STUDIES IN ORIENTAL BIBIONIDAE: NEW SPECIES OF *PLECIA* AND *PENTHETRIA* AND A REVISION OF THE *PLECIA IMPOSTOR* COMPLEX. (BIBIONIDAE: DIPTERA)*.

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The material discussed in this paper has been received for study from the following entomologists and institutions: Dr. Alan Stone, the United States National Museum; Mr. Paul Freeman, British Museum (Natural History); Dr. S. L. Hora, Zoological Survey of India; Dr. R. N. Mathur, Forest Research Institute, Dehra Dun, India and Father A. deCooman, Musèe Heude, Universite L'Aurore, Shanghai. Specimens have been received from collectors in the field in connection with the parasite exploration work which has been carried out in India as part of the biological control of fruit flies program in Hawaii. These entomologists are: Dr. I. M. Newell, University of Hawaii; Mr. Fred Bianchi, Hawaiian Sugar Planters' Association; and Mr. N. D. Waters, United States Department of Agriculture. Some specimens were also received from Mr. P. Susai Nathan, a commercial collector in South India.

The paper deals in large part with a study of the complex of species which are related to *Plecia impostor* Brunetti. The study was begun in 1943 when the writer collected, in North India, three different species which fit the original description of *impostor*. Since that time a number of other species have been studied which cannot be distinguished from the original description of *impostor*. Through the kind co-operation of Dr. S. L. Hora and Dr. R. N. Mathur, the writer has been able to study the type and one male paratopotype of *P. impostor* and it has thus been possible to definitely establish the identity of this species.

The impostor complex

This group of species is distinguished from other oriental *Plecia* by the brown to black discoloration on the anterior portion of the mesonotum. The remainder of the mesonotum is orange to rufous and the pleura are largely brown to black. The presence of dark coloring on the front of the mesonotum is useful only in separating the males, the females often have the entire mesonotum rufous. The antennae of the males are nine segmented in all of the known oriental species, excepting *dilatata* Brunetti which has twelve segments in the antennae. This latter species very probably fits in a distinct group because of other characters which it possesses but since no other close relatives are known it is treated here in the *impostor* complex. The male genitalia of the species in this complex

* Part I, published in *Musee Heude*, Notes d'Ent. Chinoise 13 (I): 1-10. (1949).

exhibit no particular affinities which definitely separate them into a group. In all of the species studied the posterior lateral margins of the ninth sternum are, however, rather strongly lobate.

Key to the *impostor* complex of *Plecia* known from the orient. (based upon males)

1. Hind tibiae parallel sided, not swollen; hind tarsi not incrassate Antennae nine segmented, apical segment small and inconspicuous....2

Hind tibiae distinctly dilated on apical halves; hind tarsi incrassate. Antennae twelve segmented, the apical segment much narrower and longer than the penultimate. (Simla, India). . .... .*dilatata* Brunetti

2. The posterior lateral margins of the ninth sternum extend well beyond the apices of the claspers, usually the lobes are about two times longer than the claspers (fig. *1b*.). 4

The claspers extend as far as, or well beyond the apices of the ninth sternum (fig. 4*b*) 3

3. The claspers about as wide as long, nearly quadrate in shape and extend only as far as the apices of the ninth sternum (fig. 4*b*). Ninth tergum not forcipate (fig. 4*a*). (Upper Assam, India).... .*intercedens* sp. nov.

Claspers at least two times longer than wide and pointed at apices; the posterior lateral margins of the sternum not strongly lobate and reach scarcely half way to the apices of claspers. Ninth tergum strongly forcipate, the lateral lobes slender and well developed. (Malabar Coast S. W. India) .. .. .*malabarana* Hardy

4. Posterior lateral margins of ninth sternum strongly forcipate, the lobes about two times longer than the remainder of the sternum. At its narrowest point (opposite the bases of the claspers) the ninth sternum is about equal in length to the extended claspers. (Assam).... ... .*pullata rubicunda* var. nov.

Not as above, the posterior lateral lobes not as long as the remainder of the sternum and the sternum, at its narrowest point two or more times longer than the claspers.. 5

5. Claspers club-shaped and with an irregular basal lobe (fig. 3*b*). Posterior median margin of ninth sternum with a large projection which has a "V" shaped concavity at its apex. Ninth tergum as in figure 3*a*. (Northern India). .*impostor* Brunetti.

Not as above.. 6

6. Claspers terminating in a sharp beak-like point on their inner apices, (fig. *6b*), see (Hardy, 1949). The median process on the hind margin of the ninth sternum two times wider than one of the claspers and terminates in a slight point. (Kumaon, India). .. . . . .*tecta* Hardy.

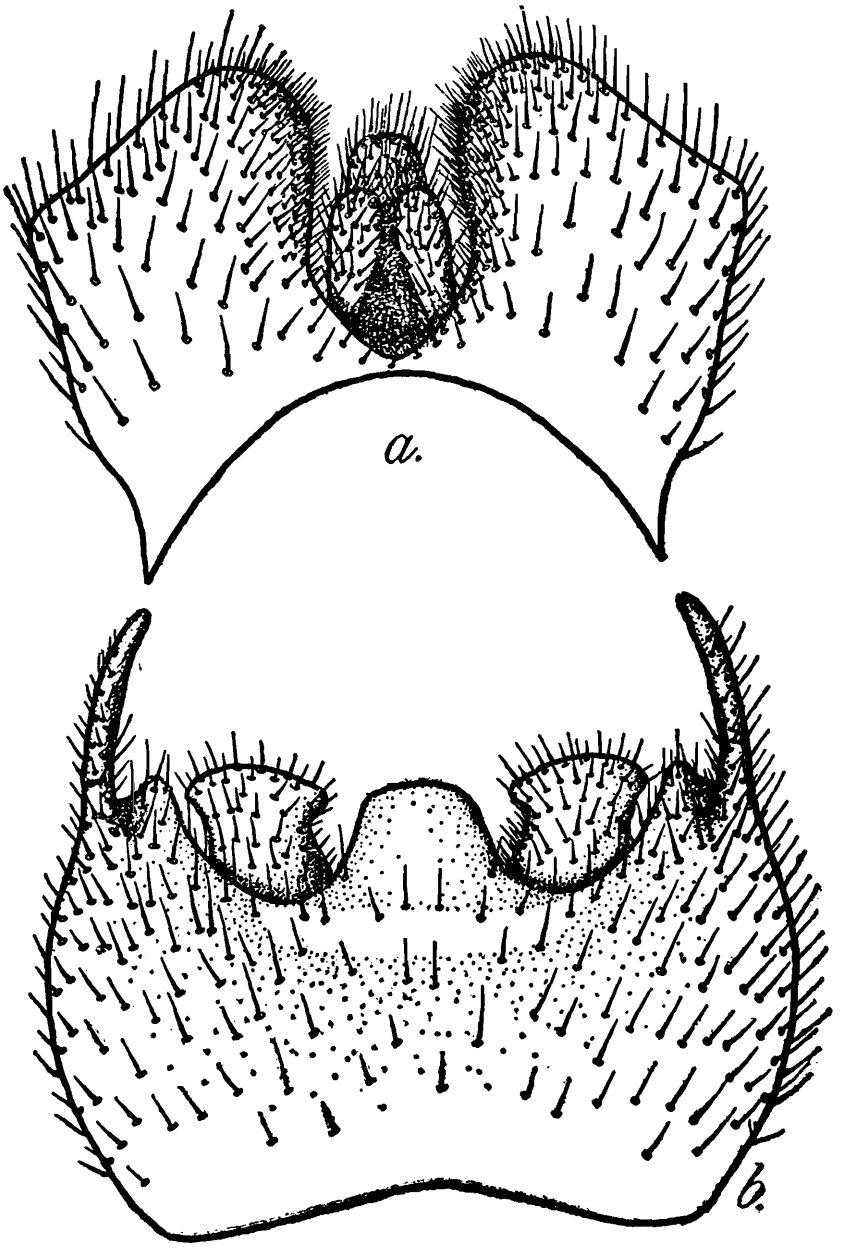
Not as above; the median process on the sternum rounded at its apex and about as broad as a clasper. 7

7. Posterior lateral margins of ninth tergum strongly tapered to acute points (fig. 5*a*). (Kumaon and Assam, India). .*neglecta* sp. nov.

