

ON SOME INDIAN ARAEOPIDAE (=DELPHACIDAE)  
(FULGOROIDEA, HOMOPTERA)

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(With 14 Text-figures)

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I—INTRODUCTION

We owe our knowledge on Indian Araeopidae to the pioneer works of Distant (1906 *et seq.*) and Muir (1921, 1922). As was perhaps customary at that time, the former, who examined majority of the species of these insects from our country, has made little use of male genitalia in his systematic descriptions. Further, he seems to have ignored the nature of the spur, which is also an important character for a study of the taxonomy of araeopids. Muir (1915), therefore, expressed serious doubts regarding the validity of Distant's genera, which he was unable to examine in constructing keys to the genera.

Araeopidae is one of the most neglected families of insects from India. Although 1114 species, belonging to 137 genera are listed all over the world by Metcalf in 1943, only 30 species, under 19 genera, are so far reported from our country. From the fact that 38 species have been recorded under 18 genera from Ceylon, with its very limited geographical boundaries and climatic limits, the vast richness of araeopid fauna awaiting discovery is easily conceivable. There is thus an urgent need for careful taxonomic revision. The present paper aims at fulfilling this objective. The type-localities have been quoted in verbatim from the original description, since the types were not available to the author for study.

*Rec. Zool. Surv. India*, 63 (1—4), 1971

(147)

## II—MATERIAL AND METHODS

The insects were collected from Rajasthan, Delhi, Uttar Pradesh, Orissa, Maharashtra, Madras and Kerala. They were caught in light traps and in electric light domes. The latter method is quite useful, as these insects gather in abundance in the domes.

Dissections of the male genitalia were made under stereoscopic binocular microscope as illustrated by Giffard (1921). All the diagrams were drawn with the help of camera lucida. The length of the insect is intended to indicate the distance from the vertex to the tip of tegmina.

## III—SYSTEMATIC ACCOUNT

Subfamily *Araeopinae* (= *Delphacinae*)

## Tribe I. Tropidocephalini

1. *Tropidocephala signata* (Distant)

(Text-fig. 1)

1912. *Orchesma signata* Distant, *Ann. Mag. nat. Hist.*, London, (8) 9, pp. 192—193. (Type-locality: Peradeniya, Ceylon.)

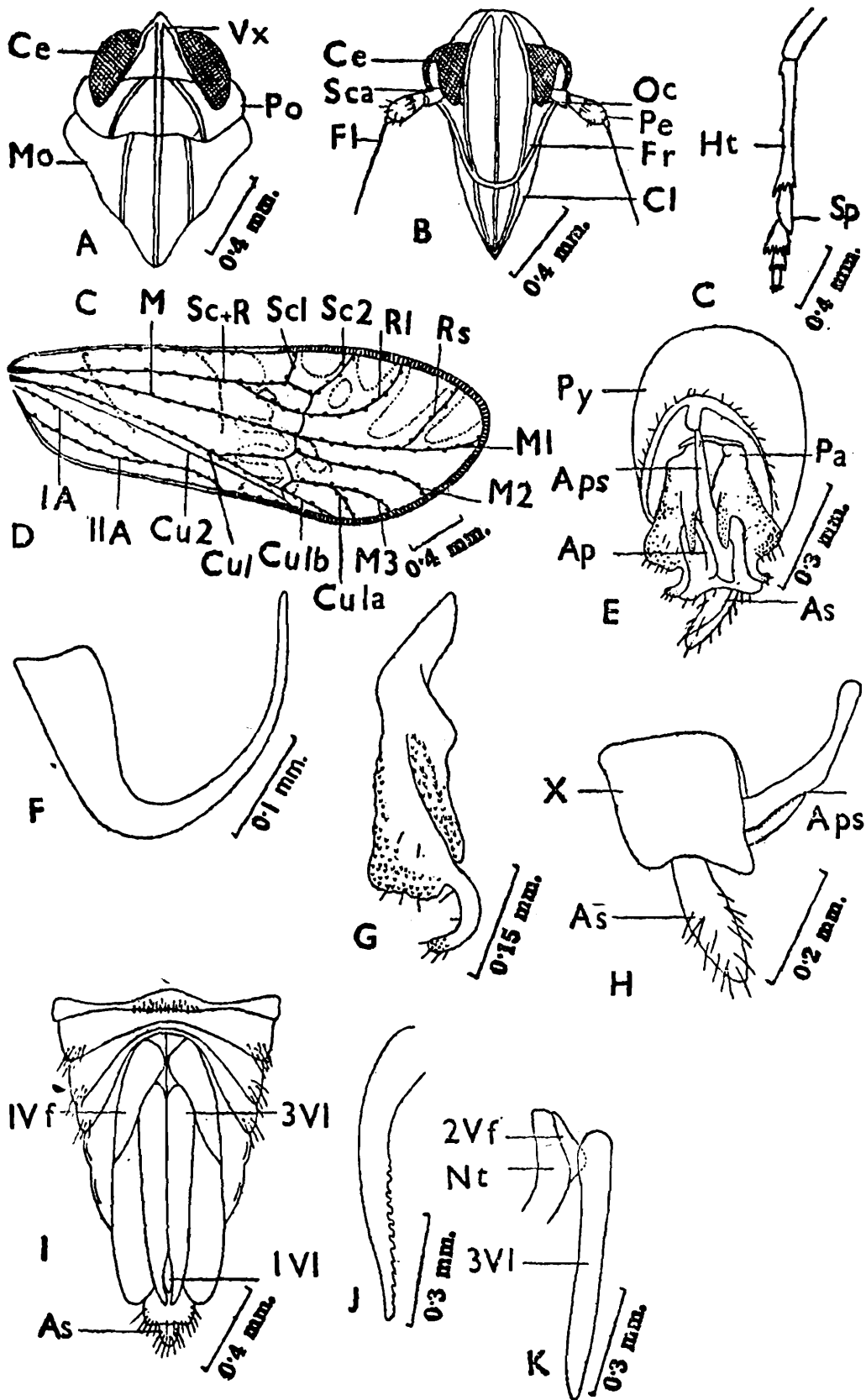
*Material*.—3 exs., Coimbatore, Agriculture College campus,—. xii. 1958. (Coll. M. G. R. Menon).

Length : *male* 3.2—3.8mm.; *female* 3.8—4.4 mm.

Vertex, pronotum and mesonotum ochraceous ; their carinae pale, with narrow margins on either side ; face testaceous red, the median carina pale and the lateral carinae pale ochraceous-brown. Antenna ochraceous, with a castaneous ring near the middle of the pedicel. Tegmen shining pale brown, with the space in between hyaline, an irregular castaneous patch near the middle, provided with profuse macrotrichiae on and adjacent to the veins. Dorsal side and ventrolateral margins of abdomen testaceous red ; rest of abdomen, ventral side of thorax, legs and ventral side of head, excluding the face, ochraceous. Spur cultrate, with the inner surface concave and without teeth. Spines on the hind margin of tarsomere seven, similar to those in other members of *Araeopinae*. Antenna short ; scape annular, only half the length of pedicel ; the latter with profuse hair growth, the hair on the castaneous ring of pedicel long and matching in colour. Vertex turbinate—triangular, with curved lateral sides. The lateral carinae of frons arcuate, mediolongitudinal carina not furcate ; vertex, pro- and mesonota tricarinate, carinae reaching the hind margin.

Genitalia complicated ; ventromedian margin of pygofer slightly produced posteriorly, anal angles short and extending only upto the proximal part of the tenth segment ; diaphragm without armature ; aedeagus periandrum tubular, curved semi-circularly, swollen at the base but gradually narrowed to the tip, projects out through a ring formed by the union of anal processes ; paramere with a basal prong bearing another curved projection at the distal end of the inner margin, outer margin wavy, outer surface with a number of small projections ; after the formation of the ring the fused anal processes continue anteriorly as a single, ventrally grooved structure, the periandrum rests in this groove. Ovipositor

extends posteriorly upto the hind margin of the ninth abdominal segment; no distinct subgenital plate; first valvifer broad basally; second valvulae serrate for more than half of their length, serrations large.



TEXT-FIG. 1—*Tropidocephala signata* (Distant)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventrolateral view of pygofer. (F) Aedeagus periandrum. (G) Lateral view of paramere. (H) Lateral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Lateral view of second valvula. (K) Lateral view of third valvula.

2. *Purohita cervina* (Distant)

(Text-fig. 2)

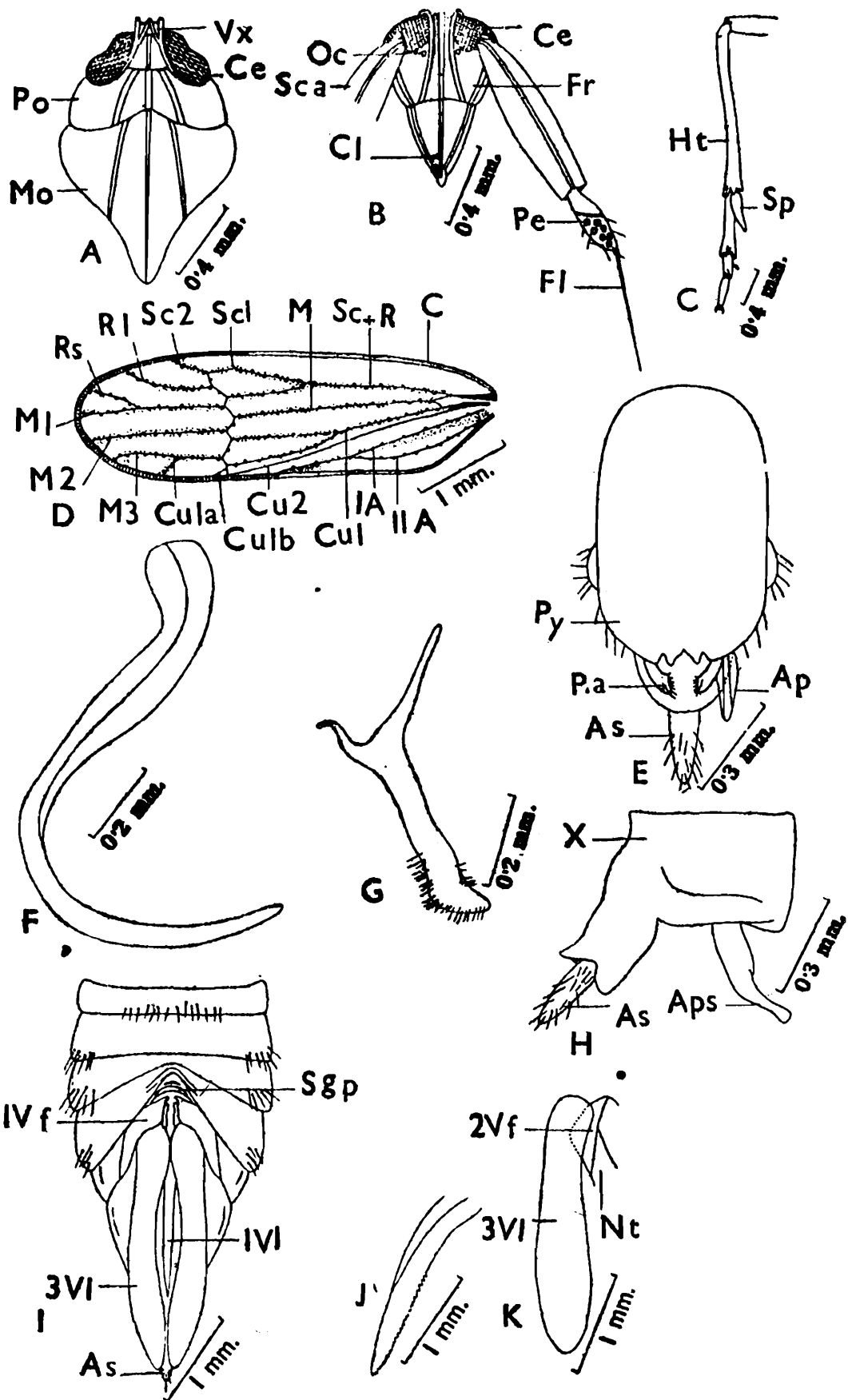
1906. *Purohita cervina* Distant, *Fauna Brit. India*, Rhynchota, 3, pp. 470—471, fig. 257. (Type-locality : Ceylon.)

*Material*.—(i) 2 exs., Calicut, Medical College campus, 18—21. ix. 1961. (Coll. A. N. A. Johnny). (ii) 6 exs., Coimbatore, Agriculture College campus, xii. 1958. (Coll. M. G. R. Menon).

Length : *male* 5.5—6.1 mm. ; *female* 6.7—7.3 mm.

Ochraceous or pale ochraceous-brown, lateral margins of vertex pale castaneous frons with a pale castaneous transverse mark near the lower part of the eyes ; clypeus pale ochraceous-brown ; lateral areas of pronotum a little darker than the middle region. Antennae ochraceous, sprinkled with testaceous. Tegmina subhyaline, along the veins brownish-ochraceous, with profuse macrotrichiae. Spur cultrate, with the inner surface concave and without teeth along the hind margin. The hind margin of first tarsomere with only six spines instead of seven as found in other Araeopinae. Scape much larger than the pedicel ; the former foliaceous and triangular in cross section, while the latter foliaceous only. Vertex longer than broad. Lateral carinae of pronotum, vertex and frons form deep keels, mediolongitudinal carina of frons unbranched ; pro- and mesonota tricarinate, all reach the hind margin.

