

## STUDIES ON INDIAN JASSIDAE (HOMOPTERA).

PART II.—DESCRIPTION OF THE GENOTYPES OF SOME OF THE GENERA FOUNDED BY  
W. L. DISTANT, WITH A REVISION OF THE GENUS *MOONIA* DISTANT.

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(Plates VI—VII.)

### INTRODUCTION.

As stated in the first part of my studies on Jassidae (*Mem. Ind. Mus.*, XI, No. 1, p. 1, 1930), Distant is the author of over 60 per cent. of the genera and species of this family described from India. Unfortunately both the descriptions and illustrations of most of the new forms described by this author are very inadequate. In many cases he based the description of a new genus or species on a single carded or mutilated specimen. Moreover, when Distant published his works on this group of Insects the importance of the structure of the genitalia as affording reliable characters of taxonomic importance was yet not fully recognized and probably therefore he did not describe these organs at all. In the case of many species Distant identified the sexes wrongly; this indicates that he did not examine the genitalia even superficially. In many cases the conclusions of this author about the position and relationships of the new forms founded by him have been seriously questioned.<sup>1</sup> In the circumstances, several eminent authorities on this important group of Insects have felt that no further progress in the knowledge of the Oriental Jassidae is possible unless most of the genera erected by Distant are redescribed and properly illustrated. This necessity has been felt not only by workers on the Oriental Fauna but also by those working on this group of Insects in other countries, as the Indian Jassidae constitute a very important component of the Jassid fauna of the world. I have, therefore, thought it desirable to redescribe the genotypes of some genera founded by this author of which material is available.

The material for this study was derived from three sources:—(a) Some material, which Distant had seen or on which he had based his original descriptions, is in the collection of the Indian Museum; (b) Material collected by myself from different parts of India and kindly compared by Mr. W. E. China with Distant's types in the British Museum (Natural History), London; (c) Most of the new genera described by Distant in 1918 (*Faun. Brit. Ind., Rhynch.*, VII) were out of the collection made by Mr. T. V. Campbell in South India. It appears that Mr. Campbell had also given a large part of his collection

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<sup>1</sup> Matsumura, *Insecta Matsumurana*, VI, No. 4, pp. 190-192 (1932).

to the late Mr. E. A. Butler of London. When in London in 1926 I purchased this material from Mrs. Butler for the collection of the Indian Museum.

The terms used in the following pages are the same which I employed in the first part of these studies (*op. cit.*, p. 3).

In the arrangement of genera and sub-families I have followed the system adopted by Distant in his work on Jassidae in the *Fauna of British India, Rhynchota*.

I take this opportunity of expressing my indebtedness to Mr. W. E. China of the British Museum who kindly compared my specimens with those in the collection under his charge and helped me by answering numerous enquiries. I am thankful to Dr. Bains Prasad, Director, Zoological Survey of India, for going through the manuscript and making some useful suggestions.

#### REVISION OF THE GENUS **Moonia** DISTANT.

##### Sub-family *BYTHOSCOPIINAE*.

##### Genus **Moonia** Distant.

1908. *Moonia*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 197.

This genus includes seven species, all described by Distant. The descriptions of most of these species are very vague. It is almost impossible for any worker to be certain about the identification of the species with the help of such descriptions. In view of the fact that this genus is of great economic importance, especially on account of its association with the spread of the spike-disease of sandal, I have thought it desirable to revise the whole genus in addition to redescribing the genotype. In this connection I am especially thankful to Mr. W. E. China who kindly supplied me with both male and female specimens of most species of this genus.

*Genotype*.—*Moonia sancita* Distant.

##### **Moonia sancita** Distant.

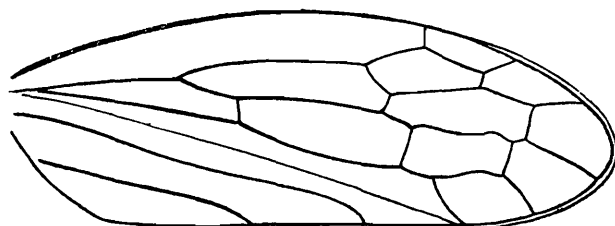
(Pl. VI, figs. 1, 1a and 1b.)

1908. *Moonia sancita*, Distant, *op. cit.*, p. 198.

The description of this species was based on specimens obtained from Mussoorie (Central Himalayas). In the collection of the Indian Museum there are three specimens (all females) from the type locality which Distant had before him when he described the species. In May, 1930, I collected a large number of specimens of both sexes of this species from the Kumaon Hills which are situated very close to Mussoorie. From Distant's description it appears that he did not distinguish the sexes correctly. His description applies to the

female only, whereas it appears that he thought that he had specimens of both sexes before him. A description covering both sexes is given below.

Robust, not so short and broad as indicated by the figures appended by Distant. Vertex, pronotum, tegmina, ventral surface of the body and legs ochraceous in the female, dark grey in the male. An oblique transverse, greyish white fascia in the proximal region of the tegmina, the fascia being rather indistinct in some specimens. Tegminal veins brown or dark brown, marked with creamy white spots in both sexes. Vertex very short, especially in middle, finely punctate, foveate in the lateral regions. Ocelli very close to, almost on the anterior margin of the head, visible from both above and below, situated in two large shallow depressions, brown and conspicuous, nearer to each other than to the eyes (Pl. VI, Fig. 1*b*). Eyes round, projecting outwards beyond the lateral margins of the pronotum. Face much broader than long, depressed in the upper half, slightly raised and convex in the lower region. Frons somewhat longer than broad; clypeus short, triangular; genae and lorae very distinctly marked off from the adjoining parts. Antennae originating from very deep cavities. Pronotum slightly narrower than the head, long, thickly punctate, depressed and laterally foveate behind the slightly convex anterior margin, raised and convex in the posterior two-thirds, medially longitudinally carinate. Scutellum about half the length of the pronotum, deeply transversely furrowed in the anterior region (not ridged as described by Distant), highly raised posterior to the furrow. Tegmina coriaceous, opaque, thickly punctate, specially in the region of the clavus, without appendices; veins very thick and prominent. Venation as in text-fig. 93, five apical and three ante-apical cells, medio-cubital



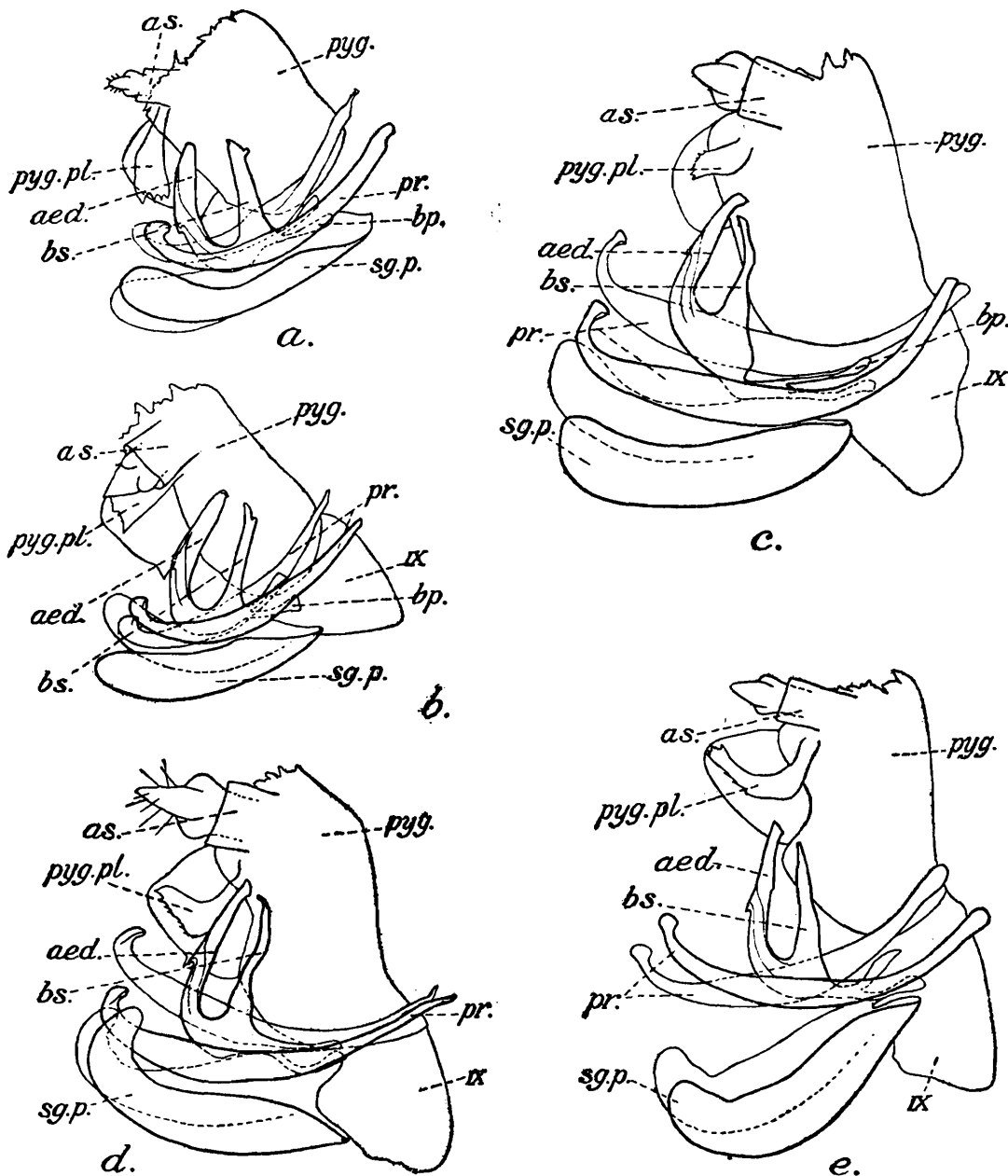
TEXT-FIG. 93.—*Moonia sancita* Distant. Tegmen;  $\times 18$ .

transverse vein present. Wings pale, smoky brown; nervures dark brown or piceous. Legs short, tibiae thick and grooved.

*Male Genitalia.*—(text-fig. 94*a*). Pygofers (*pyg.*) broad, truncate at the posterior margins, with a thin plate-like appendage (*pyg. pl.*) in the posterior region. Sub-genital plates (*sg.p.*) elongated, thin, moderately broad, without any marginal hairs. Parameres (*pr.*) long and narrow, their proximal ends very much projecting into the body cavity, the apices blunt and rounded. Basal plates (*bp.*) small, rod-like, their prolongation short. Aedeagus (*aed.*) rod-like, fairly stout, pointing towards the dorsal surface of the body, wide at base, with a well developed basal strut (*bs.*), which is almost as long as the aedeagus.

*Female Genitalia.*—Valve large, concave at the posterior margin. Pygofers large, convex, smooth. Ovipositor fairly well developed, hardly projecting beyond the posterior extremity of the abdomen.

Length.—Female 4.5 mm. ; male slightly smaller.



TEXT-FIG. 94.—Male genitalia of different species of *Moonia*, lateral view, right pygofer removed;  $\times 50$ . a. *M. sancita* Distant; b. *M. sancita* var. *albimaculata* Distant; c. *M. capitata* Distant; d. *M. capitata* var. *variabilis* Distant; e. *M. albivitta* Distant.

*aed.*, aedeagus; *as.*, anal segments; *bp.*, basal plates; *bs.*, basal strut of the aedeagus; *pr.*, parameres; *pyg.*, pygofer; *pyg. pl.*, plate-like appendage of the pygofer; *sg. p.*, sub-genital plates. IX, ninth abdominal sternite.

### *Moonia sancita* var. *albimaculata* Distant.

1916. *Moonia albimaculata*, Distant, *op. cit.*, VI, p. 233.

I have seen a very large series of specimens of this variety collected by a party of the Forest Research Institute, Dehra Dun, engaged in the investigation of the spike-disease of sandal in South India. Distant considered this form to be a distinct species but I am enumerating this as a variety of *M. sancita*, as it mainly differs from the latter in the size of the female and in the shape of the plate-like appendages of the male pygofers.

