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NYMPHS OF FULGOROIDEA

(HOMOPTERA: AUCHENORRHYNCHA) WITH DESCRIPTIONS OF TWO NEW SPECIES AND NOTES ON ADULTS OF DICTYOPHARIDAE

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NYMPHS OF FULGOROIDEA (HOMOPTERA: AUCHENORRHYNCHA) WITH DESCRIPTIONS OF TWO NEW SPECIES AND NOTES ON ADULTS OF DICTYOPHARIDAE

by

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CONTENTS

ABSTRACT

The superfamily Fulgoroidea and its families, except Kinnaridae, Achilixiidae and Gengidae, are defined. Herein, one hundred and thirteen species are described and illustrated or supplemented and revised, in addition to the 70 species that were described earlier; another 28 species are referred to. Two species of Derbidae of Taiwan, *Vekunta novensilis* and *Mysidioides nymphalba,* are new to Science. Adults of Dictyopharidae of Taiwan are also noted. Keys to the families and the lower taxa are given whenever possible.

Key words: Fulgoroidea, nymph.

INTRODUCTION

The superfamily Fulgoroidea is a large taxon of Homoptera. It currently contains 20 families. Except a small number of species, the knowledge of their nymphal stages is poorly represented in the literature . When the first author began his classical studies on Fulgoroidea of Taiwan, fifth instar nymphs were also described and illustrated whenever possible. The data revealed that nymphal characters contained much phylogenetic information. In 1989 when the first author accomplished his classical studies of Fulgoroidea of Taiwan, he had laid a strong emphasis upon fifth instar nymphs of Fulgoroidea. Nymphs of Derbidae and Issidae were the topics of the theses present by Wen-Bin Yeh and Chiou-Ling Cheng in partial fulfillment of the requirements for the degree of Master of agriculture respectively. Nymphs of other families have been described and illustrated by the first author himself. Nymphs of Issidae were published elsewhere. Unfortunately specimens of Kinnaridae, Achilixiidae and Gengidae are not available to the authors. Despite of insufficient materials, the authors are still willing to collect and define them individually. The authors have made this attempt in the hope that the phylogenetic relationships of Fulgoroidea could be revealed through fulgoromorpha nymphs in the future.

Sulc (1929) divided wax-glands of Fulgoroidea into 4 types: (1) on side of abdominal sternites III-VIII, (2) on abdominal tergites VI-VIII, (3) perianal glands and (4) glands of the horizontal hairs. In this paper, only wax-pore plates of abdominal tergites VI-VIII are described and illustrated.

The present study has been mostly based on the collections in National Chung Hsing University, Department of Entomology and several specimens were received from abroad.

METHODS

Nymphs were soaked in caustic potash till the specimens become clear. Then, put them directly into glycerin on cavity slide glass. The specimens were supported by cotton fibers in the glycerin. Figures were drawn with drawing tube.

In order to prevent misunderstanding and confusion, the terms used in the study are defined as follows (Fig. 1).

Vertex - The dorsal portion of epicranium, that portion is next to the frons and between the compound eyes. The anterior margin usually carinated, which is feeble in Cixiidae.

Lateral carinae of the vertex - The paired carinae are present between the eyes and the vertex, unite anteriorly with the lateral carinae of the frons. In Delphacidae they protrude from anterior inner margins of eyes.

Submedian carinae of the vertex - The paired carinae are present between the eyes and the median carina of the vertex, at the base protrude over the basal margin of the vertex, at the apex unite with the submedian carinae of frons.

Median carina of the vertex - The unpaired carina is present at median line of the vertex.

Lateral carinae of the frons - The paired carinae are present between the genae and the frons.

Submedian carinae of the frons - The paired carinae are present between the lateral carinae and the median carina.

Median carina of the frons - The unpaired median carina is present at median line of the frons.

Lower pits - The lower pits are usually the two pits present at lowest portion of the frons on both sides and situated beside the submedian carinae. (after Vilbase, 1968)

Median pits - The median pits are usually the two pits present near middle of the frons on both sides and situated near the lateral carinae. (after Vilbaste, 1968)

Upper pits - The upper pits are usually two pits present at upper portion of the frons on both sides and situated near the submedian carinae. (after Vilbaste, 1968)

Extra pits - The extra pits are the pits other than upper, median and lower pits present on the frons.

Sensory organs of antennae - The are three forms of the sensory organs of antennae, which are:

(1) The simple hole-form, without any appendage.

(2) The sensory organs with fine filament processes.

(3) The sensory organs with lobe-like processes.

Pronota - The pronota are separated at median line by membraneous area. Each pronotum may have

lateral carina which usually protrude from anterior to posterior margins obliquely near middle or

humeral carina(e) present at lateral area of pronotum or

additional carina present at inner side of the lateral carina, which protrudes from posterior margin to lateral carina.

Meso- and metanota - The meso- and metanota are separated by membraneous area at median line. Each meso- and metanotum have the **lateral carina** which separated the wing pad from the notum.

Wax-pore plates - The wax-pore plates usually present at both sides of abdominal tergites VI-VIII. Sometimes each of these plates is separated into wax-pore parts.

Anal combs - The anal combs are the paired structures which protrude laterally or ventrally from margins of anal opening.

(1) The comb-like anal combs are usually wider than long, nearly straight or slightly convex at margins, margins with true teeth or with terete processes, each process with a filament at apex.

(2) The lobe-like anal combs are usually longer than wide, arising laterad or ventrad.

SYSTEMATICS

Superfamily **FULGOROIDEA** Kirkaldy, 1907

Fulgoroidea Kirkaldy, 1907, Honolulu Exp. Stat. Bull.I:296.

The following combination characters are given as distinctive of fifth instar nymphs of Fulgoroidea.

Vertex carinate or ecarinate, mostly exposed, sometimes covered by protruding portion of pronota, submedian carinae usually present in Delphacidae, which arising from base or fused with lateral carinae or as carina between vertex and frons, median carina present or absent. Frons usually carinate, lateral carinae usually distinct, submedian and median carinae present or absent, each side of frons always with several sensory pits. Postclypeus carinate or ecarinate. Rostrum 3 or 4-segmented, subparallel or acutely pointed at apex. Ocelli always absent. Eyes mostly ovate. Antennae arising below eyes, second segment with sensory organs.

Thoracic nota separated along median line by membraneous area respectively. Pronota usually carinate, with pits. Meso- and metanota with or without pits. Anterior wing pads each with

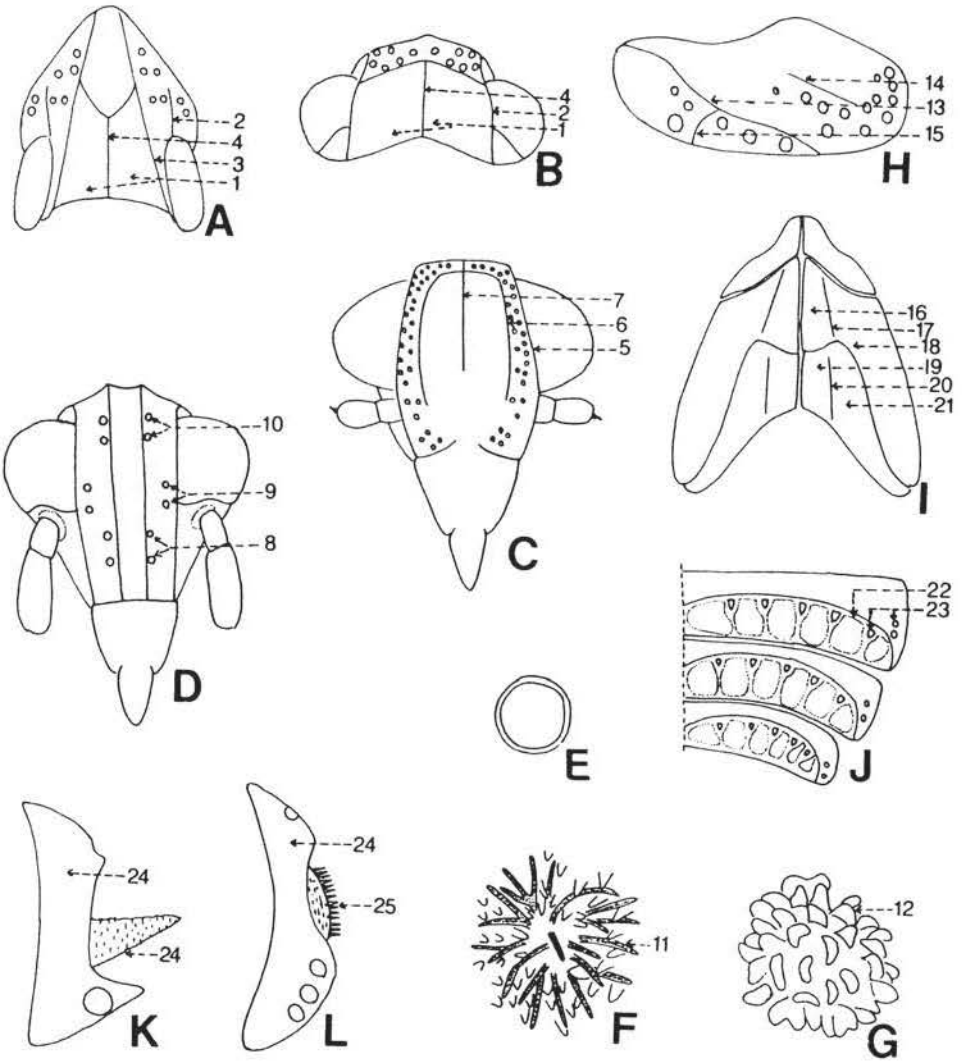

Fig. 1. A-B, head, dorsal view; C-D, frons and clypeus, ventral view; E-G, sensory organ of antennae; H, pronotum, flat surface; I, thoracic nota and wing pads, dorsal view; J, wax-pore plate of abdominal segments VI-III, flat surface; K-L, ninth abdominal segment and angle comb, lateral side.

1, vertex; 2, lateral carina of vertex; 3, submedian carina of vertex; 4, median carina of vertex; 5, lateral carina of frons; 6, submedian carina of frons; 7, median carina of frons; 8, lower pits; 9, median pits; 10, upper pits; 11, fine filament process of sensory organ; 12, broad blade process of sensory organ; 13, lateral carina of pronotum; 14, humeral carina of pronotum; 15, additional carina of pronotum; 16, mesonotum; 17, lateral carina of mesonotum; 18, anterior wing pad; 19, metanotum; 20, lateral carina of metanotum; 21, posterior wing pad; 22, part of wax-pore plate; 23, sensory pits; 24, ninth abdominal segment; 25, angle comb;

pits near notum and laterad. Posterior wing pads usually each with pits near notum only. Pro- and mesocoxae in Tettigometridae conical, in the others slender, more or less longitudinal ridged, in some families mesocoxae each with a process at basoventral angle. Metacoxa plus meron conical, movable, without meracanthus in Tettigometridae; crescent-shaped, immovable, with meracanthus in the other families. Metatrochanters ridged except in Tettigometridae. Metatibiae with or without lateral teeth, in Cixiidae with lanceolate setae, longitudinally ridged or not, mostly with single row apical teeth. Pro- and mesotarsi 2-segmented, metatarsi 3-segmented. First metatarsal segment with apical teeth, second with or without apical teeth and truncate or conical at apex.

Abdomen 10-segmented in Tettigometridae, 9-segmented in the other families. Abdominal tergites sometimes including pleurites each side with sensory pits, most species absent on abdominal tergites I-III. Wax secretory organ of abdominal tergites VI-VIII as cerachaetae in Tettigometridae; lost secondary in Delphacidae; with wax-pore plates in paedomorphosis in Meenoplidae; no paedomorphosis in the other families. Ninth abdominal segment with or without pits. Anal combs present except absent in Tettigometridae, lobe-like or comb-like, arising laterad or ventrad.

Key to families of Fulgoroidea

(for fifth instar nymph only)

1. Abdomen 10-segmented; metatrochanter not ridged ..... **TETTIGOMETRIDAE**
-. Abdomen 9-segmented; metatrochanter ridged 2
2. Second metatarsal segment at apex truncate, with 4-9 teeth arranging in a row 3
-. Second metatarsal segment at apex conical, without apical tooth or with 1-3 apical teeth at side(s) 9
3. Anal combs arising laterad; mesocoxa at basoventral angle without process 4
-. Anal combs arising ventrad; mesocoxa at basoventral angle with process 8
4. Metatibia with tibial spur; vertex with submedian carinae; between eyes and lateral carinae of frons with sensory pits ..... **DELPHACIDAE**
-. Metatibia without tibial spur; vertex without submedian carina; between eyes and lateral carinae of frons without sensory pits 5
5. Abdominal segments VI-VIII with wax-pore plates in paedomorphsis; sensory pits on thoracic nota and wing pads some ones 3.5 times longer than wide ..... **MEENOPLIDAE**
-. Abdominal segments VI-VIII with wax-pore plates not in paedomrphosis; sensory pits on thoracic nota and wing pads some one 2 times or less longer than wide 6
6. Metatibia with lateral lanceolate setae; anal combs at margin with true teeth; rostrum with apical segment at apex truncate ..... **CIXIIDAE**
-. Metatibia with lateral true teeth; anal combs at margin with terete processes, each process with a filament at apex; rostrum with apical segment at apex pointed 7
7. Rostrum with apical segment narrowing at most from apical fifth to apex, not pigmented at apex; abdominal tergites VI-VII with only second wax part, in plate-form; pronota without additional carina ..... **ACHILIDAE**
-. Rostrum with apical segment narrowing from base or middle to apex, pigmented at apex; abdominal tergites VI-VII if with wax secretory organ, in pore-form; pronota each with an additional carina ..... **DERBIDAE**
8. Vertex without sensory pit; postclypeus with median carina ..... **DICTYOPHARIDAE**
-. Vertex with sensory pits; postclypeus without median carina ..... **FULGORIDAE**
9. Second metatarsal segment without apical tooth 10

-. Second metatarsal segment with apical tooth (teeth), if without then body without sensory pits 12

10. Abdominal segment VI each side with wax-pore plate separated into 5 wax parts; associate sensory pits of wax part usually 2-3 combined, embedded lateral near middle; abdominal segment VIII with upper wax part not as concentrical multiple layers circle-shaped ..... **RICANIIDAE**

-. Abdominal segment VI without wax part, if wax-pore plate separated into 5 wax parts; associate pits not combined, usually situated at dorsal portion; abdominal segment VIII with upper wax part as concentrical multiple layers circle-shaped 11

11. Lateral carinae of frons distinctly angulated at level of antennae, frons as wide or wider than long, first metatarsal segment at ventroapical portion without crochet ..... **EURYBRACHIDAE**

-. Lateral carinae of frons not distinctly angulated at level antennae, if angulate then frons longer than wide; first metatarsal segment at ventroapical portion with crochets ..... **LOPHOPIDAE**

12. Body without sensory pit; pronota each with lateral carina feeble; second metatarsal segment at apex without tooth ..... **HYPOCHTHONELLIDAE**

-. Body with sensory pits; pronota each with lateral carina distinct; second metatarsal segment at apex with 1-3 apical teeth 13

13. Mesocoxa at basoventral angle evenly curved; mesofemur at ventral margin one side not expanded 14

-. Mesocoxa at basoventral angle with process; mesofemur at ventral margin one side expanded 15

14. Anterior wing pads each with 10-29 sensory pits near notum; posterior wing pads each with 5-14 sensory pits near notum; abdominal segments VII-VIII without multiple layers wax pore ..... **FLATIDAE**

-. Anterior wing pads each with 2-5 sensory pits near notum; posterior wing pads with 1-4 sensory pits near notum; Abdominal segments VII-VIII with wax pores some ones multiple layers ..... **TROPIDUCHIDAE**

15. Metatrochanter ridged in separated ridged; abdominal segment IX with posterior margin strongly angulated ..... **NOGODINIDAE**

-. Metatrochanter ridged in continuous semicircle-form; abdominal segment IX with posterior margin not strongly angulated 16

16. Body with thoracic nota humpbacked; wax part of abdominal segment VIII at lateroventral angle without sclerotized area ..... **ACANALONIIDAE**

-. Body with thoracic nota not humpbacked; wax part of abdominal segment VIII at lateroventral angle with sclerotized area ..... **ISSIDAE**

I. Family **TETTIGOMETRIDAE** Germar

Tettigometridae Hohrn, 1859, Cat. Hemip. :67.
Tettigometrae Germar, 1821, Mag. Entomol. 4:a6.

Body stout, elongate, with cerachaetae (a kind of wax hairs) throughout dorsal aspect, on antennae and legs. Vertex slightly protruding beyond anterior margin of eyes, ecarinate except between vertex and frons, short distance at inner sides of eyes, shorter in middle line than wide at base. Frons shorter in middle line than wide, lateral margins ecarinate except inner sides of eyes, without median and submedian carinae. Frontoclypeal suture recognizable only laterally. Postclypeus ecarinate, shorter than frons, Anteclypeus indistinctly separated from postclypeus,

between them each side with area which at upper margin not separated from postclypeus, but seems a distinct area as in Cicadelloidea-Lora. Genae in ventral view visible, appearance same as in Cicadelloidea. Rostrum 3-segmented, first segment very short, subapical segment shorter than apical. Eyes in profile shallowly emarginate ventrally. Antennae with second segment longer than wide, outer apical portion produced, with simple ring-like sensory organs, third segment at inner apical angle with process.

Pronota without lateral carina, lateroapical angle deeply emarginated, forming a process behind eye, trapezoid, each inner apical and laterocaudal areas with several pores, prosternite with many pores laterally. Meso-, metanota and wing pads without pits. Anterior wing pads large, reaching to posterior margin of fourth abdominal tergite. Posterior wing pads small. Pro- and mesocoxae conical. Metacoxa plus meron conical, movable, metacoxa without meracanthus or metacoxa normal, movable with meracanthus, meron crescent-shaped. Metatrochanters not ridged. Metatibia terete, without longitudinal ridge, without lateral tooth. Spinal formula of hind leg 8-6-0. Second metatarsal segment at apex conical. Pretarsi with claws divergent apically, claw 3-setose. Arolium reaching to apices of claws, with paired setae.

Abdomen 10-segmented. Abdominal tergites I-VII and abdominal sternites (II+III)-VII laterad with many pores. Abdominal segment VIII ring-like, short. Abdominal segment IX conical, longer than wide. In apical surface of abdominal segment IX with a inverse V-shaped sclerites dorsally, with long setae, lower portion both sides with sclerotized and pigmented, evenly curved sclerites, with long setae too, whole this portion considered as abdominal segment X.

Habitat: Under ground or close to the soil.

1. ***Hilda patruelis*** Stål (Fig. 2)

Hilda patruelis Stål, 1855, Öfv. Svenska Vet. Akad. Förh. 12:100

General color pale yellowish white. Face, process of face, vertex brown. Dorsal aspect of thorax and abdomen pale black, scattered with pale yellowish white spots. Wing pads black except median portion, ventral aspect yellowish white except last 3 abdominal sternites brown to black. Femora and tibiae scattered black ring and spots.

Vertex wider at base than long in middle line about 1.4 : 1, at apex distinctly wider than at base, anterior margin evenly emarginate medially. Frons quadrate, wider than long. Frontoclypeal suture feeble, at middle of junction of frons and postclypeus with long process, apex evenly curved upward, anteclypeus rather small. Lora recognizable. Relative length of each segment of rostrum about 0.32 : 0.65 : 1. Head in profile with vertex running into frons angulate. Eyes slightly evenly emarginate ventrally. Antennae rather large.

Length of body (exclud. process): 3.78 mm.

Length of anterior wing pad: 1.60 mm.

Specimens examined: Fifth instar nymph: 2, Zimbabwe, 31-III-1987, Chikwenhere.

Determination: Collected with adults at same time and place.

Habitat: Under ground.

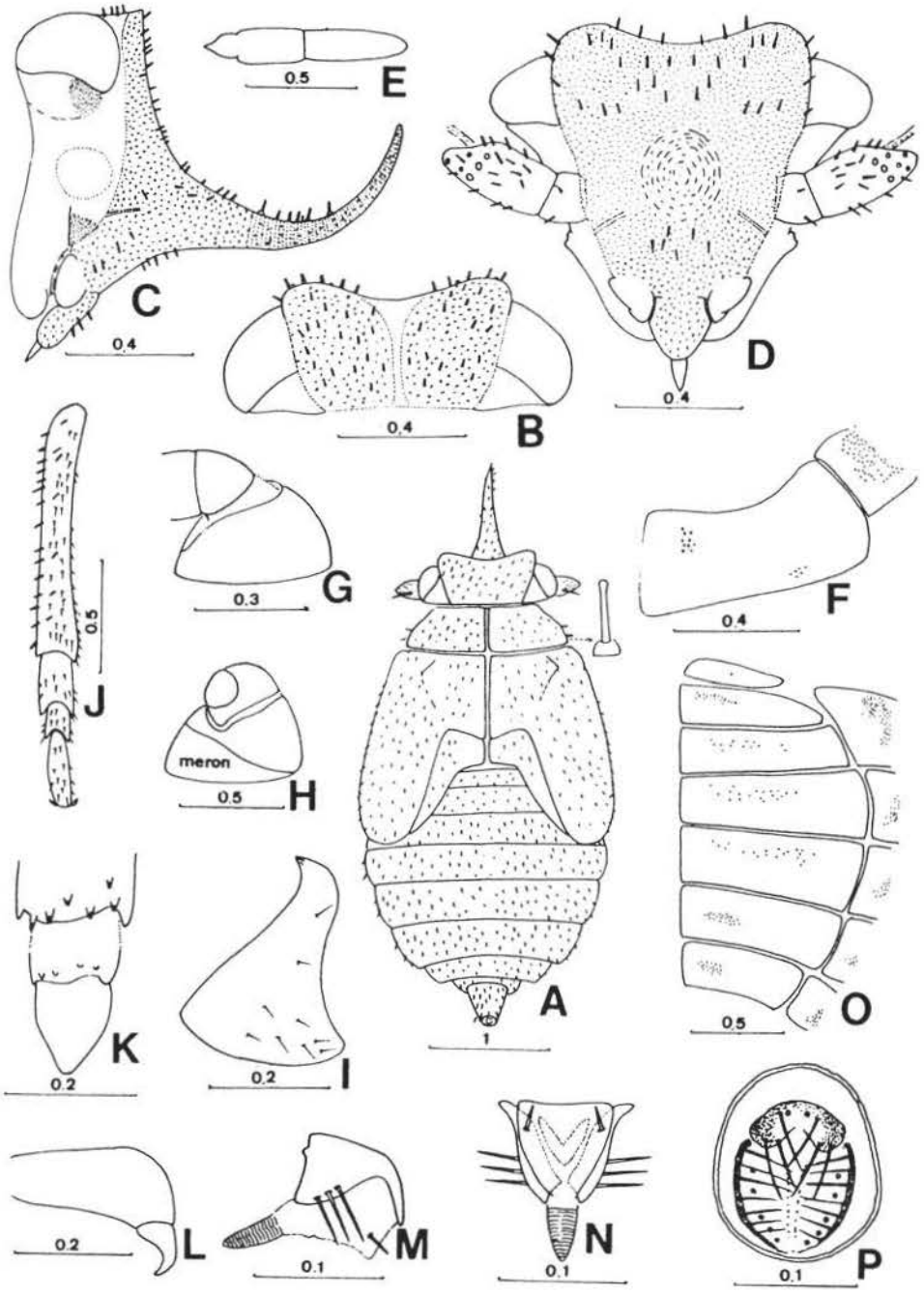

Fig. 2. *Hilda patruelis* Stål. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum; F, pronotum and pleurite, flat surface; G, procoxa and trochanter; H, metacoxa plus meron and trochanter; I, metatrochanter; J, metatibia and tarsi; K, apical teeth of metatibia and first two tarsi; L, third metatarsal segment and claw, lateral view; M, pretarsus, lateral view; N, the same, ventral view; O, abdominal tergites and pleurites I-VII, flat surface; P, abdominal segment X, caudal view. (unit = mm.)

2. *Tettigometra sulphurea* Mulsant and Rey (Fig. 3)

Tettigometra sulphurea Mulsant and Rey, 1855, Ann. Soc. Linn. Lyon.(2)2:209.

General color dirty white.

Vertex wider at base than long in middle line about 2 : 1, at apex distinctly wider than at base, anterior margin evenly arched. Frons converging to apex, wider than long. Frontoclypeal suture visible laterally, at middle above frontoclypesl suture with a as long as wide process. Lora recognizable. Relative length of each segment of rostrum about 0.60 : 0.93 : 1. Head in profile with vertex running into frons angulate. Eyes with calli produced lateral over lateral margin of eyes. Second antennal segment with 14 sensory organs.

Metacoxa normal, movable, with meracanthus, much crescent-shaped. Spinal formula of hind leg 8-6-0.

Length of body: 4.15 mm.

Length of anterior wing pads: 1.96 mm.

Specimens examined: Fifth instar nymph: 4, France, Serignan-du, contat. VIII-1992, T. Bourgoin.

Determination: Determined by T. Bourgoin.

The other species referred

1. *Hilda breviceps* Stål (Baker, 1915)

II. Family **DELPHACIDAE** Leach

Delphacidae Hohrn, 1859, Cat. Hemip. :61.
Delphacida Leach, 1815, Edinburgh Encyclopedia 9:125.

Body usually slender. Vertex carinate, lateral carinae always arising from anterior inner sides of eyes, submedian carinae always obliquely convergent anteriorly, median carina usually present, Y-shaped. Frons with lateral margins carinate, submedian carinae present, usually parallel, median carina absent, each side with pits. Between lateral carinae and eyes with pits. Postclypeus partly carinate or ecarinate. Rostrum 4 or 3-segmented, apical segment at apex truncate. Eyes in profile usually emarginate ventrally. Antennae variable, sensory organs with fine filament processes.

Pronota with lateral carinae on disc, not as anterolateral margins, with or without humeral carinae, each with about 16 pits in *Ugyops*, 8-9 pits in others. Meso- and metanota usually with pits, at least mesonota each with single pit. Anterior wing pads each usually with several pits near notum, 3 pits laterad. Posterior wing pads each with 1-2 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxae without process. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged, ridges gradually narrowing to apex, the longest one about 2 times longer than the shortest. Metatibia with 2-3 lateral teeth, with distinct tibial spur. Spinal formula of hind leg 5-(5-8)-(4-6). Second metatarsal segment at apex truncate. Pretarsi with claws divergent apically, claw with single seta. Arolium reaching nearly to apices of claws, without paired setae.

Abdomen 9-segmented. Abdominal segments IV-VIII each side with (0-3)-(1-8)-(3-9)-(3-8)-(3-10) pits respectively. Ninth abdominal segment each side with 3 pits, usually 1 dorsal, 2 ventral. Anal combs lobe-like, arising laterad.

Habitat: on leaves.

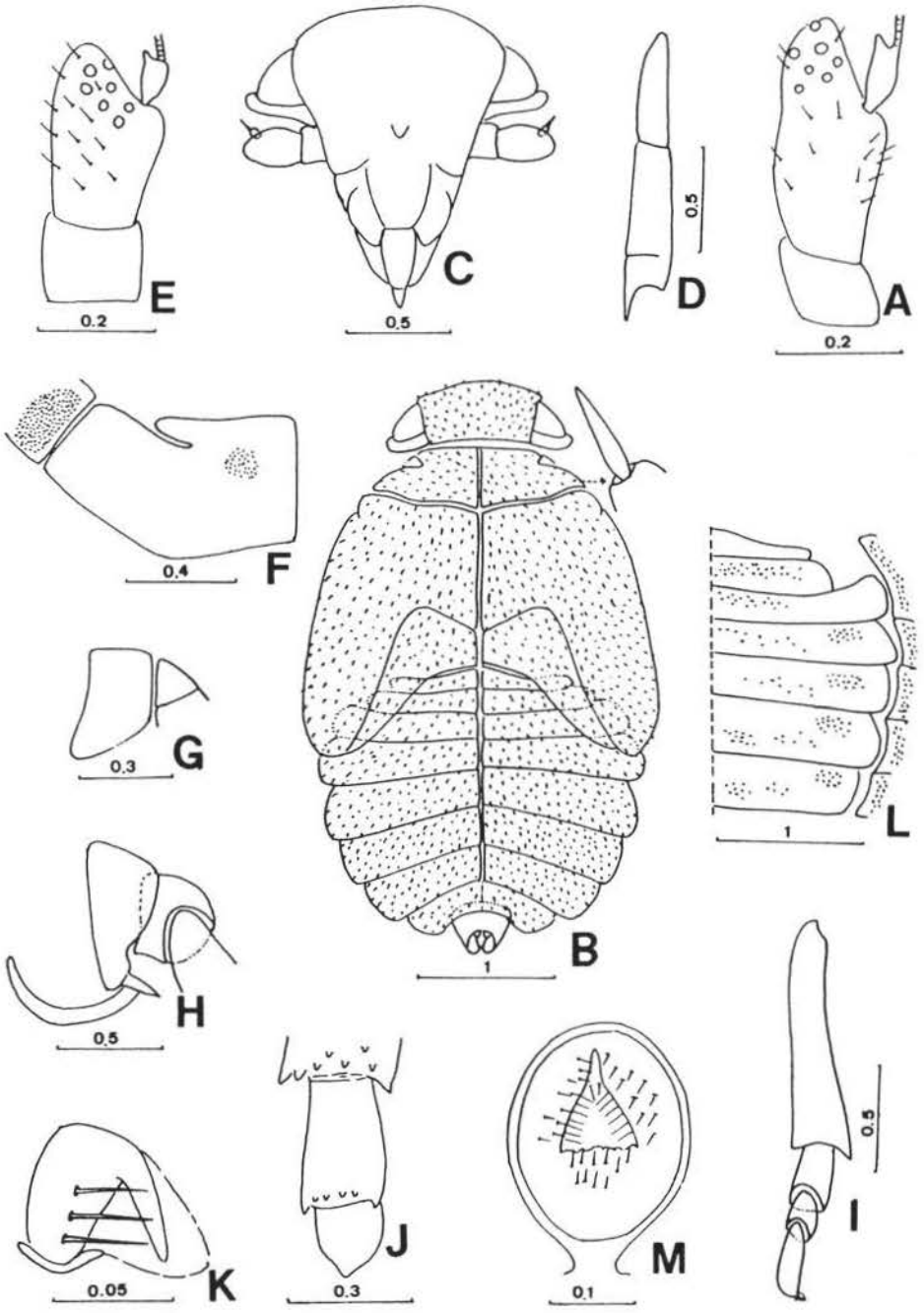

Fig. 3. *Hilda patruelis* Stål A, antenna. *Tettigometra sulphurea* Malsant and Rey B, fifth instar nymph, dorsal view; C, head, ventral view; D, rostrum; E, antenna; F, pronotum, flat surface; G, procoxa and trochanter, lateral view; H, metacoxa and meron, lateral view; I, metatibia and tarsi; J, apical teeth of metatibia and first two tarsi; L, abdominal tergites I-VII and pleurtites, flat surface; M, abdominal segment X, caudal view. (unit = mm.)

3. *Ugyops tripunctatus* (Kato) (Fig. 4)

Ugyops tripunctatus Yang, 1986, Taiwan Mus. Spec. Publ.6:9(nymph)

Specimen examined: Fifth instar nymph: 1, Taitung Hsien, Orchid Island, 14-VI-1985, J.T. Yang.

Determination: Determined from appearance by J.T. Yang.

4. **Delphacidae** sp.1. (Fig. 5)

General color uniform yellowish brown. Dorsal aspect of abdomen more darker, legs paler.

Body flattened, especially head. Head between eyes 1.7 times longer in middle line than wide at narrowest portion, strongly protruding beyond level of eyes, anterior margin strongly convex. Length of eye 0.7 times shorter than length between level of eyes and mid-point of frons. Width of head including eyes 1.7 times wider than basal compartment at basal margin. Lateral carinae of vertex not really reaching lateral carinae of frons, submedian carinae attaining basal margin of vertex laterally, basal compartment as wide at basal margin as greatest length. Eyes nearly straight. Frons 1.3 times longer in middle line than wide at widest part, lateral carinae strongly convex above level of eyes, submedian carinae present, reaching slightly over middle, slightly converging to apex. Each laterofrons at widest portion 3.3 times wider than interfrons. Lowest pit lies far away from frontoclypeal suture, distance about same as width of frons at apex. Upper of lower pits slightly higher than lower of median pits, lower of upper pits slightly higher than higher of median pits, each side with 5 extra pits dorsad. Between eye and lateral carina of frons with 2 pits above anterior margin of eye. Frontoclypeal suture arched dorsal medially. Antennae rather short, first segment wider than long, shorter than second about 1 : 2.7. Relative length of each rostral segment about 1.3 : 1.6 : 1, third segment converging to apex, pointed and pigmented at apex.

Pronota each with 7 pits, 2 medial, 5 lateral. Number and arrangement of pits on meso- and metanota and wing pads typical, relative distance between W_1 to $W_2$and W_2 to W_3 about 1.3 : 1.Spinal formula of hind leg 7-8-6. Second metatarsal segment with 3 of 6 apical teeth not pigmented at apex. Metatibia slightly shorter than 3 tarsi combined. Spur with 13 teeth, but absent at apex.

Abdominal tergites IV-VIII each with 1-3-3-3-2 pits respectively. Ninth abdominal segment in dorsal view with lateral lobes cylindrical, in lateral view gradually narrowing to apex, each side with 3 pits, 2 dorsal, 1 ventral. Anal combs irrecognizable.

Length of body: 3.2 mm.

Length of anterior wing pad: 0.97 mm.

Specimen examined: Fifth instar nymph: 1, Argentina, Sta. Fe. Autopista, 27km. SW Santa Fe. 31-I-1989, C. & L. O'Brien & G. Wibmer. (specimen was sent by L.B. O'Brien)

Determination: Determined by L.B. O'Brien as Delphacidae.

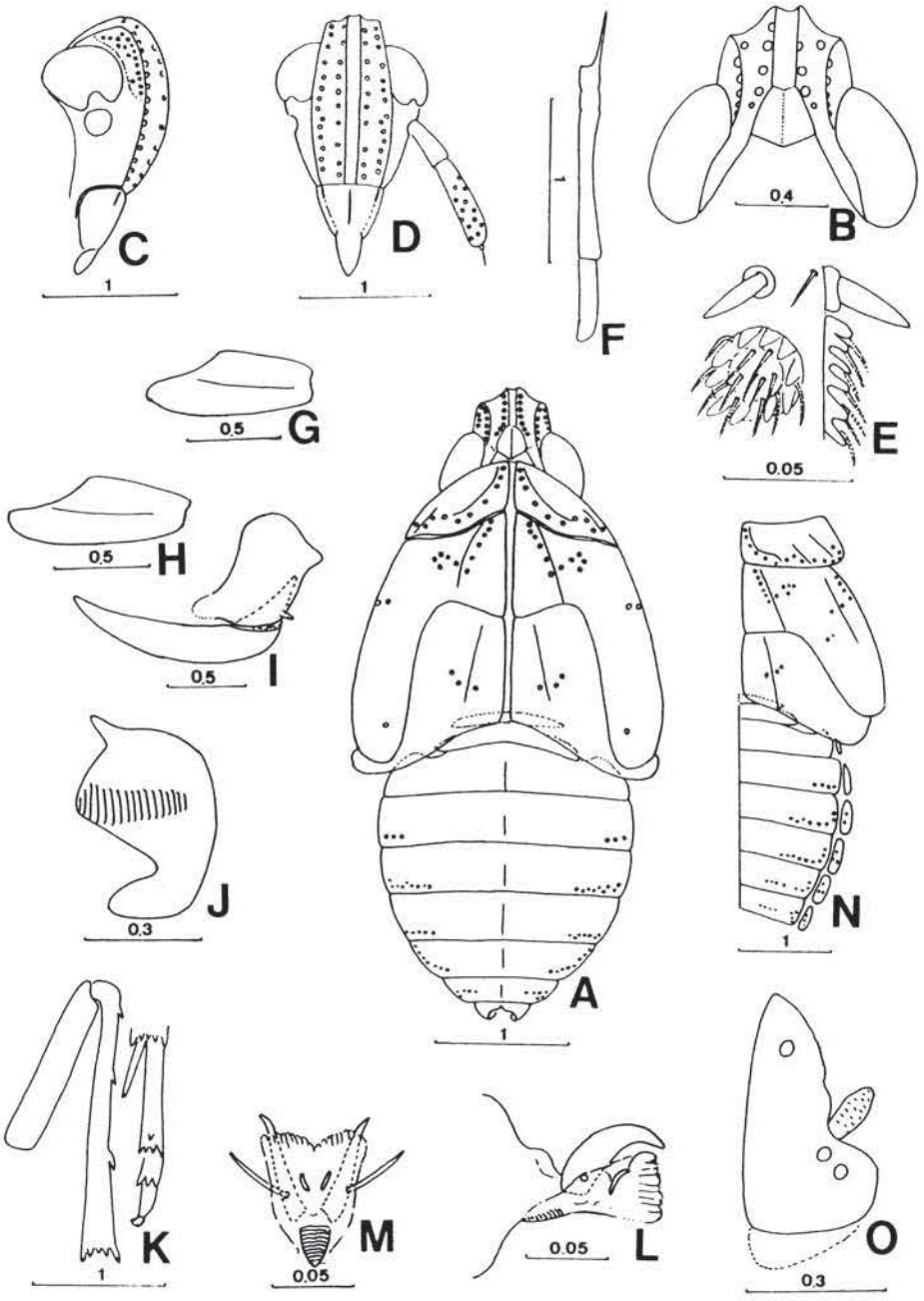

Fig. 4. *Ugyops tripunctatus* (Kato). A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, sensory organs of antenna; F, rostrum; G, procoxa; H, mesocoxa; I, metacoxa plus meron; J, metatrochanter; K, meta-leg; L, pretarsus, lateral view; M, the same, ventral view; N, thoracic nota and abdominal tergites and pleurites, flat surface; O, abdominal segment IX, lateral view. (unit = mm)

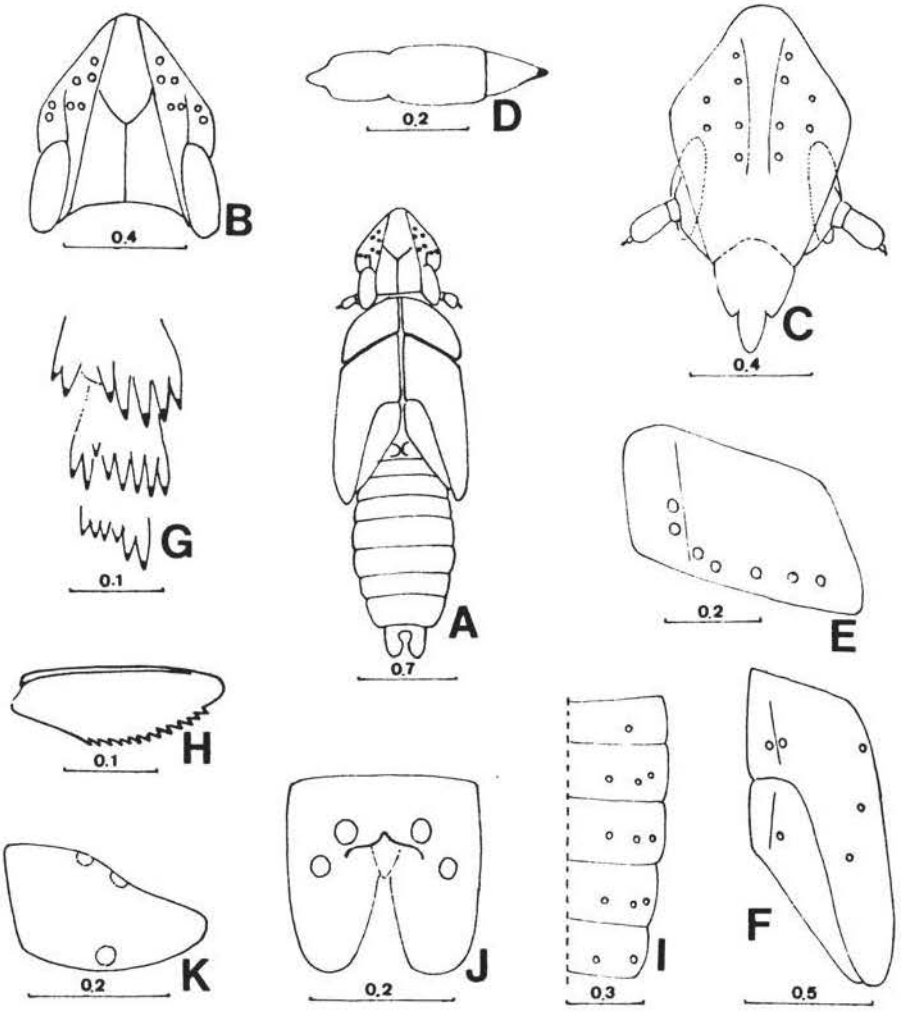

Fig. 5. Delphacidae sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, apex of metatibia and first two tarsal segments, ventral view; H, tibial spur; I, abdominal tergites IV-VIII, flat surface; J, ninth abdominal segment, dorsal view; K, the same, lateral view. (unit= mm.)

The other species examined or referred

1. *Asiraca clavicornis* (Fabr.)(Asche, 1985)
2. *Ugyops* sp. (Asche, 1985)
3. *Kelisia brucki* (Fieber)(Asche, 1985)
4. *Stenokelisia angusta* Ribaut (Asche, 1985)
5. *Stenocranus major* (Kbm)(Asche, 1985)
6. *Stenocranus agamopsyche* Kirkaldy (examined)
7. *Stenocranus lautus* Van Duzee (Calvert and Wilson, 1986)
8. *Tropidocephala brunnipennis* Signoret (examined)

9. *Tropidocephala grata* Yang and Yang (examined)
10. *Tropidocephala saccharivorella* Matsumura (examined)
11. *Tropidocephala sinuosa* Yang and Yang (examined)
12. *Tropidocephala tuberipennis* (M. and R.)(Asche, 1985)
13. *Arcofaciella verrucosa* Fennah (examined)
14. *Arcofacies fullawayi* Muir (examined)
15. *Bambusiphaga taiwanensis* (Muir)(examined)
16. *Epeurysa sinobambusae* Yang and Yang (examined)
17. *Malaxa bakeri* Muir (examined)
18. *Purohita taiwanensis* Muir (examined)
19. *Purohita picea* Yang and Yang (examined)
20. *Saccharosydne* sp. (Asche, 1985)
21. *Saccharosydne procerus* (Matsumura)(examined)
22. *Yanunka inerta* Yang (examined)
23. *Peregrimus maidis* (Ashmead)(examined)
24. *Kakuna albipennis* (Matsumura)(examined)
25. *Kakuna mira* Yang (examined)
26. *Perkinsiella thompsoni* Muir (examined)
27. *Neoconon incersa* Yang (examined)
28. *Cemus sauteri* (Muir)(examined)
29. *Tarophagus colocasiae* (Matsumura)(examined)
30. *Unkanodes sapporona* (Matsumura)(examined)
31. *Chloriona tateyamana* Matsumura (examined)
32. *Chloriona* sp. (Asche, 1985)
33. *Sogatella vibix* (Haupt)(examined)
34. *Harmalia commeliae* Yang (examined)
35. *Laodelphax striatellus* (Fallen)(examined)
36. *Toya propinque* (Fieber)(examined)
37. *Toya bridwelli* (Muir)(examined)
38. *Smicrotatodelpahx maritimus* Yang (examined)
39. *Sogata mukaensis* Yang (examined)
40. *Sogata nigrifrons* (Muir)(examined)
41. *Eoeurysa arundina* Kuoh (examined)
42. *Eoeurysa flavocapitata* Muir (examined)
43. *Nilaparvata lugens* (Stål)(examined)
44. *Taidelphax chishanensis* Yang (examined)
45. *Delphacodes bellicosa* (Wilson, 1985)
46. *Megamellus davisi* (Wilson and Mcpherson, 1981)
47. *Pantagramma longistylata* (Wilson and Wheeler, 1986)

III. Family **MEENOPLIDAE** Fieber

Meenoplidae Fieber, 1872, Katolog europaischen Cicadinen 1872:3.

Body globes. Vertex transverse, anterior and posterior margins distinctly carinate, at middle very narrow, lateral margins ecarinate. Frons longer than wide, lateral margins carinate, submedian carinae present which always unite at base as short common stem, evenly arched laterad medially, without median carina, each side with about 20 pits. Pits on frons and pro- and mesonota and anterior wing pads always elongate oval, the longest one about 3.5 times longer than widest

part. Frontoclypeal suture nearly straight. Postclypeus ecarinate. Rostrum 3-segmented, subapical segment slightly shorter than apical, apical segment truncate at apex. Antennae with second segment longer than wide, sensory organs with rather fine filament processes. Eyes in profile with basoventral angle produced downward. Median ocellus present.

Pronota with lateral carinae as anterolateral margins, each with about 20 pits. Meso- and metanota each with (4-5)-1 pits respectively. Anterior wing pads each with 4-5 pits near notum, 9 pits laterad. Posterior wing pads each with 3-4 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxae at basoventral angles without process. Metacoxa plus meron crescent-shaped, immovable, metacoxa with meracanthus. Metatrochanters ridged, ridges gradually narrowing to apex, the longest one about 2 times longer than the shortest. Metatibiae terete, distinctly dilate near apices, without longitudinal ridge, without lateral tooth. Spinal formula of hind leg 8-7-5. Second metatarsal segment truncate at apex. Unguitractor plate rather small, claws subparallel, each with single seta laterally. Arolium reaching over apices of claws over middle with paired setae.

Abdomen 9-segmented, without pleurite. Abdominal tergites IV-VIII each side with (4-5)-(8-9)-(7-10)-(6-7)-5 pits respectively. Abdominal segment VI-VIII without wax-pore plate. Abdominal tergite VIII entire. Ninth abdominal segment with dorsal portion conically protruding caudad, without sensory pit. Anal combs rather small, arising laterad, lobe-like.

Habitat: Above ground.

5. *Nisia carolinensis* Fennah (Fig.6)

Nisia carolinensis Tsaur and Yang, 1986, Taiwan Mus. Spec. Publ. 6:95. (nymph)

Specimens examined: Fifth instar nymph: 5, Taichung City, 28-VI-1991, C.T. Yang
Determination: Collected with adults at same times and place.

IV. Family **CIXIIDAE** Spinola

Cixiidae Muir, 1923, Proc. Hawaiian Entomol. Soc. 5(2):222.
Cixioides Spinola 1893, Ann. Soc. Entomol. France 8:204.

Body slender, somewhat parallel-sided. Vertex with anterior margin strongly convex medially, not really carinate, lateral margin carinate, median carina feeble. Frons wider than long or as wide as long, lateral margins carinate, without median and submedian carinae, each side with 20-32 pits. Frontoclypeal suture arched upward medially. Clypeus ecarinate. Rostrum 3 or 4-segment, subapical segment as long as apical, apical segment truncate at apex. Eyes in profile elongate oval, with ventral margin not emarginate. Antennae stout and short, with second segment as long as wide, sensory organs with fine filament processes.

Pronota each with 27-36 pits, lateral carinae indistinct. Meso- and metanota with lateral carinae more or less feeble, each with (2-3)-2 pits respectively. Anterior wing pads each with 3-5 pits near notum in oblique line, 13-21 pits laterad. Posterior wing pads each with 3-5 pits near notum in oblique line. Pro- and mesocoxae slender, ridged, mesocoxae without process. Pro- and mesofemora terete. Metacoxa plus meron crescent-shaped, immovable. Metatrochanters with ridged rather wide, gradually narrowing to apex. Metatibiae with lateral lanceolate setae (in adult as lateral teeth). Spinal formula of hind leg 6-(5-9)-(4-6). Second metatarsal segment truncate at apex. Pretarsi with claws subparallel, claws without seta. Arolium without paired setae.

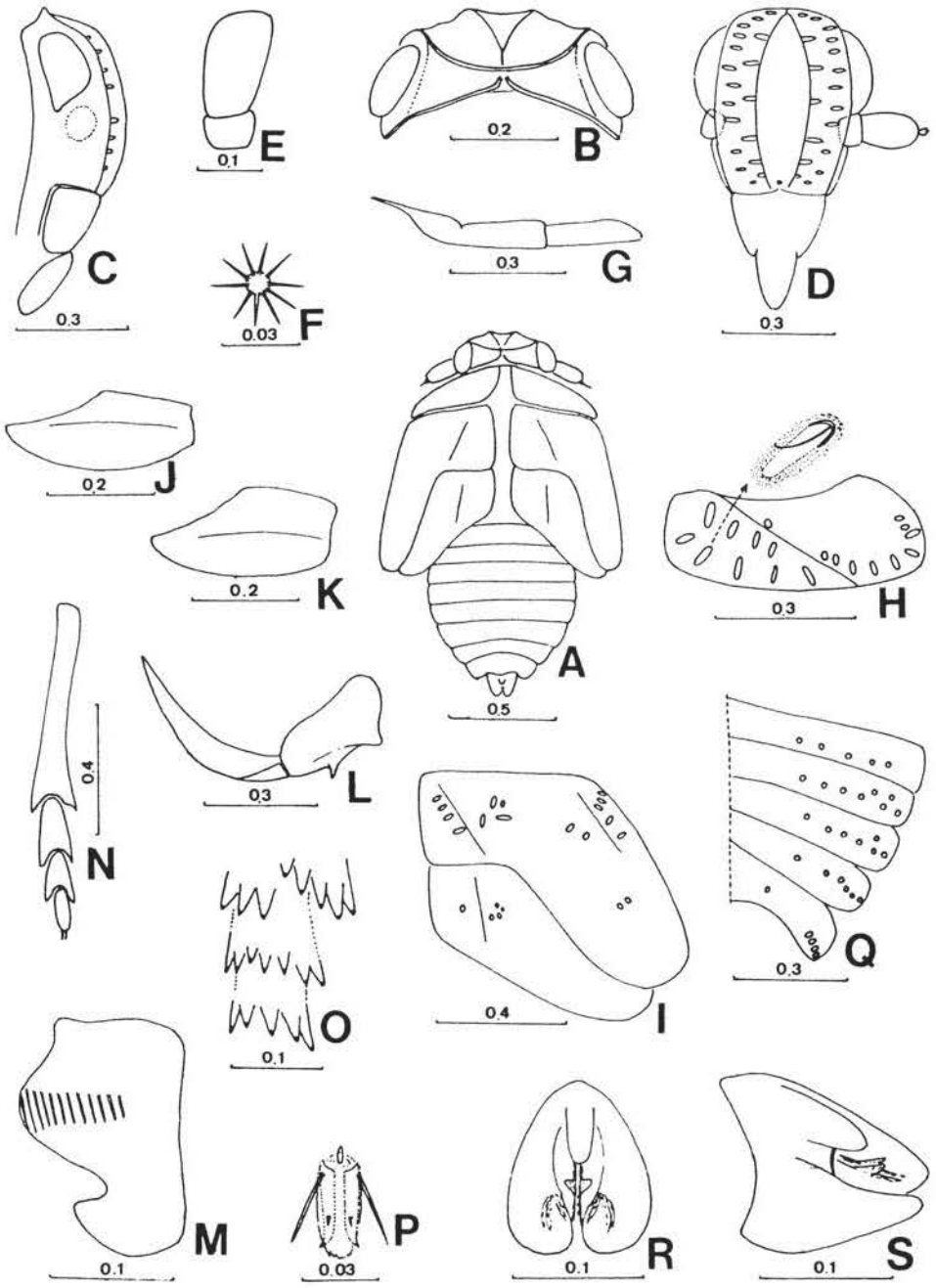

Fig. 6. *Nisia carolinensis* Fennah. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum; H, prontum, flat surface; I, wing pad, flat surface; J, procoxa; K, mesocoxa plus meron; M, metatrochanter; N, metatibia and tarsi; O, apical teeth of metatibia and first two tarsi; P, pretarsus, ventral view; Q, abdominal tergites III-VII, flat surface; R, abdominal segment IX, dorsal view; S, the same, laterodorsal view. (unit = mm.)

Abdomen 9-segmented. Abdominal tergites II-VIII each side with (0-2)-(2-5)-(8-16)-(10-16)-(7-10)-(7-10)-(7-10) pits respectively Abdominal tergites VI-VIII with wax-pore plates, plate in form A separated int 6 parts, associate sensory pits arranging in formula 1-1-1-(1-3)-(1-3) or lateral 5 parts fused, associate pits of fused portion embedded at anterior margin; In form B each as 2 subovate parts, each part composed of more than 20 pores, lateral part without pit embedded; or each as 2 circular parts, each part composed of 6-3 pores, mostly 5-4 pores. Abdominal tergite VIII entire. Ninth abdominal segment in lateral view slightly concave caudomedially, with 1 pit dorsal, 2-3 pits ventral. Anal combs comb-like, convex or straight, arising laterad, at margin with a row of teeth.

Habitat: Under ground, below rotten wood.

Key to species of Cixiidae

1. Wax-pore plates of abdominal segments VI-VIII each 6-parted, if lateral 5 parts fused, then some sensory pits embedded at anterior margin 2
-. Wax-pore plates of abdominal segments VI-VIII each 2-parted, lateral wax part without pit embedded at anterior margin 11
2. Wax-pore plates of abdominal segments VI-VIII each 6-parted except *Pentastiridius pachyces* (Matsumura) on abdominal segment VIII each 2 inner parts fused 3
-. Wax-pore plates of abdominal segments VI-VIII each with lateral 5 parts fused 9
3. Sensory pits between wax-pore parts near middle; posterior wing pads without pit laterad .. 4
-. Sensory pits between wax-pore parts move to anterior margin; posterior wing pads each with 1 pit laterad 7
4. Formula of sensory pits between wax-pore parts 1-1-1-2-3; length of body 10 mm ..... *Mnemosyne cuhana* Stål
-. Formula of sensory pits between wax-pore parts 1-1-1-2-2 or 1-1- 1-1-1 5
5. Wax-pore plates of abdominal segment VIII with 2 inner parts fused; posterior wing pads each with 3 pits near notum; meso- and metanota each with 2-1 pits respectively .... *Pentastiridius pachyceps* (Matsumura)
-. Wax-pore plates of abdominal segment VIII with 2 inner parts not fused 6
6. Formula of sensory pits between wax-pore parts of abdominal tergites VII-VIII 1-1-1-2-2 .... *Reotalus panzeri* (Stål)
-. Formula of sensory pits between wax-pore parts of abdominal tergites VII-VIII 1-1-1-1-2 .... *Olivarus* sp.1.
7. Abdominal tergites II without pit, abdominal tergite III each side with 1 pits .... *Bothriocera signoreti* Stål
-. Abdominal tergite II at least one side with 1 pit; abdominal tergite III each side with 2 pits . 8
8. Dorsal aspect of thorax brown; meso- and metanota each with 2-1 pits respectively; frons each side with about 20 pits ..... *Mundopa kotoshonis* Matsumura
-. Dorsal aspect of thorax pale yellowish white; meso- and metanota each with 3-2 pits respectively; frons each side with about 28 pits ..... *Myndus crudus* Van Duzee
9. Abdominal tergite VI with each lateral wax-pore part embedded 2 sensory pits ... *Cixius* sp.2.
-. Abdominal tergite VI with each lateral wax-pore part embedded single sensory pits 10
10. Spinal formula of hind leg 6-6-5 ..... *Kuvera* sp.1.
-. Spinal formula of hind leg 6-7-5 ..... *Cixius* sp.1.
11. Each wax-pore part composed of more than 20 pores ..... *Cixius nervosus* Linn.
-. Each wax-pore part composed of 6 or less pores 12
12. Spinal formula of hind leg 6-7-5; abdominal tergite IV each side with 16 or less pits 13
Spinal formula of hind leg 6-8-5; abdominal tergite IV each side with 16 or more pits 16

13. Abdominal tergite IV each side with 14 or less pits; posterior wing pads each with 5 pits near notum 14
-. Abdominal tergite IV each side with 16 pits; posterior wing pads each with 3-4 pits near notum ..... *Ankistrus* sp.2.
14. Pronota each with about 27 pits ..... Cixiini sp.1.
-. Pronota each with 29 or more pits 15
15. Abdominal tergite VI each side with 9 pits ..... *Ankistrus choui* Tsaur
-. Abdominal tergite VI each side with 10 pits ..... *Ankistrus* sp.1.
16. Pronota each with 36 pits; abdominal tergite III each side with 4-5 pits ..... Cixiini sp.2.
-. Pronota each with 32-33 pits; abdominal tergite III each side with 3-4 pits .... Cixiini sp.3. and Cixiini sp.4.

6. ***Pentastiridius pachyceps*** (Matsumura) (Fig. 7)

Pentastiridius pachyceps Tsaur, 1988, J. Taiwan Mus. 41(1): 66 (nymph).

The description of the nymph by Tsaur (1988) is supplemented as follows.

General color uniform pale brown. Eyes somewhat reddish.

Vertex wider at base than long in middle line about 2.9 : 1, lateral margins distinctly converging to base, anterior margin rounded. Frons wider at base than long in middle line about 18 : 1, each side with about 20 pits. Rostrum 3-segmented, subapical segment slightly longer than apical.

Pronota each with about 30 pits. Meso- and metanota each with 2-1 pits respectively. Anterior wing pads each with 3-4 pits near notum, 13 pits laterad. Posterior wing pads each with 3 pits near notum. Metatibiae each with several lateral lanceolate setae. Spinal formula of hind leg 6-(8-9)-(6-7).

Abdominal tergites II-VIII each side with (0-1)-2-12-12-11-10-10 pits respectively. Abdominal tergites VI-VIII with each wax-pore plate separated into 6-parted except on tergite VIII inner 2 parts fused but sensory pits still present, associate pits arranging in 1-1-1-2-2 form, pits near middle of parts. Ninth abdominal segment in lateral view with 1 pit dorsal, 2 pits ventral.

Length of body: 4.5 mm.

Length of anterior wing pad: 1.41 mm.

Specimens examined: Fifth instar nymph: 2, Penghu Hsien, Makung, 7-VII-1986, C.T. Yang.

Habitat: Under ground.

7. ***Oliarus*** sp.1. (Fig. 8)

Rostrum 3-segmented, subapical segment as long as apical.

Pronota each with about 31 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 4 pits near notum, 17 pits laterad. Posterior wing pads each with 4 pits near notum. Spinal formula of hind leg 6-7-5.

Abdominal tergite II(lost), III-VIII each side with 3-(11-13)-12-10-9-9 pits respectively. Abdominal tergites VI-VIII each side with 6-parted wax-pore plate respectively, associate pits on tergite VI arranging in 1-1-1-2-2, on tergites VII-VIII in 1-1-1-1-2 respectively, sensory pits near middle of parts. Ninth abdominal segment (lost).

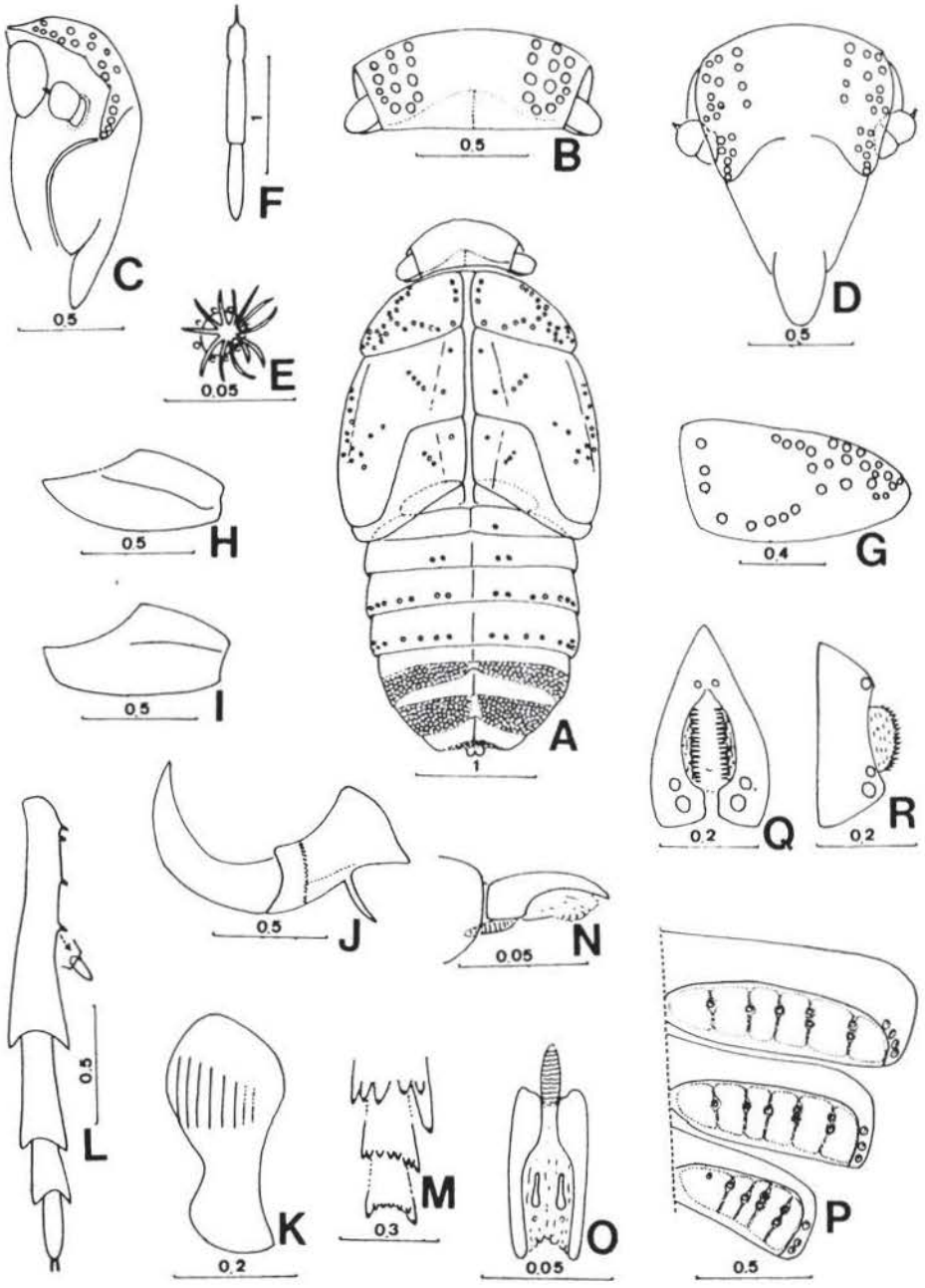

Fig. 7. *Pentastiridius pachyceps* (Matsumura). a, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, sensory organ of antenna; F, rostrum. G, pronotum, flat surface; H, procoxa; I, mesocoxa; J, metacoxa plus meron. K, metatrochanter; L, metatibia and tarsi; M, apical teeth of metatibia and first two tarsi; N, pretarsus, lateral view; O, the same, ventral view; P, wax-pore plates of abdominal segments VI-VIII, flat surface; Q, abdominal segment IX, caudal view; R, the same, lateral view. (unit = mm.)

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taipei Hsien, Tatungshan, 16-VII-1990, W.B. Yeh.

Determination: 1 incomplete female adult emerged from nymph, the mesonotum with 5 carinae. It should belong to tribe Pentastiriini, the spinal formula of metatarsal segment 7-7 should belong to genus *Oliarus*.

Habitat: Below rotten wood.

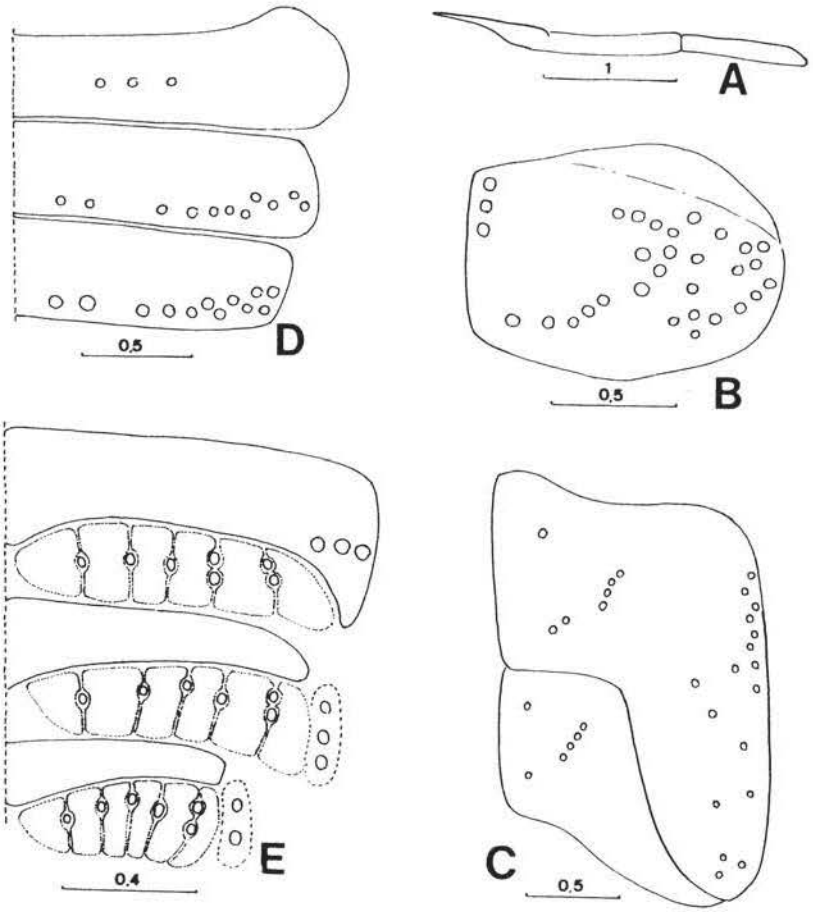

Fig. 8. *Oliarus* sp.1. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites III-V, flat surface; E, abdominal tergites VI-VIII, flat surface. (unit = mm.)

8. ***Mundopa kotoshonis*** Matsumura (Fig. 9)

Mundopa kotoshonis Matsumura, 1914, Annot. Zool. Jap.8:430.

General color pale yellow. Vertex, frons, dorsal aspect of thorax brown.

Frons wider at base than long in middle line about 1.25 : 1, each side with about 20 pits. Rostrum 3-segmented, subapical segment slightly longer than apical.

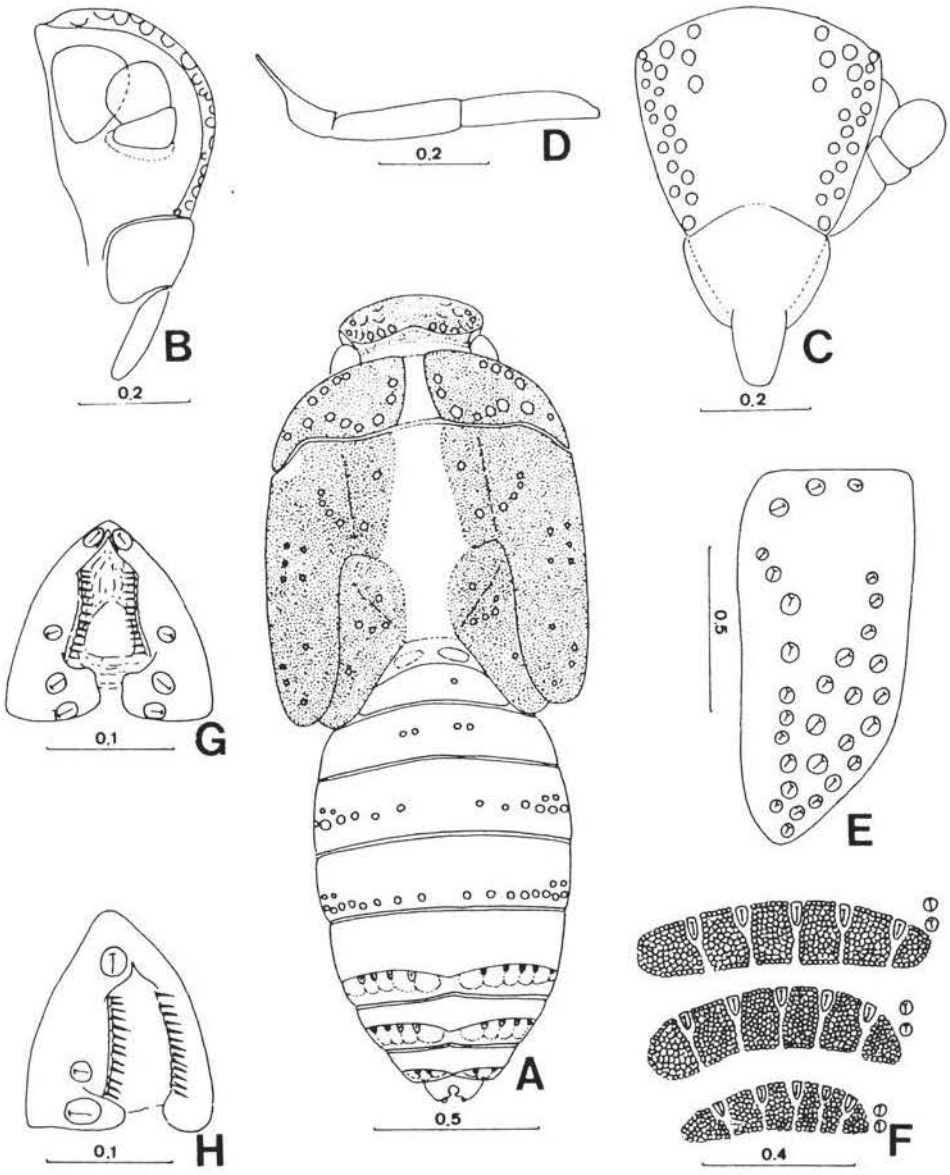

Fig. 9. *Mundopa kotoshonis* Matsumura A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wax-pore plates of abdominal tergites VI-VIII; G, ninth abdominal segment, caudal view; H, the same, laterocaudal view. (unit = mm.)

Pronota each with about 30 pits. Meso- and metanota each with 2-1 pits respectively. Anterior wing pads each with 4 pits near notum, 15 pits laterad. Posterior wing pads each with 3-4 pits near notum, 1 pit laterad. Metatibiae each with 5-7 lanceolate setae laterally. Spinal formula of hind leg 6-(5-7)-(4-5).

Abdominal tergites II-VIII each side with (0-1)-2-8-10-7-7-7 pits respectively. abdominal tergites VI-VIII with wax-pore plates each 6-parted, associate pits arranging in 1-1-1-1-1 form, pits between parts move to anterior margin but still embedded between parts. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 pits ventral.

Length of body: 2.44 mm.

Length of anterior wing pad: 0.75 mm,.

Specimens examined: Fifth instar nymph: 4, Taitung Hsien, Orchid Island, 11-VIII-1989, W.B. Yeh.

Determination: 1 male adult emerged from nymph, determined from comparison of male genitalia by C.T. Yang.

Habitat: Rotten *Pandanus odoratissimus* Linn. Var. *sinensis*.

9. ***Myndus crudus*** Van Duzee (Fig. 10)

Myndus crudus Van Duzee, 1907, Bull. Buffalo Soc. Nat. Sci. 8:33.
Wilson and Tsai, 1982, J. New York Entomol. Soc. 90(3):166- 175 (nymph)

The description of the nymph by Wilson and Tsai (1982) is supplemented as follows.

General color uniform pale yellowish white.

Head in dorsal view transversely quadrate. Vertex wider than long, anterior margin membranously incised medially. Eyes with inner margins angulate medially. Frons nearly as long as widest part, each side with about 28 pits. Rostrum 3-segmented, with subapical segment as long as apical.

Pronota each side with about 27 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 17 pits laterad. Posterior wing pads each with 4 pits near notum, single one laterad. Profemora at ventral margin each with a protuberance. Metatibiae without lateral lanceolate setae. Spinal formula of hind leg 6-6-5.

Abdominal tergites II-VIII each side with 1-2-(10-11)-(10-11)-8-7-7 pits respectively. Abdominal tergites VI-VIII with wax-pore plate each 6-parted, associate pits arranging in 1-1-1-1-1 form, pits between wax-pore move to anterior margin but still embedded between parts. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 pits ventral.

Length of body: 3.6 mm.

Length of anterior wing pad: 0.95 mm.

Specimens examined: Fifth instar nymph: 2, U.S.A. Florida, 28-II-1982, J.H. Tsai (specimens sent by Dr. S.W. Wilson).

Determination: Determined by Dr. S.W. Wilson.

Habitat: Under Ground.

10. ***Cixius*** sp.2. (Fig. 11)

Rostrum 3-segmented, subapical segment shorter than apical about 0.8 : 1.

Pronota each with about 36 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 25 pits laterad. Posterior wing pads each with 4 pits near notum. Spinal formula of hind leg 6-7-5.

Abdominal tergites II-VIII each side with 2-5-15-15-11-9-9 pits respectively. Abdominal tergites VI-VIII each side with wax-pore plates each lateral 5 parts fused, associate pits arranging in 1-2 on tergite VI, 1-3 on VII, 1-2 on VIII. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 ventral.

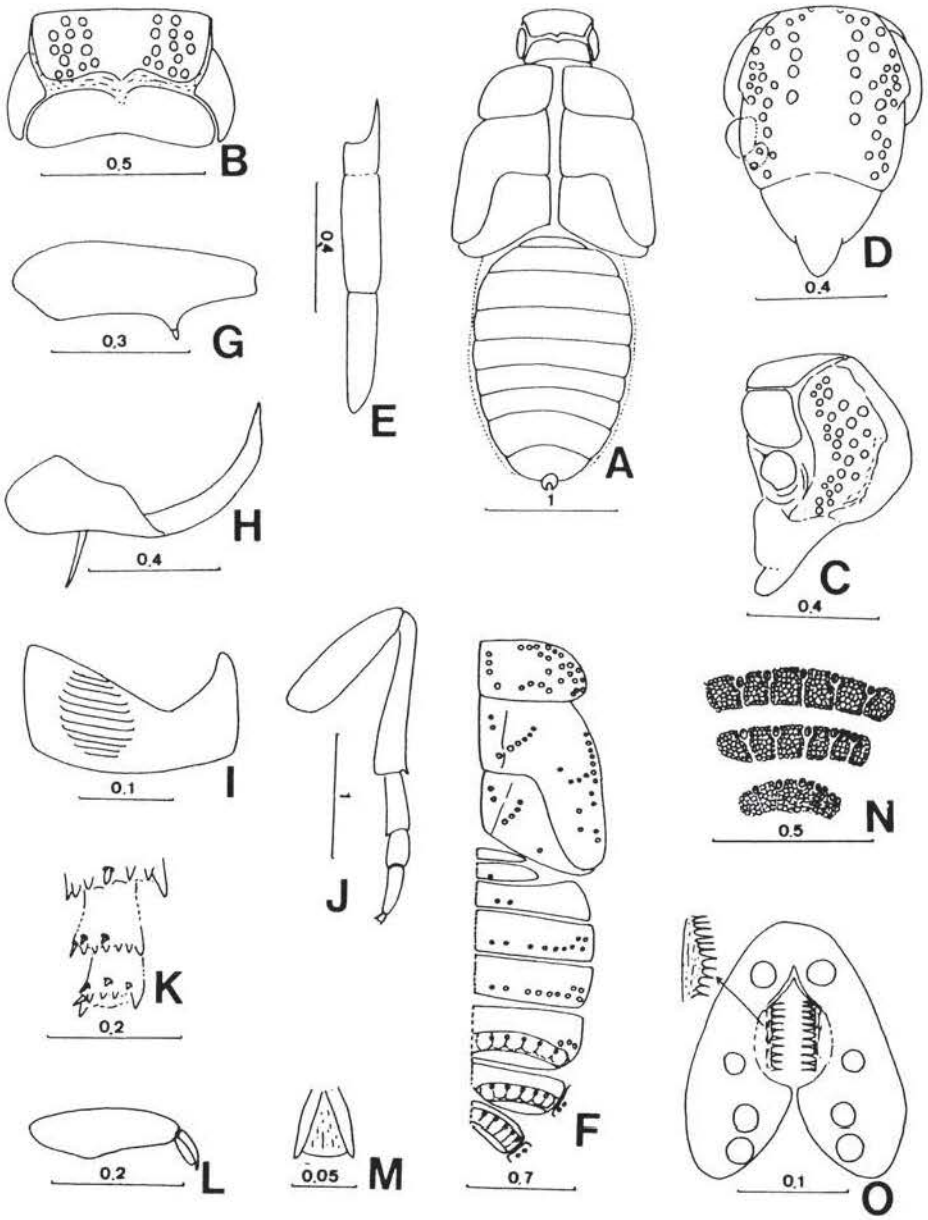

Fig. 10. *Myndus crudus* Van Duzee A, Fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum; F, thoracic nota, wing pads and abdominal tergites I-VIII, flat surface; G, profemur; H, metacoxa plus meron; I, metatrochanter; J, meta-leg; K, apical teeth of metatibia and first two tarsi; L, third metatarsal segment and pretarsus; M, pretarsus, ventral view. (unit = mm.)

Specimen examined: Fifth instar nymph: (ecdysis) 1, Hualien Hsien, Losao, 31-III-1990, W.B. Yeh.

Determination: 1 adult emerged from nymph. Unfortunately the abdomen lost, species name can't be determined. According the form of wax-pore plates which resemble in *Cixius* sp.1. it should belong to genus *Cixius*.

Habitat: Below rotten wood.

