a broad U-shaped concavity on hind margin extending almost to its base; lateral lobes rounded apically (fig. 5a). Other genital characters as discussed above and as shown in fig. 5 b-c.

Length: Body 7.5 mm; wings 6.0 mm. (Type)—body 4.0 mm; wings 5.0 mm (Paratype).

♀. Similar to ♂ but with 8 flagellomeres. The front is gray pubescent and with a prominent keel down the median portion.

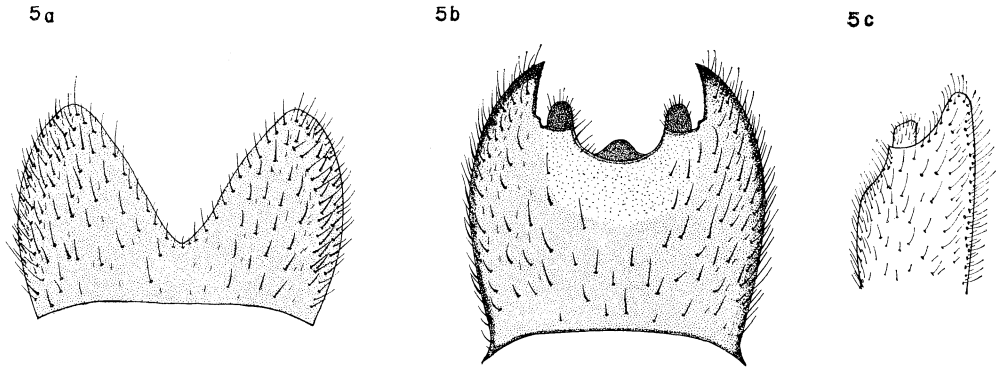


Fig. 5. *Plecia brachystylata* n. sp.: a, 9th tergum, dorsal; b, ♂ genitalia, ventral; c, apex of sternum, lateral.

Length: Body 4.0 mm; wings 5.7 mm.

Holotype ♂ (MCZ), MINDANAO: Mt. Mayo, Davao, 1200-1500 m, 29. I. (no year or collector given, probably collected by C. S. Clagg). Allotype ♀ and 2 paratypes (1 ♂, 1 ♀), E. slope, Mt. McKinley, Davao, 900 m, VIII & X.1946, H. Hoogstraal & D. Heyneman. Type in the Museum of Comparative Zoology, allotype and 1 paratype in the Field Museum of Natural History, Chicago, and 1 paratype in the University of Hawaii collection.

***Plecia cana* Hardy** Fig. 6.

*Plecia cana* Hardy, 1950, *Proc. Haw. Ent. Soc.* **14**(1): 76, fig. 2 a-b; 1958, *Pacif. Sci.* **12** (3): 194.

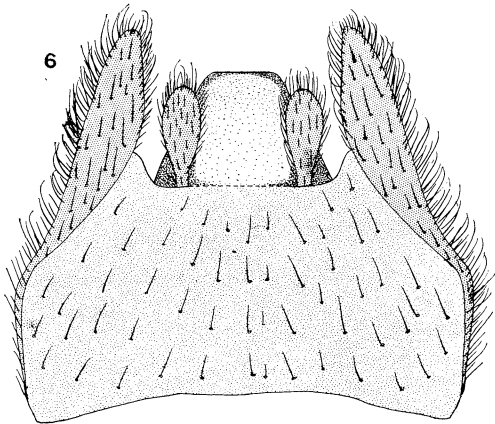


Fig. 6. *Plecia cana* Hardy, ♂ genitalia, ventral.

5.8 mm.

♀. unknown.

Type locality: Luzon: Haight's Pl., Benguet. Type in the U. S. National Museum.

This species is differentiated from all known *Plecia* from the Philippines by having the entire thorax dark brown to black, densely gray pollinose. The genitalia show close relationship to the *fulvicollis* complex because of the development of the median process and by the well-developed claspers and posterolateral processes of the 9th sternum. The ventral aspects of the genitalia are as in fig. 6. The 9th tergum has a deep U-shaped concavity extending almost the entire length on the hind margin, the lateral lobes are rounded on the apices.

Length: Body 4.2-4.5 mm; wings 5.4-

This species was not represented in the collection at hand. It is the only previously recorded Bibionidae from the Philippines which was not present.

***Plecia diopsa*** Hardy and Delfinado, new species      Fig. 7 a-d.

Because of the development of the ♂ genitalia this species would fit near *zamboanga* Hardy but the 2 are readily differentiated by the differences in the median process of the 9th sternum and in the posterolateral projections of the sternum (fig. 7b and 21a). In *diopsa* the median process is developed into a rounded protuberance on each side, appearing superficially like the stalk eyes of Diopsidae. In *zamboanga* the median projection is flattened at the apex, not produced into such distinct lobes. In *diopsa* the posterolateral margins of the 9th sternum are also bilobed on the dorsal surface; this is clearly visible only in lateral view (fig. 7d). The claspers are comparatively small but are ex-

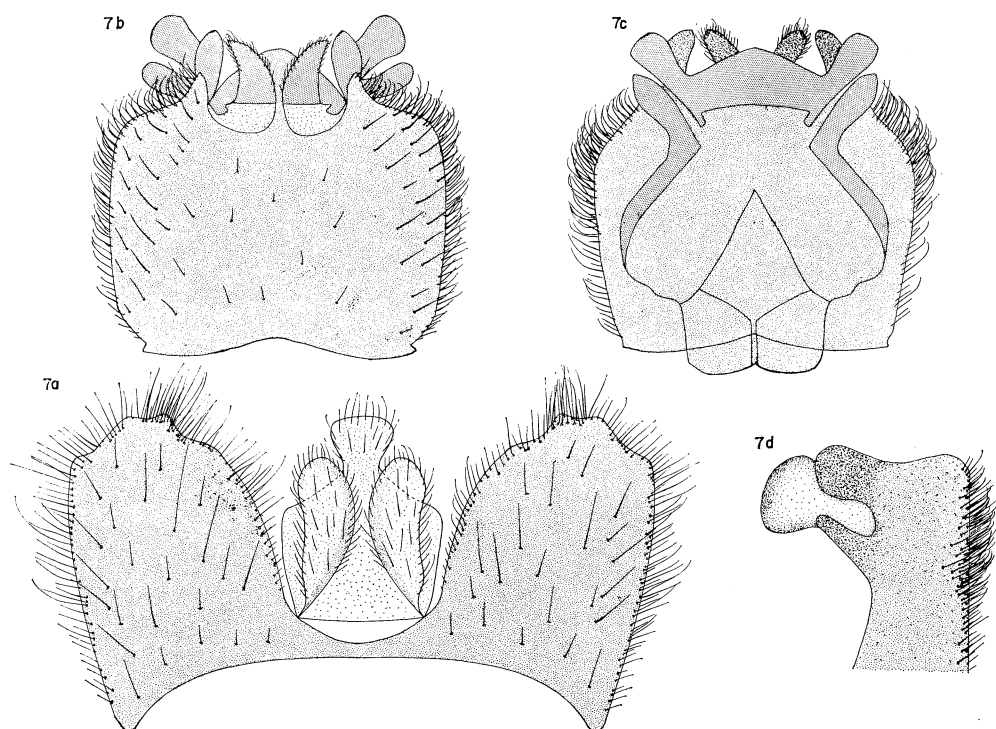


Fig. 7. *Plecia diopsa* n. sp.: a, 9th tergum, dorsal; b, ♂ genitalia, ventral; c, 9th sternum, dorsal; d, 9th sternum, lateral.

posed and conspicuous, fitting above the median projection, laterad of the posterolateral process of the sternum; each clasper is approximately  $3\times$  longer than wide and extends approximately to apex of posterolateral processes. The 9th sternum has a rather broad U-shaped cleft extending almost to the base of the segment, the lateral lobes are slightly

pointed apically as seen in direct dorsal view (fig. 7c). The dorsal aspects of the genitalia, with the 9th tergum dissected off, are as in fig. 7c and the 9th tergum is as in fig. 7a.

♂. Thorax dull orange except for a discoloration of brown through median portion of pleura on specimen at hand. As noted with specimens of some other species of this collection, we suspect that this is abnormal and may possibly have been caused by the way they were handled in the field. We see no distinctive features other than those of the ♂ genitalia. Vein  $R_{2+3}$  rather strongly oblique, entering costa at approximately a  $50^\circ$  angle to vein  $R_{4+5}$ .

Length: Body 5.7 mm; wings 6.7 mm.

♀. Unknown.

Holotype ♂ (BISHOP 7772), Luzon: Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800–2000 m, 1.V.1964, H. M. Torrevillas. Type in the B. P. Bishop Museum.

***Plecia diversa* Hardy, new status** Fig. 8 a-c.

*Plecia fumidula diversa* Hardy, 1958, *Pacif. Sci.* **12** (3): 202, fig. 14 a-b.

This species fits in the *varians-ruficornis* complex because of the development of the ♂ genitalia. It is readily differentiated from other species which have the thorax all rufous by the very broad claspers which are nearly truncate as seen in direct ventral view and which completely cover the submedian lobes on the hind margin of the 9th sternum (fig. 8b). Submedian lobes arise dorsad of claspers and are clearly visible only in dorsal view (fig. 8c); these are microscopically dentate along inner margins. Posterolateral lobes of sternum slender, pointed at apices and slightly in-curved, the lobes are approximately equal in length to remainder of sternum. The 9th tergum has a broad U- or V-shaped concavity on hind margin, extending the greater length of the segment. Lateral lobes of tergum slightly pointed (fig. 8a). Genitalia very similar to those of *malayaensis* but the latter differs by having the pleura dark brown to black. Also the 9th sternum of *diversa* is typically broader than that of *malayaensis*, being about  $2\times$  wider than long, rather than scarcely wider than long, and the hind margin of the 9th tergum is more broadly U-shaped in *diversa*. This may possibly be a subspecies of *malayaensis*.

Length: Body of ♂ 4.7 mm, ♀ (specimens on hand) 3.7 mm; wings of ♂ 5.5 mm; ♀ 4.6 mm.

Type locality: Kerawat, Gazelle Pen., New Britain. Type in the B. P. Bishop Museum.

The species is widespread over the Bismarck Is., Philippines, and New Guinea.

**SPECIMENS EXAMINED.** PHILIPPINES. MINDANAO: Misamis Or., Minalwang, 1050 m, 24. III-4.VI.1961, H. M. Torrevillas; 4 paratypes, 2 ♂♂, 2 ♀♀ from the following localities on Mindanao: same data as type; Misamis Or., Mt. Empagatao, 1050–1200 m, 19–30.VI.1961; 1 ♂, 1 ♀ Mt. Balatukan, 15 km, SW of Gingoog, 1000–2000 m, 27–30.VI.1960, Torrevillas; E. Slope Mt. McKinley, Davao, 900 m, VIII.1946, H. Hoogstraal.

***Plecia exechia* Hardy and Delfinado, new species** Fig. 9 a-d.

This species shows relationship to *bakeri* Malloch but is readily differentiated by the very different development of the median process of the 9th sternum. In *exechia* this pro-

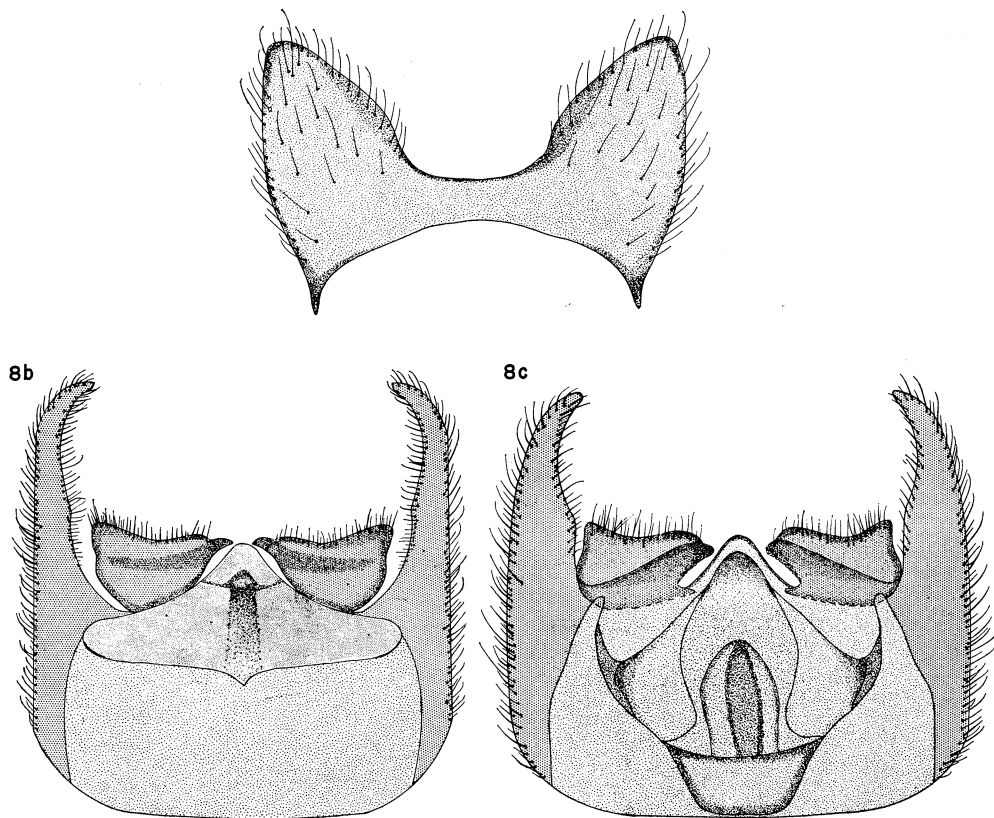


Fig. 8. *Plecia diversa* Hardy: a, 9th tergum of ♂, dorsal; b, ♂ genitalia, ventral; c, 9th sternum, dorsal.

cess is conspicuous, plainly visible from a ventral view; extends well beyond the claspers, is enlarged and divided into 2 lobes at the apex by a median longitudinal split (fig. 9c). In *bakeri* the median process is small, not visible from direct ventral view and is rounded at the apex (fig. 4a). The shapes of the projections on the posterolateral margins of the sternum are very different in the 2 species as shown in fig. 4a and 9c. Also the characteristics of the 9th sternum, as seen in dorsal view, and of the 10th sternum are very different in the 2 (fig. 4b and 9d); *exechia* lacks the row of setae along the distal portion of the 10th sternum which is characteristic of *bakeri*. The 9th tergum has a broad U-shaped cleft extending almost its entire length, and the lateral lobes are very slightly concave on their hind margins; this is scarcely visible from direct view, the lobe has to be flattened slightly in order to see this concavity (fig. 9b).