Posterior lateral margins rounded, not at all narrowed (fig. *1a*). (South-western India) . . ..*decepta* sp. nov.

Plecia decepta, sp. nov.

This species is closely related to *Plecia neglecta* sp. nov., it is distinguished by the differences in the male genital structures. The ninth tergum is very differently developed than in *neglecta*. The tergum is nearly divided into two plates by the deep concavity of the hind margin; a definite sclerotized bridge, however, joins the two side pieces. The posterior lateral margins are very broadly rounded (fig. 1*a*) and not extended into a slender lobe as in *neglecta* (fig. 5*a*). From a ventral view the genitalia are very similar in the two species, except for portions



TEXT-FIG. 1.—*Plecia decepta*, sp. nov.
a. ninth tergum of male; *b*. male genitalia, ventral view.

of the tergum which are visible from below. The posterior lateral margins of the sternum are extended into long slender arms in both species, these appear to be slightly more elongate in *decepta* than in *neglecta* as shown in the figures 1*b* and 5*b*. The claspers and the other characteristics of the sternum are very much alike in both species.

In other details this species fits the description of *P. impostor* Brunetti and *neglecta* sp. nov.

Length: body, 4·0 mm.; wings, 4·7 mm.

Female: The dorsum of the thorax is almost entirely rufous. The anterior margin of the mesonotum and the humeral ridges are just slightly discolored with brown. One female at hand, which was collected at the same time as a male at Coimbatore, has three rather broad brown to black longitudinal stripes extending part way down the dorsum. These stripes are separated by the mesonotal furrows. This is obviously an aberrant specimen and is not being designated as a paratype. The pleura of the typical *decepta* females are chiefly rufous and not extensively brown or black.

Length: body, 4·0—4·8 mm.; wings, 4·7—5·3 mm.

Holotype male, allotype female: Mormugao, Goa, India (J. C. Bridwell), seven paratypes, two females and five males from the following localities: same as type; near Poona, Purandhat, India, Circa 3,500 ft., October 17, 1927 (Col. E. P. Jewell—B. M. 1925-50), and Coimbatore, South India, December 9, 1947 (P. Susai Nathan).

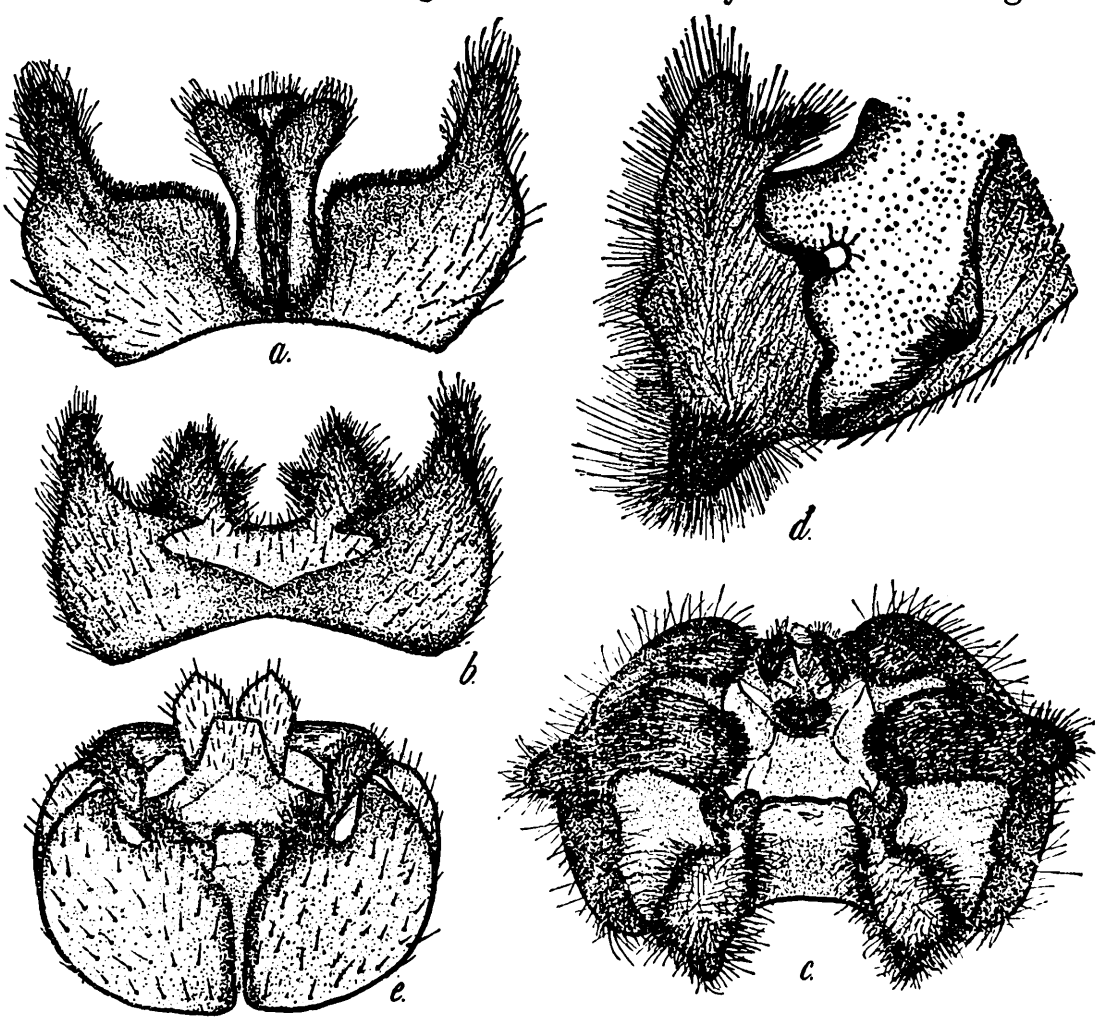
Holotype, allotype and two paratypes returned to the United States National Museum; two paratypes are in the British Museum (Natural History); two are in the B. P. Bishop Museum, Honolulu, T. H., and one is at the University of Hawaii.

Plecia gressitti, sp. nov.

This species belongs to the group of *Plecia* which have the top portion of the thorax rufous and the remainder of the body brown to black in colour. It is related to *P. pullata* Hardy from India and is distinguished from this and all the other known species by the male genitalia. The development of the clasping structures, ninth sternum and ninth tergum, as shown in the figures, is very different from that of the related forms.