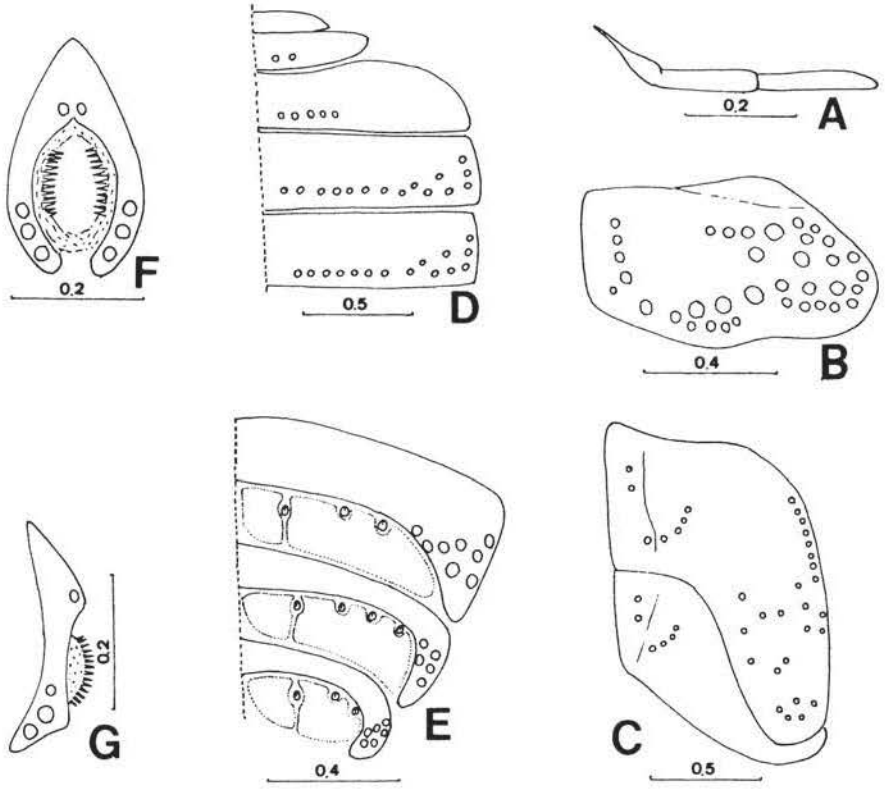

Fig. 11. *Cixius* sp.2. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites I-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view; G, the same, lateral view. (unit = mm.)

11. ***Kuvera*** sp.1. (Fig. 12)

Rostrum 3-segmented, subapical segment shorter than apical about 1 : 1.2.

Pronota each with about 44 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 17 pits laterad. Posterior wing pads each with 4-5 pits near notum. Spinal formula of hind leg 6-6-4.

Abdominal tergites II-VIII each side with 2-(5-6)-(14-15)-(14-15)-(10-11)-9-9 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each lateral 5 parts fused, associate pits arranging in 1-1 on tergite VI, 1-3 on VII, 1-2 on VIII. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 pits ventral.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Hualien Hsien, Nanhutashan, 8-V-1990, W.B. Yeh.

Determination: 1 female adult emerged from nymph. According to Tsaur's (1991) key it belonging to genus *Kuvera*, species name can't be determined.

Habitat: Below rotten wood.

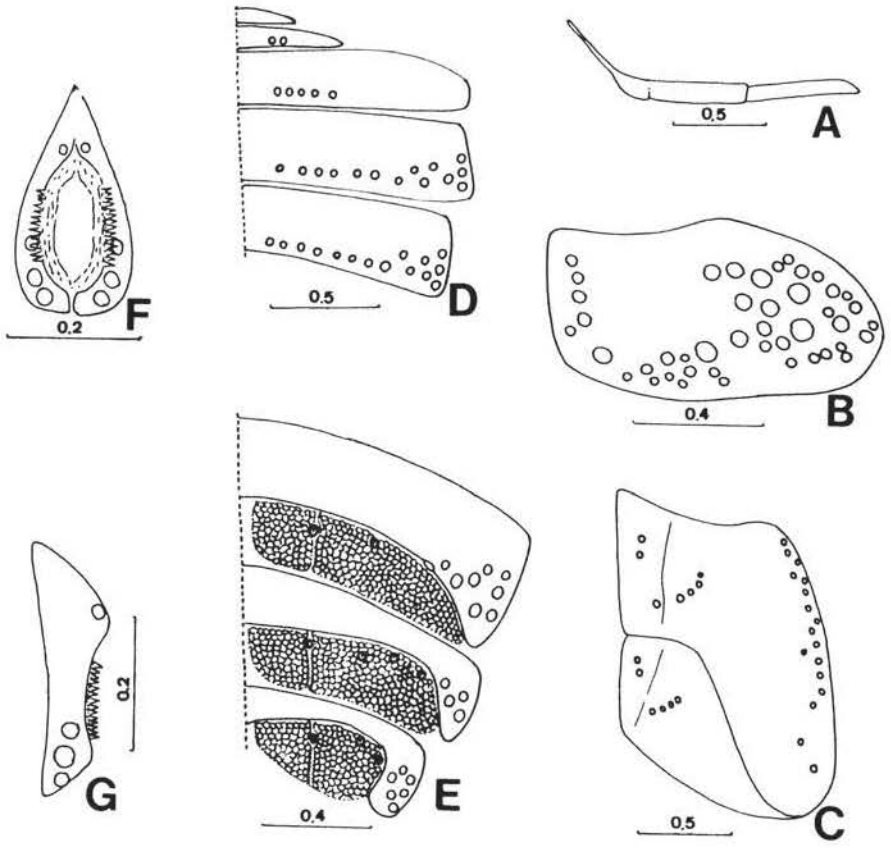

Fig. 12. *Kuvera* sp.1. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites I-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view; G, the same, lateral view. (unit = mm.)

12. ***Cixius*** sp.1. (Fig. 13)

Rostrum 3-segmented, subapical segment shorter than apical about 1.2 : 1.

Pronota each with about 47 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 22 pits laterad. Posterior wing pads each with 4 pits near notum. Spinal formula of hind leg 6-7-5.

Abdominal tergites II-VIII each side with 2-4-13-14-11-8-8 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each lateral 5 parts fused, associate pits arranging in 1-1 on tergite VI, 1-3 on VII, 1-2 on VIII. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 ventral.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Nantou Hsien, Yushan, 21-VI-1990, W.B. Yeh.

Determination: 1 male adult emerged from nymph. This species is close relative of *Cixius bicolor* Matsumura, it differs from the latter in color pattern of tegmina; the lateral processes of aedeagus.

Habitat: Below rotten wood.

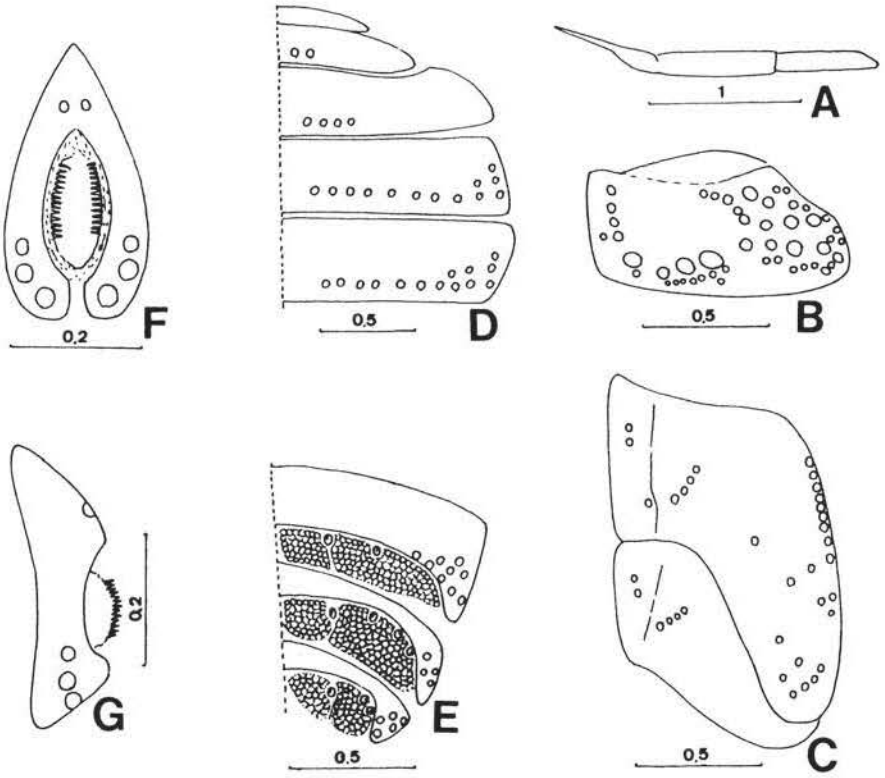

Fig. 13. *Cixius* sp.1. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites I-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view; G, the same, lateral view. (unit = mm.)

13. ***Cixius nervosus*** Linnaeus (Fig. 14)

Cixius nervosus Sulc, 1928, Bio. Spisy.7:149 (nymph)

Specimen examined: No specimen available for the author.

Distribution: Europe.

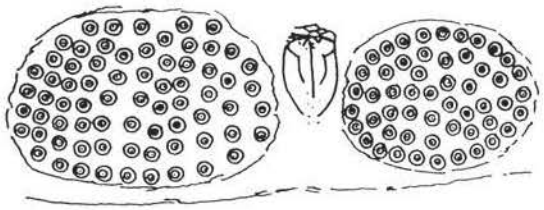

Fig. 14. *Cixius nervosus* Linneaus wax-pore plate of abdominal tergite. (after Sulc, 1928)

14. ***Ankistrus choui*** Tsaur (Fig. 15)

Ankistrus choui Tsaur, 1991, J. Taiwan Mus. 44(1):12.

Rostrum 3-segmented, subapical segment slightly longer than apical. (in adult distinctly 4-segmented)

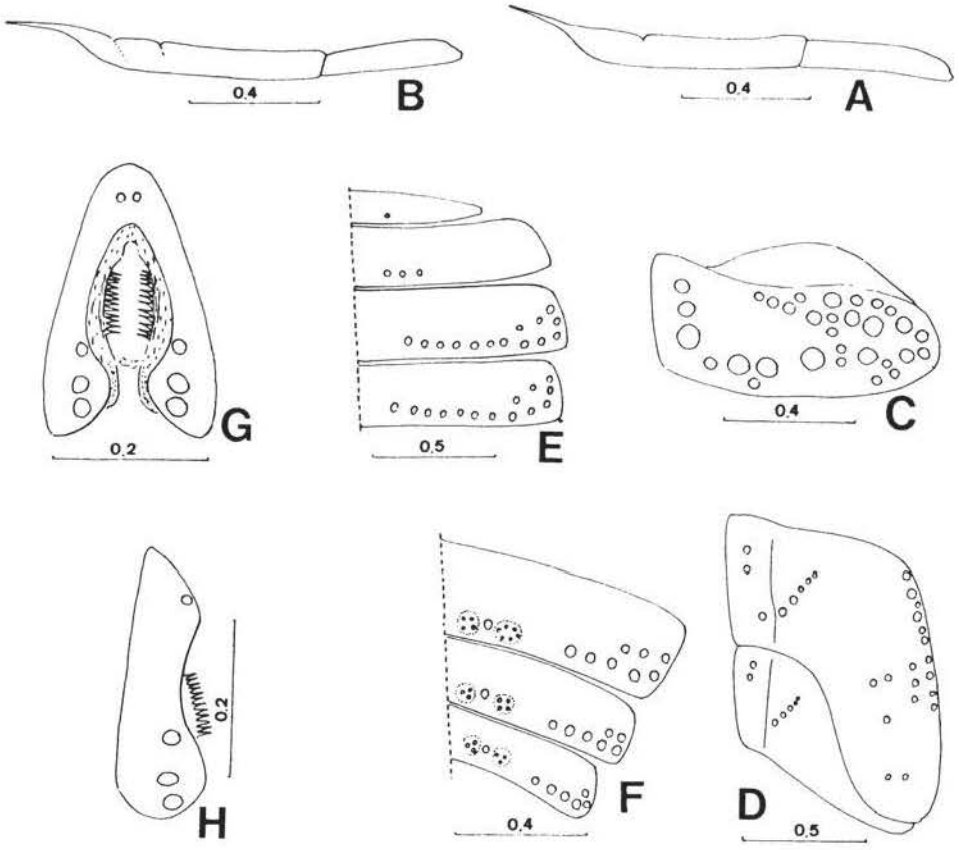

Fig. 15. *Ankistrus choui* A, rostrum; B, rostrum (adult);C, pronotum, flat surface; D, wing pads, flat surface; E, abdominal tergites II-V, flat surface; F, abdominal tergites VI-VIII, flat surface; G, ninth abdominal segment, caudal view; H, the same, lateral view. (unit = mm.)

Pronota each with about 31 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 18 pits laterad. Posterior wing pads each with 5 pits near notum. (meta-legs with tibiae and tarsi lost)

Abdominal tergites II-VIII each side with 1-3-14-14-9-8-8 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each 2-parted, each part with 3-6 pores. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 ventral.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Nantou Hsien, Wushe, 5-VII-1990, W.B. Yeh.

Determination: 1 male adult emerged from nymph. According Tsaur's key it runs to *Ankistrus choui* Tsaur.

Habitat: Below rotten wood.

15. ***Ankistrus*** sp.1. (Fig. 16)

Rostrum indistinctly 4-segmented(in adult distinct), subapical segment slightly longer than apical.

Pronota each with about 29 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 18 pits laterad. Posterior wing pads each with 5

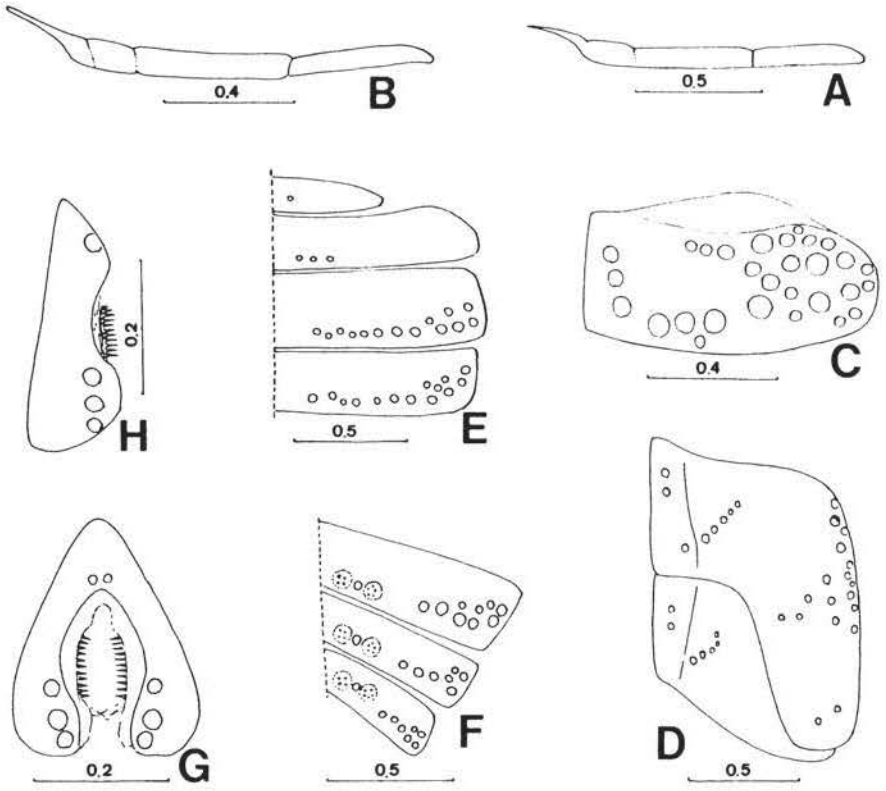

Fig. 16. *Ankistrus* sp.1. A, rostrum; B, rostrum (adult);C, pronotum, flat surface; D, wing pads, flat surface; E, abdominal tergites II-V, flat surface; F, abdominal tergites VI-VIII, flat surface; G, ninth abdominal segment, caudal view; H, the same, lateral view. (unit = mm.)

pits near notum. Metatibiae each with 3 lateral lanceolate setae (in adult as 3 lateral teeth). Spinal formula of hind leg 6-7-5.

Abdominal tergites II-VIII each side with 1-(2-3)-(13-14)-(13-14)-10-8-8 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each 2-parted, each part with 4-5 pores. Ninth abdominal segment with 1 pit dorsal, 3 ventral.

Specimens examined: Fifth instar nymph: (ecdysis) 2, Meifeng, Nantou Hsien, 3-VII-1990, W.B. Yeh.

Determination: 2 male adults emerged from nymph. According Tsaur's (1991) key this species runs to tribe Cixiini, genus *Ankistrus*, although the spinal formula of metatarsal segment was 7/7, not agrees with Tsaur's 8/6, it characters agree with Tsaur's definition of genus. In key of genus, it runs to *Ankistrus varius* Tsaur and *A. choui* Tsaur, but it differs from both species in the direction of processes of aedeagus.

Habitat: Below stone.

16. ***Ankistrus*** sp.2. (Fig. 17)

Rostrum 4-segmented, subapical segment as long as apical.

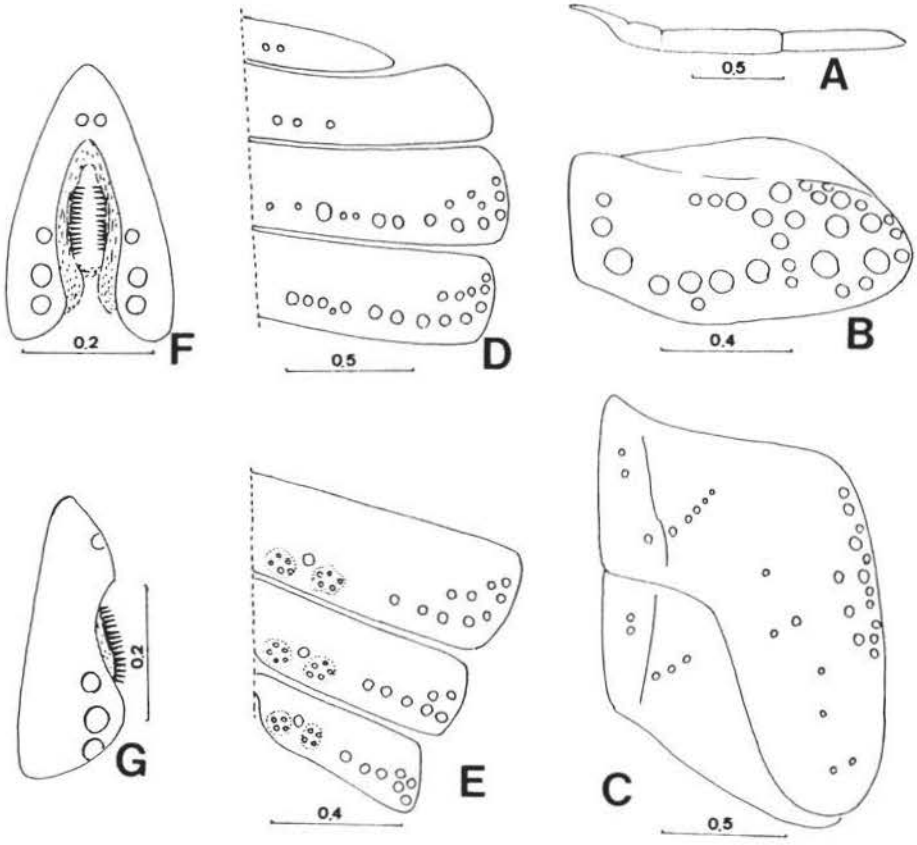

Fig. 17. *Ankistrus* sp.2. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites II-V, flat surface; F, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view; G, the same, lateral view. (unit = mm.)

Pronota each with about 31 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 21 pits laterad. Posterior wing pads each with 3-4 pits near notum. (meta-legs lost)

Abdominal tergites II-VIII each side with 2-(3-5)-16-16-11-8-8 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each 2-parted, each part with 4-5 pores. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 ventral. Anal combs in lateral view straight.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Chaiyi Hsien, Alishan, 24-VII-1990, W.B. Yeh.

Determination: 1 female adult emerged from nymph. Its spinal formula of metatarsal segment (7-8)-8 and definite marked tegmina. According Tsaur's definition, it belonging to *Ankistrus*. On marks of tegmina, it resembles *Ankistrus monticolus* Tsaur but losing basal marking.

Habitat: Below rotten wood.

17. **Cixiini** sp.1. (Fig. 18.)

General color milky white, dorsum somewhat brown.

Vertex transverse, anterior margin distinctly convex medially, extreme narrowed laterally. Vertex in lateral view roundly curving into frons. Frons in ventral view widest near base, converging to apex, apicolateral angle distinctly angulated and raised, without median and submedian carinae. Rostrum 4-segmented, subapical segment slightly longer than apical.

Pronota each side with about 27 pits. Meso- and metanota each with 3-(2-3) pits respectively. Anterior wing pads each with 5 pits near notum, 17 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of hind leg 6-7-5.

Abdominal tergites II-VIII each side with (1-2)-(3-4)-14-14-9-8-8 pits respectively. Abdominal tergites VI-VIII with wax-pore plate each 2-parted, each part with 5-6 pores. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 ventral.

Length of body: 3.54 mm.

Length of anterior wing pad: 1.12 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Hualien Hsien, Nanhutashan, 8-V-1990, W.B. Yeh.

Determination: 1 female adult incompletely emerged from nymph, it should belong to tribe Cixiini.

Habitat: Below rotten wood.

18. **Cixiini** sp.2. (Fig. 19)

Rostrum 4-segmented, subapical segment longer than apical.

Pronota each with about 36 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 19 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of hind leg 6-8-5.

Abdominal tergites II-VIII each side with 1-(4-5)-16-16-11-9-9 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each 2-parted, each part with 4-5 pores. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 pits ventral. Anal combs in lateral view slightly rounded at apex.

Specimens examined: Fifth instar nymph: 3, (ecdysis) 1, Kaohsiung Hsien, Kueiko, 20-VIII-1990, W.B. Yeh.

Determination: 1 female adult emerged from nymph. It should belong to Cixiini.

Habitat: Below rotten wood.

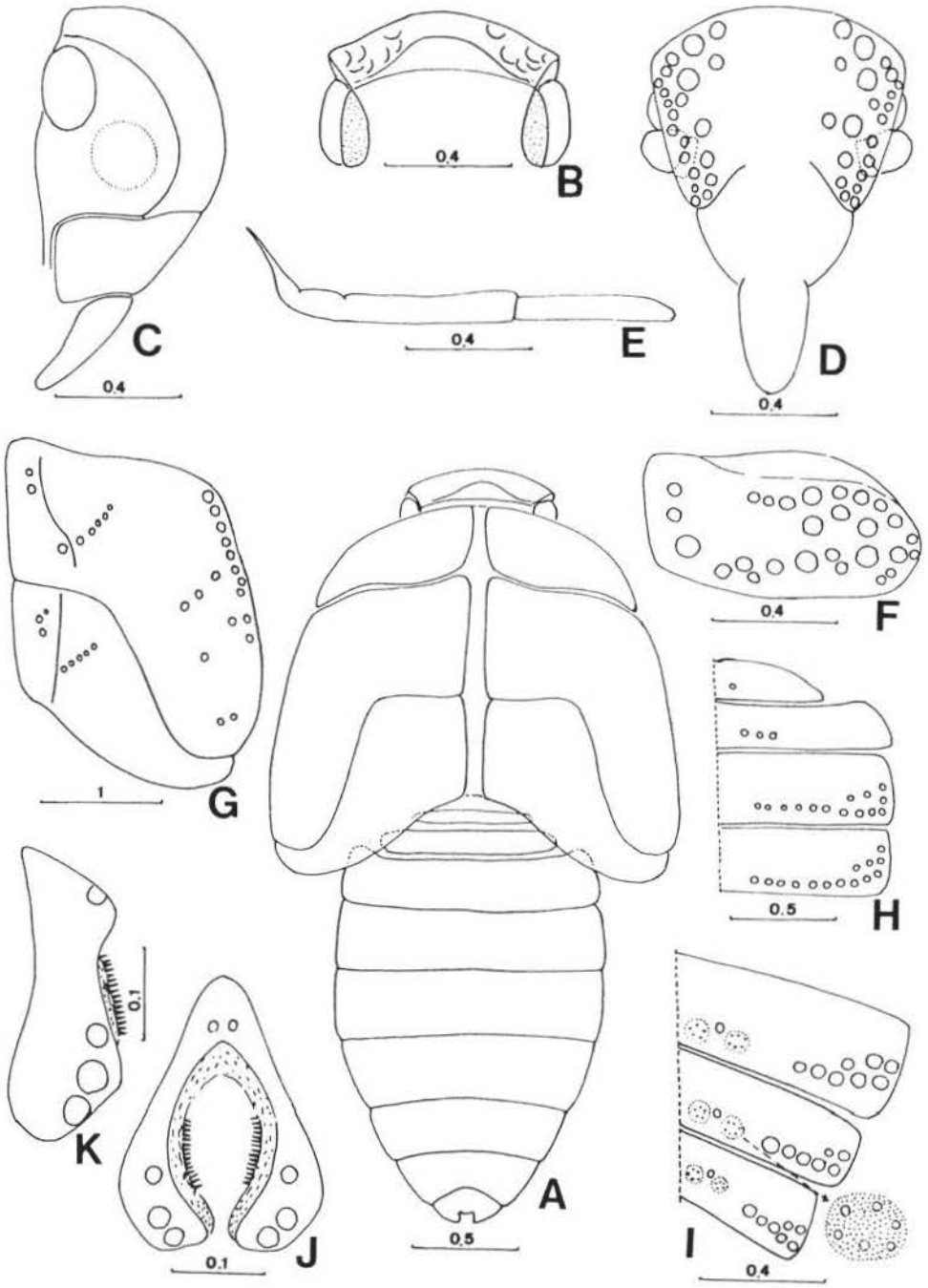

Fig. 18. Cixiini sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum; F, pronotum, flat surface; G,wing pads, flat surface; H, abdominal tergites II-V, flat surface; I, abdominal tergites VI-VIII, flat surface; J,ninth abdominal segment, caudal view; L, the same, lateral view. (unit = mm.)

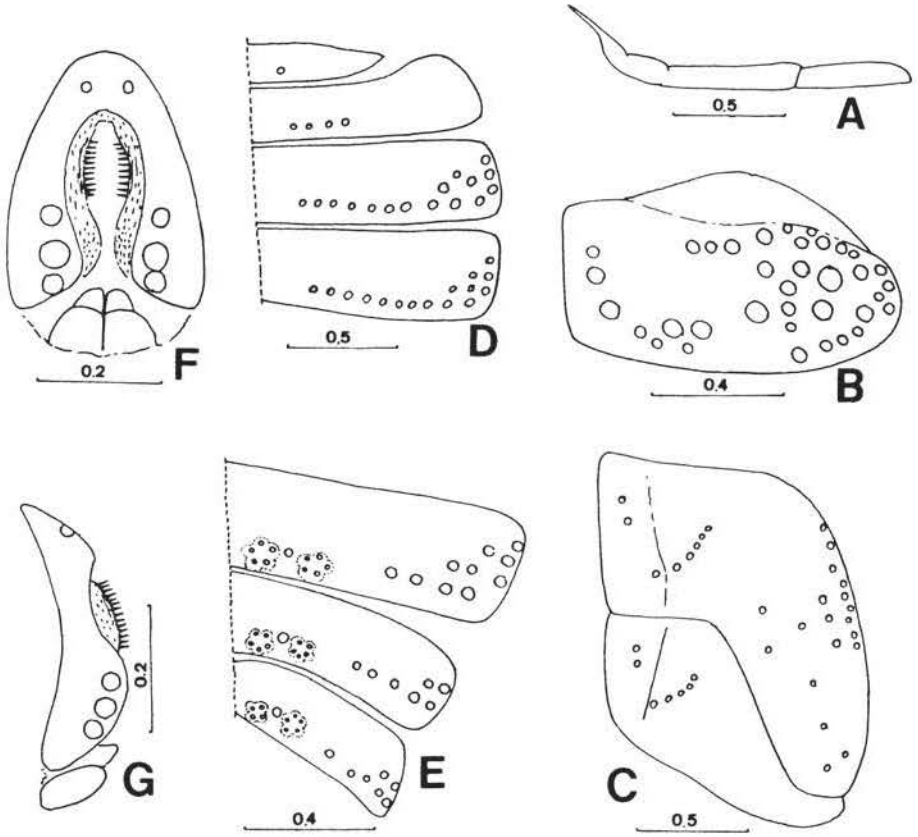

Fig. 19. Cixiini sp.2. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites II-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view; G, the same, lateral view. (unit = mm.)

19. **Cixiini** sp.3. (Fig. 20)

Rostrum 4-segmented, subapical segment slightly longer than apical.

Pronota each with about 33 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 21 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of hind leg 6-8-5.

Abdominal tergites II-VIII each side with 1-3-16-16-11-(7-8)-(8-9) pits respectively. Abdominal tergites VI-VIII with wax-pore plates each 2-parted, each part with 3-5 pores. Ninth abdominal segment in lateral view with 1 pit dorsal, 3 pits ventral. Anal combs in lateral view rounded at apex.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Nantou Hsien, Tuikuan, 20-VI-1990, W.B. Yeh.

Determination: 1 female adult emerged from nymph. It should belong to tribe Cixiini.

Habitat: Below rotten wood.

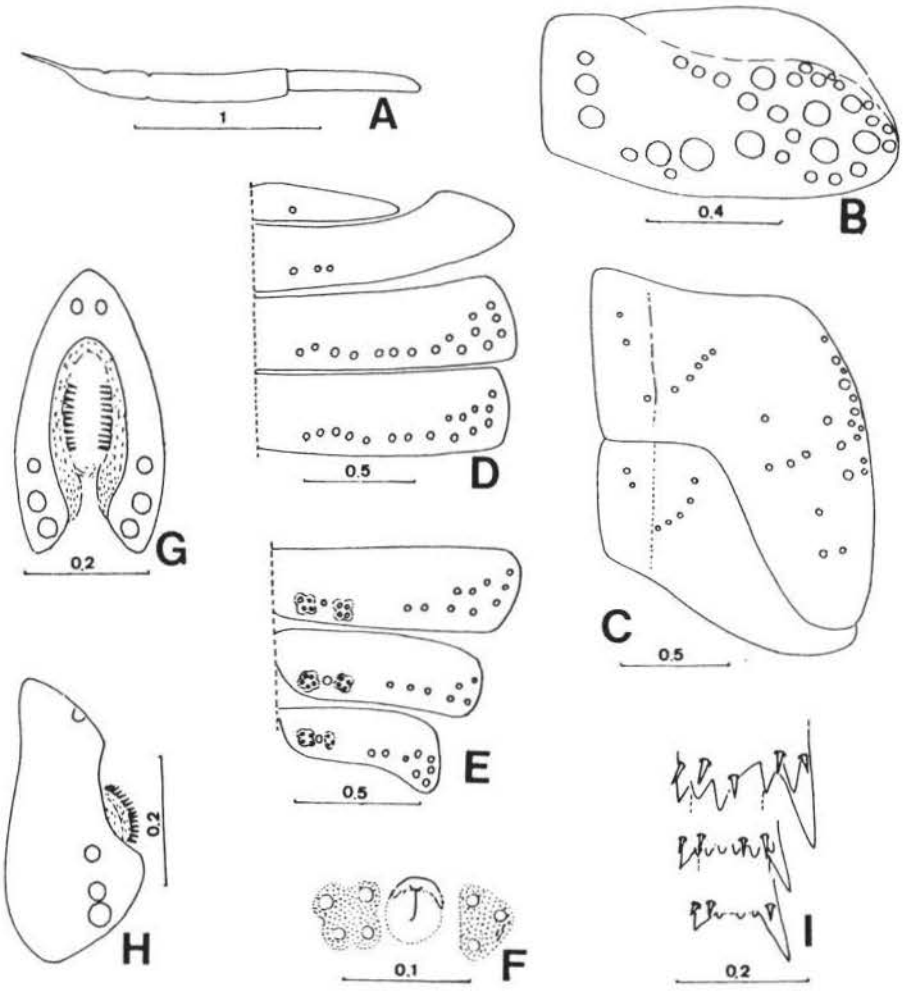

Fig. 20. Cixiini sp.3. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites II-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, wax-pore plate and sensory pit of abdominal tergite VIII; G, ninth abdominal segment, caudal view; H, the same, lateral view; I, apices of metatibia and first two metatarsal tarsi. (unit = mm.)

20. **Cixiini** sp.4. (Fig. 21)

General color brown. Frons shorter in middle line than wide at widest part about 1 : 1.2, each side with about 32 pits. Rostrum 4-segmented, subapical segment slightly longer than apical.

Pronota each with about 33 pits. Meso- and metanota each with 3-2 pits respectively. Anterior wing pads each with 5 pits near notum, 21 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of hind leg 6-8-5.

Abdominal tergites II-VIII each side with 1-(3-4)-17-(15-17)-11-(lost)-8 pits respectively. Abdominal tergites VI-VIII with wax-pore plates each 2-parted, each part with 4-5 pores.

Specimens examined: Fifth instar nymph: (ecdysis) 2, Taoyuan Hsien, Lalashan, 30-VIII-1989, W.B. Yeh.

Determination: No adult emerged from nymph. It should belong to tribe Cixiini.

Habitat: Below moist rotten wood.

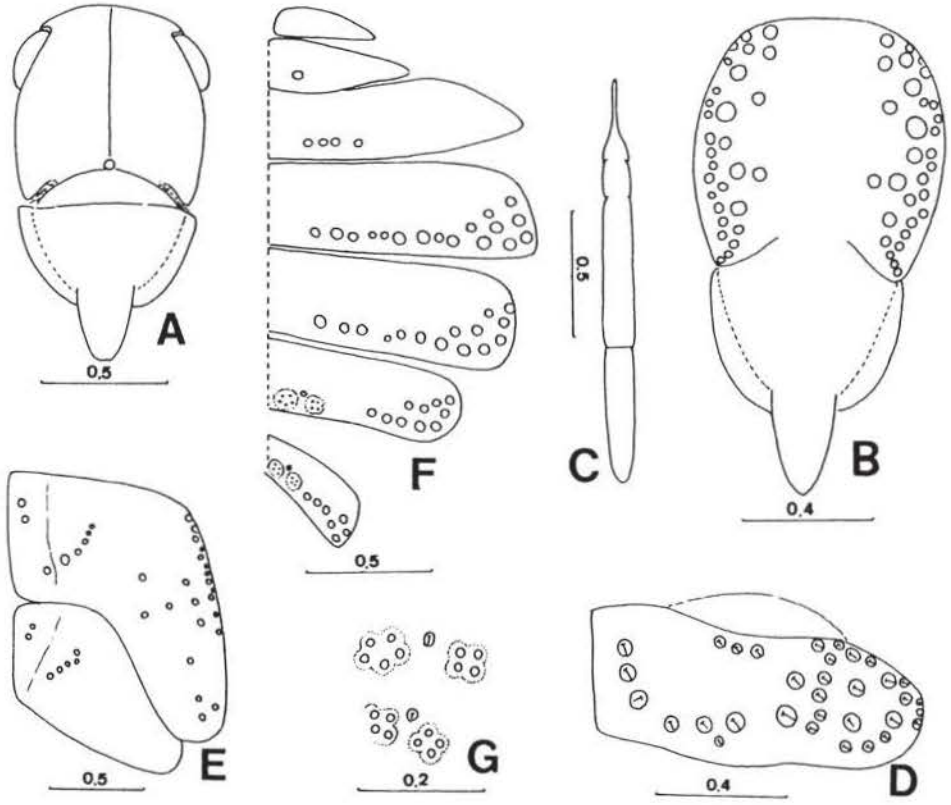

Fig. 21. Cixiini sp.4. A, head (adult), ventral view; B, the same (fifth instar nymph), ventral view; C, rostrum; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites I-V, VIII flat surface; G, wax-pore plate of abdominal tergite VI, VIII. (unit = mm.)

The other species referred

1. *Bothriocera signoreti* Stål (Myers, 1929)
2. *Mnemosyne cubana* Stål (Myers, 1929)
3. *Reptalus panzeri* (Loew)(Sulc, 1928)

V. Family **ACHILIDAE** Stål

Achilidae White, 1879, Entomol. Monthly Mag.15:217.
Achilidae Stål, 1866, Hemiptera African 4:130.

Body elongate, dorsoventrally flattened. Vertex wider at base than long in middle line, horizontal or sharply inclined from apex to base, ecarinate except between vertex and frons. Frons longer than wide, widely expanded laterad, lateral carinae slightly convex, without median and submedian carinae, each lateral side with 15-19 pits. Frontoclypeal suture obliquely curved mesad and interrupted at middle. Clypeus ecarinate. Rostrum 3 or 4-segmented, subapical segment shorter than apical, apical segment with apical fifth or less pointed but not pigmented. Eyes rounded. Antennae rather small, second segment with sensory organs with fine filament processes.

Pronota with lateral carinae on disc, each with 1-2 humeral carinae, each with about 17-21 pits. Anterior wing pads each with 4-5 pits near notum, inner 2 pits arranging obliquely, outer 2-3 transverse, 10-14 pits laterad. Posterior wing pads each with 2-6 pits in oblique line or outer 3 in triangle near notum. Pro- and mesocoxae slender, ridged, mesocoxae without process. Pro- and mesofemora terete. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged, ridges gradually narrowing to apex. Metatibiae each with single lateral tooth. Spinal formula of hind leg 7-(5-7)-(5-8). Second metatarsal segment truncate at apex. Pretarsi with claws subparallel, claws without seta. Arolium not reaching apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites III-VIII each side with (0-1)-(5-7)-(5-6)-(5-6)-(5-6)-(4-5) pits respectively, with or without pleurite. Abdominal tergites VI-VIII each side with a transverse wax-pore part, each part with more than 20 pores, densely contact each other or with 6-17 pores arranging along margins which distinctly separated each other, or transverse line of 6 pores, pores widely separated each other. Abdominal tergite VIII entire. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral. Anal combs small, comb-like, at margin with terete processes, each process with filament at apex.

Habitat: Beneath losing bark; below rotten wood.

Key to species of Achilidae

1. Wax-pore plate each part with more than 20 pores; pores of each part distributing over all surface; spinal formula of hind leg 7-7-(7-8) 2
-. Wax-pore plate each part with 17-6 pores; pores of each part arranging along margins or in a line; spinal formula of hind leg 7-(5-6)-(5-6) 4
2. Pronota each with 2 humeral carinae; frons without submedian carinae 3
-. Pronota without humeral carina; frons with distinct submedian carinae ..... Achilidae sp.7
3. Spinal formula of hind leg 7-7-7; length of anterior wing pad 1.95 mm. .. *Epiptera opaca* (Say)
-. Spinal formula of hind leg 7-7-8; length of anterior wing pad 3.80 mm. ..... *Epiptera fusca* (Walker)
4. Wax-pore part transverse oval, pores arranging along margins 5
-. Wax-pore part transverse lineal, pores arranging in a line ..... *Deferunda truncata* Chen and Yang
5. Abdominal tergite III each side with a pits 6
-. Abdominal tergite III without pits 12
6. Wax-pore part of abdominal segment VIII each part with 10 or more pores 7
-. Wax-pore part of abdominal segment VIII each part with 8 or less pores 11
7. Anterior wing pads each with 4 pits near notum; rostrum with apical segment 1.8-1.9 times longer than subapical 8
-. Anterior wing pads each with 5 pits near notum; rostrum with apical segment 1.5-1.7 times longer than subapical 9
8. Wax-pore part of abdominal segment VI each part with 16 pores, of VII 17 pores, of VIII 14 pores; color uniform black ..... Achilidae sp.6.

-. Wax-pore part of abdominal segment VI each part with 13-14 pores, of VII 12-13 pores, of VIII 11-12 pores; head and thorax black, abdomen dark brown ..... Achilidae sp.4.
9. Rostrum with apical segment 1.7 times longer than subapical; wax-pore part of abdominal segment VI each part with 13 pores ..... Achilidae sp.5.
-. Rostrum with apical segment 1.5 times longer than subapical; wax-pore part of abdominal segment VI each part with 11 pores 10
10. Spinal formula of hind leg 7-6-5; pronota each with 18 pits ..... Achilidae sp.2.
-. Spinal formula of hind leg 7-5-5; pronota each with 17 pits ..... Achilidae sp.3.
11. Wax-pore part of abdominal segment VIII each part with 8 pores; first metatarsal segment with 5 apical teeth ..... *Semibetatropis* sp.1.
-. Wax-pore part of abdominal segment VIII each part with 6 pores; first metatarsal segment with 6 apical teeth ..... *Semibetatropis animosa* Chen and Yang
12. Posterior wing pads each with 3-5 pits near notum 13
-. Posterior wing pads each with 2 pits near notum .....*Hamba bisulca* Chen and Yang
13. Wax-pore part of abdominal segment VIII each part with 12 pores .... *Magadha redunca* Chen and Yang
-. Wax-pore part of abdominal segment VIII each part with 7 pores ..... Achilidae sp.1.

21. ***Epiptrea fusca*** (Walker) (Fig. 22)

Epiptera fusca Fennah, 1950, Bull. Brit. Mus. (Nat. Hist.) Ent. 1(1):20.
Monopsis fusca Walker, 1851, List. Hom. Ins. Brit. Mus.2:326.

General color dark brown scattered yellowish areas.

Frons longer at line of lateral point of frontoclypeal suture than wide at widest part about 1.15 : 1, each side with about 19 pits. Rostrum with subapical segment longer than apical about 1.7 : 1, apical segment at extreme apex pointed, directed dorsocaudad.

Pronota each with 2 humeral carinae, 21 pits. Anterior wing pads each with 5 pits near notum, 14 pits laterad. Posterior wing pads each with 6 pits near notum. Spinal formula of hind leg 7-7-8.

Abdominal tergites III-VIII each side with 1-6-6-5-5-5 pits respectively. Abdominal pleurites present, but without pit. Abdominal tergites VI-VIII each side with wax-pore part respectively, which occupied more than half width of tergite, with more than 20 pores, distributing over all surface. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral.

Length of anterior wing pad: 3.8 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, U.S.A. Fla. Wakulla Co. 5 mi. E. Crawfordsville, Spring-1973, E.F. Rick. (specimen was sent by L.B. O'Brien)

Determination: Determined by L.B. O'Brien from female adult emerged from nymph.

22. **Achilidae** sp.7. (Fig. 23)

General color yellowish brown. Sensory pits, lateral carinae of pronota, areas below pits of metanota, lateral margins of abdominal tergites IV-VIII black. Ventral aspect of thorax and abdomen yellow, lateral margins of abdominal sternites III-VII with reddish stripe respectively.

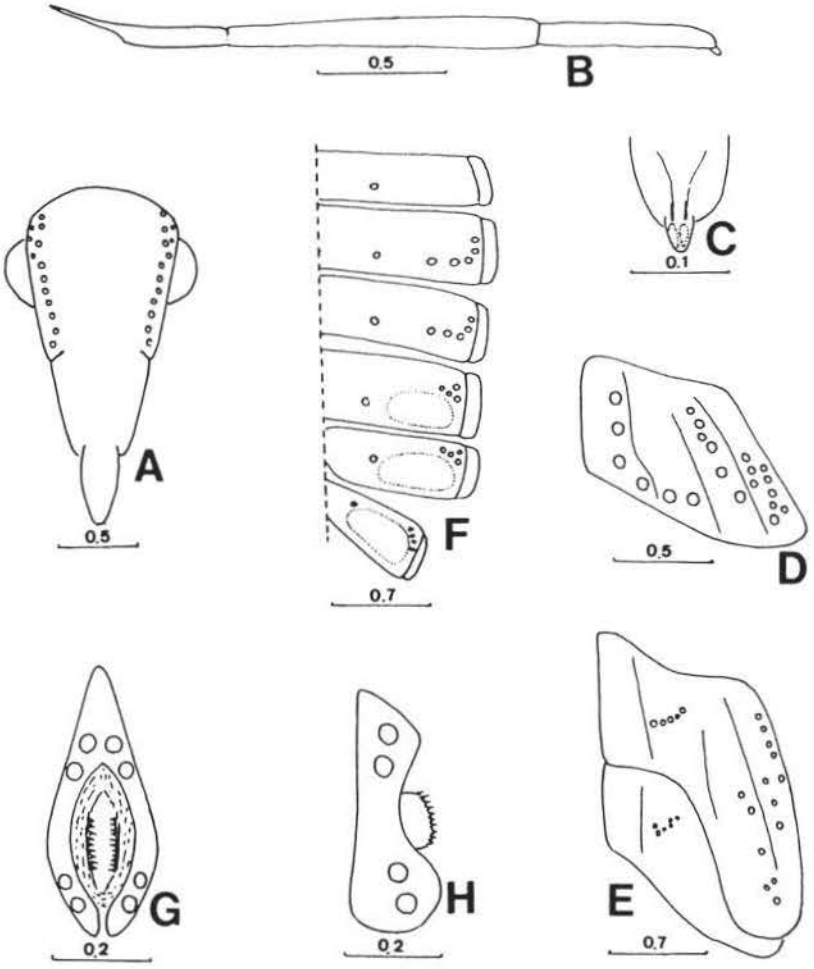

Fig. 22. *Epiptera fusca* (Walker) A, head, ventral view; B, rostrum; C, apex of rostrum, dorsal view; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites and pleurites III-VIII, flat surface; G, ninth abdominal segment, caudal view; H, the same, lateral view. (unit = mm.)

Frons longer in lateral point of frontoclypeal suture than widest part about 1.5 : 1, submedian carinae distinct, separated at base, diverging to apex, reaching nearly to frontoclypeal suture, each side with about 27 pits. Rostrum with subapical segment shorter than apical about 1 : 1.3, apical segment pointed at extreme apex.

Pronota without humeral carina, each with about 26 pits. Anterior wing pads each with 11 pits near notum, 11 pits laterad. Posterior wing pads each with 6 pits near notum. Spinal formula of hind leg 7-7-7.

Abdominal tergites IV-VIII each side with 9-(7-8)-6-6-(6-7) pits respectively. Abdominal tergites VI-VIII each side with wax-pore part respectively which occupied more than half width of tergites, with many pores. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral.

Length of body: 3.7 mm.

Length of anterior wing pad: 1.55 mm.

Specimens examined: Fifth instar nymph:3, Nantou Hsien, Chitou, 24-III-1990, W.B. Yeh.; 1, Taichung Hsien, Pahsienshan, 11-III-1990, W.B. Yeh.

Determination: No adult emerged from nymph, species name can't be determined.

Habitat: Below rotten wood.

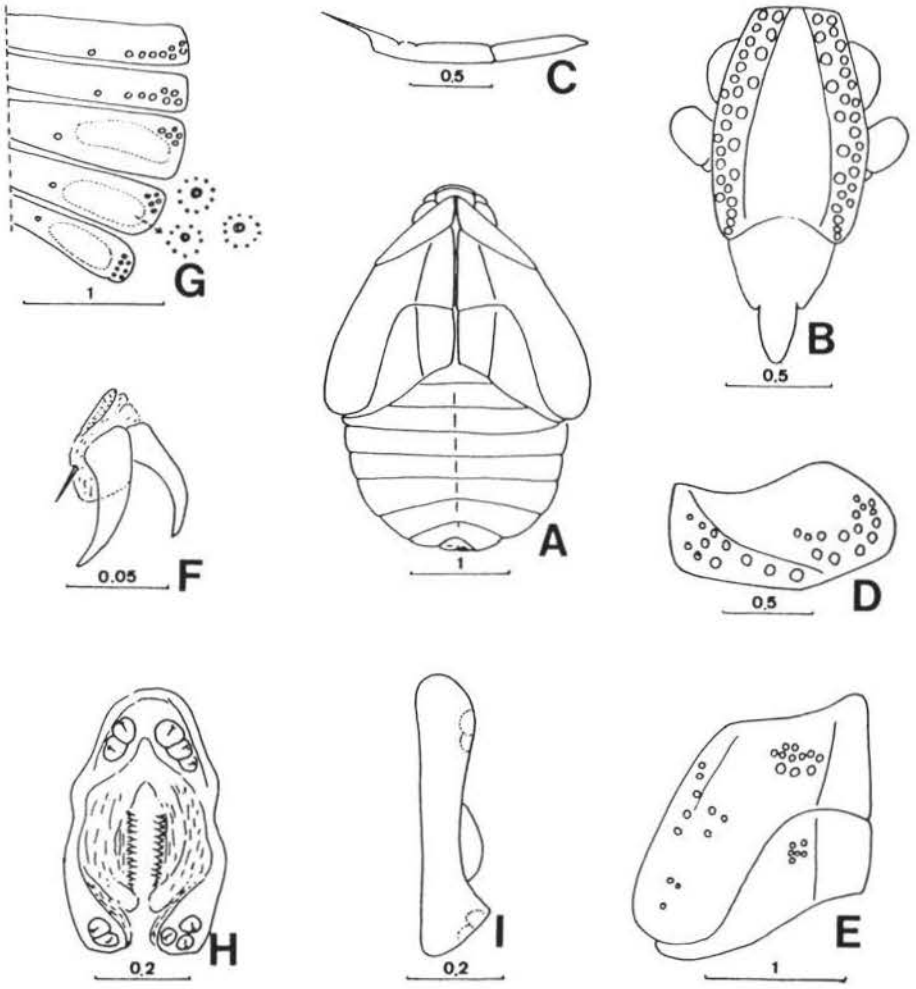

Fig. 23. Achilidae sp.7. A, fifth instar nymph, dorsal view; B, head, ventral view; C, rostrum; D, pronotum, flat surface; E, wing pads, flat surface; F, pretarsi; G,abdominal tergites IV-VIII, flat surface; H, ninth abdominal segment, caudal view; I, the same, lateral view. (unit = mm.)

23. **Achilidae** sp.4. (Fig. 24)

General color black. Abdomen with dorsal aspect dark brown, ventral aspect reddish, Rostrum and legs dark brown.

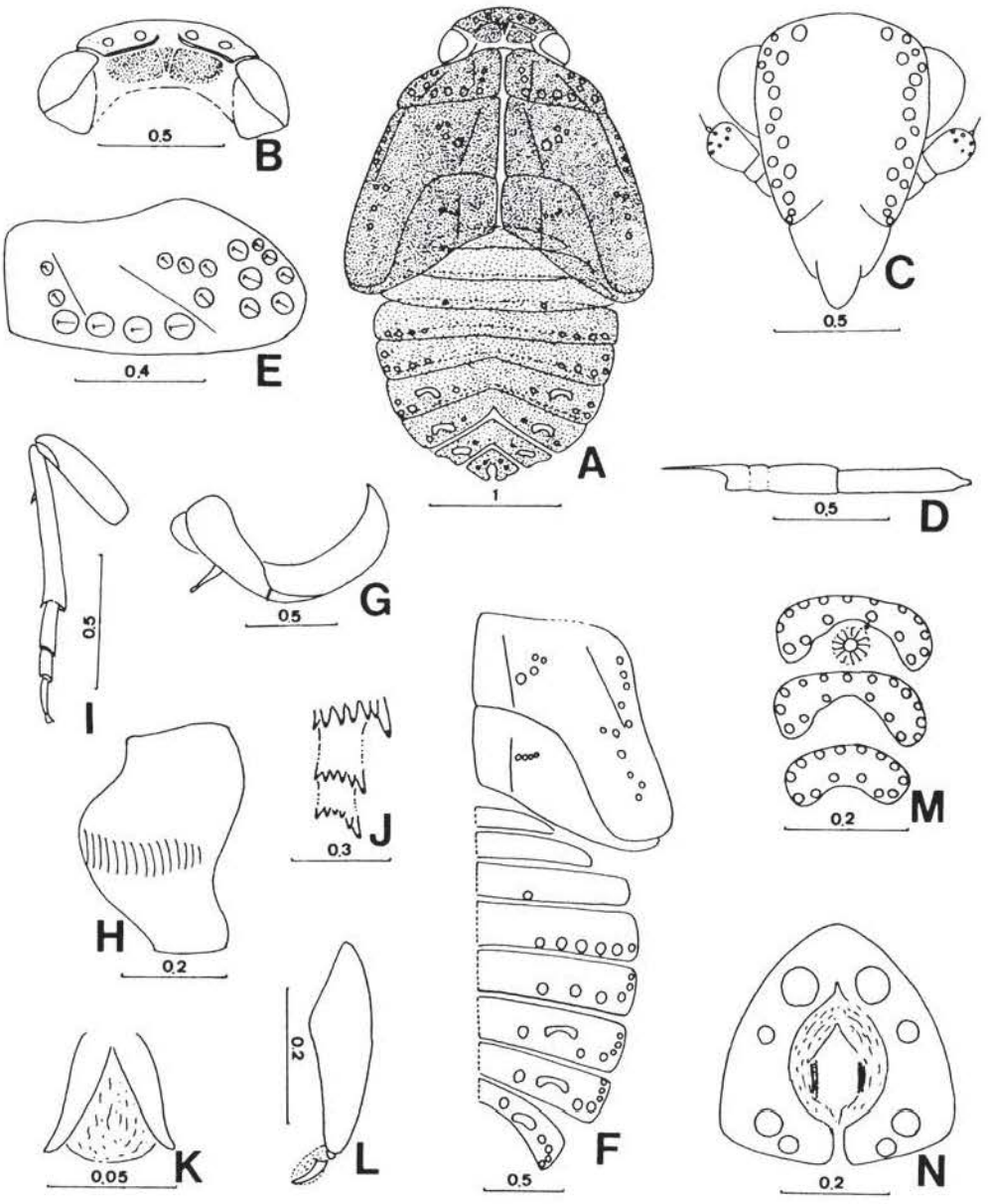

Fig. 24. Achilidae sp.4. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads and abdominal tergites I-VIII, flat surface; G, metacoxa plus meron; H, metatrochanter; I, hind leg; J, apices of metatibia and first two tarsi; K, pretarsus, dorsal view; L, third metatarsal segment and pretarsus, lateral view; M, wax-pore parts of abdominal segments VI-VIII; N, ninth abdominal segment, caudal view. (unit = mm.)

Frons longer at line of lateral point of frontoclypeal suture than widest part about 1.2 : 1, each side with about 17 pits. Rostrum with apical segment longer than subapical about 1.9 : 1.

Pronota each with single humeral carina and 17 pits. Anterior wing pads each with 4 pits near notum, 11 pits laterad. Posterior wing pads each with 4 pits near notum. Spinal formula of hind leg 7-6-6.

Abdominal tergites III-VIII each side with 1-6-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 16 pores on tergite VI, 17 on VII, 14 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of body: 3.6 mm.

Length of anterior wing pad: 1.4 mm.

Specimen examined: Fifth instar nymph: 1, Taoyuan Hsien, Lalashan, 30-VIII-1989, W.B. Yeh.

Determination: No adult emerged from nymph. It can't be determined.

Habitat: Below rotten wood.

24. **Achilidae** sp.6. (Fig. 25)

General color uniform black.

Vertex sharply inclined from apex to base. Pronota convex protruding forward reaching basal margin of frons. Frons slightly longer in middle line than widest part, each side with about 18 pits. Rostrum with apical segment longer than subapical about 1.8 : 1.

Pronota each with single humeral carina and 18 pits. Anterior wing pads each with 4 pits near notum, 11 pits laterad. Posterior wing pads each with 5 pits near notum. Metatibiae each with single lateral tooth. Spinal formula of hind leg 7-6-5.

Abdominal tergites III-VIII each side with 1-6-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 13-14 pores on tergite VI, 12-13 on VII, 11-12 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of anterior wing pad: 1.45 mm.

Specimen examined: Fifth instar nymph: 1, Nantou Hsien, Wushe, 10-X-1990, W.B. Yeh.

Determination: No adult emerged from nymph. It can't be determined.

Habitat: Below rotten wood.

25. ***Hamba bisulca*** Chen and Yang (Fig. 26)

Hamba bisulca Chen and Yang, 1989, Taiwan Mus. Spec. Publ.8:133.

Dorsal aspect dark brown to black, scattered pale yellowish white areas. Frons, clypeus, antennae, rostrum and legs brown. Ventral aspect of abdomen yellowish white.

Frons longer at line of lateral point of frontoclypeal suture than wide at widest part about 1.3 : 1, widest at lower level of eyes, lateral margins carinate, slightly convex medially, each side with about 15 pits. Rostrum with apical segment longer than subapical about 1.45 : 1.

Pronota each with single humeral carina and 17 pits. Anterior wing pads each with 4 pits near notum, 10 pits laterad. Posterior wing pads each with 2 pits near notum. Spinal formula of hind leg 7-6-6.

Abdominal tergites IV-VIII each side with 5-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 12-14 pores on tergite VI, 11-13 on VII, 11 on VIII. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral.

Length of body: 3.93 mm.

Length of anterior wing pad: 1.42 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taichung Hsien, Kukuan, 1-VII-1988, C.T. Yang.

Determination: 1 male adult emerged from nymph. determined by C.L. Chen from comparison of male genitalia.

Habitat: Below wet rotten wood.

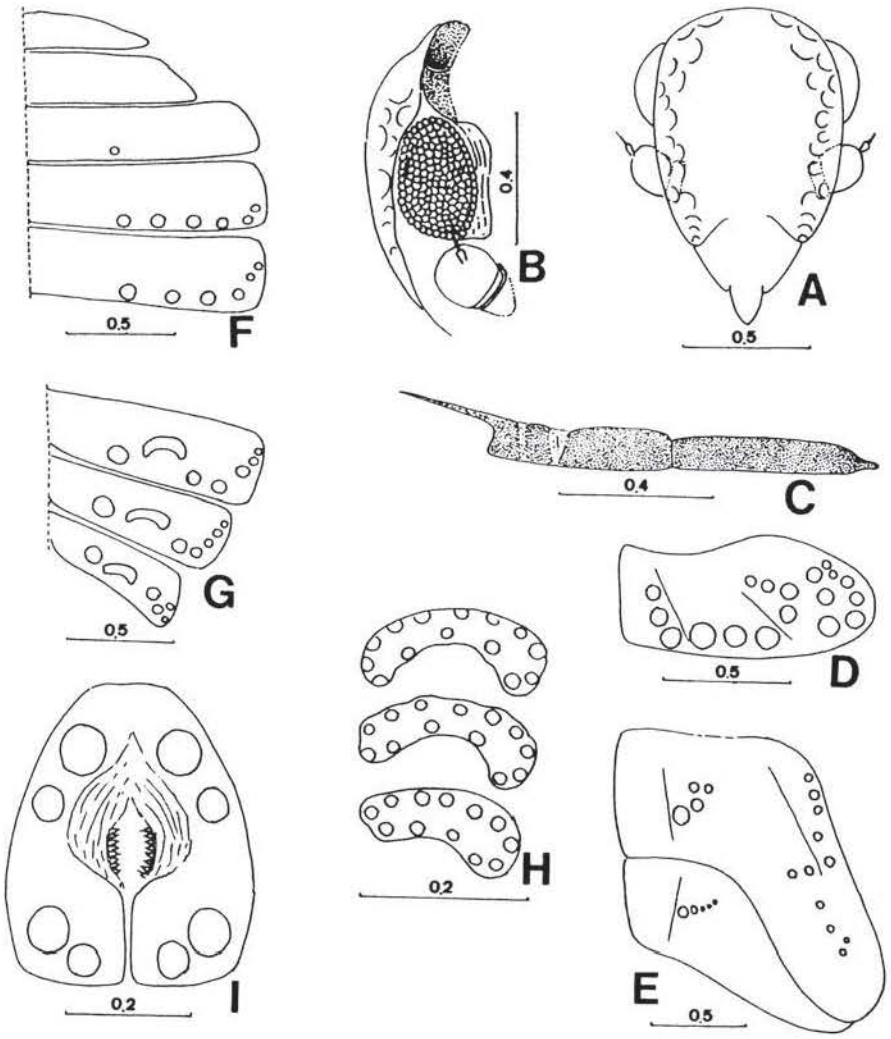

Fig. 25. Achilidae sp.6. A, head, ventral view; B, the same, laterodorsal view; C, rostrum; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites I-V, flat surface; G, abdominal tergites VI-VIII, flat surface; H, wax-pore parts of abdominal tergites VI-VIII; I, ninth abdominal segment, caudal view. (unit = mm.)

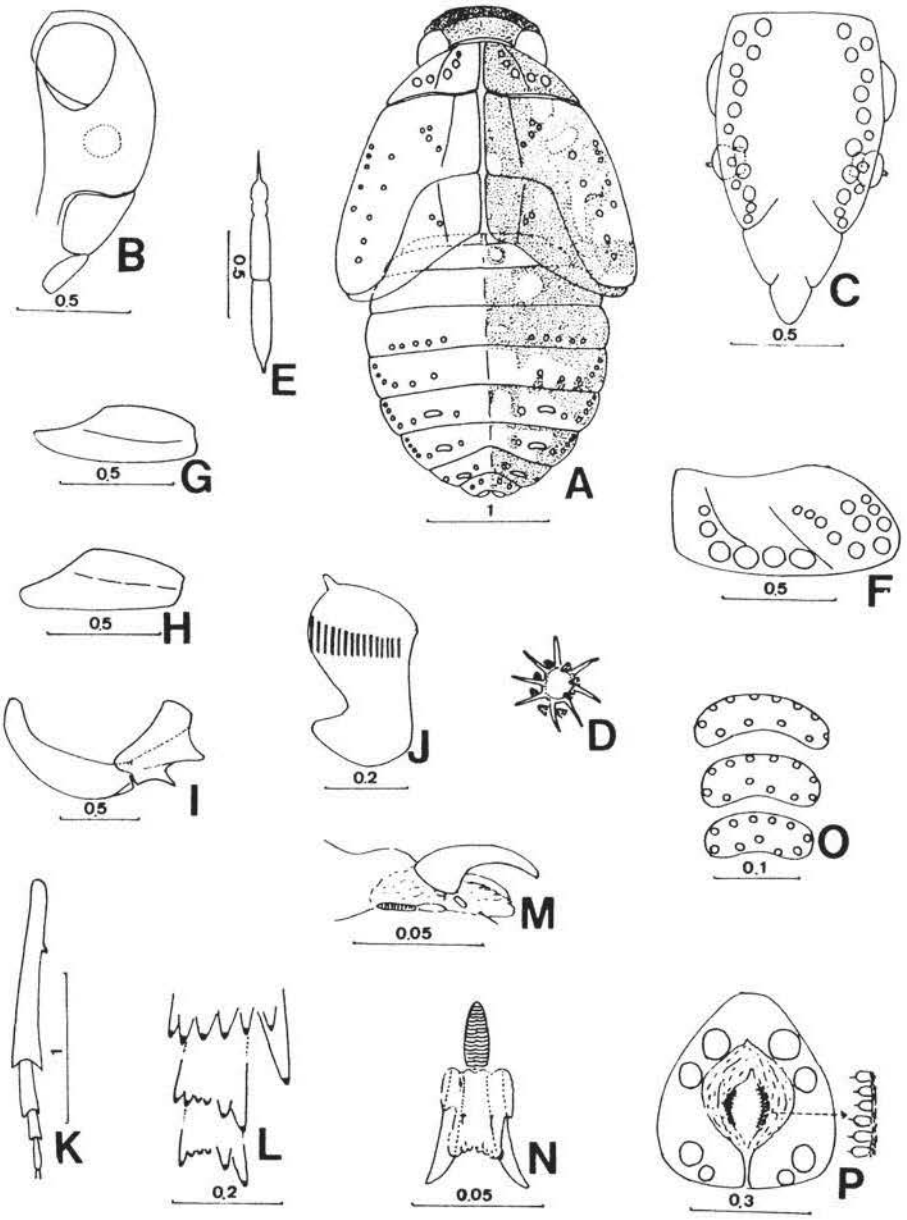

Fig. 26. *Hamba bisulca* Chen and Yang. A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, sensory organ of antenna; E, rostrum; F, pronotum, flat surface; G, procoxa; H, mesocoxa; I, metacoxa plus meron; J, metatrochanter; K, metatibia and tarsi; L, apical teeth of metatibia and first two tarsi; M, pretarsus, lateral view; N, the same, ventral view; O, wax-pore parts of abdominal segments VI-VIII, flat surface; P, abdominal segment IX, caudal view. (unit = mm.)

26. **Achilidae** sp.5. (Fig. 27)

General color dark brown, scattered yellowish areas.

Frons longer in middle line than widest part about 1.1 : 1, each side with 19 pits. Rostrum with apical segment longer than subapical about 1.7 : 1.

Pronota each with single humeral carina and 17 pits. Anterior wing pads each with 5 pits near notum, 10 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of hind leg 7-6-5.

Abdominal tergites III-VIII each side with 1-6-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 13 pores on tergite VI, 11 on VII, 10 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of anterior wing pad: 1.49 mm.

Specimens examined: Fifth instar nymph: 4, Pingtung Hsien, Kontingkunyen, 8-II-1990, W.B. Yeh.

Determination: No adult emerged from nymph. It can't be determined.

Habitat: Below rotten wood.

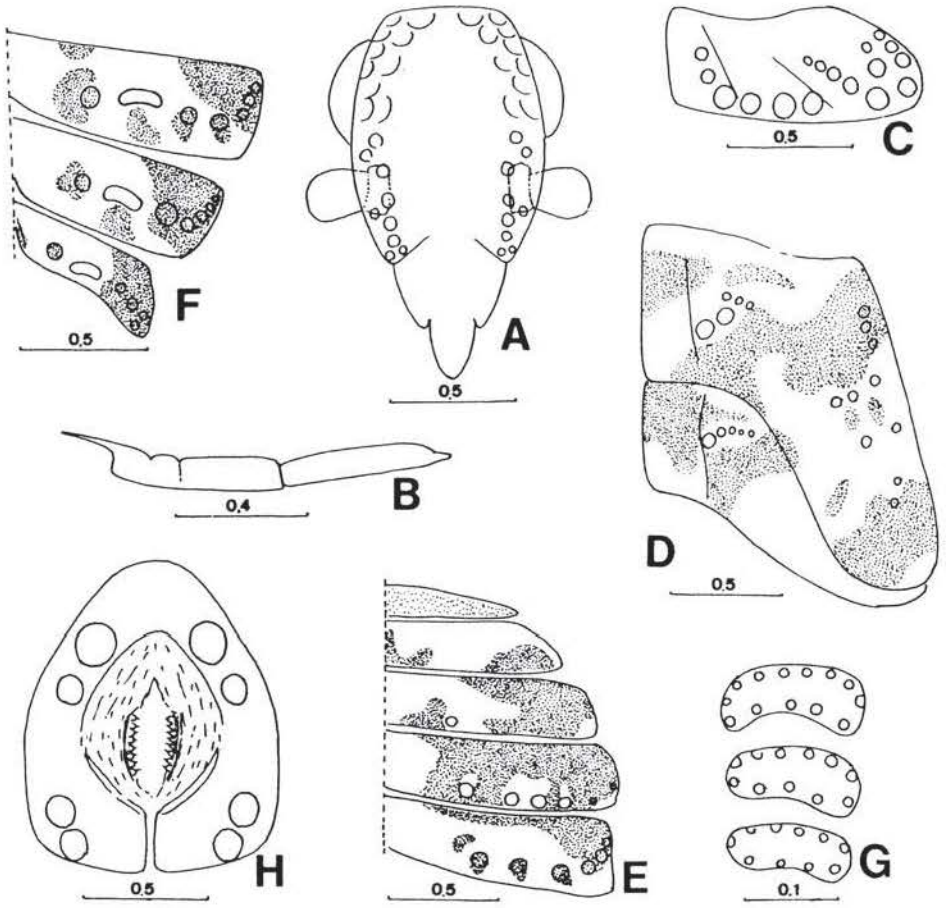

Fig. 27. Achilidae sp.5. A, head, ventral view; B, rostrum; C, pronotum, flat surface; D, wing pads, flat surface; E, abdominal tergites I-V, flat surface; F, abdominal tergites VI-VIII, flat surface; G, wax-pore parts of abdominal tergites VI-VIII; H, ninth abdominal segment, caudal view. (unit = mm.)

27. **Achilidae** sp.2. (Fig. 28)

General color dark brown. scattered yellowish areas.

Frons longer in middle line than widest part about 1.25 : 1, each side with about 17 pits. Rostrum with apical segment longer than subapical about 1.5 : 1.

Pronota each with 2 humeral carinae and 18 pits. Anterior wing pads each with 5 pits near notum, 10-11 pits laterad. Posterior wing pads each with 5 pits near notum. Metatibiae each with single lateral tooth. Spinal formula of hind leg 7-6-5.

Abdominal tergites III-VIII each side with 1-7-6-6-6-5 pits respectively. Abdominal tergites

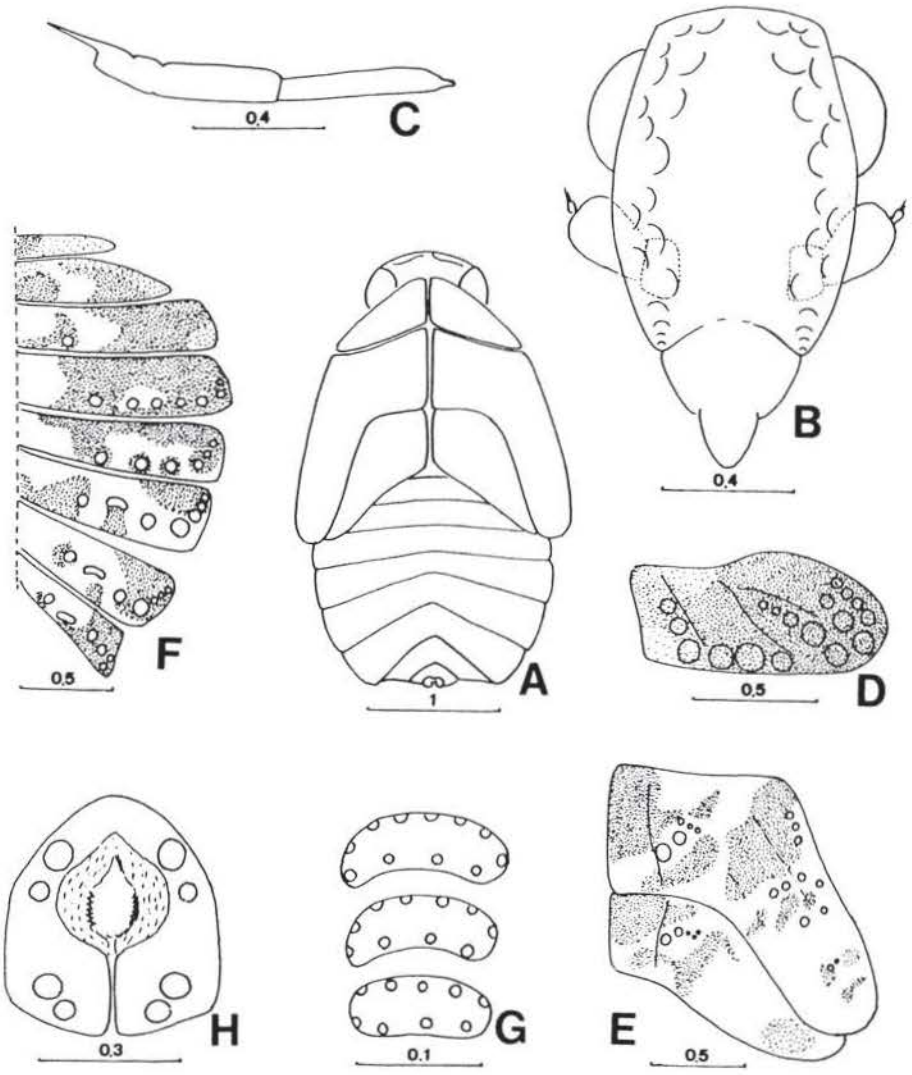

Fig. 28. Achilidae sp.2. A, fifth instar nymph, dorsal view; B, head, ventral view; C, rostrum; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites I-VIII, flat surface; G, wax-pore parts of abdominal tergites VI-VIII; H, ninth abdominal segment, caudal view. (unit = mm.)

VI-VIII each side with wax-pore part, each part with 11 pores on tergite VI, 10-11 on VII, 9-10 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Abdominal tergites III-VIII each side with 1-7-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 11 pores on tergite VI, 10-11 on VII, 9-10 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of body: 3.18 mm.

Length of anterior wing pad: 1.39 mm.

Specimen examined: Fifth instar nymph: 1, Pingtung Hsien, Luhliaochi, 7-II-1990, W.B. Yeh.

Determination: No adult emerged from nymph, species name can't be determined.

Habitat: In rotten wood.

28. **Achilidae** sp.3. (Fig. 29)

General color dark brown. scattered yellowish areas.

Frons longer in middle line than widest part about 1.1 : 1, basal margin slightly produced basad medially, each side with about 16 pits. Rostrum with apical segment longer than subapical about 1.5 : 1.

Pronota each with single humeral carinae and 17 pits. Anterior wing pads each with 5 pits near notum, 10 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of hind leg 7-5-5.

Abdominal tergites III-VIII each side with 1-6-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 11 pores on tergite VI, 11 on VII, 9-10 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of anterior wing pad: 1.37 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taitung Hsien, Anshuo, 5-IX-1990, W.B. Yeh.

Determination: Unfortunately the emerged adult flew away, it can't be determined now.

Habitat: Below rotten wood.

29. ***Semibetatropis*** sp.1. (Fig. 30)

Rostrum 4-segmented, apical segment longer than subapical about 1.8 : 1.

Pronota each with single humeral carina and 17 pits. Anterior wing pads each with 5 pits near notum, 10 pits laterad. Posterior wing pads each with 5 pits near notum. Spinal formula of metatarsal segments 5-5.

Abdominal tergites III-VIII each side with 1-6-6-6-6-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 10-12 pores on tergite VI, 10 on VII, 8 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of anterior wing pad: 1.37 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Nantou Hsien, Meifeng, 5-IX-1990, W.B. Yeh.

Determination: 1 male adult emerged from nymph. According Chen's key it runs to genus *Semibetatropis*, it may be a new species.

Habitat: Below rotten wood.

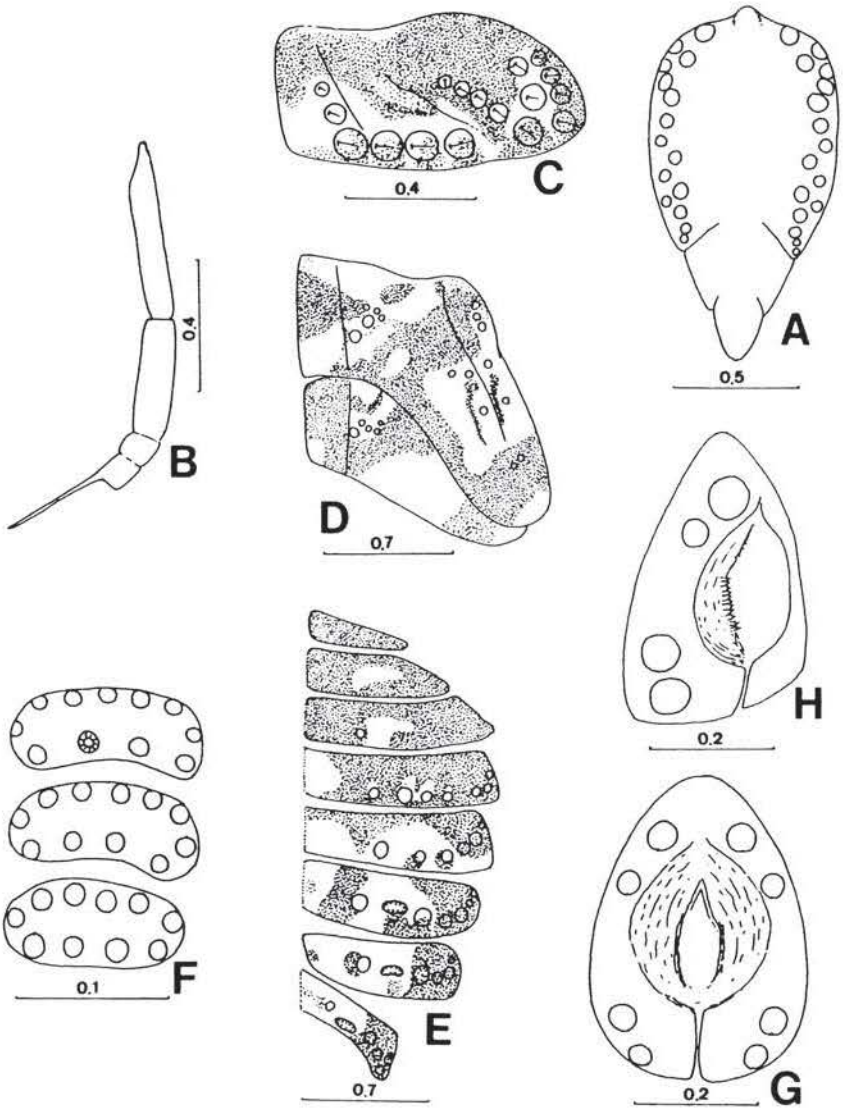

Fig. 29. Achilidae sp.3. A, head, ventral view; B, rostrum; C, pronotum, flat surface; D, wing pads, flat surface; E, abdominal tergites I-VIII, flat surface; F, wax-pore parts of abdominal tergites VI-VIII; G, ninth abdominal segment, caudal view. (unit = mm.)

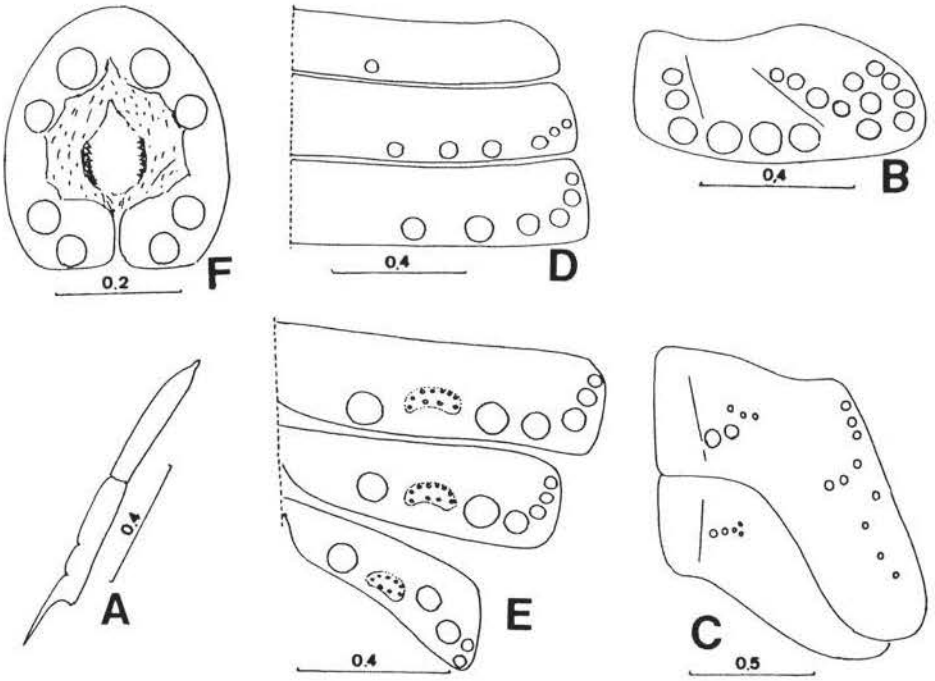

Fig. 30. *Semibetatropis* sp.1. A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites III-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view. (unit = mm.)