The specimen at hand has brown to black discolorations through the median portions of the pleura. These extend over the upper part of the sternopleuron, the upper mesopleuron, through

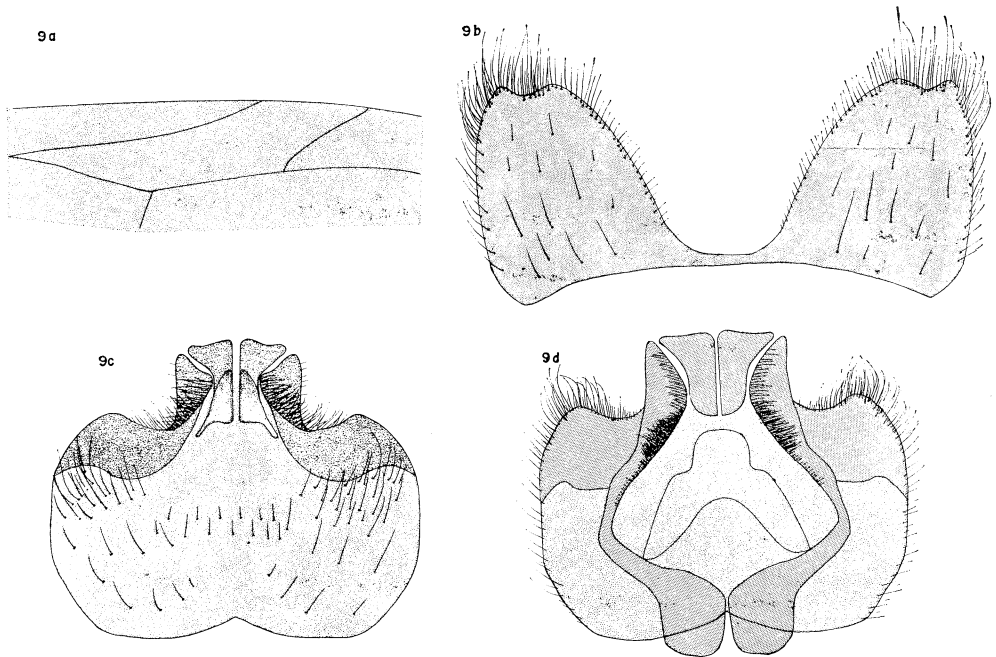


Fig. 9. *Plecia exechia* n. sp.: a, anterior portion of wing; b, 9th tergum, dorsal; c, 9th sternum, ventral; d, 9th sternum, dorsal.

the middle of the pteropleuron, and over the hypopleuron with a slight discoloration over the metapleuron. It is impossible from 1 specimen to tell whether or not this is typical. It is possible that this species should be treated in the group which is typified by having the mesonotum rufous and the pleura brown to black. It does not fit near any of the known species in this complex, however, and seems most closely related to species which have the entire thorax rufous or orange, and we are convinced that the thorax should be typically all orange. The dorsum of the thorax is entirely rufous with faint discolorations of brown on the anterior portion and on the sides. It appears evident from this specimen that this is an abnormal discoloration. The wings are evenly infuscated; we see nothing distinctive about them except that vein  $R_{2+3}$  is more oblique than in most species and enters the costa at about a  $40^\circ$  angle to vein  $R_{4+5}$  (fig. 9a). The genital characters are as noted above.

Length: Body 4.7 mm; wings 5.7 mm.

♀. Unknown.

Holotype ♂ (BISHOP 7773), LUZON: Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800-2000 m, 27.V.1964, H. M. Torre Villas. Type in the B. P. Bishop Museum.

***Plecia fulvicollis*** (Fabricius) Fig. 10 a-b.

*Hirtea fulvicollis* Fabricius, 1850, *Syst. Antl.* 53.

*Plecia philippinensis* Malloch, 1928, *Proc. Linn. Soc. N. S. W.* 53 (5): 605, fig. 8.

*Plecia fulvicollis*: Edwards, 1925, *Treubia* 6 (2): 156, fig. 1—Hardy, 1958, *Pacif. Sci.* 12 (3): 201, fig. 13a-c.

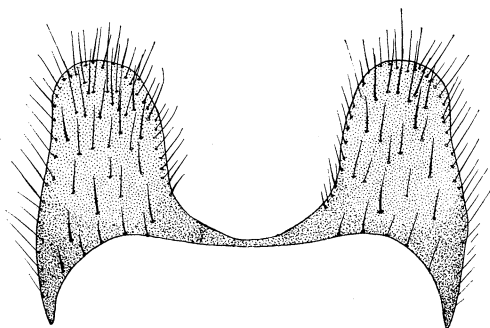
Species with thorax entirely rufous. It is readily differentiated by the ♂ genital characters. Heavily sclerotized, black projection from middle of hind margin of 9th sternum is distinctly concave; this is readily seen *in situ*. Posterolateral lobes on hind margin of sternum distinctive in shape, each with a pointed projection on inner margin. Claspers small, rather inconspicuous, and fit 1 on each side of base of median projection of sternum (fig. 10b). Median projection slanted upward into genital chamber and as seen in direct dorsal or ventral views, the margin is gently concave; if tilted forward a small mound is visible on the basomedian portion of this projection at about the apices of the claspers. The dorsal aspects of the 9th tergum are as in fig. 10a. This species fits near *jubata* n. sp. and the differentiating characters are discussed under that species.

Length: Body and wings of ♂ 6.0–6.5 mm; ♀ body 5.5–6.5 mm, wings 7.0–9.0 mm.

Type locality: Sumatra. Type in Zoological Museum, Copenhagen.

This species is common in Sumatra and probably throughout Indonesia and the Philippines. Records in the literature from India, Australia, China, Japan, Formosa, etc. are obviously errors.

10 a



10 b

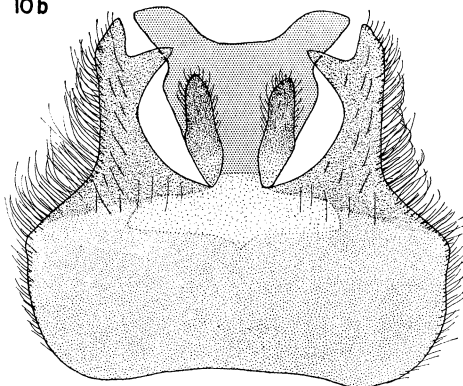


Fig. 10. *Plecia fulvicollis* Fabricius: a, 9th tergum of ♂, dorsal; b, male genitalia, ventral.

PHILIPPINES. MINDANAO (4 ♂♂, 3 ♀♀): Lanao, Dansalan, Lake Lanao, Tagaya, 7–15. VI.1958, H. E. Milliron; Zamboanga del Sur, Domingug, 22.X.1959, L. W. Quate; Zamboanga City, 20.XI.1956, G. B. Viado; Misamis Occ., Mt. Malindang, 19.X.1959, C. M. Yoshimoto; Bukidnon, Mt. Katanglad, 1250 m, 26.X.1959, Yoshimoto (BISHOP); Basilan I., Sulu Archipelago, A. F. Contant; Bukidnon, Tangcolan, C. F. Baker; Zamboanga, 2.X.1945, Jean. MINDORO: 1 ♂, Laguna de Naujas, 28.II–15. III.1910, J. J. Mounsey (BMNH coll.)

*Plecia jubata* Hardy and Delfinado, new species      Fig. 11 a-b.

This species has the thorax entirely opaque orange and is closely related to *fulvicollis*

(Fabricius); the 2 can be differentiated only by the characteristics of the ♂ genitalia. *P. jubata* is readily separated by having a prominent median lobe on the sclerotized projection from the middle of the hind margin of the 9th sternum (fig. 11b), by the very densely hairy posterolateral lobes of the 9th sternum, also by the much larger claspers which are more prominent than in *fulvicollis* (compare fig. 10b and 11b).

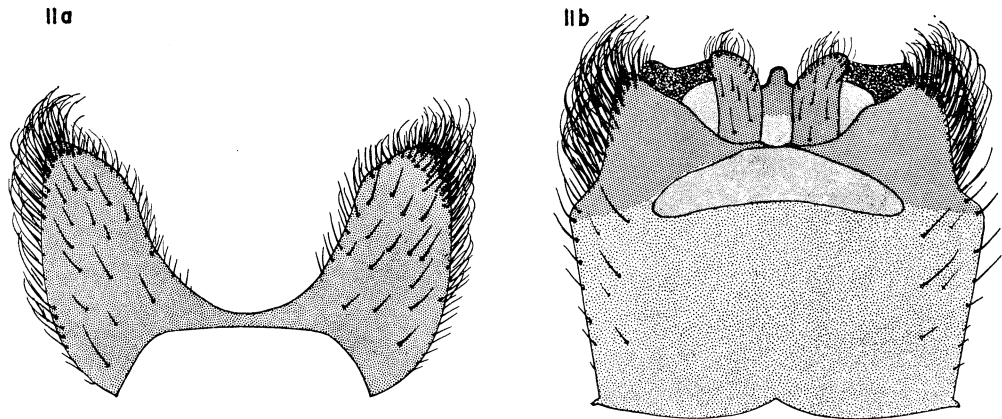


Fig. 11. *Plecia jubata* n. sp.: a, 9th tergum, dorsal; b, ♂ genitalia, ventral.

As is the case with the preponderance of species which have the thorax entirely dull orange, the ♂ genitalia give the only reliable characteristics for differentiating species. We find no other features which appear to be of any importance. The antennae have 7 flagellomeres. The last segment of the palpus is  $3 \times$  longer than wide. The wings are evenly infuscated with brown. Vein  $R_{2+3}$  is oblique, straight, enters the costa at about a  $70^\circ$  angle to vein  $R_{4+5}$ . The 9th tergum has a broad U-shaped concavity in the middle of the hind margin, the 2 plates are connected by a narrow median bridge (fig. 11a).

Length: Body 5.0 mm; wings 6.0 mm.

♀. Antennae with 9 flagellomeres. Dorsal portion of the head gray pubescent, front with a rather prominent median carina extending entire length.

Length: Body, 5.0 mm; wings, 6.3 mm.

Holotype ♂ (BISHOP 7774), MINDANAO: Lanao, Lake Lanao, Tagaya, 470-720 m, 15.VI. 1958, H. E. Milliron. Allotype ♀, Mindanao: Agusan, Los Arcos, 19-23.XI.1958, L. W. Quate; 6 paratypes, 2 ♀♀ and 4 ♂♂, same data as type and following localities on Mindanao: Esperanza, 4-11.XI.1959; San Francisco, 10 km SE, 12.XI.1959; Surigao, Lake Mainit, 23.XI.-1.XII.1959, L. W. Quate & C. M. Yoshimoto. Type, allotype and 4 paratypes returned to the B. P. Bishop Museum. Two paratypes retained in the University of Hawaii collection.

***Plecia malayaensis* Hardy** Fig. 12 a-c.

*Plecia malayaensis* Hardy, 1948, *J. Kansas Ent. Soc.* **21**: 36. New name for *Plecia minor* Edwards,



1928, *J. Fed. Malay States Mus.* **14**: 44, *nec. P. minor* Jaennicki, 1867, *Sencknb. Naturf. Gesell. Abhandl.* **4**: 318.— Hardy, 1958, *Pacif. Sci.* **12** (3): 207, fig. 18a-b.

This species is readily differentiated from all known *Plecia* from the Philippines by the predominantly rufous mesonotum and the all black pleura, also by the development of the genitalia as shown in fig. 12a and 12b. Because of the development of the genitalia it appears to show relationship to *varians* Edwards.