Genitalia complicated ; pygofer elongated, medially constricted, anal angles short reaching upto the base of the tenth abdominal segment, ventromedian margin considerably produced posteriorly forming a cover over the aedeagus and parameres and having one median wide and two lateral incisions, thus forming two small conical projections ; diaphragm without armature ; aedeagus periandrum sickle-shaped, subcylindrical, basally swollen, with a ridge at its lateral side throughout its length, projecting through a ring formed by the fusion of anal processes ; parameres small, laterally flattened with a swollen bifurcated base and swollen inner margin ; the fused tenth and eleventh segments long, bearing a long anal style ; anal processes fuse to form a ring which continue distally as a single structure. Ovipositor extends upto the middle of the anal style ; subgenital plate small and transversely elongated ; first valvifer with a small proximal projection ; second valvulae serrate for more than half of their length ; third valvula highly developed.



TEXT-FIG. 2—*Purohita cervina* (Distant)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Aedeagus perianthium. (G) Lateral view of paramere. (H) Lateral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Ventro-lateral view of second valvula. (K) Lateral view of third valvula.

## Tribe II. Araeopini (=Delphacini)

3. *Perkinsiella insignis* (Distant)

(Text-fig. 3)

1912. *Pundaluoya insignis* Distant, *Ann. Mag. nat. Hist.*, London, (8) 9, p. 190. (Type-locality : Bengal. Pusa. Balighai, near Puri, Orissa. Bassein Fort, Bombay).

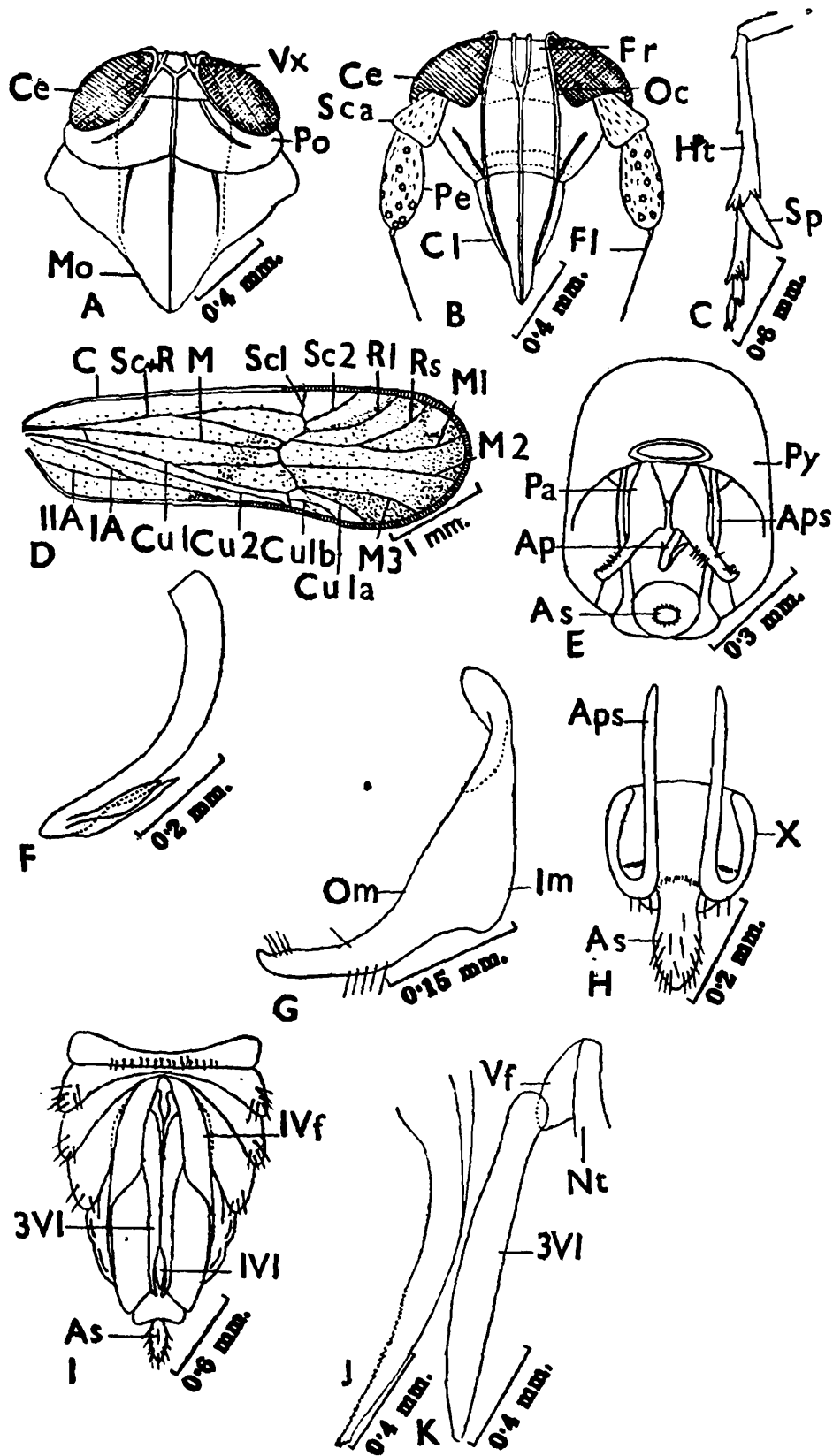
*Material*.—(i) 3 exs., Calicut, Medical College campus, 18—21. ix. 1961. (Coll. A. N. A. Johnny). (ii) 6 exs., Coimbatore, Agriculture College campus, xii. 1958. (Coll. M. G. R. Menon).

Length : *male* 4.5—5.0 mm. ; *female* 5.3—5.8 mm.

Creamy or ochraceous-white in the mediolongitudinal area from the vertex to the posterior end of mesonotum (Fig. A, marked in dashes) ; remaining part of pro- and mesonota black or castaneous. Tegmen with a creamy-white posteroproximal border, as if extending from the mesonotum and terminating a little in front of the region where the Y-vein joins the outer border, subhyaline, major part shaded black, castaneous or brown and even rarely pale brown. Abdomen dorsally black, castaneous or brown with ochraceous marks ; ventral side of head (Fig. B, the area of ochraceous colour marked in dashes), thorax and abdomen follow the same colour pattern, except for the mesothorax being completely ochraceous ; ochraceous patches of abdomen varying. Males invariably darker than females. Spur foliaceous with a large number of teeth (35-45). Scape a little longer than half the length of pedicel ; both flattened ; the former nearly triangular. Vertex a little wider than long. Mediolongitudinal carina of frons furcate near the lower margin of eyes ; pronotum tricarinate, the lateral carinae divergently curved posteriorly and not reaching the hind margin ; mesonotum also tricarinate, the lateral carinae stop a little in front of the posterior border.

Pygofer wider in the middle of the opening, the opening broader than long, anal angles rather angular, the ventromedian margin projected into a plate-like structure with each apical corner drawn out into a short, flat spine ; diaphragm without armature ; aedeagus periandrum tubular, arched, ornamented with two large spines at the posteroventral margin, spines directed posterolaterally, one on either side and of unequal length ; parameres broad in middle and divergently curved posterior to the swelling, the outer margin of the posterolateral angle pointedly produced laterally, the outer margin wavy towards the distal region ; the anal processes highly developed and extend slightly into the ventral margin of the opening of pygofer, they arise basally wide apart and uniformly

thickened throughout their length. Ovipositor stops a little short of the ninth abdominal segment ; no distinct subgenital plate ; first valvife pointed basally ; second valvulae serrate for less than half of their length.



TEXT-FIG. 3—*Perkinsiella insignis* (Distant)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Aedeagus perianthium. (G) Ventral view of paramerel. (H) Ventral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Ventro-lateral view of second valvulae. (K) Lateral view of third valvula.

4. *Perkinsiella sinensis* (Kirkaldy)

(Text-fig. 4)

1907. *Perkinsiella sinensis* Kirkaldy, *Bull. Hawaii Sug. Ass. ent. Se.*, Honolulu, 3, p. 138, pl. 12, figs. 14 & 15. (Type-locality : China).

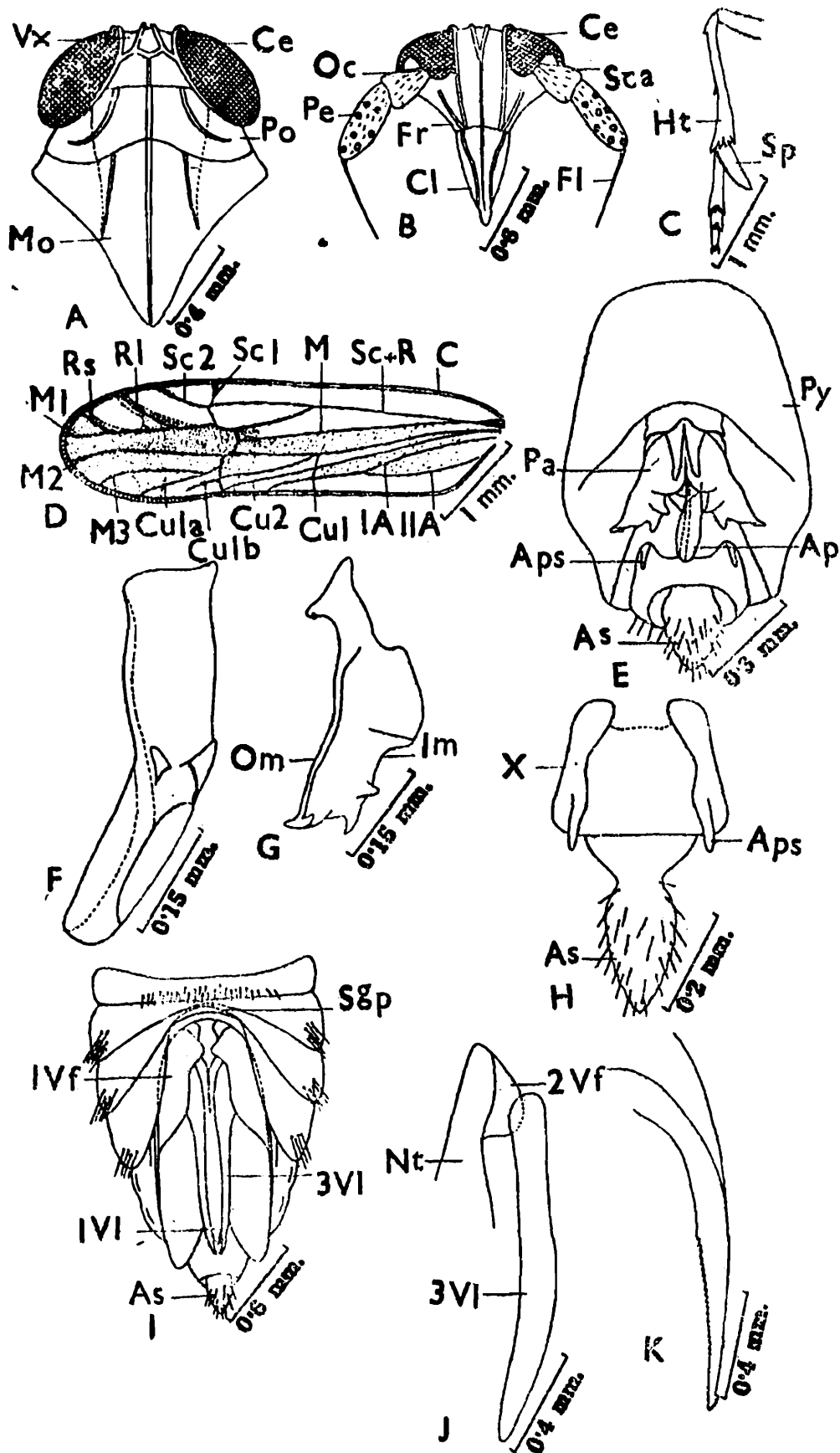
*Material*.—15 exs., Coimbatore, Agriculture College campus, xii 1958. (Coll. M. G. R. Menon).

Length : *male* 4.5—5.0 mm.; *female* 5.3—5.8 mm.

The pattern of colouration essentially the same as in *Perkinsiella insignis*, but always lighter ; castaneous, brown or pale brown with dominant ochraceous markings. Occasionally, the female specimens almost wholly ochraceous. Spur foliaceous, with a large number of teeth (35—45). Scape a little longer than half the length of pedicel ; both of them flattened ; the basal one nearly triangular. Vertex wider than long. Carination similar to that of *Perkinsiella insignis*.

Pygofer wider towards the middle of opening ; opening broader than long, anal angles angular covering the tenth abdominal segment, ventromedian, margin produced into two large divergently curved spines ; diaphragm without armature ; aedeagus periandrum stout, subtubular with a thick ridge along the ventromedian line, constricted twice, one immediately after the base and another towards the middle, curved (about 45°) ventrally after the second constriction, decorated with two small, unequal, triangular, anterolaterally directed spines ; parameres swollen medially and appose each other, distal to this they diverge, terminally end in two projections, the inner one spine-like and the outer double headed, basal to these each bearing a third, ventrally directed projection near the inner margin, outer margin of the paramere wavy ; anal processes small, directed posteriorly and well apart basally. Ovipositor stops a little short of the hind margin of the ninth abdominal segment ; subgenital plate narrow and transversely elongated ; first valvifer broad basally ; second valvulae serrate for more than half their length.