30. **Achilidae** sp.1. (Fig. 31)

FOURTH INSTAR NYMPH

Vertex, frons, clypeus, rostrum, wing pads, thoracic and abdominal tergites pale brown to black. Legs pale brown. Eyes red. Antennae pale brown. Ventral aspect of thorax and abdomen milky white except with irregular red markings at abdomen.

Frons longer at line of lateral point of frontoclypeal suture than wide at widest part about 1.2 : 1, widest at lower level of eyes, lateral margins weakly carinate, slightly convex medially, each side with about 18 pits. Rostrum with apical segment longer than subapical about 1.5 : 1.

Pronota each with a feeble humeral carina and 17 pits. Anterior wing pads each with 4 pits near notum, 10 pits laterad. Posterior wing pads each with 4 pits near notum, 3 pits at caudolateral portion in a oblique line. Spinal formula of hind leg 7-6-5.

Abdominal tergites IV-VIII each side with 5-5-5-5-5 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 10-11 pores on tergite VI, 10-11 on VII, 7 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of body: 2.14 mm.

Length of anterior wing pad: 0.45 mm.

Specimen examined: Fifth instar nymph: 1, Taichung Hsien, Kukuan, 1-VIII-1988, C.T. Yang.

Determination: No adult emerged from nymph, species name can't be determined.

Habitat: Below rotten leaves.

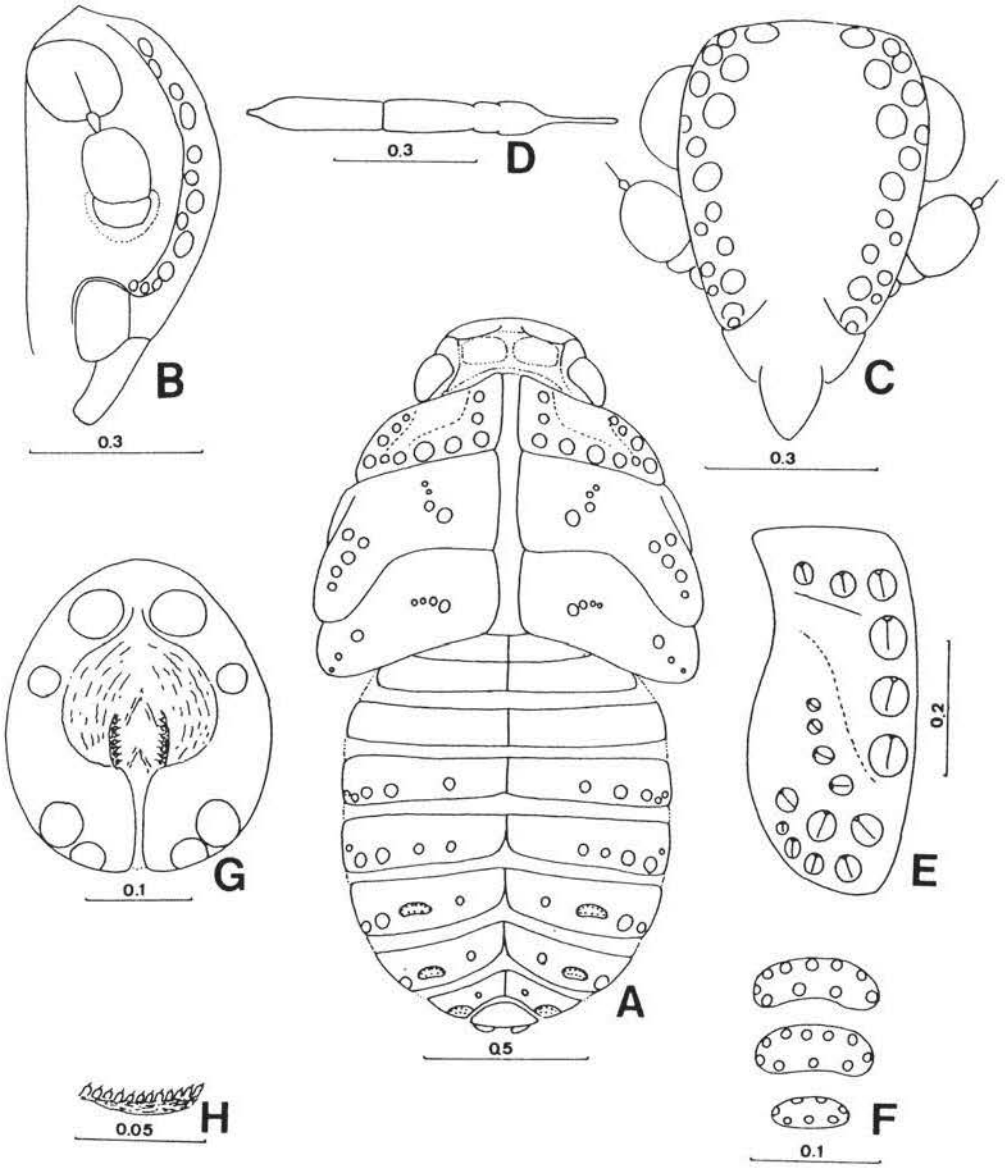

Fig. 31. Achilidae sp.1. A, fourth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wax-pore part of abdominal tergites VI-VIII; G, ninth abdominal segment, caudal view; H, anal combs. (unit = mm.)

31. ***Semibetatropis animosa*** Chen and Yang (Fig. 32)

Semibetatropis animosa Chen and Yang, 1989, Taiwan Mus. Spec. Publ.8:50.

Rostrum 4-segmented, apical segment longer than subapical about 1.8 : 1.

Pronota each with single humeral carina and 17 pits. Anterior wing pads each with 5 pits near notum, 11 pits laterad. Posterior wing pads each with 5 pits near notum. Metatibiae lost. Spinal formula of metatarsal segments 6-5.

Abdominal tergites III-VIII each side with 1-6-6-6-6-4 pits respectively. Abdominal tergites VI-VIII each side with wax-pore part, each part with 9-10 pores on tergite VI, 8-9 on VII, 6 on VIII. Ninth abdominal segment each side with 2 pits dorsal, 2 pits ventral.

Length of anterior wing pad: 1.14 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taichung Hsien, Sunghao, 14-V-1990, W.B. Yeh.

Determination: 1 male adult emerged from nymph, determined by C.T. Yang from comparison of male genitalia.

Habitat: Below rotten wood.

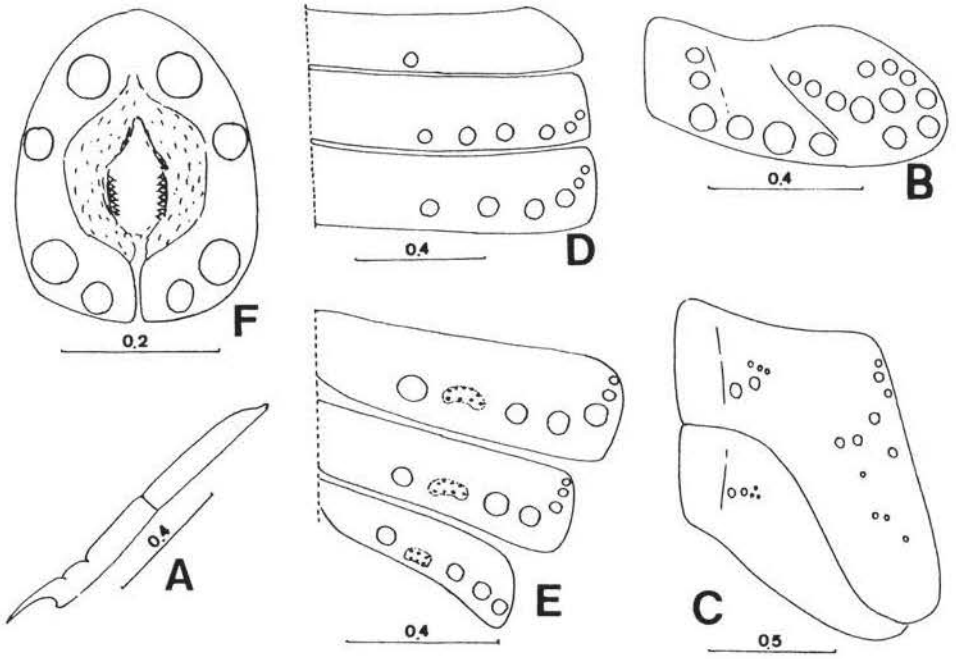

Fig. 32. *Semibetatropis animosa* Chen and Yang A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites III-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, ninth abdominal segment, caudal view. (unit = mm.)

32. ***Deferunda truncata*** Chen and Yang (Fig. 33)

Deferunda truncata Chen and Yang, 1989, Taiwan Mus. Spec. Publ.8:50.

Rostrum 3-segmented.

Pronota each with single humeral carina and 15 pits. Anterior wing pads each with 4 pits near notum, 10 pits laterad. Posterior wing pads each with 4 pits near notum. Meta-legs lost.

Abdominal tergites IV-VIII each side with 6-6-6-6-3 pits respectively. Abdominal tergites VI-VIII each side with transverse, lineal wax-pore part, each with 6 pores. Ninth abdominal segment each side with 1 pits dorsal, 1 pit medial, 2 pits ventral.

Length of anterior wing pad: 0.70 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Pingtung Hsien, Luhliaochi, 7-II-1990, W.B. Yeh.

Determination: 1 male adult emerged from nymph, determined by C.T. Yang from comparison of male genitalia.

Habitat: Below rotten wood.

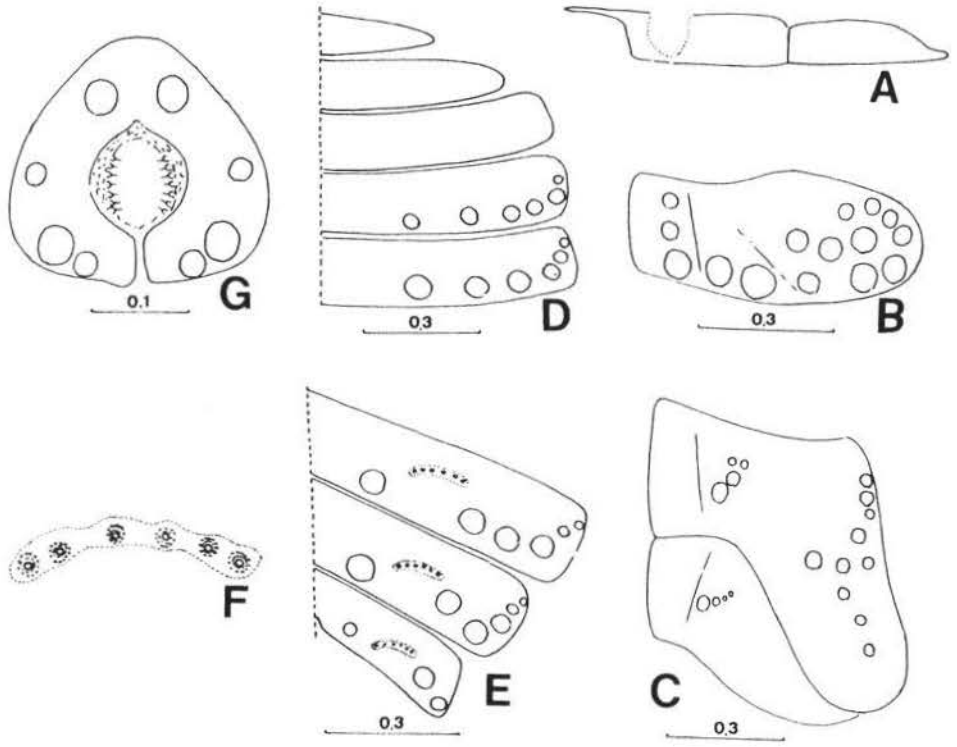

Fig. 33. *Deferunda truncata* Chen A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites I-V, flat surface; E, abdominal tergites VI-VIII, flat surface; F, wax-pore part; G, ninth abdominal segment, caudal view. (unit = mm.)

The other species examined or referred

1. *Magadha redunca* Chen and Yang (examined)
2. *Epiptera opaca* (Say) (Wilson, 1983)

VI. Family **DERBIDAE** Spinola

Derbidae Schaum, 1850, Allgemeine Encyklopadis Ersch und Gruber 51:69.
Derboides Spinola, 1893, Ann. Soc. Entomol. France 8:204.

Body hemispherical. Vertex quadrate, wider than long, anterior margin carinate, straight or somewhat produced medially, lateral margins ecarinate, median carina feeble. Frons longer than widest part, lateral margins carinate, distinctly convex, submedian carinae distinct, reaching to frontoclypeal suture, at base unite near anterior carina of vertex or a short distance below, median carina absent. Frontoclypeal suture obliquely turned upward, interrupt at middle. Postclypeus with lateral margins carinate, median carina absent. Rostrum 3-segmented, subapical segment as long as or longer than apical, apical segment narrowing at least from middle or gradually from base to apex, at apex pointed and pigmented. Antennae with second segment longer than wide, sensory organs with fine filament processes.

Pronota with lateral carinae as anterolateral margins, each with or without humeral carina, constantly with additional carina from posterior margin, protruding to lateral carina. Each pronotum with 16-28 pits. Meso- and metanota each with (1-2)-(1-2) pits respectively in genus *Vekunta,* others without pits. Anterior wing pads each with 4-5 pits near notum, 12-15 pits laterad. Posterior wing pads each with 5-7 pits near notum. Pro- and mesocoxae slender, feebly ridged, mesocoxae without process. Metacoxa plus meron crescent-shaped, immovable, with rather long meracanthus. Metatrochanters with ridges nearly same length, elongate quadrate in outline. Metatibiae terete, not ridged, each with 0-2 lateral teeth. Spinal formula of hind leg (3-7)-(1-6)-(3-6). Second metatarsal segment at apex truncate. Pretarsi with claws divergent apically, claws without seta. Arolium extreme short, with paired setae near middle.

Abdomen 9-segmented. Abdominal tergites III-VIII each side with (0-1)-(6-10)-(7-10)-(9-10)-(9-10)-(4-8) pits respectively. Abdominal tergites VI-VII each side on tergite with (0-2)-(0-1) wax pores respectively, except *Basilocephalus germanus* Yang and Wu with abdominal tergites V-VII each side with 1-1-1 pits respectively. Wax pores mostly on oblique conical top or on plane surface . Abdominal tergite VIII entire, without wax pore, protruding laterad then ventrad, posterodorsum emarginate, forming a hole to receive ninth abdominal segment. Ninth abdominal segment rather small, each side with 1-4 pits. Anal combs extreme small, comb-like, at margin with terete processes, each process with filament at apex.

Habitat: Under rotten wood.

Key to tribes of Derbidae

1. Abdominal tergite VI each side with 2 wax pores, if with 1, then rostrum with apical segment narrowing from basal fourth to apex 2
-. Abdominal tergite VI each side with 0-1 wax pores, if with 2, then metatibiae each with black-tipped apical teeth 3
2. Color gray to dark; body length more than 2.5 mm.; anterior wing pads more than 1.70 mm.; frons each side with more than 22 pits ..... **ZORAIDINI** Muir
-. Color pink to deep red or white; body length less than 2.5 mm.; anterior wing pads less than 1.3 mm.; frons each side with 19-20 pits ..... **RHOTANINI** Muir
3. Metatibiae each with only 1 apical tooth ..... **A-INI**
-. Metatibiae each with at least 4 apical teeth 4
4. Metatibiae each with 6-7 apical teeth and 2 lateral teeth ..... **CENCHREINI** Muir
-. Metatibiae each with 4-5 apical teeth and 0-1 lateral teeth, if with 2, then abdominal tergite VII without wax pore ..... **OTIOCERINI** Muir

Tribe **ZORAIDINI** Muir

Zoraidini Muir, 1918, Ent. Monthly Mag.54:173.

Color gray to black. Body large. Rostrum with apical segment gradually narrowing from base to apex or narrowing from middle. Pronota each lateral area with 13-20 pits, without humeral carina. Pits of inner side of additional carina with 6-10 processes. Meso- and metanota without pit. Anterior wing pads each with a short inner carina, extending over posterior wing pads. Posterior wing pads with 5-8 pits near notum. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 5-(4-5)-(3-5). Abdominal tergites III-VIII each side with (0-1)-(7-10)-(7-10)-(9-10)-9-(7-9) pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Some species with cuticle granules surrounding wax pore.

Length of body: 2.5-5.0 mm.

Length of anterior wing pad: 1.72-2.50 mm.

Key to species of Zoraidini

1. Rostrum with apical segment not narrowing from base; pronota each inner side of additional carina with 8-11 pits 2
-. Rostrum with apical segment gradually narrowing from base to apex; pronota each inner side of additional carina with 3 pits 3
2. Posterior wing pads each with 7-8 pits near notum; frons slightly longer than wide; spinal formula of hind leg 5-5-4 ..... *Neoproutista pseudoalbicosta* (Muir)
-. Posterior wing pads each with 5 pits near notum; frons 1.4 times longer than wide; spinal formula of hind leg 5-4-3 ..... *Pamendanga matsumurae* (Muir)
3. Apex of pit without granule spread 4
-. Apex of pit with granule spread 5
4. Caudal area of posterior wing pads each with a pit; wax pore with granules surrounding .... *Parapeggia taiwana* Yang and Wu
-. Caudal area of posterior wing pads without pit; wax pore without granule surrounding .... *Losbanosia hiberensis* Yang and Wu
5. Meso- and metanota with mid-line elevated; frons each side with 25-26 pits; pronota each lateral area with 20 pits ..... Zoraidini sp.1.
-. Meso- and metanota with mid-line not elevated; frons each side with 22-23 pits; pronota each lateral area with 13-14 pits ..... *Zoraida insolita* Yang and Wu

33. ***Neoproutista pseudoalbicosta*** (Muir) (Fig. 34)

Neoproutista pseudoalbicosta Yang and Wu, 1993, Derbidae of Taiwan: 14.
Paraproutista pseudoalbicosta Muir, 1915, Proc. Hawaiian Entomol. Soc.3:130.

General color black. Anterior wing pads with vein-like marking. Metatibiae each with 2 markings.

Frons 1.2 time longer than wide, wide between submedian carinae 1.8 times wider than wide between submedian and lateral carinae. Each side of frons with about 22-23 pits. Rostrum extending to tip of abdominal sternite IV, first segment with basal half narrowing, subapical segment as long as apical, apical segment narrowing from middle, pigmented at apical third.

Pronota each lateral area with 16-17 pits, inner side of additional carina with 8-11 pits, each pit with about 8 processes, granulated at apex. Meso- and metanota with mid-line elevated.

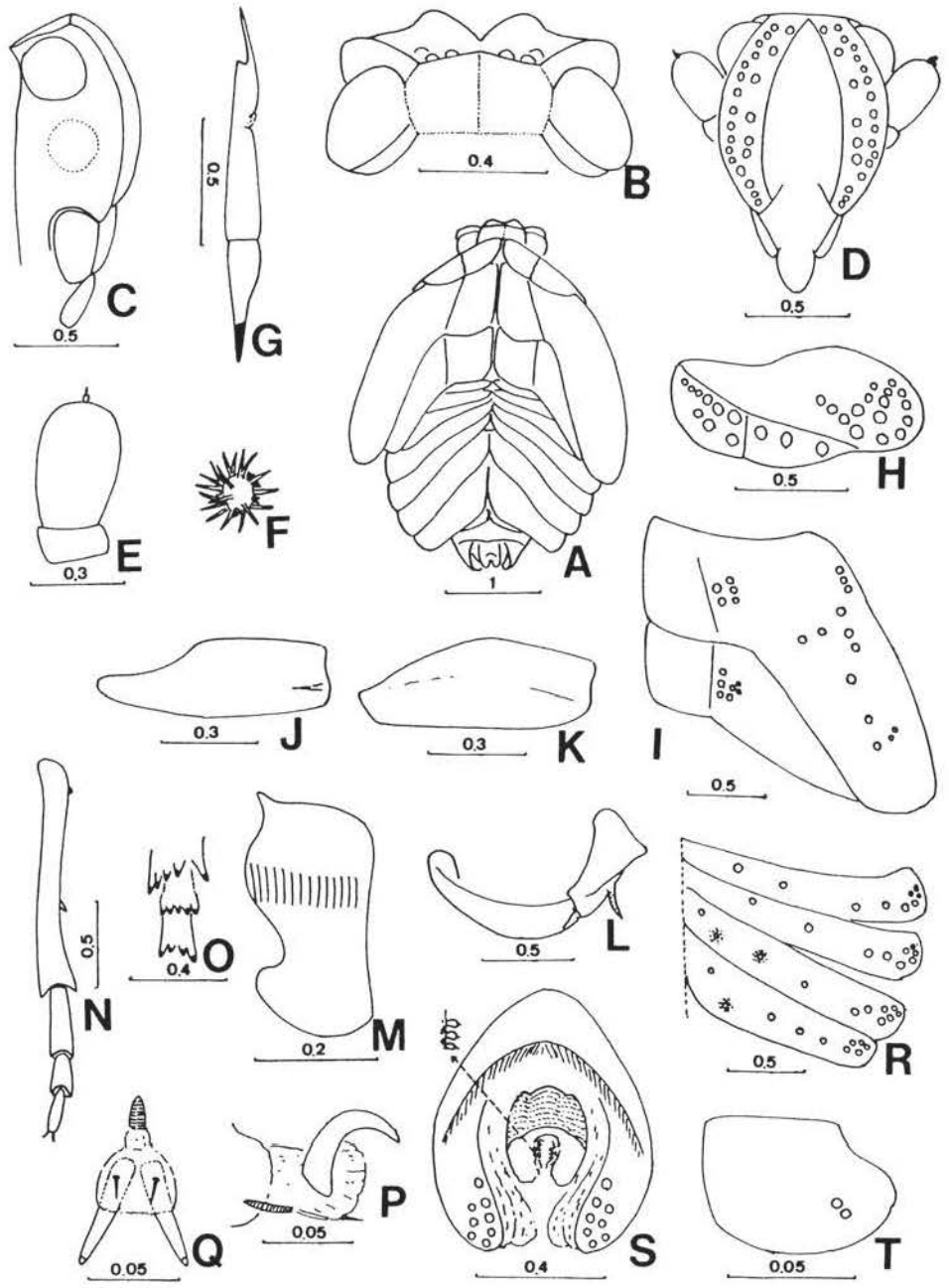

Fig. 34. *Neoproutista pseudoalbicosta* (Muir) A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, laferal view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum; H, pronotum, flat surface; I, wing pads, flat surface; J, procoxa; K, mesocoxa; L, metacoxa plus meron; M, metatrochanter; N, metleg; O, apex of metatibia and first two tarsi; P, metapretarsus, lateral view; Q, the same, ventral view; R, abdominal tergites IV-VII, flat surface; S, abdominal segments VIII-IX, caudodorsal view; T, ninth abdominal segment, lateral view. (unit=mm.)

Metatrochanter with 16 ridges. Anterior wing pads each with 5 pits near notum. Posterior wing pads each with 7-8 pits near notum. Spinal formula of hind leg 5-5-4.

Abdominal tergites IV-VII with mid-line elevated. Abdominal tergites IV-VIII each side with 9-9-9-9-(7-8) pits respectively. Wax pore at base with granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 2.8-3.3 mm.

Length of anterior wing pad: 1.9 mm.

Specimens examined: Fifth instar nymph: 3, (ecdysis) 2, Taichung Hsien, Kukuan, 24-VI-1989, W.B. Yeh; 2, (ecdysis) 9, Kaohsiung Hsien, Chiasien, 31-VII-1989, W.B. Yeh; 3, Hualien Hsien, Liyutan, 15-II-1990, W.B. Yeh.

Determination: 2 male and 7 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Beneath rotten wet bark.

34. ***Pamendanga matsumurae*** (Muir) (Fig. 35)

Pamendanga matsumurae Metcalf, 1945, Gen. Cat. Hem. part 4:33.
Paraproutista matsumurae Muir, 1918, Proc. Hawaiian Entomol. Soc.3:130.

General color black. Anterior wing pads with or without vein-like markings.

Frons 1.4 time longer than wide, wide between submedian carinae 2 times wider than wide between submedian and lateral carinae. Each side of frons with about 23 pits. Rostrum extending to tip of abdominal sternite IV, first segment with basal half narrow, subapical segment as long as apical, apical segment narrowing from middle, pigmented at apical third.

Pronota each lateral area with 14 pits, inner side of additional carina with 8-11 pits, each pit with about 6 processes, granulated at apex. Meso- and metanota with mid-line elevated. Metatrochanter with 16 ridges. Anterior wing pads each with 5 pits near notum. Spinal formula of hind leg 5-5-4.

Abdominal tergites VI-VII with mid-line elevated. Abdominal tergites IV-VIII each side with 9-7-9-9-7 pits respectively. Wax pore without granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 2.6 mm.

Length of anterior wing pad: 1.72 mm.

Specimens examined: Fifth instar nymph: 2, (ecdysis) 3, Nantou Hsien, Wushe, 10-X-1989, W.B. Yeh.

Determination: 1 male and 1 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Beneath rotten wet bark.

35. ***Parapeggia taiwana*** Yang and Wu (Fig. 36)

Parapeggia taiwana Yang and Wu, 1993, Derbidae of Taiwan: 35

General color gray. Anterior wing pads with vein-like marking. Metatibia each with 2 ring markings.

Frons 1.3 time longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with about 22-24 pits. Rostrum extending over

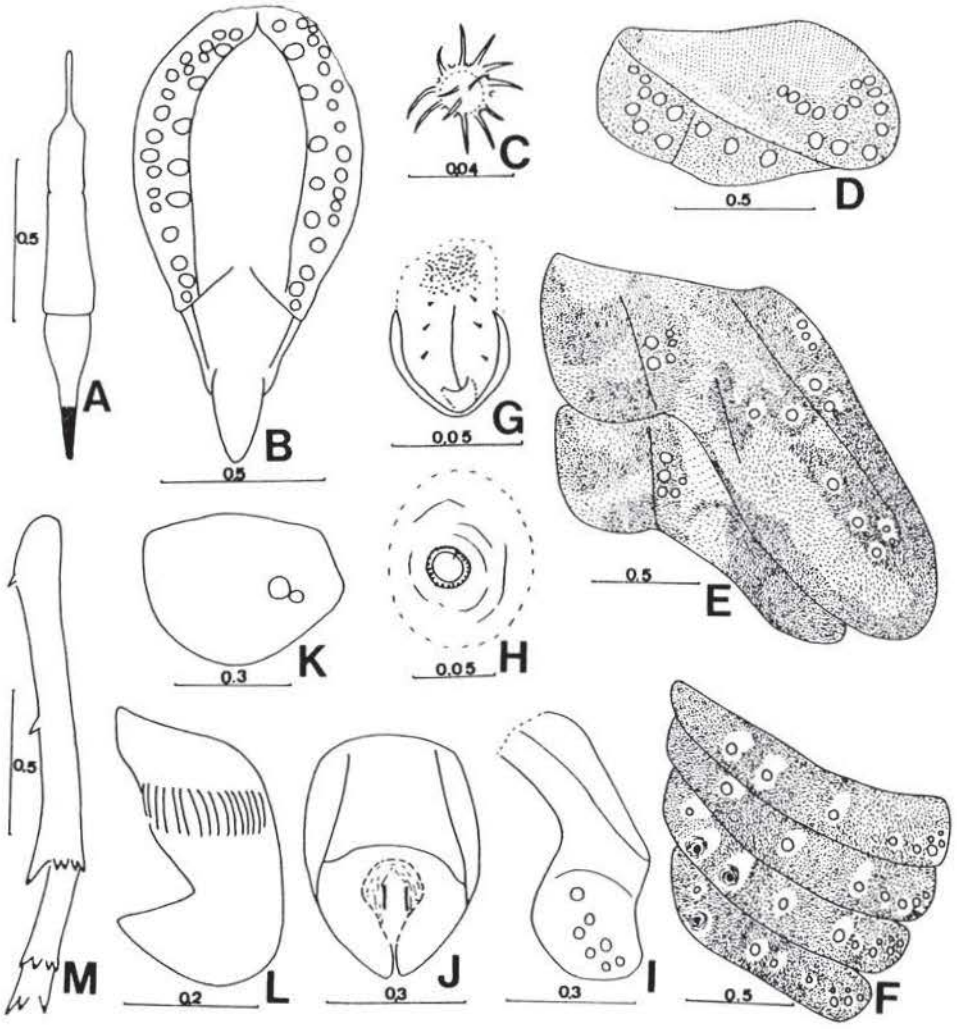

Fig. 35. *Pamendanga matsumurae* (Muir) A, rostrum; B, head, ventral view; C, sensory organ of antenna; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites IV-VII, flat surface; G, sensory pit; H, wax pore; I, abdominal tergite VIII, lateral view; J, ninth abdominal segment, dorsal view; K, the same, lateral view; L, metatrochanter; M, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

tip of abdomen, first segment with basal half narrow, subapical segment 1.2 times longer than apical, apical segment gradually narrowing from base to apex, pigmented at apical fourth.

Pronota each lateral area with 14 pits, inner side of additional carina with 3 pits, each pit with about 10 processes, not granulated at apex. Meso- and metanota with mid-line elevated. Anterior wing pads each with 5 pits near notum. Posterior wing pads each with 5 pits near notum, 1 pit at caudal area. Metatrochanter with 16 ridges. Spinal formula of hind leg 5-5-5.

Abdominal tergites VI-VII with mid-line elevated. Abdominal tergites IV-VIII each side with (7-8)-(9-10)-(9-10)-9-(7-8) pits respectively. Wax pore with cuticle granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 2.5-3.0 mm.

Length of anterior wing pad: 2.2 mm.

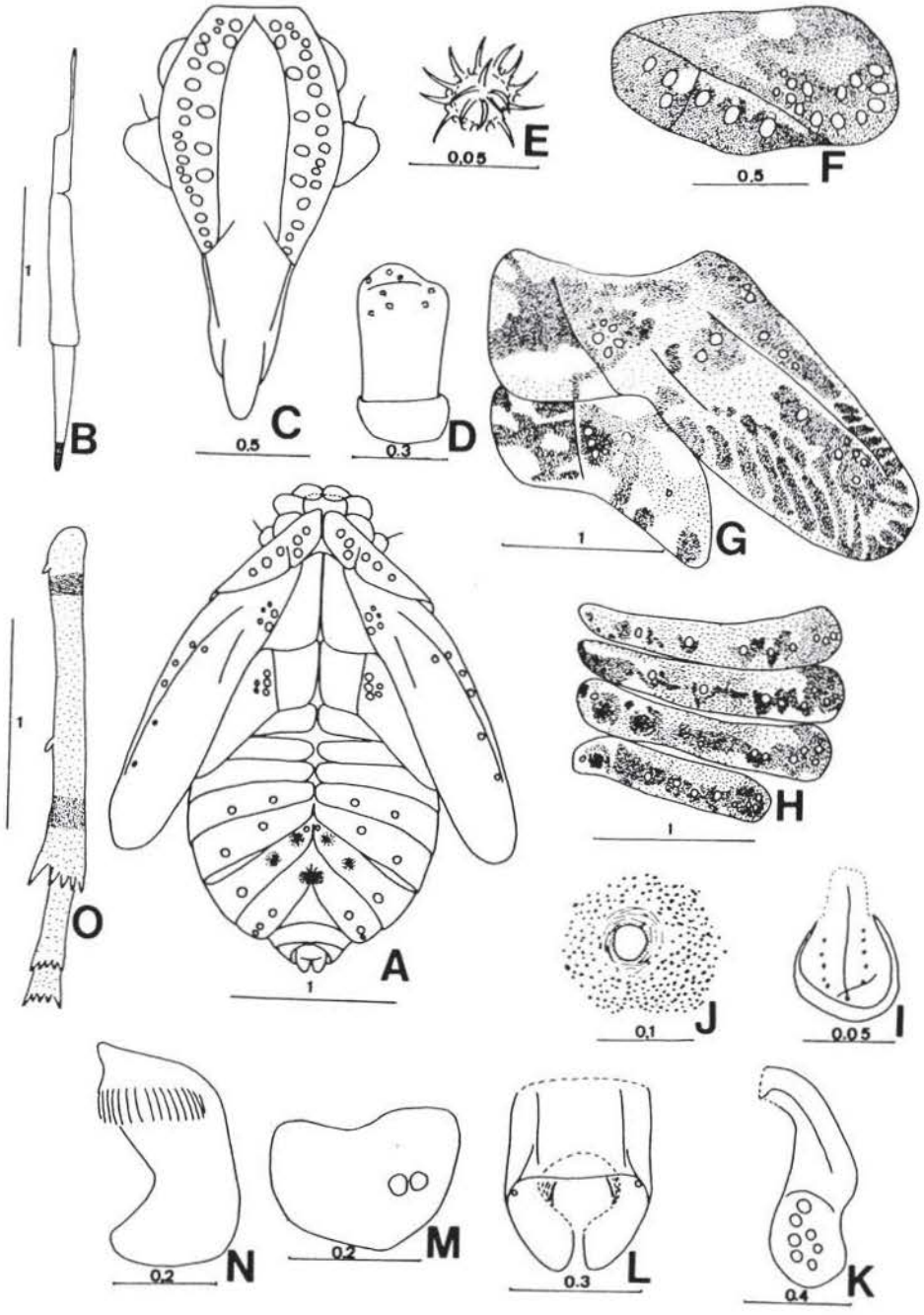

Fig. 36. *Parapeggia taiwana* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Specimens examined: Fifth instar nymph: 20, Hualien Hsien, Tienshiang, 30-X-1989, W.B. Yeh.

Determination: 4 male and 3 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under hard wood.

36. ***Losbanosia hiberensis*** (Matsumura) (Fig. 37)

Losbanosia hiberensis Chou and al. 1985, Econ. Ins. Fauna, Fasc. 36:50.
Nomuraida hiberensis Matsumura, 1935, Ins. Matsum. 10:79.

General color grayish white. Anterior wing pads with vein-like markings. Metatibia each with 2 ring markings.

Frons 1.3 time longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with about 22-23 pits. Rostrum extending over tip of abdomen, first segment with basal two-thirds narrow, subapical segment slightly longer than apical, apical segment gradually narrowing from base to apex, pigmented at apical fourth.

Pronota each lateral area with 14 pits, inner side of additional carina with 3 pits, each pit with about 10 processes, not granulated at apex. Meso- and metanota with mid-line elevated. Anterior wing pad with 8 pits at middle area. Metatrochanter with 17 ridges. Spinal formula of hind leg 5-(5-6)-5.

Abdominal tergites VI-VII with mid-line elevated. Abdominal tergites IV-VIII each side with (9-10)-9-9-9-7 pits respectively. Wax-pore without granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 3.0-3.6 mm.

Length of anterior wing pad: 2.2 mm.

Specimens examined: Fifth instar nymph: 5, Hualien Hsien, Tailuko, 14-II-1990, W.B. Yeh.

Determination: 2 male adults emerged, determined by Yeh from comparison of wing.

Habitat: Under rotten wood.

37. ***Zoraida insolita*** Yang and Wu (Fig. 38)

Zoraida insolita Yang and Wu, 1993, Derbidae of Taiwan: 47.

General color gray. Anterior wing pads with vein-like markings. Metatibiae each with 2 ring markings.

Frons 1.3 time longer than wide, wide between submedian carinae 2 times wider than wide between submedian and lateral carinae. Each side of frons with about 22-23 pits. Rostrum extending over tip of abdomen, first segment with basal half narrow, subapical segment 1.3 times longer than apical, apical segment gradually narrowing from base to apex, pigmented at apical fourth.

Pronota each lateral area with 13-14 pits, inner side of additional carina with 3 pits, each pit with about 10 processes, granulated at apex. Meso- and metanota with mid-line elevated. Anterior wing pad with 7-8 pits at middle area. Metatrochanter with 16 ridges. Spinal formula of hind leg 5-(5-6)-5.

Abdominal tergites III-VIII each side with 1-(8-9)-(9-10)-9-9-7 pits respectively. Wax-pore with cuticle granule surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 3.2-5.0 mm.

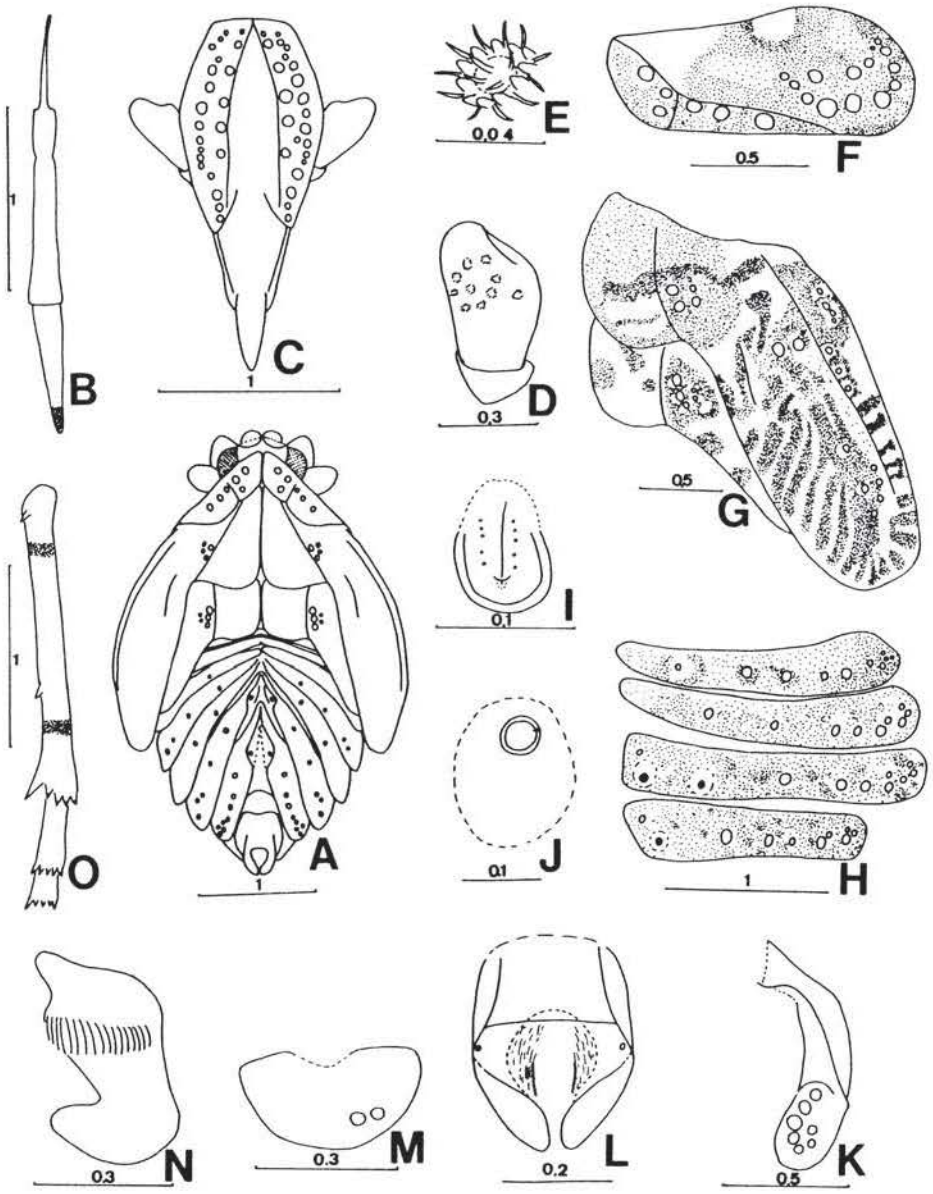

Fig. 37. *Losbanosia hiberensis* (Matsumura) A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

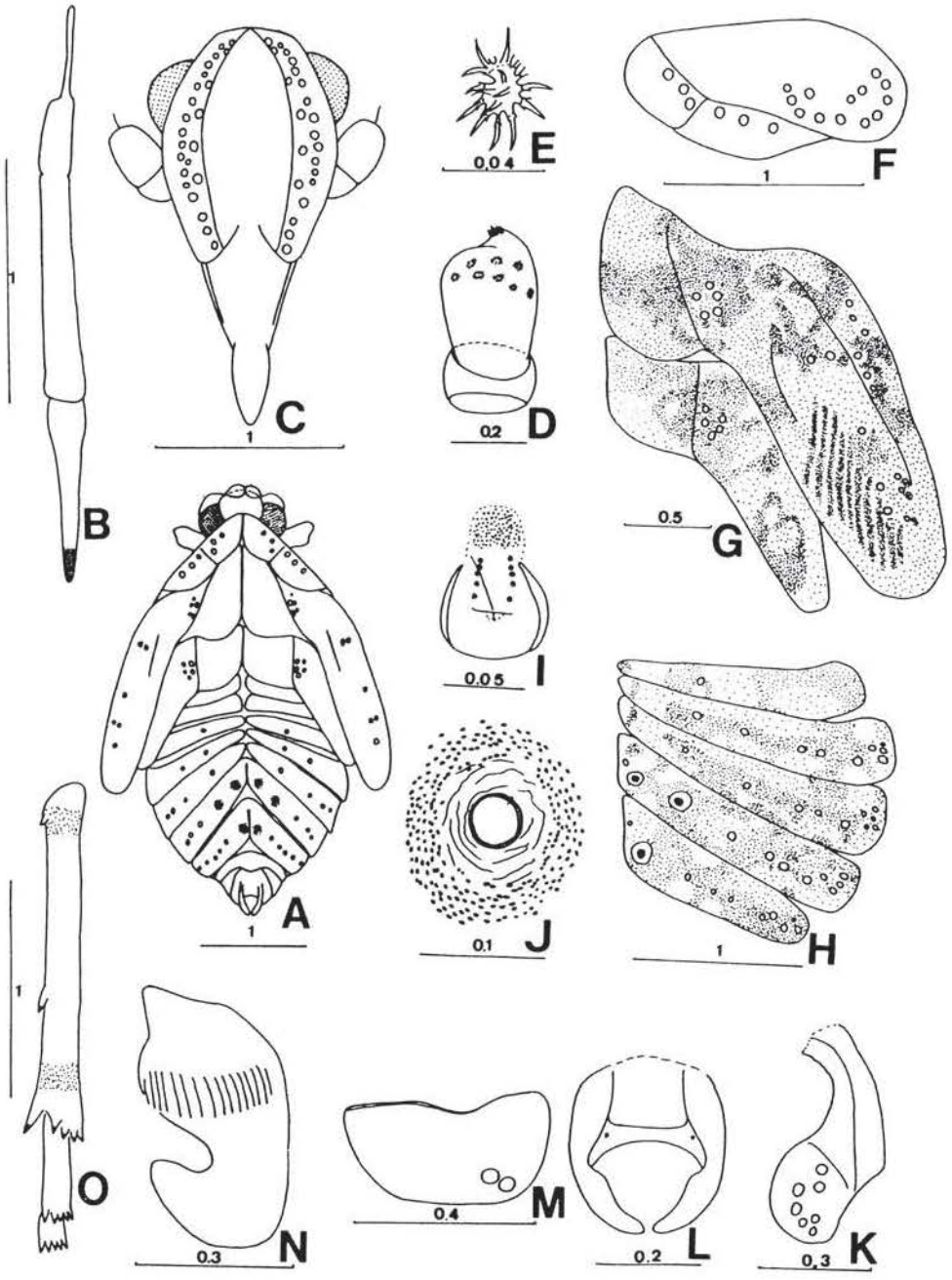

Fig. 38. *Zoraida insolita* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Length of anterior wing pad: 2 mm.

Specimens examined: Fifth instar nymph: 5, (ecdysis) 5, Pingtung Hsien, Kengtingkunyen, 8-II-1990, W.B. Yeh.; 14, Nantou Hsien, Huesun, 10-VII-1990, W.B. Yeh; 48, 2-VIII-1990, W.B. Yeh.

Determination: 6 male and 8 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under rotten wood.

38. **Zoraidini** sp.1. (Fig. 39)

General color black. Anterior wing pads with vein-like markings.

Frons 1.3 time longer than wide, wide between submedian carinae 2.5 times wider than wide between submedian and lateral carinae. Each side of frons with 25-26 pits. Postclypeus with median carina. Rostrum extending to tip of abdomen, first segment with basal three-fifths narrow, subapical segment 1.2 times longer than apical, apical segment gradually narrowing from base to apex, pigmented at apical fourth.

Pronota each lateral area with 20 pits, inner side of additional carina with 3 pits, each pit with about 10 processes, granulated at apex. Meso- and metanota with mid-line elevated. Anterior wing pad with 7 pits at middle area. Metatrochanter with 17 ridges. Spinal formula of hind leg 5-5-5.

Abdominal tergites VI-VII with mid-line elevated. Abdominal tergites IV-VIII each side with (9-10)-9-9-9-(7-9) pits respectively. Wax-pore without granule surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 5-6 mm.

Length of anterior wing pad: 2.5 mm.

Specimen examined: Fifth instar nymph: 1, Nantou Hsien, Huesun, 2-VIII-1990, W.B. Yeh.

Determination: No adult emerged, generic and species name can't be determined, but it should belong to tribe Zoraidini by comparison with other derbid nymphs.

Habitat: Under rotten wood.

Tribe **RHOTANINI** Muir

Rhotanini Muir, 1918, Ent. Monthly Mag. 54:228.

Color pink to red except *Saccharodite caudata* Yang and Wu white. Body small. Rostrum with apical segment narrowed from basal fourth, pigmented and pointed at apex. Pronota each lateral area with 8-10 pits, inner side of additional carina with 3 pits, pits without process. Meso- and metanota without pit, mid-line not elevated. Anterior wing pads each with a short inner carina . Posterior wing pads with 5 pits near notum. Metatibiae each with 1-2 lateral teeth. Spinal formula of hind leg (3-6)-(4-6)-(3-5). Abdominal tergites IV-VIII each side with (7-10)-(8-9)-(8-9)-(7-9)-(7-8) pits respectively. Abdominal tergites VI-VII each side with (1-2)-1 wax pores, wax pore without granules surrounding.

Length of body: 1.8-2.5 mm.

Length of anterior wing pad: 0.82-1.23 mm.

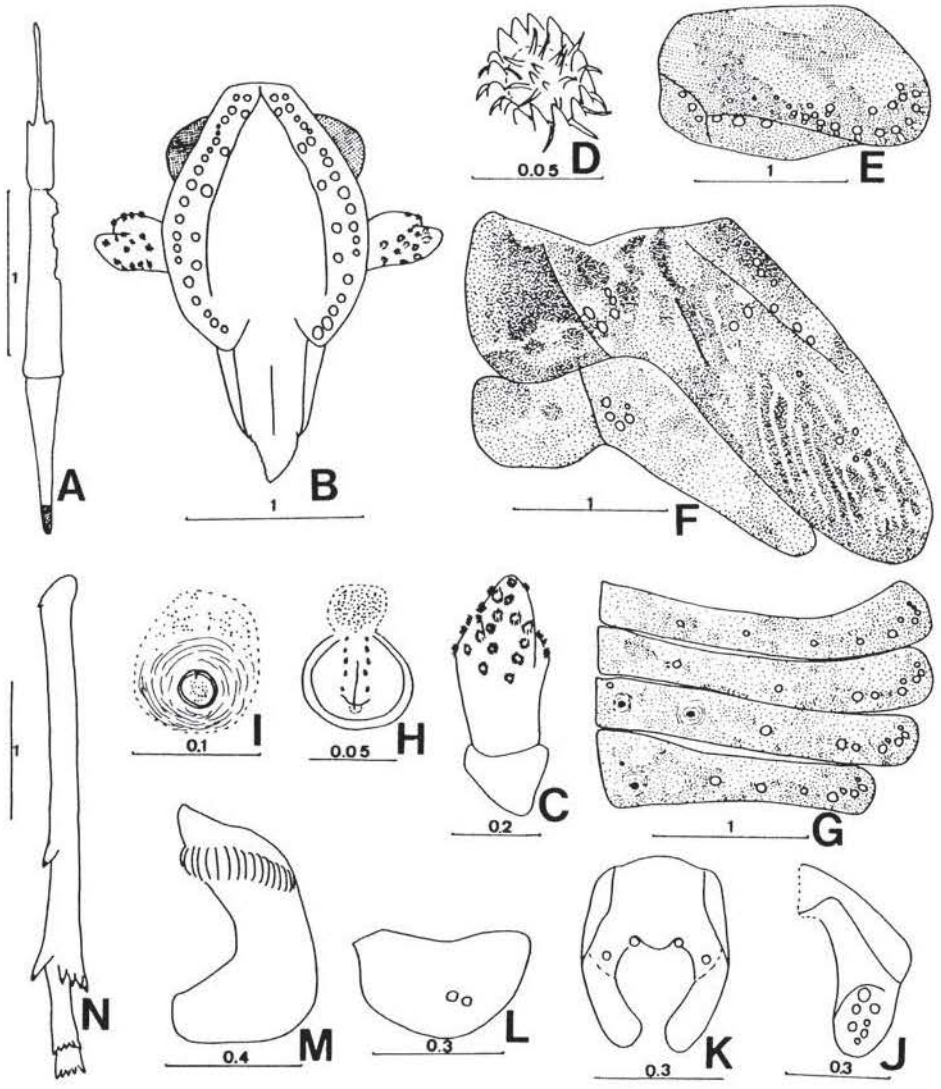

Fig. 39. Zoraidini sp.1. A, rostrum; B, head, ventral view; C, antenna; D, sensory organ of antenna; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites IV-VII, flat surface; H, sensory pit; I, wax pore; J, abdominal tergite VIII, flat surface; K, ninth abdominal segment, dorsal view; L, the same, lateral view. M, metatrochanter; N, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Key to species of Rhotanini

1. Abdominal tergite VI each side with 1 wax pore 2
-. Abdominal tergite VI each side with 2 wax pore 3
2. Color blood red; frons 1.4 times longer than wide; spinal formula of hind leg 5-5-5 ..... *Saccharodite coccinea* (Matsumura)
-. Color white; frons 1.2 times longer than wide; spinal formula of hind leg 4-5-5 .....

..... *Saccharodite caudata* Yang and Wu
3. Metatibiae each with 1 lateral teeth 4
-. Metatibiae each with 2 lateral teeth 5
4. Metatibiae each with 3 apical teeth; anterior wing pads each with 6 pits at median area .....
..... *Sumangala* sp.1.
-. Metatibiae each with 4 apical teeth; anterior wing pads each with 7 pits at median area .....
..... *Saccharodite acuta* Yang and Wu
5. Metatibiae each with 6 apical teeth (5 black-tipped) 6
-. Metatibiae each with 3 or 5 apical teeth (4 black-tipped) 7
6. Color deep red; wax pore area of abdominal tergite VI with same color as near by .....
..... *Rhotana maculata* Matsumura
-. Color pink; color of wax pore area of abdominal tergite VI paler than near by .....
..... *Rhotana inorata* Yang and Wu
7. Metatibiae each with 3 apical teeth; pronota each lateral area with 8 pits .....
..... *Formolevu guadrimaculatus* (Muir)
-. Metatibiae each with 5 apical teeth; pronota each lateral area with 10 pits .....
..... *Saccharodite matsumurae* (Muir)

39. ***Rhotana maculata*** Matsumura (Fig. 40)

Rhotana maculata Matsumura, 1914, Ann. Mus. Nat. Hungarici 12:295.

General color uniform deep red.

Frons 1.4 time longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite III, first segment with basal third narrow, subapical segment 0.7 times shorter than apical, apical segment pigmented at apical half.

Pronota each lateral area with 10 pits. Anterior wing pad with 7 pits at middle area. Metatrochanter with 17 ridges. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 6-6-5.

Abdominal tergites IV-VII each side with 9-9-9-9-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 2.1 mm.

Length of anterior wing pad: 1.25 mm.

Specimens examined: Fifth instar nymph: (ecdysis) 3, Taichung Hsien, Taiping, 1-IX-1989, W.B. Yeh; (ecdysis) 1, Luhliaochi, Pingtung Hsien, 7-II-1990, W.B. Yeh.

Determination: 3 male and 1 female adults emerged, determined by Yeh from comparison of wing.

Habitat: Under rotten wet wood.

40. ***Rhotana inorata*** Yang and Wu (Fig. 41)

Rhotana inorata Yang and Wu, 1993, Derbidae of Taiwan: 193.

General color pink.

Frons 1.3 time longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 19-20 pits. Rostrum extending to abdominal

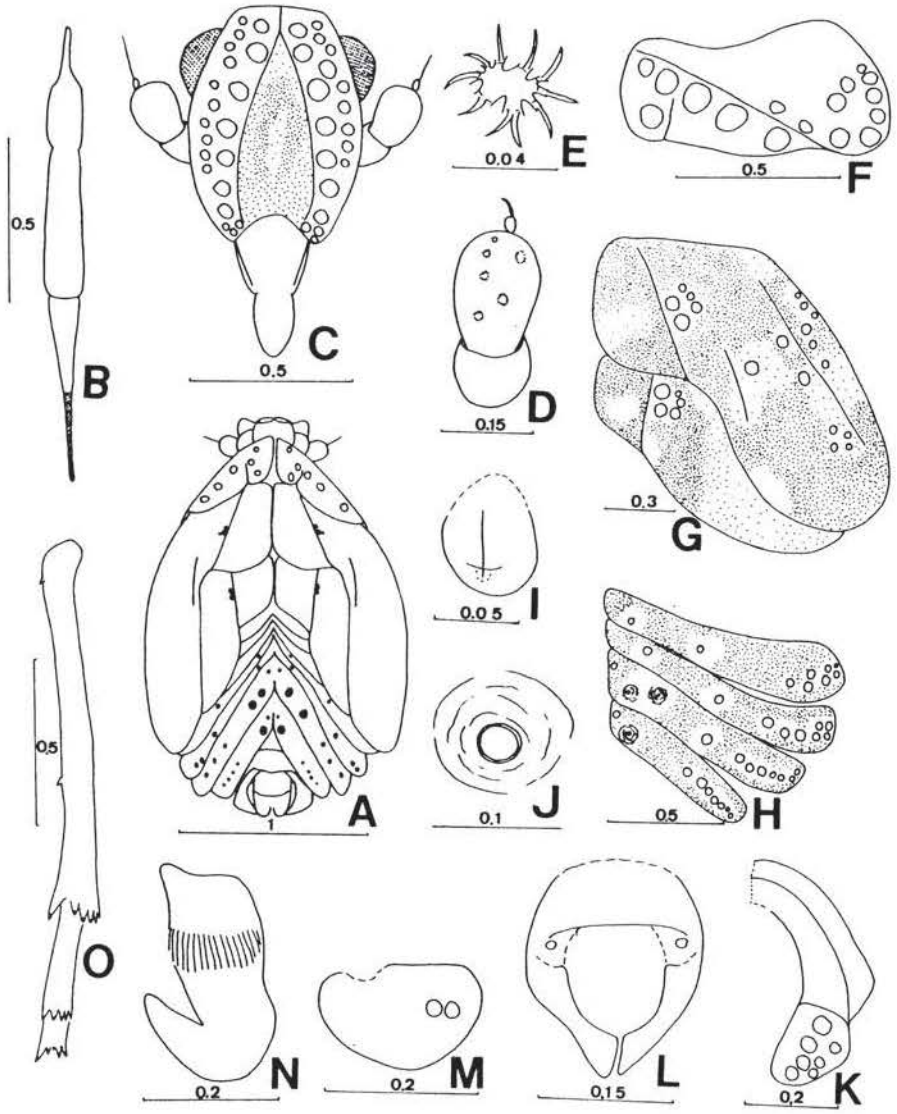

Fig. 40. *Rhotana maculata* Matsumura A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

sternite III, first segment with basal half narrow, subapical segment 0.8 times shorter than apical, apical segment pigmented at apical half.

Pronota each lateral area with 10 pits. Anterior wing pad with 7 pits at median area. Metatrochanter with 18 ridges. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 6-6-5.

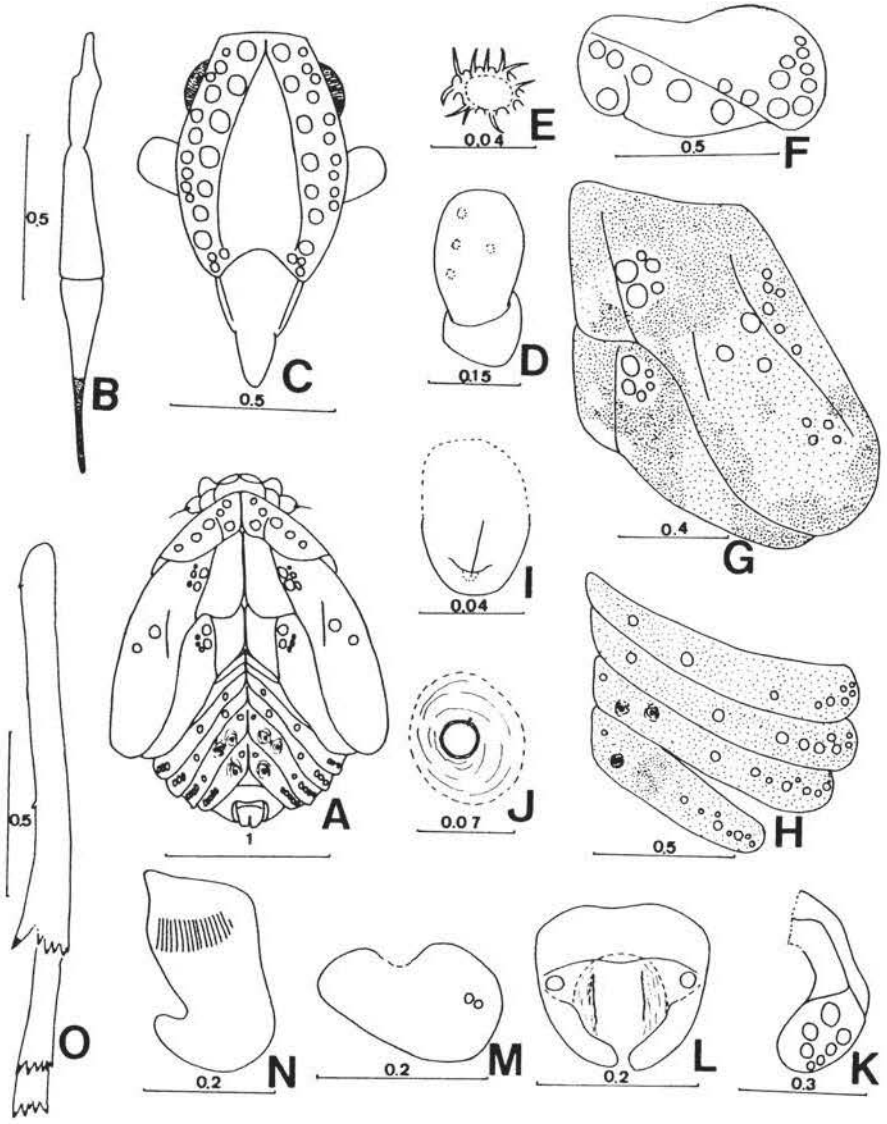

Fig. 41. *Rhotana inorata* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Abdominal tergites IV-VIII each side with 9-9-9-8-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 1.9 mm.

Length of anterior wing pad: 1.24 mm.

Specimens examined: Fifth instar nymph: 2, (ecdysis) 2, Taichung Hsien, Tekee, 17-IX-1989, W.B. Yeh.

Determination: 4 female adults emerged, determined by Yeh from comparison of wing.

Habitat: Under rotten wet wood.

41. *Sumangala* sp.1. (Fig. 42)

General color pink.

Frons 1.6 time longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum with first segment at basal two-thirds narrow, subapical segment as long as apical, apical segment pigmented at apical half.

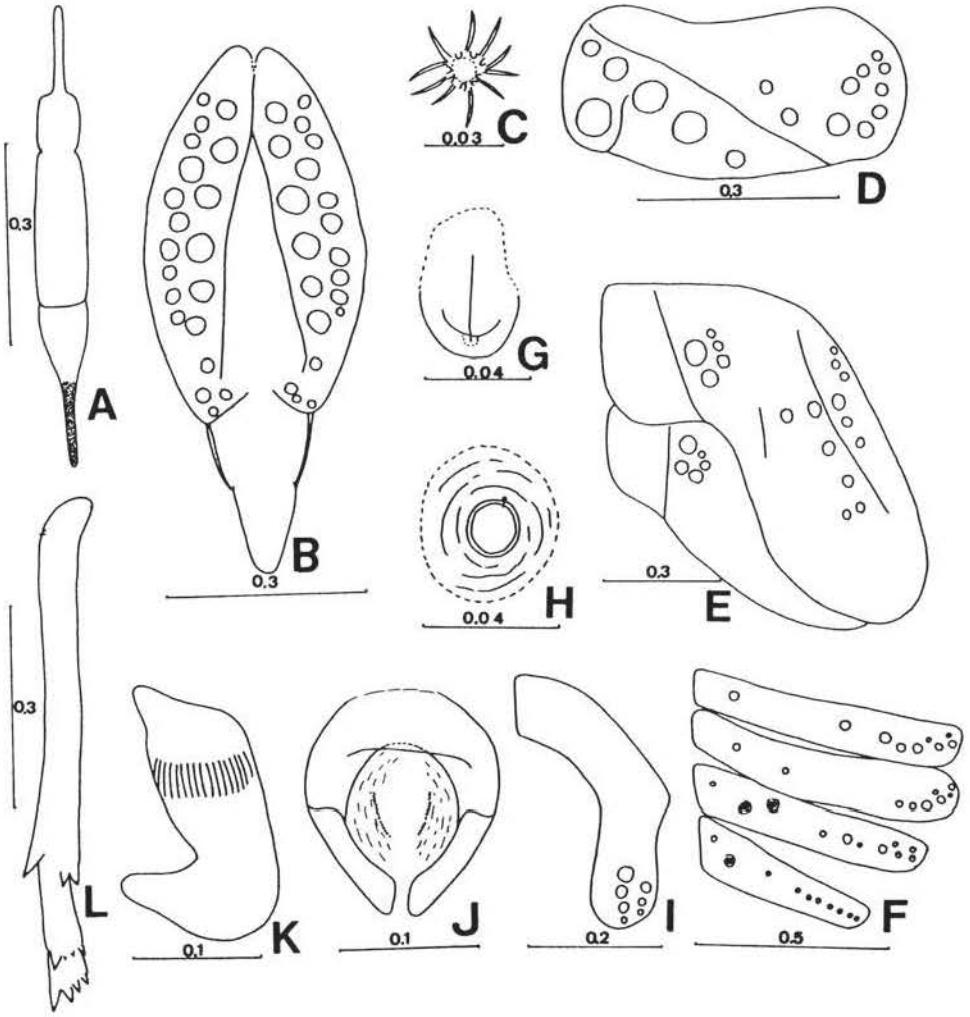

Fig. 42. *Sumangala* sp.1. A, rostrum; B, head, ventral view; C, sensory organ of antenna; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites IV-VII, flat surface; G, sensory pit; H, wax pore; I, abdominal tergite VIII, flat surface; J, ninth abdominal segment, dorsal view; K, metatrochanter; L, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Pronota each lateral area with 10 pits. Anterior wing pad with 6 pits at median area. Metatrochanter with 17 ridges. Metatibiae each with 1 lateral tooth. Spinal formula of hind leg 3-4-4.

Abdominal tergites IV-VIII each side with 9-9-9-9-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively.

Length of anterior wing pad: 0.9 mm.

Specimens examined: Fifth instar nymph: (ecdysis) 4, Taitung Hsien, Anshuo, 5-IX-1989, W.B. Yeh.

Determination: 2 female adults emerged, determined by Yeh from comparison of adult wing and spinal formula of hind leg.

Habitat: Under rotten wet wood.

42. ***Saccharodite matsumurae*** (Muir) (Fig. 43)

Saccharodite matsumurae Zelazny, 1981, Pacific Insects 23(3-4):236.
Levu matsumurae Muir, 1915, Proc. Hawaiian Entomol. Soc.3:15.

General color deep red.

Frons 1.1 times longer than wide, wide between submedian carinae 1.5 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite V, first segment with basal third narrow, subapical segment 0.8 times shorter than apical, apical segment pigmented at apical half.

Pronota each lateral area with 10 pits. Anterior wing pad with 7 pits at median area. Metatrochanter with 19 ridges. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 5-5-5.

Abdominal tergites IV-VIII each side with (9-10)-9-9-8-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 1.8-2.05 mm.

Length of anterior wing pad: 1.4-1.6 mm.

Specimens examined: Fifth instar nymph: (ecdysis) 5, Hualien Hsien, Nanhutashan, 12-V-1990, W.B. Yeh; 1, (ecdysis) 4, Nantou Hsien, Meifeng , 3-VII-1990, W.B. Yeh; (ecdysis) 1, Nantou Hsien, Huesun, 2-VIII- 1990, W.B. Yeh.

Determination: 3 male and 3 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Among rotten wet wood.

43. ***Saccharodite acuta*** Yang and Wu (Fig. 44)

Saccharodite acuta Yang and Wu, 1993, Derbidae of Taiwan: 207.

General color red.

Frons 1.5 times longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum with first segment at basal third narrow, subapical segment 0.5 times shorter than apical, apical segment pigmented at apical half.

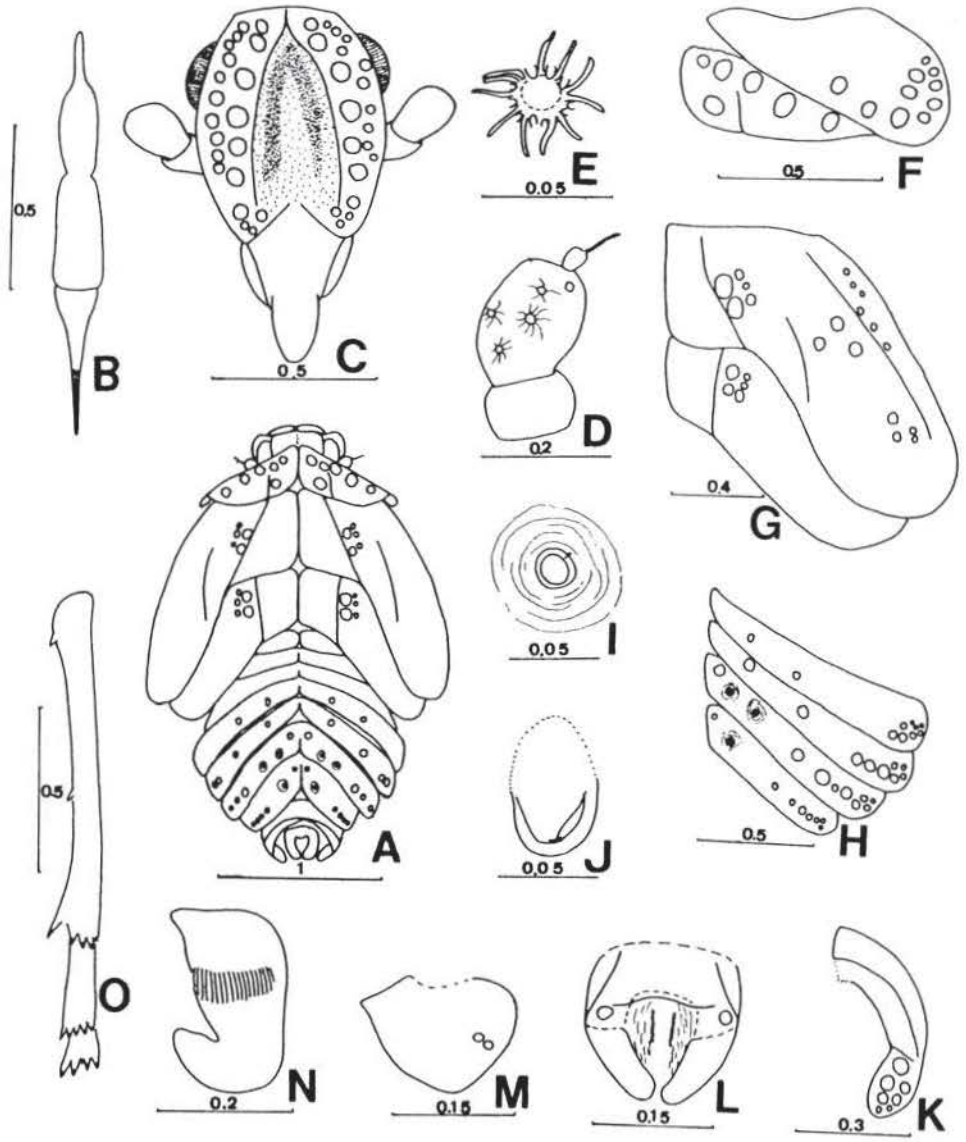

Fig. 43. *Saccharodite matsumurae* (Muir) A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, wax pore ; J, sensory pit ; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Pronota each lateral area with 10 pits. Anterior wing pad with 7 pits at median area. Metatrochanter with 18 ridges. Metatibiae each with 1 lateral tooth. Spinal formula of hind leg 4-4-5.

Abdominal tergites IV-VIII each side with 9-9-9-7-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 1 pit.

Length of anterior wing pad: 0.9 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Nantou Hsien, Tehuashe, 17-VIII-1989, W.B. Yeh.

Determination: 1 female adult emerged, determined by Yeh from comparison of wing.

Habitat: In rotten wet wood cavity.

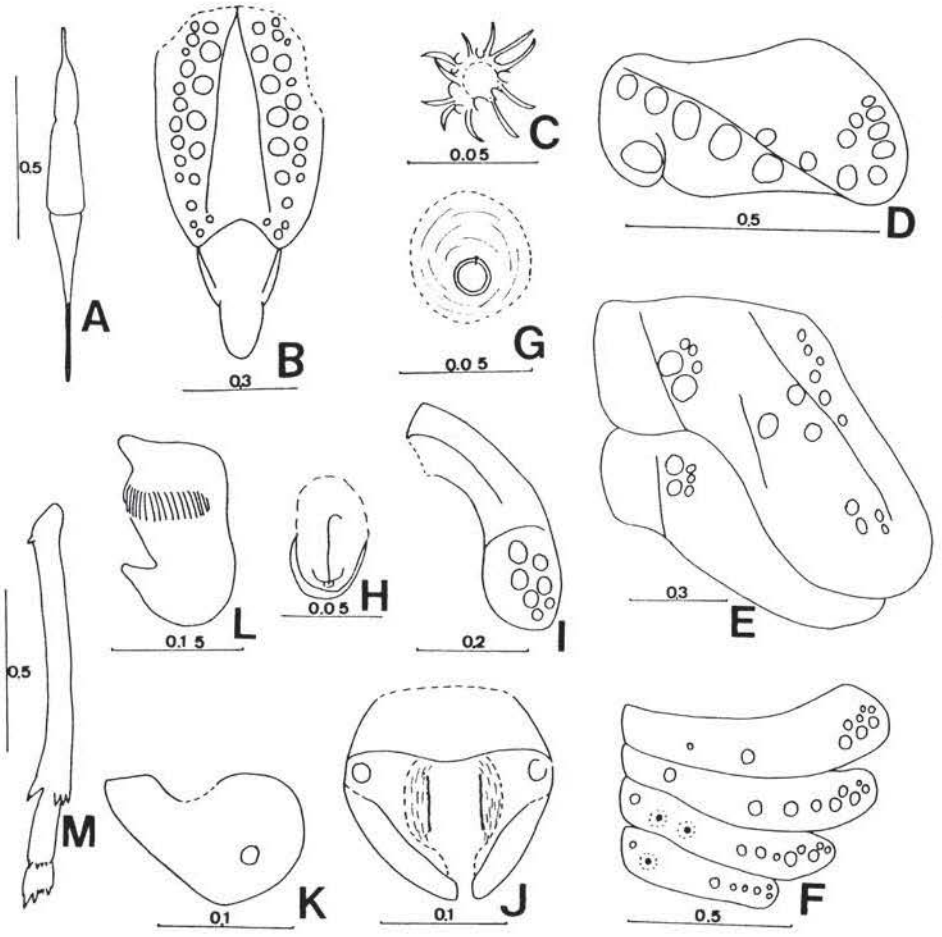

Fig. 44. *Saccharodite acuta* Yang and Wu A, rostrum; B, head, ventral view; C, sensory organ of antenna; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites IV-VII, flat surface; G, wax pore ; H, sensory pit ; I, abdominal tergite VIII, flat surface; J, ninth abdominal segment, dorsal view; K, the same, lateral view. L, metatrochanter; M, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

44. ***Saccharodite caudata*** Yang and Wu (Fig. 45)

Saccharodite caudata Yang and Wu, 1993, Derbidae of Taiwan: 212

General color white. Posterior wing pads slightly brown.

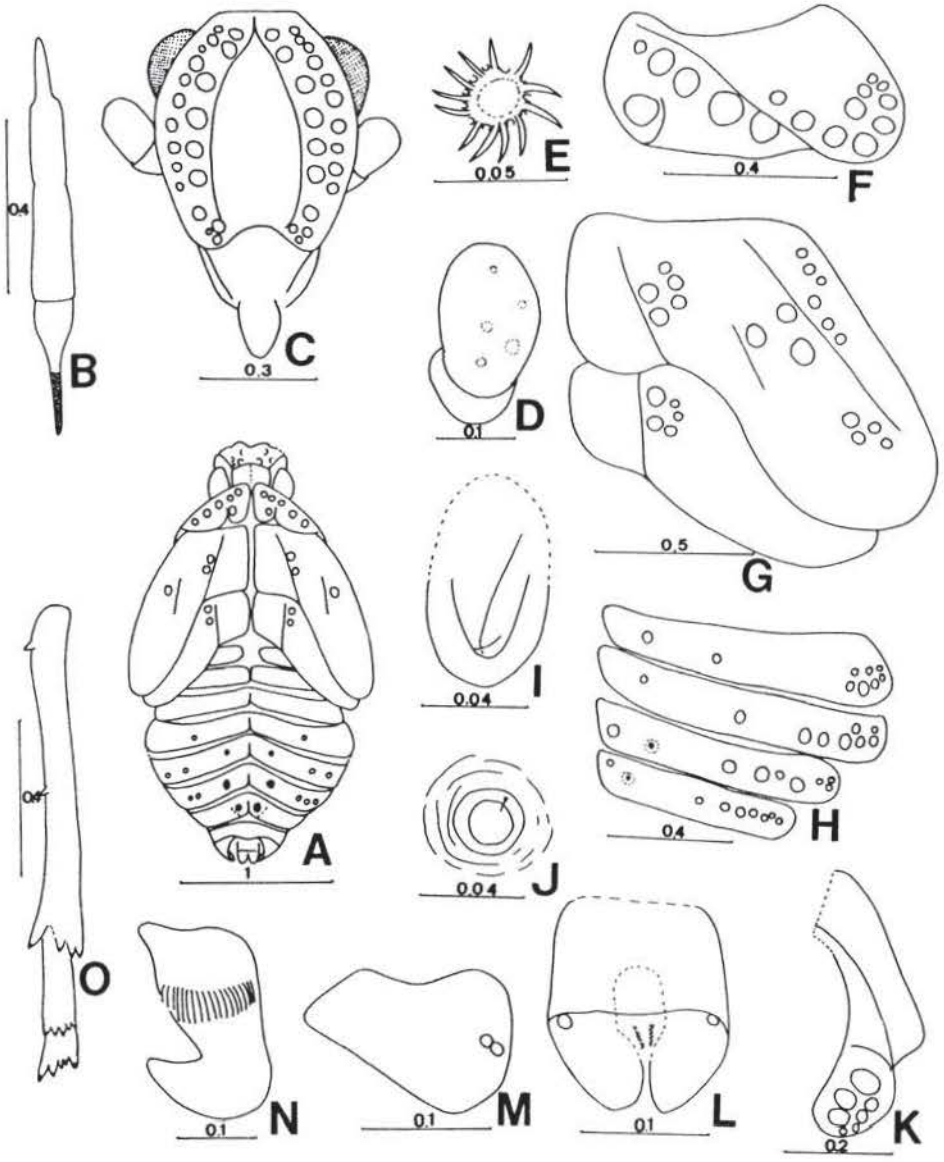

Fig. 45. *Saccharodite caudata* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit ; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Frons 1.15 times longer than wide, wide between submedian carinae 1.6 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite III, first segment with basal third narrow, subapical segment 0.8 times shorter than apical, apical segment pigmented at apical half.

Pronota each lateral area with 10 pits. Anterior wing pads each with 7 pits at median area. Metatrochanter with 19 ridges. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 4-5-5.

Abdominal tergites IV-VIII each side with 9-9-8-8-7 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pore respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 2.2-2.5 mm.

Length of anterior wing pad: 1.05 mm.

Specimens examined: Fifth instar nymph: 12, (ecdysis) 14, Hualien Hsien, Chilaipaoshenso 29-I-1991, W.B. Yeh.

Determination: 10 male and 5 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under rotten wet wood.

45. ***Saccharodite coccinea*** (Matsumura) (Fig. 46)

Saccharodite coccinea Zelazny, 1981, Pacific Insects 23(3-4):237.
Rhotana coccinea Matsumura, 1940, Ins. Matsum. 15:47.

General color blood red.

Frons 1.4 times longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum with first segment at basal fourth narrow, subapical segment as longer as apical, apical segment pigmented at apical half.

Pronota each lateral area with 10 pits. Anterior wing pad with 7 pits at median area. Metatrochanter with 17 ridges. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 5-5-5.

Abdominal tergites IV-VIII each side with (7-8)-9-9-(7-8)-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of anterior wing pad: 0.84 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taitung Hsien, Anshuo, 5-IX-1989, W.B. Yeh.