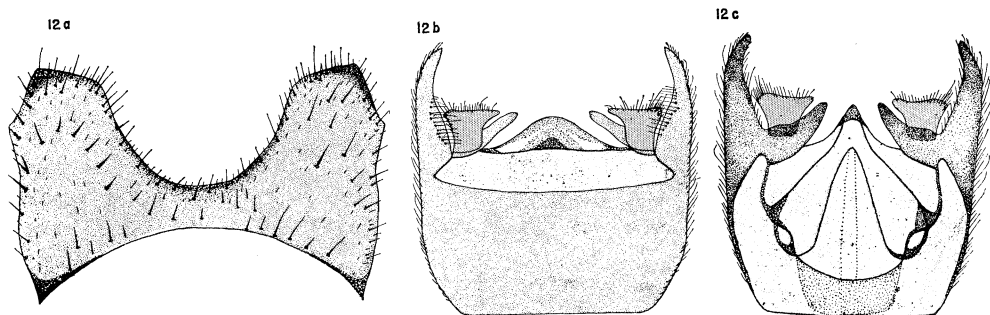


Fig. 12. *Plecia malayaensis* Hardy: a, 9th tergum of ♂, dorsal; b, ♂ genitalia, ventral; c, 9th sternum, dorsal.

The genitalia are very distinctive. The posterolateral margins of the sternum are extended into evenly tapered pointed lobes which are very prominent, readily visible *in situ*. The claspers are broad, blunt at apices (fig. 12b). As seen from dorsal view, with the 9th tergum dissected off, a pair of slender submedian lobes are developed on the hind margin of the sternum. These arise immediately behind the claspers and are barely, if at all, visible from a ventral view (fig. 12c). The other aspects of the genitalia are as in the above figures. For more complete descriptive details refer to Hardy (1958: 207).

Length: Body 4.0–5.0 mm; wings 5.0–6.4 mm.

Type locality: Mabek, peninsular Siam. Type in the British Museum (Nat. Hist.).

This species probably occurs throughout Thailand and Malaysia and possibly to the west through Burma and South India; Edwards (*loc. cit.*) records this from Methapalayam, South India. We question this record.

PHILIPPINES. LUZON: 101, Mountain Province, Abatan Buguias, 60 km S of Bontoc, 1800–2000 m, 4–12.V.1964, H. M. Torrevillas (BISHOP coll.).

This is probably the species referred to by Edwards (1929, *Notul. Ent.* **9**: 78) as *Plecia* sp. “Benguet, Height’s Place” [Haight’s Place, Pauai, Benguet, Mt. Prov., Luzon], “One female with black pleura and red mesonotum.”

***Plecia mayoensis* Hardy** Fig. 13 a–d.

*Plecia mayoensis* Hardy, 1950, *Proc. Haw. Ent. Soc.* **14**: 84, fig. 8a-b; 1958, *Pacif. Sci.* **12**(3): 208.

Fitting in the large group of species which has the entire thorax dull orange but differing from all known *Plecia* because of the distinctive ♂ genitalia. Fitting nearest to the

*varians-ruficornis* complex of species but with rather striking peculiarities. It is readily differentiated by having the posterolateral processes of the sternum more median in position, appearing like submedian lobes at 1st examination, and expanded at apices, rather capitate. By having the claspers large, extending over the top of and completely obscuring basal 3/4 of submedian lobes. Claspers nearly  $3\times$  longer than wide, broad, rounded at apices (Fig. 13d). Submedian lobes heavily sclerotized, pointed at apices, and narrowed

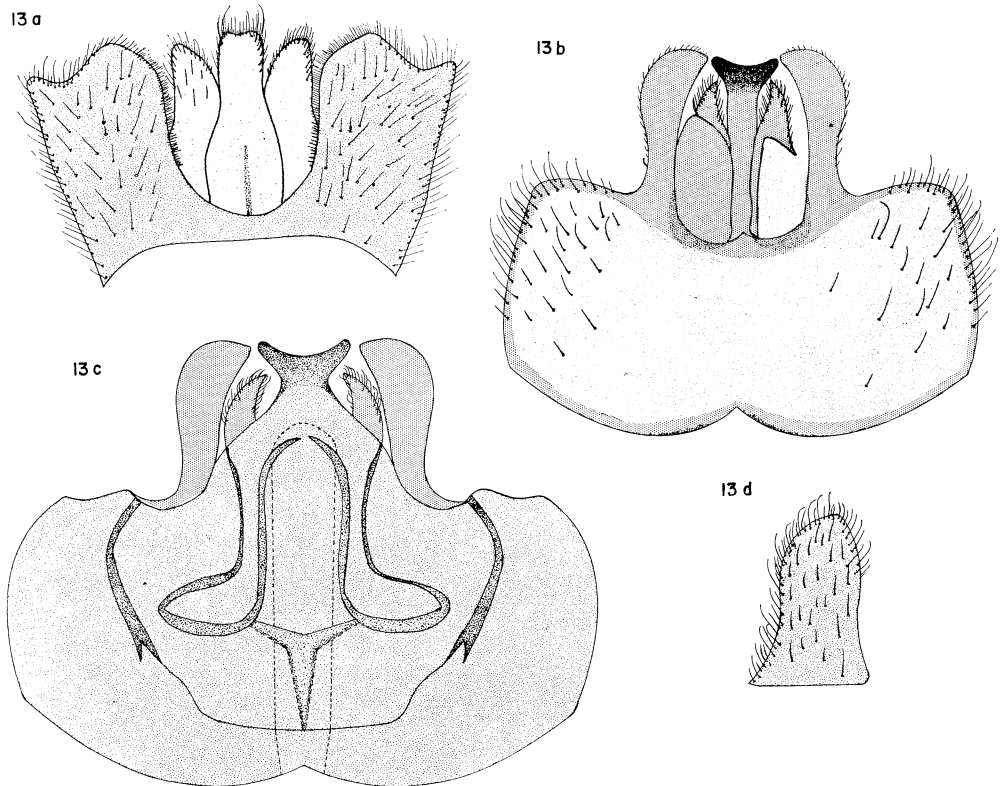


Fig. 13. *Plecia mayoensis* Hardy : a, 9th tergum, dorsal; b, 9th sternum, ventral; c, 9th sternum, dorsal; d, clasper, lateral.

to just a thin sclerotized line on inner margin; this extends just inside clasper on each side and is scarcely, if at all, visible unless the clasper is removed. The apical portion of each submedian lobe extends beyond claspers and is rather densely pilose. The median lobe is long and slender, extending beyond the submedian processes and almost as long as the projections from the posterolateral margins of the sternum; the median process is bilobed at its apex (fig. 13b). The dorsal aspects of the 9th sternum, and the 10th sternum, as seen with the 9th tergum removed, are as in fig. 13c. The 9th tergum is almost completely divided by a broad U-shaped concavity in the middle of the hind margin. The lateral lobes of the tergum each have a slight concavity in the middle of the hind margin (fig. 13a),

Length: Body 6–8 mm; wings 7.5–9.5 mm.

Type locality: Mt. Mayo, Davao, Mindanao. Type in the Museum of Comparative Zoology.

This species is known only from Mindanao. 10 specimens, 6 ♂♂, 4 ♀♀, are in the B. P. Bishop Museum from the following localities: PHILIPPINES. 6 ♂♂, 4 ♀♀, Misamis Or., Mt. Balatukan, 15 km, SW of Gingoog, 1000–2000 m, 1–5.V.1960, H. M. Torrevillas; Misamis Occ., Lake Duminagat, 1500 m, 5.VII.1958, H. E. Milliron; 2 ♀♀, Misamis Or., Mt. Kibungol, 700–800 km, SE of Gingoog, 9–18.IV.1960; Hindangon, 500–700 m, S of Gingoog, 20–24.IV.1960, Torrevillas; 1 ♀, Misamis Occ., Trib. of Clarin R., 1260 m, 14–18.VII.1958, H. E. Milliron (BISHOP coll.); 19 spec., E Slope, Mt. McKinley, Davao, 900m, VIII–X.1946, H. Hoogstraal & D. Heyneman (Field Mus. Nat. Hist.).

**Plecia parva** Malloch      Fig. 14 a–b.

*Plecia parva* Malloch, 1928, *Proc. Linn. Soc. N.S.W.* 53: 606, fig. 10.—Edwards, 1929, *Notul. Ent.* 9: 78.—Hardy, 1958, *Pacif. Sci.* 12 (3): 211, fig. 22a–c.

Edwards (*loc. cit.*) first noted that the genitalia of *parva* are very distinctive in development because of having the 9th tergum and sternum completely fused into a sclerotized ring. He also said that this species is somewhat variable in color, that “the meso-

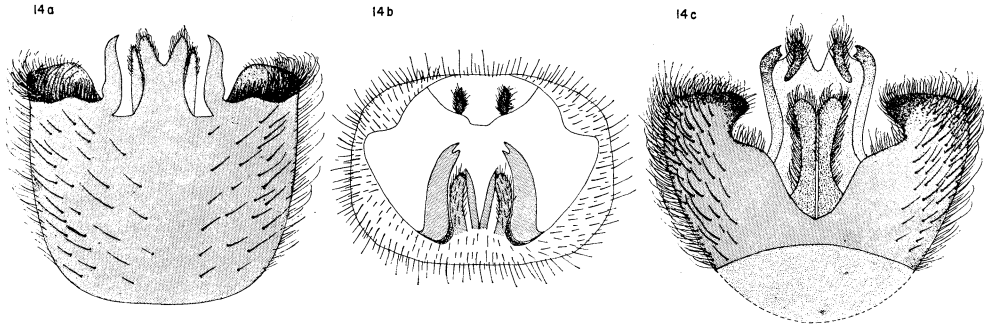


Fig. 14. *Plecia parva* Malloch: a, ♂ genitalia, ventral; b, ♂ genitalia, end view; c, ♂ genitalia, dorsal.

notum may be entirely grayish, or may have a more or less pronounced reddish tinge, either posteriorly or over the whole surface.” It is now apparent that a species complex is present which is characterized by having the 9th tergum and sternum fused and it is probable that Edwards was dealing with 2 or more species. *P. parva* can be readily differentiated from the known related species (*pulliparva* n. sp. and *affiniparva* n. sp.) by having the median process of the 9th sternum deeply cleft (fig. 14a) and the thorax typically entirely or predominantly rufous. Both *affiniparva* and *pulliparva* have the thorax entirely dark colored and the genitalia are differently developed (fig. 2a and 14a). In Hardy’s previous discussion of this species (*loc. cit.*) it was indicated that the mesonotum is chiefly rufous and the pleura brown to black. Malloch, in the original, described the thorax

as being ochreous with the pleura dull ochreous. One ♂ specimen on hand has the mesonotum entirely yellow, tinged with red and with a faint discoloration of brown on the anterior margin and with the scutellum brown, tinged faintly with yellow. The pleura are mostly yellow, tinged with red but with brown discoloration over the median portion. The type has the thorax rufous with the pleura slightly discolored. Four ♂ specimens from Acupan, Benguet, Luzon have typical *parva* genitalia but are predominantly black, rufous, tinged lightly with brown on posterior portion and on sides of mesonotum. These may be discolored or aberrant. It will be necessary to study further series to determine how variable the coloration is in this species. Malloch indicated that the antennae contained six flagellomeres "exclusive of the almost indistinguishable apical papilla." In the specimen at hand 7 flagellomeres are clearly definable. The legs are brown, tinged with red. The wings are evenly brown fumose. Vein  $R_{2+3}$  is straight and almost vertical in position, it enters the costa at about an 80° angle to vein  $R_{4+5}$ . The previous interpretation of the genitalia (Hardy, *loc. cit.*) was not correct. The structures which were interpreted as claspers actually represent slender submedian lobes from the hind margin of the 9th sternum. The posteromedian portion of the sternum is developed into a bilobed process, a V-shaped cleft is present on the hind margin of this development which extends about 1/2 its length (fig. 14a). The claspers are elongate, slender, inconspicuous and fit very close to the sides of the median projection of the sternum (fig. 14b). From a dorsal view the genitalia are as in figure 14c.

Malloch reported the length as 4.0-5.0 mm. In Hardy's previous discussion, the length of the body was recorded as 4.0-4.5 mm; the wings were recorded as 5.0-5.5 mm. The specimen at hand measures 3.5 mm for the body and 4.7 mm for the wing.

Type locality: Los Banos, Laguna. Type in the U. S. National Museum.

Malloch also recorded this from Kolambugan, Mindanao, and Edwards recorded it from Luzon: La Trinidad, and North Palawan: Binaluan. As noted above, Edwards probably had 2 or more species in his series.

PHILIPPINES. NEGROS OR.: 1 ♂, L. Balinsasayao, 1-7.X.1959, L. W. Quate (Bishop coll.); 4 spec., LUZON: Acupan, Benguet, 24.VII-12.VIII. no year given, C. S. Banks (M-CZ); 2 spec., BALABAC: Dalawan Bay, 11.X.1961, no collector given (Noona Dan Exped.).