Male: *Head*: Antennae nine segmented, and predominantly brown to black in colour; the scape and pedicel are tinged with rufous. The antennal segments are distinctly separated and not compact. The apical segment is globose in shape and almost equal in length to the penultimate segment. The rostrum folds tightly against the face and is not conspicuous. *Thorax:* Mesonotum and scutellum entirely rufous, remainder of thorax and the halteres black, tinged with brown. Thorax chiefly bare, with an inconspicuous patch of fine black hairs on the upper portions of the sternopleura and on the humeri and with some scattered brownish hairs along the mesonotal furrows. *Legs*: All black and densely covered with rather long black hair. The femora are moderately swollen on their apical portions. The tibiae and tarsi are not at all swollen, their sides are straight or nearly so. The hind metatarsi are seven to eight times longer than wide. *Wings*: Dark smoky brown fumose; the stigmata are just slightly darker brown than the remainder of the wing membrane. Vein R_3 straight, forming an angle of about 75° with R_{4+5}. The section of vein M_{1+2} from the r-m crossvein to the furcation is almost two times longer than the r-m crossvein. Vein Cu_1 is bent downward at its apex but the cubital cell is not strongly narrowed. *Abdomen*: Entirely black, densely covered with dark colored hairs.

Genitalia: The ninth sternum is about two times wider than long and is cleft about half its length on the hind margin. The lobes of the posterior lateral margins are acutely pointed but do not extend to the apices of the lateral lobes of the tergum (fig. 2*b*). The claspers are very conspicuous and densely black pilose. From a direct ventral view each clasper has a large obtuse lobe which extends beyond the apices of the lateral lobes of the sternum. There is also a small lobe developed on the inner side of each clasper near the lower edge (fig. 2*b*). The claspers appear to be fused with the median margin of the ninth sternum on their inner bases. From an end view, or when the genitalia are tilted back, the claspers are seen to extend back into the genital chamber beyond the inner edge of the



TEXT-FIG. 2.—*P. gressitti*, sp. nov.
a. male genitalia, dorsal; *b.* genitalia, ventral; *c.* genitalia, end view; *d.* right clasper of male; *e.* female genitalia, ventral.

sternum. The inner portion of each clasper is bilobed at its apex. The outer lobe is sharp pointed (fig. 2*d*). The claspers do not appear to be movable and the inner developments appear to act as supporting structures around the aedeagus. The ninth tergum is cleft almost to its base, it has a broad 'U' shaped concavity in the middle of the hind margin. The posterior lateral margins of the tergum are produced into rather slender lobes, subacute at apices (fig. 2*a*).

Length: body, 6·0 mm.; wings, 6·3 mm.

Female: Similar in most details to the male, the pleura are, however, usually distinctly tinged with rufous. In some female specimens the sternopleura are largely rufous with just brownish discolorations over the

remainder of the pleura. The antennae are eleven segmented, all the joints are very distinct except for the last two which are closely joined. The apical segment is small and nipple-like. The front possesses a rather strong tubercle in the middle just behind the antennae and has a moderately developed carina down the center. The ocellar tubercle is well developed and the compound eyes are sparsely covered with short pile. *Female genitalia* : The ninth tergum is three or more times wider than long and is semimembranous in the anterior median portion with a narrow sclerotized bridge along the posterior margin. The posterior lateral margins are developed into moderately long densely pilose lobes. The cerci are longer than wide and slightly pointed at apices. On the inner side each lateral margin of the tergum is developed into a flattened ridge which extends to the egg laying orifice. The eighth sternum is completely divided into two plates. Each is just slightly wider than long and is developed into a short obtuse lobe on its inner posterior margin (fig. 2*e*).

Length: body, 6·5—7·0 mm.; wings, 8·0—8·5 mm.

Holotype male and allotype female: Kwangtang, South China. Koon-Yam-Kok, on river between Wai-Chow and Ho-Yun, April 6, 1940 (L. Gressitt and F. K. To). Eight paratypes, three males and five females: six, same data as type, April 6, 1940, and May 4-5, 1934 (F. K. To); one from Hainan Is., South China, Faan-na, 9 mi. so. of Nodoa, Tan-hsien Dist., July 10-11, 1932 (F. K. To) and one from Tonkin, Mt. Bavi, 800-1000 m., VII-1941 (A. deCooman).

Holotype, allotype and four paratypes returned to the California Academy of Sciences; one will be returned to Musèe Heude, Shanghai; one is in the Bishop Museum collection, Honolulu, T. H., and two are being deposited in the U. S. National Museum collection.

Plecia impostor, Brunetti.

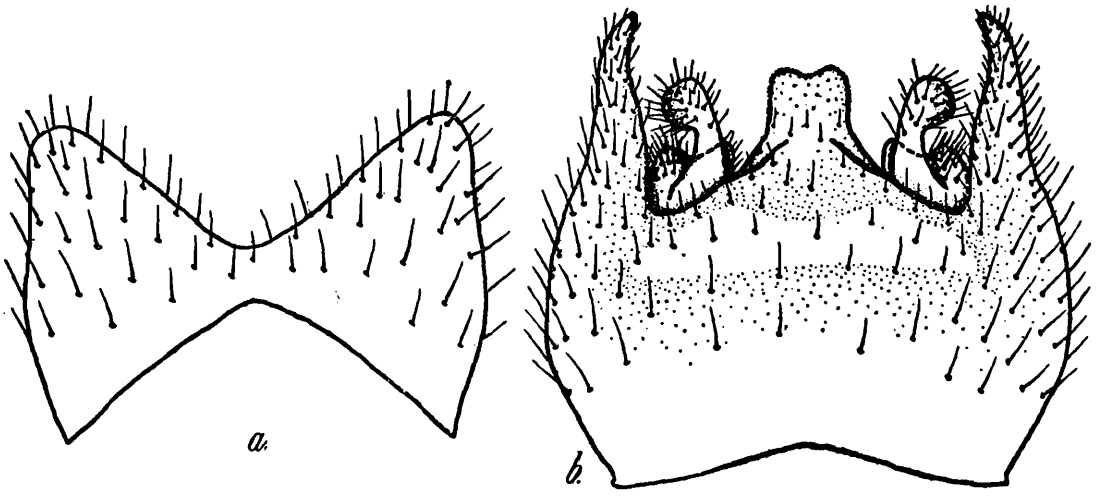
Plecia impostor Brunetti, 1912, *Rec. Ind. Mus.* vii, p. 446.

The status of this species has been most controversial and it has been impossible to accurately place it until after the type was restudied. The late Dr. F. W. Edwards had apparently studied the type and he left, at the British Museum (Natural History), some rough sketches of the dry genitalia and of the wing venation. These were reproduced and sent to the writer by Mr. Paul Freeman. The sketches did not show enough detail, however, and were of no value in placing this species. Four species were present in the British Museum under the name *impostor* none of these was correctly identified.

As is typical of the complex the body is predominantly brown to black except for the posterior two-thirds to three-fifths of the mesonotum which is orange to rufous; the antennae are also nine segmented. The male genital structures are strikingly different from those of the related species and will distinguish *impostor* from all known species of *Plecia*. Brunetti stated that *impostor* closely resembled *Penthetria melanaspis* Wied., that the whole insect is black except the hind part of the mesonotum which is rufous. His statement is misleading, the mesonotum of the type is not so extensively blackened as he has indicated.

