

# STUDIES ON INDIAN JASSIDAE (*HOMOPTERA*).

PART I.—INTRODUCTORY AND DESCRIPTION OF SOME NEW GENERA AND SPECIES.

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(Plates I—V.)

## INTRODUCTORY.

The Jassid Rhynchota constitute one of the largest and most important families of the Homoptera. The family is in fact so large that some authorities are of opinion that it deserves the rank of a super-family. Jassidae are mostly minute and inconspicuous insects, but their several species, where they occur, are found in extremely large numbers. For example, every one in Bengal is familiar with the Diwali fly, *Nephotettix bipunctatus* Fabr., which is attracted by and dies near lights in such great abundance that their dead bodies can be swept into considerable heaps. All Jassidae without exception seem to live on plant sap which they suck by means of their proboscis. Their chief food plants are the cereals, but they also attack other important crops such as cotton and valuable orchards like those of apple and mangoe. They not only decrease the yield of their hosts, but seriously affect the quality of what they leave. Besides directly damaging the crops by draining them of their sap, they act as carriers of several serious virus diseases of plants, *e.g.*, tip-burn of potatoes, leaf-curl of sugar-beet, etc. This group of insignificant looking insects is, therefore, of great economic importance, especially in an agricultural country such as India.

The study of the Indian Jassidae has attracted the attention of very few workers. Atkinson<sup>1</sup> in 1885 enumerated 38 species only of this large group but rightly remarked that the number of Jassidae awaiting examination should add several hundred species to the Indian fauna. Melichar<sup>2</sup> in 1903 listed the Ceylonese species. Then followed Distant<sup>3</sup> who monographed the family in his extensive work on Rhynchota in the Fauna of British India series. Working in England as Distant was, far away from India, naturally his work could not be a complete one, and collecting trips undertaken during the last two or three years by myself or by some of my colleagues in the Zoological Survey of India have yielded numerous new and interesting genera and species, some of which are described in the present paper.

Distant's work deserves some further comments. Distant is the author of over 60 per cent of the genera and species described from India, but unfortunately his descriptions of new forms, based as they often were on single specimens, and those too sometimes carded and mutilated, are very inadequate. He hardly took into consideration important structures like the genitalia, whose importance in affording reliable generic and specific characters is recognized by workers on almost all groups of insects. Furthermore, with a few exceptions, he did not make any remarks on the position of the new forms he established. This

<sup>1</sup> Atkinson, E. T.—Notes on Rhynchota, No. 3. *Journ. As. Soc., Bengal*, LIV, pp. 91-113 (1885).

<sup>2</sup> Melichar, L.—Homopteren-Fauna von Ceylon. Berlin; (1903).

<sup>3</sup> Distant, W. L.—*Fauna British India, Rhynchota*, Vol. IV (1908); Vol. VI (1916); Vol. VII (1918).

is especially true in the case of the work that he published in 1918 (*Faun. Brit. Ind. Rhyn. VII*). Indian Jassidae constitute a very important part of the Jassid fauna of the world and have to be referred to by workers on this group in other parts of the globe. The above-mentioned shortcomings in Distant's work are all the more felt by such workers, inasmuch as in the absence of Indian specimens they have to depend entirely on the published description and figures. That famous authority, the late Dr. C. F. Baker of the Philippines, wrote me some time before his death that the most valuable service that a worker in India could render to Jassid workers in other parts of the world was to redescribe and properly illustrate most of the genotypes of Distant. For this purpose I am endeavouring to collect specimens from the type localities and get them compared with Distant's types, most of which are preserved in the British Museum (Nat. Hist.), London. I have already been able to obtain several of the type-species which will be described in the second part of these studies. As further material becomes available, other genotypes will be described in due course.

At this stage I may point out that most of the new species which are described in the present paper belong to genera other than those founded by Distant. I have touched on only those genera of this author whose types have been examined by me. As a result of my study, in the case of several such genera I have suggested that they should be combined with other genera. New species belonging to most of Distant's genera will be dealt with after their genotypes have been redescribed.

There has been great difference of opinion regarding the limits of the family Jassidae. Stål<sup>1</sup> divided the Auchenorrhynchous Homoptera into four families: *Stridulantiæ*, *Cercopida*, *Fulgorida* and *Jassida*. Fieber<sup>2</sup> divided this group into eight families, breaking the *Jassida* of Stål into five families, namely, *Membracida*, *Ulopida*, *Paropida*, *Scarida* and *Jassida*. Edwards<sup>3</sup> broke the *Jassida* of Stål into twelve families, thus raising the total number of families of the Auchenorrhynchous Homoptera to fifteen. The number was brought back to five by Puton<sup>4</sup> who differed from Stål only in the point that he took the *Membracida* out of *Jassida* and considered the two to be of equal rank. This arrangement has been followed by Oshanin<sup>5</sup> and most subsequent writers. The late Dr. C. F. Baker<sup>6</sup>, however, raised the family Jassidae to the rank of a super-family and divided it into as many as eighteen families. Very recently Haupt<sup>7</sup> has also broken up the family into six distinct families. Thus again there is the tendency to divide Jassidae into several families, but as there is no unanimity so far with regard to the number and the limits of its families and sub-families I am following the system of Stål as modified by Puton and Oshanin and adopted by such eminent authorities as Van Duzee<sup>8</sup> and consider Jassidae as one of the five families of Auchenorrhynchous Homoptera. I am following with some modifications the works of the same authors for the division of the family into the various sub-families.

<sup>1</sup> Stål, C.—Hemiptera Africana. Holmiæ; (1864-66).

<sup>2</sup> Fieber, F. Z.—Katalog der europäischen Cicadinen, etc. Wien; (1872).

<sup>3</sup> Edwards, J.—The Hemiptera Homoptera (Cicadina and Psyllina) of the British Islands. London; (1886).

<sup>4</sup> Puton, A.—Catalogue des Hemipteres de la faune paléarctique. Caen; (1899).

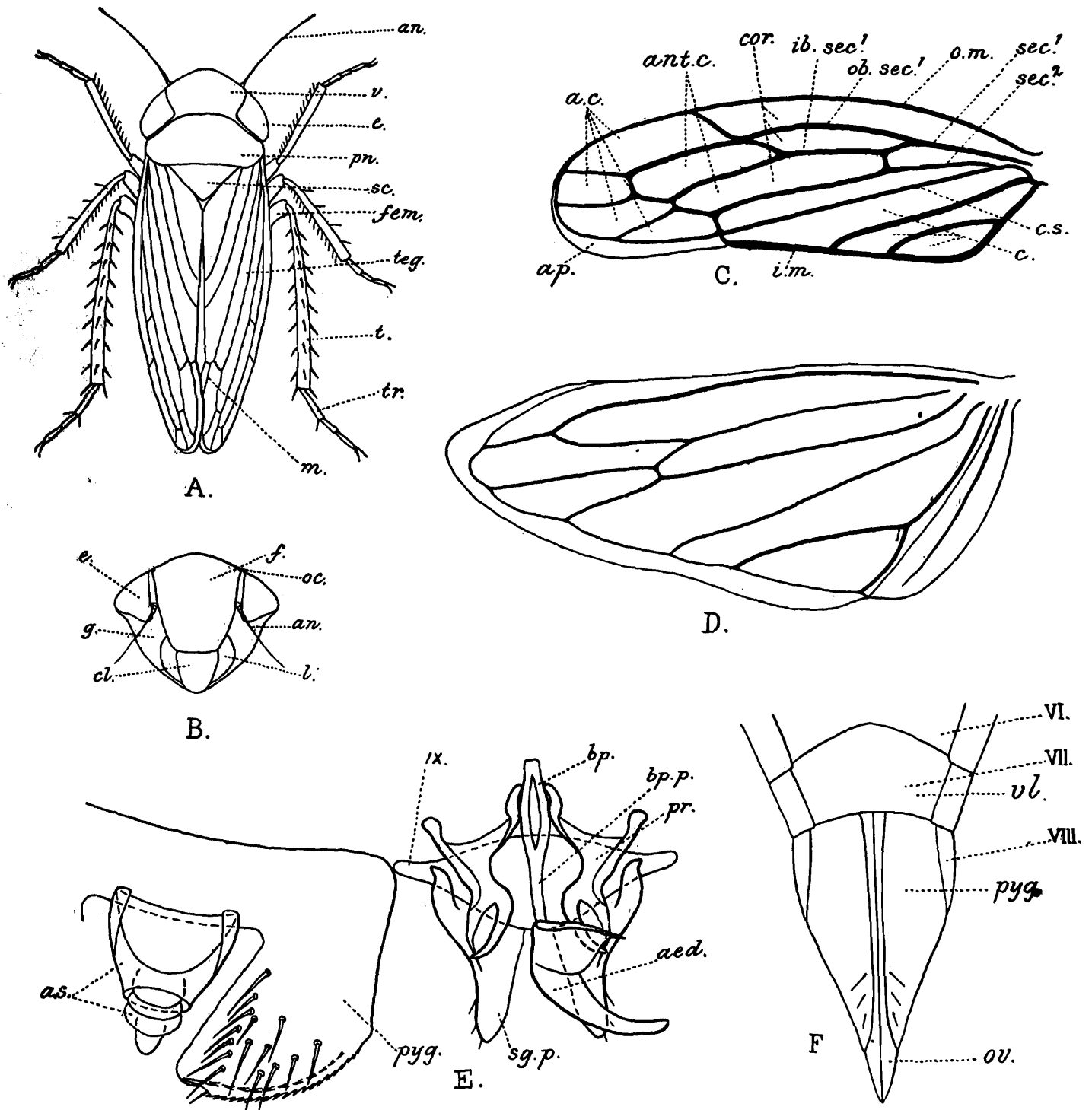
<sup>5</sup> Oshanin, B.—Katalog der paläarktischen Hemipteren. Berlin; (1912).

<sup>6</sup> Baker, C. F.—Tentative classification of the Jassiodea. Ms. 1924.

<sup>7</sup> Haupt, H.—Neueinteilung der Homoptera—Cicadina nach phylogenetisch zu wertenden Merkmalen. *Zool. Jahrb. abt. Syst.* LVIII (1929).

<sup>8</sup> Van Duzee, P.—Catalogue of North American Hemiptera. *Univ. Calif. Pub. Ent.* II (1917).

With regard to the arrangement of the genera into tribes and divisions there has been practically no agreement between any two workers on the group. Every author has introduced a new arrangement. This is especially true in the case of the largest sub-family, the Jassinae. Being yet not fully familiar with all the various sections of the group,



TEXT-FIG. 1.—Diagrams of the different parts of the body of *Cicadula montanus*, labelled in detail to explain the use of the terms employed in this paper. A. Dorsal view of the body (♀), × 18. B. Face, × 22.5. C. Tegmen or fore-wing, × 33. D. Hind-wing, × 45. E. Male genitalia and the associated structures, × 67.5. F. Ventral view of the terminal abdominal segments of the female, showing the ovipositor *in situ*, × 50. a. c., apical cells of the tegmen; aed., aedeagus; an., antennae; ant. c., ante-apical cells of the tegmen; ap., appendix of the tegmen; a. s., anal segments (X & XI abdominal segments); bp., basal plates (♂ genitalia); bp. p., basal plates' prolongation (♂ genitalia); c., clavus region of the tegmen; cl. clypeus; cor., corium region of the tegmen; c. s., claval suture; e., eyes; f., frons; fem., femur; g., genae; ib. sec.<sup>1</sup>, inner branch of the first sector (vein) of the tegmen; i. m., inner margin of the tegmen; l., lorae; m., membrane region of the tegmen; n., nervures or veins of the hind-wing; ob. sec.<sup>1</sup>, outer branch of the first sector (vein) of the tegmen; oc., ocelli; o. m., outer or costal margin of the tegmen; ov., ovipositor; pn., pronotum; pr., parameres (♂ genitalia); pyg., pygofers (lateral parts of the ninth abdominal segment associated with the genitalia); sc., scutellum (♂ genitalia); sec.<sup>1</sup>, first sector (vein) of the tegmen; sec.<sup>2</sup>, second sector (vein) of the tegmen; sg. p., sub-genital plates (♂ genitalia); t., tibiae; teg., tegmen or fore-wing; tr., tarsi; v., vertex of the head; vl., valve or the last visible abdominal segment of the female seen from the ventral side; w., hind-wing; VI-VIII., sixth to eighth abdominal segments.

especially the exotic forms, I have in the present paper not attempted to arrange the genera into tribes and divisions.

In systematic work on any group of insects the question of the selection of suitable terminology always presents some difficulty. Often a worker invents his own terms and consequently the succeeding workers have to spend a great deal of time in comparing the views of previous writers on the subject. In the case of the Jassidae this difficulty is still greater, inasmuch as the homologies of several important organs are still far from clear. For example, with regard to wing venation there is yet no unanimity in the use of the well known Comstock and Needham's system of nomenclature. This is an important problem by itself and its solution requires a careful study of the wing tracheae of the nymphs of different sub-families. The case of the equally if not more important organs, the genitalia, was similar up to 1925, when, after studying the morphology of these structures in the whole of the Rhynchotha and in several other orders of insects, I proposed<sup>1</sup> a set of terms which, with few exceptions, have been adopted by most British Hemipterists, such as China<sup>2</sup>, Hutchinson, etc., and are followed in the present paper. With regard to other organs, I have selected those terms which have been most commonly used by previous workers. Text-figure 1 (p. 3) is appended to explain the use of all the terms employed.

I must take this opportunity of thanking my numerous benefactors and friends who have assisted me in connection with this work. My chief, Lieutenant-Colonel R. B. Seymour Sewell, afforded me all kinds of facilities for carrying on this work. Most of my colleagues in the Zoological Survey of India, especially Dr. S. L. Hora, when on tour during the last few years, paid special attention to the collection of Jassidae. Through the courtesy of the entomologists and curators concerned, I had the opportunity of examining the collections of the Agricultural Research Institute, Pusa, the Agricultural Colleges, Lyallpur (Punjab) and Coimbatore (South India), the Government Museum, Madras, the Ceylon Museum, Colombo, etc. Colonel F. M. Bailey, C.I.E., sent me a collection of this family from Sikkim. Dr. F. Meidle of the Natural History Museum, Vienna, Austria, presented me with some authentically named specimens of the Palaearctic genera, while Professor Z. P. Metcalf of the State Agricultural College, North Carolina (U. S. A.), and Dr. P. B. Lawson of the Kansas University rendered me similar assistance in the case of North American species. Dr. G. Horvath, Director, Natural History Museum, Budapest, Hungary, loaned me types of some species of Melichar. Mr. W. E. China of the British Museum (Nat. Hist.), London, helped me by comparing my specimens with those in the collection of the British Museum and by answering numerous enquiries. The drawings illustrating this paper were made under my supervision by Babus D. Bagchi and S. Mondal, the artists of the Zoological Survey of India, who spared no pains in accurately delineating the complicated structures.

#### DESCRIPTION OF NEW GENERA AND SPECIES.

##### Sub-family *ULOPINAE*.

A representative of this sub-family has so far not been recorded from India. The Ulopinæ are closely allied to the Ledrinae, which are quite common in this country. The

<sup>1</sup> *Trans. Ent. Soc. London*, 1925, pp. 127-256.

<sup>2</sup> China, W. E.—*Trans. Ent. Soc. London*, 1926, p. 289.

two groups principally differ from each other in the shape and size of the eyes, which in the Ulopinae are globular and stand out prominently from the outline of the head, whereas in the Ledrinae they are in line with the lateral margins of the vertex. Moreover, the hind-tibiae in this sub-family are less dilated and foliaceous and bear fewer spines than those in the Ledrinae.

### Genus **ULOPA** Fall.

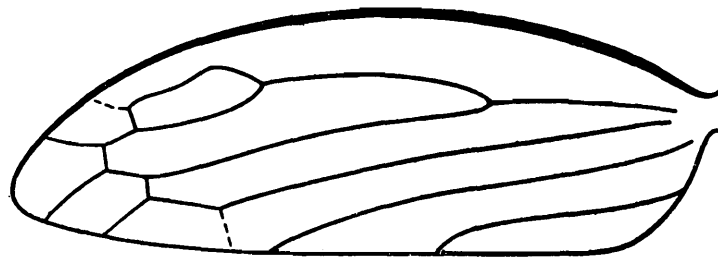
This genus is represented by about half a dozen species in the Palaearctic region. Stål described one species from South Africa. Recently it has been found also in the Nearctic region. *Ulopa* can be diagnosed as follows:—

Vertex almost horizontal, broad, anteriorly thin and foliaceous, punctate. Eyes prominent. Ocelli inconspicuous. Face slightly broader than long, punctate. Frons raised and flattened. Antennae small; the basal cavities deep and sharply edged dorsally; the first two antennal segments thick and cylindrical. Clypeus small. Genae small and narrow. Lorae indistinct. Pronotum about twice as broad as long, transverse, punctate, medially carinate. Tegmina coriaceous, punctate, touching each other along the claval margins and thus forming a roof-like structure over the body; appendix not developed. Legs small; hind-legs only slightly larger than the rest; hind-tibiae very scarcely spinulose.

### **Ulopa brunneus**, sp. nov.

(Plate I, figs. 1, 1a.)

This species is allied to the Palaearctic species *U. trivialis* Germ. which extends up to Turkestan. *U. trivialis* is much smaller and has conspicuous, dark-brown tegminal veins.

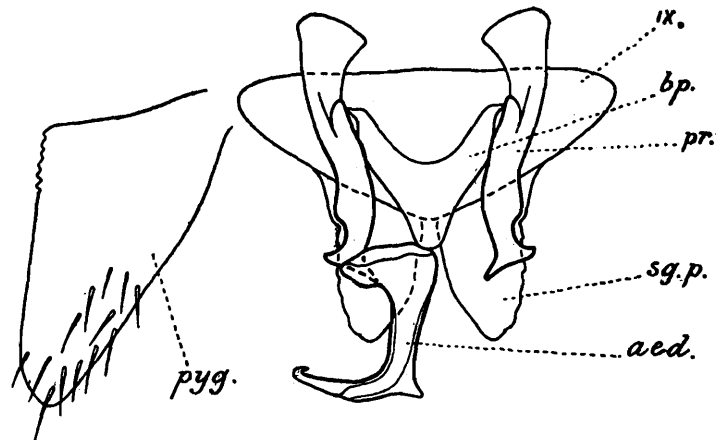


TEXT-FIG. 2.—*Ulopa brunneus*, sp. nov. Tegmen,  $\times 28$ .

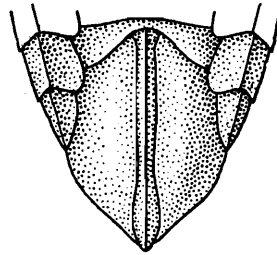
Brown. Vertex and pronotum foveately impressed; some fovae on the latter dark-brown. Pronotum depressed in the anterior region, with both the anterior and lateral margins straight and the posterior margin slightly concave. Scutellum medially, broadly carinate. Tegmina (text-fig. 2) shell-like; vein thick, only three longitudinal veins on the corium, four apical cells; claval suture obsolete. Wings not developed. Abdomen small.

*Male genitalia* (text-fig. 3). Pygofers triangular, provided with stout hairs in the posterior region. Sub-genital plates small and triangular. Parameres large and narrow. Basal plates broad, forming a V-like structure at the base of the aedeagus. Aedeagus small, wide at the base and apex, much narrower in the middle.

*Female genitalia* (text-fig. 4). Valve narrow, deeply concave at the posterior margin. Pygofers broad, flat and very finely punctate. Ovipositor moderately long and stout.



TEXT-FIG. 3.—*Ulopa brunneus*, sp. nov. Left pygofer and male genitalia; dorsal view,  $\times 87$ . Lettering as in text-fig. 1. (P. 6).



TEXT-FIG. 4.—*Ulopa brunneus*, sp. nov. ♀. Posterior abdominal segments: ventral view,  $\times 30$ .

*Length*.—♂ 3.5 mm. ; ♀ 3.75 mm.

*Holotypes*.—No.  $\frac{493-494}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Central India.

*Type-locality*.—Narsinghpur (1,300 ft.), Central Provinces ; 11—14-XII-27 (*H. S. Pruthi*). Numerous specimens of both sexes.

*Remarks*.—As appears from the description and figures of *Diamachus examplificatus* Dist., the position of the genus *Diamachus* seems to be in the Ulopinæ, near *Ulopa*, rather than in the Ledrinae as placed by Distant.

#### Sub-family BYTHOSCOPIINÆ.

#### Genus MAGNENTIUS, gen. nov.

When surveying the fauna of the Eastern Ghats during the summer of 1929, I collected half a dozen specimens of a Bythoscopid, which on a careful examination seemed to belong to a new genus. The specimens were sent to the British Museum, London, for comparison. In reply Mr. W. E. China informs me that they are identical with four specimens collected by T. V. Campbell at Nandidrug (South India) and labelled *Magnentius clavatus* by Distant. Neither Mr. China nor myself have been able to trace in the literature available the name of this genus or the species. I presume, therefore, that Distant did not publish any description of *M. clavatus*. Hence, according to the International Rules of Nomenclature<sup>1</sup> *Magnentius* or *M. clavatus* Dist. has no existence. I have, however, selected these names for the

<sup>1</sup> *Proc. Biol. Soc. Washington*, XXXIX, pp. 75-103 (1926).

new genus and its genotype in accordance with a desire expressed by Mr. China that I should do so.

The genus *Magentius* differs from all other genera of the Bythoscopinae in the size of the vertex of the head, which is extremely narrow and hardly visible from above. In this feature and in general appearance this genus comes very close to the members of the family Membracidae. The structure of the pronotum in this genus is also very remarkable. It is highly convex in the posterior region and gradually slopes down anteriorly. *Magentius* can be diagnosed as follows:—

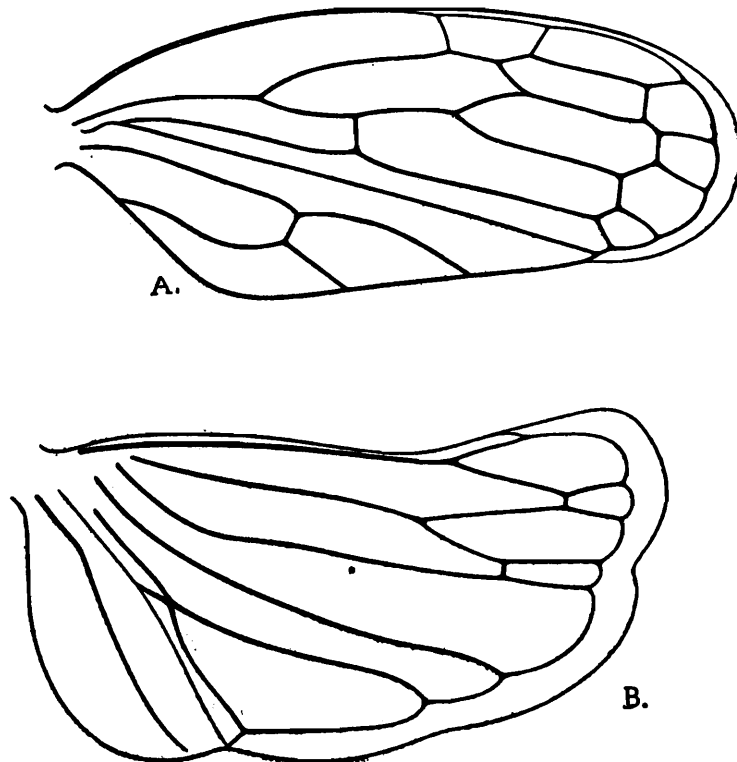
Vertex extremely narrow, forming a semi-circular ridge-like structure at the anterior end of the pronotum. Eyes small and oblique. Ocelli on the face, between the eyes, nearer the eyes than to each other. Face longer than broad; frons very large, highly raised, slightly sloping on the sides; the lower half of the face at a much lower level than the frons. Clypeus rectangular; genae moderately expanded. Pronotum long, finely, transversely striate, highly convex, very much produced in the anterior region, extending much beyond the eyes; the posterior margin distinctly concave. Scutellum about one and a half times as long as broad. Tegmina short, but longer than the body in both sexes, broad, thick and horny, not overlapping in the apical region; appendix hardly developed; claval margin almost straight; veins thick and coarse, five apical and three or four ante-apical cells. Wings well developed. Posterior legs very long and thickly spinulose.

*Genotype.*—*Magentius clavatus*, sp. nov.

***Magentius clavatus*, sp. nov.**

(Plate XXVII, figs. 2, 2a, 2b.)

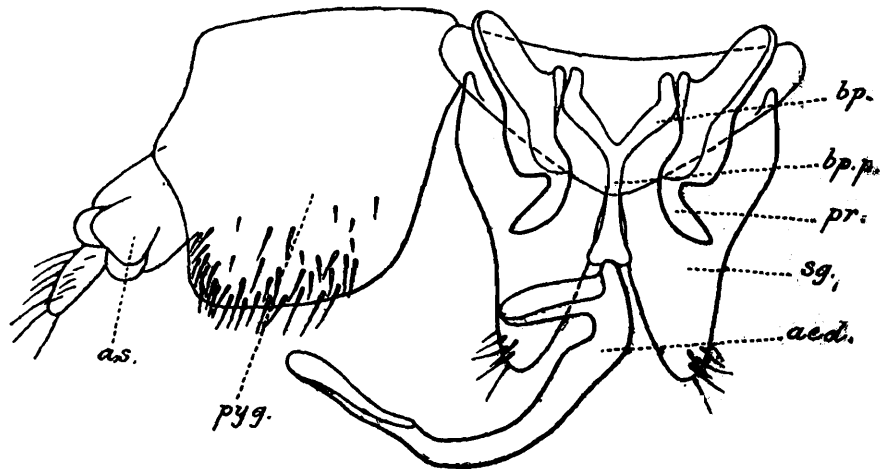
Black. Short and stout. Face, pronotum and tegmina minutely punctate. Eyes reddish. Frons medially carinate in the upper region. Lorae not reaching the apex of the



TEXT-FIG. 5.—*Magentius clavatus*, gen. and sp. nov. A. Tegmen,  $\times 20$ . B. Wing,  $\times 20$ .

clypeus. Tegmina covered with a fine, white pubescence, touching each other along the inner margins. Two cross veins between the first and second sectors (text-fig. 5) and a cross vein between the two veins in the claval region.

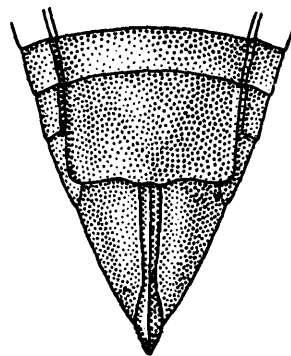
*Male genitalia* (text-fig. 6). Pygofers large, broad, covered with stout hairs in the posterior region. Sub-genital plates large, leaf-like, triangular, with a few stiff hairs near the



TEXT-FIG. 6.—*Magnentius clavatus*, gen. and sp. nov. Left pygofer, anal segments and male genitalia; dorsal view,  $\times 50$ . Lettering as in text-fig. 1 (p. 3).

posterior extremities. Parameres large. Basal plates small, rod-like, with a long prolongation. Aedeagus very long, curved, with considerably wide basal foramen and gonopore.

*Female genitalia* (text-fig. 7). Valve very long and broad. Pygofers small. Ovipositor reddish, slightly projecting beyond the posterior extremity of the abdomen.



TEXT-FIG. 7.—*Magnentius clavatus*, gen. and sp. nov. ♀. Posterior abdominal segments; ventral view,  $\times 18$ .

*Length*.—♂ 5.5 mm.; ♀ 6.0 mm.