Determination: 1 female adult emerged, determined by Yang from comparison of wing and blood red color.

Habitat: Under rotten wet betel palm leaf.

46. ***Formolevu quadrimaculatus*** (Muir) (Fig. 47)

Formolevu quadrimaculatus Yang and Wu, 1993, Derbidae of Taiwan: 216.
Levu quadrimaculatus Muir, 1915, Proc. Hawaiian Entomol. Soc.3:135.

General color pink.

Frons 1.3 times longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum with first segment at basal fourth narrow, subapical segment 0.8 times shorter than apical, apical segment pigmented at apical half.

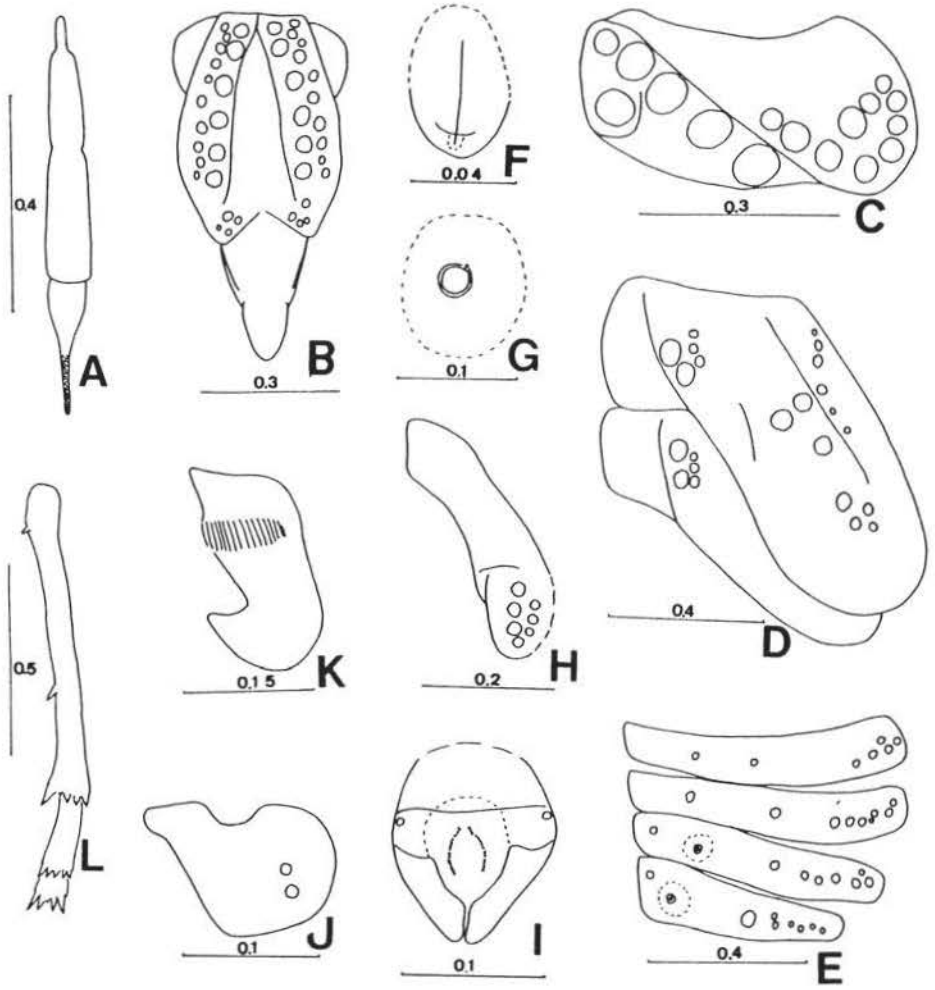

Fig. 46. *Saccharodite coccinea* (Matsumura) A, rostrum; B, head, ventral view; C, pronotum, flat surface; D, wing pads, flat surface; E, abdominal tergites IV-VII, flat surface; F, sensory pit ; G, wax pore; H, abdominal tergite VIII, flat surface; I, ninth abdominal segment, dorsal view; J, the same, lateral view. K, metatrochanter; L, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Pronota each lateral area with 8 pits. Anterior wing pad with 7 pits at median area. Metatrochanter with 19 ridges. Metatibiae each with 2 or 3 lateral teeth. Spinal formula of hind leg 3-4-5.

Abdominal tergites IV-VIII each side with 8-8-8-7-(7-8) pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of anterior wing pad: 1.1 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taichung Hsien, Sungmao, 13-V-1990, W.B. Yeh.

Determination: 1 male adult emerged, determined by Yeh from comparison of wing.

Habitat: Under rotten wet wood.

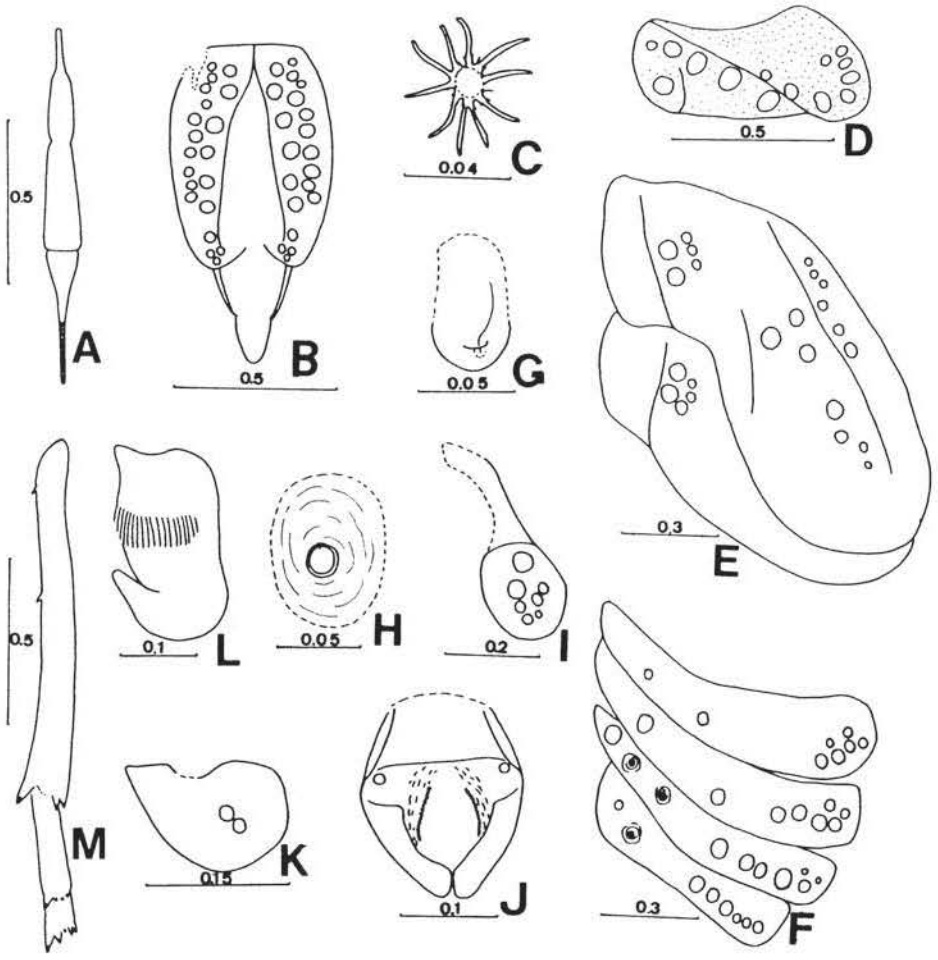

Fig. 47. *Formolevu quadrimaculatus* (Muir) A, rostrum; B, head, ventral view; C,sensory organ of antennae; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites IV-VII, flat surface; G, sensory pit; H, wax pore; I, abdominal tergite VIII, flat surface; J, ninth abdominal segment, dorsal view; K, the same, lateral view. L, metatrochanter; M, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Tribe **A-ini**

Color pink. Body large. Rostrum with apical segment narrowing from basal third to apex. pronota each lateral area with 12 pits, with a humeral carina, inner side of additional carina with 3 pits, pit without process. Meso- and metanota without pits, mid-line not elevated. Anterior wing pads each with a short inner carina. Metatibiae without lateral tooth. Spinal formula of hind leg 1-(0-1)-(1-2). Abdominal tergites VI-VIII each side with 6-9-9-8-6 pits respectively. Abdominal tergites VI-VII or V-VII each side with a wax pore respectively. Wax pore with ridges surrounding.

Length of body: 2.9-3.3 mm.

Length of anterior wing pad: 1.2-1.5 mm.

Basilocephalus Kirkaldy, 1906 originally belongs to tribe Cenchreini Muir. *Basilocephalus germanus* Yang and Wu and A-ini sp.1 with special character by having apices of

metatibiae with mostly as lanceolate setae, spinal formula of hind leg 1-(0-1)-(1-2). Impressing the authors raise its rank for comparison.

Key to species of A-ini

1. Abdominal tergite V without wax pore; spinal formula of hind leg 1-1-1; general color dark brown ..... A-ini sp.1.
-. Abdominal tergite V with wax pore; spinal formula of hind leg 1-0-2; general color pink .... *Basilocephalus germanus* Yang and Wu

47. ***Basilocephalus germanus*** Yang and Wu (Fig. 48)

Basilocephalus germanus Yang and Wu, 1993, Derbidae of Taiwan: 95.

General color pink.

Frons 1.3 times longer than wide, wide between submedian carinae 1.5 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite III, first segment with basal two-thirds narrow, subapical segment 1.2 times longer than apical, apical segment narrowing from basal third to apex, pigmented at apical fourth.

Pronota each lateral area with 12 pits, with a humeral carina, pits without process, not granulated at apex. Anterior wing pads each with 6 pits at median area. Metatrochanter with 18 ridges. Metatibiae without lateral tooth. Spinal formula of hind leg 1-0-2, 6-4-4 as lanceolate setae.

Abdominal tergites IV-VIII each side with 6-9-9-8-6 pits respectively. Abdominal tergites V-VII each side with 1-1-1 wax pores respectively. Wax pore with ridged surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 3.3 mm.

Length of anterior wing pad: 1.5 mm.

Specimens examined: Fifth instar nymph: 2, (ecdysis) 3, Taitung Hsien ,Orchid, 11-VIII-1989, W.B. Yeh.

Determination: 1 female adult emerged, determined by Yang from comparison of wing.

Habitat: Under rotten wet wood.

48. **A-ini** sp.1. (Fig. 49)

General color dark brown. Antennae, legs and ventral aspect of abdomen yellowish brown. Rostrum brown.

Vertex 2.2 times wider at base than long in middle line, lateral and median carinae feeble. Frons 1.2 times longer than wide, wide between submedian carinae 1.7 times wider than wide between submedian and lateral carinae. Each side of frons with 19 pits. Rostrum with subapical segment as long as apical, apical segment narrowing from basal third to apex, pigmented at apical fourth.

Pronota each lateral area with 10 pits, with a humeral carina, inner side of additional carina with 3 pits, pits without process, not granulated at apex. Anterior wing pads each with an inner carina, 6 pits at median area. metatibiae without lateral tooth. Spinal formula of hind leg 1-1-1.

Abdominal tergites IV-VIII each side with 6-10-9-8-(6-7) pits respectively. Abdominal

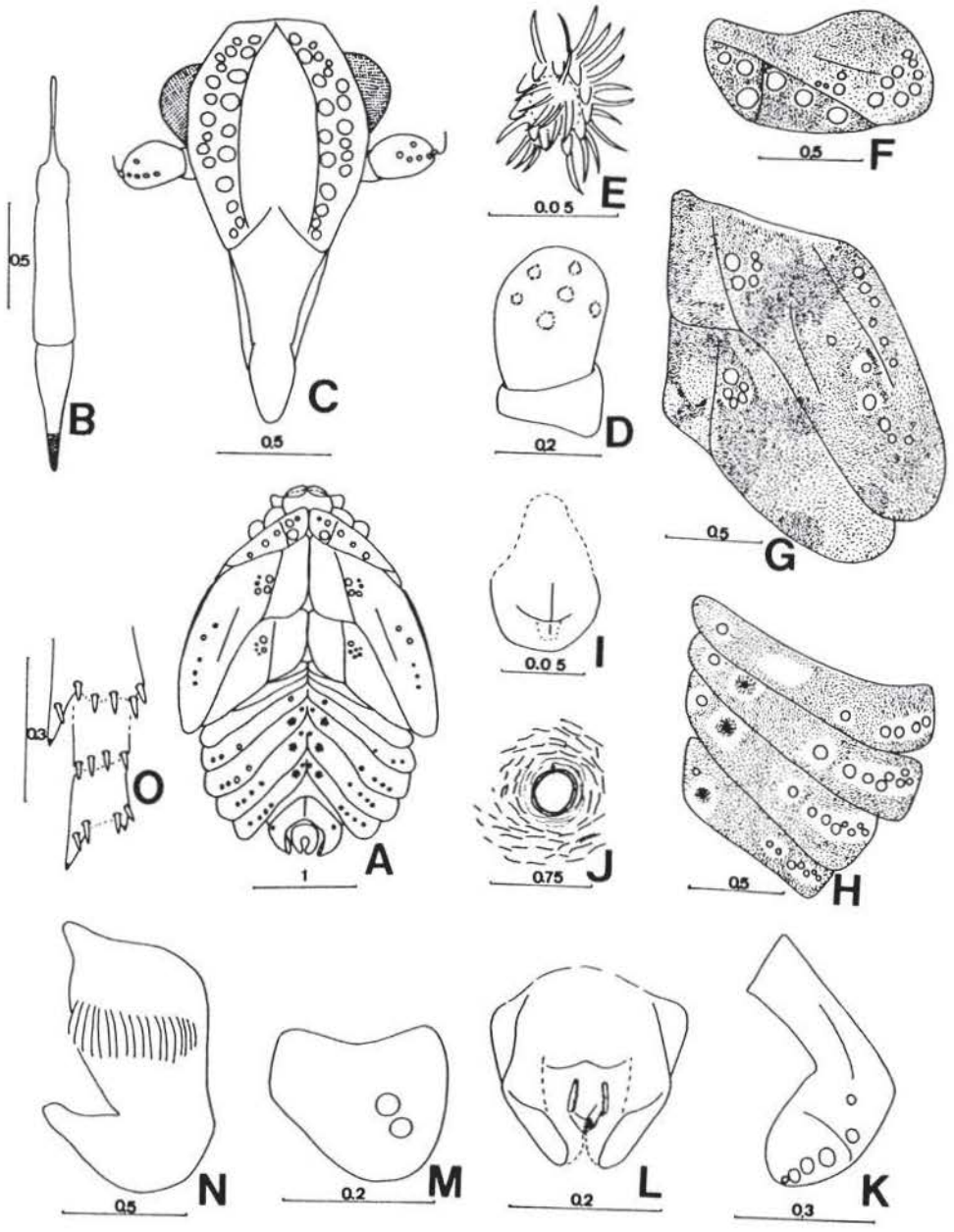

Fig. 48. *Basilocephalus germanus* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, apices of metatibia and first two tarsi. (unit = mm.)

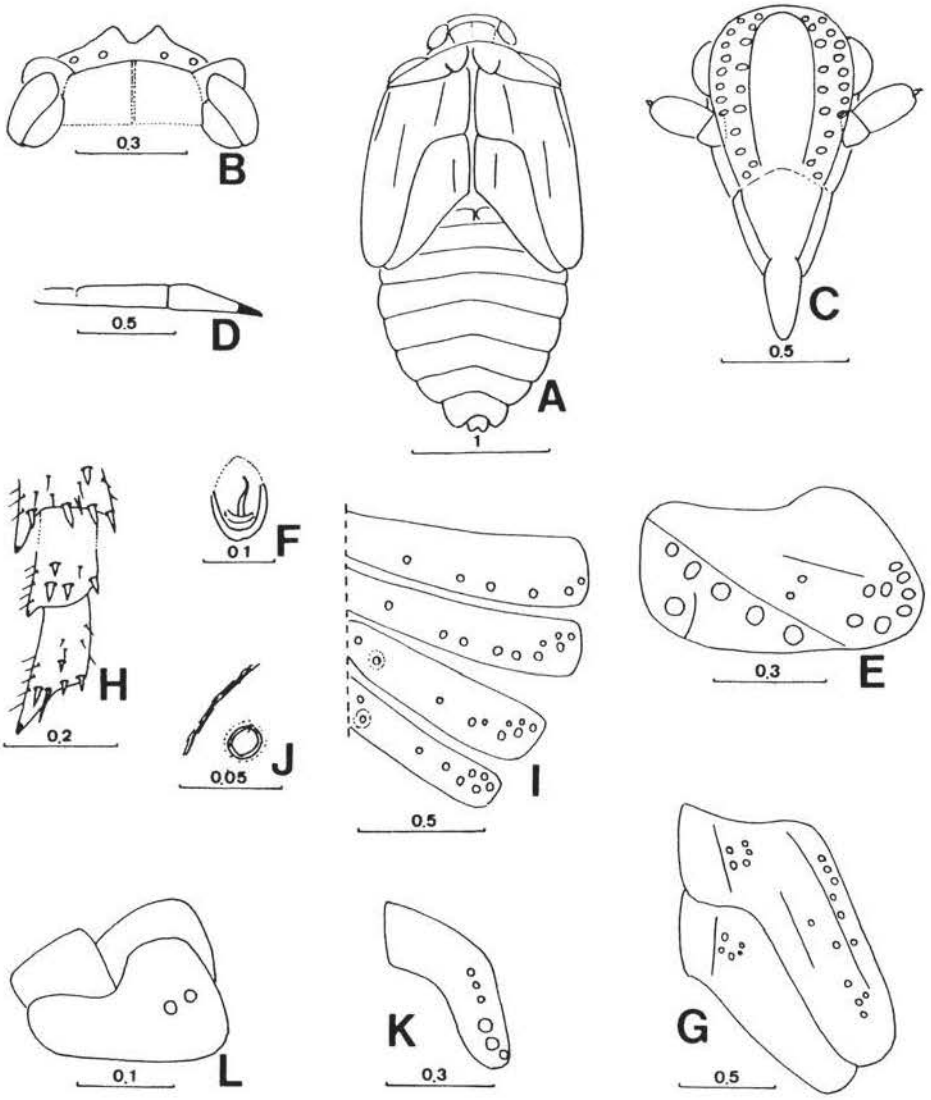

Fig. 49. A-ini sp.1. A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, pronotum, flat surface; F, sensory pit; G, wing pads, flat surface; H, apex of metatibia and first two tarsal segment, ventral view; I, abdominal tergites IV-VII, flat surface; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, laterodorsal view. (unit = mm.)

tergites VI-VII each side with 1-1 wax pores respectively. Wax pore without ridged surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 2.97 mm.

Length of anterior wing pad: 1.27 mm.

Specimen examined: Fifth instar nymph: 1, S. Belmopan. Belizf. Cayo. 6mi. 16-VIII-1977, C.W.& L.B. O'Brien & Marshall (specimen was sent by L.B. O'Brien)

Determination: Determined by O,Brien as Derbidae.

This species differs from *Basilocephalus germanus* Yang and Wu by the spinal formula of hind leg 1-1-1 (1-0-2 in *germanus*); and the abdominal tergite V without wax pore.

Tribe **CENCHREINI** Muir

Cenchreini Muir, 1918, Entomol. Monthly Mag.54:228.

Color gray, grayish red or red. Some species with distinct markings. Body small to large. Rostrum with apical segment narrowing from middle or from apical third to apex. Pronota each lateral area with 10-14 pits, some species with a humeral carina, inner side of additional carina with 3-4 pits, each pit with 6 processes or without. Meso- and metanota of some species with 1-2 pits, mid-line not elevated. Anterior wing pads not reaching over posterior wing pads, inner carinae short or long. Posterior wing pads each with 5 pits near notum. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg (7-6)-(4-6)-(5-6). Abdominal tergites IV-VIII each side with (6-9)-9-9-(8-9)-(4-7) pits respectively. Abdominal tergites VI-VII each side with (1-2)-1 wax pores respectively. Some species wax pore with short ridges surrounding.

Length of body: 1.6-3.3 mm.

Length of anterior wing pad: 0.9-1.4 mm.

Key to genera and species of Cenchreini

1. Meso- and metanota without pits; metatibiae each with 6 apical teeth; anterior wing pads without posterior carina (*Cedusa* Fowler) 2
-. Meso- and metanota each with 1-2 pits respectively; metatibiae each with 7 apical teeth; anterior wing pads with posterior carina (*Vekunta* Distant) 5
2. Abdominal tergites VI-VII each side with 1-1 wax pore respectively; abdominal tergite VIII each side with 4 pits 3
-. Abdominal tergites VI-VII each side with 2-1 wax pore respectively; abdominal tergite VIII each side with 7 pits ..... *C. ignota* Yang and Wu
3. Abdominal tergites red; frons at widest part 1.5 times wider than at base ..... *C. concava* Yang and Wu
-. Abdominal tergites gray; frons at widest part 1.8 times wider than at base 4
4. Abdominal sternites pink, length of anterior wing pad about 1.1 mm. ..... *C. cubica* Yang and Wu
-. Abdominal sternites red, length of anterior wing pad about 1.35- 1.40 mm. ..... *C. littorea* Yeh and Yang
5. General color gray 6
-. General color pink or red 8
6. Rostrum with subapical segment shorter than apical ..... *V. umbripennis* Muir
-. Rostrum with subapical segment as long as or longer then apical 7
7. Wide between submedian carinae 2.2 times wider than wide between submedian and lateral carinae; pronota each lateral area with 14 pits ..... *V. parca* Yang and Wu
-. Wide between submedian carinae 3.3 times wider than wide between submedian and lateral carinae; pronota each lateral area with 12 pits ..... *V. diluta* Yang and Wu
8. General color pink 9
-. General color deep red ..... *V. novensilis* Yeh and Yang
9. Wide between submedian carinae 2.4 times wider than wide between submedian and lateral carinae; rostrum with subapical segment as long as apical ..... *V.extima* Yang and Wu

-. Wide between submedian carinae 1.8 times wider than wide between submedian and lateral carinae; rostrum with subapical segment shorter than apical ..... *V. commendata* Yang and Wu

Genus **CEDUSA** Fowler

Cedusa Fowler, 1904, Biologia Centrali-Americana 1:112.

Thoracic dorsum gray or grayish red. Abdominal tergites gray, abdominal sternites red. Frons 1.24-1.45 times longer than wide, each side with 19-20 pits. Rostrum with apical segment narrowed and pigmented from apical third to apex. pronota each lateral area with 10 pits, without humeral carina, inner side of additional carina with 3 pits, pits without process, not granulated at apex. Anterior wing pads each with short inner carina, without posterior carina, with 5 pits at median area. Metatrochanter with 15-20 ridges. Spinal formula of hind leg 6-5-5. Abdominal tergites IV-VIII each side with 9-9-9-8-(4-7) pits respectively. Abdominal tergites VI-VII each side with (1-2)-1 wax pores respectively. Wax pore without granule surrounding.

Length of body: 1.6-2.1 mm.

Length of anterior wing pad: 1.2-1.4 mm.

49. ***Cedusa ignota*** Yang and Wu (Fig. 50)

Cedusa ignota Yang and Wu, 1993, Derbidae of Taiwan: 80.

Thoracic dorsum grayish pink, abdomen deep red.

Frons 1.24 times longer than wide, widest part 1.8 times wider than basal wide. Wide between submedian carinae 1.5 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite VI, first segment with basal two-thirds narrow, subapical segment as long as apical. Posterior wing wing pads each with a short carina. Metatrochanter with 15 ridges.

Abdominal tergites IV-VIII each side with 9-9-9-8-7 pits respectively. Abdominal tergites VI-VII each side with 2-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 1.9-2.1 mm.

Length of anterior wing pad: 0.9 mm.

Specimens examined: Fifth instar nymph: 2, (ecdysis) 4, Pintung Hsien, Langjenchi, 15-VIII-1990, W.B. Yeh.

Determination: 3 male and 1 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under hard wood.

50. ***Cedusa concava*** Yang and Wu (Fig. 51)

Cedusa concava Yang and Wu, 1993, Derbidae of Taiwan: 76.

Thoracic dorsum gray. Abdomen red.

Frons 1.25 times longer than wide, widest part 1.5 times wider than basal wide. Wide between submedian carinae 1.5 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite III, first segment with basal half narrow, subapical segment as long as apical. Metatrochanter with 17 ridges.

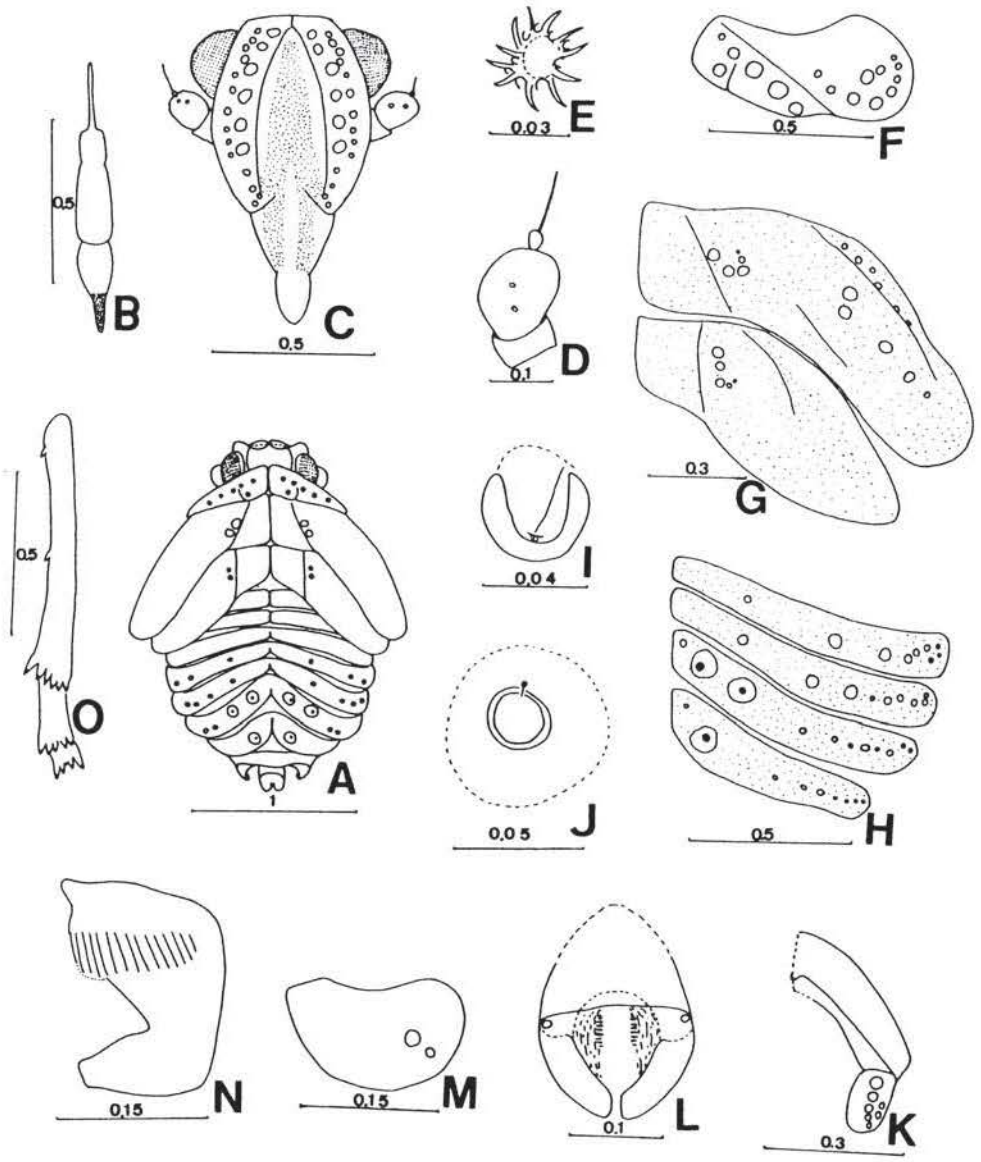

Fig. 50. *Cedusa ignota* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Abdominal tergites IV-VIII each side with 9-9-9-8-4 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 1.7-1.9 mm.

Length of anterior wing pad: 0.94 mm.

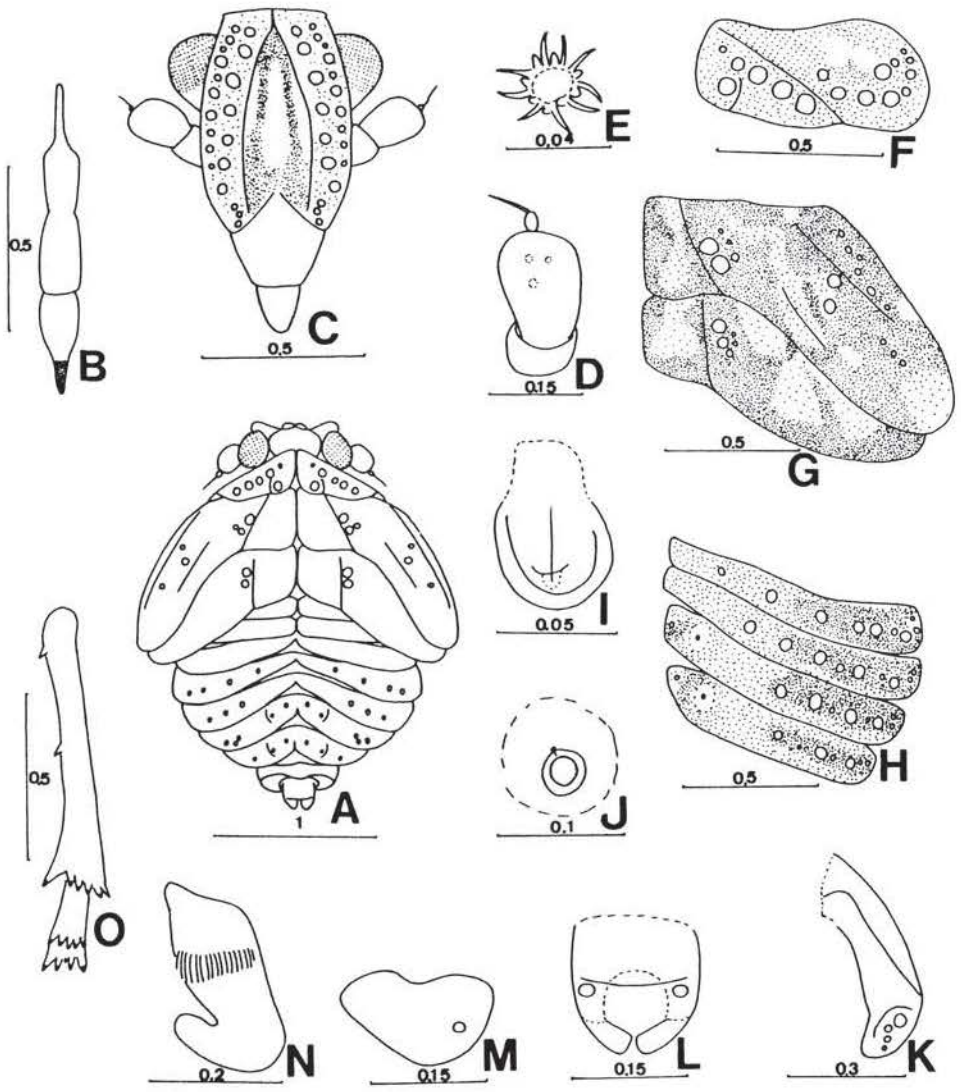

Fig. 51. *Cedusa concava* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Specimens examined: Fifth instar nymph: 6, Kaohsiung, Hsien, Chiasien, 13-IX-1987, C.T. Yang.

Determination: 2 male and 4 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Among small wet twigs beside mountain stream.

51. *Cedusa cubica* Yang and Wu (Fig. 52)

Cedusa cubica Yang and Wu, 1993, Derbidae of Taiwan: 78.

Thoracic dorsum gray, abdominal tergites gray, abdominal sternites pink.

Frons 1.3 times longer than wide, widest part 1.8 times wider than basal wide. Wide between submedian carinae 1.7 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite V, first segment with basal half narrow. Metatrochanter with 20 ridges.

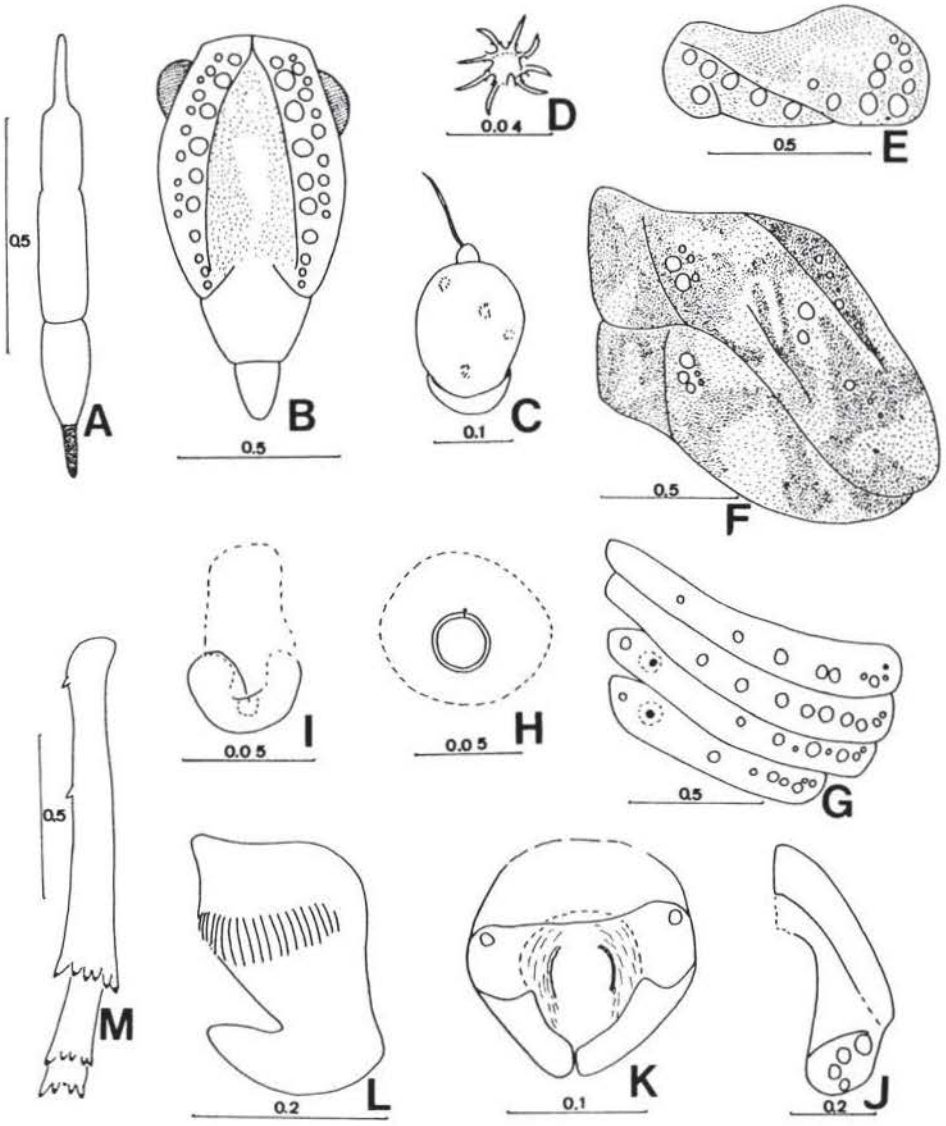

Fig. 52. *Cedusa cubica* Yang and Wu A, rostrum; B, head, ventral view; C, antenna; D, sensory organ of antenna; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites IV-VII, flat surface; H, wax pore; I, sensory pit; J, abdominal tergite VIII, flat surface; K, ninth abdominal segment, dorsal view; L, metatrochanter; M, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Abdominal tergites IV-VIII each side with 9-9-9-8-4 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 1.6 mm.

Length of anterior wing pad: 1.1 mm.

Specimens examined: Fifth instar nymph: 4, (ecdysis) 1, Hualien Hsien, Tienshan, 30-XI-1989, W.B. Yeh.

Determination: 1 male and 1 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under hard wood.

52. *Cedusa littorea* Yeh and Yang (Fig. 53)

Cedusa littorea Yeh and Yang, 1993, Derbidae of Taiwan: 83

Thoracic dorsum gray, abdominal tergites gray, abdominal sternites red.

Frons 1.3 times longer than wide, widest part 1.8 times wider than basal wide. Wide between submedian carinae 1.8 times wider than wide between submedian and lateral carinae. Each side of frons with 19-20 pits. Rostrum extending to abdominal sternite VII, first segment with basal two-thirds narrow, subapical segment as long as apical. Metatrochanter with 19 ridges.

Abdominal tergites IV-VIII each side with 9-9-9-8-4 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively. Ninth abdominal segment each side with 2 pits.

Length of body: 1.6-1.7 mm.

Length of anterior wing pad: 1.35-1.40 mm.

Specimens examined: Fifth instar nymph: 1, (ecdysis) 2, Taichung Hsien, Taiping, 31-I-1990, W.B. Yeh; 2, (ecdysis) 3, Ilan Hsien, Nanaochi, 2-IV-1990, W.B. Yeh.

Determination: 2 male and 4 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under hard wood or among decay wet leaves on ground.

Genus **VEKUNTA** Distant

Vekunta Distant, 1906, Fauna of British India 3:287.

General color grayish red to red, dorsal aspect spread black markings. Frons 0.97-1.15 times longer than wide, each side with 20-21 pits. Rostrum with apical segment narrowing from middle. Pronota each lateral area with humeral carina, with 12-14 pits, inner side of additional carina with 3-4 pits, each pit with 6 processes, granulated at apex. Meso- and metanota each with 1-2 pits respectively. Anterior wing pads each with long inner and posterior carinae, each with 7 pits at median area. Metatrochanter with 15-17 ridges. Spinal formula of hind leg 7-6-6. Abdominal tergites IV-VIII each side with 9-9-9-9-7 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively, pore with short ridges surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 2.1-2.8 mm.

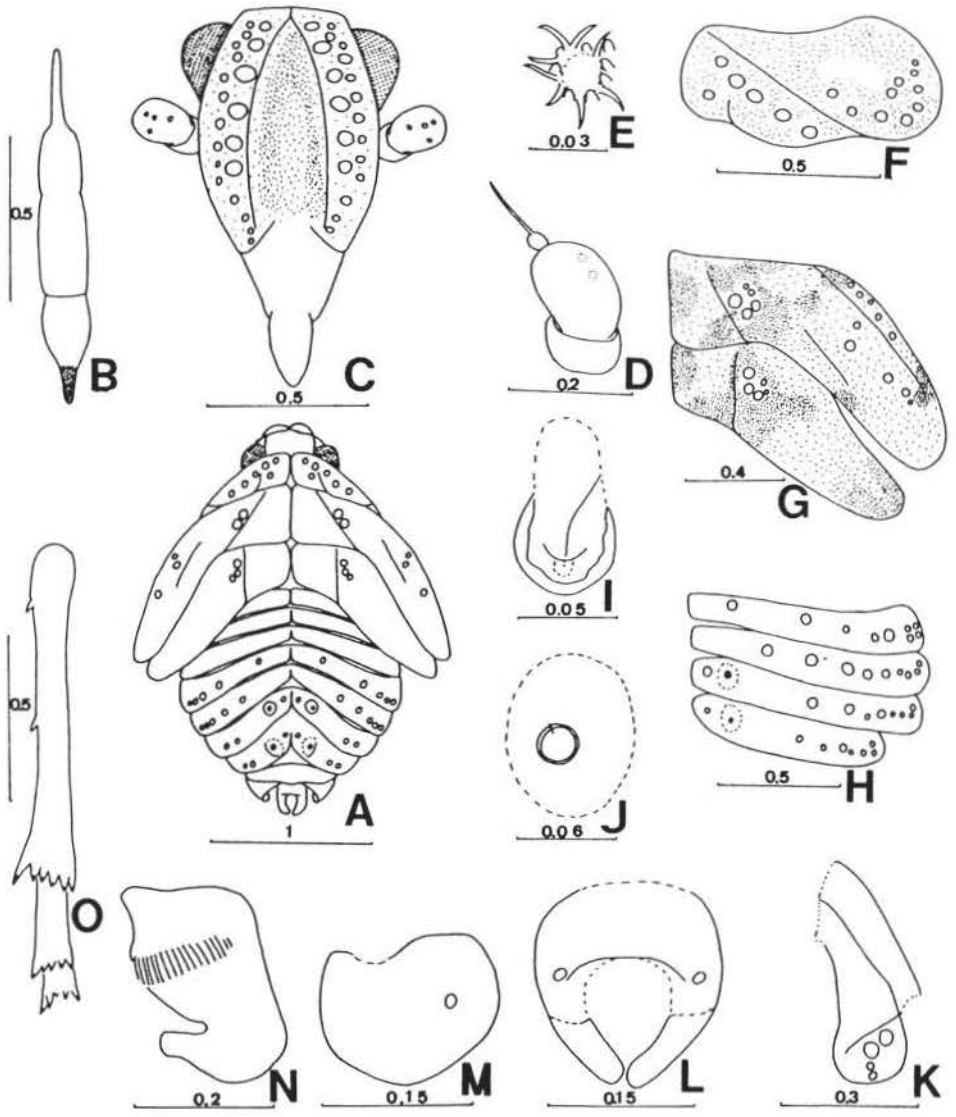

Fig. 53. *Cedusa littorea* Yeh and Yang A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

53. ***Vekunta umbripennis*** Muir (Fig. 54)

Vekunta umbripennis Muir, 1914, Proc. Hawaiian Ent. Soc.3:46.

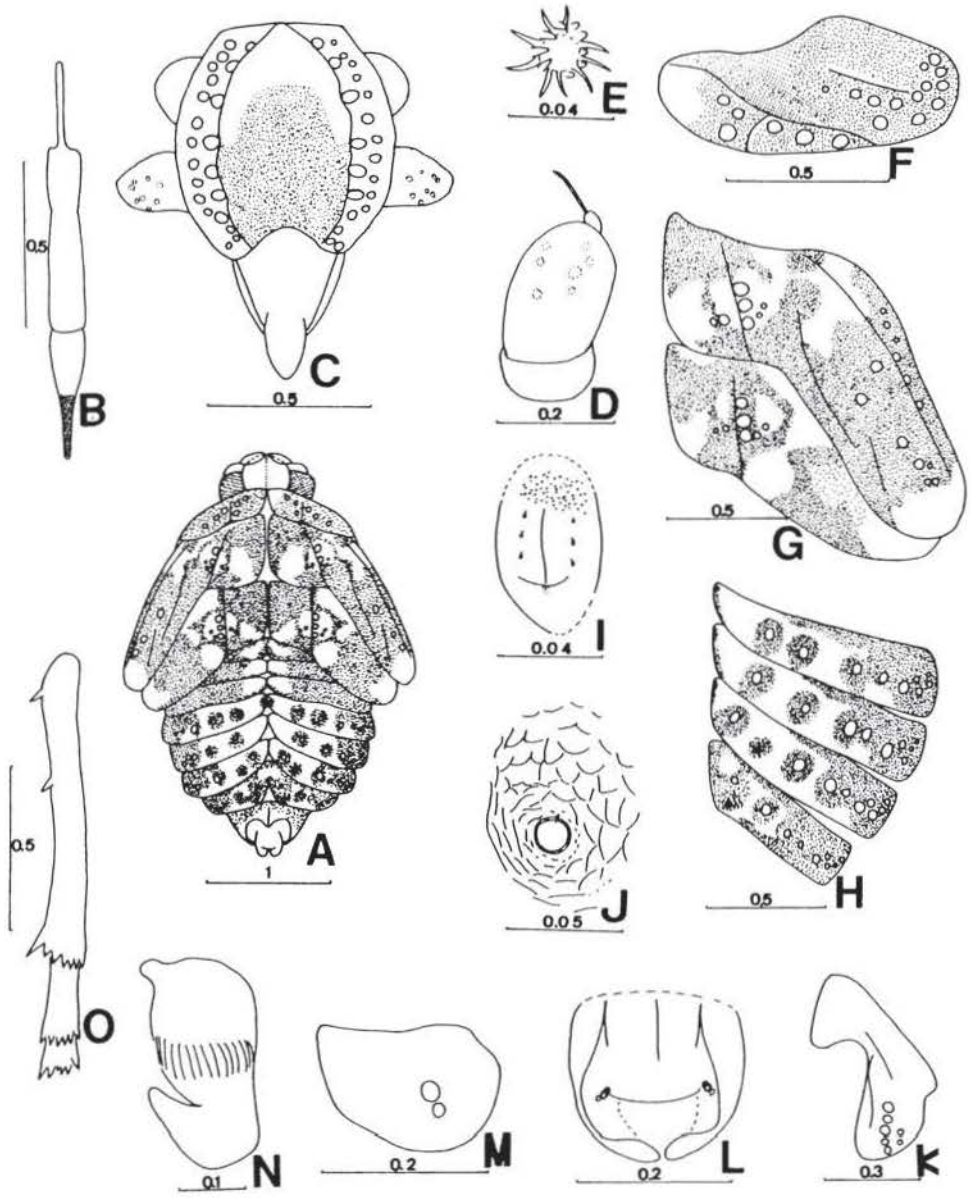

Fig. 54. *Vekunta umbripennis* Muir A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

General color gray. Abdomen slightly pink.

Frons as long as wide, widest part between submedian carinae 3 times wider than wide between submedian and lateral carinae. Each side of frons with 21 pits. Rostrum with subapical segment 0.8 times shorter than apical, apical segment pigmented at apical half.

Pronota each lateral area with 13 pits, inner side of additional carina with 3 pits. Meso- and metanota each with 1-1 pits respectively. Metatrochanter with 16 ridges.

Length of body: 2.4-2.8 mm.

Length of anterior wing pad: 1.3 mm.

Specimens examined: Fifth instar nymph: 15, (ecdysis) 1, Miaoli Hsien, Kauntaoshan, 20-VII-1989, W.B. Yeh; 5, (ecdysis) 3, 3-II-1990, W.B. Yeh.

Determination: 4 male adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Beneath bark of wood.

54. ***Vekunta extima*** Yang and Wu (Fig. 55)

Vekunta extima Yang and Wu, 1993, Derbidae of Taiwan: 111.

General color pink, with 2 longitudinal red stripes at abdominal sternites.

Frons 1.1 times longer than wide, wide between submedian carinae 2.4 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum with subapical segment as long as apical, apical segment pigmented at apical three-tenths.

Pronota each lateral area with 13 pits, inner side of additional carina with 4 pits. Meso- and metanota each with 1-1 pits respectively. Metatrochanter with 15 ridges.

Length of body: 2.38-2.75 mm.

Length of anterior wing pad: 1.4 mm.

Specimens examined: Fifth instar nymph: 6, (ecdysis) 2, Taichung Hsien, Wufeng, 1-VII-1989, W.B. Yeh.

Determination: 3 male adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Beneath bark of wood.

55. ***Vekunta parca*** Yang and Wu (Fig. 56)

Vekunta parca Yang and Wu, 1993, Derbidae of Taiwan: 113.

General color gray.

Frons as long as wide, wide between submedian carinae about 2.2 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum with subapical segment as long as apical, apical segment pigmented at apical four-tenths.

Pronota each lateral area with 14 pits, inner side of additional carina with 3 pits. Meso- and metanota each with 1 or 2 pits respectively. Metatrochanter with 17 ridges.

Length of body: 2.3-2.5 mm.

Length of anterior wing pad: 1.4 mm.

Specimens examined: Fifth instar nymph: 2, (ecdysis) 1, Hualien Hsien, Liyutan, 15-II-1990, W.B. Yeh.

Determination: 2 male adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Among small wet wood.

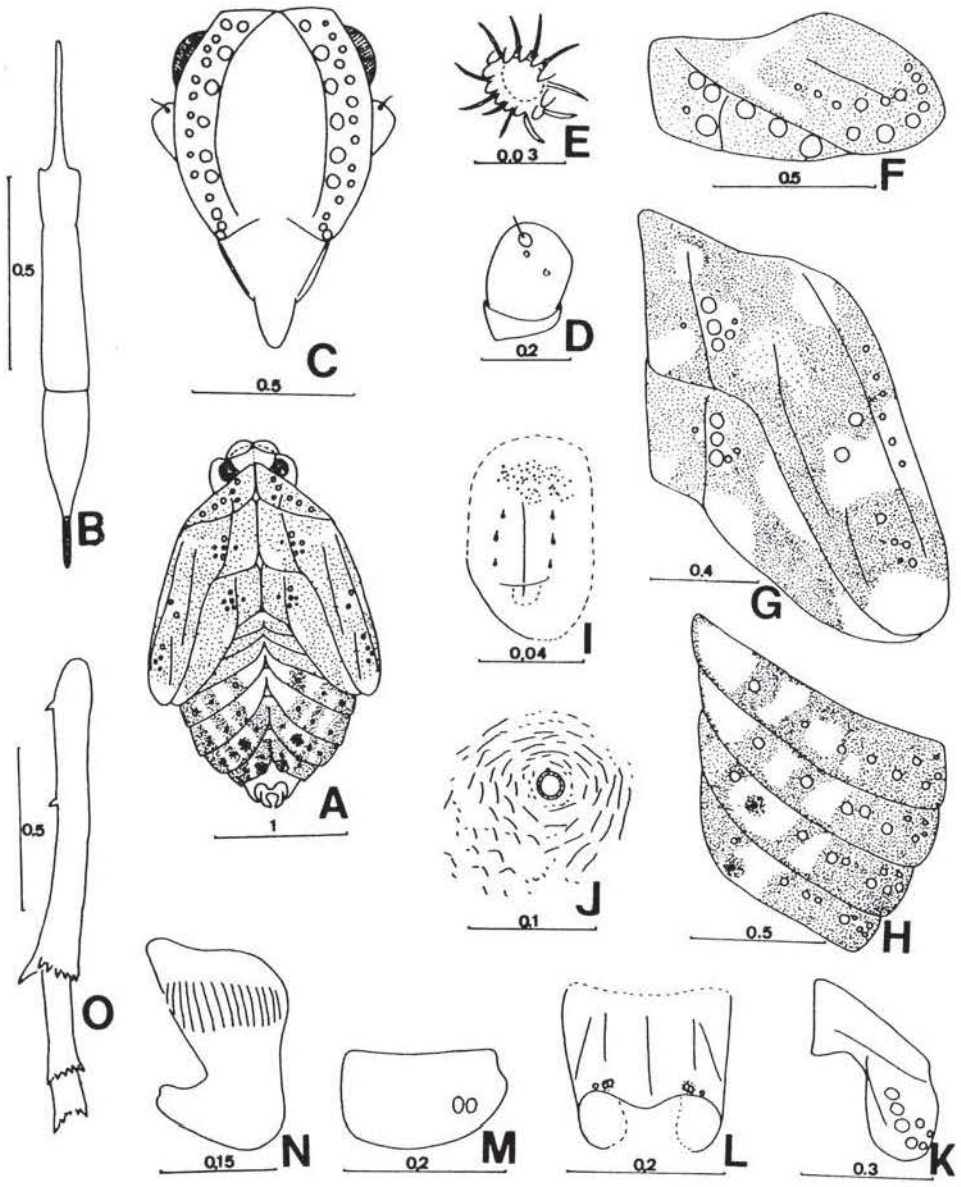

Fig. 55. *Vekunta extima* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

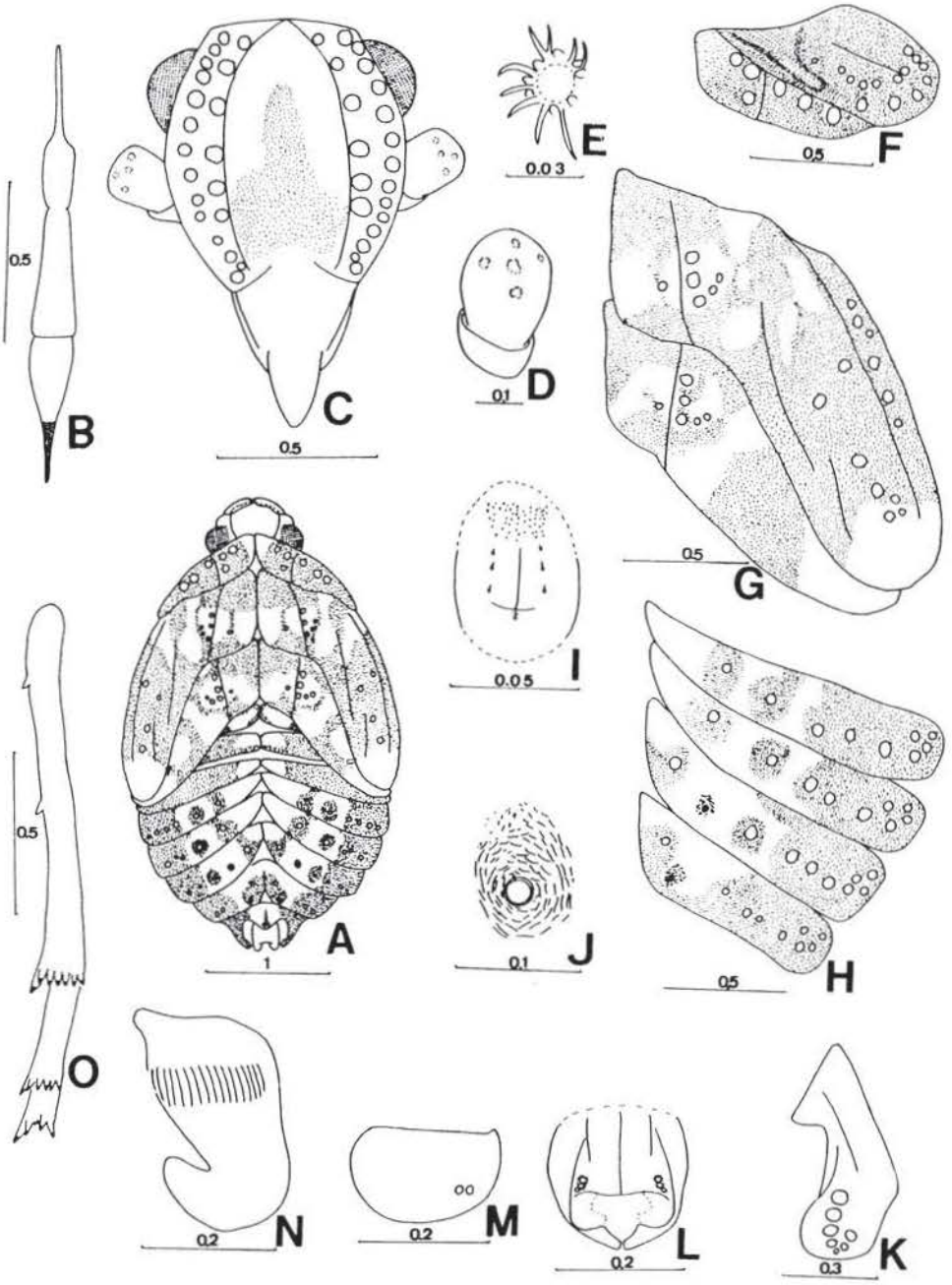

Fig. 56. *Vekunta parca* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

56. *Vekunta commendata* Yang and Wu (Fig. 57)

Vekunta commendata Yang and Wu, 1993, Derbidae of Taiwan: 126.

General color pink.

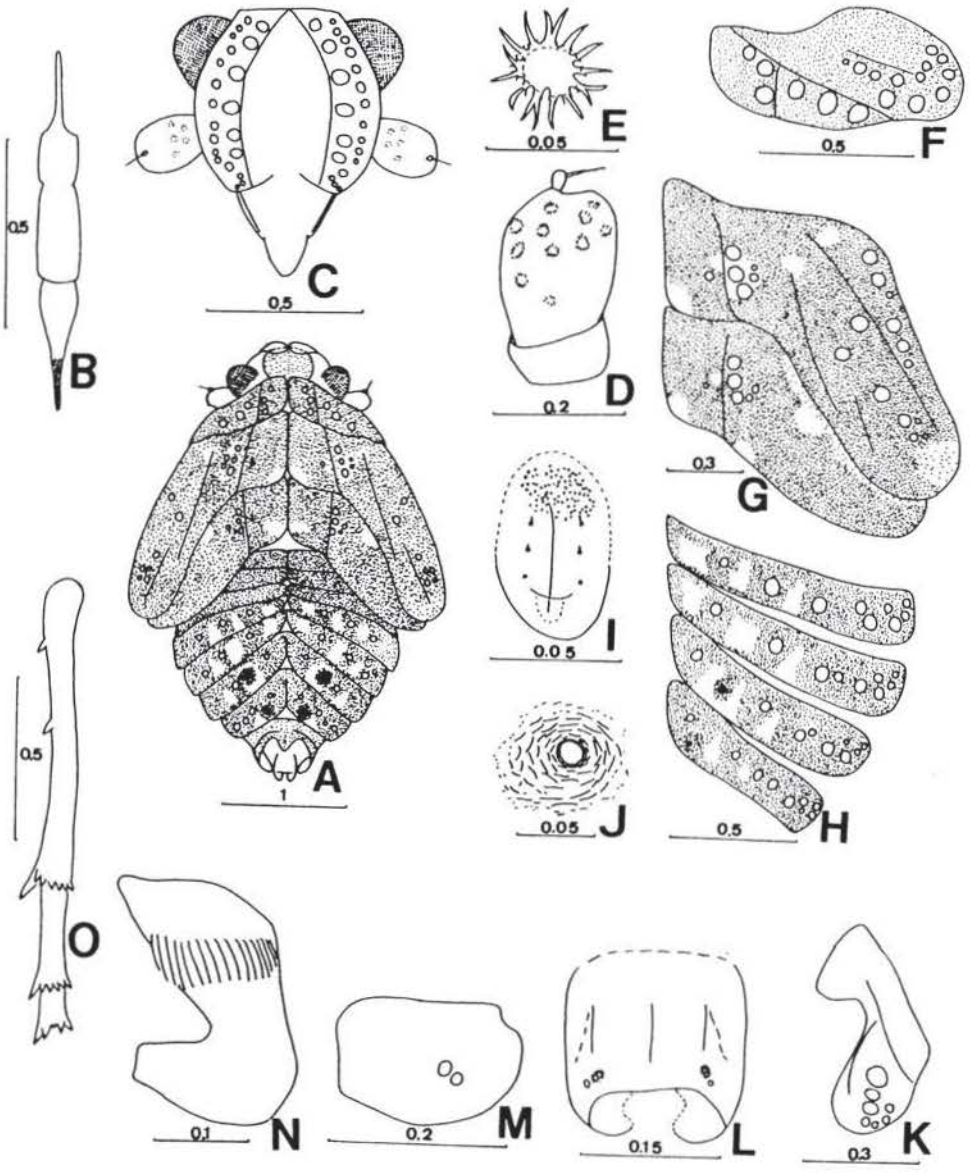

Fig. 57. *Vekunta commendata* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Frons as long as wide, wide between submedian carinae about 1.8 times wider than wide between submedian and lateral carinae. Each side of frons with 21 pits. Rostrum with subapical segment 0.8 times shorter than apical, apical segment pigmented at apical four-tenths.

Pronota each lateral area with 12 pits, inner side of additional carina with 3 pits. Meso- and metanota each with 1-1 pits respectively. Metatrochanter with 17 ridges.

Length of body: 2.3-2.6 mm.

Length of anterior wing pad: 1.05 mm.

Specimens examined: Fifth instar nymph: 4, (ecdysis) 5, Taichung Hsien, Tienlun, 6-VII-1989, W.B. Yeh; 6, (ecdysis) 1, Taichung Hsien, Pahsienshan, 12-VII-1989, W.B. Yeh.

Determination: 3 male, 9 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: Under rotten wet wood.

57. ***Vekunta diluta*** Yang and Wu (Fig. 58)

Vekunta diluta Yang and Wu, 1993, Derbidae of Taiwan: 128.

General color gray.

Frons 1.1 times longer than wide, wide between submedian carinae about 3.3 times wider than wide between submedian and lateral carinae. Each side of frons with 21 pits. Rostrum with subapical segment 1.1 times shorter than apical, apical segment pigmented at apical four-tenths.

Pronota each lateral area with 12 pits, inner side of additional carina with 3 pits. Meso- and metanota each with 1-1 pits respectively. Metatrochanter with 17 ridges.

Length of body: 2.2 mm.

Length of anterior wing pad: 1.3 mm.

Specimens examined: Fifth instar nymph: (ecdysis) 3, Nantou Hsien, Wushe, 10-X-1989, W.B. Yeh.

Determination: 3 female adults emerged, determined by Yeh from comparison of wing.

Habitat: Beneath rotten wet bark.

58. ***Vekunta novensilis*** Yeh and Yang **n.sp.** (Fig. 59)

Vertex, pro- and mesonotum dark brown. Frons and clypeus pale brown, carinae brown. Genae, antennae, rostrum and legs yellow to yellowish brown. Abdomen dark brown. Tegmina uniform pale black, near stigma with small area dirty white. Wings grayish.

Vertex 1.8 times wider at base than long in middle line, at apex narrower than at base about 1 : 1.5. Frons 2.4 times longer than wide at widest part, width at level of ocelli narrower than widest part about 1 : 1.1. Tegmina 3 times longer than widest part.

Male genitalia: Anal segment in profile broad at basal half, slender at apical half, apical half evenly curved downward, at apex distinctly emarginate medially, below anal style produced ventrad triangulate at right side, in dorsal view parallel at base, then converging to apex. Aedeagus in ventral aspect at base with single process, granulated, in left side view flagellum at basal lower side with a process, reaching halfway of flagellum, above flagellum with another process, in right side view at base with plate, at apex bifurcate, dorsal process longer, in dorsal view flagellum terminate in small process at left, narrowed, long point portion turned right, below which with a semicircular plate, serrate at apical margin. Genital styles long, slender, distinctly curved mesad at apices, inner surface at basal third with a projection which hooked dorsally, finger-shaped at apex, at base produced indistinct.

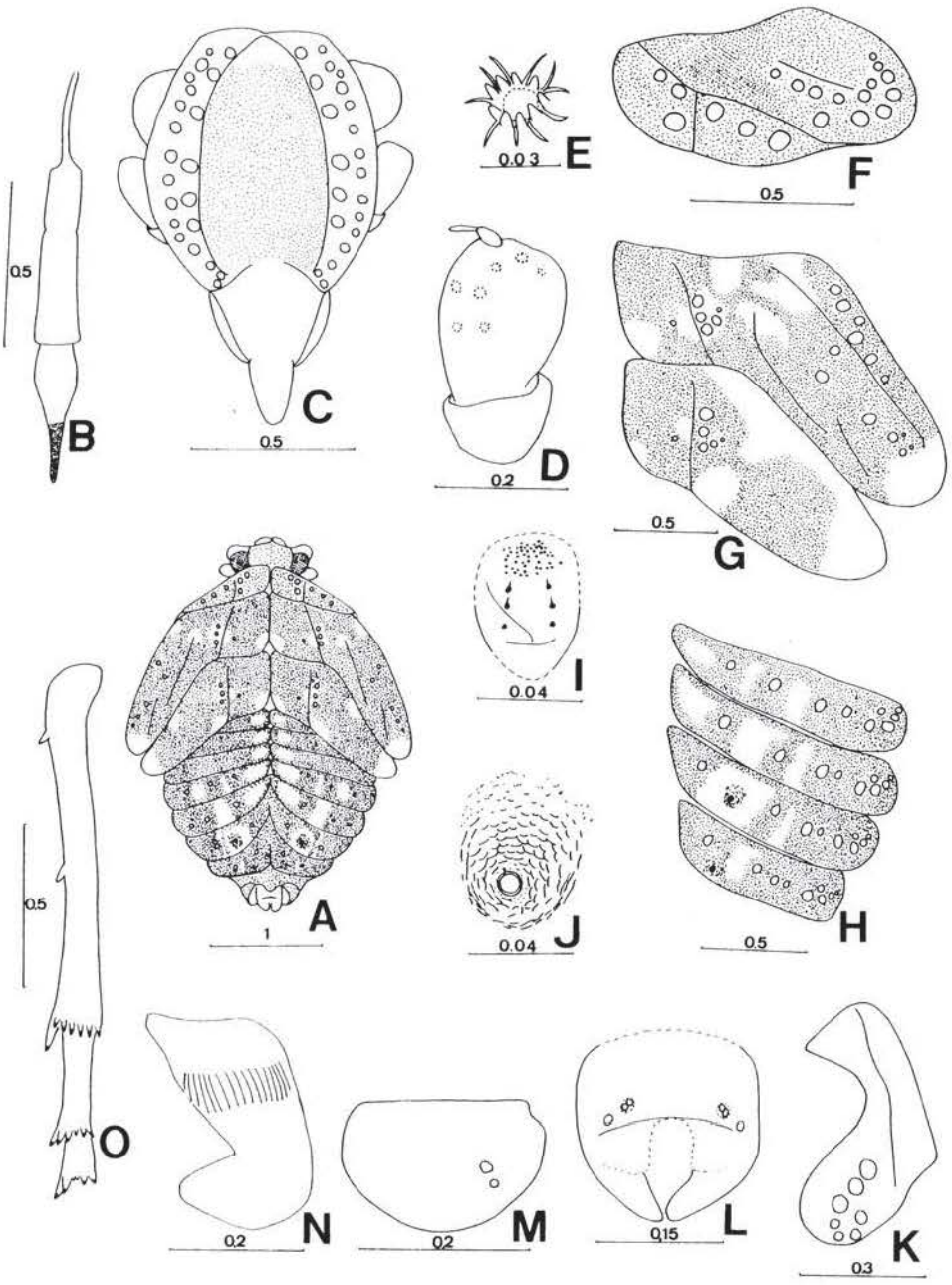

Fig. 58. *Vekunta diluta* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

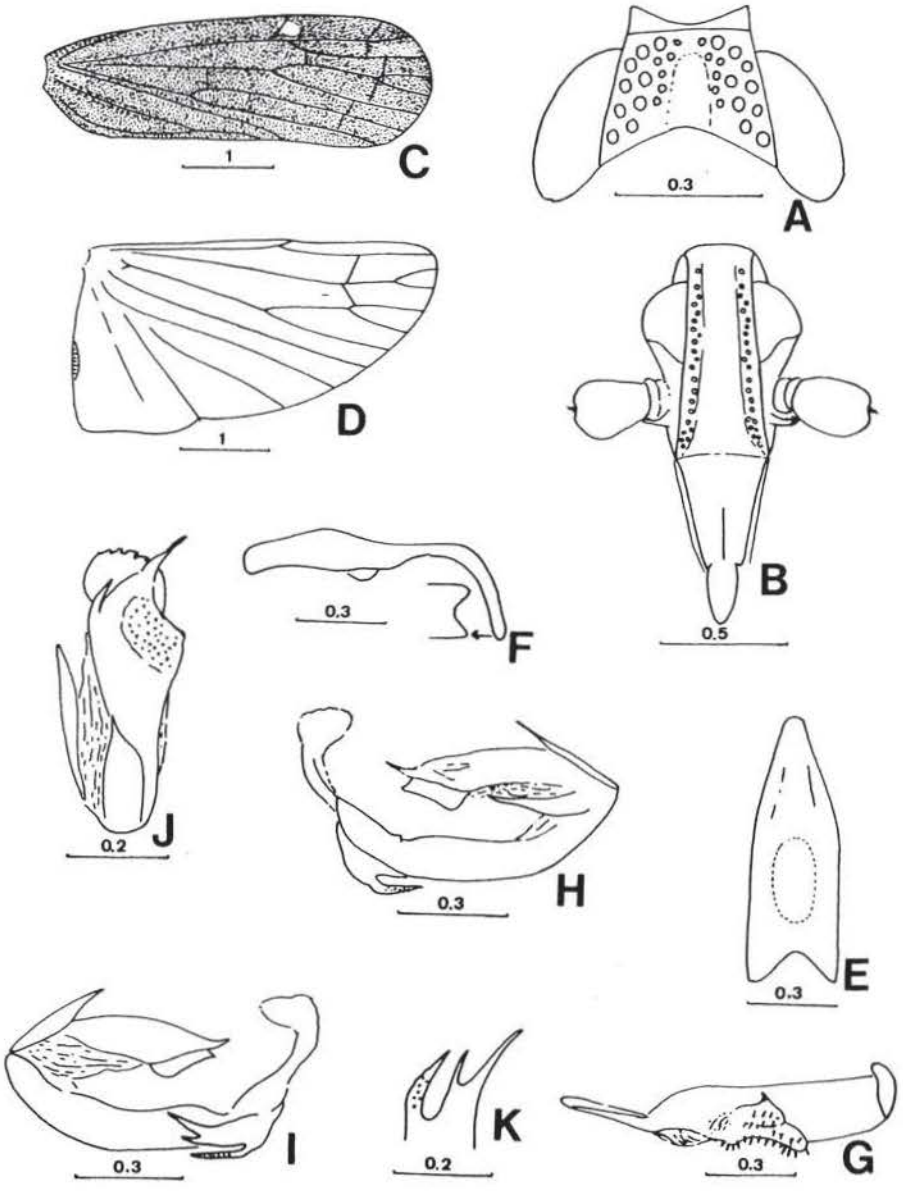

Fig. 59. *Vekunta novensilis* Yeh and Yang n.sp. A, head, dorsal view; B, the same, ventral view; C, tegmen; D, wing; E, anal segment, dorsal view; F, aedeagus, left view; I, the same, right view; J, the same, dorsal view; K, apex of right basal plate of aedeagus. (unit = mm.)

FIFTH INSTAR NYMPH (Fig. 60)

General color deep red.

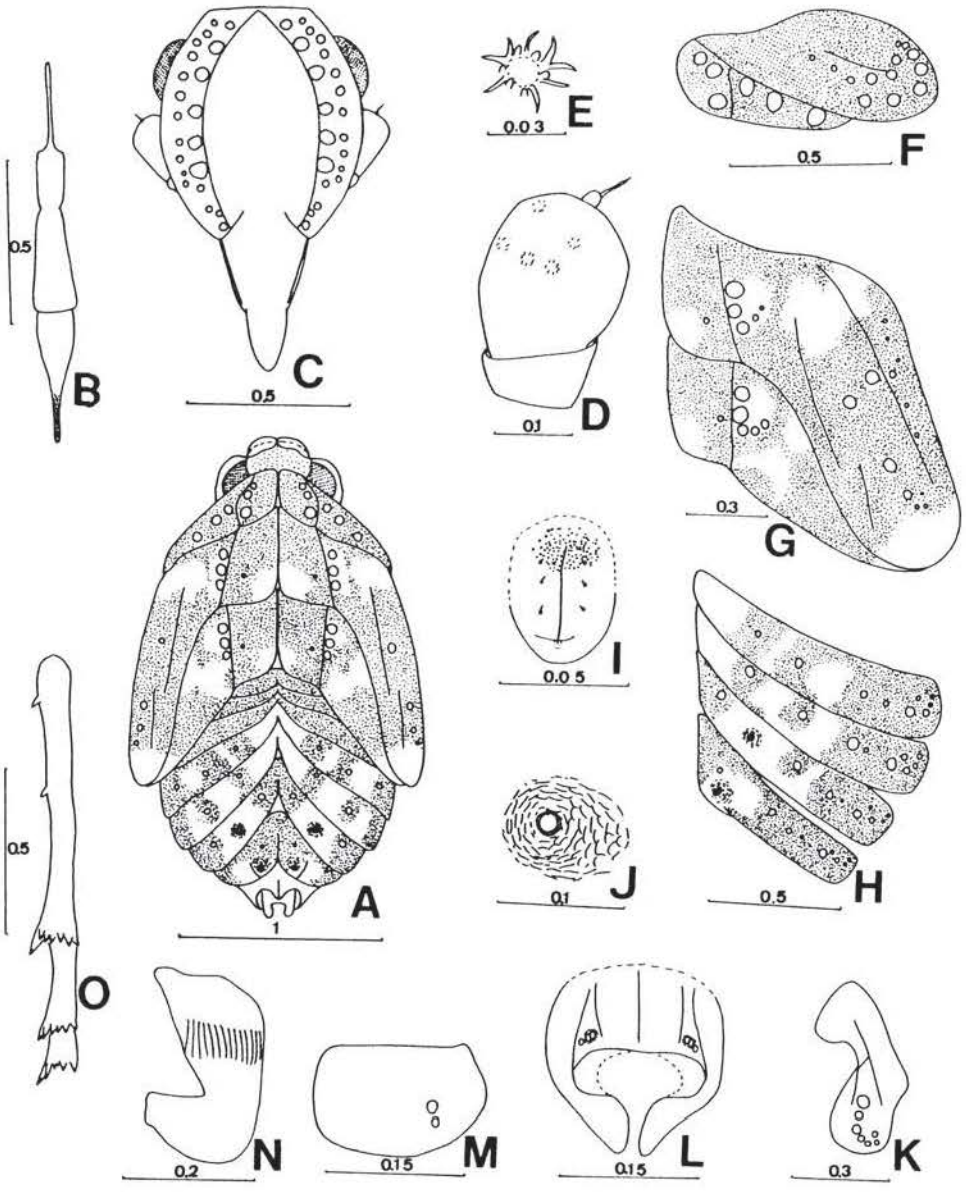

Fig. 60. *Vekunta novensilis* Yeh and Yang A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Frons 1.13 times longer than wide, wide between submedian carinae about 2.7 times wider than wide between submedian and lateral carinae. Each side of frons with 21 pits. Rostrum with subapical segment 0.8 times shorter than apical, apical segment pigmented at apical three-teeths.

Pronota each lateral area with 13 pits, inner side of additional carina with 3 pits. Meso- and metanota each with 1-1 pits respectively. Metatrochanter with 14 ridges.

Male: Length of body (includ.teg.): 5.2 mm.
Length of tegmen: 4.4 mm.
Female: Length of body (includ.teg.): 6.3-6.5 mm.
Length of tegmen: 5.3-5.5 mm.
Nymph: Length of body: 2.1-2.5 mm.
Length of anterior wing pad: 1.4 mm.

Holotype: Male (dissected), Pintung Hsien, Kentingkunyen, 6-IV-1990, W.B. Yeh (Deposited in National Chung Hsing University)

Paratypes: 2 ♀ ♀, same data as for holotype.

Nymphal specimens examined: Fifth instar nymph: 4, (ecdysis) 3, same data as for holotype.

Determination: 1 male and 2 female adults emerged, determined by Yeh from comparison of male genitalia.

This new species in Yang and Wu's (1993) key runs to *Vekunta lyricen* Fennah. It differs from the latter by the anal segment with apical half evenly curved downward; the processes of aedeagus and the shape of projection of genital style. In a whole it resembles *Vekunta gracilenta* Yang and Wu but differs in the color of tegmina; the processed of aedeagus.

Tribe **OTIOCERINI** Muir

Otiocerini Muir, 1918, Entomol. Monthly Mag.54:229.

Color red to deep red except *Epotiocerus flexuosus* black. Body small to large. Rostrum with apical segment mostly narrowing from middle or gradually from base to apex. Pronota each lateral area with 10-15 pits, some species each with a humeral carina. Meso- and metanota each without pits, mid-line not elevated. Anterior wing pads extending over posterior wing pads or not, with or without long inner carinae. Posterior wing pads each with 5 pits near notum. Metatibiae each with 0-2 lateral teeth. Spinal formula of hind leg (4-5)-(4-5)-(3-5). Abdominal tergites III-VIII each side with (0-1)-(6-9)-(8-9)-9-9-7 pits respectively. Abdominal VI-VII tergites each side with (0-1)-(0-1) wax pores respectively. Wax pore with granules surrounding or not.

Length of body: 1.3-4.1 mm.
Length of anterior wing pad: 0.83-1.40 mm.

Key to species of Otiocerini

1. Abdominal tergite VI each side with wax pore; pronota without humeral carina 2
-. Abdominal tergite VI without wax pore; pronota each lateral area with a humeral carina, if without, then abdominal tergite VII without wax pore 4
2. Anterior wing pads without posterior carina; wax pore without granules surrounding .... *Kaha fruticosa* Kirkaldy
-. Anterior wing pads with posterior carina; wax pore with granules surrounding 3
3. Each median area of anterior wing pads with 7 pits; cuticle granules small, not clearly dentate at body margin ..... *Nesokaha infuscata* Muir
-. Each median area of anterior wing pads with 6 pits; cuticle granules large, clearly dentate at body margin ..... *Nesokaha chihtuanensis* Yang and Wu
4. Anterior wing pads with posterior carinae 5

-. Anterior wing pads without posterior carinae 6
5. Abdominal tergite VII without wax pore; posterior wing pads each with a short carina .... *Epotiocerus flexuosus* Uhler
-. Abdominal tergite VII each side with a wax pore; posterior wing pads without carina .... *Kamendaka aculeata* Yang and Wu
6. Length of body 3.9-4.1 mm.; pits at inner side of additional carina of pronota each with about 8 processes ..... *Mysidioides maculata* Muir
-. Length of body 1.8-2.5 mm.; pits at inner side of additional carina of pronota each with about 4 processes ..... *Mysidioides nymphalba* Yeh and Yang

59. ***Kaha fruticosa*** Yang and Wu (Fig. 61)

Kaha fruticosa Yang and Wu, 1993, Derbidae of Taiwan: 142

General color deep red.

Frons 1.3 times longer than wide, wide between submedian carinae 1.5 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite V, first segment with basal half narrow, subapical segment 0.65 times shorter than apical, apical segment narrowing from middle, pigmented at apical third.

Pronota each lateral area with 13 pits, pits at inner side of additional carina each with about 6 processes, not granulated at apex. Anterior wing pads each with a long inner carina, with 7 pits at median area. Metatrochanter with 15 ridges. Metatibiae each with 1 lateral tooth. Spinal formula of hind leg 5-3-3.

Abdominal tergites IV-VIII each side with 6-8-9-9-7 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively. Wax pore without granules surrounding. Ninth abdominal segment each side with 1 pit.

Length of body: 1.3-1.6 mm.

Length of anterior wing pad: 0.83 mm.

