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ON A COLLECTION OF TRICHOPTERA FROM THE INDIAN MUSEUM.

PART I.—ANNULIPALPIA.

By A. B. MARTYNOV, *Leningrad.*

This work is the result of an examination of the rich material of Trichoptera in the Indian Museum, kindly sent to me for study by the Entomological Section of the Zoological Survey of India. The greater part of this material is from Continental India, but a few insects from Ceylon are also included. As our knowledge of the Trichopterous fauna of Continental India is very poor, the collection in the Indian Museum should prove of very great interest, and I, after some hesitation, accepted the proposal of Dr. H. S. Pruthi to examine it, although the determination of many Indian species was bound to present considerable difficulties.

This paper is the first part, dealing with the suborder Annulipalpia, which I consider as quite distinct from the second suborder Integripalpia.

The Trichopterous fauna of the Sunda and Philippine Isles is fairly well known, chiefly through the works of Dr. G. Ulmer, Mr. R. P. L. Navas and Prof. Dr. N. Banks, on the contrary few species were known from Continental India. Of the suborder Annulipalpia only 52 species have been described or recorded. In the material before me I found about 93 species of Trichoptera-Annulipalpia, of which 77 species are new records for Continental India, and 61 species and 4 varieties are new to science. The fauna of Trichoptera-Annulipalpia of Continental India, as now known, consists of about 134 species.

The order Trichoptera is a very interesting group from the ecological and zoogeographical points of view, and further investigations of the Indian fauna are very desirable. However, one may consider as good only such records, which are provided with detailed information, indicating the character of basins or of rivers, in which the larvae of the recorded species are found; this is the case with the records of Drs. N. Annandale, H. S. Pruthi, S. L. Hora and B. N. Chopra.

I have here to express my thanks to Dr. H. S. Pruthi for his kind proposition to examine the interesting material of the Indian Museum.

Fam. RHYACOPHILIDAE Steph.

Rhyacophila Pict.

I. *Rhyacophila ancestralis*, sp. nov.

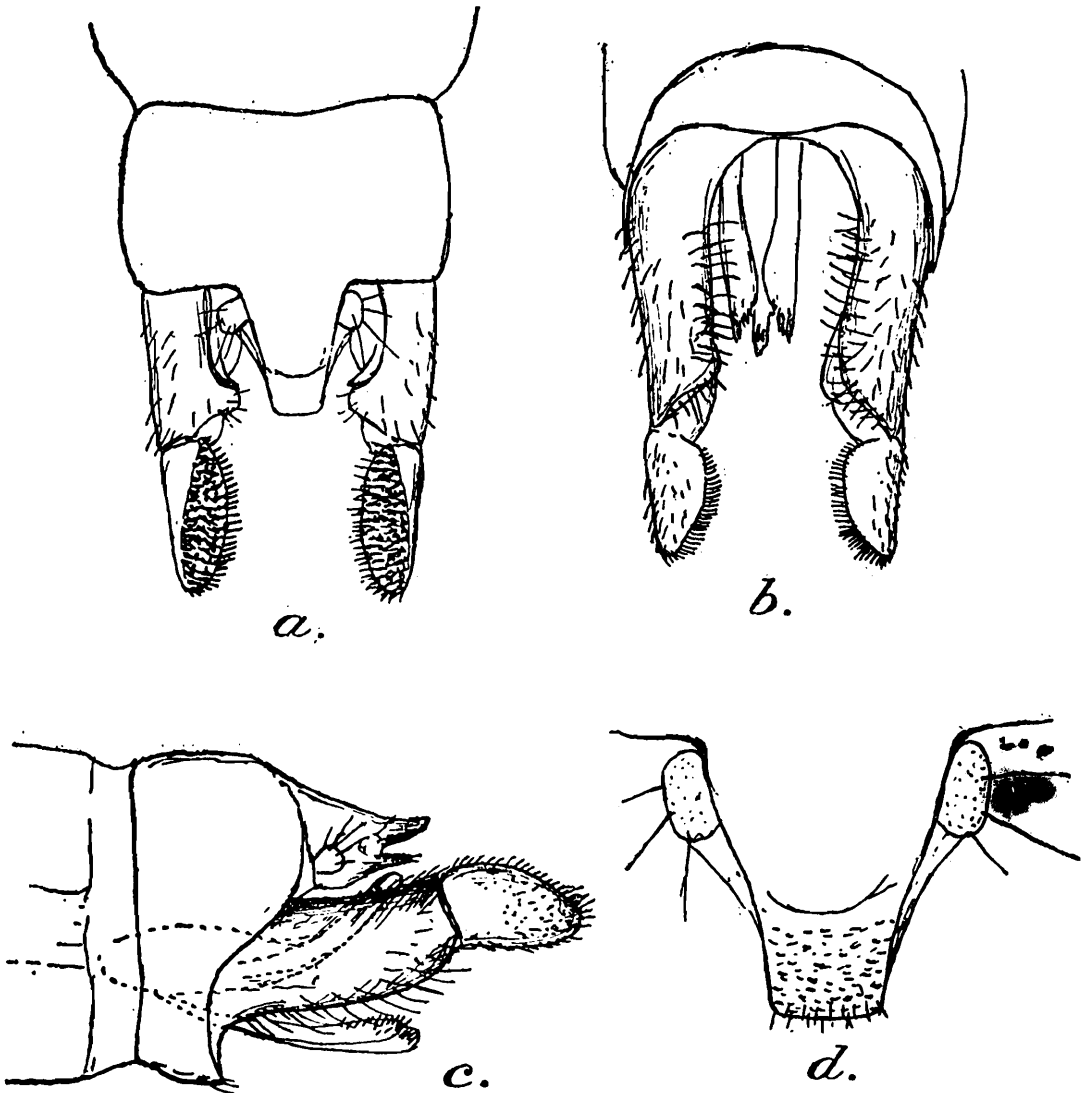
(Fig. 1.)

3 ♂, 1 ♀. Dumpep, Khasi Hills, Assam. October 1929. S. L. Hora.

Head and thorax black-brown; antennae and palpi brown; 1st and 2nd joints of the maxillary palpi very short, 3rd joint long, the 5th equal to it, 4th shorter; in the labial palpi the 2nd joint is equal to the 3rd. Legs long, slender, anterior legs brown, in the median ones coxae brown;

femora brownish-yellowish, with dark longitudinal streaks beneath, tibiae brownish, tarsi brown; posterior femora yellow, tibiae brownish, tarsi brown. Anterior wings brownish, moderately narrow; R thick, brown, ending in an elongated fork, which bounds dark spot (pterosigma); branches of RS also thick, 2nd apical fork beginning much earlier than the 1st, 3rd fork equal in length to the 4th. Posterior wings brownish-yellowish or yellowish; R thick, without apical fork, but the pterostigmal spot also dark; 2nd apical fork beginning much earlier than the 1st, 3rd fork short, M weak. Abdomen brownish above, ochraceous beneath.

♂. 9th segment brownish-yellowish, much broadened in its upper lateral parts; 9th tergite also broad, with an elongated median projection, slightly narrowing backwards and truncated at its end; hind portion provided above with some transverse tubercles. Seen from side



TEXT-FIG. 1, a-d.—*Rhyacophila ancestralis*, sp. nov. ♂; a-c. genital appendages from above, below and side respectively; d. median projection of 9th segment, more enlarged.

10th segment is roof-shaped, short, but broad, with two small rounded preanal appendices, each bearing several hairs or bristles; apical portion of 10th dorsal segment is separated by an excision from the two small lateral processes. Tergite of 10th segment is evidently represented here by the median projection of the 9th segment described above;

boundary between lateral parts of 10th and 9th segments is somewhat indistinct, but that between tergites of 10th and of 9th segments is completely lacking, and dorsal part of 10th segment appears above as a process of 9th tergite. Basal joints of pedes genitales fairly thick, uniting together at their extreme bases; 2nd joint oval, with a broad brush of dense spinules on its inner side. Penis slender, with two elongated thick, but pale titillators, bearing several spinules at their ends above.

Length of body 4.2 mm.; this is a small form.

This species is very interesting from the morphological point of view. The 10th segment (♂) presents a very archaic roof-shaped structure, not unlike to that in many Phryganeidae, Sericostomatidae, and a few Limnophilidae (*Imania* Mart.) and, even, in Calamoceratidae. However, the boundary between the 10th and 9th segments has become somewhat indistinct, and the 10th tergite, which is completely united with the 9th, is represented as a process of the 9th tergite. It appears very probable, that in many other species of *Rhyacophila* the median projection of the 9th segment has originated also from the 10th segment, which was subject to great specialization and reduction. Preanal appendices in *Rh. ancestralis* are also very archaic, reminding of those in many Phryganeidae, Sericostomatidae, Limnophilidae, etc.¹ At last, the shape of the 2nd joint in the pedes genitales appears to be more primitive than in most other species of *Rhyacophila*.

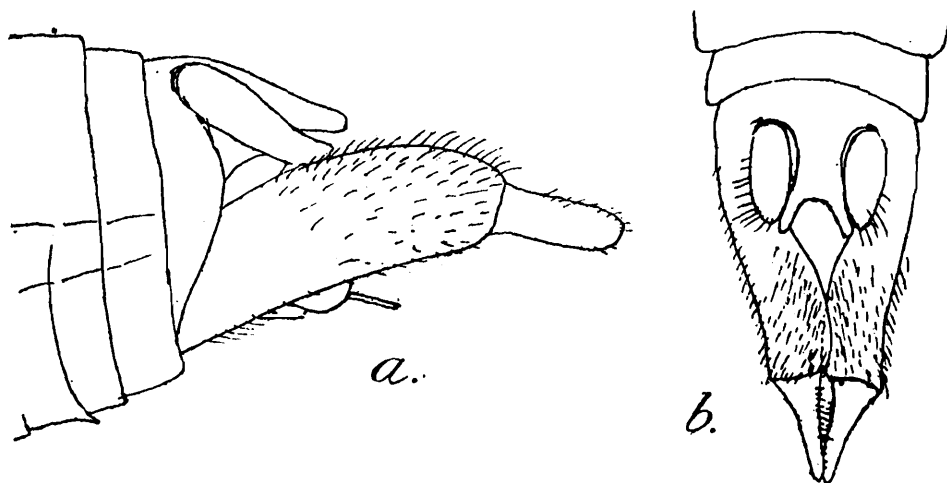
2. *Rhyacophila anatina* Morton.

(Fig. 2.)

Rhyacophila anatina, Morton, *Trans. Entom. Soc. London*, 1900, p. 6, pl. i, figs. 17-18. (Khasi Hills.)

Dumpep, Khasi Hills, Assam. October 1929. S. L. Hora.

Anterior wings brownish, triangular at their apices; pterostigma brown; venation strong, apical fork 1 beginning at the same level with



TEXT-FIG. 2, a, b.—*Rhyacophila anatina* Morton, ♂; genitalia from side and above.

¹ Attention may be directed to the fact that the 10th segment in males of some Blattoidea (e.g., *Periplaneta*) has a very similar roof-shaped structure, with two cerci at sides. Since the position of the preanal appendices is more or less identical with that of the cerci, we may consider them as homologous to cerci. Segmentation of the cerci has disappeared, but the erect hairs on the preanal appendages are preserved

the 2nd. Posterior wings greyish-brownish in their anterior portion, with dark pterostigma; 2nd apical fork beginning a little before the 1st.

♂. 9th segment not very broad, with a convex hind edge; hind projection of 9th tergite¹ ending with two slender digitiform processes; lateral lobes (probably preanal appendices) elongated, elliptic from above, with distinct hairs. 8th sternite with a false suture and small median process. Basal joint of pedes genitales long and broad, 2nd short and narrow, especially above, with a few distinct spinules on its inner side (penis not exerted).

Length of body 6.5 mm.

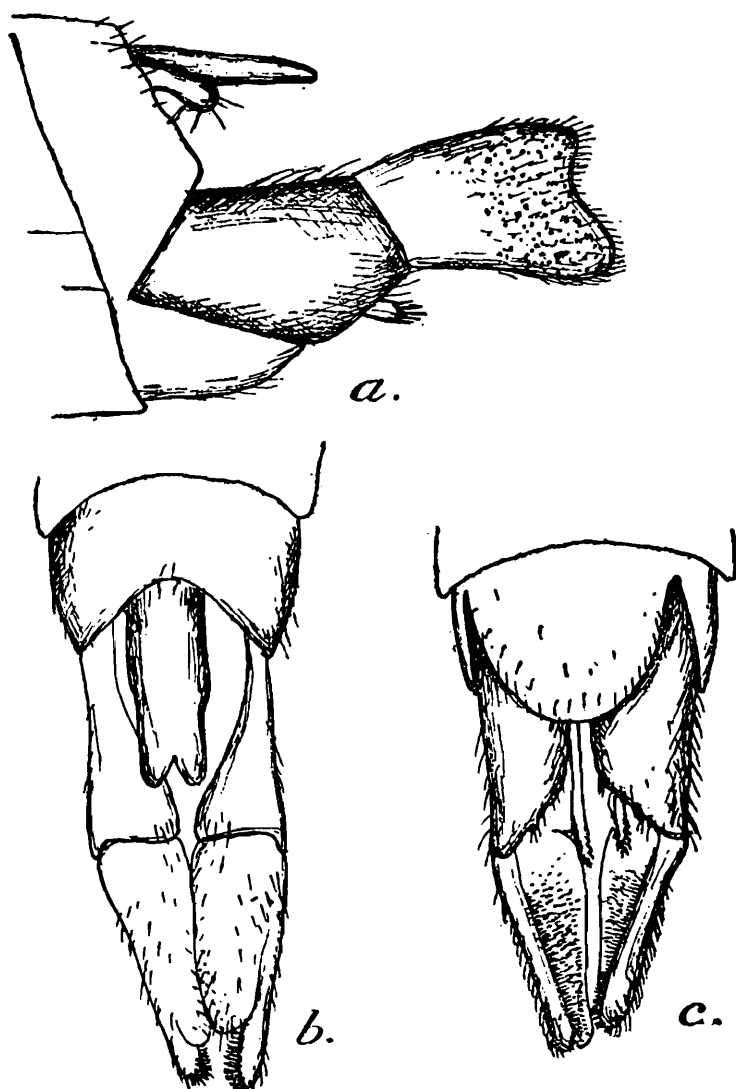
This species is already known from the Khasi Hills.

3. *Rhyacophila dilatata*, sp. nov.

(Fig. 3.)

♂. Phagu, 9,000 ft., Simla Hills, Punjab; 18-21. v. 1916. N. Annandale.

Head black, with greyish and brown hairs; antennae brown, with yellow annulations, palpi testaceous. Thorax black-brown; anterior



TEXT-FIG. 3, a-c.—*Rhyacophila dilatata*, sp. nov., ♂; genital segments and appendages from side (a), above (b) and below (c).

¹ See foot-note on p. 95.

and median legs brownish, apical portions of tibiae brown, spurs brown; posterior legs a little paler. Anterior wings brownish, with pale indistinct irrorations, clothed with yellow hairs; apical portion rounded; R with indistinct end fork; apical fork 2 beginning much earlier than the 1st. Posterior wings greyish-yellow, apical fork 2 beginning before fork 1. Abdomen brown.

♂. 9th segment broad, with two deep, triangular excisions near the pedes genitales; tergite broad, excised behind, sternite very broad, forming a large oval projection under pedes genitales. Tergite of 10th segment in the form of a narrow elongated plate, with almost parallel side-edges and small triangular excision at the end (text-fig. 3b). Lateral lobes twice shorter, directed backwards and downwards, rounded and hairy at the ends. Pedes genitales large and very broad from side; basal joints comparatively short, at their bases covered by the projecting 9th segment; 2nd joint nearly as long as the basal, broad, its hind edge with shallow excision. Upper portion of 2nd joint pale, curved inwards, somewhat shorter than the lower parts; internally the plates of the second joint covered with numerous short spinules. Titillators stick-shaped, slender, bearing spinules on their apical parts (penis not exerted).

Length of body 6.5 mm.

In this species the structure of the 9th segment is peculiar.

4. *Rhyacophila choprai*, sp. nov.

(Fig. 4.)

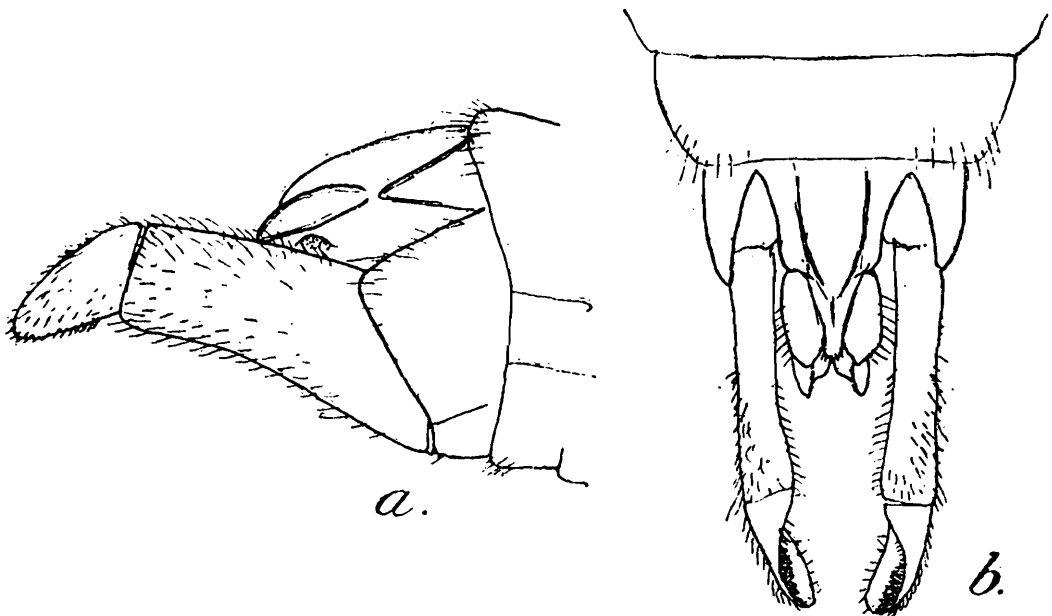
2 ♂, ♀. Company Khud, below Landour Bazar. Mussoorie, Dehra Dun district, U. P. 18. vi. 30. B. N. Chopra.

Head and thorax black; antennae brown; legs brown, clothed with short greyish hairs, spurs long, black.

Anterior wings brown, pterostigma dark brown, venation strong, distinct, 2nd apical fork beginning earlier than the 1st, 3rd and 4th forks short enough. In posterior wings 2nd apical fork beginning much earlier, than the 1st, 3rd fork equal in length to its pedicel. Abdomen dark brown.

♂. Lateral plates of 9th segment very broad, in the form of two broad rectangular plates, based from pedes genitales. 9th tergite separated from these plates by two deep triangular excisions; seen from above (text-fig. 4b) it is not very broad and long, and by two small lateral constrictions separated from the distal part, composed of a median narrow projection of the 9th tergite and of two lateral elliptic plates; median end-projection of the 9th tergite probably represents morphologically the 10th tergite united at its base with the 9th; lateral lobes are, perhaps, the preanal appendices. Seen from the side, the lateral lobes are rather narrow, and basad from them are seen two triangular figures, margined with brown. Behind and below the lateral plates are situated two more plates, separated by a median excision and forming a sort of furrow. Basal joint of pedes genitales long, broad from side, 2nd small, tongue-shaped from side. Seen from above, basal joint is

much narrower, straight; 2nd joint concave internally and bearing here a row of dense short black spinules.



TEXT-FIG. 4, a, b.—*Rhyacophila choprai*, sp. nov., ♂; genital appendages from side (a) and above (b).

Length of ♂ body 4.4-5 mm.

This species is allied to the *R. rhombica* described below.

5. *Rhyacophila rhombica*, sp. nov.

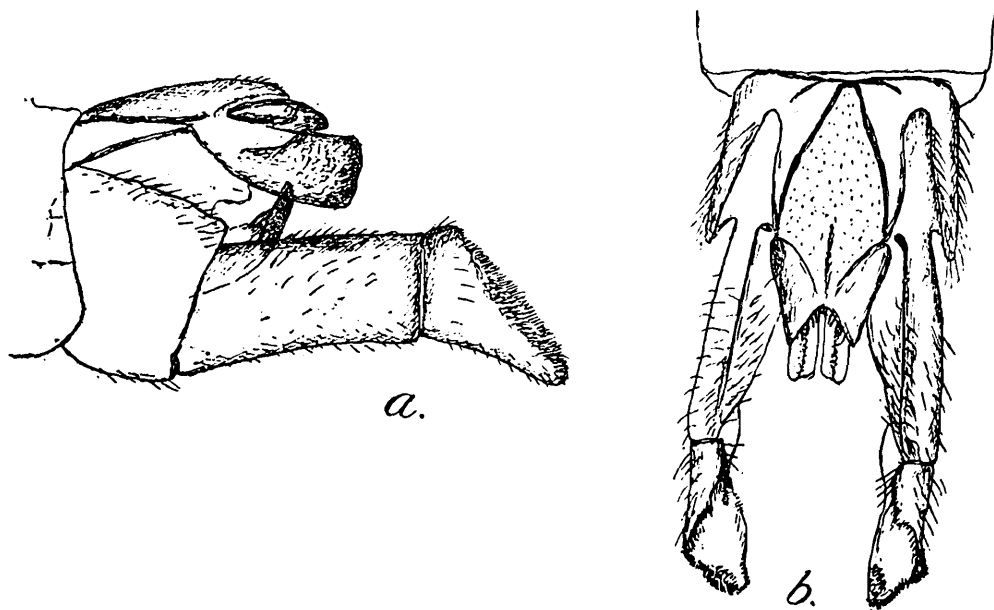
(Fig. 5.)

♂. Darjeeling district. Bengal; 7,000 ft., 7. vi. 1917. E. Brunetti.

Head yellowish-brown; thorax dark brown above, brown beneath; legs yellowish, coxae brownish, tarsi densely clothed with short yellow hairs; anterior legs somewhat darker, brownish-yellow. Anterior wings moderately narrow, brownish, with dark pterostigma; 2nd apical fork beginning but a little earlier than 1st. Posterior wings pale-brownish; 2nd apical fork beginning also a little before 1st. Abdomen dark brown above, paler beneath.

♂. Structure of the 9th segment is similar to that in *Rh. choprai*, sp. nov.; its side portions are also large and almost quadrate; 9th tergite separated by two very deep triangular excisions, but containing very pale membranes. Seen from above the 9th tergite is subquadrate, with two brown narrow stripes which diverge from the base to the posterior outer angles. Small lateral constrictions separate here the distal part, which is composed of the short triangular projection of the 9th tergite and of two side-lobes, united near their ends and bearing on their oblique hind edges several black spinules. Below these lobes are situated two elongated and broad vertical plates, truncated at their ends, somewhat tuberculated externally and bearing longitudinal series of small black spinules internally. Basal joint of pedes genitales elongated, broad from side, narrower from above, with raised straight upper edge. Second joint triangular from side, with extended hind-lower angle; hind margin

clothed with dense brush of short hairs ; upper basal portion of 2nd joint curved inwards ; its inner margin, as well as the whole hind margin of the



TEXT-FIG. 5, a, b.—*Rhyacophila rhombica*, sp. nov., ♂ ; genital appendages from side (a) and above (b).

joint is dorsally beset with a series of short spinules. On the sides of penis are two short, but thick appendages, curved upwards and black at their ends.

Length of body 4.3 mm.

This species is evidently allied to *Rh. choprai*, sp. nov.

6. *Rhyacophila similis*, sp. nov.

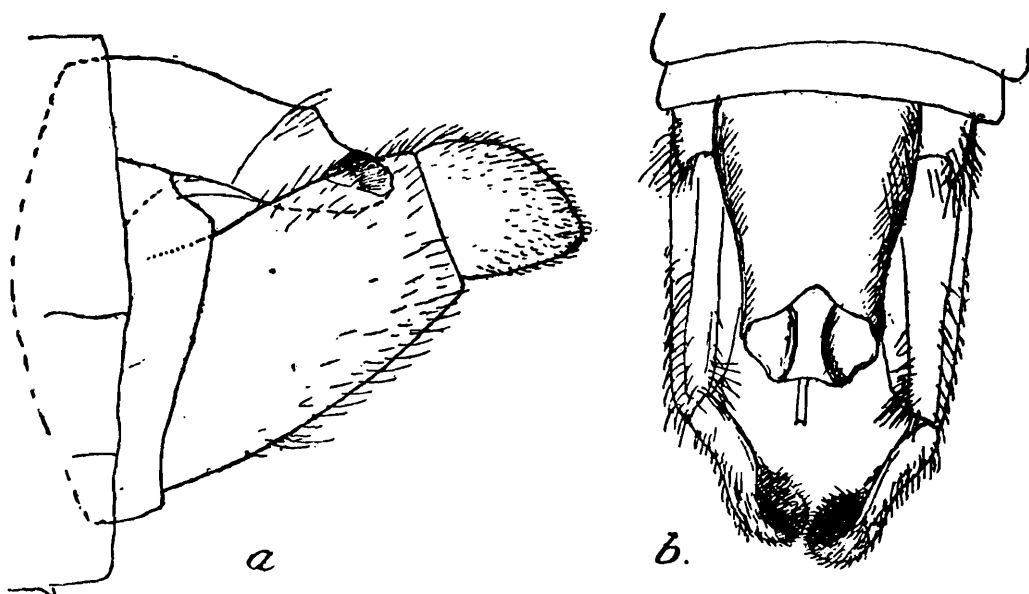
(Fig. 6.)

4 ♂, 5 ♀. Jabharket, on Mussoorie-Tehri Road, ca. 4 miles from Mussoorie, Dehra Dun district, U. P. 20-25.vi.30. B. N. Chopra (In a spring).
♀. Round about Mussoorie, U. P. 15-20.vi.—7.vi.30. B. N. Chopra.

Head black-brown, with brown antennae ; thorax black-brown ; legs brownish. Anterior wings brown, shining ; apical forks 1 and 2 beginning at the same level, fork 4 much earlier than 3rd. Posterior wings somewhat paler ; apical forks 1 and 2 beginning also at the same level. Abdomen brown above, paler, yellowish beneath ; 9th segment and pedes genitales (♂) usually yellowish.

♂. 9th segment much narrower than in *Rh. choprai* and *Rh. rhombica*, but with obtuse angles above pedes genitales ; 10th segment completely united with 9th tergite into a large and thick plate, somewhat dilated in its basal part and excised behind, if seen from above. Behind the plate are situated below two oval blackish bodies, connected by a pale median membrane. Basal joint of pedes genitales extremely broad, if seen from the side, with somewhat convex lower margin ; seen from above the second joint is more narrow, but its distal portion is

concave, rounded and beset internally with a dense brush of short blackish hairs. Penis very slender and long.



TEXT-FIG. 6, a, b.—*Rhyacophila similis*, sp. nov., ♂; genital appendages from side (a) and above (b).

Length of body 5 mm.

This species appears to be allied, although not closely, to *Rh. choprai*, and *Rh. rhombica*. 10th segment, together with the lateral lobes, is here completely united with the 9th tergite, but one can see from the side an indistinct boundary, separating a smaller distal part (=10th tergite+lateral lobes+lower processes of the 10th segment)¹ from the large basal one (=9th tergite).

7. *Rhyacophila pallida*, sp. nov.

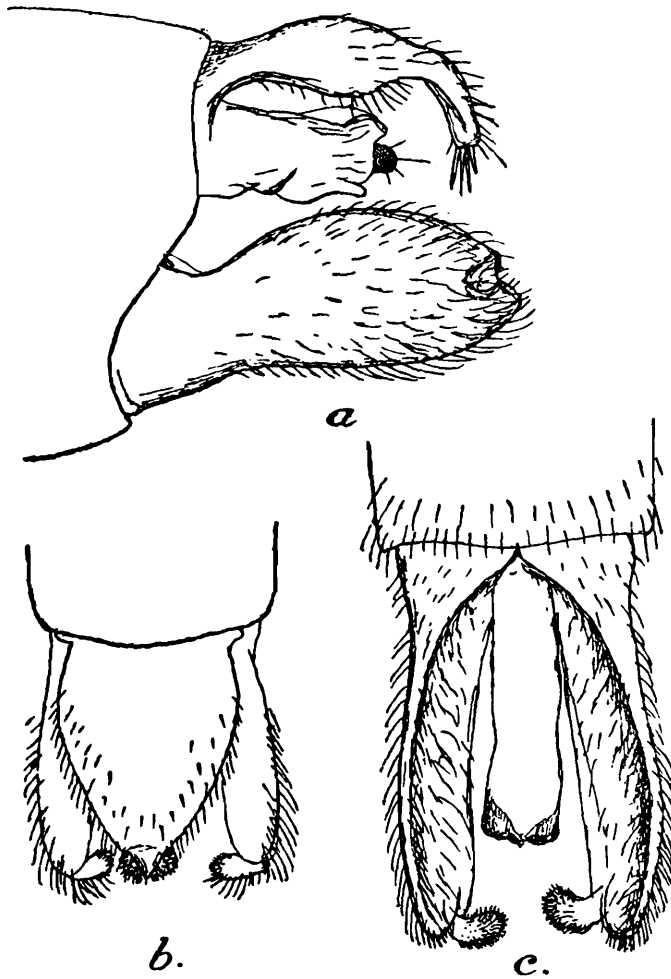
(Fig. 7.)

♂. Punj-pul Nullah, near Dalhousie, 6,500 ft., Punjab. i.v.27. S. L. Hora.

Head pale yellow, darker near eyes; hind warts with long pale hairs; antennae and palpi yellow. Thorax brown above, somewhat yellowish beneath; legs yellow, coxae of the median and hind legs brownish yellowish. Anterior wings considerably dilated in their distal part (between pterostigma and anal angle), then narrowing and nearly triangular at apices, which are somewhat extended backwards; hind apical margin straight. R ending with a fork, RS_{1+2} and RS_{3+4} dividing nearly at same level (RS_{1+2} a little earlier), all branches of RS a little curving backwards. Membrane of anterior wings pale yellowish grey, mostly clothed with sparse yellowish hairs, but there are several pale brownish fasciae and spots, as follows: (1) pale testaceous marginal band, beginning near arculus and ending at the end of M_1 ; (2) a similar premarginal band, parallel to the marginal and ending in the basal part of the 3rd apical fork; (3) third oblique and indistinct band parallel to the second and reaching the 2nd apical fork, where it is prolonged as

¹ Hind lower appendages or processes of the 10th segment perhaps represent *paraprocts* of Crampton.

two narrow streaks along the basal halves of RS_4 and R_3 , clothed with short brown hairs; (4) several irregular brown spots along and behind A_{1+2} , A_2 and A_3 ; and (5) brownish irregular spots at the end of RS_1 , RS_2 , RS_3 ; pterostigmal region yellowish testaceous. Postcostal area somewhat reticulated. Venation yellowish. Posterior wings pale, venation yellow; R also forming two branches, apical forks 1 and 2 beginning at same level; shape as in fore-wings, but the apex not extended. Abdomen brownish above, somewhat yellowish beneath; 8th, 7th and 6th segments brown, 9th segment yellowish brownish.



TEXT-FIG. 7, a-c.—*Rhyacophila pallida*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

♂. 9th segment very broad, broader in its dorsal than in ventral parts; hind margin of its tergite nearly straight. 10th segment (tergite) forming a very broad and long plate, apical portion of which is curved downwards and armed at its end with a few (4-5) spines; seen from above the plate is very broad, gradually narrowing towards the apex, which is curved downwards; its lateral margins are somewhat bent downwards, and seen from the side form a convexity. Under the plate of the 10th segment is situated a thick pale projection, bearing the anal orifice at its end and two small dark lateral oval processes at the sides. Basal joint

of pedes genitales large and nearly elliptic from side, narrowed in its basal part. Second joint very small, minute and curved inwards, thus being invisible externally; its apex is rounded and clothed with minute spinules. Penis thick, pale, its apical portion darker.

Length of body 11 mm.; length of anterior wings about 16 mm.

Separate lateral lobes are lacking in this species; probably, they are completely fused with the 10th segment.

Rh. pallida is evidently allied to *Rh. lanceolata* Morton from the Khasi Hills, but differs in the entire and not divided 10th segment and in the shape of the pedes genitales.

8. *Rhyacophila digitata*, sp. nov.

(Fig. 8.)

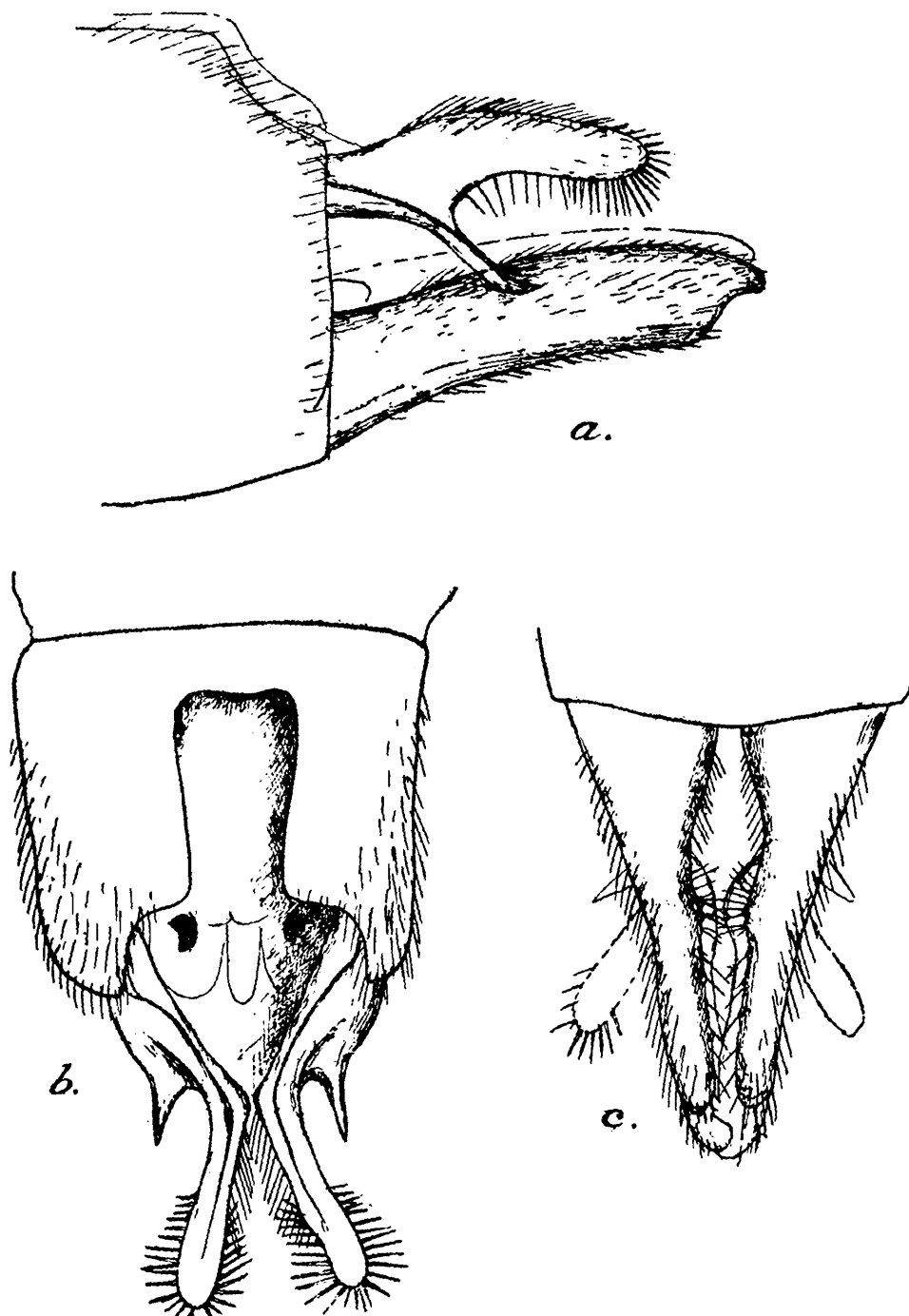
6 ♂. Darjeeling district, Bengal. Lynch.

Head varying from brown to brownish yellowish, clothed with yellow hairs, nearer to eyes mixed with brown ones; antennae brownish yellowish, annulated with pale yellow, distal portion somewhat darker. Thorax dark brown above, brownish or brownish yellowish beneath; legs testaceous, hind ones paler; tibiae of 1st and 2nd pairs of legs brown in their apical portions, but yellow just before these dark spots; tarsi brownish. Anterior wings brownish, but very densely irrorated with minute subhyaline spots, clothed with pale yellowish hairs; two large oblique bands situated between the median and distal portions of CuA and A_{1+2} and one narrower spot between the base of M and A_2 , this spot clothed with blackish hairs; across the apical portion of wings extend two indistinct brownish bands, also irrorated with subhyaline spots; costal area with series of more distinct brownish or brown spots; venation brownish yellowish, 1st and 2nd apical forks beginning at the same level. Posterior wings pale greyish, but the pterostigmal and apical fork beginning a little earlier than the 1st; SC with a fork (in anterior wings SC also forked). Abdomen dark brown above, somewhat yellowish beneath.

♂. 9th segment very broad at sides, with straight truncated hind margins; 9th tergite with a profound rectangular excision, nearly reaching the base of tergite, divided into two lateral portions. Behind 9th segment are situated two long vertical plates, forming, before the middle, two slender processes, directed downwards and outwards; near the points of the origin of these processes the plates are approximated to each other, forming between them and 9th tergite a triangular space, then diverging outwards; apical portions of the plates provided on their lower side and on the apices with many strong acute spines. Pedes genitales long and broad, from side longer than the plates of the 10th segment; separate 2nd joint lacking, perhaps represented by the small projection at the end of the basal joint, but there is no trace of a boundary line between them. Upper borders of these appendages somewhat dilated and curved inwards. Seen from below, the lower appendages are strongly dilated at their bases, but become narrower further; near the middle of the inner margins are seen 2-3 small tubercles, each bearing a group of 2-3 bristles. Penis not exerted.

Length of body 9.9-5 mm., expanse 28-32 mm.

1 ♀ from Darjeeling distr. resembles in its habitus and colouring the males of *Rh. digitata* and probably belongs to this species.



TEXT-FIG. 8, a-c.—*Rhyacophila digitata*, sp. nov., ♂; genital appendages from side (a) above (b) and below (c).

9. *Rhyacophila curvata* Morton.
(Fig. 9.)

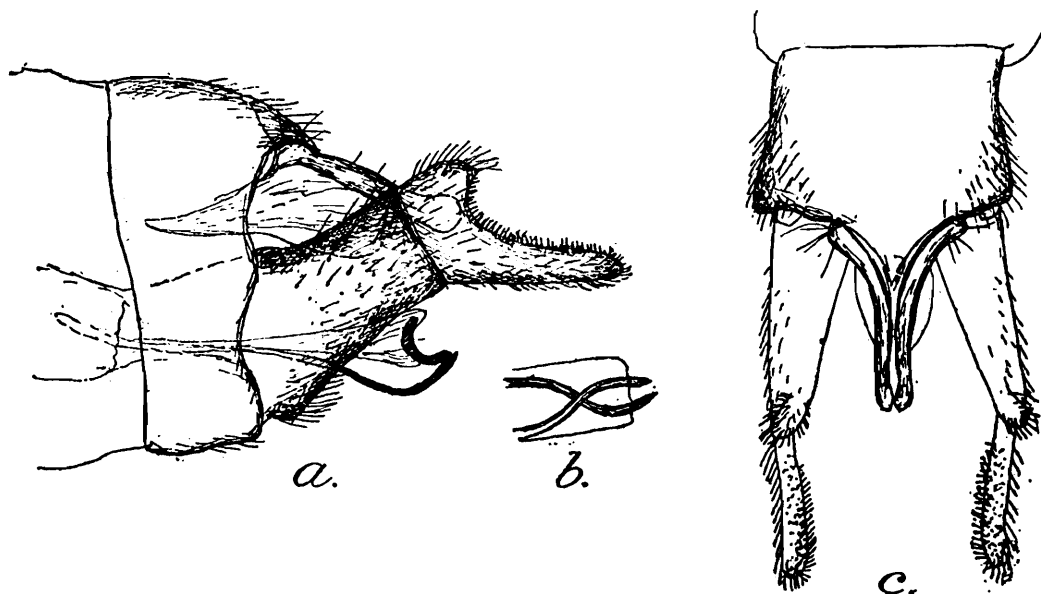
Rhyacophila curvata Morton, *Trans. Entom. Soc. London*, 1900, Pt. I, p. 5, pl. i, figs. 12-14.

♂. Dumepe, Khasi Hills, Assam. October 1929. S. L. Hora.

Head fuscous, with greyish hairs; antennae brown with pale annulations. Thorax brown above; coxae brown, legs brownish yellow-

ish, with brown spurs. Anterior wings pale greyish brownish with indistinct pale irroration in their distal half; hairs short, yellowish, but on the brownish spots they are brownish or brown; apical forks 1 and 2 beginning at the same level. Posterior wings greyish, pterostigma darker; apical fork 2 beginning a little earlier than 1st.

♂. Genital appendages are very similar to Morton's figures, but there is some difference, chiefly in the form of the 2nd joint of the pedes genitales, which is more deeply excised in this specimen, than in Morton's



TEXT-FIG. 9, a-c.—*Rhyacophila curvata* Morton, ♂; a and c. genital appendages from side and above; b. end portions of titillators.

figure. 10th segment in the shape of two longitudinal plates, which in their basal parts are separated by a triangular projection of the 9th tergite, then approximate and run near each other; lower side portions of the plates pale, not chitinized, upper portions thick and chitinized. Preanal appendages fused with the bases of the plates, forming two small rounded prominences, bearing few erect hairs. Penis pale, dilated in its apical portion (from side) and provided at its end with a black semi-circular chitinized and curved rod, with its lower end projecting freely backwards; under the penis are situated two slender brown titillators, crossing each other before their ends (text-fig. 9b). Expanse 17-18 mm.

As remarked above, the male genital appendages in this specimen are very similar to Morton's figures drawn from a specimen, also collected in the Khasi Hills, and I am, therefore, of opinion that our specimens also belong to *Rh. curvata* Morton.

***Rhyacophila* spp.**

- ♀. Darjeeling district. Lynch.
- ♀. Stream near Punj-pul Nullah, about a couple of miles from Dalhousie, 6,500 ft., Punjab, 8.v.27. S. L. Hora.
- ♀. Kumaon Hills, Saraiya, U. P.; a rapid stream flowing from the Lake. 7.v.30. H. S. Pruthi.

These females are partly defective and cannot be determined.

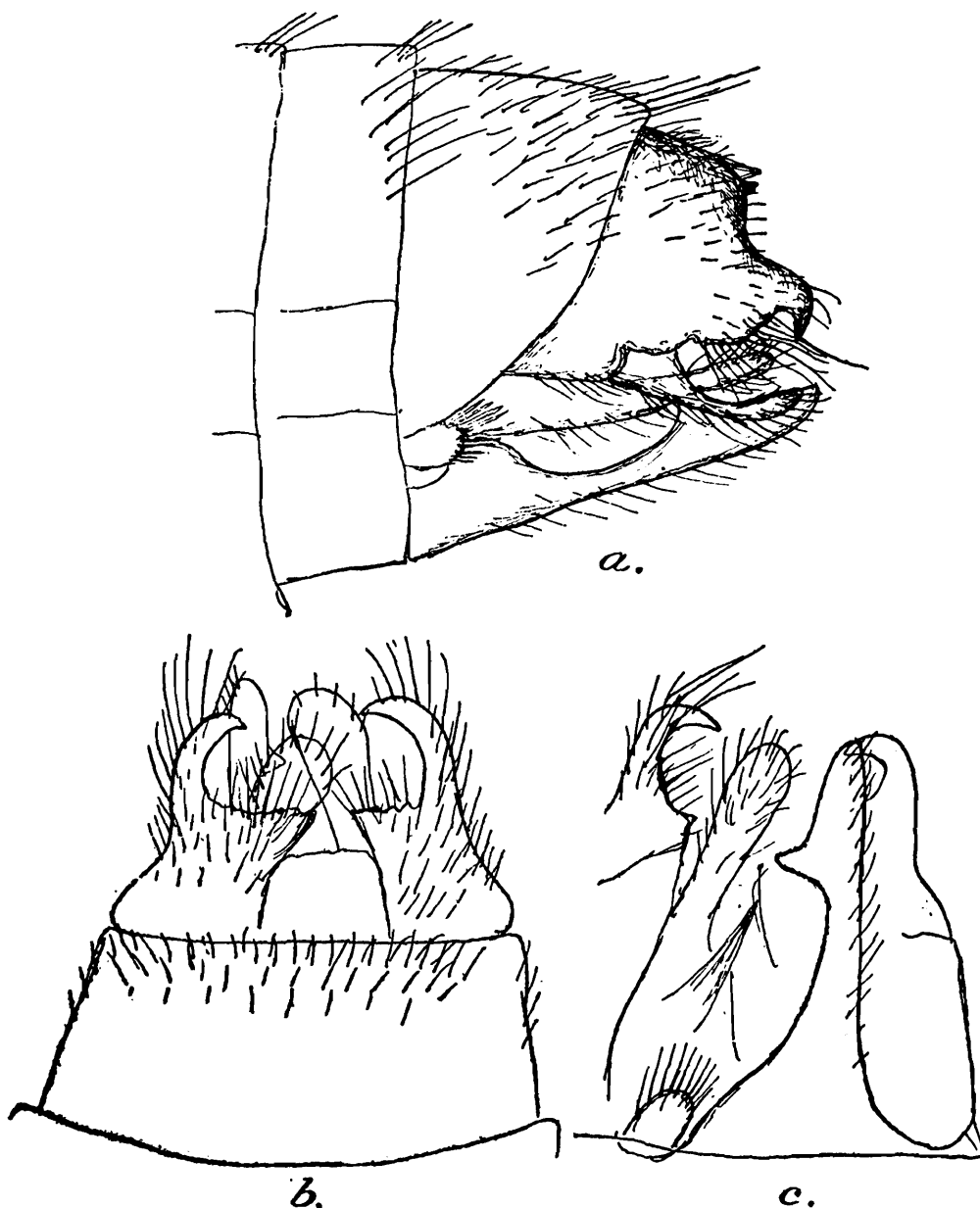
Glossosoma Curt.

1. *Glossosoma dentatum* McLach.

(Fig. 10.)

♂. Phagu, 9,000 ft., Simla Hills. 18-21.v.1916. N. ARRERDALL & S. W. KEMP

This specimen in its colouring and the structure of the male genitalia (text-fig. 10a-c) is very similar to the specimens of *Gl. dentatum* McLach. from Turkestan¹, and I, therefore, refer it to this species. Lateral parts



TEXT-FIG. 10, a-c.—*Glossosoma dentatum* McLachl. ♂; genital appendages from side (a), above (b) and below (c).

¹ McLachlan, *I vestija Soc. Amat. d'Hist. Natur., Anthropol., etc., Moscou*, XIX, I, p. 43 (1875). *A Monogr. Rev. Syn. Trich. Europ. Fauna.* Pts. I—IX, 1874-1880, p. 471, pl. xli; I Addit. Suppl. (1884); Martynov, *Ann. Mus. Zool. Acad. Sci.* XIX, p. 407 (1915); *Tabl. analyt. de la fauna de l'URSS (publiees p. Inst. Zool. Acad. Sci.)*, *Trichoptera* I, p. 92, fig. 54 (1934).

of the 10th segment shorter in our specimen, but the whole shape of 10th segment is very similar to that in the Turkestan specimens. Ventral unpaired appendage is quite similar to that in the type-form, as well as the asymmetric pedes genitales.

Length of body 5 mm.

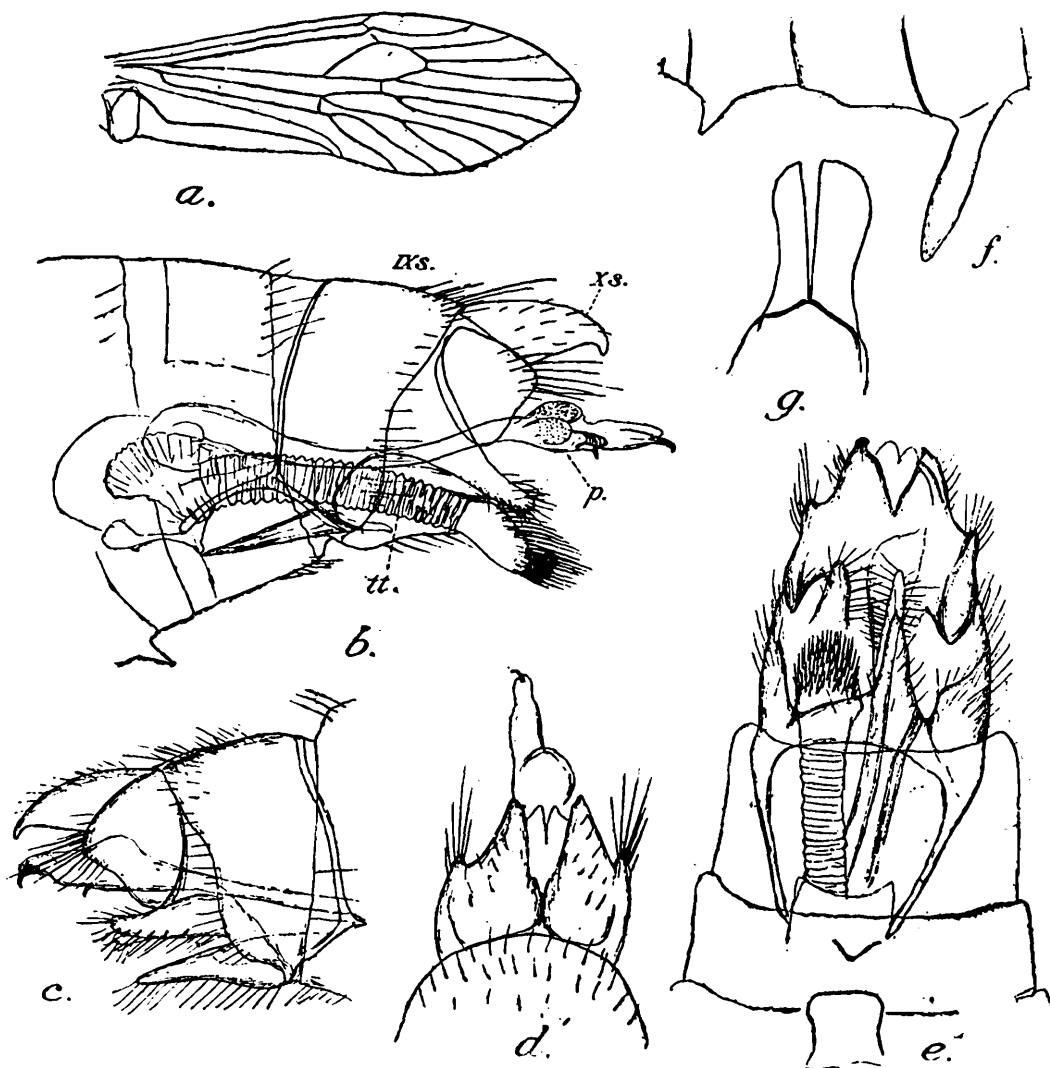
The discovery in the West Himalayas of a species, hitherto known only from the vicinities of Samarkand, S. Turkestan, is very interesting and suggests some relationships of South Turkestan fauna to that of West Himalayas.

2. *Glossosoma fissum*, sp. nov.

(Fig. 11.)

2 ♂. Company Khud, below Landour Bazar, Mussoorie, Dehra Dun district, U. P. 18.vi.30. B. N. Chopra.

Head black, antennae brown, annulated with yellow in their basal portion; thorax black-brown, legs yellowish brownish, shining, with few yellow hairs; DC broad, 3rd fork acute at base; basal callosity transverse, strong. Posterior wings pale, 2nd apical cell acute, 3rd fork a little longer than its pedicel. Abdomen dark brown.



TEXT-FIG. 11.—*Glossosoma fissum*, sp. nov., ♂; a. anterior wing; b-d. ♂ genital segments from left and right sides and from below; e. ♂ genital segments and appendages from beneath; f. g. ♂, appendages of 6th sternite from side and below.

♂. Genital appendages resembling those in *Gl. caudatum* Mart. 9th segment narrow beneath, but broad at sides and above. 10th segment with a deep median excision is divided into two conical lobes, the apices of which, if seen from side, are curved downwards; below these lobes and fused with their basis are situated two large, broad subtriangular plates which bear long hairs at their apices; these plate-like lobes probably represent the preanal appendices, in *Gl. caudatum* more completely fused with the 10th segment, but also bearing each a tuft of hairs. Inferior appendages (pedes genitales) asymmetrical, left appendage placed a little higher, but shorter, than the right. Unpaired ventral appendage of the 9th sternite not long and situated nearer to the right side. Penis, long, slender; before its end it bears above two cushion-like projections; the end is provided with a hook which is somewhat curved downwards. Titillators long, erectile, ending in a dense tuft of brownish spines. 9th segment forming two long lateral apophyses in the interior of 8th segment; near the middle, below, are situated two other chitinous tendons. Sixth sternite provided with a broad plate-like appendage sometimes divided by a fissure into two side-portions (text-fig. 11); 7th sternite with a short process.

Length of body about 5 mm.

This species appears to be allied to *Gl. caudatum* Mart. from Szechwan, but is distinct. The structure of the male genital appendages is interesting, mainly, in the presence of two large plate-like projections at the bases of the lobes of the 10th segment. The position of these plates corresponds to that of the preanal appendages, and I consider them as homologous of these appendages. One may be able to find traces of these appendages in some other species of *Glossosoma* also, but they are always more or less completely united to the paired lobes of the 10th segment.

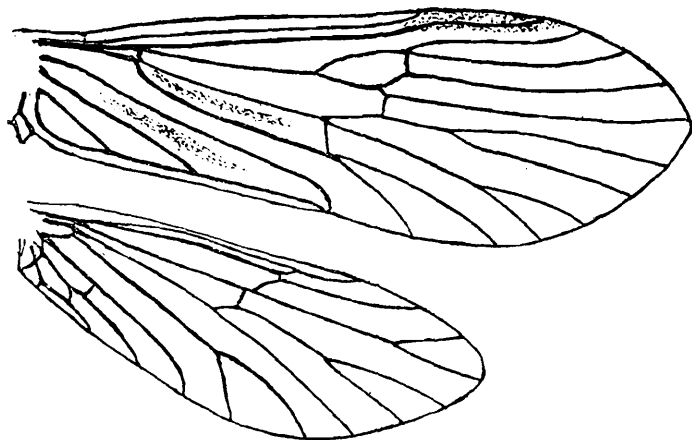
Synagapetus McLach.

Synagapetus himalayanus, sp. nov.

(Fig. 12.)

♀. Stream between Railway Station and Tista Bridge; Darjeeling district, Bengal. 27.v.30. S. L. Hora.

Head and body dark brownish; 3rd joint of the maxillary palpi the longest, 5th shorter, 4th nearly half of the 3rd. Legs yellowish brown-



TEXT-FIG. 12.—*Synagapetus himalayanus*, sp. nov., ♀; venation of wings.

ish, with 2·4·4 spurs ; median tibiae and tarsi strongly dilated. Anterior wings brownish, with dark pterostigma ; veins strong ; DC short, 1st apical fork acute, but sessile, the 2nd deeply impinging on DC, the third longer than its pedicel, almost twice longer than 4th fork ; blackish streaks between M and CuA and CuP and A₁. In the posterior wings SC long, R uniting with it before its end ; RS simple, RS₂ ending with short fork, M₃ ending with a somewhat longer one ; A₃ ending with a broad fork. Appendages on the end of abdomen long, slender. Length of body 3·7 mm.

This species in the venation of its hind wings closely resembles the genera *Synagapetus* McLach. and *Pseudagapetus* McLach.

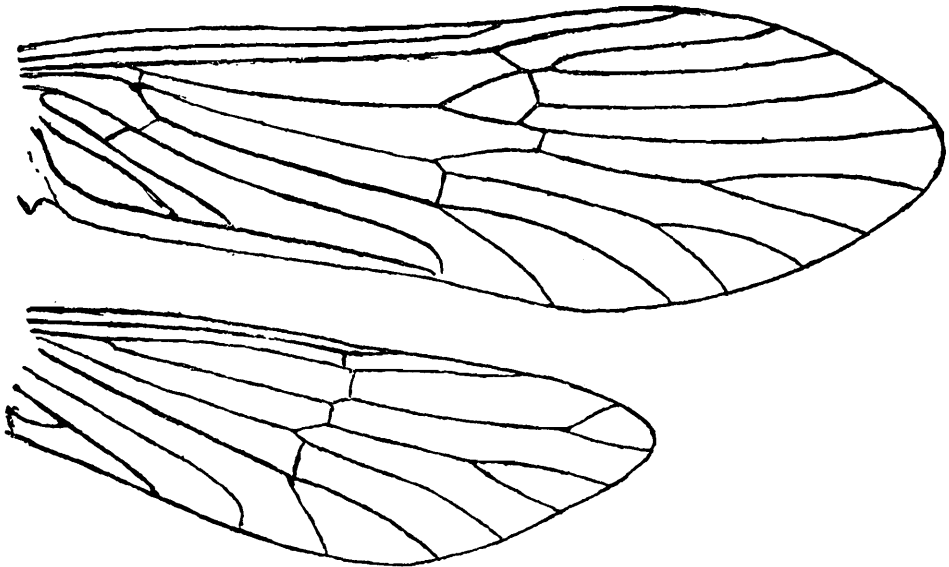
Agapetus Curt.

Agapetus triangularis, sp. nov.

(Figs. 13-14.)

♂, ♀. Almora, 5,600 ft., Kumaon, U. P. 17-31.v.11. C. Paiva.

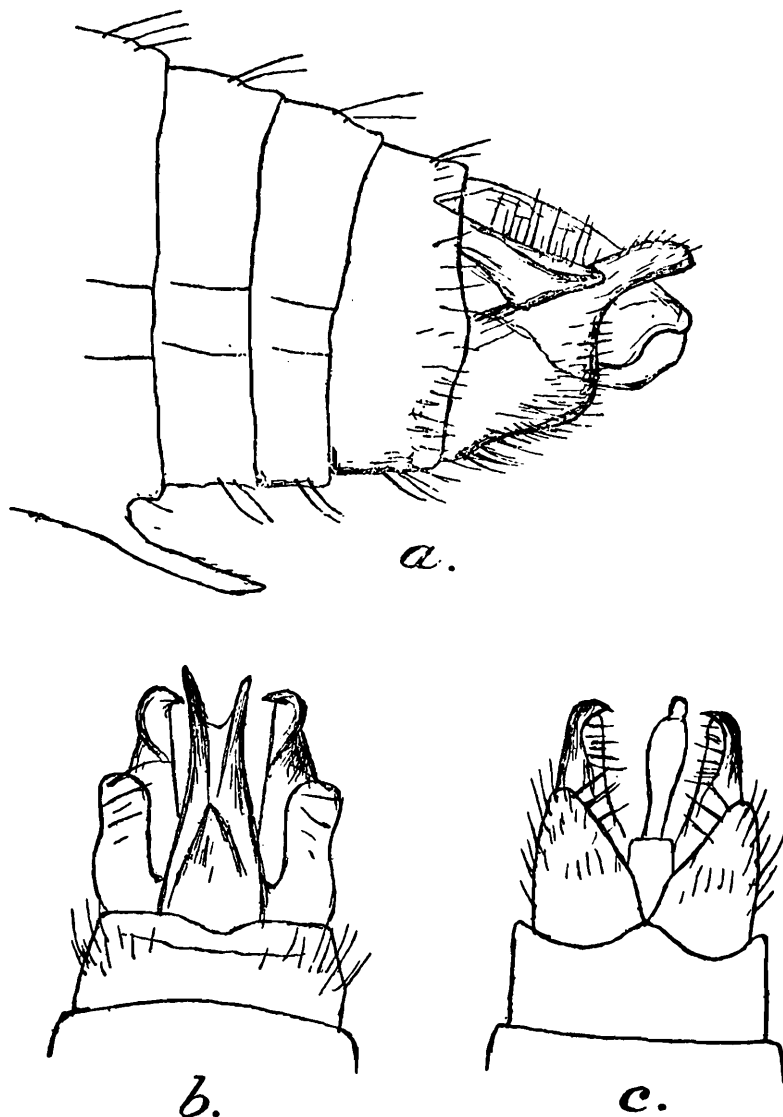
Head dark yellowish above ; antennae pale. Thorax brownish ; anterior wings pale greyish-yellowish ; DC short, triangular ; 1st apical fork with a short pedicel, 2nd sessile ; 3rd fork but a little shorter than its pedicel, 4th fork short. Posterior wings pale ; 2nd and 3rd apical forks very short, SC long, RS₁₊₂ forming as a continuation of R. Abdomen brownish, paler beneath.



TEXT-FIG. 13.—*Agapetus triangularis*, sp. nov. ; venation of wings.