***Plecia platyura*** Hardy and Delfinado, new species      Fig. 15 a-e.

This species appears to fit nearest to *bakeri* Malloch but differs because of the development of the median process of the 9th sternum, the shape of the posterolateral processes of the sternum as well as by other differences in the ♂ genitalia. The median process is developed as a large shelf-like, rectangular projection sloping dorsad into the genital chamber below the claspers, and occupying the entire area between the processes on the posterolateral margins of the sternum; this is clearly visible only in dorsal or end views. In *bakeri* the median process is small, rounded at apex, fitting immediately above the claspers. The posterolateral projections of the sternum of *platyura* are obliquely truncate as seen in direct ventral view. As seen from lateral view a prominent lobe is developed on the dorsal margin of each posterolateral process (fig. 15c). The dorsal aspects of the genitalia, with the 9th tergum removed, are as in fig. 15d. The claspers are nearly 4×

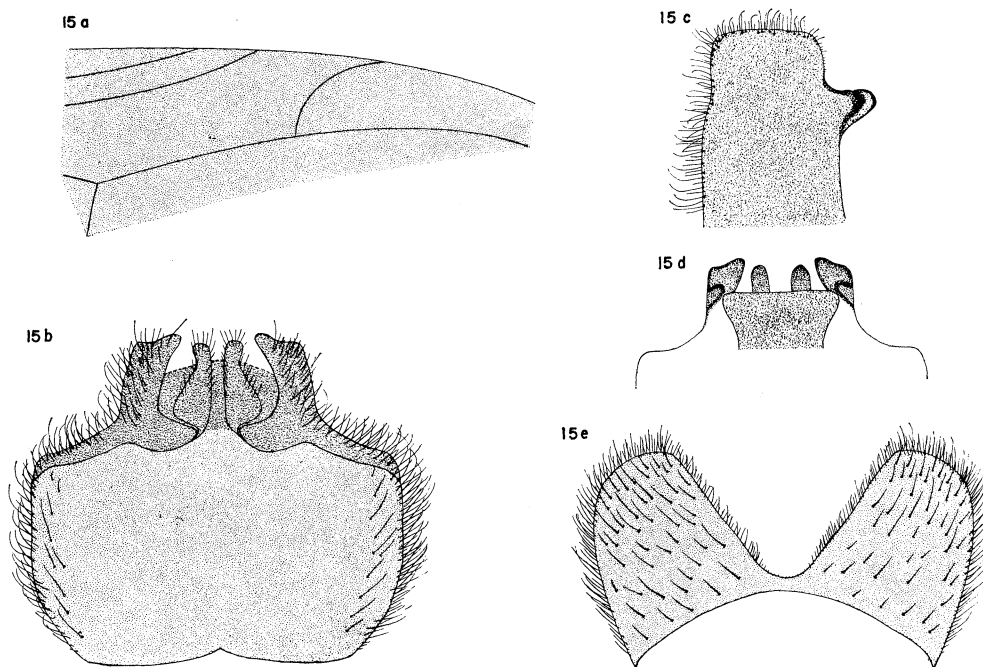


Fig. 15. *Plecia platyura* n. sp. a, anterior portion of wing; b, 9th sternum, ventral; c, 9th sternum, lateral; d, 9th sternum, dorsal; e, 9th tergum, dorsal.

longer than wide, and extend almost to the apices of the lateral projections of the sternum (fig. 15b). The row of setae on the distal portion of the 10th sternum, which is characteristic of *bakeri*, is lacking in *platyura*. The 9th tergum has a broad U-shaped cleft in the middle of the hind margin, the lateral lobes are evenly rounded at the apices (fig. 15e).

♂. Antennae with 7 flagellomeres. This species typically has the thorax entirely dull orange even though the majority of the specimens on hand, including the type (the typical specimens have the appendages broken off) have the pleura discolored with varying degrees of brown to blackish. We are convinced that this is discoloration due to greasing probably caused by the treatment they received in the field. We see nothing distinctive about this species except the characteristics of the ♂ genitalia discussed above. Vein  $R_{2+3}$  is rather gradually bent and enters the costa at about a  $70^\circ$  angle to vein  $R_{4+5}$ .

Length: Body 5.7 mm; wings 6.5 mm.

♀. Antennae with 8 flagellomeres. Front with a distinct carina extending down median portion from ocellar triangle to anterior margin. Vein  $R_{2+3}$  with a much more prominent curve than in the male.

Length: Body 4.8-5.0 mm; wings 7.0 mm.

Holotype ♂, allotype ♀ (BISHOP 7775) Luzon: Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800-2000 m, 5.IV.1964, collected in light trap, H. M. Torrevillas, 6 pa-

ratypes, all ♂, 4 same data as type, except 2 collected 27.V.1964; 1 ♂ from Mindanao: Lanao, Butig Mts., 24 km NE of Butig, 1080 m, 20.VI.1958, in rain forest H. E. Milliron, and 1 from Negros. Or.: L. Balinsasayao, 1-7.X.1959, C. M. Yoshimoto. 2 ♀ specimens are in the B. P. Bishop Museum, same data as type except that they were collected 6. and 17-19. V.1964. These are smaller than the allotype; the body measures 3.7-2.0 mm and the wing 5.5 mm. They are not being designated as paratypes. Type, allotype and 3 paratypes returned to the B. P. Bishop Museum. The remainder of the paratypes in the University of Hawaii collection.

**Plecia pulliparva** Hardy and Delfinado, new species      Fig. 16 a-c.

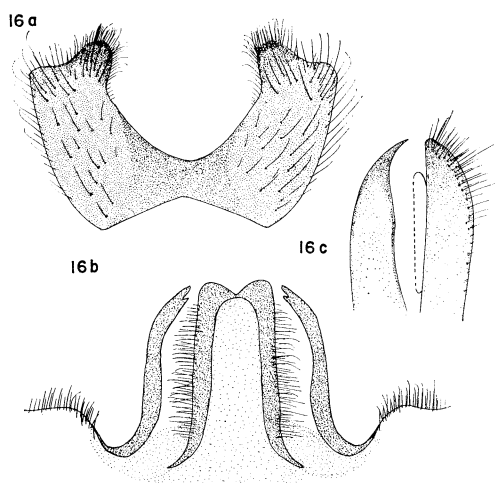


Fig. 16. *Plecia pulliparva* n. sp.: a, ♂ genitalia, dorsal; b, processes of 9th sternum, ventral; c, processes of 9th sternum, lateral.

Belonging in the *parva* complex because of the fusion of the 9th sternum and tergum of the ♂ and fitting near *affiniparva* n. sp. It is readily differentiated by the striking difference in the development of the structures on the hind margin of the 9th sternum. The median process is not divided and has a longitudinal groove running most of its length down the middle; the submedian lobes of the sternum lack the prominent spine which is characteristic of *affiniparva* and the lobes are different in shape as shown in fig. 2b and 16b. The dorsal aspects of the genitalia are as in fig. 16a. The claspers are similar to those of *affiniparva* and are hidden at the sides of the submedian lobes, distinctly visible only in lateral view fig. 16c.

Fitting the description of *affiniparva* except for genital characters, also it appears that the ♂ antennae have only 6 flagellomeres. Female antennae with 7 flagellomeres; the median portion of the front is raised only near the anterior margin.

Length: Body of ♂ 3.2 mm; wings 4.0 mm. ♀ length: Body 3.7 mm; wings 5.0 mm.

Holotype ♂, allotype ♀ (BISHOP 7776), 4 ♂ paratypes, Negros Or.: Mt. Talinas, 1020 m, 29.VI.1958, in rain forest, H. E. Milliron. Holotype, allotype and 2 paratypes returned to the Bishop Museum. Two paratypes in the University of Hawaii collection.

**Plecia recaviterga** Hardy and Delfinado, new species      Fig. 17 a-d.

This species is closely related to *subvarians* Walker and is differentiated by having the claspers about 4× longer than wide (fig. 17b), rather than about 1/2 longer than wide as in *subvarians* fig. 19b. Also by having the lobes of the 9th tergum distinctly concave on

their hind margins (fig. 17a) and the cleft between the 2 lobes rather U-shaped; in *subvarians* the lobes are evenly rounded and the cleft between is V-shaped.

♂. Fitting the general description of *subvarians* and most other species which have the thorax entirely dull orange. Posterolateral processes of the 9th sternum approximately equal in length to remainder of the segment and about  $2\times$  longer than claspers; submedian lobes well developed, they extend about  $1/2$  as long as claspers, rounded on their inner margins, very slightly pointed on their outer margins; the cleft separating submedian lobes very slightly expand-

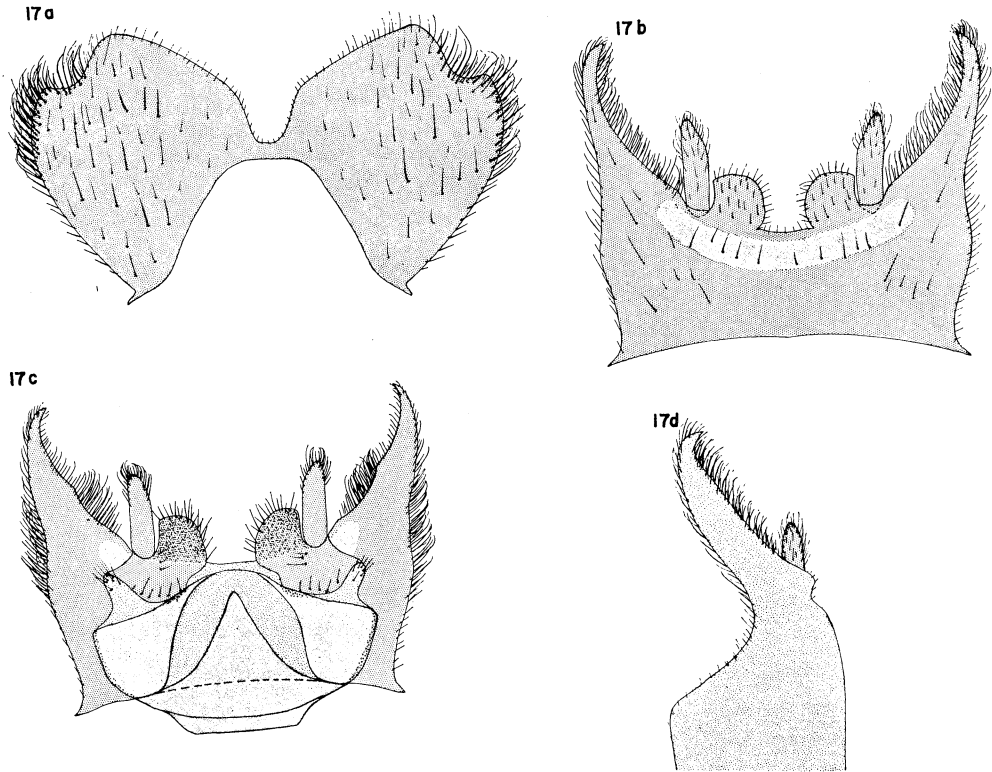


Fig. 17. *Plecia recaviterga* n. sp.: a, 9th tergum of ♂, dorsal; b, ♂ genitalia, ventral; c, 9th sternum, dorsal; d, 9th sternum, lateral.

ed at bottom as seen in direct ventral view. As seen from dorsal view, with the tergum dissected off, basad portions of median lobes distinctly setose; also distad portions of 10th sternum rather thickly setose (fig. 17c). Other aspects of the genitalia are as discussed above and as shown in fig. 17a, b and d, for *subvarians* genitalia refer to fig. 19 a-d.

Length: Body 5.0 mm; wings 6.0 mm.

Holotype ♂ (BISHOP 7777), Mindanao: Bukidnon, 1250 m, Mt. Katanglad, 4-9.XII.1959, L. W. Quate. Type in the B. P. Bishop Museum.

**Plecia ruficornis** Edwards      Fig. 18 a-d,

*Plecia ruficornis* Edwards, 1927, *Treubia* 9: 363, fig. 3d. — Hardy, 1958, *Pacif. Sci.* 12: 212, fig. 23.

A series of specimens on hand from the Philippines appear to belong here. The species has previously been known only from the type from Kei I. and the published figures and descriptions have been very sketchy. Because of the development of the genitalia this appears to fit in the *subvarians* complex. It is readily differentiated from related species by having the submedian lobes of the sternum sharp pointed and fitting closely against the sides of the claspers (fig. 18b), and by the comparatively broad, rounded posterolateral lobes of the sternum, especially as seen from lateral view (fig. 18d). Also the inner surface of each posterolateral lobe is very finely dentate or rugose. The other aspects of the genitalia are as in fig. 18a and c.