Vertex and pronotum pale brownish or ochraceous. Disc of pronotum marked with black. The three dark spots near the anterior margin and two near the posterior margin

of pronotum, included by Distant in the specific diagnosis, are absent in several specimens. Scutellum pale ochraceous in the female, piceous in the male. Tegmina with an oblique transverse, pale fascia in the proximal region ; apices of clavus pale in both sexes.

*Male Genitalia.*—Differ from these of *M. sancita* in the size of the plate-like appendages of the pygofers which are comparatively narrower and shorter (*cf.* text-figs. 94a and 94b).

### ***Moonia capitata* Distant.**

1916. *Moonia capitata*, Distant, *op. cit.*, VI, p. 234.

Head, pronotum and tegmina dark ochraceous. Vertex with a variable number of black linear spots, sometimes almost entirely black. Pronotum with dark patches in the male. Scutellum dark brown or piceous except in the lateral regions and near apex which are pale brown in both sexes. Tegmina with several light grey patches in the posterior half, especially near the costal margin and in the region of the clavus and the apical cells. Tegminal veins pale and therefore quite conspicuous against the dark ochraceous background. Face brown or dark brown, with the superior region piceous and with a transverse pale streak below the anterior margin of the head. Legs brown.

The form of the vertex, face, scutellum and tegmina in this species is the same as in *M. sancita* and its variety *albimaculata*, but the pronotum is much more gibbous than in these forms.

*Male genitalia.*—(text-fig. 94c). Differ from those of *M. sancita* in the structure of the aedeagus and of the sub-genital plates. The aedeagus is stouter and larger ; its basal strut is longer and more curved. The sub-genital plates are also stouter and broader.

*Remarks.*—*M. capitata* can be readily distinguished from *M. sancita* and its variety *albimaculata* by the characteristic colour markings of the body, the form of the pronotum and the structure of the male genitalia.

### ***Moonia brunnea* Distant.**

1916. *Moonia brunnea*, Distant, *op. cit.*, VI, p. 234.

Slightly longer and less robust than *M. capitata*. Dorsal surface of the body and legs fuscous in the female, dark brown in the male. Vertex, scutellum and the tarsal joints almost piceous in the male, without any light fascia or markings in either sex. Scutellum with a pale linear spot on each lateral margin. Face ochraceous, with its superior region reddish brown in the female and dark brown or piceous in the male and with a light transverse line just below the anterior margin of the head, especially visible in the male. Pronotum in the posterior region slightly more gibbous than in *M. capitata*. As the abdomen in the single male specimen available is mutilated, the male genitalia could not be studied.

*Remarks.*—*Moonia brunnea* is allied to *M. sancita* from which it differs chiefly in the general form of the body and the characteristic colour markings of the tegmina.

### ***Moonia capitata*, var. *variabilis* Distant.**

1916. *Moonia variabilis*, Distant, *op. cit.*, VI, p. 234.

Distant considered *M. variabilis* to be a distinct species. It is, however, very similar to *M. capitata* and in my opinion does not deserve the rank of a distinct species. It differs

from *M. capitata*, of which I consider it to be a variety, in having slightly more gibbous prothorax and somewhat differently shaped plate-like appendages of the male pygofers (cf. text-figs. 94c and 94d). The colour of the tegmina is also slightly different. The tegmina in the variety are dark brown (♀) or piceous (♂), with an irregular transverse fascia in the proximal region and a small creamy white area beyond the apex of the clavus.

### ***Moonia diversa*** Distant.

1916. *Moonia diversa*, Distant, *op. cit.*, VI, p. 235.

I have not seen any specimen of this species. Mr. W. E. China informs me that there is only a single teneral female specimen of this species in the collection of the British Museum. He is of opinion that the specimen is "undoubtedly a female of *M. brunnea*" *M. diversa* thus becomes a synonym of *M. brunnea*, which name has page priority over the former.

### ***Moonia albivitta*** Distant.

1916. *Moonia albivitta*, Distant, *op. cit.*, VI, p. 236.

Longer and less robust than *M. capitata* var. *variabilis*. Vertex dark in the female, piceous in the male, with a longitudinal pale streak in middle. Pronotum pale ochraceous, but with the fuscous and piceous areas more extensive than those in var. *variabilis*. Scutellum almost piceous, with the apex pale brown and a linear spot of the same colour on each lateral margin. Tegmina fuscous in the male and pale ochraceous in the female; veins piceous in both sexes, hence very conspicuous especially in the female. Legs rather long and delicate, brown, with the distal halves of femora, the apices of tibiae and tarsi black. Under surface of body black. Face pale ochraceous or brown, with dark patches in the lateral region of the frons; whole of the superior region piceous, with a transverse, brown streak below the anterior margin of the head.

*Male Genitalia*—(text-fig. 94e) of the same type as those of *M. capitata* from which they can be distinguished by the characteristic shape of the plate-like appendage of the pygofers.

### *Summary and conclusions.*

Excluding *M. diversa* of which only one teneral specimen has been obtained so far and which most probably belongs to *M. brunnea*, the rest of the six species of *Moonia* can be divided into two groups: (a) *M. sancita*, *M. albimaculata* and *M. brunnea*; (b) *M. capitata*, *M. variabilis* and *M. albivitta*. The two groups can be readily distinguished by the structure of the male genitalia and the general form of the body.

Of the first group, *M. sancita* and *M. albimaculata* undoubtedly do not deserve the rank of distinct species; the latter appears to be a variety of the former. They only differ from each other in the shape of the plate-like appendages of the male pygofers and the size of the female. *M. brunnea*, of which I have not studied the male sexual armature, appears to be a distinct species.

The male genitalia of the three species included in the second group, though of the same general type, differ from one another in the form of the plate-like appendages of the pygofers. Taking all the characters into consideration, *M. capitata* and *M. variabilis* appear

to be very closely allied and do not deserve the rank of distinct species. The build of the body of both sexes of these two species is very similar, and *M. variabilis* can only be regarded as a variety of *M. capitata*. *M. albivitta* can be readily distinguished from both of them and is undoubtedly a distinct species.

The synonymies and interrelationships of the various forms of *Moonia* can be tabulated as follows :—

- Group A.—1. *M. sancita*.  
 „ 2. *M. sancita* var. *albimaculata*.  
 „ 3. *M. brunnea* (with *diversa* as a synonym).  
 Group B.—4. *M. capitata*.  
 „ 5. *M. capitata* var. *variabilis*.  
 „ 6. *M. albivitta*.

#### DESCRIPTION OF SOME OTHER GENOTYPES.

##### Sub-family JASSINAE (Including ACOCEPHALINAE).

##### Genus **Omaranus** Distant.

1918. *Omaranus*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 5.

*Genotype*.—*Omaranus typicus* Distant.

Distant's description of this genus which was wrongly placed by him in the sub-family Tettigoniellinae was based on specimens obtained from Calcutta. I have collected numerous specimens of the type-species (*O. typicus*) from Calcutta as well as from several places in the Central Provinces. Distant described<sup>1</sup> another genus, *Didius* (genotype *D. sexualis*), from Calcutta of which he said he had no male specimen. He placed *Didius* in the sub-family Jassinae. When I collected *Omaranus typicus*, I noticed that it was always occurring together with *Didius sexualis*. All my specimens of these two species were males and females respectively. I, therefore, strongly suspected that they were the males and females of a single sexually dimorphic species. A careful examination of the anatomy of the species confirmed my suspicion. In the case of *O. typicus*, as in several other cases, Distant wrongly considered a pair of minute dots on the vertex to be the ocelli and placed the species in the sub-family Tettigoneillinae. He, however, rightly placed *D. sexualis* in the Jassinae. There is no doubt that these two species are conspecific and both should be included in the Jassinae. As *O. typicus* has page priority, *D. sexualis* would become its synonym. Distant's description of *D. sexualis* will answer for the description of *Omaranus typicus* female, while an amended description of *O. typicus* male is given below.

##### **Omaranus typicus** Distant, male.

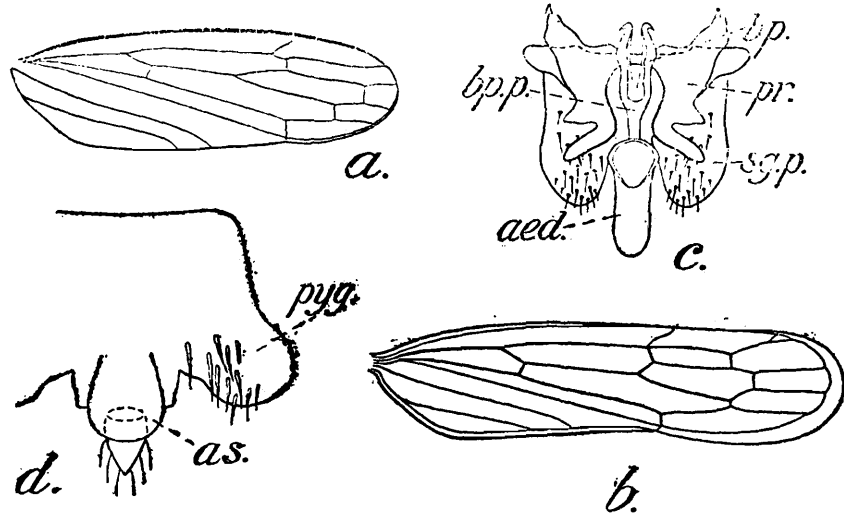
(Pl. VI, figs. 2a, 2b.)

1918. *Omaranus typicus*, Distant, *op. cit.*, VII, p. 5.

Vertex slightly longer than the breadth between the eyes, almost spatulate, finely medially longitudinally carinate, with two pairs of minute black dots on the disc and a

<sup>1</sup> *Faun. Brit. Ind., Rhynch.*, VII, p. 36 (1918).

large black marking near the apex. Lateral margins of the vertex sharp, sinuate in front of the eyes and above the insertion of the antennae. Eyes large, oblique. Ocelli minute, rather inconspicuous, on the lateral margins of the vertex, slightly in front of the level of the insertion of the antennae. Face almost as long as broad, with a pair of broad, oblique, black stripes extending from the lower margins of the eyes to the apex of the head. Frons long, fairly convex, margined with black. Clypeus short, rectangular, laterally margined with black; lorae extremely small; genae narrow, with their outer margins distinctly concave. Pronotum about as long as the vertex, flat, broad, especially in the posterior



TEXT-FIG. 95.—*Omaranus typicus* Distant. *a.* Tegmen of female;  $\times 15$ . *b.* Tegmen of male;  $\times 14$ . *c.* Male Genitalia, dorsal view, both pygofers removed;  $\times 45$ . *d.* Male pygofers flattened, dorsal view, left pygofer partly cut off;  $\times 45$ . Lettering as in text-fig. 94. *bp. p.*, basal plates prolongation.

region, with a pair of minute black dots in the middle of the dorsal surface; the anterior margin almost straight, the posterior deeply notched. Scutellum large. Tegmina much longer than the body, narrow; appendix present; veins fairly thick and conspicuous; venation as in text-fig. 95*b*, five apical and three ante-apical cells. Wings fully developed, nervures conspicuous.

*Genitalia.*—(text-figs. 95*c* and *d*). Pygofers very much flattened, bearing stout bristles in the postero-dorsal region. Subgenital plates broad, leaf-like, with stiff hairs in the apical region. Parameres large, very much flattened except in the distal region where they are narrow and rod-like. Basal plates rod-like, curved, their prolongation short and narrow. Aedeagus short, extremely wide throughout its length, almost bag-like in appearance.

*Length.*—5 mm.

*Remarks.*—The male chiefly differs from the female (Pl. VI, fig. 2) in being smaller in size, having fully developed tegmina, and in not having a greatly produced vertex and abdomen. The tegmina in the two sexes though differing in shape have the same plan of venation (*cf.* text-figs. 95*a* and *b*).

### Gurawa Distant.

1908. *Gurawa*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 262.