♂. 6th sternite with a long median process, 9th segment broad, somewhat broader below than above. Preanal appendages large ; seen from the side they are triangular, narrowed at the bases, with a series of erect hairs on their upper margins ; from above they are fairly broad and rounded at their ends, 10th segment large, roof-shaped ; seen from

above it is not very broad and is fastened by two chitinized bands, forming two projections or processes at the end; from side it is broad; hind margin with a shallow excision.



TEXT-FIG. 14, a-c.—*Agapetus triangularis*, sp. nov., ♂; genital segments and appendages from side (a), above (b) and below (c).

Pedes genitales, each composed of a large and broad basal part and of a slender distal portion, arising from the upper part of the basal piece; seen from beneath the basal part (it is probably the basal joint) is subtriangular, rounded at apex, with few (3-4) bristles on its inner edge; outer portion of the distal part (probably the 2nd joint) thick and curved inwards; inner portion plate-like, thin. Penis very broad from side, narrower from beneath.

Apparently related, though not closely to the group of North and Central Asiatic species—*A. sibiricus* Mart., *A. kirgisorum* Mart., and *A. jakutorum* Mart.

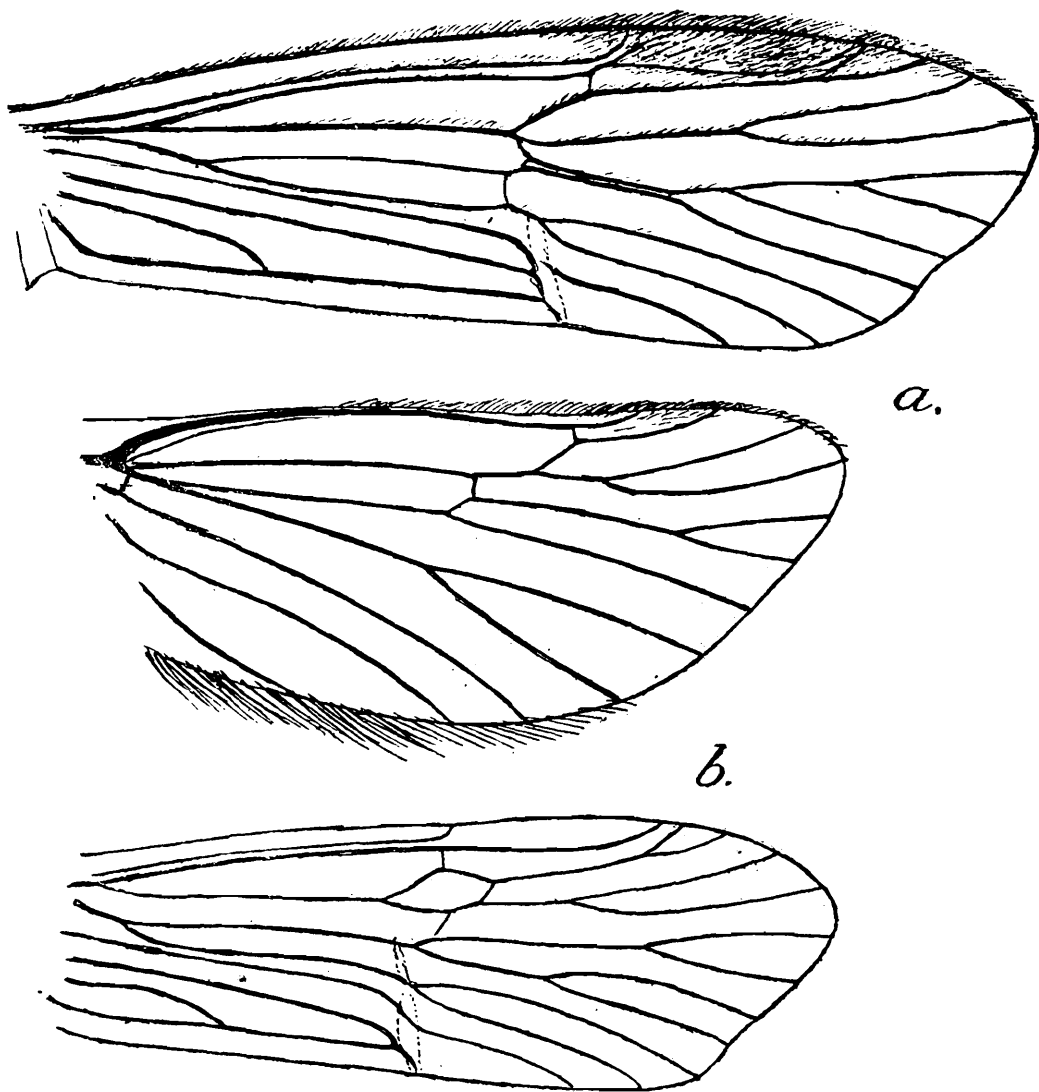
Apsilochorema Ulm.**Apsilochorema annandalei**, sp. nov.

(Figs. 15-16.)

2 ♂, ♀. Phagu, alt. 9,000 ft., Simla Hills, Punjab. 18-21.v.1916. N. Annandale & S. W. Kemp.

♂. Kufri to Phagu, alt. 8,000-9,000 ft., Simla Hills, Punjab. 18.v.16. N. Annandale & S. W. Kemp.

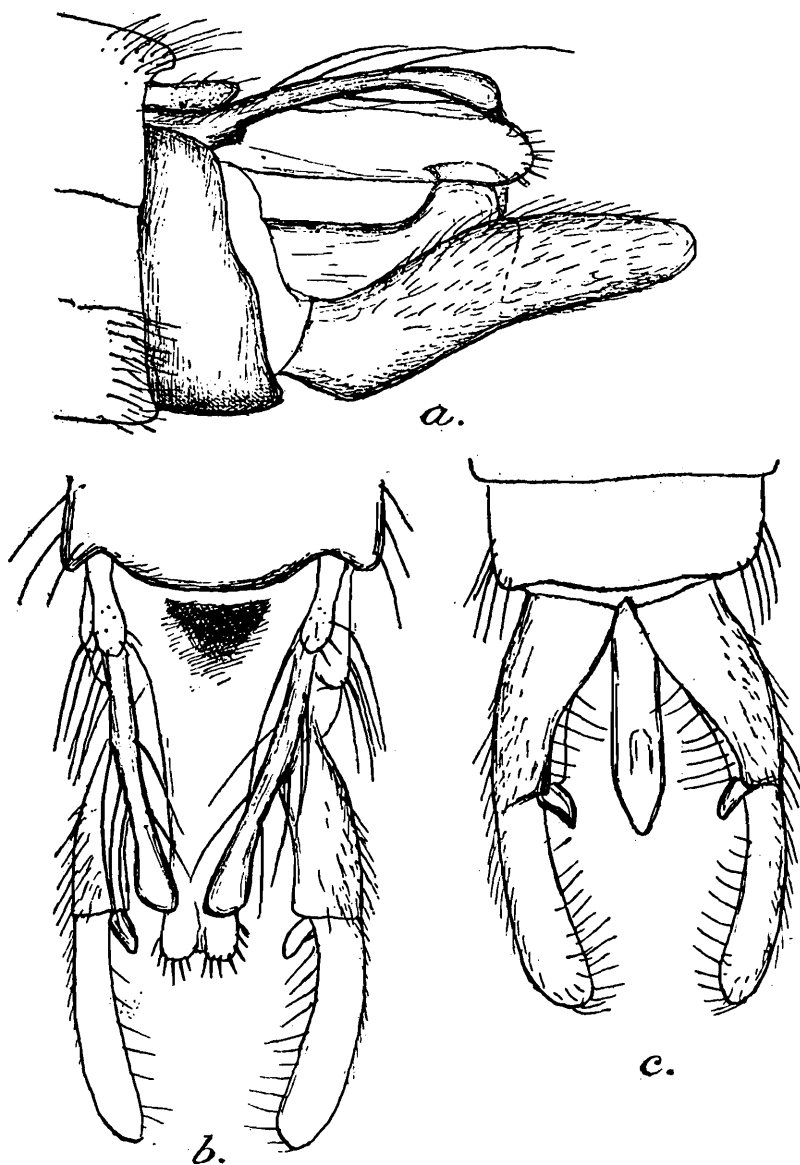
Head brown above, somewhat yellowish anteriorly ; antennae yellow, palpi brownish ; in the maxillary palpi 5th joint equal to 4th, 3rd a little longer, 2nd shorter ; 1st joint short. Thorax brown above, brownish yellowish at sides ; legs pale brownish yellowish, with long dark spurs. Anterior wings brown, slightly excised at their apical margins. Venation resembling more that of *Apsilochorema sutshanum* Mart. from South Ussuri Land ; pterostigmal region dark, hairy, veins thick, bearing series



TEXT-FIG. 15, a, b.—*Apsilochorema annandalei*, sp. nov. ; a. wings in ♂ ; b. fore-wing of ♀.

of moderately long hairs ; in ♂ R_{3+4} not approximated to R_{1+2} , its fork a little longer than its pedicel ; M_3 united at its base with M_{1+2} , M_{3+4} approximated to M_{1+2} and running quite near to it ; fork 3 short, M_3 and M_4 running parallel M_2 ; cubital fork long. Posterior wings pale-

brownish, veins distinct and also clothed with hairs; SC strong, thickening at its base, brown, R weak, appreciable but in its basal part; apical fork 1 lacking, fork 2 long; 3rd fork short, 5th long, broad and commencing at the same level with the point of the dividing of M. Venation of the female anterior wings (text-fig. 16) considerably differing from that in males; discoidal cell present, short, angulate, M_{3+4} not approximated to M_{1+2} , fork 4 longer than fork 3. Venation of posterior wings similar to that in ♂, but $\bar{M}$ more approximated to CuA and connected with it by a short cross-vein in the middle; CuA margined with brown. Length of anterior wings 6·7-7 mm. Abdomen reddish-brownish above, yellow beneath; 6th and 7th sternites provided each with a triangular projection.



TEXT-FIG. 16, a-c.—*Apsilochorema annandalei*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

♂. Male genital appendages shaped as in *A. indicum* Ulm., with but slight differences. Preanal appendages short, hairy. 10th segment

also composed of a median plate-like portion and of two lateral stick-shaped brown processes ; these processes are slender, somewhat thickened at the ends, a little converging to their ends and bearing few long hairs. Median portion broad at base, but rather narrow in its remaining portion (from above), pale, a little extending beyond the ends of stick-shaped appendages ; apical portion with a shallow excision, subdivided into two rounded lobes, bearing several spinules ; seen from side it is straight, rounded at end. Pedes genitales long and broad from side, with the 2nd joint not externally separated from the basal. Seen from above or from beneath the 2nd joint is more distinct, bounded by an articulation with the basal, and bearing series of erect hairs internally ; from the end of the basal joint arises a small inner additional process, rounded at its end and shorter than in *A. indicum* ; 2nd joint nearly equal to the basal. Penis broad from side, its apex curved upwards ; seen from beneath it is more slender, with subtriangular apical portion.

Females in general similar to males ; antennae yellow in basal, brownish, with yellow annulations in their distal parts ; anterior and median legs brownish, posterior ones yellow.

Length of ♂ body 5.5 mm., that of ♀ about 7 mm.

This species is allied to *A. indicum* Ulm., but in its wing venation is more like that of *A. sutshanum* Mart.

A. indicum Ulmer was described from Dalhousie, Punjab.—*Ann. Soc. Entom. de Belgique* XLIX, p. 38, figs. 29-33 (1905).

Fam. HYDROPTILIDAE Steph.

Insects belonging to this family are very small, often minute and almost unknown from India ; they occur mostly in running waters, but usually not in mountainous torrents or rivers ; several forms occur also in standing waters, such as lakes. Five species are recorded here.

Oxyethira Eat.

Oxyethira angustella, sp. nov.

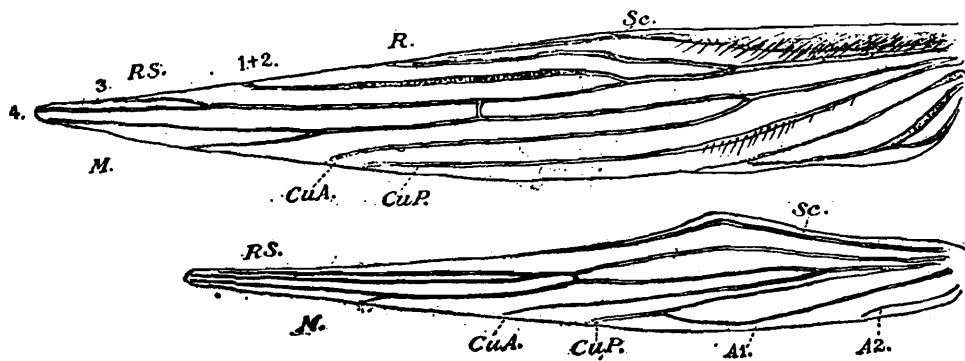
(Figs. 17-18.)

2 ♀. Above Kapildhara Fall, Rewah State, C. I. 19.11.1927. S. L. Hora.

About 12 ♀, 1 ♂. Junction of two streams about a mile below Phariseemar, Rewah State, C. I. 18.ii.27. S. L. Hora.

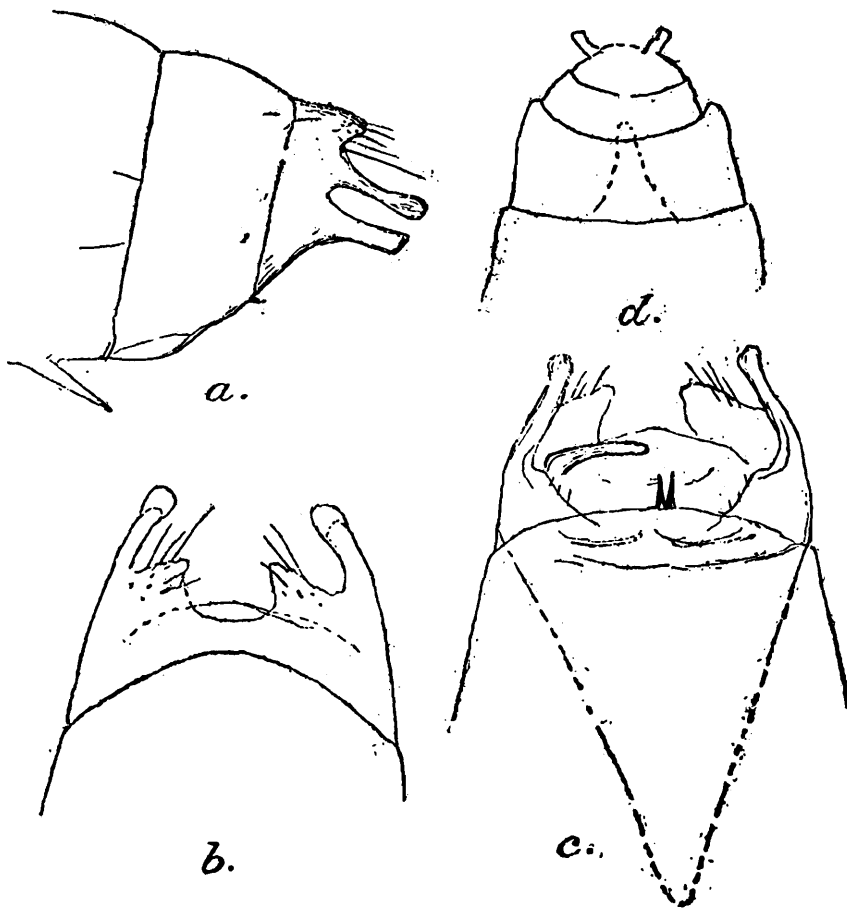
Head and body brown or brownish ; eyes large, ocelli situated near to them ; head bearing tufts of long yellowish brownish hairs above and anteriorly. Spurs 0.3.4 ; hind tibia and 1st tarsal joint with series of very long brownish yellowish hairs behind. Anterior wings long and narrow (text-fig. 17), brownish ; costal area in its basal part broad, dark brownish and densely clothed with hairs ; SC indistinct ; R distinct, in its distal part running near to SC, but not quite reaching the margin of wing ; RS_1 thick, distinct, RS_{3+4} more slender, forming narrow fork in its apical portion. M dividing into two short branches, and near its middle connected by an indistinct cross-vein with RS_{3+4} ; CuA normal ; CuP long, thick, its middle portion bearing several bristles ; end portion pale and indistinct ; A_1 slender, A_2 strong, A_3 weak. Posterior wings

very narrow, with a distinct projection anteriorly; SC strong, running near to costal edge; the stem of R running, as in anterior wings, but its,



TEXT-FIG. 17.—*Oxyethira angustella*, sp. nov.; venation of wings.

free distal portion is lacking; cross-vein rs-m situated near the middle of wing; RS divides into two long branches, approximated to each other, just behind (outwards) the vein rs-m; M dividing, as in anterior wings



TEXT-FIG. 18, a-d.—*Oxyethira angustella*, sp. nov.; a-c. ♂; genital appendages from side above and below; d. apex of ♀ abdomen.

but its hind-branch is very short; CuA similar to that in the anterior wings, slender; CuP weakened in its basal part; A₁ arcuate and connected at its end with CuP, A₂ elongated.

♂. 7th sternite with a median tooth. Basal part of the 9th segment hidden in 8th; 10th segment, apparently fused with 9th, as there is no boundary between them; seen from side, it forms behind two equal processes of which the upper is more slender; above them is an obtuse projection bearing several bristles. Seen from above the upper hairy projections are triangular, separated by a broad and deep oval median excision; outwards from them arise two upper digitiform processes probably belonging to the 10th segment; two lower processes perhaps represent derivatives of the pedes genitales. Between the dilated basal portions of the latter are situated beneath (text-fig. 18c) two or three small acute appendages (remains of ventral plate?). Penis strong, curved, end portion dilated and asymmetrical.

♀. End of abdomen rounded, bearing two short appendages (text-fig. 18d).

This is a distinct species. Unfortunately the ♂ abdomen is not well preserved, and therefore the structure of male genital appendages could not be adequately studied. The relations of the species are not clear.

Oxydroptila, gen. nov.

Ocelli absent; antennae about one half of the length of fore-wings, basal joint bulbous; two large warts on the hind portion of head. Spurs 0.2-4; posterior legs long.

Venation of anterior wings resembling that in the genus *Hydroptila* Dalm., but the proximal portions of them somewhat thickened, as in *Oxyethira angustella* sp. nov., with somewhat dilated SC. RS arising from R comparatively further, and soon dividing into thickened RS_1 and common RS_{2-4} , dividing into three branches, as in *Hydroptila*; R, after, the origin of RS, running obliquely to the end of SC. M dividing in the distal part of wing into three branches, as in *Hydroptila*; CuP long, normal, A_1 weak, A_2 and A_3 distinct. Posterior wings narrow, with an obtuse projection anteriorly in the basal half; SC thickened and running along the fore edge, as in *Ox. angustella*; $R+RS$ forming but two branches in the apical portion of wing (RS_2 and RS_4 ?). M_{1+2} detached from M and connected with RS, simulating its hind branch, M_{3+4} simple; CuA simple, CuP apparently lacking, A_1 arcuate as in *Ox. angustella*, A_2 short.

♂ genital appendages in their structure reminding more of *Oxyethira* Eat., than of *Hydroptila*.

Genotype.—*Oxydroptila furcata*, sp. nov.

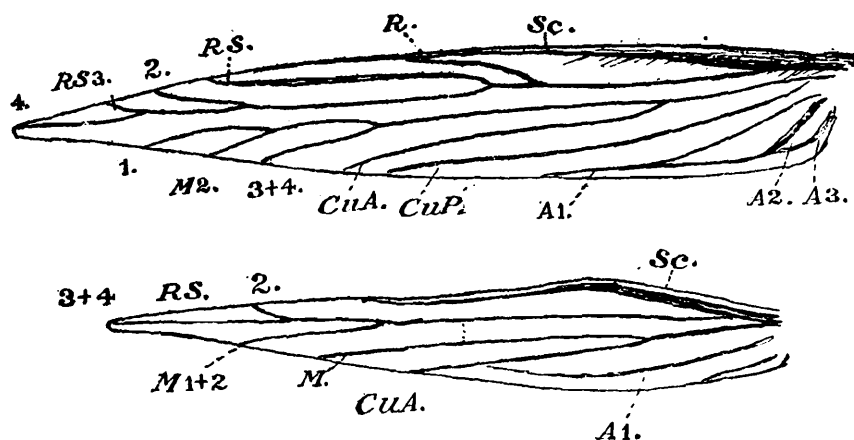
Oxydroptila furcata, sp. nov.

(Figs. 19-20.)

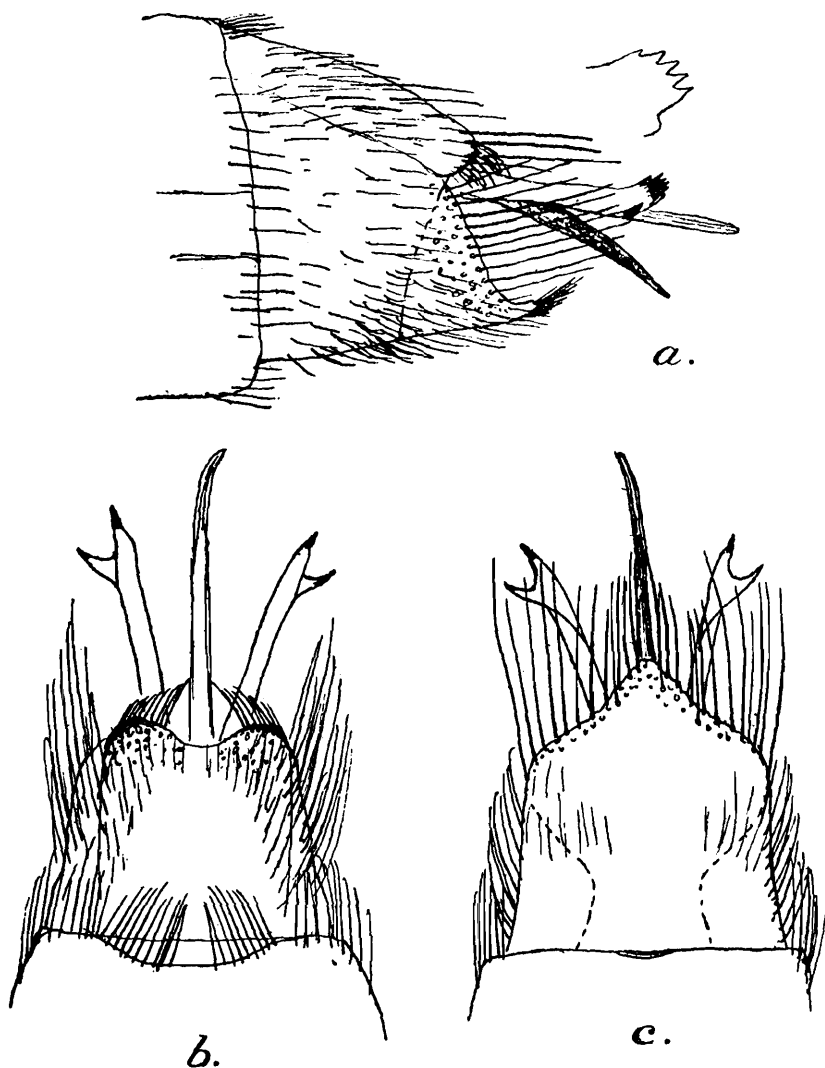
1 ♂, 1 ♀. Above Kapildhara Fall, Rewah State, C. I. 19.ii.27. S. L. Hora.

Head and body brownish. Antennae about half of the length of anterior wings, composed of no less than 27 joints; basal joint bulbous, 2nd rounded, remaining small, but somewhat longer than broad; palpi short; hind warts large, with eversible scent organs; ocelli lacking. Legs brownish yellow; posterior tibiae long, with 4 spurs, the inner of which are much longer than the outer; median tibiae ending in 2 also

unequal spurs. Anterior wings narrow, venation as in the genus; posterior wings narrow, in their shape resembling more those of *Oxyethira*



TEXT-FIG. 19.—*Oxydroptila furcata*, gen. et. sp. nov.; venation of wings.



TEXT-FIG. 20, a-c.—*Oxydroptila furcata*, gen. et. sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

than of *Hydroptila* ; SC long, very thick in its basal part ; M_{1+2} united at its base with RS, simulating its hind branch ; CuP probably lacking. A_1 arcuate, as in *Oxyethira*.

♂. 8th segment broad, almost fused with 9th, hairy, with two feeble impressed lateral lines, subdivided into a broad ventral and a narrow upper part ; seen from above it is shallowly excised in the middle and forms two rounded lateral lobes, each bearing a group of erect hairs, directed somewhat inwards ; both lobes covered above with numerous pits, from which arise short hairs. Separate pedes genitales lacking ; they are fused with ventral part of 9th segment, forming beneath a triangular plate-like projection ; apical and hind-marginal portions of this ventral plate covered with circular pits, from which arise long hairs. Penis long, straight, pale ; below it is situated the distal part of titillator ; it is brown, directed somewhat downwards and acute at its end. At the sides of penis are two longer appendages, somewhat diverging from base ; near their ends they are forked into a posterior and an outer processes ; the latter acute ; the posterior process, when seen from the side, is in the form of a vertical plate, ending in four short teeth (text-fig. 20a).

Length of body 1.6 mm.

This form is very interesting, in some features reminding of the genus *Hydroptila*, in others of the genus *Oxyethira*. The structure of the ♂ genital appendages somewhat resembles that of the genus *Oxyethira* while the general plan of wing-venation is more like that of *Hydroptila*.

Ortotrichia Eaton.

1. *Ortotrichia indica*, sp. nov.

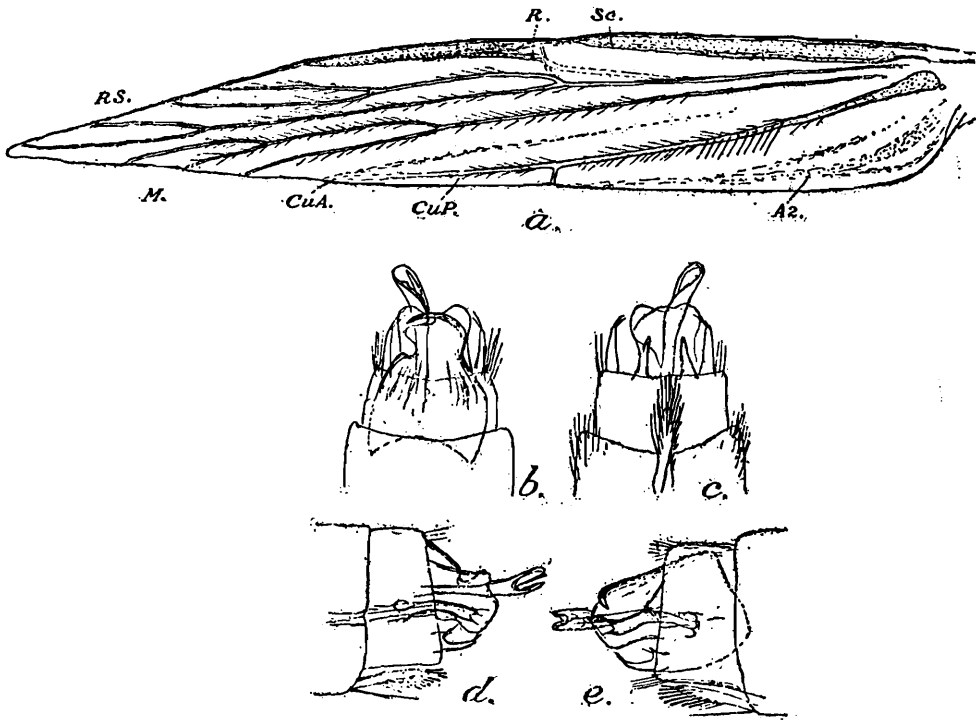
(Fig. 21.)

3 ♂, 3 ♀. Inlé Lake, S. Shan States, at light. F. H. Gravely.

Head and body yellowish brownish ; hind portion of head elevated. Antennae pale, in males 29-jointed and thick, a little longer than the whole body ; in females slender and shorter than the body, about 23-jointed. Legs pale, spurs 1.3.4, brown. Anterior wings clothed with dense brownish yellowish pubescence, narrow ; venation (text-fig. 21a, ♀) similar to that in *Ortotrichia angustella*, but the anterior portion up to the subcosta thickened ; RS forming two forks, the first equal to its pedicel, the second much shorter than RS_{3+4} ; trace of R is also present ; it is curved at the level of the division of RS and then runs indistinctly along the costal edge (this portion is somewhat thickened) ; M straight, 3rd fork present ; CuA reduced, almost invisible, CuP distinct, bearing a group of 10 brown short bristles in the basal half ; A_1 lacking, A_2 broad and discernible, mainly by small sockets of hairs. In posterior wings SC+R strong ; only 2nd apical fork present ; CuA indistinct, CuP distinct as in the fore-wings ; anal veins lacking.

♂. 9th segment large, but its greatest part hidden in the interior of the 8th ; its dorsal part forming a large projection backwards, broad at end, but somewhat constricted near its base, asymmetrical. Hind margin of its left half is thickened and the right half is prolonged into a free slender process directed to the right side and separated from the membranous portion ; basal excision on the right side is much deeper

than on the left. Under the plate of 9th tergite and partly coalesced with it, is another pale membranous plate, which is broader than the



TEXT-FIG. 21. *a.*—*Ortotrichia indica*, sp. nov.; venation of fore-wing (♀); *b-e.* ♂; genital appendages from above (*b*), below (*c*), left (*d*) and right (*e*) side.

plate of the 9th tergite subdivided by shallow excision behind into two rounded lobes; side basal parts are bent downwards covering the penis. I consider this plate as representing the 10th tergite. From the sides of 9th segment, but hidden under 8th segment, arise two processes, directed backwards; their free portions are thick, somewhat curved and excised at ends bearing several minute hairs. On the underside behind the 8th sternite there are two processes, somewhat shorter than the ones described above; seen from side, they are thickened at the base, bearing above short projections; these processes are probably derivatives of the pedes genitales. Penis in its distal portion somewhat thickened and curved to the right; seen from above it is provided with an oblique ridge; from side it appears to be subdivided into two lobes; titillator lacking (or small and hidden). 6th sternite with an elongated and thick process, bearing several hairs, gradually thickened to their ends.

Length of body about 2 mm.

This species seems to be more allied to *Ortotrichia angustella* McLach.

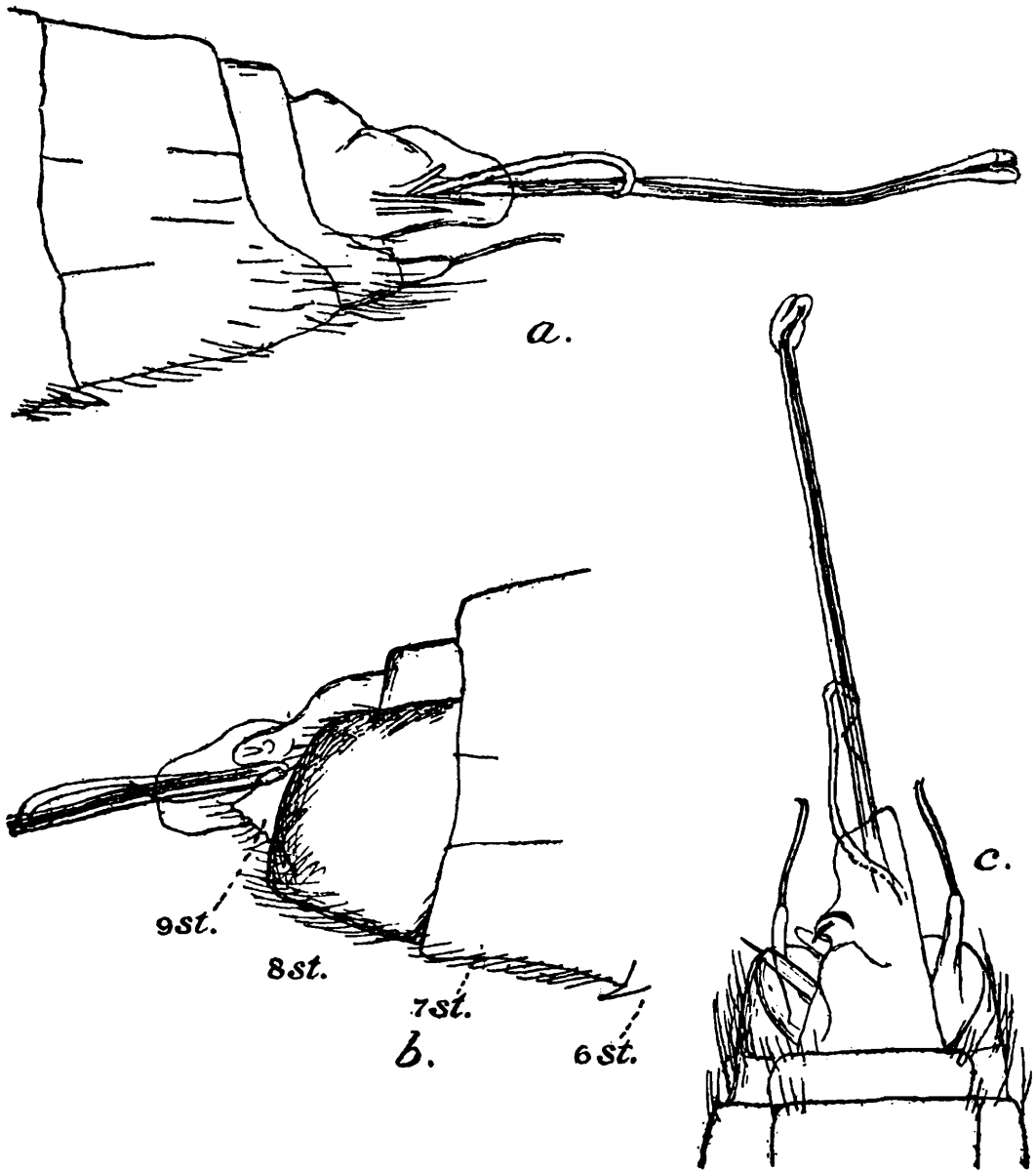
2. *Ortotrichia extensa*, sp. nov.

(Fig. 22.)

♂, ♀. Above Kapildhara Fall, Rewah State, C. I. 19.ii.27. S. L. Hora.

Head and body brownish yellowish beneath (antennae set off); legs pale yellow, spurs 0.3.4; wings brownish, venation similar to that of *O. tetensii* Kolbe.

♂. 7th sternite with a small tooth. Genital segments and appendages asymmetrical. 9th segment broader from the right than from the left side ; with it are connected ventrally two short, pale, cylindrical appendages, each with two long bristles, and on the right side there is one more triangular projection with a long bristle. 10th segment pale,



TEXT-FIG. 22, a-c.—*Ortotrichia extensa*, sp. nov. ♂ ; genital appendages from left side (a), right side (b), and above (c).

irregular, elongated ; its left margin in dorsal view straight, the right side provided with three short and slender appendages. Penis slender and very long, thickened at its end ; titillator long, slender, nearly reaching the middle of penis, then bent round it and recurving to the base.

Length of body 1.5 mm.

This species is, apparently, allied to the European *O. tetensii* Kolbe, but is distinct. Unfortunately, the structure of the male genital appendages in the single ♂ specimen could not be elucidated in detail.

Stactobia McLach.

Stactobia sp.

4 ♀. Nerbudda Survey, Sarai (land), 2,700 ft., Rewah State, sta. 31, February 1927. H. S. Pruthi.

I think that these female specimens belong probably to this genus and represent a new species, but it is useless to describe them without the males.

Melanotrichia Ulm.

Melanotrichia (singularis) Ulmer, *Notes from the Leyden Museum*, XXVIII, pp. 100-102, figs. 109-112 (1906).

Ocelli absent; antennae slender, with elongated joints. Legs slender, long, spurs 1.4.4. Anterior wings comparatively broad, discoidal cell present, elongated. In posterior wings DC open, 1st fork lacking, the 2nd present, long; M only two-branched, fork 5 present; in anterior wings 5th fork absent, but the 4th present.

Apical portion of ♀ abdomen somewhat extended, but without forming an ovipositor.

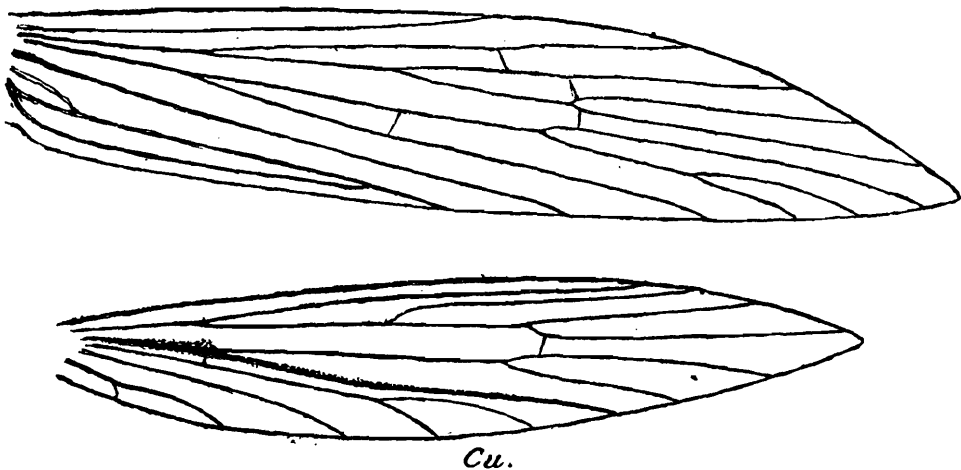
Melanotrichia singularis, Ulm., var. ?

(Figs. 23-34.)

2 ♂, ♀. Five Falls, Courtallam, S. India. x. 1924. H. S. Rao.

Since these specimens reveal some character different from those in the type-form, described by Ulmer¹, one might doubt that they belong to *M. singularis* Ulm., but judging by the figures 109-112 of Ulmer, I believe that they belong to this species, but perhaps constitute a distinct variety.

I give below a more detailed description of my specimens.



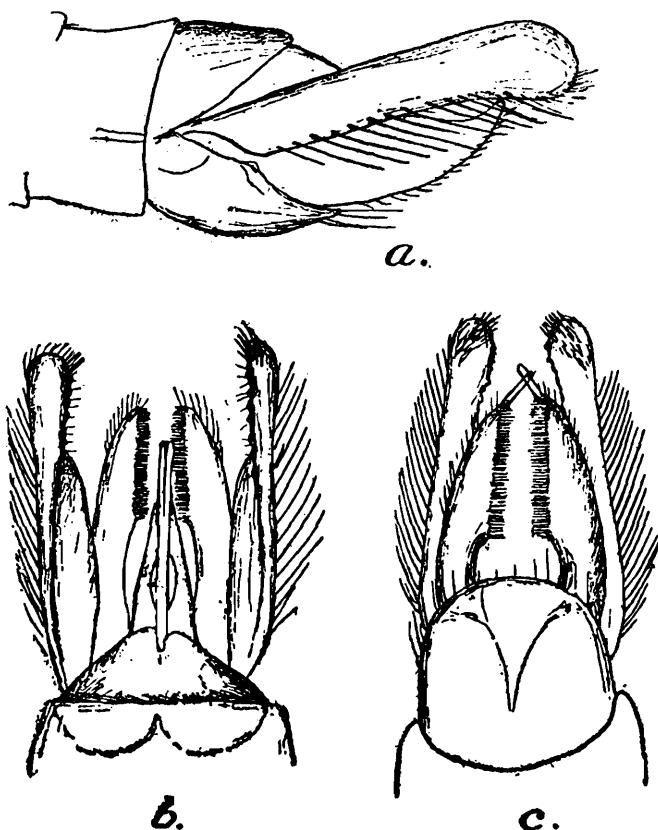
TEXT-FIG. 23.—*Melanotrichia singularis* Ulmer, var.; venation of wings.

Body black. Three basal joints of antennae black-brown, the next ones brown with whitish yellow annulations, further up these annulations become narrower and darker and the distal part of antennae appears

¹ *Notes from the Leyden Museum*, XXVIII, pp. 100-102, figs. 109-112 (1906).

wholly brown. Ocelli lacking. Legs dark brown. Anterior wings dark brown, with acute apices; venation (text-fig. 23) resembling that in Ulmer's figure 109, except DC, which is somewhat longer in my specimens. Posterior wings narrow, elliptic; DC open; only 2nd and 5th fork present; before CuA is situated a long dark streak reaching hind margin between M_{3+4} and CuA_1 . Membrane of wings brown, clothed with black hairs. Abdomen black-brown.

♂. Genital appendages similar to those in the type-form (see Ulmer's figures 110-112), but differing in some details. 9th segment large, but deeply excised at sides, preanal appendices arising from these excisions; 9th tergite above broadly triangular, indistinctly separated from 10th; 9th sternite large, with rounded hind margin. Preanal appendages long, straight, broad, parallel-sided, with a series of bristles along their lower, outer edges; their inner edge, if seen from above, tuberculated and black in the distal part; further towards base upper side of appendages becomes narrow, but lower portion forms a dilatation inwards, occupying basal two-thirds of appendages; ends of appendages rounded



TEXT-FIG. 24, a-c—*Melanotrichia singularis* Ulmer, var., ♂; genital appendages from side (a), above (b) and below (c).

from side and from above. Pedes genitales shorter than preanal appendages, broad at base, narrowing to the ends and curved here somewhat upwards, if seen from side; seen from beneath they are thick and end internally in two elongated plates, densely clothed with brushes of short brown hairs, turned towards each other; at their ends are two small and slender spine-like appendages. 10th segment elongately triangular above, continuing into a slender median process, at its end with an incision subdivided in two lobes; 10th segment shorter than the pedes

genitales. End portion of abdomen somewhat extended, without forming an ovipositor.

Length of body about 3 mm.

Although my figures of ♂ genitalia somewhat differ from Ulmer's figures 110, 111 and 112, I do not believe that these specimens belong to a distinct species.

Fam. PHILOPOTAMIDAE Wall.

Dolophiliella Ulm.

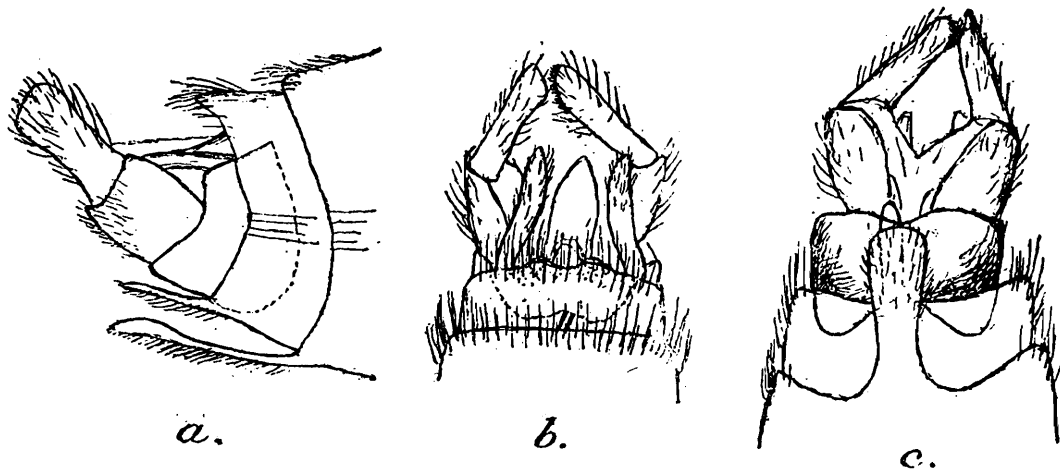
Dolophiliella relictæ, sp. nov.

(Fig. 25.)

♂. Kurseong, Bengal, E. Himalayas, 4,700 ft. 14-17.iv.1911. N. Annandale.

Head and body pale yellow; antennae and palpi pale yellow. Legs yellow, spur 2.4.4; hind tibiae very long. Anterior wings pale, greyish yellowish; RS and RS_{1+2} thick, before RS_{1+2} is a greyish opaque streak; DC moderately elongated; 1st apical fork absent, 2nd acute, 3rd short, 4th a little longer than its pedicel; cubital fork long, but MC commencing earlier than it. Posterior wings a little shorter and narrower; only 2nd, 3rd and 5th apical forks present; M dividing at the same level as CuA; DC somewhat smaller than in anterior wings.

♂. 7th sternite forming a long, plate-like appendage, somewhat



TEXT-FIG. 25, a-c.—*Dolophiliella relictæ*, sp. nov., ♂; genital segments and appendages from side (a), above (b) and below (c).

dilated and rounded at its end; 8th sternite also with an appendage which is narrower and shorter, almost not extending beyond the end of the foregoing appendage. 8th tergite forming two hairy convexities or projections behind. 9th segment in its greatest portion hidden in interior of 8th segment; its side-pieces large enough, with excised hind margins; tergite narrow and not visible from above. Preanal appendages long, hairy; 10th segment tongue-shaped above, nearly as long as the preanal appendages, provided with an oval prominence at the base above. Basal joints of pedes genitales short and broad, chitinized externally, membranous and pale internally; 2nd joint a little longer

than 1st, broad in lateral view, narrower when seen from above, apical portions bearing tufts of short spinules internally (penis not exerted).

Length of body 4 mm.

This species resembles the second species of the genus—*D. chinensis* Ulm., from China, but is distinct.

Dolophilodes Ulm.

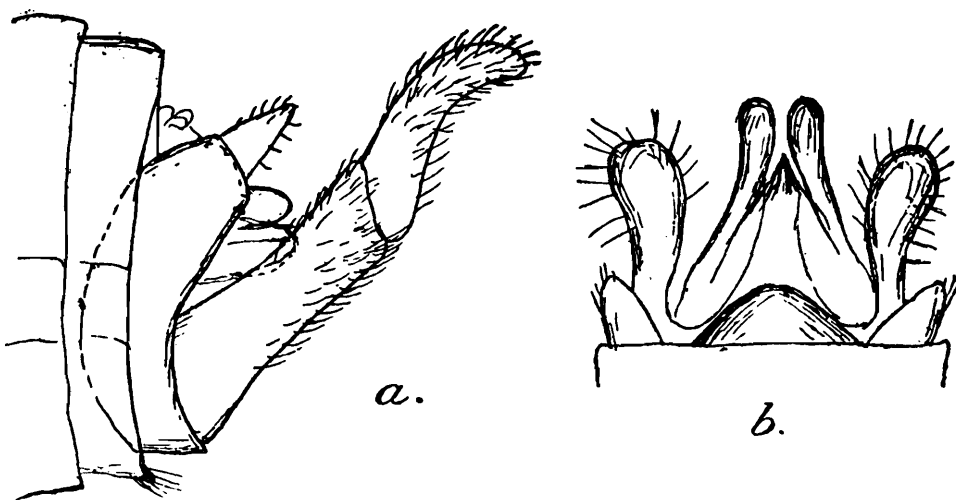
***Dolophilodes indicus*, sp. nov.**

(Fig. 26.)

♂. Punj-pul Nullah, Dalhousie, 6,500 ft., Punjab. i-v-1927. S. L. Hora.

2 ♂, ♀. Punj-pul, about a couple of miles from Dalhousie on Dalhousie-Bakloh Road, 6,500 ft., Punjab. S. L. Hora.

Head brown, clothed with greyish yellow hairs, mixed with blackish; antennae brown, with reddish annulations, in the distal part becoming wholly reddish; anterior and median legs brown, posterior ones brownish yellowish. Anterior wings brown, irrorated with numerous hyaline oval spots, clothed with brown hairs; venation fuscous; 1st apical fork very short, discoidal cell elongated. Posterior wings greyish, clothed with rufous-brownish pubescence; discoidal cell elongated; 1st apical fork present, but very small. Abdomen brown.



TEXT-FIG. 26, a, b.—*Dolophilodes indicus*, sp. nov., ♂; genital appendages from side (a) and above (b).

♂. 9th segment with concave side margins, somewhat dilated in their upper portions when seen from the side. Preanal appendages short, triangular in lateral view, dilated and rounded in dorsal view, bearing several distinct hairs. 10th segment triangular above, raised in its median portion; from its side-parts arise two moderately thick processes, approximated to each other in their distal portions. Basal joint of the pedes genitales long, somewhat narrowed at the middle, brown; second joint paler, long, but a little shorter than the first, curved.

Length of body 5.5–6.5 mm.

Dolophilodes indicus sp. nov. in the structure of its male genitalia resembles rather closely *Dolophilodes ornata* Ulm., and is allied to this species.

The genus *Dolophilodes* occurs in mountainous streams and torrents.

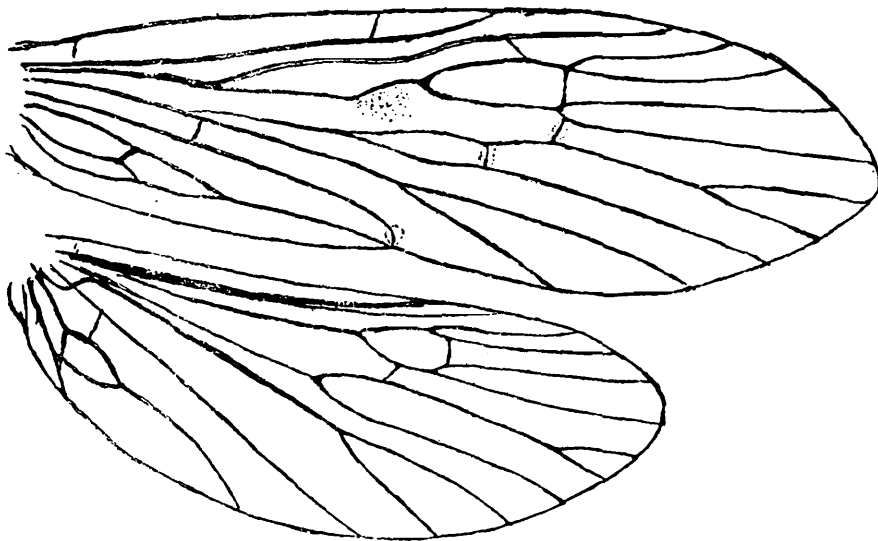
Chimarrha Leach.

1. **Chimarrha digitata**, sp. nov.

(Figs. 27-28.)

- ♂, ♀. Gandhala Reserve Forest, ca. 4 miles from Choa Saidan Shah, Salt Range, Punjab. 2.v.31. H. S. Pruthi.
 ♂. Vegetation on the sides of Gandhala Nala, near Forest Office, Choa Saidan Shah, Salt Range, Punjab. 26.iv.31. H. S. Pruthi.
 2 ♂. Katarmal, ca. 4,500 ft., Kumaon Hills, district Almora, U. P.; bushes and trees on the banks of the Kosi. 29.v.30. H. S. Pruthi.
 12 specimens. Katarmal, ca. 4,500 ft., Kumaon Hills, district Almora, U. P.; trees on the banks of the Kosi. 29.v.30. H. S. Pruthi.
 3 ♂, 2 ♀. Ranikhet, U. P., 5,000 ft., Reserve Forests, opposite Upat. 26.v.33. H. S. Pruthi.

Head and thorax black, bearing black hairs; ventrally the thorax is dark brown; legs brown, spurs 1.4.4. Antennae and palpi brown. Anterior wings brownish or greyish brown, clothed with brown hairs;

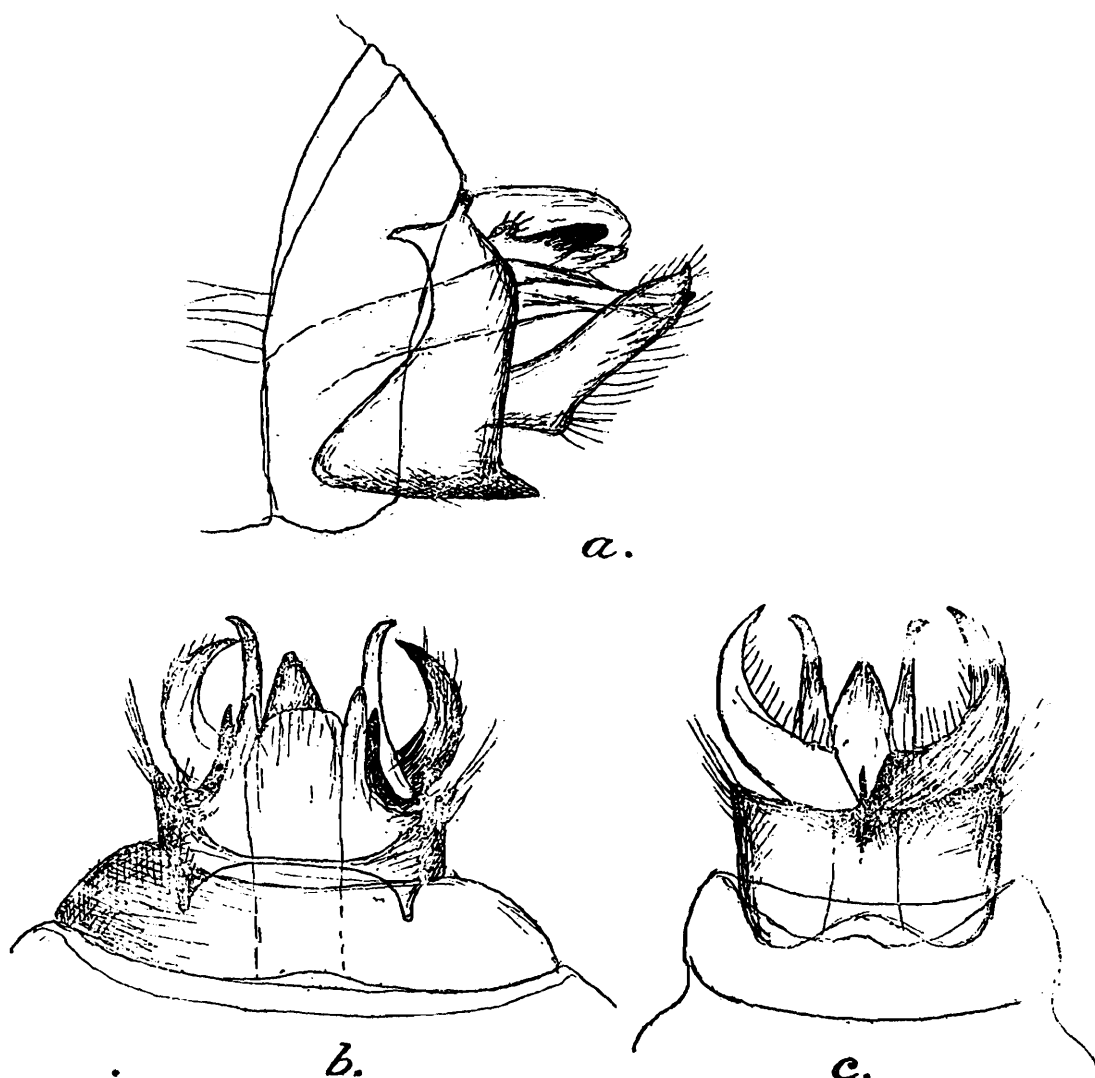


TEXT-FIG. 27.—*Chimarrha digitata*, sp. nov., ♂; venation of wings.

R rather thick, distinct, S-shaped; RS suddenly curved forwards after the middle; DC broad, with rounded base; MC equal to it in length, but strongly narrowed to its base; 3rd apical fork shorter than its pedicel; 5th long; between the distal part of RS and MC is a short, brown, chitinized spot. In the posterior wings SC strong, R slender; DC shorter than in the anterior wings, but broad; MC open, fork 3 very short.

♂. 9th segment broad in its ventral portion, very narrow in its dorsal part; 10th segment broad above, pale, membranous, its side-portion chitinized, brown, projecting backwards in the form of two short brown processes, accompanied internally by short lateral membranous processes of the dorsal plate; at base of brown lateral portions are situated two small oval hairy projections, probably representing preanal appendages. Below these parts are seen two more processes of the 10th segment, which are longer than other appendages and at their ends are curved somewhat outwards. Pedes genitales ascendent, broad

laterally, bearing behind series of long hairs ; seen from beneath they have the shape of two thick claws with acute ends ; between their bases



TEXT-FIG. 28, *a-c.*—*Chimarrha digitata*, sp. nov., ♂ ; genital appendages from side, above and below.

is a small black spine-like process. Penis broad above, triangularly narrowed in its apical portion ; near the penis is a short titillator.

Length of bodies 3—3.5 mm.

2. *Chimarrha kumaonensis*, sp. nov.

(Figs. 29-30.)

♂, ♀. Kumaon Hills, U. P. Saraiya Tal, a rapid hill-stream, flowing out of the lake. 7.v.30. H. S. Pruthi.

Head and thorax black-brown ; antennae brown, with indistinct pale-brownish annulations ; legs dark-brown, spurs 1.4.4. Anterior wings brownish, with pale, whitish spots at thyridium and at the cross-vein m-cu, at arculus, along anastomosis and a transverse pale spot in the basal portion of wing, between C and R ; R straight but curved in its basal part ; RS arcuate, in its middle approximating to M ; DC elongated, narrowing at its base, closed by the usual cross-vein ; thyridial cell as long as the discoidal, closed ; MC a little shorter and narrower. In posterior

shaped median projection without any projection under base of pedes genitales; dorsal portion narrow, forming two short oval projections, clothed with erect hairs; these projections probably represent preanal appendices. Pedes genitales long and thick, broad from side; seen from below; they are thick and ending in two short black teeth, directed inwards; upperside broader than the lower, with an inner dilatation, bearing several short spinules. Membrane just above bases of pedes genitales chitinized, yellowish, connecting two lateral hairy projections of side-pieces of 9th segment. Internally, preanal appendages are connected by two broad plates, ending above in two thick digitiform processes, above which are situated two more slender and paler processes. All these processes belong to 10th segment, in particular to its side-portion, but its tergite is reduced or absent. Penis is shifted far upwards, and since the tergites of the 9th and 10th segment are reduced or absent, it appears as arising from under 8th tergite above the just described parts of 10th segment; penis thick, pale, with two internal longitudinal chitinous rod-like structures.

Length of body 4 mm.

Penis is shifted more or less upwards in most of the species of *Chimarrha*, but in *Ch. kumaonensis* this shifting is especially efficient and the penis comes to arise from under the 8th tergite.

3. *Chimarrha aberrans*, sp. nov.

(Figs. 31-32.)

2 ♂, 2 ♀. Phagu, alt. 9,000 ft., Simla Hills. 18-21.v.1916. Simla, Punjab; 7,000-8,000 ft., W. Himalayas. 10-13.iv.34. Capt. Evans.

♂, ♀. Dalmoti, Almora district, Kumaon Hills, U. P., sides of the Kali Nala, below the Forest Bungalow. 21-22.v.30. H. S. Pruthi.

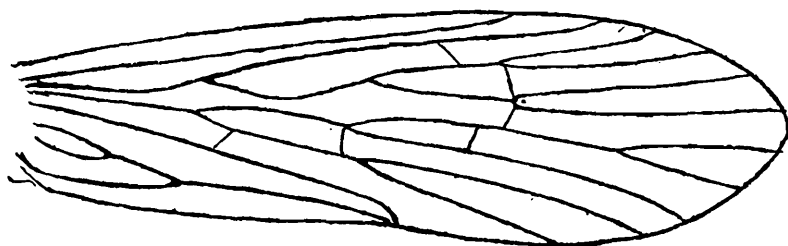
3 ♂, 5 ♀. Almora, 5,500 ft., Kumaon Hills, U. P. 1-18.iii.1912. C. Paiva.

2 ♂, ♀. Ranikhet, 5,000 ft., Reserve Forest, Kumaon Hills, U. P.; banks of the stream. 26.v.1930. H. S. Pruthi.

2 ♂, ♀. Sides of the Deo-Gad Stream and Forests S. W. of Pinath, 7 miles from Kasauni (Almora district), Kumaon Hills, U. P. 1.vi.30. H. S. Pruthi.

♀. Darjiling district, Bengal, E. Himalayas, Lynch.