Specimens examined: Fifth instar nymph: 4, (ecdysis) 3, Taitung Hsien, Luyeh, 6-IX-1989, W.B. Yeh.

Determination: 1 male and 1 female adults emerged, determined by Yeh from comparison of wing.

Habitat: Under hard wet wood among bamboo twigs.

60. ***Nesokaha infuscata*** Muir (Fig. 62)

Nesokaha infuscata Muir, 1914, Proc. Hawaiian Entomol. Soc.3:47.

General color pink or red.

Cuticle granules smaller than in *N. chihtuanensis*, not clearly dentate at body edges. Frons 1.1 times longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20-21 pits. Rostrum extending to abdominal sternite VIII, first segment with basal three-fifths narrow, subapical segment as long as apical, apical segment narrowing from middle, pigmented at apical half.

Pronota each lateral area with 12 pits, pits at inner side of additional carina each with about 6 processes, not granulated at apex. Anterior wing pads extending over posterior wing pads. Anterior wing pads with posterior carinae, each with 7 pits at median area. Metatrochanter with 16 ridges. Metatibiae without lateral tooth. Spinal formula of hind leg 5-5-5.

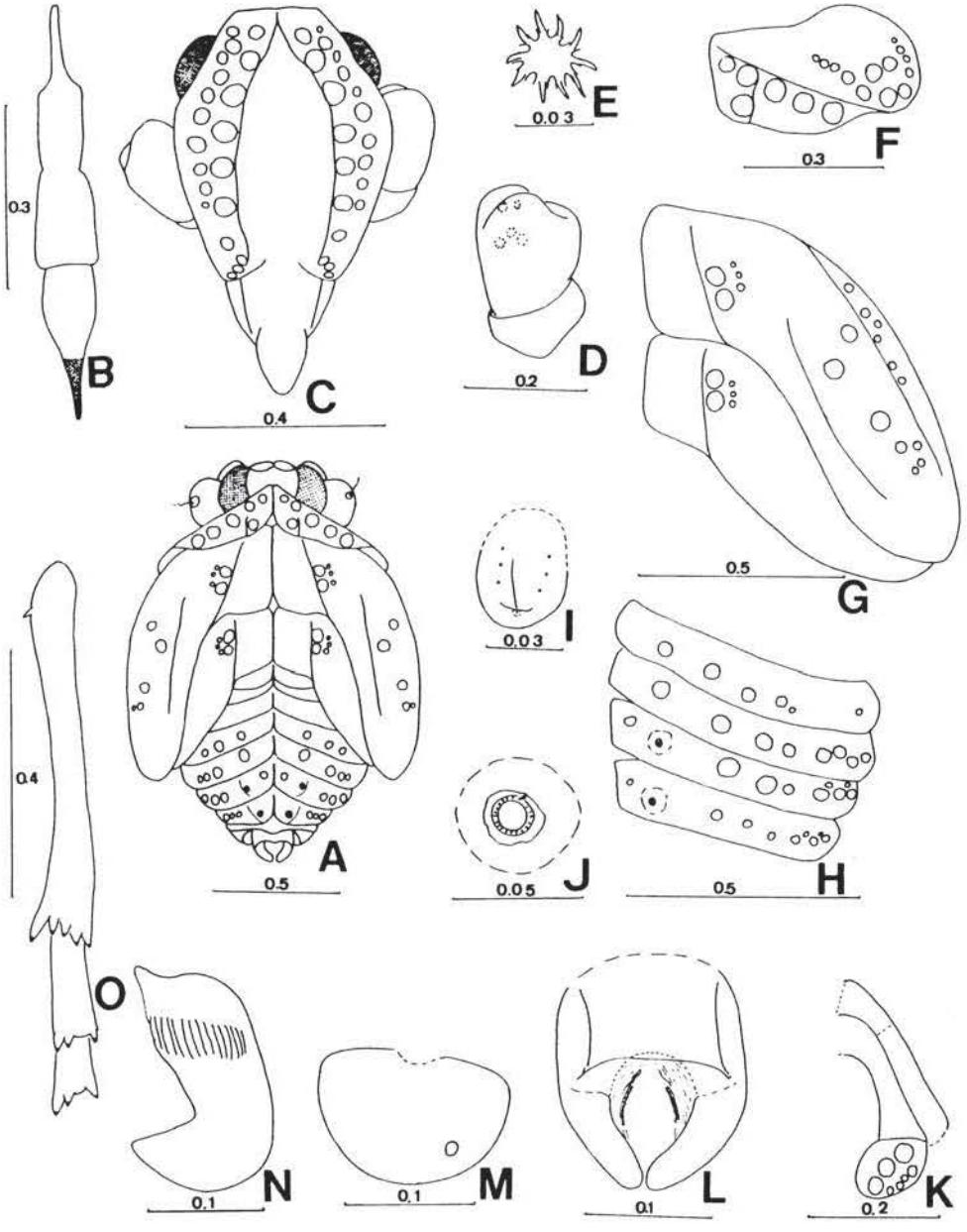

Fig. 61. *Kaha fruticosa* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

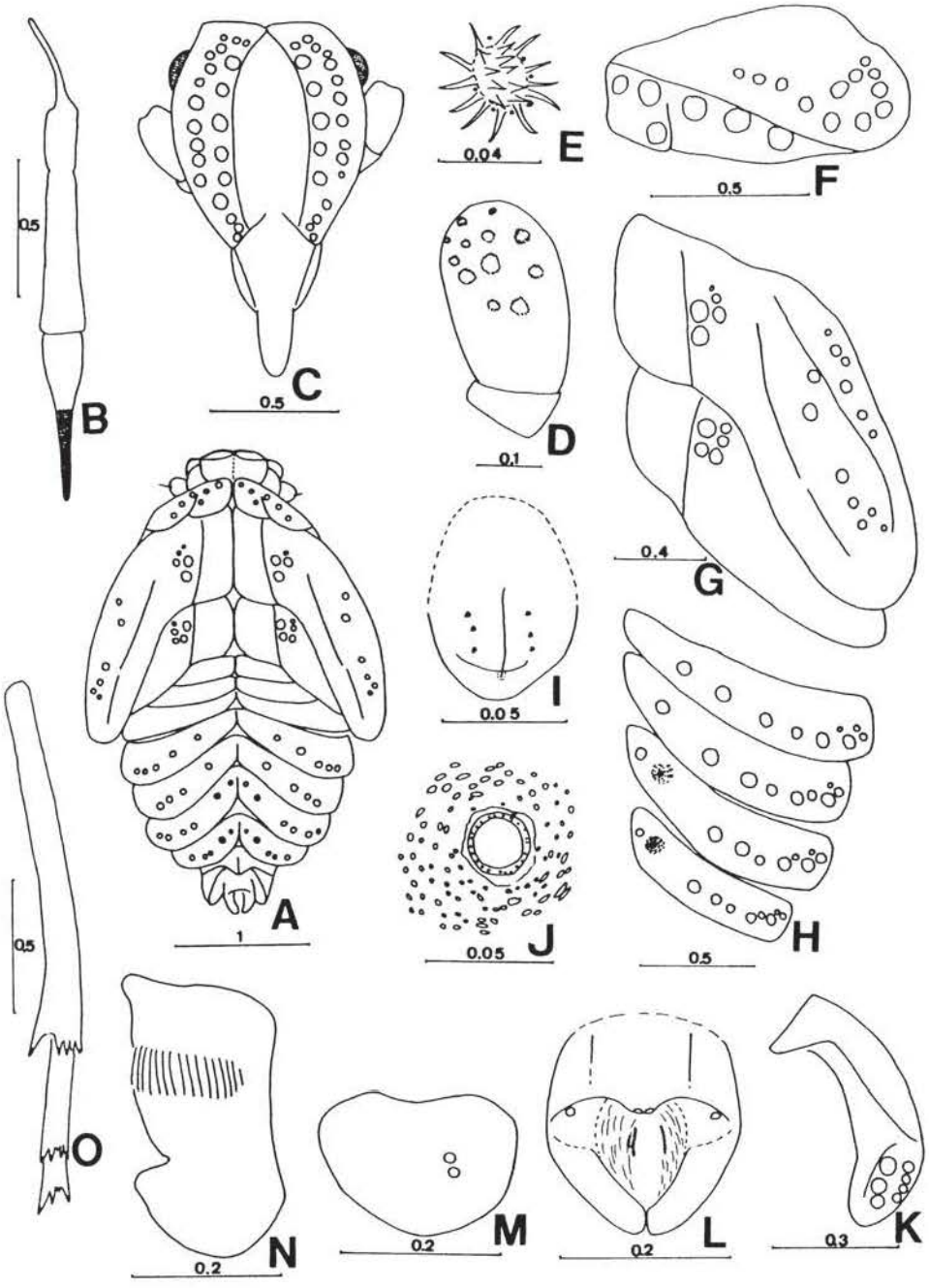

Fig. 62. *Nesokaha infuscata* Muir A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view; N, metatrochanter; O, apices of metatibia and first two tarsi. (unit = mm.)

Abdominal tergites IV-VIII each side with 9-9-9-9-7 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively. Wax pore with granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 1.9-2.3 mm.

Length of anterior wing pad: 1.4 mm.

Specimens examined: Fifth instar nymph: (ecdysis) 1, Pingtung Hsien, Kentingkunyen, 26-VII-1989, W.B. Yeh; 2, (ecdysis) 4, Taichung Hsien, Tekee, 4-VIII-1989, W,B, Yeh; 2, (ecydsis) 2, Nantou Hsien, Tehuashe, 17-VIII-1989, W.B. Yeh; 2, (ecdysis) 2, Ilan Hsien, Fusan, 28-X-1989, W.B. Yeh; 2, (ecdysis) 1, Pingtung Hsien Luhliaochi, 7-II-1990, W.B. Yeh.

Determination: 4 male and 4 female adults emerged, determined by Yeh from comparison of wing.

Habitat: In rotten wet wood cavity or under wet wood.

61. ***Nesokaha chihtuanensis*** Yand and Wu (Fig. 63)

Nesokaha chihtuanensis Yang and Wu, 1993, Derbidae of Taiwan: 146.

General color pink or red.

Cuticle granules larger than in *N. infuscata*, clearly dentate at body edges. Frons slightly longer than wide, wide between submedian carinae as wide as wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite VI, first segment with basal three-fifths narrow, subapical segment 0.8 times shorter than apical, apical segment narrowing from middle, pigmented at apical half.

Pronota each lateral area with 12 pits, pits at inner side of additional carina each with about 10 processes, not granulated at apex. Anterior wing pads with posterior carinae, each with 6 pits at median area. Metatrochanter with 15 ridges. Metatibiae without lateral tooth. Spinal formula of hind leg 5-5-5.

Abdominal tergites IV-VIII each side with 8-9-9-9-7 pits respectively. Abdominal tergites VI-VII each side with 1-1 wax pores respectively. Wax pore with granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 1.8-2.5 mm.

Length of anterior wing pad: 1.05 mm.

Specimens examined: Fifth instar nymph: 28, Taichung Hsien, Chingshan 4-VIII-1989, W.B. Yeh; (ecdysis) 1, Taoyuan Hsien, Lalashan 30-VIII-1989, W,B, Yeh; 6, Taichung Hsien, Tekee 17-IX-1989, W.B. Yeh.

Determination: 9 male and 4 female adults emerged, determined by Yeh from comparison of wing.

Habitat: Under rotten wet wood .

62. ***Kamendaka aculeata*** Yang and Wu (Fig. 64)

Kamendaka aculeata Yang and Wu, 1993, Derbidae of Taiwan: 150

General color gray.

Frons slightly longer than wide, wide between submedian carinae 1.8 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits.

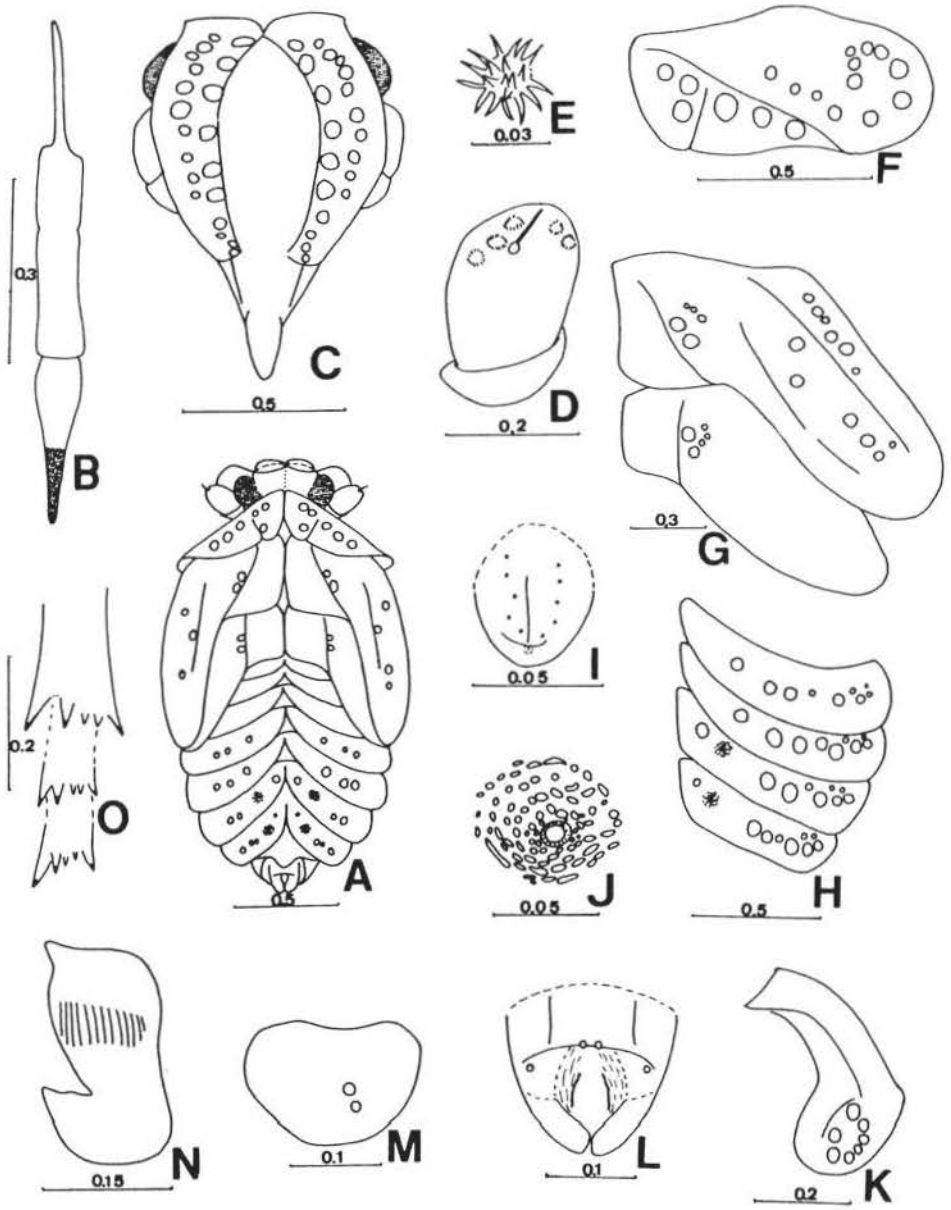

Fig. 63. *Nesokaha chihtuanensis* Yang and Wu A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral sids; N, metatrochanter; O, apices of metatibia and first two tarsi. (unit = mm.)

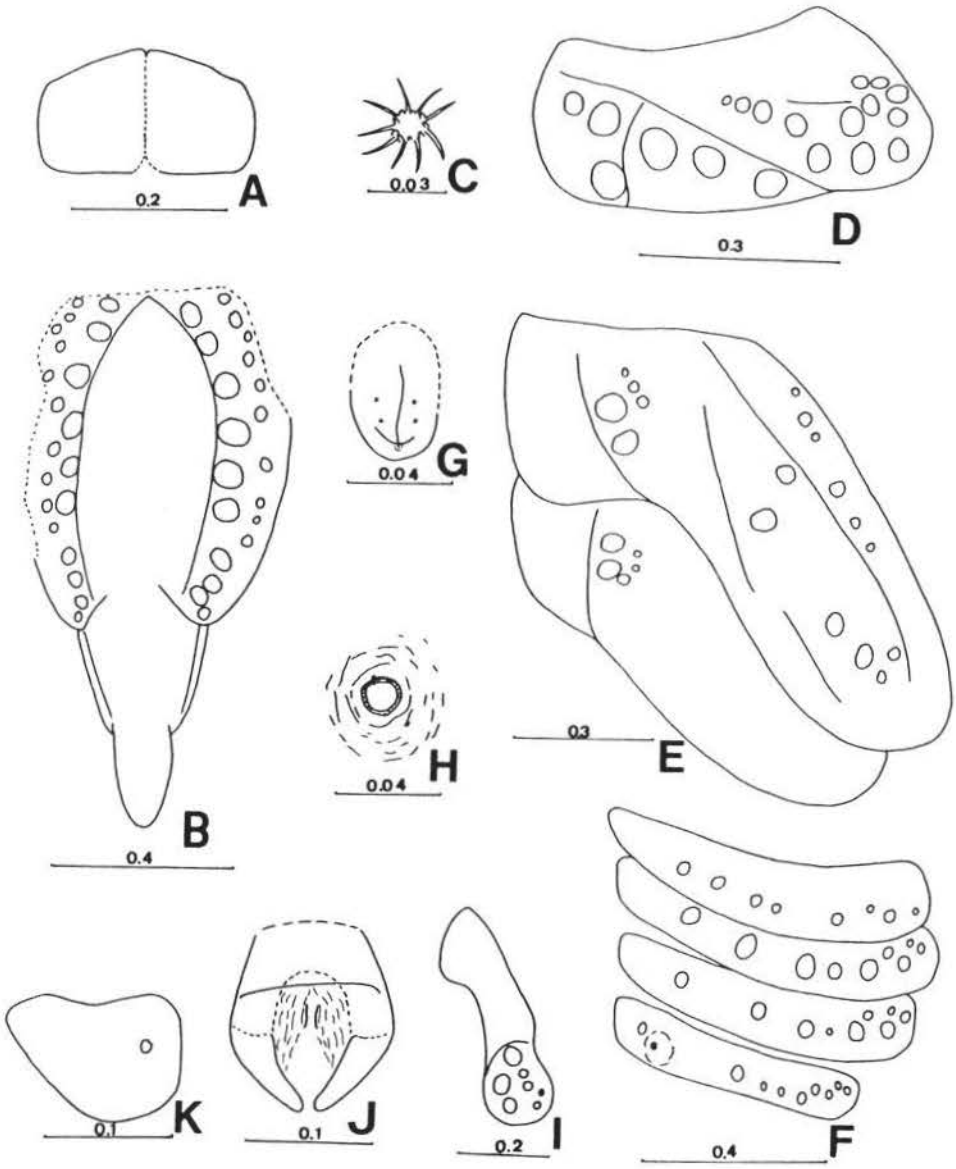

Fig. 64. *Kamendaka aculeata* Yang and Wu A, vertex, dorsal view; B, head, ventral view; C, sensory organ of antenna; D, pronotum, flat surface; E, wing pads, flat surface; F, abdominal tergites IV-VII, flat surface; G, sensory pit; H, wax pore; I, abdominal tergite VIII, flat surface; J, ninth abdominal segment, dorsal view; K, the same, lateral view. (unit = mm.)

Pronota each lateral area with a humeral carina, 13-15 pits, pits at inner side of additional carina each with about 4 processes, not granulated at apex. Anterior wing pads not extending over posterior wing pads. Anterior wing pads with posterior carina, each with 6 pits at median area..

Abdominal tergites IV-VIII each side with 8-9-9-9-7 pits respectively. Abdominal tergite VI without wax pores. Abdominal tergite VII each side with 1 wax pore. Wax pore without granule surrounding. Ninth abdominal segment each side with 1 pit.

Length of anterior wing pad: 0.93 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Taitung Hsien, Chihpen, 7-IX-1989, W.B. Yeh.

Determination: 1 male adult emerged, determined by Yeh from comparison of male genitalia.

Habitat: Among small wet wood.

63. ***Mysidioides maculata*** Muir (Fig. 65)

Mysidioides maculata Muir, 1915, Proc. Hawaiian Entomol. Soc. 3:126.

General color pink.

Body with intersegmental membrane distinct. Frons 0.9 times shorter than wide, wide between submedian carinae 2.3 times wider than wide between submedian and lateral carinae. Each side of frons with 20 pits. Rostrum extending to abdominal sternite II, first segment with basal two-thirds narrow, subapical segment 0.7 times shorter than apical, apical segment narrowing from apical third, pigmented at apical third.

Pronota each lateral area with a humeral carina, 13 pits, pits at inner side of additional carina each with about 8 processes, not granulated at apex. Anterior wing pads not extending over posterior wing pads. Anterior wing pads with long inner carinae, each with 7 pits at median area. Metatrochanter with 15 ridges. Metatibiae without lateral tooth. Spinal formula of hind leg 4-5-5.

Abdominal tergites IV-VIII each side with (7-8)-9-9-9-7 pits respectively. Abdominal tergites VI without wax pore. Abdominal tergite VII each side with 1 wax pores. Wax pore without granules surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 3.9-4.1 mm.

Length of anterior wing pad: 1.4 mm.

Specimens examined: Fifth instar nymph: 3, Nantou Hsien, Chingkuan, 24-VIII-1989, W.B. Yeh.

Determination: Nymph and 1 male adult were collected together on the same wood, determined by Yeh from comparison of male genitalia.

Habitat: Under rotten wet wood .

64. ***Mysidioides nymphalba*** Yeh and Yang **n.sp.** (Fig. 66)

Head black except carinae dirty white. Legs dark brown to black. Pro- and mesonotum brown. Abdomen with ventral aspect black, dorsal aspect and genital segment yellowish white. Tegmina and wings white with small black marking at apical of clavus.

Lateral carine of frons divergent at level of lower margin of eyes. Rostrum with apical segment 2 times longer than widest part, gradually diverging to apex. Ocelli absent. Antennae with second segment rather large, gradually diverging to apex. Tegmina 2.8 times longer than widest part.

Male genitalia: Anal segment in profile with apical third turned downward, anal style sets at apex, in dorsal view subparallel, with angles protruding somewhat laterad, in caudal view deeply emarginate medially at apex. Pygofer in ventral view with medioventral process not definite, rounded at apex. Aedeagus in left side near middle dorsad with rather stout process, directed

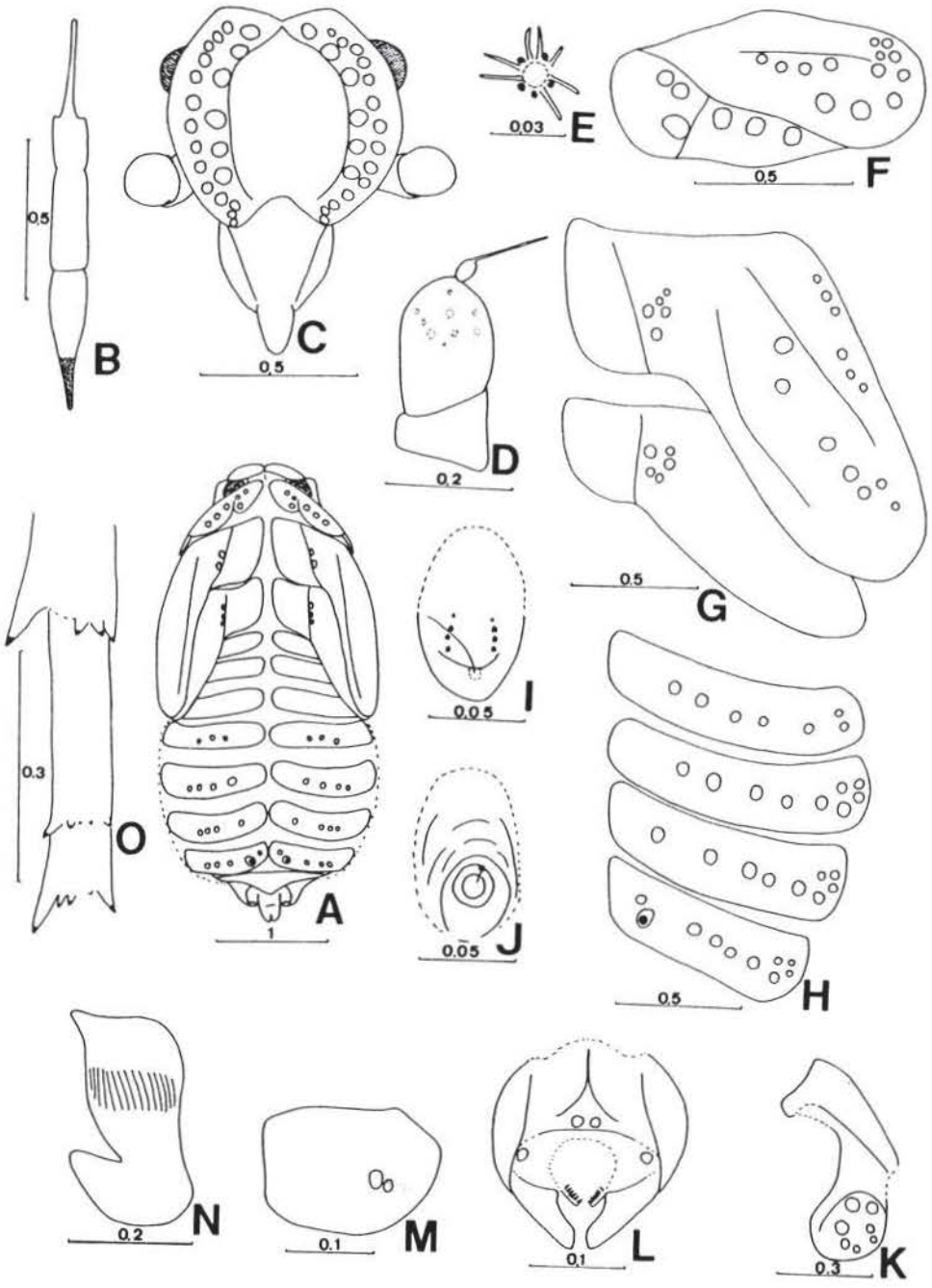

Fig. 65. *Mysidioides maculata* Muir A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral sids; N, metatrochanter; O, apices of metatibia and first two tarsi. (unit = mm.)

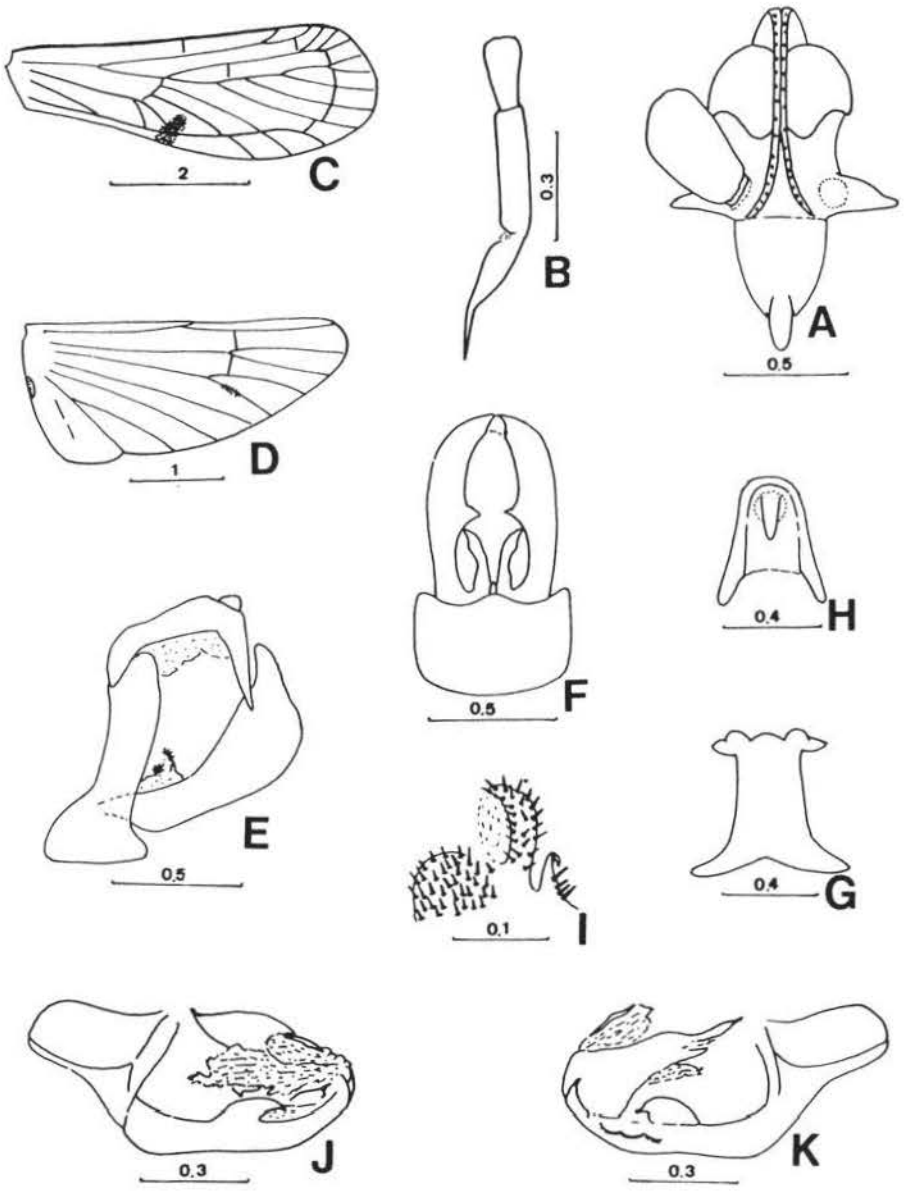

Fig. 66. *Mysidioides nymphalba* Yeh and Yang n.sp. A, head, ventral view; B, rostrum; C, tegmen; D, wing; E, male genitalia, lateral view; F, the same, ventral view; G, anal segment, dorsal view; H, the same, caudal view; I, basal projection of genital style; J, aedeagus, left view; K, the same, right view. (unit = mm.)

caudad, at apex right side with small projection which pointed at apex. Flagellum membraneous at left, rather large plate at right which pointed at apex. Genital styles in profile gradually diverging to apex at dorsocaudal angle produced dorsocaudal triangularly, basodorsal projection as figured, in ventral view near middle each with a triangular projection, basomedial portion arisiong 2 separated processes, not pigmented, between them with a elongate sclerite, process long, outer side sinuate.

Male: Length of body (inlcud.teg.): 5.5-6.2 mm.
Length of tegmen: 4.7-5.3 mm.
Female: Length of body (inlcud.teg.): 6.7 mm.
Length of tegmen: 5.8 mm.

FIFTH INSTAR NYMPH (Fig. 67)

General color gray or dark red.

Frons as long as wide, wide between submedian carinae about 2 times wider than wide between submedian and lateral carinae. Each side of frons with 20-22 pits. Rostrum extending to abdominal sternite III, first segment with basal two-thirds narrow, subapical segment 0.8 times shorter than apical, apical segment narrowing from apical third, pigmented at apical third.

Pronota each lateral area with a humeral carina, 13 pits, pits at inner side of additional carina each with 4 processes, not granulates at apex. Anterior wing pads each with a long inner carina, with 7 pits at median area.Metatrochanter with 13 ridges. Metatibiae without lateral tooth. Spinal formula of hind leg 4-5-5.

Abdominal tergites IV-VIII each side with 9-9-9-9-7 pits respectively. Abdominal tergite VI without wax pore. Abdominal tergite VII each side with 1 wax pore. Wax pore without granule surrounding. Ninth abdominal segment each side with 2 pits.

Length of body: 1.8-5.2 mm.

Length of anterior wing pad: 1.25 mm.

Holotype: Male, Kaohsiung Hsien, Liukuei, 12-X-1990, W.B. Yeh (Deposited in National Chung Hsing University)

Paratypes: 1 ♂, 2 ♀ ♀, same data as for holotype.

Nymphal specimens examined: Fifth instar nymph: 13, (ecdysis) 13, same data as for holotype.

Determination: 2 male and 2 female adults emerged, determined by Yeh from comparison of male genitalia.

Habitat: In rotten wet wood cavity.

This new species resembles *Mysidioides maculata* Muir but differs from the latter by the shape and color of basomedial processes of genital styles; the stout process of aedeagus.

65. ***Epotiocerus flexuosus*** (Uhler) (Fig. 68)

Epotiocerus flexuosus Matsumura, 1914, Ann. Mus. Hungarici 21:200.
Otiocerus flexuosus Uhler, 1896, Proc. United States Nat. Mus. 19:283.

General color black

Body elongate ovate, slightly flattened. Frons in profile convex medially, in ventral view gradually convergent to apex, wide at base between submedian carinae 3 times wider than wide between submedian and lateral carinae. Each side of frons with 20-22 pits. Rostrum with first segment with basal third narrow, subapical segment 0.6 times shorter than apical, apical segment gradually narrowing from base to apex, pigmented at apical fourth.

Thoracic nota with rather broad carinae. Pronota each lateral area with 10 pits, pits without process, granulated at apex. Anterior wing pads not extending over posterior wing pads.

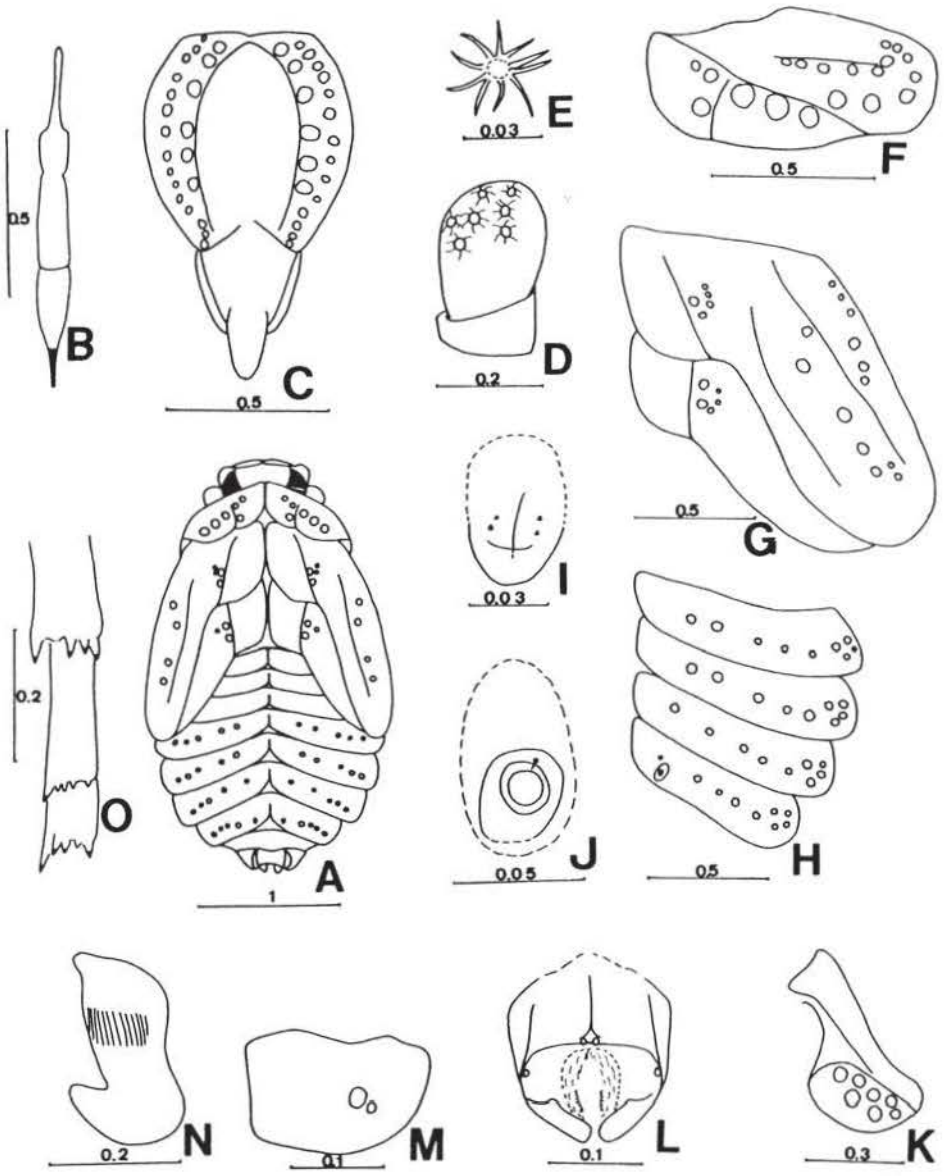

Fig. 67. *Mysidioides nymphalba* Yeh and Yang A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D, antenna; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites IV-VII, flat surface; I, sensory pit; J, wax pore; K, abdominal tergite VIII, flat surface; L, ninth abdominal segment, dorsal view; M, the same, lateral view. N, metatrochanter; O, apices of metatibia and first two tarsi. (unit = mm.)

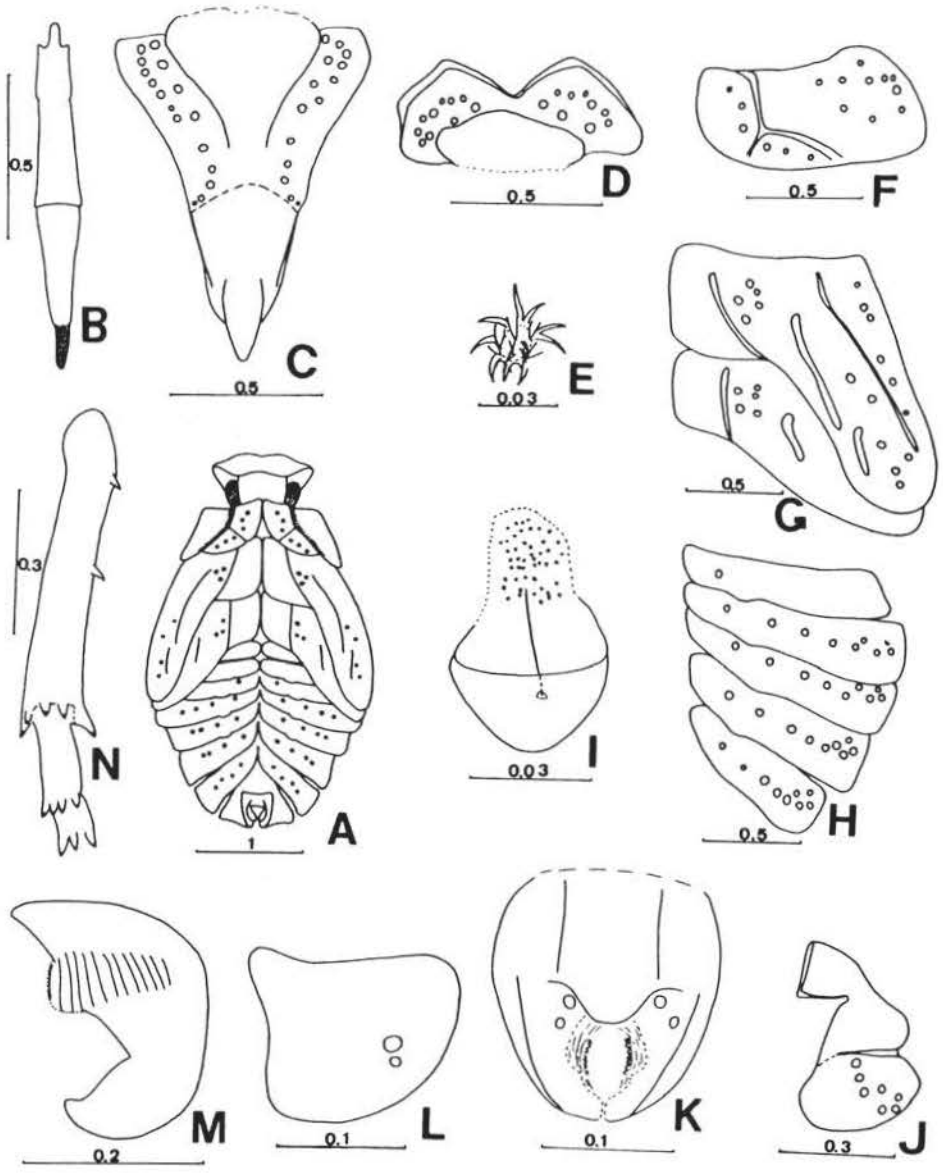

Fig. 68. *Epotiocerus flexuosus* (Uhler) A, fifth instar nymph, dorsal view; B, rostrum; C, head, ventral view; D,frons, dorsal view; E, sensory organ of antenna; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites III-VII, flat surface; I, sensory pit; J, abdominal tergite VIII, flat surface; K, ninth abdominal segment, dorsal view; L, the same, lateral sids; M, metatrochanter; N, lateral teeth and apices of metatibia and first two tarsi. (unit = mm.)

Anterior wing pads with posterior carinae, each with 6 pits at median area. Posterior wing pads each with a short carina. Metatrochanter with 13 ridges. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 5-4-3.

Abdominal tergites III-VIII each side with 1-9-9-9-9-7 pits respectively. Abdominal tergites VI and VII without wax pore. Ninth abdominal segment each side with 2 pits.

Length of body: 2.3 mm.

Length of anterior wing pad: 1.3 mm.

Specimen examined: Fifth instar nymph: (ecdysis) 1, Ilan Hsien, Fushan, 28-X-1989, W.B. Yeh.

Determination: 1 female adult emerged, determined by Yeh from comparison of appearance.

Habitat: Under wet wood .

The other species referred

1. *Apache degeerii* (Kirby)(Wilson, 1982)

VII. Family **DICTYOPHARIDAE** Spinola

Dictyopharidae Haglund, 1899, Öfv. Svenska Vet. Akad. Fördh. 56:60.
Dictiophoroides Spinola, 1839, Ann. Soc. Ent. France 8:202.

Body somewhat slender. Head usually protruding far beyond anterior margin of eyes, with lateral carinae converging to apex, median carina present or not. Frons slender, lateral carinae divergent apically or parallel, submedian carinae reaching or nearly reaching to frontoclypeal suture, carina prominent, each side with 23-67 pits. Postclypeus 3-carinate. Rostrum 4-segmented, subapical segment longer than apical, apical segment truncate at apex. Eyes at ventral margin not emarginate, with distinct callus. Antennae rather small, second segment globose, sensory organs with short filament processes.

Pronota with lateral carinae not really as anterolateral margins, each with a humeral carina, with 29-38 pits. Anterior wing pads each with 3-6 pits near notum, 2-7 pits laterad. Posterior wing pads each with 1-7 near notum. Pro- and mesocoxae slender, ridged, mesocoxae at basoventral angles one side with process. Pro- and mesofemora at ventral margin one side slightly expanded. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters with ridged narrow. Metatibiae compressed, each with 4-7 lateral teeth, longitudinal ridged. Spinal formula of hind leg (7-9)-(7-14)-(7-10). Second metatarsal segment at apex truncate. Pretarsi with claws divergent apically, claw 3-setose. Arolium with paired setae.

Abdominal 9-segmented. Abdominal tergites IV-VIII each side with (3-9)-(3-15)-(3-7)-(1-6)-(0-2) pits respectively. Abdominal pleurites III-VIII each with (0-3)-(3-9)-(3-10)-(2-7)-(2-7)-(3-8) pits respectively. Abdominal tergites VI-VIII each side with a rounded wax-pore plate respectively on membraneous area or not. Abdominal tergite VIII small. Ninth abdominal segment small, in dorsal view sunk into emargination of 8th segment, each side with a pit below base of anal comb, in lateral view rather narrow, subparallel, anal combs lobe-like, arising ventrad, directed dorsad.

Habitat: On leaves.

Key to species of Dictyopharidae

1. Abdominal segments VI-VIII or VII-VIII each side with wax-pore plate respectively; pronota each with single humeral carina; fifth instar nymph with anterior wing pads reaching nearly to apex of posterior ones 2

-. Abdominal segments VII-VIII without wax-pore plate; pronota each with 2 humeral carina; fifth instar nymph with anterior wing pads not near apex of posterior ones ..... Orgerini sp.1.
2. Abdominal segment VI with wax-pore plates; anterior wings pads each with 5-6 pits near notum 3
-. Abdominal segment VI without wax-pore plates; anterior wings pads each with 3 pits near notum ..... *Scolops* sp.1.
3. First metatarsal segment with both sides extremely blade-shaped expanded; metatibiae each with 9 apical teeth ..... *Taosa paraherbida* Muir
-. First metatarsal segment cylindrical; metatibiae each with 7 apical teeth 4
4. Vertex 2.5 times longer than wide at base or less; abdominal tergite V each side with 8 pits; second metatarsal segment with 10 apical teeth 5
-. Vertex 3.3 times longer than wide at base or more; abdominal tergite V each side with 12 or more pits; second metatarsal segment with 7 apical teeth 6
5. Profemora in ventral margins each with a rather large tooth subapically; vertex 2.5 times longer than wide at base; color uniform green ..... *Tenguna watanabei* Matsumura
-. Profemora in ventral margins without large tooth; vertex 1.35 times longer than wide at base; color brown to dark brown ..... *Orthopagus splendens* (Germar)
6. Vertex 3.3 times longer than wide at base; frons 3.25 times longer than widest part .... *Philotheria* sp.3
-. Vertex 3.6 times longer than wide at base; frons 3.7 times longer than widest part .... *Philotheria* sp.4

Nersis florens Stål is not included

66. ***Philotheria*** sp.4. (Fig. 69)

General color uniform pale yellowish green.

Vertex 3.6 times longer in middle line than wide at base, median carina distinct at basal half. Frons 3.7 times in middle line than wide at widest part, median carina distinct at basal half. Rostrum with subapical segment 1.4 times longer than apical.

Pronota each with 34 pits, between lateral and humeral carinae with 4 pits. Anterior wing pads each with 5 pits near notum. Pro- and mesofemora each in ventral margin apical portion with 2 small teeth or not. Metatibiae each with 4-6 lateral teeth. Spinal formula of hind leg 7-14-10.

Abdominal tergites IV-VIII each side with 8-8-(5-6)-(5-6)-0 pits respectively. Abdominal pleurites IV-VIII each with (7-8)-8-3-(2-3)-4 pits respectively.Abdominal segments VI-VIII each side with a wax-proe plate respectively, plate on segment VI about one-fourth of segment VII.

Length of body: 6.8 mm.

Length of anterior wing pad: 2.16 mm.

Specimens examined: Fifth instar nymph: 5, Taitung Hsien, Lanshu, 4-VIII-1987, C.T. Yang.

Determination: Collected with many adults at same time and same place.

67. ***Philotheria*** sp.3. (Fig. 70)

General color uniform green.

Vertex 3.3 times longer in middle line than wide at base, lateral carinae parallel between eyes, then converging to apex, median carina distinct. Frons 3.25 times longer in middle line than

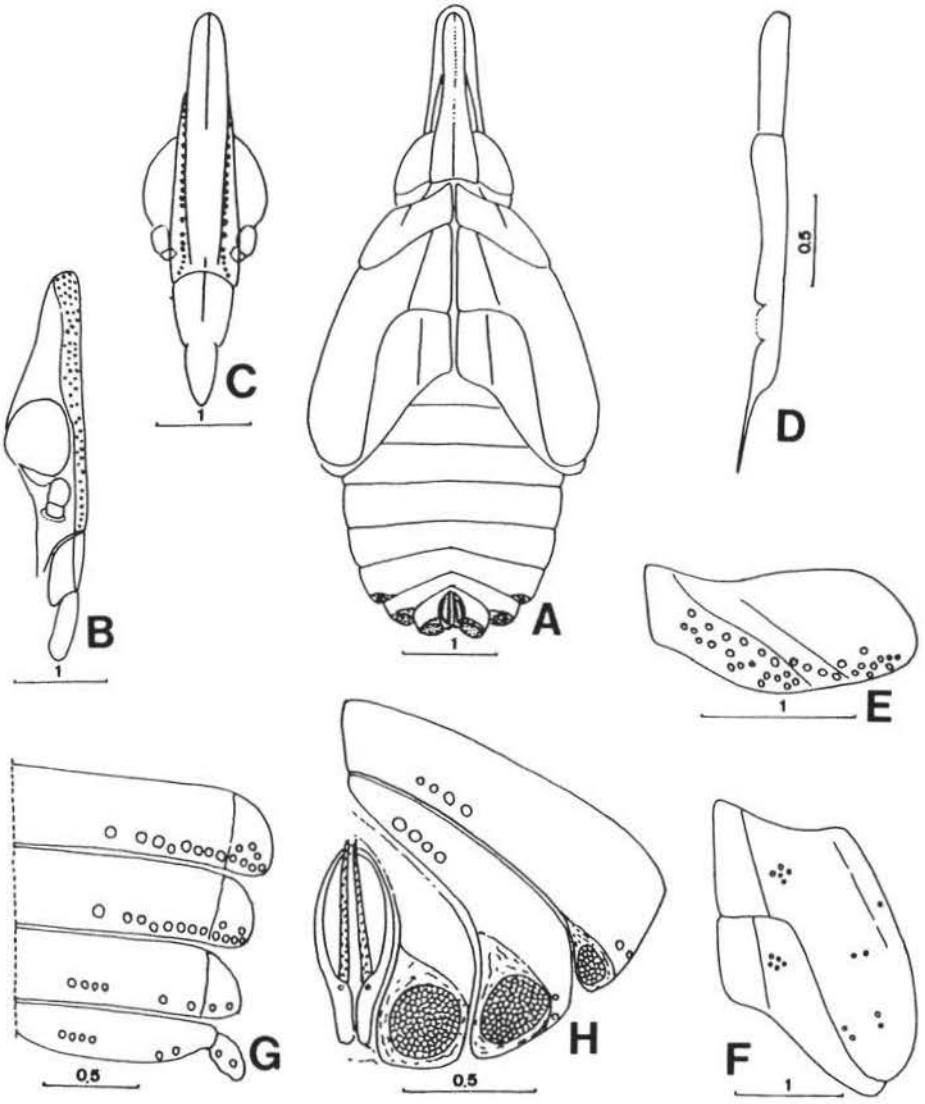

Fig. 69. *Philotheria* sp.4 A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites IV-VII, flat surface; H, abdominal segment VI-IX, caudal view. (unit = mm.)

wide at widest part, widest at level of base of antennae, submedian carinae reaching to frontoclypeal suture, slightly converging to apex, median carina distinct. Rostrum with subapical segment 1.4 times longer than apical.

Pronota each with 35 pits, between lateral and humeral carinae with 4 pits. Anterior wing pads each with about 5 pits near notum, 5 pits laterad. Posterior wing pads each with 6-7 pits near notum. Profemora in ventral margin each with 2 rather small teeth subapically. Metatibiae each with 5 lateral teeth. Spinal formula of hind leg 7-13-10.

Abdominal tergites IV-VIII each side with (7-8)-8-(5-6)-(5-6)-0 pits respectively. Abdominal pleurites IV-VIII each with (5-7)-(4-6)-(2-3)-(2-3)-(3-4) pits respectively. Abdominal segments VI-VIII each side with a wax-proe plate respectively, plate on segment VI about one-fourth of segment VII.

Length of body: 7.57 mm.

Length of anterior wing pad: 2.15 mm.

Specimen examined: Fifth instar nymph: 1, Penghu Hsien, 24-VII-1978, J.Z. Ho.

Determination: Collected with adults at same time and same place.

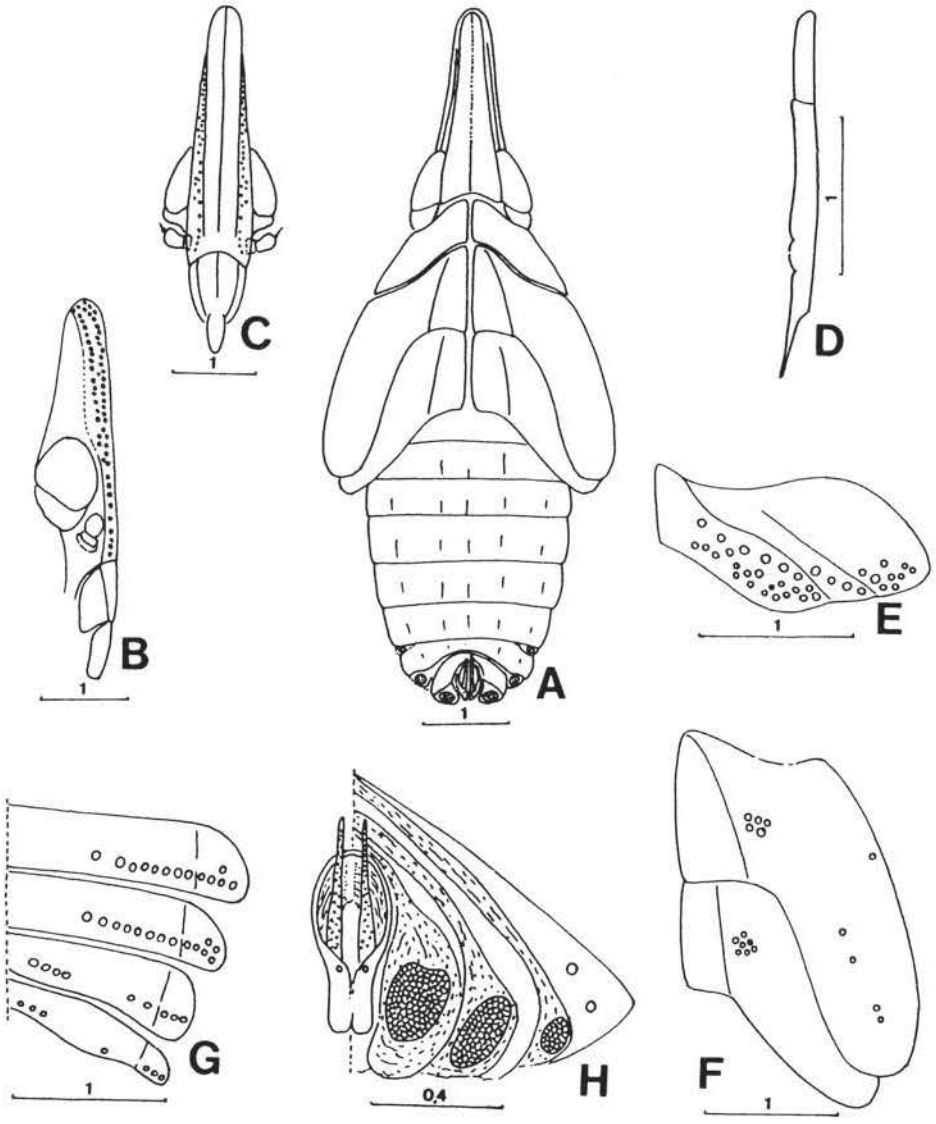

Fig. 70. *Philotheria* sp.3. A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites IV-VII, flat surface; H, abdominal segment VI-IX, caudal view. (unit = mm.)

68. ***Orthopague splendens*** (Germar) (Fig. 71)

Orthopagus splendens Oshanin, 1908, Ann. Mus. Zool. St. Petersburg 13:444.
Flata splendens Germar, 1830, Thon's Entomologisches Archiv. 2(2):48.

General color brown to dark brown. Legs scattered with pale black and black marking. Abdomen with membraneous areas between segmentation somewhat reddish.

Vertex 1.35 times longer in middle line than wide at widest part, widest at middle of eyes, lateral carinae strongly converging to apex. Frons 3.2 times longer in middle line than wide at widest part, widest near frontoclypeal suture, submedian carinae reaching to frontoclypeal suture, converging from base to apex, median carina distinct. Rostrum with subapical segment only slightly longer than apical.

Pronota each with about 31 pits, between lateral and humeral carinae with about 7 pits. Anterior wing pads each with 6 pits near notum, 7 pits laterad. Posterior wing pads each with 5-7 pits near notum. Profemora in ventral margins serrated. Metatibiae each with 7 lateral teeth. Spinal formula of hind leg 7-(12-13)-7.

Abdominal tergites IV-VIII each side with 7-(12-14)-(6-7)-4-0 pits respectively. Abdominal pleurites IV-VIII each with 9-(8-10)-(6-7)-(6-7)-(7-8) pits respectively. Abdominal segments VI-VIII each side with a wax-proe plate respectively, plate on segment VI slightly smaller than on segment VII. Ninth abdominal segment in lateral view extreme narrow, subparallel, anal combs arising near middle.

Length of body: 7.5 mm.

Length of anterior wing pad: 2.52 mm.

Specimens examined: Fifth instar nymph: 10, Kaohsiung Hsien, Chiashan, 12-VIII-1986, S.C. Tsaur.

Determination: 4 male adults emerged from nymph, determined by C.T. Yang from comparison of male genitalia.

69. ***Tenguna watanabei*** Matsumura (Fig. 72)

Tenguna watanabei Matsumura, 1910, Trans. Sapporo Nat. Hist. Soc. 3:105.

General color uniform green except tarsal segment somewhat brown.

Vertex with disc slightly incised medially, 2.5 times longer in middle line than wide at base, lateral carinae parallel between eyes, then incurving to apex, median carina distinct at basal half. Frons 3.3 times longer in middle line than wide at widest part, widest above level of eyes, submedian carinae reaching nearly to frontoclypeal suture, uniting at base, converging to apex, median carina distinct at basal half. Rostrum with subapical segment 1.25 times longer than apical.

Pronota each with about 30 pits, between lateral and humeral carinae with about 8 pits. Anterior wing pads each with 6 pits near notum, 6 pits laterad. Posterior wing pads each with 7-8 pits near notum. Profemora in ventral margins each with a rather large tooth subapically. Metatibiae each with 5-6 lateral teeth. Spinal formula of hind leg 8-(9-10)-7.

Abdominal tergites IV-VIII each side with (8-9)-(14-15)-7-3-0 pits respectively. Abdominal pleurites IV-VIII each with (8-9)-7-7-7-6 pits respectively. Abdominal segments VI-VIII each side with a wax-proe plate respectively, plate on segment VI same size as on segment VII. Ninth abdominal segment rather narrow, anal combs arising near ventral.

Length of body: 9.0 mm.

Length of anterior wing pad: 2.90 mm.

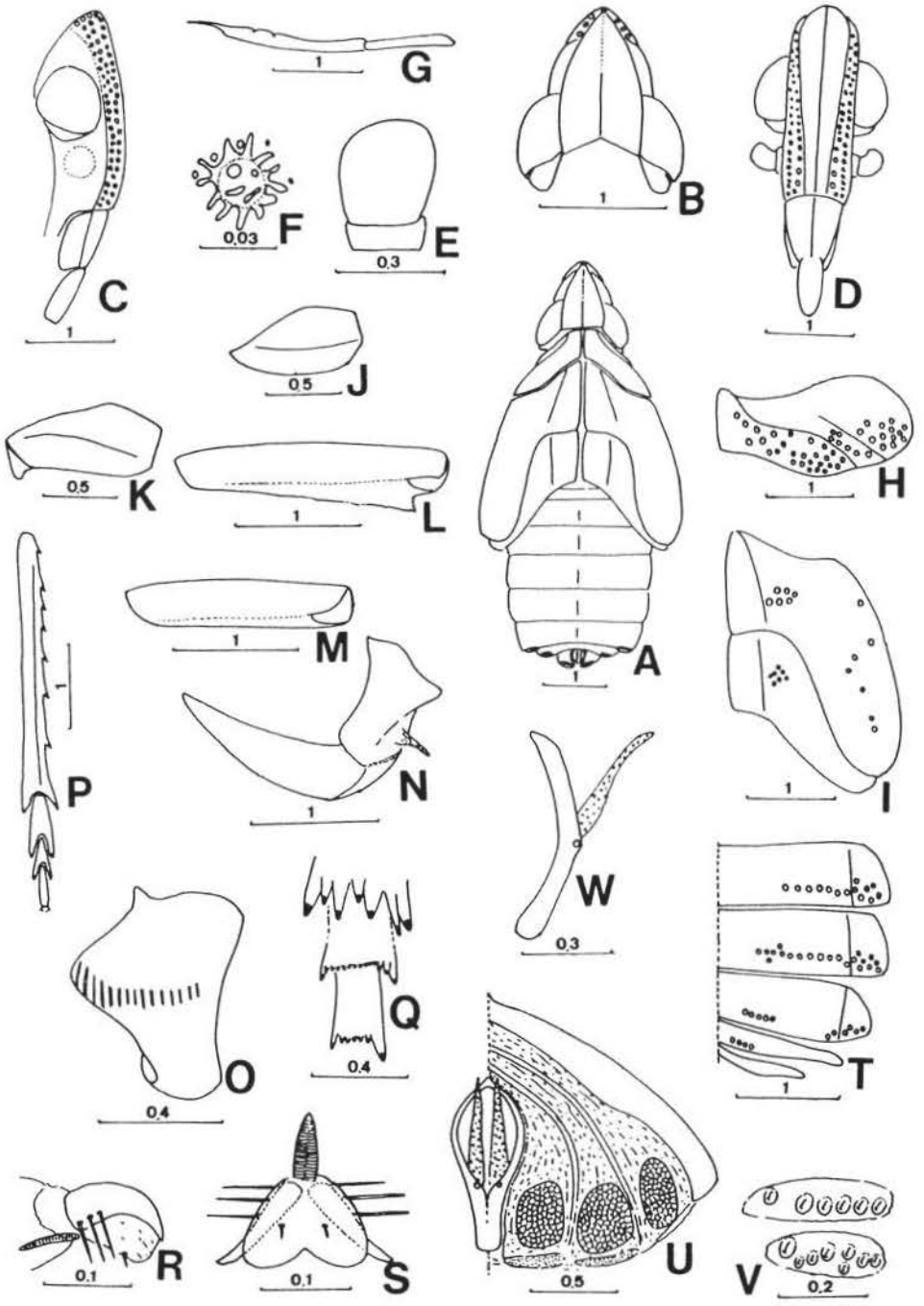

Fig. 71. *Orthopagus splendens* (Germar). A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, wing pads, flat surface; J, procoxa; K, mesocoxa; L, profemur; M, mesofemur; N, metacoxa plus meron; O, metatrochanter; P, metatibia and tarsi; Q, apical teeth of metatibia and first two tarsi; R, pretarsus, lateral view; S, the same, ventral view; T, abdominal tergites and pleurites VI-VIII, flat surface; U, abdominal segments VI-IX, caudal view; V, sensory pits of abdominal segment VII-VIII. (unit = mm.)

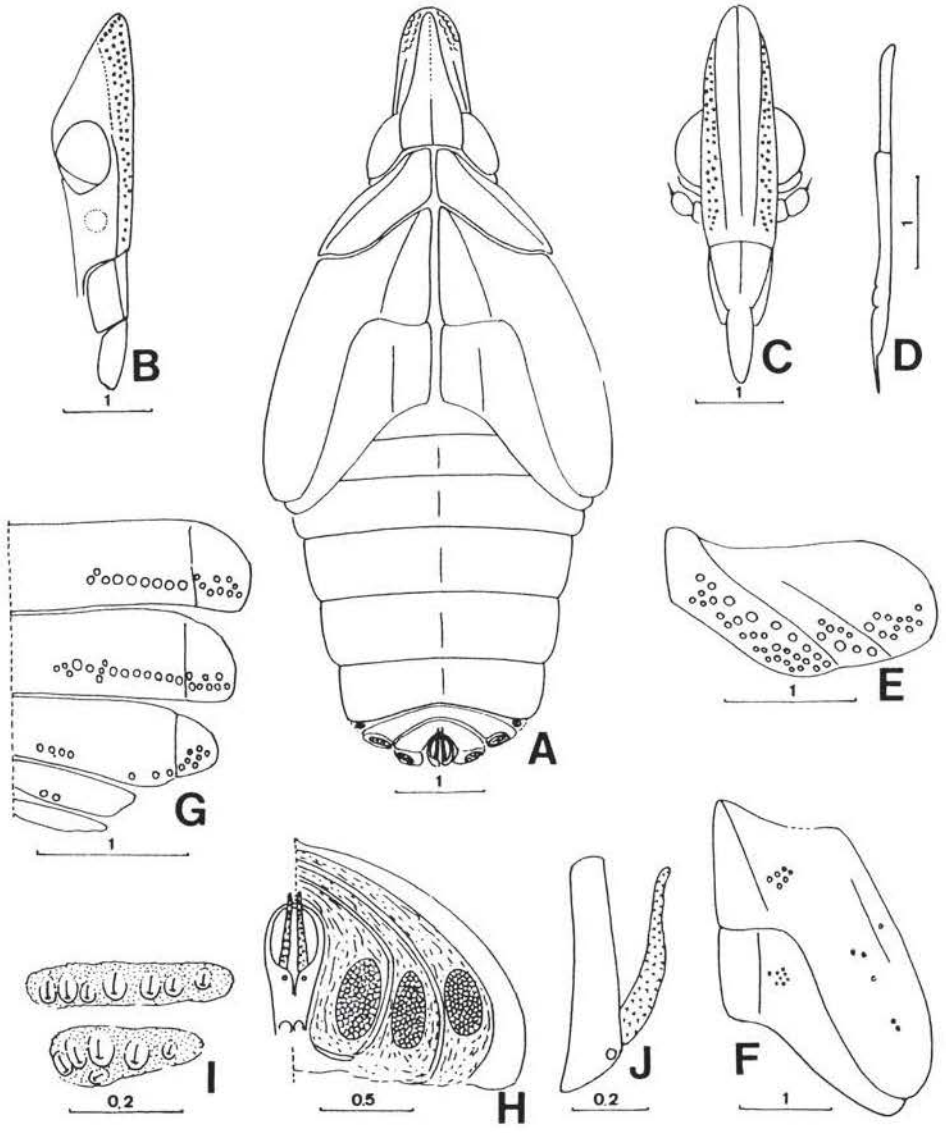

Fig. 72. *Tenguna watanabei* Matsumura A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites IV-VIII, flat surface; H, abdominal segments VI-IX, caudal view; I, sensory pit of abdominal segments VII and VIII; J, ninth abdominal segment, lateral view. (unit = mm.)

Specimen examined: Fifth instar nymph: 1, Taichung Hsien, Kukuan, 4-VII-1987, C.T. Yang.

Determination: Collected with adult and by the appearance.

70. ***Taosa paraherbida*** Muir (Fig. 73)

Taosa paraherbida Muir, 1931, Proc. Hawaiian Entomol. Soc. 7:474.

General color uniform yellowish green. Lateral and submedian carinae somewhat brown.

Vertex 1.4 times longer in middle line than wide at base, median carina feeble. Frons 2.3 times longer in middle line than wide at widest part, submedian carinae somewhat converging to apex, median carina present at basal third. Each side of frons with about 38 pits. Anteclypeus distinctly 3-carinate at base. Rostrum with subapical segment 1.1 times longer than apical.

Pronota each with about 26 pits, between lateral and humeral carinae with 4 pits. Anterior wing pads each with 6 pits near notum, 2 extreme small pits laterad. Posterior wing pads each with 6 pits near notum. Pro- and mesofemora at ventral margins each at both sides indistinctly dentated. Metatibiae each with 4 lateral teeth. Spinal formula of hind leg 9-7-7. Apical teeth of tibia, 1 dorsal, 8 ventral. First metatarsal segment with both sides extremely blade-shaped expanded, in ventral view main body of segment more or less recognizable, in dorsal view median line longitudinal ridged and elevated.

Abdominal tergites IV-VIII each side with 8-7-3-1-0 pits respectively. Abdominal pleurites III-VIII each with 2-6-5-3-5-7 pits respectively. Abdominal segments VI-VIII each side with a wax-pore plate on membraneous area at caudolateral portion of tergite respectively. Abdominal segment VIII entire, each side with a wax-pore plate.

Length of body: 8.53 mm.

Length of anterior wing pad: 3.12 mm.

Specimen examined: Fifth instar nymph: 1, Italy, Venez. Bol, 29km. E. Caicara de Orinoco.180. 29-VII-1988, C.& W. O'Brien & Gjwibmer. (specimen was sent by L.B. O'Brien)

Determination: Determinated by L.B. O'Brien.

71. ***Scolops*** sp.1. (Fig. 74)

General color uniform brown, scattered yellowish areas.

Vertex 3.5 times longer in middle line than wide at widest part, lateral carinae converging to apex, median carina feeble. Frons 3.3 times longer in middle line than wide at widest part, submedian carinae reaching nearly to frontoclypeal suture, unite at base, then parallel-sided, median carina present at basal half. Each side of frons with about 67 pits. Rostrum with subapical segment 1.6 times longer than apical.

Pronota each with about 38 pits, between lateral and humeral carinae with 4 pits. Anterior wing pads each with 3 pits near notum, 3 pits laterad. Posterior wing pads each with 6 pits near notum. Pro- and mesofemora at ventral margins one side with many teeth. Metatibiae each with 4 lateral teeth. Spinal formula of hind leg 8-13-8.

Abdominal tergites IV-VIII each side with 7-6-3-2-0 pits respectively. Abdominal pleurites IV-VIII each with 5-5-4-5-5 pits respectively. Abdominal segments VII-VIII each side with a wax-proe plate respectively. Wax-pore plate absent on abdominal segment VI.

Length of body: 7.5 mm.

Length of anterior wing pad: 2.18 mm.

Specimen examined: Fifth instar nymph: 1, U.S.A. Lake Co. 5mi. N. Clermont Fla. 15-VI-1965, C.W. O'Brien. (specimen was sent by L.B. O'Brien)

Determination: Determined by L.B. O'Brien as *Scolops* sp.

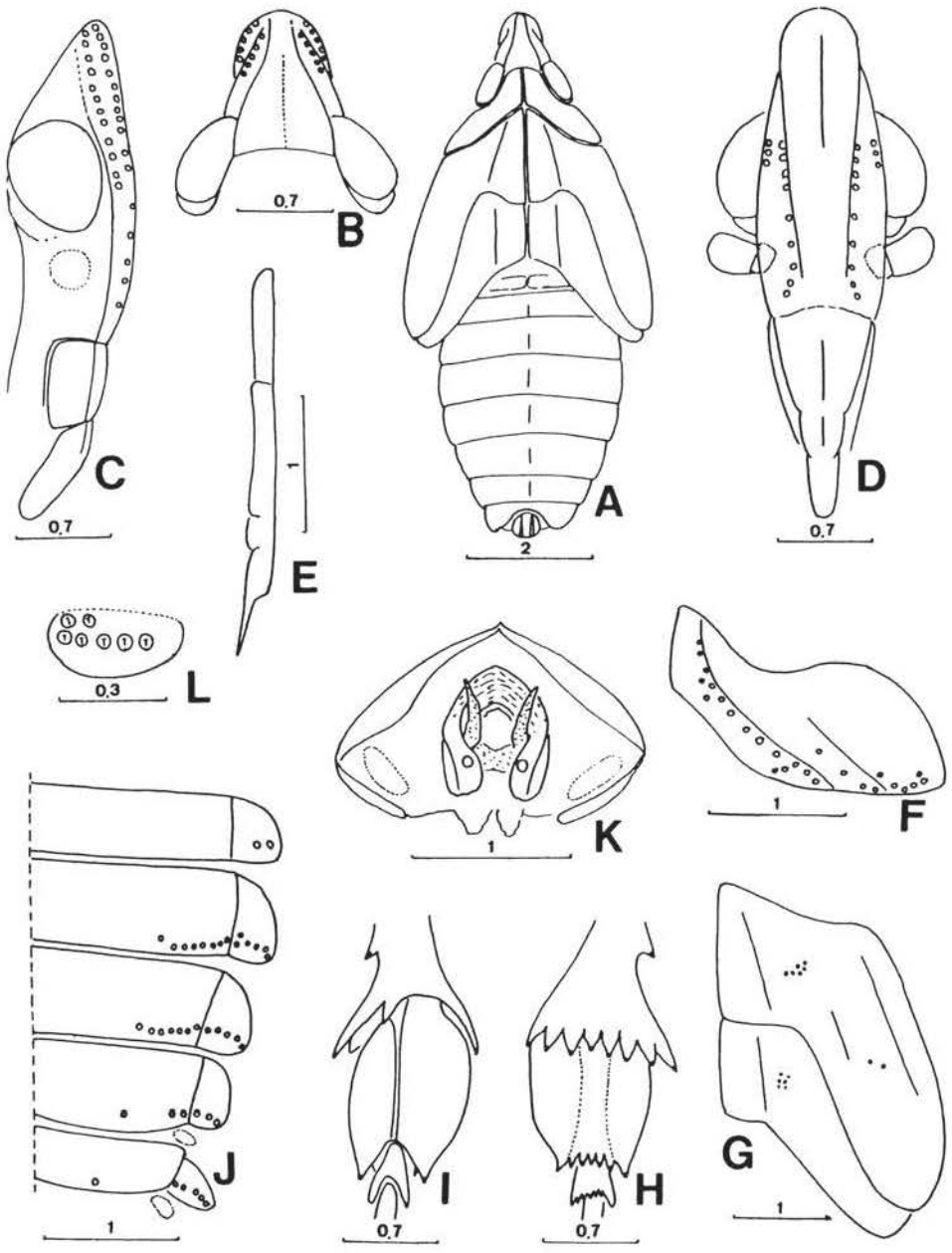

Fig. 73. *Taosa paraherbida* Muir A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum; F, pronotum, flat surface; G, wing pads, flat surface; H, apex of metatibia and first two tarsal segment, ventral; I, the same, dorsal view; J, abdominal tergites and pleurites III-VII, flat surface; K, abdominal segments VIII-IX, caudal view; L, sensory pit of abdominal pleurite VIII. (unit = mm.)

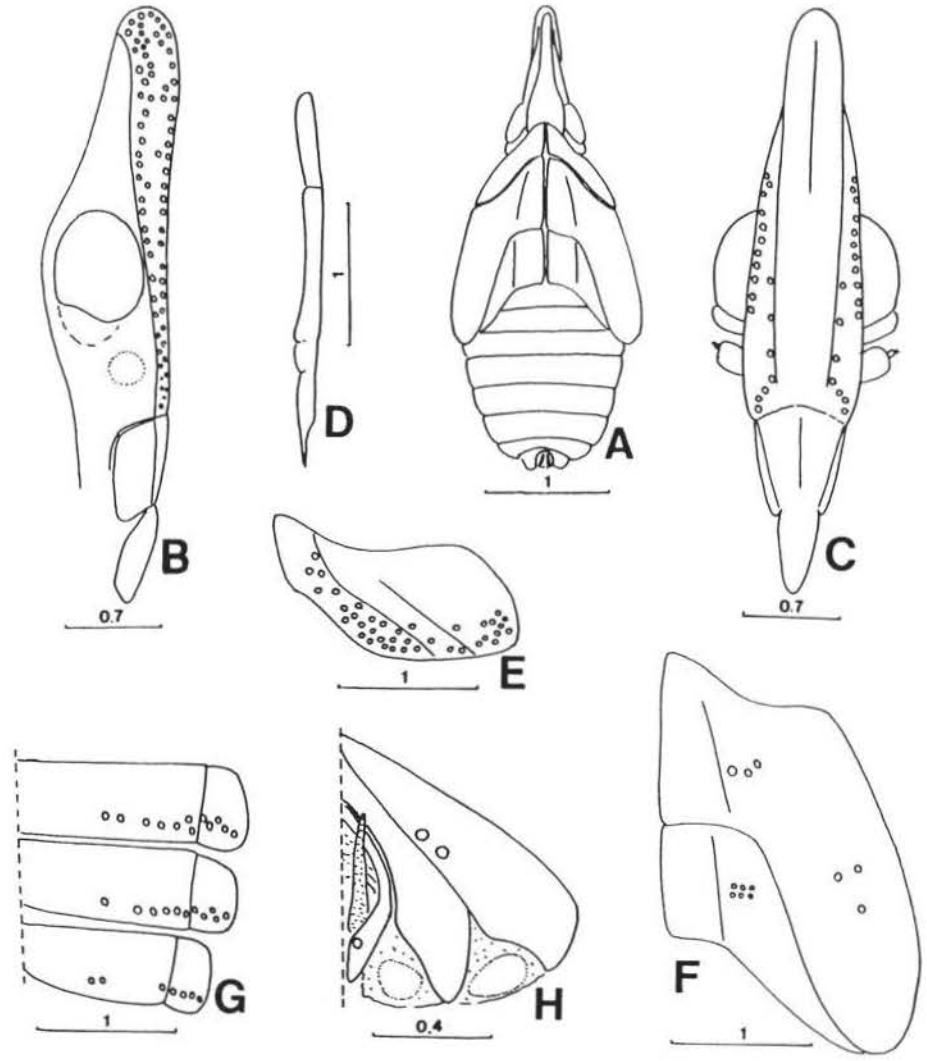

Fig. 74. *Scolops* sp.1. A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites and pleurites IV-VI flat surface; H, abdominal segments VII-IX, caudal view. (unit = mm.)

72. **Orgerini** sp.1. (Fig. 75)

General color dirty white, scattered small, black spots.

Head slightly protruding beyond anterior margin of eyes. Vertex with lateral carinae parallel between eyes, then converging to apex, median carina feeble. Frons with lateral carinae nearly parallel, submedian carinae unite at base, parallel-sided, reaching nearly to frontoclypeal suture, median carina present. Each side of frons with about 23 pits. Rostrum with subapical segment 1.2 times longer than apical.