I have already commented on the position of the genus *Gurawa* (*Mem. Ind. Mus.*, XI, p. 29, 1930). Distant included *Gurawa* in the sub-family Gyponinae as he wrongly considered a pair of black dots on the vertex to be the ocelli. The ocelli, as also pointed out

by China<sup>1</sup>, are distinctly on the lateral margins of the vertex about midway between the apex of the head and the eyes. In wing venation, structure of the genitalia, general form of the head, etc., *Gurawa* comes close to the genus *Chiasmus*, *Strongylocephalus*, etc. of the sub-family Jassinae (Acocephalinae). There is, therefore, no doubt that *Gurawa* must be included in the Jassinae and not in the Gyponinae.

*Genotype*.—*Gurawa vexillum* Distant.

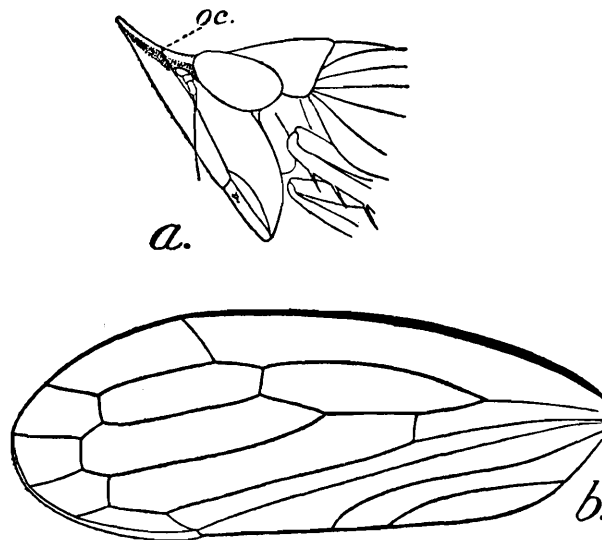
### ***Gurawa vexillum* Distant.**

1908. *Gurawa vexillum*, Distant, *op. cit.*, IV, p. 262.

Distant based the description of this species on a single carded male specimen, collected by Atkinson at Mungphu, Sikkim, Eastern Himalayas. There are four specimens of this species in the collection of the Indian Museum, two from Sikkim and one each from the Khasi hills (Eastern Himalayas) and Kodaikanal (Palni Hills, South India). Some of these specimens have been compared with the type-specimen in the British Museum.

Dull ochraceous, greyish or brownish. Vertex with a broad, black, medial longitudinal stripe, and with a pair of black dots near the base and one dot on each lateral margin. Face dotted all over with irregular black spots. Pronotum with several transverse black lines behind the anterior margin. Scutellum with a big, black spot near each basal angle.

Vertex about as long as the breadth between the eyes, anteriorly sub-acute, foliaceous and very much raised, slightly depressed in the proximal region; the lateral margins distinct and thin. Ocelli on the lateral margins of the vertex (text-fig. 96*a*), about midway



TEXT-FIG. 96.—*Gurawa vexillum* Distant. *a.* Head and part of thorax, lateral view;  $\times 21$ . *b.* Tegmen;  $\times 22$ .  
Oc., Ocelli.

between the eyes and apex and not on the vertex as described by Distant. Face longer than broad, frons very long, with a shallow depression in the upper region; clypeus narrow, rectangular; lorae very narrow, not reaching the apex of the clypeus; genae expanded. Pronotum transverse, almost flat, transversely wrinkled, much shorter than the vertex. Tegmina coriaceous, longer than the body, touching each other along the inner margins;

<sup>1</sup> *Entomologist*, p. 216, 1924.

appendix very small. Tegminal veins thick and prominent, venation as in text-fig. 96*b*, five apical and three ante-apical cells, one or two cross veins between the sectors.

*Male genitalia*.—The abdomen of the single male specimen available is mutilated and therefore the male genitalia have not been studied. I described these organs of the closely allied species *G. minorcephala* in *Mem. Ind. Mus.*, XI, p. 30, 1930.

*Female genitalia*.—Valve large, deeply concave at the posterior margin. Pygofers long and smooth. Ovipositor stout, slightly projecting beyond the posterior extremity of the abdomen.

#### Genus **Chudania** Distant.

1908. *Chudania*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 268.

*Genotype*.—*Chudania delecta* Distant.

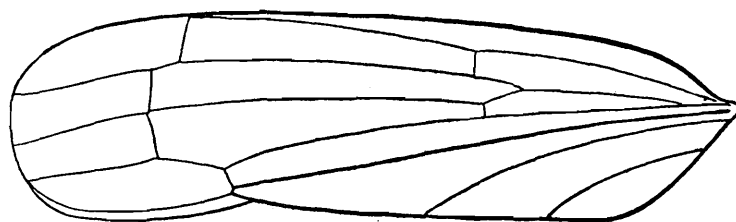
#### **Chudania delecta** Distant.

(Pl. VI, figs. 3 and 3*a*.)

1908. *Chudania delecta*, Distant, *op. cit.*, p. 268.

*Chudania* is a monotypic genus. Distant based the description of the genotype on a single female specimen obtained from Kurseong, Eastern Himalayas. In the collection of the Indian Museum there are three specimens of this species from the Darjeeling District, from Kurseong, Ghumti and Lebong. Two specimens are females, while the third of which the abdomen is missing appears to be a male.

Vertex flat, broad, apically sub-angulate, with the lateral margins ridged and slightly raised and constricted in front of the eyes. Ocelli on the vertex, near the lateral margins, in front of and close to the eyes. Face slightly longer than broad; frons very much swollen,



TEXT-FIG. 97.—*Chudania delecta* Distant. Tegmen;  $\times 20$ .

longitudinally carinate in the proximal region; clypeus flat, subtriangular; lorae extremely narrow, reaching the apex of the clypeus; genae narrow. Pronotum flat, slightly convex at the anterior, distinctly concave at the posterior margin. Tegmina long, veins thin, rather indistinct; venation as illustrated in text-figure 97, four apical cells, four longitudinal veins in the region of the corium. Legs thin and long, tibiae of all legs spinulose.

*Female Genitalia*.—Valve large, slightly produced at the posterior margin. Pygofers narrow, with fine hairs near the margin and in the posterior region. Ovipositor stout, slightly projecting beyond the posterior extremity of the abdomen.

*Remarks*.—Distant kept this genus apart from the rest of the genera included in the Jassinae. The general form of the body, the shape of the head, position of the ocelli and the tegminal venation indicate that it is closely allied to the genus *Kana* (*Faun. Brit. Ind., Rhynch.*, IV, p. 285).

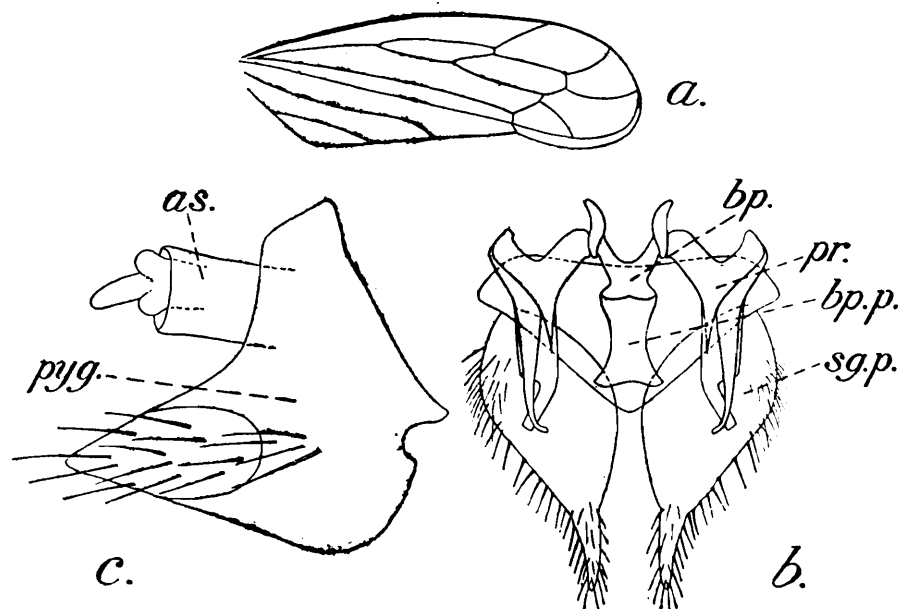
Genus **Mukaria** Distant.1908. *Mukaria*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 269.*Genotype*.—*Mukaria penthimioides* Distant.***Mukaria penthimioides*** Distant.

(Pl. VI, figs. 4 and 4a.)

1908. *Mukaria penthimioides*, Distant, *op. cit.*, p. 270.

This species was described from Maskeliya, Ceylon. I have examined a male specimen of this species (of the Madras Museum) in the collection from Laws Ghat Road, Palni Hills, South India.

Vertex slightly longer than the breadth between the eyes, flat, slightly depressed in the anterior region, broad at base, in the distal region tapering to a conical apex. Lateral margins of the vertex ridged, prominent, slightly sinuate in front of the eyes, with a sub-marginal impressed line. Eyes prominent. Ocelli small, inconspicuous, on the vertex, close to the lateral margins, near and in front of the eyes; Distant stated that the ocelli are indiscernible. Face broader than long, depressed in the upper half; clypeus long, rectangular; lorae long, reaching the apex of the clypeus; genae moderately expanded. Pronotum convex, about as long as the vertex, distinctly broader than the head, especially in the posterior region; the anterior and posterior margins distinctly convex and concave respectively. Scutellum large and prominent, much broader than long. Tegmina much longer than the body, semi-transparent, with a distinct appendix; veins rather thin and inconspicuous; venation as illustrated in text-fig. 98a. Legs long and thin, front and posterior tibiae thickly spinulose.



TEXT-FIG. 98.—*Mukaria penthimioides* Distant. a. Tegmen;  $\times 12$ . b. Male Genitalia, dorsal view, both pygofer and aedeagus removed;  $\times 50$ . c. Left pygofer, lateral view;  $\times 50$ .

Lettering as in text-figs. 94, 95.

*Male Genitalia*.—(Text-figs. 98b and c.) Pygofer conically produced in the posterior direction, with numerous stiff hairs in the distal region. Sub-genital plates large, very

much flattened in the proximal two-thirds, considerably narrowed in the apical region. Parameres long and narrow. Basal plates and their prolongation short, the latter considerably flattened at the base of the aedeagus. Aedeagus mutilated in the specimen available, hence not described.

*Remarks.*—Distant was doubtful about the position of this genus. In the general form of the body and the structure of the face *Mukaria* resembles some genera such as *Penthimia*, etc. of the Gyponinae. Distant's reason for not including this genus in this sub-family was that the ocelli were indiscernible. The ocelli are on the vertex of the head as in the sub-family Gyponinae but at a slightly different situation. In the position of the ocelli *Mukaria* is similar to *Chudania* described above and *Kana*, but its venation is quite distinct from that of these genera. Taking all the characters into consideration, the position of *Mukaria* seems to be in the sub-family Gyponinae rather than in the Jassinae.

### **Bumizana** Distant.

1918. *Bumizana*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 32.

*Bumizana* includes only two species, namely, *B. elongata* Dist., the genotype, and *B. ruberosa* Pruthi. While describing the latter species (*Mem. Ind. Mus.*, XI, p. 20, 1930), I commented on the position of the genus *Bumizana*. This genus differs in some very important characters from the genus *Cephalelus*, to which according to Distant it is allied. In the general shape of the head, form and position of the ocelli, structure of the genitalia, and the nature of the tegminal venation, it is so similar to *Dorydium* Burm. that it is very doubtful whether *Bumizana* deserves to be considered as a distinct genus.

### Genus **Gessius** Distant.

1908. *Gessius*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 301.

*Genotype.*—*Gessius verticalis* Distant.

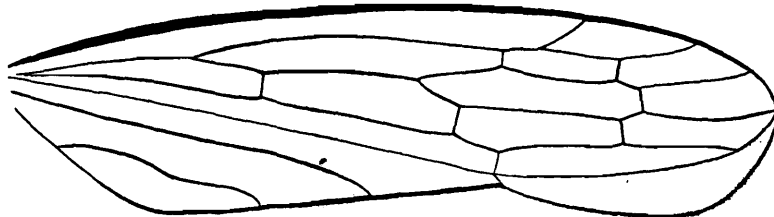
### **Gessius verticalis** Distant.