Male genitalia: The ninth tergum is one and one-half times longer than wide, and is rather deeply concave on both the anterior and posterior margins but the sclerotized bridge joining the two lateral lobes is broader than that of *neglecta* and other related species (fig. 3*a*). The ninth sternum is developed into an elongate, slender, lobe on each posterior lateral margin. The median margin is produced into a prominent projection which extends as far as the apices of the claspers; the apex of this median process is very slightly concave and its apical edge is finely serrated. The claspers are conspicuous and terminate in a moderately large club-like head (fig. 3*b*). The claspers also possess an irregular basal lobe which arises from the dorsal side. *Thorax*: The anterior two-fifths of the mesonotum is black. This black coloration extends along the sides of the mesonotum to the postalar calli. The scutellum is dark reddish brown to black. *Wings*: Brownish fumose and with venation as in other species of the group except that the cubital vein appears to bend more sharply downward near its apex; the cubital cell at the wing margin is approximately equal in width to the length of the m-cu cross-vein.

Length: body, 5·0 mm.; wings, 6·2 mm.



TEXT-FIG. 3.—*P. impostor* Brunetti.
a. ninth tergum of male; *b*. male genitalia, ventral.

Female: Fitting the description of the male except for genital characters, the slightly larger size, eleven segmented antennae and chiefly rufous scutellum.

Length: body, 6·5 mm.; wings, 8·2 mm.

Type locality: Airadeo, Kumaon, India, 6880 feet.

Type in the Zoological Survey of India.

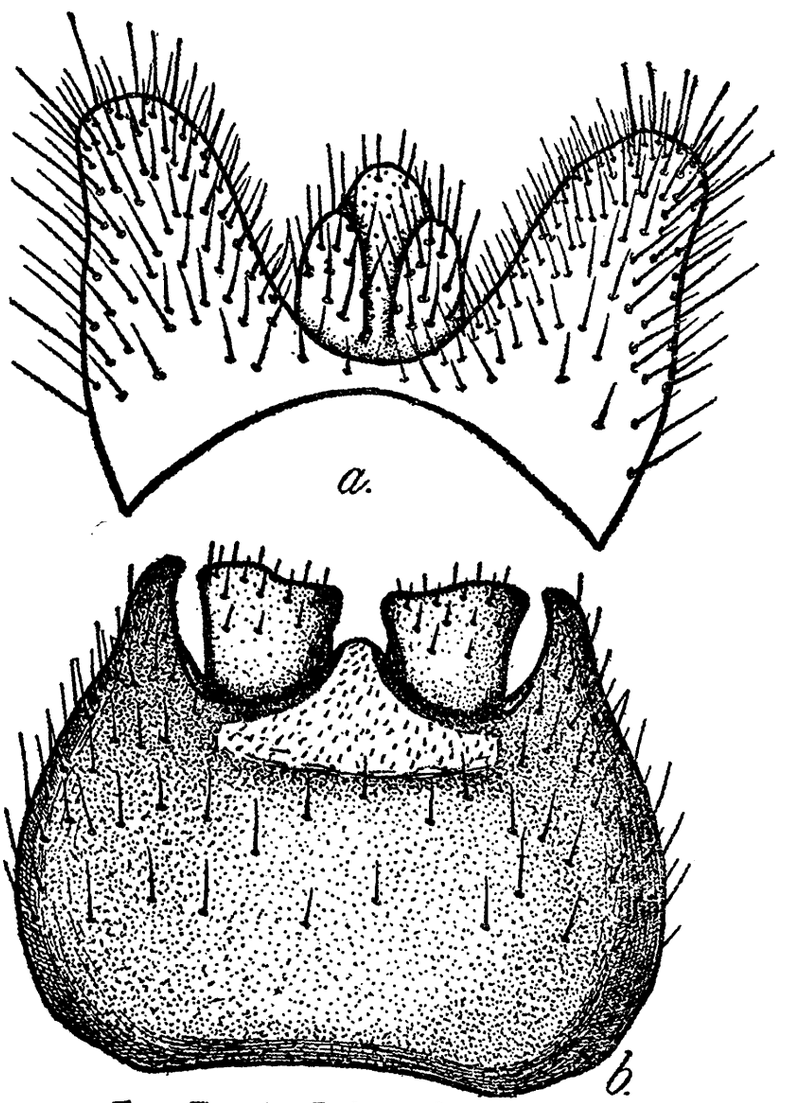
The writer has studied the type and a cotype and large series of specimens from the following localities: 6-10 mi. N. of Tinsukia, Assam, India, June 1944 (D. Elmo Hardy) (these were taken in the jungle which borders the Brahmaputra River), and Simla, N. W. India, August-September, 1898 (C. G. Nurse, B. M. 1934-8).

Plecia intercedens, sp. nov.

This species apparently belongs to the *impostor* complex although the discoloration of the front margin of the mesonotum is indistinct. The

genital characters certainly indicate that it is rather closely related to *impostor* Brunetti. This may possibly be the species which Brunetti* considered to be *tergorata* Rondani. The latter species occurs in Borneo and does not extend into India.

P. intercedens appears more closely allied to *P. decepta* sp. nov. than to any other species. It is distinguished by the inconspicuous discoloration of the front margin of the mesonotum and by male genital characters. The characteristic shape of the ninth sternum and the claspers will readily



Text-Fig. 4.—*P. intercedens*, sp. nov.
a. ninth tergum ; *b*. male genitalia, ventral.