*Holotypes*.—No.  $\frac{506}{H7}$ ,  $\frac{508}{H7}$ ; Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India.

*Type-locality*.—Kangumadugu (3,000 ft.), Seshachalams (Palkonda hills), Eastern Ghats, Cuddapah district; 21—23-VII-29 (*H. S. Pruthi*). 6 specimens.

### Genus **TROCNADELLA**, gen. nov.

Head including the eyes narrower than the pronotum; vertex extremely short, anteriorly broadly rounded. Eyes small. Face about one and a half times as broad as long, fairly raised in the region of the frons, abruptly depressed in the lower half. Ocelli on the

frons, nearer the eyes than to each other. Clypeus rectangular. Lorae not reaching the apex of the clypeus. Genae broad, deeply sinuate near the eyes. Pronotum very much raised, especially in the posterior region; the anterior margin convex, the posterior almost straight. Scutellum large, almost as long as broad. Tegmina longer than the body; the inner margins not straight; venation of *Bythoscopus* type, but the apical cells longer than those in *Bythoscopus*.

This genus differs from *Bythoscopus* Germ. in its head being narrower than the pronotum, in the form of the face, and in its pronotum being highly convex. In these characters it approaches the Australian genus *Trocnada* Walk.

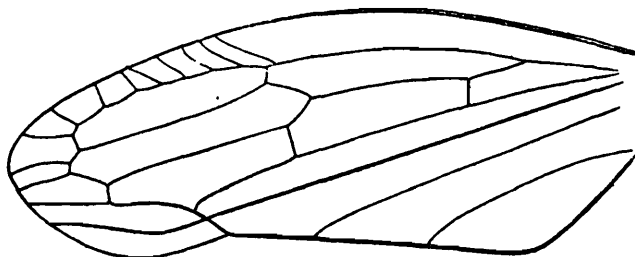
*Genotype*.—*Trocnadella shillongensis*, sp. nov.

### ***Trocnadella shillongensis*, sp. nov.**

(Plate I, figs. 3, 3a.)

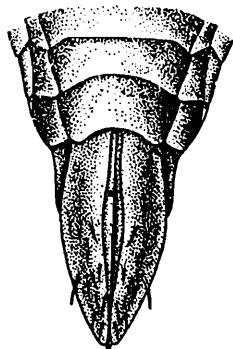
*Female*.

Large, stout and reddish-brown. Eyes small and black. Frons with a purple patch in each lateral area. Ocelli of the same colour as the frons, but quite conspicuous.



TEXT-FIG. 8.—*Trocnadella shillongensis*, gen. and sp. nov. Tegmen,  $\times 13.5$ .

Pronotum and scutellum distinctly transversely striated. Tegmina almost opaque, except in the apical region, where they are sub-hyaline, spotted with reddish pigment in the costal and claval areas; veins inconspicuous; venation as shown in text-fig. 8, numerous veinlets near the costal margin. Wings pale brown, nervures brown. Femora flattened and smooth; posterior tibiae profusely, strongly spinulose. Abdomen small.



TEXT-FIG. 9.—*Trocnadella shillongensis*, gen. and sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 18$ .

*Genitalia* (text-fig. 9). Valve large, distinctly concave at the posterior margin. Pygofers large, very much swollen, bearing numerous stiff hairs in the distal region. Ovipositor delicate, hardly projecting beyond the posterior extremity of the abdomen.

*Length*.—7.0 mm. Breadth across pronotum 2.75 mm.

*Holotype*.—No.  $\frac{505}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Assam.

*Type-locality*.—Shillong (4,500 ft.); October, 1920 (*T. B. Fletcher*). One female specimen.

*Remarks*.—The male of this species is not known.

### **Trocnadella punctatus**, sp. nov.

(Plate I, figs. 4, 4a, 4b.)

*Female*.

In this species the characters that distinguish the genus *Trocnadella* from *Bythoscopus* are less well marked. The head is only slightly smaller than the pronotum and the latter is less raised than that of *T. shillongensis*.

Large, robust, pale or yellowish-greens. Eyes small and black. Frons with a pair of irregular patches in the lateral regions. Ocelli prominent. Vertex, pronotum and scutellum transversely striated. Pronotum with a median longitudinal carina. Scutellum proportionately smaller than that of *T. shillongensis*, deeply, obliquely impressed in the apical region, with a pair of black dots near the anterior margin. Tegmina long, punctate except in the apical region; veins thin and indistinct. Wings whitish; nervures distinct. Femora flattened.

*Genitalia* (Pl. I, fig. 4b). Valve large, wavy at the posterior margin. Pygofers convex and covered all over with stiff hairs. Ovipositor as in *T. shillongensis*.

*Length*.—9.0 mm. Breadth across pronotum 3.0 mm.

*Holotype*.—No.  $\frac{509}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Eastern Himalayas.

*Type-locality*.—Yatung (10,000 ft.), Sikkim (Tibet frontier); August, 1927 (*F. M. Bailey*). One specimen.

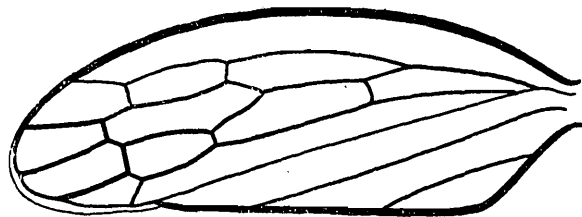
*Remarks*.—The male of this species is not known.

Genus **AGALLIA** Curtis.

### **Agallia robustus**, sp. nov.

(Plate I, figs. 5, 5a.)

Short and stout. Fuscous, male darker than female. Vertex short, anteriorly obtuse, with a pair of large, black spots and a pair of dark longitudinal stripes one each side of the

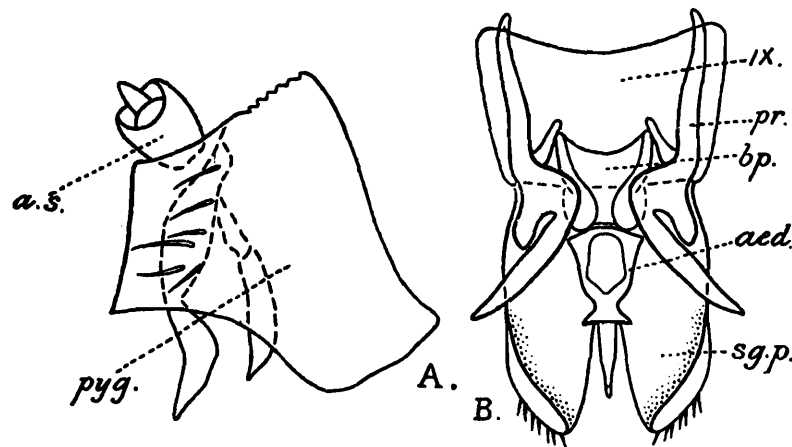


TEXT-FIG. 10.—*Agallia robustus*, sp. nov. Tegmen,  $\times 22$ .

median line; the stripes being continued on the frons, where they diverge from each other and end at the bases of the antennae. Face slightly broader than long. Lower half of the frons with a dark longitudinal stripe in the middle and a row of irregular black spots

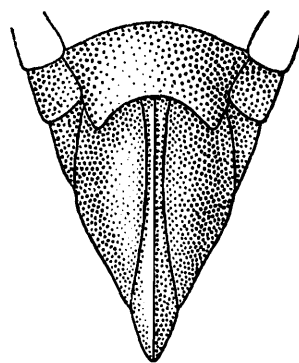
and patches near the lateral margins. Clypeus rectangular. Lorae narrow, not reaching the apex of the clypeus. Genae fairly expanded. Pronotum about one and a half times as broad as long, with a pair of black spots near the anterior margin, which is somewhat produced between the eyes; the lateral margins short, posterior margin almost straight; the disc with a dark longitudinal stripe in the middle and a pair of dark blotches in the lateral regions. Scutellum small, posteriorly acuminate, with a black triangular mark at each basal angle. Tegmina semi-transparent, broad and slightly longer than the body; appendix very small; veins dark brown, prominent; venation (text-fig. 10): the inner branch of the first sector bifurcating about the middle of the corium, four apical and three ante-apical cells, two transverse veins between the sectors. Wings well developed; nervures inconspicuous. Legs brown, dotted with black. Abdomen both above and below black, except in the region of the genital segments where it is brown.

*Male genitalia* (text-fig. 11). Sternum of the ninth segment very large. Pygofers short and broad, truncate at the posterior margins, each with a stout appendage on the



TEXT-FIG. 11.—*Agallia robustus*, sp. nov. A. Right pygofer and anal segments of the male,  $\times 52$ . B. Male genitalia; dorsal view,  $\times 87$ . Lettering as in text fig. 1 (p. 3).

inner side. Sub-genital plates large and broad. Parameres large and narrow, twisted in the middle. Basal plates forming a plate-like structure at the base of the aedeagus. Aedeagus short, enormously wide at the base, considerably narrowed posteriorly and pointed at the apex.



TEXT-FIG. 12.—*Agallia robustus*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 31.5$ .

*Female genitalia* (text-fig. 12). Valve large, deeply concave at the posterior margin. Pygofers small, fairly convex and smooth. Ovipositor stout, slightly projecting beyond the posterior extremity of the abdomen.

*Length*.—♂ 3.0 mm., ♀ 3.5 mm.

*Holotypes*.—No.  $\frac{511-512}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—N. Western Himalayas.

*Localities*.—Jhika Gali (6,700 ft.) and Kuldana (7,000 ft.), Murree hills, N. Western Himalayas; October, 1928 (*H. S. Pruthi*). One male and two female specimens.

*Type-locality*.—Jhika Galli.

*Remarks*.—Osborn and Ball<sup>1</sup> in their diagnosis of this genus state that the tegmina have five apical cells, but a specimen of the genotype, *A. puncticeps* Germ., which I received from the Vienna Museum and which had been named by Fieber, has only four apical cells as is the case in *A. robustus* described above.

### Genus **DURGADES** Dist.

Distant erected this genus in 1912 (*Ann. Mag. Nat. Hist.* (8) X, p. 608) for the species *D. nigropictus* Dist. obtained from the Eastern Himalayas. This or any other species of this genus has not since been recorded from any other locality in India or outside. I have obtained specimens of two more species of *Durgades* which are distinct from *D. nigropictus* Dist. and are described as new below.

Both of my species show distinct sexual dimorphism but Distant did not make any mention of this phenomenon in the case of *D. nigropictus*. From his figures<sup>2</sup> and description of this species it, however, appears that he had only female specimens before him and that he was not aware of this fact.<sup>3</sup>

### **Durgades mirabilis**, sp. nov.

(Plate I, figs. 6, 6a, 7, 7a, 7b.)

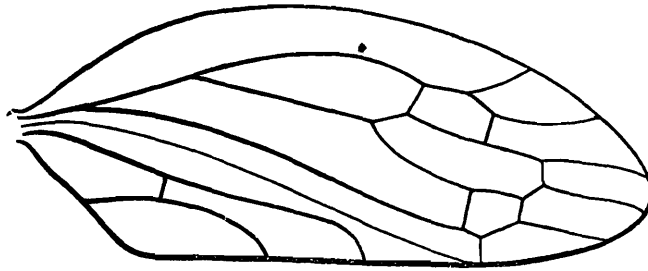
Fuscous, male darker than female. Head distinctly broader than pronotum. Vertex extremely short, especially in the middle, marked with three black stripes (rather faint and indistinct in the female), which are continued on the frons, where the median one bifurcates and its branches end at the bases of the antennae. Face broader than long; frons flat, its lower half with broad, black stripes (broken in irregular patches in the female) along the lateral margins. Ocelli conspicuous. Clypeus rectangular, with a dark median longitudinal fascia in the female. Lorae and genae not reaching the apex of the clypeus. Genae deeply sinuate below the eyes. Pronotum short, broad, with a pair of minute dark spots near the anterior margin, which is slightly produced between the eyes; the posterior margin deeply notched in the middle; a median longitudinal black stripe on the disc present only in the male. Scutellum deeply, transversely impressed about the middle of its length. Tegmina longer than the body in both sexes, hard and horny, with more or less pointed apices; appendix not at all developed; the costal margin convex, the claval almost

<sup>1</sup> Osborn, H. & Ball, E. D.—*Proc. Davenport Acad. Nat. Sci.* VII, p. 45 (1898).

<sup>2</sup> *Fauna British India*, Rhynchota, VI, p. 238 (1916).

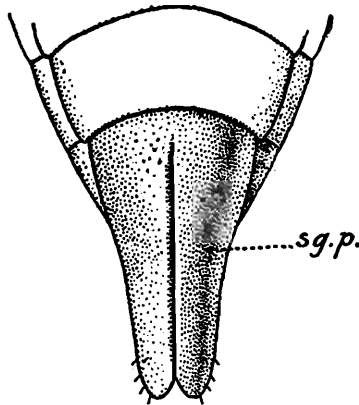
<sup>3</sup> Mr. W. E. China informs me that the two specimens of this species in the British Museum are both females.

straight; veins conspicuous; venation shown in text-fig. 13: the inner branch of the 1st sector bifurcating about the middle of the tegmina as in *Agallia* (vide supra), five apical



TEXT-FIG. 13.—*Durgades mirabilis*, sp. nov. Tegmen of the female,  $\times 27$ .

and three ante apical cells. Wings very small. Legs very long and stout. Abdomen small and conical, especially in the male.



TEXT-FIG. 14.—*Durgades mirabilis*, sp. nov. ♂. Posterior extremity of the abdomen, ventral view,  $\times 57$ . *sg. p.* = sub-genital plates.

*Male genitalia* (text-fig. 14). Sub-genital plates long and fairly broad. Rest of the genitalia not dissected due to the fragile nature of the single male specimen in our collection.

*Female genitalia* (Pl. I, fig. 7b). Valve large, smooth, slightly sinuate in the middle of the posterior margin. Pygofers small, broad, convex, with numerous stiff hairs in the posterior region. Ovipositor long, stout, extending beyond the posterior extremity of the body.

*Length*.—♂ 3.0 mm.; ♀ 4.0 mm. The male though smaller is much stouter than the female.

*Holotypes*.—No.  $\frac{514-515}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Eastern Himalayas.

*Type-locality*.—Yatung (10,000 ft.), Sikkim (Tibet frontier), August and September, 1927 (*F. M. Bailey*). Two females and one male.

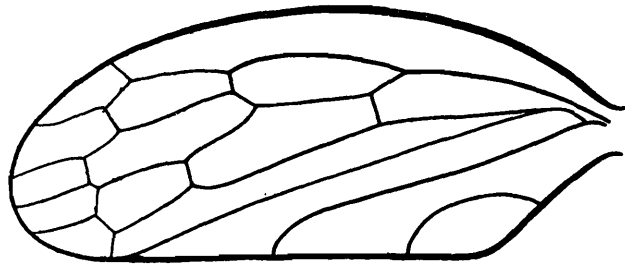
*Remarks*.—*D. mirabilis* principally differs from *D. nigropictus* Dist. in the markings on the face, scutellum and the tegmina. The genitalia and the tegminal venation of *D. nigropictus* Dist. have not been properly described or figured by Distant or any other worker, therefore these two sets of organs cannot be compared in the two species.

### ***Durgades idiocerus*, sp. nov.**

(Plate II, figs. 1, 1a, 2.)

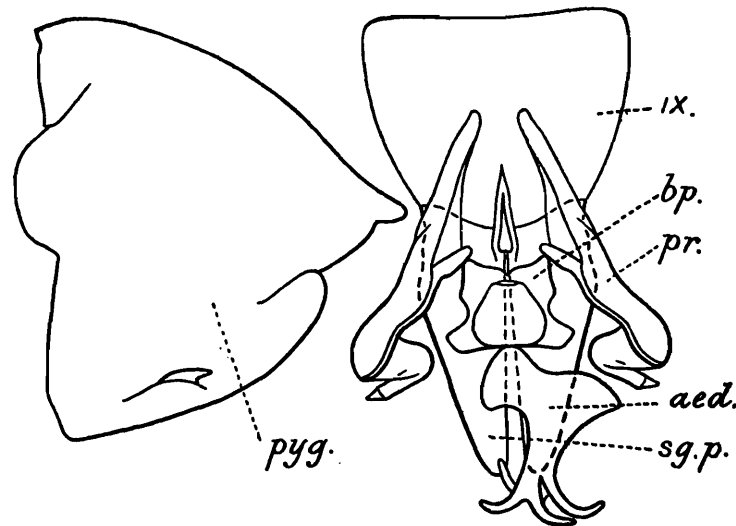
I have named this species as such on account of the superficial resemblance of the female of this species to the members of the genus *Idiocerus*. *D. idiocerus* differs from *D. mirabilis* in general appearance, the tegminal venation and the structure of the genitalia.

Fuscous, male darker than female, with numerous black and white patches irregularly distributed over the body. Colouration and markings of the vertex and face almost similar to those in *D. mirabilis*. Posterior margin of the pronotum slightly notched in the male, almost straight in the female. Pronotum with a black median longitudinal stripe, dotted with black near the anterior margin in the female, entirely black in that region in the male. Tegmina comparatively shorter and broader in the male, in the female folding in such a fashion as to make it resemble the species of *Idiocerus*. Tegminal venation (text-fig. 15)



TEXT-FIG. 15.—*Durgades idiocerus*, sp. nov. Tegmen of the male,  $\times 27$ .

differing from that in *D. mirabilis* in having two cross veins between the sectors and having no such vein on the clavus. Legs dark brown. Abdomen both above and below black, with the exception of the genital segments, which are brown.



TEXT-FIG. 16.—*Durgades idiocerus*, sp. nov. Left pygofer and male genitalia,  $\times 67.5$ . Lettering as in text-fig. 1 (p. 3).

*Male genitalia* (text-fig. 16). As in *Agallia*, sternum of the ninth segment very large. Pygofers large and broad, truncated at the posterior margins. Sub-genital plates long and triangular. Parameres very much twisted, hook-like in the distal region. Basal plates forming a plate-like structure at the base of the aedeagus. Aedeagus short, very wide at the base, bearing a circlet of stout appendages round the gonopore.

*Female genitalia* (text-fig. 17). Differ from those of *D. mirabilis* in the shape of the pygofers, which are long, narrow and smooth.

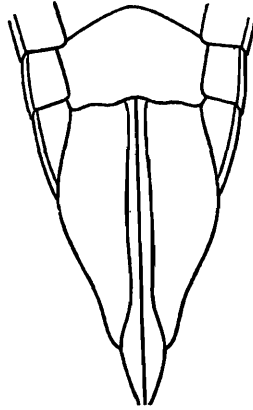
*Length*.—♂ 3.0 mm. ; ♀ 5.75 mm.

*Holotypes*.—No.  $\frac{517-518}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution.*—N. Western Himalayas.

*Localities.*—Various places in the Murree hills (4,000—7,000 ft.); October, 1928 (*H. S. Pruthi*).  
Very common. Females more abundant than males.

*Type-locality.*—Kachhut, about five miles from Murree.



TEXT-FIG. 17.—*Durgades idiocerus*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 27$ .

### Genus **SYMPHYPYGA** Haupt.

Haupt<sup>1</sup> founded this genus and described its three species, two from Bokhara and one from Turkestan. Lindberg<sup>2</sup> in 1924 added to the list a new variety obtained from Ashabad ("Transkaspien"). Thus *Symphypyga* has so far not been recorded from India. I have recently obtained a large number of specimens of a species of this genus which appears to be new. Before describing the species some important diagnostic characters of the genus may be enumerated.

Vertex very narrow, especially in the middle. Face slightly broader than long; frons flattened. Ocelli on the frons, nearer the eyes than to each other. Clypeus rectangular. Genae very narrow, concave at the outer margins, not reaching the apex of the clypeus. Pronotum long, fairly raised; the anterior margin convex and slightly produced between the eyes, the posterior margin gently sinuate, the lateral margins very short. Tegmina long, narrow and opaque; venation as in *Agallia* and *Durgades*, numerous cross veins on the clavus and in the distal half of the tegmen; appendix very small.

### **Symphypyga maculatus**, sp. nov.

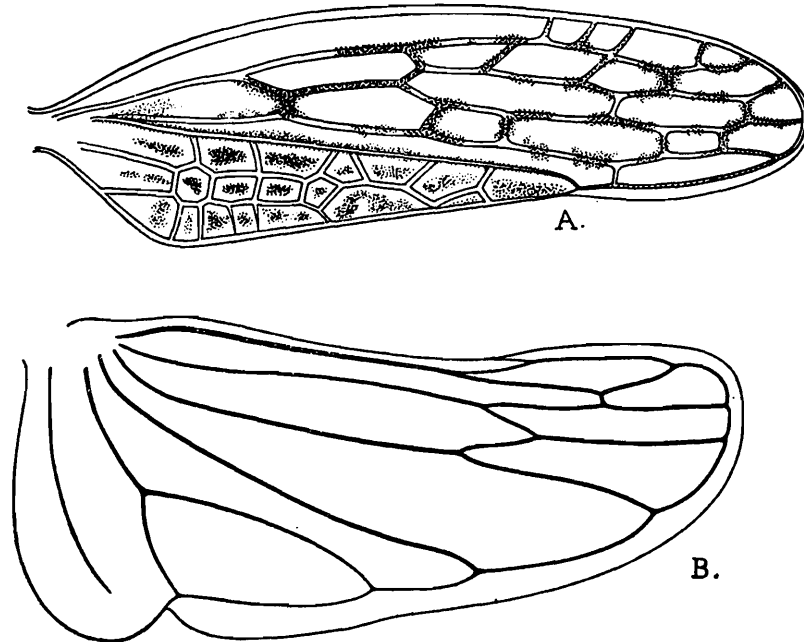
(Plate II, figs. 3, 3a.)

Pale ochraceous, darkly maculated especially on the tegmina. Vertex and the upper half of the frons pinkish. Lower half of the frons with dark linear markings near the lateral margins. Clypeus broad at the base, margined with black. Lorae not reaching the apex of the clypeus. Scutellum about one and a half times as broad as long, deeply, transversely impressed in the middle, with a pair of black dots in front of the impression and a faint dark spot near the basal angles. Tegmina slightly overlapping in the apical region, with a large amount of dark pigment deposited on the veins and inside the cells; veins due to the

<sup>1</sup> Haupt, H.—*Wien. Ent. Zeit.* XXXVI, p. 239 (1917).

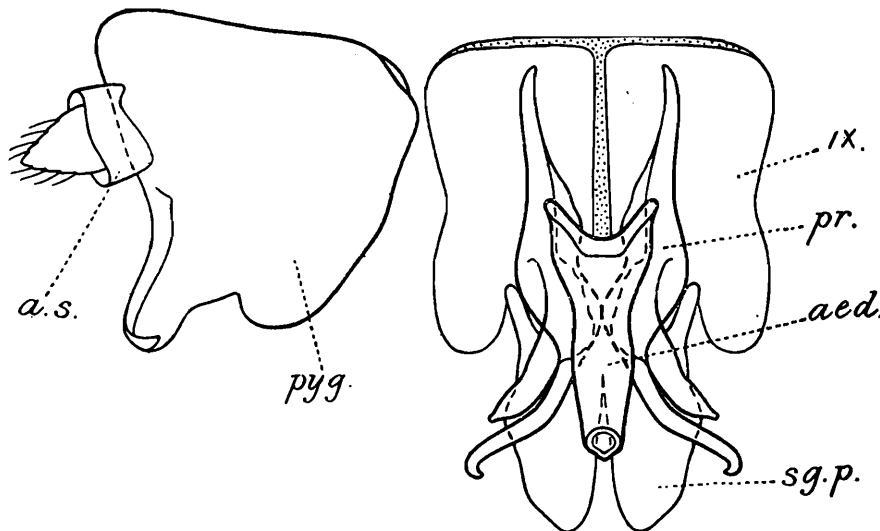
<sup>2</sup> Lindberg, H.—*Not. Ent.* IV, p. 108 (1924).

pigment indistinct (text-fig. 18A). Wings whitish; nervures dark brown and very conspicuous (text-fig. 18B). Ventral surface of the body pale greenish, with numerous black patches, especially in the region of the thorax. Legs brown, front and middle femora marked with black.



TEXT-FIG. 18.—*Symphypyga maculatus*, sp. nov. A. Tegmen. B. Wing,  $\times 24$ .

*Male genitalia* (text-fig. 19). Sternum of the ninth segment very large. Pygofers large, bearing hook-like structures on the inside of the posterior margins, which are almost



TEXT-FIG. 19.—*Symphypyga maculatus*, sp. nov. Anal segments, left pygofer and the genitalia of the male,  $\times 57$ . Lettering as in text-fig. 1 (p. 3).

truncated. Sub-genital plates small and leaf-like. Parameres very long, twisted, thickened near the base of the aedeagus, bifurcated in the distal region. Basal plates hardly developed. Aedeagus short, wide, with a wide gonopore.

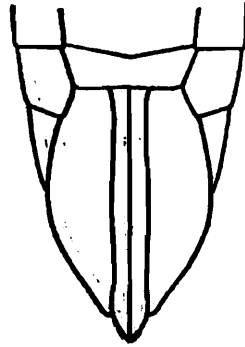
*Female genitalia* (text-fig. 20). Valve narrow. Pygofers short, broad, fairly convex. Ovipositor delicate, black, hardly projecting beyond the posterior extremity of the abdomen.

*Length*.—♂ 5.0 mm.; ♀ 5.25 mm.

*Holotypes*.—No:  $\frac{528-529}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—North India.

*Type-locality*.—Lyallpur, Punjab; September, 1921 (*H. S. Pruthi*), at Light Trap; October, 1929 (*A. Rahman*), at Light Trap. Numerous specimens of both sexes. The specimens collected in 1921 are not in the collection of the Indian Museum. Some were sent to the British Museum and the rest were kept in the Punjab Agricultural College, Lyallpur.



TEXT-FIG. 20.—*Symphypyga maculatus*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 31.5$ .

*Remarks on the genus Symphypyga*.—Haupt, who erected the genus, placed it near *Agallia* Curtis on account of the almost similar tegminal venation in the two genera. But in the general form of the body, shape of the face and the structure of the genitalia *Symphypyga* is distinct from *Agallia* and comes near *Durgades* Dist. The tegminal venation in the three genera is almost of the same plan. Obviously Haupt when going into the affinities of *Symphypyga* altogether ignored *Durgades*, which had been erected about five years before he discovered *Symphypyga*.

#### Genus **IDIOCERUS** Lewis.

This genus is found in almost all parts of the world. In India it is already represented by nine species to which one more may be added which is described as new below.

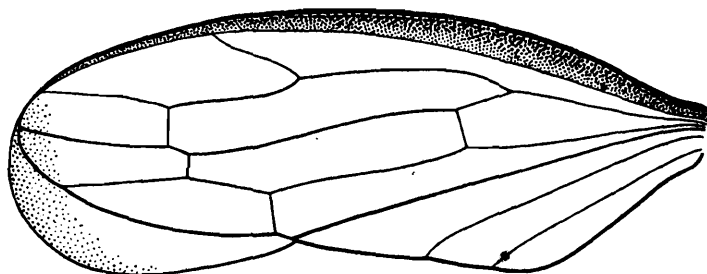
#### **Idiocerus nagpurensis**, sp. nov.

(Plate II, figs. 4, 4a.)

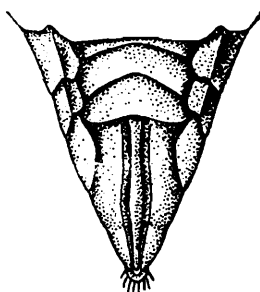
*Female*.