(Pl. VI, figs. 5 and 5a.)

1908. *Gessius verticalis*, Distant, *op. cit.*, p. 302.

The genus *Gessius* is monotypic. The genotype was described from the Ruby mines, Burma. The single female specimen of this species in the collection of the Indian Museum is from Kurseong (alt. 5,000 ft.), Eastern Himalayas.

Vertex very short, almost transverse, anteriorly broadly rounded. Eyes small. Ocelli on the face, close to the anterior margin of the vertex, not actually on the margin as des-



TEXT-FIG. 99.—*Gessius verticalis* Distant. Tegmen;  $\times 9$ .

cribed by Distant, nearer the eyes than to each other. Face almost as long as broad. Frons broad, rather short, slightly raised; clypeus narrow at base, broad near apex; lorae

distinct, fairly large ; genae expanded. Pronotum broader than the head, long, arched, finely transversely striate, anteriorly narrow, gradually widening in the posterior region ; the anterior margin slightly convex, the posterior concave, the lateral margins long. Scutellum very large, only slightly smaller than the pronotum. Tegmina long, semi-transparent ; appendix well developed ; veins conspicuous, venation as illustrated in text-fig. 99, five apical cells, not four as described by Distant, three ante-apical cells, two cross veins between the sectors. Legs large and stout.

*Female Genitalia.*—Valve large, concave at the posterior margin. Pygofers broad, convex, with a few stiff hairs. Ovipositor moderately stout and long.

*Remarks.*—The general shape of the head and pronotum, the position of the ocelli and the nature of the venation indicate that this genus is remarkably allied to *Bythoscopus*, but the study of the male, which is yet unknown, is essential for the determination of the affinities of this interesting genus.

#### Genus **Carvaka** Distant.

1918. *Carvaka*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 40.

*Genotype.*—*Carvaka picturata* Distant.

Distant described the genotype and three other species of *Carvaka* from South India, mostly from the Nilgiri hills. I studied the genotype in the British Museum (Natural History), and concluded that Distant's description of this species is very inadequate and his figures hardly help workers in naming the species correctly. There is no specimen of the genotype in the collection of the Indian Museum, but there are numerous specimens of another species, namely *C. thoracica* Dist., which is very closely allied to the genotype. *C. thoracica* is described in detail below :—

#### **Carvaka thoracica** Distant.

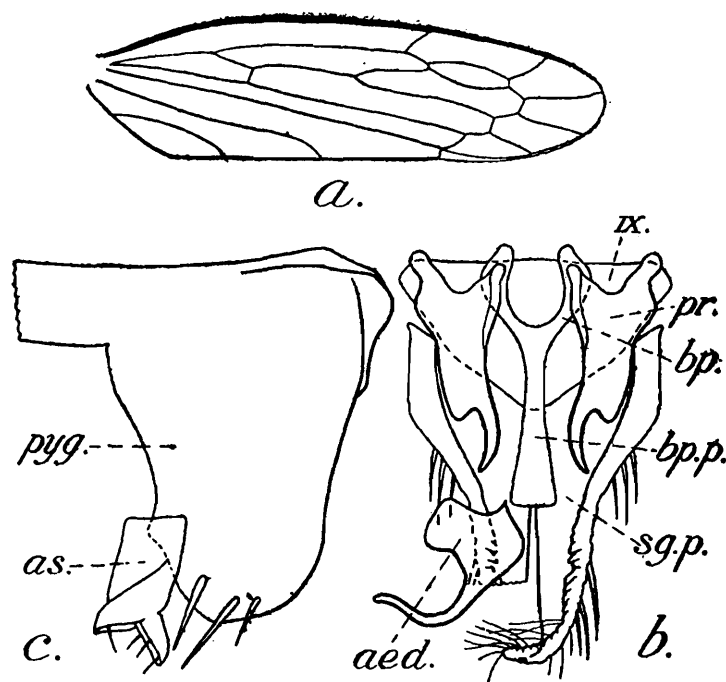
(Pl. VI, figs. 6 and 6a.)

1918. *Carvaka thoracica*, Distant, *op. cit.*, p. 41.

Large, rather elongated. Vertex about half the breadth between the eyes, with a transverse impressed line in the anterior region. Eyes large, oblique. Ocelli on the anterior margin of the head, close to the eyes. Antennae long and thin. Face somewhat broader than long. Frons flat, with fine ridges and grooves in the upper region ; clypeus rectangular ; genae and lorae very distinct from each other, the former very much expanded. Pronotum long and broad, anterior margin convex, posterior almost straight. Scutellum more than half as long as pronotum, deeply transversely impressed in middle. Tegmina long, rather narrow, grey, marked with numerous irregular brown lines and dots. Veins brown, conspicuous, marked with black near the costal margin. Venation as illustrated in text-fig. 100a. Legs long, front and hind tibiae thickly spinulose.

*Male Genitalia.*—(text-figs. 100 b and c.). Pygofers elongated, with a few strong bristles in the posterior region, sub-genital plates large, broad at base, tapering in the distal region to fine apices, with numerous stiff hairs along the outer margins. Parameres large and flattened, with apices narrow and curved. Basal plates small, their prolongation very long. Aedeagus very wide at base, extremely narrow, almost spine-like in the distal region.

*Female Genitalia*.—Valve very large, produced at the postero-lateral corners and in the middle of the posterior margin. Pygofers large, long, thickly covered with stiff hairs. Ovipositor stout, not extending beyond the posterior extremity of the abdomen.



TEXT-FIG. 100.—*Carvaka thoracica* Distant. a. Tegmen;  $\times 12$ . b. Male Genitalia, dorsal view, both pygofers removed;  $\times 50$ . c. Left pygofer, flattened;  $\times 50$ . Lettering as in text-figs. 94, 95.

*Remarks*.—Distant did not make any remark on the position and affinities of *Carvaka*. The general shape of the body, and the form of the head, the face and the tegmina indicate that this genus is allied to *Phelpsius*, *Selenocephalus*, etc. of the Acocephalinae.

#### Genus **Kutara** Distant.

1908. *Kutara*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 308.

*Genotype*.—*Kutara brunnescens* Distant.

#### **Kutara brunnescens** Distant.

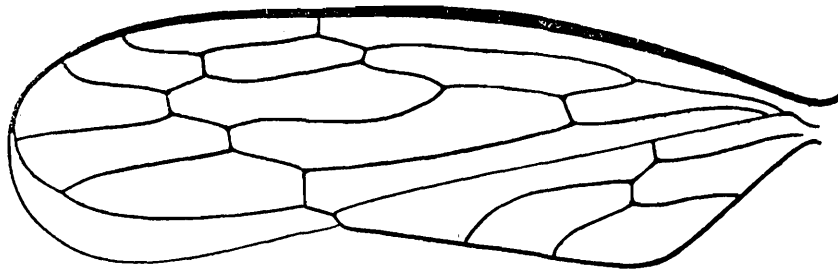
(Pl. VI, figs. 7 and 7a.)

1908. *Kutara brunnescens*, Distant, *op. cit.*, p. 308.

Distant based the description of this species on a single female specimen obtained from Kandy, Ceylon. In the collection of the Indian Museum there are two specimens, a male and a female of this species. The male specimen is from the same locality as the type specimen, while the female is from Fraserpet, Coorg, South India. The male differs considerably in colour and markings from the female. It is much lighter in colour than the female, and the numerous black maculations on the face, pronotum, scutellum and tegmina present in the female are either missing or are extremely faint in the male.

Vertex short, about one-third the length of the pronotum, anteriorly convexly rounded, with a transverse impressed line in the anterior region. Ocelli on the anterior margin of the head, close to the eyes, distinct and not obscure as stated by Distant. Eyes large,

oblique. Face broader than long (5 : 4), flat; frons long; genae large, expanded; clypeus broader near apex; lorae not reaching the apex of the clypeus. Pronotum convexly rounded at the anterior, almost straight at the posterior margin. Scutellum as long as pronotum, broad, transversely impressed in middle. Tegmina extending beyond the posterior extremity of the abdomen; veins distinct; venation as illustrated in text-figure 101, two or three transverse veins in claval area; the number of anal veins variable in the right and left tegmen of the same specimen. Legs rather short.



TEXT-FIG. 101.—*Kutara brunnescens* Distant. Tegmen;  $\times 18$ .

*Male Genitalia.*—As in the single male specimen available the abdomen is unfortunately mutilated, the male genitalia could not be studied.

*Female Genitalia.*—Valve short, very much produced at the postero-lateral angles, concave at the posterior margin, except in the middle where it is slightly produced posteriorly. Pygofer long, with a few hairs in the posterior region. Ovipositor moderately long and stout, not extending beyond the posterior extremity of the abdomen.

*Remarks.*—Distant placed *Kutara* in the division Tartessusaria. The shape of the head, face, tegmina, etc. of *K. brunnesceus* distinctly indicate that this genus is allied to *Phlepsius*, *Carvaka*, etc.

#### Genus **Mukwana** Distant.

1908. *Mukwana*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 317.

*Genotype.*—*Mukwana introducta* Distant.

#### **Mukwana introducta** Distant.

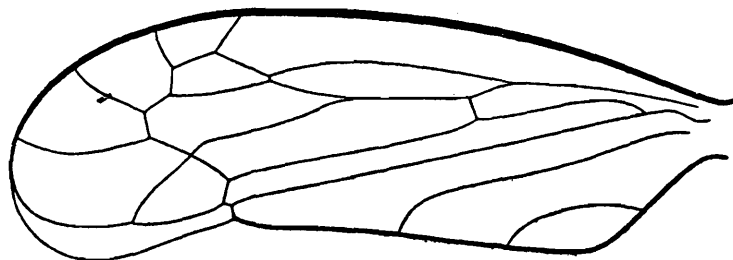
(Pl. VI, figs. 8 and 8a.)

1908. *Mukwana introducta*, Distant, *op. cit.*, p. 317.

*Mukwana* is a monotypic genus. The genotype was described by Distant from Ceylon, apparently from a single male specimen. I have seen numerous specimens of this species from the same locality (collection of the Colombo Museum), but all of them are unfortunately females. Only the female therefore is figured and described below:—

Vertex as long as the pronotum and scutellum together, triangular, centrally, longitudinally, broadly foveate; lateral margins ridged, constricted in front of the eyes, which are very long and oblique. Face elongate; frons long and convex; clypeus long, fairly broad, rectangular; lorae very small, terminating a little beyond the middle of the clypeus; genae long and narrow. Antennae thin and extremely long. Pronotum short, less than half as long as broad, with three longitudinal carinae, one along the median line and two in the lateral regions. The anterior margin slightly convex between the eyes, the posterior

slightly wavy. Scutellum distinctly longer than the pronotum (not shorter than the latter as described by Distant). Tegmina hardly extending beyond the apex of the abdomen.



TEXT-FIG. 102.—*Mukwana introducta* Distant. Tegmen;  $\times 23$ .

coriaceous, with five apical (not four, as described by Distant) and three ante-apical cells (text-fig. 102). Legs long, especially the posterior pair, with the posterior tibiae densely spinulose.

*Length*: 7.5 mm.

#### Genus **Varta** Distant.

1908. *Varta*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 320.

*Genotype*.—*Varta rubrofasciata* Distant.

#### **Varta rubrofasciata** Distant.

(Pl. VII, figs. 1 and 1a.)

1908. *Varta rubrofasciata*, Distant, *op. cit.*, p. 321.