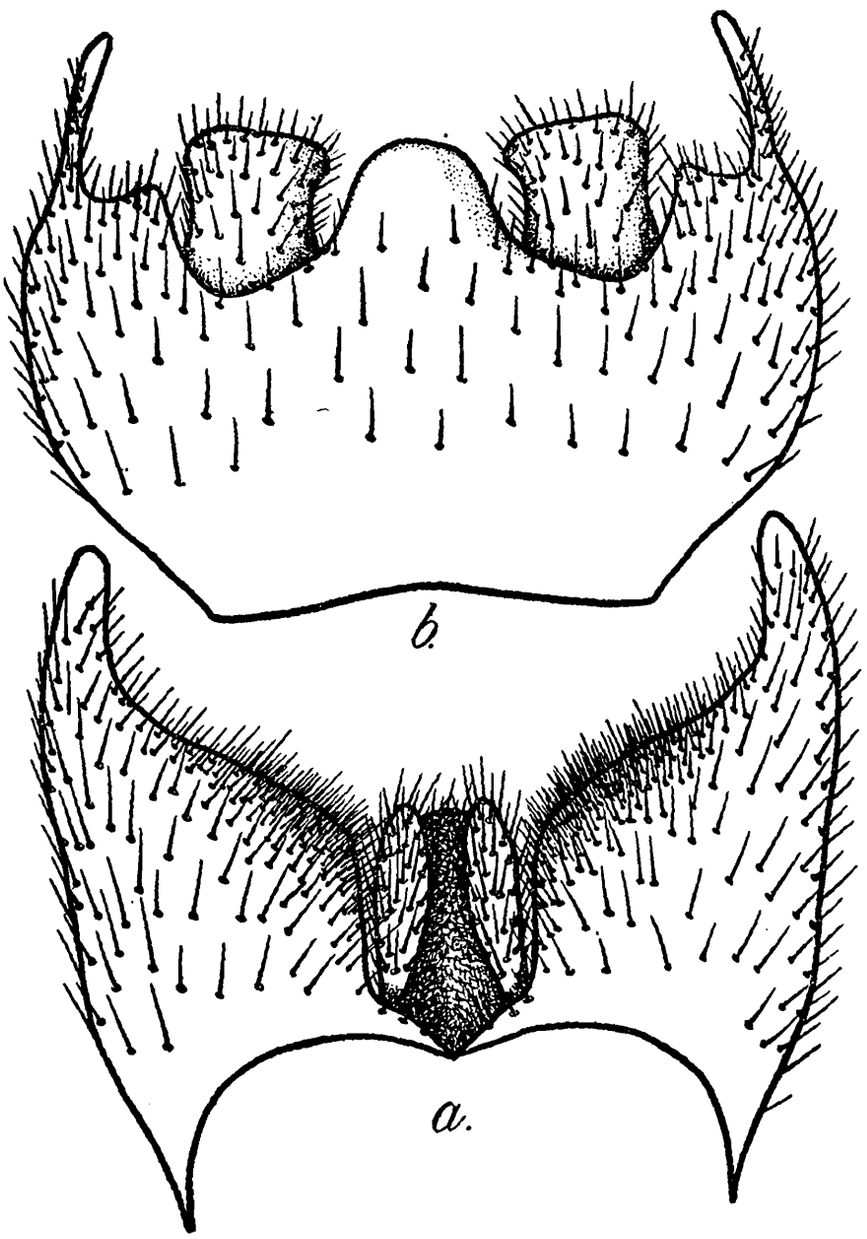
separate it. The claspers are nearly quadrate in shape and are about as wide as long. The posterior lateral margins of the ninth sternum are sharply pointed but the apices do not extend beyond the tips of the claspers (fig. 4*b*). The ninth tergum is also different in shape than it is in *decepta*. The posterior margin is more broadly " U " shaped, and the posterior lateral lobes are rounded (fig. 4*a*), not truncate at their apices.

The antennae are broken in the male specimen at hand ; the scape and pedicel are black and tinged with rufous at their apices. The females have

*Brunetti The Fauna British Ind. Diptera Nematocera, p. 27, 1912, *Rec. Ind. Mus* vii, p. 446, 1925.

eleven segments in the antennae. The apical segment is small and nipple-like, it is scarcely half as long as the penultimate segment. The mesonotum of the male is chiefly rufous, the anterior margin is discolored with brown. The scutellum is rufous and the pleura are predominantly brown to black. In the female the mesonotum is all rufous and the pleura are extensively rufous. The wings are brown fumose and the venation is the same as in other species of this group.

Holotype male, allotype female and three female paratypes : Doom Dooma, Assam, India, April 22—May 23, 1943 (D. E. Hardy).



TEXT-FIG. 5.—*P. neglecta*, sp. nov.
a. ninth tergum ; *b.* male genitalia, ventral.

Type, allotype and one paratype returned to the United States National Museum. One paratype in the B. P. Bishop Museum, Honolulu, T. H., and one at the University of Hawaii.

Plecia neglecta, sp. nov.

This species was considered, by the writer, to probably be *impostor* Brunetti. Previous to the restudy of the type this is the only species of

the group, besides *Plecia tecta* Hardy, which had been seen from the Kumaon District of India.

The species is readily distinguished from others of the complex by the characteristics of the male genitalia. It is separated from *P. impostor* Brun. by the slender, long pointed, posterior lateral margins of the ninth tergum (fig. 5*a*) ; by the deep " U " shaped cleft in the middle of the hind margin of the tergum ; by the very slender posterior lateral margins of the ninth sternum (fig. 5*b*) and the much broader and shorter claspers. The median process on the hind margin of the ninth sternum is broadly rounded in *neglecta* (fig. 5*b*) and is concave in *impostor* (fig. 3*b*). The claspers are simple in *neglecta*, no basal lobe is developed as in *impostor*.

Length : body and wings, 4·0—5·0 mm.

Holotype male and allotype female, Chabua, Assam, India (about 30 mi. N. E. of Dibrugarh, Lakhimpur District), October 10, 1943 (D. E. Hardy). Twenty-five paratypes, eleven males and fourteen females : same data as type, June 1943—April 1944 (D. E. Hardy) ; Doom Dooma, Assam, May 1943 (D. E. Hardy) and Tanakpur, U. P.—India, November, 1949 (N. D. Waters).

Holotype, allotype and fourteen paratypes returned to the United States National Museum. Paratypes are being deposited in the following museums : British Museum (Natural History) ; Bishop Museum, Honolulu, T. H. ; Zoological Survey of India and University of Hawaii.

Plecia pullata rubicunda, var. nov.

A male specimen is at hand which fits in the *impostor* complex because of the predominantly red mesonotum, with only the anterior portion darkened ; it also has the nine segmented antennae which is typical of most members of this group. The genitalia are identical with those of *P. pullata* Hardy* and it is obviously just a red colored variety of this. Typical *pullata* are entirely opaque black with just a faint reddish tinge in the ground colour of the thorax. *P. pullata* var. *rubicunda* has the mesonotum all rufous with the anterior portion slightly discoloured with brown. The variety *rubicunda* also appears to be smaller than typical *pullata*.

Length : body, 6·0 mm. ; wings, 7·0 mm.

Female unknown.

Holotype male. Lower Ranges N. Khasi Hills, Assam, " 1878, 96-135 (A. Chennell)".

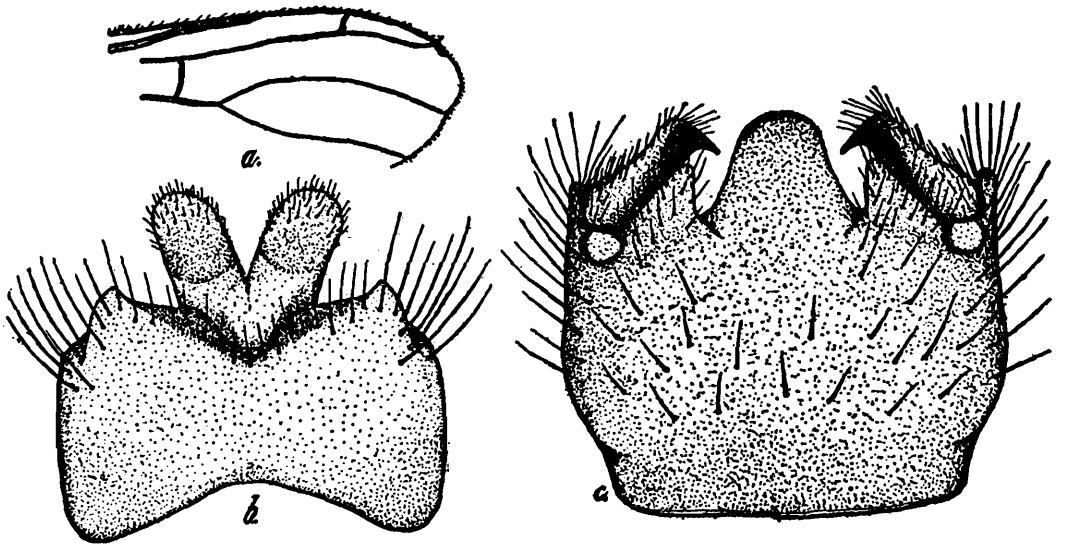
Type returned to the British Museum (Natural History).