Vertex testaceous, with a pair of prominent black spots near the anterior margin. Eyes large and prominent. Face almost as long as broad; frons fairly elevated, its upper region grey, lower region testaceous with some yellow patches near the base of the clypeus. Clypeus brown, broad at the base and apex, narrow in the middle. Lorae elongated, not reaching the apex of the clypeus. Genae testaceous, narrow. Pronotum much broader than long; the anterior margin convex, the posterior almost straight; disc of the pronotum greyish. Scutellum much longer than broad, yellow, with a dark longitudinal stripe in the left half and two prominent black spots near the basal angles. Tegmina brown, transparent, except near the costal margin, where they are thick and opaque; veins thin; venation as shown in text-fig. 21—unlike that in most other species of this genus there are two transverse veins between the sectors; the post-costal apical cell very large. Legs brown. Thoracic sterna yellowish, but marked with black patches behind the first coxae. Abdomen short, triangular, brown below, dark above, black at the posterior extremity.

*Genitalia* (text-fig. 22). Valve almost straight at the posterior margin. Pygofers convex, narrow, bearing thick hairs in the extreme posterior region. Ovipositor fairly stout.



TEXT-FIG. 21.—*Idiocerus nagpurensis*, sp. nov. Tegmen.



TEXT-FIG. 22.—*Idiocerus nagpurensis*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 36$ .

*Length*.—3.0 mm.

*Holotype*.—No.  $\frac{558}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Central India.

*Type-locality*.—Nagpur; April, 1915 (*T. B. Fletcher*). One specimen received from Pusa.

*Remarks*.—The male of this species is not known.

This species comes very near *I. clypealis* Leth. from which it differs in the markings of the face and the general colouration of the body.

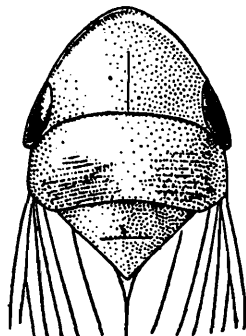
Sub-family *JASSINAE* including *ACOCEPHALINAE*.

Genus **PARABOLOCRATUS** Fieb.

This genus is found in almost all parts of the world. In India it is already represented by six species and the seventh is described as new below.

**Parabolocratus mandlensis**, sp. nov.

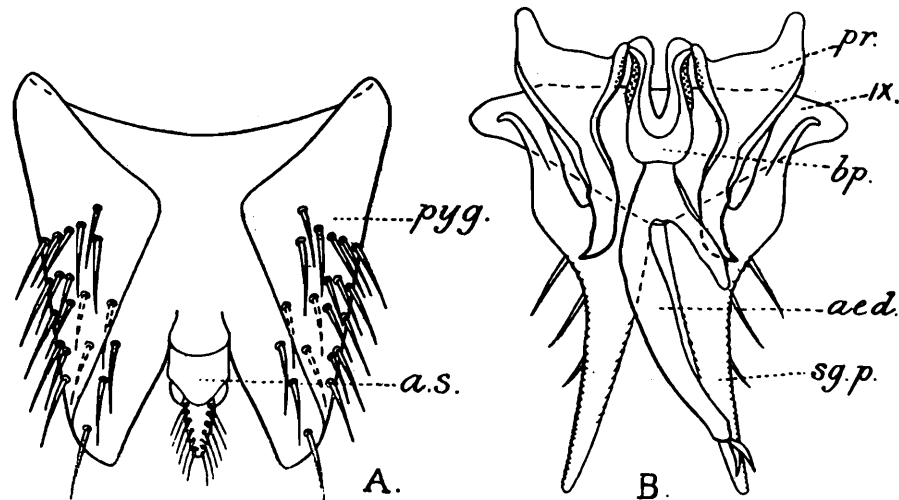
Brown. Head slightly broader than the pronotum (text-fig. 23). Vertex slightly depressed along the margins, especially before the apex; the margins consequently ridge-



TEXT FIG. 23.—*Parabolocratus mandlensis*, sp. nov. Female. Head and thorax,  $\times 13.5$ .

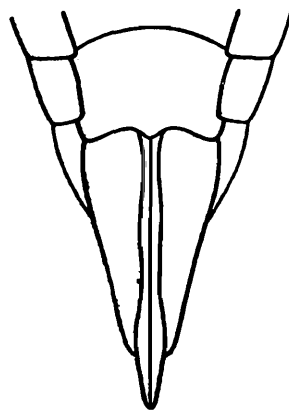
like, marked with black. Ocelli inconspicuous. Eyes vinous. Frons slightly convex, dark brown, with pale irregular longitudinal stripe. Clypeus squarish. Lorae and genae pale brown. Pronotum shorter than the vertex, finely, transversely striated. Scutellum with a transverse impression in the middle. Tegmina reaching the posterior extremity of the body in the male but not doing so in the female, sub-hyaline, marked with black at the end of the claval suture; veins of almost the same colour as the tegmina, rather inconspicuous. Wings whitish; nervures indistinct. Femora stout.

*Male genitalia* (text-fig. 24). Sternum of the ninth segment triangular. Pygofers conically produced and covered with stout spines in the posterior region. Sub-genital



TEXT-FIG. 24.—*Parabolocratus mandlensis*, sp. nov. A. Pygofers and anal segments of the male; ventral view,  $\times 45$ . B. Male genitalia; dorsal view,  $\times 52.5$ . Lettering as in text-fig. 1 (p. 3).

plates long, narrow, more or less pointed at the apices. Parameres large, flattened in the proximal two-thirds, gradually tapering in the distal region to very hard and pointed apices. Basal plates small and stout. Aedeagus long, with a strong basal strut and with a pair of stout spines near the gonopore.



TEXT-FIG. 25.—*Parabolocratus mandlensis*, sp. nov. Female. Posterior abdominal segments; ventral view.  $\times 22.5$ .

*Female genitalia* (text-fig. 25). Valve large. Pygofers long, narrow, hardly convex, almost smooth. Ovipositor smooth, somewhat projecting beyond the posterior extremity of the abdomen.

*Length*.— $\sigma$  5.25 mm.;  $\text{f}$  6.0 mm. Female much stouter.

*Holotypes*.—No.  $\frac{1167-1168}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Central India. Probably widely distributed.

*Type-locality*.—Dindori, Mandla district, Central Provinces; 9-VI-27 (H. S. Pruthi). Numerous specimens of both sexes.

*Other localities*.—Koilari and Sarai, Rewa State, Central India; February, 1927 (H. S. Pruthi). Common.

*Remarks*.—This species comes near *P. porrectus* Walk., from which it differs in the entire absence of the orange-red longitudinal fasciae on the vertex, pronotum and the scutellum, and in the large size of the vertex, which is longer and broader (including the eyes) than the pronotum.

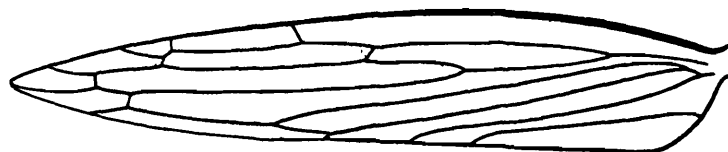
#### Genus **BUMIZANA** Dist.

This genus includes only one species, *B. elongata* Dist., the specimens of which were obtained from Kodaikanal, South India. Most of the specimens of the following new species have also been collected from South India, but from a locality near the East Coast. The new species chiefly differs from *B. elongata* Dist. in colour, the size of the vertex and the structure of the pronotum.

#### **Bumizana ruberosa**, sp. nov.

(Plate II, figs. 5, 5a.)

Reddish-brown. Vertex about thrice as long as the pronotum and scutellum together, thin and foliaceous, distinctly spatulate; the apex dark and very much raised. Ocelli on the lateral margins of the vertex, close to the eyes, minute and black. Distant does not make any reference to the position of the ocelli either in the generic diagnosis or in the description of the genotype. Eyes small. Face anterior to the eyes dark brown and prominently carinate, posterior to those organs brown. Clypeus rectangular. Genae fairly broad. Pronotum coarsely punctate, centrally prominently carinate, with short ridges in the lateral areas. Scutellum almost as long as the pronotum, not considerably shorter than the pronotum, as stated by Distant in the generic diagnosis. Tegmina reddish-brown, subhyaline, thick and coriaceous, long, pointed at the apices, meeting each other along the inner margins and thus forming a triangular roof-like structure over the body; appendix not developed. Tegminal veins red, conspicuous; venation (text-fig. 26): the inner branch

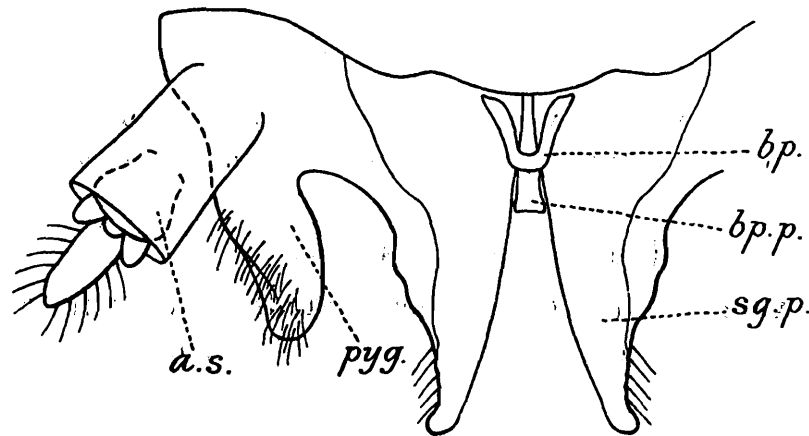


TEXT-FIG. 26.—*Bumizana ruberosa*, sp. nov. Tegmen,  $\times 21$ .

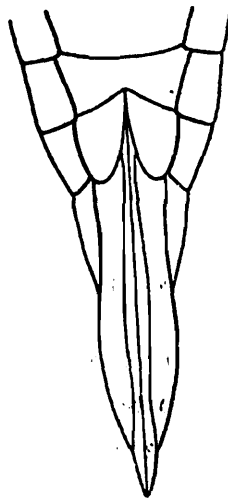
of the first sector bifurcated in the proximal region of the wing; five apical and four anteapical cells. Legs short and delicate.

*Male genitalia* (text-fig. 27). Pygofers elongated, tapering in the distal region. Subgenital plates large, triangular. Basal plates short, rod-like, their prolongation short. Aedeagus and parameres mutilated in the single male specimen that is available at present. The aedeagus appears to be small, curved and styliform.

*Female genitalia* (text-fig. 28). Valve large, slightly produced at the anterior margin, very deeply notched in the posterior region, almost divided into two parts. Pygofers very



TEXT-FIG. 27.—*Bumizana ruberosa*, sp. nov. Anal segments, left pygofer and male genitalia (aedeagus not shown),  $\times 57$ . Lettering as in text-fig. 1 (p. 3).



TEXT-FIG. 28.—*Bumizana ruberosa*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 31.5$ .

much elongated, narrow and smooth. Ovipositor slightly projecting beyond the posterior extremity of the abdomen.

*Length.*—♂ 8.25 mm.; ♀ 9.0 mm.

*Holotypes.*—No.  $\frac{585-586}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution.*—Central and South India.

*Type-locality.*—Chitteri (3,000 ft.), Chitteri Range, Eastern Ghats, South India, 20—22-VI-29 (*H. S. Pruthi*). Two female and one male specimens.

*Other localities.*—Amarkantak, Rewa State, Central India; January, 1927 (*H. S. Pruthi*). One female.

*Remarks on the genus Bumizana.*—Distant stated that this genus is allied to *Cephalelus* Perch. Obviously he forgot that unlike that in *Bumizana*, in *Cephalelus* there is no carina along the mid-dorsal line of the vertex and that the ocelli are obsolete. In both these characters *Bumizana* resembles *Dorydium* Burm. Moreover, the tegminal venation and the female genitalia in these two genera are almost identical, as will be evident by comparing my figures of these organs of *B. ruberosa* Pruthi (text-figs. 26 and 28) with those of the different S. African species of *Dorydium* as given by Naudé.<sup>1</sup> In fact I am strongly of opinion

<sup>1</sup> Naudé, T. J.—Cicadellidae of South Africa. *Union South Afr. Dept. Agric. Ent. Mem.* No. 4, pp. 30-33, pl. ii, figs. 1-4 (1926).

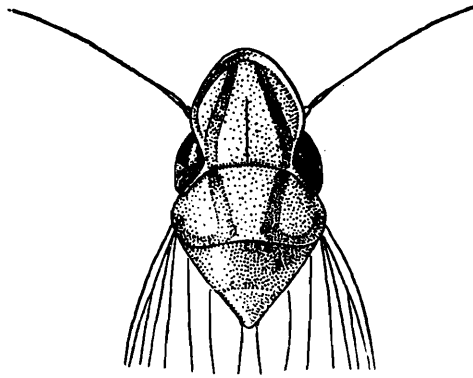
that *Bumizana* Dist. does not deserve the rank of a separate genus and that it should be included under *Dorydium* Burm.

Genus **KANA** Dist.

This genus already includes four species, three from Ceylon and one from Burma (Tenasserim). The following additional new species is also from Ceylon.

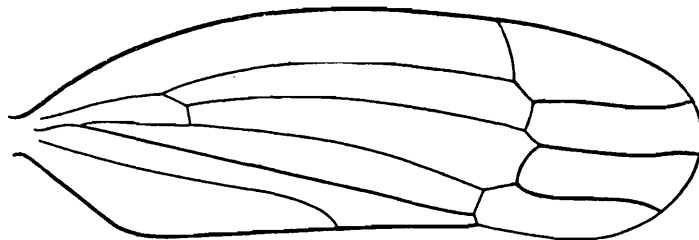
**Kana fasciata**, sp. nov.

Vertex (text-fig. 29) about one-half longer than the pronotum, slightly spatulate in the apical region, finely sulcate in the proximal half; the lateral margins sharp and



TEXT-FIG. 29.—*Kana fasciata*, sp. nov. ♂ Head and thorax,  $\times 13.5$ .

ridge-like. Vertex and pronotum brown, the former with a sub-lateral, orange-yellow fascia on each side, which meet each other in the anterior region and posteriorly are continued up to the posterior margin of the pronotum, where they bend outwards and end near the lateral margins. Eyes fairly large, oblique and yellow. Ocelli placed on the vertex, at a short distance from its lateral margins and slightly in front of the eyes. Face brown; frons very convex, with numerous pale, oblique striae in the lateral regions. Antennae very fine and long. Scutellum pale brown. Tegmina long, almost opaque, pale yellowish, each with an orange-yellow stripe near the base, a broad fuscous stripe in the middle and some dark-brown pigment deposited in the apical cells. Tegminal veins very inconspicuous except in the apical region; venation (text-fig. 30):

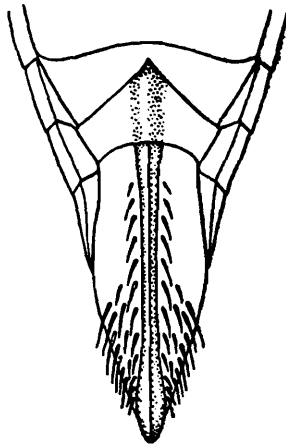


TEXT-FIG. 30.—*Kana fasciata*, sp. nov. Tegmen,  $\times 18$ .

only three longitudinal veins in the region of the corium, four apical cells. Wings whitish; nervures concolorous. Ventral surface of the body and the legs brown. Posterior tibiae richly spinulose.

The single delicate male specimen at my disposal has not been dissected for the study of the male genitalia.

*Female genitalia* (text-fig. 31). Valve angularly produced at the anterior margin. Pygofer long, narrow and profusely covered with stiff hairs. Ovipositor moderately stout and long.



TEXT-FIG. 31.—*Kana fasciata*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 27$ .

*Length*.—♂ 6.0 mm.; ♀ 6.25 mm.

*Holotypes*.—No.  $\frac{588}{H7}$  and  $\frac{2270}{H7}$ , Z. S. I., (*Ind. Mus.*) Calcutta.

*Distribution*.—Ceylon.

*Type-locality*.—Kandapola, Ceylon; 23-IX-29. One male and two female specimens received from the Colombo Museum.

### Genus **CHIASMUS** Muls. & Rey.

This is a very old genus and is represented in almost all parts of the world. So far only one species was known from the Indian region, namely, *C. uzeli* Melich., which was obtained from Ceylon. Distant did not see this or any other species of the genus from India, but it appears that *Chiasmus* is fairly widely distributed in this country. There are in the collection of the Indian Museum specimens of *C. uzeli* collected from the Chamba valley (Punjab) and *C. alata*, a new species which is described below, occurs in almost all parts of India.

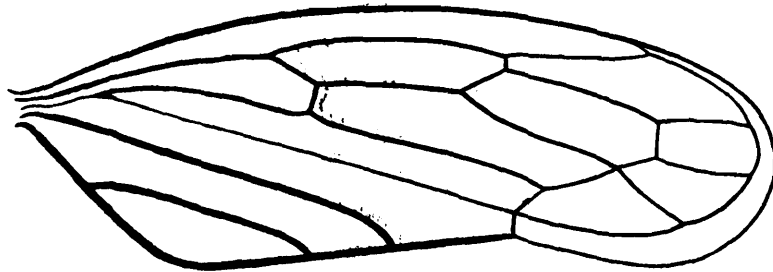
#### **Chiasmus alata**, sp. nov.

(Plate II, figs. 6, 6a.)

This species is named as such on account of the fact that, unlike most other species of this genus, it has fully developed tegmina in both sexes.

Vertex slightly shorter than the breadth between the eyes, somewhat depressed except near the apex which is slightly reflexed, anteriorly sub-acute, dark ochraceous, with a large, black marking near the apex and a black dot in the middle of each lateral margin. Eyes of moderate size, oblique and dark brown. The ocelli which cannot be made out are probably hidden by the black spots in the middle of the lateral margins of the vertex. Face slightly broader than long, brown, except in the region of the genae, where it is grey. Lorae not reaching the apex of the clypeus. Clypeus elongated. Genae large, expanded, deeply sinuate below the eyes. Pronotum, unlike that in most other species of the genus, about as long as the vertex, raised in the posterior region, dark grey, with numerous black dots near the broadly-rounded anterior margin; the posterior margin concave. The large size of the pronotum is most probably due to the full develop-

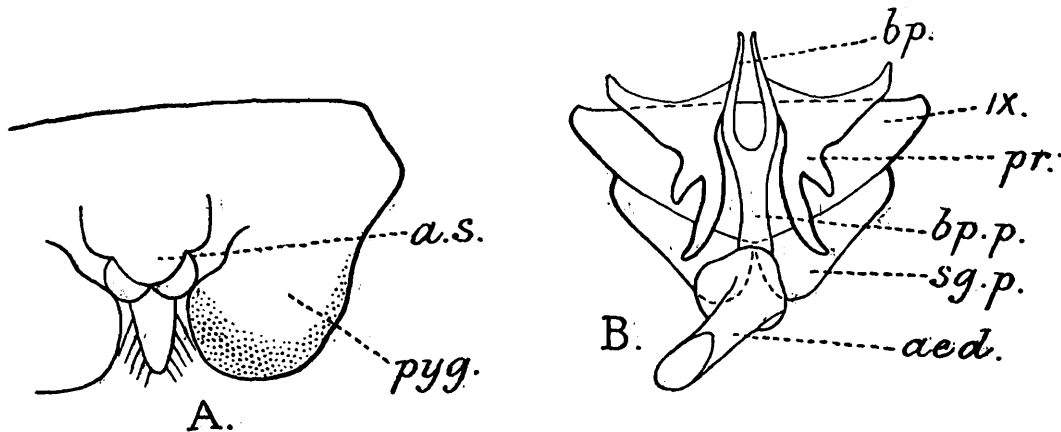
ment of the tegmina. Scutellum slightly broader than long, deeply, transversely impressed near the apex, with a pair of big, black marks near the basal angles and three black dots on the disc. Tegmina fully developed in both sexes, slightly coriaceous, subhyaline, grey or pale brown; appendix fairly large; veins thick and prominent; venation (text-fig. 32): the outer branch of the first sector unbranched, four apical and two



TEXT-FIG. 32.—*Chiasmus alata*, sp. nov. Tegmen,  $\times 36$ .

ante-apical cells. Wings fully developed. Dorsal surface of the abdomen black, the ventral surface ochraceous.

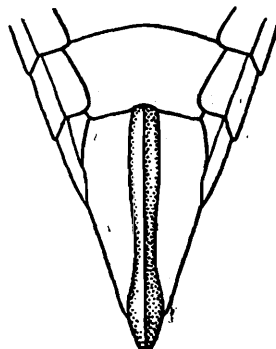
*Male genitalia* (text-fig. 33). Pygofers very much expanded, but rather short. Sternum of the ninth segment very large, triangular. Sub-genital plates small and:



TEXT-FIG. 33.—*Chiasmus alata*, sp. nov. A. Pygofers and anal segments of the male, dorsal, view,  $\times 117$ . B. Male genitalia; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

triangular. Parameres very much expanded in the proximal half, narrow, curved and highly chitinized in the distal region. Basal plates elongated, their prolongation large and broad. Aedeagus short, almost uniformly wide throughout its length, with a big gonopore.

*Female genitalia* (text-fig. 34). Valve fairly long, almost straight at the posterior margin. Pygofers long, narrow and smooth. Ovipositor fairly stout, slightly projecting beyond the posterior extremity of the abdomen and the apices of the tegmina.



TEXT-FIG. 34.—*Chiasmus alata*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 39$ .

*Length.*—♂ 3.0 mm.; ♀ 3.25 mm. (size very variable).

*Holotypes.*—No.  $\frac{590-591}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution.*—Throughout India, especially in the Punjab and Cisgangetic sub-region.

*Type-locality.*—Kuldana, near Murree, N. W. Himalayas; Oct., 1928 (*H. S. Pruthi*), numerous specimens of both sexes.

*Other localities.*—Calcutta; April—Aug., 1927 (*H. S. Pruthi*), numerous specimens. Mandla district, Central Provinces; Nov., 1927 (*H. S. Pruthi*), common. Nerbudda valley, Rewa State, Central India; Feb., 1927 (*H. S. Pruthi*), common. Kodaikanal Road Station, South India; August, 1929 (*H. S. Pruthi*), two specimens. Razampeta, Cuddapah district, South India; August, 1929 (*H. S. Pruthi*), two specimens.

### ***Chiasmus (Kartwa) mustelina* (Dist.).**

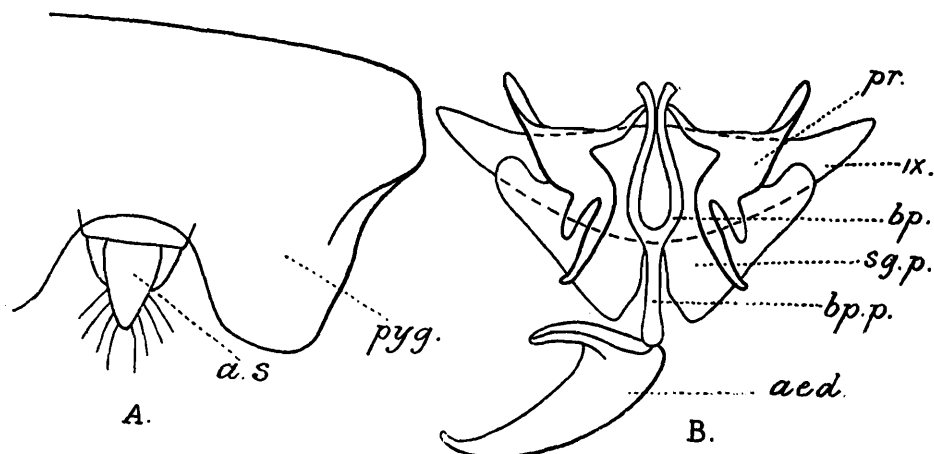
(Plate II, figs. 7, 7a.)

The genus *Kartwa* was founded by Distant with *K. mustelina* as the genotype, specimens of which were obtained from India. No other species of this genus has yet been described from India or any other part of the world. So far as my information goes Distant had only four specimens of *K. mustelina* before him, two of which are in the collection of the Indian Museum and the remaining two in that of the British Museum. The specimens in the Indian Museum are males and, as Mr. W. E. China informs me, those in the British Museum are also of this sex. As is evident from the description of *Kartwa mustelina*, given below, this species differs as much from the species of the genus *Chiasmus* as the latter differ from one another. I am, therefore, synonymising the genus *Kartwa* with *Chiasmus*.<sup>1</sup> The reason why Distant was misled seems to be that he was not aware of the fact that all the specimens before him were of one sex, *i.e.*, males. I have collected both male and female specimens of this species from various parts of India and a description covering both sexes is given below. Only the female and the male genitalia have, however, been illustrated as the figure given by Distant is a fair delineation of the male.

Tawny brown. Vertex about as long as the breadth between the eyes, anteriorly angulate, slightly depressed except near the apex, medially sulcate in the basal half, of a dark brown colour with an oblique mark in the middle of the lateral margins and a medially interrupted black spot at the apex. Face slightly broader than long; as in all other species of *Chiasmus*, frons with a large furrow in the upper region; clypeus, lorae and genae similar to those of *C. alata*. Pronotum about half as long as the vertex, transverse, arched, brown, with numerous transverse dark spots and stripes, which are more conspicuous in the female. Tegmina short, covering at the most the first three segments of the abdomen, coriaceous; the apical margins truncate. Abdomen large, its dorsal surface convex, brown, with minute white spots, especially conspicuous in the male, distributed all over the surface, and a piceous, transverse mark near the anterior margins of the posterior abdominal segments. Legs delicate, but quite long.

<sup>1</sup> The late Dr. C. F. Baker in his "Tentative Classification of the Jassoidea" which he circulated in MS. to several workers in 1924, but which has never been published, also listed *Kartwa* as a synonym of *Chiasmus*, a course which I, unaware of the existence of his work named above, suggested to him in 1926.

*Male genitalia* (text-fig. 35). Differ from those in *C. alata* Pruthi in the shape of the basal plates and their prolongation, which are very slender, and in the form of the



TEXT-FIG. 35.—*Chiasmus (Kartwa) mustelina* (Dist.). A. Left pygofer and anal segments of the male,  $\times 84.3$ . B. male genitalia; dorsal view,  $\times 84$ . Lettering as in text-fig. 1 (p. 3).

aedeagus. The latter is very wide in the proximal region and gradually tapers in the distal to a narrow apex.

*Female genitalia*.—Almost similar to those in *C. alata*.

*Length*.—♂ 2.5 mm., ♀ 3.25 mm.

*Holotype (female)*.—No.  $\frac{619}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Throughout India.

*Type-locality* (♀).—Tret, Murree hills, N. Western Himalayas.

*Other localities*.—Nerbudda valley, Rewa State, Central India; February, 1927 (*H. S. Pruthi*); numerous specimens. Pachmaci (3,300 ft.), Central Provinces; December, 1927 (*H. S. Pruthi*); few specimens. Calcutta; May, 1927 (*H. S. Pruthi*); numerous specimens. Murree hills, (ca. 7,000 ft.), N. Western Himalayas; Sept.—Oct., 1928 (*H. S. Pruthi*); numerous specimens.

### Genus **LEOFA** Distant.

Distant placed this genus near *Chiasmus*, but, as is shown below, its affinities with this genus seem to be rather remote.

*Leofa* at present includes five species, all from South India. The following additional new species was collected by me in Central India. It differs from all the previously known species in the fact that its female has fully developed wings.