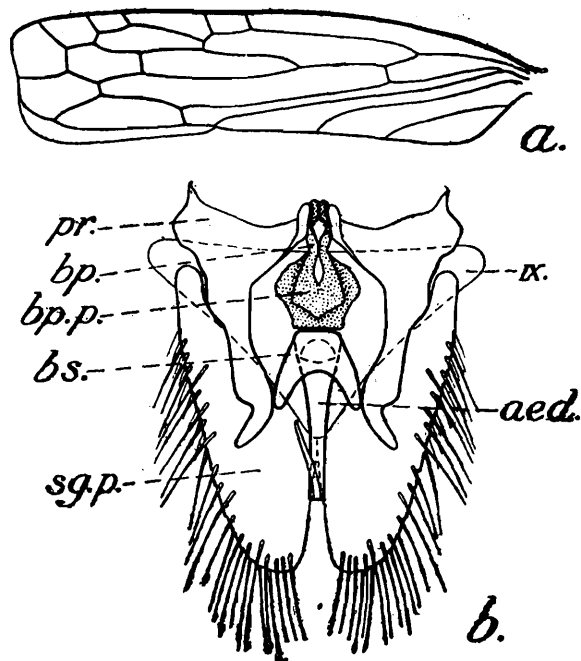
The genus *Varta* is monotypic. Distant described the genotype from a single female specimen obtained from Pusa, Bihar. In the collection of the Indian Museum, there are numerous specimens of both sexes of this species, collected from several localities in different parts of India.

Distant's description of the general colouration of the species is fairly accurate, except for the colour of the abdomen which is often stramineous and not black as described by this author. The structure of the species, however, requires redescription.

Elongated. Vertex flat, triangular, medially longitudinally sulcate, with a fine transverse impressed line before the conical apex. Lateral margins of the vertex ridged. Eyes large and oblique. Ocelli on lateral margins of vertex, close to eyes, not near apex as described by Distant. Face longer than broad; frons long, slightly convex; clypeus rectangular; lorae small, not reaching the apex of the clypeus; genae large and expanded. Antennae long and thin. Pronotum slightly shorter than vertex, flat; anterior margin slightly, convexly produced between eyes, posterior margin almost straight. Scutellum about as long as pronotum. Tegmina distinctly longer than the body in both sexes, apically truncate; veins distinct, venation as illustrated in text-figure 103a, four or five apical cells.

*Male Genitalia*.—(text-fig. 103b.). Pygofers broad, with a fine appendage on their ventral margins, slightly produced in the postero-dorsal region, where they bear numerous hairs. Subgenital plates thin and flattened, leaf-like, with numerous stiff hairs along outer margins. Ninth sternite triangular. Parameres large, flat, broad in the proximal region, narrower in the distal. Basal plates small, their prolongation short but very much

flattened. Aedeagus short, narrow, almost rod-like, with a stout basal strut and a big process near the apex.



TEXT-FIG. 103.—*Varta rubrofasciata* Distant. a. Tegmen;  $\times 12$ . b. Male Genitalia, dorsal view, both pygofer removed;  $\times 50$ . Lettering as in text-figs. 94, 95.

*Female Genitalia.*—Valve large, almost straight at the posterior margin. Ovipositor rather slender, not projecting beyond the posterior extremity of the abdomen. Pygofer long, narrow, with numerous short but stiff hairs in the posterior region.

#### Genus **Dussana** Distant.

1908. *Dussana*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 322.

*Genotype.*—*Dussana quaerenda* Distant.

#### **Dussana quaerenda** Distant.

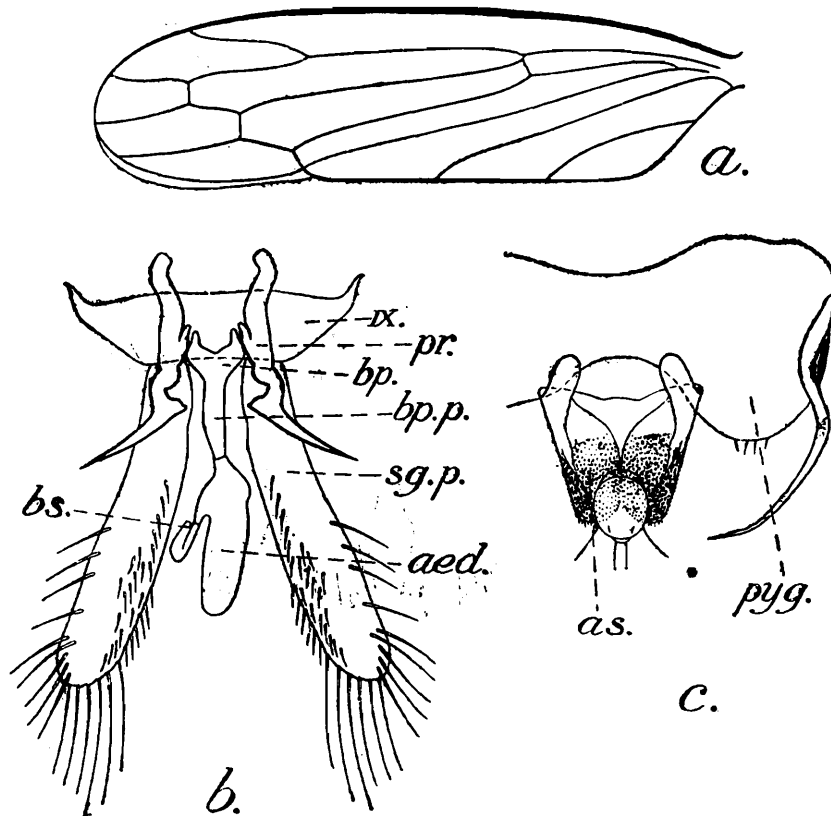
(Pl. VII, figs. 2 and 2a.)

1908. *Dussana quaerenda*, Distant, *op. cit.*, p. 322.

*Dussana* is also a monotypic genus. The genotype was described by Distant from Ceylon. He had only one specimen. In the collection of the Indian Museum there are about two dozen specimens of both sexes of this species, mostly collected from the Palni Hills, South India.

Elongated. Vertex long, flat, medially longitudinally prominently carinate, anteriorly sub-acute; lateral margins distinctly ridged, ridges extending up to the base of the vertex and touching inner margins of eyes. Ocelli distinct, white or dark brown, not indiscernible as remarked by Distant, just below the lateral margins of the vertex, between its apex and the eyes, nearer the latter. Face long, abruptly depressed in the lateral regions; frons centrally longitudinally carinate, finely punctate; clypeus long, broad, narrowed in apical region; lorae small, narrow, not extending beyond middle of the clypeus; genae long and narrow. Eyes large, oblique, projecting beyond the lateral margins of the vertex. Pronotum slightly shorter than the vertex, broad, narrowed in the anterior

region, finely transversely striate, the anterior margin convex, the posterior straight, lateral margins oblique. Pronotum not centrally longitudinally carinate as described by Distant. Scutellum large and broad, slightly shorter than the pronotum. Tegmina long, narrow,



TEXT-FIG. 104.—*Dussana quaerenda* Distant. a. Tegmen;  $\times 16$ . b. Male Genitalia, dorsal view, both pygofers removed;  $\times 40$ . c. Left pygofer flattened out.  $\times 40$ .  
Lettering as in text-figs. 94, 95.

veins thin and rather inconspicuous; venation as illustrated in text-fig. 104a, four apical cells, two transverse veins between the sectors. Legs moderately long.

*Male Genitalia*.—(text-figs. 104b and c). Pygofers with a long appendage near their postero-ventral margins. Sub-genital plates long, narrow, flat with numerous long hairs on their outer margins and the apices and few short stiff hairs on the inner margins. Basal plates small, their prolongation very long. Parameres long, narrow, twisted, pointed at the apices. Aedeagus short, fairly wide throughout.

*Female Genitalia*.—Valve large. Pygofers long and narrow, with some stiff hairs in the posterior region. Ovipositor well developed but not extending beyond the posterior extremity of the abdomen.

#### Genus *Arya* Distant.

1908. *Arya*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 338.

*Genotype*.—*Arya rubrolineata* Distant.

Some of the specimens on which Distant based the description of the type-species are in the collection of the Indian Museum, and I have already commented on the affinities of the genus *Arya* (*Mem. Ind. Mus.*, XI, p. 40). This genus has only a superficial resemblance to the genus *Jassus* near which Distant placed it. In the general form of the body, particularly the face and pronotum, the nature of the tegminal venation and the structure of

the genitalia *Arya* comes very close to the genus *Aconura* Leth. and is absolutely distinct from *Jassus*.

Genus **Divitiacus** Distant.

1918. *Divitiacus*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 59.

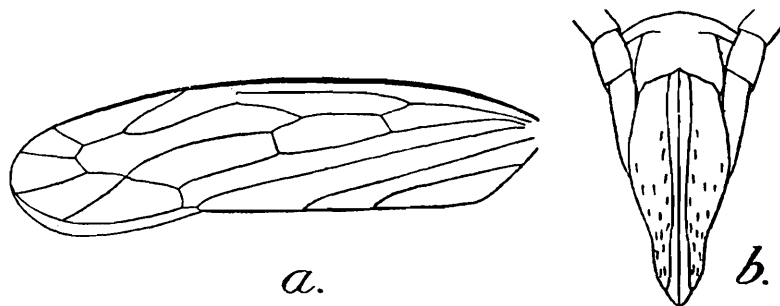
*Genotype*.—*Divitiacus primus* Distant.

**Divitiacus primus** Distant.

1918. *Divitiacus primus*, Distant, *op cit.*, p. 59.

Distant based the description of this species on some specimens collected by Mr. T. V. Campbell from the Nilgri Hills, South India. In the collection of the Indian Museum there are two specimens of this species from the same locality and obtained by the same collector. Unfortunately both are females, therefore the description given below applies to the female only.

Vertex flat, short, about half the breadth between the eyes, medially longitudinally sulcate at base, anteriorly sub-angulate. Ocelli inconspicuous. Eyes small. Face almost as long as broad. Frons slightly raised; clypeus rectangular; lorae large, reaching the apex of the clypeus; genae expanded. Pronotum almost flat, about twice as long as the vertex, slightly narrower than the head, anteriorly broadly rounded, the posterior margin almost straight, the lateral margins moderately long. Scutellum large, almost as long as the vertex. Tegmina long, semi-transparent; veins creamy-white, conspicuous; venation as illustrated in text-fig. 105a; five apical and three ante-apical cells; two cross veins between the sectors. Legs long and delicate.



TEXT-FIG. 105.—*Divitiacus primus* Distant. a. Tegmen;  $\times 14$ . b. Female Genitalia, ventral view;  $\times 23$ .

*Female Genitalia*.—(text-fig. 105b). Valve large, slightly concave at the posterior margin, except in the middle where it is slightly produced in the posterior direction. Pygofers narrow, moderately long. Ovipositor delicate, not projecting beyond the posterior extremity of the abdomen.

*Remarks*.—Distant did not make any remark on the affinities of this genus. The shape of the head and thorax and the nature of the tegminal venation indicate that this genus is allied to *Deltocephalus* Burm., etc.

Genus **Bhatia** Distant.

1908. *Bhatia*, Distant, *Faun. Brit. Ind., Rhynch.*, IV, p. 357.

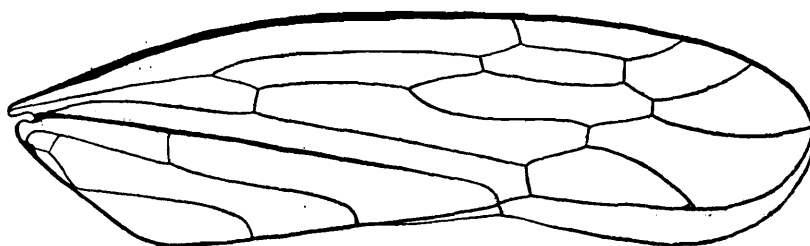
*Genotype*.—*Bhatia olivacea* (Melichar).

**Bhatia olivacea** (Melichar).1903. *Eutettix* ? *olivacea*, Melichar, *Hom. Faun. Ceyl.*, p. 191.1908. *Bhatia olivacea*, Distant, *op. cit.*, p. 357.

Melichar doubtfully included this species in the genus *Eutettix*. Distant erected a new genus, *Bhatia*, for this species and slightly amended the description given by Melichar. No other species of the genus *Bhatia* has so far been described. Both Melichar and Distant omitted to describe some important characters which indicate the true position of the genus and species.