Head brown, yellowish beneath; antennae and palpi brown. Thorax brown, but the median portion of mesonotum paler, yellowish; ocelli distinct, prominent; maxillary palpi long, basal joint small, 2nd longer, equal to 3rd, 4th shorter, but a little longer than half of the 3rd joint; 5th equal to 2nd and 3rd. Anterior wings brownish, clothed with brown hairs; veins brown; RS arising from R later than in foregoing species; it is strongly curved towards M, nearly touching it; DC elongated,

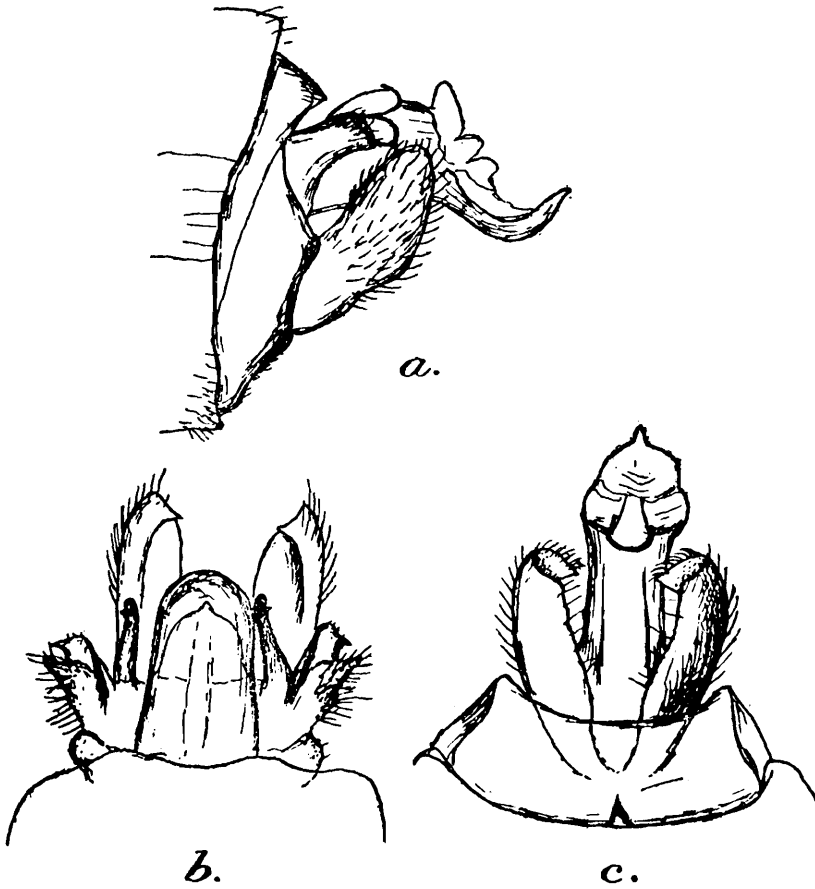


TEXT-FIG. 31.—*Chimarrha aberrans*, sp. nov.; venation of anterior wing.

triangular, dilated at its end, where it is closed by an oblique vein; M arising from CUA but a little earlier than the point of division of R;

thyridial cell shorter than DC. MC considerably shorter than the thyridial cell. Legs brown or brownish, hind legs yellowish brownish, spurs brown. In ♂ basal joint of anterior tarsi long and slender, 2nd short, twice the size of 3rd, 4th still shorter, 5th equal to 2nd; last three joints broader than 1st and 2nd; in ♀ 5th, 4th and 3rd tarsal joints not dilated. Abdomen brown.

♂. Side pieces of 9th segment broad enough, shallowly excised behind at the bases of pedes genitales; 9th tergite narrow and hidden under the 8th, 9th sternite with concave hind margin. Pedes genitales ascendent and broad from side, with convex hind margins somewhat



TEXT-FIG. 32, a-c.—*Chimarraha aberrans*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

curved inwards; upper apical portions curved inwards, triangular, with acute inner angles. 10th segment forming two composite side-pieces, each of which consists of three plate-like processes, as follows: outer process, broad from side, triangular from above and hairy (= preanal appendages); median process which is a little longer than the outer, with an acute end-tooth externally; and inner longer process slender from above, rounded at its end, with an acute minute tooth near end externally. Penis large, broad, erectile in its upper portion, with apical portion fastened below with a broad chitinized plate, curved upwards at its end.

Length 5.5 mm.

♀. 7th sternite with a median process; the median process of 8th small, chitinized. From the base of the 9th segment arise two dorsal, two lateral and two ventral bristles, the dorsal ones being the longest. 10th segment sub-divided into two lateral portions.

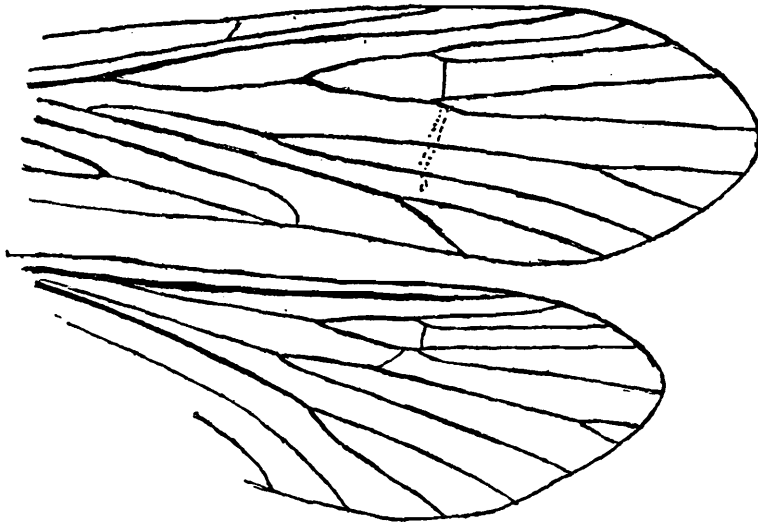
This species is distinct, differing in the structure of ♂ anterior tarsi and in the structure of ♂ genital segments.

4. *Chimarrha minuta*, sp. nov.

(Figs. 33-34.)

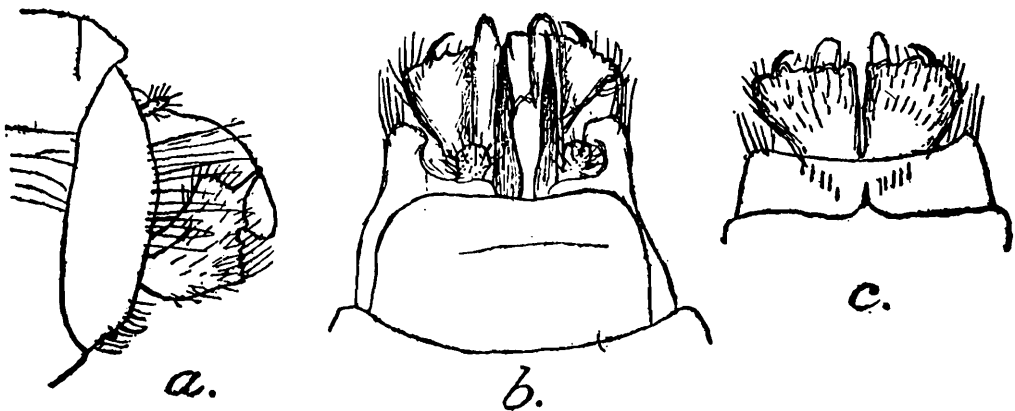
♂. Phagu, alt. 9,000 ft., Simla Hills, Punjab. 18-21.v.16. N. Annandale and S. W. Kemp.

Head brown above, two large warts paler; antennae brownish, annulations indistinct; palpi brown, 3rd joint considerably longer than 2nd, 4th half as long, 5th a little longer than 3rd. Thorax brown above, paler beneath. Legs brownish yellowish, hind legs somewhat paler;



TEXT-FIG. 33.—*Chimarrha minuta*, sp. nov.; venation of wings.

spurs 1.4.4. Anterior wings dusky brownish with distinct venation; R and RS almost straight; DC elongated, broad, regular; 1st apical fork narrow, 3rd fork short; M dividing earlier than R, thyridial and median cells narrow, open; between RS_{3+4} and the base of 5th fork is a transverse hyaline band. In posterior wings DC elongated, triangular, regular, fork 1 also narrow, fork 3 very short, rudimentary. Abdomen brown.



TEXT-FIG. 34, a-c.—*Chimarrha minuta*, sp. nov., ♂; genital appendages lateral (a), dorsal (b) and ventral (c) views.

♂. Side-pieces of 9th segment moderately broad, with hind margin convex, arcuate, bearing long hairs. 10th segment, seen from side, roof-shaped and very broad; seen from above it is parallel-sided and with a deep excision reaching its middle, and is divided in the distal half into two parallel lobes, strengthened with two dark chitinous ribs, reaching the base of the segment and acute at ends; median portion of 10th segment pale. At the sides of the 10th tergite are situated two short hairy preanal appendages which appear rounded from above. Pedes genitales short, but very broad, both ventrally and laterally; seen from below they are very broad, but narrow to their bases, separated from each other by a narrow median fissure; hind edges tuberculated; near the outer angles are seen two slender black claws; seen from side, pedes genitales appear very broad in their distal part; their upper portion sub-divided by an excision into a broad proximal lobe and a slender short process behind; hind edge irregular, tuberculated, excised. Penis not exerted.

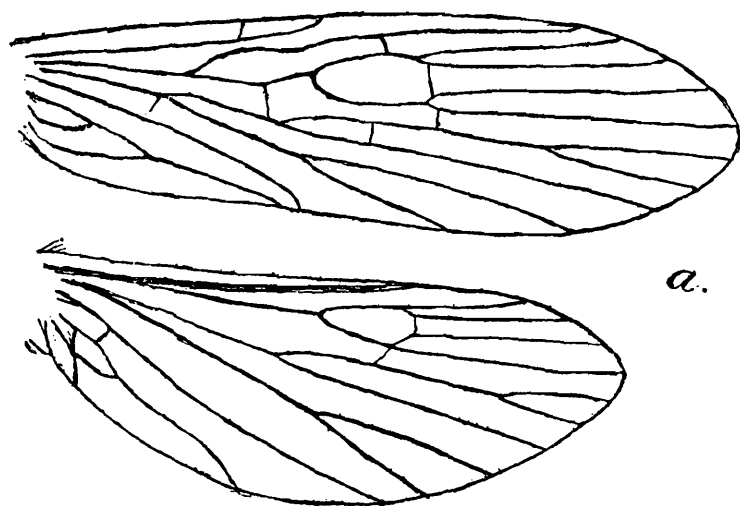
Length of body 3.2 mm.

***Chimarrha* sp.**

(Fig. 35a.)

3 ♀. Nilgiri Hills, S. I., 3,500 ft. 1910. H. Andrews.

Head brown, clothed with yellow hairs above and anteriorly; antennae brown. Thorax and abdomen brown; hind legs yellow, the



TEXT-FIG. 35a.—*Chimarrha* sp. N. 1. Venation in female wings.

median brownish, anterior legs also brown. Anterior wings almost brown, clothed with greyish yellow hairs; shape of wings narrow: SC ending on C before the middle of wing, R curved, as in *Ch. digitata*, sp. nov., in its basal half forming an elliptic space without hairs; DC very broad, rounded at its base; MC much shorter and narrower than DC, apical fork 3 a little longer than its footstalk. Posterior wings resembling those of *Ch. digitata*, sp. nov.

As the venation of these specimens greatly resembles that of *Ch. digitata*, sp. nov., it is possible that they belong to this species.

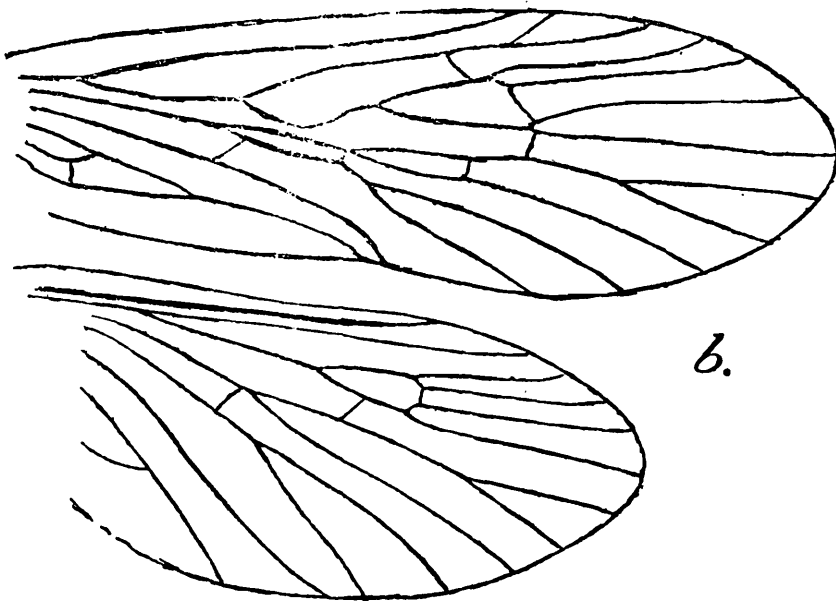
Chimarrha spp.

(Fig. 35b.)

There are several other females of *Chimarrha* from various localities, which, unfortunately, cannot be named.

1. ♀. Peradeniya, Ceylon. July, 1910.

Wing venation (text-fig. 35b) resembles that of *Ch. confusa* Ulm., but it is impossible to decide whether it belongs to this species.



35b.—*Chimarrha* sp. N. 2. Venation in female wings.

Four species of the genus are already known from Ceylon.
Length of body 4 mm.

2. ♀. Goethal School, Kurseong, Bengal, E. Himalayas, alt. 5,500 ft. 9.iii.26.
M. Sharif.

Defective specimen, probably belonging to *Ch. aberrans*, sp. nov.

3. ♀. Company Khud, below Landour Bazar, Mussoorie, U. P. 18.vi.30. B. N. Chopra.
4. ♀. Bhowali, trees on the stream below sanitorium, Kumaon Hills. U. P. 12.v.30. H. S. Pruthi.
5. ♀. Reo-Jora, Cinchona Plantation, 5,000 ft., Darjeeling district, Bengal. 8.xii.26. S. L. Hora.

Fam. STENOPSYCHIDAE Mart.

To this family belong two Asiatic genera, *Stenopsyche* McLach. and *Parastenopsyche* Kuwayama. The genus *Stenopsyche* has been known from India for a long time, but *Parastenopsyche* is recorded here for the first time.

Stenopsyche McLach.

1. *Stenopsyche griseipennis* McLach.

Stenopsyche griseipennis, McLachlan, *Trans. Entom. Soc. London* (3) V, p. 265, pl. 17, fig. 5; pl. 19, fig. 5 (1866). (India Orient.); *Journ. Linn. Soc., Zool.*, XI, pt. 2, p. 134, 1871 (Assam); Betten, *Rec. Ind. Mus.* III, p. 231 (1909); (Sikkim, Kulu, Kurseong, Darjeeling, Calcutta, Assam); Martynov, *Eos* II, p. 288, figs. 3-11, 1926 (N. Asia; general distribution).

In the material before me males of *St. griseipennis* are lacking, but some females perhaps belong to this species. Two females from Nilgiri Hills, alt. 3,500 ft. VIII. 10 and X. 10, collected by H. L. Andrews, somewhat resemble this species, but I am not certain that they can be referred to it.

2. *Stenopsyche quadrilobata*, sp. nov.

(Fig. 36.)

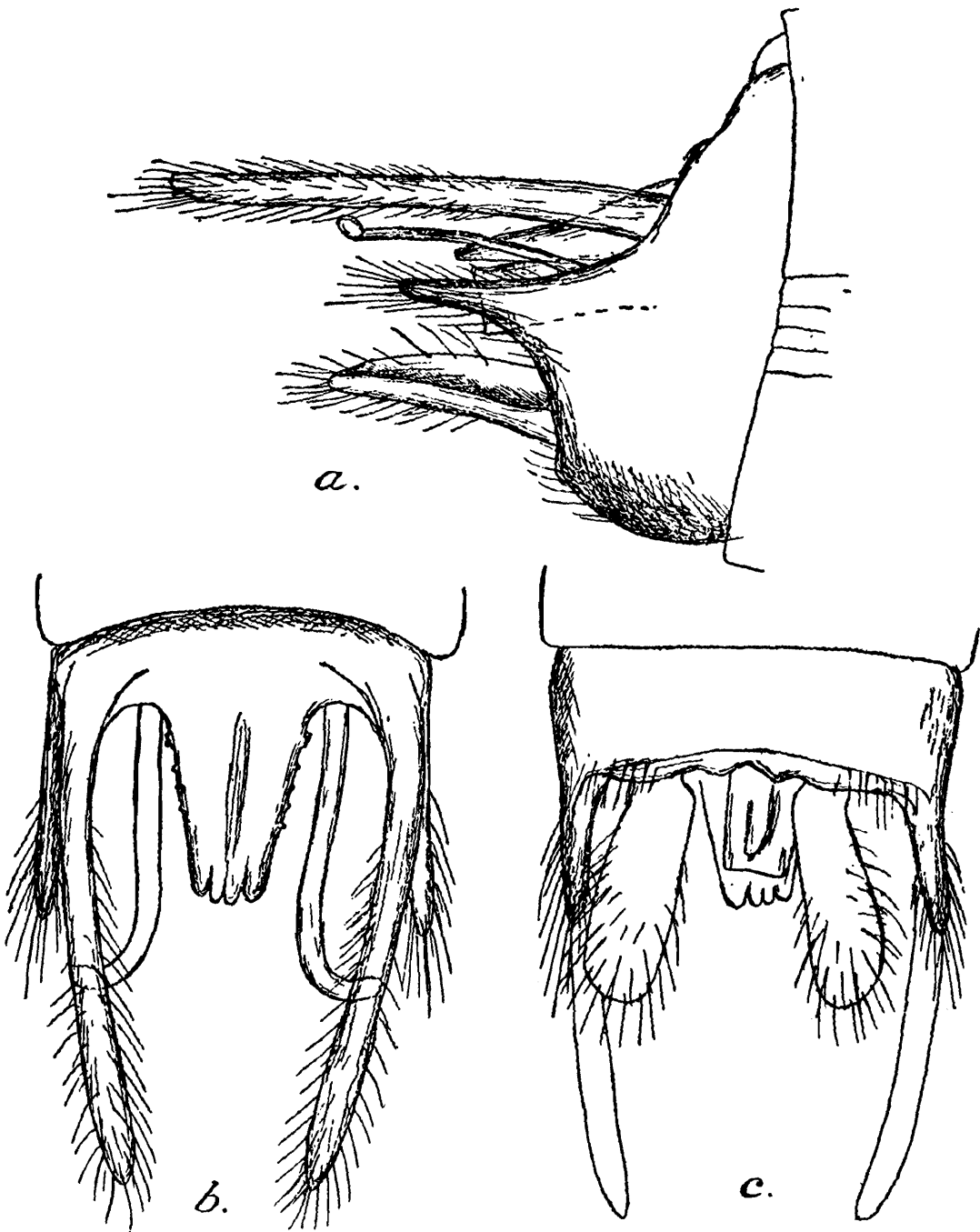
One ♂ specimen. Kalimpong, Darjeeling district, E. Himalayas, Bengal. 4,500 ft. 24.iv.-10.v.15. F. H. Gravely.

Head reddish yellow above; ocelli large, margined with brown; antennae somewhat pilose, yellow, with brown annulations; apical portion brown, narrowly annulated with yellow; maxillary palpi yellow, 3rd joint long, 4th much shorter, 5th somewhat longer than the preceding joints together; labial palpi yellow. Pronotum yellow, with light yellowish hairs; mesonotum yellow, with two brownish longitudinal streaks; underside pale yellow. Legs yellow, anterior and median legs with two broad ring-like brown bands, first joint of the anterior and first and second tarsal joints of the median legs also marked with brown externally; spurs 3.4.4. Anterior wings almost hyaline, yellowish, with brownish reticulation, becoming paler and indistinct in the apical portion of wings; broad postcostal area pale, with very indistinct reticulation. Discoidal cell nearly triangular, with convex anterior edge (RS_{1+2}); apical fork 1 with short pedicel, fork 4 beginning much earlier than 3rd. Posterior wings pale greyish, rounded at their apices; SC thick, brownish, R very weak, DC elongated, narrow, RS_2 uniting with the apical portion of $R+SC$. Abdomen pale yellow.

♂. Structure of ♂ genital appendages resembling that of *Stenopsyche angustata* Mart. and *St. griseipennis* McLach.

Preanal appendices long, straight, not thickened in their distal parts, hairy. 9th segment forming two elongated digitiform lateral projections like those in *St. angustata*. 10th segment forming above a plate, which is somewhat longer than in *St. angustata* and in *St. griseipennis*, narrowing to its end (text-fig. 36b); side edges each bearing 3-4 minute tubercles, basal tubercles thicker than others; apical portion divided above into four lobes, the two median ones smaller, paler and arranged somewhat above the lateral ones; median portion of the plate thin, somewhat translucent. Lower portions of pedes genitales broad, plate-like, rounded at their ends, narrowed at extreme base

(text-fig. 36c); their inner portions curved upwards; seen from side they are broad, with a straight lower and a convex, arcuate upper edge (text-fig. 36a). Upper portions of pedes genitales long, slender and nearly straight, but curved outwards in their end-portions. Penis not exerted in this specimen; its apical portion broad, truncated at end.



TEXT-FIG. 36, a-c.—*Stenopsyche quadrilobata*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

Length of body 13.5 mm.

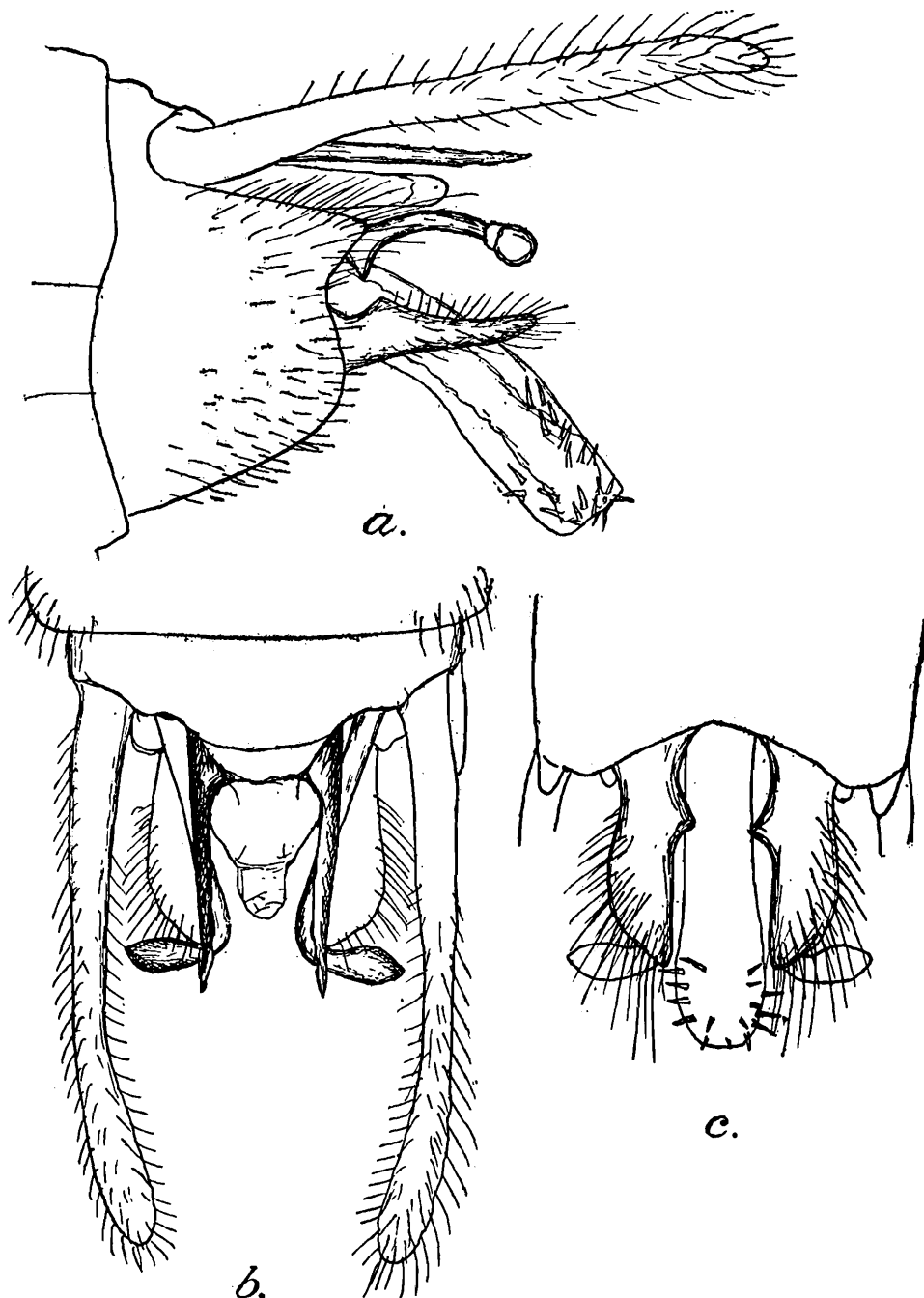
This species is evidently allied to *Stenopsyche angustata* Mart., differing from it, mainly, in the absence of lateral processes on the 10th tergite and in the somewhat larger lower branches of the pedes genitales.

3. *Stenopsyche splendida*, sp. nov.

(Fig. 37.)

4 ♂, 3 ♀. Jog Falls, N. Kanara district, Bombay Pres. 28-29.xi.28. B. Prashad and H. S. Rao.

Head brownish, clothed with yellow hairs; eyes and ocelli large; antennae reddish yellowish, with brown spiral line, more distinct in the basal part. Thorax brown; anterior and median legs brownish yellowish, posterior ones yellow, coxae brown; spurs 3.4.4. Membrane of anterior



TEXT-FIG. 37, a-c.—*Stenopsyche splendida*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

wings pale yellowish, clothed with golden-yellow pubescence, but densely and uniformly reticulated with short anastomosing transverse brown bands or spots, clothed with brown hairs; all these spots or bands slender and short, large markings lacking. Venation also yellowish; 1st fork sessile, 2nd deeply impinging on discoidal cell, forks 3 and 4 also impinging on median cell. Posterior wings pale, rounded at their ends; apical fork 1 lacking.

♂. Side-pieces of 9th segment very broad, with short triangular projections above the pedes genitales; 9th tergite narrow, but broader than in most other species, projecting a little backwards in the middle. Preanal appendages long and rather thick, with somewhat tubercular outer sides. 10th segment composed of a median short plate, broadening at its base, and of two lateral stick-shaped processes, situated somewhat above the median plate; these processes are straight, slender, thickened at their bases, not very long and do not exceed half the length of preanal appendages. Median plate much shorter than the lateral appendages, with pale apical portion. Lower portions of pedes genitales yellow, broad from beneath, forming a triangular tooth on their inner-upper edge, well seen from beneath. Upper portions of pedes genitales brownish, in their distal parts curved abruptly outwards and a little thickened at the apices. Seen from side these appendages are arcuate, with a tooth-like basal projection downwards, just behind the triangular projections of 9th segment. Penis long, thick, in its end portion bearing on each side numerous acute spinules, similar to those in *St. denticulata* Ulmer, but shorter.

Length of body 14-15.5 mm.

This species in the structure of ♂ genital segments and the colouring of anterior wings resembles *St. denticulata* Ulm., from China, and is evidently allied to it.

4. *Stenopsyche furcatula*, sp. nov.

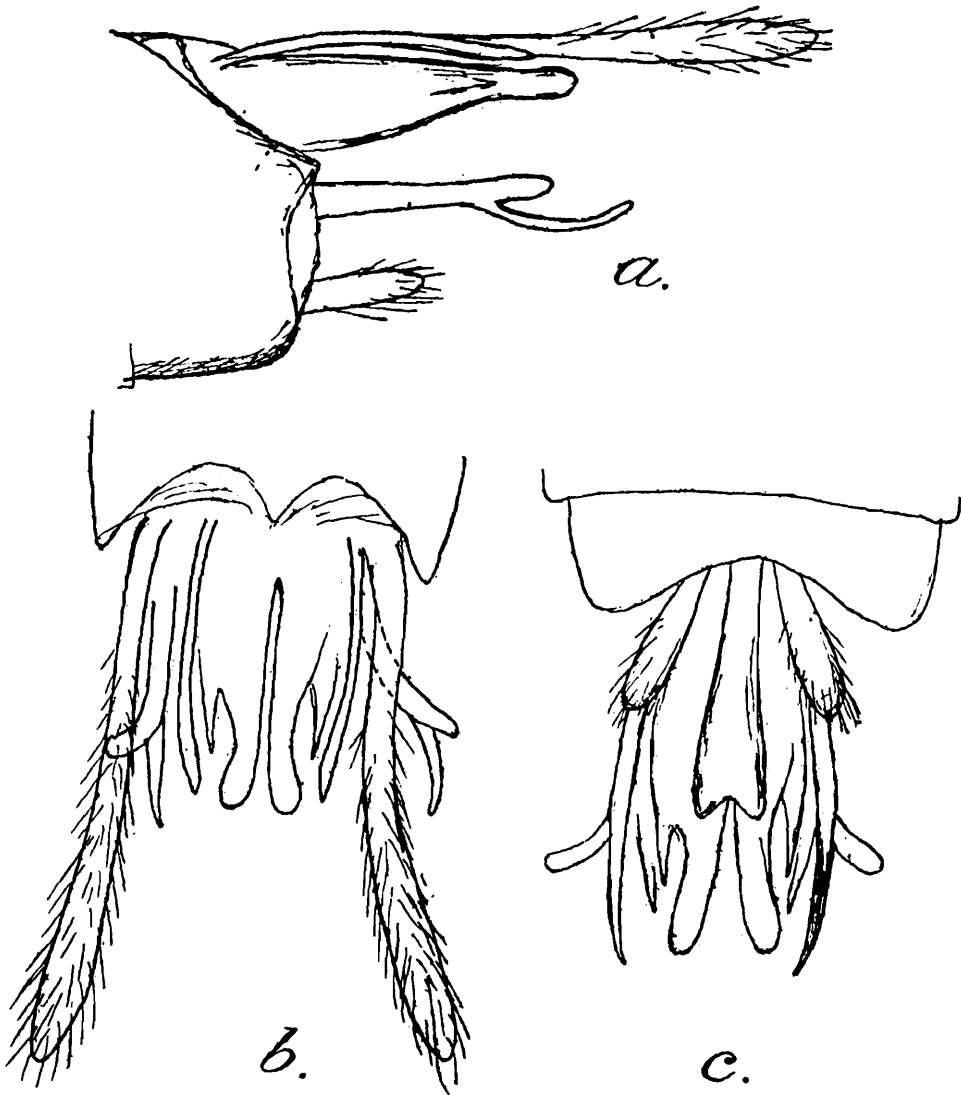
(Fig. 38.)

♂. Hoshangabad, Centr. Prov. 14-18.iii.19. F. H. Gravely.
2 ♂, 4 ♀. Sanjal River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Pale pupae, with translucent male genital appendages.

♂. Side-pieces of 9th segment broad, with short triangular projections behind. Preanal appendages somewhat thickened in their distal portions. 10th segment divided by a long narrow fissure into two portions, broad in basal two-thirds, then forming two short processes, reaching the level of the middle of the preanal appendages; externally from these thick processes are two more short and slender ones. From the base of 10th segment arise above two longer and slender processes, not extending beyond the ends of two median processes. Lower portions of pedes genitales short, obliquely truncated at their ends. Upper portions long, slender, directed backwards, their ends curved somewhat

outwards ; from their under side arise before their ends two more slender appendages of 10th segment. Spurs on legs 3.4.4.



TEXT-FIG. 38, a-c.—*Stenopsyche furcatula*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

Length of body 15-16 mm.

This species appears to be allied to *Parastenopsyche composita*, sp. nov., but is distinct.

Parastenopsyche Kuwayama.

Parastenopsyche, Kuwayama.—*Insecta Matsumurana* IV, No. 3 (1930).

This genus differs from *Stenopsyche* only in the formula of spurs 0.4.4. in ♂ and 2.4.4. in ♀; in *Stenopsyche* the formula is 3.4.4.

General habitus and wing-venation is the same in both the genera. The differences between the structures of ♂ genital appendages do not

coincide with the division of the Stenopsychinae into two genera on the basis of the formula of spurs. Both *Stenopsyche* and *Parastenopsyche* represent complexes of species, some of which are very different from each other in the structure of their genitalia. I, therefore, do not think that *Parastenopsyche* is a natural genus, containing allied species, but am of opinion that the arrangement of the species in the subfamily Stenopsychinae into various genera should be based mainly on the structure of their genitalia. Though recognising the genus *Parastenopsyche* here, I consider it to be only provisional.

1. *Parastenopsyche similis* (Ulm.).

(Fig. 39.)

Stenopsyche similis Ulmer, *Entomol. Mitt.* XVI, p. 175, pl. v, fig. 8; pl. 6, fig. 9 (1927). Martynov, *Proc. Zoolog. Soc. London*, 1930, p. 73.

1 ♂. Round about Hurst Cottage, Bakrota Hill, 7,000 ft., Dalhousie, Punjab. V.vi.27. S. L. Hora.

1 ♂. Kalatope Hill, Dalhousie, Punjab. 2.vi.27. S. L. Hora.

Three pupæ, 1 ♂ and 2 ♀. Kangra Valley. Stream in Nagal Khad, beyond the gardens at Palampur, Punjab. 1.vi.26. S. L. Hora.

1 ♂. Kurseong, E. Himalayas, 4,700 ft. 14-17.iv.1911. N. Annandale.

I believe that these specimens should be referred to *St. similis* Ulmer (1927), which was described from round Darjeeling.

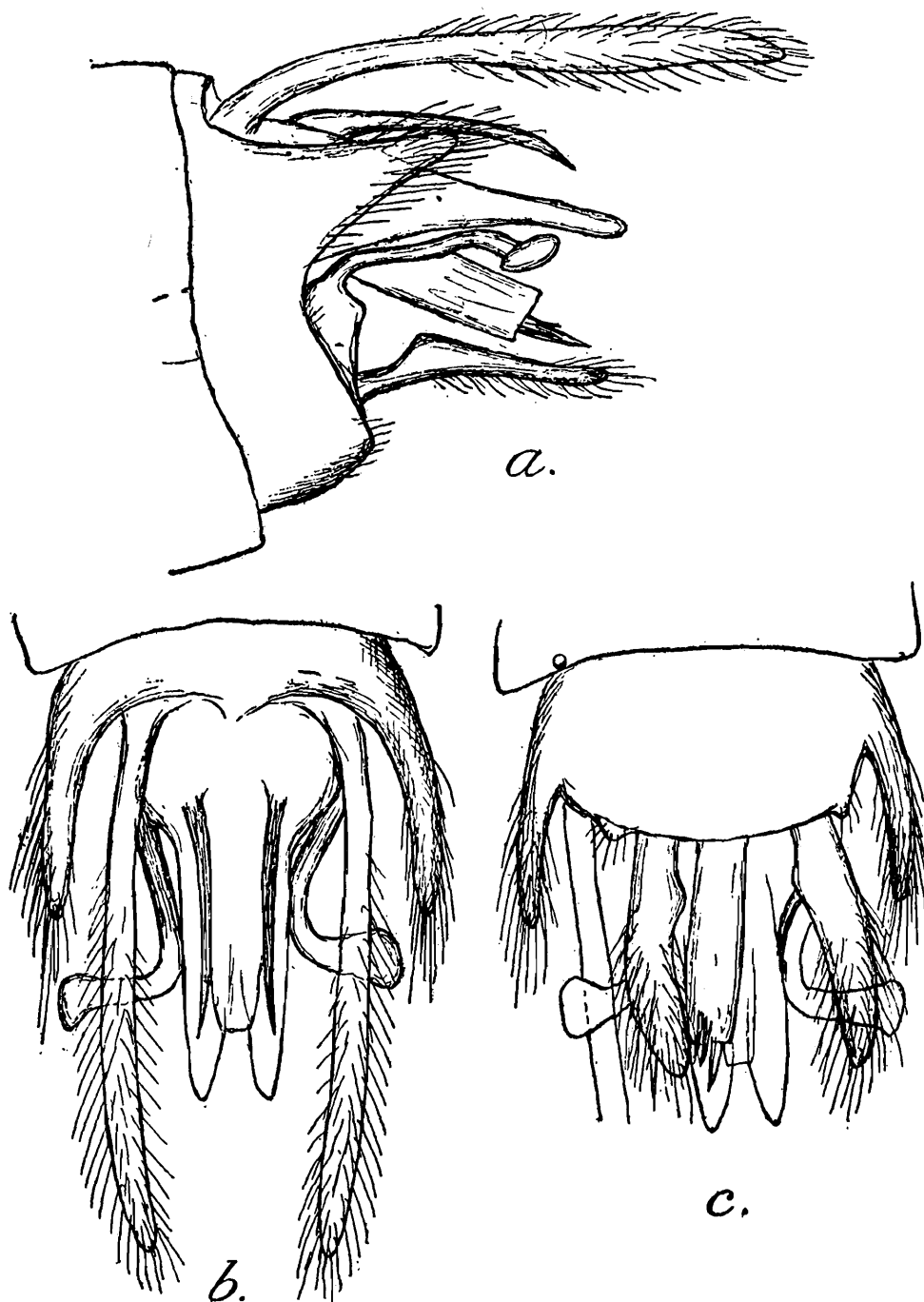
The first named specimen, from Bakrota Hill, differs in its dark coloration: head and thorax brown above, yellow beneath; anterior and median tibiae rather brown, annulated with yellow in the middle; tarsal joints also brown or brownish in their basal parts; anterior wings rather brown or brownish, irrorated with small yellow markings or spots, larger pale markings situated near the end of SC and in the dorsal part of wing; first apical fork sessile, the second deeply impinging on the discoidal cell; abdomen brownish, paler beneath.

The second specimen is similar to the first.

The specimen from Kurseong, on the other hand, differs in its pale coloration; head and thorax are yellow, legs also yellow, with brownish markings; anterior wings pale yellowish, reticulated with brownish; costal area yellow. Male genital appendages (test-fig. 39) similar to those in the form described by Ulmer (Plate v, fig. 8 and Plate vi, fig. 9), but the 10th segment in the specimens before me appears to be a little shorter and broader and its slender superior appendages are straight; both pairs of small appendages on the apex of penis according to Ulmer's description are two-jointed; in my specimen the penis is not fully exerted, and their end-appendages have the aspect of spines. The above mentioned pupae belong to this species; their ♂ genital appendages are well seen through pupal envelope.

Length of ♂ specimens about 15 mm.

Parastenopsyche similis is allied to the group of *St. griseipennis* McLach.



TEXT-FIG. 39, a-c.—*Parastenopsyche similis* (Ulmer); genital appendages from side (a), above (b) and below (c).

2. *Parastenopsyche composita*, sp. nov.

(Fig. 40.)

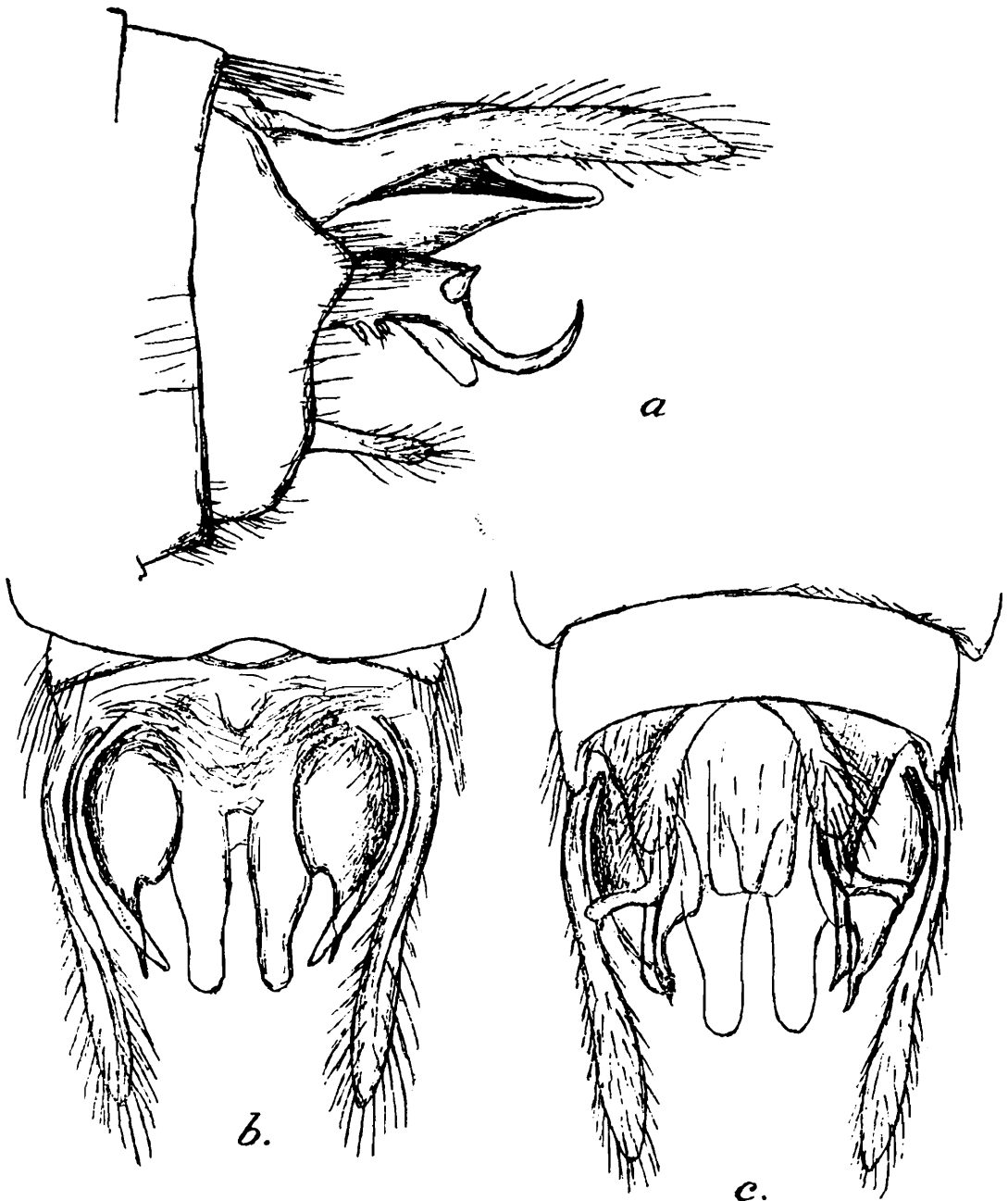
1♂. Sta. 55. Nerbudda Survey, opposite the Camp at Harra, 2,625 ft., Rewah State. C.I. March, 1927. H. S. Pruthi.

3♂, 7♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Head and thorax brown above. Ocelli large; antennae yellow, with brown annulations; palpi yellow, but 3rd and 4th joints somewhat

brownish anteriorly; anterior portion of head yellow. Legs yellow, with 0.4.4 spurs (in ♂), but the anterior and median tibiae each with two fuscous transverse bands; basal joint of tarsi also with a brown band; 1st, 2nd and 3rd joints of the median legs each with a brown spot; hind legs yellow; under side of the thorax yellow. Anterior wings greyish with pale brown reticulation, posterior wings greyish. Abdomen brownish yellowish, paler beneath, 8th segment reddish.

♂. 9th tergite as usual very narrow, side-pieces with two very low subtriangular projections. Preanal appendages yellow and broad enough from side, narrower from above or from beneath, slightly thick-



TEXT-FIG. 40, a-c.—*Parastenopsyche composita*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

ened in their distal portion. 10th segment brownish and of composite structure. It is very broad at the base, then dividing into two brownish

short lateral portions and two thick (above) median and pale but not very long processes separated by a deep longitudinal fissure; seen from side they are very broad at base. Lateral portions of 10th segment, seen from above, appear as two oval broad plates ending in two slender processes, acute at their ends and, seen from the side, lie laterally to the two above mentioned median processes. Outer margins of oval plates thickened and raised upwards, prolonging at their ends into two slender processes as long as the hind processes of the oval plates. Lower portions of pedes genitales short, digitiform, rounded at their ends and directed somewhat outwards. Upper portions, seen from the side, composite, their basal parts thick and situated under the 10th segment; distal parts represented, on each side, by two processes, one of which is long and claw-shaped, the other directed outwards and invisible from the side; seen from beneath it is shorter but thicker than the other. From the under side of the basal thick portions arise, on either side, three minute slender processes. Penis not exerted; its end portion forming a subtriangular projection (from side) downwards.

Length of body 12.7 mm.

This species in the structure of its ♂ genitalia differs greatly from other known species of *Parastenopsyche* and resembles more *Stenopsyche siamensis* Mart. *Proc. U. S. Nat. Mus.* LXXIX, Art. 25, p. 5, pl. 2, figs. 14-15 (1931), in which the 10th segment is also subdivided into two lateral and a median portion of a similar structure.

Fam. PSYCHOMYIDAE Kol.

Ecnomus McLach.

1. *Ecnomus tenellus* Ramb.

- ♂, 2 ♀. Kierpur, Purneah district, Bihar. 12.ix.1915. C. Paiva, at light.
 3 ♂, 3 ♀. Balighai, near Puri, Orissa. 16-20.viii.1911. N. Annandale and F. H. Gravely.
 3 ♂, ♀. Forbesganj, Purneah district, Bihar. 10.ix.1910. C. Paiva, at light.

This species is widely distributed and is known from Europe, Caucasus, Turkestan, Amurland, China, Japan and Formosa. It is recorded here for the first time from India. It occurs chiefly in slow running waters.

2. *Ecnomus montanus* Mosely.

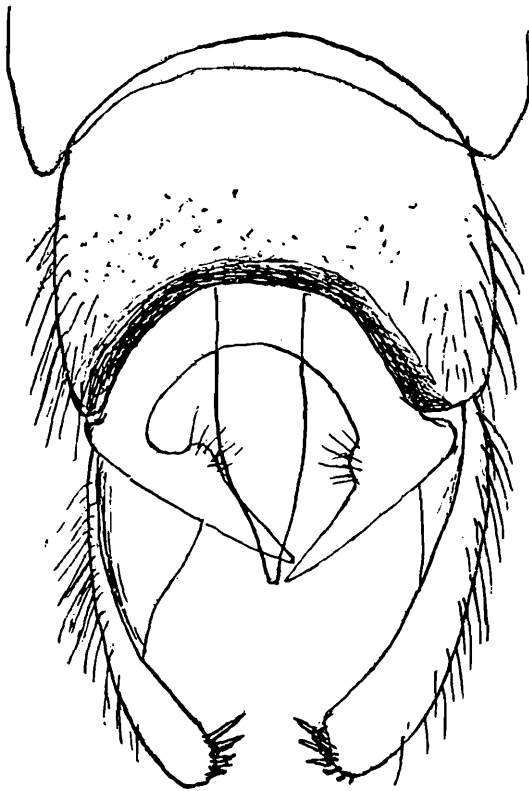
(Fig. 41.)

Ecnomus montanus Mosely, *Stylops, Journ. of Taxon. Entom.* I, pl. 7, p. 168, figs. 10-12 (1932).

- 4 ♂, ♀. Bhim Tal, 4,450 ft., Kumaon Hills, U. P. 2-10.v.1911. S. W. Kemp.
 ♂. Opposite the camp at Harra, Rewah State, C. I., Nerbudda Survey. March, 1927. H. S. Pruthi.

10th segment is represented, mainly, by two chitinated bifurcate plates; tergite of 10th segment reduced and perhaps represented by two small, pale weak appendages above pedes genitales; bilobed plate under 10th segment belongs to penis. Pedes genitales short, black, elongately

triangular from beneath and connected with a yellowish transverse plate, margining 9th sternite ; the latter is concave behind.



TEXT-FIG. 41.—*Ecnomus montanus* Mosely, ♂ ; genital appendages from below.

Known from Kashmir and Ramgarh, Kumaon.

E. montanus appears to be closely allied to *E. tumidus* Ulmer from the Philippine Islands.

3. *Ecnomus indicus*, sp. nov.

(Figs. 42-43.)

2 ♂, 2 ♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.1918. N. Annandale and F. H. Gravely.

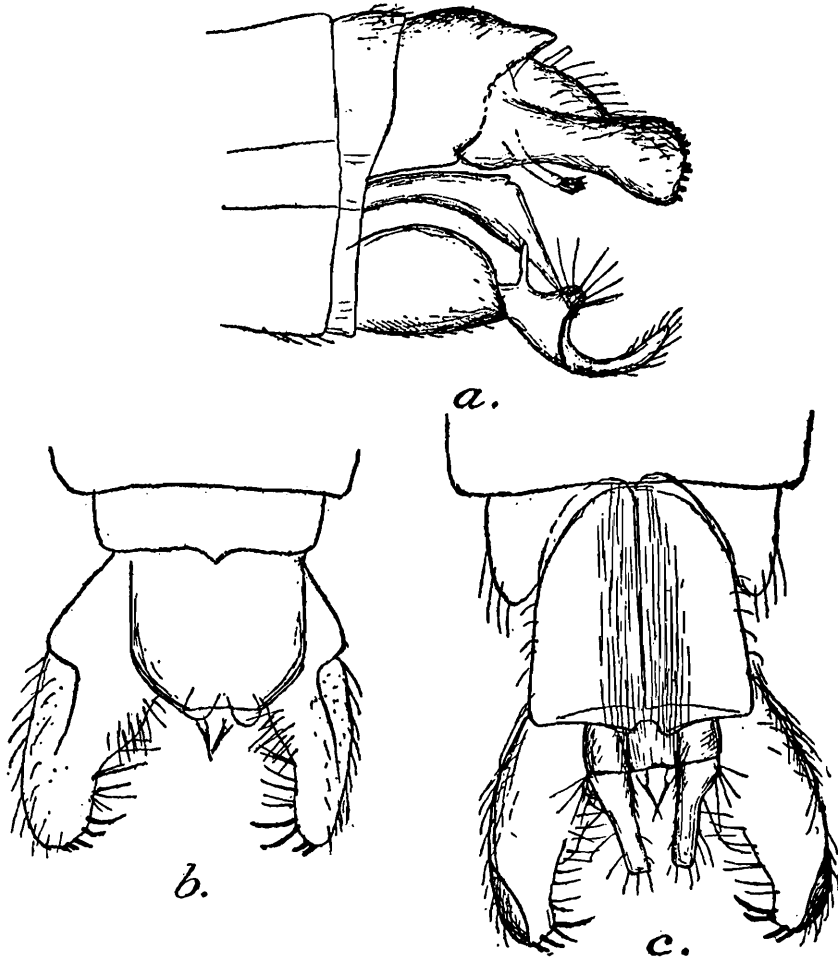
Closely allied to *Ecnomus hendersoni* Mosely—*Trans. Entom. Soc. London*, LXXX, p. 2, figs. 1-4 (1932).

Head yellow, somewhat brownish above ; antennae and palpi pale yellow. Thorax yellow, brownish above ; legs yellow. Anterior wings greyish yellowish. Abdomen brownish above, paler beneath.

♂. 9th dorsal segment indistinctly separated at sides from the 10th ; hind portion somewhat protruded (from side), narrowed to its end (from above).¹ Preanal appendages, seen from side, very broad at base, narrowing to their middle, with concave lower edge ; hind portion not as broad, almost truncated at end and armed with few

¹ In Mosely's paper the 9th dorsal segment is designated as the "tenth segment".

strong spines, somewhat curved inwards. 10th segment represented by only two curved slender processes, under (and between) preanal appendages, at their ends each bearing several spinules; median portion of 10th segment reduced and not visible externally. 9th ventral segment large, and, seen from side, with rounded convex upper margin. Pedes genitales slender from side, and curved, as in *E. hendersoni*; basal

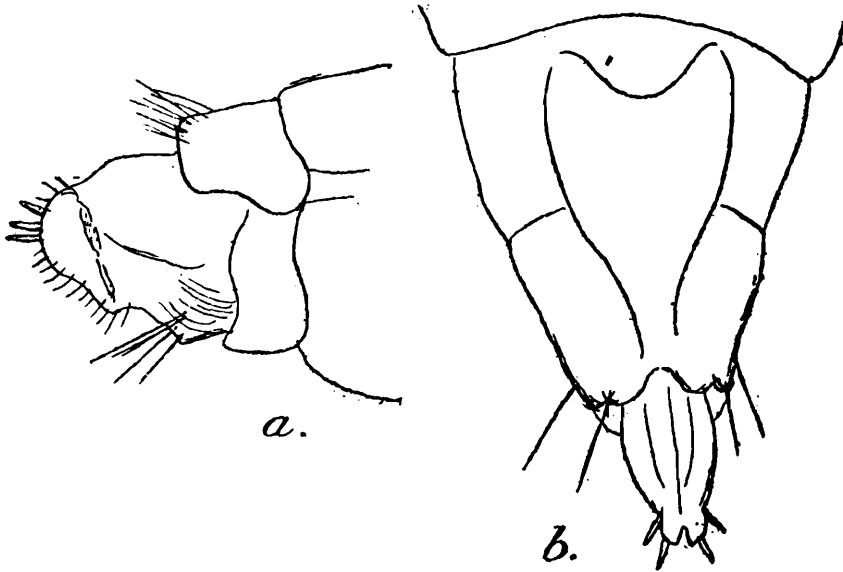


TEXT-FIG. 42, a-c.—*Ecnomus indicus*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

portion forming a broad rounded projection upwards, bearing several erect hairs; basad from this projection arises an extra basal short and very slender process; seen from beneath the inferior appendages appear to be similar to those in *E. hendersoni*, but their apical portions are not dilated. Penis somewhat thickened in its distal portion, then extended downwards in the form of a slender and long beak.

♀. 8th sternite with a small rounded excision behind and with two pairs of erect hairs at sides; median portions of 8th and 7th sternites forming a broad convexity narrowing backwards. 9th and 10th segments united and ending in the usual three pairs of papillae.

This species is closely allied to *E. hendersoni* Mosely from Perak, but is apparently distinct, differing in some details of the structure of ♂ genital appendages.



TEXT-FIG. 43, a, b.—*Ecnomus indicus*, sp. nov., ♀; genital appendages from side (a) and below (b).

4. *Ecnomus moselyi*, sp. nov.

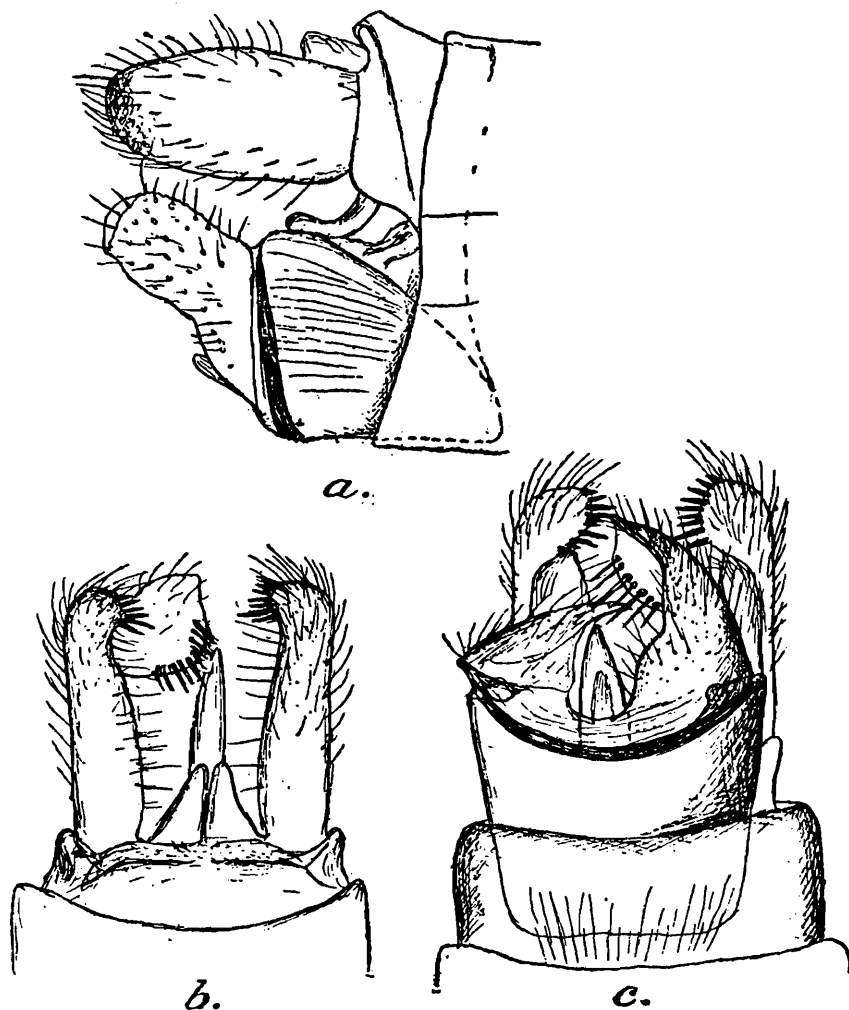
(Fig. 44.)

♂, ♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Body pale yellowish, antennae and legs pale yellow. In the anterior wings the discoidal cell is a little broader than in *E. indicus*, cross-vein *rs-m* arising nearly from the end of DC.

♂. Structure of ♂ genital appendages somewhat resembling that in *E. similis* Mosely from Africa, Cape Province. Dorsal part of 9th segment rather narrow, with two oblique dark lines, running from hind edges downwards to 8th segment; ventral part very broad, margined behind with a broad dark chitinous band which when seen from beneath is concave backwards, seen from side it narrows to the base. Preanal appendages very broad on the sides, with rounded brownish apex and convex upper margin; seen from above they are more slender, straight, with apices somewhat turned inwards and provided with several (7-8) black spines. Dorsal part of 10th segment short, triangular, pale, subdivided by a median fissure into two side lobes; to this segment belong also two short curved chitinous appendages, which are seen from below from the base of preanal appendages (they are similar to analogous curved processes in *E. indicus*). Pedes genitales broad from

side with irregular lower edge; their surface tuberculated and covered with sparse short erect hairs, arising from tubercles. Seen from below inferior appendages are very broad at base, then tapering, with apical portions curved inwards; hind upper portions are bent inwards and form two broad plates, united with distal parts of inferior appendages; inner margins of these plates each armed with a series of strong pale



TEXT-FIG. 44, a-c.—*Ecnomus moselyi*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

spines. Penis rather slender, narrowing to its end, in both dorsal and ventral views.

Females similar to that of *E. indicus*.

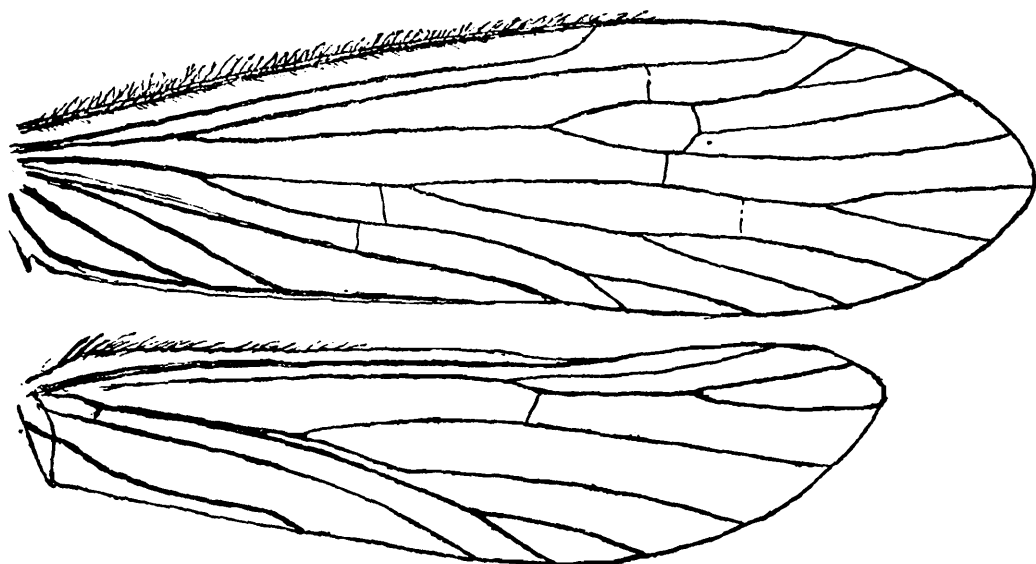
This species is apparently related to *E. similis* Mosely. I have dedicated it to Dr. M. E. Mosely, who has recently published a valuable contribution on the genus *Ecnomus*. This genus has proved to be a large one, containing a large series of species from the Oriental Region and from Africa.

5. *Ecnomus costalis*, sp. nov.

(Figs. 45, 46.)

♂. Junction of two streams, about a mile below Pharisemar. Rewah State. C. I. 18.ii.1927. S. L. Hora.