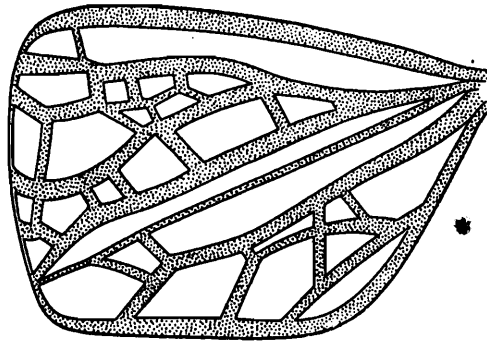
### **Leofa parwala**, sp. nov.

(Plate II, figs. 8, 9, 9a.)

The two sexes of this species differ in some important points from each other, therefore they are described separately.

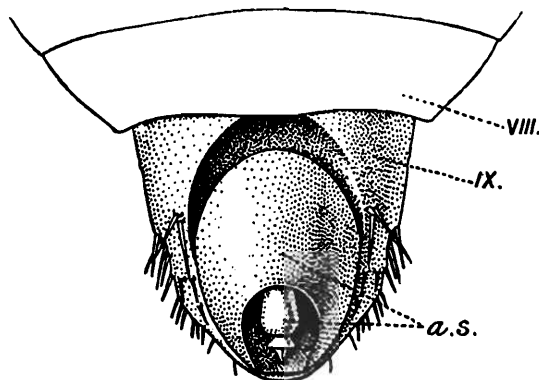
*Male*.—Vertex slightly longer than the breadth between the eyes, flat, anteriorly obtuse, neither foliaceous nor separated from the face by distinct margins, medially sulcate for two-thirds of its length, ochraceous, with a pair of dark oblique marks near the base; the lateral margins piceous. Eyes large and black. Frons dark brown, with oblique, piceous striae in the lateral regions. Clypeus rectangular and black. Genae and lorae dark ochraceous.

**Pronotum** piceous; the anterior margin broadly rounded, the posterior slightly concave. **Scutellum** ochraceous, with a broad median longitudinal black stripe. **Tegmina** (text-fig. 36);



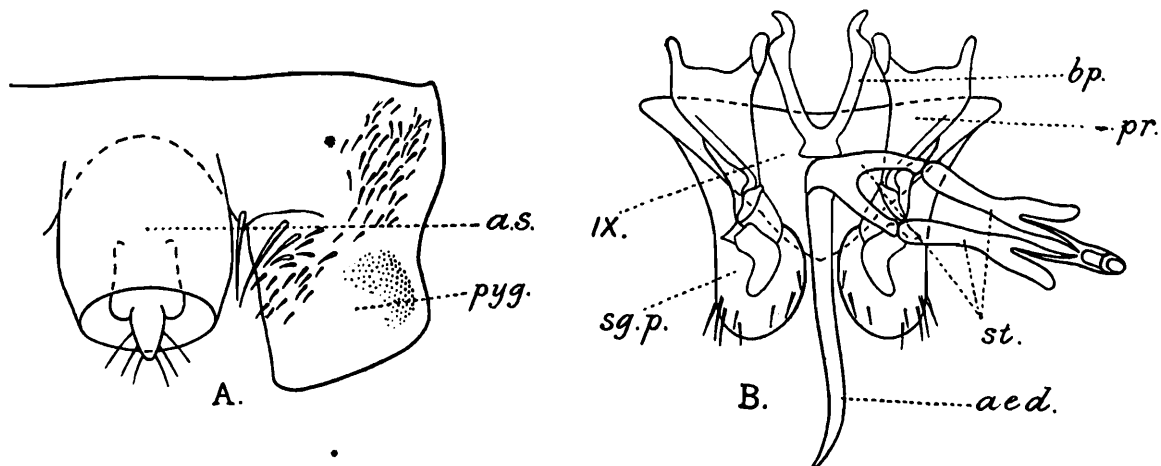
TEXT-FIG. 36.—*Leofa parwala*, sp. nov. Tegmen of the male,  $\times 50$ .

**coriaceous**, not extending beyond the posterior margin of the fourth abdominal segment; the posterior margins truncate; veins conspicuous, venation variable and irregular. **Wings** extremely small. Anterior and middle pair of legs piceous, the junctions of femora and tibiae, however, ochraceous; posterior femora flattened. **Abdomen** very broad, black, with eight longitudinal rows of pale ochraceous spots on the dorsal surface. Tenth abdominal (anal) segment very large (text-fig. 37).



TEXT-FIG. 37.—*Leofa parwala*, sp. nov. Posterior abdominal segments of the male; dorsal view,  $\times 57$ . Lettering as in text-fig. 1 (p. 3).

**Genitalia** (text-fig. 38). Pygofers of moderate length, almost truncate at the posterior margins. Sub-genital plates small, broad, rounded at the apices. Parameres large,



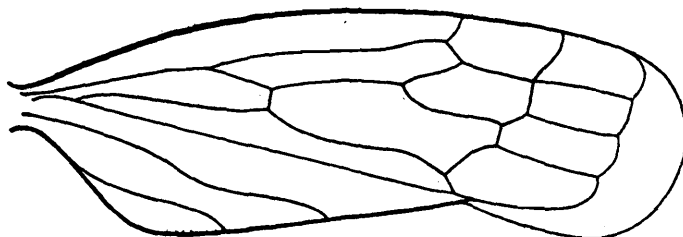
TEXT-FIG. 38.—*Leofa parwala*, sp. nov. A. Pygofer and anal segments of the male,  $\times 52.5$ . B. Male genitalia; dorsal view,  $\times 52.5$  (st., basal strut of the aedeagus), rest of the lettering as in text-fig. 1 (p. 3).

flattened in the proximal region, twisted in the middle. Basal plates long, narrow; their prolongation hardly developed. Aedeagus long, narrow, tapering in the distal region to a fine apex, with a very well developed basal strut (*st.*).

*Length.*—3 mm.

*Holotype.*—No.  $\frac{1062}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

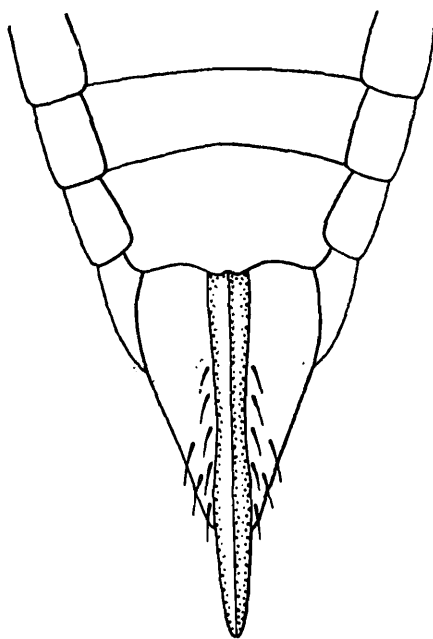
*Female.*—Chiefly differs from the male in the colour and markings of the body and in the structure of the tegmina. Lateral margins of the vertex very faintly piceous. Face entirely and the legs almost black. Scutellum with a pair of prominent black spots near the basal angles. Abdomen entirely black, without any ochraceous spots. Tegmina (text-fig. 39) fully developed, long, pale ochraceous, with dark-brown pigment deposited



TEXT-FIG. 39.—*Leofa parwala*, sp. nov. Tegmen of the female,  $\times 33$ .

in the middle and apical regions; veins fairly thick and conspicuous, not extending up to the apical margin; four apical and three ante-apical cells. Wings also fully developed.

*Genitalia* (text-fig. 40). Valve large; the posterior margin slightly produced in the middle. Pygofers small and narrow, with some stout bristles in the posterior region. Ovipositor stout, very much produced beyond the posterior extremity of the abdomen.



TEXT-FIG. 40.—*Leofa parwala*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 33$ .

*Length.*—3.1 mm. (excluding the ovipositor).

*Holotype.*—No.  $\frac{085}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution.*—Central India.

*Type-localities.*—(♂) Koilari and (♀) Harra, Nerbudda valley, Rewa State; Feb.—Mar., 1927 (H. S. Pruthi). Two male and one female specimens.

*Remarks.*—The female of *L. parwala* Pruthi comes very close to *Prasutagus pulchellus* Dist., the only species known of the genus *Prasutagus* Dist. The description of *P. pulchellus* was based on the female only, the male presumably being not available.<sup>1</sup> It seems, however, highly probable that *Prasutagus pulchellus* is a species of *Leofa* in which the female has fully developed wings, as in *Leofa parwala*. It may also be added that the specimens of *P. pulchellus* were obtained from the same part of India as most species of *Leofa*. The examination of the type of *Prasutagus pulchellus* is essential to settle the position of *Prasutagus* definitely.

A few remarks may be made on the genus *Leofa* itself. Distant placed this genus near *Chiasmus* on account of the "long vertex of the head and the posteriorly rounded margins of the tegmina" It appears, however, that the resemblance between the two genera is very superficial. Whereas in *Chiasmus* the vertex is always thin and foliaceous, and its lateral margins are always sharp, in *Leofa* it is fairly thick and is not separated from the face by well defined borders (Plate II, fig. 9a). Moreover, the tegminal venation, when fully developed, and the structure of the genitalia are entirely different in the two genera (compare text-figs. 33 and 38). The closest ally of *Leofa* seems to be the Ceylonese genus *Doratulina* Melichar. In fact, *Leofa* is so much like *Doratulina* that it does not seem to deserve the rank of a distinct genus.

#### Genus **GURAWA** Dist.

This genus was erected by Distant<sup>2</sup> with *G. vexillum* Dist. as the genotype, of which he possessed only one specimen, collected by Atkinson in Sikkim, Eastern Himalayas, India. No additional species of this genus has so far been described. In the case of *Gurawa*, as in several other cases, it appears that Distant mistook a pair of black spots situated near the base of the vertex for the ocelli and placed the genus in the sub-family Gyponinae, though he recognized its close resemblance to the genus *Euplix*, etc. I have been able to get some specimens, both male and female, of *G. vexillum* from Sikkim which have been compared with the type of the species in the British Museum. The ocelli in the genotype as well as in *G. minorcephala*, sp. nov., which is described below, are on the lateral margins of the vertex, though they are not very prominent. This character, as well as the foliaceous nature of the head, the wing venation, the shape of the face and the structure of the genitalia distinctly show that *Gurawa* should be placed in the sub-family Jassinae (Acocephalinae), near *Chiasmus*, etc.

#### **Gurawa minorcephala**, sp. nov.

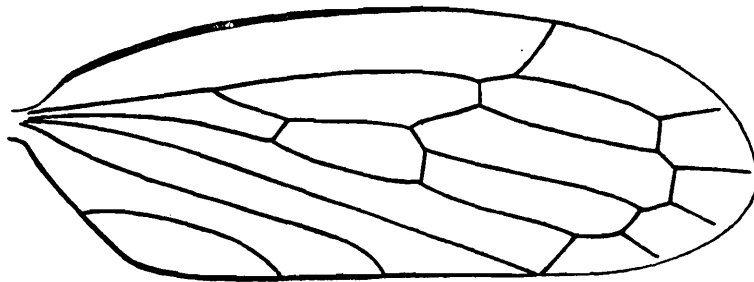
(Plate II, figs. 10, 10a, 10b.)

Vertex much shorter than the breadth between the eyes, anteriorly sub-acute and foliaceous, slightly depressed in the proximal region, highly reflexed near the apex, ochraceous, with a broad, dark longitudinal band extending up to the apex and a pair of minute dots near the base. Face almost as long as broad, dark grey; frons long, mottled all over with black, with a shallow depression in the upper region. Clypeus very long, about

<sup>1</sup> *Fauna British India*, Rhynchota, VII, p. 53 (1918).

<sup>2</sup> *Fauna British India*, Rhynchota, IV, p. 262 (1908).

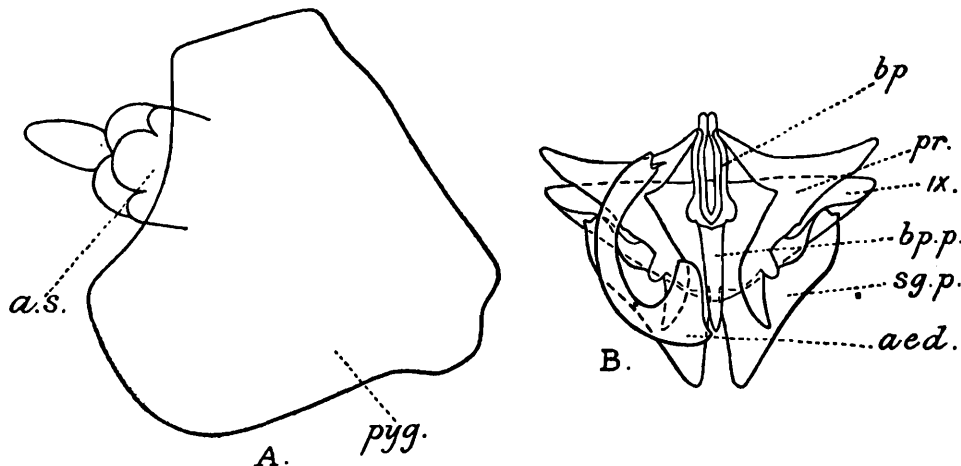
half the length of the frons. Lorae not reaching the apex of the clypeus. Genae slightly less expanded than in the species of *Chiasmus*, described above. Pronotum about as long as the vertex, transverse, medially, longitudinally carinate, coarsely wrinkled, and almost black. Scutellum large, pale ochraceous, with curved, dark bands near the lateral margins. Tegmina hard and coriaceous, longer than the body in both sexes, without appendix, touching each other along the inner margins, and of a dark brown colour. Veins thick, dark brown, here and there dotted with white, prominent; venation (text-fig. 41) similar to



TEXT-FIG. 41.—*Gurawa minorcephala*, sp. nov. Tegmen,  $\times 30$ .

that in the palaeartic genus *Stronglycephalus* Flor., two cross veins between the sectors, five apical and three ante-apical cells. Legs and ventral surface of the body dark brown; the posterior abdominal segments pale brown.

*Male genitalia* (text-fig. 42). Of the same type as in *Chiasmus*. Pygofer very large and broad, almost truncate at the posterior extremities. Sternum of the ninth segment



TEXT-FIG. 42.—*Gurawa minorcephala*, sp. nov. A. Left pygofer and anal segments of the male,  $\times 87$ . B. Male genitalia; dorsal view,  $\times 87$ . Lettering as in text-fig. 1 (p. 3).

large and triangular. Sub-genital plates very small and triangular. Parameres flattened in the proximal one-third, narrow in the distal region, pointed at the apices. Basal plates rod-like, their prolongation large. Aedeagus fairly long, wide and deeply curved.

*Female genitalia* (Plate II, fig. 10b). Valve large, deeply concave at the posterior margin. Pygofer long, fairly convex and smooth. Ovipositor stout, slightly projecting beyond the posterior extremity of the abdomen.

*Length*.— $\delta$  4.0 mm.;  $\text{♀}$  4.25 mm.

*Holotypes*.—No.  $\frac{687-688}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—N. Western Himalayas.

*Localities*.—Murree hills: Murree, Kuldana, Jhika Galli, etc. (7,000 ft.); Sept., 1928 (*H. S. Pruthi*).  
2 males and 2 females.

*Type-locality*.—Jhika Galli.

Genus **BAILEYUS**, gen. nov.

This genus is named in honour of its collector, Lt.-Col. F. M. Bailey, Political Agent, Sikkim.

Vertex thin and foliaceous, about one-third longer than the pronotum, anteriorly angulate, flat, but distinctly reflexed near the apex and the lateral margins; the latter slightly constricted in front of the eyes. Ocelli on the lateral margins of the vertex, rather indistinct. Eyes large, prominent and oblique. Face longer than broad, with a depression or furrow beneath the superior margin. Clypeus long, about one-half the length of the frons. Lorae raised, short, not reaching the apex of the clypeus. Genae deeply sinuate below the eyes. Pronotum about twice as broad as long; the posterior margin concave. Scutellum small. Tegmina fully developed in both sexes, hard and horny, touching each other along the straight inner margins and forming a roof-like structure over the body; the apices more or less pointed; appendix not developed. Veins thick and prominent; five apical and three ante-apical cells, only one cross vein between the sectors. Wings small.

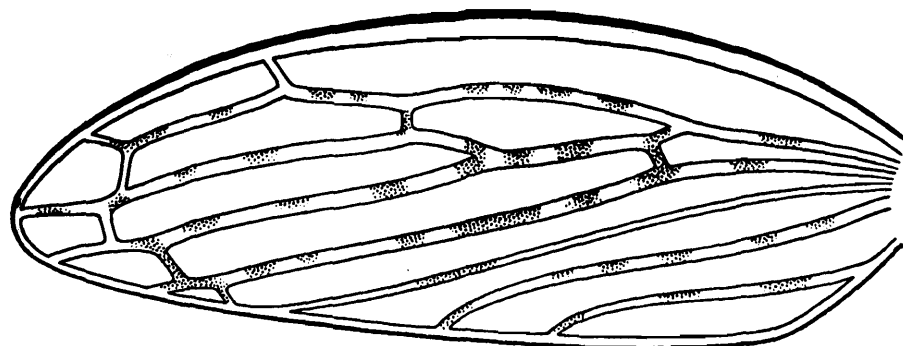
In general appearance this genus comes close to *Gurawa* Dist., from which it chiefly differs in the size of the vertex, shape of the face and the structure of the genitalia.

*Genotype*.—*Baileyus brunneus*, sp. nov.

**Baileyus brunneus**, sp. nov.

(Plate III, figs. 1, 1a, 1b.)

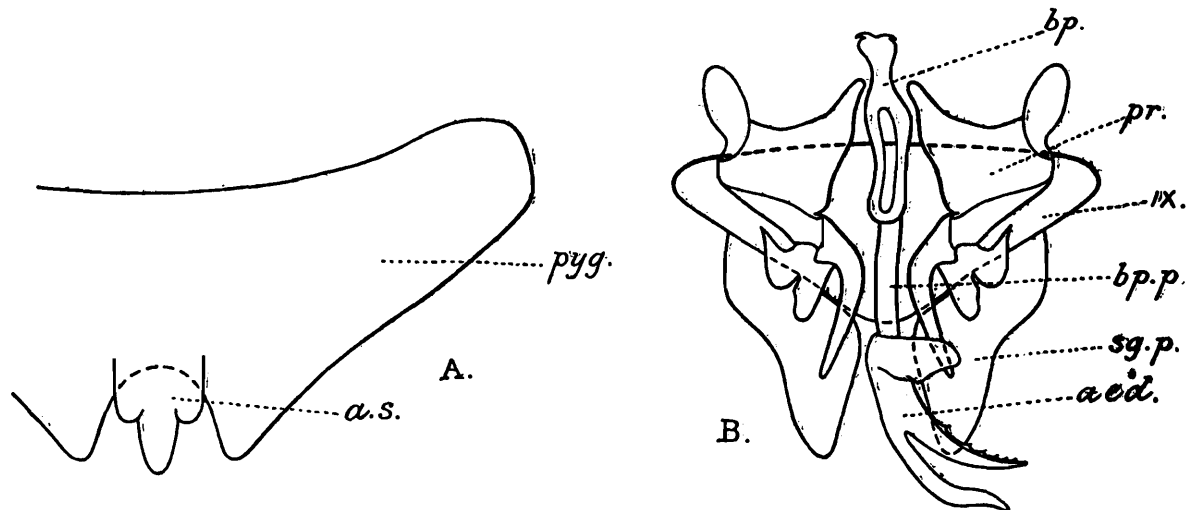
Brown or dark brown, some specimens almost black. Vertex brown, with a pair of minute black dots near the base and black dashes on the margins. Face brown, except in the extreme upper region where it is ochraceous, covered all over with irregular black dots and patches. Pronotum darker than the vertex, transversely, coarsely wrinkled, with two pairs of black, transverse markings on the disc. Scutellum ochraceous, with a black spot near each basal angle. Tegmina bronzed, not covering the tip of the ovipositor; veins black, here and there spotted with white; venation shown in text-fig. 43. Legs long and stout.



TEXT-FIG. 43.—*Baileyus brunneus*, gen. and sp. nov. Tegmen,  $\times 27$ .

*Male genitalia* (text-fig. 44). Pygofers slightly produced posteriorly in the dorsal region. Sternum of the ninth segment very large. Sub-genital plates fairly large and triangular. Parameres large, very much flattened in the proximal half, narrow and curved near the apices, which are pointed. Basal plates fused with each other at their proximal ends; the

prolongation long and stout. Aedeagus large, wide at the base, bipartite in the distal half, the upper branch with teeth-like processes on the dorsal side.



TEXT-FIG. 44.—*Baileyus brunneus*, gen. and sp. nov. A. Pygofer and anal segments of the male,  $\times 87$ . B. Male genitalia; dorsal view,  $\times 90$ : Lettering as in text-fig. 1 (p. 3).

*Female genitalia* (Plate III, fig. 16). Valve large, narrower near the posterior margin, which is wavy. Pygofers short, prominent, fairly convex and smooth. Ovipositor stout.

*Length*.—♂ 3.25 mm.; ♀ 3.5 mm.

*Holotype*.—No.  $\frac{691-692}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Eastern Himalayas.

*Type-locality*.—Yatung (10,000 ft.), Tibet frontier, Eastern Himalayas; Aug.—Oct., 1927 (*F. M. Bailey*). Numerous specimens of both sexes.

### Genus **PLATYMETOPIUS** Burm.

This old genus is mostly met with in the Palaearctic and Nearctic regions. I am recording it from India for the first time.

There is some difference of opinion with regard to the position of *Platymetopius*. Melichar<sup>1</sup> and Edwards<sup>2</sup> included it in the sub-family Acocephalinae on account of the shape of its head. But Oshanin,<sup>3</sup> Van Duzee,<sup>4</sup> Osborn,<sup>5</sup> etc., placed it in the Jassinae, near the genus *Deltocephalus*, principally on account of the presence of two cross veins between the 1st and 2nd sectors of the tegmina. Taking all the important characters into consideration, it appears that *Platymetopius* is nearer the genera included in the Acocephalinae than those in the Jassinae. I am, therefore, describing it at the end of the *Chiasmus* group. The genus can be recognized by the following characters:—

Vertex very long, apically acute and slightly reflexed; the lateral margins sharp. Ocelli on the lateral margins of the vertex, close to the eyes. Frons long, narrow, two to three times as long as broad, fairly convex. Clypeus long, narrow, somewhat broad at the

<sup>1</sup> Melichar, L.—Cicadinen von Mittel-Europa. Berlin; (1896).

<sup>2</sup> Edwards, J.—Hemiptera—Homoptera of the British Islands. London; (1896).

<sup>3</sup> Oshanin, B.—Katalog der palaearktischen Hemipteren. Berlin; (1912).

<sup>4</sup> Van Duzee, E. P.—Catalogue of the Hemiptera of America, north of Mexico. *Uni. Cal. Pub. Tech. Rull.*, Vol. II (1917).

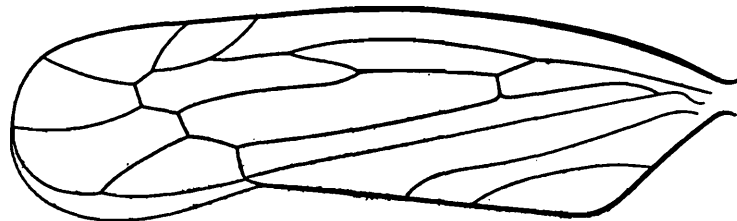
<sup>5</sup> Osborn, H.—The Leaf-hoppers of Ohio. *Ohio Biol. Surv. Bull.*, 14 (1928).

apex. Pronotum short, slightly broader than the head. Tegmina longer than the body in both sexes, often with two cross veins between the first and second sectors. Costal cell often with numerous cross veinlets.

**Platymetopius rahmani**, sp. nov.

(Plate III, figs. 2, 2a.)

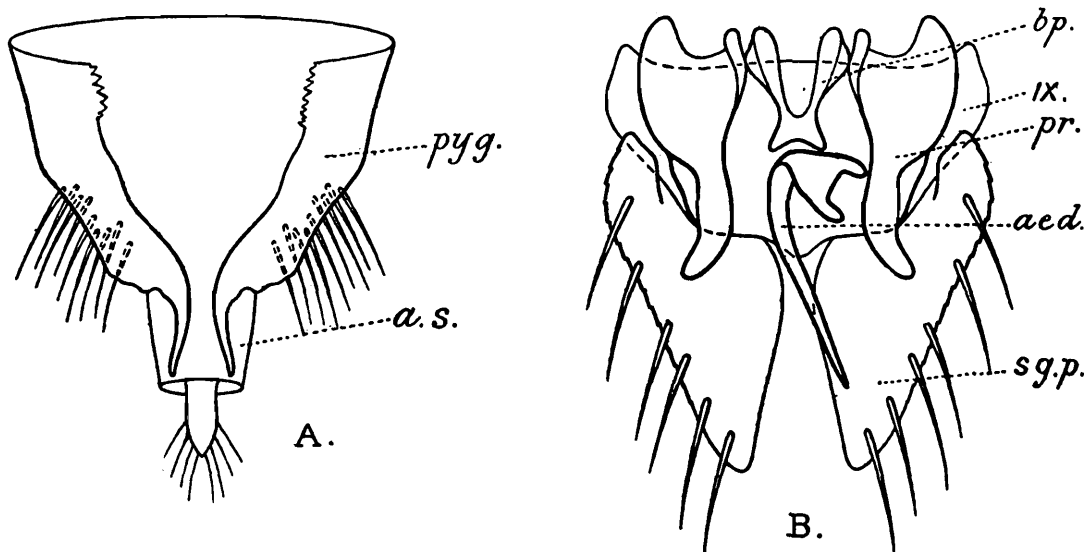
Vertex dark brown, with three longitudinal rows of linear markings and a spot near each eye pale ochraceous. Eyes large and pinkish. Ocelli pale and conspicuous. Face medially raised throughout its length, sloping on the sides, of a creamy-white colour, with a few dark brown, oblique striae in the upper region. Pronotum, scutellum and tegmina mottled with black and white. Anterior margin of the pronotum convex, almost truncate between the eyes; the posterior margin concave. Costal margin of the tegmina pale; veins inconspicuous, only one cross vein between the sectors (text-fig. 45). Wings dark



TEXT-FIG. 45.—*Platymetopius rahmani*, sp. nov. Tegmen,  $\times 24$ .

but transparent; nervures conspicuous. Dorsal surface of the abdomen black, the ventral surface of the thorax and abdomen creamy-white. Legs creamy-white.

*Male genitalia* (text-fig. 46). Pygofers large, produced into narrow processes in the posterior region. Sub-genital plates large, triangular and with a few strong marginal hairs.



TEXT-FIG. 46.—*Platymetopius rahmani*, sp. nov. A. Pygofers and anal segments of the male; ventral view,  $\times 87$ . B. Male genitalia; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

Parameres flattened, narrower in the apical region. Basal plates small; the prolongation hardly developed. Aedeagus long, narrow, cylindrical and with a broad basal strut.

*Female genitalia*.—Valve convex at the anterior margin. Pygofers with a few strong hairs in the posterior region. Ovipositor moderately stout.

*Length*.—♂ 5.8 mm.; ♀ slightly larger.

*Holotypes*.—No.  $\frac{712-713}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—North India.

*Type-locality*.—Lyallpur, Punjab; Oct., 1929 (*A. Rahman*). At light. Numerous specimens of both sexes.

### Genus **RHOMBOPSIS** Haupt.

This genus was erected by Haupt<sup>1</sup> on specimens obtained from Palestine and so far includes only one species, *R. virens* Haupt, which has not yet been found elsewhere. Haupt based the description of the genotype on the male only, the female being unknown to him. I have obtained specimens of both sexes of another species of this genus from Lyallpur (Punjab, N. India) which is described below.