TEXT-FIG. 4—*Perkinsiella sinensis* (Kirkaldy)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Aedeagus perianthrum. (G) Ventral view of paramere. (H) Ventral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Lateral view of third valvula. (K) Ventrolateral view of second valvulae.

5. *Phyllodinus pulchellus* (Distant)

(Text-fig. 5)

1912. *Pundaluoya pulchella* Distant, *Ann. Mag. nat. Hist.*, London, (8)9, p.190.  
 (Type-locality: Peradeniya and Trincomalee, Ceylon. Bengal. Pusa.  
 Chapra, Bihar. Tenmalai, W. Ghats. Bassein Fort, Bombay).

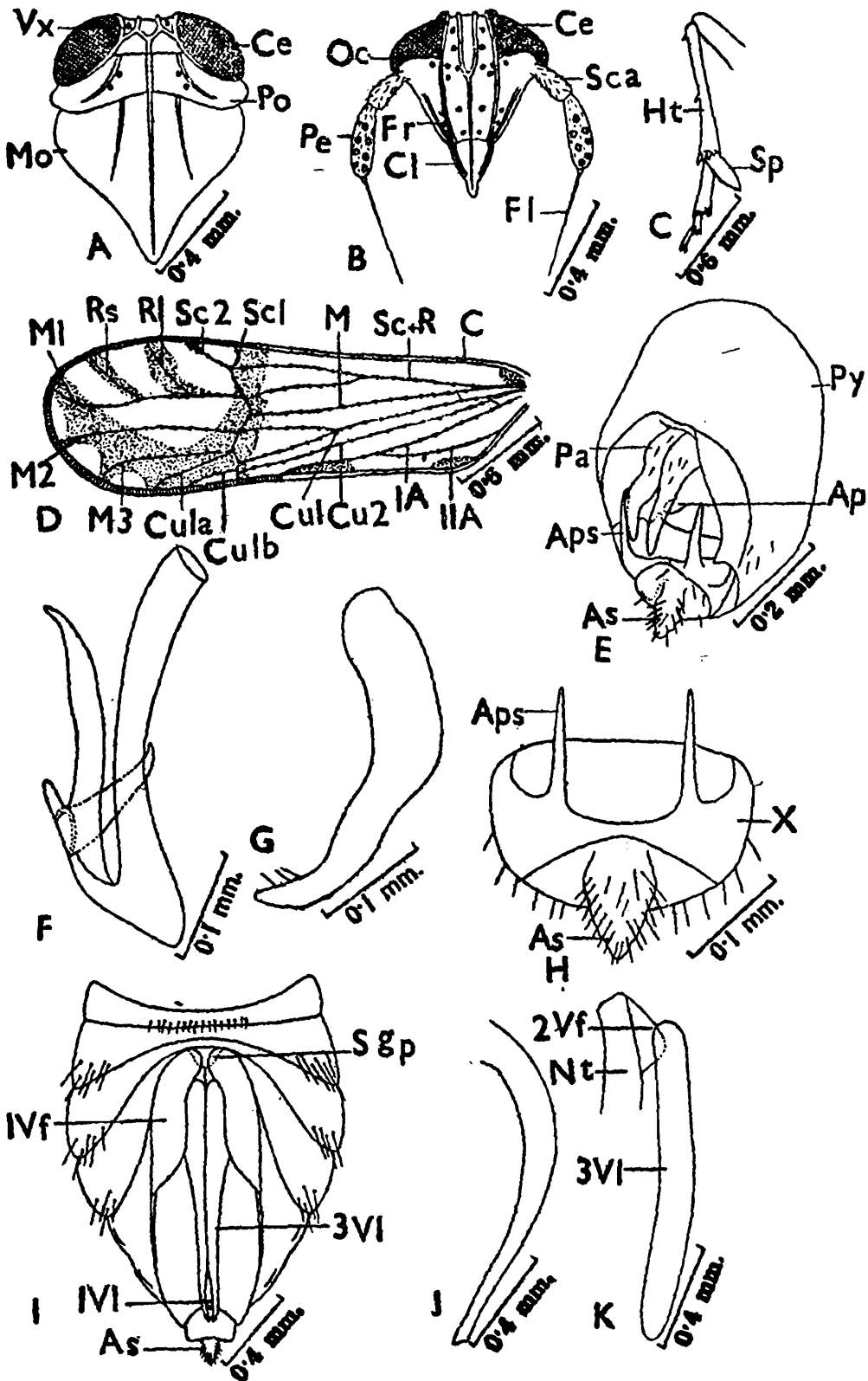
*Material*.—(i) 7 exs., Coimbatore, Agriculture College campus, xii. 1958. (Coll. M. G. R. Menon). (ii) 2 exs., Poona, University campus, 10. iii. 1960. (Coll. Joseph).

Length : *male* 3.5—4.0 mm.; *female* 4.3—4.8 mm.

Black with ochraceous marks. Vertex ochraceous suffused with black; pronotum, vertex and frons speckled with ochraceous (Figs. 5A,B); pro- and mesonota black, carinae ochraceous; a transverse ochraceous band on the ventral side passing from one side of thorax to another across the head at the junction of frons and clypeus. Sometimes the head, pro- and mesonota castaneous instead of black. Scape black, pedicel ochraceous-brown. Legs ochraceous or castaneous with black streaks. Tegmen hyaline with fuscous marks, veins thickly speckled with fuscous at the base of macrotrichiae, (Cu2) also provided with macrotrichiae. Spur foliaceous with a large number of small teeth (25—30). Anterior and intermediate femora and tibiae foliaceous. Antenna long; scape longer than half the length of pedicel. Vertex wider than long, head as broad as pronotum. The median carina of frons furcate near the middle; pro- and mesonota tricarinate, the lateral pronotal carinae divergingly curved under the eyes, not reaching the posterior margin, the lateral carinae of mesonotum stop a little in front of the hind margin.

Pygofer rather globular, the opening longer than broad, anal emargination angular and covers only the basal half of the tenth segment, the ventromedian margin slightly produced into a lip-like projection; the diaphragm without armature, but its dorsomedian margin a little more thickly sclerotised than the remaining part; aedeagus periandrum tubular, narrow towards the middle from both the sides and ventrally curved, distally much swollen and the dorsal margin decorated with two large unequal spines and a small projection, of these one spine very large, curved and recurved and directed anterolaterally extending three-fourths the length of periandrum, the other spine comparatively small and slightly curved; the parameres subcylindrical, swollen and almost parallel to each other, basally much swollen and constricted towards the middle; the combined tenth and eleventh segments large with

the base of anal processes apart, anal processes narrow and pointed. The ovipositor stops a little in front of the hind margin of the ninth segment ; the subgenital plate conical ; the first valvifer broad basally ; the second valvulae serrate for lesser than half of their length.



TEXT-FIG. 5—*Phyllodinus pulchellus* (Distant)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventrolateral view of pygofer. (F) Aedeagus periandrum. (G) Ventrolateral view of paramere. (H) Ventral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Lateral view of second valvulae. (K) Lateral view of third valvulae.

6. *Phyllodinus sauteri* (Muir)

(Text-fig. 6)

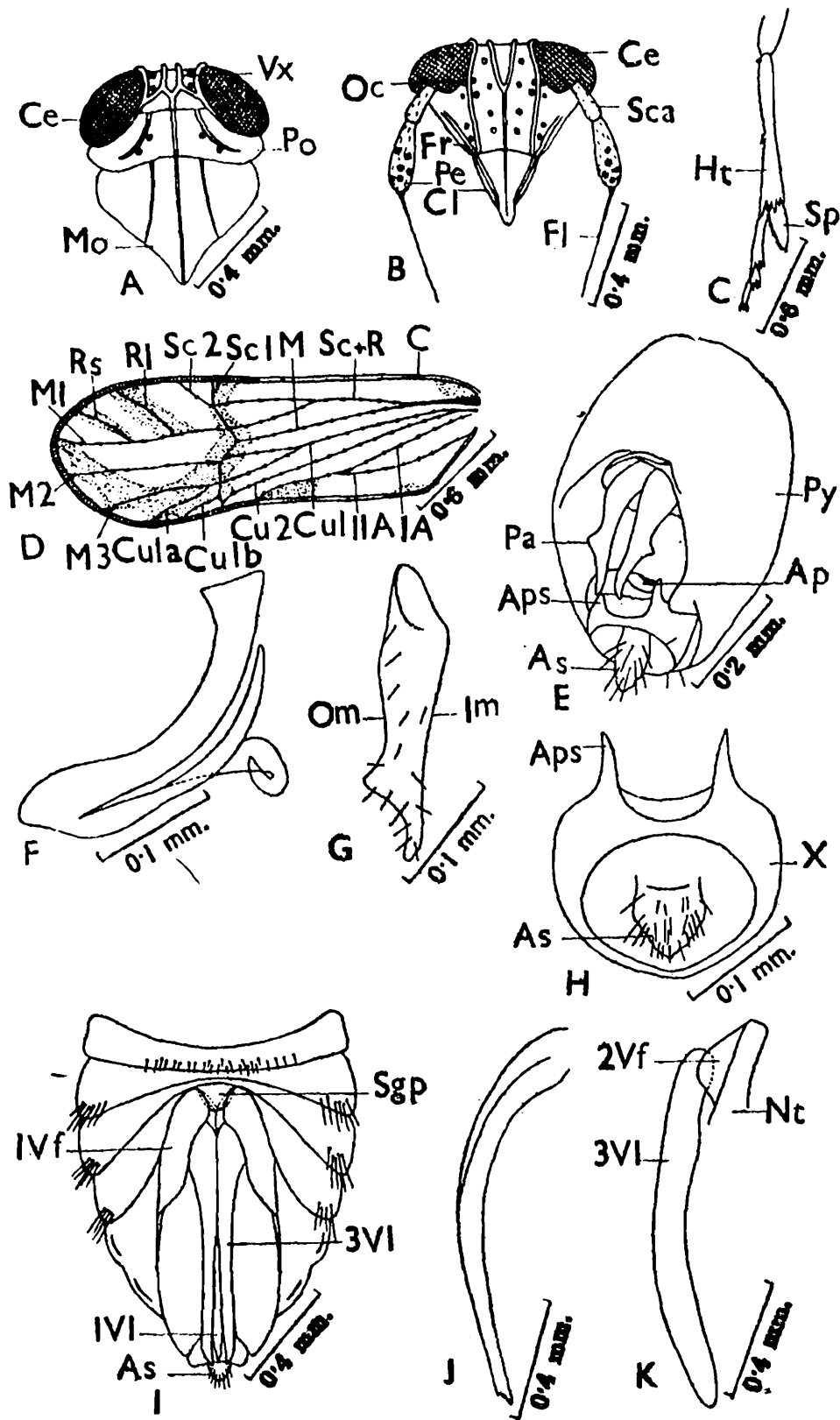
1917. *Phyllodinus sauteri* Muir, *Proc. Hawaii. ent. Soc.*, Honolulu, 3 (4), pp. 319—320, pl. 5, figs. 25, 25a. (Type-locality : Dainakko Formosa).

*Material*.—6 exs., Calicut, Medical College campus 18—21.ix. 1961. (Coll. A. N. A. Johnny).

Length : *male* 2.9—3.3 mm.; *female* 3.1—3.5 mm.

Colouration similar to that of *Phyllodinus pulchellus*. Spur foliaceous with a number of teeth (19—25). Anterior and intermediate femora and tibiae foliaceous. Antenna long; scape longer than half the length of pedicel. Vertex wider than long, head as broad as pronotum. Carination similar to that of *Phyllodinus pulchellus* except for the lateral mesonotal carinae which reach the hind border.

Pygofer rather globular, opening longer than broad, the anal emargination short and extends only upto the base of the tenth segment, the ventromedian margin produced into a lip-like projection, more conspicuous than *Phyllodinus pulchellus*; the diaphragm without armature, its dorsomedian margin thickly sclerotised than the remaining part; the aedeagus perianth tubular, arched ventrally but wider at both ends, a large bifurcated spine at the posteroventral margin, one of the bifurcations runs parallel to the perianth proximally and extends more than three-fourths the length of the tube, the other curved and recurved and directed externally; parameres small with swollen bases; parallel to each other, each with an outer prong distally and tapering posteriorly; fused tenth and eleventh segments large, anal processes short and conical. Ovipositor extends upto the posterior end of the tenth abdominal segment or a little beyond that; subgenital plate broader than *Phyllodinus pulchellus*; the first valvifer broad basally; the extension of the serration of the second valvulae similar to that of *Phyllodinus pulchellus*.



TEXT-FIG. 6.—*Phyllodinus sauteri* (Muir)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventrolateral view of pygofer. (F) Aedeagus periandrum. (G) Ventral view of paramere. (H) Ventral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Ventrolateral view of second valvulae. (K) Lateral view of third valvulae.