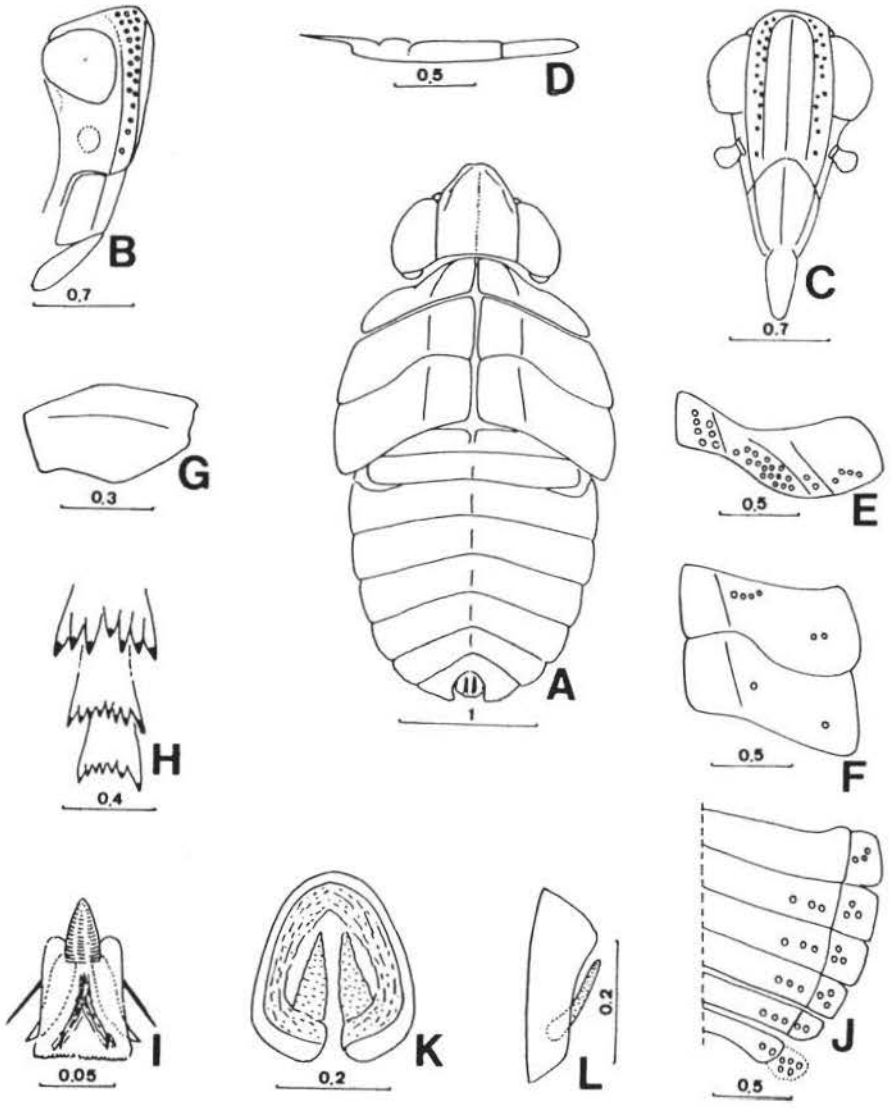

Fig. 75. Orgerini sp.1. A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, mesocoxa; H, apex of metatibia and first two tarsal segment, ventral view; I, pretarsus. ventral view; J, abdominal tergites and pleurites III-VIII, flat surface; K, ninth abdominal segment, caudal view; L, the same, lateral view. (unit = mm.)

Pronota each with 2 humeral carinae and about 29 pits. Anterior wing pads each with 4 pits in a oblique line near notum, 2 pits laterad. Posterior wing pads each with single pit near notum, another pit laterad. Brachypterous species with fifth instar nymph anterior wing pads not reaching to apex of posterior wing pads. Mesocoxae each at basoventral angle only by obtusely angulated, ventral margin distinctly produced ventrad medially. Metatibiae each with 6-7 lateral teeth. Spinal formula of hind leg 7-8-7. Claw unisetose.

Abdominal tergites III-VIII each side with 0-3-3-3-3-2 pits respectively. Abdominal pleurites III-VIII each with 3-(3-4)-3-(2-3)-(2-3)-5 pits respectively. Abdominal segments VI-VIII without wax-proe plate. Abdominal segment VIII entire. Ninth abdominal segment in dorsal view sunk into emargination of VIII, without pit. Anal combs lobe-like, arising ventrad, directed dorsad, rather short.

Length of body: 3.8 mm.

Length of anterior wing pad: 0.5 mm.

Specimen examined: Fifth instar nymph: 1, Gerlach 3 mi. S. Washoe, Co. 17-VI-1966, Nov at night, W. Gagne & C.W. O'Brien. (specimen was sent by L.B. O'Brien)

Determination: Determined by L.B. O'Brien as Orgerini, Dictyopharidae.

The other species referred

1. *Nersis florend* Stål (Wilson and McPherson, 1981)

NOTES ON DICTYOPHARIDAE OF TAIWAN

The family Dictyopharidae is one of the larger family of the Fulgoroidea. Up till now 17 species are recorded from Taiwan. They are:

1. *Dichoptera similis* Schumacher
2. *Orthopagus helios* Melichar
3. *Orthopagus helios* var. *diffusus* Melichar
4. *Orthopagus lunulifer* Uhler
5. *Orthopagus splendens* (Germar)
6. *Saigona gibbosa* Matsumura
7. *Saigona taiwanella* Matsumura
8. *Thanatodictya fuscovittata* Stål
9. *Canithus gramineus* Fabricius
10. *Tenguna watanabei* Matsumura
11. *Dictyophara cummingi* Distant
12. *Dictyophara katoi* (Kato)
13. *Dictyophara okinawensis* Matsumura
14. *Dictyophara patruelis* Stål
15. *Dictyophara sinica* Walker
16. *Dictyophara kotoshonis* Matsumura
17. *Dictyophara haywardi* Lallemand

Unfortunately most species have not been collected by the author. The most collected specimens belong to genus *Dictyophara*, but authors' specimens present the red bands on the frons and on the pronotum. According Synave (1965), they should belong to *striata*-group, should be transfered to genus *Philotheria*. There is no opportunity to compare specimens with type, the authors can't do any decision this times. The description and the illustration here are in hope of giving some help in the future. *Orthopagus splendens* (Germar) and *Tenguna watanabei* are redescribed and illustrated.

Key to species of Dictyopharidae

1. Vertex 2.4 times or less longer than wide at base; phalli above phallobase 2
-. Vertex 3.9 times or more longer than wide at base; phalli irrecogizable among phallobase 3
2. Vertex 1.2 times longer than wide at base; metatibiae each with 7 lateral teeth; general color yellowish brown ..... *Orthopagus splendens* (Germar)
-. Vertex 2.4 times longer than wide at base; metatibiae each with 5-6 lateral teeth; general color uniform green ..... *Tenguna watanabei* Matsumura
3. Phalli with separated portions winged indistinct; phallobase with 6 processes 4
-. Phalli with separated portions winged distinct; phallobase with 4 processes 5
4. Phallobase with 4 lower processes at apices at same row; phalli with separated portions 2 times longer than fused portion; length of tegmen 8.0-8.2 mm ..... *Philotheria* sp.1.
-. Phallobase with 4 lower processes at apices not at same row, outer pair directed caudolaterad, inner pair directed cauded then ventrad; phalli with separated portions 1.5 times longer than fused portion; length of tegmen 6.8 mm ..... *Philotheria* sp.2.
5. Phallobase slender; phalli with separated portions at apices bent mesad; genital styles with dorsocaudal process near middle ..... *Philotheria* sp.3.
-. Phallobase stout, rounded at base; phalli with separated portions at apices not bent mesad; genital styles with dorsocaudal process near apex 6
6. Phallobase with dorsal pair, sclerotized processes each at inner side after middle with a small, lobed production; tegmen 3.4 times longer than widest part ..... *Philotheria* sp.6.
-. Phallobase with dorsal pair, sclerotized processes each at inner side without production; tegmen 3.1 times longer than widest part 7
7. Phallobase with membraneous processes each with 8-9 spines at apex; second metatarsal segment with 15 apical teeth ..... *Philotheria* sp.4.
-. Phallobase with membraneous processes each with 4 spines at apex; second metatarsal segment with 12-13 apical teeth ..... *Philotheria* sp.5.

73. ***Orthopagus splendens*** (Germar) (Fig. 76)

Orthopagus splendens Oshanin, 1908, Ann. Mus. Zool. St. Petersburg, 13:444.
Anagnia splendens Matsumura, 1910, Trans. Sapporo Nat. Hist. Soc. 3:102.
Flata splendens Germar, 1830, Thon's Entomologisches Archiv. 2(2):48.

General color yellowish brown. Vertex with most part black. Frons at lateral areas scattered pale black markings, along inner side of submedian carinae each with a red line. Ocelli red. Lateral areas of abdomen reddish. Tegmina hyaline, pale brown at stigma and apicoventral area with black markings, area below second and common stem of claval vein brown. Wings with small black markings as figured. Female more darker.

Vertex 1.2 times longer in middle line than wide at widest part, widest at dorsal level of eyes, at apical half distinctly narrower than at basal, median carina distinct at basal half. Frons 2.35 times longer in middle line than wide at widest part, widest at base of antennae, submedian carinae reaching to level of lower margin of antennae. Pronotum each side with 2 carinae. Tegmina 3.2 times longer than widest part, stigma with 4 cells. Metatibiae each with 7 lateral teeth, Spinal formula of hind leg 7-(15-19)-(10-13).

Male genitalia: Anal segment reaching to level of apex of genital styles, in dorsal view oval, longer than widest part about 1.8 : 1. Pygofer in profile with dorsal margin extreme short, hind margin roundly produced caudad below base of anal segment. Aedeagus with phallobase in profile distinctly incised at apex, subdivided apical mambraneous portion into 2 lobes, dorsal one short and

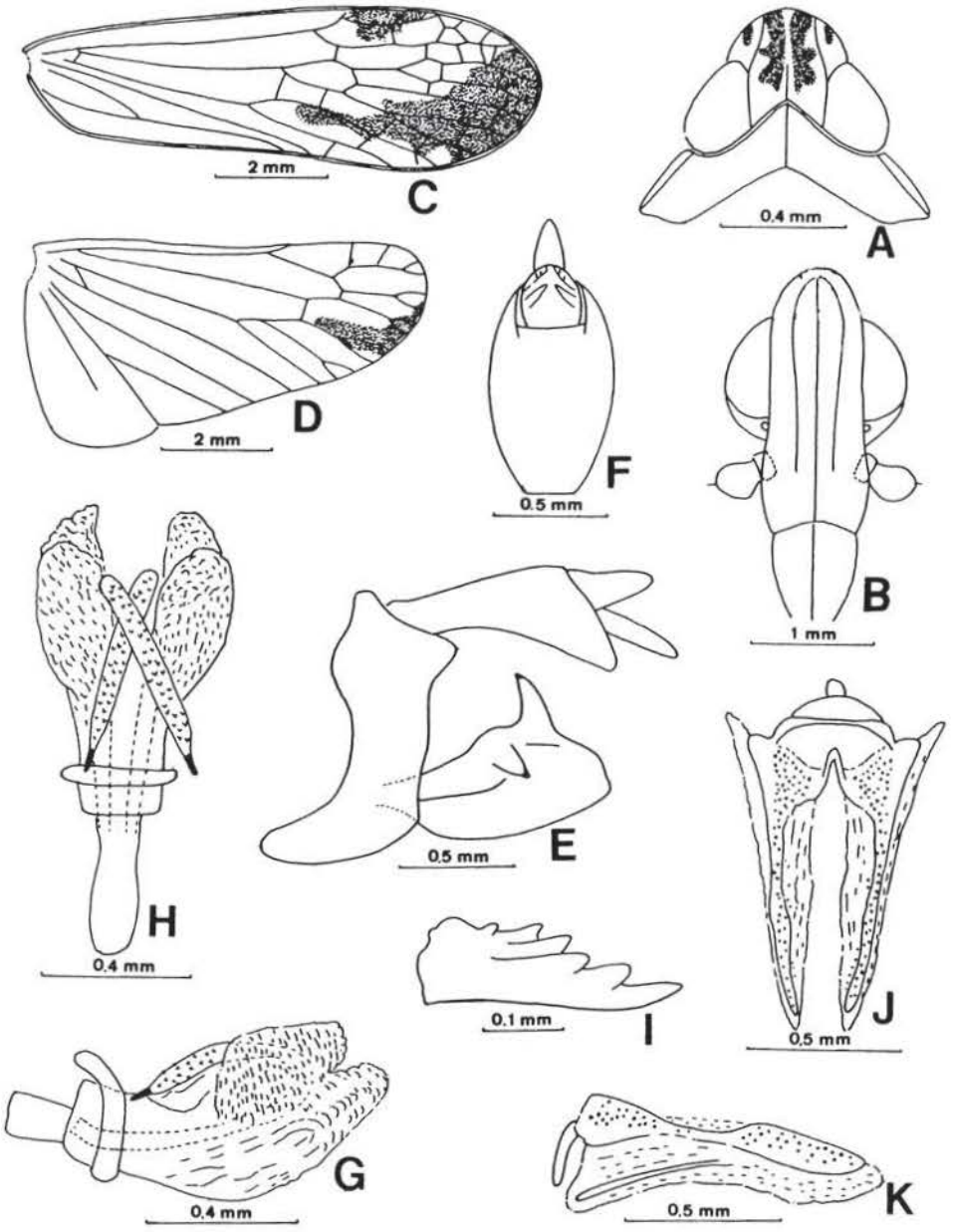

Fig. 76. *Orthopagus splendens* (Germar) A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, wing; E, male genitalia, left view; F, anal segment, dorsal view; G, aedeagus, left view; H, the same, dorsal view; I, apex of first valvifer; J, genital sclerites, dorsal view; K, the same, lateral view.

broad, in dorsal view distinct bipartite at apex, phalli parallel, apices reflected cephalad and cross at base, apices narrow, pigmented. Genital styles rather large, apical margin sinuate, dorsocaudal process near apex.

Female genitalia: Anal segment circular, nearly as long as widest. First valvafer with 6 teeth. Genital sclerites as figured.

Male: Length of body (inlcud. teg.): 11.1-12.3 mm.
Length of tegmen: 8.9-9.9 mm.
Female: Length of body (includ. teg.): 13.1-14.2 mm.
Length of tegmen: 10.7-11.5 mm.

Specimens examined: 4 ♂♂, Taichung Hsien, Takeng, 5-VI-1985, S.C. Tsaur; 1 ♀, Taichung Hsien, Takeng, 28-VI-1985, M.L. Chang.

Distribution: Taiwan, Mainland China, Japan, Burma, Malaysia, Sri Lanka, India.

74. ***Tenguna watanabei*** Matsumura (Fig. 77)

Tenguna watanabei Matsumura, 1910, Trans. Sapporo Nat. Hist. Soc. 3:105.
Centromeria formosana Kato, 1933, Entomol. World, 1:460.

General color uniform green. Hind tibiae at apices each side with a black marking. Tegmina hyaline.

Vertex with lateral carinae in front of eyes converging to apex, 2.4 times longer in middle line than wide at widest part. Frons 3 times longer in middle line than wide at widest part, widest at level of base of antennae, submedian carinae reaching to level of lower level of eyes, median carina distinct throughout. Postclypeus 3-carinate. Rostrum reaching to abdominal sternite VII.

Pronotum each side with 2 carinae. Tegmina 3.1 times longer than widest part, stigma with 4 cells. Metatibiae each with 5-6 lateral teeth. Spinal formula of hind leg 8-(10-11)-(9-11).

Male genitalia: Anal segment reaching over apex of genital styles, in dorsal view longer than widest part about 1.8 : 1. Pygofer in profile with hind margin slightly produced caudad above lower margin of anal segment. Aedeagus large, suspensorium distinct. Phallobase extreme complex, apical two-thirds membraneous, in dorsal view seems 4-lobed, in profile with distinct lower pair. Phalli crossed at middle, protruding from median emargination, then reflected cephalad into 2 slender processes, pigmented and sclerotized at apices. Genital styles distinct widening to apex, dorsal margin sinuate, apical margin straight, dorsocaudal process near apex.

Female genitalia: Anal segment widest at base, longer than widest part about 1.2 : 1. First valvafer small, first valvafer in profile with 7 teeth. Genital sclerites slightly tapering to apex.

Male: Length of body (includ. teg.): 14.2-14.3 mm.
Length of tegmen: 11.2 mm.
Female: Length of body (includ. teg.): 15.3-16.0 mm.
Length of tegmen: 12.0-12.7 mm.

Specimens examined: 2 ♂♂, 6 ♀♀, Taichung Hsien, Kukuan, 4-VII-1987, C.T. Yang.

Distribution: Taiwan, Japan.

75. ***Philotheria*** sp.1. (Fig. 78)

General color green, each side along median carina of frons with a pink stripe. Pro- and mesonotum with disc somewhat yellow. Apex of postclypeus and anteclypeus black. Legs pale brown with black stripes. Tegmina pale brown apically with stigma pale black.

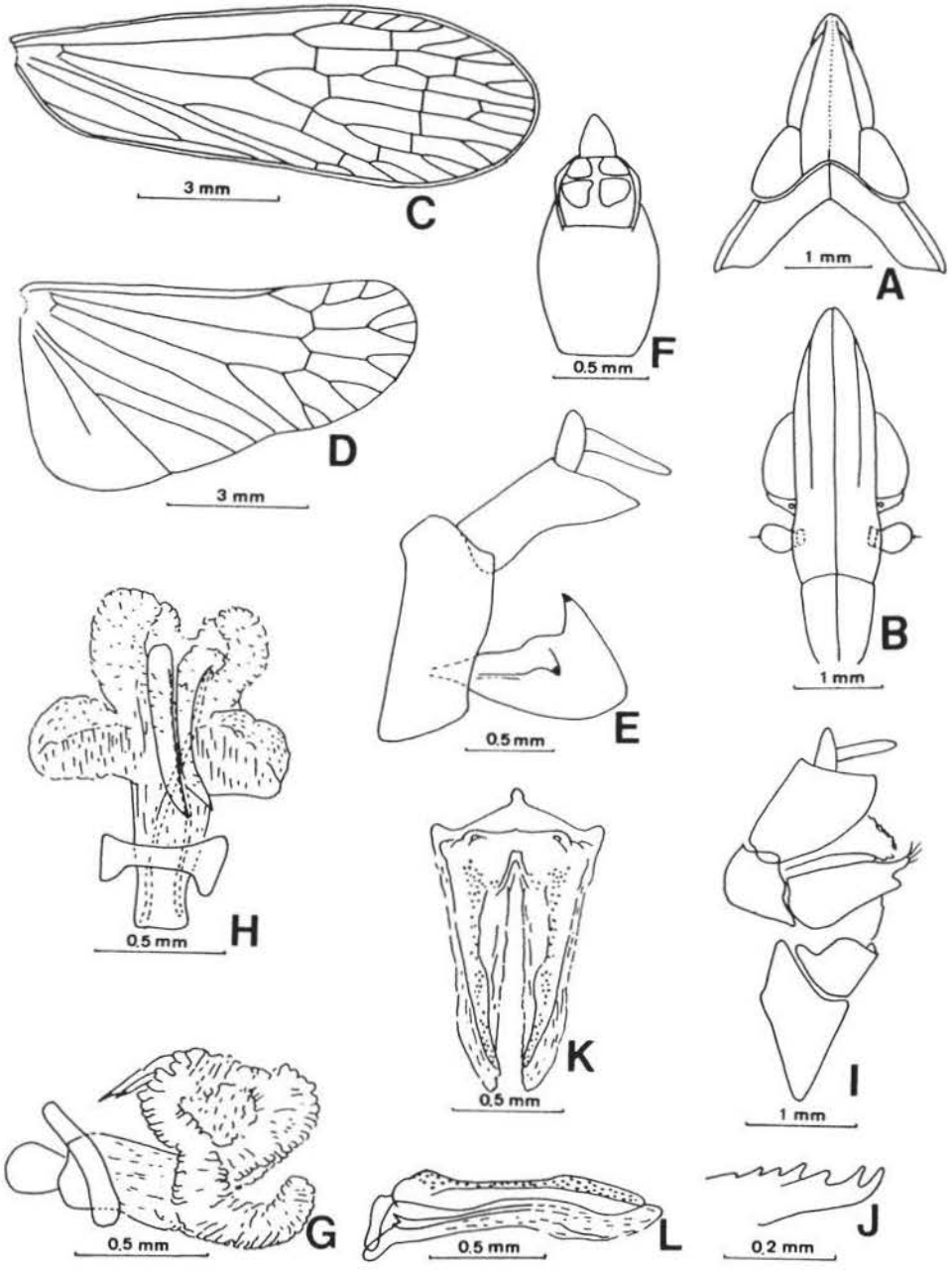

Fig. 77. *Tenguna watanabei* Matsumura A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, wing; E, male genitalia, lateral view; F, anal segment, dorsal view; G, aedeagus, left view; H, the same, dorsal view; I, female genitalia, lateral view; J, apex of first valvifer; K, genital sclerites, dorsal view; K, the same, lateral view.

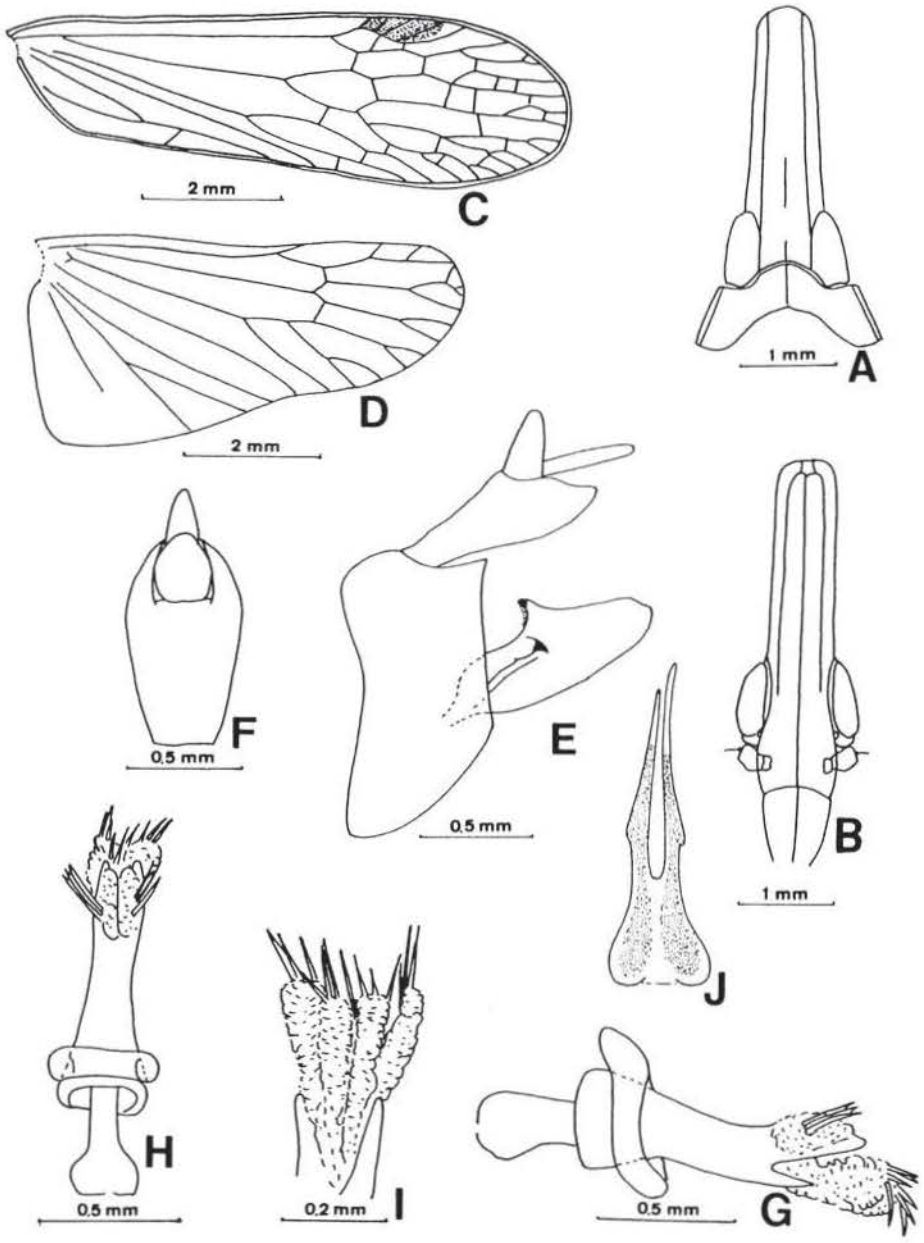

Fig. 78. *Philotheria* sp.1. A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, wing; E, male genitalia, lateral view; F, anal segment, dorsal view; G, aedeagus, lateral view; H, the same, dorsal view; I, the same, ventral view; J, phalli, dorsal view.

Vertex 4.8 times longer in middle line than wide, median carina distinct at base. Frons 4 times longer in middle line than wide at widest part, submedian carinae reaching to middle of eyes, median carina distinct throughout. Tegmina 3.4 times longer than wide. Metatibiae each with 4 lateral teeth.Spinal formula of hind leg 8-(10-11)-(9-11).

Male genitalia: Anal segment in profile not reaching to apex of genital style,in dorsal view longer than widest part about 1.7 : 1. Pygofer with hind margin acutely produced caudad below base of anal segment. Aedeagus with phallobase slender, with 2 processes dorsally, membraneous dorsomedially, each with 3 long spines, with 4 membraneous processes ventrally, at same row, each apex with 3-4 long spines. Phalli slender, separated portion 2 times longer than fused portion, separated portion winged indistinct. Genital styles with apical margin extreme oblique straight, dorsocaudal process at middle.

Male: Length of body (includ.teg.): 11.5 mm.
Length of tegmen: 8.0-8.2 mm.

Specimens examined: 2 ♂ ♂, Taichung City, 2-VI-1987, S.R. Yang

76. ***Philotheria*** sp.2. (Fig. 79)

General color nearly same as in *Philotheria* sp.1.

Vertex 4.8 times longer in middle line than wide, median carina feeble. Frons 4.4 times longer in middle line than wide at widest part, submedian carinae reaching to middle of eyes, median carina distinct at extreme apex. Tegmina 3.3 times longer than widest part. Metatibiae each with 4-5 lateral teeth. Spinal formula of hind leg 7-19-(16-17).

Male genitalia: Anal segment not reaching to apex of genital style, in dorsal view 1.6 times longer than widest part, widest after middle. Pygofer with hind margin triangularly produced caudad below base of anal segment. Aedeagus with phallobase slender, with dorsal pair process somewhat sclerotized ventrally, membraneous dorsally, each with 3 long spines at cephalad margin, directed cephaloventrad, 4 membraneous processes each with 2 or 3 long spines, outer pair directed caudolaterad, inner pair directed caudad than ventrad. Phalli slednder, separated portion 1.5 times longer than fused portion, separated portion winged indistinct. Genital styles with apical margin extreme oblique straight, dorsocaudal process at middle.

Male: Length of body (includ. teg.): 10.0 mm.
Length of tegmen: 6.8 mm.

Specimen examined: 1 ♂, Taichung Hsien, Anmashan, 15-VII-1975, S.C. Lee.

This species and *Philotheria* sp.1. are closely relative of *Philotheria proxima* (Melichar). It differs from *Ph.* sp.1. mainly in direction of the processes of phallobase and the shape of phalli.

77. ***Philotheria*** sp.3. (Fig. 80)

General color pale yellowish brown. All specimens too old to describe color.

Vertex with lateral carinae slightly diverging to base, 4 times longer in middle line than wide at widest part. Frons 4 times longer in middle line than wide at widest part, widest at level of base of antennae, submedian carinae reaching to level of antennae, median carina distinct throughout. Metatibiae each with 4 lateral teeth. Spinal formula of hind leg 7-(19-20)-15. Tarsi each tooth with a long, colorless tooth except sides ones. Tegmina 3.1 times longer than widest part.

Male genitalia: Anal segment in dorsal view longer than widest part about 1.6 : 1, in profile reaching over apex of genital styles. Pygofer quadrate, dorsocaudal angle not produced caudad. Aedeagus with phallobase somewhat slender, in dorsal view bilobed at apex, each rounded at apex, wholly sclerotized, membraneous processes distinctly diverging to apices, in profile with basoventral portion produced downward, with about 12-13 long spines. Phalli stout, separated portions strongly winged, at apices each bent mesad. Genital styles with apical margin extreme oblique, straight, dorsocaudal process at middle.

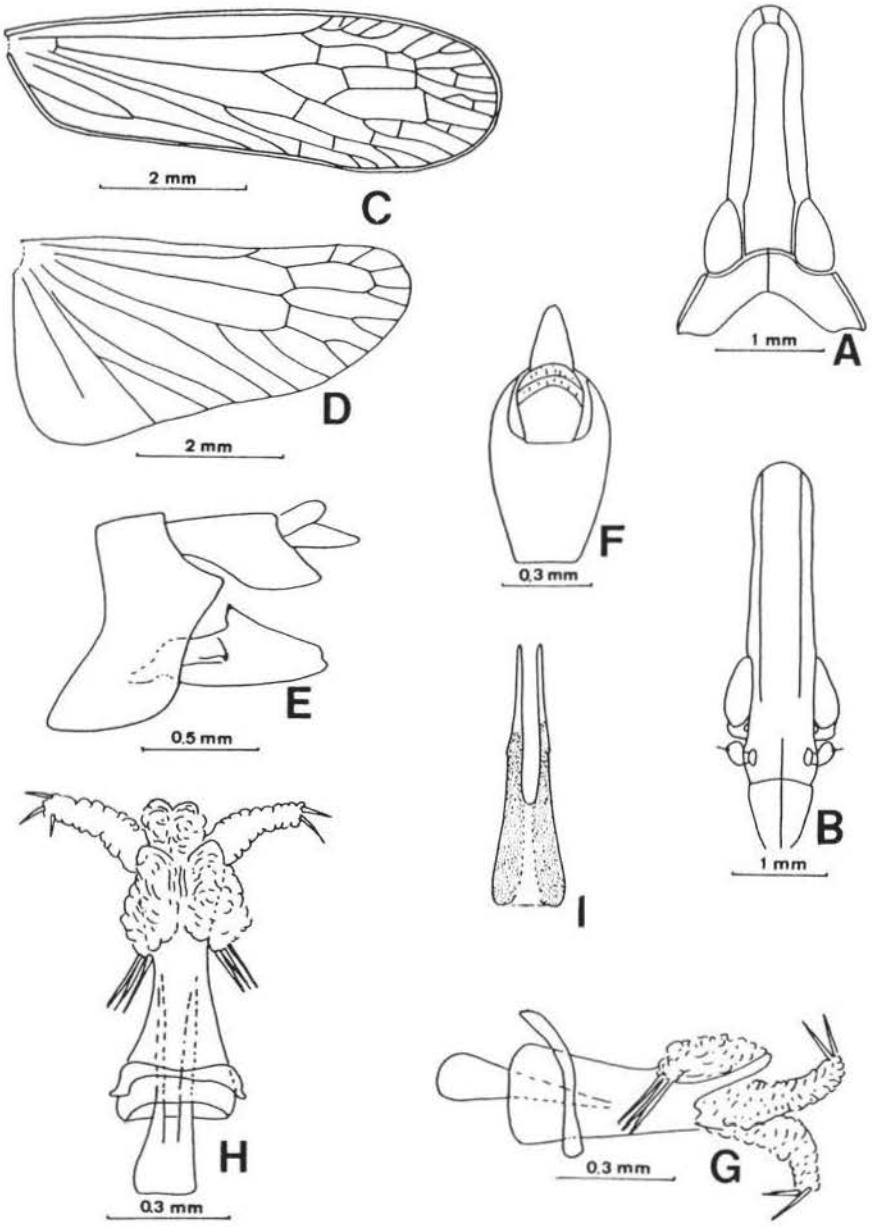

Fig. 79. *Philotheria* sp.2. A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, wing; E, male genitalia, lateral view; F, anal segment, dorsal view; G, aedeagus, lateral view; H, the same, dorsal view; I, phalli, dorsal view.

Male: Length of body (includ. teg.): 11.0 mm.
Length of tegmen: 7.0 mm.
Female: Length of body (includ. teg.): 12.3-12.8 mm.
Length of tegmen: 8.3-9.0 mm.

Specimens examined: 3♂♂, 7♀♀, Penghu Hsien, Makon, 10-VIII-1985, C.L. Hsieh.

This species is a isolated group. It resembles sp.1-group in the phallobase slender, but differs in phallobase with dorsal pair not membraneous, ventral pair reduced; the phalli are stout winged. It resembles sp.4-group in phallobase with 4 membraneous processes and the shape of phalli but differs in the phallobase slender.

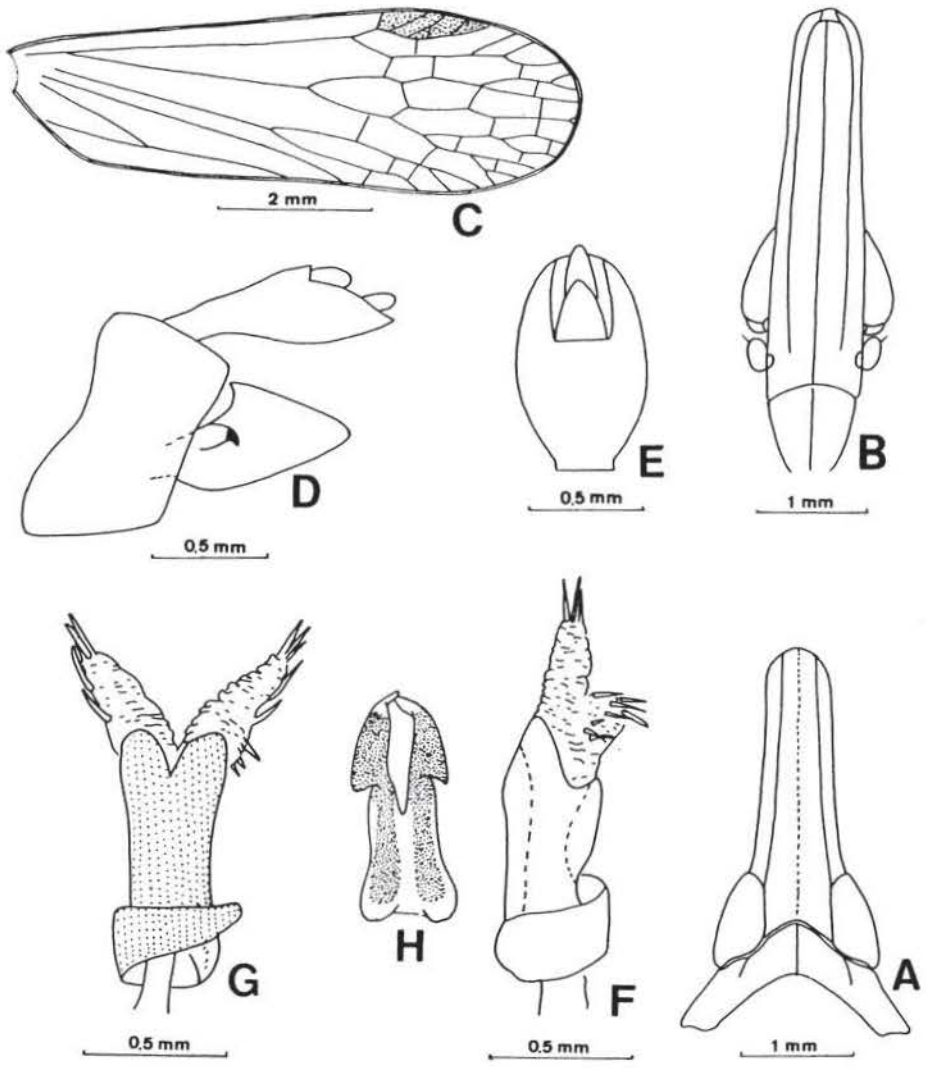

Fig. 80. *Philotheria* sp.3. A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, male genitalia, lateral view; E, anal segment, dorsal view; F, aedeagus, left view; G, the same, dorsal view; H, phalli, dorsal view.

78. *Philotheria* sp.4. (Fig. 81)

General color pale yellowish brown. Frons along median carina and lateral green, most frons red medially. Postclypeus with carinae green, disc pale brown. Anteclypeus with carinae white, disc black. Vertex with lateral carinae and basal short median one green. Pro- and mesonotum with 9 and 5 lines respectively, area between lines red. Femora and tibiae with black stripes. Abdomen somewhat green, abdominal sternites VII-VIII black medially. Genital styles black.

Vertex with lateral carinae parallel, 5.5 times longer in middle line than wide at widest part. Frons 3.8 times longer in middle line than wide at widest part, widest at level of base of antennae, submedian carinae reaching to frontoclypeal suture, median carina distinct at apical third. Postclypeus 3-carinate.

Rostrum 4-segmented. Pronotum each side 2-carinated. Tegmina 3.1 times longer than widest part. Metatibiae each with 4-5 lateral teeth. Spinal formula of hind leg 7-(15-16)-15. Tarsi with several colorless teeth apically.

Male genitalia: Anal segment in dorsal view oval, slightly pertrioled, longer than wide about 1.5 : 1. Pygofer with dorsolateral angle triangulately produced cauded. Aedeagus with phallobase stout, rounded at base, with a pair process dorsally, each pointed at apex, with 2 membraneous processes, parallel, each with 2-3 long spines , 2 dorsomedially, 8-9 laterobasally in oblique line, 8-10 at apex. Phalli with separated portion strongly winged. Genital styles with apical margin moderately oblique, straight, dorsocaudal process near apex.

Male: Length of body (includ. teg.): 11.1- 12.2 mm.
Length of tegmen: 7.5-8.1 mm.
Female: Length of body (includ. teg.): 12.7-14.2 mm.
Length of tegmen: 8.3-9.7 mm.

Specimens examined: 15 ♂♂, 6 ♀♀, Taitung Hsien, Lanshu, 29-30,IX-1985, C.Y. Yang and S.C. Tsaur.

79. *Philotheria* sp.5. (Fig. 82)

General color nearly same as in sp.4.

Vertex with lateral carinae slightly diverging to base, 3.9 times longer in middle line than wide at widest part. Frons 3.9 times longer in middle line than wide at widest part, widest at level of base of antennae, submedian carinae not reaching to level of lower margin of eyes, median carina distinct only at extreme base and apex. Tegmina 3.1 times longer than widest part. Metatibiae each with 4-5 lateral teeth. Spinal formula of hind leg 7-16-(12-13).

Male genitalia: Anal segment in dorsal view longer than widest part about 1.6 : 1, in profile reaching over apex of genital styles. Pygofer with hind margin blunt triangulately produced below base of anal segment. Aedeagus with phallobase stout, rounded at base, with a pair stout process dorsally, with 2 membraneous processes, at dorsobasal portion with a long spine, apical portion with 1+3 spines, laterobasal portion with 9 spines in 2 lines. Phalli with separated portion strongly winged. Genital styles with apical margin moderately oblique, dorsocaudal process near apex.

Male: Length of body (includ. teg.): 12.3- 12.5 mm.
Length of tegmen: 8.3-8.7 mm.
Female: Length of body (includ. teg.): 13.3 mm.
Length of tegmen: 9.0 mm.

Specimens examined: 2 ♂♂, 1 ♀, Taichung Hsien, Wufeng, 24-VI-1985, S.C. Tsaur.

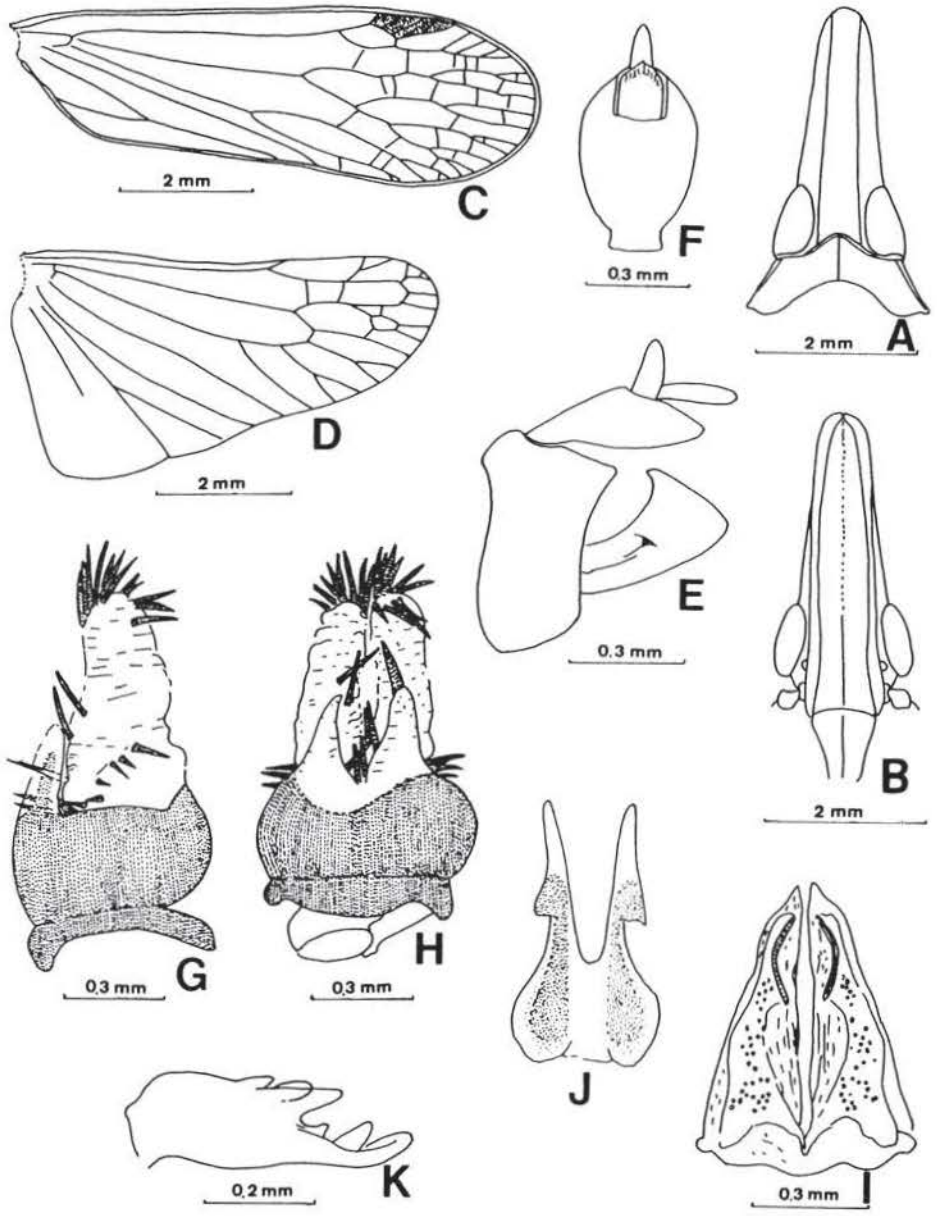

Fig. 81. *Philotheria* sp.4. A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, wing; E, male genitalia, lateral view; F, anal segment, dorsal view; G, aedeagus, lateral view; H, the same, dorsal view; I, genital sclerites, dorsal view; J, phalli, dorsal view; K, apex of first valvifer.

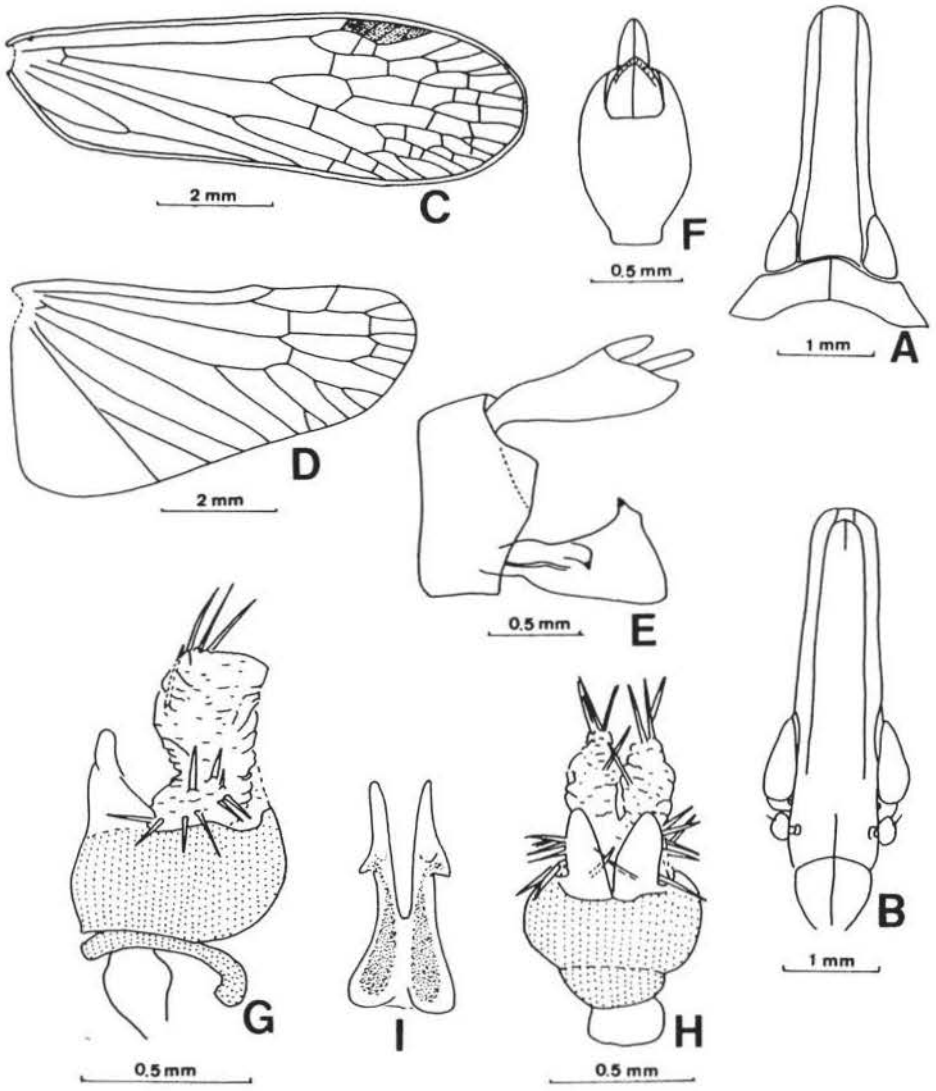

Fig. 82. *Philotheria* sp.5. A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, wing; E, male genitalia, lateral view; F, anal segment, dorsal view; G, aedeagus, lateral view; H, the same, dorsal view; I, phalli, dorsal view.

80. ***Philotheria*** sp.6. (Fig. 83)

General color nearly same as in sp.4.

Vertex 4.4 times longer in middle line than wide at widest part. Frons 3.9 times longer in middle line than wide at widest part, submedian carinae reaching to middle of eyes, median carina distinct at apical half. Tegmina 3.4 times longer thas widest part. Metatibiae each with 4-5 lateral teeth. Spinal formula of hind leg 7-15-(12-13).

Male genitalia: Anal segment reaching not over apex of genital styles, in dorsal view longer than widest part about 1.45 : 1. Pygofer with caudal margin sharply produced below base of anal segment. Aedeagus with phallobase stout, rounded at base, with a pair process dorsally, each at inner side after middle seems with a small lobed production, with 2 membraneous processes, each with 8-9 long spines at basodorsal portion, 7 at apical half dorsally, in profile widening to apex, apical margin oblique, with caudoventral angle produced caudad. Genital styles with apical margin somewhat convex, dorsocaudal process near apex.

Male: Length of body (includ. teg.): 12.0 mm.
Length of tegmen: 8.0 mm.

Specimen examined: 1 ♂, Nantou Hsien, Wuche, 17-VII-1971, C.T. Yang.

This species, *Philotheria* sp.4. and *Ph.* sp.5. are same species-group. Their phallobase are stout, rounded at base; there are 2 sclerotized dorsally, 2 membraneous processes ventrally; the phalli have the separated portion strongly winged. Three species differ each other mainly by the shape and the spine of phallobase.

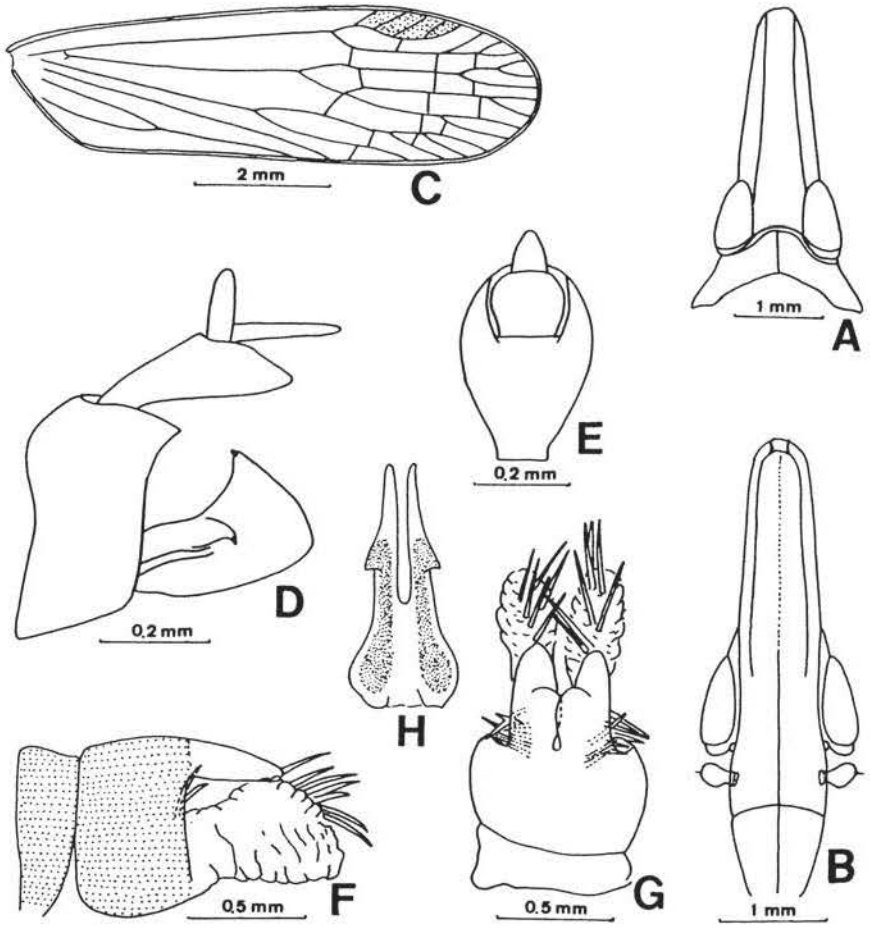

Fig. 83. *Philotheria* sp.6. A, head and pronotum, dorsal view; B, frons and postclypeus, ventral view; C, tegmen; D, male genitalia, lateral view; E, anal segment, dorsal view; F, aedeagus, lateral view; G, the same, dorsal view; H, phalli, dorsal view.

VIII. Family **FULGORIDAE** Dumeril

Fulgoridae Stephens, 1829, Systematic Catalogue of British Insects 2:355.
Fulgorelle Dumeril, 1820, Dictionnaire des Siences Naturelle 17:509.

Body large. Vertex 1.5-4.4 times longer than wide at base or 12 times wider than long, median carina present, at least at base in front of eyes always with several pits. Frons about 3 times longer than wide, submedian carinae developed, reaching nearly to frontoclypeal suture, median carina if present, at base only, each side of frons with 14-30 pits. Postclypeus with lateral carinae distinct, without median carina. Rostrum 4-segmented, subapical segment longer than apical, apical segment truncate at apex. Eyes small, rounded, with callus. Antennae small. second segment longer than wide, sensory organs with short and stout processes.

Pronota with lateral carinae not really as anterolateral margins, humeral carinae present, each with about 30 pits, between lateral and humeral carinae with 4-9 pits. Anterior wing pads each with 7-10 pits near notum, 7-12 pits laterad. Posterior wing pads each with 6-22 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxae one side with process. Pro- and mesofemora at ventral margins one side slightly expanded, not toothed. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatibiae each with 4-6 lateral teeth, compressed, longitudinal ridged. Spinal formula of hind leg (6-7)-(7-10)-(2-7). Second metatarsal segment truncate at apex. Pretarsi with claws divergent apically, claw 2-setose. Arolium reaching to middle, with paired setae.

Abdomen 9-segmented. Abdominal tergites IV-VIII each side with (8-15)-(8-17)-(8-16)-(1-4)-(0-3) pits respectively. Abdominal pleurites III-VIII each with (0-2)-(0-5)-(0-5)-(0-6)-(1-7)-(1-6) pits respectively. Abdominal tergites V and VI with additional lateral ridged respectively. Abdominal tergites VII and VIII each with a pair wax-pore plate, on membraneous area, or without. Abdominal tergite VIII entire. Ninth abdominal segment sunk into emargination of 8th segment, each side with 2 pits ventrally, with or without pit dorsally. Anal combs well developed, lobe-like, arising ventrad, directed dorsal, in lateral view narrow, subparallel-sided.

Habitat: On leaves.

Key to species of Fulgoridae

1. Vertex 12 times wider than long; meso- and metatibiae each at base with a large spine; pro- and mesonota with triangular processes ..... *Itzalana submaculata* Schmidt
-. Vertex 1.5-4.4 times longer than wide at base; meso- and metatibiae each at base without large spine; pro- and mesonota without triangular process 2
2. Vertex 1.5 times longer than wide at base; frons 2.1 times longer than widest part 3
-. Vertex 4.4 times longer than wide at base; frons 4.7 times longer than widest part .... Fulgoridae sp.2.
3. Abdominal segments VII-VIII with recognizable wax-pore plates; second metatarsal segment with 7 apical teeth; pronota each between lateral and humeral carinae with 9 pits .... *Lycorma meliae* Kato
-. Abdominal segments VII-VIII without recognizable wax-pore plates; second metatarsal segment with 3 apical teeth; pronota each between lateral and humeral carinae with 4 pits .... Fulgoridae sp.1.

81. ***Lycorma meliae*** Kato (Fig. 84)

Lycorma meliae Kato, 1929, Trans. Nat. Hist. Soc. Formosa 19:550.

General color black. Vertex, thorax, wing pads and abdomen scattered large red markings and several pale yellow small ones. Frons with basal portion red, apical area pale yellow. Legs black with several rather large white spots.

Vertex 1.5 times longer in middle line than wide at base, before anterior level of eyes with a pair of pits, suddenly narrowing from middle. Frons 2.1 times longer in middle line than wide at widest part, widest near base, submedian carinae angulated laterad near base, area between where 2.7 times wider than at level of antennae, in lateral view strongly angulate, each side of frons with about 30 pits, most of them on basal portion. Rostrum with subapical segment 1.5 times longer than apical.

Pronota each with about 30 pits, between lateral and humeral carinae with 9 pits. Anterior wing pads each with 8 pits near notum, 7 pits laterad. Posterior wing pads each with 17 pits near notum. Metatibiae each with 5 lateral teeth. Spinal formula of hind leg 7-10-7.

Abdominal tergites IV-VIII each side with 8-(9-10)-9-1-0 pits respectively. Abdominal pleurites VII-VIII each with 1-1 pits respectively. Abdominal segments VII-VIII each side with a pair of rather small wax-pore plate, nearly same size. Ninth abdominal segment in lateral view slightly widening to base, each side with 2 ventral pits only.

Length of body: 13.3 mm.

Length of anterior wing pad: 4.68 mm.

Specimen examined: Fifth instar nymph: 1, Taichung Hsien, Wufeng, 24-VI-1985, S.C. Tsaur.

Determination: No adult emerged from nymph, but collected with adult.

82. **Fulgoridae** sp.1. (Fig. 85)

General color uniform pale brown, scattered rather small, black spots, apical portion of frons and base of postclypeus pale yellowish white.

Vertex 1.5 times longer in middle line than wide at base, before anterior level of eyes with pit, suddenly narrowing from basal third. Frons 2.1 times longer in middle line than wide at widest part, widest near apex, submedian carinae angulated laterad near base, distance at where 2.7 times wider than at level of antennae, in lateral view angulate, each side with about 22 pits. Rostrum with subapical segment 1.3 times longer than apical.

Pronota each with about 30 pits, between lateral and humeral carinae with 4 pits. Anterior wing pads each with 7 pits near notum, 7-9 pits laterad. Posterior wing pads each with 9 pits near notum. Metatibiae each with 6 lateral teeth. Spinal formula of hind leg 7-7-3.

Abdominal tergites IV-VIII each side with 8-8-8-4-3 pits respectively. Abdominal pleurites III-VIII each with 2-5-3-4-5-3 pit respectively. Abdominal segments VII-VIII each side without wax-pore plate. Ninth abdominal segment in lateral view with base rather long, each side with 2 pits ventral.

Length of body: 9.14 mm.

Length of anterior wing pad: 3.41 mm.

Specimen examined: Fifth instar nymph: 1, Hualien Hsien, Mukwa, 5-VII-1985, C.L. Chen.

Determination: No adult emerged from nymph. As a whole resembles *Lycorma meliae*, it should belong to Fulgoridae.

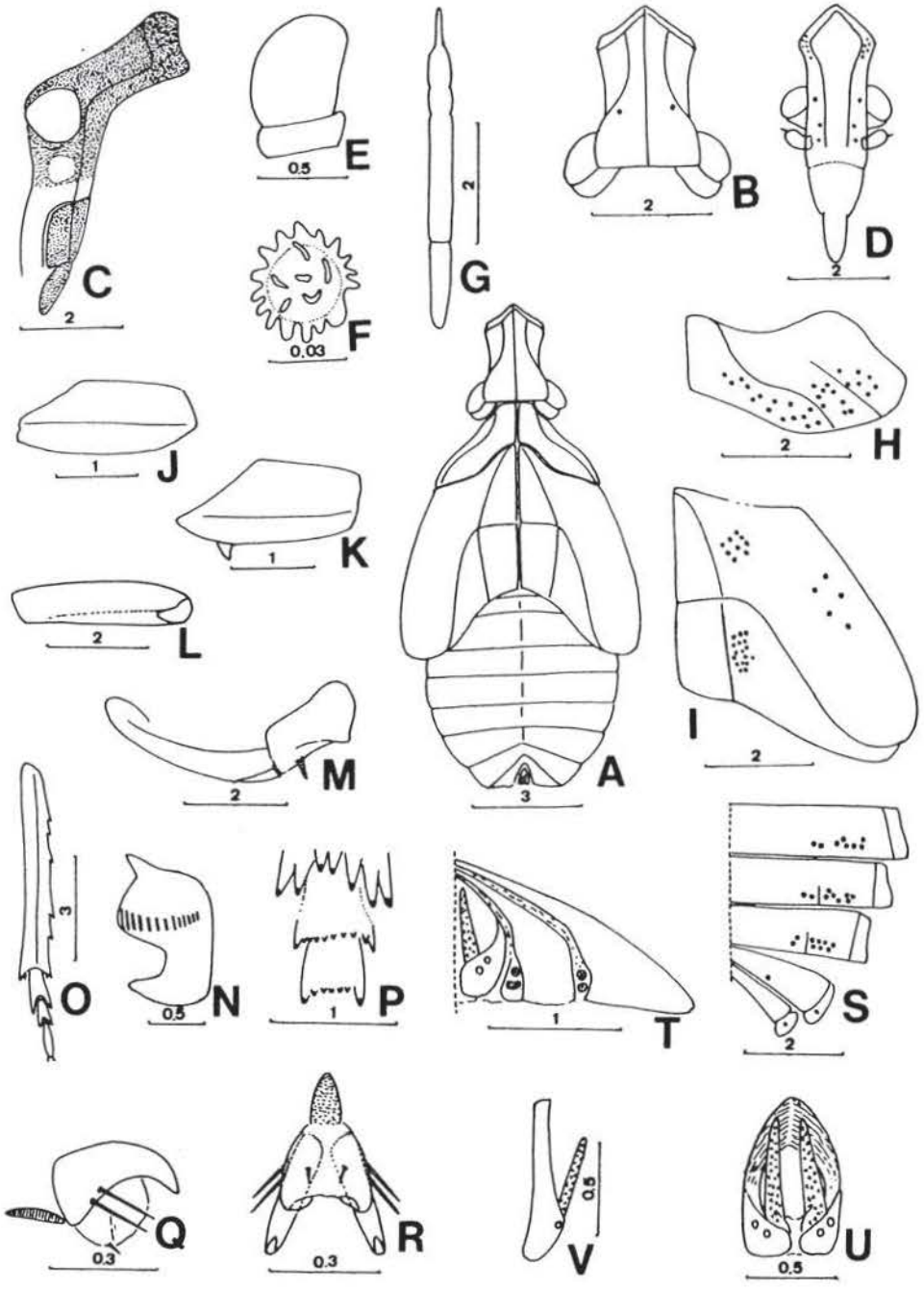

Fig. 84. *Lycorma meliae* Kato. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, wing pads, flat surface; J, procoxa; K, mesocoxa; L, mesofemur; M, metacoxa plus meron; N, metatrochanter; O, metatibia and tarsi; P, apical teeth of metatibia and first two tarsi; Q, pretarsus, lateral view; R, the same, ventral view; S, abdominal tergites VI-VIII, flat surface; T, abdominal segments VII-IX, caudal view; U, abdominal segment IX, caudal view; V, the same, lateral view. (unit = mm.)

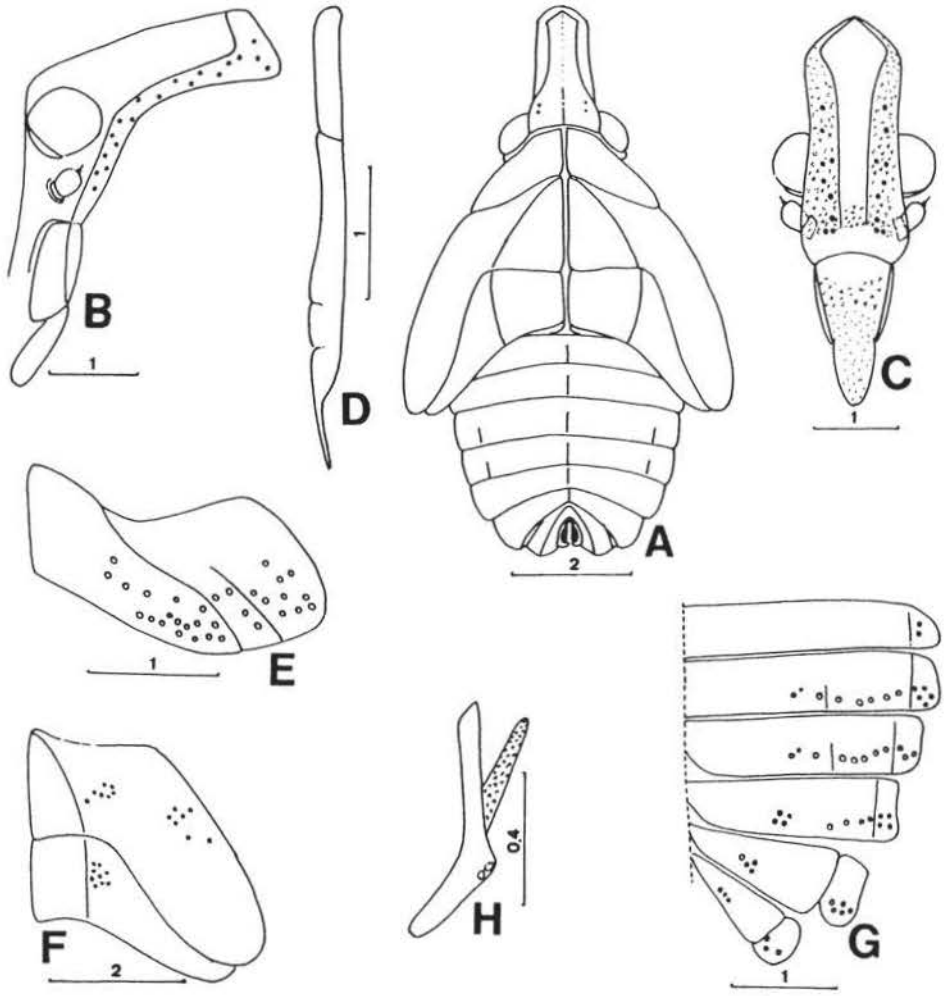

Fig. 85. Fulgoridae sp.1. A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites III-VIII, flat surface; H, ninth abdominal segment, lateral view. (unit = mm.)

83. **Fulgoridae** sp.2. (Fig. 86)

General color uniform brown, scattered black, small spots.

Vertex extreme long, 4.4 times longer in middle line than wide between eyes, gradually narrowing to apex, median carina distinct throughout, before anterior level of eyes with many pits. Frons in lateral view straight, 4.7 times longer in middle line than wide at level of antennae, near base strongly angulate laterad, diamond-shaped, distance at where 4.8 times wider than at level of antennae, median carina present at basal fourth, each side with about 70 pits. Rostrum with subapical segment 1.6 times longer than apical.

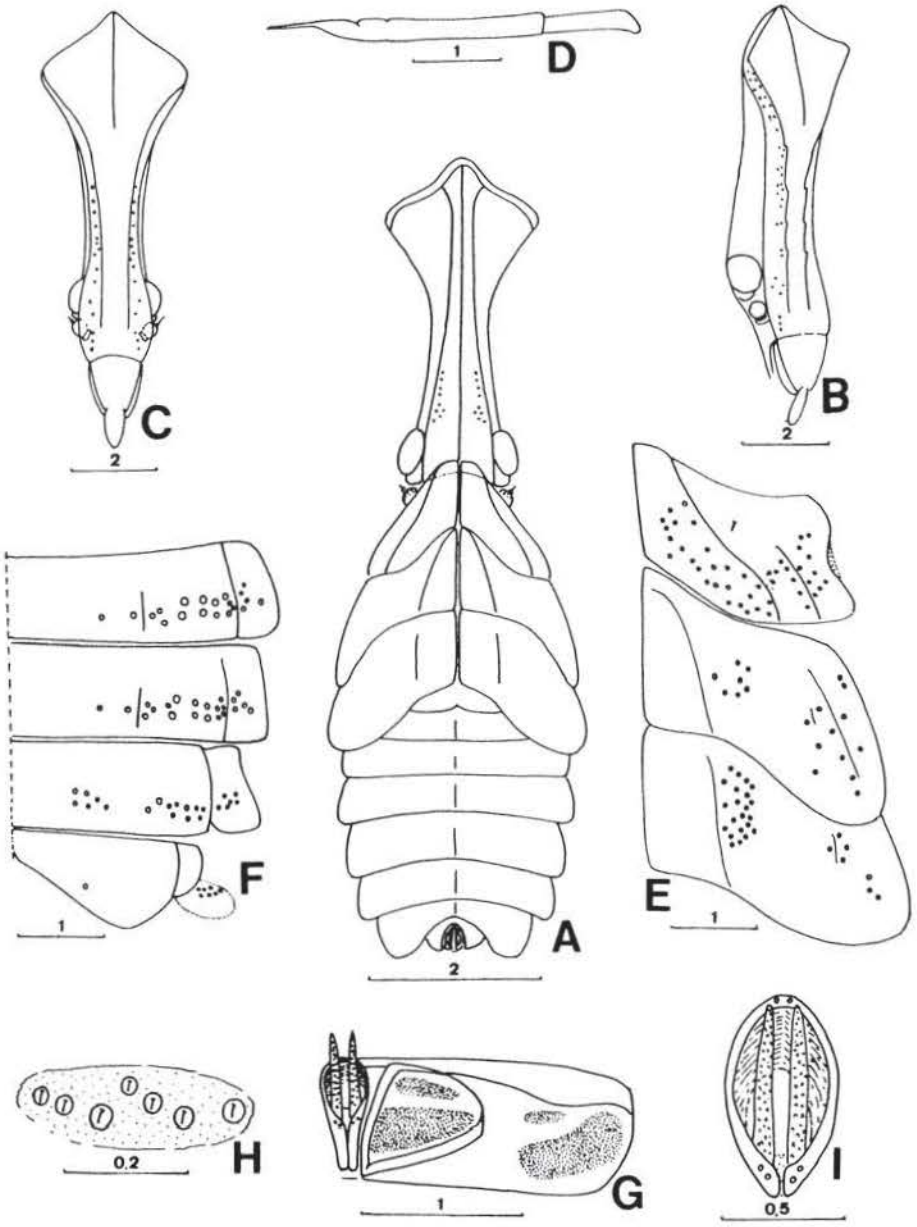

Fig. 86. Fulgoridae sp.2. A, fourth instar nymph, dorsal view; B, head, lateroventral view; C, the same, ventral view; D, rostrum; E, pronotum and wing pads, flat surface; F, abdominal tergites IV-VII, flat surface; G, abdominal segments VII-IX, caudal view; H, sensory pits of abdominal segment VIII; I, ninth abdominal segment, dorsal view. (unit = mm.)

Pronota each with about 44 pits, between lateral and humeral carinae with 8 pits. Anterior wing pads each with 7 pits near notum, 12 pits laterad. Posterior wing pads each with 22 pits near notum. Metatibiae each with 6 lateral teeth. Spinal formula of hind leg 7-9-4.

Abdominal tergites IV-VIII each side with 15-17-16-1-0 pits respectively. Abdominal pleurites IV-VIII each with 5-5-6-7-6 pit respectively. Abdominal segment VIII rather small. Abdominal segments VII-VIII each side with a pair of transverse, wax-pore plate, dorsal one smaller than ventral, indistinct but recognizable. Ninth abdominal segment each side with 2 pits dorsal, 2 ventral.

Length of body: 9.2 mm.

Length of anterior wing pad: 1.30 mm.

Specimen examined: Fourth instar nymph: 1, Ilan Hsien, Shuanleipi, 14-V-1988, S.C. Tsaur.

Determination: No adult emerged from nymph. As a whole resembles *Lycorma meliae*, it should belong to Fulgoridae.

The other species referred:

1. Itzalana submaculata Schmidt (Wilson and O'Brien, 1986)

IX. Family **RICANIIDAE** Amyot and Serville

Ricaniidae Distant, 1879, J. Asiatic Soc. Bengal 48:38.
Ricanides Amyot and Serville, 1843, Histoire Naturalle des Insectes. Hemipteres 1843:527.

Body stout and short. Vertex wider than long in middle line, horizontal. Frons as long in middle line as wide at widest part, with distinct median and submedian carinae, median carina always distinct only at basal half, each side of frons with 14-26 pits. Frontoclypeal suture arched. Postclypeus ecarinate. Rostrum 4-segmented, subapical segment longer than apical, apical segment truncate at apex. Antennae with first segment wider than long, second segment cylindrical, sensory organs with lobe-like processes.

Pronota with lateral carinae as anterolateral margins, each with or without humeral carina, with 16-26 pits. Meso- and metanota without pit. Anterior wing pads each with 1-7 pits near notum, 2 pits laterad. Posterior wing pads without pit. Pro- and mesocoxae slender, ridged, mesocoxae at basoventral angle angulate, not really produced as process. Pro- and mesofemora at ventral margins one side slightly expanded and with teeth. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged, gradually narrowing to distal portion. Metatibiae compressed, longitudinal ridged, each with 2-4 lateral teeth. Spinal formula of hind leg (6-7)-(5-10)-0. Second metatarsal segment at apex conical. Pretarsi with claws stout, widely divergent apically, claw 3-setose. Arolium reaching to apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites III-VIII each side with (0-4)-(3-6)-(4-6)-(5-13)-(4-5)-(8-9) pits respectively. Pits present on tergites III-V confined lateral third. Abdominal pleurites absent. Sensory pits associate with wax-pore plates of tergites VI and VIII sometimes deeply embedded or removed, 2 or 3 pits combined, bordered with subcircular or subquadrate sclerotized ring. Abdominal tergite VI each side with 5 wax-pore parts which set at caudolateral membraneous areas, usually 3 of them ventrad, count from middle usually the first one the largest, each associate with 1-3 pits. Abdominal tergites VII each side if with 3 wax-pore parts, the upper one the largest, the fused portion of 3 parts. Abdominal tergites VIII reduced, each side with single, large wax-pore plate, the fused portion of 6 parts, associate with 8-9 pits (arranging in 1-1-2-2-(1-2). Ninth abdominal segment in lateral view usually broadest dorsad, with 2 pits near dorsal margin. Anal comb long, 2 times longer than wide, lobe-like, arising laterad.

Habitat: On leaves.

84. *Ricanula sublimata* (Jacobi) (Fig. 87)

Ricanula sublimata Metcalf, 1955, Gen. Cat. Homoptera, Fas. IV, part 16:101.
-: Wu and Yang, 1989, Taiwan Mus. Spec. Publ. 8:197 (nymph).
Ricania sublimata Jacobi, 1916, Deutsche Ent. Zeit.:303.

Specimens examined: Fifth instar nymph: 15, Nantou Hsien, N. Tungyaanshan, VII-1985, S.J. Fang; C.L. Chen and C.T. Yang.

Determination: 3 male adults emerged from nymphs, determined by C. T. Yang from comparison of male genitalia.

85. **Ricaniidae** sp.1. (Fig. 88)

Head yellowish with vertex, lateral areas of frons above portion somewhat reddish. Pronota with median disc yellowish, transverse band at middle reddish, lateral areas brown. Pro-, mesonota and wing pads dark brown, round spot at inner apical angle of mesonota, triangle areas at each end of lateral carina yellowish. Abdomen with dorsal aspect brown, ventral aspect and legs yellow.

Frons 1.2 times wider at widest part than long in middle line, each side with about 26 pits. Anterior wing pads each with single pit near notum, 2 pits laterad. Metatibiae each with 3 lateral teeth. Spinal formula of hind leg 6-7-0.

Abdominal segments III-VIII each side with 4-5-(5-6)-13-5-7 pits respectively. On segment VI each side with single pit on tergite, other associate pits arranging in 1-2-3-3-3, VII in 1-1-1-1-1, VIII in 1-1-2-2-1. Ninth abdominal segment in lateral view with 2 pits dorsal, close to dorsal margin.

Length of anterior wing pad: 1.97 mm.

Specimens examined: Fifth instar nymph: 1, Nantou Hsien, N. Tungyaanshan, 22-VII-1985, C.T. Yang; 1, same place, 23- VII-1985, S. J. Fang; 2, 17-VII-1986, L. Y. Huang.

Determination: No adult emerged from nymph.

The other species examined

1. *Pochazia pitera* Distant (examined)
2. *Ricania fumosa* (Walker) (examined)
3. *Ricania quadrimaculata* Kato (examined)
4. *Ricania simulans* (Walker) (examined)
5. *Ricania* sp. (examined)

X. Family **EURYBRACHIDAE** Stål

Eurybrachidae Stål, 1869, Handl. Svenska Vet. Akad. 8(1):100.
Eurybrachydidum Stål, 1862, Öfv. Svenska Vet. Akad. Förh. 19:488.

Body oval. Vertex transverse, 3-5 times wider than long in middle line, carinate, median carina feeble or distinct. Frons wider than long, area above union of submedian carinae at same plane of vertex, lateral margins carinate, distinctly angulated at level of antennae, submedian carinae at base unite medially, in ventral view lateral carinae at base invisible, median carina present or absent, each side of frons with 25-35 pits. Postclypeus ecarinate. Frontoclypeal suture

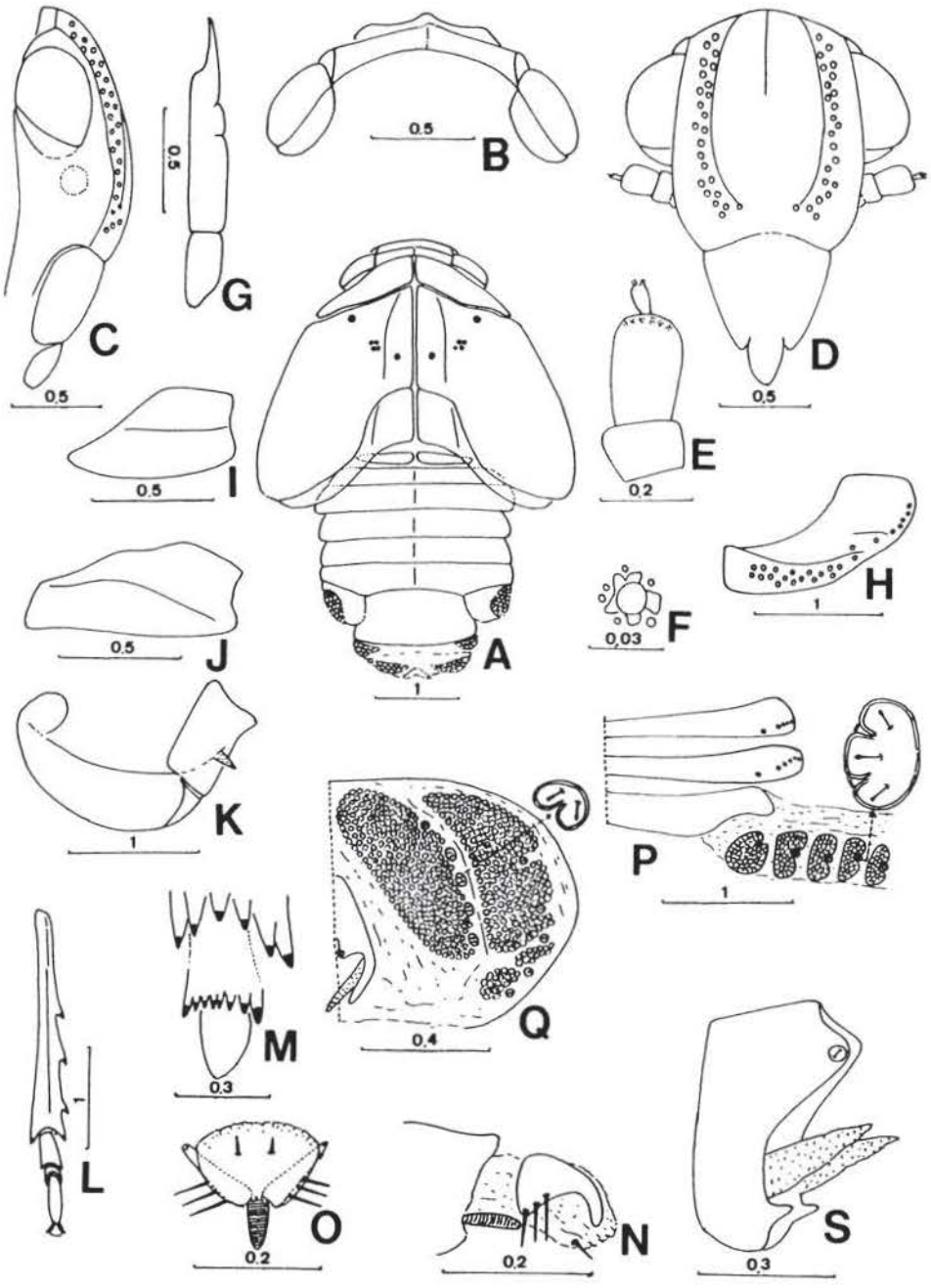

Fig. 87. *Ricanula sublimata* (Jacobi). A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, procoxa; J, mesocoxa; K, metacoxa plus meron; L, metatibia and tarsi; M, apical teeth of metatibia and first two tarsi; N, pretarsus; O,the same, ventral view; P, abdominal tergites VI-VI, flat surface; Q, abdominal segments VII-IX, caudal view; S, abdominal segment IX, lateral view. (unit = mm.)