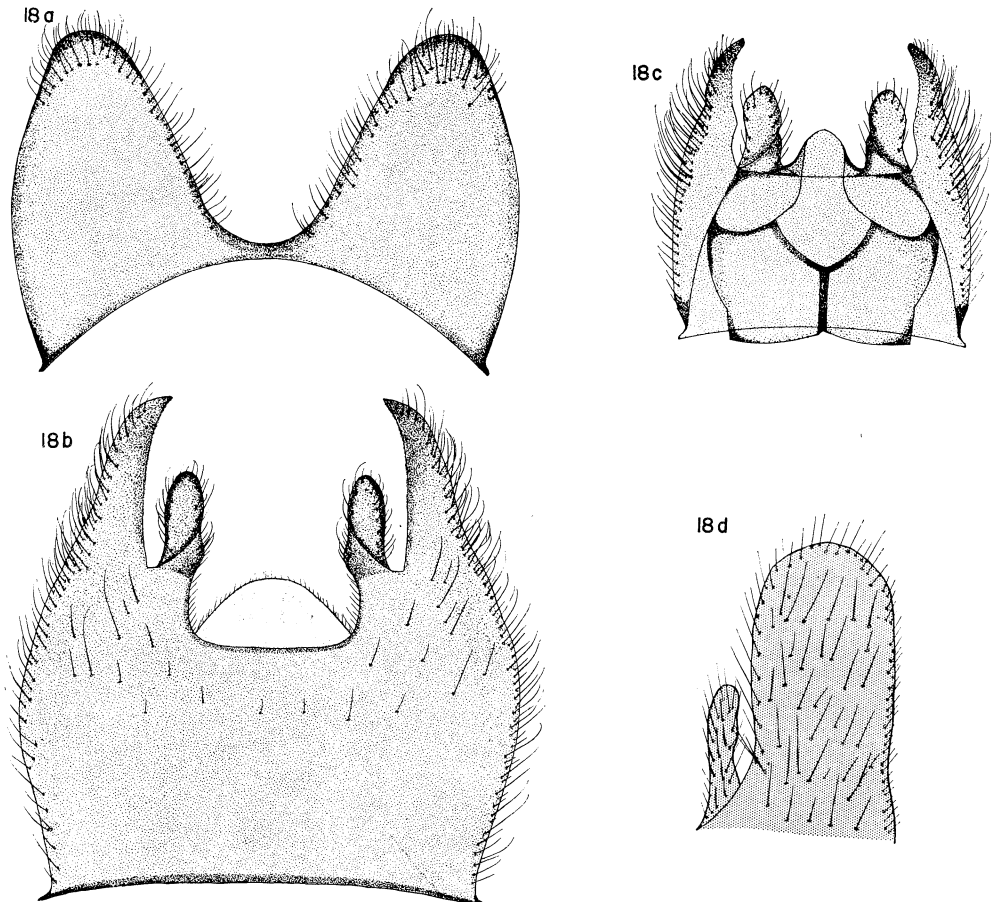


Fig. 18. *Plecia ruficornis* Edwards: a, 9th tergum, dorsal; b, ♂ genitalia, ventral; c, 9th sternum, dorsal; d, side lobes of sternum, lateral.



Length: Body 4.0 mm; wings 4.5 mm.

Type locality: Kei I. (Kai, Indonesia). Type in the British Museum (Nat. Hist.)

PHILIPPINES. MINDANAO: 6 ♂♂, 1 ♀, Misamis Or., Minalwang and Minubana, 1050-1200 m, 5-9.IV.1961, H. M. Torrevillas (BISHOP coll.).

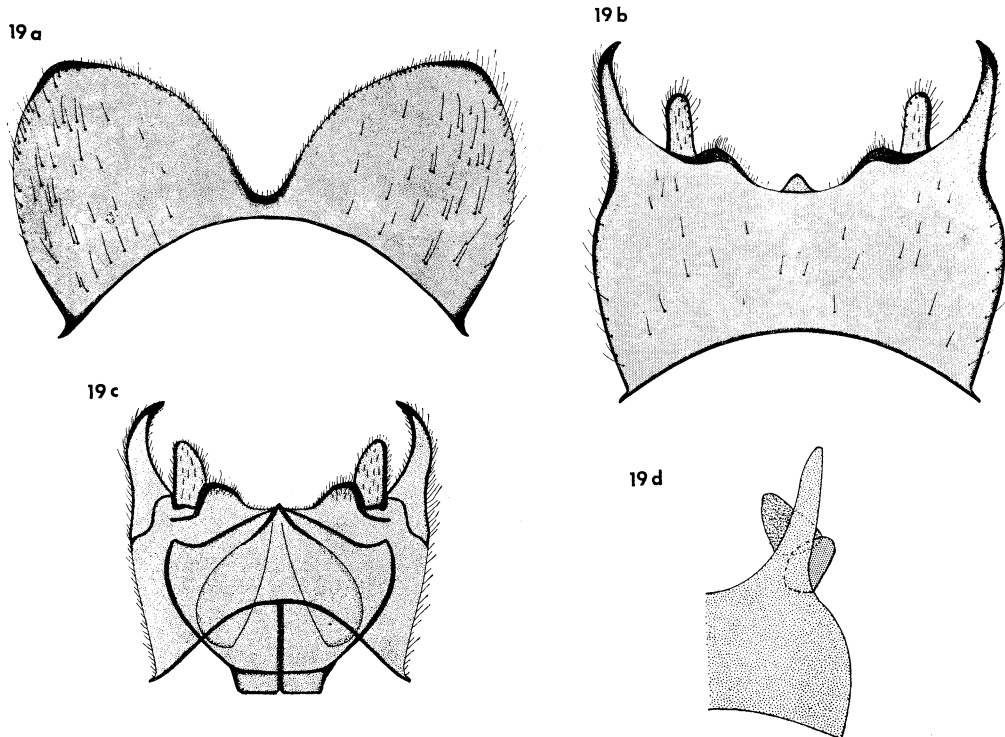


Fig. 19. *Plecia subvarians* Walker: a, 9th tergum of ♂ dorsal; b, ♂ genitalia, ventral; c, 9th sternum, dorsal; d, 9th sternum, lateral; (Species not known from the Philippines; included for comparison with *recaviterga* n. sp.)

***Plecia varians* Edwards** Fig. 20 a-d.

*Plecia varians* Edwards, 1928, *J. Fed. Malay States Mus.* **14**: 43, fig. 38.—Hardy, 1958, *Pacif. Sci.* **12** (3): 218, fig. 3a-b.

This species is related to *subvarians* Walker from Borneo and Indonesia but differs by having the processes on the posterolateral margins of the 9th sternum expanded at their apices, rather capitate as seen in lateral view (fig. 20c), rather than evenly tapered, slender and sharp pointed at apices as in *subvarians* (fig. 19d).

The processes at the posterolateral margins of the sternum are almost equal in length

to the remainder of the segment. The claspers are prominent, just slightly over  $1/2$  longer than wide and extend just over  $1/2$  the length of the lateral processes of sternum. The submedian lobes are well developed and typically are inclined inwardly so that the cleft between the 2 lobes is expanded basally. In Hardy's previous key (1958:187) this feature was used as a diagnostic character. We now believe that this may be somewhat variable and is not reliable. The strong curvature in the posterolateral projections shown in previous drawings (Edwards & Hardy, *loc. cit.*) was due to the angle from which these were viewed; from a direct ventral view, just a slight curvature is visible. The dorsal aspects of the 9th sternum are as in figure 20b. The 9th tergum is as in fig. 20d. The lobes of the tergum are rather evenly tapered, almost pointed.

Length: Body 5.5-6.0 mm; wings 6.5-7.5 mm.

Type locality: Pahang, Malaysia. Type in the British Museum (Nat. Hist.).

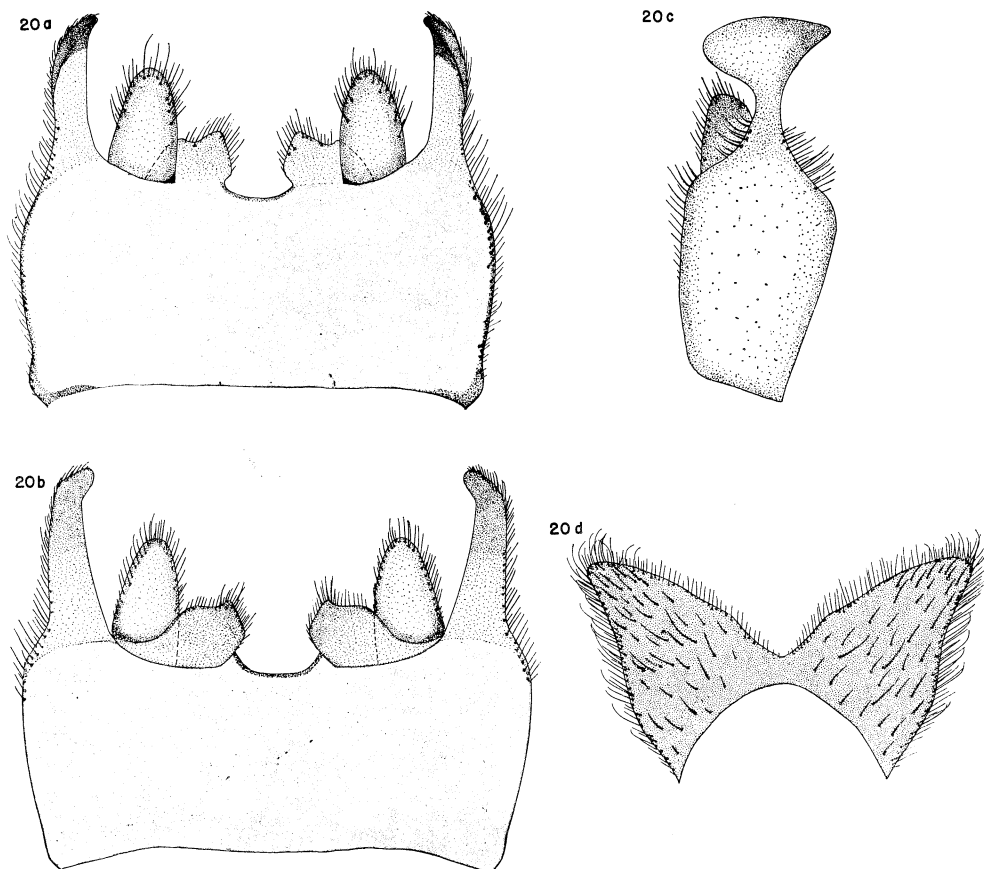


Fig. 20. *Plecia varians* Edwards: a, ♂ genitalia, ventral; b, 9th sternum, dorsal; c, 9th sternum, lateral; d, 9th tergum, dorsal.

PHILIPPINES. MINDANAO: 1 ♂, 3 ♀♀, Misamis Or., Balason, 4-5.IV.1960, H. M. Torrevillas (BISHOP coll.); 1 ♂, Sapamoro, Curuan District, 18.XII.1961, no collector given (Noona Dan Exped.).

***Plecia zamboanga* Hardy** Fig. 21 a-b.

*Plecia zamboanga* Hardy, 1950, *Proc. Haw. Ent. Soc.* **14** (1): 84, fig. 9a-b; 1958, *Pacif. Sci.* **12** (3): 220.

Fitting in the *fulvicollis* complex of species and differentiated by having the median projection of the 9th sternum of the ♂ simple, truncate and slightly expanded apically (fig. 21a). Also by having the posterolateral processes of the sternum rather simple, not strongly bilobate (fig. 21b). Ninth tergum deeply concave on hind margin, cleft almost to base.

Length: Body 9.0-9.5 mm; wings 10.0-10.5 mm.

Type locality: Mindanao: Zamboanga. Type in Museum of Comparative Zoology.

PHILIPPINES. LUZON: 6, Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800-2000 m, 30.IV-9.V.1964, in light trap, H. M. Torrevillas (BISHOP coll.); MINDANAO: 3, Zamboanga, no date (gift of B. P. Clark) (MCZ).

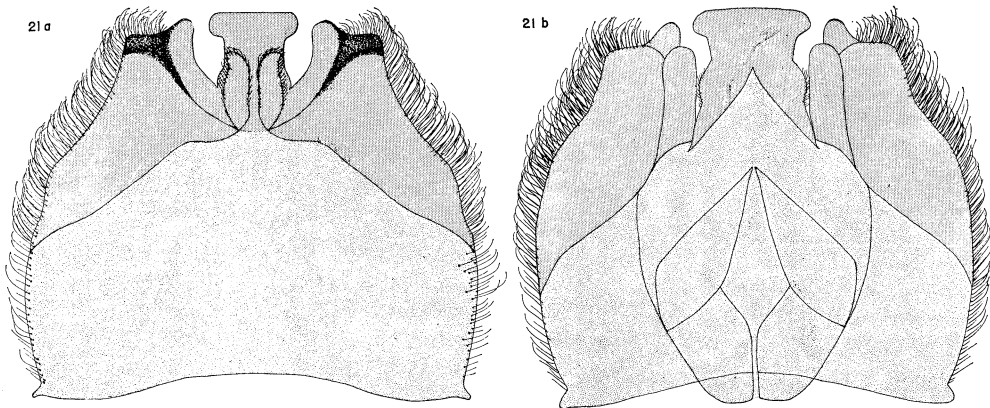


Fig. 21. *Plecia zamboanga* Hardy: a, 9th sternum, ventral; b, 9th sternum, dorsal.