In the collection of the Indian Museum there is a female specimen of *B. olivacea* from Peradeniya, Ceylon, the locality from which Melichar originally described the species.

Vertex short, about  $\frac{1}{3}$  the breadth between the eyes, anteriorly broadly rounded, faintly medially sulcate at base, transversely impressed in the anterior region. A shallow furrow on the anterior margin of the head. Ocelli near the ends of this furrow, at a short distance from the eyes, conspicuous. Face (Pl. VII, fig. 3) almost as broad as long, almost flat, very slightly deflected in the region of the genae. Frons fairly broad, clypeus dumb-bell-shaped; lorae large, not reaching the apex of the clypeus; genae broad. Eyes oblique. Pronotum more than twice as long as the vertex, very finely, transversely striate, moderately convex in middle, slightly deflected in the lateral regions; the anterior margin convex, the posterior concave, the lateral margins short. Scutellum large, with an oblique transverse deep impression slightly behind the middle. Tegmina long, very much extending beyond the tip of the abdomen in both sexes; appendix well developed; veins thin but conspicuous, with some dark brown pigment along their course here and there and near their ends on the claval margin. Venation as illustrated in text-fig. 106, five apical and three ante-apical cells, two cross veins between the sectors, one cross vein in the region of the clavus as described by Melichar. Distant did not see any cross vein in the region of clavus.

TEXT-FIG. 106.—*Bhatia olivacea* Distant. Tegmen;  $\times 17$ .

*Female Genitalia*.—Valve very short. Pygofers broad, with a few short stiff hairs in the posterior region. Ovipositor moderately long and stout.

*Remarks*.—The general form of the body, face and vertex, and the presence of a furrow on the anterior margin of the head indicate that the genus *Bhatia* is closely allied to *Selenocephalus* and other genera of the *Acocephalinae* and not to *Eutettix* or *Thamnotettix* as Melichar and Distant respectively considered.

Genus **Divus** Distant.1908. *Divus*, Distant, *Faun. Brit. Ind.; Rhynch.*, IV, p. 365.

*Genotype*.—*Divus bipunctatus* (Melichar).

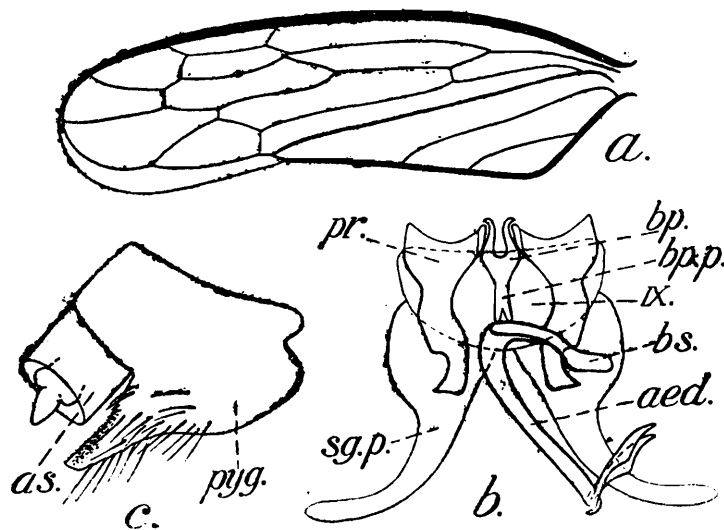
**Divus bipunctatus** (Melichar).

(Pl. VII, figs. 4 and 4a.)

1903. *Eutettix bipunctatus*, Melichar, *Hom. Faun. Ceyl.*, p. 192.1908. *Divus bipunctatus*, Distant, *op. cit.*, p. 365.

Melichar included the above species in the genus *Eutettix*. He had one male specimen only, but Distant erected the new genus, *Divus*, for this species. He also had only one example. In the collection of the Indian Museum there are several specimens representing both sexes of this interesting species.

Vertex less than half as long as the breadth between the eyes, slightly transversely depressed in the anterior region, almost angulate at the anterior margin, with a pair of large black spots. Eyes oblique, extremely large. Ocelli on the anterior margin of the vertex, close to the eyes, conspicuous. Face broad; frons slightly convex, marked with dark-brown medially, in the lateral regions especially near the antennal cavities and along the margins. Clypeus short, abruptly flattened in the apical region; lorae not reaching the apex of the clypeus; genae expanded. Antennae extremely long and thin. Pronotum about thrice as long as the vertex, slightly arched, anteriorly produced between the eyes, almost straight at the posterior margin, finely transversely striate, irregularly marked with dark brown. Scutellum twice as long as the vertex, deeply transversely impressed in middle, bright yellow in the posterior half. Tegmina much longer than the body in both sexes, semi-transparent, veins thin but very distinct; venation as illustrated in text-fig. 107a, five apical and three ante-apical cells, not four and two respectively as described by Distant. Legs thin and long.



TEXT-FIG. 107.—*Divus bipunctatus* Distant. a. Tegmen;  $\times 15$ . b. Male Genitalia, dorsal view, both pygofers removed;  $\times 38$ . c. Left pygofer, flattened out;  $\times 38$ .  
Lettering as in text-figs. 94, 95.

*Male Genitalia.*—(text-figs. 107b and c). Pygofers large, produced into narrow hairy processes in the dorso-posterior region. Sub-genital plates long, very broad in the proximal region. Parameres large, flat, narrow near the apices. Basal plates short, their prolongation long. Aedeagus very long and stout, with a strong basal strut and a pair of large appendages near the gonopore.

*Female Genitalia*.—Valve large, slightly produced in the middle of the posterior margin. Pygofers fairly convex, smooth, marked with black along the ventral margins. Ovipositor delicate, not projecting beyond the posterior extremity of the abdomen.

*Length*.—Male 5 mm. ; female a little larger.

Genus **Campbellinella** Distant.

1918. *Campbellinella*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 69.

*Genotype*.—*Campbellinella illustrata* Distant.

**Campbellinella illustrata** Distant.

(Pl. VII, figs. 5 and 5a.)

1918. *Campbellinella illustrata*, Distant, *op. cit.*, p. 69.

*Campbellinella* is a monotypic genus.

In 1926 when I was in London, there were only four specimens of the type-species in the British Museum. Some of the specimens on which Distant based the description of this species were from Chikkaballapura, South India, and had been collected by Mr. T. V. Campbell. In the collection of the Indian Museum there are four specimens, representing both sexes, all obtained from Chikkaballapura by Mr. Campbell. Most probably these specimens were collected at the same time as those on which Distant based the description of the genotype.

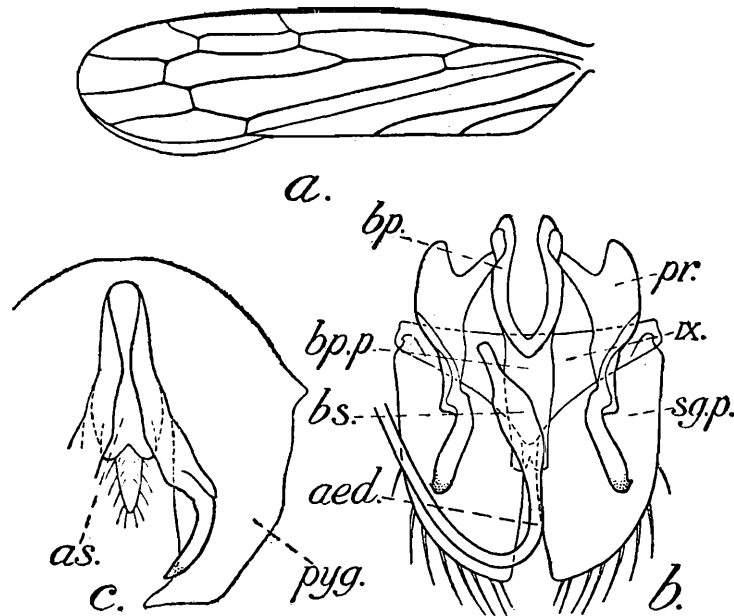
Vertex about twice as long as the breadth between the eyes, flat, sulcate at base, anteriorly sub-acute. Ocelli on the lateral margins of the vertex, close to the eyes, black and conspicuous. Eyes large, oblique. Face about  $1\frac{1}{2}$  times as long as broad, fairly raised in middle, deflected on the sides ; frons and clypeus long ; lorae distinct, not reaching the base of the clypeus ; genae fairly expanded. Antennae very long and thin. Pronotum three-fourth the length of the vertex, flat ; the anterior margin truncate between the eyes, deeply concave and curved behind these organs, the posterior margin wavy. Scutellum only slightly shorter than the pronotum. Tegmina long, extending beyond the tip of the abdomen in the male, semi-transparent ; veins thin but conspicuous ; venation as illustrated in text-fig. 108a, five apical and three ante-apical cells. Posterior pair of legs very long.

*Male Genitalia*.—(text-figs. 108b and c). Pygofers long, with strong curved appendages on their postero-ventral margins. Sub-genital plates broad, leaf-like, with a few strong marginal hairs. Parameres long, broad and flattened in the proximal region, rod-like in the distal one-third. Basal plates long rod-like, their prolongation long and flattened. Aedeagus long, wide at base, beyond which it is deeply bent and points almost towards the anterior end of the body.

*Female Genitalia*.—Valve large. Pygofers long, narrow, fairly convex. Ovipositor stout, very long, very much protuding beyond the posterior extremity of the abdomen, with fine hairs on the apex.

*Length*.—Female 7.2 ; male a little smaller.

*Remarks.*—Distant did not make any remark regarding the affinities of this genus. The form of the head, face and thorax, the nature of the wing venation and the structure of the genitalia clearly show that *Campbellinella* is allied to the genera *Aconura*, *Arya*, etc.



TEXT-FIG. 108.—*Campbellinella illustrata* Distant. a. Tegmen;  $\times 14$ . b. Male Genitalia, dorsal view, both pygofers removed;  $\times 38$ . c. Pygofers, dorsal view, part of left pygofer cut-off;  $\times 30$ .  
Lettering as in text-figs. 94, 95.

### Genus *Nandidrug* Distant.

1918. *Nandidrug*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 74.

*Genotype.*—*Nandidrug speciosum*, Distant.

### *Nandidrug speciosum* Distant.

(Pl. VII, figs. 6 and 6a.)

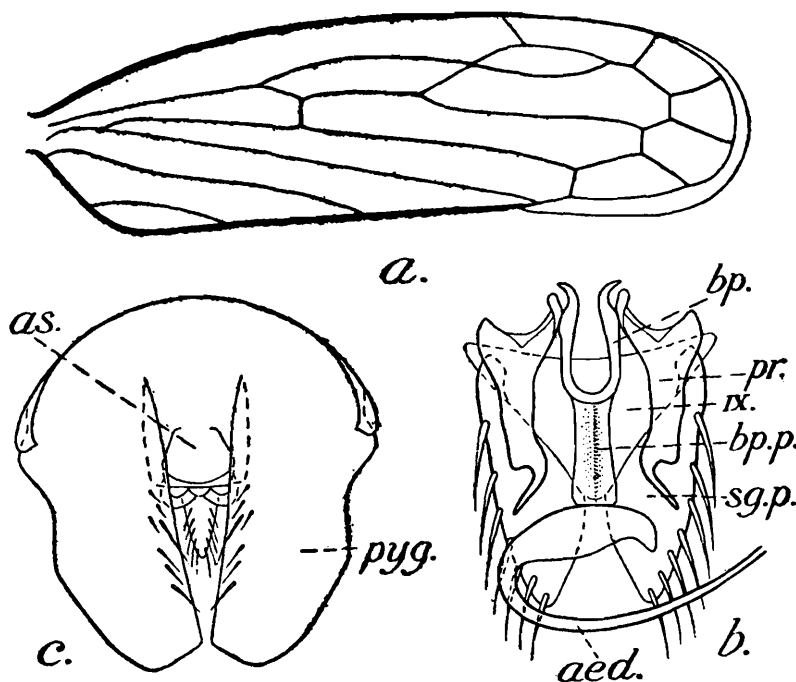
1918. *Nandidrug speciosum*, Distant, *op. cit.*, p. 75.