Head pale above, somewhat brownish anteriorly; antennae and palpi yellowish. Thorax reddish brownish above, pale beneath; legs yellowish. Anterior wings pale greyish yellowish, clothed with pale hairs; costal vein thick, brownish and up to the end of subcosta densely

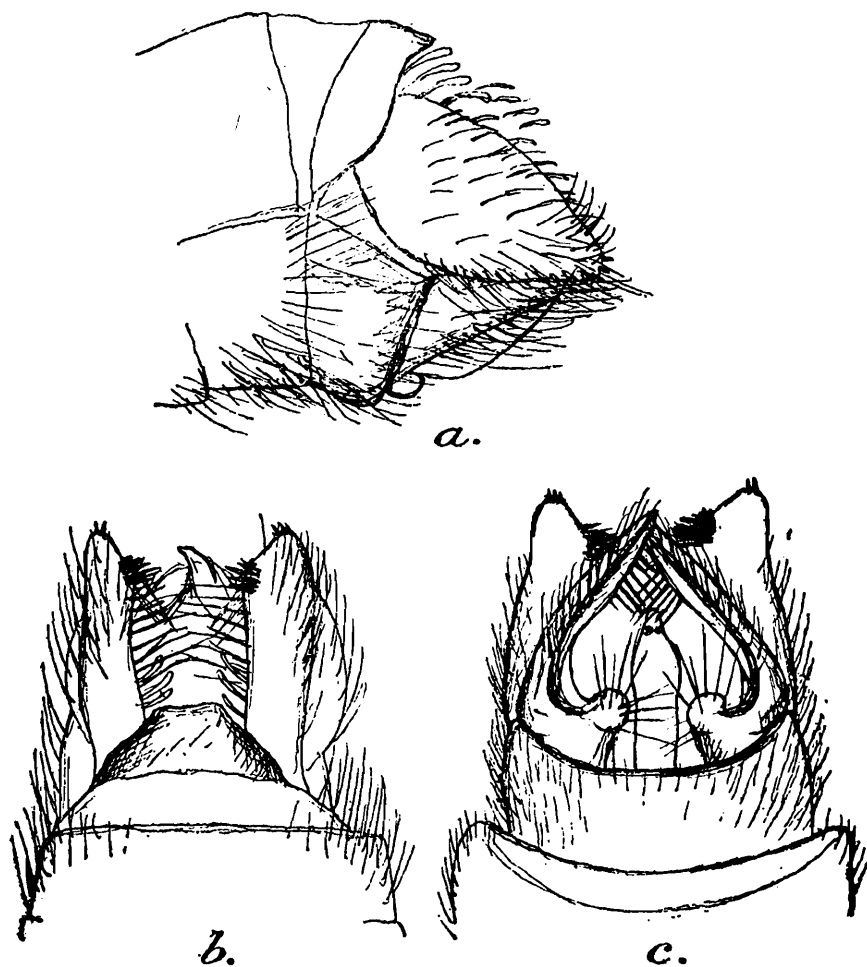


TEXT-FIG. 45.—*Ecnomus costalis*, sp. nov., ♂; wings.

clothed with pale slender hairs; discoidal cell triangular in its basal portion, 2nd apical fork not narrowed; 4th apical fork deeply impinging on MC, 3rd a little longer than its pedicel; 5th fork small. In posterior wings SC strong, thick; 2nd apical fork equal to its pedicel.

♂. Dorsal portion of 9th segment much narrower than ventral; seen from above it is broad at base, but rapidly narrows to the truncated end; ventral part subquadrate from side, if seen from beneath, with concave hind edge; hind edge brownish. Preanal appendages large elliptic, but very broad from side, bearing above, nearer to their inner edges, series of distinct thickened sensory hairs; seen from above preanal appendages are also thick, forming each a convexity or dilation on its outer side; from inner margins of appendages arise thickened hairs in basal part and usual bristles in distal parts; apices obliquely truncated, each bearing three short spinules on their ends; hind inner angles armed with 7-8 black spines. 10th segment imperceptible. Pedes genitales in the form of two elongated, ventrally ribbed appendages, directed somewhat inwards and touching each other below by their acute ends; basal portions suddenly dilated inwards and forming two rounded, hairy projections, which can be seen also from the side; distal portions armed internally with short rows of spines or bristles. Penis moderately thick, attenuated at its end,

In the presence of a thickening on the inner side of the bases of the pedes genitales and in the shape of the 9th dorsal segment this species



TEXT-FIG. 46, *a-c.*—*Ecnomus costalis*, sp. nov., ♂; genital appendages from side (*a*), above (*b*) and below (*c*).

reminds somewhat of *E. pseudotenellus* Ulm. from Sumatra and partly of *E. obtusus* Ulm. from Java.

6. *Ecnomus pusanus* Mosely.

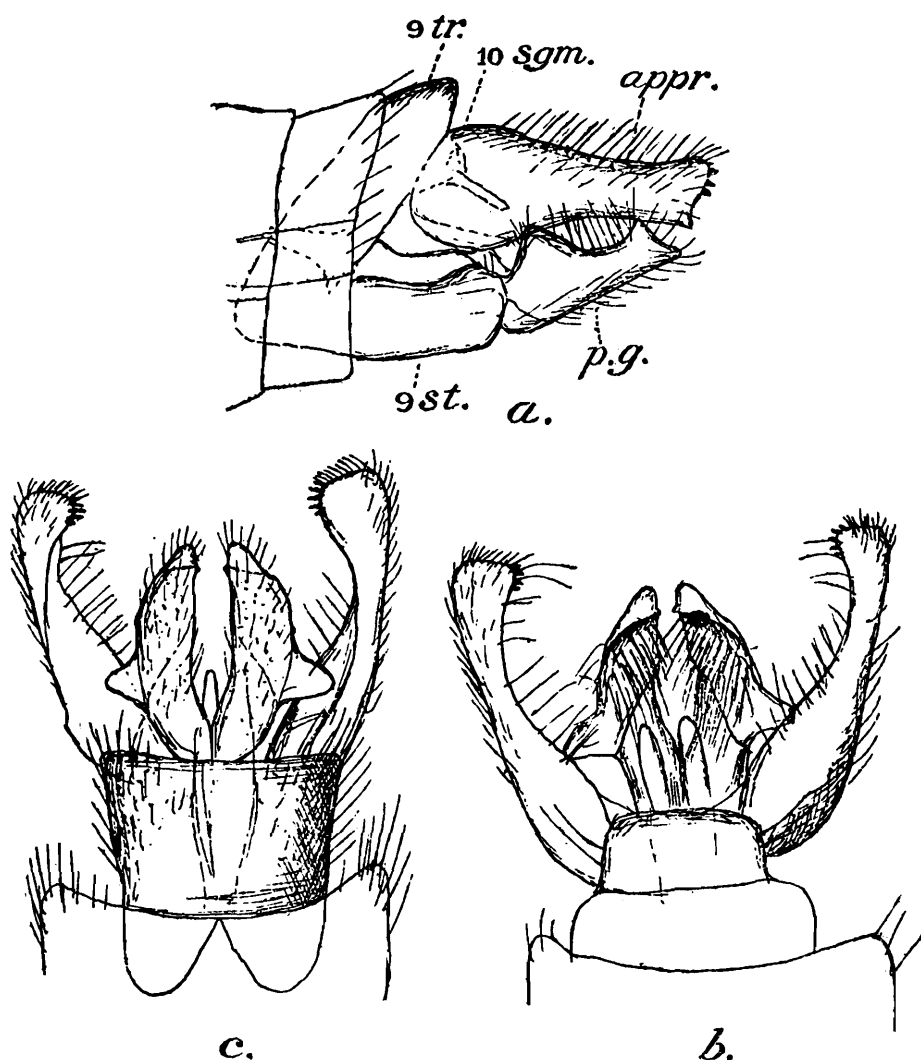
(Fig. 47.)

Ecnomus pusanus Mosely, *Stylops, Journ. of Taxon. Entom.* I, pl. 7, p. 165, figs. 1-3 (1932).

♂. Neighbourhood of Dhupdal and Gokak, Belgaum district, Bombay Presidency. xi.1928. B. Prashad and H. S. Rao.

Male genital appendages in this specimen are very similar to those of *E. pusanus* Mos., described from Pusa, Bihar, and differ only in the

outer processes or teeth on the pedes genitales being more robust and more prominent.



TEXT-FIG. 47, a-c.—*Ecnomus pusanus* Mosely, ♂; genital appendages from side (a), above (b) and below (c).

7. *Ecnomus ceylanicus* Mosely.

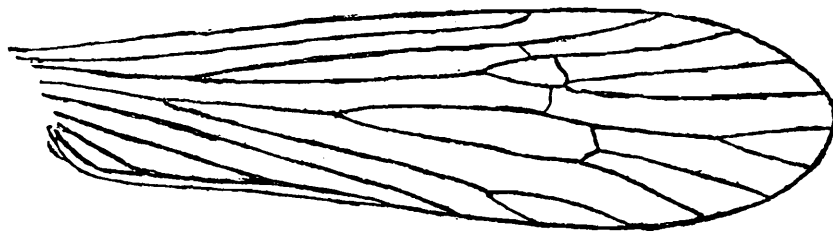
(Fig. 48.)

Ecnomus ceylanicus Mosely, *Trans. Entom. Soc. London*, LXXX, p. 8, figs. 20-22 (1932).

♀. Peradeniya, Ceylon. 2.vii.1910. F. H. Gravely.

♂, 2 ♀. Peradeniya, Ceylon. 8.vi.1910. F. H. Gravely.

Male genital appendages fully agree with Mosely's figures 20-22, and I, therefore, consider these specimens as belonging to this species.



TEXT-FIG. 48.—*Ecnomus ceylanicus* Mosely; venation of anterior wing.

Length of body of these specimens is 2.2 mm. Anterior wings (text-fig. 48) greyish brownish, with indistinct pale irrorations, clothed with yellowish hairs; DC elongated, apical fork 1 absent, 3rd fork shorter than its pedicel, the 5th beginning at the same level with the base of DC. Posterior wings narrow, greyish, clothed with greyish yellowish hairs.

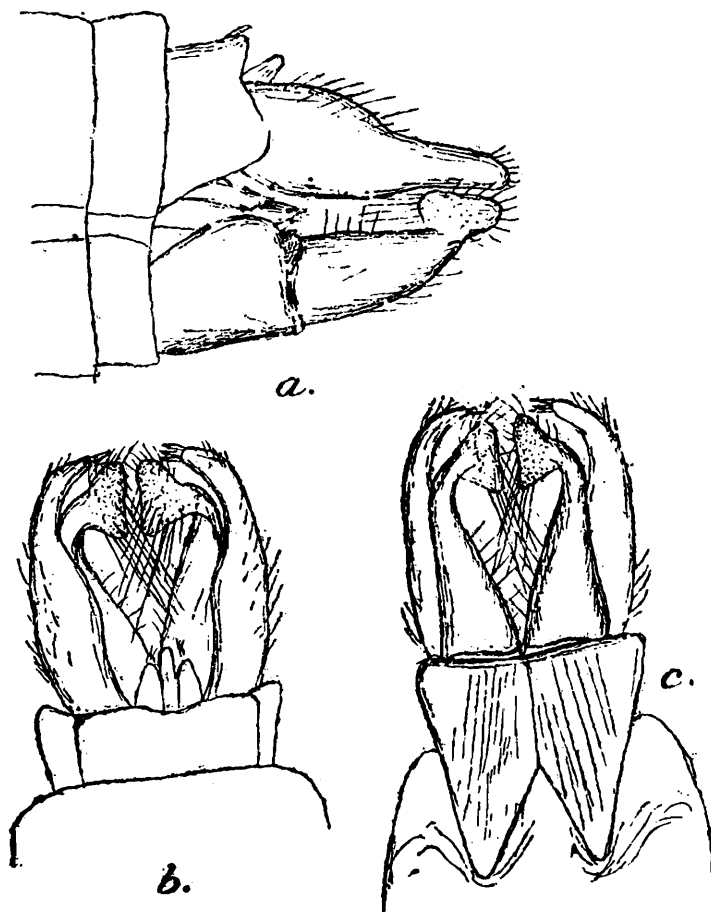
8. *Ecnomus oppositus*, sp. nov.

(Fig. 49.)

3 ♂, many ♀. Inlé Lake, Yawnghwe State, S. Shan States, at light. F. H. Gravoly.

Head and body yellowish, thorax and abdomen sometimes brownish above; anterior wings pale brownish yellowish; DC elongated. Legs pale.

♂. 9th sternite broad, but with a deep triangular excision in its basal part divided into two triangular basal lobes; hind edge distinct, **straight**; dorsal part of segment regular, slightly excised in the middle



TEXT-FIG. 49, a-c.—*Ecnomus oppositus*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

of its hind margin. Preanal appendages large, long, from side broad in their basal parts, narrower in their distal portions; end-portions curved inwards and each armed at ends with three spinules. 10th segment reduced, as usual represented above by two pale short appendages, situated between the preanal appendages. Pedes genitales thick

in their basal portions, gradually tapering, then curved inwards and ending in two thick discs, nearly touching each other in the middle; each disc is provided above and on its inner side with a tuft of long thin hairs, directed to the bases of appendages. At the bases of pedes genitales are situated, above, two minute appendages, ending in short hairs. Penis short, slender (not exerted in our specimens).

Length of body $3.4=4.7$ mm. (♀).

This species in the structure of its ♂ genitalia appears to be allied to *Ecnomus crepidulus* Mosely from Lahat.

Ecnomus spp.

4 ♀. The lake at Yercand, 4,600 ft., Shervaroy Hills, S. I. 2-15.vi.29. H. S. Pruthi.

These specimens should perhaps be referred to *E. tenellus* Ramb.

♀. Medha, Yenna Valley, Satara district, Bombay Pres., ca. 2,200 ft. 17-23.iv.12. F. H. Gravely.

Comparatively large specimen.

Psychomyiella Ulm.

Psychomyiella pruthii, sp. nov.

(Fig. 50.)

♂, ♀. (Many specimens.) Nerbudda Survey, opposite the Camp at Harra, 2,625 ft., Rewah State, C. I. March 1927. H. S. Pruthi.

♂. Junction of two streams about a mile below Pharisemar, Rewah State. 18.ii.1927. S. L. Hora.

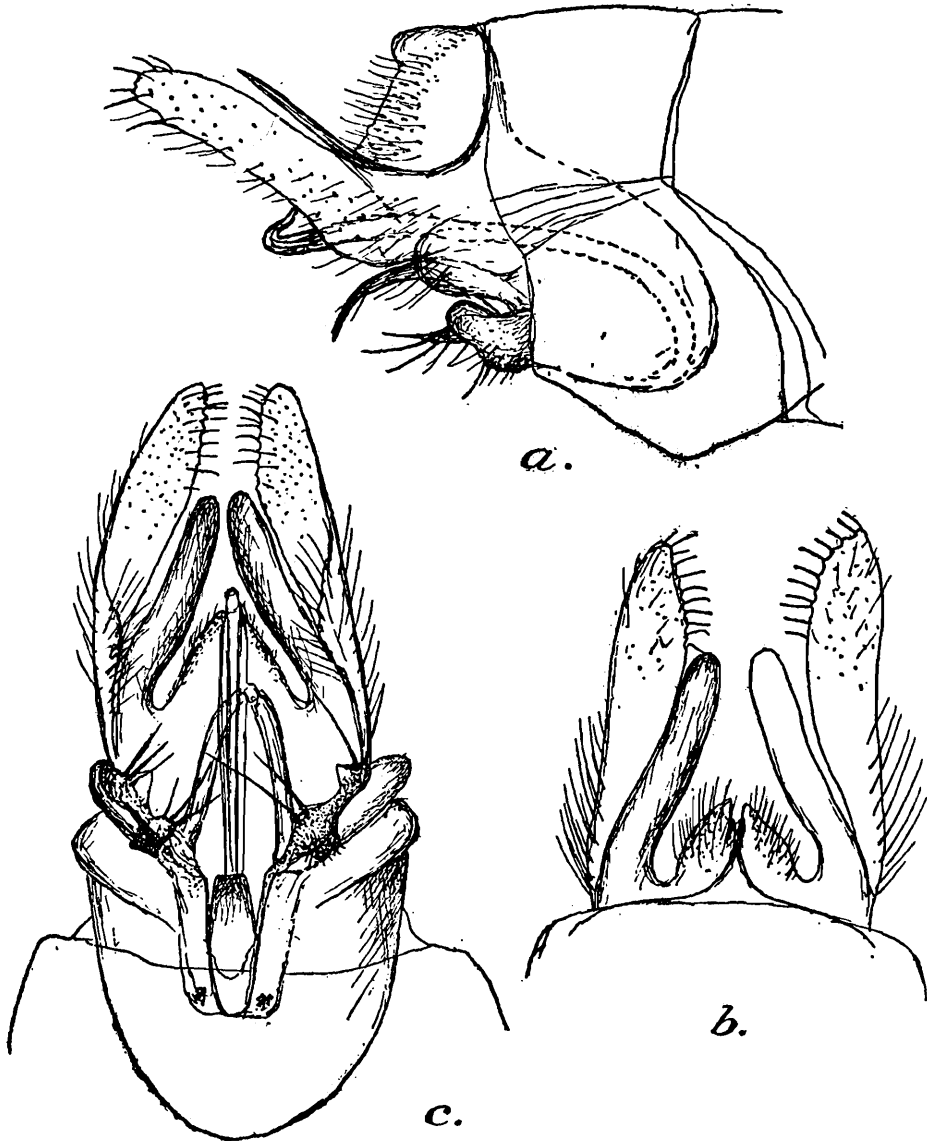
♀. Nerbudda Survey. A pool close to the water channel of the river at Manot. Nov. 1927. H. S. Pruthi.

♂. Nerbudda Survey. Sarai (land), 2,700 ft., Rewah State. C. I. Feb. 1927. H. S. Pruthi.

Head greyish yellowish above, with two large and prominent hind warts. Thorax somewhat brownish above, pale yellow beneath; legs yellowish. Anterior wings yellowish brownish, posterior ones paler. Abdomen brownish yellowish.

♂. 9th segment hidden in the interior of the 8th, 9th tergite very narrow, but with a short median triangular projection; ventral part of 9th segment large, sack-like, but its greatest part hidden in 8th segment; its sternite deeply excised behind, and in this excision is situated a narrow plate probably belonging to the pedes genitales. These appendages are very short, irregular and situated along the hind-margins of the 9th ventral segment; seen from the side they are divided into a rounded irregular lower lobe, with a small appendage behind, bearing 2-3 stiff hairs, and an upper lobe covered externally with a rounded plate-like dilation of the base of the pedes genitales; from the lower lobe arise internally two more long processes, claw-shaped when seen from side; lower portions continue also along the margins of the median excision of 9th segment. Preanal appendages large, long, band-shaped from side, pale, clothed with sparse hairs externally and with several erect bristles on their apical portions internally,

lower edges curved downwards in the basal parts ; the bases of appendages are united with the base of 10th segment. 10th short, but broad from side, roof-shaped, with obliquely truncated hind edge ; seen from



TEXT-FIG. 50, a-c.—*Psychomyiella pruthii*, sp. nov., ♂ ; genital appendages from side (a), above (b) and below (c).

above it is short, sub-divided into two lobes at end ; with the bases of these lobes are united externally two more band-shaped processes, running along the preanal appendages but shorter ; seen from above they are fairly broad and directed somewhat inwards ; along the side they are very narrow acute at ends. Penis long, slender, in the distal part curved somewhat downwards, but at the end curved suddenly upwards.

Length of body 2.5-3 mm.

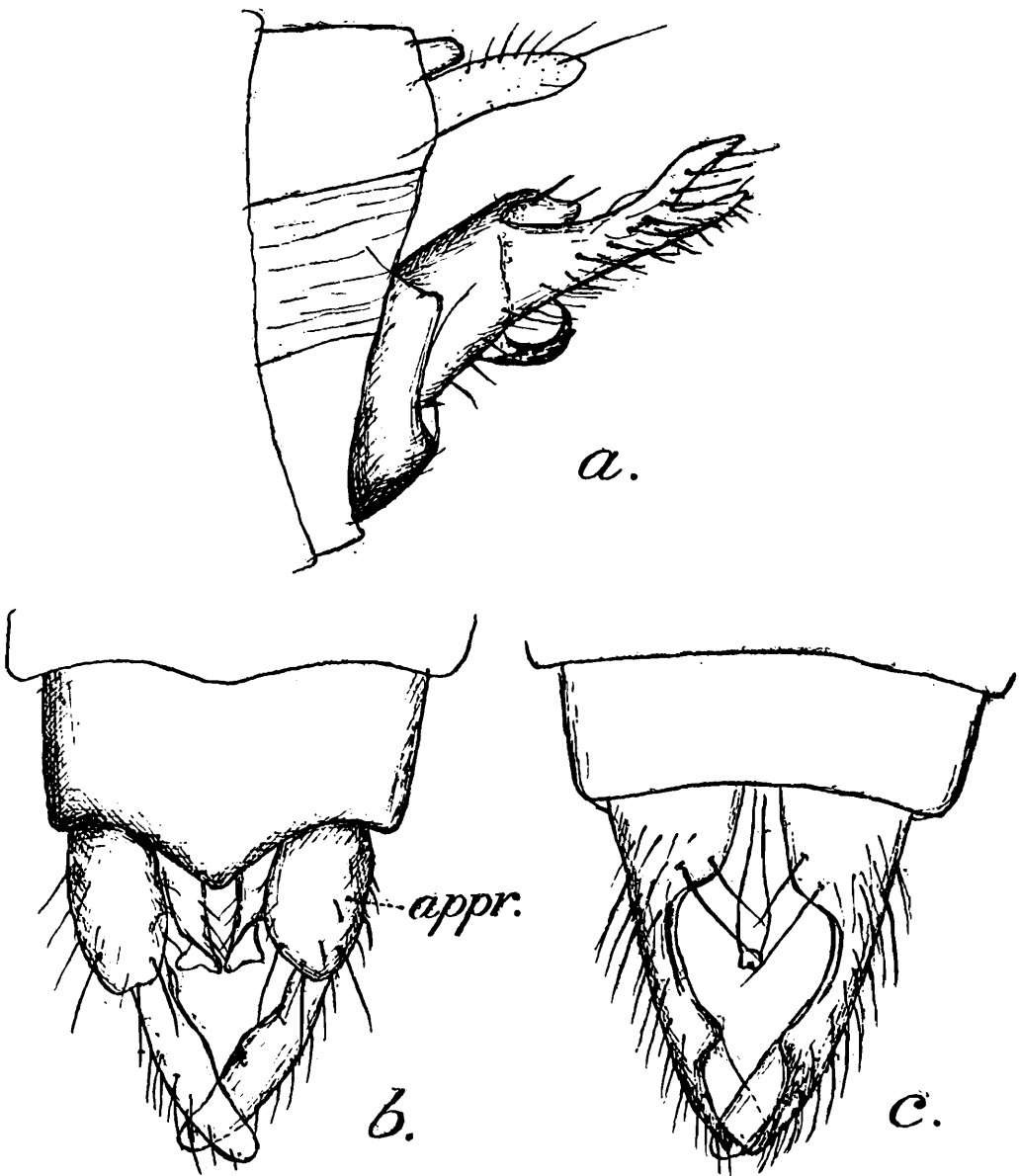
This species is evidently allied to *Ps. fulmeki* Ulmer, from Sumatra and Java—*Treubia*, XI, p. 432, figs. 86-87 (1930), but is quite distinct.

Paduniella Ulm.**1. *Paduniella fissa*, sp. nov.**

(Fig. 51.)

♂. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.1918. N. Annandale and F. H. Gravely.

Head and thorax brownish yellowish above, antennae and palpi brownish; in maxillary palpi 3rd joint equal to 4th, 5th little shorter, then follow 6th, 2nd and 1st joints; 2nd joint shorter than in *P. uralensis* Mart.; under side of thorax and legs somewhat yellowish. Wing-venation resembling that in *P. uralensis* Mart.; in the posterior wings RS_{1+2} approximated to SC and running close to it for a short distance; behind CuP one anal vein not reaching the hind margin is visible.



TEXT-FIG. 51, a-c.—*Paduniella fissa*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

♂. Genital appendages somewhat resembling those in *P. amurensis* Mart.; 9th tergite with a low triangular projection behind; ventral

part moderately broad, with almost straight posterior edge. Preanal appendages half the size of pedes genitales, broad from above, anal, bearing several hairs. 10th segment small, forming two short processes between the preanal appendages. Pedes genitales long, composed of a thick basal portion, broad from side and from beneath, and of a more slender distal part, which at its end forms two processes, lower one slender and the upper band-shaped from above; outer side of pedes genitales provided with a series of strong hairs which are also present on upper lobe; from the end of the basal part of appendages arises an inner short plate-like process, provided with two short spines.

Penis slender, its end-portion curved upwards in a claw-shaped manner and acute.

Length of body 2-2.5 mm.

Allied to *P. amurensis* Mart.

2. *Paduniella amurensis* Mart.

Paduniella amurensis, Martynov, *Trichoptera Annulipalpia of the U. S. S. R.*, edit. Acad. Sci. Leningrad, p. 208, figs. 148-149 (1934).

1 ♂, 1 ♀. Nerbudda Survey, opposite the Camp at Harra, 2,625 ft., sta. 55. March 1927. H. S. Pruthi.

This species was described from S.-Ussuri land, from the rivers Sitza and Bikin. Many specimens of it are present in the collection of the Indian Museum.

These specimens are similar to those from S.-Ussuri land, and I can not detect any essential differences between them.

This species differs from *P. fissa*, sp. nov., in the longer preanal appendages (they are as long as the pedes genitales) in males, in the plate-like and slender pedes genitales, which are also divided at the ends into two slender processes; in the more prominent 9th tergite and in other details of the structure of the ♂ genital appendages. Maxillary and labial palpi of the females are shorter and more slender than in the males.

Length of body 2.5-3 mm.

3. *Paduniella ceylanica* Ulm.

Paduniella ceylanica, Ulmer, *Deutsche Entom. Zeitschr.*, p. 42, figs. 2-5 (1915).

2 ♀. Peradeniya, Ceylon. 8.vi.1910.

Judging by the wing-venation, these specimens apparently belong to *P. ceylanica* Ulm.

Fam. POLYCENTROPIDAE Ulm.

Plectrocnemia Steph.

1. *Plectrocnemia aurea* Ulmer.

Plectrocnemia aurea, Ulmer, *Stettin. Entom. Zeit.* LXVI, p. 101, pl. iv, figs. 130-131 (1905); *Notes from the Leyden Museum*, XXIX, p. 35, figs. 52-54 (1907). (Sikkim, Darjeeling).

2 ♂. Darjeeling district Lynch.

♀. Darjeeling, 7,000 ft., at light. 1.vi.14. F. H. Gravely.

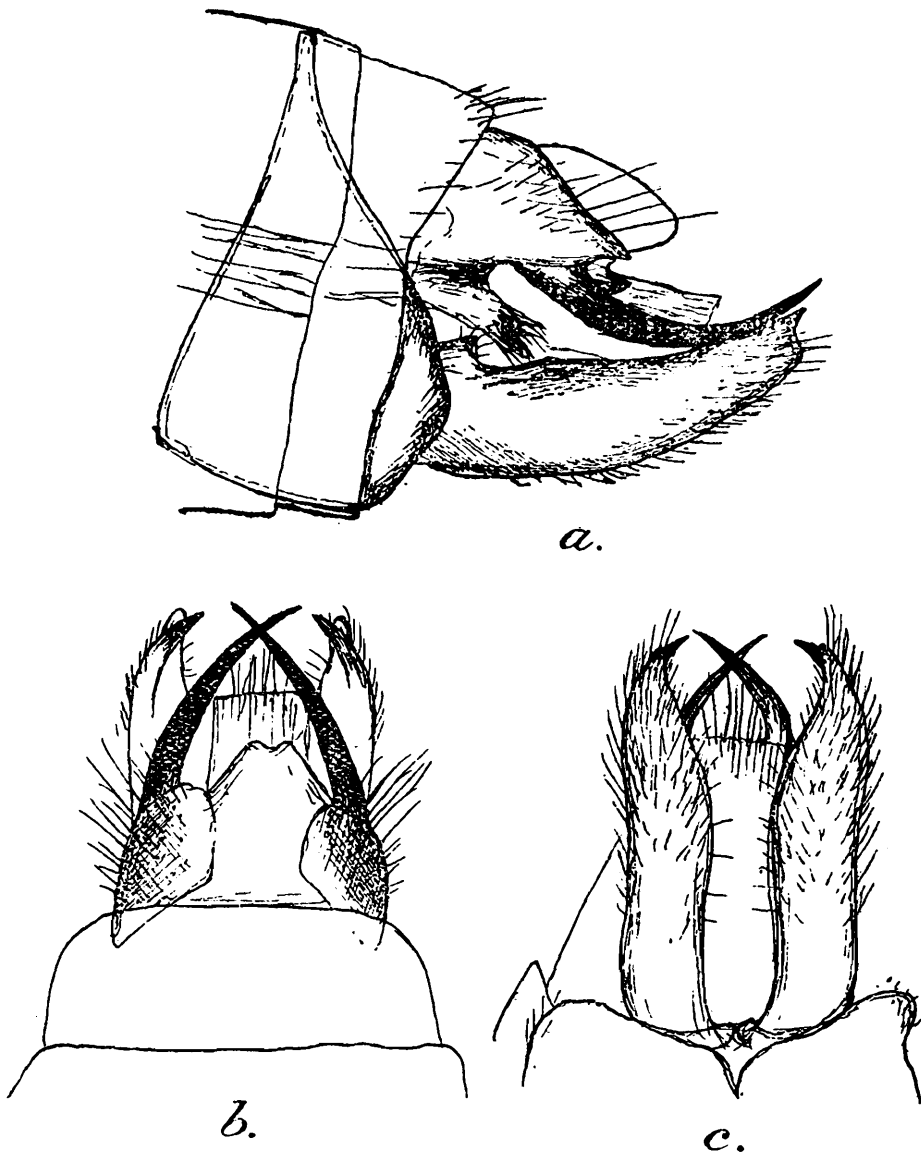
This species is already known from Darjeeling and Sikkim. The male genital appendages are as in Ulmer's figures 52-54.

2. *Plectrocnemia punjabica*, sp. nov.

(Fig. 52.)

♂. Punj-pul Nullah, about a couple of miles from Dalhousie, on Dalhousie-Bakloh Road, 6,500 ft., Punjab. V.1927. S. L. Hora.

Head and thorax black-brown; antennae, palpi and legs brown. Anterior wings brown or brownish, not very broad, narrowing to the ends; RS pale; DC very long, longer than MC; 1st apical fork short, 2nd reaching DC, but not impinging on it; MC closed with whitish hyaline cross-vein; fork 3 twice longer than its pedicel, fork 4 reaching, but not impinging on the median cell; cross-vein m-cu whitish hyaline.



TEXT-FIG. 52, a-c.—*Plectrocnemia punjabica*, sp. nov., ♂; genital appendages from side, above and below.

Posterior wings greyish, clothed with brown hairs; DC triangular, elongated, apical fork 1 equal to its pedicel, fork 2 slightly impinging on it; cross-vein rs-m reaching the middle of DC; CuA strong, dark brown. Abdomen brown.

♂. 9th segment broad ventrally, but very narrow dorsally; its greatest part hidden in the interior of 8th and 7th segments. 10th segment forming a pale median plate, projecting upwards if seen from side; from above it narrows backwards and is slightly excised at the end. With this pale median plate are united two lateral brownish yellowish portions, clothed with hairs above and on sides; seen from above they are rhombic/ from side triangular with nearly acute hind angles; from their lower side arise two brown, curved and long sabre-like processes, crossing each other at their ends. Side-portions of the dorsal plate probably represent preanal appendices united with tergite of 10th segment; sabre-like appendages probably belong also to 10th segment. Below, from the base of the lateral plates arise downwards two shorter projections, ending each in a tuft of short hairs. Pedes genitales thick and slightly curved upwards when seen from side; seen from beneath they are also thick and long; end-portions attenuated, ending each in an acute black tooth directed somewhat inwards; from the extreme base of the pedes genitales arise two small hairy projections. Penis pale, soft, truncated at its end.

This species is somewhat allied to *Pl. chinensis* Ulm. from China, although preanal appendages in the latter species are wholly separate from the 10th segment.

3. *Plectrocnemia distincta*, sp. nov.

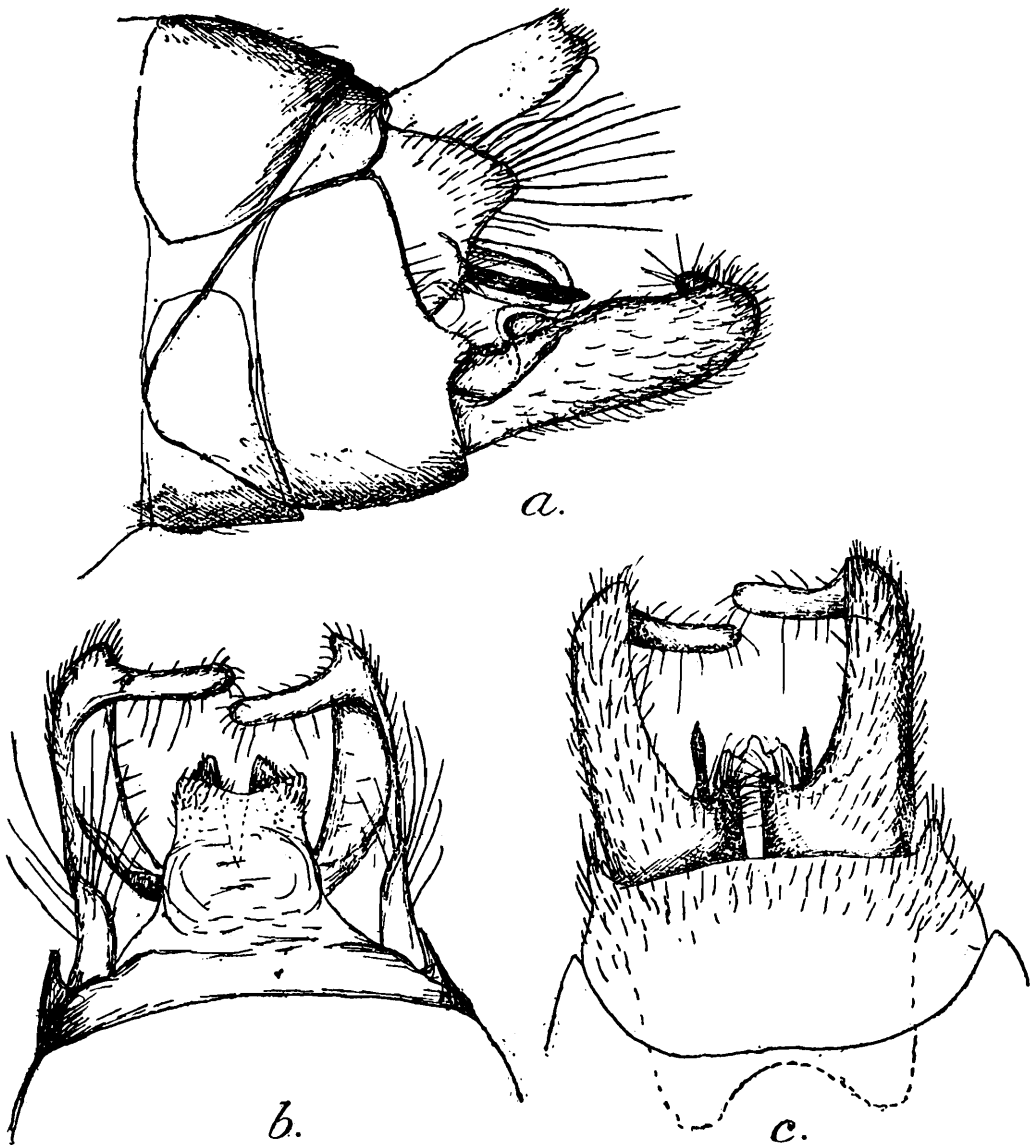
(Fig. 53.)

One ♂. Locality unknown (India)¹.

♂. 8th segment brown, at sides more or less fused with 9th; 9th segment very broad, but its dorsal part narrow; hind edge truncated at sides with but a small rounded projection above the pedes genitales. Dorsal plate pale, dilated at its base, and seen from above, shallowly excised behind; side margins somewhat curved downwards. Preanal appendages very broad at base, from side triangular, bearing behind several long hairs or bristles; on the lower side is a short hairy secondary projection. Pedes genitales long, broad from side, rounded at ends; seen from beneath they are dilated internally at base, forming each a small inner projection, clothed with hairs; from the inner side of appendages arise two more plate-like, short processes, the apical portions of which are, seen from side, near the base; from the apical portions of pedes genitales arise two digitiform processes, directed at right angles inwards and nearly touching each other near the ends. Penis thick, pale, broad above, accompanied by two rod-like brown titillators.

This is a very distinct species, distinguished by its pedes genitales and by other genital structures. Unfortunately, the exact provenance is not known.

¹ The single ♂ specimen of this species, after examination of its genital appendages, was unfortunately lost; its label is also not preserved.



TEXT-FIG. 53, a-c.—*Plectrocnemia distincta*, sp. nov., genital appendages from side (a) above (b) and below (c).

4. *Plectrocnemia obliquofasciata*, sp. nov.

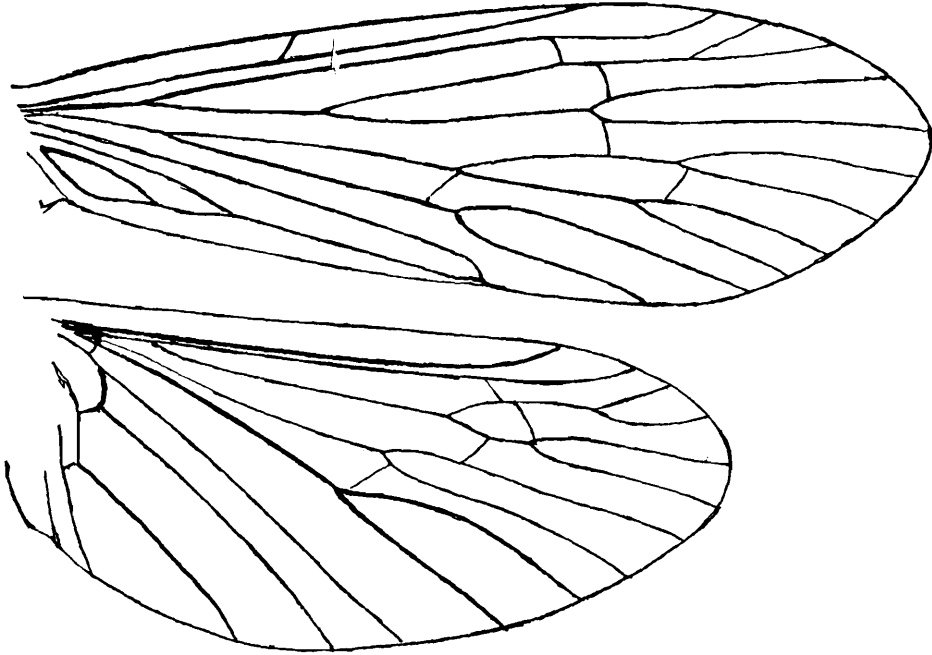
(Figs. 54, 55.)

♂. Punj-pul Nullah, about a couple of miles from Dalhousie, on Dalhousie-Bakloh Road, 6,500 ft., Punjab. V.1927. S. L. Hora.

2 ♀. Darjeeling, Bengal. Lynch.

Head brown, clothed above with yellowish-greyish hairs; antennae yellow, palpi dark yellow. Thorax brown above and bearing yellowish hairs; brownish yellow beneath. Legs yellow. Anterior wings pale greyish, clothed with golden yellow hairs, but with brownish markings, clothed with dark brown hairs, as follows: (1) brown spots at the ends of apical sectors; (2) oblique broad band in the middle of the apical part of wing, parallel to the apical margin; (3) two elongated brownish spots on CuA, and behind CuA₂; (4) a broad, large, but not as distinct, spot before the cross-vein rs-m, containing backwards up to CuP; this

brownish band separated from the oblique apical by a narrow pale-yellow stripe; (5) large brownish marking in the basal portion of wing, somewhat interrupted by a distinct oblique, narrow, pale yellowish stripe in the basal cell; and (6) indistinct brownish marking between

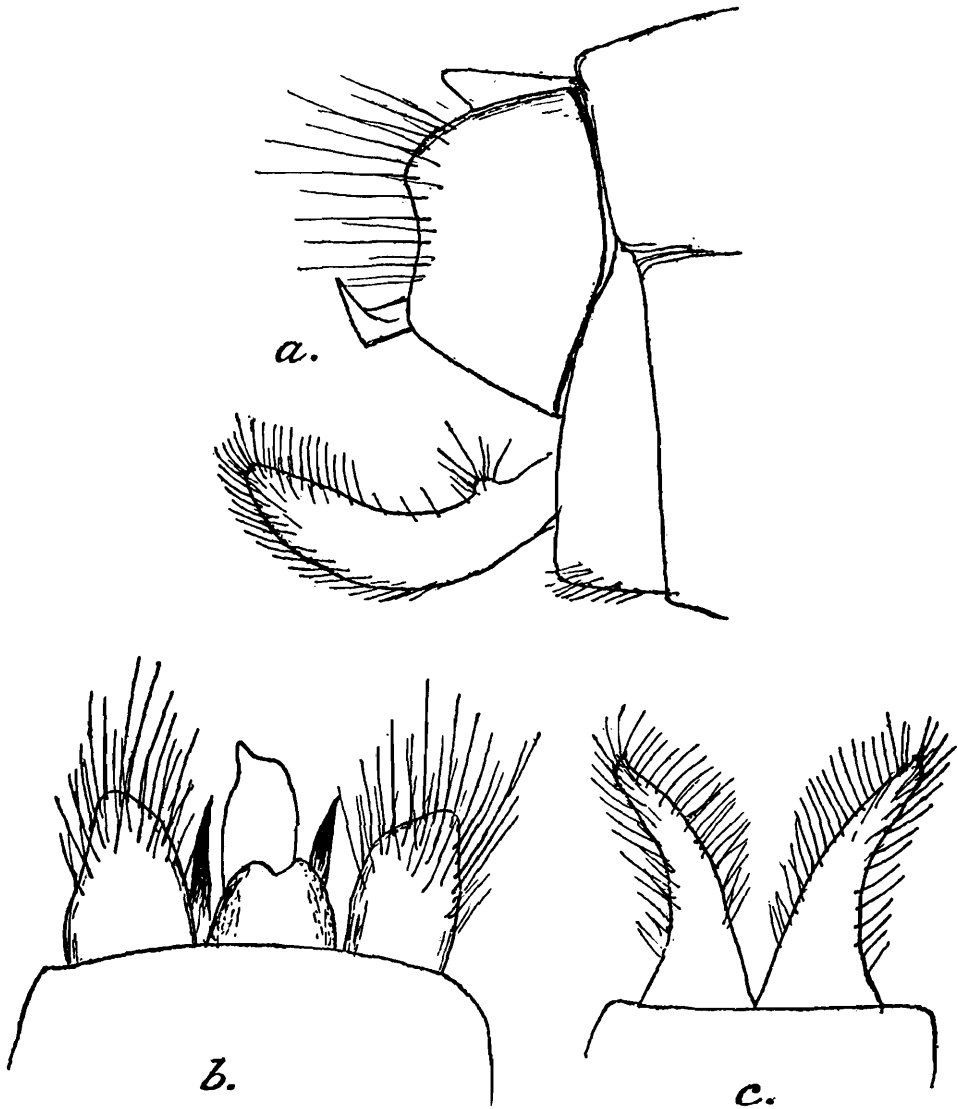


TEXT-FIG. 54, a-c.—*Plectrocnemia obliquofasciata*, sp. nov.; venation of wings.

the end of A_2 and the end of RS. In the female the apical oblique band is not so clear, but there are distinct narrow yellow stripes in the basal cell, in the middle of the thyridial cell and at the end of CuA; all these stripes run parallel to the apical edge of wing; cross-veins m-cu and rs-m subhyaline. Costal area with a series of brownish spots. Venation brownish (text-fig. 54); DC very long, MC shorter, both fork 4 and fork 3 impinging on it; apical fork 1 not longer than its pedicel. Posterior wings pale, subhyaline, clothed with short rufous-yellowish hairs; DC triangular, closed by oblique vein; apical fork N1 equal to its pedicel. Abdomen brown above, yellow beneath; basal portion above reddish brown.

♂. Ventral part of 9th segment with regular and somewhat convex hind margin, without projections above the bases of the pedes genitales. Preanal appendages extremely broad from side, with shallowly excised hind edge; hind portion clothed with long hairs; seen from above these appendages are not as broad being obliquely truncated at ends. Dorsal plate short, somewhat excised at its hind margin; below it are seen two black, slender, spine-like appendages, acute at their ends; they also belong to 10th segment. Pedes genitales brown, rather narrow, band-shaped from side, arcuate, dark with a small projection at base; seen from below they are moderately broad at base, then taper to sub-acute apices and are curved outwards; in their distal part the appendages are densely clothed with hairs. Penis straight, broader in dorsal than

in lateral view ; apical portion provided at the end with a short process, directed upwards.



TEXT-FIG. 55, a-c.—*Plectrocnemia obliquofasciata*, sp. nov., ♂ ; genital appendages from side (a), above (b) and below (c).

Length of ♂ body 8 mm. ; that of ♀ about 8.6 mm.

Cyrnopsis, gen. nov.

Antennae short, slender ; maxillary palpi short, 5th joint not annulated, entire, two basal joints short, 3rd joint equal to the two basal ; 4th shorter and 5th a little longer than 3rd ; labial palpi very short, rudimentary, 3rd joint entire. Spurs on legs 3.4.4. In the anterior wings SC thick, strong ; cross-vein c-sc lacking ; DC and MC long ; apical fork 1 absent, forks 2-5 present. In posterior wings SC also thick, R slender. RS branching off early from R and ending in one fork (the 2nd apical fork) ; M with only two branches, CuA with a broad fork ; posterior wings narrower than the anterior.

This genus is evidently allied to *Cyrnus* Steph., differing mainly in the non-annulated last joint of maxillary and labial palpi.

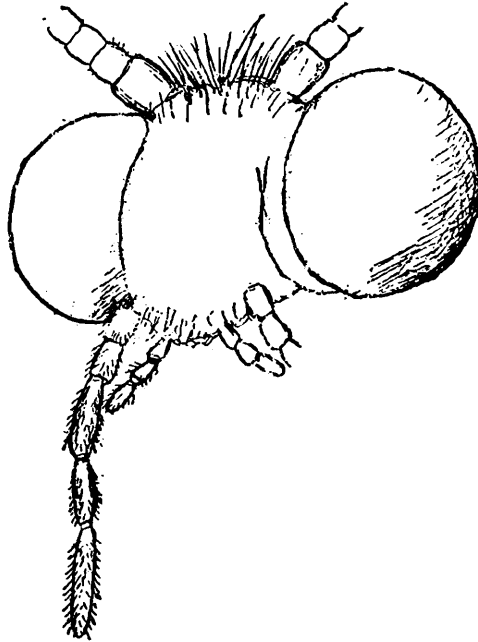
Genotype.—*Cyrnopsis palpalis*, sp. nov.

***Cynopsis palpalis*, sp. nov.**

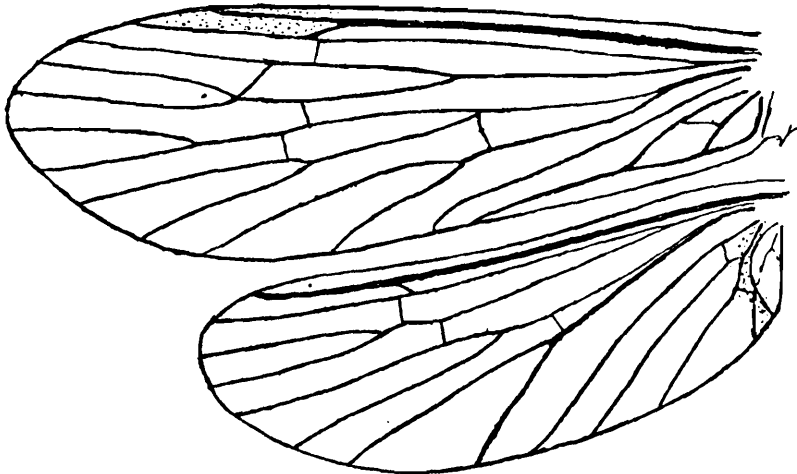
(Figs. 56, 57.)

♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Head pale, eyes large, black; antennae shorter than body, slender, pale; maxillary palpi short, 1st and 2nd joints short, 3rd equal to the



TEXT-FIG. 56.—*Cynopsis palpalis*, gen. et sp. nov.; head and palpi, anteriorly.



TEXT-FIG. 57.—*Cynopsis palpalis*, gen. et sp. nov.; venation of wings.

1st and 2nd together, 4th shorter, 5th a little longer than 3rd; labial palpi very small, joints sub-equal, 3rd longest. Thorax brownish-yellowish; wings pale, venation resembling that of the genus *Cyrnus* Steph., but SC thick in both anterior and posterior wings, M in anterior

wings dividing a little earlier than RS; DC long, equal to MC and closed with an oblique vein; fork 3 longer than its pedicel. In posterior wings SC and R straight, 2nd apical fork long, with a short pedicel; anterior wings clothed with yellowish brownish hairs.

Length of body 5.7 mm.

Males unknown.

Dipseudopsis WALKER.

1. *Dipseudopsis indica* McLach.

(Figs. 58, 59.)

Dipseudopsis indicus, McLachlan, *Tijdschr. f. Entomol.*, XVIII, pl. 18, p. 12, figs. 13, 14 (1875); Ulmer, *Deutsche Entomol. Zeitschr.* Heft III, p. 187, fig. 24 (1929).

10 ♂. Puri, Orissa Coast. 20.vii.1911. N. Annandale and F. H. Gravely.

4 ♂. Puri, Orissa Coast, Balighai. 8.iv.1915. N. Annandale.

4 ♂, ♀. Puri, Orissa Coast. 1-5.viii.1910. N. Annandale.

♂, ♀. Puri, Orissa Coast. 5-13.xi.1910. S. W. Kemp.

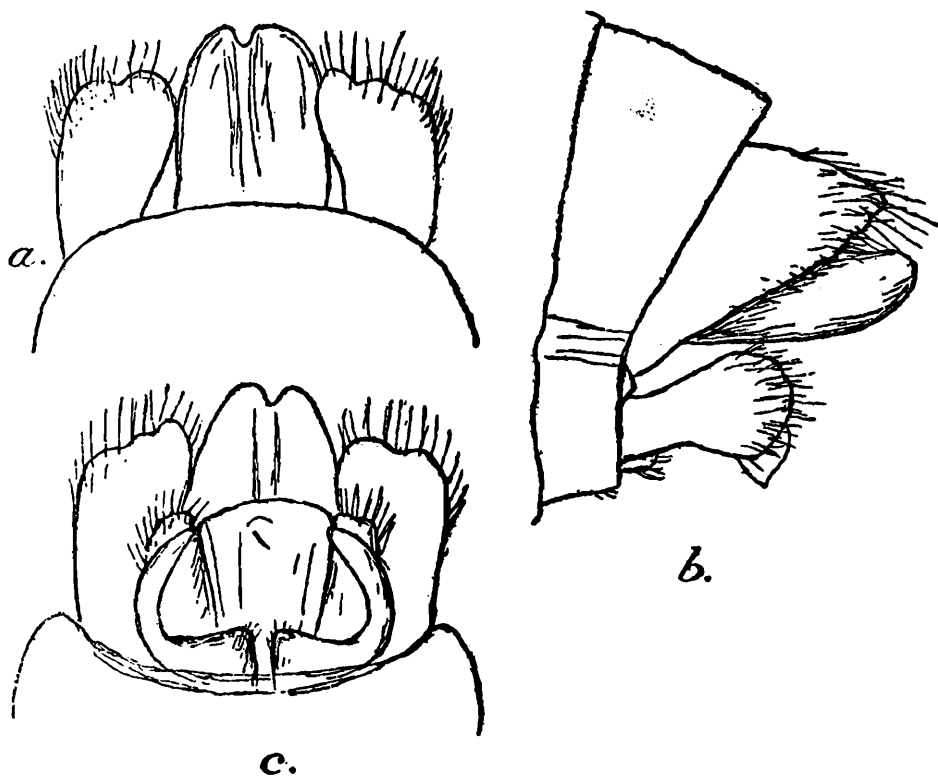
4 ♂, 3 ♀. Balighai, near Puri, Orissa. 16-20.viii.1911. N. Annandale and F. H. Gravely.

2 ♂, ♀. Bhubaneswar, Puri district, Orissa. 4-6.xi.1912. F. H. Gravely.

3 ♂, ♀. Katihar, Purneah district, N. Bengal. 7-31.viii.1910. C. Paiva.

♂. Bubak, Sind, from pools. 12.xi.1927. B. Prashad and B. N. Chopra.

Body reddish brown or brown. Anterior wings brown, with several pale subhyaline markings, arranged as follows: one spot between the



TEXT-FIG. 58, a-c.—*Dipseudopsis indica* McLach., ♂; genital appendages from above (a), side (b) and below (c).

basal parts of RS_{1-2} and RS, the second between RS_4 and M_{1+2} , between M_{1+3} and M_3 , between M_4 and CuA, and at the end of R;

hyaline markings exist also at thyridium and at arculus; the hyaline spots between RS_{1+2} and RS , between M_{1+2} and M_3 , at thyridium and at arculus are more distinct than others, and sometimes only these markings are perceptible. Membrane clothed with short golden yellow hairs. Inner spur in the hind legs of ♂ nearly $1\frac{1}{2}$ as long as the outer; its form is represented in Ulmer's fig. 24.

♂. Male genital appendages were not described. Preanal appendages broad, triangular from side, with two small excisions at their ends (text-fig. 58); seen from above they are somewhat dilated to their ends, apical margin obliquely truncated and irregularly excised; 10th segment broad, longer than the preanal appendages, rounded at its hind margin, but with a small median excision behind. Pedes genitales, seen from below, slender and curved inwards; from side they are much dilated in their distal parts.

The specimen from Bubak, Sind, is somewhat different; the median process of the inner spur in ♂ is shorter and curved quite in-



TEXT-FIG. 59, a, b.--*Dipseudopsis indica* var. *sindica*, nov., ♂; inner spur on the right posterior leg of ♂ from the inner surface (a) and in front (b).

wards (text-fig. 59). This specimen perhaps represents a distinct variety which may be designated as var. *sindica* nov.

2. *Dipseudopsis lamellata*, sp. nov.

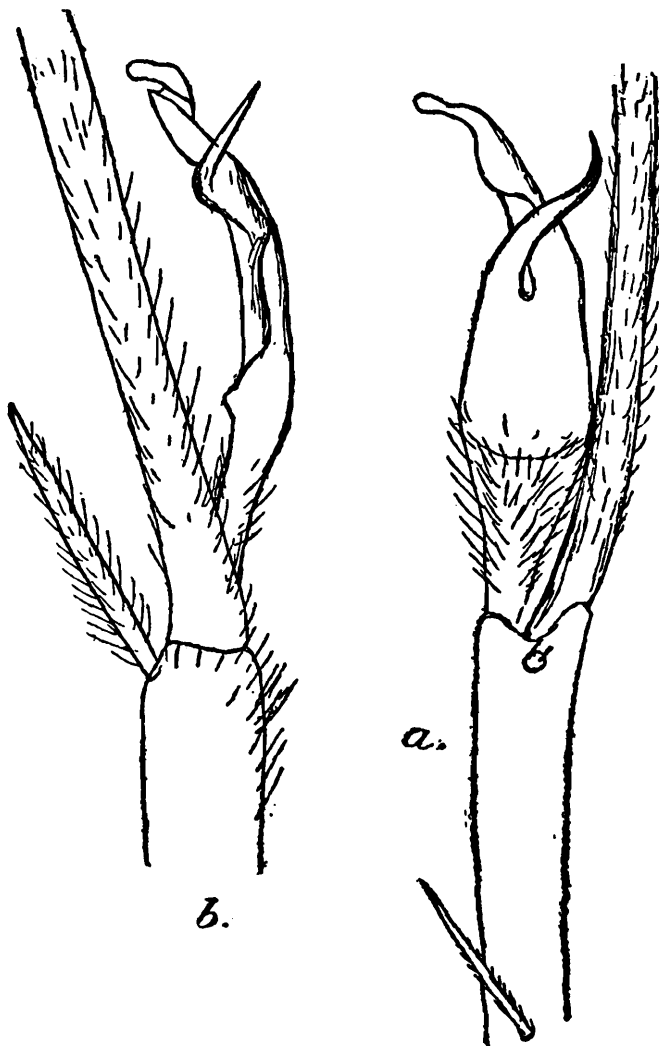
(Figs. 60, 61.)

♂. 12 ♀. Lonton, Western shores of Indawgyi Lake, Myitkyina district, U. Burma. 18-31.x.1926. B. N. Chopra.

♀. Kamaing, Myitkyina district, U. Burma. October 1926. B. N. Chopra.

♂. Mangaldai, Assam. 16-18.x.1910. S. W. Kemp.

♂. Head and thorax black-brown; eyes dark, with metallic reflexion; antennae reddish-brownish with paler annulations, in the distal part becoming almost uniformly reddish-yellowish; palpi brownish. Legs dark yellow; in ♂ inner spur of posterior legs not less than $1\frac{1}{2}$ times as long as the outer (text-fig. 60); basal third slender, but gradually thickening to its end, clothed with moderately prominent short hairs; median portion broad, plate-like, soon dividing into two



TEXT-FIG. 60, a, b.—*Dipseudopsis lamellata*, sp. nov., ♂; inner posterior spur (right) from in front (a) and outer view (b).

long processes, one of which is long, in the shape of a narrow plate, not infrequently somewhat twisted, curved in its distal portion; from the hind margin of the dilated portion of the spur arises the second process, which is first curved inwards, then forwards crossing the distal part of spur, and is acute at its end (text-fig. 60). Anterior wings brown, with pale markings in the cells behind the anastomosis, oval

spot behind the discoidal cell, spot in the basal part of 4th apical cell and the neighbouring spot in the area between M_4 and CuA are more distinct; cross-vein m-cu at thyridium subhyaline, pale marking is also before DC, along RS_{1-2} . Posterior wings brownish; abdomen brown.

♀. Coloration of females somewhat variable; in some specimens anterior wings are brownish yellow, legs yellow, with brownish tarsi; body brown; antennae usually yellow, with dark annulations; basal part darker; palpi dark yellow.

The specimen from Assam is dark, with brown wings; the inner spur of the posterior legs is better preserved than in male from Lonton, which is represented in text-fig. 61.



TEXT-FIG. 61.—*Dipseudopsis lamellata*, sp. nov., ♂; right inner posterior spur, outer view of the specimen from Mangaldai.

In the structure of inner spur of the ♂ this species resembles *D. indica* McLach.

3. *Dipseudopsis triclavata*, sp. nov.

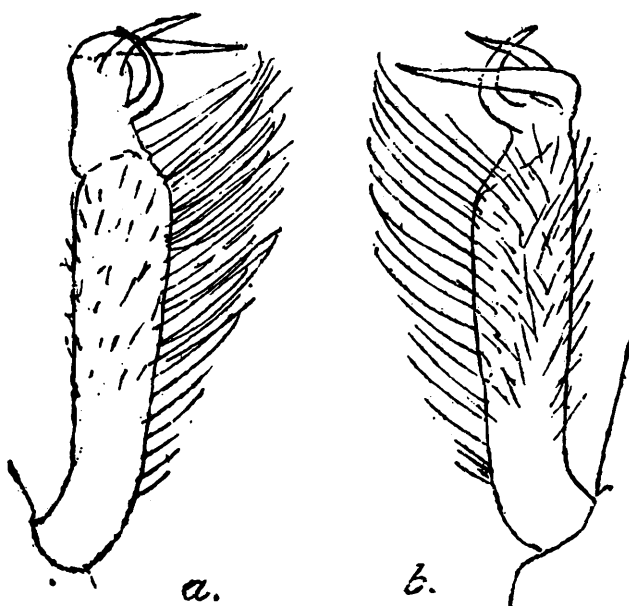
(Figs. 62-64.)

♂, ♀. Khanapur, Belgaum district, Bombay Presidency. 18-19.xi.1928. B. Prashad and H. S. Rao.

♂. The Peak, Shillong, Assam, 8,400 ft. 12.x.1914. S. W. Kemp.

Head and thorax black-brown; palpi brownish; antennae reddish brown, in their distal portion becoming reddish to reddish-yellowish; basal joints brownish. Inner posterior spur in ♂ but a little shorter than the outer, cylindrical, in its apical portion bearing three slender and acute processes; inner process the longest and curved away from the leg; externally from it is situated the second, shorter process, also turned outwards; the third process arises a little nearer to the base; it is claw-shaped and is curved in opposite direction towards the leg; the spur is provided behind with a row of long hairs (text-fig. 62).