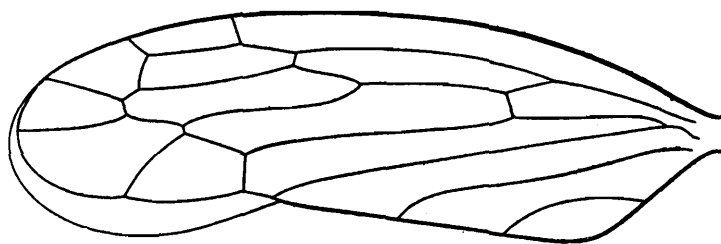
*Rhombopsis* comes near *Platymetopius* Burm., from which it can be readily distinguished by the size of the head, which is slightly broader than the pronotum, and by the position of the ocelli, etc. *Rhombopsis* can be diagnosed as follows:—

Vertex almost as long as the breadth between the eyes, flat, slightly reflexed near the apex, which is sub-acute, almost sharp at the margins. Ocelli on the lateral margins of the vertex, at some distance from the eyes, not visible from above. Face rhomboid, medially convex, sloping on the sides. Clypeus long, narrow in the proximal region, flattened near the apex. Lorae not reaching the apex of the clypeus. Outer margins of the genae almost straight, except below the eyes where they are slightly sinuate. Antennae very fine and long. Pronotum almost as long as the vertex; the anterior margin convex, the posterior slightly concave, the lateral margins short. Scutellum large. Tegmina longer than the body in both sexes; venation of *Thamnotettix* type.

### **Rhombopsis viridis**, sp. nov.

(Plate III, figs. 3, 3a.)

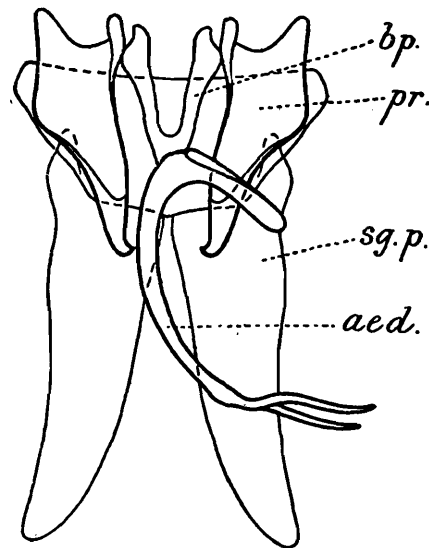
Pale green, green or virescent. Vertex with faint, reddish patches near the eyes. The latter purplish-red, large and oblique. Ocelli greenish and inconspicuous. Frons with a reddish longitudinal stripe near the lateral margins. Pronotum flat; the anterior margin very much produced between the eyes. Scutellum deeply, transversely impressed in the apical region, with a longitudinal broad stripe in the middle and a pair of big spots near the basal angles brown. Tegmina pale yellow, transparent; veins thin, concolorous, indistinct; claval margin marked with black at the ends of the anal veins. Venation shown in text-fig. 47. Wings whitish, nervures inconspicuous. Legs pale brown, delicate; middle and hind tibiae dotted with black. Both dorsal and ventral surfaces of the abdomen green.



TEXT-FIG. 47.—*Rhombopsis viridis*, sp. nov. Tegmen,  $\times 24$ .

<sup>1</sup> Haupt, H.—Homoptera Palestinae. I. *Bull. Agric. Expt. Sta. Tel-Aviv.*, No. 8, (1927).

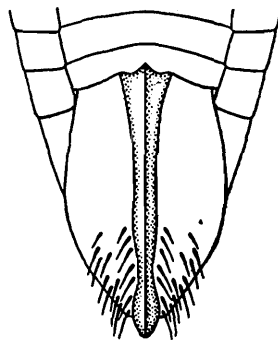
*Male genitalia* (text-fig. 48). Pygofers large. Sub-genital plates very long, narrow, especially in the distal region. Parameres small, flattened, broader in the proximal region,



TEXT-FIG. 48.—*Rhombopsis viridis*, sp. nov. Male genitalia; dorsal view,  $\times 67.5$ . Lettering as in text-fig. 1 (p. 3).

tapering in the distal to fine apices. Basal plates thin; the prolongation hardly developed. Aedeagus very long, narrow, slightly curved, with a pair of processes near the gonopore.

*Female genitalia* (text-fig. 49). Valve short. Pygofers large, broad, fairly convex, with numerous short hairs in the distal region. Ovipositor stout.



TEXT-FIG. 49.—*Rhombopsis viridis*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 26$ .

*Holotypes*.—No.  $\frac{717-718}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—North India.

*Type-locality*.—Lyallpur, Punjab; Oct., 1929 (*A. Rahman*). Six specimens. At light.

*Remarks*.—In the collection sent to me by the Ceylon Museum there is a specimen which seems to belong to the above species, but is smaller than the specimens from Lyallpur and differs from them in the markings of the body, especially the tegmina, which are brownish in the apical region.

#### Genus **DRABESCUS** Stål.

This genus mostly occurs in the Indo-Malayan region. In India it is already represented by six species and the seventh is described as new below:—

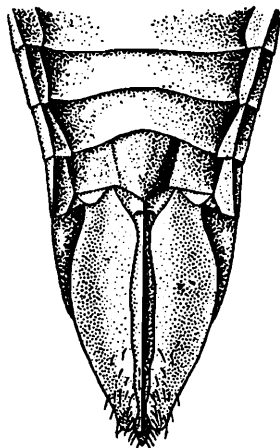
**Drabescus kempi**, sp. nov.

(Plate III, figs. 4, 4a.)

*Female.*

Large; reddish-brown. Vertex short, prominently ridged at the anterior margin, which is almost angulate and is marked with black near the ocelli and eyes. Eyes large and oblique. Antennae thin and extremely long. Face flattened, much broader than long; frons finely punctate, with a row of black spots near the lateral margins. Clypeus black, with a broad median carina. Lorae highly flattened and plate-like. Outer margins of the genae sinuate near the eyes. Pronotum finely, transversely striate, gradually rising in the posterior region; the anterior margin convex, protruding between the eyes, the posterior margin concave, the lateral margins fairly long. Scutellum long, raised in the middle and sloping in the antero-lateral areas, deeply, transversely impressed near the apex. Legs stout, anterior tibiae very much dilated. Tegmina much longer than the body, sub-hyaline, coarsely punctate, reddish-brown, with a big pale spot in the middle near the costal margin. Tegminal veins dark [brown, thick and prominent. Wings smoky white; nervures dark brown, fine but quite conspicuous.

*Genitalia* (text-fig. 50). Valve moderately long, raised near the median line, slightly produced caudad in the middle of the posterior margin. Pygofer broad, convex, and



TEXT-FIG. 50.—*Drabescus kempi*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 14$ .

bearing stout hairs in the distal region. Ovipositor stout, hardly projecting beyond the posterior extremity of the abdomen.

*Length*.—10.25 mm.

*Holotype*.—No.  $\frac{722}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India.

*Type-locality*.—Tope, foot of Palni hills; 1922 (*S. Kemp*). One female.

*Remarks*.—The male of this species is not known.

The above species comes close to *D. conspicuous* and *D. stramineous* of Distant. It may, however, be pointed out that the anterior tibiae of *D. conspicuous*, as figured by Distant, are not dilated and thus this species lacks an important generic character. Of the other species, *i.e.*, *D. stramineous*, Distant did not figure the anterior tibiae at all, nor did he make any remark about their structure.

Genus **SELENOCEPHALUS** Germ.

This genus is also met with in almost all parts of the world. In India it is already represented by four species and the fifth is described as new below.

*Selenocephalus*, as its name indicates, is characterized by the presence of a furrow at the anterior margin of the vertex of the head. By this feature alone it can be readily distinguished from the allied genera.

**Selenocephalus brunneus**, sp. nov.

(Plate III, figs. 5, 5a.)

*Female.*

Vertex short, about one-third as long as the breadth between the eyes, apically subangulate, ochraceous, with two transverse, medially interrupted, dark brown fasciae in the anterior region. Eyes large, oblique and dark brown; the outer margins in line with the lateral margins of the vertex. Face flattened, slightly broader than long, brown, with a fine, black transverse line in the upper region and a row of black markings near the lateral margins of the frons. Clypeus long, wider at the base and apex than in the middle. Pronotum ochraceous, and mottled all over with black; the anterior margin convex, posterior margin slightly concave, lateral margins short. Scutellum as broad as long, deeply, transversely impressed in the posterior region, with several dark brown, oblique stripes. Tegmina brown, hyaline, with some brown pigment deposited near the claval margins at the ends of the veins; veins dark brown and prominent. Wings pale brown; nervures conspicuous. Thoracic sterna ochraceous. Anterior and middle legs brown, posterior tibiae spotted with black. Ventral surface of the abdomen dark brown.

*Genitalia.*—Valve piceous, produced caudad in the middle of the posterior margin. Pygofers long, narrow, with strong hairs in the posterior region.

*Length.*—7.0 mm.

*Holotype.*—No.  $\frac{728}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution.*—South India.

*Type-locality.*—Kodaikanal (7,000 ft.), Palni hills; 15-V-1919 (*Mulyl*). One female specimen received from the Agricultural College, Coimbatore.

*Remarks.*—The male of this species is not known.

Genus **ACONURA** Leth.

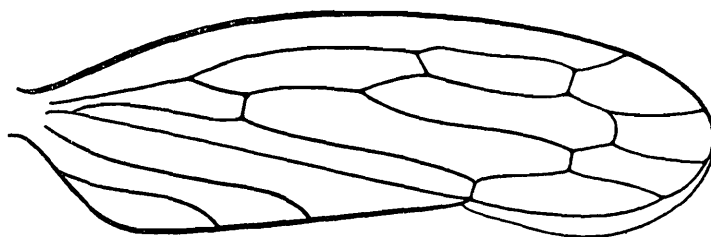
This is also a cosmopolitan genus. Melichar<sup>1</sup> described its two species from Ceylon. Distant did not record the occurrence of these or any fresh species from any part of India. I have obtained both sexes of Melichar's two species from South India, Central Provinces and Bengal. It appears that these species do not extend towards North India, inasmuch as my two months' collecting in the Muree hills did not yield even a single specimen. I have collected two more species which appear to be new and are described as such below. One of these is fairly widely distributed in India.

<sup>1</sup> Melichar, L.—Homopteren-Fauna von Ceylon, pp. 187-189. Berlin; (1903).

**Aconura dindorensis**, sp. nov.

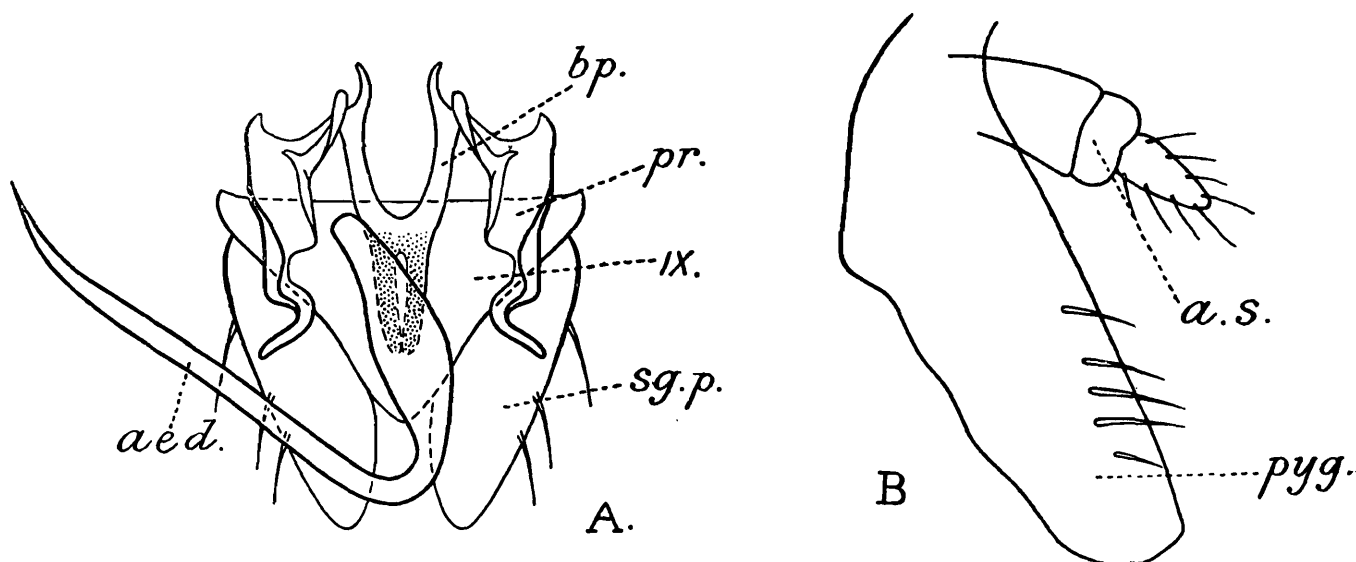
(Plate III, figs. 6, 6a.)

Brown or reddish-brown. Vertex about one-half longer than the distance between the eyes, anteriorly sub-acute, sulcate at the base, with a linear impression on each side of the sulca. Eyes very large, oblique and projecting over the lateral pronotal angles. Ocelli black, situated on the lateral margins of the vertex, very close to the eyes, not visible from above. Face slightly longer than broad; the upper half of the frons dark brown, with a median pale streak, the lower half of the frons, clypeus and genae brown. Clypeus elongated, extending beyond the lower margins of the lorae and genae. Genae slightly sinuate near the eyes. Antennae thin and very long. Pronotum more than half the length of the vertex, medially, prominently carinate. Scutellum slightly longer than broad. Tegmina subhyaline, brown, fully developed in both sexes, considerably longer than the body in the male, shorter in the female, the ovipositor very much projecting beyond their apices. Veins of the same colour as the tegmina; venation (text-fig. 51): four apical and three

TEXT-FIG. 51.—*Aconura dindorensis*, sp. nov. Tegmen,  $\times 31.5$ .

ante-apical cells; the outer branch of the first sector often without any branch on the costal side, connected by one or two cross veins to the inner branch. Legs brown. Abdomen both above and below dark brown.

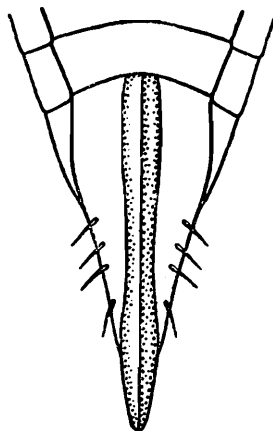
*Male genitalia* (text-fig. 52). Pygofers very much elongated, highly chitinized near the posterior margins, with a few stout marginal hairs. Sternum of the ninth segment large

TEXT-FIG. 52.—*Aconura dindorensis*, sp. nov. A. Male genitalia; dorsal view,  $\times 117$ . B. Pygofer and anal segments of the male,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

and triangular. Sub-genital plates rather small, triangular, with a few strong marginal hairs. Parameres considerably narrow and twisted in the distal region. Basal plates rod-like; the prolongation large, flattened, highly thickened near the lateral margins.

**Aedeagus** very much elongated, wide at the base, beyond which it is sharply bent and extremely narrow.

*Female genitalia* (text-fig. 53). Valve short, concave at the posterior margin. Pygofers long, narrow, hardly swollen, with a few stout hairs in the distal region. Ovipositor very long and stout, projecting much beyond the posterior extremity of the abdomen.



TEXT-FIG. 53.—*Aconura dindorensis*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 26$ .

*Length*.—♂ 3.25 mm.; ♀ 3.5 mm.

*Holotypes*.—No.  $\frac{724-725}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

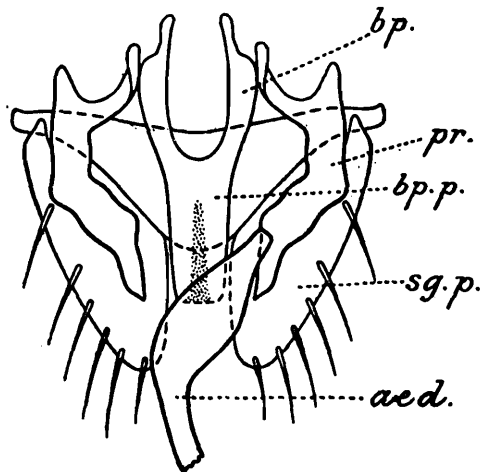
*Distribution*.—Central India.

*Type-locality*.—Dindori, district Mandla, Central Provinces; 5-VI-1927 (*H. S. Pruthi*). 2 males and 2 females.

### ***Aconura tolla*, sp. nov.**

(Plate III, figs. 7, 7a.)

Vertex brown, almost as long as the distance between the eyes, anteriorly very slightly angulate. Eyes purple; ocelli black. Face as long as broad, pale brown, with dark brown striae in the upper half of the frons and black patches on the genae. Pronotum virescent, with a pair of minute black dots (more prominent in the female) near the anterior margin. Scutellum yellowish, with a fine, transverse impression in the middle. Tegmina greenish-yellow, long but not reaching the apex of the ovipositor; veins pale but quite conspicuous; venation as in *A. dindorensis*. Front coxae ochraceous, with a black annulus near the distal end. Legs reddish-brown. Ventral surface of the body almost black.



TEXT-FIG. 54.—*Aconura tolla*, sp. nov. Male genitalia, the aedeagus mutilated; dorsal view,  $\times 87$ . Lettering as in text-fig. 1 (p. 3).

*Male genitalia* (text-fig. 54). Of the same plan as those in *A. dindorensis*, differing chiefly in the shape of the parameres. Sub-genital plates with more numerous marginal hairs.

*Female genitalia*. Valve broad, slightly sinuate at the posterior margin. Pygofers narrow, hardly swollen. Ovipositor black, of moderate length, projecting beyond the posterior extremity of the abdomen.

*Length*.—♂ 3.0 mm.; the female slightly bigger than the male.

*Holotypes*.—No.  $\frac{727-728}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Bengal, Eastern and Western Himalayas; probably more widely distributed.

*Type-locality*.—Tollygunge, Calcutta; 5-VIII-27 (*H. S. Pruthi*).

*Other localities*.—Mariambari Tea Estate, Pankhabari P. O., Eastern Himalayas; 15—23-VIII-28 (*I. M. Puri*). Chhangla Gali (8,450 ft.), Muree hills; 3-X-28 (*H. S. Pruthi*).

*Remarks*.—This species differs from most other species of this genus in the shape and size of the vertex, which is shorter and only slightly angulate at the anterior margin.

#### Genus **ARYA** Dist.

This genus so far includes only one species, *A. rubrolineata* Dist., the description of which was based on specimens some of which are in the collection of the Indian Museum. Distant placed this genus in the division Jassusaria, obviously due to its superficial resemblance to *Jassus*, etc. But a careful examination of the specimens of the genotype in the collection of the Indian Museum and of those of another species, described as new below, clearly shows that the position of *Arya* should be near *Aconura*, far remote from any member of Jassusaria.

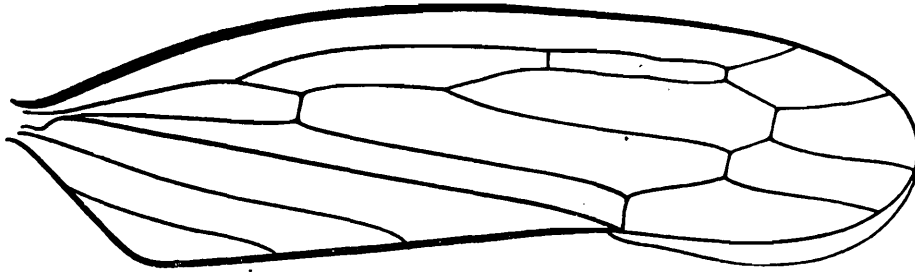
#### **Arya rotundus**, sp. nov.

(Plate III, figs. 8, 8a, 8b.)

Closely allied to *A. rubrolineata* Dist., from which it chiefly differs in the shape of the vertex, which is rounded at the anterior margin instead of being sub-conical.

Vertex longer than the breadth between the eyes, broadly rounded in the anterior region, medially sulcate, reddish-brown, with two oblique, dark, linear impressions near the base. Eyes large, black, oblique and projecting over the lateral pronotal angles. Ocelli situated on the anterior margin of the vertex, close to the eyes, hardly visible from above, of black colour. Face as long as broad, brown. Frons fairly raised, with transverse, reddish-brown striae in the lateral areas. Clypeus rectangular, long, about half the length of the frons; lorae not reaching the lower margin of the clypeus. Antennae thin and long. Pronotum slightly longer than the vertex, finely, transversely striated, grey, with a pair of dark linear impressions near the anterior margin in the female and a transverse black stripe in the same position in the male; the anterior margin produced between the eyes, truncate; the lateral margins extremely short; the posterior margin gently concave. Scutellum about as long as broad, transversely impressed in the middle. Tegmina brown or stramineous, sub-hyaline; much longer than the abdomen in the male, shorter in the female, whose ovipositor extends beyond their apices; appendix small; veins brown.

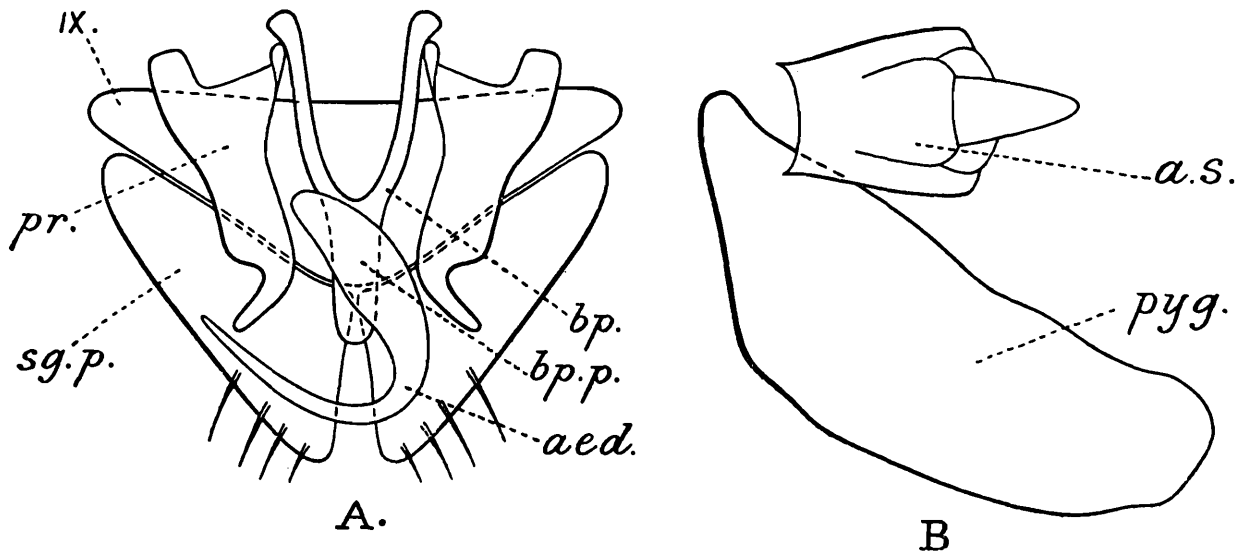
but distinct; venation (text-fig. 55) of *Aconura* type. Wings whitish; nervures pale brown. Legs brown. Thoracic sterna with dark patches in the lateral regions. Abdomen both



TEXT-FIG. 55.—*Arya rotundus*, sp. nov. Tegmen,  $\times 27$ .

above and below black in the male, brown in the female, with the lateral margins and the genital segments ochraceous. Spiracles black.

*Male genitalia* (text-fig. 56). Of the same plan as in the genus *Aconura*. Pygofers very much produced in the posterior direction. Sternum of the ninth segment large and



TEXT-FIG. 56.—*Arya rotundus*, sp. nov. A. Male genitalia; dorsal view,  $\times 90$ . B. Right pygofer and anal segments of the male,  $\times 90$ . Lettering as in text-fig. 1 (p. 3).

triangular. Sub-genital plates fairly large, triangular, with a few strong marginal hairs. Parameres large, flattened, extremely narrow and curved near the apices. Basal plates rod-like; the prolongation flattened, thickened near the lateral margins. Aedeagus very wide at the base, deeply bent in the middle, tapering in the distal region to a fine apex which points towards the anterior end of the body.

*Female genitalia* (Pl. III, fig. 8b). Valve short, concave at the posterior margin. Pygofers elongated, with stiff hairs in the apical region. Ovipositor very stout and long, bearing a few bristles near the apex.

*Length*.—♂ 4.0 mm.; ♀ 4.5 mm.

*Holotypes*.—No.  $\frac{736-737}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Central India.

*Localities*.—Sarai, Harai, Koilari and Harra, Nerbudda valley, Rewa State, Central India; Feb., 1927 (*H. S. Pruthi*). Numerous specimens of both sexes.

*Type-locality*.—Sarai.

*Remarks.*—The shape of the face, pronotum, scutellum and tegmina, the nature of the wing venation and the structure of both the male and female genitalia of the genus *Arya* are almost similar to those of *Aconura*. The two genera principally differ from each other in the general appearance of the body and the shape of the vertex, which is often angulate in *Aconura*. Both the known species of *Arya* are large, whereas most species of *Aconura* are comparatively small and delicate.

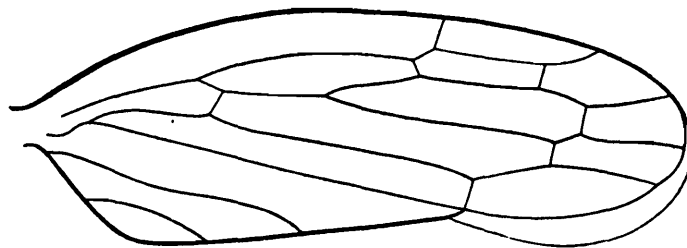
#### Genus **PATERNUS** Dist.

This genus so far includes only one species, *P. pusanus* Dist., which was described from a single female specimen obtained from Pusa (Bihar) and which is in the collection of the British Museum, London. There is no other record of this genus from India or outside. I examined the type-specimen when in London in October, 1926, and felt that Distant's description of *Paternus* was poor and misleading. Therefore the two new species of this genus which I have since discovered are described below in some detail. As is shown hereafter (p. 44), *Paternus* is very similar to *Aconura* and does not deserve the rank of a distinct genus.

#### **Paternus viridula**, sp. nov.

(Plate IV, figs. 1, 1a.)