Plecia septenrionalis, sp. nov.

This species belongs to the *aterrima* Brunetti complex but the male genitalia will distinguish it from all known species of *Plecia*. The species is characterized by its all black coloring, by the short vertical vein R_3 of the male and by the male genitalia as described and figured below.

*Hardy, D. E., *Musée Heude*, 13 (I), pp. 7-8, 1949.

Male. Head: The antennae are broken in the specimen at hand. The rostrum is poorly developed and scarcely protrudes beyond the oral margin. *Thorax*: Opaque brown to black, faintly dusted with grayish pollen; sparsely covered with black hairs. The mesonotal furrows are poorly developed, no distinct grooves are present. *Legs*: Dark brown to black, covered with black hairs. The segments are proportioned as in typical *Plecia*. *Wings*: smoky brown fumose, slightly darker along the costal margin. Vein R_3 is very short and almost vertical in position (fig. 6*a*). Vein R_{4+5} (that portion of Rs beyond the forking off of R_3) is about one-half as long as Rs between the r-m crossvein and R_3. *Abdomen*: Opaque black, with black pile. *Genitalia*: The ninth tergum is about one and one-half times broader than long and its hind margin is somewhat undulated and has just a small " U " shaped concavity in the middle (fig. 6*b*). The posterior margin of the tergum is broad and shelf-like and the inner edge folds in towards the aedeagus. The mound-like supporting structure which surrounds the aedeagus extends almost to the apices of the claspers. The claspers are large, conspicuous, and



TEXT-FIG. 6.—*P. septenrionalis*, sp. nov.
a. apex of wing; *b*. ninth tergum of male; *c*. genitalia, ventral.

each terminates in a rather slender, inward directed, beak-like point (fig. 6*c*). A pair of conspicuous lobes are developed on the posterior margin of the sternum just inside the bases of the claspers. The posterior lateral margins of the sternum are developed into small lobes (fig. 6*c*).

Length: body, 6·0 mm.; wings, 6·8 mm.

Female: Very similar to the male in general details except that vein R_3 is moderately curved and vein R_{4+5} is approximately equal in length to that portion of Rs between the r-m crossvein and the forking off of R_3.

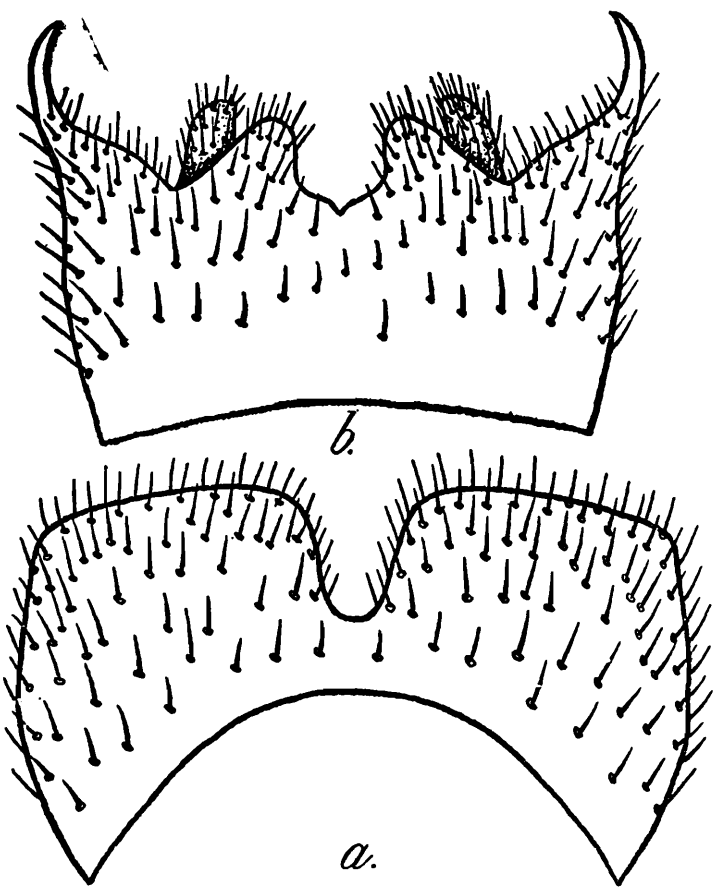
Holotype male and allotype female: Mandchourie, Prov. Kirin, Kao-lin-tze, July 6-10, 1939 and July 2, 1940 (M. Volkoff).

Both are to be returned to *Musee Heude*, Shanghai, China, when conditions permit.

Plecia siamensis, sp. nov.

This species is distinguished from all others of the *fulvicollis* complex (those species which have the entire thorax rufous) by its very characteristic genitalia.

Male. Head: Antennae chiefly brown to black, basal segments yellowish. Each is made up of nine, distinctly separated, segments. The ocellar tubercle is well developed. *Thorax:* Entirely bright orange, mesonotal furrows not very deep. Halteres dark brown to black. *Legs*: Black, densely black pilose. The femora are moderately enlarged towards their apices, the tibiae are not at all swollen. *Wings:* Smoky fumose, stigma and costal margin brown. Vein R_3 nearly straight, forming a 75° angle with R_{4+5}. Petiole of cell M_1 slightly longer than the m crossvein. Cubital cell wide open. *Abdomen:* Brown to black,



Text-Fig. 7.—*P. siamensis*, sp. nov.
a. ninth tergum; *b.* genitalia, ventral.

faintly shining and rather densely black pilose. *Genitalia:* Ninth tergum about two times wider than long and with a narrow "U" shaped cleft extending about one-half the length of the segment on the hind margin (fig. 7*a*). The ninth sternum has the posterior lateral margin produced into a pair of very slender, sharply pointed lobes. The median margin also has a pair of lobes, these are short and broadly rounded and are separated by a broadly "V" shaped concavity. The claspers are very small and simple (fig. 7*b*).

Length: body and wings, 6·0 mm.

Female. Antennae eleven segmented. Front lightly grayish, frontal ridge moderately developed, the tubercle just above the antennae is

very prominent and usually reddish coloured. The wings are more brownish gray fumose than in the male.

Length: body, 6·0 mm.; wings, 9·0—9·6 mm.

Holotype male and allotype female: Koh Chang Is., Aug. 2, 1929 (W. R. S. Ladell). Two paratype females: Talum, Siam, Jan. 20, 1902 (H. C. Robinson and N. Annandale).

Type, allotype and one paratype returned to the British Museum. One paratype deposited in the U. S. National Museum.