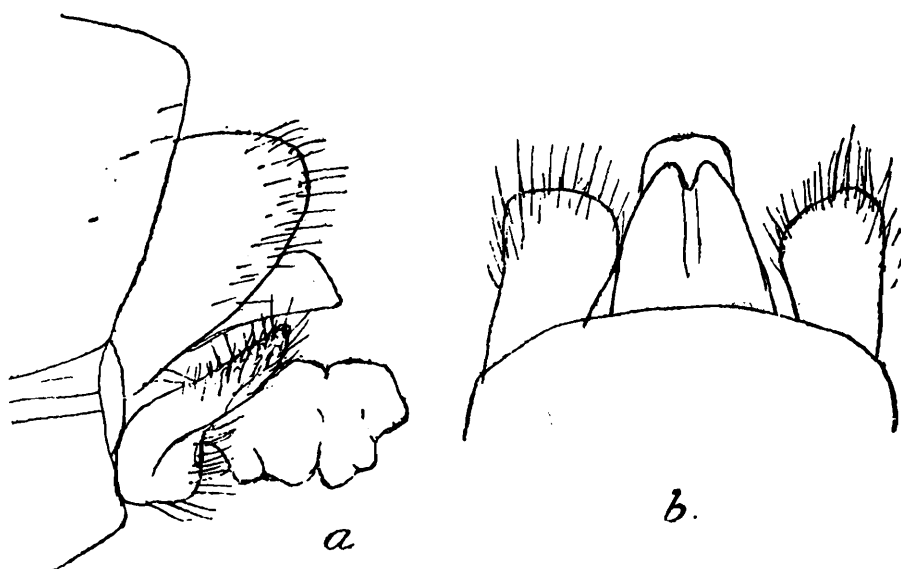
Anterior wings brownish, becoming paler just behind the anastomosis, pale spot behind DC is a longitudinal pale spot; the regions of thyri-



TEXT-FIG. 62, a, b.—*Dipseudopsis triclavata*, sp. nov., ♂; left posterior inner spur, outer (a) and inner (b) views.

dium and of arculus also somewhat paler; golden yellow hairs also present. Abdomen brown.

♂. Preanal appendages large, seen from side rounded at their hind edge; see from above they are also more rounded than in

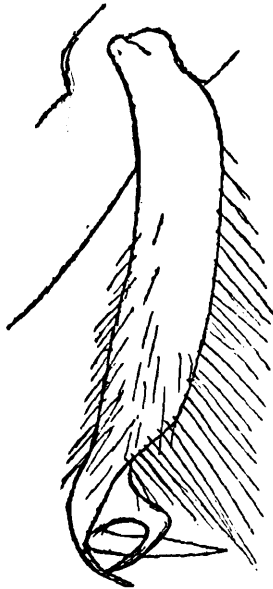


TEXT-FIG. 63, a, b.—*Dipseudopsis triclavata*, sp. nov., ♂; genital appendages from side (a) and above (b).

D. indica and truncated rather inwards to the base; 10th segment more narrowed to its end than in *D. indica*, with a median excision. Pedes genitales more slender externally than in *D. indica*; penis very thick and irregular from side.

The specimen from the Peak, Shillong, Assam, is somewhat different in the end-process of the inner spur being very slender (fig. 64); it

may be a distinct form, but I do not think it represents a distinct species as the genital appendages are similar to those of the specimen from Khanapur.



TEXT-FIG. 64.—*Dipseudopsis triclavata*, sp. nov., ♂; left posterior spur, outer view of the specimen from Shillong.

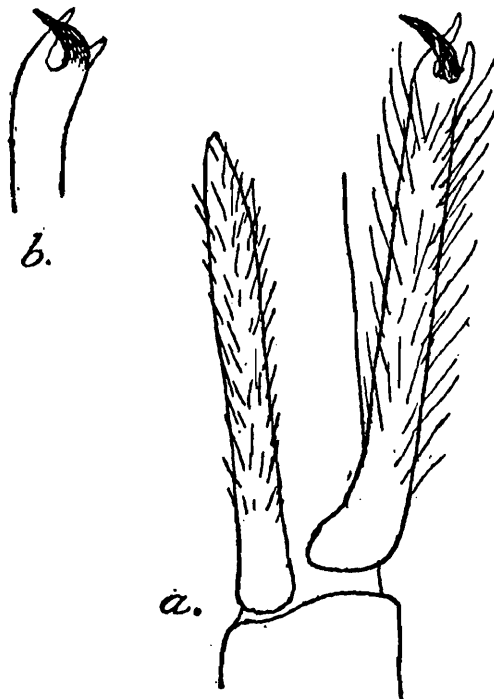
4. *Dipseudopsis recta*, sp. nov.

(Fig 65.)

♂. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.1918. N. Annandale and F. H. Gravely.

♂, ♀. Purulia, Manbhum district, Chota Nagpur. 10.ii.1912.

Head and thorax brownish above, yellow beneath; antennae yellow. Legs yellow; inner posterior spur in ♂ a little longer than the



TEXT-FIG. 65.—*Dipseudopsis recta*, sp. nov., ♂; left posterior inner spur, anterior (a) and outer (b) view.

outer (text-fig. 65), straight inwards; from between them arises a third, longer, claw-shaped brown process, curved outwards. Anterior wings pale, yellowish. Abdomen pale.

This species differs in its pale coloration and the structure of the inner spur in ♂, which is similar to the outer but bears at its end three small processes.

5. *Dipseudopsis bombayana*, sp. nov.

(Figs. 66, 67.)

♂. Gokak, Belgaum district, Bombay Presidency (at light). June 1928. B. Prashad and H. S. Rao.

Head and thorax brown; antennae reddish brown, palpi brownish-yellowish; legs yellow; inner posterior spur in ♂ equal in length to



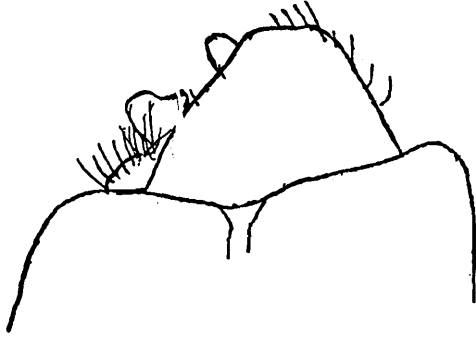
TEXT-FIG. 66, a, b.—*Dipseudopsis bombayana*, sp. nov., ♂; left posterior inner spur, outer view (a); (b) apex of the same from inside.

the outer, straight, slender, at its end somewhat curved forwards and provided with two forwardly directed short slender processes; the third process is longer and thicker and is directed outwards to the right. Anterior wings brownish yellow; pale spots behind DC and at thyridium indistinct. Abdomen brown.

♂. Preanal appendages yellow, very broad and, if seen from side, truncated at ends, concealing pedes genitales and 10th segment.

Length of body 9 mm.

This species reminds of *D. recta*, sp. nov., but differs in the structure of the inner posterior spur in the ♂.



TEXT-FIG. 67.—*Dipseudopsis bombayana*, sp. nov., ♂; genital appendages from side.

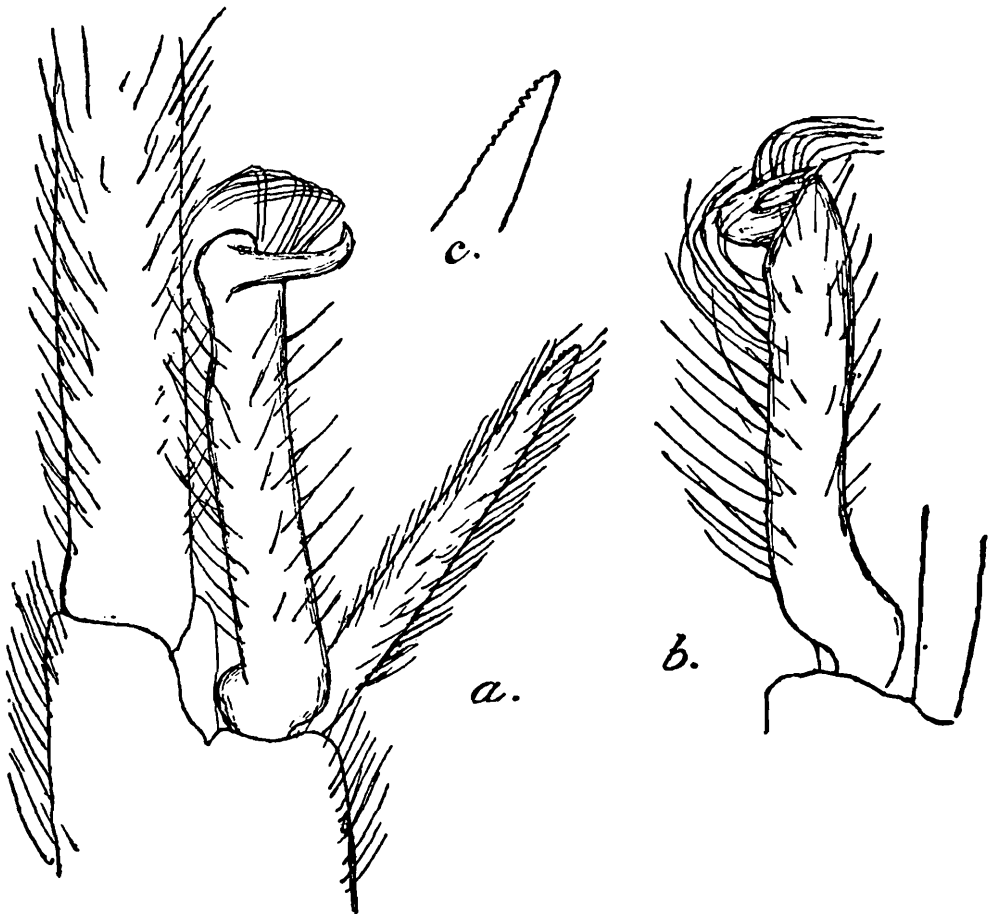
6. *Dipseudopsis bicolorata*, sp. nov.

(Figs. 68, 69.)

2 ♂, ♀. Castle Rock, North Kanara district, Bombay Pres. October 1916. S. W. Kemp

♂. Talewadi, Castle Rock, N. Kanara district, Bombay Pres. 3-10.1916. S. W. Kemp.

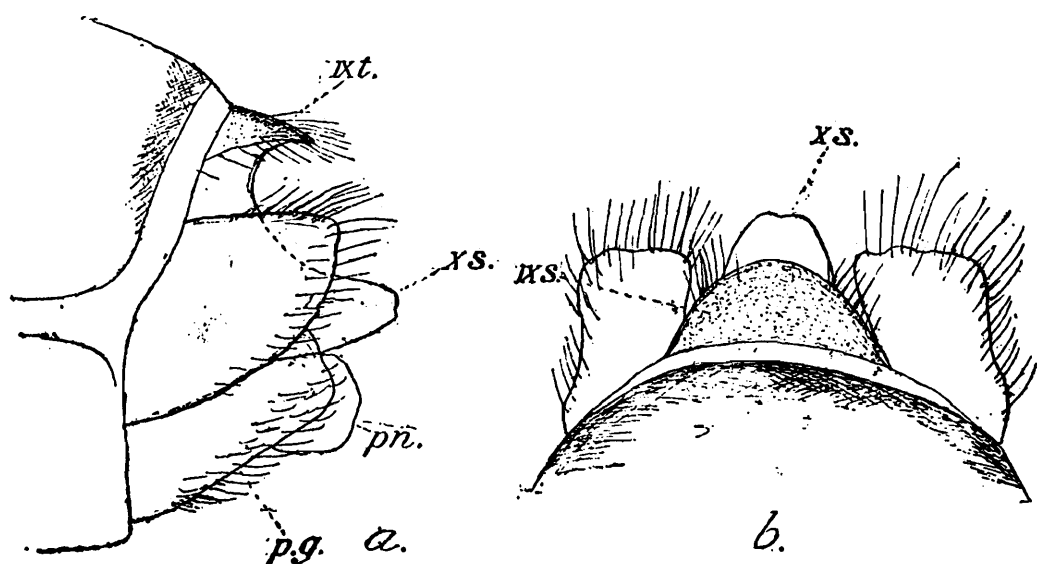
Head and the basal joint of antennae lightly yellow; clypeus brown; antennae except the basal joint maxillary and labial palpi brown, the basal pieces of maxillae and their long outer lobes yellow. Pronotum and epimera yellow, episterna and anterior legs brown; mesonotum



TEXT-FIG. 68, a-c.—*Dipseudopsis bicolorata*, sp. nov., ♂; (a) right posterior inner spur, from inside; (b) the same, anterior view; (c) apex of the outer spur, more enlarged, with its teeth.

and metanotum brown, pleura brownish yellow, coxae and femora of median and posterior legs yellow, tibiae and tarsi brown, with dark brown spurs; inner posterior end spur in ♂ equal in length to the outer, straight and at its end, provided with a process, curved forwards and then outwards; apex of the spur provided with a tuft of long hairs, curved towards the leg and outwards. Outer spur provided with a row of microscopical teeth at its end. Abdomen brown (♂), with pale lateral lines; female abdomen brown above, yellowish beneath. Anterior wings brownish, hairy, darker in the anterior and apical portions; posterior wings paler; discoidal cell elongated, rhombic, triangular at its base and end; median cell a little longer.

♂. 9th tergite rather small, with rounded apical margin; 10th segment separated from it by a broad, large excision; seen from above



TEXT-FIG. 69, a, b.—*Dipseudopsis bicolorata*, sp. nov., ♂; genital appendages from side (a) and from above (b).

it is narrower than 9th tergite and is feebly excised at its end. Preanal appendages large, seen from above they appear truncated at ends, hairy; pedes genitales hidden partly under the preanal appendages.

Length of body 14 mm.

This species has a distinctive coloration. It reminds of *Dipseudopsis* sp. (Betten, 1901), but in the latter species the maxillary lobes are longer and thicker; the colouring and structure of ♂ inner end spur are also different.

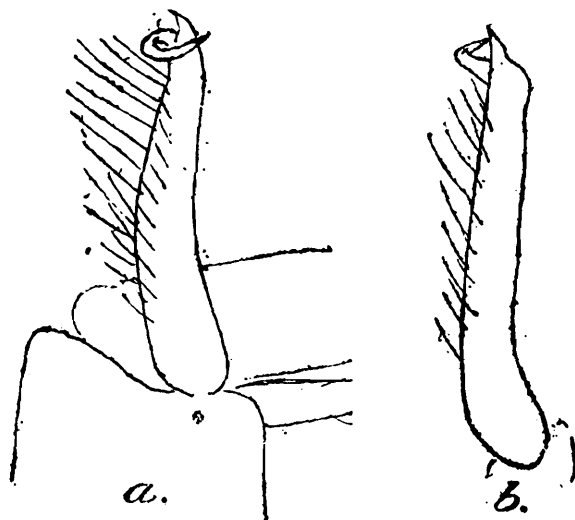
7. *Dipseudopsis pallida*, sp. nov.

(Fig. 70.)

♂ and ♀ in copula. Pusa, Bihar. 31.iii-4.iv.1911. F. H. Gravely.

Head brown above, pale in the remaining parts; palpi pale; antennae yellow with a short longitudinal brown slender stripe in the basal part, externally. Thorax yellow, pale beneath; legs pale, wings very pale, abdomen pale. In male the posterior inner end spur a little shorter than the outer, ending in a short triangular process anteriorly; from its

posterior side arises a longer process acute at end and curved forwards and inwards.



TEXT-FIG. 70, *a, b.*—*Dipseudopsis pallida*, sp. nov., ♂; right posterior inner spur, inner (*a*) and anterior (*b*) views.

Length of ♂ body 11 mm., that of ♀ 13.5 mm.

To this species should perhaps also be referred a ♀ from Kierpur, Purneah district, Bihar (26.ix.15, C. Paiva), which is also wholly pale.

Hyalopsyche ULMER.

1. **Hyalopsyche rivalis** Betten.

Hyalopsychodes rivalis, Betten, *Rec. Ind. Mus.*, III, p. 231, pl. xvi, figs. 5-7 (1909).

Not present in the collection before me. This species was described from Rajshahi, E. Bengal.

2. **Hyalopsyche similis**, sp. nov.

(Figs. 71, 72.)

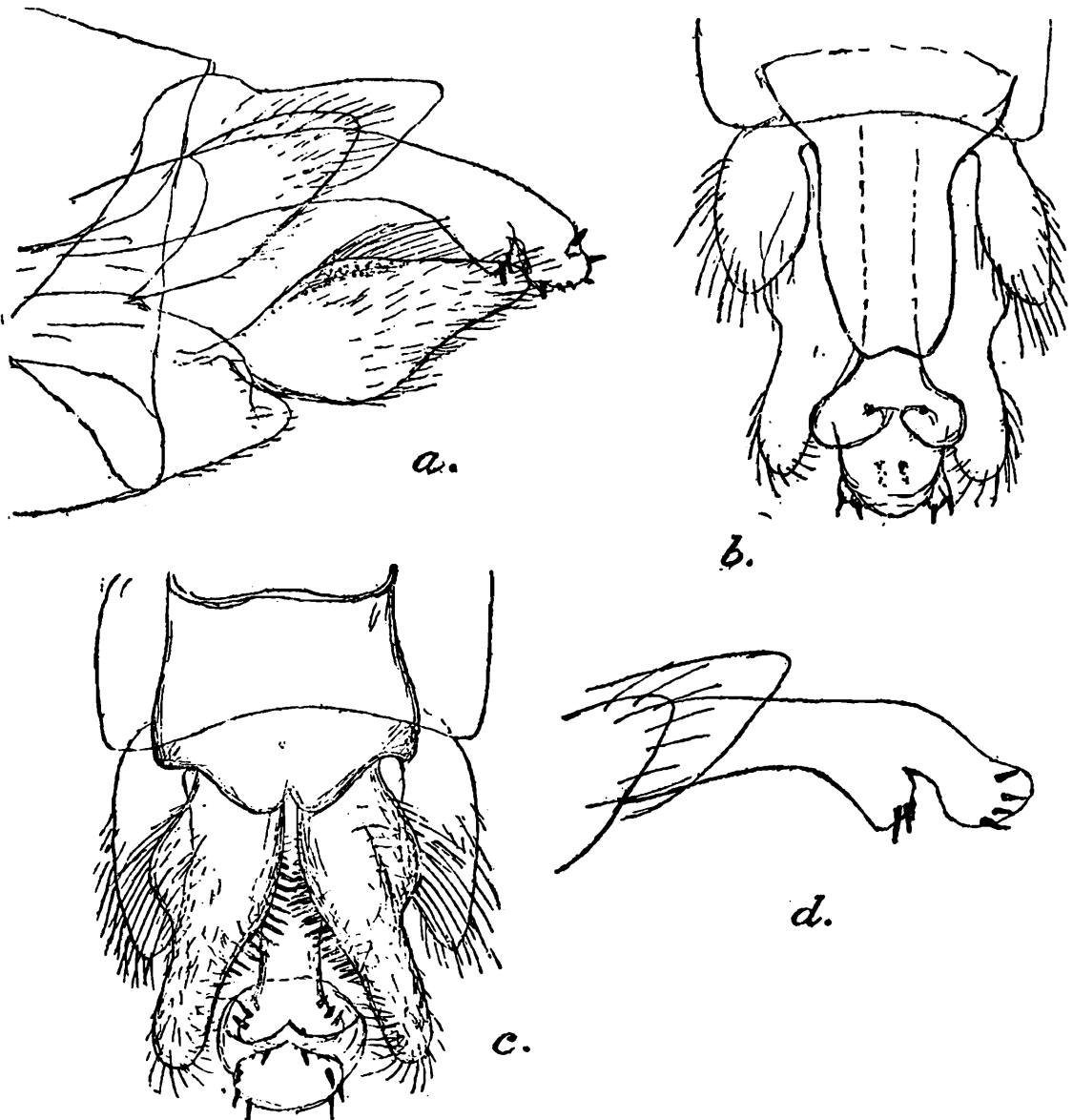
2 ♂, 2 ♀. Neighbourhood of Dhupdal and Gokak, Belgaum district, Bombay Presidency. June 1928. B. Prashad and H. S. Rao.

2 ♀. Katihar, Purneah district.

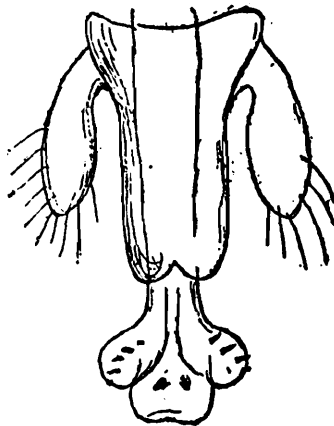
Similar to *H. rivalis* and *H. amurensis* Mart. Head and thorax reddish-yellowish, legs and antennae yellow. Anterior wings clothed with yellow hairs; venation similar to that in *H. rivalis*, but DC appears to be more dilated at its end and more triangular, 2nd fork impinging on it not as far; 1st apical fork a little longer than in *H. rivalis*, 3rd fork also with short pedicel. In posterior wings 3rd apical fork nearly equal to its pedicel, cross-vein m-cu arising from the base of M_3+4 .

♂. Structure of genital appendages similar to that of *H. amurensis* Mart., differing mainly in the shape of pedes genitales and of penis. Preanal appendages large, elongated; 10th segment forming, above, an elongated plate with slightly excised apical margin. Pedes genitales broad, narrowing to their ends; their upper and lower margins convex from side, the upper bearing a tuft of long hairs in the middle; internally

they are provided with a series of spinules near the lower edge ; another series of spinules is situated near the upper margin ; seen from beneath



TEXT-FIG. 71, a-c.—*Hyalopsyche similis*, sp. nov., ♂ ; genital appendages from side (a), above (b) and below (c) ; d. penis from side.



TEXT-FIG. 72.—*Hyalopsyche amurensis* Mart., ♂ ; dorsal plate and penis from above.

the appendages are markedly dilated in their basal halves. Penis erectile in its apical portion; viewed from side it is subdivided here into a short lower and an elongated broad upper lobe; the lower lobe is provided with two lateral groups of 3 spines each; the upper lobe bears two lateral series of 4 spinules each; these spinules are clearly seen from below, but from above only two spinules are perceptible on each side and two more dark spots in the middle.

Length of body 4.7—5.2 mm.

This species is allied to *H. rivalis* Betten, but is only half its size. Unfortunately the males of *H. rivalis* have not been described and any comparison of the genital appendages is, therefore, not possible.

H. similis, sp. nov., is also allied to *H. amurensis*, but the shape of the apex of penis in the new species is somewhat different; it forms here two side-lobes, each bearing behind 4 spinules; these spinules are well seen from above, but not from beneath (text-fig. 72).

Since the structure of ♂ genital appendages in *H. rivalis* remains unknown, it is possible that the specimens before me may belong to *H. rivalis*, but as *H. rivalis*, according to Betten, is twice the size of the specimens from the Bombay Presidency, I do not think that the two forms are identical.

3. *Hyalopsyche parvula*, sp. nov.

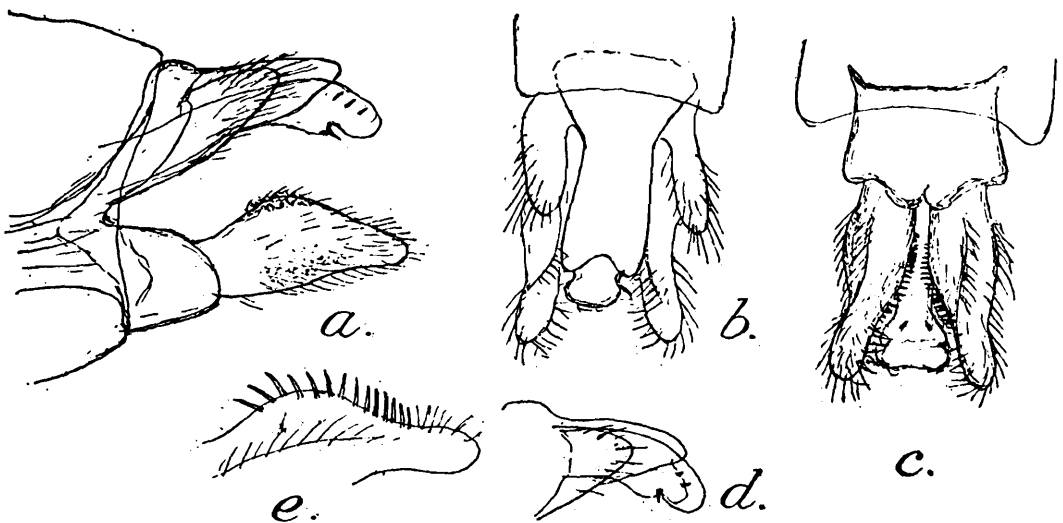
(Fig. 73.)

♂. Tezpur, Mangaldai district, Assam. 8.9.10. S. W. Kemp.

Similar to the foregoing species, but smaller, the length of the body being only 3.5 mm.

Venation of anterior wings similar to that of *H. rivalis*, but the cross-vein *rs-m* and that closing the discoidal cell situated nearly on same level; pedicel of the 3rd apical fork very short. In the posterior wings 3rd apical fork is longer with very short pedicel; 1st apical fork present.

♂. Male genital appendages resembling more those in *H. amurensis* Mart. Dorsal plate excised behind; pedes genitales similar to those



TEXT-FIG. 73, a-e.—*Hyalopsyche parvula*, sp. nov., ♂; a-c. genital appendages from side, above and below; d. penis from side; e. pedes genitales from above and somewhat internally.

in *H. amurensis*; their dilated basal portions, seen from beneath, are twice longer than the narrower apical portions, and do not project outwards as strongly, as in *H. similis*, sp. nov. Penis bearing before its end two small side-lobes, each with one spinule; on each side of the apical portion are situated only 2-3 small spinules.

This species is closely allied to *H. amurensis*, but is, apparently, distinct, as it differs in the structure of the apical portion of the penis and is much smaller.

Hyalopsyche sp.

2 ♀. Katihar, Purneah district, Bihar. 7-31.viii.10. C. Paiva.

Fam. ARCTOPSYCHIDAE.

Arctopsyche McLach.

Arctopsyche lobata Mart.

Arctopsyche lobata Martynov, *Proc. Zool. Soc. London*, p. 77, figs. 20-21 (1930).

♂, ♀. Darjeeling district, Bengal, E. Himalayas. Lynch.

♂. Darjeeling district, 7,000 ft., Bengal. 11.vi.14. F. H. Gravely.

2 ♂. Punj-pul Nullah, about a couple of miles from Dalhousie, on Dalhousie-Bakloh Road, 6,500 ft., Punjab. May 1927, at light. S. L. Hora.

Similar to the type-form from Tibet, but the anterior wings are somewhat broader, DC also is a little broader. Preanal appendages similar, but not thickened in their distal parts; penis not so much bent downwards. Although there is some difference in the structure of preanal appendages I do not believe the specimens mentioned above constitute a distinct species.

Fam. HYDROPSYCHIDAE Curt.

Sub-family : HYDROPSYCHINAE.

Hydropsyche Pict.

1. Hydropsyche kaznakovi Mart.

(Fig. 74.)

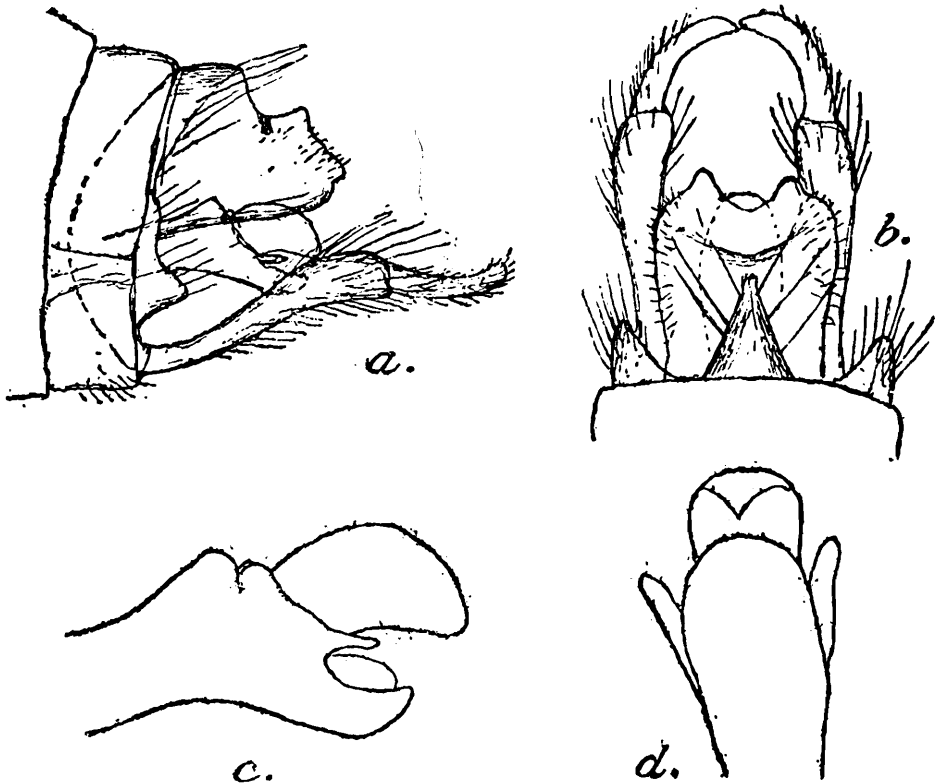
Hydropsyche kaznakovi Martynov, *Ann. Mus. Zoolog. Acad. Imper. Sci.* XIX, p. 411, figs. 6, 7 (1915).

3 ♂. Chimiksan stream, a little below Kunisht, Rambhur Valley, Chitral, N.-W.-F. Province. 4.vii.1929. B. N. Chopra.

Head brownish, clothed with brownish and greyish hairs, but anteriorly there is a patch of white hairs. Antennae yellow with dark oblique line. Thorax brown above, clothed with greyish yellow hairs; yellowish brown beneath; legs yellow. Anterior wings pale greyish brown, sprinkled with numerous pale irrorations, bearing pale yellow hairs. Posterior wings greyish; median cell closed.

♂. Structure of ♂ genital appendages identical with that in the type-form from E. Bukara, Russian Turkestan. 9th tergite triangularly produced, as seen from above, bearing several hairs on its hind

margin. 10th segment thick, excised above behind 9th tergite, appearing obliquely truncated at its apex if seen from side; hind margin



TEXT-FIG. 74, a-d.—*Hydropsyche kaznakovi* Mart., ♂; a, b. genital appendages from side (a) and from above (b); c, d. penis from side and from below.

excised (if seen from above). Basal joint of pedes genitales long, somewhat thickened in its distal part; second joint moderately short, curved inwards. Penis thickened in its apical portion, forming large upper and shorter lower lobes; side-portions forming two short processes above the lower lobe.

Length of body 7 mm.

The structure of the penis appears to be somewhat different from Martynov's figure 6 (*op. cit.*, p. 411), but the species was described from a single specimen, in which all details of the structure of the penis could not be elucidated. *Hydropsyche kaznakovi* belongs to the group of *H. ornatula* McLach. (Europe, Siberia), *H. guttata* Pict. (Europe, Siberia), *H. gracilis* Mart. (Caucasus, Turkestan) and some other South European and West Asiatic species.

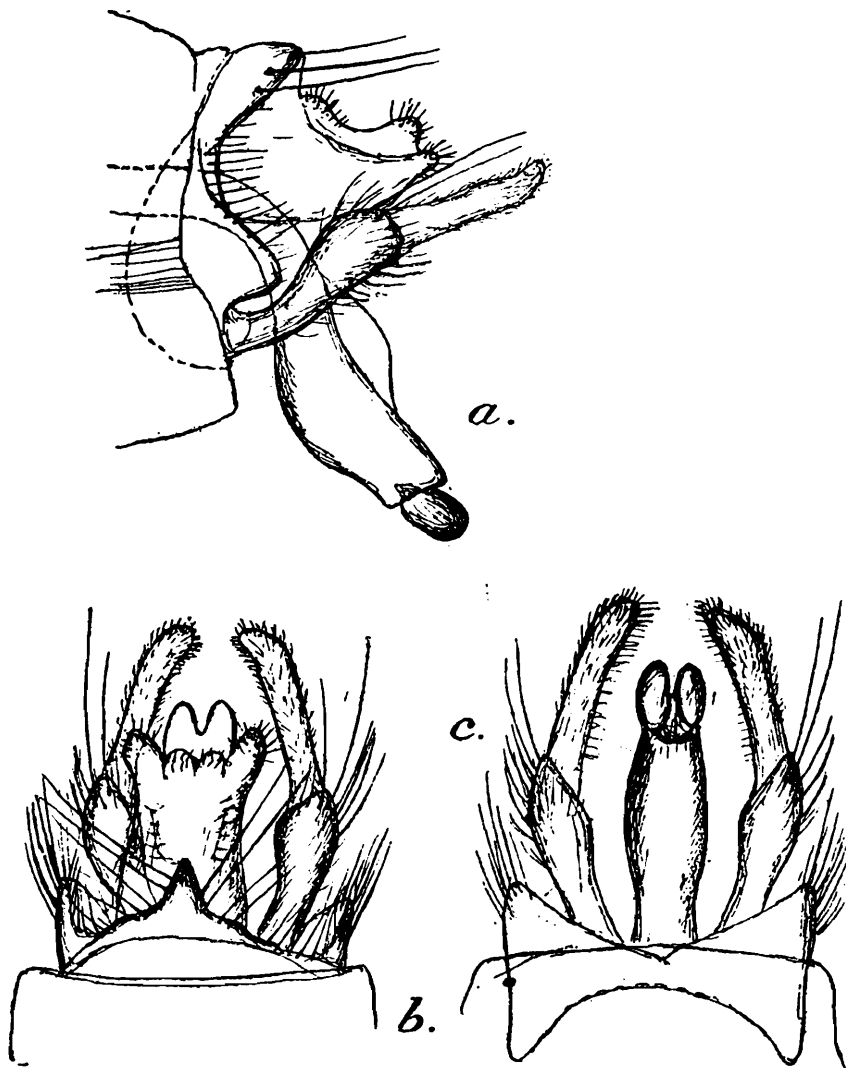
2. *Hydropsyche obscura*, sp. nov.

(Fig. 75.)

♂. Darjeeling district, Bengal. Lynch.

Head and thorax black, legs black-brown, abdomen brown. Anterior wings brown, clothed with brown hairs; 2nd apical fork reaching the middle of discoidal cell, 1st fork acute, but sessile, 3rd fork with a short pedicel, 4th deeply impinging on median cell (up to $\frac{2}{5}$ of its length). Venation of posterior wings is similar to that of the fore-wings, but the 1st fork is pedicellate and equal in length to its pedicel.

♂. 9th tergite rather narrow, forming a small median black triangular projection, well seen above and bearing at sides 2-3 stiff black



TEXT-FIG. 75, *a-c.*—*Hydropsyche obscura*, sp. nov., ♂; genital appendages from side (*a*), above (*b*) and below (*c*).

hairs. Side-portions of 9th segment each forming a subtriangular projection above the base of pedes genitales. 10th segment thick, elongated, parallel-sided, with a shallow saddle-shaped excision above; its end-portion subdivided by a small median excision into two small rounded hairy lobes, laterally and below it are situated two other more elongated processes, also bearing minute hairs. Basal joint of pedes genitales comparatively short, strongly thickened in its distal portion, indistinctly separated from the second joint by an oblique boundary (from both above and below). Second joint equal in length to first, yellowish, straight. Penis curved downwards and strongly thickened ventrally before the apex; dorsally there is a membranous dilatation. End-portion small, capitate, sharply separated from proximal part; from below it is seen to consist of two ovoid lobes, situated near each other.

Length of body 5.5 mm.

Since tarsi of the legs are badly preserved, the presence of tufts on the last tarsal joints is not evident, and the inclusion of this species in the genus *Hydropsyche* is, therefore, somewhat uncertain.

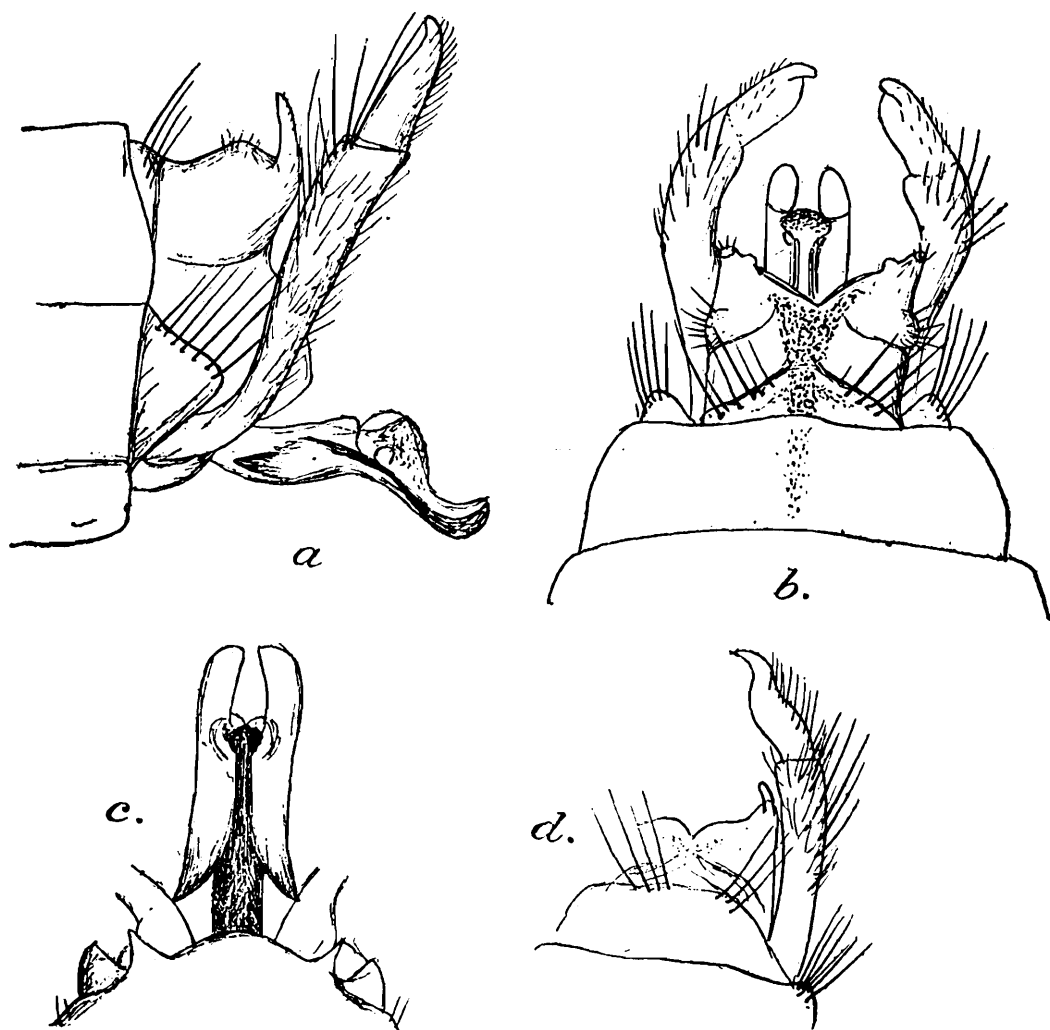
3. *Hydropsyche tenuicornis*, sp. nov.

(Fig. 76.)

♂, 6 ♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.1918. N. Annandale and F. H. Gravely.

2 ♂. Nerbudda Survey. The river at Mandla. November 1927. H. S. Pruthi.

Head yellow, brownish above, with two large oval posterior warts. Antennae yellow, with brown oblique line; palpi yellow. Thorax yellow, darker above; legs yellow, spurs long. Anterior wings pale greyish yellow, with yellow veins; SC and R thick in their distal portions; discoidal cell elongated, rs-m arising from the middle of RS_{3+4} ; first apical fork short. Posterior wings greyish; SC thick, R slender, RS approximated near its base to M; DC elongated, cross-vein rs-m oblique; apical fork 1 present, small; fork 2 deeply impinging on DC; median cell closed, elongated. Abdomen greyish, abdominal segments bordered posteriorly with brownish bands. In the female the median legs are feebly dilated.



TEXT-FIG. 76, a-d.—*Hydropsyche tenuicornis*, sp. nov., ♂; a, b. genital appendages from side and above; c. penis from below; d. genital appendages of another specimen from above.

♂. 9th segment forming two triangular projections above the base of pedes genitales; its tergite only slightly projecting behind 8th tergite and bearing along its hind border several hairs. 10th segment very broad from side and from above, triangularly excised behind; from the ends of its two triangular end-portions arise two slender digitiform processes, directed upwards; anterior to these are two oval hairy projections. Basal joint of pedes genitales very long; slightly thickened in its distal portion; 2nd joint a little shorter than the half of the length of first one, its end-portion attenuated. Penis having a rounded end-portion, prolonged below into two lobes, directed backwards; each of these lobes is extended to the base of penis and forms beneath two triangular processes on the sides of penis.

Length of body 5 mm.

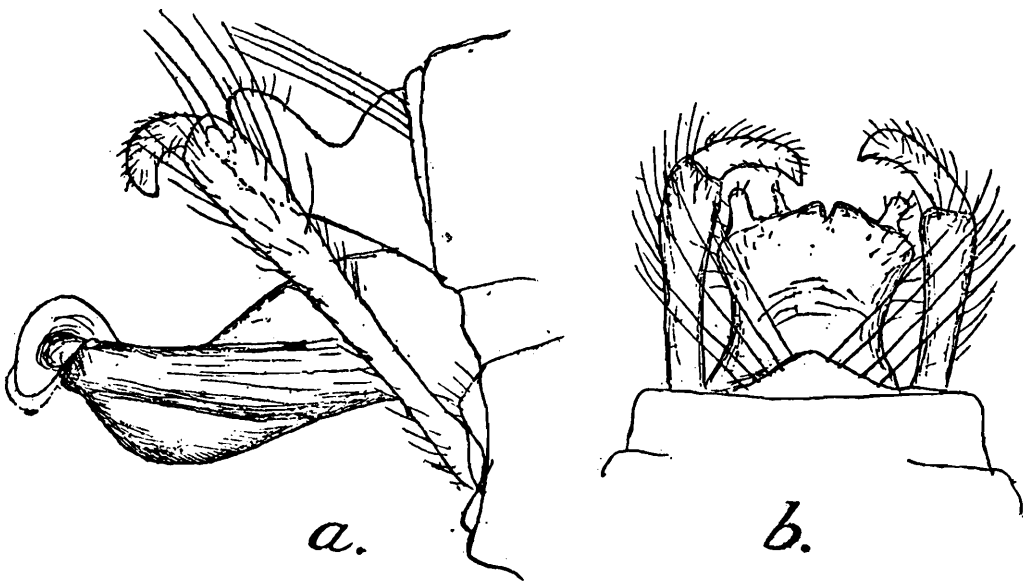
This species appears to be allied to *H. javanica* Ulm. and *H. hamifera* Ulm.

4. *Hydropsyche pallidipennis*, sp. nov.

(Fig. 77.)

♂. Kumaon Hills, Katarmal, ca. 4,500 ft., Almora district, U. P.; bushes and trees on the banks of the Kosi. 29.v.1930. H. S. Pruthi.

Head brown, clothed with yellow hair; antennae yellow, distal parts of joints brownish, forming a spiral line; palpi yellow. Thorax dark brownish above, paler beneath; metanotum brownish; legs yellow, tibiae brownish externally. Anterior wings pale yellowish, clothed with short yellow hairs; discoidal cell long. Rs_{1+2} short, its fork equal to the discoidal cell (DC); 3rd apical fork with a long pedicel, 4th a little impinging on MC. Posterior wings pale; DC also long, 2nd apical fork reaching its middle, 1st fork short; R running separately from SC, slender, weak, connected by an oblique cross-vein with DC, then approximated to SC; fork 3 shorter than the fork 2; MC open. Abdomen brownish; segments bordered with greyish behind.



TEXT FIG. 77, a, b.—*Hydropsyche pallidipennis*, sp. nov., ♂; genital appendages from side (a) and above (b).

♂. Genital appendages brownish. 9th tergite forming an obtuse subtriangular projection backwards and bearing two groups of long hairs behind. 10th segment, seen from side, rather narrow, deeply constricted above, near the middle; seen from above broad, but also somewhat constricted at sides; its apical portion provided with two short processes; in the middle of the hind margin is a short narrow excision. Basal joint of pedes genitales straight, long, somewhat thickened in distal part; second joint short, directed inwards. Penis thick, curved, forming a broad convexity downwards, if seen from side; its apical portion provided with two oval pale lobes, curved downwards. Length of body 4.5 mm.

In the structure of the 10th segment and the open median cell in the hind wings this species reminds of the genus *Cheumatopsyche* Wall. and, perhaps, may be referred to it. The species probably occurs in quick running rivers and streams, like *Cheumatopsyche*.

5. *Hydropsyche processuata* Mart.

Hydropsyche processuata Martynov, *Ann. Mus. Zoolog. Acad. Sci. U. R. S. S.*, p. 190, pl. v, figs. 51-53 (1927); ——— *Trich. Annulipalpia of U. S. S. R.*, Leningrad, p. 290, fig. 212 (1934).

4 ♂, 6 ♀. At light. Mokameh Ghat.

These specimens differ from the Persian form in paler coloration; the male genital appendages, however, are similar in structure to the Persian. The species is known from Persia (Shellalli).

6. *Hydropsyche* sp.

♀. Junction of two streams about a mile below Pharisemar, Rewah State, C. I. 18.ii.1927. S. L. Hora.

Spurs long; 2nd fork in posterior wings deeply impinging on the discoidal cell up to its middle length of body 5.5 mm.

Cheumatopsyche Wall.

Cheumatopsyche Wallengren, *Skandin. Neuroptera II, Kongl. Sv. Vet. Akad. Handlingar*, XXIV, No. 10, p. 142 (1891); *Hydropsyche* Auct. (partim); *Ulmeria* Navas, *Broteria, Ser. Zool. XVI*, Fasc. 1, p. 75 (1918); *Cheumatopsyche* Martynov, *Trich. of U. S. S. R. I.* Leningrad, p. 282 (1934).

1. *Cheumatopsyche truncata*, sp. nov.

(Figs. 78, 79.)

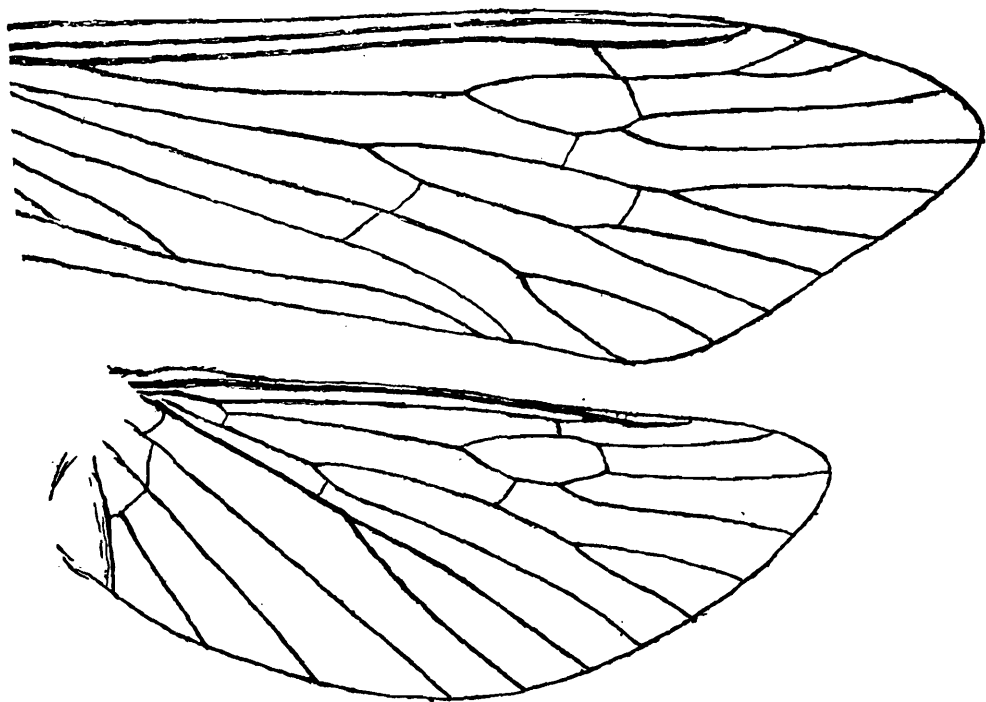
♂. Company Khud, below Landour Bazar, Mussoorie, Dehra Dun district, U. P. 18.vi.1930. B. N. Chopra.

♂, ♀. Tura, Garo Hills, Assam, 1,200-1,500 ft. June-July 1917. S. W. Kemp.

2 ♂, ♀. Machrar Nala, tributary at Chapra, 2,625 ft., Rewah State, C. I. March 1927. H. S. Pruthi.

Head dark yellow or brown, with 2 oval yellow warts above. Antennae yellowish or brownish with indistinct annulations. In maxillary

palpi 2nd joint longer than 3rd, 4th nearly equal to 3rd. Thorax brownish above, scutellum pale yellow; under side paler. Legs yellow, spurs long. Anterior wings brownish-yellowish, with brown venation;



TEXT-FIG. 78.—*Cheumatopsyche truncata*, sp. nov., ♂; Venation of wings.

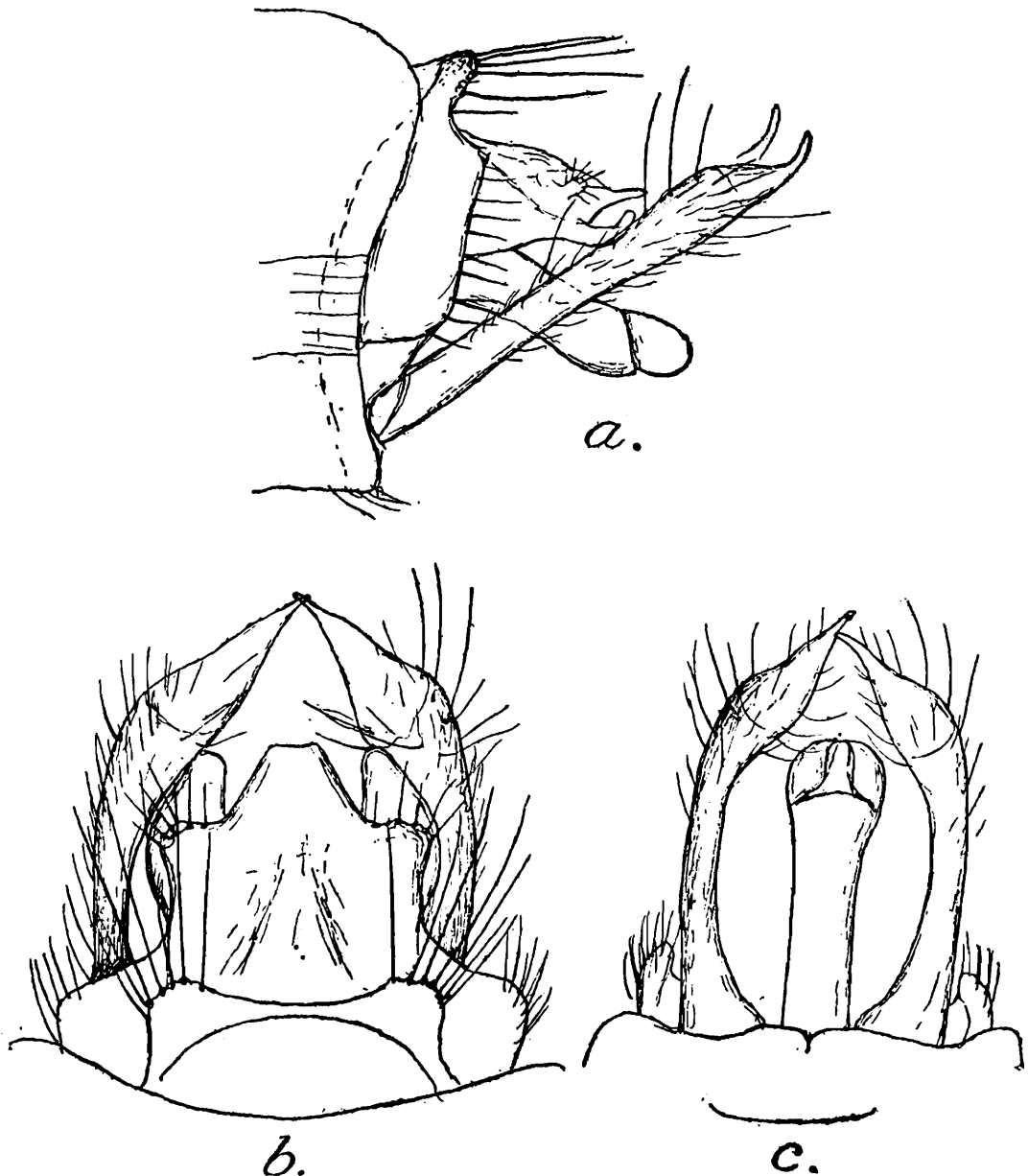
DC elongated, 1st fork equal to its pedicel; MC almost twice longer than DC, 3rd fork with a short pedicel, 4th impinging on MC. In posterior wings 1st fork is absent; DC elongated, closed with an oblique cross-vein; 3rd fork short; M not approximated to Cu. Abdomen yellowish, darker above.

♂. 9th tergite narrow and forming above two postero-lateral prominences, each bearing several long hairs; side-portions of 9th segment broad, with hind margin straight, bearing several hairs; 9th sternite narrow, imperceptible. 10th segment, seen from above, large, broad, forming a median triangular projection truncated at its end; postero-lateral angles rounded, bearing several bristles. Seen from the side 10th segment is much narrower and terminates ventrally in two processes, which are slender in side view, but broad, plate-like in dorsal view; median hind projection of 10th segment is also plate-like, and narrow from the side. Basal joint of pedes genitales long and straight, slightly thickened in its apical portion; 2nd joint short, thick in its basal part, and acute at its end, triangular from above; its base but indistinctly separated from 1st joint. Penis usual, not very thick, ending in a rounded apical portion, separated by an oblique boundary; seen from below this portion is seen to be divided into two lateral lobes, acuminate at their ends (fig. 76c).

Length of body 4.2—4.5 mm.

Cheumatopsyche truncata, sp. nov. is rather closely allied to the group of *Ch. infascia* Mart. and *Ch. albofasciata* McLach, from East Siberia.

This species, as well as the whole genus *Cheumatopsyche*, are evidently closely allied to the genus *Hydropsychodes* Ulm., and I believe that at



TEXT-FIG. 79, a-c.—*Cheumatopsyche truncata*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

least such species of *Hydropsychodes*, as *H. falcifera* Ulm., *H. obscurata* Ulm., the Indian *H. angusta* Ulm., *concava* Ulm., *auripennis* Ulm., *lucida* Ulm., *kraepelini* Ulm., belong to *Cheumatopsyche* Wall.

2. *Cheumatopsyche columnata*, sp. nov.

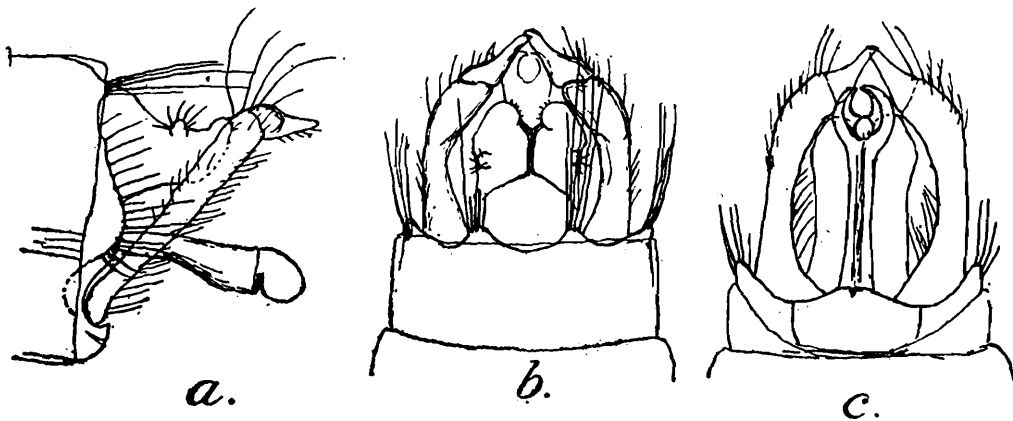
(Fig. 80.)

3 ♂, 3 ♀. Opposite the Camp at Harra, Rewah State, C. I. March 1927. H. S. Pruthi.

Head brownish, paler beneath; antennae yellow, with brownish annulations; palpi brownish yellow; pronotum greyish yellow, mesonotum brownish to brown, metanotum greyish brown, pale beneath; abdomen brownish above, pale beneath. Legs pale; in female median legs but slightly dilated. Anterior wings greyish yellow, with brownish

venation ; DC elongated ; 1st apical fork shorter than its pedicel ; MC $\frac{1}{2}$ or even more longer than DC and closed with a cross-vein, situated somewhat distant from cross-vein closing DC ; 5th fork beginning considerably earlier than the 4th. Posterior wings pale ; DC similar to that in anterior wings ; 1st fork lacking in ♂, present though small in ♀.

♂. Genital appendages shaped as in *Cheumatopsyche* (*Hydropsychodes*) *angusta* Ulmer. 9th tergite narrow, with two usual, hairy,



TEXT-FIG. 80, a-c.—*Cheumatopsyche columnata*, sp. nov., ♂ ; genital appendages from side (a), above (b) and below (c).

small projections behind. 10th segment elongated, concave above, ending in two thick oval lobes separated by a deep median excision ; before these lobes are situated two small oval projections or tubercles, bearing several short bristles. In the middle of the upper side is a chitinised rod, beginning in the middle of the segment and reaching the bottom of the hind excision. Basal joint of pedes genitales long, straight ; second joint short, attenuated to its end, but not acute ; end of 2nd joint provided above with several long curved hairs. Penis ending in a capitulum divided into the usual two lateral oval lobes.

Length of body about 4 mm.

This species is allied to *Ch.* (*Hydropsychodes*) *angusta* (Ulm.)—*Treubia*, XI, Livr. 4, p. 445, figs. 101-103 (1930).

3. *Cheumatopsyche curvata*, sp. nov.

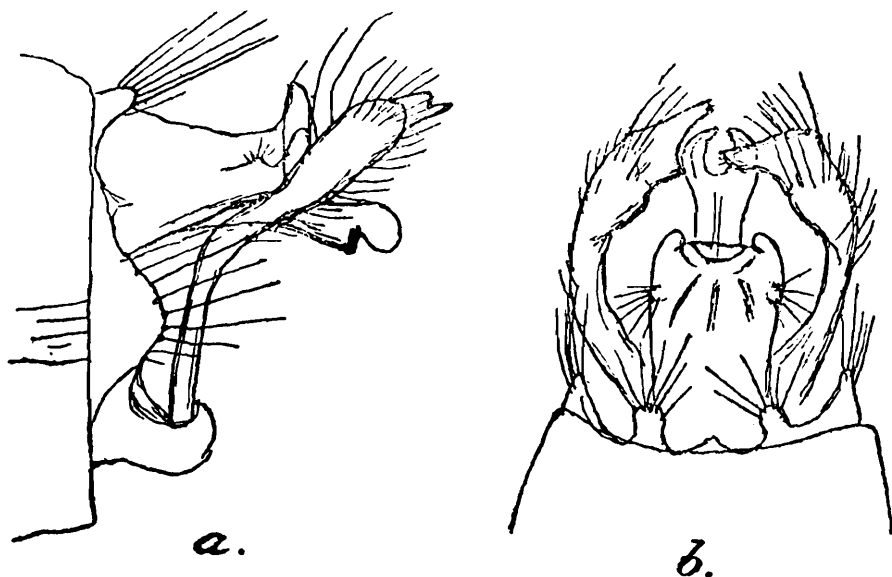
(Fig. 81.)

2 ♂, ♀. Opposite the Camp at Harra, Rewah State, C. I., Nerbudda Survey. March 1927. H. S. Pruthi.

Colouring yellowish or yellowish-brownish as in *Ch. columnata*, sp. nov. Anterior wings greyish yellow ; DC somewhat elongated, 1st apical fork nearly equal to its pedicel ; MC almost twice longer than DC and closed by the cross-vein in continuation of the one, closing the discoidal cell. In posterior wings fork 1 lacking in ♂, present but small in ♀. Median legs in female slightly dilated.

♂. 9th tergite with the usual two oval projections, bearing several outstanding hairs ; 9th sternite somewhat projected backwards, forming above a concavity for the bases of the pedes genitales (text-fig.

80a); 10th segment elongated, from above almost parallel-sided, truncated at end, with two small lateral rounded end-lobes (text-fig. 80b);



TEXT-FIG. 81, a, b.—*Cheumatopsyche curvata*, sp. nov., ♂; genital appendages from side (a) and above (b).

before these lobes are two very small rounded projections, clothed with short bristles. Seen from side, 10th segment is slightly concave above, but its end portion is suddenly curved upwards. Pedes genitales long, slender, curved, thickened in their distal portions; second joint coalesced with the first, short, broad from above, obliquely excised internally; in the right joint is a proximal angle, in the left one it is wanting (fig. 81b). Penis having the rounded end-portion, divided into two side-portions, as usual.

Length of body 4.4-6 mm.

***Cheumatopsyche* sp.**

There are a few other separate female specimens of this genus, which cannot be determined specifically.

Female from River at Basha Ghat, near Bargi (C. P.). December 1927. H. S. Pruthi.

In the wing venation this specimen resembles *Ch. curvata*, sp. nov.

♀. Junction of two streams about a mile below Pharisemar, Rewah State, C. I. 18.ii.1927. S. L. Hora.