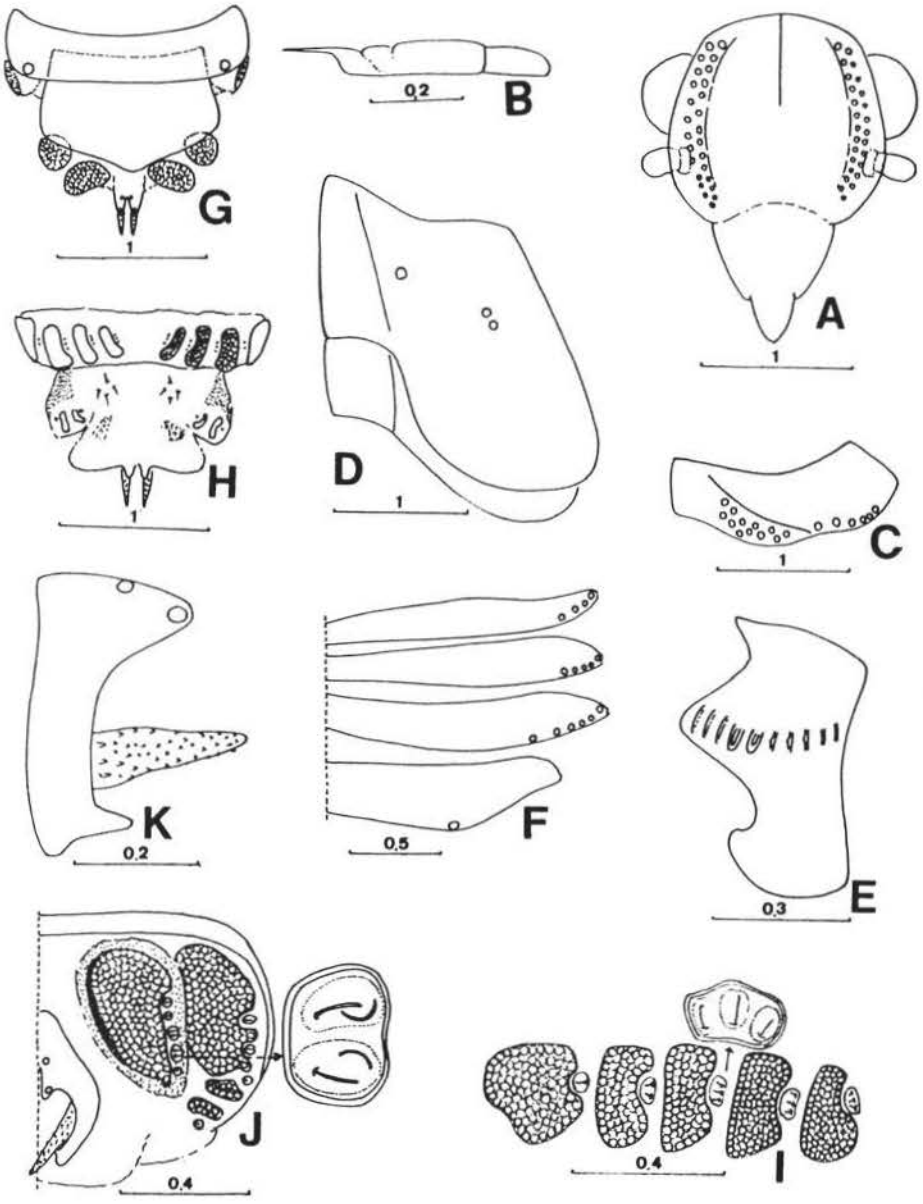

Fig. 88. Ricaniidae sp.1. A, head, ventral view; B, rostrum; C, pronotum, flat surface; D, wing pads, flat surface; E, metatrochanter; F, abdominal tergites III-VI, flat surface; G, abdominal segments VI-IX, dorsal view; H, the same, ventral view; I, wax-pore plates of abdominal segment VI, flat surface; J, abdominal segments VII-IX, caudal view; K, ninth abdominal segment, lateral view. (unit = mm.)

arched upward or straight. Rostrum 4-segmented, subapical segment longer than apical, apical segment longer than wide, truncate at apex, apex at apicodorsal portion each side with a elongate ovate, transparent part. Eyes in lateral view distinctly emarginate ventrally. Antennae with first segment wider than long, second segment longer than wide, sensory organs with lobe-like processes.

Pronota with lateral carinae as anterolateral margins, each with 19-24 pits, most of them confined inner side of lateral carina. Sensory pits bordered with entire sclerotized ring. Meso- and metanota without pit. Anterior wing pads each with 8-13 pits near notum, 3-7 pits laterad. Posterior wing pads each with 9-10 pits near notum. Procoxae short, but not conical, ridged. Pro- and mesofemora and tibiae compressed, femora diverging to apex, protibiae distinctly longitudinal ridged from dorsobasal portion to ventroapical, mesotibiae longitudinal ridged, with margins parallel. Metacoxa plus meron crescent-shaped, immovable, each with a meracanthus. Metatrochanters ridged, ridges gradually narrowing to apex. Metatibiae compressed, longitudinal ridged, each with 4-5 lateral teeth. Spinal formula of hind leg (9-10)-(5-12)-0. First metatarsal segment with apical teeth interrupt at middle, with dense setae at ventral surface apical two-thirds. Second metatarsal segment at apex conical. Pretarsi with claws divergent apically, claw 3-setose. Arolium reaching nearly to apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites IV-VIII each side with 1-1-1-1-0 pits respectively. Abdominal pleurites reduced. Abdominal segments III-VI or IV-VI each side with 1-5 wax-pore parts respectively, always on membraneous area, pits associate above. Abdominal segments VII-VIII each side with 2-6 wax-pore parts respectively, each with 2 kinds of pores. Wax-pore part of VIII at upper portion shaped in concentric circle, with or without pit at center. Abdominal tergite VIII reduced as a paired rather small plate above abdominal segment IX. Ninth abdominal segment each side with 3-4 pits, 2-3 dorsal, 1 ventral.

Habitat: On leaves.

Key to species of Eurybrachidae

1. Frons uniform brown; frons with distinct median carina; apical teeth of first metatarsal segment arranging in 2 longitudinal rows ..... Eurybrachidae sp. 2.
-. Frons brown to dark brown, median third black below where with a transverse white line; frons without median carina; apical teeth of first metatarsal segment arranging in transverse rows ..... Eurybrachidae sp. 1.

86. **Eurybrachidae** sp. 2. (Fig. 89)

General color brown. Wing pads, median line of abdominal tergites and pro-legs nearly black. Meso- and meta-legs yellowish brown.

Vertex 2.8 times wider at base than long in middle line. Frons 1.15 times wider than long in longest part, lateral carinae above postclypeus angulate upward. Submedian carinae forming a ring, reaching nearly to median carina. Median carina present. Each side of frons with about 35 pits. Frontoclypeal suture arched upward.

Pronota each with about 24 pits. Anterior wing pads each with 13 pits near notum, 7 pits laterad. Posterior wing pads each with 10 pits near notum. Protibiae with dorsoapical angle evenly arched. Metatibiae each with 4 lateral teeth. Spinal formula of hind leg 10-12-0. Apical teeth of first metatarsal segment arranging in 2 longitudinal rows.

Abdominal segments III-VI each side with wax-pore plate, on III first part present on tergite medially as 2-3 stripes, other 3 parts on membraneous area, without associate pits respectively. On V first part present on tergite medially too, as 2 stripes, the other 4 parts on membraneous area, associate 11 pits. All the first part of membraneous area shaped somewhat

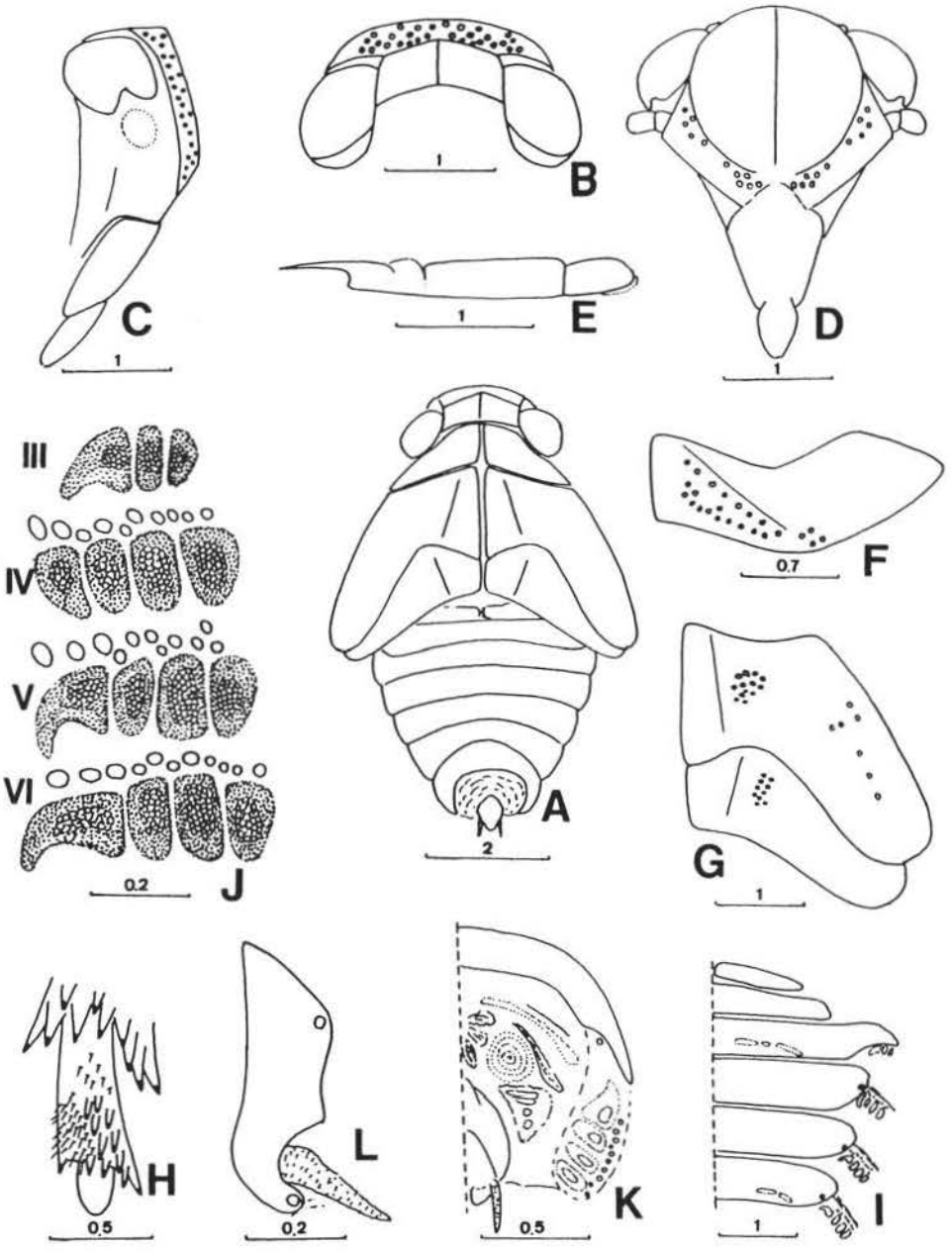

Fig. 89. Eurybrachidae sp.2. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum; F, pronotum, flat surface; G, wing pads, flat surface; H, apex of metatibia and first two tarsal segment, ventral view; I, abdominal tergites I-VI and wax-pore plates, flat surface; J, wax-pore plates of abdominal segments III-VI; K, abdominal segments VII-IX, caudal view; L, ninth abdominal segment, lateral view. (unit = mm.)

different and each part with 2 kinds of pore, central ones larger. Abdominal segment VII each side with 5-parted wax-pore plate, first part slender, upper, the other 4 same shaped as on VI, associate 11 pits. Abdominal segment VIII each side with 5-parted wax-pore plate, first part present as 7 layers concentric circle, lowered, without associate pit, the other 4 on triangular, elevated area, upper 2 stripe-shaped, combined but easily recognizable, lower 2 rounded. Ninth abdominal segment each side with 3 pits, 2 dorsal, 1 ventral.

Length of body: 7.25 mm.

Length of anterior wing pad: 2.75 mm.

Specimen examined: Fifth instar nymph: 1, Australia N. T. Mary River, Amhem wy. 5-X-1989, C. T. & L. B. O'Brien. (specimen was sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien as Eurybrachidae.

87. **Eurybrachidae** sp. 1. (Fig. 90)

Vertex, frons above submedian carinae, pronota above ends of lateral carinae, mesonota and median third of abdominal tergites II-VII dirty yellowish. Frons below submedian carinae with basal third dark brown, median third black, below where with a narrow white line, apical third brown. Clypeus and rostrum dark brown to black. Genae brown scattered yellowish spots except basoventral angles yellowish. Antennae with first segment black, second segment brown, in anterior view with black line arising from dorsobasal angle, protruding to ventroapical angle, basal segment of flagellum black. Lateral areas of pronota, wing pads, metanota, abdominal tergite I and lateral areas of tergites II-VII black. Legs brown to black, scattered yellowish spots. Abdominal sternites IV-VII black.

Vertex 5.3 times wider than long in middle line. Frons 2 times wider at widest part than long in middle line. Submedian carinae reaching slightly over angulations. Median carina absent. Each side of frons with about 25 pits. Frontoclypeal suture straight. Eyes with callus at emarginations produced triangulately above surface.

Pronota each with about 19 pits. Anterior wing pads each with 8 pits near notum, 3 pits laterad. Posterior wing pads each with 9 pits near notum. Protibiae with dorsoapical angles obliquely truncate. Metatibiae each with 5 lateral teeth. Spinal formula of hind leg 9-5-0, apical teeth of first metatarsal segment arranging in a transverse row. Abdominal segments IV-VI each side with a transverse wax-pore plate. Abdominal segments VII-VIII each side with 2-parted wax-pore plate, upper one of VII slender, distinctly arched medially, lower one same shaped as of VI. Upper one of VIII with pores arranging in concentric circle, with a pit at center, lower one on top surface of triangular elevation. Ninth abdominal segment each side with 4 pits, 3 dorsal, 1 ventral.

Length of body: 6 mm.

Length of anterior wing pad: 2.60 mm.

Specimen examined: Fifth instar nymph: 1, India, Malabar Cement, Kerala, 6km. W. Walayar, 12-X-1985, C. W. & L. B. O'Brien. (specimen was sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien.

XI. Family **LOPHOPIDAE** Stål

Lophopidae Haglund, 1899, Öfv. Svenska Vet. Akad. Förh. 56:65.
Lophopida Stål, 1866, Hemiptera Africana 4:130.

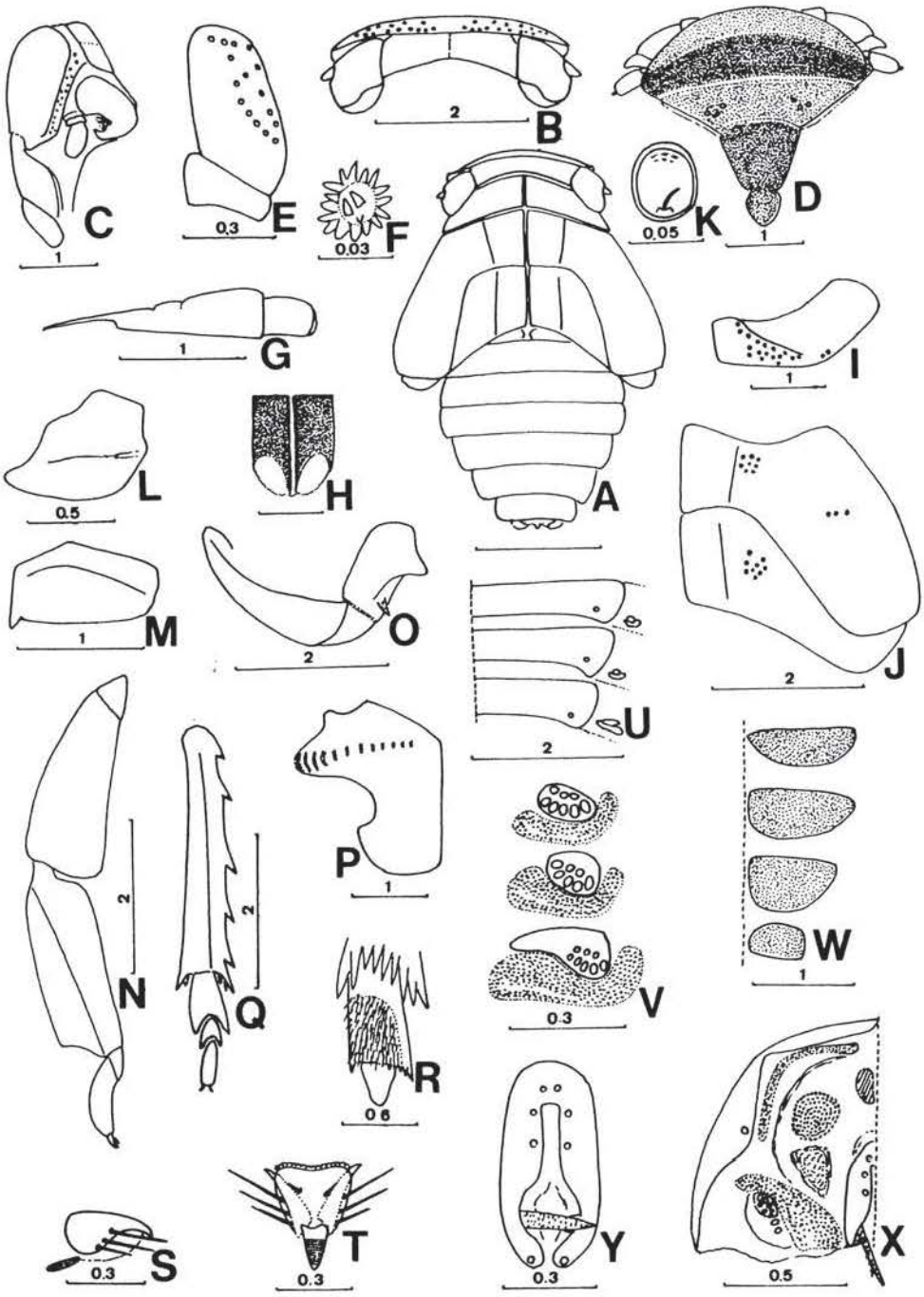

Fig. 90. Eurybrachidae sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, anterolateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum; H, apex of apical segment of rostrum, dorsal view; I, pronotum, flat surface; J, wing pads, flat surface; K, sensory pit; L, procoxa; M, mesocoxa; N, pro-leg; O, metacoxa plus meron; P, metatrochanter; Q, metatibia and tarsi; R, apical teeth of metatibia and first two tarsi; S, pretarsus, lateral view; T, the same, ventral view; U, abdominal tergites IV-VI, flat surface; V, wax-pore plates and sensory pits of abdominal segments IV-VI; W, sclerites of abdominal sternites IV-VII; X, abdominal segments VII-IX, caudal view; Y, abdominal segment IX, caudal view. (unit = mm.)

Body slender. Vertex quadrate, longer than wide, lateral carinae elevated, median carina absent. Frons elongate, lateral carinae oblique, distinctly incurved mesad above frontoclypeal suture, submedian carinae parallel, area between submedian carinae elevated, median carina absent, each side of frons with 11-14 pits. Postclypeus 3-carinate, median carina indistinct. Rostrum 3-segmented, subapical segment longer than apical, apical segment as wide or wider than long, truncate at apex. Eyes in lateral view rounded. Antennae with first segment as wide as long, second segment cylindrical, sensory organs with lobe-like processes.

Pronota with lateral carinae on disc near center, each with 3-6 pits, 1-2 of them on elevate carina. Meso- and metanota with lateral carinae, without pit. Anterior wing pads each with 2 pits near notum, 2-3 pits laterad. Posterior wing pads each with 2 pits near notum. Procoxae slender, ridged, mesocoxae slender, weakly ridged, each basoventral angle with process. Pro- and mesofemora at ventral margins one side expanded ventrad, only expand margin toothed. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged. Metatibiae compressed, longitudinal ridged, each with 2 lateral teeth, apical teeth arranging more than 1 transverse rows, first metatarsal segment with 3-12 teeth, interrupted medially, with distinct crochets at ventroapical portion, second metatarsal segment at apex conical, without tooth. Pretarsi with claws divergent apically, claw 3 setose. Arolium reaching to apices of claws, with 2 paired setae.

Abdomen 9-segmented. Abdominal tergites IV-VIII each side with 1-1-2-2-1 pits respectively. Abdominal pleurites III-VIII each with 2-(2-3)-2-2-(2-3)-1 pits respectively. Pits on tergites relatively close to lateral margins. Abdominal segment VII each side with 2-parted wax-pore plate, upper one kidney-shaped, lower one indefinite, sometimes present by a few scattered pores. Abdominal tergite VIII reduced, each side with 2-parted wax-pore plate, upper one rounded, concentric circle-shaped, lower one slender, definite. Ninth abdominal segment each side with 1 pit ventral. Anal combs rather short, lobe-like, arising laterad.

Habitat: On leaves.

Key to species of Lophopidae

1. Pronota each with 6 pits; metatibia with about 25 apical true teeth .... *Lophops carinata* (Kirby)
-. Pronota each with 3 pits; metatibia with about 13 apical true teeth .... *Elasmoscelis perforata* Walker

88. ***Lophops carinata*** (Kirby) (Fig. 91)

Lophops carinata Tsaur and Yang, 1985, Bull. Soc. Entomol. NCHU 18:75 (nymph)

The description of this nymph by Tsaur and Yang is supplemented and corrected as follows.

Pronota each with 6 pits, one on posterior oblique side of lateral carina. Anterior wing pads each with 2 pits near notum, 2 pits laterad. Posterior wing pads each with 2 pits near notum. Metatibiae each with about 25 teeth arranging in 3 rows. First metatarsal segment with 3 teeth, apical half ventral side with dense crochets.

Abdominal tergites IV-VIII each side with 1-1-2-2-1 pits respectively. Abdominal pleurites III-VIII each with 2-3-2-2-2-1 pits respectively. Abdominal segment VII each side with 2-parted wax-pore plate, upper one large, kidney-shaped, lower one near lateroventral area, represent by widely scattered a few pores, indefinite. Abdominal segment VIII each side with 2-parted wax-pore plate, upper one arranging in concentric circle, lower one slender, obliquely lies on elevated portion.

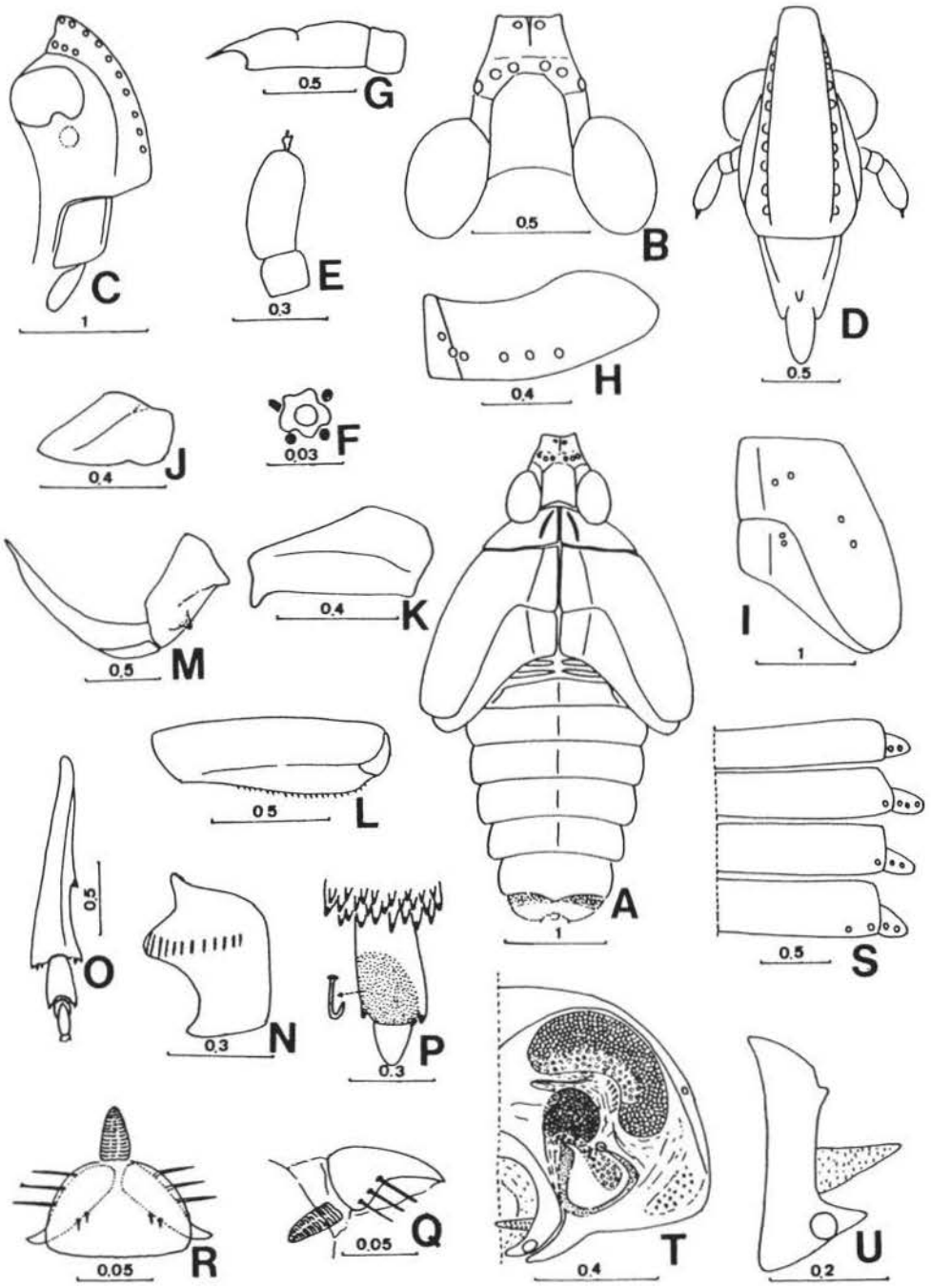

Fig. 91. *Lophops carinata* (Kirby) A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, wing pad, flat surface; J, procoxa; K, mesocoxa; L, mesofemur; M, metacoxa plus meron; N, metatrochanter; O, metatibia and tarsi; P, apical teeth of metatibia and first two tarsi; Q, pretarsus; R,the same, ventral view; S, abdominal tergites and pleurites III-VI, flat surface; T, abdominal segments VII-IX, caudal view; U, abdominal segment IX, lateral view. (unit = mm.)

Specimen examined: Fifth instar nymph: 1, Taichung Hsien, Kukuan, 30-VII-1987, C. T. Yang.

Determination: Determined from its appearance by C.T. Yang.

89. ***Elasmoscelis perforata*** Walker (Fig. 92)

Elasmoscelis perforata Chan and Yang, 1988, Taiwan Mus. Spec. Publ. 8:158 (nymph).

The description of this nymph by Chan and Yang is supplemented and corrected as follows.

Postclypeus in lateral view with apical portion distinctly protruding, cover base of anteclypeus. Pronota each side with 3 pits, 2 of them on lateral carina. Anterior wing pads each with 2 pits near notum, 3-4 pits laterad. Posterior wing pads each with 2 pits near notum. Membraneous metatarsal teeth at ventral side with crochets.

Abdominal tergites IV-VIII each side with 1-1-2-2-0 pits respectively. Abdominal pleurites III-VIII each with 2-2-2-2-3-1 pits respectively. Abdominal segment VII each side with 2-parted wax-pore plate, upper one kidney-shaped, lower one present by a few scattered pores. Abdominal segment VIII each side with 2-parted wax-pore plate, upper one rounded, lower one slender, protruding into ventral aspect.

Specimen examined: Fifth instar nymph: 1, Kaohsiung Hsien, Chiasien, 9-IX-1987, M. L. Chan.

Determination: Collected with adult at same place and time by Chan.

XII. Family **HYPOCHTHONELLIDAE** China and Fennah

Hypochthonellidae China and Fennah, 1952, Ann. Mat. Nat. Hist. 12(5):194.

Body slender, with rather long setae throughout. Frons, thoracic nota, wing pads and abdominal tergites without sensory pit. Vertex wider than long, anterior margin produced roundly forward, obsoletely carinate, lateral margins carinate, fused with lateral carinae of frons a short distance in front of eyes, median line narrowly membraneous. Frons longer than wide, rounded at base, lateral margins obsoletely carinate, slightly angulate near base, without median and submedian carinae. Frontoclypeal suture straight. Postclypeus rather large, ecarinate. Rostrum long, 3-segmented, subapical segment 2 times longer than apical, apical segment truncate at apex. Antennae with first segment 1.5 times longer than widest part, second segment cylindrical, slightly dilate at apex, 2 times longer than widest part, third segment rather large, with setae, elongate-oval, sensory organs with broad lobe-like processes. Eyes rather small, obsolescent.

Pronota with lateral carinae feeble, as anterolateral margins. Meso- and metanota without lateral carinae. Anterior wing pads reaching far before posterior margin of posterior wing pads, same as in most fourth instar nymph of other Fulgoroidea. Pro- and mesocoxae slender, ridged, mesocoxae at basoventral angles without process. Pro- and mesofemora at ventral margins with one side slightly produced ventrad, without tooth. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged, ridges short, gradually narrowing to apex. Metatibiae terete, ridged, without lateral tooth. Spinal formula of hind leg 5-4-0. Second metatarsal segment at apex conical. Pretarsi with claws rather long, subparallel, claw 3-setose. Arolium extreme small, one-fourth as long as claw, with paired setae.

Abdomen 9-segmented. Abdominal tergites VI-VIII each side with 4-5-3 rounded, small wax pore parts respectively on tergites. Ninth abdominal segment small, ventrad, without sensory pit. Anal combs small, lobe-like, arising laterad.

Habitat: Under ground.

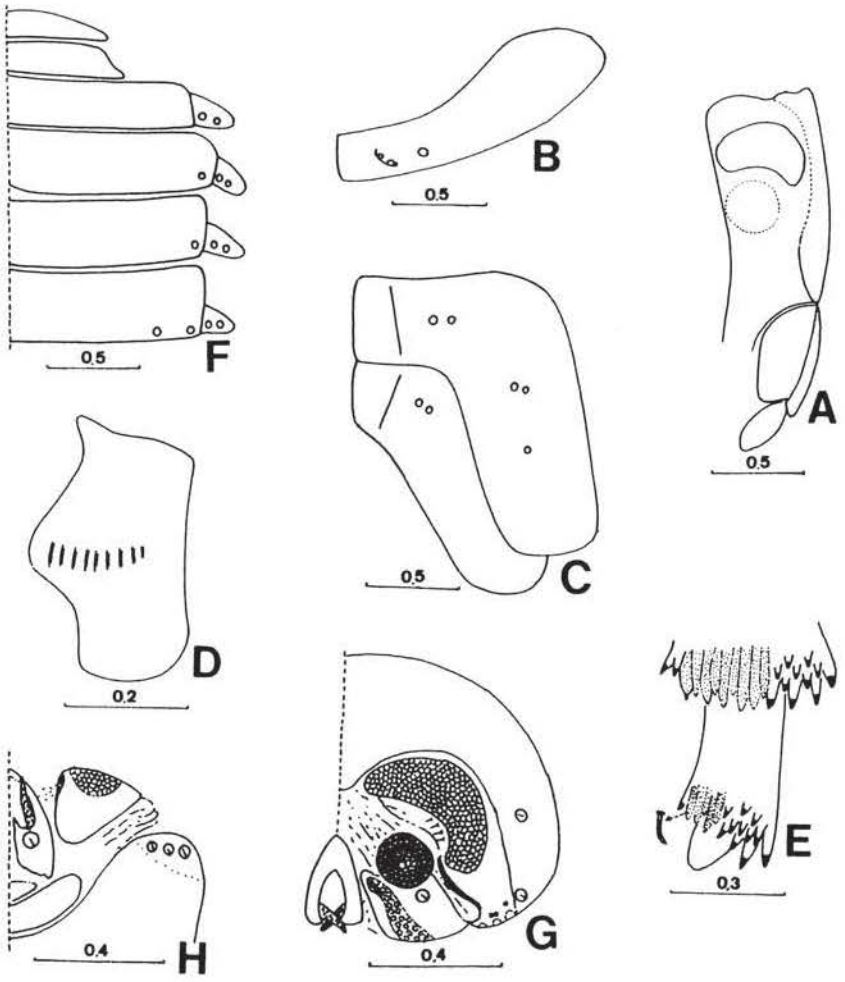

Fig. 92. *Elasmoscelis perforata* Walker A, head, lateral view; B, pronotum, flat surface; C, wing pads, flat surface; D, metatrochanter; E, apices of metatibia and first two tarsi; F, abdominal tergites and pleurites I-VI, flat surface; G, abdominal segments VII-IX, caudal view; H, the same, ventral view. (unit = mm.)

90. ***Hypochthonella caeca*** China and Fennah (Fig. 93)

Hypochthonella caeca China and Fennah, 1952, Ann. Mag. Nat. Hist. 12(5):190.

Body uniform dirty white.

Length of body: 7.94 mm.

Specimen examined: Fifth instar nymph: 2, S. Rhodesia, Salisbury S. Brechin Farm, 24-IV-1950, C. H. Bunzli (specimens were sent by BMNH.)

Determination: Fennah's original specimens.

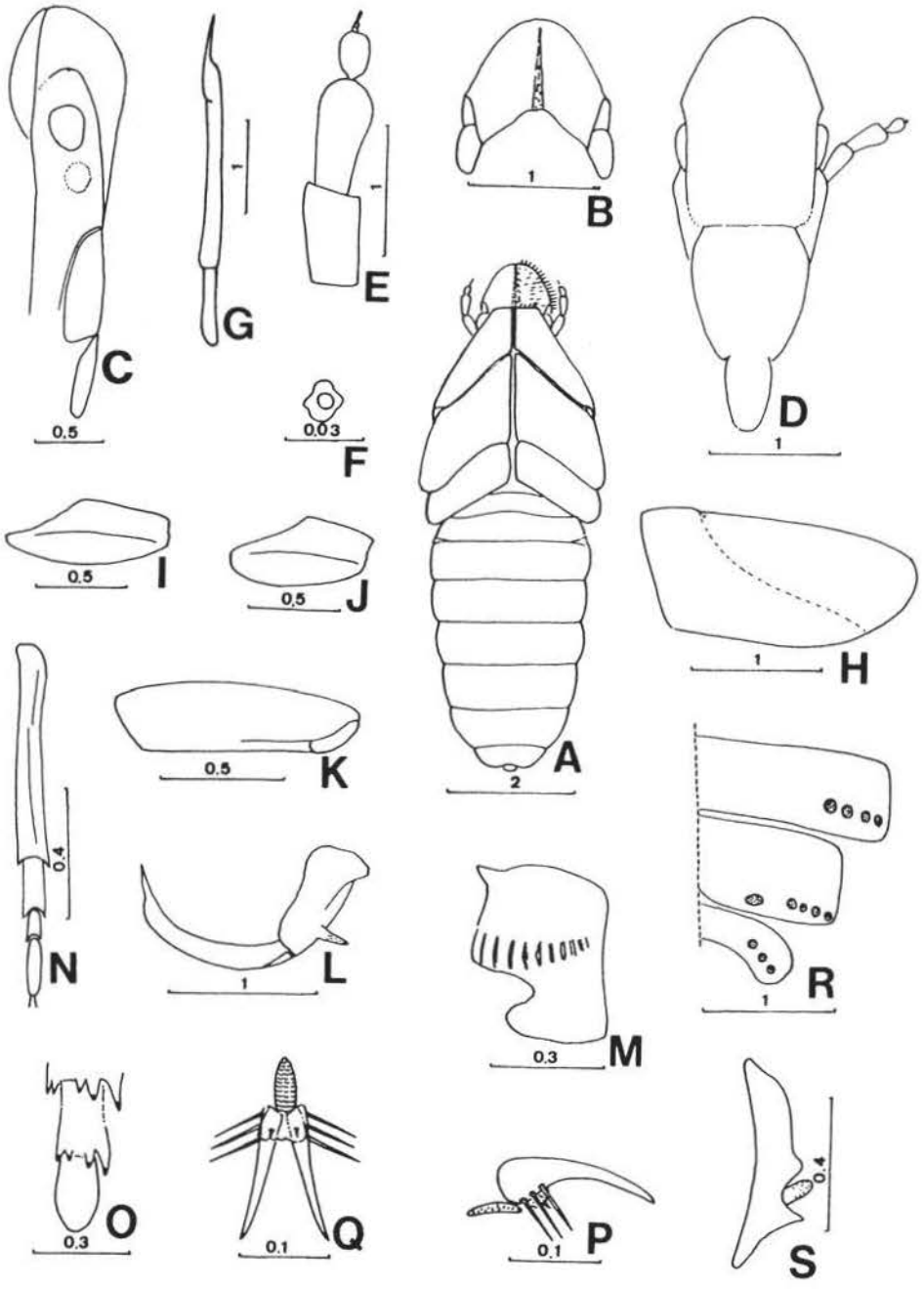

Fig. 93. *Hypochthonella caeca* China and Fennah A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, procoxa; J, mesocoxa; K, mesofemur; L, metacoxa plus meron; M, metatrochanter; N, metatibia and tarsi; O, apical teeth of metatibia and first two tarsi; P, pretarsus; Q, the same, ventral view; R, abdominal tergites VI-VIII, flat surface; S,abdominal segment IX, lateral view. (unit = mm.)

XIII. Family **FLATIDAE** Spinola

Flatidae Swainson and Shuckard, 1840, Natural Arrangement of Insects 1840:130.
Flatoides Spinola, 1839, Ann. Soc. Entomol. France 8:205.

Body stout, more or less slender. Vertex transverse, usually covered by protruding portion of pronota. Frons as wide as long, median and submedian carinae usually present, each side with 18-35 pits. Clypeus ecarinate. Rostrum 3 or 4-segmented, subapical segment longer than apical, apical segment truncate at apex. Antennae cylindrical, first segment longer than wide, sensory organ with short and lobe-like sensory processes.

Pronota with lateral carinae usually as anterolateral margins, each with 12-73 pits. Meso- and metanota without pit. Anterior wing pads each with 10-29 pits near notum, 3-28 pits laterad. Posterior wing pads each with 5-14 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxae without process. Pro- and mesofemora at ventral margins one side not expanded ventrad. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged. Metatibiae compressed, longitudinal ridged, each with 2-4 lateral teeth. Spinal formula of hind leg (6-8)-(7-8)-2. Second metatarsal segment at apex conical. Pretarsi with claws stout, widely divergent apically, claw 1-3 setose, arolium reaching over apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites III-VIII each side with (0-6)-(5-10)-(5-9)-(2-10)-(2-11)-0 pits respectively. Abdominal pleurites III-VIII each with (0-3)-(3-5)-(3-4)-(2-6)-(3-9)-(4-7) pits respectively. Sensory pits associate with wax-pore parts of abdominal tergite VI usually above wax parts. Wax-pore plates of abdominal tergite VI each side usually as 5-parts, elongate or rounded, of VII and VIII with 2-3 different size wax pores, of VII always fused as single one, but usually constricted near middle, of VIII 2 parts or fused as single one. Ninth abdominal segment each side usually with 4 pits, 3 dorsal, 1 ventral. Anal combs short, very broad at base, arising laterad or ventrad.

Habitat: On leaves or below rotten, associate with ants.

Key to species of Flatidae*

1. Anal combs arising laterad 2
-. Anal combs arising ventrad 10
2. Abdominal tergite VI each side with one J-shaped and 4 elongate wax-pore parts 3
-. Abdominal tergite VI each side with 4-5 small, rounded wax-pore parts 4
3. Anterior wing pads each with about 29 pits near notum; abdominal tergite IV each side with 9 pits; J-shaped wax-pore part with longer lower portion ..... Flatidae sp. 3.
-. Anterior wing pads each with about 18 pits near notum; abdominal tergite IV each side with 5 pits; J-shaped wax-pore part with shorter lower portion ..... *Anormenis chloris* (Melichar)
4. Abdominal tergite VI each side with 5 small, rounded wax-pore parts; head in dorsal view pits of frons not recognizable; lateral carinae of frons not strongly incurved at apices 5
-. Abdominal tergite VI each side with 4 small, rounded wax-pore parts; head in dorsal view pits of frons recognizable; lateral carinae strongly incurved at apices ..... *Mimophantia maritima* Matsumura
5. Abdominal tergites III-V each side with wax-pore parts; wax-pore plates of VII and VIII each with 3 different size wax pores; dorsal aspect with 4 longitudinal orange stripes ..... *Salurnis formosana* Jacobi
-. Abdominal tergites III-V without wax-pore part; wax-pore plates of VII and VIII each at most

* *Ormenoides venusta* (Melichar) and *Metcalfa pruinosa* (Say) are not included.

with 2 different size of wax pores 6
6. Wax-pore plates of abdominal segment VIII each side distinctly 2 parted 7
-. Wax-pore plates of abdominal segment VIII each side fused into single 8
7. Upper portion of wax-pore part of abdominal segment VII with uniform large pores; pronota protruding forward not reaching anterior margin of head ..... Flatidae sp. 2.
-. Upper portion of wax-pore part of abdominal segment VII each side distinctly with 2 size pores; pronota protruding forward over anterior margin of head ..... *Phylliana serva* Walker
8. Metanota each with black linear marking along inner side of wax pores; metatibiae each with 8 apical teeth ..... *Cyarda* sp.
-. Metanota without black marking; metatibiae each with 6-7 apical teeth 9
9. Frons only slightly wider than long; anterior wing pads each with about 28 pits laterad .... Flatidae sp. 1.
-. Frons 1.4 times wider than long; anterior wing pads each with about 12 pits laterad .... *Ormenaria rufifascia* (Walker)
10. Vertex 3 times wider than long; pronota each with about 52 pits; anterior wing pads each with 17 pits near notum ..... Flatoides sp. 1.
-. Vertex slightly wider than long; pronota each with 30 or less pits; anterior wing pads each with 9 or less pits near notum 11
11. Fourth instar nymph with abdominal segment VII each side with single wax-pore part; pronota each with about 30 pits; anterior wing pads each with 8-9 pits near notum ..... Flatoides sp. 2.
-. Fourth instar nymph with abdominal segment VII each side with 2 wax-pore parts; pronota each with about 12 pits; anterior wing pads each with 5 pits near notum ..... Flatoides sp. 3.

91. ***Anormenis chloris*** (Melichar) (Fig. 94)

Anormenis sepentrionalis Wilson, 1981, Ann. Entomol. Soc. Am. 74(3):300. (nymph).

The description of this nymph by Wilson (1981) is supplemented as follows.

Frons wider than long, median and submedian carinae present, each side with about 25 pits.

Pronota each with about 62 pits. Anterior wing pads each with 18 pits near notum, 17 pits laterad. Posterior wing pads each with 11 pits near notum. Metatibiae each with 2-4 lateral teeth. Spinal formula of hind leg (7-8)-(7-8)-2. Claw 3-setose.

Abdominal tergites III-VIII each side with 1-5-7-7-5-0 pits respectively. Abdominal pleurites IV-VIII each side with 2-2-3-5-5 pits respectively. Abdominal tergite VI each side with 5 small wax-pore parts, first (count from middle) one J-shaped, lateral 4 somewhat elongate, associate pits arranging in 1-1-1-2-2 form. Wax-pore plate of abdominal segment VII half constricted above middle. Wax-pore plate of abdominal segment VIII single, ovate. The size of pores of both segments uniform. Ninth abdominal segment each side with 2 pits dorsal.

Specimen examined: Fifth instar nymph: 1, U.S.A. Illinois, VI-1977, S. W. Wilson. (specimen was sent by S. W. Wilson)

Determination: Determined by S. W. Wilson.

92. **Flatidae** sp. 3. (Fig. 95)

General color pale yellow. Wing pads each side with several small, brown or black marks. Sensory pits brown. Pronota behind eyes and posterior wing pads at apices black.

Vertex 6.5 times wider at widest part than long in middle line, median carina feeble. Frons 1.5 times wider at widest part than long in middle line, widest at level of antennae. Lateral carinae

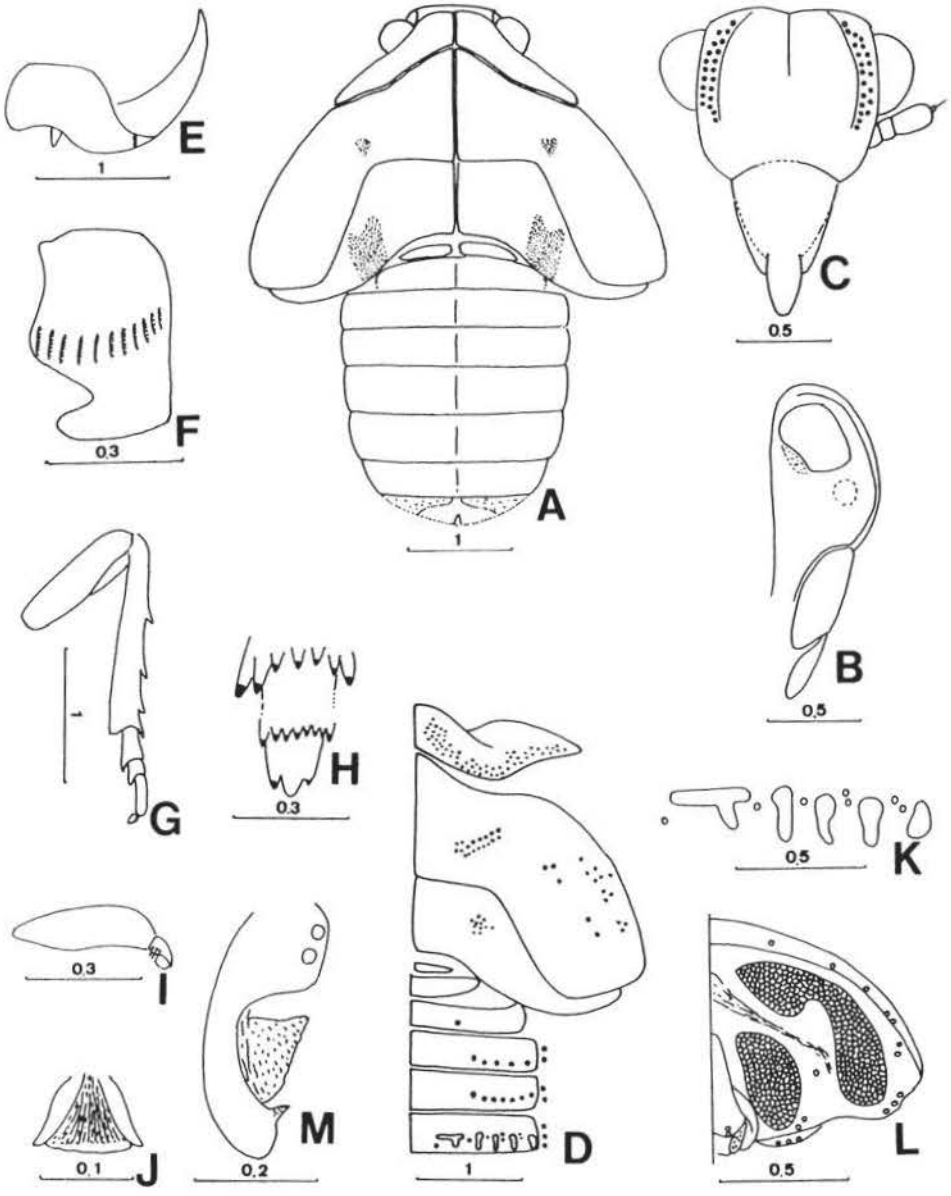

Fig. 94. *Anormenis chloris* (Melichar) A, fifth instar nymph, dorsal view; B, head, lateral view; C, the same, ventral view; D, pronotum, wing pads and abdominal tergites I-VI, flat surface; E, metacoxa plus meron; F, metatrochanter; G, hind leg; H, apex of metatibia and first two tarsi; I, third metatarsal segment and pretarsus; J, pretarsus, ventral view; K, wax-pore plate of abdominal tergite VI; L, abdominal segments VII-IX, caudal view; M, ninth abdominal segment, lateral view. (unit = mm.)

strongly convex, submedian carinae only visible at base, median carina present at extreme base. Each side of frons with about 25 pits, 5-6 pits separated from others, lie above frontoclypeal suture. Rostrum with subapical segment 1.1 times longer than apical.

Pronota each with a humeral carina and about 70 pits. Anterior wing pads each with about 29 pits near notum, 21 pits laterad. Posterior wing pads each with about 14 pits near notum. Metatibiae each with 3 lateral teeth. Spinal formula of hind leg 8-7-2. Claw 2-setose.

Abdominal tergites IV-VIII each side with 9-9-(8-9)-5-0 pits respectively. Abdominal pleurites IV-VII each with 3-3-(3-4)-3 pits respectively. Abdominal tergite VI each side with 5-parted wax-pore plate, first part (count from middle) J-shaped, other 4 elongate, widened at both ends, sensory pits still between parts, arranging in 1-1-2-2-(2-3) form. Membraneous area of abdominal segment VII and whole VIII-IX lost.

Length of body: 6.3 mm.

Length of anterior wing pad: 3.2 mm.

Specimen examined: Fifth instar nymph: 1, U.S.A. Fla. Leon. Co. Tallahassee 2-IV-1976, G. R. Marshall. (specimen was sent by L. B. O'Brien).

Determination: Determined by L. B. O'Brien as Flatidae.

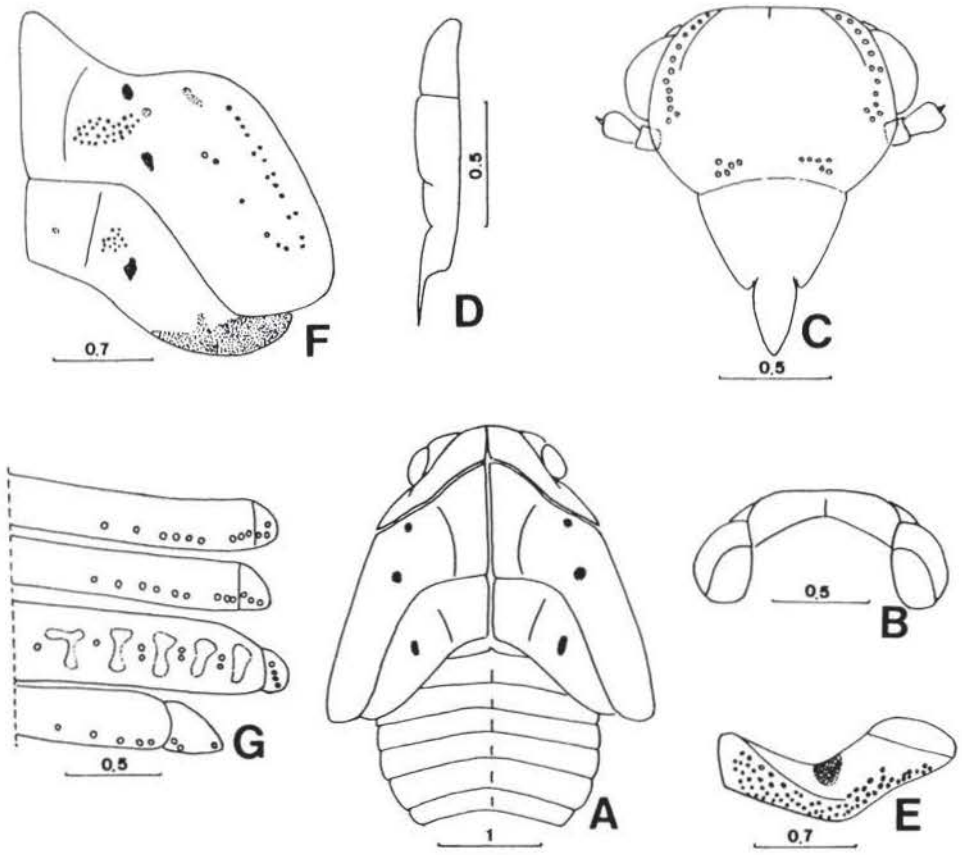

Fig. 95. Flatidae sp.3. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites and pleurites IV-VII, flat surface. (unit = mm.)

93. **Flatidae** sp. 2. (Fig. 96)

General color uniform whitish.

Frons each side with about 30 pits. Rostrum seemly 4-segmented.

Pronota each with about 60 pits. Anterior wing pads each with 22 pits near notum, 17 pits laterad. Posterior wing pads each with 6-7 pits near notum. Metatibiae each with 4 lateral teeth. Spinal formula of hind leg 7-7-2. Claw 3-setose.

Abdominal tergites III-VIII each side with 1-6-6-7-3-0 pits respectively. Abdominal pleurites IV-VIII each with 3-3-3-9-6 pits respectively. Abdominal tergite VI each with 5 small, rounded wax-pore parts. Wax-pore plate of segment VII extreme slender, constricted near middle, the upper portion gradually narrowing to apex, 7 times longer than widest part, with large pores, the lower portion elongate ovate with small pores. Wax-pore plate of abdominal segment VIII distinctly separated 2-parted, upper one with large pores, lower one with small pores. Ninth abdominal segment each side with 4 pits, 3 dorsal, 1 ventrad.

Length of body: 5.0 mm.

Length of anterior wing pad: 2.30 mm.

Specimen examined: Fifth instar nymph: 1, Nantou Hsien, Shitou, 24-III-1990, W. B. Yeh.

Determination: No adult emerged from nymph, species name can't be determined.

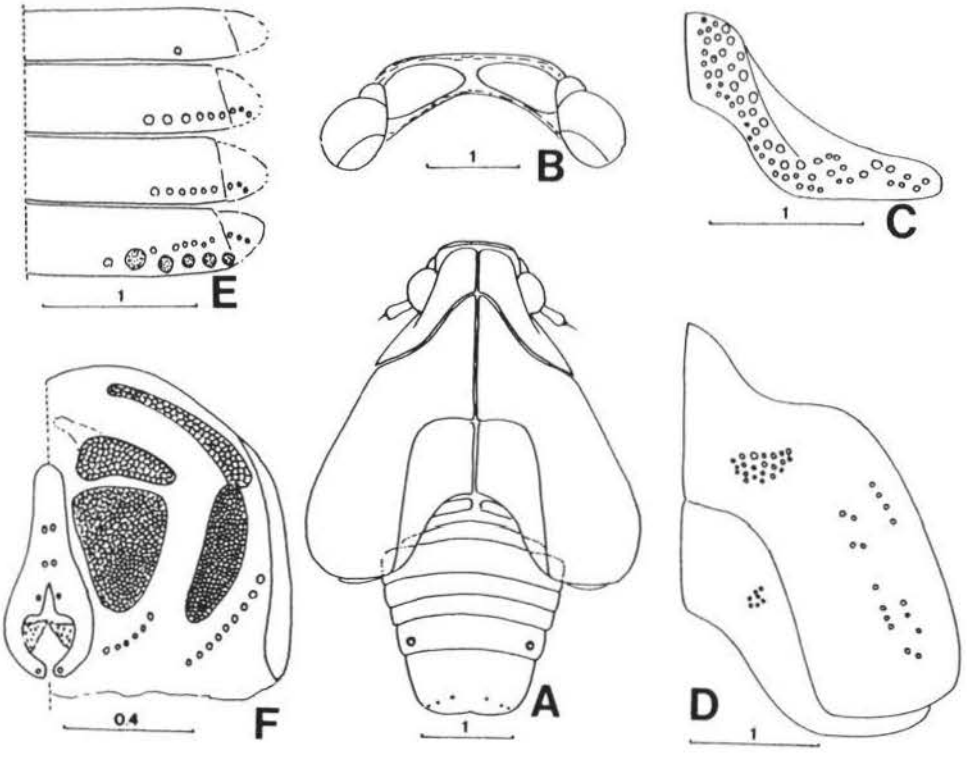

Fig. 96. Flatidae sp.2. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, pronotum, flat surface; D, wing pads, flat surface; E, abdominal tergites III-VI, flat surface; F, abdominal segments VII-IX, caudal view. (unit = mm.)

94. ***Phylliana serva*** Walker (Fig. 97)

Phylliana serva Medler, 1986, Reichenbachia Mus. Tierk. Dresden 23, Nr. 19:107.
Phylliana alba Fang, 1989, Taiwan Mus. Spec. Publ. 8:12. (nymph)

The description of this nymph by Fang (1989) is supplemented and corrected as follows.

Vertex distinctly wider than long, median portion membraneous, each sclerotized lateral area rounded at median end. Frons as long in middle line as widest part. Median carina present at basal half, submedian carinae present, not prominent, reaching to lower level of antennae, each side of frons with about 35 pits. Area along frontoclypeal suture distinctly incised. Rostrum 4-segment, in lateral view basal 2 segments abruptly narrowed, subapical segment 1.1 times longer than apical.

Pronota each with about 73 pits. Anterior wing pads each with about 21 pits near notum, 21 pits laterad, truncated at apices. Posterior wing pads each with about 10 pits near notum. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 8-(7-8)-2. Claw 3 setose.

Abdominal tergites III-VIII each side with 1-8-(7-8)-8-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-4-(3-4)-3-6-7 pits respectively. Abdominal tergite VI each side with 5 small, rounded wax-pore parts. Abdominal segments VII-VIII each side with wax-pore plates, of VII distinctly constricted at middle, upper one 4 times longer than widest part, with inner 2 areas wax pores larger, lower one elongate quadrate with smaller wax pores. Of VIII distinctly 2-parted, upper one gradually narrowing to lateral end, with large wax pores, lower one triangular with small wax pores. Ninth abdominal segment each side with 4 pits, 3 dorsal, 1 ventral.

Length of body: 5.3 mm.

Length of anterior wing pad: 1.80 mm.

Specimen examined: Fifth instar nymph: 1, Kaohsiung Hsien, Liukou, 6-IV-1986, C. T. Yang.

Determination: Collected with many adults at same host plant, determined by Fang from comparison of male genitalia.

95. ***Mimophantia maritima*** Matsumura (Fig. 98)

Mimophantia maritima Matsumura, 1900, Entomol. Nachr. 26:212.
-: Tsaur, 1989, J. Taiwan Mus. 42(1):31. (nymph)

The description of this nymph by Tsaur (1989) is supplemented and corrected as follows.

Vertex with median carina feeble, anterior margin angulate medially. Frons with submedian carinae reaching nearly to frontoclypeal suture, lateral carinae incurved from level of antennae, then reaching to frontoclypeal suture in right angle, basal median portion distinctly raised. Postclypeus ecarinate.

Pronota each with 40-43 pits. Anterior wing pads each with 15-17 pits near notum, about 20 pits laterad, inner caudal angle widely angulate. Posterior wing pads each with 7 pits near notum. Claw 2-setose.

Abdominal tergites III-VIII each side with 1-7-8-10-2-0 pits respectively. Abdominal pleurites III- VIII each with 2-4-4-3-8-(6-7) pits respectively. Abdominal tergite VI each side with 4 rounded wax-pore parts. Abdominal tergite VII and VIII each side with single plate, of VII with upper two-thirds subparallel-sided, lower one third ovate. Pores same size. Ninth abdominal segment each side with 4 pits, 3 dorsal, 1 ventral. Anal combs triangulate, wide at base.

Specimen examined: Fifth instar nymph: 5, Taoyuan Hsien, Palin, 24-VI-1988, S. C. Tsaur.

Determination: Collected with emerged adult. Determined by S. C. Tsaur.

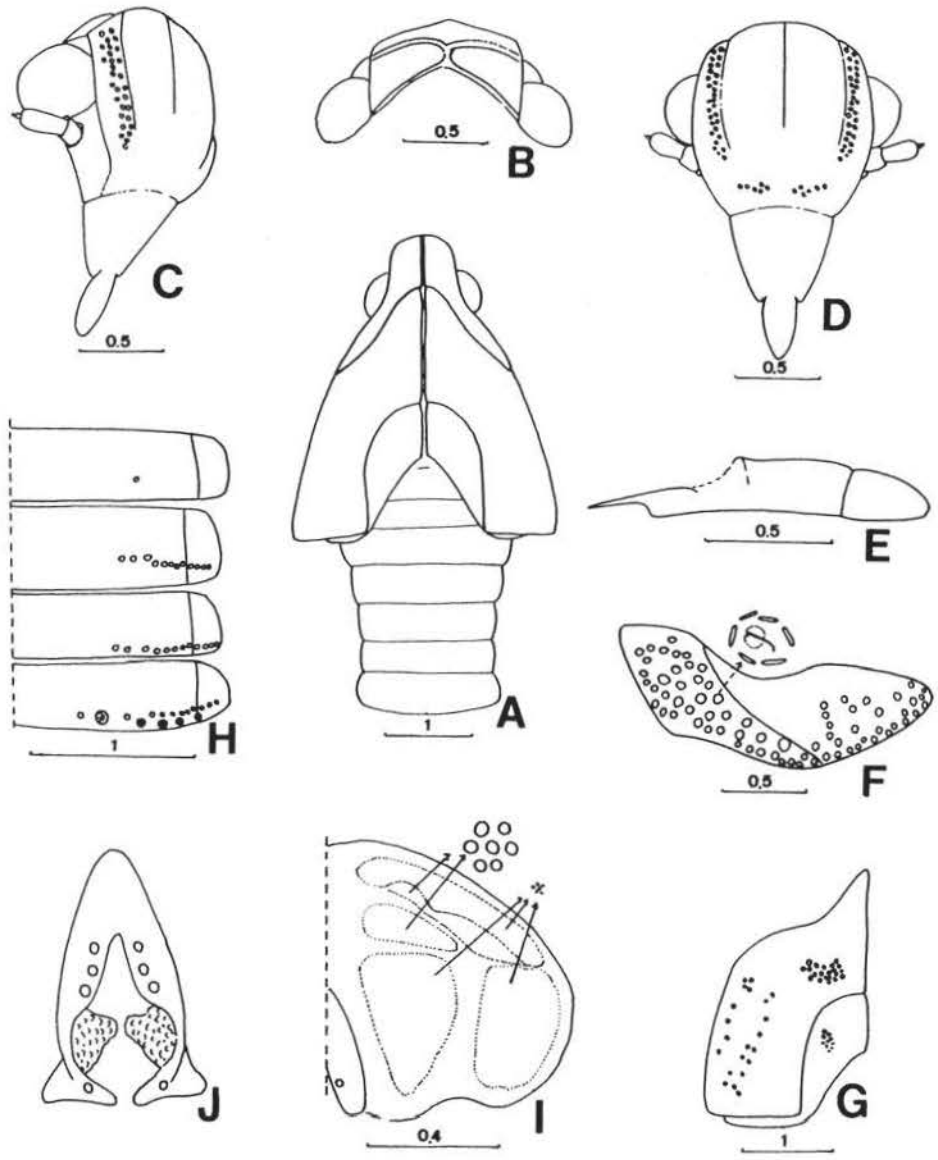

Fig. 97. *Phylliana serva* Walker A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, apicolateral view, D, the same, ventral view; E, rostrum; F, pronotum, flat surface; G, wing pads, flat surface; H, abdominal tergites and pleurites III-VI, flat surface; I, abdominal segments VII-IX, caudal view; J, ninth abdominal segment, caudal view. (unit = mm.)

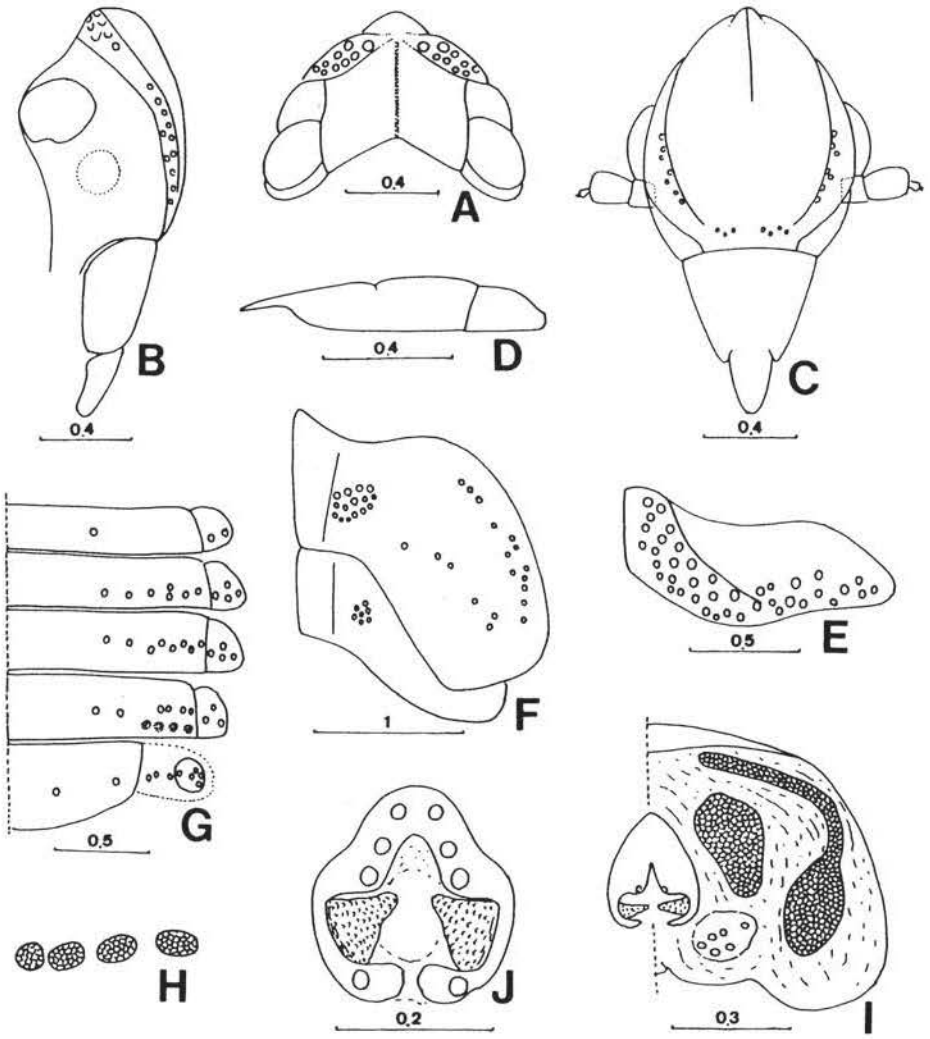

Fig. 98. *Mimophantia maritima* Matsumura A, head, dorsal view; B, the same, lateral view, C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites III-VII, flat surface; H, wax-pore plate of abdominal tergite VI; I, abdominal segments VII-IX, caudal view; J, ninth abdominal segment, caudal view. (unit = mm.)

96. **Flatidae** sp. 1. (Fig. 99)

General color uniform green.

Vertex wider than long. Frons slightly wider than long, quadrate, median and submedian carinae indistinctly present, each side with about 26 pits. Rostrum 3-segmented.

Pronota each with about 56 pits, pits bordered fregmented stripes, anterior margin distinctly protruding forward, nearly cover whole vertex. Anterior wing pads each with 18 pits near

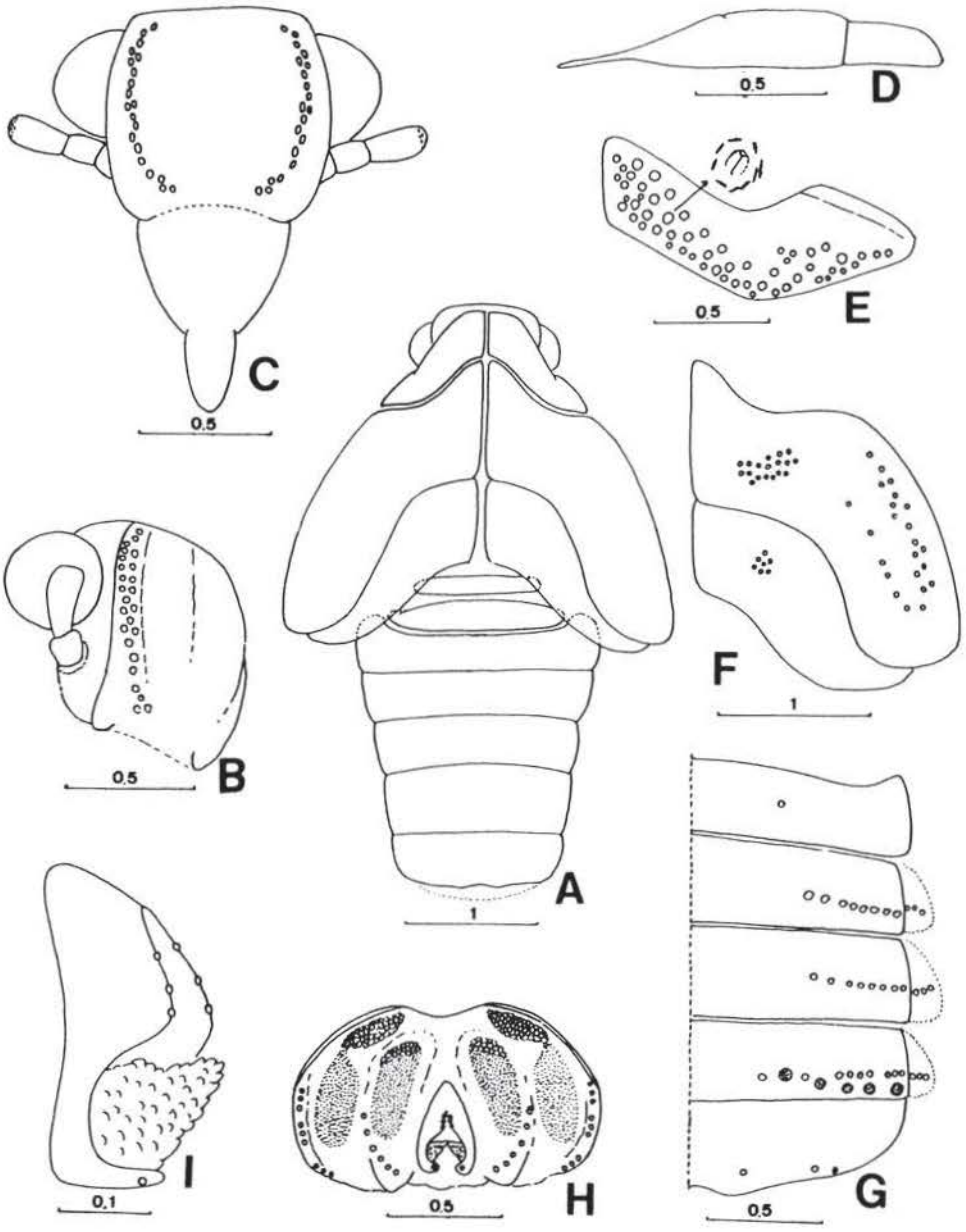

Fig. 99. Flatidae sp.1. A, fifth instar nymph, dorsal view; B, head, apicolateral view, C, the same, ventral view; D, rostrum; E, pronotum, flat surface; F, wing pads, flat surface; G, abdominal tergites III-VII, flat surface; H, abdominal segments VII-IX, caudal view; I, ninth abdominal segment, lateral view. (unit = mm.)

notum, 28 pits laterad. Posterior wing pads each with 7 pits near notum. Metatibiae each with 3 lateral teeth. Spinal formula of hind leg 6-7-2. Claw 2-setose.

Abdominal tergites III-VIII each side with 1-8-8-9-3-0 pits respectively. Abdominal pleurites IV-VIII each with 3-3-3-9-6 pits respectively. Abdominal tergite VI each side with 5 small, rounded wax-pore parts. Wax-pore plate of abdominal segment VII extremely constricted near middle, upper portion 2 times longer than widest part, with large pores, lower portion with small pores. Wax-pore plate of abdominal segment VIII fused as single, but upper fifth with large pores, the remainder with small pores. Ninth segment each side with 4 pits, 3 dorsal, 1 ventral.

Length of body: 4.4 mm.

Length of anterior wing pad: 1.76 mm.

Specimen examined: Fifth instar nymph: 1, U.S.A. Maryland, II-1990, M. M. Yang.

Determination: No adult emerged from nymph.

97. ***Ormenaria rufifascia*** (Walker) (Fig. 100)

Ormenaria rufifascia Metcalf and Bruner, 1948, Ann. Entomol. Soc. America 41:78.
-: Wilson and Tsai, 1984, J. New York Entomol. Soc. 92(4): 307 (nymph)
Poeciloptera rufifascia Walker, 1851, List of Homopterous Insects 2:458.

The description of this nymph by Wilson and Tsai (1984) is supplemented as follows.

Vertex 2.6 times wider than long in middle line, posterior margin strongly angulate at middle, median carina feeble. Frons 1.4 times wider at widest part than long in middle line, median carina present at base, submedian carinae present, not prominent, each side of frons with about 30 pits. Rostrum 3-segmented, subapical segment 1.4 times longer than apical.

Pronota each with a humeral carina and about 52 pits. Anterior wing pads each with 19 pits near notum, 12 pits laterad. Posterior wing pads each with 10 pits near notum. Metatibiae each with 3 lateral teeth. Spinal formula of hind leg 6-8-2. Claw unisetose.

Abdominal tergites IV-VIII each side with 6-6-8-3-0 pits respectively. Abdominal pleurites IV-VIII each with 3-3-2-6-4 pits respectively. Abdominal tergite VI each side with 5 small, rounded wax-pore parts. Abdominal segments VII-VIII each side with wax-pore plates, of VII nearly separated into 2 parts, upper one acute at both ends, 3.5 times longer than widest part, with large pores; lower one drop-shaped, with small pores. Of VIII elongate oval, fused as single one, upper seventh with large pores, the remainder small. Ninth abdominal segment each side with 4 pits, 3 dorsal, 1 ventral.

Specimen examined: Fifth instar nymph: 2, U.S.A. Florida, 25-V-1983, J. H. Tsai. (specimens were sent by S. W. Wilson)

Determination: Determined by S. W. Wilson.

98. ***Salurnis formosana*** Jacobi (Fig. 101)

Salurnis formosanus Jacobi, 1915, Deutsche Entomol. Zeit. 1915:171.
Salurnis formosana Tsaur, 1989, J. Taiwan Mus. 42(1):32. (nymph)

The description of this nymph is corrected and supplemented as follows.

Fifth instar nymph: Claw 3-setose. Abdominal tergites III-VIII each side with 4-9-9-8-6-0 pits respectively. Abdominal tergites III-VI each side with 3-3-3-5 small, rounded wax-pore parts respectively. Abdominal segment VII each side with 2 wax-pore parts, inner one rather small, slender, with large pores, outer one somewhat constricted near middle, with median pores, at lower

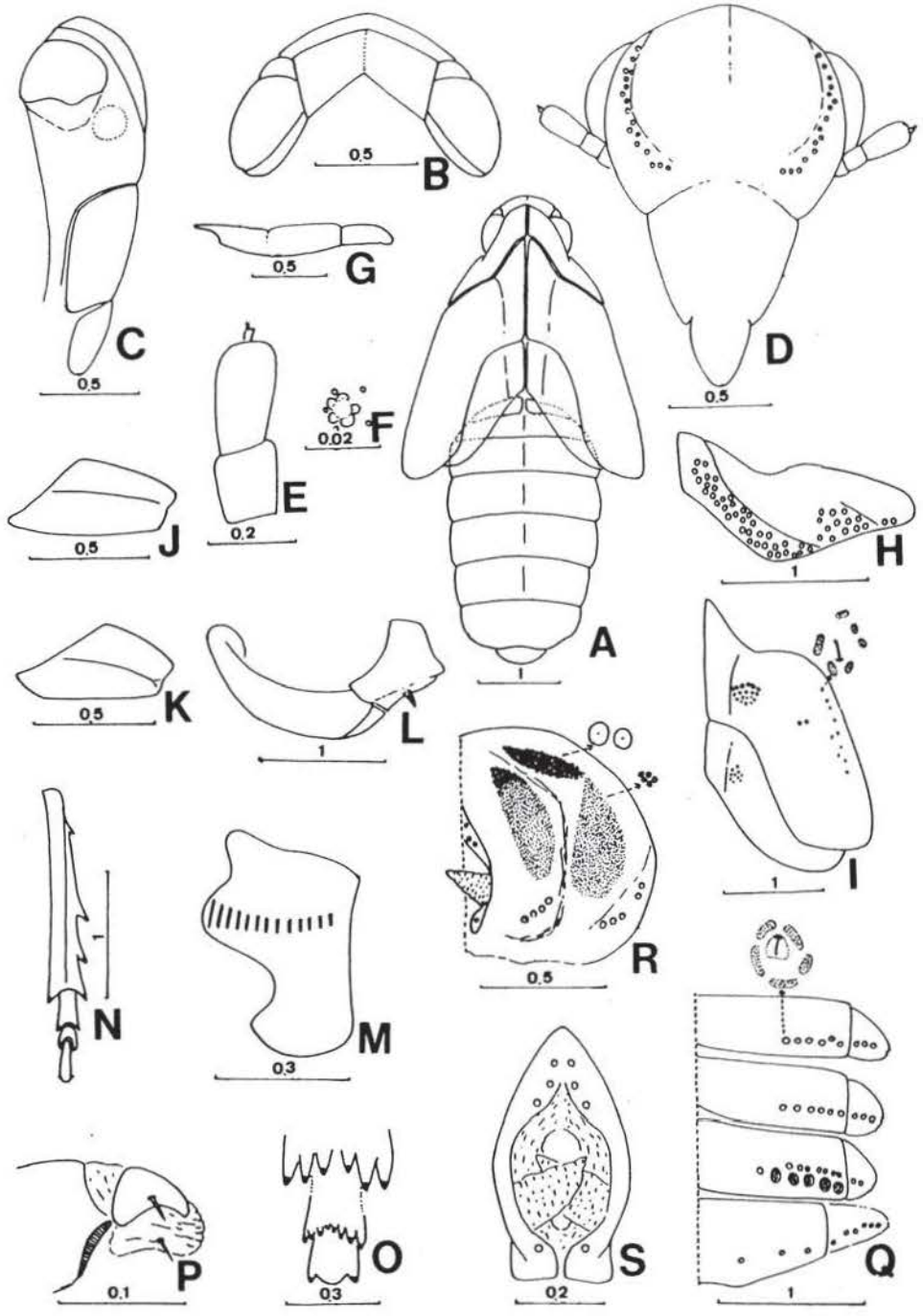

Fig. 100. *Ormenaria rufifascia* (Wakler) A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, wing pad, flat surface; J, procoxa; K, mesocoxa; L, metacoxa plus meron; M, metatrochanter; N, metatibia and tarsi; O, apical teeth of metatibia and first two tarsi; P, pretarsus, lateral view; Q, abdominal tergites and pleurites IV-VII, flat surface; R, abdominal segments VII-IX, caudal view; S, abdominal segment IX, caudal view. (unit = mm.)

portion of median area with small pores. Abdominal segment VIII each side with 2 wax-pore parts, upper one small, with large pores, lower one at dorsal with median pores, ventral with small pores.