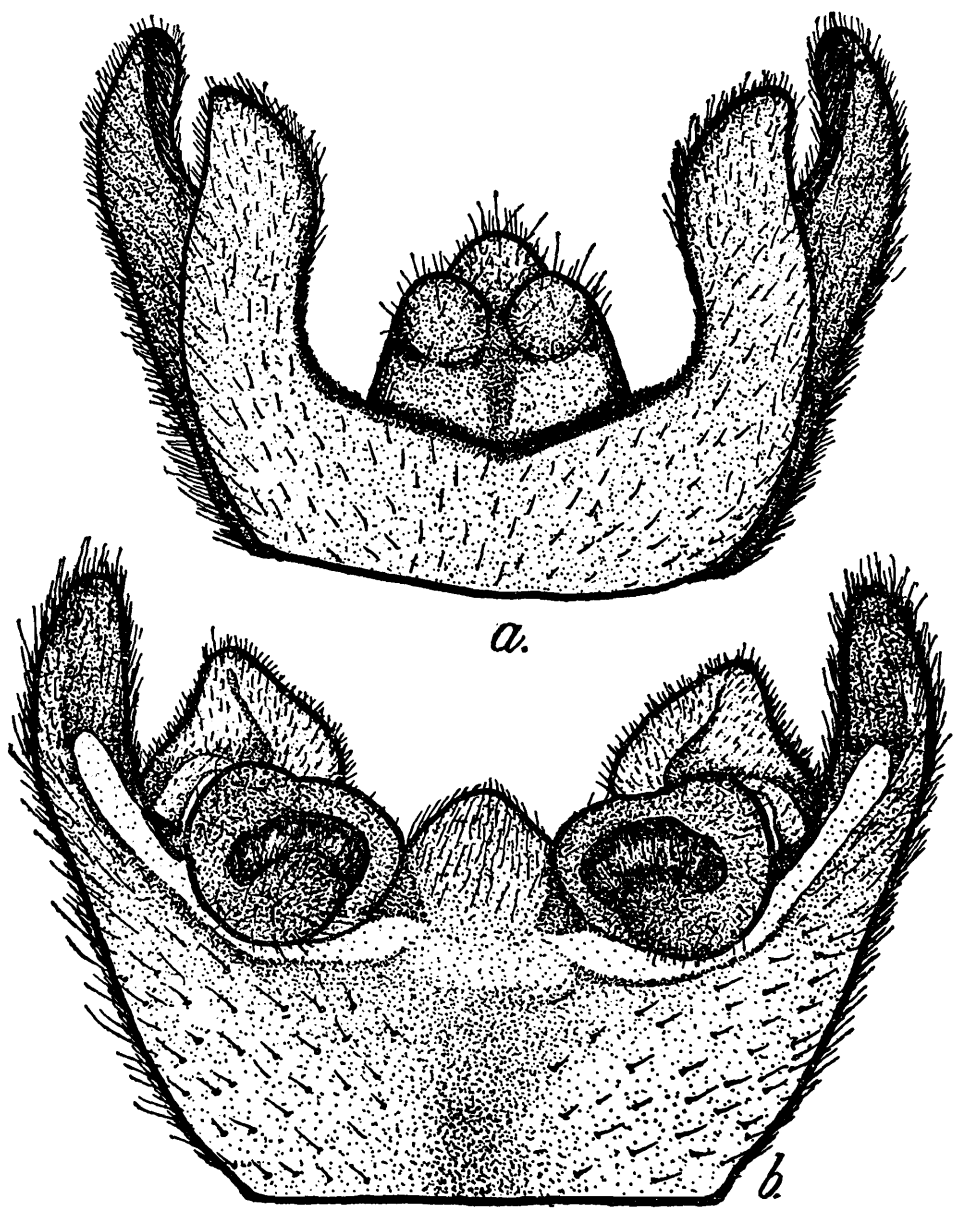
Plecia sinensis, sp. nov.

This species is related to *P. tergorata* Rondani but is readily distinguished by the male genital characters. The hind margins of the ninth tergum and sternum are not strongly forcipate as in *tergorata* and the clasping structures are very different in form. The shape of the claspers will characterize this species from all other *Plecia* known to the writer.

Male.—General colour dark brown to black, with the top of thorax entirely rufous. The pleura are largely blackish but the sternopleura are rufous tinged. The middle femora are very faintly tinged with rufous at their bases. *Head:* Rostrum moderately developed, extending about as long as the antennae but folded against the under side of the face when in resting position. Antennae nine segmented; the apical segment is small and scarcely over half as long as the penultimate segment. *Thorax:* Colour as described above, almost devoid of pile and with conspicuous mesonotal furrows. Halteres brown to black, the extreme bases are tinged with yellow. *Legs:* Densely covered with short dark coloured hairs. Femora moderately thickened on their apical portions. Tibiae slightly thicker on their apical portions but not noticeably swollen. Tarsal subsegments not at all swollen, the hind basitarsi are six times longer than wide. *Wings:* Yellowish brown fumose, darker along the costal margin. The stigma is concolorous with the other membrane in the costal region. Vein R_3 straight, forming about an 80° angle with R_{4+5}. Vein R_3 arises at the basal one-third of the distance along the radial sector from the r-m crossvein to the wing margin. The petiole of cell M_1, that portion of vein M_{1+2} from r-m crossvein to the furcation, is just slightly longer than the r-m crossvein. *Abdomen:* Dark brown to black, covered with dark coloured pile. *Genitalia:* The ninth sternum is developed into a moderately long lobe on each posterior lateral margin. These lobes are about equal in length to the remainder of the segment (fig. 8*b*). The claspers are very irregular in shape, they are large and rather circular in general outline. The inner portion is hollowed out in the middle so that it forms a heavily sclerotized ring which extends around the back part of a ventral median lobe (fig. 8*b*). The ninth tergum also has the posterior lateral margins lobate. The concavity between the two lobes extends two-thirds to three-fourths the length of the tergum (fig. 8*a*).

Length: body, 6·0 mm.; wings, 7·0 mm.

Female. Fitting the description of the male in most respects. The antennae are eleven segmented, counting the small nipple-like tip. The front is distinctly carinated; the carina is most prominent just above the antennae. The ocellar tubercle is well developed. The female genitalia are very similar to those of *P. gressitti.* The anal region is, however, more elongate, and rounded at the apex, and the cerci are rounded at their apices.



Text-Fig. 8.—*P. sinensis*, sp. nov.
a. ninth tergum; *b.* genitalia, ventral.

Length: body, 6·5 mm.; wings, 8·5 mm.

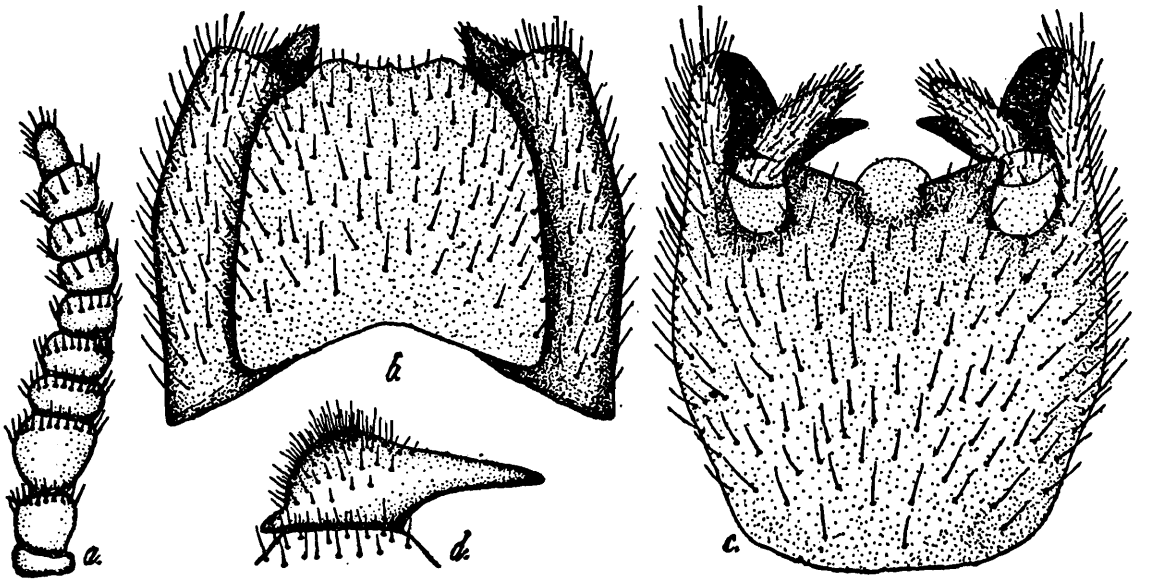
Holotype male and allotype female: Fukien, South China, Yen-Ping, Nan-Ping District, June and July, 1933 (D. C. Ngu). One paratype male from Ouyuen.