Only two species of the Genus *Nandidrug* have been described so far.

The description of the genotype was based on specimens collected by Mr. T. V. Campbell at Nandidrug, South India. In the collection of the Indian Museum there are numerous specimens of both sexes of this species, obtained by the same collector and from the same locality and probably collected at the same time as the genotype.

Vertex about twice as long as the breadth between the eyes, flat, anteriorly sub-acute; the lateral margins in line with the outer margins of the eyes. Ocelli black, minute, on the lateral margins of the vertex, close to the eyes. Eyes very large and prominent, projecting over the lateral margins of the pronotum. Face much longer than broad, fairly convex in middle, deflected in the lateral regions; clypeus rectangular; lorae distinct; genae moderately expanded. Antennae very long and thin. Pronotum slightly shorter than the vertex, flat; the anterior margin convex, the posterior somewhat concave. Scutellum small, about  $\frac{2}{3}$  the length of the pronotum, triangular. Vertex, pronotum and scutellum traversed by orange coloured longitudinal bands. Tegmina fairly long, but not extending beyond the tip of the abdomen especially in the female, semi-transparent, veins

thin but very distinct; venation as illustrated in text-fig. 109a, five apical and three ante-apical cells, not three apical cells as described by Distant. Legs thin and fairly long.



TEXT-FIG. 109.—*Nandidrug speciosum* Distant. a. Tegmen;  $\times 24$ . b. Male Genitalia, dorsal view, both pygofers removed;  $\times 60$ . c. Pygofers, flattened out, dorsal view;  $\times 60$ .  
Lettering as in text-figs. 94, 95.

*Male Genitalia*.—(text-figs. 109b and c). Pygofers elongated in the posterior direction. Sub-genital plates triangular, thin and leaf-like, with some strong marginal hairs. Parameres long and flat. Basal plates rod-like, their prolongation long and flattened. Aedeagus very long and narrow, but very wide at base beyond which it is abruptly bent and points towards the anterior end of the body.

*Female genitalia*.—Valve large. Pygofers narrow, covered with numerous stiff hairs. Ovipositor very stout and long, projecting beyond the posterior extremity of the abdomen, with a few stiff hairs on the tip.

*Length*.—Female 5.5 mm. (including ovipositor); male a little smaller.

*Remarks*.—Distant did not make any comment on the relationships of this genus. In the general form of the body, the shape of the head, the nature of the wing venation and the structure of the genitalia *Nandidrug* comes very close to *Campbellinella*, from which it can be distinguished by the form of the pronotum and the characteristic structure of the male genitalia.

#### Genus **Crispina** Distant.

1918. *Crispina*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 76.

*Genotype*.—*Crispina nigristigma* Distant.

#### **Crispina nigristigma** Distant.

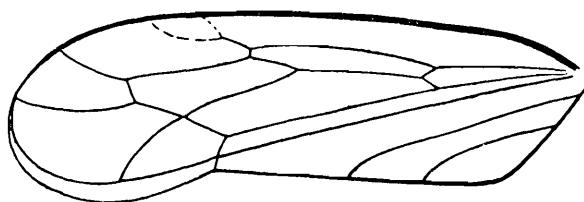
(Pl. VII, figs. 7 and 7a.)

1918. *Crispina nigristigma*, Distant, *op. cit.*, p. 77.

*Crispina* is also a monotypic genus. Distant based the description of the genotype on specimens obtained from Kodaikanal (South India) by Mr. T. V. Campbell. In the

collection of the Indian Museum there are four specimens of this species, all from the type locality and collected by the same collector and probably at the same time as those on which the description of the type is based. Unfortunately all the specimens available to me are females, the following description, therefore, is based on the female only.

Vertex shorter than breadth between the eyes, triangular, flat and medially sulcate at base, gradually deflected in the anterior region. Ocelli on the lateral margins of the vertex, between the eyes and the apex, reddish, prominent. Eyes small. Face slightly broader than long, flattened; frons broad, tapering towards the clypeus, the latter long and narrow; lorae prominent, reaching the apex of the clypeus; genae comparatively narrow. Pronotum about one and a half times as long as the vertex, fairly convex, smooth, with the anterior margin rounded and the posterior almost straight. Tegmina long, narrow, extending beyond the posterior extremity of the abdomen; veins thin and rather incons-



TEXT-FIG. 110.—*Crispina nigristigma* Distant. Tegmen;  $\times 19$ .

picuous; venation as illustrated in text-fig. 110. The black longitudinal bands on the tegmina mentioned by Distant in the specific diagnosis and present also in the specimen figured here are faint or even absent in some other specimens before me. Legs long and thin.

*Female Genitalia.*—Valve large, concave at the posterior margin. Pygofers short and broad, with numerous stiff hairs in the distal region. Ovipositor delicate, not projecting beyond the posterior extremity of the abdomen.

*Remarks.*—Distant did not make any comment on the position of this genus. The position of the ocelli is rather peculiar. Apparently Distant did not notice this character. I have not studied the male of the genotype, therefore, I am not sure about the affinities of *Crispina*.

#### Genus **Galerius** Distant.

1918. *Galerius*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 78.

*Genotype.*—*Galerius indicatrix* Distant.

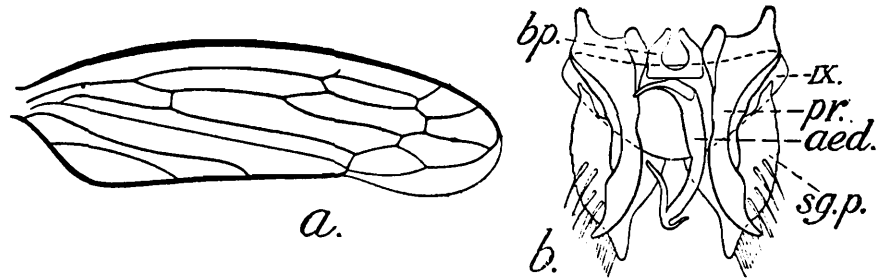
#### **Galerius indicatrix** Distant.

(Pl. VII, figs. 8 and 8a.)

1918. *Galerius indicatrix* Distant, *op. cit.*, p. 78.

This species was described from specimens obtained by Mr. T. V. Campbell from several localities in South India, e.g., Kodaikanal, Chikkaballapura and Nilgiri Hills. There are numerous specimens of this species in the collection of the Indian Museum from the above localities and collected by Mr. Campbell.

Vertex about as long as the breadth between the eyes, medially longitudinally deeply sulcate for about two-thirds of its length, flat, anteriorly angulate. Ocelli black, minute but conspicuous, on the lateral margins of the vertex, at some distance from the eyes. Eyes large. Face about as long as broad, fairly raised. Frons large, broad; clypeus short, quadrate; lorae large. Pronotum long and broad, flat, the anterior margin rounded, the posterior almost straight. Scutellum small. Tegmina extending beyond the posterior extremity of the abdomen in both sexes, transparent; veins thick and conspicuous, with some dark brown pigment along their course in the apical region. Venation as illustrated in text-fig. 111a, five apical and three ante-apical cells.



TEXT-FIG. 111.—*Galerius indicatrix* Distant. a. Tegmen;  $\times 18$ . b. Male Genitalia, dorsal view, both pygofers removed;  $\times 45$ . Lettering as in text-fig. 94.

*Male Genitalia.*—(text-fig. 111b). Pygofers narrowly produced in the posterior direction. Sub-genital plates leaf-like, very broad except in the extreme distal region where they are narrow and conical. Parameres very large, fairly broad, more or less pointed at the apices. Basal plates small and rod-like, their prolongation small. Aedeagus long, wide at base, tapering in the distal region to a fine apex, which is surrounded by several long and fairly stout appendages.

*Female Genitalia.*—Valve fairly broad. Pygofers narrow, with numerous stiff hairs. Ovipositor moderately stout.

*Length.*—Female 4.5 mm.; male a little smaller.

*Remarks.*—Distant did not make any remarks on the position of this genus. The general form of the body, the nature of the wing venation and the plan of the male genitalia of the genotype show that *Galerius* belongs to the *Thamnotettix* group of genera.

#### Genus **Maximianus** Distant.

1918. *Maximianus*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 79.

*Genotype.*—*Maximianus notatus* Distant.

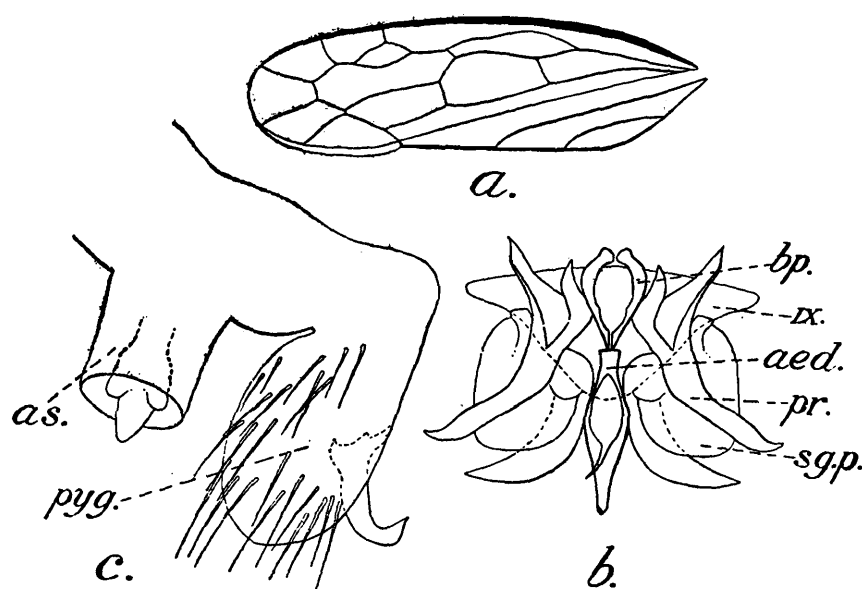
#### **Maximianus notatus** Distant.

(Pl. VII, figs. 9 and 9a.)

1918. *Maximianus notatus* Distant, *op. cit.*, p. 79.

This species was described from specimens collected by Mr. T. V. Campbell at Kodai-kanal, South India. In the collection of the Indian Museum there are four specimens collected from the same locality, by the same collector, and probably at the same time.

Vertex longer than the breadth between the eyes, flat, finely, medially longitudinally sulcate, sub-acute at the apex. Eyes extremely large. Ocelli on the lateral margins of the vertex, close to the eyes, minute, black and conspicuous. Face slightly longer than broad, convex in middle, deflected on the sides; frons large, convex, clypeus rectangular; lorae small, not reaching the apex of the clypeus; genae rather small and narrow, deeply sinuate below the eyes. Pronotum about two-thirds the length of the vertex, almost flat; the anterior margin convex, the posterior almost straight, the lateral margins very short. Scutellum shorter than the pronotum (7:9.5), but not "much shorter" as described by Distant. Tegmina moderately long, hardly extending beyond the posterior extremity of the abdomen in the female, semi-transparent; veins indistinct, venation as illustrated in text-fig. 112*a*, five apical and three ante-apical cells, two cross veins between the sectors. Legs thin and very long.



TEXT-FIG. 112.—*Maximianus notatus* Distant. *a.* Tegmen;  $\times 27$ . *b.* Male Genitalia, dorsal view, both pygofers removed;  $\times 75$ . *c.* Right pygofer, flattened out, dorsal view;  $\times 75$ .  
Lettering as in text-fig. 94.

*Male Genitalia.*—(text-figs. 112*b* and *c*). Pygofers large, broad throughout their length, almost rounded at the posterior margins where they are covered with numerous long hairs and each bears a stout appendage on its inner side. Sub-genital plates broad and thin in the proximal half, narrow, curved, hard and rod-like in the distal region, pointed at the apices. Parameres long, narrow, slightly flattened in the proximal region. Basal plates narrow, curved, their prolongation hardly developed. Aedeagus spindle-shaped, with a strong and broad basal strut.