Genus ***Dilophus* Meigen**

*Philia* Meigen, 1800, *Nouv. Class. des Mouch.*, 20. Suppressed by Intern. Com. on Zool. Nomencl. 1963, Opinion 678, *Bull. Zool. Nomencl.* **20**: 339.

*Dilophus* Meigen, 1803, *Mag. f. Insekt.* **2**: 264.

Type species: *Tipula febrilis* Linnaeus.

This genus is differentiated by the presence of a ring of spines at the apex of the front

tibia and the presence of one or more sets of dorsal spines above the apical set (fig. 23a and 28b). Also by 2 rows of combs on the anterior portion of the mesonotum (fig. 22c).

Seven species are known from the Philippines, 3 are new; 4 have previously been recorded.

#### KEY TO DILOPHUS

1. More than 3 spines above apical set on front tibia. .... 2  
 Front tibia with 3 prominent spines near middle of segment. Comparatively large, dark winged species; both sexes entirely polished black. .... **trispinosus** Edwards
2. Four spines just above middle of tibia; these are arranged in 2 closely placed rows, the top 2 spines close together and the lower pair widely spaced (fig. 23a). Hind tibia of ♂ strongly clavate, tarsi swollen (fig. 23b). .... **bakeri** Hardy  
 Spines usually more than 4 and not arranged as above; if the hind tibia and tarsi are swollen the spines are arranged in a single row ..... 3
3. Front tibia with a pair of closely placed dorsal spines near basal 2/5 of segment, another pair of rather widely spaced (1 anterodorsal, 1 posterodorsal) spines at middle and with a single posterodorsal spine near apical 1/3 of segment (fig. 25b). Stigma lacking in ♂ ..... 4  
 Spines not as above, arranged in a single row near middle of segment (fig. 22b) or with 3 dorsal spines in a row and 1 or 2 distally placed posterodorsal spines (fig. 27b). Stigma conspicuously dark brown. .... 5
4. Mesonotum, coxae, trochanters and femora of ♂ yellow to rufous. Vein R<sub>1</sub> continued to costa. Posterior veins faintly tinged brownish yellow. .... **pictilis** n. sp.  
 Thorax and legs metallic black or brown. Vein R<sub>1</sub> not reaching costa (fig. 25a). Posterior veins colorless. .... **innubilus** n. sp.
5. Claspers of male scarcely visible *in situ*, comparatively small, not over 1/4 as long as 9th sternum. Wings of ♂ faintly infuscated. Middle set of spines on front tibia with 3 dorsal teeth and with 1 (or more) distally placed spine on either posterodorsal or anterodorsal surfaces. Posterior comb on mesonotum not with 3 prominent, longitudinally arranged teeth on each side. Tarsi slender. .... 6  
 Claspers large and conspicuous, about equal in length to sternum. Wings of ♂ hyaline, milky white. Front tibia with 4 or 5 spines in a row near middle (fig. 22b). Posterior comb with 3 prominent longitudinally arranged teeth on each side (fig. 22c). Hind tarsus of ♂ swollen, basitarsus about 3× longer than wide. .... **acutidens** Edwards
6. Claspers of ♂ 2× longer than wide and rounded at apices. Legs entirely black. Front tibia with 3 dorsal teeth just before middle and with 1 (possibly 2-3) more distally placed posterodorsal tooth. Rostrum, sclerotized portion of head in front of eye, prominent; in ♀ about equal in length to eye. .... **scabricollis** Edwards  
 Claspers very short, flattened apically, scarcely 1/5 as long as sternum (fig. 24c). Front trochanters and posterior and anterior surfaces of the front femur yellow to rufous. Front tibia with displaced (distal) tooth on anterodorsal surface (fig. 24a). Rostrum short, scarcely visible from direct lateral view. .... **crenulatus** n. sp.

**Dilophus acutidens** Edwards      Fig. 22 a-c.

*Dilophus acutidens* Edwards, 1929, *Notul. Ent.* 9: 79, fig. 2c.

*Philia acutidens*: Hardy, 1951, *Proc. Haw. Ent. Soc.* 14 (2): 260, fig. 1a.

Because of the strongly clavate hind tibia and the swollen hind tarsus of the ♂, this species would fit near *bakeri* Hardy. It is differentiated by having the spines above the apical set arranged in a single row and by having the wings hyaline, slightly milky. It also appears rather closely related to *varipes* Skuse from Australia, but the latter species is differentiated by having the hind metatarsus thicker than the tibia and the wings tinged with yellow.

We have not seen the ♂ of this species. Edwards said the antennae have only 6 distinct flagellomeres. The ♀ specimen on hand has 8 flagellomeres; the last 2, however, are closely joined. The ♂ is entirely shining black, the ♀ typically has the thorax, coxae and femora rufous. One ♀ from Mt. Apo, Mindanao, has the thorax predominantly dark colored, rufous only on the hind portion of the mesonotum, the scutellum, metanotum,

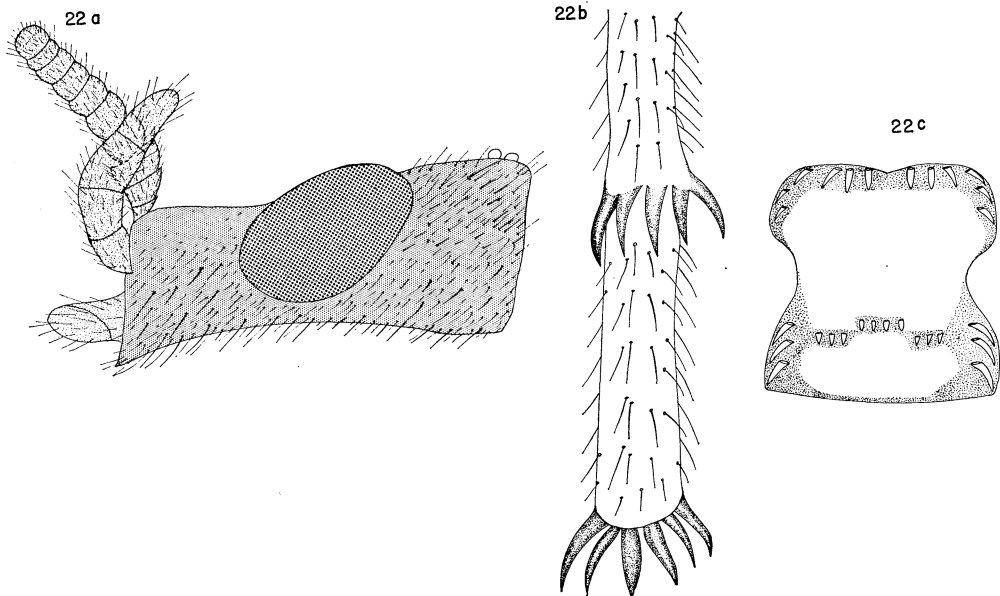


Fig. 22. *Dilophus acutidens* Edwards: a, head of ♀, lateral; b, front tibia; c, thoracic combs.

humeral ridges and tinged with rufous on the sides of the mesonotum. The conjunctiva of the abdomen is rufous in 1 ♂, brown in the other. The head of the ♀ is entirely black, the rostrum is about equal in length to eye (fig. 22a). One set of spines present on the front tibia above apical set (fig. 22b); 1 ♂ on hand has 4 spines arranged in a direct row, the other has 5 spines. The ♀ specimen on hand has 4 spines on 1 tibia, 5 spines on the other. Edwards says the anterior comb of the thorax of the ♂ is composed of about 10 long and sharply pointed teeth in an anteriorly convex arch. In the ♀ the comb is arranged in an arch which is divided into 2 distinct sets of 6 spines each by a separation equal to the distance between 2 spines. Edwards says that the posterior comb of the ♂ has about 8 small teeth. In the ♀ the posterior comb has about 10 tiny teeth arranged in 2 irregular rows across the segment and 3 rather large teeth extending

longitudinally on each side (fig. 22c). Edwards said that the hind femur of the ♂ is "strongly clubbed at the tip, slender and cylindrical on basal half or more. Hind tibia much swollen on about the apical half, hind tarsus with each segment somewhat swollen, especially the 1st, which is about 3 times as long as broad, and over 3 times as thick as the swollen end of the tibia." He describes the wings of the ♂ as having a faint milky tinge, with the costal cell yellow and the stigma conspicuous, dark brown, and the posterior veins pale brown. He described the ♀ wings as "rather smokey, darker anteriorly." The ♀ on hand has the wings evenly but faintly tinged brownish yellow. Edwards said that the 9th tergum of the ♂ has a "deep V-shaped notch;" and the claspers are "large, irregular in shape and extended backwards."

Length of ♂ body 3.5 mm; wings 3.2 mm. Length of ♀: Body 4.25–4.5 mm; wings 4.5 mm.

Type locality: Balbalasang (we are unable to locate this place name, it is probably on Luzon). Type in the British Museum (Nat. Hist.).

Hardy recorded the ♀ specimen from Mindanao: La Lun Mts., Davao.

PHILIPPINES. LUZON: 1 ♀, Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800–2000 m, 28–29.V.1964, H. M. Torrevillas (BISHOP coll.); ♂, Los Banos, no date given, F. Muir; MINDANAO: Batraeyon, Mt. Apo, 2400 m, 14.IX. (no year), C. S. Clagg (MCZ).

***Dilophus bakeri* Hardy, New Comb.** Fig. 23 a-d.

*Philia bakeri* Hardy, 1951, *Proc. Haw. Ent. Soc.* 14 (2): 260, fig. 2a.

This species is related to *acutidens* Edwards and is differentiated by the differences in the arrangement of the spines on the front tibia (fig. 22b and 23a) and by the brownish-yellow wings of the ♂. The ♀ of *bakeri* is unknown.

Body and legs entirely polished black. Antennae with 9 flagellomeres; rostrum produced almost 1/2 as long as lower portion of eye, but not extended beyond bases of antennae (taken from the original description, the specimen on hand has the head broken off). About 10 rather prominent spines present in anterior set on dorsum of thorax; these are separated into 2 groups by a space in the middle about equal in width to the distance between 2 spines. Posterior set on thorax consists of 4 small spines on each side, with a distinct separation in middle about equal to distance between 2 or 3 spines and with 2 slightly larger spines on sides of mesonotum opposite median row but extending longitudinally. Spines of front tibia arranged as in fig. 23a. Hind legs shaped as in fig. 23b: Femora slender, tibiae rather strongly swollen at apices and tarsomeres distinctly swollen. Wings pale brownish yellow, posterior veins light brown. Genitalia most unusual, nothing like them has been recorded for *Dilophus*. Ninth tergum tapered posteriorly and with a V-shaped concavity in middle of hind margin extending about 1/5 or 1/6 length of segment (fig. 23c). Claspers very large, well-developed. almost equal in length to 9th sternum and as seen from ventral view they are partially bilobed at apices (fig. 23d). Ninth sternum with a rather small U-shaped concavity in middle of hind margin and a small submedian lobe on each side of this concavity extending over inner bases of claspers (fig. 23d). As seen from dorsal view, with tergum dissected off, each clasper is developed into a broad rounded basal lobe and the 10th sternum, aedeagus and phallobase are as in fig. 23e.

The original description gave the length of the body as 5.0 mm and the wings 5.3 mm. The specimen on hand measures approximately 4.0 mm for both the body and the wings.