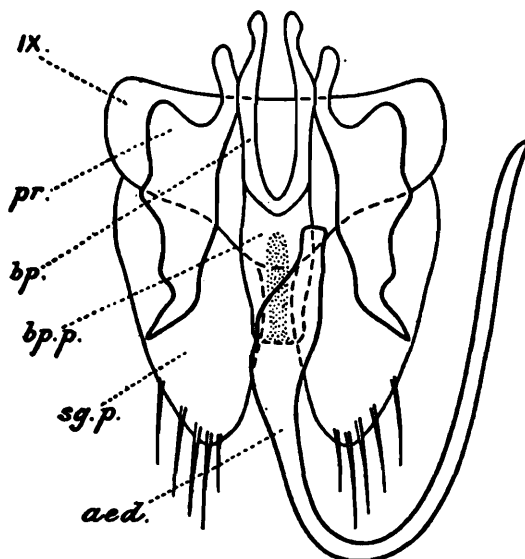
Greenish-yellow. Vertex longer than the breadth between the eyes, flat, acute at the apex, sulcate at the base, with an oblique impression on each side of the sulca; the lateral margins in line with the outer margins of the eyes. Eyes grey, large, oblique, and projecting over the lateral pronotal angles. Ocelli on the lateral margins of the vertex, close to the eyes, black, conspicuous, hardly visible from above. Face yellowish-green, much longer than broad; frons fairly raised; clypeus long and narrow; lorae not reaching the apex of the clypeus. Antennae very long and thin. Pronotum about twice as broad as long; the anterior margin truncate between the eyes and then concavely oblique to the lateral margins, which are short; the posterior margin slightly concave; the disc with a pair of linear impressions near the anterior margin. Scutellum about as long as broad, deeply, transversely impressed in the distal region. Tegmina long and broad, sub-hyaline, overlapping in the distal region, extending much beyond the posterior extremity of the body in the male, not covering the apex of the long ovipositor in the female; appendix small; veins thin but con-



TEXT-FIG. 57.—*Paternus viridula*, sp. nov. Tegmen,  $\times 42$ .

spicuous, venation (text-fig. 57) of *Aconura* type. Wings smoky white; nervures inconspicuous. Legs pale brown. Ventral surface of the body greenish.

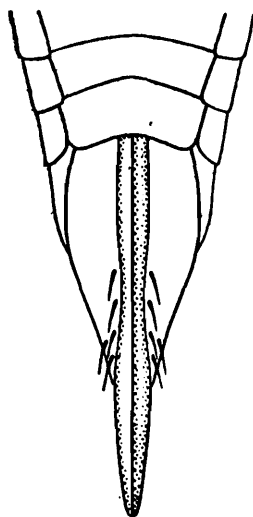
*Male genitalia* (text-fig. 58). Of the same plan as in *Aconura*. Pygofers elongated. Sub-genital plates with several stout marginal hairs. Parameres long and narrow. Basal



TEXT-FIG. 58.—*Paternus viridula*, sp. nov. Male genitalia ; dorsal view.  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

plates long ; the prolongation very broad and flattened, heavily chitinized near the lateral margins. Aedeagus extremely long, wider at the base, beyond which it is bent with the gonopore pointing towards the anterior end of the body.

*Female genitalia* (text-fig. 59). Of the same plan as in *Aconura*. Valve slightly concave at the posterior margin. Pygofers narrow and fairly convex. Ovipositor very long and stout.



TEXT-FIG. 59.—*Paternus viridula*, sp. nov. Female. Posterior abdominal segments ; ventral view,  $\times 31.5$ .

*Length*.—♀ 4.50 mm. ; ♂ much smaller.

*Holotype*.—No.  $\frac{748}{H7}$ ,  $\frac{750}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India.

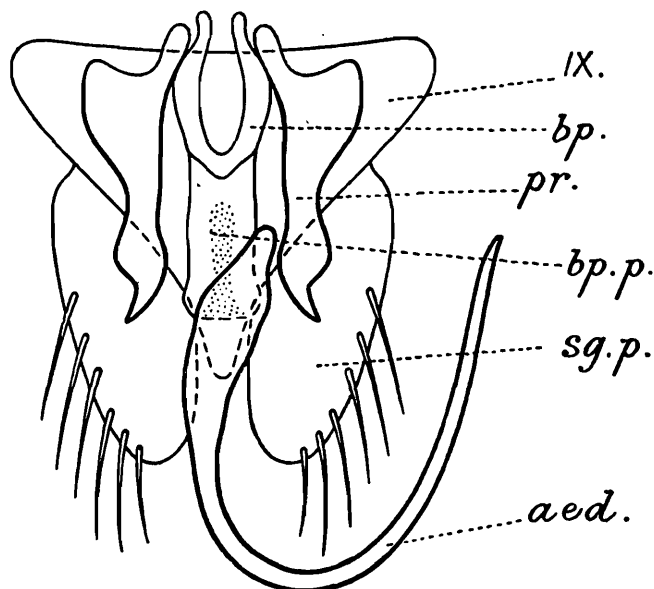
*Type-locality*.—Kodaikanal Road Station, foot of Palni hills, 3—4-VII-29 (*H. S. Pruthi*). Numerous specimens ; males comparatively fewer than females.

*Other localities*.—Kangumadugu (3,000 ft.), Seshachalams (Palkonda hills), Cuddapah district ; 20—21-VII-29 (*H. S. Pruthi*), one female. Vempalle, Cuddapah district ; 5-VIII-29 (*H. S. Pruthi*), two females.

**Paternus vertica**, sp. nov.

This is allied to *P. viridula*, from which it chiefly differs in size, the form of the vertex, and the structure of the genitalia. It is pale brown in colour, with reddish patches in the lateral region of the frons. The vertex is relatively shorter and is less acute at the apex. The tegmina are comparatively longer and the ovipositor does not project beyond their apices.

*Male genitalia* (text-fig. 60). Differ from those in *P. viridula* in the shape of the parameres and the size of the basal plates.



TEXT-FIG. 60.—*Paternus vertica*, sp. nov. Male genitalia; dorsal view,  $\times 57$ . Lettering as in text-fig. 1 (p. 3).

*Length*.—♂ 3.75 mm.; ♀ 4.25 mm.

*Holotypes*.—No.  $\frac{761-762}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India and Ceylon.

*Type-locality*.—Chitteri (3,000 ft.), Chitteri hills, Eastern Ghats; 20—22-VI-29 (*H. S. Pruthi*), 1 male and 2 females.

*Other localities*.—Colombo, Ceylon; 11-I-29. Five female specimens received from the Colombo Museum.

*Remarks on the genus Paternus*.—The general shape of the head, face and thorax, the tegminal venation and the structure of both the male and female genitalia of *Paternus* are very close to those of *Aconura*. It is therefore very doubtful if *Paternus* deserves the rank of a distinct genus.

Genus **BELLA**, gen. nov.

Vertex very long, about twice as long as the breadth between the eyes, gradually narrowing to an acute apex, slightly deflected in the anterior region; the lateral margins thick and forming a distinct border between the vertex and the face. Eyes long and oblique. Ocelli on the lateral margins of the vertex, close to the eyes. Face much longer than broad, medially convex, sloping on the sides; clypeus long and narrow. Genae large and expanded. Pronotum about twice as broad as long, transverse; the anterior margin slightly produced between the eyes, almost truncate; the posterior margin straight. Tegmina short and broad,

not reaching the posterior extremity of the abdomen in either sex; appendix hardly developed; the inner margin almost straight; veins thick and prominent, five apical and three or four ante-apical cells. Abdomen bulky in both sexes. Legs delicate. Ovipositor very much projecting beyond the posterior extremity of the abdomen.

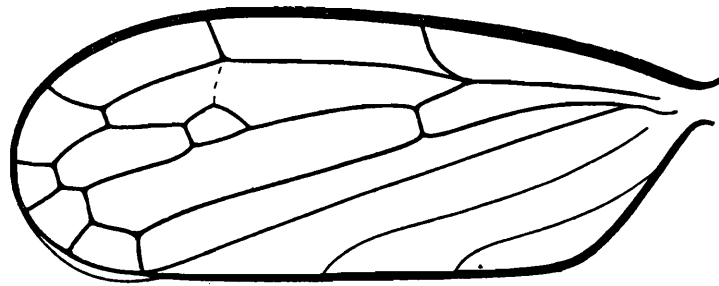
In general appearance this genus comes close to the genera *Viridomarus* and *Bituitus* of Distant. But the shape of the pronotum and the structure of both the male and female genitalia are almost like those in *Aconura*.

*Genotype.*—*Bella apicalis*, sp. nov.

***Bella apicalis*, sp. nov.**

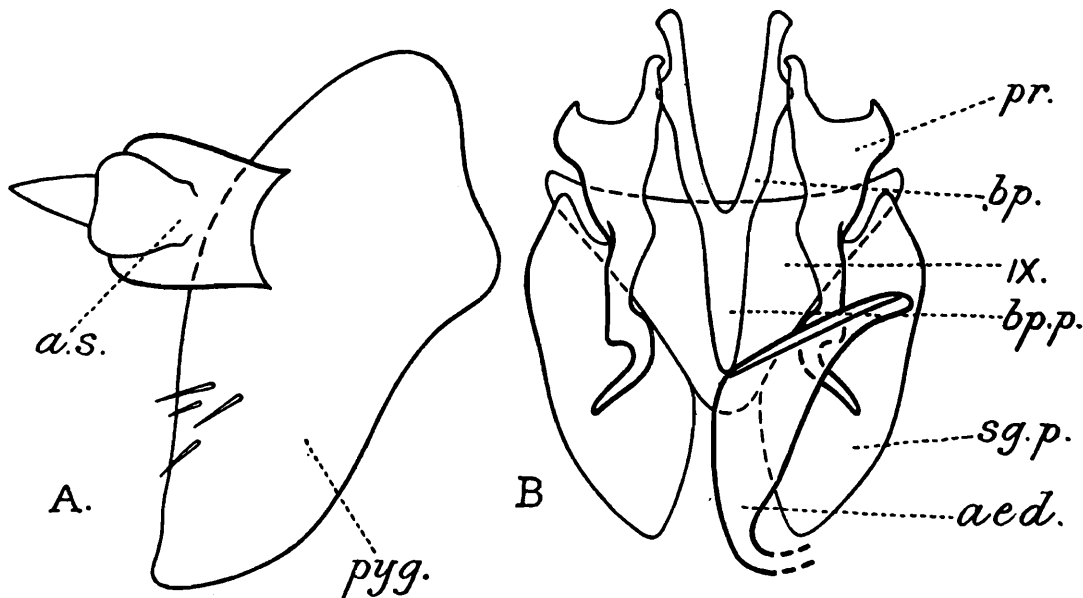
(Plate IV, figs. 2, 2a.)

Vertex brown, sulcate at the base, with a black dash-like marking at the apex; the lateral margins pale ochraceous. Face medially dark brown, almost black in the lateral regions and pale ochraceous along the margins. Pronotum brown, finely, transversely striated; scutellum brown, deeply, transversely impressed in the apical region. Tegmina



TEXT-FIG. 61.—*Bella apicalis*, gen. and sp. nov. Tegmen,  $\times 67.5$ .

thick, sub-hyaline, brown; venation shown in text-figure 61; appendix very small. Ventral surface of the body dark. Legs brown, tibiae dotted with black.

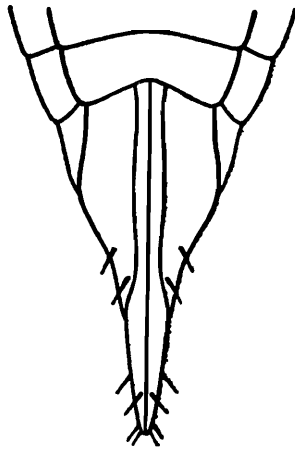


TEXT-FIG. 62.—*Bella apicalis*, gen. and sp. nov. A. Left pygofer and anal segments of the male,  $\times 117$ . B. Male genitalia, aedeagus mutilated; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

*Male genitalia* (text-fig. 62). Pygofers long, almost pointed at the posterior extremities. Sternum of the ninth segment large and triangular. Sub-genital plates fairly large and

triangular. Parameres very large, rather narrow. Basal plates long, their prolongation well developed. Aedeagus long, very wide at the base, beyond which it is very narrow and deeply bent.

*Female genitalia* (text-fig. 63). Valve short, concave at the posterior margin. Pygofer small, narrow and fairly convex. Ovipositor very long and stout.



TEXT-FIG. 63.—*Bella apicalis*, gen. and sp. nov. Female. Posterior abdominal segments ; ventral view,  $\times 31.5$ .

*Length*.—♂ 4.0 mm. ; ♀ 5.0 mm.

*Holotypes*.—No.  $\frac{766-767}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India.

*Type-locality*.—Ballapalli (1,000 ft.), foot of the Seshachalams (Palkonda hills), Cuddapah district ; 18—23-VIII-29 (*H. S. Pruthi*). Numerous specimens of both sexes.

*Other localities*.—Chitteri (3,000 ft.), Chitteri hills, Eastern Ghats ; 20—22-VI-29 (*H. S. Pruthi*). Numerous specimens.

#### Genus **BALCLUTHINA**, gen. nov.

Head including the eyes much narrower than the pronotum ; vertex about half as long as the pronotum, anteriorly obtuse. Eyes small, their outer margins in line with the lateral margins of the vertex. Ocelli situated at some distance from the eyes, partly visible from above. Face almost as long as broad. Clypeus rectangular, broad. Genae deeply sinuate close to the eyes. Pronotum long, much broader in the posterior region ; both the anterior and posterior margins straight, the lateral margins long. Tegmina much longer than the body, overlapping in the apical region ; membrane about as long as the inner margin of the clavus ; appendix fairly well developed ; venation as in the genus *Balclutha* Kirk.

This genus is allied to *Balclutha* Kirk., from which it chiefly differs in the size and form of the vertex, which is triangular in outline and almost straight at the base.

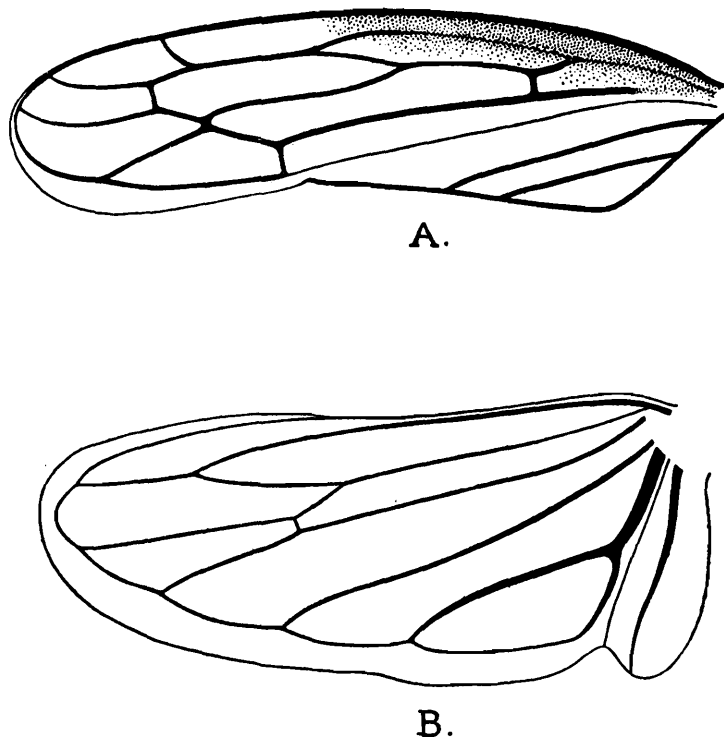
*Genotype*.—*Balcluthina viridis*, sp. nov.

#### **Balcluthina viridis**, sp. nov.

(Plate IV, figs. 3, 3a.)

Delicate ; green or pale yellow. Vertex sulcate at the base, with a minute black spot on each side of the sulca. Ocelli black and very conspicuous. Eyes purple. Frons moderately raised, with a pair of curved brownish stripes in the lateral regions. Pronotum depressed near the anterior margin, gradually rising in the distal region, transparent, some irregular dark patches on the anterior region of the mesonotum being visible through it. Scutellum

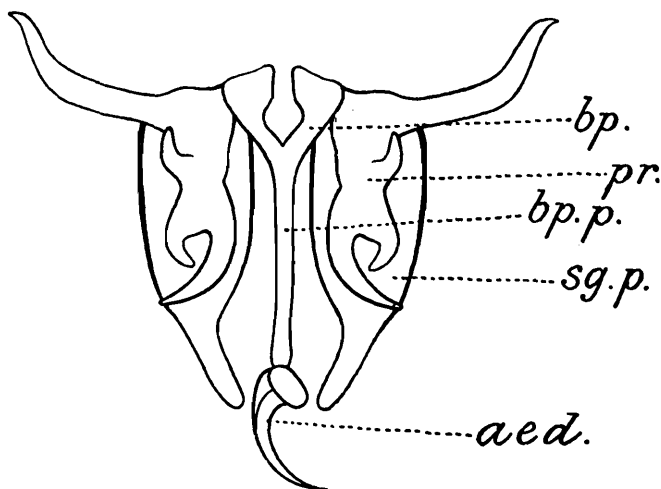
about as long as broad, with a pair of black spots near the basal angles. Tegmina hyaline; veins distinct; venation (text-fig. 64): the outer branch of the first sector hardly visible in



TEXT-FIG. 64.—*Balcluthina viridis*, gen. and sp. nov. A. Tegmen,  $\times 27$ . B. Wing,  $\times 27$ .

the proximal region. Wings smoky white; nervures dark and conspicuous. Legs pale yellow; posterior tibiae strongly spinulose.

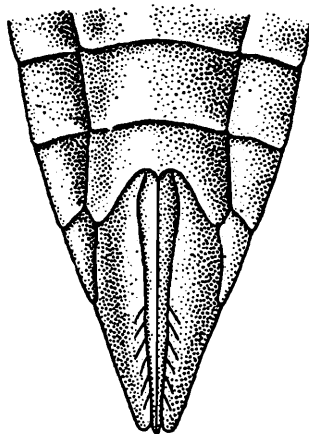
*Male genitalia* (text-fig. 65). Pygofers very much produced in the posterior direction. Sub-genital plates long, leaf-like, broad in the proximal region, considerably narrow in the



TEXT-FIG. 65.—*Balcluthina viridis*, gen. and sp. nov. Male genitalia; dorsal view,  $\times 60$ . Lettering as in text-fig. 1 (p. 3).

distal one-third. Parameres produced into long processes at the antero-outer corners, flattened in the proximal region, narrow and curved in the distal one-fourth, pointed at the apices. Basal plates short and flattened, their prolongation extremely long and narrow. Aedeagus very short, styliform, wide at the base, tapering in the distal region to a pointed apex.

*Female genitalia* (text-fig. 66). Valve large, deeply notched at the posterior margin. Pygofers narrow, convex, with a row of stiff hairs along the inner margins. Ovipositor delicate.



TEXT-FIG. 66.—*Balcluthina viridis*, gen. and sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 36$ .

*Length*.—♂ 3.25 mm.; ♀ 3.5 mm.

*Holotypes*.—No.  $\frac{781-782}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Western and South India.

*Localities*.—South India: Rhamba, district Ganjam; 16-X-22 (*N. Annandale*). At light, 10 specimens. Taliparamba, N. Malabar; 20-X-25 (*A. G. R.*). 4 specimens received from the Agricultural College, Coimbatore.

Bombay Presidency: near Jog Falls, district N. Kanara; Khanpur, district Belgaum; Tuppur, district Shimoga; November, 1928 (*B. Prashad* and *H. S. Rao*). At light, 6 specimens.

*Type-localities*.—(♂) Near Jog Falls and (♀) Khanpur, Bombay Presidency.

### Genus **EUGNATHODUS** Baker.

In 1903, Baker<sup>1</sup> separated *Balclutha abdominalis* Van Duzee from the rest of the species of *Balclutha* on account of the shape of its head, and erected thereon a new genus *Eugnathodus*. In this genus the head is as wide as or wider than the pronotum and is often transverse at the anterior margin. The antennae are very long. The pronotum is large, with the anterior margin gently curved and the posterior margin almost straight. The tegmina are much longer than the body. The tegminal venation is of the *Balclutha* type.

So far this genus is mostly known from the Nearctic region, though Nandé<sup>2</sup> has recently described four species from S. Africa. I am recording it from India for the first time. *E. indica*, one of the four new species described below, occurs in almost all parts of India.

### **Eugnathodus indica**, sp. nov.

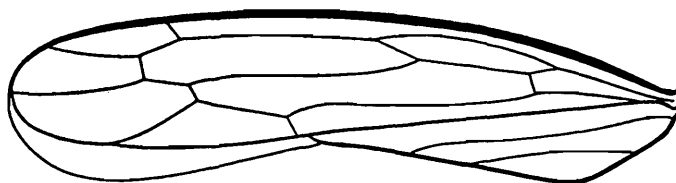
(Plate IV, figs. 4, 4a, 4b.)

Green, pale green or stramineous (old specimens). Head as wide as the pronotum. Vertex short, medially sulcate, broadly rounded at the anterior margin. Eyes small, oblique

<sup>1</sup> *Invertebrata Pacifica*, Vol. I, p. 1.

<sup>2</sup> *Union South Afr. Dept. Agric. Ent. Mem.* No. 4 (1926).

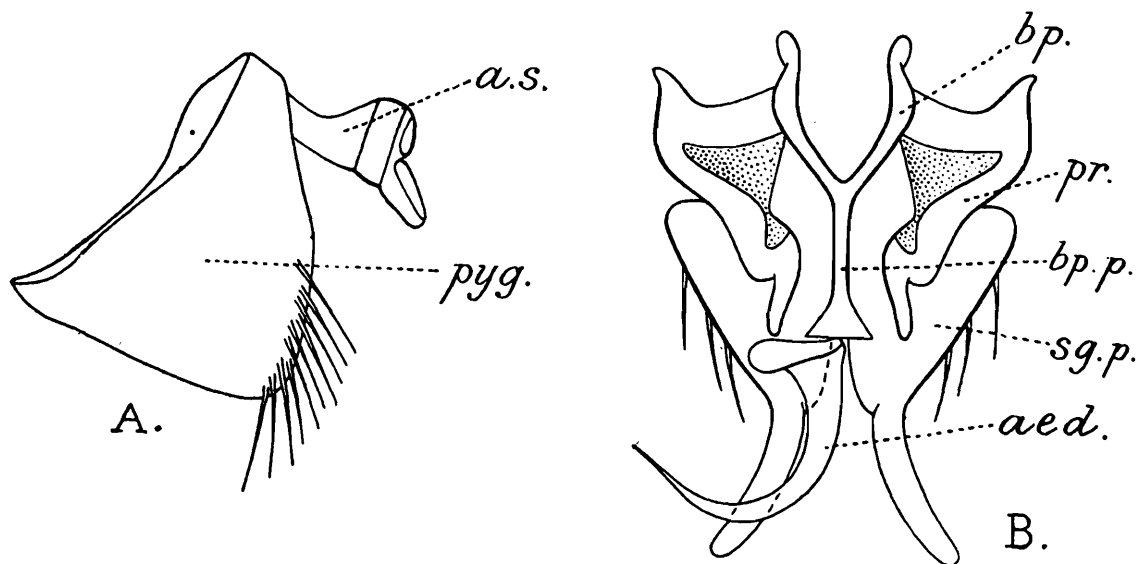
and dark. Ocelli black, situated on the anterior margin of the head, close to the eyes, partly visible from above. Face slightly broader than long. Frons broad, fairly convex, brown, with dark longitudinal patches in the lower region. Clypeus long and narrow. Lorae well differentiated from the genae; the latter deeply sinuate below the eyes. Pronotum more than one and a half times as broad as long. Scutellum small, as long as broad, with a deep, transverse impression in the middle, in some specimens with a dark spot near each basal angle. Tegmina stramineous, hyaline; veins thin but distinct and conspicuous; venation (text-fig. 67): the outer branch of the first sector well developed, coalescing with the outer



TEXT-FIG. 67.—*Eugnathodus indica*, sp. nov. Tegmen,  $\times 24$ .

fork of the inner branch and thus forming a cell in the proximal region of the tegmen. Wings smoky white; nervures distinct, especially in the apical region. Dorsal surface of the abdomen dark, with the posterior margins of its various segments yellow. Ventral surface of the body brown.

*Male genitalia* (text-fig. 68). Pygofers broadly produced in the posterior direction, bearing stout hairs near the posterior margins. Sub-genital plates leaf-like and triangular



TEXT-FIG. 68.—*Eugnathodus indica*, sp. nov. A. Pygofers and anal segments of the male; lateral view,  $\times 110$ . B. Male genitalia; dorsal view,  $\times 165$ . Lettering as in text-fig. 1 (p. 3).

in the proximal region, thin and extremely narrow in the distal. Parameres large, flattened in the proximal region, narrow and rod-like near the apices. Basal plates large and curved, their prolongation long and delicate, flattened at the base of the aedeagus. Aedeagus long, curved, wide at the base, tapering in the distal region to a fine apex.

*Female genitalia* (Plate XXX, fig. 4b). Valve short, almost straight at the posterior margin. Pygofers large, broad, convex, with numerous stiff hairs in the distal region. Ovipositor delicate, hardly projecting beyond the posterior extremity of the abdomen.

*Length*.—♂ 3.5 mm.; ♀ 4.0 mm.

*Holotypes*.—No.  $\frac{794-795}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Throughout India.

*Localities*.—North India : Kohala (2,000 ft.), Tret (3,300 ft.), etc. in the Murree hills, N. Western Himalayas ; Sept.—Oct., 1928 (*H. S. Pruthi*). Numerous specimens. Lyallpur, Punjab ; Oct., 1929 (*A. Rahman*). 10 specimens.

Central India : Koilari, Harra, Sankal, etc. in the Nerbudda valley ; Feb.—March, 1927 (*H. S. Pruthi*). Numerous specimens. Pachmari (3,300 ft.), Hoshangabad (1,300 ft.) ; December, 1927 (*H. S. Pruthi*). Numerous specimens.

South India : Taliparamba, N. Malabar ; Oct., 1925 (*A. G. R.*). 8 specimens received from the Agricultural College, Coimbatore.

*Type-localities*.—(♂) Koilari and (♀) Amarkantak, Rewa State, Central India.

### ***Eugnathodus micropterus*, sp. nov.**

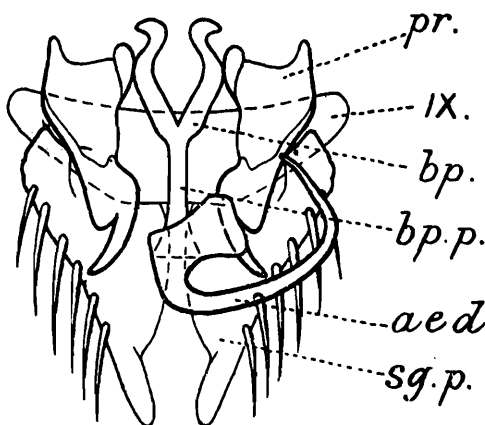
Pale green. Vertex (text-fig. 69) not truncate but slightly produced at the anterior margin, with a pair of minute, dark spots near the base, almost without any median sulca.



TEXT-FIG. 69.—*Eugnathodus micropterus*, sp. nov. Head and thorax, dorsal view,  $\times 30$ .

Ocelli black and conspicuous. Face uniformly green or greenish-yellow. Scutellum yellow. Tegmina (♀) about one and a half times as long as the abdomen, whereas in *E. indica* they are more than twice the length of the abdomen. Tegminal veins green and conspicuous. Dorsal surface of the abdomen entirely dark in the female, pale brown in the male ; the ventral surface pale brown in both sexes.

*Male genitalia* (text-fig. 70). Similar to those in *E. indica*, except in the shape of the parameres and sub-genital plates ; the latter with more numerous stout marginal hairs.



TEXT-FIG. 70.—*Eugnathodus micropterus*, sp. nov. Male genitalia ; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

*Length*.—♂ 2.75 mm. ; ♀ 3.25 mm.

*Holotype*.—No.  $\frac{870}{H7}$  Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution.*—South India.