7. *Peregrinus maidis* (Ashmead)

1890. *Delphax maidis* Ashmead, *Psyche, Camb., Mass., Mass*, 5, pp. 321—324. (*Type-locality* : Florida).

For figures refer Mathur & Joseph (1961 *a, b*) and Joseph (1961*b*).

*Material*.—(i) 2 exs., Trivandrum, Agriculture College campus, 8. x. 1960 ; (ii) 11 exs., Trichur District, Valapad, 15—22. v. 1960; (iii) 3 exs., Trichur District, Ollur, 23.v. 1960 ; (All Coll. *Joseph*). (iv) 5 exs., Calicut, Medical College campus, 18—21. ix. 1961 ; (Coll. *A.N.A. Johnny*). (v) 157 exs., Coimbatore, Agriculture College campus, xii. 1958 ; (Coll. *M. G. R. Menon*). (vi) 7 exs., Poona, University campus, 7—10. iii. 1960 ; (vii) 3 exs., Agra, Balwant Rajput College campus, 26. vii. to 4. ix. 1962; (viii) 5 exs., Delhi, Indian Agricultural Research Institute campus, 12.x. 1960; (All Coll. *Joseph*).

Length : *male* 3.5—3.9 mm. ; *female* 4.3—4.7 mm.

Vertex pro- and mesonota ochraceous ; their carinae pale, the area between median and lateral carinae with testaceous fasciae ; the lateral margins of pro- and mesonota piceous or castaneous ; ventrally head piceous. Antennae ochraceous, with the distal part of the scape and basal and terminal parts of pedicel piceous or piceous-brown. Tegmen hyaline with castaneous patches distally. Ventrally pro- and mesothorax with castaneous marks, femur and distal part of fore and middle legs, occasionally the hind leg too, piceous, remaining part ochraceous ; metatergum and the anterior two or three terga of abdomen ochraceous with castaneous or dark marks ; remaining part of abdomen castaneous or black with posterior margin, dorsomedian margin and lateral sides of segments ochraceous. Generally female lighter coloured, ninth segment and ovipositor ochraceous to a greater extent. Spur foliaceous with a number of teeth (19—24). Antenna long ; pedicel longer than scape. [Refer foot-note, Mathur & Joseph (1961*a* p.5)]. Vertex wider than long, base wider than apex. Median carina of frons furcate towards the base ; a thin mediolongitudinal carina on vertex ; pro- and mesonota tricarinate, all the carinae reach the hind margin, the lateral carinae converge posteriorly.

Pygofer globular, opening longer than broad, anal angles short, acute and cover only the base of the tenth segment ; diaphragm without armature ; aedeagus periandrum tubular, elongated, arched medially, narrow and gradually enlarging towards the base, it bears

five or six basally directed spines at the distal region, of these the distal one longest and sometimes branches basally, the remaining ones small and gradually reduced in length from the second to the last ; parameres small, sickle-shaped, abruptly narrow basally behind the diaphragm and with three distal projections, the distal one largest, anal processes absent. Ovipositor extends upto the tenth segment ; subgenital plate small and conical ; first valvifer project internally towards the middle ; second valvulae serrate for two-thirds of their length.

### 8. *Sardia rostrata* (Melichar)

(Text-fig. 7A-C)

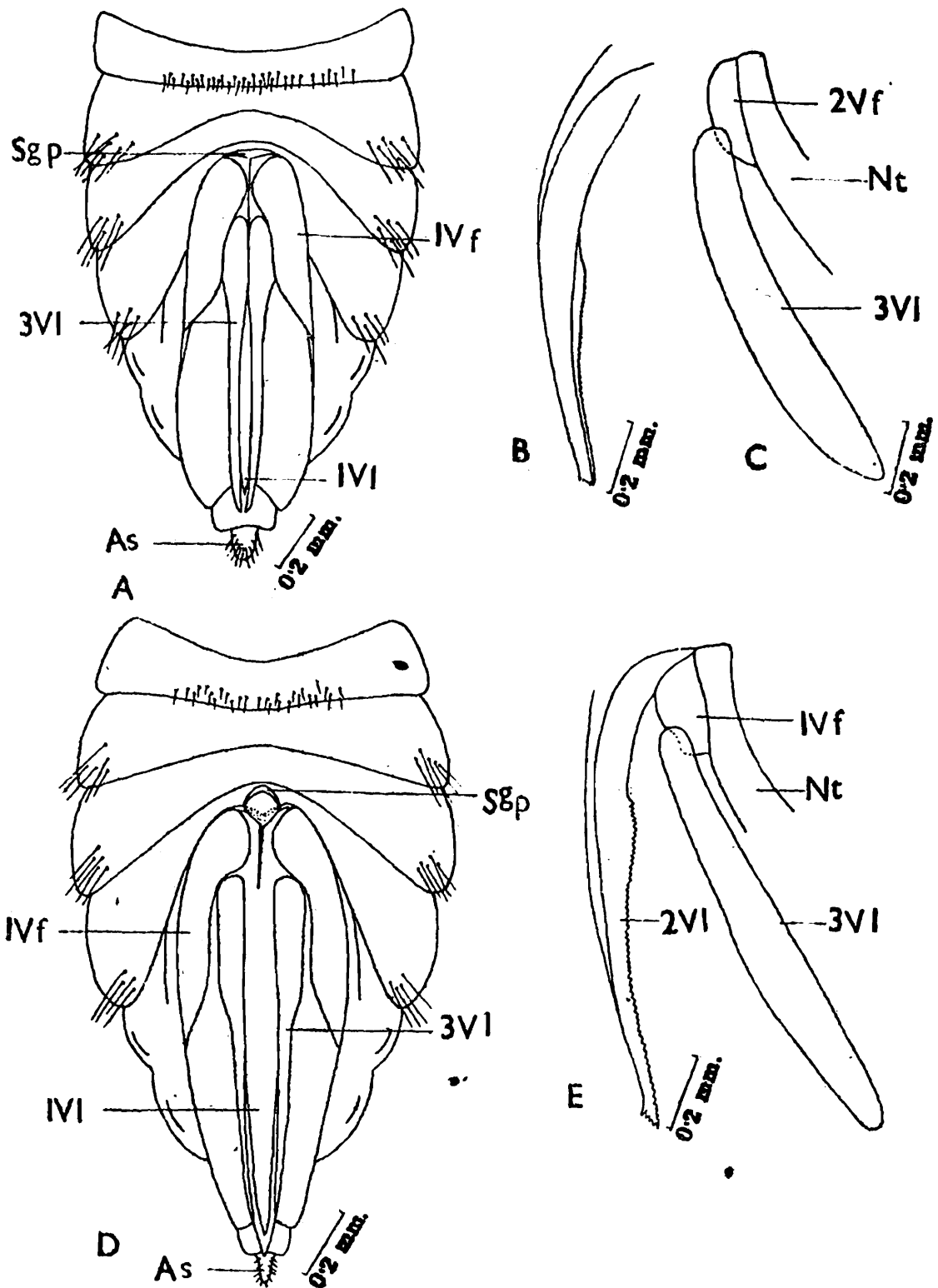
1903. *Sardia rostrata* Melichar, *Homoptera Fauna Ceylon*, pp. 96—97, pl. 2, fig. 4. (Type-locality : Henaratgoda, Ceylon).

*Material*.—(i) 2 exs., Trivandrum, Agriculture College campus, 8. x. 1960 ; (ii) 1 ex., Kaladi, Church campus, 26. v. 1960 ; (iii) 8 exs., Trichur District, Valapad, 15—22. v. 1960 ; (iv) 1 ex., Trichur District, Ollur, 25. v. 1960 ; (All Coll. *Joseph*). (v) 5 exs., Calicut, Medical College campus, 18-21. ix. 1961 ; (Coll. *A. N. A. Johny*). (vi) 53 exs., Coimbatore, Agriculture College campus, xii. 1958 ; (Coll. *M. G. R. Menon*). (vii) 4 exs., Poona, University campus, 7—10. iii. 1960 ; (viii) 2 exs., Ajmer, Government College campus, 10. viii. 1960 ; (ix) 5 exs., Abu Road., near Railway Station, 26. ix. 1959 ; (x) 2 exs., Mount Abu, 27. ix. 1959 ; (xi) 1 ex., Agra, Balwant Rajput College campus, 25. iii. 1960 ; (xii) 7 exs., Agra, Balwant Rajput College campus, 15. viii. to 9. ix. 1962 ; (xiii) 2 exs., Delhi, Indian Agricultural Research Institute campus, 12. x. 1960 ; (All Coll. *Joseph*). (xiv) 1 ex., Cuttack, Medical College campus, 13. viii. 1961 ; (Coll. *C. V. J. Varghese*).

For figures and description of males refer Joseph (1961a).

The specimens from Kerala darker than from other areas.

The ovipositor extends posteriorly a little beyond the ninth abdominal segment ; subgenital plate narrow and transversely elongated ; first valvifer broad basally ; second valvulae serrate nearly half of their length, serrations minute, innumerable and located on a well developed ridge.



TEXT-FIG. 7 (A-C). *Sardia rostrata* Melichar ; (D, E) *Liburnia furcifera* (Horvath)

(A) Ventral view of female abdomen. (B) Ventrolateral view of second valvulae. (C) Lateral view of third valvula. (D) Ventral view of female abdomen. (E) Ventrolateral view of second valvulae and lateral view of third valvula.

### 9. *Liburnia furcifera* (Horvath)

(Text-fig. 7, D & E)

1899. *Delphax furcifer* Horvath, *Természetr. Fiiz*, Budapest, 22, p. 372, fig. 1  
 (Type-locality : Yesso, Japan).

For figures of male refer Mathur & Joseph (1961c).

*Material*.—(i) 2 exs., Trivandrum, Agriculture College campus, 8. x. 1960 ; (ii) 2 exs., Kaladi, Church campus. 26. v. 1960 ; (iii) 11 exs.,



Trichur District, Valapad, 15—22. v. 1960 ; (iv) 1 ex., Trichur District, Ollur, 24. v. 1960 ; (All Coll. *Joseph*). (v) 36 exs., Coimbatore, Agriculture College campus, xii. 1958; (Coll. *M. G. R. Menon*). (vi) 1 ex., Poona, University campus, 7. iii. 1960 ; (vii) 55 exs., Ajmer, Government College campus, 20. vii. to 16. ix. 1959; (viii) 70 exs., Ajmer, Government College campus, 12. viii. to 15. ix. 1961 ; (ix) 6 exs., Abu Road, near Railway Station, 26. ix. 1966 ; (x) 17 exs., Jaipur, near Railway Station, 29. ix. to 2. x. 1966 ; (xi) 1 ex., Pilani, Birla College campus, 10. vii. 1961 ; (xii) 3 exs., Agra, Balwant Rajput College campus, 25. iii. 1960 ; (xiii) 34 exs., Agra, Balwant Rajput College campus, 15. vii. to 21. ix. 1962 ; (xiv) 9 exs., Delhi, Indian Agricultural Research Institute campus, 12. x. 1960 ; (All Coll. *Joseph*). (xv) 3 exs., Cuttack, Medical College campus 13. vii. 1961; (Coll. *C. V. J. Varghese*).

Length: *male* 2.7—3.2 mm. ; *female* 3.7—4.2 mm.

In profile almost wholly ochraceous dorsally. A creamy-white medio longitudinal area from the transverse carina of head to hind border of mesonotum ; external to this the mesonotum black. Tegmina subhyaline, tinted with brownish-ochraceous at the posterior half which becomes a little darker apically and also beneath the fused first and second anal veins. Antennae, carinae of frons, clypeus and legs ochraceous. Body beneath dark brown with ochraceous marks in male, in female almost wholly ochraceous. Spur foliaceous with a large number of teeth (25—30). Scape almost equal in length to the pedicel. Vertex longer than broad, apex narrower than base. Vertex with a mediolongitudinal carina behind the transverse carina, the latter carina dividing the posterior region of vertex into two pentagonal areas ; pro- and mesonotum tricarinate, the lateral carinae of pronotum divergingly curved posteriorly and fade away before reaching the hind border.

Pygofer rather elongated, opening longer than broad, the ventro-median margin produced a little posteriorly, the anal angles rather pointed ; armature of diaphragm U-shaped and thickly sclerotised ; aedeagus periantrum tubular, basally enlarged, two rows of anteriorly directed spines meeting basally, one row starting from the external opening while the other well posterior to it, the spines gradually decrease in size posteriorly ; the paramere of peculiar scapula-like shape, somewhat circular at the base, abruptly bulged in middle, prominently internally, distally bifid ; the anal processes divergingly curved, bases well apart. The ovipositor extends upto the base of anal style ; subgenital plate small, lightly sclerotised and conical ; the first valvifer basally broad, inner margin incurved medially ; second valvulae serrate for three-fourths of their length.