Holotype and allotype returned to the California Academy of Sciences. The paratype will be returned to Musee Heude, Shanghai.

Plecia yunnanica, sp. nov.

This species is related to *Plecia aterrima* Brunetti and fits Brunetti's original description in all details. *P. yunnanica* is distinguished from

aterrima by the characteristics of the male genitalia. The ninth segment of *P. yunnanica* is much more slender, not so broad as in *aterrima*. The ninth sternum is longer than wide and the tergum is about as long as wide. The posterior median margin of the ninth tergum of *yunnanica* has a small projection in the middle (fig. 9*b*). From a dorsal view the median portion of the ninth sternum is hidden by the posterior edge of the ninth tergum and the claspers are rather inconspicuous (fig. 9*b*). In *aterrima* the hind margin of the ninth sternum and the claspers are plainly visible from dorsal view. The posterior lateral margins of the ninth sternum are more strongly developed in *yunnanica* than in *aterrima*. They extend well beyond the apices of the claspers in the former (fig. 9*c*) and are much shorter than the claspers in the latter. The claspers of both species terminate in a long point on their inner apices (fig. 9*d*). The apical segment of the antenna appears to be more slender in *yunnanica* (fig. 9*a*) than in the specimens of *aterrima*



TEXT-FIG. 9.—*P. yunnanica*, sp. nov.

a. antenna of male; *b*. genitalia, dorsal; *c*. genitalia, ventral; *d*. male clasper, inside view.

which the writer has studied. As in *aterrima*, the male antennae possess ten segments and the female antennae are twelve segmented.

Male length: body, 9·0 mm.; wings, 9·5 mm.

Female length: body, 11·0 mm.; wings, 12·0 mm.

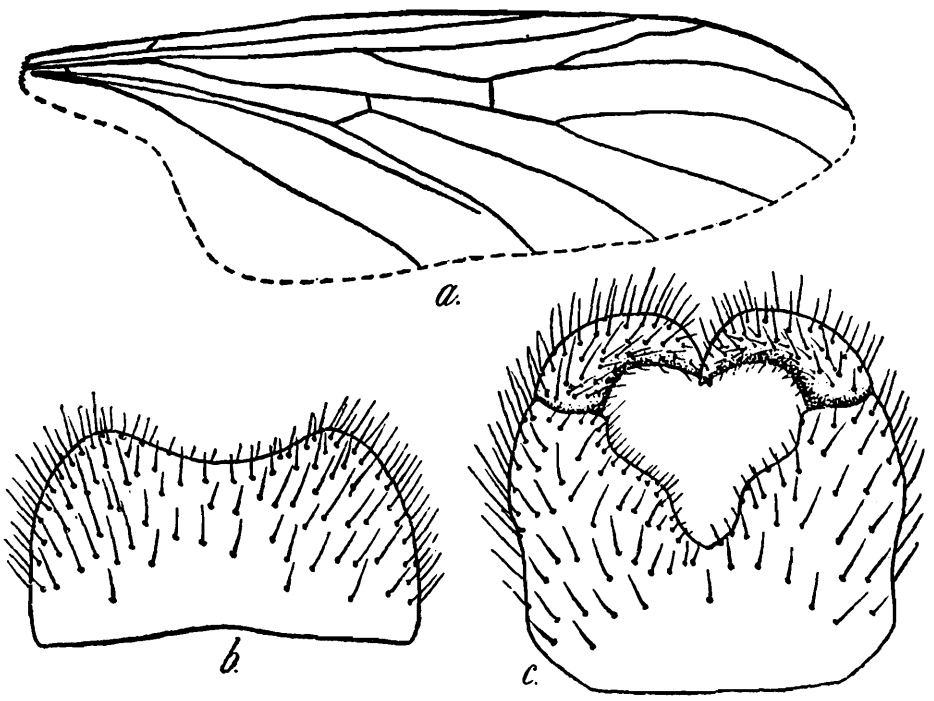
Holotype male and allotype female: *Yunnan*, 1918, (G. Forrest) M. J. Mansfield Coll. B. M. 1950-244.

Both have been returned to the British Museum (Natural History).

Penthetria formosana, sp. nov.

This species is related to *Penthetria takeuchii* Okada. It differs as follows: The body is entirely black; the antennae are twelve segmented. Vein R_3 is curved and only about one-half as long as vein R_{4+5}; vein M_{1+2} forks well beyond the r-m crossvein and the basal section of $_{+4}$ is only one-half as long as the m-cu crossvein.

Male: Rather slenderly built species, all black in colour except for the faintly reddish tinge in the legs and the red humeral ridges. Pile all black, short and rather sparse. *Head:* Eyes with sparse, microscopic hairs. Ocellar tubercle well developed, ocelli yellow. *Thorax:* Opaque, except for the lower portion of the sternopleura which are highly polished. *Legs:* All segments slender, femora and tibiae but slightly enlarged at their apices. The hind metatarsi are five to six times longer than wide. *Wings:* Yellowish fumose, stigmata and anterior margin of each wing brownish. Vein R_3 somewhat undulated, not straight. The section of the radial sector from the crossvein to the fork is two or more times longer than the r-m crossvein. The forking of M_{1+2} is opposite the forking of R_3 and R_{4+5} and the second section of M_{1+2} is also two times longer than the r-m. The m-cu crossvein is two to



Text-Fig. 10.—*Penthetria formosana*, sp. nov.
a. wing; *b.* ninth tergum; *c.* genitalia, ventral.

three times longer than the basal section of M_{3+4} (fig. 10*a*). *Abdomen:* Subshining black in ground colour, densely covered with grayish pubescence and with a moderate amount of short dark hairs. *Genitalia:* The ninth tergum is about two times wider than long and is gently concave on its hind margin (fig. 10*b*). The sternum is about as broad as long and is cleft about half its length on the hind margin. The claspers are rather strongly curved inwardly and are acutely pointed at apices (fig. 10*c*).

Length: body, 7·5—8·0 mm.; wings, 7·5—7·8 mm.

Female unknown.

Holotype male and one paratype male: Hassenzan, Formosa, June 26, 1934 (L. Gressitt).

Both returned to the Museum of Comparative Zoology.