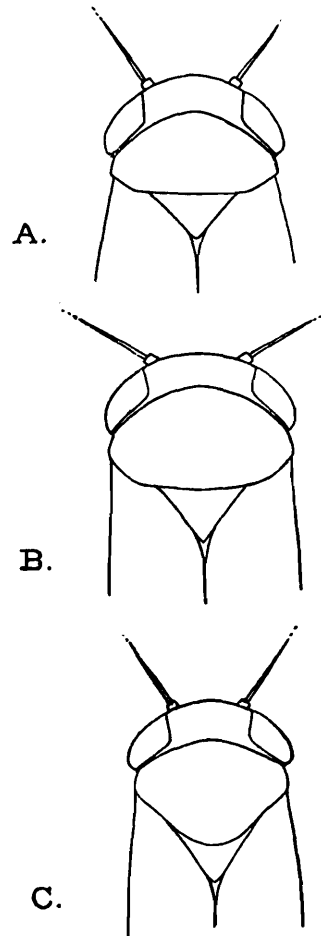
*Type-locality.*—Muliar (5,000 ft.), below Kodaikanal, Palni hills; 1—3-VII-29 (*H. S. Pruthi*).  
Numerous specimens.

*Remarks.*—This species is closely allied to *E. indica*, from which it chiefly differs in the form of the vertex and the size of the tegmina, which are proportionately much smaller.

***Eugnathodus ocellatus*, sp. nov.**

(Plate IV, fig. 5.)

Small and delicate. Head slightly wider than the pronotum. Relative size of the vertex and pronotum variable in the specimens from different localities (text-fig. 71). Ver-



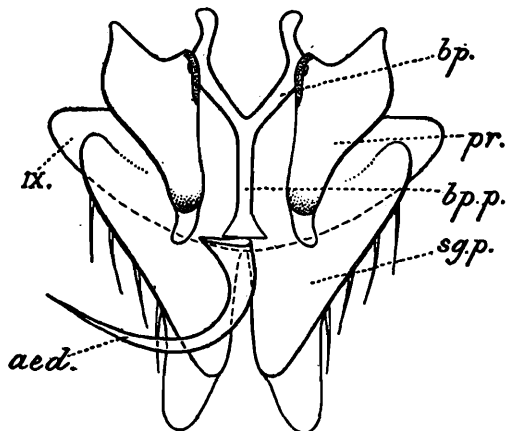
TEXT-FIG. 71.—*Eugnathodus ocellatus*, sp. nov. Head and Thorax of specimens from (A) Caloutta, (B) Malabar and (C) Pachmarhi (Central Provinces).

tex medially sulcate, of a pale brown colour, with a pair of minute, dark spots near the base. Eyes violaceous. Ocelli red and very conspicuous. Pronotum grey. Tegmina about twice as long as the body, pale stramineous, transparent; veins white and distinct. Wings smoky white, sub-hyaline; nervures inconspicuous. Dorsal surface of the abdomen black, ventral surface dark brown, except for the genital segments, which are pale brown. Legs pale brown.

*Male genitalia* (text-fig. 72). Differ from those of *E. indica* in the form of the parameres and the sub-genital plates. The distal narrow portions of the latter are much shorter and stumpy in this species.

*Length.*—♂ 2.0 mm. ; ♀ 2.25 mm.

*Holotypes.*—No.  $\frac{853-854}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.



TEXT-FIG. 72.—*Eugnathodus ocellatus*, sp. nov. Male genitalia; dorsal view,  $\times 200$ . Lettering as in text-fig. 1 (p. 3).

*Distribution.*—Throughout India.

*Type-localities.*—(♂) Calcutta; April, 1927 (*H. S. Pruthi*). 2 specimens. (♀) Mariambari Tea Estate, Pankhabari P. O., Eastern Himalayas; 15—23-VIII-28 (*I. M. Puri*). 6 specimens.

*Other localities.*—Ranchi, 14-IX-15 (*C. C. G.*). One specimen received from Pusa. Pachmari (3,300 ft.), Central Provinces; 15—16-XII-27 (*H. S. Pruthi*). Numerous specimens. Tali-paramba, N. Malabar, South India, 26-X-25 (*A. G. R.*). Two specimens received from the Agricultural College, Coimbatore. Lyallpur, Punjab; Oct., 1929 (*A. Rahman*). 2 specimens.

*Remarks.*—The specimens of both sexes from the E. Himalayas and Malabar (South India) are bigger than those from Calcutta.

### ***Eugnathodus (Nesosteles) sanguinescens* (Kirk.).**

(Plate IV, figs. 6. 6a.)

Kirkaldy<sup>1</sup> included this species in his genus *Nesosteles*, which he placed near *Cicadula*. But the form of the head, nature of the tegminal venation and the structure of the genitalia, described below, show that this species has all the characters of *Eugnathodus* and I, therefore, include it in this genus. Through the courtesy of Dr. O. H. Swezey of Honolulu I have also examined some specimens of *Nesosteles hebe* Kirk., the genotype, and do not find any characters of generic importance by which this species can be separated from those included in the genus *Eugnathodus*. I am, therefore, of opinion that *Nesosteles* Kirk. does not deserve the rank of a distinct genus and that it should be amalgamated with *Eugnathodus* Baker.

As Kirkaldy's description of *E. sanguinescens* is rather inadequate, I redescribe the species below:—

Head almost as wide as the pronotum, anteriorly broadly rounded. Vertex sulcate, of brown colour, with a pair of dark brown dots near the base. Eyes pale violaceous. Ocelli black and slightly visible from above. Face slightly broader than long, testaceous; frons in some specimens, however, reddish-brown and with a median pale fascia. Clypeus long and narrow. Antennae long. Pronotum testaceous, with three pink longitudinal stripes on the disc, which are continued on the scutellum; the depth of the colour of the

<sup>1</sup> Kirkaldy, G. W.—*Rept. Exp. Sta. Hawaiian S. P. A., Div. Ent., Bull., No. 1, pt. 9, p. 343 (1906).*

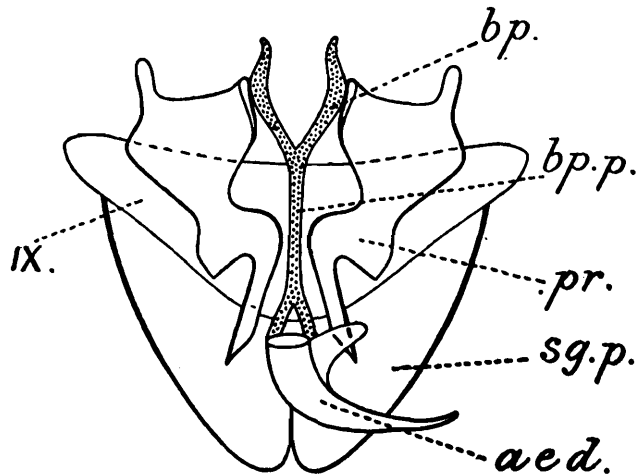
stripes variable in different specimens. Tegmina crimson red, with the costal area and the inner half of the membrane stramineous; 2nd apical cell filled with a dark pigment. In some specimens there is very little red pigment on the tegmina, which are consequently wholly stramineous. Tegminal veins colourless but very conspicuous; venation (text-fig. 73) as in



TEXT-FIG. 73.—*Eugnathodus (Nesosteles) sanguinescens* (Kirk). Tegmen,  $\times 22$ .

typical species of *Eugnathodus*. Dorsal surface of the abdomen black, the ventral surface dark brown, genital segments pale brown. Legs pale ochraceous.

*Male genitalia* (text-fig. 74). Differ from those of *E. indica* and *E. ocellatus* in the shape and size of the parameres and the sub-genital plates. The latter are triangular and lack the distal narrow portions.



TEXT-FIG. 74.—*Eugnathodus (Nesosteles) Sanguinescens* (Kirk.). Male genitalia; dorsal view,  $\times 90$ . Lettering as in text-fig. 1 (p. 3).

*Length*.—♂ 4.0 mm.; ♀ 4.5 mm.

*Distribution*.—North and Central India and Bengal.

*Localities*.—North India: Tret (3,000 ft.), Murree hills; Oct., 1928 (*H. S. Pruthi*). Numerous specimens. Lyallpur, Punjab; Oct., 1929 (*A. Rahman*).

Central India: Amarkantak, Koilari, Sarrai, etc. in the Nerbudda valley; Jan.—Feb., 1927 (*H. S. Pruthi*). Numerous specimens. Pachmarī (3,300 ft.); Dec., 1927 (*H. S. Pruthi*). Common.

Bengal: Calcutta; May, 1927 (*H. S. Pruthi*). Common.

### Genus **CICADULA** Zett.

This is a cosmopolitan genus. So far only one species of this genus, *C. vaga* Melich., has been recorded from India (Ceylon). Distant did not see any fresh specimens of this species from Ceylon or any other part of India. It appears, however, that *Cicadula* is fairly well represented in this country. I am describing below six species of this genus, some of which occur in almost all parts of the country.

There has been some confusion in the diagnosis of this genus. In Fieber's system *Cicadula* is restricted to those species in the tegminal venation of which the outer branch of

the first sector is almost obsolete, thus leaving only two ante-apical cells. Van Duzee's diagnosis is: "Head broad and rounded before as in *Limnotettix*, the front is rather narrow, the sides of the pronotum of moderate length and without a carina; tegmina long, with well developed appendix." The best description of the genus is, however, given by Scott<sup>1</sup> which is reproduced in full below:—

"*Head*.—*Crown* (vertex): anterior margin gently rounded, scarcely acuminate in the centre, length about equal to half the width between the eyes on the concave basal margin. *Eyes*, viewed from above, spherical triangular; outer margins projecting beyond the sides of the pronotum. *Ocelli* on the anterior margin, near each eye, and visible from above. *Face*: convex, about as long as broad between the eyes, measured on the frons. *Clypeus*: apex reaching to or very little beyond the lower margin. *Lorae* sub-oval. *Antennae* placed in a small cavity at the lower corner of each eye.

*Thorax*—*Pronotum*: twice as broad as long; posterior margin straight or very faintly concave, rounded towards the shoulders; lateral margins convex. *Scutellum* triangular, apex acute. *Elytra* with 4 apical areas; the first transverse nerve dividing the ante-apical from the apical area at, or close to, the apex of the claval suture.

*Abdomen*—♂: last genital segment above with a projecting tube of greater or lesser length, underneath genital valve triangular, its base extending across the entire breadth of the abdomen; genital plates long, triangular, outer margin sometimes convex."

Thus, unlike Fieber and Van Duzee, Scott restricted the genus to species having the vertex equal to half the breadth between the eyes. But it appears that several subsequent workers have not attached much importance to this character. For example, Matsumura<sup>2</sup> in 1907 described two species under this genus (*C. bipunctella* and *C. tunisiana*) in which the vertex is almost as long as the breadth between the eyes. All the authors, however, agree that the most important generic character is the plan of the tegminal venation, namely, that the outer branch of the first sector is either obsolete or if developed does not reach the apical margin of the wing. In the case of the six new species described below, though in some the head is longer than broad at the base, and in others it is smaller, but in all of them the plan of the tegminal venation is as described above. My study, however, shows that the size of the head is also of some classificatory importance, inasmuch as in the species in which the head is shorter than broad at the base, the male genitalia are slightly different from those of the species in which it is as long as or longer than broad. It seems, therefore, justifiable to break up the genus *Cicadula* into two genera or at least to erect a new sub-genus under it. To be absolutely certain on this point more material, especially from foreign countries, should be examined. I have, therefore, for the present described all my species under the same genus *Cicadula*.

### ***Cicadula indica*, sp. nov.**

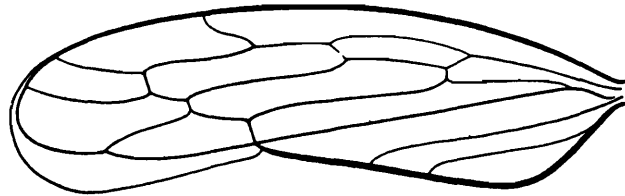
(Plate IV, figs. 7, 7a.)

Vertex pale brown, about as long as the breadth between the eyes, anteriorly obtuse, medially sulcate in the proximal region. Eyes large and grey. Ocelli black, on the lateral

<sup>1</sup> Scott, J.—*Ent. Mon. Mag.*, XI, p. 229 (1875).

<sup>2</sup> Matsumura, S.—*Neue Cicadinen aus Europe und Mitltemeergebiet. Jl. Coll. Sc. Imp. Uni. Tokyo*, XXIII, Art. 6 (1907-08).

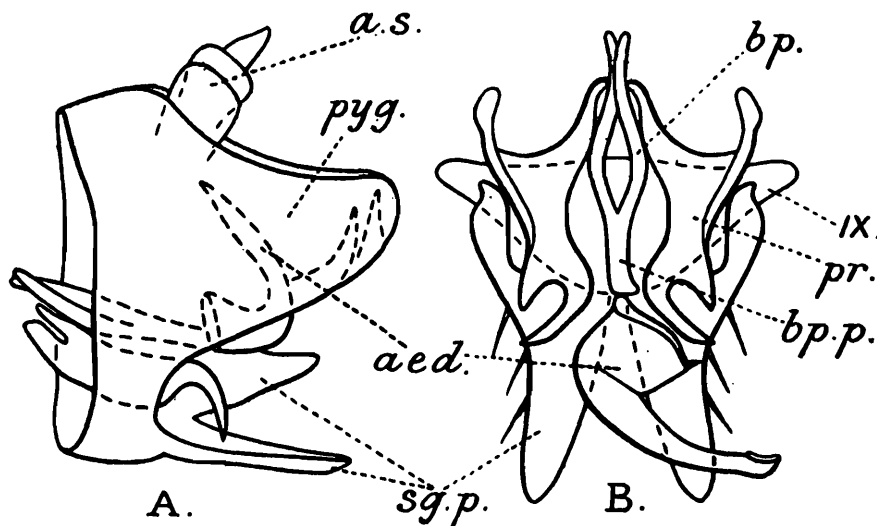
margins of the vertex, close to the eyes, visible from above. Face slightly broader than long. Frons pale brown in the female, dark brown in the male, with a pale fascia along the median line and oblique dark striae (absent in some specimens) in the lateral regions. Clypeus rectangular, brown. Lorae and genae grey. Pronotum greenish-yellow, thin, transparent, about as long as the vertex; the anterior margin convex, the posterior straight, the lateral margins short. Scutellum broader than long, deeply, transversely impressed in the apical region, of green colour. Tegmina long, narrow, sub-hyaline, pale yellow; appendix well developed; veins yellow, distinct; venation (text-fig. 75): four apical and two ante-apical



TEXT-FIG. 75.—*Cicadula indica*, sp. nov. Tegmen,  $\times 30$ .

cells. Thoracic sterna almost black. Legs brown. Abdomen both above and below black, with the exception of the lateral margins, the 7th and 8th terga and the genital segments, which are yellow.

*Male genitalia* (text-fig. 76). Pygofer very much produced in the posterior direction, each with a pointed appendage on the inside of the posterior margin. Sub-genital plates



TEXT-FIG. 76.—*Cicadula indica*, sp. nov. A. Posterior abdominal segments with the genitalia ( $\delta$ ) *in situ*; side (left) view,  $\times 110$ . B. Male genitalia; dorsal view,  $\times 110$ . Lettering as in text-fig. 1 (p. 3).

long, narrow, especially in the distal region, with a few strong marginal hairs. Basal plates very long and narrow, their prolongation of moderate size. Parameres flattened in the proximal two-thirds, narrow and deeply curved in the distal region. Aedeagus large, wide at the base, beyond which it is slightly bent and gradually tapers to a narrow apex.

*Female genitalia* (text-fig. 77). Valve slightly concave at the posterior margin. Pygofer long, narrow, with a few hairs in the posterior region. Ovipositor reddish-brown, slightly projecting beyond the posterior extremity of the abdomen.

*Length*.— $\delta$  2.5 mm.;  $\text{♀}$  3.0 mm.

*Holotypes*.—No.  $\frac{920-921}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Throughout India.

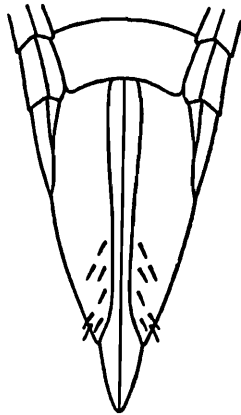
*Localities.*—North India : Kohala (2,000 ft.), Tret (3,300 ft.), Murree hills, N. Western Himalayas ; Sept.—Oct., 1928 (*H. S. Pruthi*). Numerous specimens. Dalhousie hills, Punjab , May, 1927 (*S. L. Hora*).

Bengal : Calcutta, March—June, 1927 and 1928 (*H. S. Pruthi*). Numerous specimens.

Central India : Nerbudda valley, Central Provinces ; Feb.—June, 1927 (*H. S. Pruthi*). Numerous specimens.

South India : Salem district ; June, 1929 (*H. S. Pruthi*). 6 specimens. Razampeta, district Cuddapah ; Aug., 1929 (*H. S. Pruthi*). One dozen specimens.

*Type-locality.*—Tret, Murree hills.



TEXT-FIG. 77.—*Cicadula indica*, sp. nov. Female. Posterior abdominal segments ; ventral view,  $\times 45$ .

*Remarks.*—Though numerous specimens of this species were obtained from low altitudes (up to 3,300 ft.) in the Murree hills, very few were obtained from Murree itself, which is about 7,000 ft. high. Moreover, during my collecting trip in South India in the summer of 1929 I obtained specimens of this species only from low places like Salem and Razampeta but none from Kodaikanal (*ca.* 7,000 ft.), Yercaud (4,500 ft.), etc.

### ***Cicadula (Deltocephalus) montanus* (Dist.).**

(Plate IV, fig. 8.)

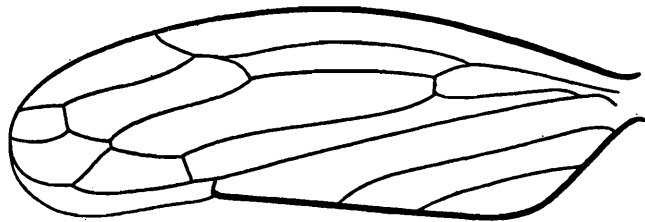
Distant based the description of his species *Deltocephalus montanus* on specimens collected by the late Dr. N. Annandale at Matiana in the Simla hills. Three of these specimens are in the collection of the Indian Museum. I have examined these as well as a large number of specimens of this species from Dumpep (Assam), Dalhousie and Murree hills. The form of the head, tegminal venation, etc. of this species are entirely different from those in *Deltocephalus* and are of *Cicadula* type ; I, therefore, include the species in the genus *Cicadula*.

Whereas most of the specimens obtained from Assam (Dumpep) are identical with those on which Distant based the description of *Deltocephalus montanus*, those collected in the Murree hills (N. Western Himalayas) differ from them in several important points. I am, therefore, describing the Murree specimens as a variety of *C. montanus*. At each of these two localities, *i.e.*, Dumpep and Murree, both forms are present, but only one is predominant. In the Dalhousie hills both forms are equally abundant.

*Cicadula (Deltocephalus) montanus* is redescribed in detail below:—

Greenish-yellow or greenish-ochraceous. Vertex almost as long as the breadth between the eyes, anteriorly obtuse, ochraceous, with a dark transverse fascia in the middle, which is medially continued up to the apex. Eyes piceous. Frons entirely black or ochraceous, with piceous, oblique striae in the lateral regions. Pronotum almost as long as the vertex, finely, transversely striated; the striae are inconspicuous in the anterior region, where the pronotum is ochraceous and has several irregular black spots and patches. Scutellum pale yellow, deeply, transversely impressed in the middle, with two minute dark spots in front of the transverse impression.

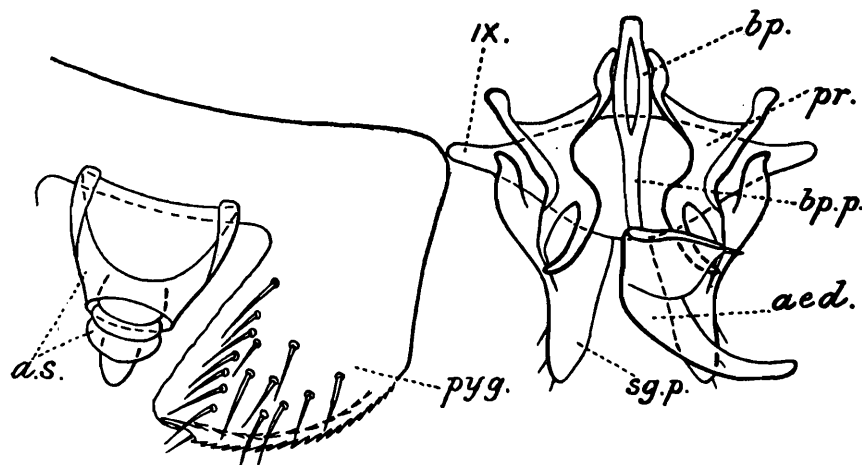
Tegmina sub-hyaline, not covering the posterior extremity of the abdomen in the female; veins brown and thin; venation (text-fig. 78) distinctly of *Cicadula* type. Dorsal



TEXT-FIG. 78.—*Cicadula (Deltocephalus) montanus* (Dist.). Tegmen,  $\times 31.5$ .

surface of the abdomen black, except the tergites of the posterior segments, which are yellow; the lateral regions of the abdomen yellow, the ventral surface black. Legs pale brown, with numerous black patches.

*Male genitalia* (text-fig. 79). Pygofers large, broadly produced in the posterior direction, with stout hairs in the distal region. Sub-genital plates, parameres, basal plates and aedeagus almost of the same shape as those of *C. indica* (cf. text-fig. 76).



TEXT-FIG. 79.—*Cicadula (Deltocephalus) montanus* (Dist.). Left pygofer, anal segments and genitalia of the male,  $\times 67.5$ . Lettering as in text-fig. 1 (p. 3).

*Length*.—♀ 3.0 mm. The male is much shorter and more delicate than the female.

*Distribution*.—Especially abundant in Assam (Khasi hills); found in fair numbers in the Simla and Dalhousie hills, scanty in the North Western Himalayas.

*Localities*.—Dumpep, Khasi hills, Assam; Nov., 1926, and Oct., 1929 (*S. L. Hora*). Numerous specimens. Females much more common. Dyankhund, Dalhousie, etc., in Dalhousie hills (ca. 3,000 ft.); May, 1927 (*S. L. Hora*). 15 specimens. Topa (5,000 ft.), Murree hills; 8-IX-28 (*H. S. Pruthi*). One specimen.

**Cicadula montanus** var. **macropterosus**, nov.

(Plate IV, fig. 9; Plate V, figs. 1, 1a.)

In this form the whole body and its markings are darker, and the tegmina are longer and extend beyond the posterior extremity of the abdomen in both sexes. Though the tegminal venation is identical with that of *C. montanus*, the veins are thicker and more conspicuous. The lateral margins of the vertex are black, and the transverse fascia on the vertex is not only continued medially up to the apex but is continued backwards up to the base as well. The frons is entirely black. The scutellum is black near the anterior margin and has a big black blotch in the distal region. The male genitalia are similar to those of *C. montanus*.

*Length*.—Both the male and female are slightly longer but less stouter than those of *C. montanus*.

*Holotypes*.—No.  $\frac{1169-1170}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Especially abundant in the North Western Himalayas.

*Localities*.—Murree hills (ca. 7,000 ft.), Sept.—Oct., 1928 (*H. S. Pruthi*). Numerous specimens.

Dyankhund, Dalhousie (3,000 ft.); May, 1927 (*S. L. Hora*). Numerous specimens of both sexes.

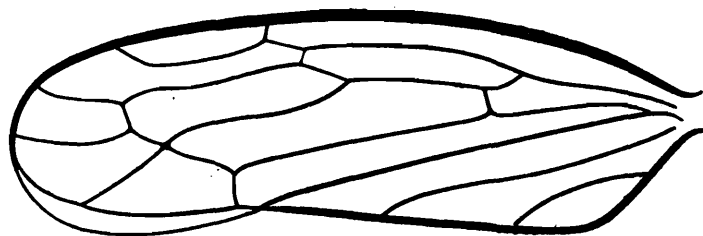
*Type-locality*.—Topa, Murree hills.

**Cicadula maculatus**, sp. nov.

(Plate V, figs. 2, 2a, 2b, 2c.)

This is a very interesting species. Whereas in general appearance it resembles most other species of *Cicadula*, in the plan of the tegminal venation and the structure of the male genitalia, it comes very close to the genera *Aconura* and *Thamnotettix* respectively.

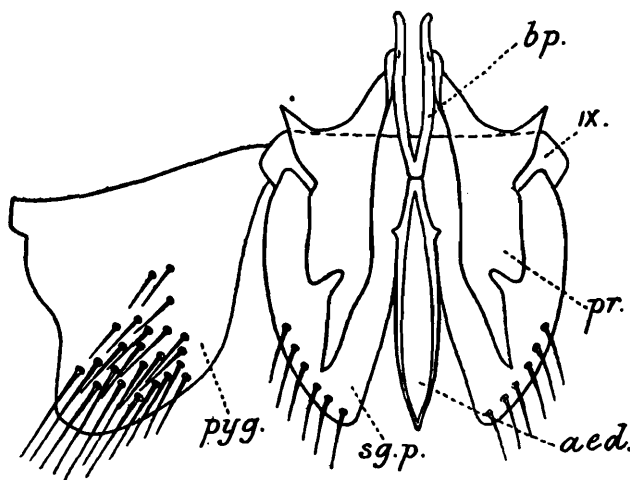
Vertex shorter than the breadth between the eyes, sulcate in the proximal region, anteriorly sub-acute, of brown colour, with three large, black spots near the apex, the apical spot extending on the superior region of the face. Eyes black; ocelli black and minute. Face almost as long as broad, brown; frons hardly raised, slightly pale along the median line, with big, black patches near the bases of the antennae. Clypeus broad at the base, gradually narrowing in the distal region. Pronotum long, greenish-yellow, with some black patches near the anterior margin. Scutellum with a black spot near the basal angles. Tegmina long and narrow in the male, shorter and broader in the female, of pale brown colour; veins inconspicuous; venation (text-fig. 80) slightly different from that in other



TEXT-FIG. 80.—*Cicadula maculatus*, sp. nov. Tegmen,  $\times 30$ .

species of *Cicadula*—the outer branch of the first sector reaching the apex of the tegmina, as in most species of *Aconura*. Wings dark grey. Legs brown; the bases of the first coxae marked with black. Abdomen shorter and stouter in the female than in the male, both above and below black ( $\delta$ ), or dark brown ( $\text{♀}$ ).

*Male genitalia* (Plate V, fig. 2b and text-fig. 81). Of somewhat different type from those of *C. indica*, almost similar to those of *Thamnotettix prabha* (*vide infra* p. 62,



TEXT-FIG. 81.—*Cicadula maculatus*, sp. nov. Left pygofer and male genitalia,  $\times 67.5$ . Lettering as in text-fig. 1 (p. 3).

text-fig. 86). Pygofers very much expanded, bearing numerous strong hairs in the postero-ventral region. Sternum of the ninth segment short. Sub-genital plates large and triangular. Parameres large. Basal plates long, narrow, their prolongation hardly developed. Aedeagus large, dorso-ventrally compressed, narrow at the base and apex, widest in the middle, more or less spindle-shaped.

*Female genitalia* (Pl. V, fig. 2c). Valve large, deeply notched in the middle of the posterior margin. Pygofers short, broad, with numerous stiff hairs in the posterior region. Ovipositor of moderate size.

*Length*.—♂ 3.5 mm.; ♀ 3.25 mm.

*Holotypes*.—No.  $\frac{1009-1010}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Eastern Himalayas.

*Type-locality*.—Gangtok (6,000 ft.), Sikkim; Aug., 1927, and April, 1928 (*F. M. Bailey*). Numerous specimens of both sexes.

*Other localities*.—Darjiling (6,000—7,000 ft.); May, 1928 (*S. Ribeiro*). Eight specimens.