10. *Liburnia pallescens* (Distant)

(Text-fig. 8)

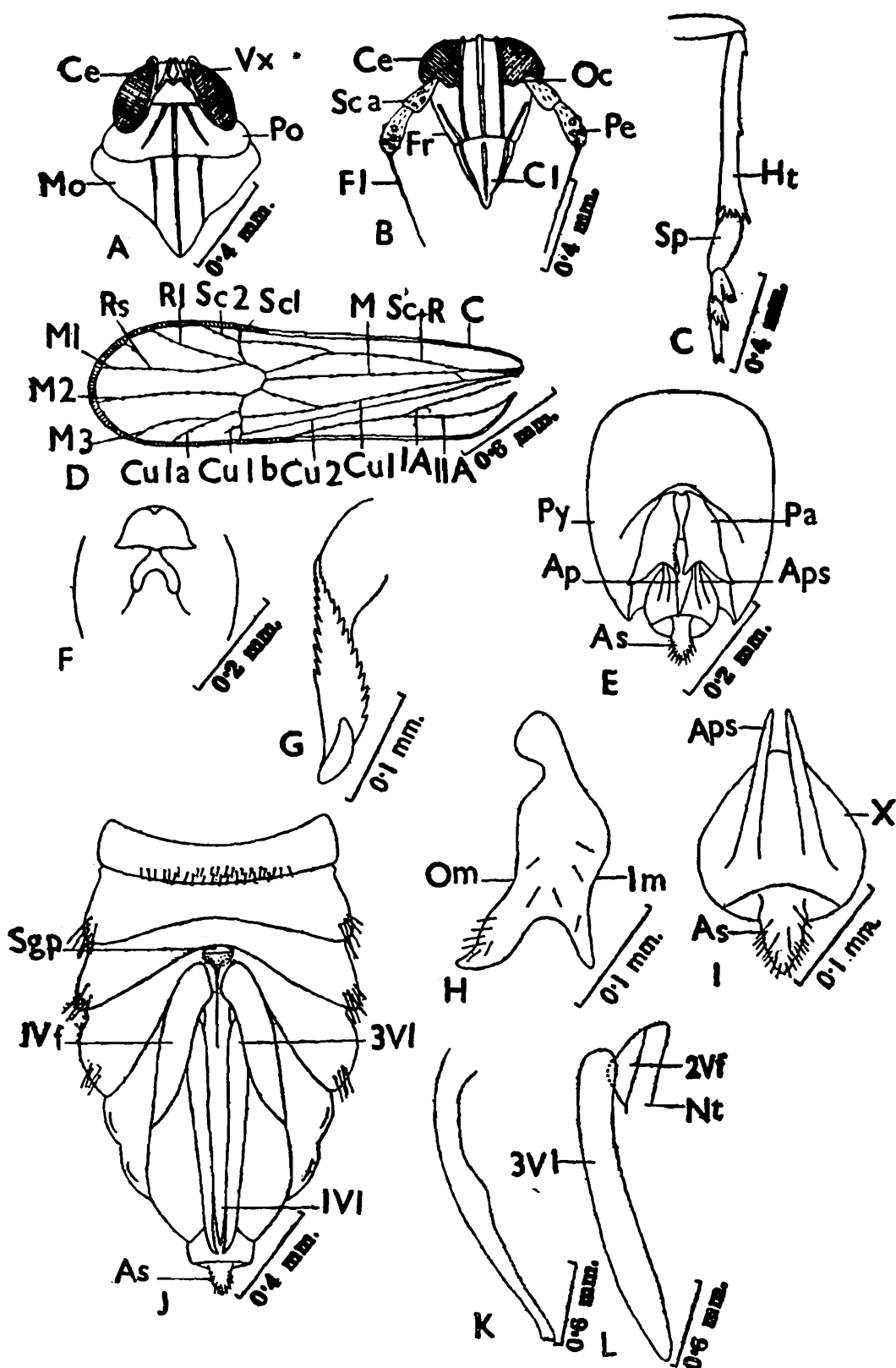
1912. *Sogata pallescens* Distant, *Ann. Mag. nat. Hist.*, London, (8) 9, p. 190.  
(Type-locality : Galle, Ceylon. Chapra, between Bopore and Rampore Haut, Bihar, Calcutta).

*Material*.—(i) 1 ex., Trivandrum, Agriculture College campus, 8. x. 1960 ; (ii) 2 exs., Kaladi, Church campus, 26. v. 1960 ; (iii) 5 exs., Trichur District, Valapad, 15—18. v. 1960 ; (All Coll. *Joseph*) ; (iv) 4 exs., Calicut, Medical College campus, 18—21. ix. 1961 ; (Coll. *A. N. A. Johnny*.) (v) 63 exs., Coimbatore, Agriculture College campus,—xii. 1958 ; (Coll. *M. G. R. Menon*). (vi) 6 exs., Poona, University campus, 7—10. iii. 1960 ; (vii) 31 exs., Ajmer, Government College campus, 20. viii. to 16. ix. 1959 ; (viii) 58 exs., Ajmer, Government College campus, 12. viii. to 15. ix. 1961 ; (ix) 1 ex., Abu Road, near Railway Station, 26. ix. 1959 ; (x) 1 ex., Mount Abu, 27. ix. 1959 ; (xi) 16 exs., Jaipur, near Railway Station, 29. ix. to 2. x. 1959 ; (xii) 2 exs., Pilani, Birla College campus, 10. vii. 1961 ; (xiii) 4 exs., Agra, Balwant Rajput College campus, 25. iii. 1960 ; (xiv) 29 exs., Agra, Balwant Rajput College campus, 18. viii. to 21. ix. 1962 ; (xv) 4 exs., Delhi, Indian Agricultural Research Institute campus, 12. x. 1960 ; (All Coll. *Joseph*). (xvi) 2 exs., Cuttack, Medical College campus, 13. viii. 1961 ; (Coll. *C. V. J. Varghese*).

Length : *male* 3.0—3.5 mm. ; *female* 3.7—4.3 mm.

In profile ochraceous. A creamy-white mediolongitudinal area extending from the transverse carina of vertex to the hind margin of mesonotum included in the lateral carinae of pro- and mesonota ; external to this to a greater extent the mesonotum testaceous, castaneous or black. Tegmen subhyaline (Fig. d) with or without pale infumation at the posterodistal region. Antennae ochraceous. Abdomen and ventrally the thorax and head ochraceous, or testaceous or castaneous or black with ochraceous marks. Spur foliaceous with a number of teeth (14—20). Scape nearly equal in length to that of pedicel. Vertex a little longer than broad. The lateral carinae of frons nearly parallel ; no mediolongitudinal carina on vertex posterior to the transverse carina ; pro- and mesonota tricarinate, the lateral carinae of pronotum not reaching the hind margin and divergingly curved.

Pygofer large basally, the opening longer than broad, anal angles rather pointed and cover the tenth abdominal segment, the ventromedian margin produced a little posteriorly ; armature of diaphragm U-shaped, thickly sclerotised and projecting ; aedeagus periandrum tubular, basally swollen followed by a curve, two rows of anteriorly directed spines meeting basally, one row from the external opening while the other well posterior to it, the spines become gradually reduced in size from the distal to the proximal part ; parameres twice constricted, the posterior margin behind the basal constriction rather circular in outline, the distal margin asymmetrically divided into two by a deep notch, the outer one large and directed externally, the inner one small and straight ; the anal processes small and pointed, their bases well apart. Ovipositor extends upto the distal part of the tenth abdominal segment ; the second valvulae serrate or a little more than half of their length ; subgenital plate and first valvifer similar to those of *Liburnia furcifera* (Horvath).



TEXT-FIG. 8.—*Liburnia pallescens* (Distant)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Armature of diaphragm. (G) Aedeagus perianthrum. (H) Ventral view of paramere. (I) Ventral view of tenth and eleventh male abdominal segments. (J) Ventral view of female abdomen. (K) Lateral view of second valvulae. (L) Lateral view of third valvula.

Muir (1919) synonymises *Liburnia pallescens* with *Liburnia furcifera* which has been followed by later workers. I do not agree with Muir, since I observe the following differences :—

	<i>L. furcifera</i>	<i>L. pallescens</i>
1. Colouration	dark	pale
2. Mediolongitudinal carina of vertex posterior to the transverse carina	distinct	obsolete
3. Number of spur teeth	25 to 30	14 to 20
4. Paramere	distal border only a little incurved	asymmetrically divided into two by a deep notch
5. Anal processes	short, divergingly curved	long, straight
6. Ovipositor	extends up to the base of anal style	extends only upto the distal part of the tenth segment
7. Second valvulae	serrate for three-fourths of their distance	only for a little more than half of their length

I should retain *Liburnia pallescens* as a distinct species, as originally done by Distant (1912).

### 11. *Liburnia pusana* (Distant)

( Text-fig. 9 )

1912. *Sogata pusana* Distant, *Ann. Mag. nat. Hist.*, London, (8) 9, p. 191.  
(Type-locality : Bengal. Pusa. Calcutta. Berhampur and Murshidabad District, Bengal.)

*Material*.—(1) 1 ex., Trivandrum, Agriculture College campus, 8. x. 1960 ; (ii) 1 ex., Kaladi, Church campus, 26.v. 1960 ; (iii) 3 exs., Trichur District, Valapad, 15—22.v. 1960 ; (All Coll. *Joseph*). (iv) 1 ex., Calicut, Medical College campus, 20. ix. 1961 ; (Coll. *A. N. A. Johnny*). (v) 25 exs., Coimbatore, Agriculture College campus,—. xii. 1958. (Coll. *M. G. R. Menon*). (vi) 2 exs., Poona, University campus, 10. iii. 1960 ; (vii) 6 exs., Ajmer, Government College campus, 20.vii. to 11. ix. 1959 ; (viii) 4 exs., Ajmer, Government College campus, 12. viii. to 5. i x. 1961 ; (ix) 2 exs., Abu Road, near Railway Station, 26. ix. 1959 ; (x) 1 ex., Mount

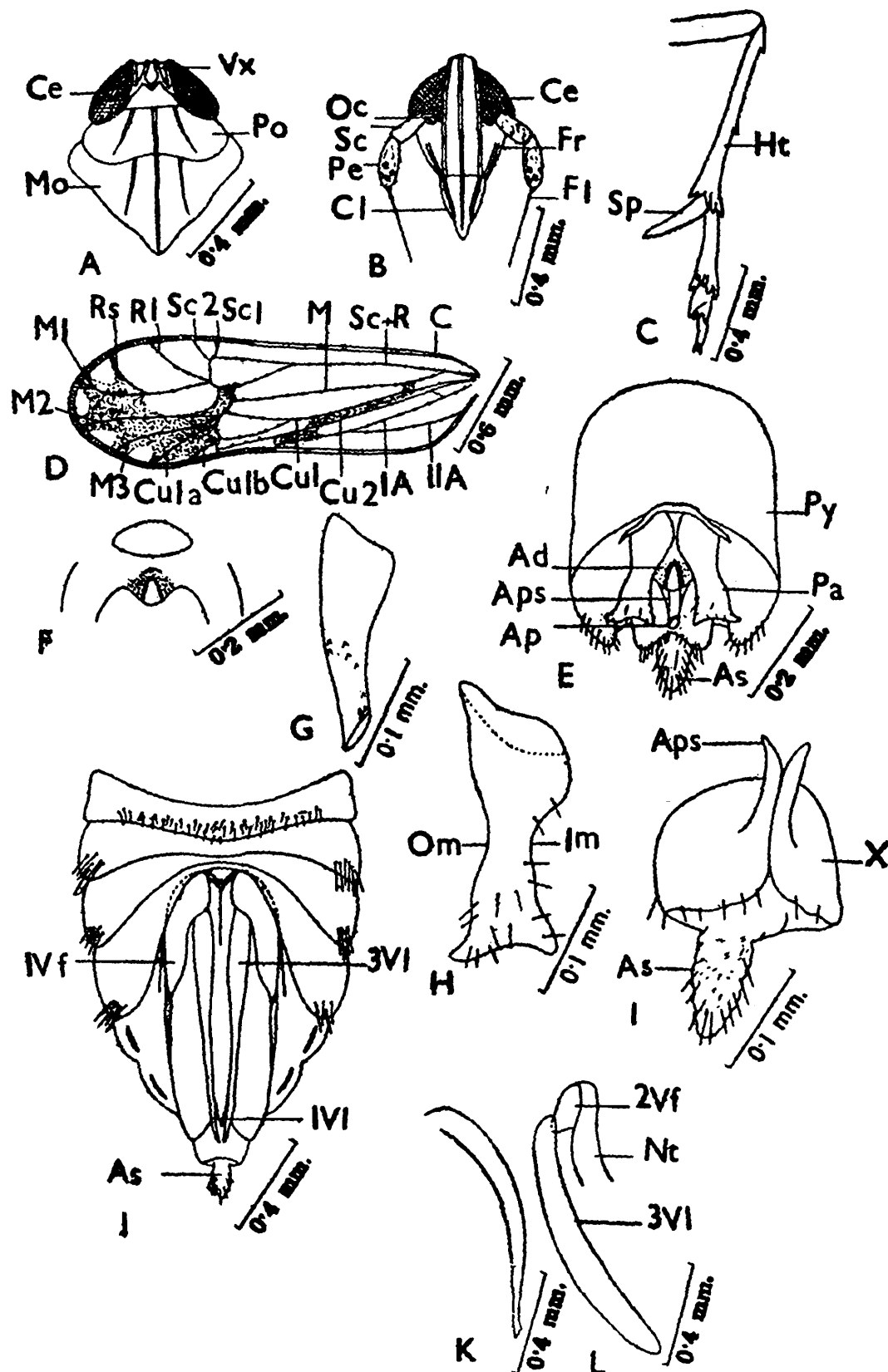
**Abu**, 27.ix. 1959; (xi) 1 ex., Pilani, Birla College campus, 10.vii. 1961; (xii) 1 ex., Agra, Balwant Rajput College campus, 25.iii. 1960 ; (xiii) 10 exs., Agra, Balwant Rajput College campus, 15.viii. to 21.ix. 1962 ; (xiv) 1 ex., Delhi, Indian Agricultural Research Institute campus, 12.x. 1960 ; (All Coll. *Joseph*).