***Hydatopsyche* Ulm.**

***Hydatopsyche spatulata*, sp. nov.**

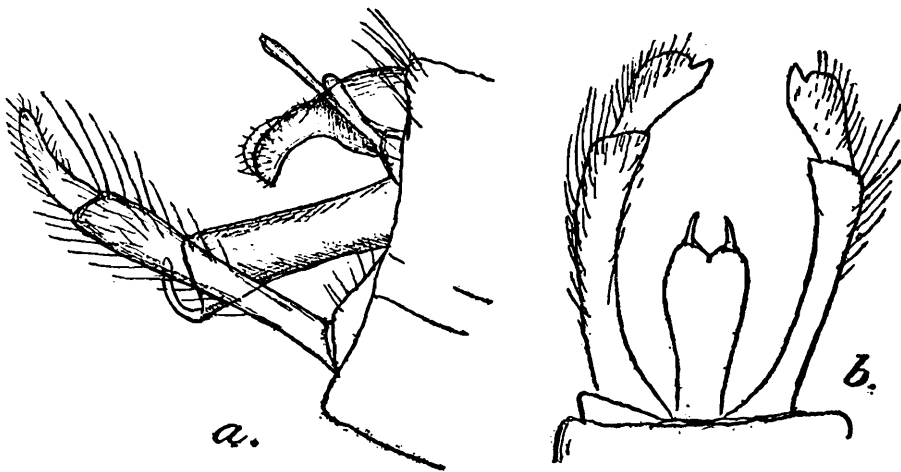
(Fig. 82.)

1 ♂, 8 ♀. Jog Falls, N. Kanara district, Bombay Presidency. 29.xi.1928. B. Prashad and H. S. Rao.

Head yellow, clothed with pale yellow hairs, hind (occipital) portion darker, brownish. Three basal joints of antennae yellow; joints of the next $\frac{2}{3}$ of antennae also yellow, in the distal portion of each joint

an oblique brown spot ; these spots form a sort of spiral line ; in the distal third each joint is pale in basal and brown in its distal half. Palpi yellowish. Thorax brown above, but the median portion is somewhat paler and clothed with yellowish hairs ; warts of pronotum yellow, with yellow hairs. Seen from below the thorax is somewhat paler ; legs brownish-yellowish, with long yellowish spurs. Anterior wings yellowish to brownish grey, sprinkled with numerous small pale irroration, clothed with short yellowish hairs ; DC elongated ; 1st apical fork a little longer than RS_{1+2} , 2nd fork deeply impinging on DC up to its middle ; cross-vein $rs-m$ oblique ; MC but a little longer than DC ; pedicel of the 3rd fork very short ; postcostal area pale ; several darker but indistinct spots situated along A_2 . Posterior wings greyish ; RS_{1+2} but a little longer than its fork ; DC long, narrow ; 2nd apical fork impinging on it a little further than its middle ; cross-vein $rs-m$ deriving from the basal part of DC ; MC open.

♂. Genital appendages resemble those of *Hydropsyche feminalis* Mart., yellowish-brownish. 9th segment in its greatest part covered up by 8th, and from side are seen but two obtuse subtriangular projections above base of pedes genitales. 10th segment narrow above and at its end subdivided into two lobes ; laterally it is not very broad in its basal



TEXT-FIG. 82, a, b.—*Hydatopsyche spatulata*, sp. nov., ♂ ; genital appendages from side (a) and below (b).

part, but its distal part is much narrower, covered with minute bristles and curved somewhat downwards. From the base of the 10th segment arise two long and slender preanal appendages, in their middle each forming an additional small rounded process, directed somewhat upwards (fig. 82a). Basal joint long, slender, second joint short, slender from side, but gradually dilated in its distal part, if seen from above or from beneath ; hind margin with a minute excision, separating a small inner lobe (text-fig. 82b). Penis long, cylindrical, somewhat thickened at its apex, which is truncated ; from its hind-lower edge arise two slender processes, curved upwards.

Length of body 6.4-8 mm.

This species resembles *Hydatopsyche feminalis* Mart., from Amurland, but is distinct. The males, as in that species, are much more rare than females.

Diplectrona WESTW.**1. *Diplectrona marginata* (Betten).**

(Figs. 83, 84.)

Hydromanicus marginatus Betten, *Rec. Ind. Mus.*, III, p. 236, pl. xv, fig. 13 (1909).

10 specimens, mostly ♂. Ghuma, Simla Hills, alt. 3,760 ft., Punjab; in jungle at light; 6-8.ix.1925. B. Chopra.

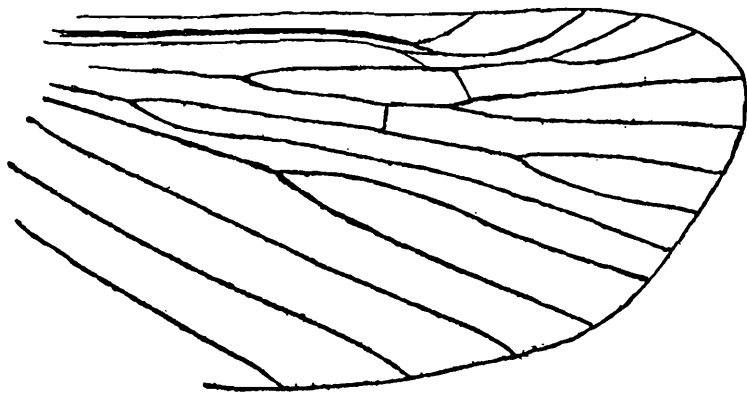
♀. Tindharia, Darjeeling district, Bengal, E. Himalayas. 9.x.1915. Mrs. Drake.

1 ♀. Darjeeling, Bengal, E. Himalayas. Lynch.

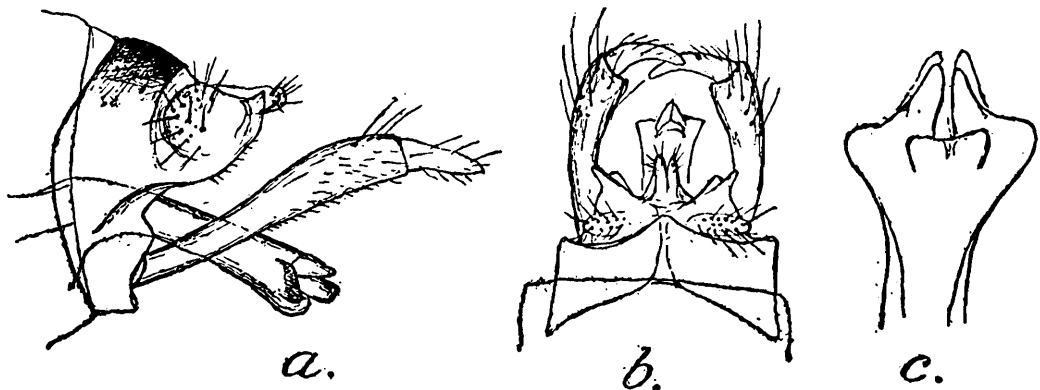
2 ♂, ♀. Kurseong, Bengal, E. Himalayas, 4,700 ft. 14-17.iv.1911. N. Annandale.

♂, ♀. Jabharket, on Mussoorie-Tehri Road, ca. 4 miles from Mussoorie, Dehra Dun district, U. P. 20-25.vi.1930. B. N. Chopra.

Head and thorax brown above, paler beneath; pronotum and mesoscutellum yellowish. Antennae slender, shorter than the wings, yellowish with indistinct brown annulations; maxillary palpi brownish, 2nd joint longer than the 3rd, 4th shorter, 5th joint long. Legs dark yellow, spurs 2-4-4. Anterior wings brownish; DC equal in length to MC, triangular and acute at its base; 1st fork with a short pedicel, 2nd fork a little impinging on DC; 3rd fork with a short pedicel, fork 4

TEXT-FIG. 83.—*Diplectrona marginata* Betten, ♀; venation of posterior wing.

impinging deeply on MC. In the posterior wings DC is also long. 1st fork a little longer than its pedicel, 5th fork long (text-fig. 83). Abdomen brownish above, paler beneath; filaments at base of 5th abdominal segment present, but not long.

TEXT-FIG. 84, a-c.—*Diplectrona marginata* Betten, ♂; a, b. genital appendages from side (a) and above (b); c. end portion of the penis, from below.

♂. 9th segment moderately broad; tergite slightly projecting triangularly backwards, subdivided, with a pale median stripe. 10th segment broad from side, bearing two lateral transverse prominences, clothed with erect short bristles. Seen from above it is subdivided into two subtriangular side-lobes, ending above with two minute slender processes, directed outwards and upwards and accompanied internally with two other obtuse projections. Median portion of 10th segment represented by two contiguous pale narrow lobes, bearing few minute hairs; right lobe a little longer than left; at its base this portion is somewhat dilated. Basal joint of the pedes genitales long, thickened in its distal portion; second joint short, slender, usually curved inwards. Penis long, straight; end-portion thickened, both in dorsal and ventral views, forming two lateral lobes, at the base of which is situated a short transverse plate.

Length of ♂ body 6.8 mm., that of ♀ about 8 mm. Abdominal filaments in females are much shorter than in males.

This species was described by C. Betten as a *Hydromanicus* but, in my opinion, it belongs to the genus *Diplectrona*.

Two specimens from Jabharket, near Mussoorie, somewhat differ from the other. In the male the pedes genitales appear to be more slender, the second joint is longer, but more slender; the lateral portions of the 10th segment are directed more backwards and truncated at their ends; median portion of the 10th segment resembles that in other ♂ specimens. Length of body 6 mm.

I presume that these two specimens also belong here and represent the normal, typical form of the species, whilst the specimens from Kurseong and from Simla Hills represent a mountain form of the species.

2. *Diplectrona ulmeri*, sp. nov.

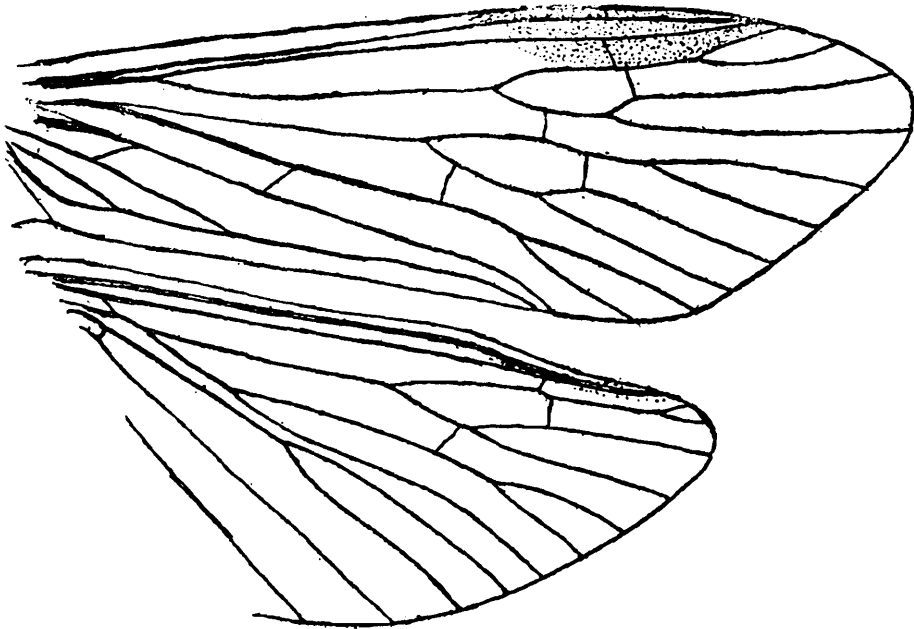
(Figs. 85-87.)

♂. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.1918. N. Annandale and F. H. Gravely.

♂. Nerbudda Survey, 6 miles from Sarai, 2,650 ft., Rewah State, C. I. February 1927. H. S. Pruthi.

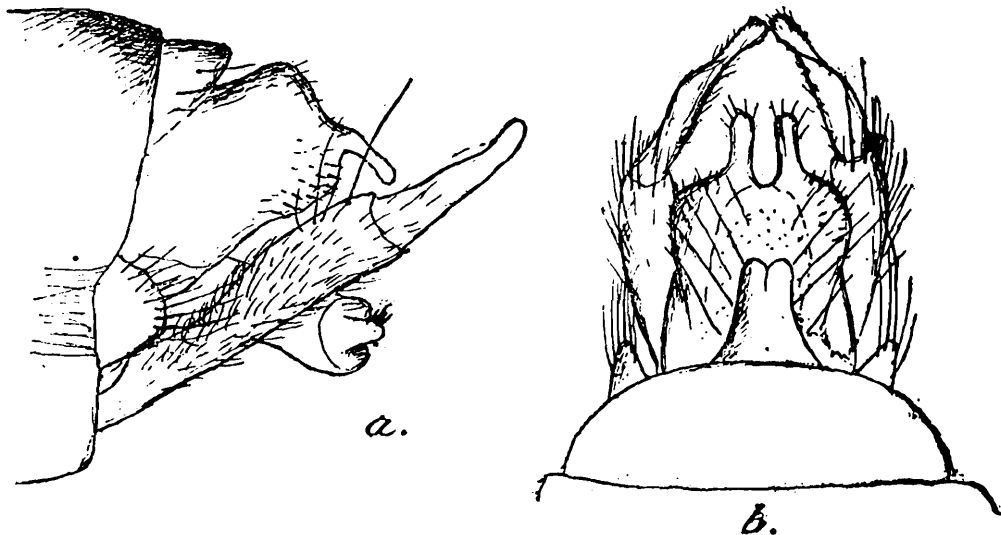
Head brownish above, with 4 yellow spots, dark yellow beneath; antennae yellowish, with indistinct brownish annulations; maxillary palpi pale; 2nd joint nearly twice longer than 3rd, 5th nearly equal to 3rd, 5th longer than 2-4 joints together. Pronotum yellow; mesonotum brown, but its median portion yellow; underside of the thorax yellowish; legs yellow, spurs 2-4-4. Anterior wings fumose, yellowish, clothed with yellowish hairs; SC and R pale, but thick, uniting at their ends; DC somewhat elongated, MC a little longer; 1st fork rather long, longer than its pedicel, 3rd fork also long, with a short pedicel; cross-vein m-cu arising from basal part of M_{3+4} . Posterior wings not much dilated in their anal parts; SC thick, R slender near the cross-vein, r-rs uniting with SC; DC elongated, 1st fork minute, 2nd reaching the middle of DC. Abdomen reddish-yellowish beneath, reddish testaceous above; at the base of 5th segment are situated two short, thick appendages.

[♂. Genital segments yellowish. 9th tergite forming a distinct projection backwards, at its end divided into two small lobes with a



TEXT-FIG. 85.—*Diplectrona ulmeri*, sp. nov.; venation of wings.

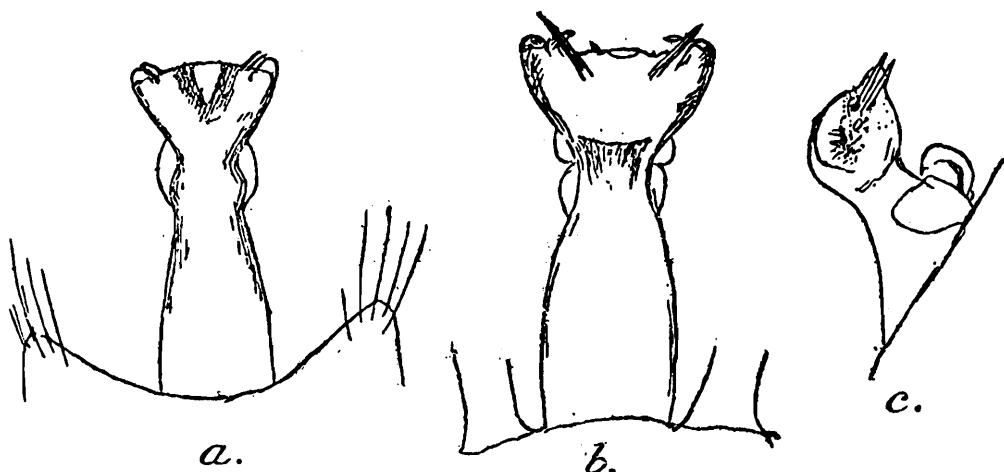
minute median incisure; side-pieces above the bases of pedes genitales rounded, hairy. 10th segment thick and broad both laterally and above; its apical portion obliquely truncated and provided behind with two stick-shaped short processes, directed backwards and downwards; seen from above 10th segment is broad, with rounded hind



TEXT-FIG. 86, a, b.—*Diplectrona ulmeri*, sp. nov., ♂; genital appendages from side (a) and above (b).

angles and with two straight processes placed near to each other. Basal joint of pedes genitales long, somewhat thickened in its distal portion; 2nd joint short, slender, with raised and curved upper edge. Penis thick, its apical portion strongly dilated, and having two side-lobes, internal to it are seen two groups of short bristles, three bristles in each group (text-fig. 87a), sometimes the bristles are longer

(text-fig. 87b); above the penis are situated two thick oval projections (text-fig. 87c).



TEXT-FIG. 87, a-c.—*Diplectronea ulmeri*, sp. nov.; a, b. penis from above; c. from side.

Length of body 5-6 mm.

This species somewhat resembles *D. trifasciata* Bks. from the Philippines.

3. *Diplectronea* sp.

1 ♀ (defective specimen). Peradeniya, Ceylon. 14-17.iv.1914. T. B. Fletcher.

Median legs in ♀ not dilated.

Hydromanicus BRAUER.

Hydromanicus truncatus Betten.

(Fig. 88.)

Hydromanicus truncatus Betten, *Rec. Ind. Mus.*, III, p. 235, pl. xv, figs. 5-8 (1909).

2 ♂, 3 ♀. Darjeeling district, Bengal, E. Himalayas. Lynch.

♀. Ghumti, 4,500 ft. Darjeeling district, Bengal, vii.1911. F. H. Gravely.

♀. Kurseong, Bengal, E. Himalayas, 1,700 ft. 19.vi.10. N. Annandale.

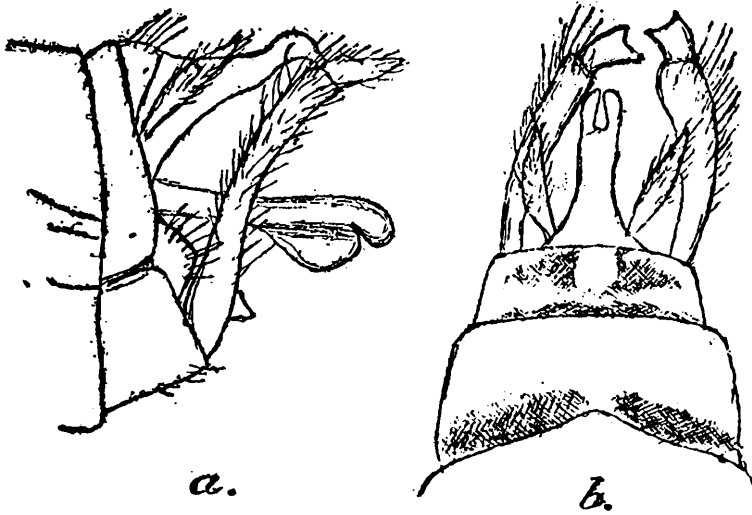
♂. Sureil, 5,000 ft., Darjeeling district, Bengal, E. Himalayas. 11-31.x.17. N. Annandale and F. H. Gravely.

Venation, as in Betten's figure 5, but the discoidal cell in the posterior wings appears to be somewhat longer. Anterior wings brownish, with rounded hyaline irrorations, more distinct in DC in the region near DC and in the apical portion of wings.

♂. 10th segment, as in Betten's figs. 7 and 8, but narrower above, with deep median fissure at the end, dividing the apical portion into two lobes. Preanal appendages somewhat thickened in the middle, hairy. Basal joint of the pedes genitales long, slender, second joint broad, from above, excised behind and subdivided into two lobes, inner lobe elongated and acute and the outer more obtuse. Penis before its

apex strongly thickened ; apical portion capitate, seen from above forming two side-lobes.

Length of body 5.5 mm.]



TEXT-FIG. 88, a, b.—*Hydromanicus truncatus*, sp. nov., ♂ ; genital appendages from side (a) and above (b).

Diplectronella Ulm.

Diplectronella taprobanes Hagen.

2 ♀. Peradeniya, Ceylon, July 1910 and June 8, 1910. F. H. Gravely.

Anterior wings somewhat leathery, brownish ; venation similar to that in the fig. 2 of Dr. Mosely's paper of 1931.¹ Posterior wings also similar, but SC and R running in their distal parts near to each other ; apical fork 2 impinging on DC more deeply.

Length of body 5.2 mm.

This species is already known from Ceylon.

Subfam. MACRONEMATINAE.

This subfamily is very well represented in the collections of the Indian Museum. Our knowledge of the ecology of Macronematinae is very scanty, and only very few larvae have been described. However, at present it may be said that the ecology of most Macronematinae is different from that of Hydropsychinae and that they prefer large rivers, but in all cases are not found in mountain streams. The larvae in such genera as *Aethaloptera*, *Chloropsyche*, *Amphipsyche* and in *Macronema* occur, usually, at comparatively considerable depths.

Macronema PICT.

1. **Macronema pallidipennis**, sp. nov.

(Fig. 89.)

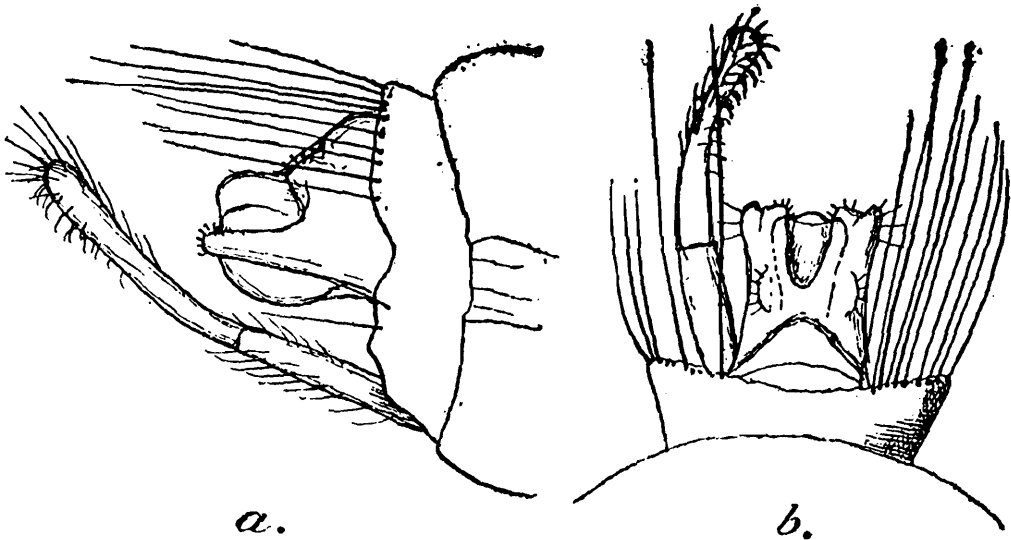
2 ♂. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

2 ♂. The same locality, two pupae.

¹ *Ann. Mag. Nat. Hist.* (10), VIII, p. 197, figs. 2-5 (1931).

Head dark yellow with two white warts near eyes just behind antennae, two also white but smaller warts in occipital region. Antennae yellow with brown annulations; in maxillary palpi 3rd joint longer than 2nd. Thorax yellow, somewhat testaceous, abdomen pale. Legs pale, hind tibiae long, pale. Venation similar to that of *M. fastosum* Walk. and *M. opulentum* Ulm.; cross-vein dc-m arising from the middle of MC, MC similar to that in *M. fastosum*. Posterior wings M-shaped as in *M. opulentum*. Anterior wings pale, almost without darker markings; length of anterior wings 10 mm.

♂. 9th segment chitinised, with hind lateral edges irregular; 9th tergite concave behind, bearing two side-groups of very long bristles.



TEXT-FIG. 89, a, b.—*Macronema pallidipennis*, sp. nov., ♂; genital appendages from side (a) and above (b).

10th segment broad above, with subparallel side-edges; distal half with a deep and moderately broad excision is divided into two lobes, truncated and a little excised on their ends; seen from side, these lobes are digitiform and arise from lower part of 10th segment. On upper side of 10th segment are situated two rounded hairy prominences. Basal joint of pedes genitales slender and somewhat shorter than second, this joint a little thickened distally. Penis thick, forming a rounded and very broad, from side, apical portion.

Length of body 9.5 mm.

This species somewhat resembles *M. pallipes* Bks., and of *M. fastosum* Walk.

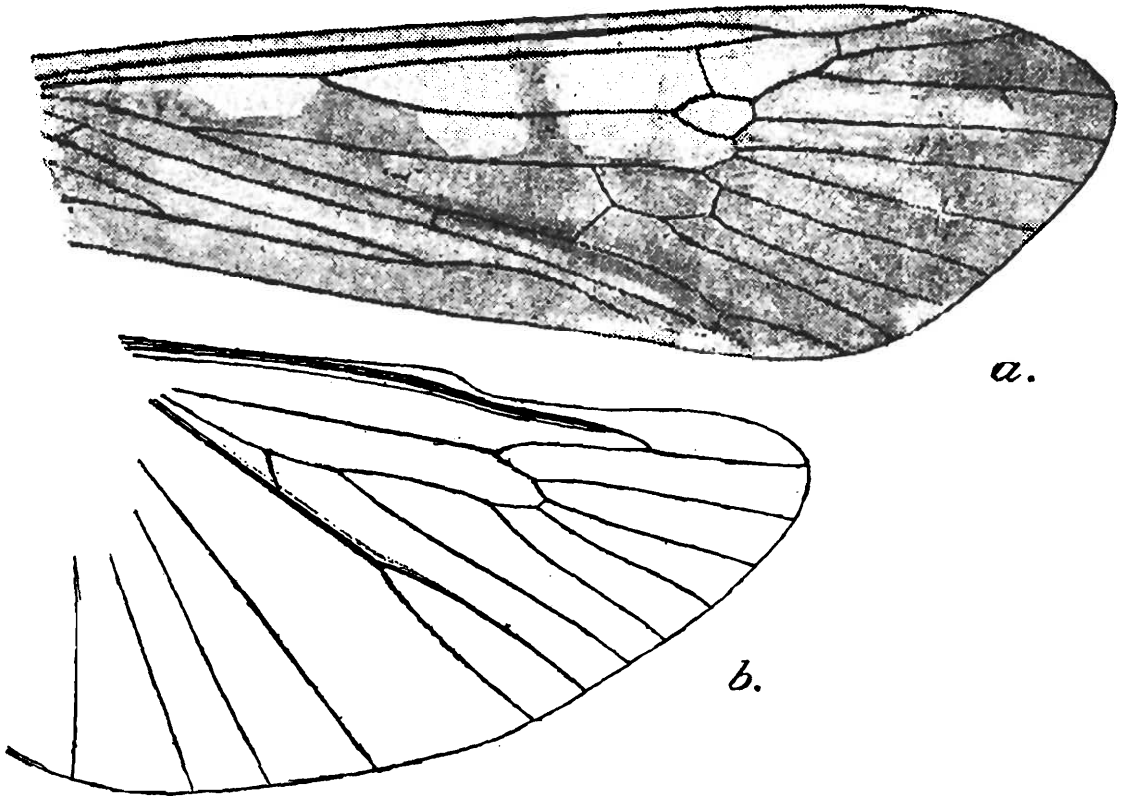
2. *Macronema fulvescens*, sp. nov.

(Figs. 90, 91.)

♂. Chalakudi, Cochin State, S. I. 14-30.ix.1914. F. H. Gravely.

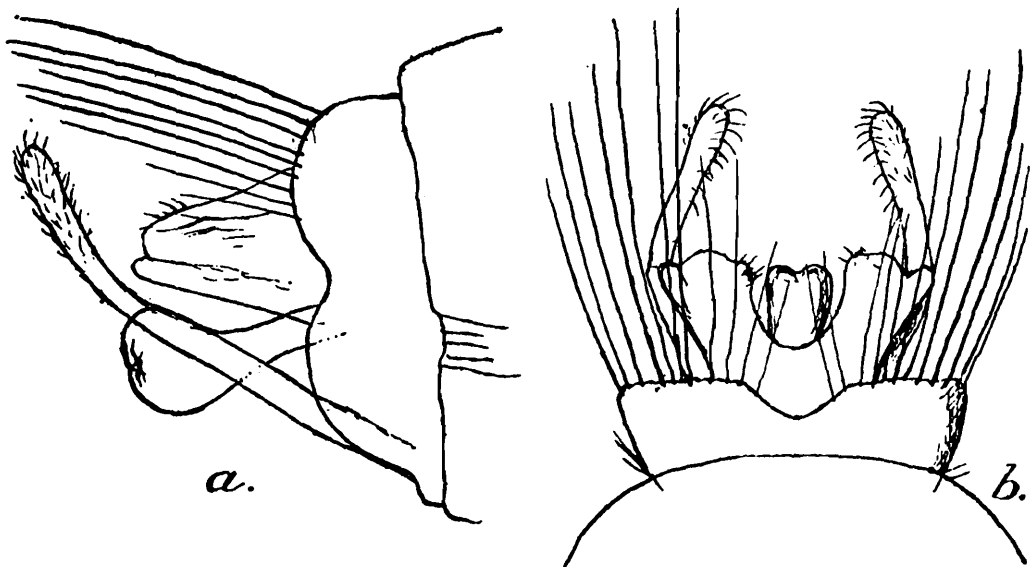
Head pale yellow, with large eyes; antennae yellow, somewhat darker in the basal parts of joints narrowly annulated with brown. In maxillary palpi 3rd joint equal to 2nd, 4th a little shorter, 5th longer than 1-4 joints together. Pronotum pale, mesonotum pale yellow, but the side-portion

reddish brown ; underside of thorax pale. Legs pale, abdomen pale yellowish. Anterior wings obliquely truncated at their apices (text-fig. 90a) ; discoidal cell much smaller than median, angular, broad ;



TEXT-FIG. 90, a, b.—*Macronema fulvescens*, sp. nov., ♂ ; (a) anterior, (b) posterior wing.

cross-vein r-rs arising from its middle ; 4th apical cell narrow at its base, but not acute ; MC angulate, connected in its basal part with CuA. Membrane pale, with dark yellowish longitudinal streaks along CuA and M, forming a broad projection, reaching the base of RS, then a yellowish transverse band, crossing the middle of DC, and a very feeble



TEXT-FIG. 91, a, b.—*Macronema fulvescens*, sp. nov., ♂ ; genital appendages from side (a) and above (b).

streak near base of DC ; postcostal area and apical portion also yellowish, but second apical cell in its greatest part pale. Posterior wings pale and very broad (text-fig. 90b) ; SC thick, R very slender, weak ; M_1 not reaching the cross-vein m-cu, which is oblique ; CuA thick.

♂. 9th segment moderately broad ; its tergite with a rounded, median excision subdivided into two side-parts, bearing behind two series of long stout hairs ; side-pieces forming two convexities behind, separated by a small excision. 10th segment divided into two thick side-lobes by a deep, broad oval excision, which from above appear directed somewhat outwards. Seen from side, 10th segment is broad at base, narrowing to its apex ; end-portion with a small incision subdivided into two prominences. Pedes genitales slender ; second joint shorter than the first, but very indistinctly separated from it. Penis slender, strongly thickened in its apical portion, having the shape of rounded head, from side.

Length of body 8.5 mm.

This species is evidently allied to *M. pallidepennis*, sp. nov.

3. *Macronema fastosum* Walk.

Macronema fastosum Walker, *Cat. Neur. Brit. Mus.*, p. 76 (1852), Sikkim, Hongkong.

Macronema fasciatum Albarda, *Neuroptera in Midden-Sumatra, Natuurlijke Hist.*, p. 18 (1881) ; Sumatra ; Ulmer, *Stett. Ent. Zeit.*, p. 72 (1905), Sikkim, Java ; Ulmer, *Notes Leyden Mus.*, XXVIII, p. 73 (1906) ; *Gen. Insect. Fasc.* 60, pl. 39, fig. 7 ; Betten, *Rec. Ind. Mus.* III, p. 232, figs. 4-7 (1909), Kurseong.

♂. Sureil, Mangpu, Darjeeling district, 5,000 ft. IV.v.17. S. W. Kemp.

♂. Bhoirakund, Assam-Bhutan Frontier, Darrang district, 15-22.x.12. S. W. Kemp.

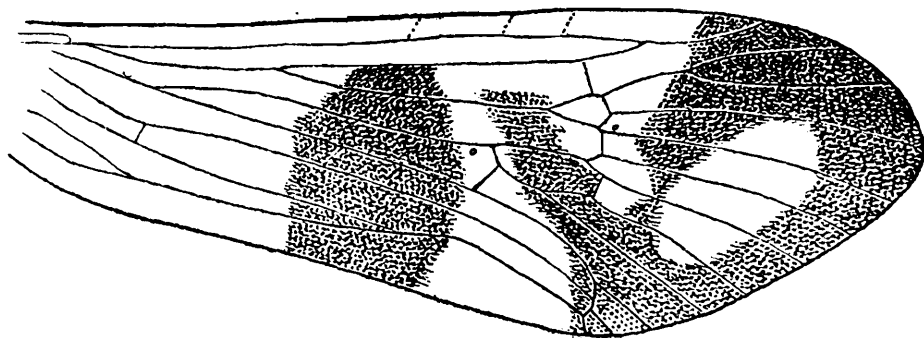
Anterior wings yellow with transverse brown stripe in the middle ; second specimen smaller.

4. *Macronema fastosum* forma *fuscum*, nov.

(Fig. 92.)

♂. Ghumti, Darjeeling district, Bengal, E. Himalayas, 4,000 ft. vii.11. F. H. Gravely.

Venation as in *M. fastosum*, but the body is black, antennae almost black, palpi yellow ; portions between frons and eyes shining silvery. Thorax brown beneath ; femora brownish in their basal parts, then yellow ; anterior legs rather brown ; median and posterior tibiae yellow, end of tarsal joints brownish. Anterior wings yellow, with a broad



TEXT-FIG. 92.—*Macronema fastosum*, forma *fuscum* nov. ; anterior wing.

brown spot in middle of wing behind R; apical portion brown, but with a large oval yellow spot in middle; from hind portion of brown marking arises an oblique brown branch, reaching RS just before discoidal cell. Posterior wings densely clothed with brownish hairs, appear greyish brownish, but anteriorly is an elongated pale-yellow streak around ends of R and of SC; cross-vein m-cu oblique and arising from the basal part of M_{3+4} ; CuA margined with brown. Genital appendages similar to those in *M. fastosum fastosum*. I presume this is nothing more than a form of *M. fastosum*.

Length of body 7 mm., expanse 23 mm.

5. *Macronema fastosum* forma **bifasciatum**, nov.

♂. Pashok, alt. 2,000 ft., Darjeeling district, Bengal. 26.v.14. F. H. Gravely.

Head yellow, palpi pale-yellow, antennae dark yellow. Thorax brownish yellow above, with golden yellow hairs, brownish beneath; legs yellow. Anterior wings golden yellowish, with two dark brown transverse bands or spots in middle of wing and in apical portion. Posterior wings pale yellowish, in anterior portion two transverse brown bands, prolonging brown bands of anterior wings; in the region of M these two bands are united, and the whole basal part of wings becomes greyish brown. Venation similar to that of *M. fastosum*.

Length of body 5 mm.

Probably this is also only a form of *M. fastosum*.

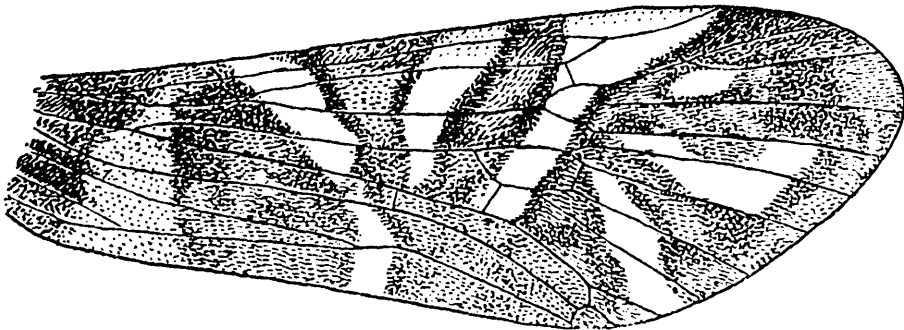
6. *Macronema pseudoneura* Brauer.

(Fig. 93.)

Macronema pseudoneura Brauer, *Verh. Zool. Botan. Gesel. Wien*, XV, p. 420 (1865); Ulmer, *Coll. Zool. de Selys Longchamps*, Fasc. VI, p. 95, fig. 102 (1907), Ceylon.

♀. Bhadravati, Shimoga district, Mysore State, 12-14.xii.28. H. S. Rao.

Colour pattern of the forewings in this specimen very much resembles that of the specimen figured by Ulmer (fig. 102). The pale spot in the



TEXT-FIG. 93.—*Macronema pseudoneura* Brau.; anterior wing.

basal part of wing in my specimen is larger, nearly triangular; dark markings are clothed, mostly, with golden hairs, but bordered with narrow brown strips without such hairs; costal area rather pale in its greatest part.

Length of body 7 mm.

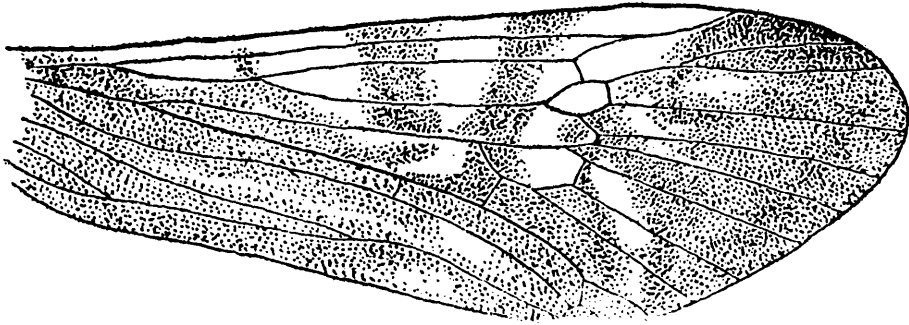
This species was known hitherto but from Ceylon.

7. *Macronema pseudoneura* forma *dilutum*, nov.

(Fig. 94.)

♀. Mormugao, Portuguese India. ix.16. S. W. Kemp.

Colour pattern not as distinct; basal pale spot indistinct, costal and subcostal area pale in their basal parts; transverse pale band at

TEXT-FIG. 94.—*Macronema pseudoneura*, forma *dilutum*, nov.; anterior wing.

the end of the basal third distinct but in its anterior part; longitudinal pale streak in the apical portion rather lacking.

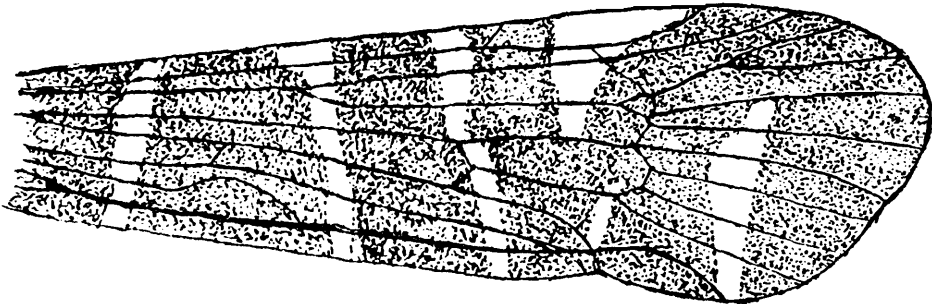
This specimen belongs to the same species, but perhaps represents a distinct form.

8. *Macronema quinquefasciatum*, sp. nov.

(Fig. 95.)

♂. Kumaon Hills, Katarmal, ca. 4,500 ft., Almora distr., U. P., bushes and trees on the banks of the Kosi. 29.v.30. H. S. Pruthi (Sta. 57).

Head black-brown, with large rounded anterior and narrower posterior warts, clothed with brownish yellowish hairs. Antennae yellow, annulated with black; basal joint brownish; palpi yellow; second joint with a distinct projection on its inner angle, bearing few spinules; 3rd joint equal to 2nd in length, 4th a little shorter, 5th very long; anterior portion of the head blackish, but with bluish reflexion. Thorax black. Anterior femora testaceous, tibiae and tarsi yellow with dark brown claws; median femora and tibiae brown, spurs yellow, inner spurs twice as long as outer, tarsi yellow. Anterior wings only slightly dilated at their ends, rounded at their apices, with a slight incision at the end of M; membrane brownish yellow, clothed with sparse golden-yellow hairs and with trans-

TEXT-FIG 95.—*Macronema quinquefasciatum*, sp. nov.; anterior wing.

verse whitish hyaline bands as follows : (1) a nearly transverse band in the basal part ; (2) oblique narrow band, crossing the base of RS ; (3) median band, divided into two separate anterior and posterior portions ; (4) a cuneiform white marking at pterostigma extending up to M_{1+2} ; as its continuation may be considered a small whitish streak between the end of M_{3+4} and CuA ; and (5) apical transverse band, extending forwards up to RS_3 . SC in its distal part deviating from C, bounding a rather large pterostigmal region ; DC very small, 2nd apical fork rounded at its base ; M bending backwards at its end ; MC rather large, elongated ; A appears as to be shortened and forming a sinuosity forward in its distal part (text-fig. 96a). Posterior wings fumose, but in their anterior portion are seen two short whitish hyaline bands, prolonging 4th, pterostigmal, and 3rd median bands of anterior wing ; venation resembling that of *M. sinuatum* Ulm. ; between SC and R is a fold with row of hairs ; base of M_{3+4} situated rather far from the oblique cross-vein m-cu.

Length of body 6 mm.

This species is distinct, but is evidently allied to *M. sinuatum* Ulm. (Borneo).

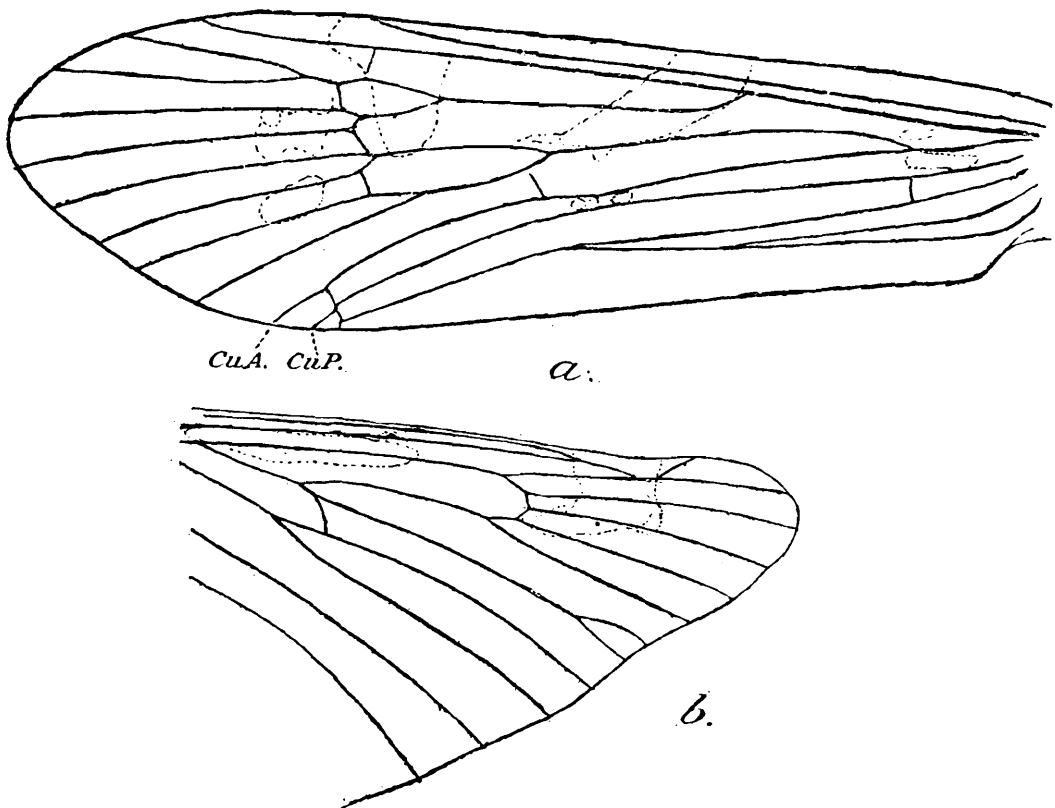
Leptonema Ulm.

Leptonema giganteum, sp. nov.

(Fig. 96.)

1 ♀. Castle Rock, N. Kanara district, Bombay Pres. October 1916. S. W. Kemp.

Head yellow, brown above ; antennae slender, yellow, narrowly annulated with brown ; basal joint also yellow, brownish internally ; on its outer side is a small blackish stripe. Maxillary palpi yellow, 3rd



TEXT-FIG. 96, a, b.—*Leptonema giganteum*, sp. nov. ; a, b. anterior and posterior wings.

joint a little longer than 4th, which is longer than 2nd ; 5th joint extraordinarily long, more than twice as long as 1st-4th joints together ; 3rd joint of labial palpi also very long, more than twice longer than the 1st and 2nd joints together. Thorax brown above, pale yellow beneath ; legs yellow ; spurs 1.4.4, but the spur in the foreleg is very small, rudimentary. Anterior wings brown, somewhat paler in their end-portions ; there are but two larger yellow spots, one transverse, beginning on the costa, near the end of subcosta, and reaching the distal part of M_{1+2} , the other oblique, beginning on C in the basal part of wing and running obliquely to the distal part of M ; oval pale spot in 6th apical cell, and another small spot in third one ; basal parts of 3rd and 4th apical cells are also somewhat paler ; two small oval spots are situated at cross-vein between CuA and CuP, and an elongated, small, and indistinct yellowish spot in the basal part of wing, between CuA-M and CuP. Venation resembling that of *Leptonema occidentale* Ulm. ; DC somewhat elongated, angulate, 1st apical fork long, its pedicel short ; MC long, nearly twice longer than DC, cross-vein m-cu arising from the basal part of M_{3+4} ; CuA and CuP connected with a short cross-vein. Posterior wings brownish and very hairy, adorned with two pale markings, one longitudinal situated between R and the basal part of M, and another transverse, beginning on the fore-margin, around SC+R, reaching RS_4 and sending an elongated extension to the base of M_1 . SC uniting at end with R and then with RS_{1+2} ; RS_1 short. M_{3+4} ending in both wings with a short end-fork ; CuA dividing at same level with M, CuA connected by an oblique cross-vein with the base of M_{3+4} . Abdomen brown or brownish.

Length of body 13 mm. ; length of anterior wing 19 mm.

Leptonema giganteum, sp. nov. is evidently allied to *L. occidentale* Ulm., from the Kamerons, and to *L. natalense* Mosely from Natal. DC is somewhat longer than in *L. occidentale*, MC is of very similar shape. Posterior wings are also similar, but CuA divides in *L. occidentale* somewhat earlier. *L. giganteum* is easily distinguished by its large size and by the coloration of its wings. These three species constitute a natural group of allied species. The Madagascar species, *L. madagascariense* Ulm. and *L. affine* Ulm. form another group ; MC in this group is elongated, but triangular or subtriangular. In the American species, which constitute a distinct large group, MC is nearly always triangular and short. *L. ceylanicum* Hagen, from Ceylon, appears to be allied to the Madagascar species, and the Madagascar species appear to be more allied to the South American than Indo-African species.

Aethaloptera Brauer.

Aethaloptera sexpunctata (Kol.).

Setodes sexpunctata Kolenati, *Gen. et Species Trich.* II, p. 266, pl. 3, fig. 28 (1859),
Aethaloptera sexpunctata (Kol.) Ulmer, *Stett. Ent. Zeit.* LXVI, p. 50, pl. i, fig. 40 (1905) ; Betten, *Rec. Ind. Mus.* III, p. 234, pl. xiv, figs. 10-12 (1909) ; Navas, *Mem. Pont. Accad. Sci. N. Lincei*, XVI, p. 955 (1932).

- 3 ♂. Pusa, Bihar. 5-10.ii.15. F. H. Gravely.
- ♂. Katihar, Purneah district, Bihar. 7-31.viii.10. C. Paiva.
- ♂. Yenangyaung, Upper Burma. VII.ix.1911. J. Coggin Brown.
- 6 ♂, ♀. Mokameh, Bihar, at light. F. H. Gravely.
- 2 ♂. On boat, Mokameh Ghat, Bihar. 31.iii.1911,

This species is widely distributed in the Indian region and also occurs in Indo-China and Borneo. According to Ulmer (*Deutsche Zentralafrika Exp.* IV, p. 95) it occurs perhaps also in Africa.

Paraethaloptera, gen. nov.

Allied to *Aethaloptera* Kol. and *Chloropsyche* McLach.

Maxillary and labial palpi lacking. Spurs 0.2.2; in median legs of females tibiae and 1st tarsal joint strongly dilated, 2nd, 3rd and 4th tarsal joints small, 2nd and 3rd ones bearing behind fringes of hairs as on the 1st joint (text-fig. 98); spurs short, unequal, plate-like, in the hind legs the spurs are also short, but only slightly dilated.

♀. Anterior wings without false cross-veins anteriorly; SC uniting at its end with R into one common vein; RS approximated to R, RS_{1+2} thick, running near to SC+R and forming short narrow fork; 2nd fork long, its pedicel short, but at the base of this pedicel is a minute triangular cell; M and Cu as in *Aethaloptera* (♀). Posterior wings similar to those in ♀ of *Aethaloptera*, but 1st apical fork small, narrow, M dividing earlier than RS.

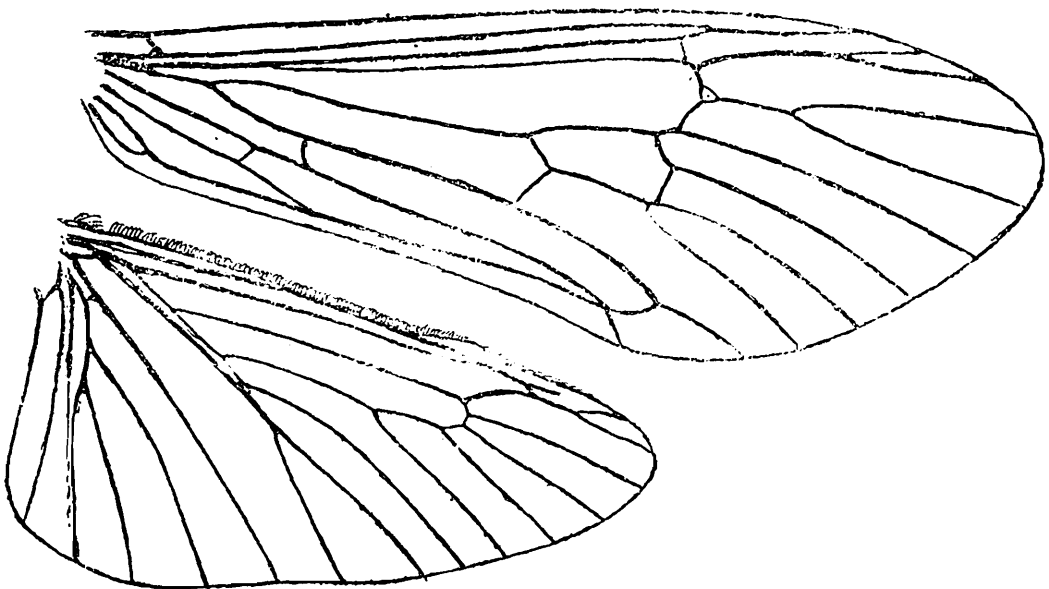
Genotype. *Paraethaloptera gracilis*, sp. nov.

Paraethaloptera gracilis, sp. nov.

(Figs. 97, 98.)

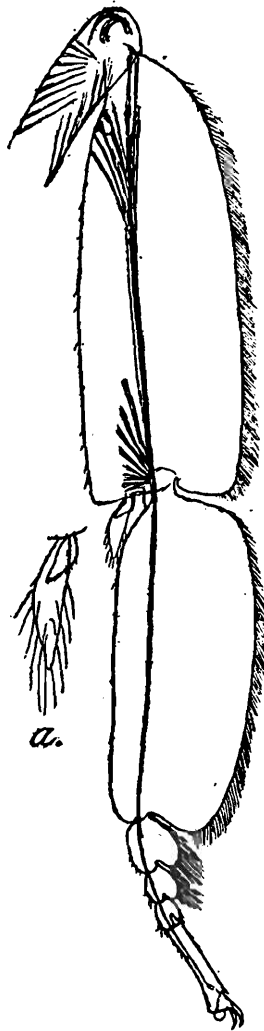
4 ♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Head pale yellow; antennae long, slender, with brown annulations, mouth-parts lacking; eyes large, prominent, black. Thorax dark, yellowish above; anterior legs as usual, tarsi elongated and very slender; median tibiae and 1st tarsal joint strongly dilated, bearing behind fringes of hairs; 2nd tarsal joint small but dilated, both 1st and 2nd joints



TEXT-FIG. 97.—*Paraethaloptera gracilis*, gen. et sp. nov.; female wings.

bearing behind a fringe of hairs ; two flattened end-spurs, one of which is very small and triangular ; hind legs as usual, tarsi slender. Anterior wings whitish subhyaline, with pale veins. RS early arising from R and running near to R ; its fork narrow and short ; 2nd apical fork more than twice longer than its pedicel, at the base of RS_{3+4} is a small triangular cell ; DC lacking ; MC angulate at base, forks 3 and 4 sessile ; CuA running not close to M, with a false end fork (true 5th fork lacking). In posterior wings SC and R strong, at their ends uniting into a common



TEXT-FIG. 98.—*Paraethaloptera gracilis*, gen. et sp. nov., ♀ ; median legs and tibial spurs enlarged (a).

vein, as in fore-wings ; RS long ; 1st fork short, 2nd fork sessile, narrowed at its base ; M forming a continuation of the basal part of RS ; 5th fork comparatively long, elongately triangular. Abdomen pale, ending with three pairs of minute tubercles.

Length of ♀ body 6.8-7 mm.

The genus *Paraethaloptera* is evidently closely allied to *Aethaloptera* but differs in the absence of the false veinlets in the costal area, absence of separate apical portion of SC, narrow 1st fork of anterior wings, the union of SC with R in posterior wings and in the formula of spurs.

Polymorphanisus Walker.

1. *Polymorphanisus ocularis* Ulmer, var.

- ♀. Kamaing, Myitkyina district, U. Burma. 29.x.26, at light. B. N. Chopra.
 ♀. Khurda Road, Puri district, Orissa. 13.ix.12. F. H. Gravely.

Length of body 14 mm., expanse 40 mm. Habitus and venation, apparently, very similar to that in the type-form from Java and to that in *P. indicus* Bks. from Bengal—*Proc. Ent. Soc. Washington*, XIII, p. 105 (1911). Anterior and posterior brown spots in fore-wings situated at cross-veins, closing discoidal and median cells; size somewhat larger than in both *P. ocularis* and *P. indicus*.

These two females belong, perhaps, to *P. indicus*, but since the description of N. Banks is rather poor and is not accompanied by any figure, it is impossible to separate his species from the form described by Ulmer—*Notes from the Leyden Mus.* XXVIII, p. 60, fig. 65 (1906). I, therefore, refer my specimens to *P. ocularis* Ulmer and consider them as a variety.

2. *Polymorphanisus nigricornis* Walker.

Polymorphanisus nigricornis Walker, *Catal. Brit. Mus. Meuropt.* p. 79 (1852); McLachlan, *Ann. Soc. Entom. Belg.* XV, p. 70 (1872); Brauer, *Verh. Zool. Bot. Gessel. Wien*, XXV, p. 73 (1875); Ulmer, *Catal. Coll. Selys*, Fasc. VI, p. 24 (1907).

2 ♀. Barkuda Island, Chilka Lake, Ganjam district, Madras Presidency. Caught in verandah of house 23.x.19. N. Annandale.

Large specimens with length of body 17 mm.

Antennae brown in their basal parts; in the next 6 joints the distal portion of each joint brown, the basal yellow; the remainder of the antennae fulvous, with narrow dark annulations. Two oval black spots on mesonotum distinct. Wings pale.

This species is known from India, Indo-China and has also been recorded from the Celebes.

Oestropsyche Brauer.

Oestropsyche vitrina (Hagen).

(Fig. 99.)

Macronema vitrinum Hagen, *Verh. Zool. Bot. Ges. Wien*, IX, p. 209 (1859).

Polymorphanisus vitrinus Hagen, *ibid.* XIV, p. 875 (1864); *Oestropsyche vitrina* Ulmer, *Catal. Coll. Selys*, Fasc. VI, 2, p. 29, figs. 19-22 (1907).

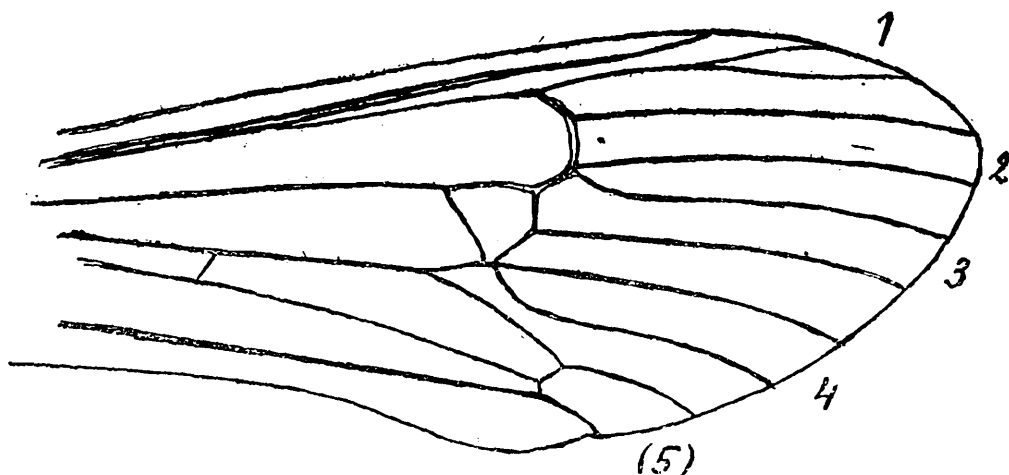
♀. Opposite the Camp at Harra, 2,625 ft., Nerbudda Survey, Rewah State, C. I. March 1927. H. S. Pruthi.

♂, ♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Venation of anterior wings differs in M_{3+4} not forming the continuation of CuA, and MC appears to be somewhat smaller, though varying in length. In ♀ the antennae are short, a little longer than half the length of body; MC somewhat smaller (text-fig. 99) than in ♂, RS distinct, although running near to R; in median legs the tibiae, 1st, 2nd and 3rd tarsal joints very strongly dilated; spurs 2·2·2. Genital appendages resembling Ulmer's fig. 22.

Length of body 9·9·5 mm.

I think that these specimens belong to this species; the shape of MC is variable, and the difference mentioned above represents probably



TEXT-FIG. 99.—*Oestropsyche vitrina* Hagen; venation of female anterior wing.

an individual variation. *Oe. vitrina* is known from the Sunda Isles, Ceylon, China, and the Philippines.

Amphipsyche McLachlan.

1. *Amphipsyche distincta*, sp. nov.

(Fig. 100.)

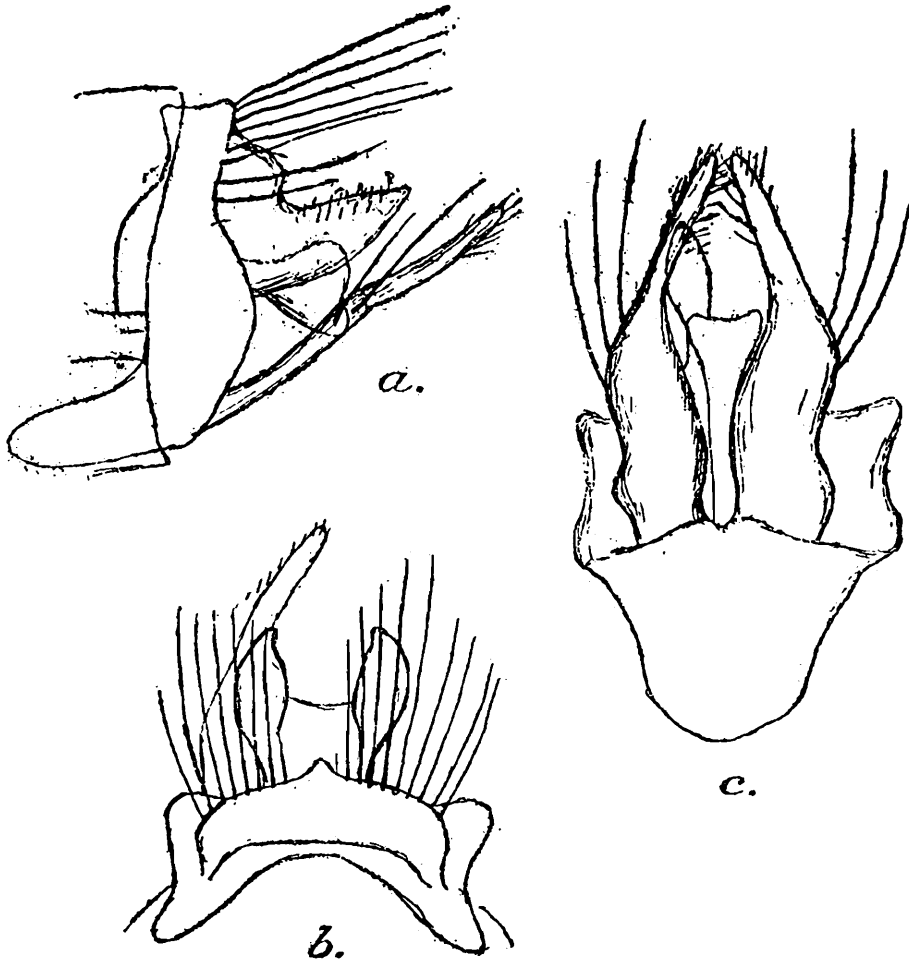
- 4 ♂. Nerbudda Survey; the river at Mandla, C. I. H. S. Pruthi.
2 ♂. Nerbudda Survey; the river at Mandla, C. I. H. S. Pruthi.