*Female Genitalia.*—Valve very large, considerably produced in the middle of the posterior margin. Pygofers narrow, with numerous long hairs in the posterior region. Ovipositor moderately stout, not projecting beyond the posterior extremity of the abdomen.

*Length.*—Male 3 mm., female a little longer.

*Remarks.*—In general appearance, the shape of the head, the structure of the genitalia and the nature of the wing venation *Maximianus* is very similar to *Deltocephalus*, and it is very doubtful if it can be regarded as a distinct genus.

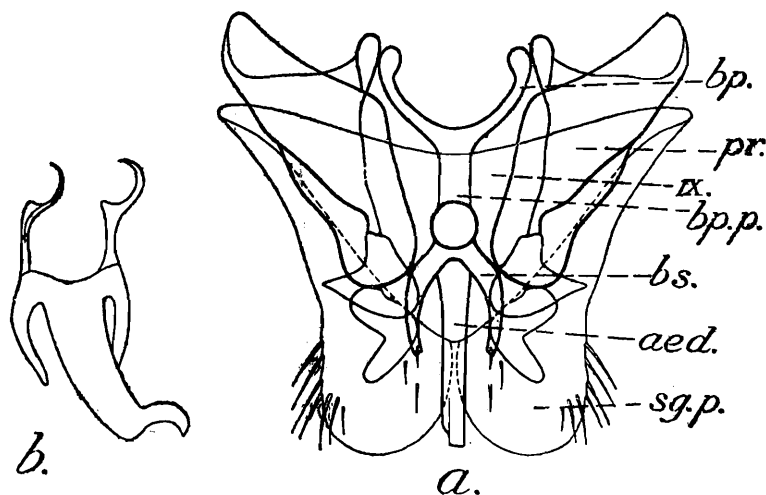
Genus **Leofa** Distant.1918. *Leofa*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 86.*Genotype*.—*Leofa mysorensis* Distant.**Leofa mysorensis** Distant.1918. *Leofa mysorensis*, Distant, *op. cit.*, p. 86.

*Leofa* consists of five species, all described by Distant. The genotype was described from the Mysore State. Distant based the description of the species only on female specimens. In the collection of the Indian Museum there are numerous specimens of both sexes of this species from the type locality.

I have already described and figured a species of *Leofa* which is very closely allied to *L. mysorensis* (*Mem. Ind. Mus.*, XI, p. 27, 1930). I am therefore not appending here the figures of the various organs of the latter species, except those of the genitalia by which the two species can be distinguished.

Vertex almost as long as the breadth between the eyes, flat, faintly medially sulcate at base, anteriorly sub-conical, the lateral margins in line with the outer margins of the eyes. Vertex neither foliaceous nor separated from the face by distinct margins. Ocelli on the lateral margins of the vertex, close to the eyes, black, conspicuous. Face longer than broad, centrally raised, depressed in the lateral regions; frons fairly raised; clypeus small, rectangular; lorae large, reaching the apex of the clypeus; genae moderately expanded. Pronotum slightly smaller than the vertex, the anterior margin distinctly convex, the posterior slightly concave, the lateral margins short. Scutellum short and broad. Tegmina thick, opaque, not extending beyond the middle of the abdomen, with the apical margins truncate. Abdomen broad, tapering in the distal region. Posterior abdominal segments in the male of characteristic shape. Legs long and delicate.

*Male Genitalia*.—(text-fig. 113). Pygofers short, almost truncate at the posterior margin. Sub-genital plates small, broad, leaf-like, broadly rounded at the apices. Parameres large, expanded in the proximal region, thickened and twisted in the distal.



TEXT-FIG. 113.—*Leofa mysorensis* Distant. a. Male Genitalia, dorsal view, both pygofers removed;  $\times 67$ . b. Aedeagus with its basal strut;  $\times 67$ .

Lettering as in text-figs. 94, 95.

Basal plates thin and rod-like, their prolongation moderately developed. Aedeagus short, narrow, styliform, with a well developed basal strut.

*Female Genitalia.*—Valve large, concave at the posterior margin except in the middle where it is slightly produced in the posterior direction. Pygofers small and narrow, with a few stiff hairs in the posterior region. Ovipositor very stout and long, very much projecting beyond the posterior extremity of the abdomen.

*Remarks.*—I have already commented on the position of *Leofa* (*Mem. Ind. Mus.*, XI, p. 26). This genus has only superficial resemblance with *Chiasmus*, to which Distant considered it to be allied. The shape and structure of the vertex, face, pronotum, the plan of the genitalia, etc., are quite distinct in the two genera. The closest allies of *Leofa* seem to be *Driotura* Osb. and Ball and *Doratulina* Melich.; *Leofa* is so similar to the latter, that in my opinion, it hardly deserves the rank of a distinct genus.

#### Genus **Gunhilda** Distant.

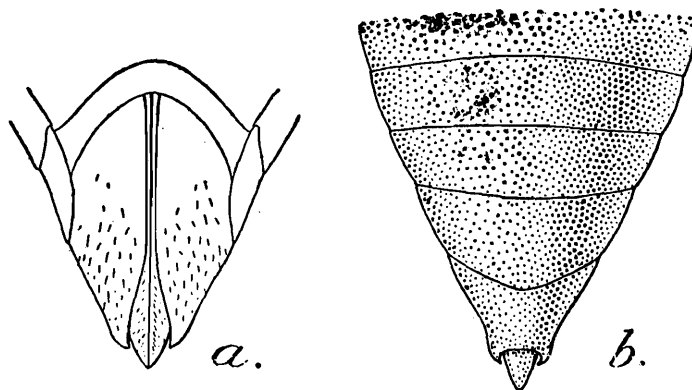
1918. *Gunhilda*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 88.

*Genotype.*—*Gunhilda noctua* Distant.

#### **Gunhilda noctua** Distant.

1918. *Gunhilda noctua*, Distant, *op. cit.*, p. 88.

The genotype was described from specimens collected by Mr. T. V. Campbell from the Nilgiri Hills, South India. The two specimens (both females) of this species in the collection of the Indian Museum are also from the same locality and were obtained by the same collector. Distant identified the sexes wrongly. He thought that he was describing the male, whereas his figures clearly indicate that he had only female specimens before him. The male of this species is yet not known and the female is redescribed in detail below :—



TEXT-FIG. 114.—*Gunhilda noctua* Distant. a. Female Genitalia, ventral view;  $\times 33$ . b. Abdomen (♀), dorsal view;  $\times 32$ .

Vertex short, less than half the breadth between the eyes, flat, faintly, centrally, longitudinally carinate, broadly rounded at the anterior margin. Eyes small, projecting in the lateral direction. Ocelli inconspicuous, at the margins of the vertex, midway between the eyes and the apex. Face broader than long, fairly raised in the region of the frons. Frons flat; clypeus short and rectangular; genae narrow. Pronotum longer than the

vertex, much broader than long, flat, punctate, transversely striate; both the anterior and posterior margins almost straight, the lateral margins fairly long. Scutellum very small. Tegmina thick, coriaceous, opaque, thickly, coarsely punctate, hardly covering the base of the abdomen, truncate or broadly rounded at the apical margins. Abdomen (text-fig. 114b) long, broad at base, distally tapering to a very narrow extremity, highly convex on the dorsal side, flat on the ventral.

*Female Genitalia.*—(text-fig. 114a). Valve narrow, deeply concave at the posterior margin. Pygofers moderately long and broad, covered with minute hairs in the distal region. Ovipositor long, slightly projecting beyond the posterior extremity of the abdomen.

*Remarks.*—The genus *Gunhilda* seems to be closely allied to *Leofa* Dist., which as pointed out above has no affinities with the genus *Chiasmus* as considered by Distant. The position of *Gunhilda* and *Leofa* is near *Doratulina*, *Driotura*, etc.

#### Genus **Paivanana** Distant.

1918. *Paivanana*, Distant, *Faun. Brit. Ind., Rhynch.*, VII, p. 95.

*Genotype.*—*Paivanana indra* Distant.

#### **Paivanana indra** (Distant).

(Pl. VII, figs. 10a-c.)

1908. *Typhlocyba indra*, Distant, *op. cit.*, IV, p. 415.

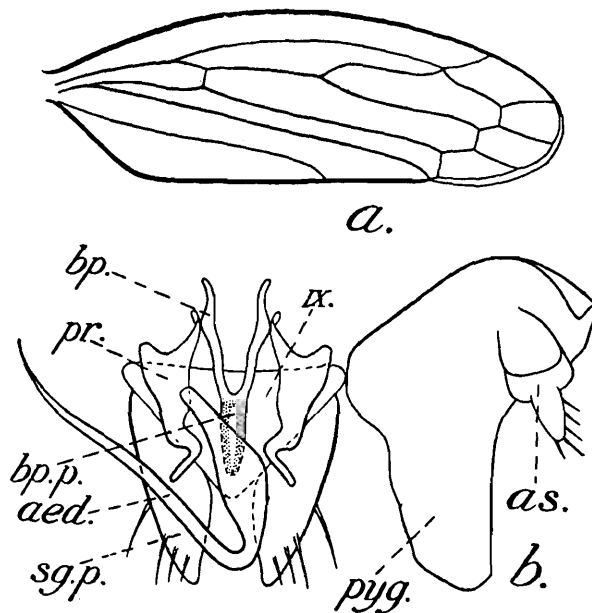
1918. *Paivanana indra*, Distant, *op. cit.*, VII, p. 95.

In 1908 Distant described this species under the genus *Typhlocyba* (sub-fam. Typhlocybinae). In 1918 he erected a new genus, *Paivanana*, for this and another new species which he described. He included the new genus also in the sub-family Typhlocybinae. Some of the specimens on which Distant based the description of the genotype are in the collection of the Indian Museum. A careful examination of these as well as numerous other specimens of this species shows that *Paivanana* has absolutely no affinities with the other genera of Typhlocybinae, but undoubtedly belongs to the sub-family Jassinae. Recently Matsumura<sup>1</sup> has also come to the same conclusion.

Vertex slightly longer than the breadth between the eyes, medially sulcate at base, anteriorly angularly rounded. Ocelli on the lateral margins of the vertex, close to the eyes, minute, black, fairly conspicuous. Eyes very large and prominent. Face distinctly longer than broad, convex in middle, deflected in the lateral regions. Frons fairly broad throughout its length; clypeus broad at base, gradually tapering to a narrow apex; lorae narrow, reaching the apex of clypeus; genae narrow. Antennae very long and thin. Pronotum flat, almost as long as the vertex, convexly produced between the eyes, with the posterior margin straight, the lateral margins very short. Tegmina short and broad, not reaching the posterior extremity of the abdomen in the female, velvety and opaque in the

<sup>1</sup> *Insecta Matsumurana*, VI, No. 4, pp. 190-192 (1932).

region of the clavus; appendix small; veins thin but conspicuous; venation as illustrated in text-fig. 115a, four apical cells. Legs long and thin.



TEXT-FIG. 115.—*Paivanana indra* Distant. a. Tegmen;  $\times 28$ . b. Male Genitalia, dorsal view, left pygofer cut away, right pygofer turned on side and flattened out;  $\times 66$ .  
Lettering as in text-figs. 94, 95.

*Male Genitalia.*—(text-fig. 115b). Pygofers long, produced in the posterior direction. Sub-genital plates small, leaf-like, with a few long and stout marginal hairs. Parameres large, flat, but narrow and rod-like in the apical region. Basal plates long and thin, their prolongation flattened. Aedeagus very long, wide at base, beyond which it is deeply bent and points towards the anterior end of the body.

*Female Genitalia.*—Valve slightly concave at the posterior margin. Pygofers moderately long and broad, with a few hairs in the posterior region. Ovipositor very long and stout, very much protruding beyond the terminal segments of the abdomen.

*Remarks.*—In the form of the head, the nature of the tegminal venation and the structure of the genitalia *Paivanana* comes close to *Aconura*, *Arya*, etc. Matsumura (*op. cit.*) goes further and considers *Paivanana* to be a synonym of *Aconura*.