Length : *male* 3.3—3.8 mm. ; *female* 3.5—4.0 mm.

Posterior to the transverse carina of vertex and the mediolongitudinal area of thoracic nota creamy or creamy-white with ochraceous tinge ; the said area of thorax bordered by piceous margin with ochraceous lateral areas. Tegmen subhyaline with brown or dark brown marks, the posterior margin white for one-third distance from the proximal border. Antennae, frontal carinae, metathorax and legs ochraceous, the metathorax with castaneous marks. Frons, pro- and mesonota and abdomen black or castaneous with ochraceous marks. Female lighter coloured ; generally ochraceous abdomen with castaneous marks. Spur foliaceous, with a large number of teeth (22—27). Scape almost equal in length to that of pedicel. Vertex a little longer than wide. The lateral carinae of frons almost straight ; no mediolongitudinal carina on vertex behind the transverse carina ; pro- and mesonota tricarinate, the lateral pronotal carinae divergingly curved and stop a little in front of the posterior border.

Pygofer a little broader distally, the opening broader than long, anal angles rather rounded covering almost the tenth segment ; armature of diaphragm with numerous small projections arranged in an inverted V-form, the projections at the posterior margin large ; aedeagus periandrum tubular, base swollen followed by a curve, decorated with basally directed small spines whose number varies with the specimens, a few spines crowded near the external opening followed by two small rows of spines ; paramere medially constricted, distally with two projections ; anal processes short, bases appose each other, divergingly curved distally. Ovipositor extends upto the middle of the tenth abdominal segment ; subgenital plate indistinct ; first valvifer similar to that

of *Liburnia furcifera*, though shorter ; second valvulae serrate for more than half of their length.



TEXT-FIG. 9.—*Liburnia pusana* (Distant)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Armature of diaphragm. (G) Aedeagus periantrum. (H) Ventral view of paramere. (I) Ventral view of tenth and eleventh abdominal segments. (J) Ventral view of female abdomen. (K) Lateral view of second valvulae. (L) Lateral view of third valvula.

12. *Dicranotropis cognata* Muir

(Text-fig. 10)

1917. *Dicranotropis cognata* Muir, *Proc. Hawaii. ent. Soc.*, Honolulu, 3(4), pp. 319—320, pl. 5, figs. 25, 25a. (*Type-locality* : Daimakko, Formosa).

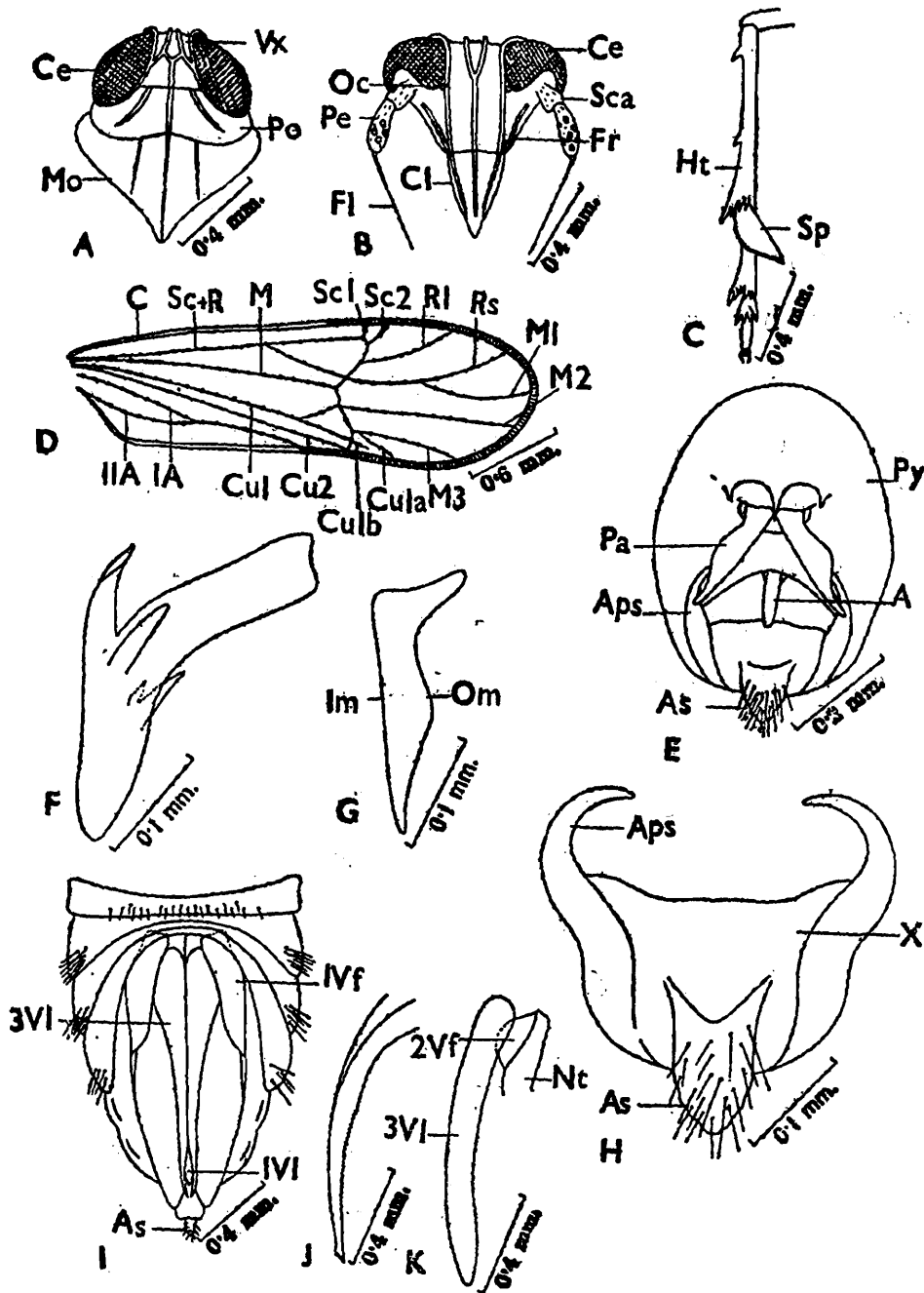
*Material*.—5 exs., Calicut, Medical College campus, 18—21. ix. 1961. (Coll. A. N. A. Johnny).

Length : *male* 3.0—3.3 mm. ; *female* 3.4—3.7 mm.

Vertex, pro- and mesonota ochraceous ; the area between the median and longitudinal carinae testaceous, carinae pale ; ventral side of head pale ochraceous-brown with ochraceous speckles in between the median and lateral carinae of frons. Antenna ochraceous. Ventral side of thorax and legs ochraceous, a castaneous speckle just above the coxae one on either side of metathorax. Tegmen subhyaline, its distal veins chocolate-brown. Abdomen dorsally ochraceous-brown with ochraceous markings ; ventral side ochraceous with ochraceous-brown marks, the latter colour dominant in male and the pygofer castaneous. Spur foliaceous with a large number of teeth (28—35). Pedicel nearly one and a half times the length of scape. Length of vertex nearly equal to the width at its base. The median carina of frons furcate at the lower margin of eyes ; pro- and mesonota tricarinate, the lateral carinae of pronotum divergingly curved and not reaching the hind border.

Pygofer swollen about the middle, opening longer than broad, the ventromedian margin bears three outgrowths, one median pointed spine-like projection and two small, lateral, ventrally curved outgrowths; diaphragm without armature; aedeagus periandrum arcuate, cylindrical and ornamented with four spines, one of them dorsal, large, directed anterodorsally and twisted towards the distal end, the remaining three lateral in position and directed anterodorsally, two of them in one cluster and the other independent, those in cluster small and subequal; each paramere enlarged basally, swollen at the outer margin near the middle and pointed distally ; the fused tenth and eleventh segment

large with a well developed anal style, the anal processes well apart, basally large, curved and recurved. Ovipositor terminates a little anterior to the hind margin of ninth segment; subgenital plate indistinct; first valvifer broad basally; second valvulae serrate for more than half of their length.



TEXT-FIG. 10.—*Dicranotropis cognata* Muir

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Aedeagus periandrum. (G) Ventral view of paramere. (H) Ventral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Ventrolateral view of second valvulae. (K) Lateral view of third valvula.



13. *Sogata rhodesi* Muir

(Text-fig. 11)

1929. *Sogata rhodesi* Muir, *Ann. Mag. nat. Hist.*, London, (10) 4, pp. 208—209, figs. 28—30. (Type-locality : Eshowe, Zululand).

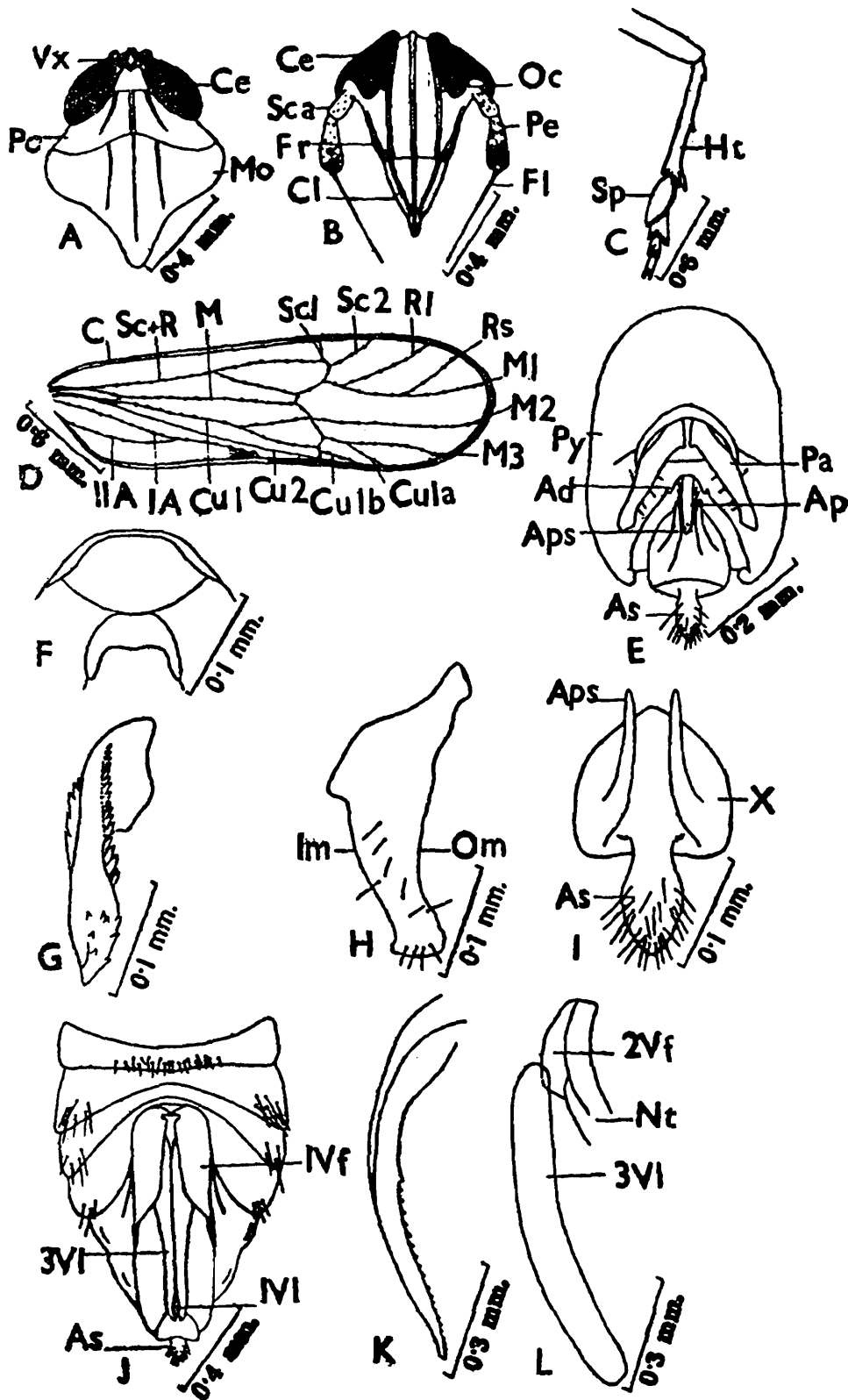
*Material.*—(i) 4 exs., Trivandrum, Agriculture College campus, 5—8.x.1960 ; (Coll. A. V. Joseph). (ii) 2 exs., Calicut, Medical College campus, 18—21.ix.1961 ; (Coll. A. N. A. Johny). (iii) 1 ex., Poona, University campus, 9.iii.1960 ; (Coll. Joseph).

Length : *male* 2.8—3.3mm.; *female* 3.1—3.6 mm.