Head pale yellow, its side-portions brownish, quadrate above; warts brownish. Antennae in their basal part yellow, with dark annulations, in which median and distal parts become brownish and brown; in maxillary palpi 2nd, 3rd and 4th joints subequal, 5th longer. Thorax pale yellow, but the median elliptic part of mesonotum brownish. Legs pale, spurs 0.3.2; on median legs outer spur small, reaching but $\frac{2}{5}$ of the length of the inner one, on median legs it is as long as $\frac{3}{5}$ of the length of the inner. Anterior wings pale; pterostigma and the distal part of the costal area opaque; RS straight, apical fork 1 a little longer than its pedicel, 4th fork with a short pedicel. Venation in posterior wings, as in *A. proluta* McL., but SC does not reach the end of wing; apparently fork 1 longer, M_{1+2} equal or a little longer than fork 3.

♂. 9th tergite with a small median projection on its hind edge, separating two side-groups of long bristles. 10th segment broad at its base, then forming in its lower portion two elongated lobes, subtriangular from side, rather elliptic from above (text-fig. 100b). Pedes genitales slender from side, as in other species of the genus; second joint almost equal to basal; seen from beneath the basal joint is strongly dilated, with excised outer margin; near its union with the slender 2nd joint it bears three long hairs. 9th sternite very broad. Penis

strongly thickened below, in its apical portion, not forming a separate upper process.

Length of body 4.5-5.5 mm.



TEXT-FIG. 100, a-c.—*Amphipsyche distincta*, sp. nov., ♂; genital appendages from side (a), above (b) and below (c).

2. *Amphipsyche tricalcarata*, sp. nov.

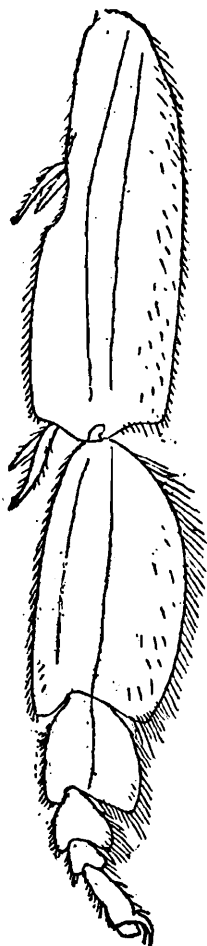
(Figs. 101, 102.)

♀. Bhubaneswar, Puri district, Orissa. 4-6.xi.1912. F. H. Gravely.

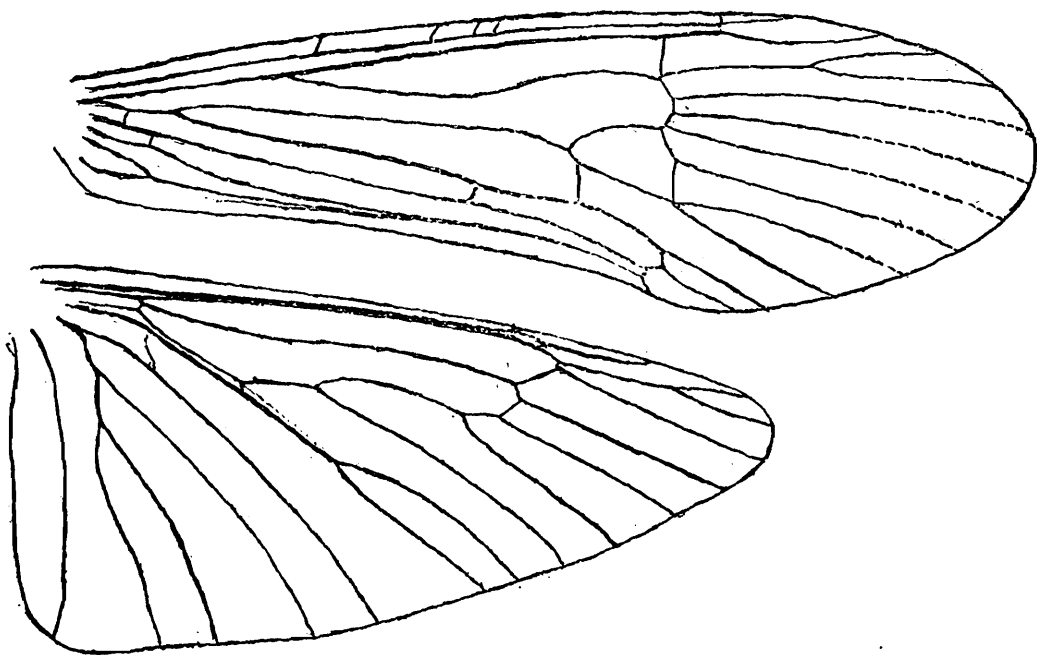
Head yellow, antennae yellow with narrow brown annulations; maxillary palpi short, 3rd joint equal to 2nd; labial palpi short. Pronotum raised, narrow. Meso- and metanotum brownish yellow, paler beneath. Legs yellow, spurs 0.4:3; in median legs of ♀ 1st, 2nd and 3rd joints more strongly dilated behind than in *A. proluta* McL. (text-fig. 101). Anterior wing pale yellowish, opaque anteriorly and along CuA; in costal area 3-4 pale cross-veins; RS strongly curved, 1st apical fork almost equal to its pedicel, RS₃ not approximated to RS₁₊₂; MC subtriangular, strongly dilated to its end; cross-vein CuA-CuP situated not far from m-cu; 4th fork acute. In posterior wings RS₃ approxi-

mated at its base to RS_{1+2} , which is forming a short fork; M connected, before its furcation, with a short cross-vein with CuA (text-fig. 102).

Length of body 7 mm., length of anterior wing 10 mm.



TEXT-FIG. 101.—*Amphipsyche tricalcarata*, sp. nov.; female median leg.



TEXT-FIG. 102.—*Amphipsyche tricalcarata*, sp. nov., ♀; wings.

3. *Amphipsyche* sp.

♀. Sanjai River, Chakradharpur, Chota Nagpur. 8-10.ii.18. N. Annandale and F. H. Gravely.

Venation resembles that of *A. meridiana* Ulmer, but in posterior wings 2nd apical fork has a longer pedicel.

Length of body 5.5 mm.

Amphipsyche vedana Banks is also similar, and I cannot find any essential differences between them.

4. *Amphipsyche indica*, sp. nov.

(Figs. 103, 104, 105.)

Phanostoma sp. Betten, *Rec. Ind. Mus.* III, p. 234, pl. xiv, figs. 13-15 (1909), Sara Ghat.

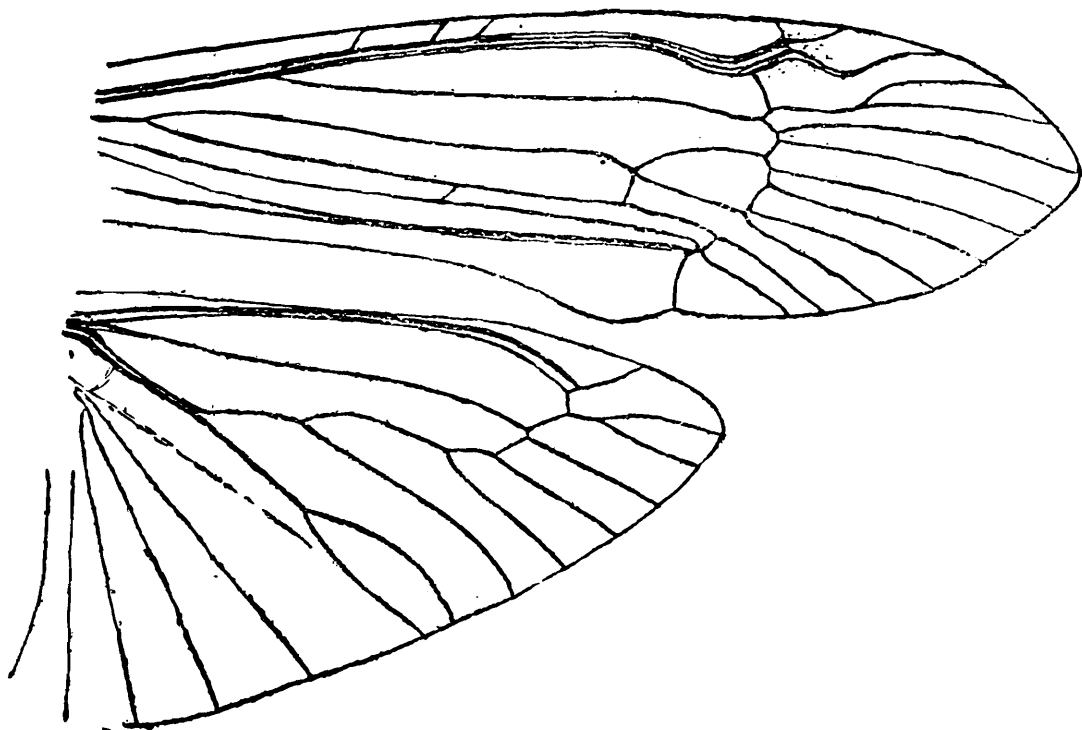
♂. Mokameh, Bihar, at light.

♂. Dinapore, Bihar, at light. N. Annandale.

2 ♂, 2 ♀. Pusa, Bihar. 5-10.xi.15. F. H. Gravely.

2 ♂. At light on board steamer, Damukdia Ghat, E. Bengal. 30.vi.08.

Head and thorax dark yellowish, antennae long, slender, yellow, with dark narrow annulations; in basal third of antennae each joint is brownish at its base. Anterior wings hyaline, but pterostigmal region opaque, grey; between C and SC 3-4 cross-veins. R strong, thick, double-curved in its distal portion; SC also strong and parallel to R,



TEXT-FIG. 103.—*Amphipsyche indica*, sp. nov., ♂; wings.

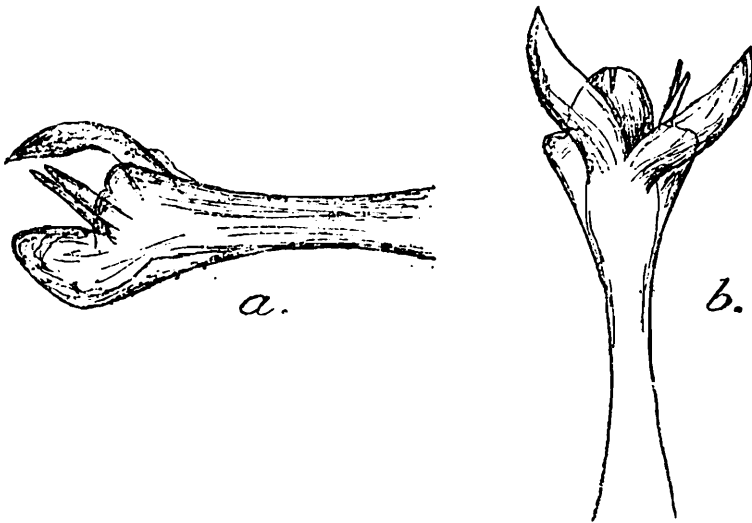
but ending earlier on C; RS_{1+2} somewhat curved and approximated to RS_{3+4} ; fork 1 longer than its pedicel, fork 2 narrowed at its base; MC elongately triangular, with convex fore-margin; posterior wings broad, as usual; false 1st fork with a short pedicel. Legs yellow, with 1.4.3 spurs. Abdomen pale.

♂. 9th segment hidden in 8th and only two rounded side-pieces are seen above the base of pedes genitales; tergite bearing long stiff hairs.

10th segment shaped as in Betten's figures 14 and 15, broadly divided into two side lobes, without any prominence in the middle. Pedes



TEXT-FIG. 104, a-c.—*Amphipsyche indica*, sp. nov., ♂; genital appendages from side and above.



TEXT-FIG. 105, a, b.—*Amphipsyche indica*, sp. nov.; penis from side and above.

genitales slender, second joint but a little shorter than the basal. Penis thickened in its apical portion, forming a thick, obliquely truncated from side, lower lobe and two long, leaf-like, curved upper lobes; above the lower lobe are situated four more slender spinules.

Length of body 6 mm.

The species described above is evidently very similar to *Phanostoma* sp. Betten 1909 and to *Amphipsyche propinqua* Ulm. from Cambodia, Mekong, but judging by the localities, I think that it is identical with Betten's *Phanostoma* sp. Betten gave the figures of the wing-venation and of ♂ genital appendages, and a comparison of my figures with Betten's figure 15 clearly shows that the structure of the penis in *A. indicum* sp. nov. is identical with that of Betten's *Phanostoma* sp., and both these forms represent the same species. Unfortunately, Betten did not name this species. Ulmer's *A. propinqua* is very similar, but since the structure of the penis in this species is unknown, one cannot be certain whether the two are identical. Unfortunately, Ulmer did not compare his species with *Phanostoma* sp.

Since the genus *Phanostoma* is very closely related to *Amphipsyche*, and the formula of spurs in *Amphipsyche* is variable, I am unable to find any essential differences between these two genera. Ulmer has described his *propinqua* as a species of *Amphipsyche*, and I think that this was correct, although the wing-venation in this species is very similar to that in *Phanostoma*. On these grounds I have decided to unite these two genera.

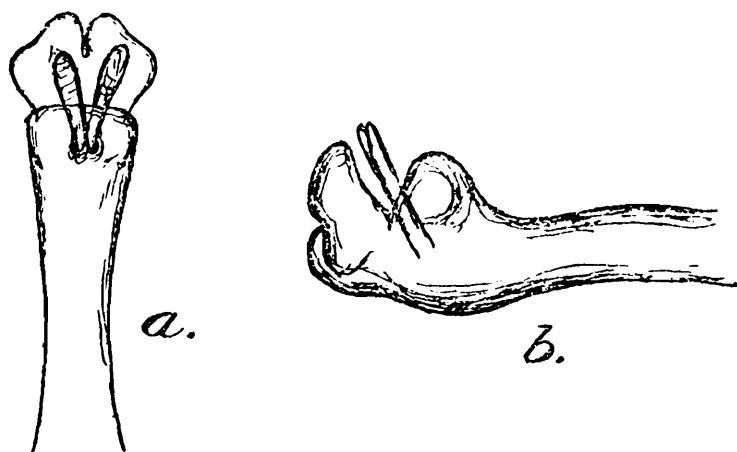
5. ***Amphipsyche bengalensis*, sp. nov.**

(Fig. 106.)

2 ♂. Calcutta, Bengal, at light. 19.vi.07. R. Hodgart.

Habitus as in the foregoing species. Body pale yellow. Antennae yellow, with narrow dark annulations. Anterior wings pale. R curved in its apical portion even more strongly than in *A. indicum*, SC forming before its end not one, but three short venules. In posterior wings first (apparently false) fork sessile, not pedicellate; MC similar, but a little shorter; formula of spurs 1.4.2.

♂. 10th segment as in the foregoing species, but its side-lobes appear to be somewhat broader. Lower end-lobe of the penis broader, dis-



TEXT-FIG. 106, a, b.—*Amphipsyche bengalensis*, sp. nov.; penis from above (a) and from side (b).

tinctly excised in the middle and curved upwards (if seen from side); upper leaf-like lobes lacking, in their place is an oval elevation, behind which are situated two stick-shaped appendages; underside of the penis thickened before its lower end-lobe.

Length of body 6 mm.

This species differs chiefly in the structure of penis and in the formula of spurs.

***Amphipsychella*, gen. nov.**

Maxillary palpi very short, not reaching eyes, 5th joint short, with few indistinct annulations; labial palpi also very short. Spurs 0.2 (1) 2, the outer spur on the median legs reduced, indistinct; ♀ median legs strongly dilated, 2nd tarsal joint as broad as the basal, third joint also broad, 4th very short, transverse. Venation in ♀ resembling that in *Amphipsyche*, but in anterior wings RS_{1+2} somewhat approximated to R; MC very broad, false cross-vein between C and SC present.

Allied to *Amphipsyche*.

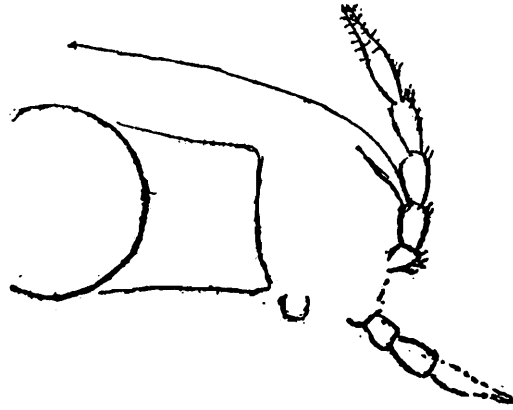
Genotype.—*Amphipsychella extrema*, sp. nov.

***Amphipsychella extrema*, sp. nov.**

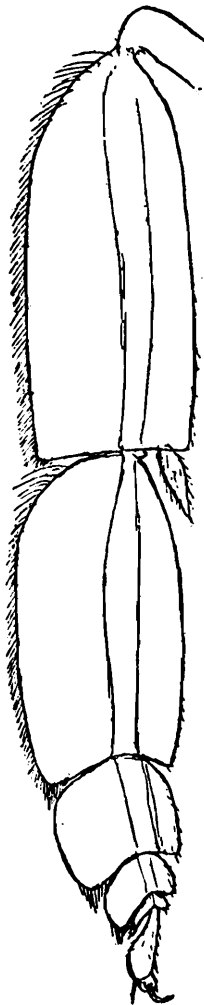
(Figs. 107, 108, 109.)

♀. Calcutta, Bengal, Eden Garden, at light. 26.v.1912. F. H. Gravely.
 ♀. Calcutta, Bengal. v.1915. F. H. Gravely.

Pale yellow. Antennae very slender, yellowish, with narrow darker annulations. Maxillary palpi very short, not reaching eyes (text-fig. 107); 2-4 joints subequal; 5th joint shorter than 3rd and 4th ones

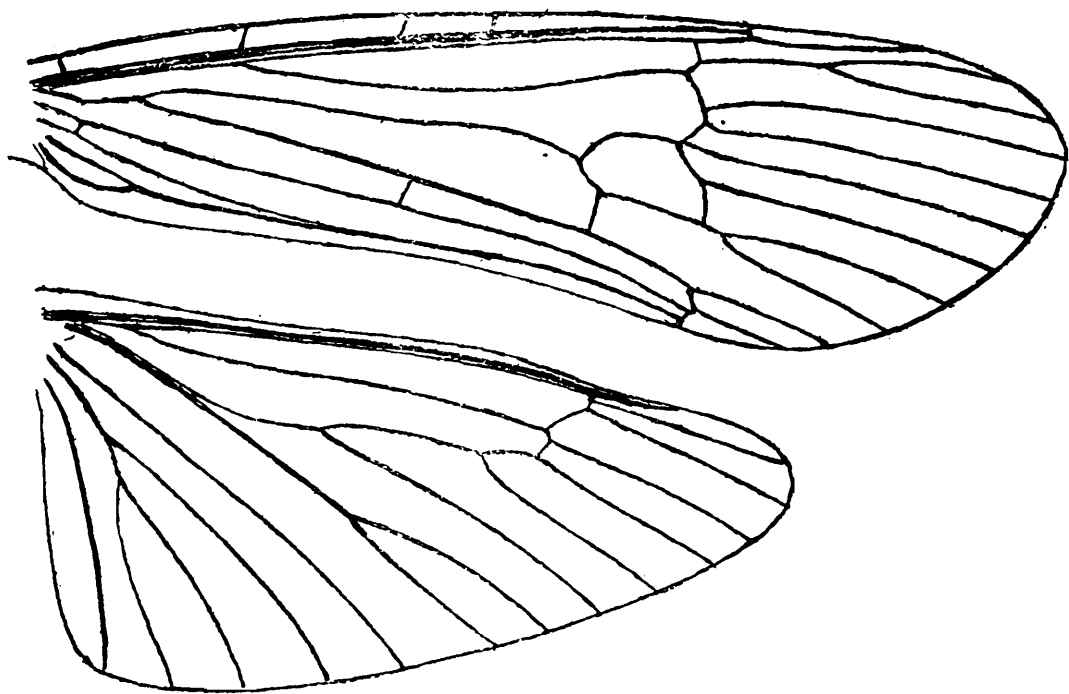


TEXT-FIG. 107.—*Amphipsychella extrema*, gen. et sp. nov., ♀; maxillary and labial palpi.



TEXT-FIG. 108.—*Amphipsychella extrema*, gen. et sp. nov., ♀; median leg.

combined, its distal half slender and but very indistinctly annulated; labial palpi also very short; labrum very small. Anteriorly from fore-episterna is a small hairy appendage. In median legs the tibiae are shorter than femur, in posterior ones the tibiae are very long. 2nd tarsal joint in ♀ median legs as broad as the basal, quadrilateral, 3rd joint also broad, transverse, 4th very short, but transverse (text-fig. 108). In anterior wings (text-fig. 109) three false veinlets are seen between C and Sc; 1st apical fork a little longer than its pedicel



TEXT-FIG. 109.—*Amphisychella extrema*, gen. et sp. nov.; wings of female.

and somewhat approximated to R; R long, slightly arcuate; MC very broad, with M_{1+2} convexly curved forwards; 4th apical fork with a short pedicel. RS_{1+2} in posterior wings simple, not united at its base with RS_3 ; M and CuA dividing as in *Amphisycha*. Abdomen pale.

Length of ♀ body 5.5 mm.; males unknown.

The genus *Amphisychella* is closely allied to the genus *Amphisycha*, differing chiefly in the reduced condition of the maxillary palpi and by the formula of spurs.

SUPPLEMENT.

List of species of Trichoptera-Annulipalpia from Continental India with their geographical distribution.

Family RHYACOPHILIDAE.

1. *Rhyacophila ancestralis*, sp. nov. *antea* p. 93—Khasi Hills, Assam.
2. *Rhyacophila anatina* Morton, *Trans. Entom. Soc. Lond.* I, p. 6, pl. i, figs. 17, 18 (1900)—Khasi Hills. Also *antea* p. 95—Khasi Hills, Assam,

3. *Rhyacophila naviculata* Morton, *id.*, p. 6, pl. i, figs. 19, 20.—Trichinopoly, S. India.
4. *Rhyacophila lanceolata* Morton, *id.*, p. 2, pl. i, figs. 1-4.—Khasi Hills, Assam.
5. *Rhyacophila dilatata*, sp. nov. *antea* p. 96—Phagu, Simla Hills, Punjab.
6. *Rhyacophila choprai*, sp. nov. *antea* p. 97—Mussoorie, Dehra Dun dist. U. P.
7. *Rhyacophila rhombica*, sp. nov. *antea* p. 98—Darjeeling district, Bengal.
8. *Rhyacophila similis*, sp. nov. *antea* p. 99—Mussoorie-Tehri Road, Dehra Dun district, U. P.
9. *Rhyacophila pallida*, sp. nov. *antea* p. 100—Punj-pul Nullah, Punjab.
10. *Rhyacophila digitata*, sp. nov. *antea* p. 102—Darjeeling district, Bengal.
11. *Rhyacophila curvata* Morton, *Trans. Ent. Soc. Lond.* I, p. 5, pl. i, figs. 12-14 (1900).—Khasi Hills, Assam. Also *antea* p. 103—Khasi Hills, Assam.
12. *Rhyacophila inconspicua* Morton, *id.*, p. 7, pl. i, fig. 21. Khasi Hills, Assam.
13. *Rhyacophila tecta* Morton, *id.*, p. 4, pl. i, figs. 8, 9.—Khasi Hills, Assam.
14. *Rhyacophila scissa* Morton, *id.*, p. 5, pl. i, figs. 15, 16.—Khasi Hills, Assam.
15. *Rhyacophila carletoni* Banks, *Psyche*, XXXVIII, No. 1, p. 69, fig. 7 (1931).—Kulu, N. India.
16. *Glossosoma dentatum* McLach. *antea* p. 105—Phagu, Simla Hills, Punjab.
17. *Glossosoma fissum*, sp. nov. *antea* p. 106—Company Khud, Mussoorie, U. P.
18. *Synagapetus himalayanus*, sp. nov. *antea* p. 107—Darjeeling district, Bengal.
19. *Agapetus triangularis*, sp. nov. *antea* p. 108—Almora, Kumaon, U. P.
20. *Apsilochorema indicum* Ulmer, *Ann. Soc. Entom. Belg.* XLIX, p. 39, figs. 29-31 (1905).—Punjab.
21. *Apsilochorema annandalei*, sp. nov. *antea* p. 110—Phagu, Simla Hills, Punjab.

Family HYDROPTILIDAE.

22. *Ithytrichia violacea*, Morton, *Ent. M. Mag.*, p. 283 (1902).—India.
23. *Oxyethira angustella*, sp. nov. *antea* p. 112—Kapildhara Fall, Rewah State, C. I.
24. *Oxydroptila furcata*, gen. et sp. nov. *antea* p. 114—Kapildhara Fall, Rewah State, C. I.
25. *Ortotrichia indica*, sp. nov. *antea* p. 116—Inlé Lake, S. Shan States, Burma.
26. *Ortotrichia extensa*, sp. nov. *antea* p. 117—Kapildhara Fall, Rewah State, C. I.
27. *Stactobia* sp. *antea* p. 119—Sarai, Rewah State, C. I.
28. *Melanotrichia singularis*, Ulmer, *Notes Leyd. Mus.* XXVIII, p. 101, figs. 109-112 (1906).—India. Also *antea* p. 119—Courtallam, S. India.

Family PHILOPOTAMIDAE.

29. *Dolophiliella relictæ*, sp. nov. *antea* p. 121—Kurseong, E. Himalayas, Bengal.
30. *Dolophilodes indicus*, sp. nov. *antea* p. 122—Punjab.
31. *Chimarrha bicolor*, Navas, *Rev. Acad. Cienc. Zaragoza*, XV, p. 23 (1931)—Bombay.
32. *Chimarrha pulla*, Navas, *id.*, p. 26, fig. 30—Bombay.
33. *Chimarrha pilosella*, Navas, *id.*, p. 27—Bombay.
34. *Chimarrha digitata*, sp. nov. *antea* p. 123—Punjab ; Kumaon Hills, U. P.
35. *Chimarrha kumaonensis*, sp. nov. *antea* p. 124—Kumaon Hills, U. P.
36. *Chimarrha aberrans*, sp. nov. *antea* p. 126—Simla Hills, Punjab ; Kumaon, Almora district, U. P. and Darjeeling, Bengal.
37. *Chimarrha minuta*, sp. nov. *antea* p. 128—Phagu, Simla Hills, Punjab.
38. *Chimarrha*, sp. *antea* pp. 129-130—Nilgiri Hills, S. India ; Darjeeling district, Bengal ; Kumaon Hills and Mussoorie, U. P. ; Peradeniya, Ceylon.

Family STENOPSYCHIDAE.

39. *Stenopsyche griseipennis*, McLachlan, *Trans. Ent. Soc. London* (3) V, p. 265, pl. xvii, v, pl. xix, v (1886)—India Orient.
40. *Stenopsyche quadrilobata*, sp. nov. *antea* p. 131—Darjeeling, Bengal.
41. *Stenopsyche splendida*, sp. nov. *antea* p. 133—Bombay.
42. *Stenopsyche furcatula*, sp. nov. *antea* p. 134—Central Provinces ; Chota Nagpur, Bihar.
43. *Parastenopsyche similis*, Ulmer, *Entom. Mitt.* XVI, p. 175, pl. v, fig. 8 ; pl. vi, fig. 9.—Darjeeling, Bengal. Also *antea* p. 136—Dalhousie, Punjab ; Kurseong, Bengal.
44. *Parastenopsyche composita*, sp. nov. *antea* p. 137—Rewah State, C. I. ; Chota Nagpur, Bihar.
45. *Parastenopsyche montana*, Navas, *Mem. Pont. Accad. Sci., N. Lincei*, XVI, p. 932, fig. 50.—Darjeeling distr., Bengal.

Family PSYCHOMYIDAE.

46. *Ecnomus tenellus* Ramb. *antea* p. 139—Purneah district, Bihar ; Orissa.
47. *Ecnomus montanus*, Mosely, *Stylops*, I, p. 168, figs. 10-12 (1932).—Kashmir ; Kumaon, U. P. ; Rewah State, C. I.
48. *Ecnomus indicus*, sp. nov. *antea* p. 140—Chota Nagpur, Bihar.
49. *Ecnomus moselyi*, sp. nov. *antea* p. 142—Chota Nagpur, Bihar.
50. *Ecnomus costalis*, sp. nov. *antea* p. 144—Rewah State, below Phari-semar, C. I.
51. *Ecnomus pusanus*, Mosely, *Stylops*, I, Pt. 7, p. 164, figs. 1-3 (1932).—Pusa, Bihar ; Belgaum district, Bombay Presidency.
52. *Ecnomus oppositus*, sp. nov. *antea* p. 147—Inle Lake, Yawngnwe district, Burma.

53. *Ecnomus falcatus*, Mosely, *Stylops*, I, Pt. 7, p. 167, figs. 4-8 (1932).—Chicalda, Central Provinces.
54. *Ecnomus hendersoni*, Mosely, *Trans. Ent. Soc. London*, 40, p. 2, figs. 1-4 (1932).—Perak, Malay Peninsula.
55. *Ecnomus digitatus*, Mosely, *id.*, p. 3, figs. 5-7.—R. Kinta, Ipoh.
56. *Ecnomus forcipatus*, Mosely, *id.*, p. 5, figs. 8-10.—Perak, Malay Peninsula.
57. *Ecnomus fletcheri*, Mosely, *Stylops*, I, Pt. 7, p. 166, figs. 4-6 (1932).—Palnis, Kodaikanal, S. India.
58. *Ecnomus*, sp. *antea* p. 148—The lake at Yercaud, Shevaroy Hills; Medha, Yenna Valley.
59. *Psychomyiella pruthii*, sp. nov. *antea* p. 148—Rewah State (vicinity of Manot), C. I.
60. *Paduniella fissa*, sp. nov. *antea* p. 150—Sanjai River, Chota Nagpur, Bihar.
61. *Paduniella amurensis*, Martynov, *Trichoptera-Annulipalpia of U. S. S. R., Leningrad*, p. 208, figs. 148, 149 (1934).—S. Ussuri Land. Also *antea* p. 151—Opposite the Camp at Harra, Rewah State, C. I.
62. *Paduniella ceylanica*, Ulmer, *Deutsche Entom. Zeitschr.*, p. 42, figs. 2-5 (1915).—Ceylon. Also *antea* p. 151—Peradeniya, Ceylon.
63. *Tinodes pullulans*, Navas, *Rev. Acad. Cienc. Zaragoza*, XIV, p. 28, fig. 31 (1932).—Khandala, Bombay.

Family POLYCENTROPIDAE.

64. *Plectrocnemia aurea*, Ulmer, *Stett. Ent. Ztg.* 66, p. 101, pl. iv, figs. 130, 131 (1905).—Sikkim, E. Himalayas, Darjeeling, Bengal. Also *antea* p. 151—Darjeeling, Bengal.
65. *Plectrocnemia navasi*, Ulmer, *Notes Leyd. Mus.* XXVIII, p. 84, figs. 85, 86 (1906).—India Meridionalis.
66. *Plectrocnemia punjabica*, sp. nov. *antea* p. 152—Dalhousie, Punjab.
67. *Plectrocnemia distincta*, sp. nov. *antea* p. 153—India.
68. *Plectrocnemia obliquofasciata*, sp. nov. *antea* p. 154—Punj-pul Nullah, Punjab; Darjeeling, Bengal.
69. *Cyrnopsis palpalis*, gen. et sp. nov. *antea* p. 157—Sanjai River, Chota Nagpur, Bihar.
70. *Dipseudopsis indica*, McLachlan, *Tijdschr. v. Entom.* 18, p. 18, pl. ii, figs. 13, 14 (1875); Ulmer, *Deutsche Ent. Zeitschr.* H. III, p. 187, fig. 24 (1929).—India. Also *antea* p. 158—Puri, Orissa; Katihar, Purneah district, Bihar.
71. *Dipseudopsis indica* var. *sindica*, nov. *antea* pp. 158-159—Bubak, Sind.
72. *Dipseudopsis lamellata*, sp. nov. *antea* p. 160—Lonton and Kamaing, U. Burma; Assam.
73. *Dipseudopsis triclavata*, sp. nov. *antea* p. 161—Khanapur, Belgaum distr., Bombay Presidency; Shillong, Assam.
74. *Dipseudopsis recta*, sp. nov. *antea* p. 163—Sanjai River, Chota Nagpur, Bihar.

75. *Dipseudopsis bombayana*, sp. nov. *antea* p. 164—Gokak, Belgaum distr., Bombay Presidency.
76. *Dipseudopsis bicolorata*, sp. nov. *antea* p. 165—N. Kanara district, Bombay Presidency.
77. *Dipseudopsis pallida*, sp. nov. *antea* p. 166—Pusa, Bihar.
78. *Dipseudopsis modesta*, Banks, *Proc. Ent. Soc. Washing.*, XIII, p. 105, fig. 2 (1911).—Pusa, Bihar.
79. *Dipseudopsis*, sp., Betten, *Rec. Ind. Mus.*, p. 238, figs. 8-13 (1909).—Bengal, India.
80. *Hyalopsyche rivalis*, Betten, *Rec. Ind. Mus.*, p. 238, figs. 5-7 (1909).—E. Bengal.
81. *Hyalopsyche similis*, sp. nov. *antea* p. 167—Gokak, Belgaum district, Bombay Presidency ; Katihar, Purneah district, Bihar.
82. *Hyalopsyche parsula*, sp. nov. *antea* p. 169—Tezpur, Assam.

Family ARCTOPSYCHIDAE.

83. *Arctopsyche lobata*, Martynov., *Proc. Zool. Soc. Lond.*, p. 77, figs. 20, 21 (1930).—Tibet. Also *antea* p. 170—Darjeeling district, Bengal ; Punj-pul Nullah, Punjab,

Family HYDROPSYCHIDAE.

84. *Hydropsyche asiatica*, Ulmer, *Stett. Ent. Ztg.* 66, p. 91, pl. 4, figs. 122-124 (1905).—Sikkim.
85. *Hydropsyche indica*, Betten, *Rec. Ind. Mus.* III, p. 234, figs. 1-4 (1909).—Kurseong, Bengal.
86. *Hydropsyche kaznakovi*, Martynov, *Ann. Mus. Zool. Ac. Sci. Petersb.* XIX, p. 409, figs. 6, 7 (1915).—E. Bokhara, Persia. Also *antea* p. 170—Rambhur Valley, Chitral.
87. *Hydropsyche obscura*, sp. nov. *antea* p. 171—Darjeeling district, Bengal.
88. *Hydropsyche tenuicornis*, sp. nov. *antea* p. 173—Sanjai River, Chota Nagpur, Bihar ; the river at Mandla, C. P.
89. *Hydropsyche pallidipennis*, sp. nov. *antea* p. 174—Kumaon Hills, Almora district, U. P.
90. *Hydropsyche processuata*, Martynov, *Ann. Mus. Zool. Acad. Sci. U. R. S. S.* p. 190, figs. 51-53 (1927).—Shellalli, Persia. Also *antea* p. 175—Mokameh.
91. *Cheumatopsyche (Ulmeria) suffusa*, Navas, *Rev. Acad. Cienc. Zargoza*, (4), XIV, p. 30 (1932).—Khandala, Bombay.
92. *Cheumatopsyche (Ulmeria) lebasi*, Navas, *id.*, p. 30, fig. 32.—Kurseong, Bengal.
93. *Cheumatopsyche (Ulmeria) chlorogastra*, Navas, *id.*, p. 32.—Khandala, Bombay.
94. *Cheumatopsyche (Ulmeria) stenocyta*, Navas, *id.*, p. 33.—Khandala, Bombay.
95. *Cheumatopsyche truncata*, sp. nov. *antea* p. 175—Company Khud, Dehra Dun district ; Tura, Garo Hills, Assam ; Machrar Nala, Rewah State, C. I.

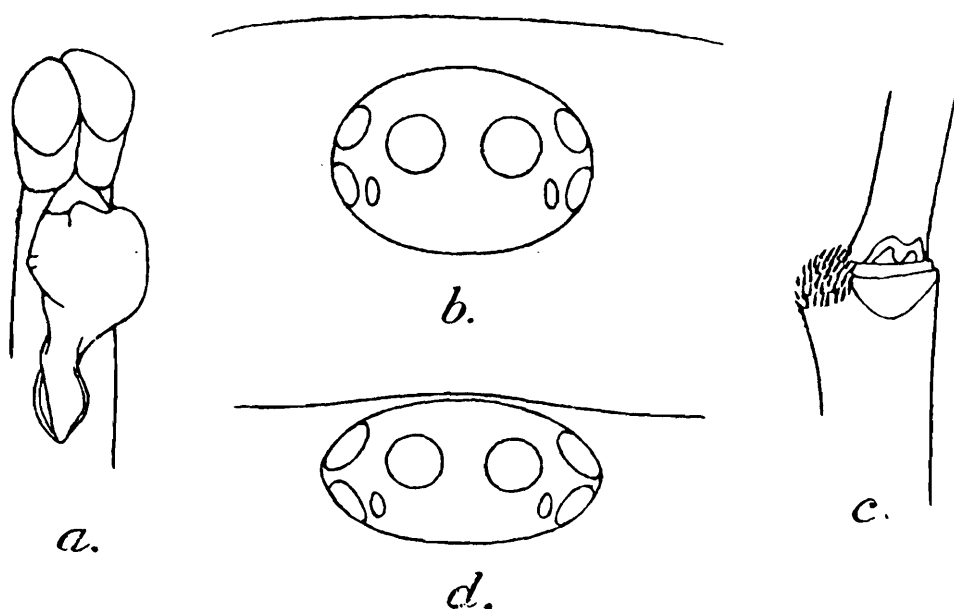
96. *Cheumatopsyche columnata*, sp. nov. *antea* p. 177—Opposite the Camp at Harra, Rewah State, C. I.
97. *Cheumatopsyche curvata*, sp. nov. *antea* p. 178—Same locality as for 96.
98. *Cheumatopsyche* sp. *antea* p. 179—Bargi, C. P. ; near Pharisemar, Rewah State, C. I.
99. *Hydropsychodes indica*, Navas, *Rev. Acad. Cienc. Zaragoza* (4) XIV, p. 29 (1932).—Khandala, Bombay.
100. *Hydatopsyche spatulata*, sp. nov. *antea* p. 179—Jog Falls, Bombay Presidency.
101. *Diplectrona marginata*, Betten, *Rec. Ind. Mus.* III, p. 236, pl. xv, fig. 13 (1909).—Kurseong, Bengal. Also *antea* p. 181—Darjeeling, Kurseong, Bengal ; Simla, Punjab ; Mussoorie-Tehri Road, Dehra Dun district, U. P.
102. *Diplectrona salai*, Navas, *Rev. Ac. Ci. Zaragoza* (4), p. 34 (1932).—Khandala, Bombay.
103. *Diplectrona ulmeri*, sp. nov. *antea* p. 182—Sanjai River, Chota Nagpur, Bihar ; near Sarai, C. I.
104. *Hydromanicus luctuosus*, Ulmer, *Stett. Ent. Ztg.* 66, p. 92, pl. iv, figs. 125-127 (1905).—Sikkim.
105. *Hydromanicus orientalis*, Betten, *Rec. Ind. Mus.* III, p. 237, pl. xv, figs. 14-16 (1909).—Kurseong, Bengal.
106. *Hydromanicus brunneus*, Betten, *id.*, p. 237, pl. xvi, figs. 1-4.—Upper Assam.
107. *Hydromanicus truncatus*, Betten, *id.*, p. 235, pl. xv, figs. 5-8.—Kurseong, Bengal. Also *antea* p. 184—Darjeeling, Kurseong, and Surail, Bengal.
108. *Hydromanicus feanus*, Navas, *Mem. Pont. Acc. Sci. N. Lincei*, XVII, p. 101, fig. 91 (1933).—Birmanian, Carin-Cheba.
109. *Diplectronella indica*, Mosely, *Ann. Mag. Nat. Hist.* (10) VIII, p. 199, figs. 6-9 (1931).—Belgaum, Bombay Pres.
110. *Macronema fastosum*, Walker, *Cat. Neur. Brit. Mus.*, p. 76 (1852).—Sikkim, Kurseong, Honkong, Java, Sumatra. Also *antea* p. 188—Darjeeling ; Bhoirakund, Assam-Bhutan frontier.
111. *Macronema fastosum* var. *fuscum*, nov. *antea* p. 188—Ghumti, Darjeeling.
112. *Macronema fastosum* var. *bifasciatum*, nov. *antea* p. 189—Pashok, Darjeeling.
113. *Macronema punctatum*, Betten, *Rec. Ind. Mus.* III, p. 232, fig. B (1909).—Kulu, W. Himalayas.
114. *Macronema indistinctum*, Banks, *Proc. Ent. Soc. Wash.* XIII, p. 106, fig. 4 (1911).—Pusa, Bengal.
115. *Macronema pallidipennis*, sp. nov. *antea* p. 185—Sanjai River, Chota Nagpur, Bihar.
116. *Macronema fulvescens*, sp. nov. *antea* p. 186—Chalakudi, Cochin State.
117. *Macronema pseudoneura*, Brauer, *Verh. Zool. Bot. Gesel. Wien.*, XV, p. 420 (1865).—Ceylon. Also *antea* p. 189—Bhadravati, Shimoga distr., Mysore State.
118. *Macronema pseudoneura* var. *dilutum*, nov. *antea* p. 190—Mormugao, Portuguese India.

119. *Macronema quinquefasciatum*, sp. nov. *antea* p. 190—Kumaon Hills, Katarmal, U. P.
120. *Leptonema giganteum*, sp. nov. *antea* p. 191—Castle Rock, N. Kanara district, Bombay Pres.
121. *Aethaloptera sexpunctata*, Kol. *Gen. Species Trich.* II, p. 266 (1859) ; Betten, *Rec. Ind. Mus.* III, p. 234 (1909).—India (various localities). Also *antea* p. 192—Pusa, and Katihar, Bihar ; Upper Burma.
122. *Paraethaloptera gracilis*, gen. et sp. nov. *antea* p. 193—Sanjai River, Chota Nagpur, Bihar.
123. *Polymorphanisus indicus*, Banks, *Proc. Ent. Soc. Wash.* XIII, p. 105 (1911).—Pusa, Bengal.
124. *Polymorphanisus nigricornis*, Walker, *Cat. Brit. Mus. Neuropt.*, p. 79 (1852) ; Ulmer, *Cat. Coll. Selys Fasc.* VI, 2, p. 24 (1907).—India ; Indo-China and Celebes. Also *antea* p. 195—Chilka Lake, Madras Pres.
125. *Polymorphanisus ocularis*, Ulmer, var. *antea* p. 195—U. Burma ; Orissa.
126. *Oestropsyche vitrina*, Hagen, *Verh. Zool. Bot. Gesel. Wien.*, IX, p. 209 (1859).—Sunda Isles ; Ceylon ; China and Philippine Is. Also *antea* p. 195—Rewah State, C. I. ; Chota Nagpur, Bihar.
127. *Amphipsyche vedana*, Banks, *Trans. Amer. Ent. Soc.*, XXXIX, p. 235 (1913).—Pusa, Bihar.
128. *Amphipsyche nirvana*, Banks, *id.*, p. 236—Pusa, Bihar.
129. *Amphipsyche distincta*, sp. nov. *antea* p. 196—The river at Mandla, C. P.
130. *Amphipsyche tricalcarata*, sp. nov. *antea* p. 197—Puri district, Orissa.
131. *Amphipsyche indica*, sp. nov. *antea* p. 199—Mokameh, Dinapur and Pusa, Bihar ; Damukdia Ghat, Bengal.
132. *Amphipsyche* sp. *antea* p. 199—Sanjai River, Chota Nagpur.
133. *Amphipsyche bengalensis*, sp. nov. *antea* p. 201—Calcutta, Bengal.
134. *Amphipsychella extrema*, gen. et sp. nov. *antea* p. 202—Calcutta, Bengal.

THE MALE OF *ORNITHOCTONUS MINAX* (THORELL).

By F. H. GRAVELY, D.Sc., Superintendent, Government Museum, Madras.

In my "Notes on Indian Mygalomorph Spiders" Nos. 1 and 2 (*Rec. Ind. Mus.* XI, pp. 257-287, pl. xv and XXXVII, pp. 69-84, text-figs. 1-3) I suggested that Pocock's two genera *Ornithoctonus* and *Melopoeus* were probably identical with Simon's genus *Cyriopagopus* and should be merged in it (see pp. 280-282 and 81-82 of the respective papers). My grounds for this were that the undescribed male of *Melopoeus*, of which I had collected a specimen for the Zoological Survey of India between Thingannyinaung and the base of the Dawna Hills in the Amherst District of Tenasserim, had the carapace low as in *Cyriopagopus*, and that I could find no satisfactory distinction between *Ornithoctonus* and *Melopoeus*. At the actual time of writing the first paper, the specimen was on loan and could not be re-examined. Since the writing of the second paper, however, it has been returned with the palp and first two legs of the right side missing. On comparing it with the type of *Cyriopagopus paganus*, Simon's genotype, which is also in the collection of the Zoological Survey, I find that although the height of the carapace resembles that of *Cyriopagopus*, the ocular tubercle differs (as does also that of the female) in being set well behind the front margin of the carapace instead of close behind, and in being about twice as wide as long instead of a little more—characters in which



Ornithoctonax minax (Thorell).

a. male palpal organ ; b. eyes ; and c. junction of tibia and tarsus of first leg.

Cyriopagopus paganus Simon.

d. eyes of type-specimen.

Melopoeus resembles *Ornithoctonus*. The type, which is I believe the only known specimen, of *Cyriopagopus paganus* is almost certainly

immature, but it seems unlikely that these are immature characters, especially as they appear to be found also in *Omothymus* Thorell (see Simon, *Histoire Naturelle des Araignees*, I, pp. 155-156) described from a mature male, a genus which Pocock regards, doubtless correctly, as a synonym of *Cyriopagopus*.

The genera *Ornithoctonus* (including *Melopoeus*) and *Cyriopagopus* (including *Omothymus*) may, therefore, both be retained, being distinguished from one another by the position of the ocular tubercle, but not by the degree of elevation of the carapace.

The male specimen of *Ornithoctonus minax* may be described as follows:—Total length 35 mm., carapace 18×16 mm. Colour dark brown. Thoracic fovea transverse, not procurved as in female. Stridulating organ much as in female, but with spines on coxa of palp somewhat less stoutly dentiform. Palpal organ as in fig. 1a, tibial apophysis of first leg as in fig. 1c. Legs in the order 1, 4, 2, 3, femur of first pair about equal to carapace in length, patella and tibia of second pair a little longer and those of third pair a little shorter than carapace.

DESCRIPTION OF A NEW SPECIES OF HEMIRHAMPHID FISH,
DERMOGENYS BURMANICUS FROM LOWER BURMA, WITH
NOTES ON SEXUAL DIMORPHISM AND ITS TAXONOMIC
SIGNIFICANCE.

By DEV DEV MUKERJI, *M.Sc., Zoological Survey of India, Calcutta.*

In December, 1934, three specimens of a species of *Dermogenys*, collected from a "large kutchha domestic water tank in the village Myagaing, Kyauktan township, Hanthawaddy District," Lower Burma, were received for determination by the Zoological Survey of India, from the Director, Harcourt Butler Institute of Public Health, Rangoon. Unfortunately, in these specimens, the beaks were damaged and it was, therefore, not possible to identify the fish specifically, until, on request, a further consignment of three well preserved specimens was received from the same source. At Dr. S. L. Hora's request the Director of the above named institute kindly sent some interesting ecological notes on the species; these are included at the end of the descriptive account.

There is a tendency among certain ichthyologists to attach taxonomic significance to the presence or absence of secondary sexual characters in viviparous species of Hemirhamphid fishes. It has been stated by Weber and de Beaufort¹ that in the genus *Dermogenys* van Hasselt, there is no marked sexual dimorphism. Weed² thinks that *Rhamphodermogenys* Fowler and Bean,³ a subgenus of *Dermogenys* should stand as a distinct genus if it is confirmed that the type-species of the subgenus is sexually dimorphic. The new species of *Dermogenys* under consideration, shows definite secondary sexual characters in males. Opportunity is, therefore, taken to discuss below the question of sexual dimorphism in *Dermogenys* and its taxonomic significance.

I wish to express here my sincere thanks to the Director of the Harcourt Butler Institute of Public Health, Rangoon, for affording me an opportunity of studying and describing this interesting species of fish, as also for the generous gift of the material to the collection of the Indian Museum. My thanks are due also to Messrs. R. C. Bagchi and B. Bagchi who have drawn the accompanying illustrations under my supervision.

***Dermogenys burmanicus*, sp. nov.**

D. 9-10; A. 15-16; P. 1/8; V. 1/5; C. 18; L. l. 45-46.

The body is moderately elongated and compressed. The back is broad, while the sides gradually converge below to a somewhat narrow and rounded ventral surface. Both the head and the caudal peduncle

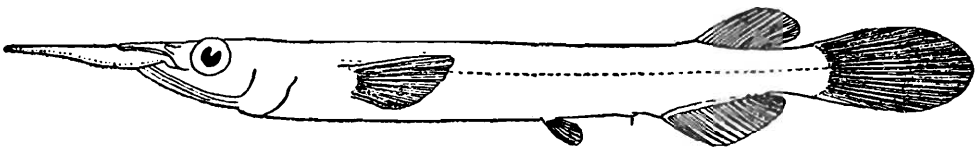
¹ Weber and de Beaufort, *Fish. Indo-Austral. Archipel.*, IV, pp. 136, 137 (1922).

² Weed, 'Notes on Fishes of the Family Hemirhamphidae'—*Zool. Ser. Field Mus. Nat. Hist., Chicago*, XX, pp. 49, 50 (1933).

³ Fowler and Bean, 'Fishes of Formosa and the Philippine Islands'—*Proc. U. S. Nat. Mus.*, LXII, pp. 15, 16 (1923).

are more compressed than the body ; ventrally they are more trenchant than rounded. The dorsal profile of the body is more or less horizontal from the tip of the lower jaw to the insertion of the dorsal fin, while the ventral profile is moderately arched throughout.

The head is slightly higher than broad and almost 3 times as long as broad ; its length from the tip of the upper jaw to the branchial opening is contained about 4.5 times in the length of the body from the tip of the lower jaw to the hypural joint. In the length of the trunk the head is contained nearly 3 times. The length of the lower jaw beyond the extremity of the upper jaw is contained from 6.5 to 7 times in the length of the body excluding the caudal fin, while including the caudal, it is contained from 7.5 to a little over 8 times. The eyes are large and slightly impinging in the dorsal profile. They are situated nearer the angle of the opercles than the tip of the snout. The diameter of the eye is contained almost 4.5 times in the length of the head, as measured from the tip of the snout. The interorbital space is narrow and is from flat to slightly concave. The triangular part of the upper jaw is truncate or faintly emarginate in front ; it is longer than broad. The preorbital is rounded and almost equal to half the diameter of the eye. The gape of the mouth is moderate and extends as far as or just a little beyond the nostrils. The nasal barbels are short and stumpy. The caudal peduncle is short and slightly longer than high.



TEXT-FIG. 1.—Lateral view of a type specimen (female) of *Dermogenys burmanicus*, sp. nov. $\times 2$.

The gill opening is rather narrow and extends forwards only as far as the lower level of the orbit. The isthmus is narrow and slender. The folds of skin bordering along each side of the beak are well developed and broadest in the middle. Both the jaws are provided with rows of simple conical teeth.

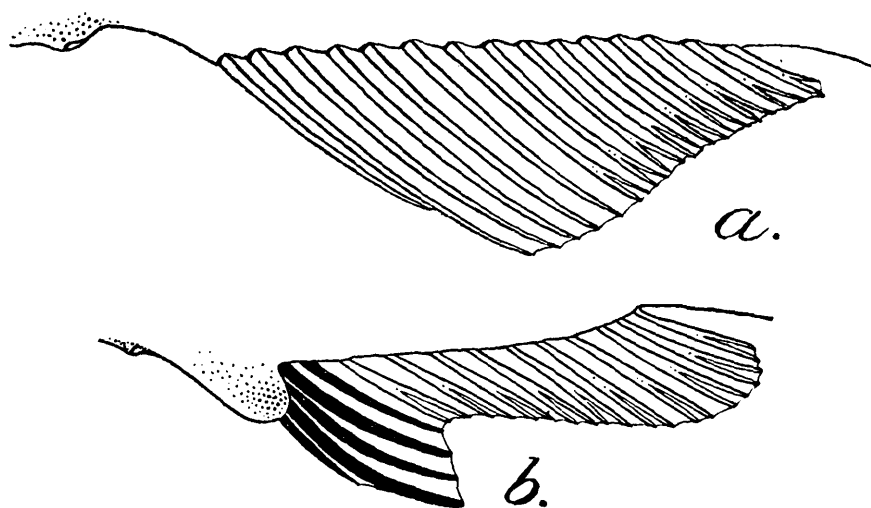
The scales are large and cycloid ; they are very thin and imbricate. Owing to the scales being thin and imbricate and the body thickly spattered with minute dark dots throughout, it is difficult to determine exactly the squamation in this species. There appear to be, however, 45 to 46 scales in a longitudinal series, counting from the angle of the opercles to the root of the caudal fin, while there are about 8 rows in a transverse series. There are 14 scales round the caudal peduncle. The head, cheeks, the opercles and the bases of the anal and the caudal are covered with scales, which are larger than those on the body.

The dorsal fin is inserted opposite the 6th ray of the anal. It is a little longer than high and has somewhat a convex distal margin. The number of rays varies from 9 to 10, of which 3 to 5 anterior ones are simple. The origin of the anal, which is nearly twice as long as high, is 6 scales in advance of that of the dorsal. The anal is longer than the dorsal. The number of rays varies from 15 to 16 of which 5 to 6 anterior

ones are spinous. Both the dorsal and the anal, when adressed fall short of the caudal. The caudal is shorter than the length of the head, and considerably longer than high; it has an elongate-ovoid distal margin. The pectorals are inserted somewhat high on the sides; they are much shorter than the head and are separated from the origin of the ventrals by a distance almost equal to their own length. The ventral fins are small and inserted nearer the gill opening than the hypural joint. The vent is situated nearer the origin of the anal than the tip of the ventrals.

The colouration of the specimens in alcohol is uniformly pale olivaceous green. Except for the ventral surface, the body is infuscated with fine dark specks and minute dots. On the back, before the insertion of the dorsal fin, there are two close-set parallel lines formed by dusky dots. The occiput and the jaws are blackish. In some specimens there is a faint indication of a dusky narrow lateral band from the shoulder to the base of the caudal fin. The fins are pale brown with minute dusky dots.

Sexual Dimorphism.—Of the six specimens of *Dermogenys burmanicus* under report, two are males and four females. The males, as measured from the tip of the upper jaw to the hypural joint, are 29 and 33 millimetres, while the females are 37, 39, 42 and 46 millimetres in length respectively. With such limited material it is not possible to be definite about the variation in the size of the males and females of the species, but it appears that the males are of a comparatively smaller size than the females. The chief secondary sexual characters of the males of *D. burmanicus*, however, lie in the modifications of the anal fin and the skin of the genital area. In female specimens the anal fin is somewhat triangular in shape and sub-angulate posteriorly; the rays are normal and more or less subequal. The genital papilla, situated well in advance of the insertion of the anal fin, is represented by a slightly elevated small rounded area (Text-fig. 2, *a*). In the male individuals, on the contrary,



TEXT-FIG. 2.—Enlarged views of anal fin of specimens of *Dermogenys burmanicus*, sp. nov. $\times$ ca. 9.

(*a*) Female; (*b*) Male, showing secondary sexual characters.

the anal fin has a deep notch behind the last simple ray; posteriorly it is more rounded than angulate. The undivided rays, 5 or 6 in number,

as the case may be, are decidedly shorter than those in the females. They are considerably thickened, strong and quite spinous, and have rather blunt tips. Among these modified rays, the second is the longest and thickest. All the spinous rays are recurved and closely adherent. Anteriorly and to some extent laterally, they are partially enveloped by an elongated swollen fold of skin which "seems to be an outgrowth of the genital papilla" This swollen fold of skin is like a pocket and is capable of being everted. (Text-fig. 2, b.)

In regard to the structure of the anal fin in *Dermogenys*, Weber and de Beaufort (*op. cit.*, p. 137) have remarked: "None of the rays thickened, but in males the anterior part of the anal is sometimes enveloped by a swollen fold of skin, which seems to be an outgrowth of the genital papilla." Weed (*op. cit.*, p. 50) in his revision of the genera of the Hemirhamphid fishes has adopted the above account for *Dermogenys*. In view of the presence of well defined secondary sexual characters in males of *D. burmanicus*, it is, however, necessary to emend the definition of the genus.

In 1923, Fowler and Bean (*op. cit.*, pp. 15, 16) described a species of *Dermogenys*, *D. bakeri*, from Zamboanga, Philippine Islands, and created a new subgenus, *Rhamphodermogenys* for its reception. Unfortunately, the authors had a single specimen before them, and they did not describe the characteristics of the anal fin. From the figure of the fish published by them (p. 16, fig. 3), however, it appears that the specimen represents a male. The form of the anal fin is more or less identical with that of a male of *D. burmanicus*. In this connection Weed remarks; "If the form of anal fin as shown by Fowler and Bean is a sexual character and there are no intergradations with the conditions mentioned for *Dermogenys* by Weber and de Beaufort (1922, p. 137) this form [*Dermogenys* (*Rhamphodermogenys*) *bakeri*] probably should stand as a distinct genus"

It will thus be seen that sexual dimorphism may be well-defined in some species of *Dermogenys* and ill-defined or absent in others and no taxonomic value can, therefore, be attached to it.

The subgenus *Rhamphodermogenys* is distinguished "from the subgenus *Dermogenys* Van Hasselt by its long upper jaw and advanced ventrals" But so far as can be judged from the description and the figure of the type-species, *D. (Rhamphodermogenys) bakeri*, the upper jaw does not appear to be much longer than in most species of *Dermogenys* (its "width $1\frac{3}{5}$ in its length"). The ventrals in *Rhamphodermogenys* are inserted nearer the gill opening than the hypural joint. But it may be pointed out that in *Dermogenys* itself the ventral fins may be "inserted about midway between gill opening and hypural joint or a little nearer to either" (Weed, *op. cit.*, p. 49). Division of the genus *Dermogenys* into subgenera on such characters, therefore, appears to be too artificial.

Relationship and Remarks.—*Dermogenys burmanicus* is closely allied to *D. pusillus* van Hasselt found in the rivers of Malay Peninsula, Siam, Philippines, etc., but can be readily distinguished from it by the position of the ventral fins. In *D. pusillus*, the base of the ventrals is nearer

the caudal than the head, while in *D. burmanicus*, it is nearer the head than the caudal. Besides, there are differences in colouration between the two species. *D. orientalis* M. Weber,¹ known from Borneo and Celebes, is another near ally of *D. burmanicus*, but the latter differs from the former in having a proportionately shorter beak and an entirely different colour pattern.

Hemirhamphus brachynopterus Bleeker², which should also be referred to the genus *Dermogenys*, was obtained from the River Hooghly. Since its discovery it has not been rediscovered so far and Day,³ while giving a very short account of the species in his *Fishes of India*, remarked : "Dr. Bleeker received a single small specimen, which unfortunately is now in such a bad state that I cannot add anything to the above description" It is, however, clear that *D. burmanicus* differs from *D. brachynopterus* in having a much longer upper jaw. In Bleeker's species the upper jaw is "rather wider than long, its length not equalling one diameter of orbit", while in *D. burmanicus* the upper jaw is longer than wide, its length being nearly twice the orbital width.