*Remarks*.—Most of the specimens collected at Gangtok during August were females, whereas those collected during April at the same place were mostly males.

### ***Cicadula bipunctatus*, sp. nov.**

(Plate V, fig. 3.)

Small and delicate. Vertex almost as long as the breadth between the eyes, anteriorly acute, especially in the female, sulcate at the base, of brown colour, with a pair of prominent, black markings in the distal region. Eyes black. Ocelli black. Face slightly longer than broad, reddish-brown, with a pale median longitudinal stripe. Bases of the antennae marked with black. Pronotum brown, slightly shorter than the vertex. Scutellum with a big, brown spot near each basal angle. Tegmina long, brown, sub-hyaline; veins thin but distinct. Dorsal surface of the abdomen black, ventral surface brown. Legs brown.

Male genitalia mutilated in the single male specimen available.

*Female genitalia*.—Valve large. Pygofers elongated, bearing stiff hairs in the distal region. Ovipositor slender, black, not extending beyond the posterior extremity of the abdomen.

*Length*.—♀ 3.0 mm. Male slightly smaller.

*Holotypes*.—No.  $\frac{1047-1048}{H7}$ , Z. S. I. (*Ind. Mus.*); Calcutta.

*Distribution*.—Bengal, Central and South India (Cisgangetic subregion).

*Type-locality*.—Sarai, Rewa State, Central India; 19-II-27 (*H. S. Pruthi*). 1 male and 4 females.

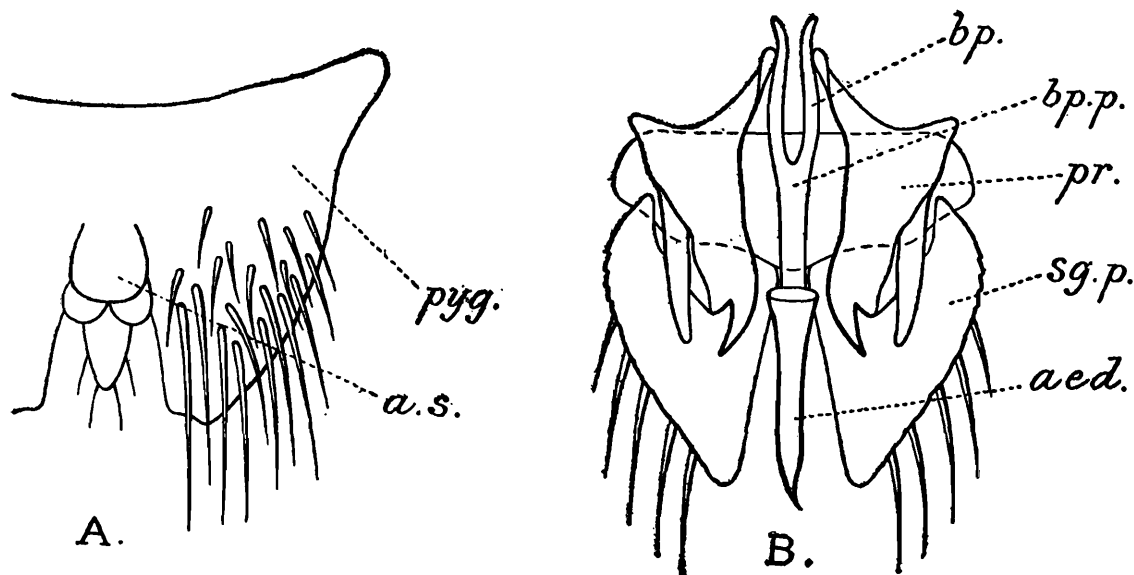
*Other localities*.—Mariambari Tea Estate, Pankhabari P. O., Eastern Himalayas; 15—23-VIII-28 (*I. M. Puri*). 1 ♀. Taliparamba, North Malabar; 26-X-25 (*A. G. R.*). One female specimen received from the Agricultural College, Coimbatore.

### *Cicadula fletcheri*, sp. nov.

(Plate V, fig. 4.)

Vertex slightly shorter than the breadth between the eyes, anteriorly obtuse, ochraceous in the proximal half, dark fuscous in the distal region, with a large, piceous marking between the eyes, especially prominent in the female. Eyes dark grey. Ocelli black. Frons and clypeus fuscous and dark fuscous respectively; lorae and genae pale brown. Bases of the antennae marked with black. Pronotum slightly shorter than the vertex, dark brown. Tegmina long, narrow, sub-hyaline, pale near the costal and inner margins, dark brown in the middle; veins dark brown. Abdomen above and below piceous. Legs brown.

*Male genitalia* (text-fig. 82). Pygofers as in most other species [of *Cicadula*. Subgenital] plates large, distinctly triangular, with several strong marginal hairs in the distal



TEXT-FIG. 82.—*Cicadula fletcheri*, sp. nov. A. Pygofer and anal segments of the male,  $\times 117$ . B. Male genitalia; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

region. Parameres large. Basal plates long and narrow, their prolongation very long. Aedeagus short, wide at the base, gradually tapering in the distal region to a fine apex.

*Female genitalia*.—Pygofers long and narrow, with strong hairs in the distal region. Ovipositor piceous, moderately stout.

*Length*.—♂ 4.5 mm.; ♀ 4.75 mm.

*Holotypes*.—No.  $\frac{1055-1056}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India.

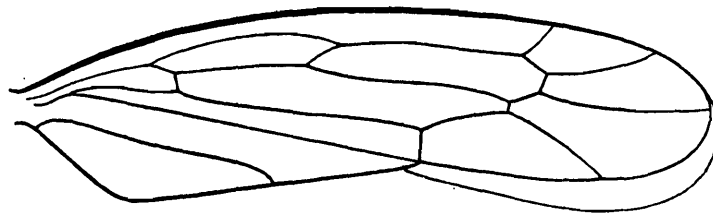
*Type-locality*.—Kodaikanal (7,000 ft.), Palni hills; Sept., 1921 (*T. B. Fletcher*). 5 male and one female specimen received from the Agricultural Research Institute, Pusa.

***Cicadula indrina*, sp. nov.**

(Plate V, fig. 5.)

Allied to the Palaearctic species *C. sexnotata* Fall., from which it differs in the markings of the body, in size, and the structure of the male genitalia.

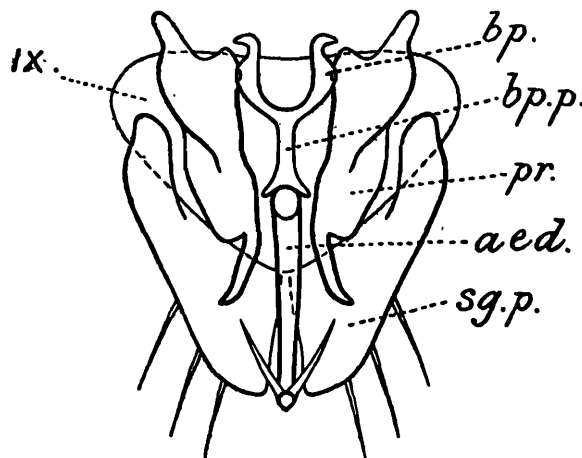
Vertex much shorter than the breadth between the eyes, anteriorly broadly rounded, sulcate at the base, pale ochraceous, with a pair of well-defined, black spots near the base, a pair of fine, transverse, vinous stripes just beyond the middle and a black marking on each side of the apex. Eyes dark violaceous. Ocelli pinkish. Face almost as long as broad, pale brown; frons with a dark brown, longitudinal stripe in the middle and several oblique striae of the same colour in the lateral regions. Genae with a black patch near the base of each antenna. Pronotum much longer than the vertex, yellow, thin and transparent, the dark markings on the mesonotum being visible through it. Scutellum greenish-yellow, with a distinct, transverse impression in the middle. Tegmina pale stramineous, long, subhyaline; veins thin but distinct. Venation shown in text-fig. 83. Legs brown. Dorsal



TEXT-FIG. 83.—*Cicadula indrina*, sp. nov. Tegmen,  $\times 31.5$ .

surface of the abdomen black, with the exception of the tergum of the 6th segment which is deep yellow; ventral surface of the body brown.

*Male genitalia* (text-fig. 84). Sternum of the ninth segment fairly large. Sub-genital plates small, almost triangular, with a few strong marginal hairs. Parameres large. Basal



TEXT-FIG. 84.—*Cicadula indrina*, sp. nov. Male genitalia; dorsal view,  $\times 141$ . Lettering as in text-fig. 1 (p. 3).

plates small and curved, their prolongation of moderate length. Aedeagus straight, uniformly narrow, with a pair of stout processes near the apex.

*Length*.—♂ 3.0 mm. ; ♀ slightly bigger.

*Holotypes*.—No.  $\frac{1058-1059}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Punjab.

*Type-locality*.—Chamba (ca. 3,000 ft.); May, 1927 (*S. L. Hora*). Five specimens.

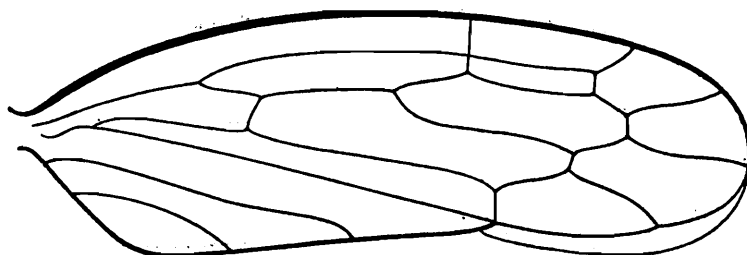
### Genus **THAMNOTETTIX** Zett.

This is one of the most cosmopolitan genera among the Jassidae. In India it is already represented by three species, and four more, all new, are described below.

#### **Thamnotettix prabha**, sp. nov.

(Plate V, figs. 6, 6a.)

Vertex slightly shorter than the breadth between the eyes, anteriorly obtuse, dark ochraceous in the proximal one-third, black in the distal region, except near the apex where there are three pale spots. Eyes large and dark brown. Face broader than long; frons fairly raised, dark brown or almost black, with a pale, median longitudinal stripe and a few oblique piceous striae in the lateral regions. Clypeus small, squarish, dark ochraceous. Lorae dark ochraceous, margined with black, not reaching the apex of the clypeus. Genae fairly broad, with big black patches. Pronotum almost as long as the vertex, dark brown or black, with a few pale markings near the anterior margin; anterior margin broadly rounded, posterior margin almost straight. Scutellum about twice as broad as long, deeply, transversely impressed near the apex. Tegmina long and narrow in the male, short and broad

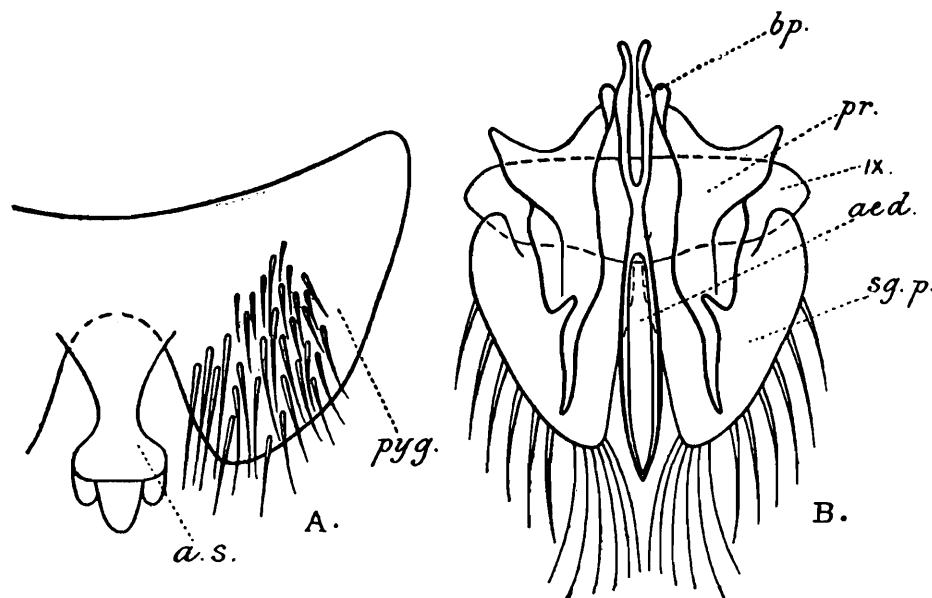


TEXT-FIG. 85.—*Thamnotettix prabha*, sp. nov. Tegmen, × 33.

in the female, leaving several posterior abdominal segments exposed in the latter sex; appendix small; veins thin, rather inconspicuous. Venation (text-fig. 85): four apical and three ante-apical cells. Wings white, sub-hyaline, rudimentary in the female; nervures dark brown, conspicuous. Both the dorsal and ventral surfaces of the body black, except the genital segments of the male which are ochraceous. Legs dark brown, with numerous black patches here and there; tibial spines pale brown.

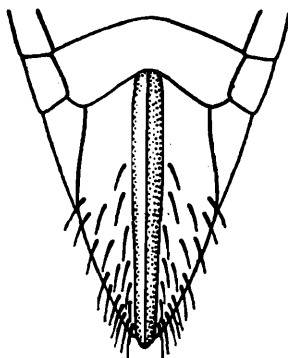
*Male genitalia* (text-fig. 86). Pygofers produced in the posterior direction, bearing numerous stiff hairs in the posterior region. Sternum of the ninth segment small. Subgenital plates fairly large, triangular, with numerous long marginal hairs. Parameres flattened in the proximal three-fourths, extremely narrow and rod-like in the distal region.

Basal plates thin and delicate, their prolongation small. Aedeagus short, straight, narrow at the base, wider in the middle, gradually tapering to a fine apex.



TEXT-FIG. 86.—*Thamnotettix prabha*, sp. nov. A. Pygofer and anal segments of the male,  $\times 87$ . B. Male genitalia; dorsal view,  $\times 87$ . Lettering as in text-fig. 1 (p. 3).

*Female genitalia* (text-fig. 87). Valve of moderate length. Pygofers fairly convex, covered with numerous stiff hairs in the distal region. Ovipositor delicate, hardly projecting beyond the posterior extremity of the abdomen.



TEXT-FIG. 87.—*Thamnotettix prabha*, sp. nov. Female. Posterior abdominal segments; ventral view,  $\times 33$ .

*Length*.— $\sigma$  3.3 mm.;  $\text{f}$  slightly larger and much stouter.

*Holotypes*.—No.  $\frac{1063-1064}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Assam.

*Type-locality*.—Dumpep, Khasi hills; 16-XI-26 and Oct., 1929 (*S. L. Hora*). Numerous specimens, mostly females.

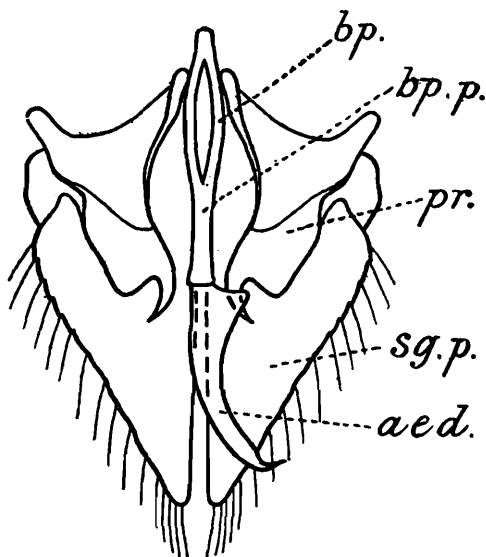
### ***Thamnotettix veinatus*, sp. nov.**

(Plate V, fig. 7.)

Brown or dark brown. Vertex slightly deflexed in the anterior region, shorter than the breadth between the eyes, obtuse at the apex, sulcate at the base, ochraceous, with numerous dark patches and spots. Eyes almost black. Frons dark brown, with a pale, longitudinal fascia in the middle line and several oblique striae of the same colour in the

lateral regions. Pronotum much longer than the vertex, fairly raised, grey, with some dark brown patches near the anterior margin. Scutellum with a pair of dark stripes in the anterior region and a big black spot near each basal angle. Tegmina longer than the body in both sexes, sub-hyaline, brown; veins pale, thick, prominent, with some dark pigment deposited along their course. Bases of the tibial spines of the posterior legs dotted with black. Dorsal surface of the abdomen black.

*Male genitalia* (text-fig. 88). Differ from those in *T. prabha* in the shape of the parameres and the sub-genital plates. The parameres are narrow and hook-like near the apices.



TEXT-FIG. 88.—*Thamnotettix veinatus*, sp. nov. Male genitalia; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

and the sub-genital plates are larger, distinctly triangular and provided with numerous marginal hairs.

*Length*.—♀ 4.0 mm.; ♂ slightly smaller.

*Holotypes*.—No.  $\frac{1160-1161}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Central and South India.

*Localities*.—Amarkantak (3,300 ft.), Sarai (2,700 ft.), etc., Nerbudda valley, Rewa State, Central India; Jan.—Feb., 1927 (*H. S. Pruthi*). 14 specimens. Tuppur and Sagar, Shimoga district, Mysore State; Dec., 1928 (*H. S. Rao*). 3 specimens. Salem (947 ft.), South India; 15—17-VI-29 (*H. S. Pruthi*). Three specimens. Benhope (2,500 ft.), Nilgiri hills, South India; Oct., 1925 (*S. L. Hora*). One specimen.

*Type-locality*.—Sarai, Rewa State.

### ***Thamnotettix chhota*, sp. nov.**

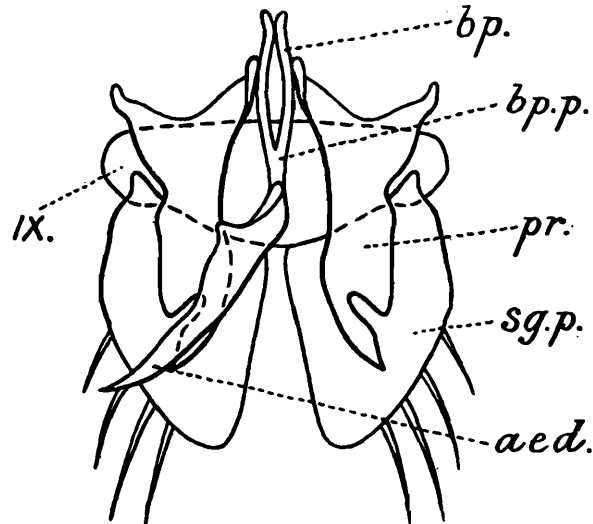
(Plate V, fig. 8.)

Allied to *T. veinatus*, from which it chiefly differs in size, the plan of the tegminal veins and the structure of the male genitalia.

Small and delicate, of brown colour. Vertex longer in the female than in the male, sulcate at the base, with a minute spot on each side of the sulca. Ocelli situated very close to the eyes, large, black, very prominent. Frons reddish-brown, with a pale, median longitudinal fascia; rest of the face pale brown. Pronotum greyish, with transverse, dark,

impressed areas near the anterior margin. Tegmina brown, almost transparent; veins thin and inconspicuous. Legs brown. Dorsal and ventral surface of the body brown or dark brown.

*Male genitalia* (text-fig. 89). Differ from those in *T. veinatus* in the form of the parameres and sub-genital plates and in the size of the basal plates' prolongation, which is much shorter in this species. The sub-genital plates are almost similar to those of *T. prabha*.



TEXT-FIG. 89.—*Thamnotettix chhota*, sp. nov. Male genitalia; dorsal view,  $\times 117$ . Lettering as in text-fig. 1 (p. 3).

*Length*.—♂. 3.0 mm. Female much stouter.

*Holotypes*.—No.  $\frac{1162-1163}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—North India and Bengal.

*Type-locality*.—Calcutta; April—May and July—Nov., 1927 (*H. S. Pruthi*). Numerous specimens.

*Other localities*.—Chamba, Punjab, Western Himalayas; May, 1927 (*S. L. Hora*). Numerous specimens. Pashok (2,600 ft.), Darjiling district, Eastern Himalayas; Dec., 1926 (*S. L. Hora*). (No collection of Jassidae has yet been made at any place between Darjiling and Chamba. 15 V. 30).

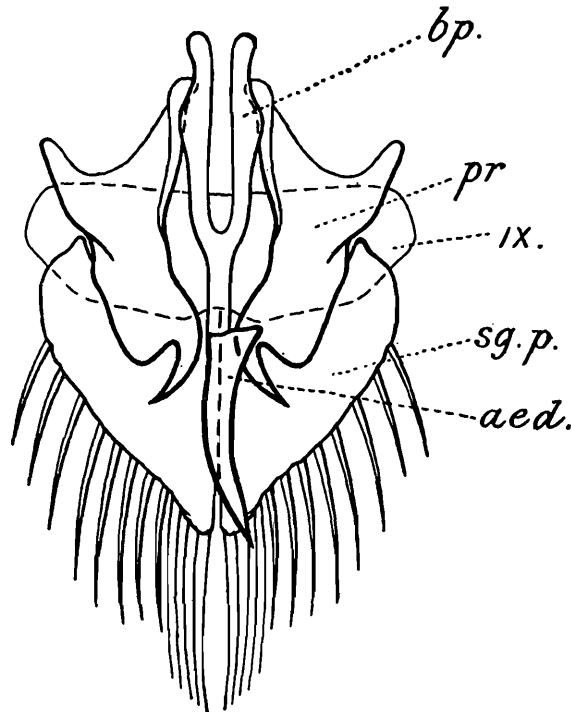
*Remarks*.—In four out of eighty specimens examined the tegmina are short and leave the posterior extremity of the abdomen exposed. Both sexes show this variation.

### ***Thamnotettix bicolor*, sp. nov.**

(Plate V, fig. 9.)

Vertex, frons and pronotum of orange colour. Vertex medially sulcate, with a pair of dark impressed areas (more conspicuous in the female) in the proximal region, one on each side of and close to the sulca. Eyes black. Ocelli near the eyes, black and very conspicuous. Lower half of the face pale brown. Bases of the antennae marked with black. Pronotum with a black, transverse stripe, which is anteriorly interrupted in the median line in the male. Scutellum brown. Tegmina smoky white, sub-hyaline, longer than the body in both sexes; veins thin and brown. Dorsal surface of the abdomen black, ventral surface yellow. Ovipositor black.

*Male genitalia* (text-fig. 90). Differ from those in *T. veinatus* in the shape of the parameres and the sub-genital plates; the marginal hairs of the latter are longer and stouter.



TEXT-FIG. 90.—*Thamnotettix bicolor*, sp. nov. Male genitalia; dorsal view,  $\times 138$ . Lettering as in text-fig. 1 (p. 3).

*Length*.—♂ 3.0; ♀ 3.3 mm.

*Holotypes*.—No.  $\frac{1164-1165}{H 7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—South India.

*Type-locality*.—Muliar (5,000 ft.), below Kodaikanal, Palni hills; 1—3-7-29 (*H. S. Pruthi*). Numerous specimens.

*Remarks on the genera Thamnotettix and Cicadula*.—As stated on p. 54, the various species of *Cicadula* can be grouped into two categories, namely, those in which the head is shorter than its breadth between the eyes and those in which it is almost as long as the distance between the eyes. The structure of the male genitalia in each category is characteristic. All the species of the genus *Thamnotettix*, described above, have almost the same type of male genitalia which comes very close to that found in those species of *Cicadula* in which the head is shorter than its breadth between the eyes. This shows that the genera *Cicadula* (part) and *Thamnotettix* are very closely allied and further supports my conclusion stated on p. 54 that *Cicadula* as at present constituted is not a homogenous genus.

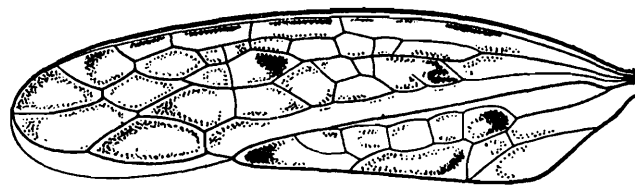
#### Genus **OROSIUS** Dist.

So far only one species, *O. albicinctus*, Dist., is included in the genus. Distant's description of this species is very inadequate; for example, he neither properly described nor figured important structures like the tegminal venation, etc. I have been able to collect numerous specimens (both ♂ and ♀) of *O. albicinctus* as well as of another species, which is distinct from the genotype and is described as now below.

**Orosius maculatus**, sp. nov.

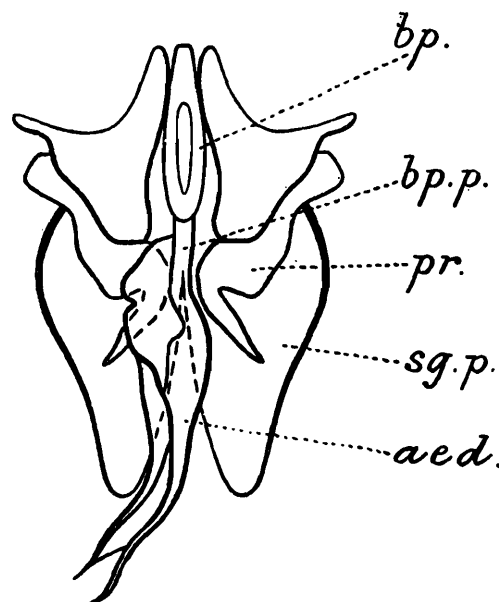
(Plate V, figs. 10, 10a, 10b.)

Virescent. Vertex slightly deflexed in the anterior region, somewhat longer in the female than in the male, sulcate at the base, of grey colour, with numerous black dots and pale patches. Eyes large and faintly purple. Ocelli on the anterior margin of the head, close to the eyes, black. Face about as long as broad in the female, broader than long in the male. Frons slightly convex, brown, with a pale longitudinal stripe along the median line and a few dark markings in the lateral regions. Clypeus slightly longer than broad. Genae slightly sinuate below the eyes. Pronotum about half as long as broad, fairly raised, with a row of black markings near the anterior margin; the posterior margin almost straight. Scutellum about one and a half times as broad at the base as long, deeply, transversely impressed in the middle, with brown spots near the basal angles. Tegmina much longer than the body, transparent, with numerous white patches and black spots; of the latter three are most constant, namely, one in the distal region of the corium and two close to the claval suture. Tegminal veins white and conspicuous. Venation (text-fig. 91) of *Thamnotettix* type, numerous additional cross veins. Under surface of the

TEXT-FIG. 91.—*Orosius maculatus*, sp. nov. Tegmen,  $\times 2$ .

body dark in the male, pale ochraceous in the female. Posterior tibiae densely, strongly spinulose.

*Male genitalia* (text-fig. 92). Pygofers bearing stout bristles in the postero-dorsal region. Sub-genital plates long, triangular, gradually tapering to conical apices. Para-

TEXT-FIG. 92.—*Orosius maculatus*, sp. nov. Male genitalia; dorsal view,  $\times 114$ . Lettering as in fig. 1 (p. 3).

meres large, highly flattened in the proximal two-thirds, rod-like and curved in the distal region, pointed at the apices. Basal plates short, their prolongation well developed.

Aedeagus elongated, wide at the base, almost bifid in the distal region, with a very wide gonopore.

*Female genitalia* (Pl. V, fig. 10b). Valve fairly large, wavy at the posterior margin. Pygofers convex, covered with minute but stiff hairs. Ovipositor stout.

*Length*.—♂ 3.0 mm. ; ♀ 3.25 mm.

*Holotypes*.—No.  $\frac{1166}{H7}$  and  $\frac{1171}{H7}$ , Z. S. I. (*Ind. Mus.*), Calcutta.

*Distribution*.—Central India.

*Type-locality*.—Sarai (2,700 ft.), Rewa State, Central India ; 21-2-27 (*H. S. Pruthi*). 6 specimens.