Vertex, pro- and mesonota ochraceous ; ventrally the head black with its lateral margins and labrum ochraceous, carinae ochraceous. Antenna ochraceous with a castaneous ring at the distal margin of scape. Tegmen subhyaline, the distal veins pale brown with a castaneous speckle at the region where the 'Y' vein joins the anal margin. Ventral side of pro- and mesothorax ochraceous, legs castaneous, their coxae and trochanters with castaneous streaks or with castaneous pale enfumation. In males the abdomen black, the medioventral area, the ventrolateral margins and the posterior border of each segment ochraceous. The females invariably lighter coloured, ochraceous with castaneous or pale brown marks whose extent varies with the specimens. Spur foliaceous with about twenty teeth. The first tarsomere of the hind leg longer than other two together. Pedicel more than one and a half times the length of scape. Vertex longer than wide. The frontal carina furcate at its very base ; no mediolongitudinal carina on the vertex behind the transverse carina ; pro- and mesonota tricarinate, the lateral carinae of the former diverging and disappear a little in front of the hind border, the mesonotal carinae not reaching the hind border.

The opening of pygofer as broad as long, anal angles well produced, rounded and curved inwards to cover the tenth segment ; the diaphragm with an inverted U-shaped highly sclerotised thickening as its armature ; the aedeagus periandrum subtubular, laterally compressed and decorated with a few scattered, small spines distally, one row of five or six spines ventrally and another long, oblique row of a large number of spines opposite to the first row on a flange ; the paramere of peculiar shape with a projection at the basal angle, another small at the distal end towards the inner margin ; anal processes medium sized, flattened, apart basally and nearly straight, the anal style well developed. The ovipositor extends upto the posterior margin of the ninth abdominal

segment; subgenital plate indistinct; the first valvifer with a small hook-like projection at the antero-inner margin; the second valvulae serrate for more than half of their length, the serrations large and basally apart.



TEXT-FIG. 11.—*Sogata rhodesi* Muir

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Armature of diaphragm. (G) Aedeagus periantrum. (H) Ventral view of paramere. (I) Ventral view of tenth and eleventh male abdominal segments. (J) Ventral view of female abdomen. (K) Ventrolateral view of second valvulae. (L) Lateral view of third valvula.

14. *Nilaparvata lugens* (Stål)

(Text-fig. 12)

1854. *Delphax lugens* Stål, *Ofvers. Vetensk Akad. Forh.*, Stockholm, 11, p. 246. (Type-locality : Java).

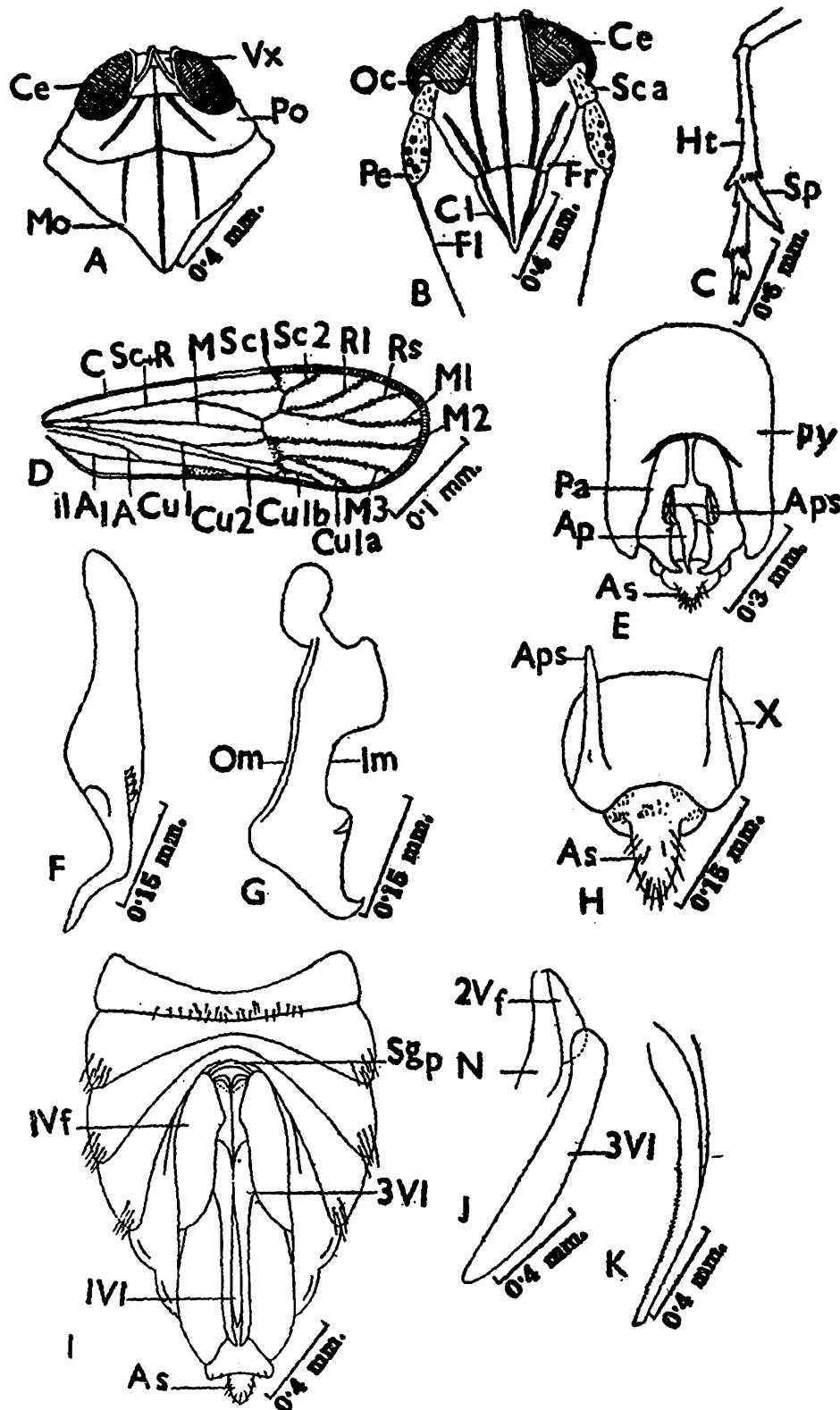
*Material.*—(i) 1 ex., Trivandrum, Agriculture College campus, 5—8.x.1960 ; (Coll. *A. V. Joseph*). (ii) 3 exs., Kaladi, Church campus, 26.v.1960 ; (iii) 23 exs., Trichur District, Valapad, 15—22.v.1960 ; (iv) 3 exs., Trichur District, Ollur, 24.v.1960 ; (A11 Coll. *Joseph*). (v) 5 exs., Calicut, Medical College campus, 18—21.ix.1961 ; (Coll. *A.N.A. Johnny*). (vi) 90 exs., Coimbatore, Agriculture College campus,—xii. 1958 ; (Coll. *M. G. R. Menon*). (vii) 16 exs., Poona, University campus, 7—10.iii.1960 ; (Coll. *Joseph*). (viii) 4 exs., Ajmer, Government College campus, 3—5.ix.1961 ; (Coll. *Joseph*).

Length : *male* 3.5—4.0 mm. ; *female* 4.3—4.8 mm.

Almost wholly ochraceous or pale ochraceous. Vertex and mesonotum rather light brown ; in many cases, especially in males, the mesonotum, pronotum and head brown, in such cases the abdomen either follows the same colouration with ochraceous markings or piceous or black with ochraceous marks. Antenna ochraceous. Tegmen subhyaline with a small dark-brown enfumation at the region where the combined anal vein joins the border, the distal veins as well as their borders brown. Spur foliaceous with a large number of teeth (21—31). The first tarsomere of the hind leg provided with one to four small spines. Scape longer than half the length of pedicel. Vertex almost as wide as long. Mediolongitudinal carinae of vertex meeting at the base of frons ; the pro- and mesonota tricarinate, the pronotal carinae divergingly curved posteriorly and stop a little in front of the hind border.

Pygofer elongated, distal margin wider, opening longer than broad, anal angles rounded and cover the tenth abdominal segment ; diaphragm without armature ; aedeagus periantrum tubular, curved and recurved distally, extending posteriorly to a considerable distance after the external opening, a shallow constriction towards the base, the external opening located at its lateral side and ornamented with four anterolaterally directed spines adjacent to the external opening, distal to the opening much narrowed ; paramere convergingly curved, constricted medially and distally, posterior to the distal constriction triangular with the distal angle produced into a curved spine, at the base of the triangle towards the inner side a small pointed outgrowth directed ventrally, proximal to the constriction it projects internally ; the anal processes straight, well apart

basally. Ovipositor stops posteriorly a little short of the ninth abdominal segment; subgenital plate for the major part hidden; first valvifer conical basally; second valvulae serrate for a little more than half of their length.



TEXT-FIG. 12.—*Nilaparvata lugens* (Stål)

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Aedeagus periandrum. (G) Ventral view of paramere. (H) Ventral view of tenth and eleventh male abdominal segments. (I) Ventral view of female abdomen. (J) Lateral view of third valvula. (K) Ventrolateral view of second valvulae.

15. *Delphacodes propinqua* Fieber

(Text-fig. 13)

1866. *Delphacodes propinqua* Fieber, *Verh. Zool.-bot. Ges. Wien.*, Vienna, 16, p. 525, pl. 8, fig. 24. (Type-locality : Trieste, Europe. Malaga, Spain).

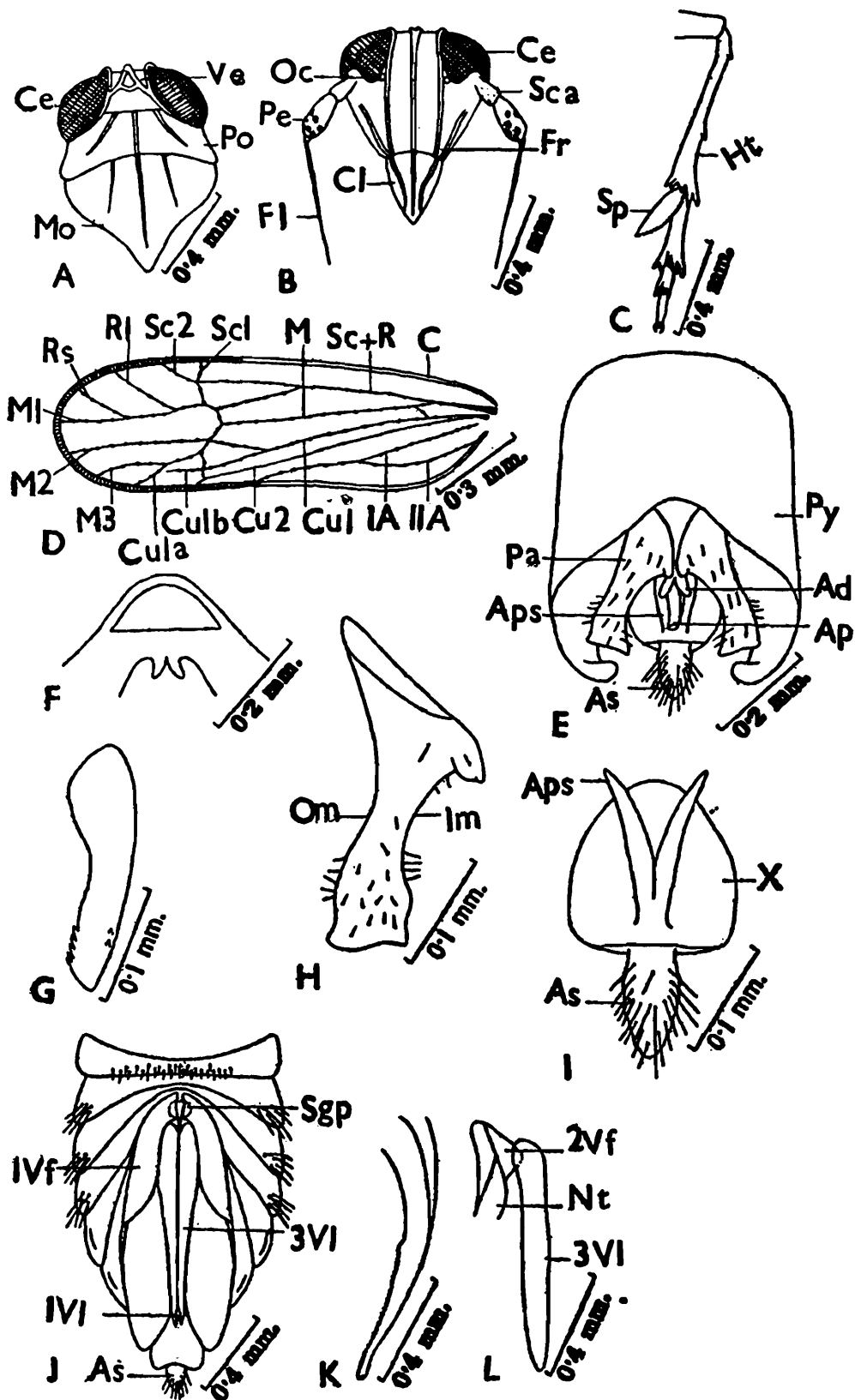
*Material*.—(i) 4 exs., Trivandrum, Agriculture College campus, 8.x.1960 ; (ii) 2 exs., Kaladi, Church campus, 26.v.1960 ; (Coll. *Joseph*). (iii) 5 exs., Calicut, Medical College campus, 18—21.ix.1961 ; (Coll. *A. N. A. Johnny*). (iv) 48 exs., Coimbatore, Agriculture College campus, —.xii. 1958 ; (Coll. *M. G. R. Menon*). (v) 2 exs., Poona, University campus, 9.iii.1960 ; (vi) 25 exs., Ajmer, Government College campus, 20.viii. to 16.ix.1959 ; (vii) 61 exs., Ajmer, Government College campus, 12. viii. to 15.ix.1961 ; (viii) 2 exs., Abu Road, near Railway Station, 26.ix.1959 ; (ix) 1 ex., Mount Abu, 27.ix.1959 ; (x) 13 exs., Jaipur, near Railway Station, 29.ix. to 2.x.1959 ; (xi) 1 ex., Pilani, Birla College campus, 10.vii. 1961 ; (xii) 1 ex., Agra, Balwant Rajput College campus, 25.iii. 1960 ; (xiii) 29 exs., Agra, Balwant Rajput College campus, 20.viii. to 21.ix ; 1962 ; (xiv) 4 exs., Delhi, Indian Agricultural Research Institute campus, 12.x.1960 ; (All Coll. *Joseph*). (xv) 3 exs., Cuttack, Medical College campus, 13.viii. 1961 ; (Coll. *C. V. J. Varghese*).