Distribution.—*D. burmanicus* is found generally in the fresh water rivers throughout the Delta Districts in Burma. It is interesting to note that since Bleeker's discovery in 1853, the genus *Dermogenys* is being reported from the Indo-Burmese waters for the first time. It has so far been known to be widely distributed in the fresh waters of Siam, Malay Peninsula, Sumatra, Borneo, Java, Celebes and the Philippines.

Ecological notes.—The Director of the Harcourt Butler Institute of Public Health, Rangoon, has kindly supplied the following ecological notes on *D. burmanicus*, which is locally known as "*Pseudo Ngapaung-Yo*" :

- " 1. It is found generally in fresh water river, throughout the Delta Districts in Burma.
- " 2. It breeds throughout the year, as the young ones can be captured throughout all seasons.
- " 3. It attains not more than 4 inches in length.
- " 4. It always swims against the tide along the banks of the river.
- " 5. It is very delicate and it does not stand long journey, specially in buses, boats carts and trains.
- " 6. It feeds on insects, larvae and pupae.
- " 7. It is not used as food."

Type-specimens.—No. F 11778/1 (male) ; No. F 11780/1 (female), preserved in the collection of the *Zoological Survey of India, Indian Museum, Calcutta.*

¹ Weber & de Beaufort, *Fish. Indo-Austral. Archipel*, IV, pp. 137, 138 (1922).

² Bleeker, *Verh. Batav. Genoot*, XXV, p. 146 (1853).

³ Day, *Fish. India*, p. 517 (1878).

Measurements in millimetres :

	Types.		
	♀	♂	♀
Length of body from tip of lower jaw to hypural joint	42.0	33.0	39.0
Length of trunk from branchial opening to hypural joint	27.0	23.5	25.0
Height of body	4.0	3.5	3.5
Length of head from tip of upper jaw to branchial opening	9.0	9.0	9.0
Breadth of head	3.0	2.75	3.0
Height of body	3.5	3.0	3.5
Length of snout	4.0	3.5	4.0
Diameter of eye	2.0	2.0	2.0
Interorbital width	0.75	0.75	0.75
Length of base of dorsal	3.0	3.0	3.0
Height of dorsal	2.5	2.3	2.5
Length of base of anal	5.0	4.0	4.5
Height of anal	2.5	2.5	2.5
Length of pectoral	6.5	5.8	6.0
Length of ventral	2.5	2.5	2.5
Length of caudal	7.0	6.2	6.5
Length of caudal peduncle	3.0	2.3	2.5
Least height of caudal peduncle	2.0	2.0	2.0
Length of lower jaw beyond extremity of upper	6.0	5.8	6.0

NEW ASILIDAE FROM INDIA (INSECTA : DIPTERA).

By STANLEY W. BROMLEY, *Ph.D.*, *Dudley, Massachusetts, U. S. A.*

In the present paper are described a number of new species of Asilidae contained in a collection loaned by the Indian Museum, through the kindness of Dr. H. S. Pruthi, Zoological Survey of India, Indian Museum, Calcutta, India. To Dr. Pruthi and Dr. Chopra of this institution, the writer is greatly indebted for the opportunity of studying this collection. Thanks are also due to Mr. C. H. Curran and others on the staff of the American Museum of Natural History for valuable assistance.

The types are deposited in the Indian Museum. In addition, an annotated list of the flies of this family present in the above-mentioned collection is included.

I. ASILINAE.

Asilus ricardoi, sp. nov.

Total length, 18 to 21 mm. A yellowish-brown pollinose species with three broad black stripes on the mesonotum. Legs black. Wings pale brownish. Genitalia deep black.

Male.—Head black, pale yellowish-brown pollinose. Mystax mostly yellowish-brown with a few black bristles above. Antennae black with black bristles. Bristles of vertex and occiput black. Beard yellow. Palpi black with yellowish hairs. Thorax yellowish-brown pollinose. Mesonotum with three broad black stripes above, the median extending to the scutellum. Hairs and bristles of pleura and coxae yellowish. Legs black with fine appressed yellowish hairs and black bristles. Mesonotum with black hairs and bristles. Scutellum grayish-yellow pollinose, with fine yellowish hairs on disc and long upturned bristles on the margin, some black, some yellowish. Halteres pale reddish. Wings pale brownish. Abdomen uniformly yellowish-brown pollinose with concolorous hairs and bristles. Hypopygium deep black. Forceps simple, not wider than seventh segment when viewed from above. Hairs black.

Female.—Similar. Ovipositor black, not longer than sixth and seventh segments together.

Holotype ♂ $\frac{625}{H6}$.—Simla, Western Himalayas, in jungle. viii-ix.25. B. N. Chopra. *Allotopotype* ♀ $\frac{626}{H6}$. Four *paratopotypes* ♂ ♂ $\frac{627-630}{H6}$.

This species is placed in the genus *Asilus* (*sens. lat.*), its nearest affinity being with *Machimus*. *Asilus ricardoi*, sp. nov. is closely related to *Asilus orientalis* Ricardo, but is smaller, slenderer and the pale vestiture lighter in colour than that of *orientalis*.

Machimus (Tolmerus) punjabensis, sp. nov.

Total length, 20 mm. A black species, ashy-gray pollinose, with black legs. The abdomen with the first segment, the anterior border of the second and the posterior borders of the second to seventh broadly ashy-gray pollinose.

Female.—Head black, whitish pruinose. Palpi black with black hairs. Antennae black with black bristles. Bristles of vertex and occiput black. Beard white. Mystax pale yellowish-white with a few black bristles. Thorax black, grayish-white pollinose. A broad dark median stripe with an ashy-gray pollinose longitudinal streak anteriorly. Bristles of mesonotum black, fine hairs mostly black, those above wings grayish-white. Scutellum grayish-pollinose with fine black hairs on disc and black bristles and white hairs on margin. Hairs of pleura and coxae whitish. Legs black with black bristles and finely appressed whitish hairs. Wings hyaline, slightly grayish towards the apex. Halteres yellowish. Abdomen black with fine black hairs above. Bristles on margin and sides of first segment black. Bristles on succeeding segments white. One or two on second segment black. White hairs on side of first segment. First segment, anterior border of second and posterior borders of succeeding segments grayish-white pollinose. Ovipositor black, just a trifle longer than the seventh segment.

Holotype ♀ $\frac{631}{H6}$ —Binnu Khad, below Dak Bungalow at Baijnath, 3,000 ft., Kangra Valley, Punjab. 10.vi.26. S. L. Hora.

Machimus (Tolmerus) incisularis, sp. nov.

Total length, 10 to 12 mm. A small black species with incisures of abdominal segments narrowly whitish pollinose. Legs black.

Female.—Head black, whitish pollinose. Antennae black with black bristles. Bristles of vertex and occiput black. Beard white. Mystax composed of whitish and blackish bristles. Palpi very small, with a few whitish hairs. Thorax black, whitish pollinose on sides. Mesonotum very pale brownish pollinose with black bristles posteriorly. Pleura with white hairs. Scutellum narrow with some black bristles on the margin and minute black hairs on the disc. Legs shining black with scattered black and white bristles. Minute scattered pile white. Wings hyaline, grayish towards the tips. Abdomen black, with black bristles along sides of segments. Posterior margins narrowly whitish pollinose. First segment and base of second grayish pollinose. Ovipositor black, not longer than seventh segment.

Holotype ♀ $\frac{632}{H6}$.—Birch Hill, Darjiling Dist., 6,000 to 7,000 feet. 1.vii.1914. Lord Carmichael's Collection. *Paratype* ♀ $\frac{633}{H6}$ Ghumti, Darjiling Dist., 1,500 to 5,000 feet. vi.1914. Lord Carmichael's Collection.

Machimus hirsutus, sp. nov.

Total length, 13 to 14 mm. A small, robust, hairy, dark brownish pollinose species; legs with contrasting black and yellowish-brown longitudinal markings.

Male.—Head black, brownish pollinose. Mystax thick, with black bristles above and a few white ones below. Antennae black with black hairs. Bristles of vertex and occiput black. Beard white. Palpi black with black hairs. Thorax dark brown pollinose. Mesonotum with a broad black median line and black bristles. Thickly set black bristles and hairs. Scutellum black, brownish pollinose, with long black hairs and marginal bristles. First two coxae with whitish hairs. Wings pale brownish with a dark brown area in the sub-costal and marginal cells. Legs black. Exterior aspect of femora, tibiae and tarsi yellowish-brown. Most of the hairs on legs black. Abdomen black. Black hairs predominating. A few pale hairs on first and second segments. Posterior margins narrowly grayish-brown pollinose. Hypopygium black, forceps simple, brownish pollinose with black hairs.

Female.—Similar. Ovipositor slightly longer than segments six plus seven. Piceous.

Holotype ♂ $\frac{634}{H6}$.—Gorge below Dak Bungalow, Dumpep, Khasi Hills, Assam. xi.26. S. L. Hora. *Allotopotype* ♀ $\frac{635}{H6}$. Same data. *Paratopotype* ♂.

***Machimus subgenitalis*, sp. nov.**

Total length, 15 to 16 mm. A black hirsute species, grayish-brown pollinose. Legs contrastingly marked longitudinally with black and reddish-brown.

Male.—Head black, whitish pollinose. Mystax mostly black, few yellowish-white bristles intermingled. Beard yellowish-white. Palpi black-haired. Antennae black with black hairs. Bristles of vertex and occiput black. Thorax black, grayish-brown pollinose. Mesonotum with a broad black median line. Pleura with pale hairs. Mesonotum with black hairs and black bristles. Scutellum brownish pollinose with long black marginal bristles. Coxae with pale hairs. Legs black with external aspect reddish-brown. Bristles mostly black, some white. Fine hairs whitish. Wings pale brownish, nearly hyaline. Abdomen grayish-brown pollinose. Incisures slightly lighter. Hairs on venter black, many on dorsum whitish. Many of the bristles on lateral and posterior portions of tergites whitish. Genitalia black with black hairs. The tips of the forceps prolonged into a narrow process projecting downward subterminally. The ventral portion of the hypopygium dark reddish-brown, thickened.

Female.—Similar. Ovipositor piceous, about the length of segments four to seven inclusive.

Holotype ♂ $\frac{637}{H6}$.—Round about Hurst Cottage, Bakrota Hill, Dalhousie, 7,000 feet, Punjab. S. L. Hora. *Allotopotype* ♀ $\frac{638}{H6}$. Same data.

***Machimus infra femoralis*, sp. nov.**

Total length, 15 to 16 mm. A black species, grayish-brown pollinose, with femora contrastingly marked with black and yellowish-brown.

Male.—Head black, grayish pollinose. Mystax composed of black bristles and numerous yellowish-white bristles below. Beard whitish.

Palpi black with black hairs, occipital bristles black. Antennae black with black bristles. Bristles of vertex black. Thorax black, grayish pollinose. Mesonotum with broad black median and two lateral spots. Hairs and bristles black. Scutellum grayish-brown pollinose, marginal black bristles. Hairs of pleura whitish and a patch of black bristles behind the wings. Coxae with whitish hairs. Femora with anterior portion black. Posterior aspect yellowish-brown. Tibiae and tarsi yellowish-brown, the posterior darker towards the tip. Hairs of legs whitish. Bristles black. Wings nearly hyaline. Abdomen black, grayish pollinose. Hairs and bristles mostly whitish. Few black bristles around the posterior margin of first segment. Hypopygium very small, dark brown above, reddish-brown below. Upper forceps curved downwards at the tips.

Female.—Similar. Ovipositor brownish, slightly longer than segments six *plus* seven.

Holotype ♂ $\frac{639}{H6}$.—Kalimpong, Darjiling Dist., 600 to 4,500 feet, Eastern Himalayas. 24.iv–10.v.1915. F. H. Gravely. *Allotopotype* ♀ $\frac{640}{H6}$. Same data.

Machimus inutilis, sp. nov.

Total length, 12 mm. A grayish pollinose species with hyaline wings. The hypopygium longer than segments five to seven. The upper forceps with the long slender process at the tips projecting backwards, but curved in slightly so that they appear to meet from above.

Male.—Head black, grayish-white pollinose. Mystax black with a few white bristles intermingled. Beard bushy, whitish. Palpal hairs black; hairs on vertex whitish; occipital bristles black. Antennae black with black bristles. Thorax black, grayish-white pollinose. Mesonotum with the usual markings, and with black bristles and hairs. Scutellum grayish pollinose with white hairs and black marginal bristles. Femora black on anterior portion, yellowish-brown on posterior aspect, the tip of the front femora yellowish-brown. Front tibiae yellowish-brown, other tibiae similarly coloured, but with the external aspect darker. Tarsi dark yellowish-brown. Legs with mostly light hairs, some black and some pale yellow bristles. Abdomen grayish-brown pollinose with pale hairs predominating. Hypopygium black, brownish pollinose with fine black hairs and pale hairs intermingled.

Holotype ♂ $\frac{641}{H6}$.—Round about Hurst Cottage, Bakrota Hill, Dalhousie, 7,000 feet, Punjab. S. L. Hora.

Neolophonotus indicus, sp. nov.

Total length, 10.5 mm. A small black species, brownish pollinose, with pale yellowish hairs on the scutellum.

Female.—Head black. Antennae black with black bristles. Mystax extending from antennae to oral margin, black above and on sides yellowish-brown in the anterior and lower portion. Occipital bristles black curving forward over ocellar tubercle. Beard yellowish-white. Thorax black, grayish-brown pollinose on sides, yellowish-brown pollinose above. Mane black with yellowish hairs on the side. Scutellum with

a thick tuft of upturned yellowish hairs. Legs black with fine long yellowish pile and black bristles. Wings nearly hyaline with a slight iridescent tint. Abdomen black with fine yellowish hairs and some black hairs above. Ovipositor black, blade-like, slightly shorter than lengths of segments five to seven.

Holotype ♀ $\frac{642}{H6}$.—Amarkantak, 3,300 feet, Rewa State. 30.i.27 H. S. Pruthi.

***Neoitamus khasiensis*, sp. nov.**

Total length, 18 mm. A black species, grayish pollinose, with legs contrasting black and yellow.

Female.—Head black, pale golden pollinose. Mystax mostly black, some white bristles below. Antennae black with black hairs. Bristles of vertex and occiput black. Beard white. Palpi black with black hairs. Thorax black, yellowish-brown pollinose. Bristles and hairs on mesonotum black. Hairs on pleura white. Scutellum grayish-brown pollinose with black marginal bristles and fine white hairs on disc. Wings hyaline, grayish towards tips. Halteres pale brown. Coxae with pale yellowish hairs. Femora yellowish with a black line on the upper anterior side. Tibiae yellowish with black tips. Tarsi black, the anterior portion of the basal tarsus on the first two pairs of legs yellowish. Abdomen black, yellowish-brown pollinose with pale hairs and bristles. Ovipositor beginning with the fifth segment, long, slender, laterally compressed.

Holotype ♀ $\frac{643}{H6}$.—Near Dak Bungalow, Mawphlon, Khasi Hills, Assam. 12.iv.27. Gopi Ram.

***Astochia canis*, sp. nov.**

Total length, 28 mm. A large, robust black species, ashy-gray pollinose, with legs contrasting black and reddish-brown.

Female.—Head as broad as thorax from above. Facial prominence little developed. Antennae black with black hairs. The third joint oval. The arista almost three times as long as the third joint. Head pale yellowish, whitish pollinose. Occipital with fine white pile and black bristles. Hairs on vertex white, bristles black. Mystax sparse, white. Palpi dark brown with some black hairs and some white hairs. Beard white. Pronotum with white hairs and black bristles. Thorax black, grayish-white pollinose. Pleura covered with fine white hairs. Mesonotum with many fine white hairs and black bristles posteriorly. Some fine black hairs on disc. Scutellum grayish-white pollinose, black bristles on margin, fine white hairs on disc. Wings brownish along costal margin and towards apex. Halteres brownish. Coxae grayish-white pollinose with white hairs and a few black ones intermingled. Femora of first two pairs of legs reddish-brown, black above. Posterior femora mostly black. Tibiae of first two pairs of legs reddish-brown, black at the apex. Posterior tibiae black. Tarsi deep black; first segment slightly thickened, with rather thickly set black bristles. Legs with fine white hairs and black bristles. Abdomen black, grayish pollinose. Sides of third and fourth segments brownish pollinose. Sides of abdomen with fine white pile. Few black bristles

on the sides of the first segment. Fifth segment narrowing sharply posteriorly. The ovipositor beginning with the sixth segment, long, black and laterally compressed.

Holotype ♀ $\frac{644}{H6}$.—Kamaing, Myitkyina Dist., Upper Burma. xi-xii.26. B. N. Chopra.

Promachus ghumtiensis, sp. nov.

Total length, 25 mm. A black species, yellowish-brown pollinose, with black legs, reddish tibiae. Wings dark brownish. Hypopygium small, black with black hairs.

Male.—Head black, yellowish-brown pollinose. Antennae black with black hairs. The third segment missing. Mystax black with some yellowish bristles intermingled. Bristles immediately in front of antennae black. Occipital bristles and bristles of vertex black. Beard yellowish-white. Palpi black with black hairs. Thorax black, brownish pollinose. Disc of mesonotum thickly covered with fine black hairs and bristles. Scutellum with yellowish hairs and black bristles. Wings brownish, a large black shadow in the first sub-marginal cell. Tufts of hairs on both sides of halteres, yellowish. Halteres pale brownish. Coxae with yellowish hairs and a few black ones. Femora black with thick yellowish pile, and a few black bristles, and some fine black hairs. Tibiae reddish-black at the tip with yellowish pile and black bristles. Tarsi black with black hairs and bristles. Abdomen yellowish-brown pollinose with yellowish hairs. Hypopygium from above not broader than sixth segment, black with black hairs, a few light ones towards the tip. Forceps simple.

Holotype ♂ $\frac{645}{H6}$.—Ghumti, Darjiling Dist., 4,000 feet. viii.1912. Lord Carmichael's Collection.

Philodicus pruthii, sp. nov.

Total length, 18 to 20 mm. Black species, grayish-brown pollinose, with legs black and reddish covered with fine white appressed pile.

Male.—Head black, whitish pollinose. Antennae black with black hairs. Occipital bristles black. Rest of vestiture of head white. Mystax with a pale yellowish tint. Beard white. Thorax pale brownish pollinose, above grayish pollinose on pleura. A black mid-dorsal line divided longitudinally anteriorly by a lighter streak, the side spots dark. Mesonotum with black bristles posteriorly. Scutellum grayish pollinose with fine white hairs and a pair of long black marginal bristles. Pleura with white hairs and bristles. Coxae with whitish hairs. Femora black with fine short appressed white pile. Tibiae reddish-black towards tip, with fine white pile and few yellowish bristles on anterior pair. Tarsi reddish with fine white appressed pile, pale yellowish bristles and few black bristles. Wings nearly hyaline, slightly grayish towards tips. Abdomen black, the posterior portions banded with grayish pollinose. Incisures brownish-black. Anterior portions of segments brownish pollinose. Bristles yellowish, hairs whitish. Hypopygium black, narrow, slightly shorter than segments six *plus* seven, covered with fine appressed whitish pile and a few black bristles.

Female.—Similar, except all bristles on anterior tibiae black. The ovipositor black, shining, slightly shorter than second segment.

Holotype ♂ $\frac{646}{H6}$.—Pearl Bank Fisheries, Tuticorin, Madras Pres. ii-iii.26. R. B. S. Sewell. *Allotopotype* ♀ $\frac{647}{H6}$. Same data.

***Apoclea indica*, sp. nov.**

Total length, 20 mm. A whitish pruinose and pubescent species with hyaline wings and yellowish legs with black femora covered with fine white hairs.

Male.—Head black. Thick mystax, entire vestiture whitish. Antennae dark brown. Arista at least three times as long as the short oval third segment. Thorax whitish pollinose with white pile and bristles. Mesonotum with two narrow dark median lines and large lateral spots, covered with light brownish pollen and fine whitish hairs. Coxae with white hairs. Femora entirely black with white pubescence and white bristles. Tibiae and tarsi reddish with white pubescence, and white bristles. Ungues black with reddish bases. Wings hyaline with reddish veins. Halteres reddish. Abdomen black, whitish pollinose and pubescent. Hypopygium black and somewhat broader than sixth segment, slightly broader than seventh. Pale brownish-white pubescent. Scutellum thickly covered with white hairs. Marginal bristles white.

Holotype ♂ $\frac{648}{H6}$.—Pearl Bank Fisheries, Tuticorin, Madras Pres. ii-iii.26. R. B. S. Sewell.

***Ommatius carmichaeli*, sp. nov.**

Total length, 14 to 18 mm. A grayish pollinose species with legs contrasting black and yellow. Male with a bulge in the costa, the veins clouded with brown at this bulge. The female does not have this bulge, but the veins are clouded with brown in this area.

Male.—Head black, whitish pollinose. Mystax whitish, a few black hairs in upper part of mystax. Antennae with light hairs. Occipital and vertical bristles black. Beard whitish. Palpi black with a few black hairs and some white hairs. Thorax grayish pollinose. Hairs on coxae and pleura whitish, bristles on posterior portion of mesonotum black. Scutellum grayish pollinose with black hairs and black marginal bristles. Antennae and middle femora yellowish-black above. Posterior femora black. Tibiae yellowish, posterior tibiae dark brown at tip. Tarsi yellowish, becoming brownish towards the tip. Legs with fine yellowish hairs and black bristles. Wings nearly hyaline, pale brownish towards the tip, the costal margin bulging forward at about two-thirds the distance and the area around the veins brownish. Abdomen blackish with pale incisures and fine white pile. Hypopygium black, upper forceps with slender, incurved hooks meeting, as seen from above.

Female.—Similar, except the wings lack the costal bulge. In the area where the bulge occurs in the male, the colour is brownish.

Holotype ♂ $\frac{649}{H6}$.—Singla, Darjiling Dist., 1,500 feet. v.1913. Lord Carmichael's Collection. *Allotype* ♀ $\frac{650}{H6}$. Ghumti, Darjiling Dist., 1,500 to 5,000 feet. vi.1914. Lord Carmichael's Collection. *Paratypes* ♂. Kalimpong, Darjiling Dist., 600 to 4,500 feet, Eastern Himalayas. 24.iv-10.v.15. F. H. Gravely. 2 ♀♀ $\frac{651-652}{H6}$. Singla, Darjiling Dist., 1,500 feet. v.1913. Lord Carmichael's Collection. Ghumti, Darjiling Dist., 1,500 to 5,000 feet. vi.1914. Lord Carmichael's Collection.

Ommatius subgracilis, sp. nov.

Total length, 13 mm. A small blackish species, grayish pollinose with yellowish legs and hyaline wings. A slight costal bulge in the male. Apex of wings brownish.

Male.—Head with pale yellowish vestiture, except bristles of vertex and occiput, which are black. Antennae with black bristles also. Thorax grayish pollinose, the usual mesothoracic markings black, bristles posteriorly on the mesonotum. Hairs and bristles of pleura and coxae whitish. Scutellum grayish pollinose and two black bristles on the margin. Legs yellowish, the distal three-fourths of the posterior femora yellowish-brown. Tips of femora and tibiae darker, as are also tarsi. Wings hyaline, brownish towards tip, partly brownish under the costal bulge. Halteres pale yellowish. Abdomen blackish, grayish pollinose, white hairs. Hypopygium reddish-brown. Slightly broader in seventh segment, narrowing sharply towards the tip, as viewed from above.

Female.—Similar. Ground colour of the abdomen more brownish and the wings do not possess the costal bulge.

Holotype ♂ $\frac{653}{H6}$.—Kalimpong, Darjiling Dist., 600 to 4,500 feet, Eastern Himalayas. 24.iv-10.v.15. F. H. Gravely. *Allotopotype* ♀ $\frac{654}{H6}$. Same data. *Paratopotype* ♀. Same data.

Ommatius nigrifemorata, sp. nov.

Total length, 8 mm. A small black species, grayish pollinose with black femora and yellowish tibiae.

Female.—Head black, pale yellowish pollinose. Occipital and ocellar bristles black. Mystax black with some white bristles. Palpi with black hairs. Thorax black, grayish pollinose. Mesonotum with black bristles posteriorly. Scutellum grayish pollinose with two black bristles on the margin and fine white hairs on the disc. Wings nearly hyaline, iridescent. Halteres yellowish. Vestiture of pleura whitish. Femora black with pale hairs and bristles. A few bristles on posterior femora black. Tibiae yellowish with black tips. Bristles black, fine hairs white. Tarsi black with black bristles and hairs. Abdomen black, grayish pollinose. Incisures narrow, margin brown, fine hairs white.

Holotype ♀ $\frac{655}{H6}$.—Singla, Darjiling Dist., 1,500 feet. v.1913 Lord Carmichael's Collection. *Paratopotype* ♀ $\frac{656}{H6}$. Same data.

Ommatius ater, sp. nov.

Total length, 9 to 10 mm. A small black species with black legs.

Female.—Head black. Face yellowish pollinose. Occiput whitish pollinose. Mystax black. Beard white. Occipital, vertical and ocellar bristles black. Antennae black with black bristles. Palpi black with black hairs. Thorax black. Pleura yellowish-gray pollinose. Mesonotum with black bristles. Scutellum grayish pollinose with fine white hairs and two black marginal bristles. Coxae with whitish hairs. Legs entirely black, with fine white hairs and black bristles. Wings nearly hyaline, iridescent. Halteres pale yellowish-brown. Abdomen metallic black, grayish pollinose.

Holotype ♀ $\frac{657}{H6}$.—Simla, Western Himalayas, in jungle. viii-ix.25. B. N. Chopra. *Paratype* ♀. Simla, 6,000 to 7,000 feet, Western Himalayas, at light. viii-ix.25.

II. LAPHRIINAE.

Andrenosoma choprai, sp. nov.

Total length, 17 to 21 mm. An entirely black species, grayish pollinose, hirsute. Wings very faint brownish, nearly hyaline.

Male.—Head black, grayish-white pollinose. Occipital, ocellar and antennal bristles black. Bushy hairs of face and mystax white. Mystax with some black bristles above. Beard bushy white. Palpi black with black hairs. Thorax black, grayish pollinose. Mesonotum with faint black markings. Disc of mesonotum covered with black hairs. Scutellum grayish-whitish pollinose with black hairs and bristles. Pleura grayish pollinose with yellowish-white hairs. Wings nearly hyaline, lightly brownish along veins. Legs black with bushy yellowish-white pile and some black hairs intermingled. Bristles black. Abdomen black with a single black bristle at the side of the first segment and two black bristles at the sides of segments two and three. Fine hairs on tergites black. Incisures grayish pollinose. A small grayish pollinose patch on the lateral posterior margins of segments one to six. Thick pile along sides of abdomen, mostly whitish. Hypopygium black with whitish hairs and a few black hairs.

Female.—Similar. Oviduct black, about the length of the fifth segment.

Holotype ♂ $\frac{658}{H6}$.—Singla, Darjiling Dist., 1,500 feet. v.1913. Lord Carmichael's Collection. *Allotopotype* ♀ $\frac{659}{H6}$. Same data.

Maira longirostra, sp. nov.

Length, 20 mm., exclusive of rostrum which is 4 mm. in length. A rather slender species with thorax and head whitish pollinose and abdomen club-shaped. The fifth segment as broad as the thorax, black with metallic purplish reflections. Abdominal segments one to five with a white spot on the posterior lateral margins.

Female.—Head black, whitish pollinose. Antennae long, black, arising from a prominence, their bases closely approximate, black with

black hairs. Occipital bristles black. Hairs immediately below antennae black. Hairs along sides of face white. Mystax black. Beard white. Palpi black with black hairs. Pleura whitish pollinose. Ground colour of mesonotum black with metallic purplish reflections, but covered with brownish-white pollen, fine black hairs. Two large patches of white pollen back of the humeri. Scutellum black with metallic purplish reflections, black marginal bristles directed backwards. Coxae with whitish hairs. Legs blue-black with whitish hairs and a few black ones intermingled. Underparts of tarsi and distal portions of tibiae with fine golden pubescence. Wings hyaline at base, becoming grayish, the apical two-thirds grayish. Abdomen black with metallic purple reflections (incisures, brownish-white pollinose), club-shaped, the second segment narrower than the first, third segment slightly broader. Abdomen broadening from there on to the fifth segment, which is about as broad as the thorax. The sixth segment tapers sharply, the seventh very small. Ovipositor very short. Segments one to five with a white patch on the posterior lateral margins. Venter pale grayish-brown pollinose.

Holotype ♀ $\frac{660}{H6}$.—Singla, Darjiling Dist., 1,500 feet. v.1913. Lord Carmichael's Collection.

III. DASYPOGONINAE.

Cyrtopogon khasiensis, sp. nov.

Total length, 12 mm. A black species with hyaline wings, very faintly brownish along veins.

Female.—Head black, grayish pollinose, vestiture black, except beard which is yellowish-white. A few yellowish-white hairs on lower part of mystax. Thorax black, grayish-white pollinose. Mesothorax with two median black lines and two black spots on each side. Pleura grayish-white pollinose with whitish hairs. Scutellum whitish pollinose with black hairs. Wings hyaline. Halteres dark brown. Cross veins faintly clouded with brown. Legs black, except bases of tibiae which are brownish. Bristles mostly reddish. Hairs black and yellowish intermingled. Parascutellum black, the callosities white pollinose. Abdomen shining black. Tufts of yellowish hairs at the sides of the first and second segments, a whitish spot on posterior lateral border of first segment, posterior margins of segments two to four banded with grayish-white, interrupted in the centre. Segments five and six with a white patch on the posterior lateral margin. Segment seven with a very faint indication of this patch. Ovipositor with brownish spines.

Holotype ♀ $\frac{661}{H6}$.—Nungbru Forest, near Mairong, Khasi Hills, Assam. Gopi Ram. 15.iv.27. *Paratype* ♀. Near Dak Bungalow, Mawphlon, Khasi Hills, Assam. Gopi Ram. 12.iv.27.

Cyrtopogon laxenecera, sp. nov.

Total length, 14 mm. A brownish hirsute species with slender cylindrical abdomen, superficially resembling a *Laxenecera*.

Male.—Head black, yellowish-white pollinose, thickly pilose. Hairs and bristles of vertex, occiput, antennae and upper part of mystax black. Lower part of mystax, beard, pronotal hairs yellowish. Thorax brownish pollinose. Pleura, posterior part of mesonotum and scutellum thickly covered with yellowish hairs. Legs black, thickly covered with yellowish hairs. Wings grayish at tips, yellowish at base. Abdomen black. Posterior margins of segments broadly banded with yellowish-white, thickly covered with reddish-yellow pile. Abdomen narrower than thorax, constricted between the second and third segments, broadly rounded at tip. More cylindrical than most species of this genus.

Holotype ♂ $\frac{662}{H6}$.—Round about Hurst Cottage, Bakrota Hill, Dalhousie, 7,000 feet, Punjab, at light. S. L. Hora.

***Stenopogon subtus*, sp. nov.**

Total length, 17 mm. A blackish species with reddish legs and dorsum of abdomen reddish-black. Occipital hairs yellowish, hairs on vertex black. Antennae reddish, third segment black. Face grayish-white pollinose. Mystax composed of black bristles above and on sides whitish bristles anteriorly, becoming more numerous toward the lower portion. Beard white. Thorax black, pale brownish pollinose. Humeri reddish with black bristles. Thorax covered with pale yellowish hairs and black bristles. Some of the bristles on the posterior portion of the mesonotum yellowish. Scutellum grayish-yellow pollinose. Margin bordered with black bristles, intermingled with yellow. Coxae with whitish hairs. Legs reddish with black bristles and pale hairs. Anterior femora black above, with a black line above, extending three-fourths of the length and a black area below basally seven-eighths the length. Middle femora basal anterior portion seven-eighths the length black. Posterior femora with the anterior portion black to seven-eighths of the length. Wings grayish, nearly hyaline. Halteres brownish. Abdomen reddish with pale yellowish hairs. The anterior portion of the first segment, sides and anterior portion of the second and the sides of segments three to seven blackish, grayish-brown pollinose, becoming whitish pollinose posteriorly. Ovipositor reddish, the eighth segment with the posterior margin blackish. Spines black. Venter mostly reddish.

Holotype ♀ $\frac{653}{H6}$.—Dayankund Nallah, below bridge, between mile-stones 14 and 15 on Dalhousie-Khajiar Road, 8,000 feet, Dalhousie, Punjab. S. L. Hora.

***Damalis claripennis*, sp. nov.**

Total length, 8 to 10 mm. A dark brown species, golden pollinose with yellowish legs and hyaline wings.

Male.—Head yellowish pollinose. Antennae black, third segment broken off, black bristles. The few bristles of the mystax black. Palpi with black hairs. Occiput with yellowish and whitish hairs. Face golden-brown pollinose. Thorax golden pollinose with whitish hairs. Mesonotum with a broad brownish line, disappearing posteriorly. Scutellum golden-brown pollinose with fine whitish hairs. Wings hyaline.

Base of veins yellowish. Legs yellowish. Tips of femora, tibiae and tarsi dark brown. Hairs and bristles on legs black, intermingled with fine sparse yellowish hairs. Halteres pale yellowish. Abdomen brownish with sparse brown hairs.

Female.—Similar.

Holotype ♂ $\frac{622}{H6}$.—Singla, Darjiling Dist., 1,500 feet. vi.1913. Lord Carmichael's Collection. *Allotopotype* ♀ $\frac{623}{H6}$. Same data. *Paratopotype* 1 ♂, 2 ♀♀. Same data.

List of Determined Species in the Collection.

ASILINAE.

Asilus orientalis Ricardo. Numerous specimens from Soom and Ghumti, Darjiling District. (There may be two species in this material. Specimens in rather poor state.)

Asilus opulentus Walker. Singla, Darjiling District.

Asilus aurimystax Bromley. Kalimpong, Darjiling District.

Dysmachus tolmeroides Bromley. Masmal Reserve Forest, Khasi Hills, Assam.

Machimus rufipes Ricardo. Numerous specimens from Singla and two from Kalimpong, Darjiling District.

Heligmoneura (*Asilus*) *armatipes* Macquart. Singla, Darjiling District.

Heligmoneura (*Asilus*) *montanus* Ricardo. Two specimens from Kalimpong and one from Ghoom, Darjiling District.

Heligmoneura (*Asilus*) *yenpingensis* Bromley. One from Ghumti and one from Sukna, Darjiling District.

Promachus leoninus Loew. Several specimens from Singla, Darjiling District.

Promachus binghamensis Ricardo. Numerous specimens from Singla, Darjiling District.

Promachus yerburyensis Ricardo. One specimen from the Pearl Bank Fisheries, Tuticorin, Madras Pres.

Astochia maculipes Walker. Singla, Darjiling District.

Astochia determinatus Walker. Victoria Forest, Kurseong, Eastern Himalayas and Khasi Hills, Assam.

Philodicus univentus Walker. Namma, U. Burma.

Allocotosia auratus Fabricius. Singla, Darjiling District.

Ommatius peregrinum Van der Wulp. Upper Burma and Singla, Darjiling District.

LAPHRIINAE.

Nusa elva Walker. Silcuri, Cachar, Assam.

DASYPOGONINAE.

Cryptopogon laphrides Walker. Mt. Hattu, Simla Hills.

Damalis planiceps Wied. Ghoom, Darjiling District.

Damalis fusca Walker. Birch Hill, Darjiling.

Microstylum ? *trimelas* Walker. Singla, Darjiling District.

Microstylum ? *apicale* Wied. Singla, Darjiling District.

ACANTHOCEPHALAN PARASITES OF CERTAIN FISHES FROM CALCUTTA.

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(Plate V.)

During a survey of the parasites of fishes of the Calcutta markets we examined the intestines and viscera of *Labeo rohita* (Ham. Buch.), *Catla catla* (Ham. Buch.) and *Ophicephalus striatus* Bloch, during the months of May to September 1934. With the exception of a few specimens all were heavily infected with Acanthocephalan parasites. In one large specimen of *Catla catla* which was caught in a tank near Diamond Harbour more than 250 of these parasites were found in the intestine. All the parasites were fixed and preserved in the usual way. Sagittal and transverse sections were cut, where necessary, for study.

In all the three Acanthocephalan worms described below we find that the vasa efferentia from the two testes join each other to form the vas deferens instead of opening directly into the prostatic glands, as described by Thapar (1930). The vas deferens runs for a short distance and opens separately at the side of the seminal vesicle near its opening at the base of the penis. The organ which we have termed as the penis is a muscular ending into which all the tubes from the prostatic glands and the testes open. It is clearly differentiated and can be readily distinguished in all cases.

Acanthogyrus acanthogyrus Thapar.

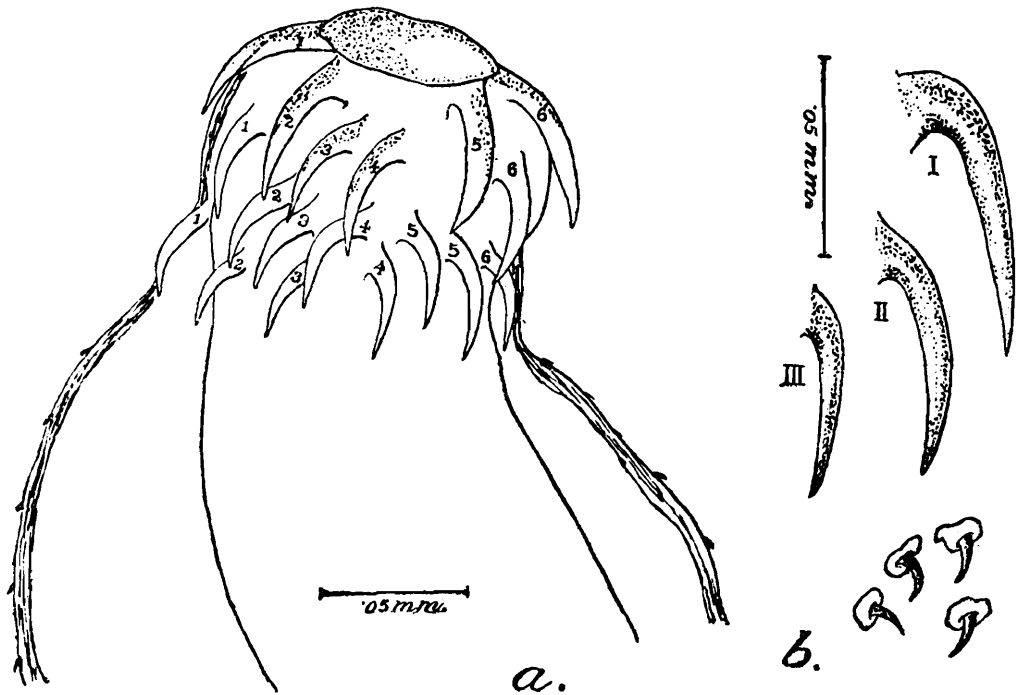
1927. *Acanthogyrus acanthogyrus*, Thapar, *Journ. Helminthol.* V, pp. 109-120.

The body is club-shaped and swollen at the anterior end just behind the proboscis. The males are smaller and more slender than the females. The males are 2.80—8.00 mm. long and 0.60—1.10 mm. broad; the females 3.00—15.50 mm. long and 0.70—1.70 mm. broad. The maximum number of worms found in one host was 14.

The proboscis is globular and is armed with 3 rows of recurved hooks with 6 hooks in each row. The proboscis sheath is a thick walled muscular sac.

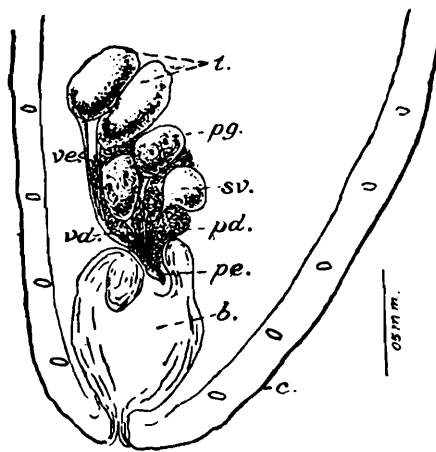
The body is studded with regular rows of fine, curved hooks. At the anterior two-third portion there are 23 rows of complete rings encircling the body, the next four rows form incomplete rings (24th row has 12 hooks, 25th-8, 26th-5 and 27th-3) followed by several rows with 2 hooks in each row. The rows of hooks correspond to the lateral branches of the lacunar canals which arise from two longitudinal canals to form a regular lacunar system in the body wall.

On the two sides of the proboscis-sheath there are two long and narrow lemnisci, each with a large nucleus.



TEXT-FIG. 1.—*Acanthogyrus acanthogyrus*. (a) Anterior region, (b) spines of the proboscis and the body magnified.

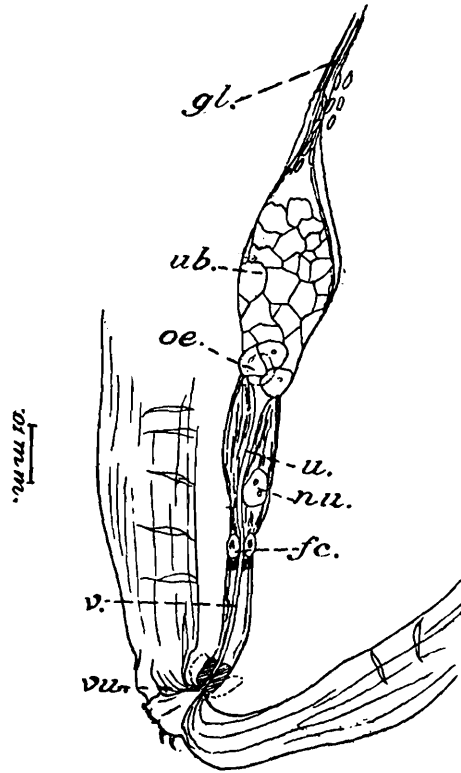
There is a single nerve ganglion situated near the posterior end of the proboscis-sheath. It sends out fine branches, called retinaculi, which are distributed in the body wall.



TEXT-FIG. 2.—Male genitalia of *Acanthogyrus acanthogyrus*. b., bursa; c., cuticle; pe., penis; pd., prostatic duct; pg., prostatic glands; sv., seminal vesicle; t., testes; ve., vasa efferentia; vd., vas deferens.

The male genitalia lying at the posterior third of the body consist of a pair of ovoid testes, two vasa efferentia, one vas deferens, a seminal vesicle, a bilobed prostatic gland, a small conical penis and a bursa. The two testes are situated close behind one another. The vasa efferentia, arising from the testes after a short distance, unite to form the vas deferens; this terminates at the base of the rudimentary penis. A tube

from the small sac-like seminal vesicle joins the vas deferens before its opening into the penis. The prostatic glands consist of a bilobed mass with two or more nuclei embedded in it. Short tubes lead out of this mass and end at the base of the penis.



TEXT-FIG. 3.—Female genitalia of *Acanthogyryus acanthogyryus*. *fc.*, flask-shaped cells; *gl.*, genital ligament; *nu.*, nucleus, in the wall of the uterus; *oe.*, ovijector; *u.*, uterus; *ub.*, uterine bell; *v.*, vagina; *vu.*, vulva.

The female genitalia consist of a uterine bell, the uterus, thick muscular vagina, vulva and ova scattered in the body cavity in various stages of development. A pair of flask-shaped cells lie at the posterior end of the uterus, a big nucleus is also found in its wall. The vulva which is at the postero-lateral end of the body is armed with a few very fine spines.

Host.—*Labeo rohita* (Ham.).

Location.—Intestine.

Locality.—Calcutta, Bengal.

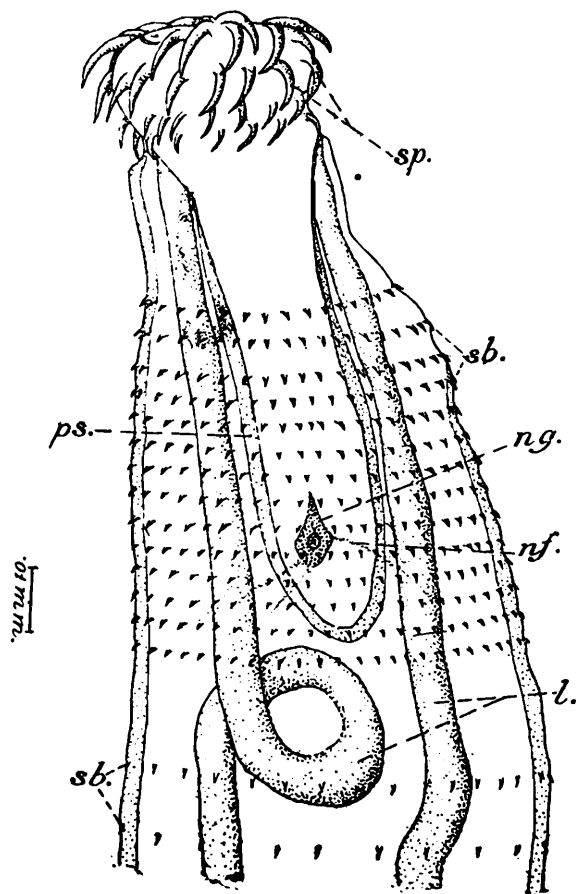
Specimens of *Acanthogyryus acanthogyryus* were also collected from *Catla catla* (Ham.) obtained at Calcutta, Diamond Harbour and Port Canning. These specimens were smaller than those from *Labeo rohita* (Ham.) The largest male measured 3.49 mm. by 0.68 mm. and the largest female 7.00 mm. by 1.45 mm. The proboscis is 0.10 mm. long and 0.09 mm. broad. The action of the proboscis is controlled by strong retractor and protractor muscles. The proboscis-sheath is single walled. The two lemnisci, which are filamentous structures, arise from the two sides of the proboscis-sheath near its point of origin; they measure 0.86 mm. by 0.14 mm. A few large nuclei are embedded in the lemnisci.

The genitalia in both the sexes are similar to those of worms obtained from *Labeo rohita*.

Pallisentis nagpurensis (Bhalerao).

1931. *Farzandia nagpurensis*, Bhalerao, *Ann. Mag. Nat. Hist.* (10) VII, pp. 569-573.

In almost all the specimens of *Ophicephalus striatus* Bloch dissected by us the intestines contained 14-17 of these parasites, while one specimen, about 12 inches long, had in its intestine 29 parasites. In specimens left in water in a tray the protrusion of the proboscis was clearly observed; the protrusion is the result of a sudden springing movement, while the withdrawal is much slower and gradual. These worms, when fresh, were pinkish brown in colour, but after fixation and preservation in alcohol became whitish. The males in all cases were more numerous than the females.



TEXT-FIG. 4.—Anterior region of *Pallisentis nagpurensis*. *l.*, lemnisci; *nf.*, nerve fibres; *ng.*, nerve ganglion; *ps.*, proboscis sheath; *sb.*, spines of the body; *sp.*, spines of the proboscis.

The proboscis is somewhat globular and there is a distinct long neck devoid of spines. The proboscis is armed with 4 rows of 8-10 hooks each. At the anterior part of the body there are 14 rows of close-set spines followed by a spineless region, after which again there are regular rows of widely placed thinner spines.

Measurements.—The males are 14.00 mm. $\times$ 0.45 mm. and the females 17.50 mm. $\times$ 0.56 mm.; the proboscis is 0.20 mm. $\times$ 0.23 mm.; the proboscis sheath 0.88 mm. $\times$ 0.28 mm.; lemnisci 2.43 mm. $\times$ 0.09 mm.; anterior testis 1.04 mm. $\times$ 0.23 mm.; posterior testis 0.74 mm. $\times$ 0.23 mm.; prostatic gland 2.65 mm. $\times$ 0.20 mm.; seminal vesicle

0.85 mm. $\times$ 0.13 mm.; and the bursa 0.94 mm. $\times$ 0.27 mm. In the collection from Uttarbhag the largest male measured 22.00 mm. $\times$ 0.75 mm. and the female 32.00 mm. $\times$ 0.90 mm.

The male genitalia, situated in the posterior half of the body consist of a pair of elongated testes situated one behind the other, from each of these a duct, vas efferens, runs for a short distance alongside the prostatic gland, and then joins with the other to form the vas deferens, which opens at the base of the penis. A duct from the thin elongated sac-like seminal vesicle joins the vas deferens before it opens into the penis. The prostatic gland which is a bilobed elongated structure has in the anterior part 15 or more nuclei. The two prostatic ducts from the prostatic mass after meeting each other open at the base of the minute penis. There is a funnel shaped eversible bursa.

The female genitalia consist of the uterine bell, the uterus, the vagina, the vulva and the ovary which is seen only in very young specimens. In mature worms the ovary bursts, liberating the oval egg-balls which float in the body cavity. The egg-balls contain ova in all stages of development. The uterine bell is a thin wide-mouthed funnel-shaped structure attached at one side by a thin ligament, the genital ligament, to the base of the proboscis sheath. At its basal portion there are a few guard cells which serve the function of sorting out the ova, and only allow the mature ova to pass out into the uterus. The uterus is a thick walled, long tube which leads into an elongated vagina. The vagina has two bands of strong muscles at its two ends which apparently allow the ova to pass out in a single file. The vulva is placed more or less postero-ventrally.

Host.—*Ophicephalus striatus* Bloch.

Location.—Intestine.

Locality.—Calcutta and Uttarbhag, Bengal.

In conclusion we have to express our gratitude to Dr. Bains Prasad, Director, Zoological Survey of India, for his unceasing guidance and kind help, as also for going through the manuscript.

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EXPLANATION OF PLATE V.

Acanthogyrus acanthogyrus Thapar.

FIG. 1.—Microphotograph of the entire male specimen showing the body-nuclei and the male genitalia. $\times 30$.

FIG. 2.—Microphotograph of the anterior part of the same. $\times 80$.

FIG. 3.—Microphotograph of sagittal section through the region of the male genitalia, showing the course of the vasa efferentia and vas deferens, and the Penis. $\times 75$.

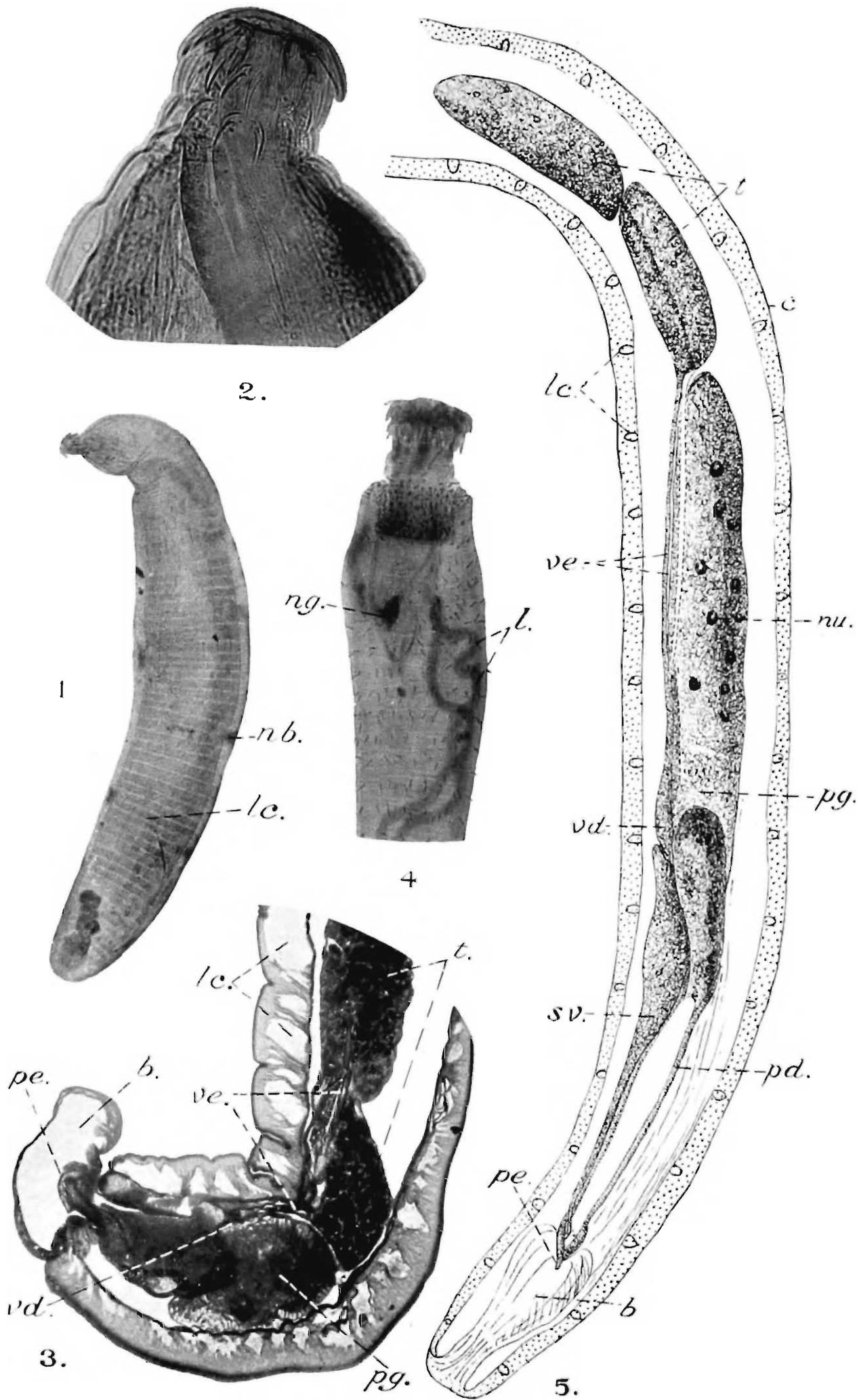
Pallisentis nagpurensis (Bhalerao).

FIG. 4.—Microphotograph of the anterior part showing the position of the Nerve ganglion and its fibres. $\times 20$.

FIG. 5.—Posterior region of the body showing the male genitalia. $\times 50$.

Reference to letterings.

b., bursa; *c.*, cuticle; *l.*, lemnisci; *lc.*, lacunar canals; *nb.*, body-nuclei; *ng.*, nerve-ganglion; *nu.*, nucleus; *pe.*, penis; *pg.*, prostatic glands; *ps.*, proboscis sheath; *sb.*, spines of the body; *sp.*, spines of the proboscis; *sv.*, seminal vesicle; *t.*, testes; *vd.*, vas deferens; *ve.*, vasa efferentia.



Indian Acanthocephala.

THE AMPHIBIANS AND REPTILES OBTAINED BY CAPT. KINGDON WARD IN UPPER BURMA, ASSAM AND S. W. TIBET

By MALCOLM A. SMITH.

The collection of Amphibians and Reptiles obtained by Capt. Kingdon Ward on his last expeditions to Upper Burma, Upper Assam and the adjacent region of Tibet, although not large, is of considerable interest. The region visited is the meeting place of the Eastern Himalayan fauna, which belongs mainly to the Indo-Chinese subregion, and the Trans-Himalayan, which is mainly Chinese in origin. Of the 16 species collected, 7 are known from China or Yunnan, 3 from the Himalayas, while the remainder are widely distributed or are peculiar to the region visited. The Tibetan collection extends the range of several species to a considerable extent. The accounts of the two journeys, with maps of the areas visited, have appeared in *The Geographical Journal*: "Explorations on the Burma-Tibet border", Vol. 80, Dec. 1932, pp. 465-480, and "The Himalaya East of the Tsangpo", Vol. 84, Nov. 1934, pp. 369-397.

The following is a detailed account of the collection, which has been presented to the British Museum (Natural History). The Lohit Valley was visited in March, the Rong-to Valley in May, Shugden Gumpa and the Salween valley in July and August and the Di-chu Valley in August.

AMPHIBIANS.

Megophrys minor Stejneger.

To this species I refer a small Toad obtained in the Lohit Valley, Sadiya Frontier Tract, at 5,000 ft. altitude. It agrees well with the brief description of the type (*Proc. Biol. Soc. Washington*, XXXIX, 1926, p. 53), which came from Szechuan, E. China. The following details supplement Stejneger's description :

Female with ripe ova. Tongue nicked behind ; canthus rostralis sharp ; loreal region vertical, concave ; nostril equidistant from the tip of the snout and the eye ; interorbital region concave, broader than the upper eyelid ; fingers long, the first when applied to the second reaching only half way up ; third finger nearly twice as long as first ; toes with a rudiment of a web, the third a little longer than the fifth ; tibio-tarsal articulation reaching to the anterior border of the eye ; skin above with numerous rounded glandules.

Colour in formalin : Greyish black above, the glandules paler. Lighter below, heavily marbled with black, the throat nearly all black.

From snout to vent 35 mm.

About 15 ova, 2 mm. in diameter, in each oviduct.

A single tadpole obtained in the same pool as the adult no doubt belongs to this species. Head about twice as long as broad, the mouth with a large funnel-shaped expansion. Tail four and a half times as

long as high, with narrow dorsal and ventral crests, the greatest height of the crests being about half the depth of the muscular portion of the tail at the middle. Olivaceous in colour, speckled with darker. Total length 28, tail 21 mm. No visible limbs.

Scutiger sikkimensis (Blyth).

Two adult males were found in the Adung Valley, Burma-Tibetan border at 12,000 ft. altitude. They were caught in February and have their peculiar breeding characters well marked, namely a large black plate on each breast composed of minute horny tubercles, and nuptial pads of large black horny spines on the first and second fingers.

From snout to vent 70 mm.

A rare toad previously known only from high altitudes, 12,000 to 14,000 ft. in the Eastern Himalayas.

Bufo viridis Laur.

Five examples from the Salween Valley (11,000-12,000 ft.), one from Shugden Gumpa (13,000 ft.), both localities in S. E. Tibet. All the specimens have the under-parts heavily marbled with dark olive.

Range.—Widely distributed in N. China and N. E. Tibet.

Bufo stuarti Smith.

One specimen from the Lohit Valley at between 3,000 and 4,000 ft. altitude. Colour in life bright yellow. The type and only other known specimen was described from the Putao plain, Upper Burma, in 1919 (Smith, *Rec. Ind. Mus.*, XXXI, p. 78, text-fig. 1).

Rhacophorus maximus Günth.

Three specimens from the Negmung Valley (1,500 ft.), Burma-Tibetan frontier.

Range.—Eastern Himalayas, Assam, Khasi Hills.

REPTILES.

Japalura splendida Barb. & Dunn.

Three examples, Salween Gorge, N. of Shugden Gumpa, 10,000 ft. altitude.

Range.—Western China.

Calotes kingdon-wardi Smith.

The description of this species has appeared in my Volume on the Lizards in the "Fauna of British India", New series, (1935, p. 204). The specimen, a juvenile, was caught in camp in the Adung Valley, 7,000 ft. altitude.

Lygosoma indicum (Gray).

Two examples, Lohit Valley, 2,000 ft., one from Nam Tamai, near Fort Hertz, 3,500 ft. altitude.

Range.—Widely distributed in the Indo-Chinese subregion.

Natrix nuchalis (Blgr.).

1 ♂, 2 ♀♀, Adung Valley, 6,000 ft. altitude. Ventrals ♂ 145, ♀♀ 147, 155; subcaudals ♂ 50, ♀♀ 46, 46.

Range.—Yunnan; N. China.

Natrix subminiata helleri Schmidt.

1 ♀, Lohit Valley, 3,000 ft. Scale-rows 17-19-17; ventrals 171, subcaudals 86; 8 supralabials, 1 pre- and 3 post-oculars; temporals 2+2. Dark olive above, the neck and anterior part of the body with an indistinct reticulation of red, the colour being confined chiefly to the interstitial skin; a series of small dorso-lateral spots on the posterior half of the body; below greyish, speckled with darker; upper labials yellowish.

The specimen is considerably larger than any previously recorded, measuring 1,300 mm. in total length, the tail being 300 mm.

Range.—Southern China; Yunnan.

Elaphe mandarina (Cantor).

1 ♂, Nam-tamai divide, Burma-Tibetan border, 4,000 ft. Scale-rows 23-23-19, ventrals 228, subcaudals 75.

Range.—China.

Elaphe taeniura taeniura Cope.

1 ♀, Rong-to (Rong-thod) Valley, N. of Rima, 6,000 ft. Scale-rows 23-21-19; ventrals 246, subcaudals 94. Light chocolate in life with the usual black markings.

Range.—E. Himalayas to China and Indo-China.

Ptyas korros (Schlegel).

One juvenile, Kachin Hills, Burma.

Range.—Eastern Himalayas and Indo-China.

Zaocys nigromarginatus (Blyth).

One ♀ caught among bracken in a pine forest in the Rong-to Valley. Ventrals 206, subcaudals 112 (tail incomplete).

Colour in life, grass green above on the anterior half of the body, yellowish posteriorly, with the usual black longitudinal stripes.

Range.—Szechuan; Yunnan.

***Trimeresurus jerdoni* Günth.**

One ♂, Di-chu Valley, S. E. Tibet, 9000 ft. Ventrals 188, subcaudals 73; two from the Adung Valley; ventrals 186, 187, subcaudal 66, 76.

Range.—Assam to Central China.

***Trimeresurus monticola* (Gray).**

One ♀, Burma-Tibetan border, 2,000 ft.

Range.—The Eastern Himalayas to China and Indo-China.