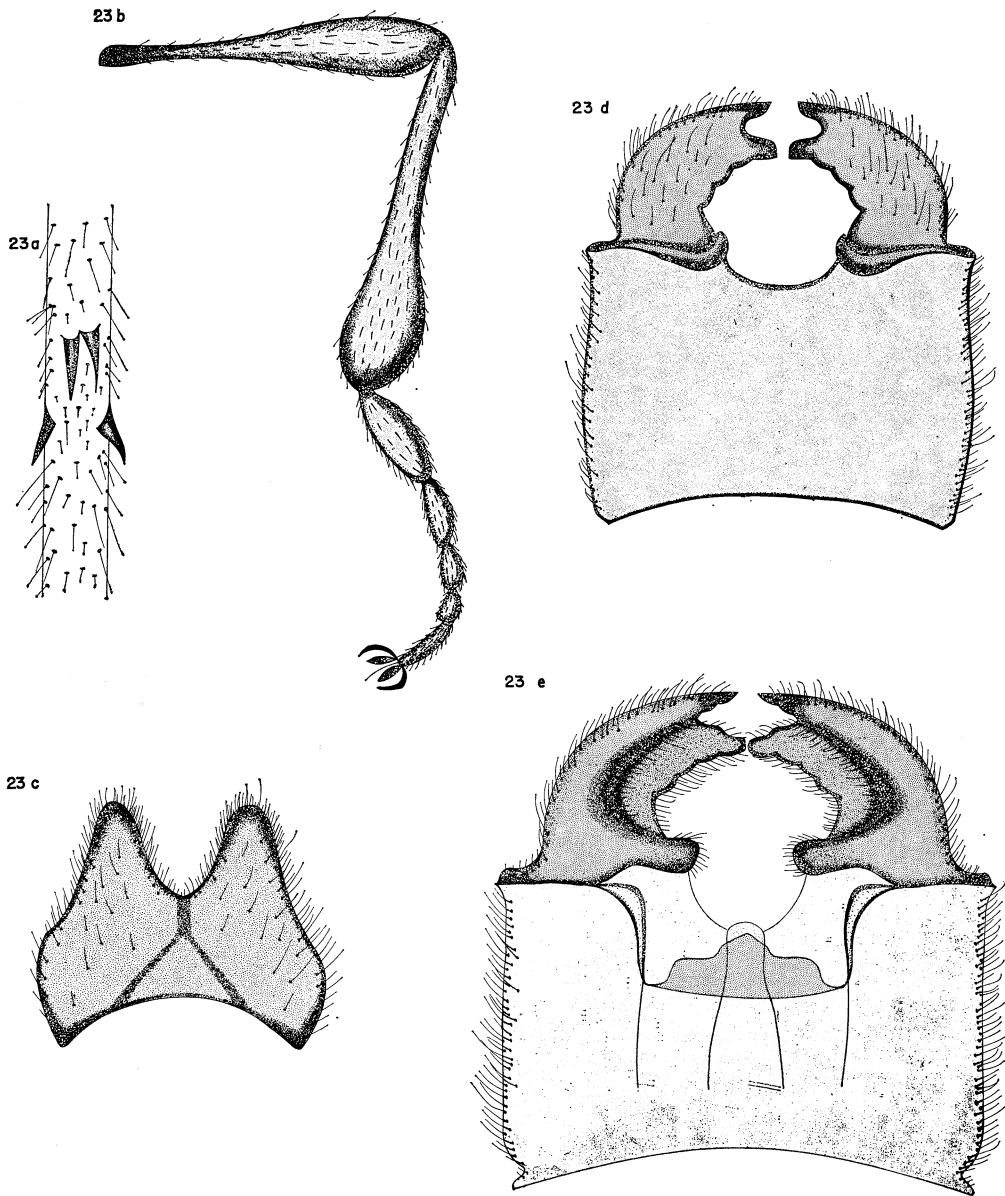


Fig. 23. *Dilophus bakeri* Hardy: a, front tibia b, hind leg c, 9th tergum of ♂ dorsal; d, ♂ genitalia, ventral; e, 9th sternum, dorsal.

♀. Unknown.

Type locality: Luzon: Baguio, Benguet. Type in the U. S. National Museum.

PHILIPPINES. LUZON: 1 ♂, Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800–2000 m, 28–29.V.1964, H. M. Torrewillas (BISHOP coll.).

**Dilophus crenulatus** Hardy and Delfinado, new species      Fig. 24 a–c.

This species appears to be close to *scabricollis* Edwards and would fit his description of that species except that the genitalia are obviously different; those of *crenulatus* are quite distinctive from those figured by Edwards. The claspers are broad, rather flattened laterally, with sharp, slightly crenulated inner edges; the figure of *scabricollis* shows the claspers to be 2× longer than wide and broadly rounded at apices. The 9th tergum of *crenulatus* is straight or nearly so, in Edwards' figure of *scabricollis* the 9th tergum has a shallow concavity on posterior margin. Also, Edwards' description would indicate that the rostrum, the sclerotized portion of the head in front of the eye, is well developed in *scabricollis*; in his description of the ♀ he says "head in side view fully twice as long as eye." The yellow to rufous front trochanters and posterior and anterior surfaces of the femora are probably also distinctive for *crenulatus*.

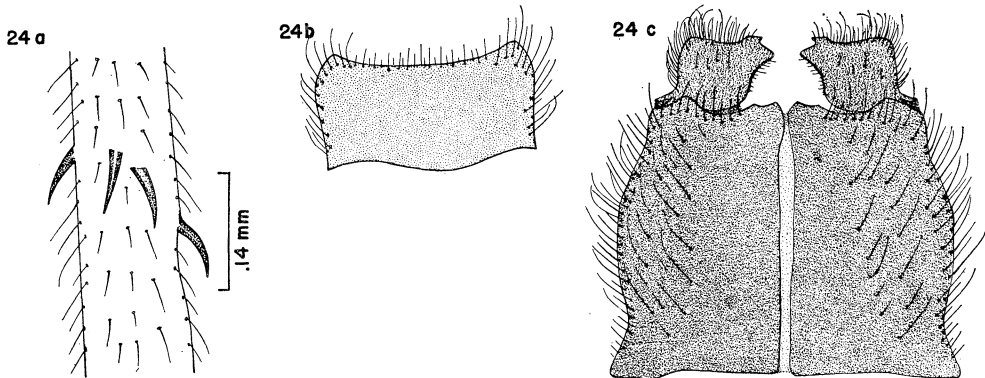


Fig. 24. *Dilophus crenulatus* n. sp.: a, front tibia; b, 9th tergum of ♂, dorsal; c, ♂, genitalia, ventral.

♂. *Head*: Rostrum, the sclerotized portion of head in front of eye, only slightly developed, scarcely visible from direct lateral view and about equal in length to scape and pedicel of antennae. Scape and pedicel yellow, tinged with brown. Flagellum brown and appears to be made up of 8 or 9 flagellomeres, apical portion closely fused and the sections are difficult to differentiate. Last segment of palpus short, scarcely longer than wide. *Thorax*: Entirely metallic black except for tinges of yellow on humeral ridges and propleura, also stems of halteres and underside of scutellum yellow. Both thoracic combs made up of approximately 10 prominent, rather blunt teeth arranged in an arc; 1 rather widely displaced tooth present on each side behind posterior comb, in line with dorsocentral row. A series of short yellow hairs extends down each dorsocentral line, also sparse yellow pile is present on sides of mesonotum. Lateral



margins of mesonotum wrinkled, dorsal portion smooth except for minute wrinkles down antero-medial portion. *Legs*: Predominantly polished black, front trochanters, posterior and anterior surfaces of the front femur, extreme bases of front tibia and extreme apices of hind femur and bases of hind tibia yellow. Spines on front tibia large and prominent; series just above middle of segment consists of 4 spines arranged diagonally across tibia, 3 dorsal spines situated close together near basal 1/3, and 1 slightly more distally placed anterodorsal spine near middle (fig. 24a). In *scabricollis* the displaced tooth is on the posterodorsal surface of tibia. Leg segments slender, hind basitarsus approximately 2/5 as long as tibiae and 2× longer than 2nd tarsomeres. Legs sparsely yellow pilose except for black hairs on tarsi. Tibial spur approximately equal in size to spines of apical set. *Wings*: Very slightly infuscated, yellowish in costal cell. Stigma conspicuous, dark brown. Anterior veins brown, posterior veins yellow-brown, distinctly darker than membrane. *Abdomen*: 9th sternum slightly longer than wide and with a clear space extending down middle almost entire length of sclerite. Claspers short and broad, flattened apically with inner edges sharp and slightly crenulated (fig. 24c). Claspers very short compared to 9th sternum, as seen from direct ventral view each would be about 1/5 as long as sternum. Ninth tergum almost 1/2 wider than long, hind margin almost straight (fig. 24b).

Length: Body and wings, 3.75 mm.

♀. Unknown.

Holotype ♂ (MCZ), Mindanao: La Lun Mts., Davao, 3.V. (no year given), C. S. Clagg. Type returned to the Museum of Comparative Zoology.

***Dilophus innubilis*** Hardy and Delfinado, new species      Fig. 25 a-d.

Because of the arrangement of the spines on the front tibia this would appear to fit near *exiguus* (Hardy), from Papua. It differs from that species, however, by having the thorax and legs entirely black, not with the legs chiefly pale yellow and sides of prothorax yellow; also by having rostrum distinctly developed, rather than not at all produced and not protruding beyond eye margin; and by having wings completely hyaline and with stigmata colorless, rather than having the wings faintly fumose with the stigmata pale yellowish brown. The species fits closest to *pictilis* n. sp. but differs by having the thorax and legs metallic black or brown; vein R<sub>1</sub> not reaching costa (fig. 25a), and the posterior veins colorless.

♂. *Head*: Antennae entirely dark brown to black, and with 8 to 9 flagellomeres, these closely joined and difficult to ascertain on apical portion. Rostrum distinctly developed and very prominent as seen from direct lateral view. Sclerotized portion beyond eye margin equal to approximately 1st 3 flagellomeres. *Thorax*: Metallic black on dorsum, dark brown, tinged with rufous on sides. Lateral margins of mesonotum covered with microscopic yellow pubescence which makes an opaque patch on each side above wing bases. Anterior comb made up of about 10 rather small acutely pointed teeth arranged in a slight arc. Posterior comb made up of approximately 12-14 small teeth with about 10 arranged almost in a row transversely across mesonotum and with 2 widely displaced teeth on each side arranged longitudinally down each dorsocentral line. Mesonotum almost devoid of setae, just a few pale hairs extend down dorsocentral rows and with a few pale hairs located on each side. Stems of halteres yellow, tinged faintly with brown, knobs brownish yellow. *Legs*: Predominantly black or dark reddish brown, tinged with rufous in ground color of trochanters and femora. Front tibia with 2 closely placed dorsal spines just before middle, 1 spine on anterodorsal and 1 spine on posterodorsal surfaces at middle of segment and 1 distally placed posterodorsal spine near apical 2/3 of segment

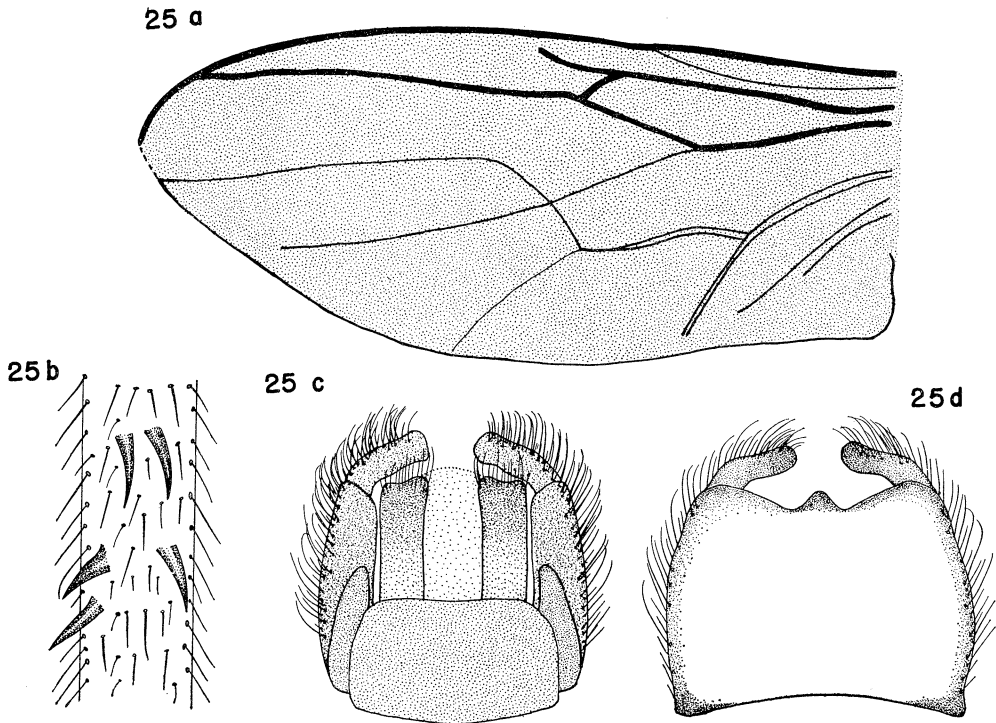


Fig. 25. *Dilophus innubilis* n. sp.: a, wing; b, front tibia; c, ♂ genitalia, dorsal; d, ♂ genitalia, ventral.

(fig. 25b). Hind tibia and tarsi slender, basitarsus about  $1/3$  as long as tibia. *Wings*: Entirely hyaline, posterior veins and stigmata colorless and anterior veins very faintly tinged with yellow. Vein  $R_1$  does not extend to costa but evanesces just beyond where it forks off the radial sector. Costa extends almost  $2/3$  distance between apices of radial sector and vein  $M_{1+2}$  (fig. 25a). *Abdomen*: Entirely black, opaque on dorsum, covered with brown pubescence. Sterna mostly shining. 9th sternum slightly longer than wide and raised in middle of hind margin. Claspers about  $2.5\times$  times longer than wide and rounded at apices (fig. 25d). 9th tergum wider than long and straight on hind margin (fig. 25c).

Length: Body and wings, 3.2 mm.

♀. Unknown.

Holotype ♂ (MCZ), Mindanao: Mt. Mayo, Davao, 1200–1500 m, 26. I. (no year or collector given, probably collected by C. S. Clagg). Paratype ♂ (BISHOP), Mindanao: Misamis Or., Minalwang, 1050 m, 24.III–4.IV.1961, H. M. Torrevillas. Type in the Museum of Comparative Zoology; paratype in B. P. Bishop Museum.

***Dilophus pictilis* Hardy and Delfinado, new species**

Fig. 26 a–c.