Length : *male* 2.9—3.3 mm. ; *female* 3.4—3.8 mm.

Colouration much varies. Vertex, pronotum and mesonotum ochraceous, their carinae pale ; ventral side of head either black or castaneous with ochraceous carinae ; the carinae of frons narrowly margined on either side with castaneous except the external border of the outer carinae. Ventral side of mesothorax chocolate brown, castaneous or black with ochraceous marks ; in metathorax *vice versa*. Legs wholly ochraceous or ochraceous with brown streaks ; generally the hindtrochanter fuscous or castaneous. Tegmina subhyaline, their veins pale brown. Abdomen of male black, castaneous or chocolate brown and ventrolateral sides white. In females almost wholly ochraceous with chocolate-brown or fuscous marks. Spur foliaceous with a number of teeth (16—25). Pedicel considerably longer than scape. Vertex as wide as long. Median carina of frons furcate at its base ; mediolongitudinal carina posterior to the transverse carina of vertex absent ; pro- and mesonota tricarinate, the lateral carinae of pronota divergingly curved and not reaching the hind margin.

Opening of pygofer broader than long, anal angles highly developed, projected well above the tenth segment and curved internally to form partly a roof over the parameres ; diaphragm with a pair of well developed, horn-like outwardly directed projections as armature ; aedeagus periandrium small, tubular, pistol-shaped and decorated with two rows of basally directed spines towards the distal part, one row at the distal side having five to six spines and the other slightly lateral to the dorsal side with two to three spines ; paramere swollen for three-fourth distance from the base while the remaining part flat, narrow towards the middle, at the basal angle the paramere gives a small projection and distally it terminates in two small lateral projections ; anal style well developed, anal processes divergingly curved distally and basally appose each other.

Ovipositor stops a little anterior to the hind end of the ninth abdominal segment ; subgenital plate small and hidden by the first valvifers, the latter broader proximally ; second valvulae serrate for more than half of their length.



TEXT-FIG. 13.—*Delphacodes propinqua* Fieber

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Armature of diaphragm. (G) Aedeagus periandrum. (H) Ventral view of paramere. (I) Ventral view of tenth and eleventh male abdominal segments. (J) Ventral view of female abdomen. (K) Ventrolateral view of second valvulae. (L) Lateral view of third valvula.

16. *Delphacodes crawfordi* Muir & Giffard

(Text-fig. 14)

1924. *Delphacodes crawfordi* Muir & Giffard, *Bull. Hawaii. Sug. Asst., ent. Sec.*, Honolulu, No. 15, p. 34, pl. 3, fig. 29 and pl. 5, fig. 97a (Type-locality : Mexico).

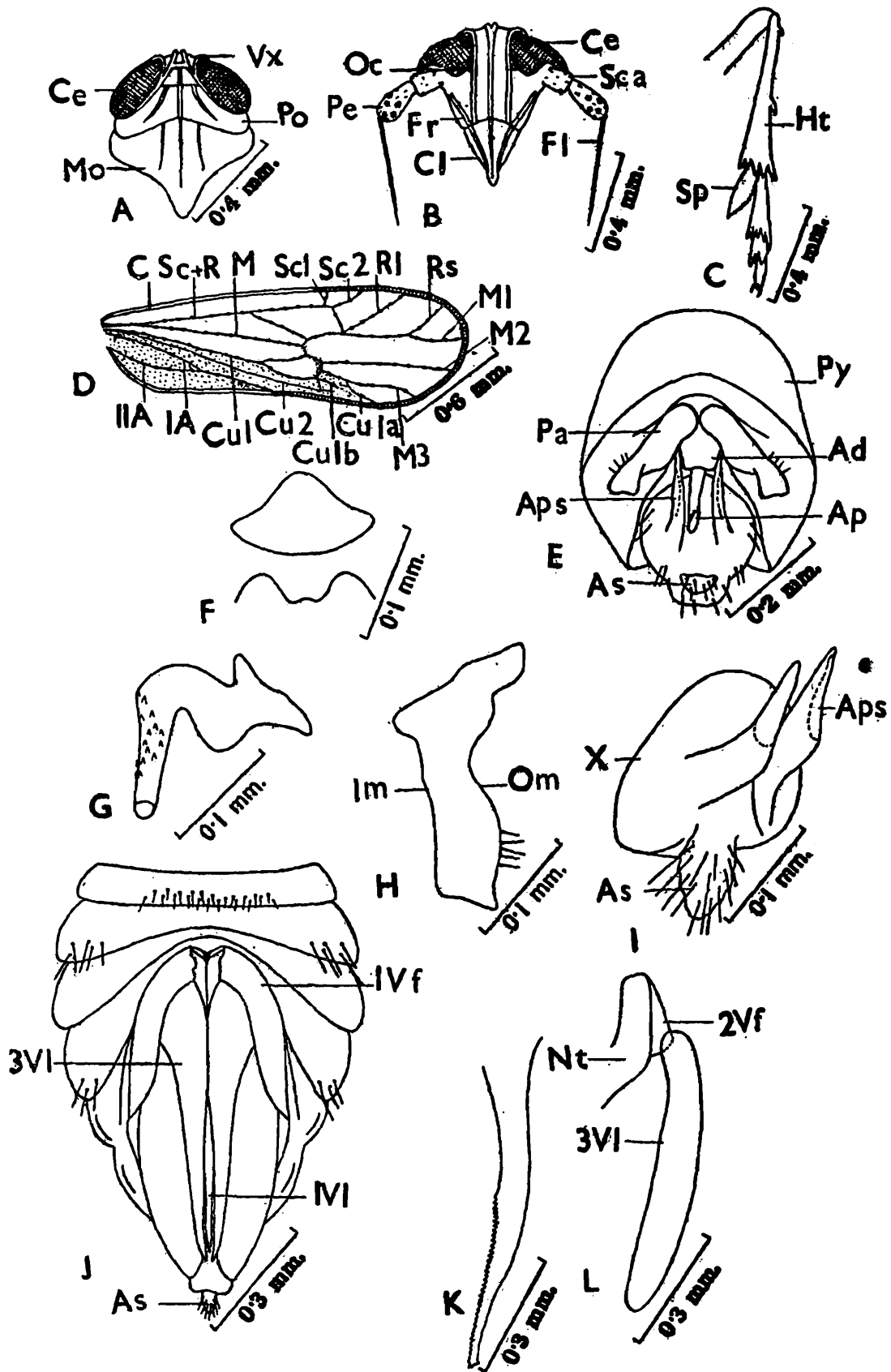
*Material*.—(i) 2 exs., Trivandrum, Agriculture College campus, 8.x.1960 ; (ii) 5 exs., Poona, University campus, 7—10. iii.1960 ; (All Coll. *Joseph*).

Length : *male* 2.4—2.7 mm. ; *female* 2.6—3.0 mm.

Vertex and pronotum ochraceous ; mesonotum black with ochraceous posterior margin ; in female the area between the lateral and median carinae also ochraceous. Ventrally the head black, the carinae ochraceous with a thin black line medially. Scape black, pedicel ochraceous. Tegmen subhyaline and speckled with a castaneous mark at the region where the combined anal vein joins the anal margin, with or without pale enfumation posterior to ( $Cu_1$ ). Ventral side of pro- and mesothorax black or castaneous with ochraceous marks and *vice versa* in metathorax. Legs ochraceous with castaneous or black streaks. Abdomen black with an ochraceous red area at the anterolateral region, the lateral areas and the hind margin of the segments ochraceous. Females lighter coloured. Spur foliaceous, almost as long as the first tarsomere ; sixteen teeth generally, the number varies from fourteen to eighteen. Scape almost as broad as long ; pedicel twice the length of scape. Vertex as wide as long. Median carina of frons furcate at its base ; medio-longitudinal carina of vertex posterior to the transverse carina faint ; pro- and mesonota tricarinate, the lateral carinae of former diverging and stop before reaching the hind border.

Opening of pygofer broader than long, anal angles rather rounded and cover the tenth segment ; diaphragm with a small projection as armature, the latter almost as broad as long, distal margin incurved ; aedeagus periandrum laterally compressed for the proximal one-third, apical two-thirds, strongly curved and tubular, distal part ornamented with a number of small spines at its ventral and ventrolateral sides ; paramere swollen at the middle towards the internal side, diverge posteriorly, basal angle small and rounded, in ventral view concave internally and convex externally towards the distal part ; anal processes laterally flattened, long and extend upto the base of diaphragm, their bases moderately wide apart, in front view slightly sinuate, curiously enough they open externally at their lateral sides a little away from the middle. Ovipositor stops a little in front of the posterior end of the ninth abdo-

minal segment ; first valvifer broad proximally ; subgenital plate indistinct ; second valvulae serrate for more than half of their length.



TEXT-FIG. 14.—*Delphacodes crawfordi* Muir & Giffard

(A) Dorsal view of head, pronotum and mesonotum. (B) Cephalic view of head. (C) Distal region of hind leg. (D) Tegmen. (E) Ventral view of pygofer. (F) Armature of diaphragm. (G) Aedeagus periandrum. (H) Ventral view of paramere. (I) Ventrolateral view of tenth and eleventh male abdominal segments. (J) Ventral view of female abdomen. (K) Lateral view of second valvulae. (L) Lateral view of third valvula.



## IV—SUMMARY

It is a preliminary survey of araeopids from various parts of India and 16 species under 11 genera have been described. 4 species, namely, *Sogata rhodesi* Muir, *Delphacodes crawfordi* Muir & Giffard, *Phyllodinus sauteri* Muir and *Dicranotropis cognata* Muir are reported for the first time from India.

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## VII—ABBREVIATIONS USED IN TEXT—FIGURES

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| <i>A.</i> , first anal.                      | <i>Oc.</i> , ocellus.                    |
| <i>IIA.</i> , second anal.                   | <i>Om.</i> , outer margin of paramere.   |
| <i>A; Ap.</i> , aedeagus perianthium.        | <i>Pa.</i> , paramere.                   |
| <i>Aps.</i> , anal processes.                | <i>Pe.</i> , pedicel.                    |
| <i>As.</i> , anal style.                     | <i>Po.</i> , pronotum.                   |
| <i>C.</i> , cost:                            | <i>Py.</i> , pygofer.                    |
| <i>Ce.</i> , compound eye.                   | <i>R1.</i> , radial one.                 |
| <i>Cl.</i> , clypeus.                        | <i>Rs.</i> , radial sector.              |
| <i>Cu1.</i> , cubitus one.                   | <i>Sca.; Sc.</i> , scape.                |
| <i>Cula.</i> , first branch of cubitus one.  | <i>Sc1.</i> , first branch of subcosta   |
| <i>Culb.</i> , second branch of cubitus one. | <i>Sc2.</i> , second branch of subcosta. |
| <i>Cu2.</i> , cubitus two.                   | <i>Sc+R.</i> , subcosta plus radius.     |
| <i>Fl.</i> , flagellum.                      | <i>Sgp.</i> , subgenital plate.          |
| <i>Fr.</i> , frons.                          | <i>Sp.</i> , spur.                       |
| <i>Ht.</i> , tibia.                          | <i>1Vf.</i> , first valvifer.            |
| <i>Im.</i> , inner margin of paramere.       | <i>2Vf.</i> , second valvifer.           |
| <i>M.</i> , media.                           | <i>1Vl.</i> , first valvula.             |
| <i>M1.</i> , first branch of media.          | <i>2Vl.</i> , second valvula.            |
| <i>M2.</i> , second branch of media.         | <i>3Vl.</i> , third valvula.             |
| <i>M3.</i> , third branch of media.          | <i>Vx.; Vs.</i> , vertex.                |
| <i>Mo.</i> , mesonotum.                      | <i>X.</i> , tenth abdominal segment.     |
| <i>Nt.</i> , ninth tergum.                   |  |