This species fits near *innubilis* n. sp. but is differentiated by having the mesonotum, coxae, trochanters and femora of ♂ yellow to rufous; by having vein  $R_1$  continued to

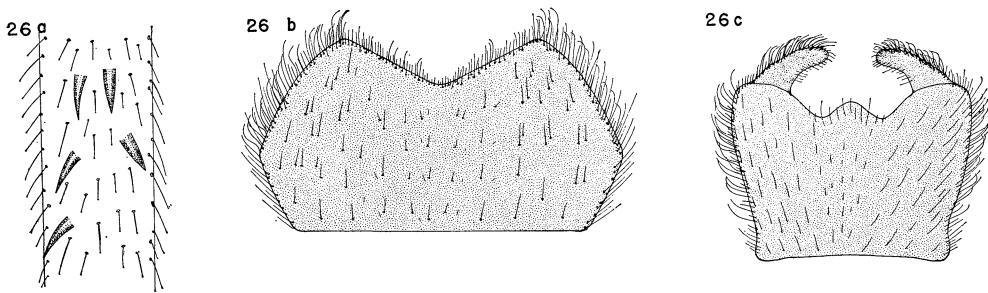


Fig. 26. *Dilophus pictilis* n. sp.: a, front tibia; b, 9th tergum of ♂, dorsal; c, ♂ genitalia, ventral.

costa and posterior veins of wing faintly tinged, brownish yellow.

♂. Similar in many respects to *innubilus*. *Head*: Pedicel of antenna predominantly yellow, flagellum dark brown to black and apparently composed of 9 flagellomeres, apical portion closely fused. Last segment of palpus about 2.5× longer than wide. Rostrum well developed, similar to that of *innubilus*. *Thorax*: Mesonotum entirely yellow to rufous; prothorax and pleura dark brown to black, also metanotum dark brown to black; scutellum yellow, tinged with brown. Anterior comb consists of 10 sharp pointed teeth in an almost straight line and with 2 displaced, longitudinally arranged teeth on each side, the 2nd of these is in line with posterior comb. Posterior comb consists of 4 tiny teeth on each side with a rather wide space between each set, equal in width to the distance between 3 of the teeth. Mesonotum almost bare, a few short yellow setae present down each dorsocentral line and a few setae present on each side. Lateral margins of mesonotum tinged with brown to black in ground color and densely covered with microscopic yellow pubescence. Stems of halteres yellow, knobs brown, tinged with yellow. *Legs*: Coxae, trochanters, and femora bright yellow, tibiae and tarsi shining black. The arrangement of spines on front tibia similar to that of *innubilus* and as shown in fig. 26a. *Wings*: Hyaline with a very faint tinge of yellow on stigmata. Vein  $R_1$  extends to costa. Anterior veins pale brown and posterior veins yellow, tinged slightly with brown. *Abdomen*: Entirely black, opaque, covered with gray to brown pubescence on terga and with sterna predominantly polished. Abdomen covered with short yellow pile. Genitalia similar to those of *innubilus* and as in fig. 26b and 26c. Posterior border of 9th tergum slightly concave.

Length: Body and wings, 3.75 mm.

♀. Unknown.

Holotype ♂ (MCZ), Mindanao: La Lun Mts., Davao, 2.VII. (no year given), C. S. Clagg. Type in the Museum of Comparative Zoology.

#### ***Dilophus scabricollis* Edwards** Fig. 27 a-b.

*Dilophus scabricollis* Edwards, 1929, *Notul. Ent.* 9: 79, fig. 2b.

*Philia scabricollis*: Hardy, 1951, *Proc. Haw. Ent. Soc.* 14 (2): 272.

This species resembles *trispinosus* Edwards but is differentiated by the arrangement of spines on the front tibia. According to the original description the tibia has 4 spines above the apical set near the middle of the front tibia. Edwards said "with three dorsal

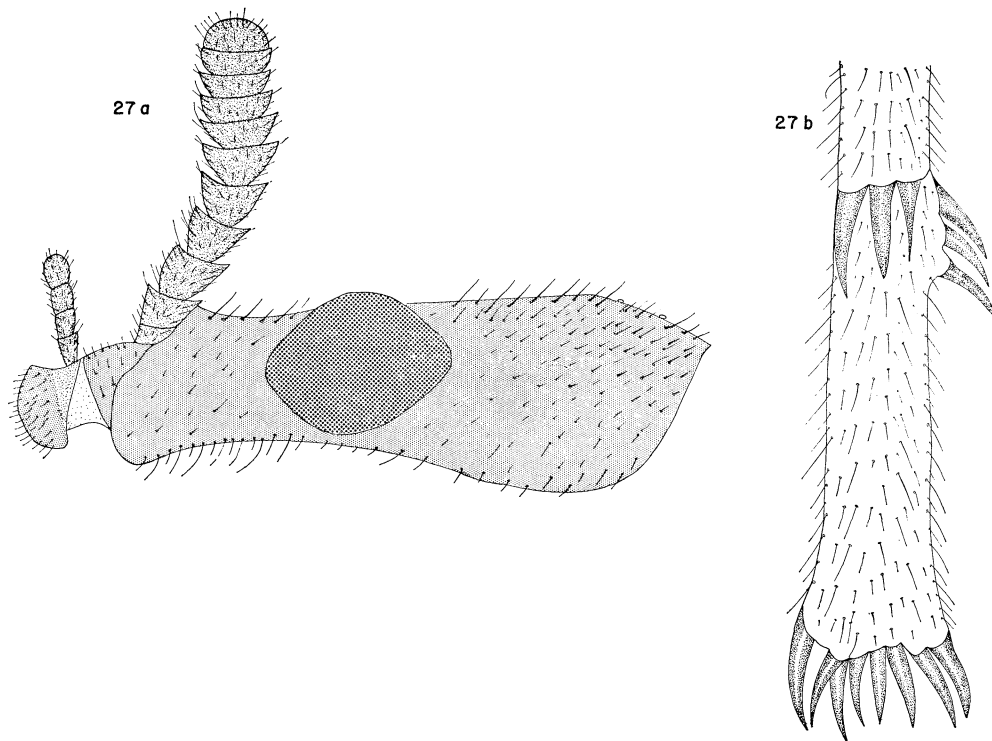


Fig. 27. *Dilophus scabricollis* Edwards: a, head of ♀, lateral; b, front tibia.

teeth just before the middle, 1 more tooth on outer side a little lower distally placed." One ♀ specimen on hand appears to belong here but only 1 front tibia is intact and it has 3 spines placed in a transverse row just above middle of the segment and 3 spines arranged longitudinally on the outer side opposite the dorsal row (fig. 27b). This may be an aberrant specimen. Edwards indicated that the ♀ tibia has 2 teeth on the outer side "one in front of the other." Since Edwards only saw 1 ♂ and 1 ♀ it is impossible to tell just what is typical for this species until more material has been studied. The ♀ is entirely shining black, faintly tinged with reddish in the ground color. The head is rather elongate, the rostrum is about equal in length to the eye (fig. 27a). The pedicel of the ♀ antenna is yellow, and 9 flagellomeres are present in the ♀. The last segment of the palpus is about 1/2 longer than wide.

Length: Edwards gave the length of the body of the ♂ as 3.0 mm, ♀ 4.5 mm; wings of ♂ 3.0 mm, ♀ 4.5 mm. On the ♀ specimen at hand, the body measures 4.5 mm, the wing measures 4.0 mm.

Type locality: Balbalasang (we are unable to locate this place name, it is probably on Luzon). Type in the British Museum (Nat. Hist.).

PHILIPPINES. MINDANAO: Misamis Or., Mt. Balatukan, 15 km SW of Gingoog, 1080-

2000 m, 1-5.V.1960, H. M. Torrevillas (BISHOP coll.). Two other ♀ specimens are in the Field Museum of Natural History; I am placing them here with a query, from Mindanao: E. Slope Mt. McKinley, 1800 m, XI.1946, H. Hoogstraal.

***Dilophus trispinosus* Edwards** Fig. 28 a-d.

*Dilophus trispinosus* Edwards, 1929, *Notul. Ent.* 9: 78, fig. 2a.

*Philia trispinosa* Hardy, 1951, *Proc. Haw. Ent. Soc.* 14 (2) 273, fig. 12a.

This species differs from other known *Dilophus* from the Pacific, which are shiny black bodied and which have slender hind legs, by having just 3 spines above the apical set on the front tibia (fig. 28b).

A moderately large species with body and appendages entirely polished black and pile of head, thorax and posterior portion of abdomen predominantly black; pile of scutellum, abdomen

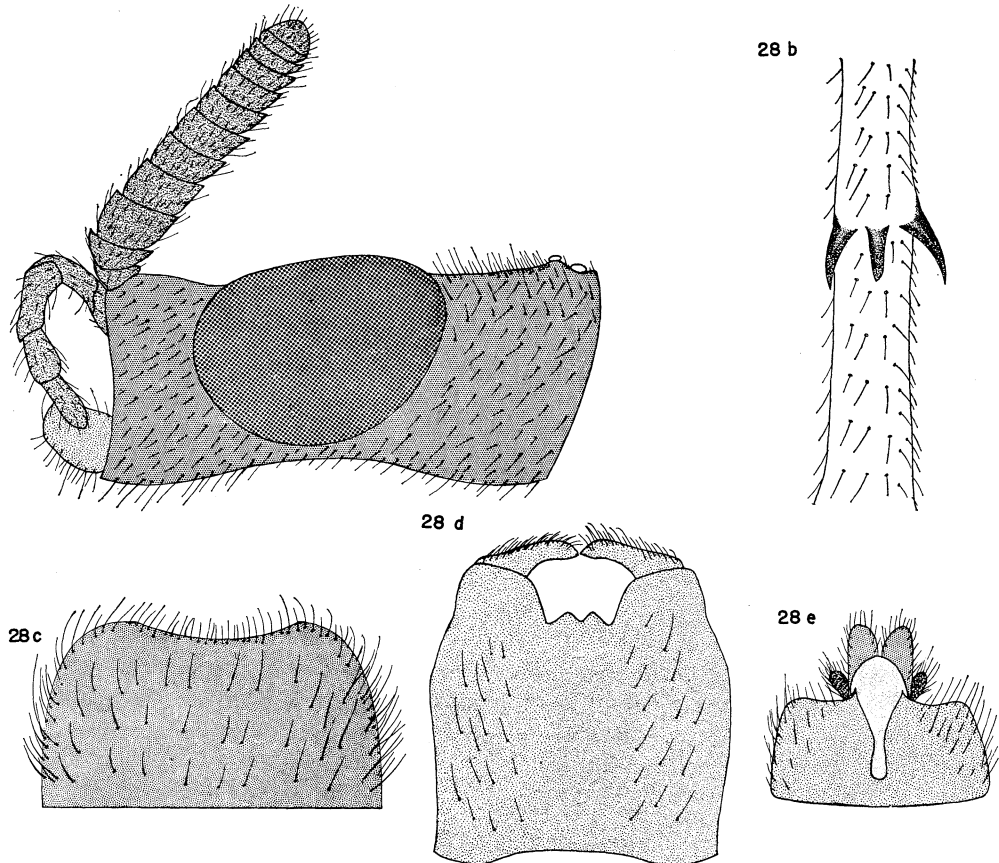


Fig. 28. *Dilophus trispinosus* Edwards: a, head of ♀, lateral; b, front tibia; c, 9th tergum of ♂; d, ♂, genitalia, ventral; e, terminalia of ♀, ventral.

except apex, coxae and femora pale yellow. Last segment of palpus approximately  $3\times$  longer than wide. Antennae with 10 flagellomeres in both sexes. Rostrum not produced beyond bases of antennae and in ♀ is less than  $1/2$  as long as compound eye (fig. 28a). The 3 spines on front tibia above the apical set are situated near the middle of the segment (fig. 28b). Tibial spurs are comparatively short and inconspicuous, and are shorter than the spines at apex of tibia. Wings uniformly light brown fumose, darker brown along costal margin and more intensely fumose in ♂ than in ♀. Posterior veins brown, darker than membrane. Costa extends about  $1/3 - 2/5$  the distance between the apices of Rs and vein  $M_1$ . Anterior spines on dorsum of thorax vary in number from 6 to 10, these are well-developed and evenly spaced in a continuous row with no separation in middle. Approximately 12 smaller spines make up the secondary set on the notum. Ninth tergum of ♂ not much wider than long and slightly concave on posterior margin (fig. 28c). Concavity at median margin of 9th sternum extends about  $1/4$  length of segment. Claspers short, slightly pointed at apices as seen in direct ventral view (fig. 28d). ♀ terminalia shaped as in fig. 28e.

Length: ♂ body and wings 4.5-5.0 mm, ♀ 6.0-6.7 mm.

Type locality: Luzon: Mountain Prov., Haight's Pl., Benguet. Type in the British Museum (Nat. Hist.).

PHILIPPINES. 28 spec., Mountain Prov., Abatan, Buguias, 60 km S of Bontoc, 1800-2000 m, 5. IV.-29.V. 1964, in light trap, H. M. Torrevillas (BISHOP coll.).

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