Fourth instar nymph: Vertex transverse, ecarinate. Abdominal tergites III- VIII each side with 1-7-6-6-2-0 pits respectively. Abdominal pleurites III-VIII each with 1-2-1-1-5-3 pits respectively. Abdominal tergites III-VI bear each side 2-2-2-4 small, rounded wax-pore parts respectively.

Specimen examined: Fifth instar nymph: 1 (without abdominal segment); Fourth instar nymph: 2 Taitung Hsien, Chipen, 7- IX-1988, S. C. Tsaur.

Determination: Determined by S. C. Tsaur.

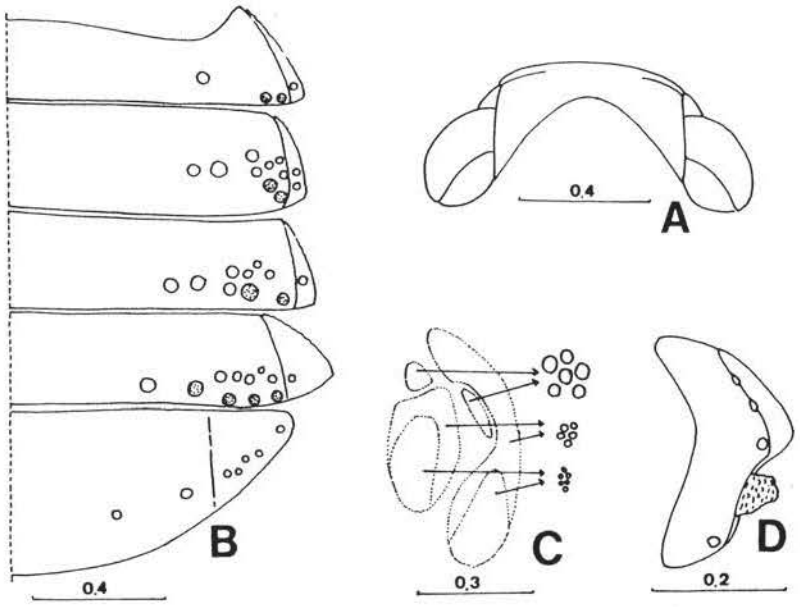

Fig. 101. *Saturnis formosana* Jacobi (fourth instar nymph) A, head, dorsal view; B, abdominal tergites III-VII, flat surface; C, wax-pore plates of abdominal segments VII-VIII; D, ninth abdominal segment, lateral view. (unit = mm.)

99. ***Flatoides*** sp. 1. (Fig. 102)

General color yellowish brown scattered dark brown spots or stripes.

Vertex 3 times wider at apex than long in middle line, median carina distinct, anterior margin roundly convex. Frons 1.1 times wider at widest part than long in middle line, widest above level of antennae, lateral carinae strongly convex laterad near middle, above eyes in ventral view invisible where occupied by submedian carinae. Submedian carinae reaching to median level of eyes, median carina absent. Each side of frons with about 33 pits. Postclypeus with lateral carinae indistinct, in profile recognizable. Rostrum with subapical segment 1.6 times longer than apical. Antennae slender,first segment longer than wide, second segment 2 times longer than wide.

Pronota with lateral carinae distinct, each with a humeral carina and about 52 pits, pits with entire marginal ring. Anterior wing pads each with about 17 pits near notum, 26 pits laterad.

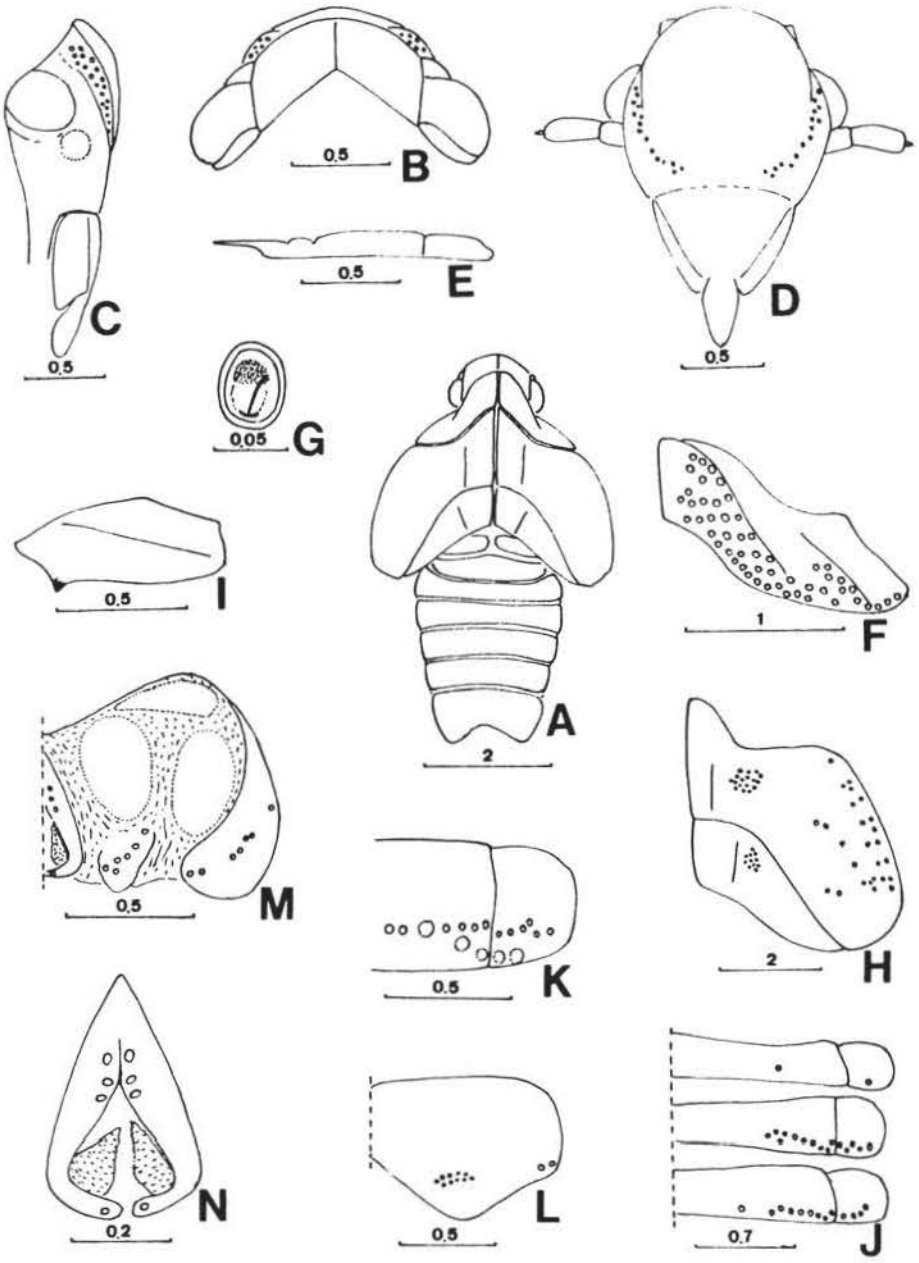

Fig. 102. Flatoides sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum, flat surface; G, sensory pit; H, wing pad, flat surface; I, mesocoxa; J, abdominal tergites and pleurites III-V, flat surface; K, abdominal tergites VI, flat surface; L, abdominal tergite VIII, dorsal view; M, abdominal segments VII-IX, caudal view; N, ninth abdominal segment, lateral view. (unit = mm.)

Posterior wing pads each with 11 pits near notum. Mesocoxae each with a process which sets more distal than at base. Metatibiae each with 3 lateral teeth. Spinal formula of hind leg 7-8-2.

Abdominal tergites III-VII each side with (0-1)-10-9-6-11 pits respectively, pits arranging in a line in IV-VI, 10 of them aggregate in VII. Abdominal pleurites III-VIII each with 1-5-4-6-7-6 pits respectively. Abdominal segment VI each side with 5 small, rounded wax-pore parts, first one (count from middle) more dorsad, at same level of pits, second and third still on tergite, last 2 on pleurite. Abdominal tergite VII in dorsal view with posterior margin distinctly emarginate medially, each side with 2 wax-pore parts, upper one transverse, lower one elongate ovate, rather large. Abdominal tergite VIII entirely reduced, each side with a wax-pore plate. Ninth abdominal segment each side with 4 pits, 3 dorsal, 1 ventral, segment in profile rather wide. Anal combs arising ventrad, directed dorsad, rather short.

Length of body: 6.3 mm.

Length of anterior wing pad: 2.1 mm.

Specimen examined: Fifth instar nymph: 1, U.S.A. Fla. Franklin Co. 3 mi. NW. Alligator Pt. 17-IV-1976, C. W. O'Brien & Marshell (specimen was sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien as Flatoides.

100. ***Flatoides*** sp. 2. (Fig. 103)

FIFTH INSTAR NYMPH (Fig. 103 A-L)

(Body fragmented) Frons each side with 24-25 pits. Sensory pits bordered nearly whole range with small elongate-quadrate sclerites. Pronota each with about 30 pits. Anterior wing pads each with 8-9 pits near notum, 11-12 pits laterad. Posterior wing pads each with 5 pits near notum. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 6-6-2. Abdominal tergites III-VIII each side with 6-6-5-2-2-0 pits respectively. Abdominal pleurites III-VIII each with 3-3-3-2-3-4 pits respectively. Abdominal segments VII-VIII each side with a wax-pore plate respectively, elongate-ovate in outline.

FOURTH INSTAR NYMPH (Fig. 103 M-U)

General color uniform brown, scattered many black, small spots. Vertex 1.3 times wider than long in middle line. Frons slightly longer than widest part, lateral carinae strongly convex medially, in ventral view eyes invisible, area between submedian carinae somewhat raised than lateral areas. Submedian carinae present, indistinct, each side with about 19 pits.

Pronota each with about 30 pits. Anterior wing pads each with 8-9 pits near notum, 12 pits laterad. Posterior wing pads each with 6 pits near notum, 4 pits laterad. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 6-5-2.

Abdominal segments VII-VIII each side with a wax-pore plate respectively, elongate-ovate. Ninth abdominal segment same as in fifth instar nymph.

Fifth instar nymph: Length of anterior wing pad: 2.47 mm.

Fourth instar nymph: Length of body: 4.1 mm.

Length of anterior wing pad: 1.20 mm.

Specimen examined: Fifth instar nymph: 1, fourth instar nymph: 1, Ilan Hsien, Taipingshan, 11-VIII-1990, W. B. Yeh.

Determination: No adult emerged from nymph. As a whole it should belong to Flatidae.

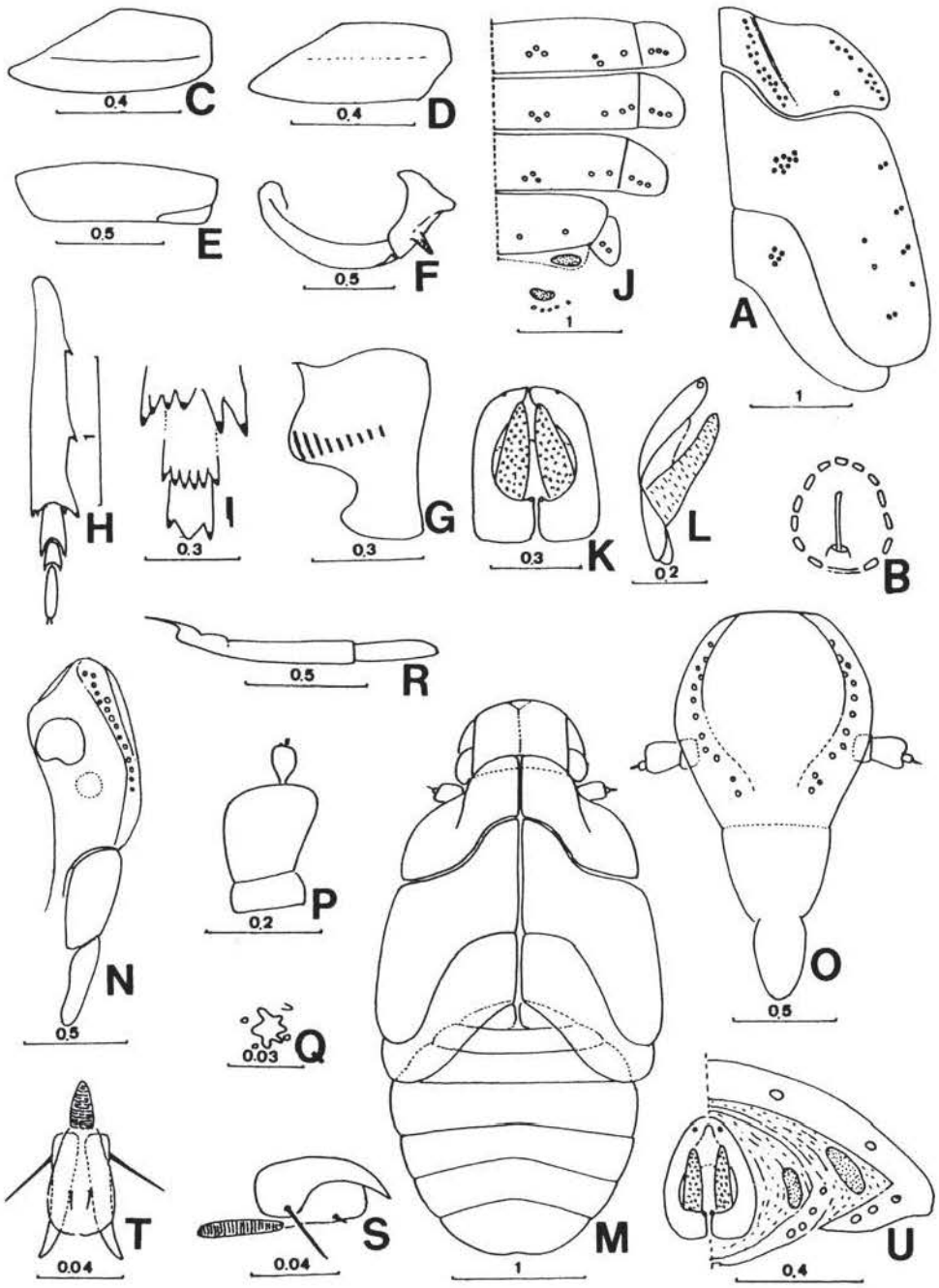

Fig. 103. Flatoides sp.2. fifth instar nymph: A, wing pads, flat surface; B, sensory pit; C, procoxa; D, mesocoxa; E, mesofemur; F, metacoxa plus meron; G, metatrochanter; H, metatibia and tarsi; I, apical teeth of metatibia and first two tarsi; J, abdominal tergites IV-VII and wax-pore plate of VIII, flat surface; K, abdominal segment IX, ventral view; L, the same, lateral view; M, fourth instar nymph, dorsal view; N, head, lateral view; O, the same, ventral view; P, antenna; Q, sensory organ of antenna; R, rostrum; S, pretarsus, lateral view; T, the same, ventral view; U, abdominal segment VII-IX, ventral view. (unit = mm.)

101. ***Flatoides*** sp. 3. (Fig. 104)

General color uniform dark brown, scattered black spots.

Vertex only slightly longer than widest part. Frons 1.1 times longer than widest part, lateral carinae especially ampliated at level of eyes, but in ventral view eyes still visible, submedian carinae at base not fused with anterior margin of vertex. Pits with margin entire, only top one-fourth bordered elongate-quadrate sclerites. Rostrum with subapical segment 1.9 times than apical.

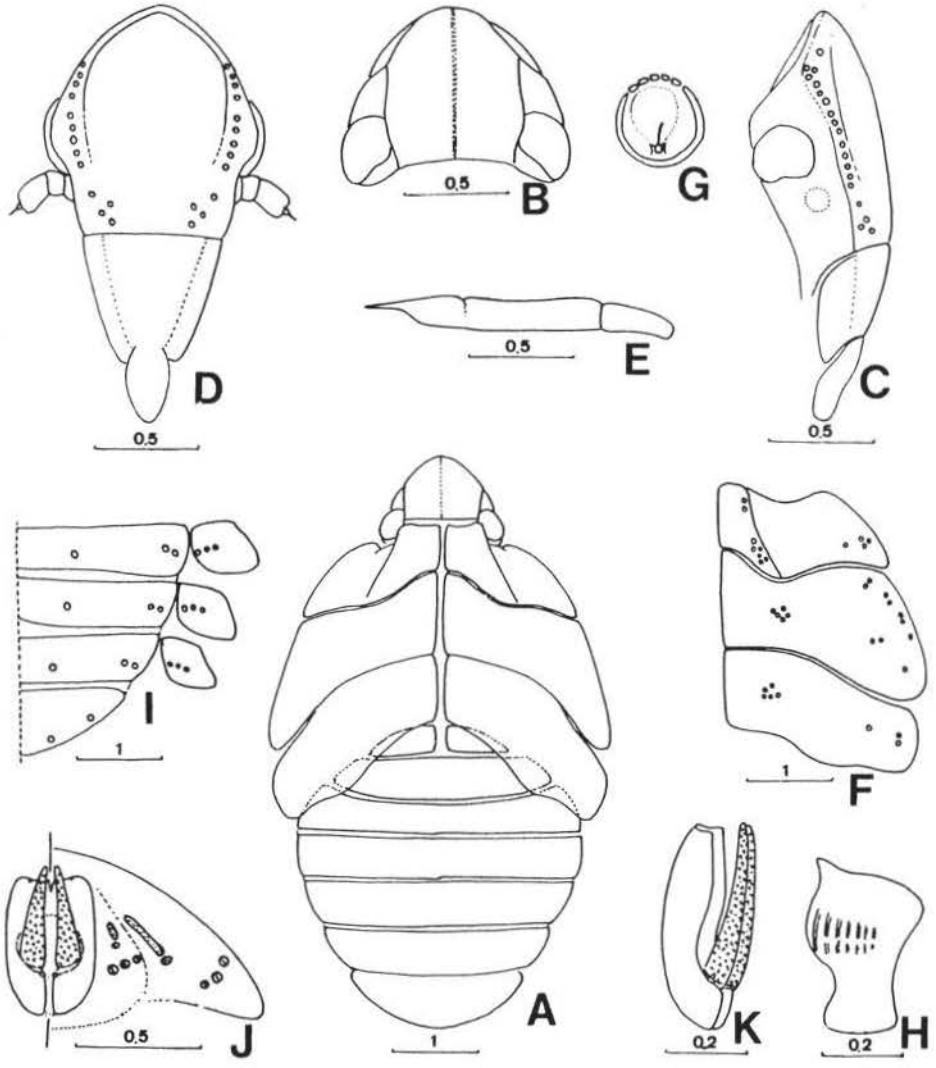

Fig. 104. Flatoides sp.3. A, fourth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum and wing pads, flat surface; G, sensory pit; H, metatrochanter; I, abdominal tergites and pleurites IV-VII, flat surface; J, abdominal segments VII-IX, ventral view; K, ninth abdominal segment, lateral view. (unit = mm.)

Pronota each with 12 pits, pits at inner side separated into 2 groups. Anterior wing pads each with 5 pits near notum, 10 pits laterad. Posterior wing pads each with 5 pits near notum, 3 pits laterad. Metatibiae each with 2 lateral teeth. Spinal formula of hind leg 6-6-0.

Abdominal tergites III-VIII each side with 0-3-3-3-2-0 pits respectively. Abdominal pleurites IV- VIII each with 3-3-3-3-3 pits respectively. Abdominal segments VII-VIII each side with 2 wax-pore parts respectively, dorsal ones slender, ventral ones rounded, separated area recognizable.

Length of body: 6.5 mm.

Length of anterior wing pad: 1.50 mm.

Specimen examined: Fourth instar nymph: 1, Taitung, Hsien, Lanshu, 1-VII-1987, S. C. Tsaur.

Determination: No adult emerged from nymph. As a whole it should belong to Flatidae.

The other species referred

1. *Metcalfa pruinosa* Say (Wilson and McPherson, 1981)
2. *Ormenoides venusta* Melichar (Wilson and McPherson, 1981)
3. *Cyarda* sp. (Wheeler and Hoebeke, 1982)

XIV. Family **TROPIDUCHIDAE** Stål

Tropiduchidae Haglund, 1899, Öfv. Svenska Vet. Akad. Förh. 56:64.
Tropiduchida Stål, 1866, Hemiptera Africana 4:186.

Body flattened or not. Vertex longer or shorter in middle line than widest part, lateral carinae elevated or not, at apex fused with lateral carinae of frons, then protruding weakly to apex or irrecognizable, submedian carinae transverse as anterior margin or oblique running to apices, median carina feeble. Frons longer than wide, submedian carinae always close to lateral carinae, reaching nearly to frontoclypeal suture, median carina prominent, each side of frons with 11-45 pits. Frontoclypeal suture straight or distinctly arched upward. Postclypeus with lateral carinae at base or not, median carina always absent. Rostrum 3-segmented, short and stout, subapical segment longer than apical, apical segment as long as wide, truncate at apex. Eyes in profile with ventral margin emarginate or not. Antennae cylindrical, first segment slightly longer than wide, second segment with sensory organs with lobe-like processes.

Pronota with lateral carinae on disc, not as anterolateral margins, humeral carina present or absent, each with 8-23 pits. Meso- and metanota without pit. Anterior wing pads each with 2-5 pits near notum, 1-4 pits laterad. Posterior wing pads each with 1-4 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxae without process. Pro- and mesofemora terete, at ventral margin one side not expanded ventrad. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged. Metatibiae compressed, longitudinal ridged, each with 2-3 lateral teeth. Spinal formula of hind leg (5-7)-(4-7)-2. Second metatarsal segment at apex conical. Pretarsi with claws stout, widely divergent apically, claw 2-setose. Arolium reaching over apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites III-VIII each side with (0-3)-(1-6)-(2-4)-(2-5)-(1-4)-0 pits respectively. Abdominal pleurites III-VIII each with (0-2)-(0-3)-(0-3)-(0-3)-(0-3)-(2-5) pits respectively. Abdominal segment VII each side with a wax-pore plate which composed of about 30 pores or less, or only with 1-6 pores in curved line. Abdominal tergite VIII reduced, each side with a wax-pore plate which composed of about 20 pores or less, or only with 2-6 pores in curved

line. Ninth abdominal segment each side with 2-3 pits, 1-2 dorsal, 1 ventral. Anal combs lobe-like, arising laterad.

Habitat: On leaves.

Key to species of Tropiduchidae*

1. Abdominal segments VII and VIII each side with a wax-pore plate respectively; metatibiae each with 7 apical teeth 2
-. Abdominal segments VII and VIII each side with 6-1 wax pores respectively, arranging in a line; metatibiae each with 6 or less apical teeth 5
2. Vertex distinctly longer than wide; pronota each with 19 or more pits 3
-. Vertex distinctly wider than long; pronota each with 18 or less pits 4
3. Frons each side with about 45 pits; pronota each with 23 pits; ninth abdominal segment each side with 3 pits ..... *Leptotambinia viridinervis* Kato
-. Frons each side with about 24 pits; pronota each with 19 pits; ninth abdominal segment each side with 2 pits ..... *Sogana hopponis* Matsumura
4. Pronota each with 18 pits; frons each side with about 37 pits; anterior wing pads each with 5 pits near notum ..... *Mesepora onukii* Matsumura
-. Pronota each with 9 pits; frons each side with about 16 pits; anterior wing pads each with 3 pits near notum ..... *Catullia subtestacea* Stål
5. Abdominal segments VII and VIII each side with 5 or more wax pores; pronota each with 5-6 pits 6
-. Abdominal segments VII and VIII each side with 3 or less wax pores; pronota each with 8-12 pits 7
6. Vertex 1.5 times wider than long; pronota each with 5 pits; abdominal segment VII each side with 6 wax pores ..... *Ommatissus lofouensis* Muir
-. Vertex 1.1 times longer than wide; pronota each with 6 pits; abdominal segment VII each side with 5 wax pores ..... *Neommatissus formosanus* Kato
7. Abdominal segment VII each side with 3 wax pores; frons 1.9 times longer than wide 8
-. Abdominal segment VII each side with 2 or less wax pores; frons 1.5 or less times longer than wide 9
8. Pronota each with 11 pits; frons each side with about 37 pits; anterior wing pads each with 5 pits near notum ..... *Chasmocephala* sp. 1.
-. Pronota each with 8 pits; frons each side with about 16 pits; anterior wing pads each side with 2 pits near notum ..... *Ossoides lineatus* Bierman
9. Abdominal segment VII each side with 2 wax pores; pronota each with 9 pits 10
-. Abdominal segment VII each side with single wax pore; pronota each with 10 pits .... *Lanshu glochidionae* Yang and Yang
10. Meso- and metanota at ends of lateral carinae each with a red spot; frons 1.2 times longer than wide; frons each side with 12 pits ..... *Tambinia bozontata* Matsumura
-. Meso- and metanota without marking; frons 1.5 times longer than wide; frons each side with 16 pits ..... *Kallitaxilla sinica* (Walker)

* *Pelitropis rotulata* Van Duzee is not included here.

102. *Catullia subtestacea* Stål (Fig. 105)

Catullia subtestacea Yang and Yang, 1989, Taiwan Mus. Spec. Publ. 8:72. (nymph)

The description of the nymph by Yang and Yang is supplemented and corrected as follows.

Lateral carinae of vertex fused with lateral carinae of frons immediately over level of anterior margin of eyes. Spinal formula of hind leg (7-8)-(7-8)-2. Abdominal tergites III-VIII each side with 0-(5-6)-(4-5)-3-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-0-0-0-(4-5) pits respectively. Ninth abdominal segment each side with 2 pits, 1 dorsal, 1 ventral.

Specimen examined: Fifth instar nymph: 1, Hsinchu Hsien, Wufeng, 24-VI-1985, S. C. Tsaur.

Determination: Collected with adults. Determined by J. T. Yang.

103. *Leptotambinia viridinervis* Kato

Leptotambinia viridinervis Yang and Yang, 1991, J Taiwan Mus. 44(1):161. (nymph)

The description of the nymph by Yang and Yang is corrected as follows.

Abdominal tergites III-VIII each side with 2-3-3-3-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-2-2-3-3 pits respectively.

Specimen examined: Fifth instar nymph: 1, Taitung Hsien, Lanshu, 2-VII-1987.

104. *Sogana hopponis* Matsumura

Sogana hopponis Yang and Yang, 1991, J. Taiwan Mus. 44(1):158. (nymph)

The description of the nymph by Yang and Yang is corrected as follows.

Abdominal tergites III-VIII each side with 2-3-3-3-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-2-2-3-3 pits respectively.

Specimen examined: Fifth instar nymph: 3, Taichung Hsien, Chiapaotai, 11-VII-1987, S. C. Tsaur.

105. *Mesepora onukii* Matsumura

Mesepora onukii Yang and Yang, 1991, J. Taiwan Mus. 44(1):158. (nymph)

The description of the nymph by Yang and Yang is corrected as follows:

Abdominal tergites III-VIII each side with 2-3-3-3-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-3-3-3-3-3 pits respectively.

Specimen examined: Fifth instar nymph: 1, Pingtung Hsien, Kenting, 14-VIII-1990, W. B. Yeh.

106. *Ommatissus lofouensis* Muir

Ommatissus lofouensis Yang and Yang, 1991, J. Taiwan Mus. 44(1):155. (nymph)

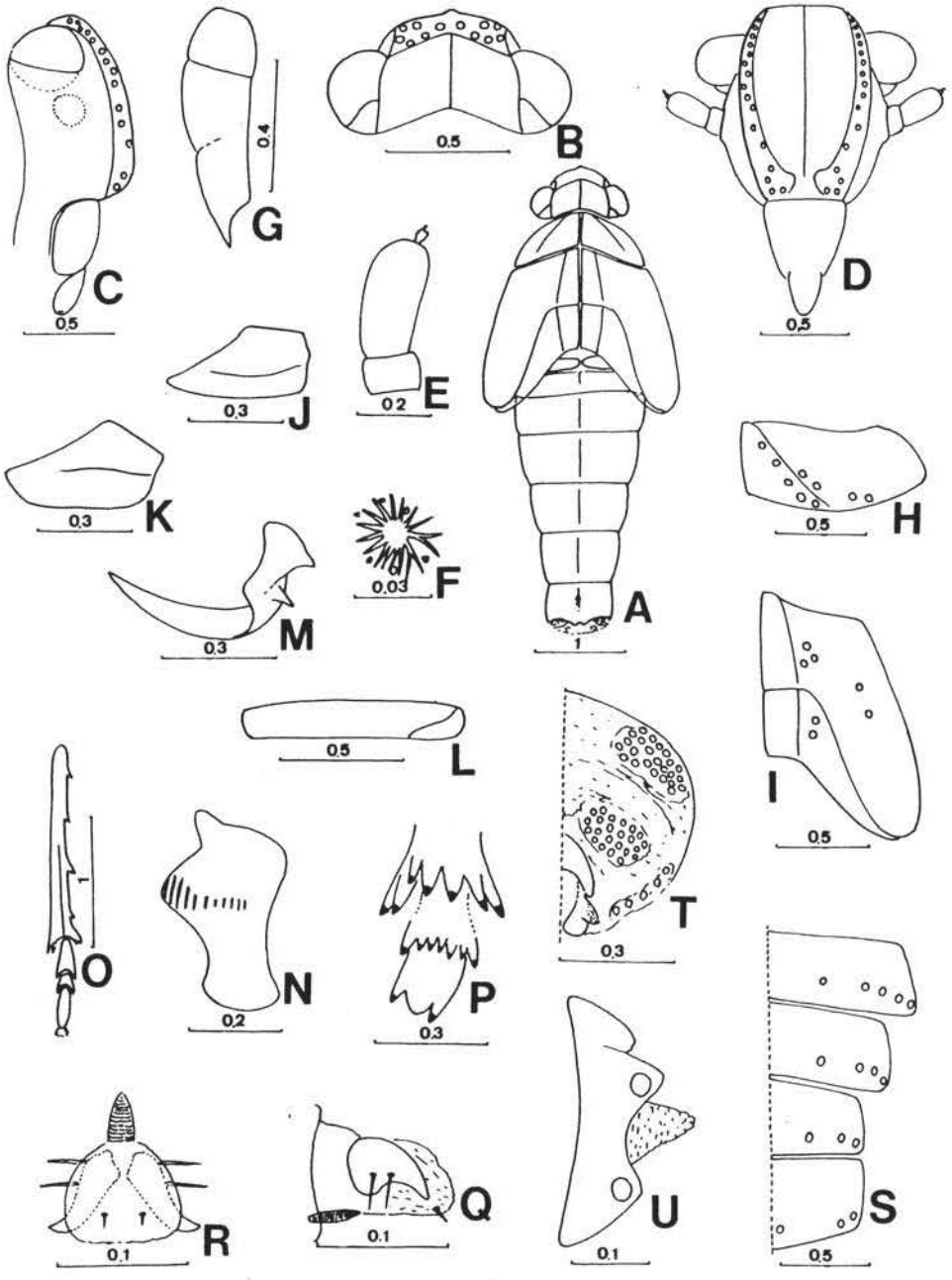

Fig. 105. *Catullia subtestacea* Stål A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, wing pad, flat surface; J, procoxa; K, mesocoxa; L, mesofemur; M, metacoxa plus meron; N, metatrochanter; O, metatibia and tarsi; P, apical teeth of metatibia and first two tarsi; Q, pretarsus, lateral view; R, the same, ventral view; S, abdominal tergites IV-VII, flat surface; T, abdominal segments VII-IX, caudal view; U, abdominal segment IX, lateral view. (unit = mm.)

The description of the nymph by Yang and Yang is corrected as follows.

Abdominal tergites III-VIII each side with 3-(3-4)-3-2-1-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-0-0-0-3 pits respectively.

Specimen examined: Fifth instar nymph: 1, Taichung Hsien, Lishan, 22-X-1987, C. T. Yang.

107. ***Neommatissus formosanus*** Kato

Neommatissus formosanus Yang and Yang, 1991, J. Taiwan Mus. 44(1):156. (nymph)

The description of the nymph by Yang and Yang is corrected as follows.

Abdominal tergites III-VIII each side with 0-2-2-2-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-1-1-0-0-3 pits respectively.

Specimen examined: Fifth instar nymph: 1, Taitung Hsien, Sapodan, 13-II-1990, W. B. Yeh.

108. ***Chasmocephala*** sp. 1. (Fig. 106.)

General color greenish yellow. Lateral carinae of frons, outer sides of lateral carinae of pronota, above pits near nota of anterior wing pads, broad transverse band near apical margins of wing pads, abdominal tergite II, hind margins of I, center of II or whole first 3 tergites and lateral areas of V-VI or IV-VI black. Frons, clypeus and rostrum green except median line of frons and clypeus reddish. Apical tarsal segments black.

Vertex 1.5 times longer in middle line than widest part, anterior margin angulate forward medially, median carina absent. Frons 2.2 times longer in middle line than widest part, submedian carinae slightly convex, reaching nearly to frontoclypeal suture, median carina absent. Each side of frons with about 37 pits. Postclypeus with lateral margins carinate. Rostrum with subapical segment 1.4 times longer than apical. Claw 3-setose.

Pronota each with 11 pits, each with a humeral carina. Anterior wing pads each with 5 pits near notum, 3 pits laterad. Posterior wing pads each with 2 pits near notum. Metatibiae each with 3 lateral teeth. Spinal formula of hind leg 5-5-3. Second metatarsal segment at apex pointed and pigmented.

Abdominal tergites III-VIII bear each side 3-4-4-4-4-0 pits respectively. Abdominal pleurites present, III-VIII bear each 2-2-2-2-2-3 pits respectively. Abdominal segments VII-VIII each side with 3 wax pores respectively. Ninth abdominal segment each side with 3 pits, 2 dorsal, 1 ventral.

Length of body: 5.0 mm.

Length of anterior wing pad: 1.42 mm.

Specimen examined: Fifth instar nymph: 1, Martinique, Road Piton de Carbet to St. Joseph, 15-V-1985, C. W. & L. B. O'Brien; 1, Martinique, 5 km. SE. Morne Rouge, 5-V-1985, Forest Rd. C. W. & L. B. O'Brien. (Specimen sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien.

109. ***Ossoides lineatus*** Bierman (Fig. 107-A, C, L)

Ossoides lineatus Yang and Yang, 1989, Taiwan Mus. Spec. Publ. 8:91. (nymph)

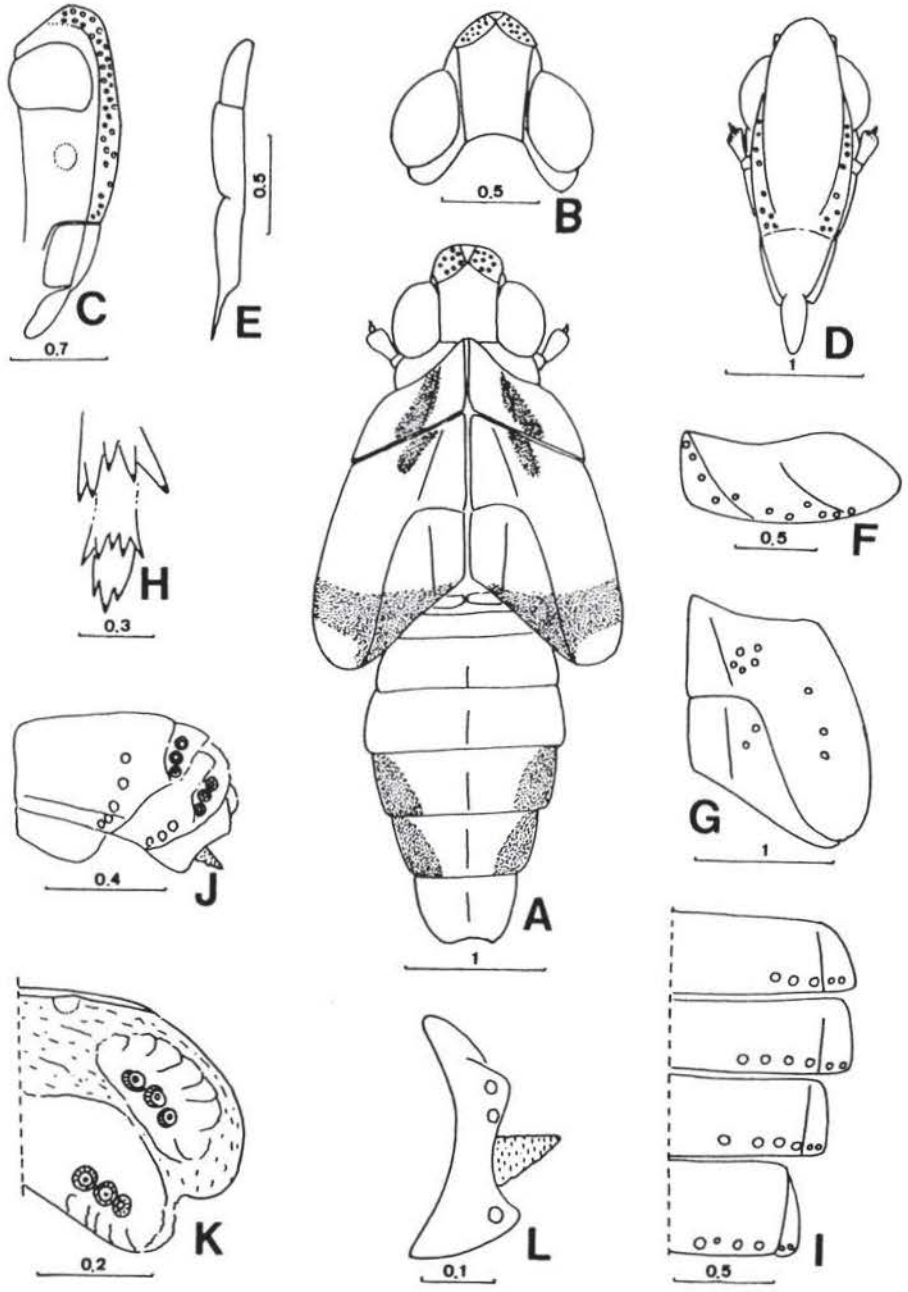

Fig. 106. *Chasmocephala* sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum, flat surface; G, wing pad, flat surface; H, apex of metatibia and first two tarsal segments, ventral view; I, abdominal tergites and pleurites III-V, flat surface; J, abdominal segments VII-IX, lateral view; K, abdominal segments VII-VIII, caudal view. (unit = mm.)

The description of the nymph by Yang and Yang is supplemented and corrected as follows.

Lateral carinae of vertex fused with lateral carinae of frons far away level of anterior margin of eyes. Frons in ventral view with eyes visible, median carina present, weak, submedian carinae very weak. Abdominal tergites III-VIII each side with 0-3-3-2-2-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-0-0-0-2 pits respectively. Ninth abdominal segment in lateral view slightly wider ventrally than dorsally.

Specimen examined: Fifth instar nymph: 1, Taitung Hsien, Orchid Island, 12-VII-1985, C. T. Yang.

Determination: Collected with adults. Determined by J. T. Yang.

110. ***Lanshu glochidionae*** Yang and Yang (Fig. 107-D, F)

Lanshu glochidionae Yang and Yang, 1989, Taiwan Mus. Spec. Publ. 8:96. (nymph)

The description of the nymph by Yang and Yang is supplemented and corrected as follows.

Lateral carinae of vertex fused with lateral carinae of frons a short distance away level of anterior margin of eyes. Frons with median carina present, weak, submedian carinae very weak. Abdominal tergites III-VIII each side with 0-1-2-2-2-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-0-0-1-2 pits respectively. Ninth abdominal segment each side with 3 pits, 2 dorsal, 1 ventral.

Specimen examined: Fifth instar nymph: 2, Taitung Hsien, Orchid Island, 4,12-VII-1985, S. C. Tsaur and C. T. Yang.

Determination: Collected with adults. Determined by J. T. Yang.

111. ***Kallitaxila sinica*** (Walker) (Fig. 107-G, J)

Kallitaxila sinica Yang and Yang, 1989, Taiwan Mus. Spec. Publ. 8:87. (nymph)

The description of the nymph by Yang and Yang is supplemented and corrected as follows.

Lateral carinae of vertex fused with lateral carinae a short distance over level of anterior margin of eyes. Anterior wing pads each with 2 pits near notum, 3 pits laterad. Abdominal tergites III-VIII each side with 0-2-3-3-2-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-0-0-0-2 pits respectively. Ninth abdominal segment in lateral view subparallel.

Specimen examined: Fifth instar nymph: 1, Taichung Hsien, Songho, 1-VII-1985, S. C. Tsaur.

Determination: Compared with Yang's figure.

112. ***Tambinia bizonata*** Matsumura (Fig. 107-B, E, I)

Tambinia bizonata Yang and Yang, 1989, Taiwan Mus. Spec. Publ. 8:82. (nymph)

The description of the nymph by Yang and Yang is supplemented and corrected as follows.

Lateral carinae of vertex fused with lateral carinae of frons a short distance over level of anterior margin of eyes. Abdominal tergites III-VIII each side with 0-2-3-3-3-0 pits respectively. Abdominal pleurites III-VIII each with 0-0-0-0-0-2 pits respectively. Ninth abdominal segment each side with 3 pits, 2 dorsal, 1 ventral.

Specimen examined: Fifth instar nymph: 1, Taitung Hsien, Orchid Island, 12-VII-1985, C. T. Yang.

Determination: Collected with adults. Determined by J. T. Yang.

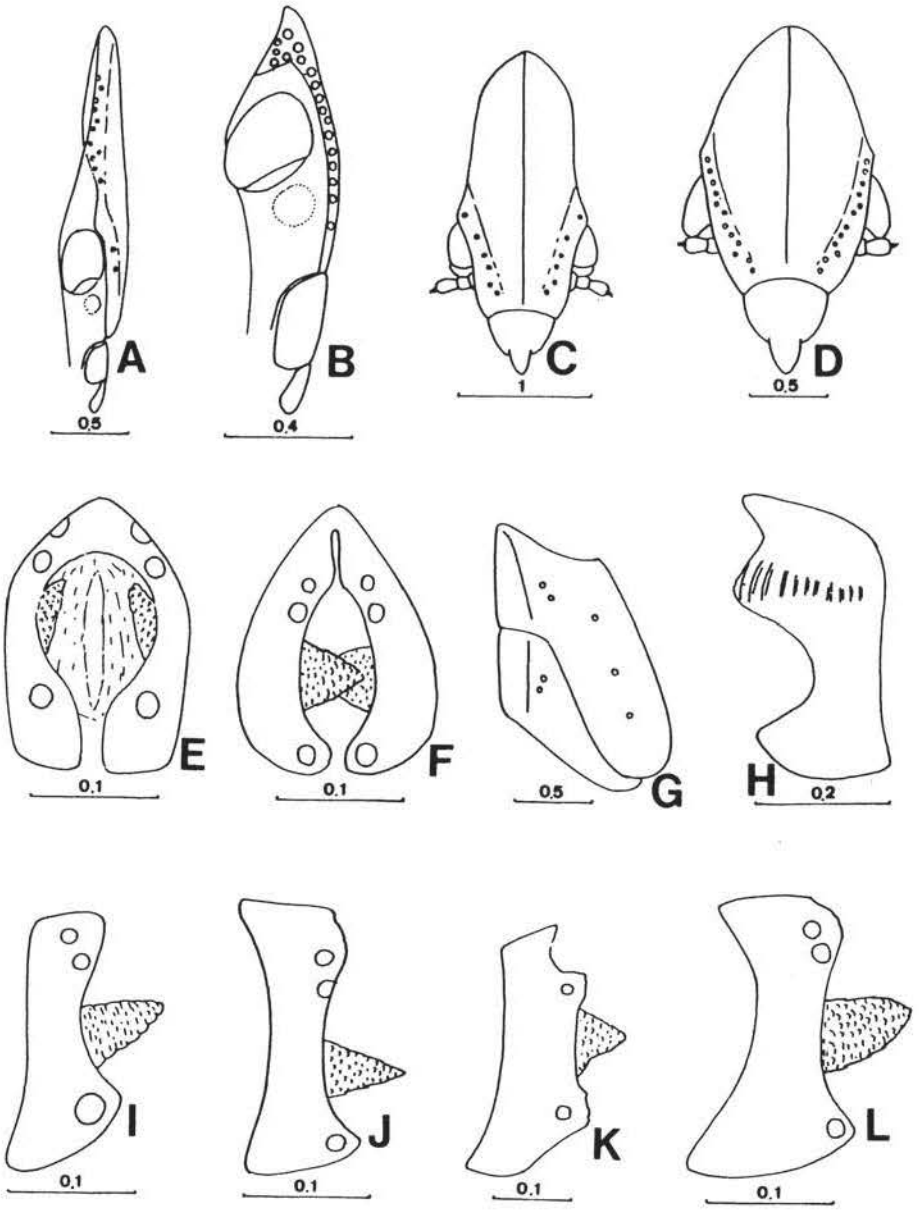

Fig. 107. Nymph of *Ossoides lineatus* Bierman A, head, lateral view; C, the same, ventral view; L, ninth abdominal segment, lateral view. Nymph of *Tambinia bizonata* Matsumura B, head, lateral view; E, ninth abdominal segment, caudal view; I, the same, lateral view. Nymph of *Lanshu glochidionae* Yang D, head, ventral view; F, ninth abdominal segment, caudal view. Nymph of *Kallitaxila sinica* (Wakler) G, wing pads, flat surface; J, ninth abdominal segment, lateral view. Nymph of *Catullia subtestacea* Stål H, metatrochanter; K, ninth abdominal segment, lateral view. (unit = mm.)

The other species referred

1. *Pelitropis rotulata* Van Duzee (Wilson and Wheeler, 1984)
2. *Tambinia verticalis* Distant (Wilson, M. R., 1986)

XV. Family **NOGODINIDAE** Melichar

Nogodinidae Muir, 1930, Ann. Mag. Nat. Hist. (10)6:466.
Nogodini Melichar, 1898, Ann. Nat. Hofmus. Wien. 13:204.

Body somewhat slender. Vertex wider than long, horizontal, carinate, median carina feeble. Frons distinctly longer than wide, median carina present or absent, if present only distinct at base, submedian carinae distinct, reaching close to frontoclypeal suture, parallel, each side of frons with about 50 pits. Frontoclypeal suture straight. Clypeus ecarinate. Rostrum 4-segmented, subapical segment as long as or slightly longer than apical, apical segment with apex truncate. Eyes rounded. Antennae small, first segment wider than long, second segment longer than wide, sensory organs with short, lobe-like processes.

Pronota with lateral carinae as anterolateral margins, each with about 46 pits, anterior margin distinctly protruding forward medially and cover vertex. Meso- and metanota without pit. Anterior wing pads each with 10-14 pits near notum, 4-8 pits laterad. Posterior wing pads each with 6-7 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxa at basoventral angle with process. Pro- and mesofemora at ventral margins one side expanded ventrad, with 2 toothed lines. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged. Metatibiae compressed, longitudinal ridged, each with 4-5 lateral teeth. Spinal formula of hind leg (8-11)-(9-11)-2. Second metatarsal segment at apex conical. Pretarsi with claws stout, widely divergent apically, claw 3-setose, arolium reaching to apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites II-VII each side with (0-3)-(0-3)-(1-4)-(3-4)-(4-6)-(8-10)-9 pits respectively. Abdominal pleurites III-VIII each with (5-7)-6-6-(4-6)-0-0 pits respectively. Pits on tergites aggregate laterad, on pleurites usually arranging in 2 oblique rows, on abdominal segments VII and VIII arranging in line at lateral side of wax-pore plate, not at ventral side, considered as on tergite. Abdominal tergite VI each side with 5 small, rounded wax-pore parts or not, if present, associate pits roughly arranging in 1-1-2-2-1 form. Abdominal segment VII each side with 2 wax-pore parts or single, if 2, the lower one very small, all associate pits on tergite in 1-1-(1-2)-2-2 form. Abdominal segment VIII each side with single wax-pore part. Ninth abdominal segment each with 4 pits, 2 dorsal, 2 ventral. Anal combs short, lobe-like, arising laterad.

Habitat: On leaves.

113. ***Mindura subfasciata kotoshonis*** Matsumura (Fig. 108)

Mindura subfasciata kotoshonis Wu and Yang, 1989, Taiwan Mus. Spec. Publ. 8:166. (nymph)

The description of the nymph by Wu and Yang is supplemented and corrected as follows.

Abdominal tergites III-VIII each side with (0-3)-(1-3)-3-6-8-9 pits respectively, all pits on tergites III-V aggregate laterad except on tergite IV single at median half. Abdominal pleurites III-VIII each with 7-6-6-4-0-0 pits respectively, pits on pleurites arranging in 2 oblique rows.

Abdominal tergite VI each side with 5 small, rounded wax-pore parts, associate pits roughly arranging in 1-1-2-2-1 form. Abdominal segment VII each side with 2 wax-pore parts, lower one very small, associate pits all on tergite, arranging in 1-1-1-2-2 form. Abdominal segment

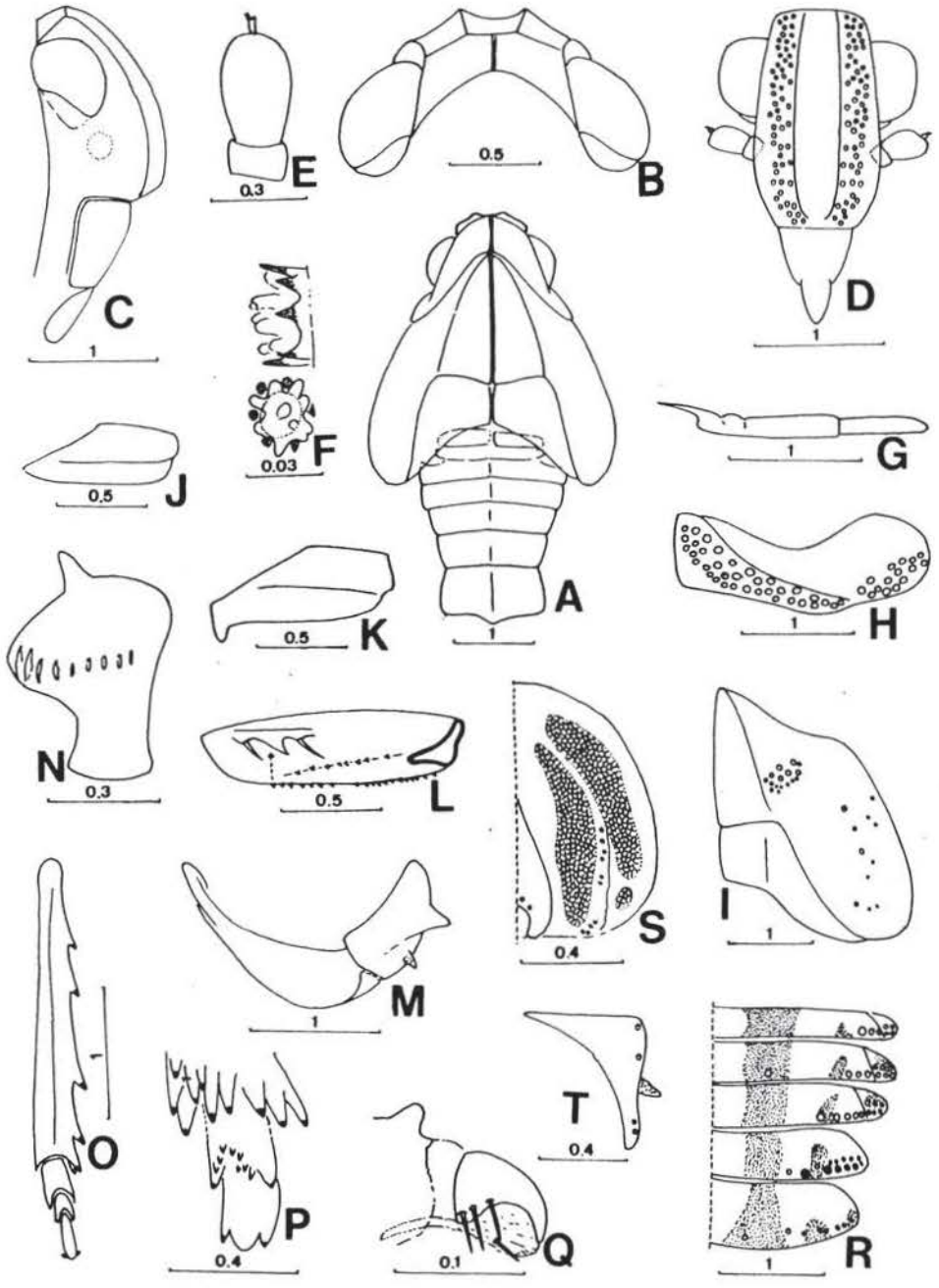

Fig. 108. *Mindura subfasciata kotoshonis* Matsumura A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, wing pad, flat surface; J, procoxa; K, mesocoxa; L, mesofemur; M, metacoxa plus meron; N, metatrochanter; O, metatibia and tarsi; P, apical teeth of metatibia and first two tarsi; Q, pretarsus, lateral view; R, abdominal tergites III-VII, flat surface; S, abdominal segments VII-IX, caudal view; T, abdominal segment IX, lateral view. (unit = mm.)

VIII with pits arranging in 1-1-2-2-2 form. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral.

Specimen examined: Fifth instar nymph: 1, Taitung Hsien, Lanshu, 4-VIII-1987, C. T. Yang.

Determination: Many adults and nymphs collected at same place.

114. ***Pisacha naga*** Distant (Fig. 109)

Pisacha naga Distant, Wu and Yang, 1989, Taiwan Mus. Spec. Publ. 8:168. (fourth instar nymph)

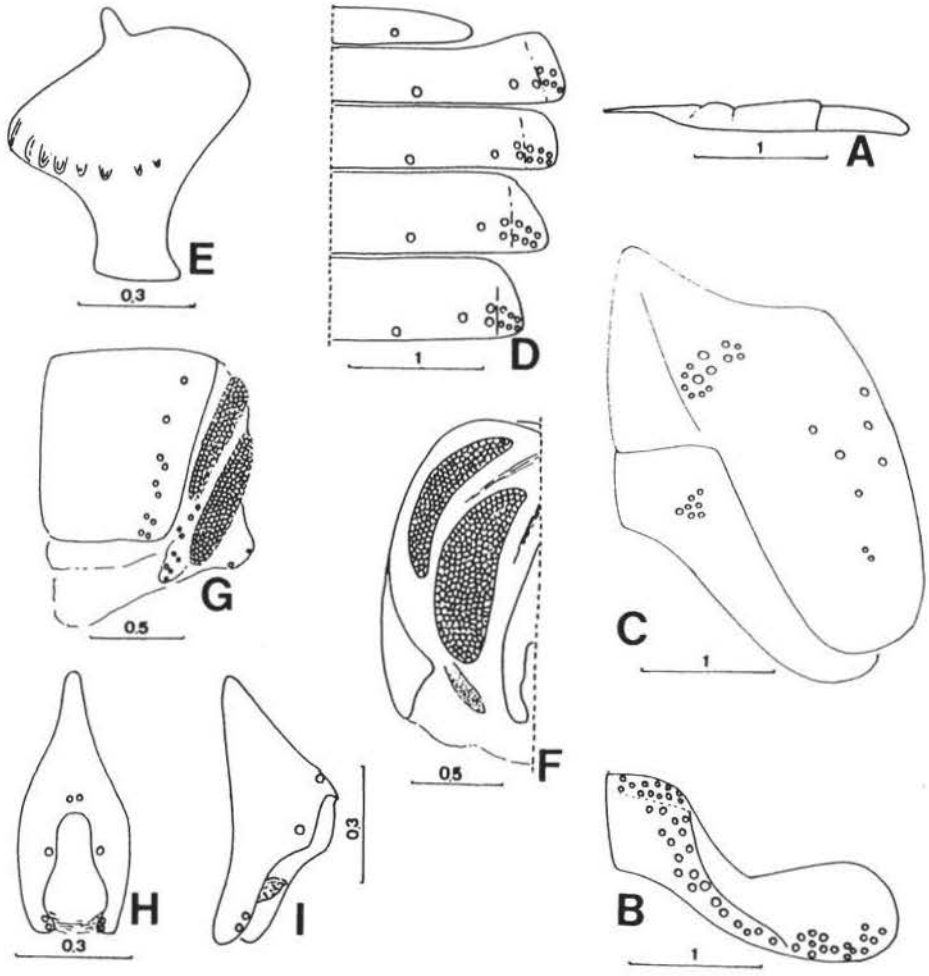

Fig. 109. *Pisacha naga* Distant A, rostrum; B, pronotum, flat surface; C, wing pads, flat surface; D, abdominal tergites II-VI, flat surface; E, metatrochanter; F, abdominal segments VII-IX, caudal view; G, the same, lateral view; H, ninth abdominal segment, caudal view; I, the same, lateral view. (unit = mm.)

Dorsal aspect, antennae and legs dark brown scattered yellowish spots. Frons and ventral aspect yellowish brown.

Pronota each with about 47 pits, mid-anterior portion turned downward. Anterior wing pads each with 13-14 pits near notum, 8 pits laterad. Posterior wing pads each with 6-7 pits near notum. Metatibiae each with 5 lateral teeth. Spinal formula of hind leg 11-11-2.

Abdominal tergites II-VIII each side with 1-2-4-4-4-10-9 pits respectively. Abdominal pleurites III-VIII each with 5-6-6-6-0-0 pits respectively. Abdominal segment VI without wax-pore part. Abdominal segments VII and VIII each side with single wax-pore part respectively, slender. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral.

Length of anterior wing pad: 2.55 mm.

Specimen examined: Fifth instar nymph: 1, Kaohsiung Hsien, Tienchih, 15-VIII-1987, S. C. Tsaur.

Determination: Determined from its general appearance by C. T. Yang.

XVI. Family **ACANALONIIDAE** Amyot and Serville

Acanaloniidae Melichar, 1901, Ann. Nat. Hofmus. Wien. 16:179.
Acanonides Amyot and Serville, 1843, Histoire Naturelle des Insectes. Hemipteres 1943:520.

Body stout, sub-ovate, thoracic nota humpbacked. Vertex much wider0 than long in middle line, ecarinate except between vertex and frons. Frons shorter than wide, lateral margins carinate, median and submedian carinae present or absent, each side with about 25 pits. Frontoclypeal suture interrupted at middle. Clypeus ecarinate, slightly shorter than frons. Rostrum 4-segmented, subapical segment longer than apical, apical segment at apex truncate. Eyes in profile rounded. Antennae short, first segment wider than long, second segment longer than wide, sensory organs with lobe-like processes.

Pronota with lateral carinae as anterolateral margins, each with 22-40 pits. Meso- and metanota without pit. Anterior wing pads each with 14-21 pits near notum, 8-20 pits laterad. Posterior wing pads each with 8-16 pits near notum. Pro- and mesocoxae slender, ridged, mesocoxae each at basoventral angle with process. Pro- and mesofemora at ventral margins one side expanded, only expand margin toothed. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged. Metatibiae compressed, longitudinal ridged, with 2-4 lateral teeth. Spinal formula of hind leg (6-7)-(9-10)-(1-2). Second metatarsal segment at apex conical. Pretarsi with claws stout, widely divergent apically, claw 2-setose. Arolium reaching over apices of claws, with single seta medially.

Abdomenal 9-segmented. Abdominal tergites III-VIII each side with (3-4)-(5-6)-(4-6)-(1-4)-(1-2)-0 pits respectively. Abdominal pleurites III-VIII each with (1-3)-(1-3)-(1-3)-(2-6)-(4-5)-5 pits respectively. Pits on abdominal pleurites III-V single, on VI-VII in transverse row. Abdominal tergite VI each side with single ovate wax-pore plate, at caudolateral membraneous area. Abdominal tergite VII each side with single wax-pore plate on membraneous area, associate pits all on tergite. Abdominal tergite VIII reduced, each side with single, elongate oval wax-pore plate, associate pits on ventral large pleurite. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral. Anal combs short, lobe-like, arising laterad.

Habitat: On leaves.

Key to species of Acanaloniidae

1. Abdominal segment VI each side with wax-pore plate; ninth abdominal segment each side with 3-4 pits; frons with median and submedian carinae irrecognizable 2
-. Abdominal segment VI without wax-pore plate; ninth abdominal segment each side with single pit; frons with median and submedian carinae distinct ..... *Acanalonia viriditerminata*(?) Lethierry
2. Metatibiae each with 5-6 lateral teeth; posterior wing pads each with about 17 pits near notum; abdominal pleurites III-V each with 3 pits respectively ..... Acanaloniidae sp. 1.
-. Metatibiae each with 2-4 lateral teeth; posterior wing pads each with about 8 pits near notum; abdominal pleurites III-V each with single pit respectively ..... *Acanalonia conica* (Say)

115. *Acanalonia conica* (Say) (Fig. 110)

Acanalonia conica Wilson and McPherson, 1981, Ann. Entomol. Soc. Amer. 74(3):294. (nymph)

Vertex transverse, wider than long. Frons wider than long, without median and submedian carinae, each side with about 25 pits. Clypeus ecarinate. Rostrum 4-segmented, subapical segment longer than apical, apical segment at apex truncate. Eyes rounded. Antennae short, second segment globose.

Pronota each with about 40 pits. Anterior wing pads each with 21 pits near notum, 20 pits laterad. Posterior wing pads each with about 8 pits near notum. Metatibiae each with 2-4 lateral teeth. Spinal formula of hind leg 7-(7-9)-1.

Abdominal tergites III-VIII each with 4-5-5-2-2-0 pits respectively. Abdominal pleurites III-VIII each with 1-1-1-4-4-5 pits respectively. Abdominal tergite VI each side with a small, rounded wax-pore plate on caudolateral membraneous area. Abdominal tergite VII each side with single, elongate wax-pore plate, all associate pits on tergite and pleuron. Abdominal segment VIII each side with single elongate-oval wax-pore plate, associate pits below. Ninth abdominal segment each side with 4 pits, 2 dorsal, 2 ventral.

Length of anterior wing pad: 2.10 mm.

Specimen examined: Fifth instar nymph: 1, U.S.A. Illinois, W. Wilson (specimen was sent by S. W. Wilson).

Determination: Determined by S. W. Wilson.

116. **Acanaloniidae** sp. 1. (Fig. 111)

General color pale yellow, scattered brown areas especially at basal half of anterior wing pads. Pronota behind eyes black.

Vertex 7.5 times wider at apex than long in middle line, anterior margin straight, median carina absent. Frons 1.3 times wider at widest part than long in middle line, submedian and median carinae irrecognizable. Each side of frons with about 34 pits, along median line, at apical third distinctly elevated. Rostrum with subapical segment 1.2 times longer than apical. Antennae with second segment widened at apex.

Pronota each with about 40 pits. Anterior wing pads each with about 23 pits near notum, 14 pits laterad. Posterior wing pads each with 17 pits near notum, 1 pit laterad. Metatibiae each with 5-6 lateral teeth. Spinal formula of hind leg 7-9-2. Meta-claw 2-setose.

Abdominal tergites III-VIII each side with 4-6-6-1-1-0 pits respectively. Abdominal pleurites III-VIII each with 3-3-3-(5-6)-5-5 pits respectively. Abdominal segment VI each side with

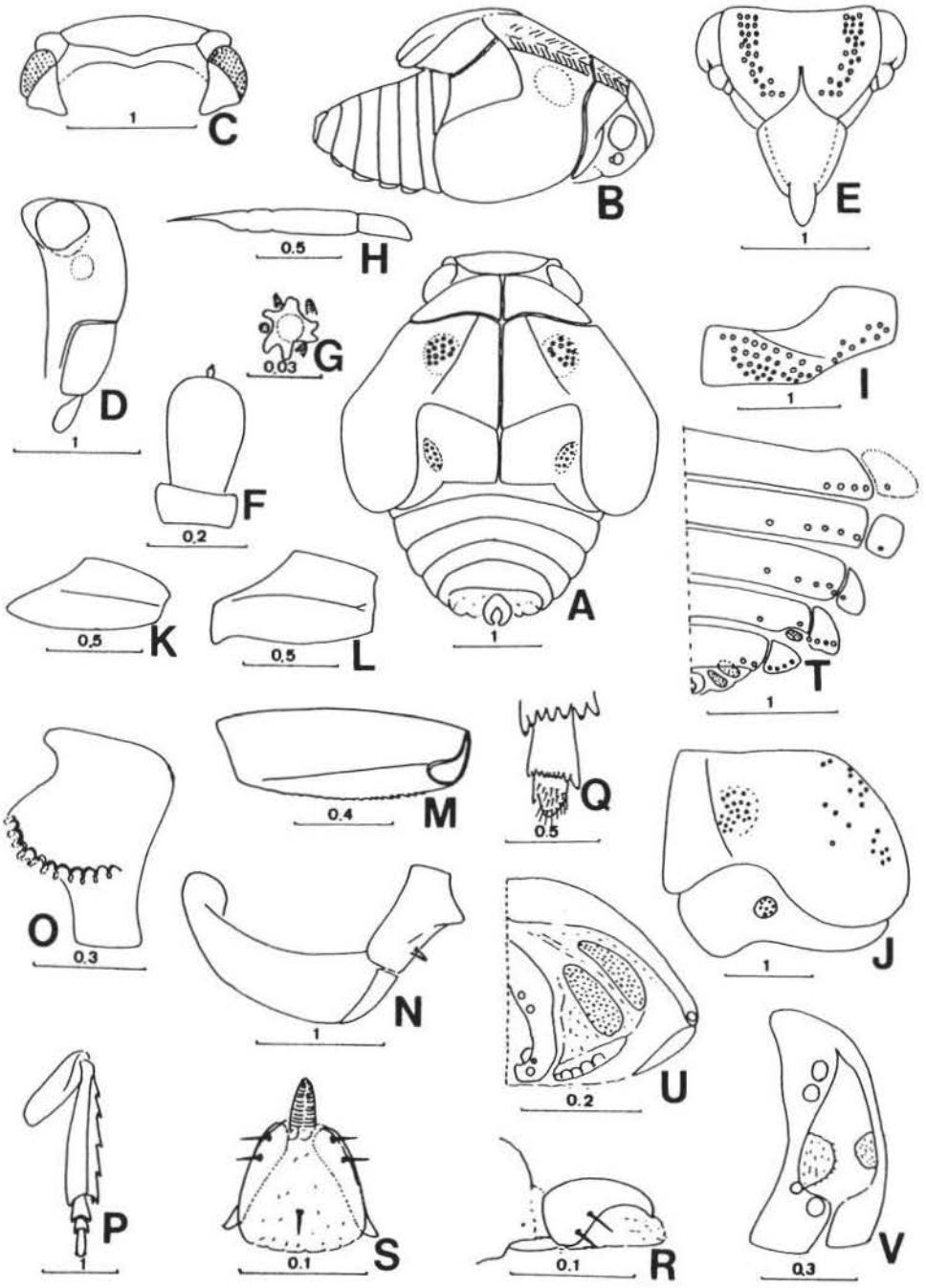

Fig. 110. *Acanalonia conica* (Say) A, fifth instar nymph, dorsal view; B, the same, dorsolateral view; C, head, dorsal view; D, the same, lateral view; E, the same, ventral view; F, antenna; G, sensory organ of antenna; H, rostrum, I, pronotum, flat surface; J, wing pad, flat surface; K, procoxa; L, mesocoxa; M, mesofemur; N, metacoxa plus meron; O, metatrochanter; P, meta-leg; Q, apical teeth of metatibia and first two tarsi; R, pretarsus, lateral view; S, the same, ventral view; T, abdominal tergites and sternites III-VII, flat surface; U, abdominal segments VII-IX, caudal view; V, abdominal segment IX, caudolateral view. (unit = mm.)

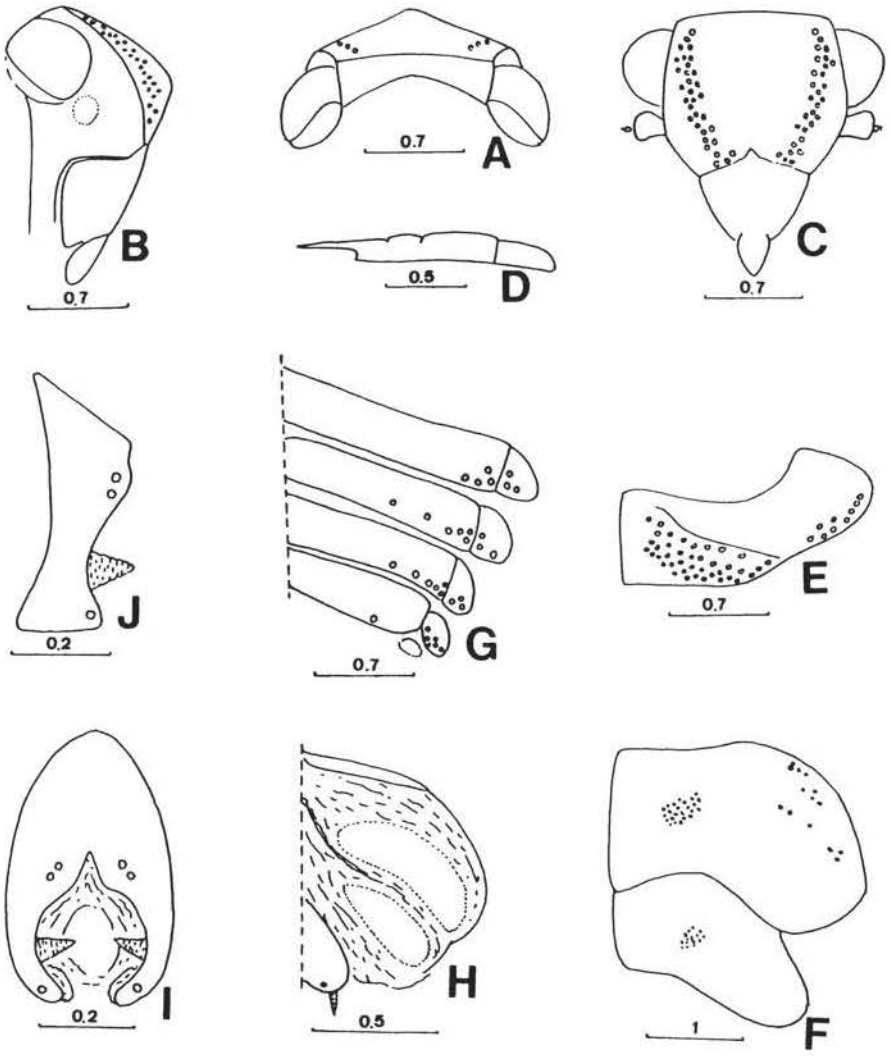

Fig. 111. Acanaloniidae sp.1. A, head, dorsal view; B, the same, lateral view; C, the same, ventral view; D, rostrum, E, pronotum, flat surface; F, wing pad, flat surface; G, abdominal tergites and pleurites III-VI, flat surface; H, abdominal segments VII-IX, caudal view; I, ninth abdominal segment, caudal view; J, the same, lateral view. (unit = mm.)

a rounded wax-pore plate on caudolateral membraneous area. Abdominal segments VII-VIII each side with a wax-pore plate respectively, wax-pore plate elongate oval, in VIII inner ends narrowed. Ninth abdominal segment each side with 3 pits, 2 dorsal, 1 ventral.

Specimen examined: Fifth instar nymph: 1, Bladen Co. N.C. Jones Lake St. Pk. 27-VI-1965, C. W. O'Brien (specimen was sent by L. B. O'Brien).

Determination: Determined by L. B. O'Brien as Acanaloniidae.

117. *Acanalonia viriditerminata* (?) Lethierry (Fig. 112)

General color uniform dark brown. Thoracic nota and wing pads somewhat paler, scattered yellowish spots.

Vertex 6.2 times wider than long in middle line, median carina feeble. Frons 1.2 times wider at widest part than long in middle line, submedian carinae distinct, subparallel with lateral carinae, at apex protruding mesad, reaching nearly to median carina. Median carina distinct, reaching to frontoclypeal suture. Each side of frons with about 32 pits. Median line of frons at apical fourth strongly elevated. Rostrum with subapical segment 1.2 times longer than apical.

Pronota each with a humeral carina, parallel with lateral margin, with about 31 pits. Anterior wing pads each with about 23 pits near notum, 17 pits laterad. Posterior wing pads each with mid-line strongly elevated, each with 15 pits near notum, without pit laterad. Metatibiae each with single lateral tooth. Spinal formula of hind leg 7-9-2. Meta-claw 2-setose.

Abdominal tergites III-VIII each side with 3-5-4-3-2-0 pits respectively. Abdominal pleurites III-VIII each side with (1-2)-2-2-(2-3)-4-5 pits respectively. Abdominal segment VI

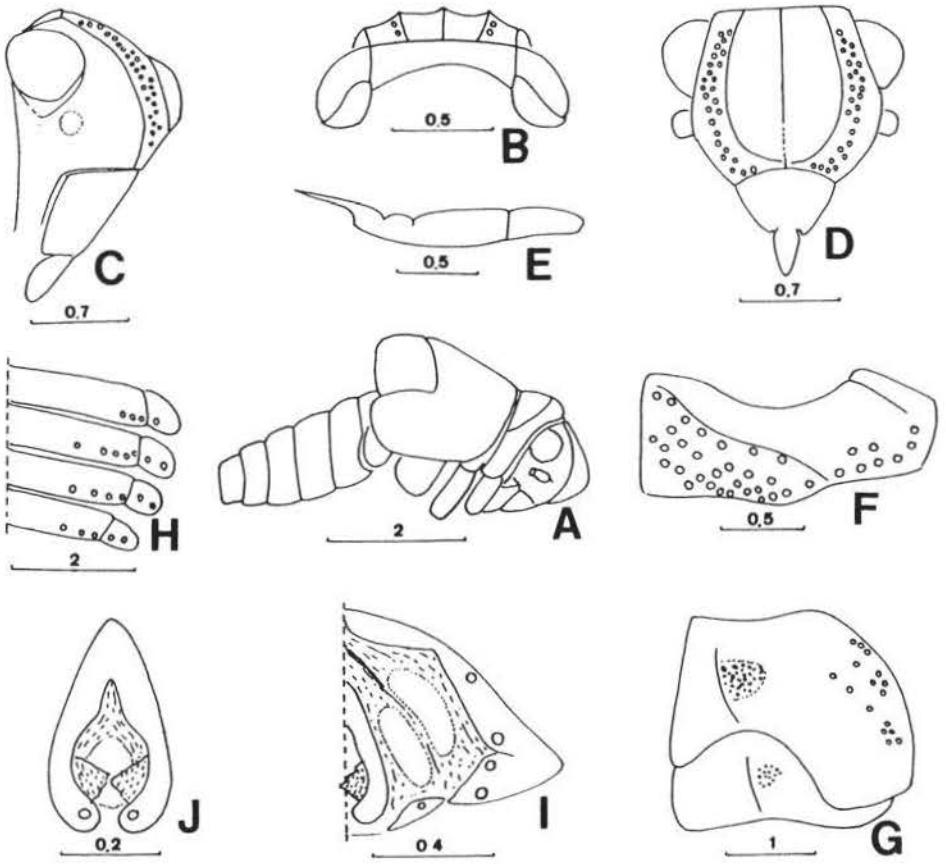

Fig. 112. *Acanalonia viriditerminata* (?) Lethierry A, fifth instar nymph, lateral view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum, flat surface; G, wing pad, flat surface; H, abdominal tergites and pleurites III-VI, flat surface; I, abdominal segments VII-IX, caudal view; J, ninth abdominal segment, caudal view.(unit = mm.)

without wax-pore plate. Abdominal segments VII-VIII each side with a elongate oval wax-pore plate. Ninth abdominal segment each side with single pit ventral.

Length of body: 5.9 mm.

Length of anterior wing pad: 2.1 mm.

Specimen examined: Fifth instar nymph: 1, Dominica, ca 2500'. N. P. Fresh water lake 15-VIII-1986, C. W. & L. B. O'Brien. (specimen was sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien as "*Acanalonia* prob. *viriditerminata* Lethierry. Adult and nymph, only acanaloniid I found on island so far, associated by this and shape of frons."

The other species referred

1. *Acanalonia brivittata* (Say)(Wilson and McPherson, 1981)
2. *Acanalonia pumila* Van Duzee (Wheeler and Hoebeke, 1982)

XVII. Family **ISSIDAE** Spinola

Issidae Schaum, 1850, Allgemeine Encyklopadie Ersch and Gruber 51:70.
Issites Spinola, 1839, Ann. Soc. Ent. France 8:158.

Body somewhat elongate. Vertex wider than long, anterior margin carinate, median carina present. Frons as wide as long, lateral margins carinate, submedian carinae distinct, rather close to lateral carinae especially near base, some species lateral carinae in ventral view invisible, median carina present or absent. Frontoclypeal suture nearly straight. Postclypeus ecarinate. Rostrum 3-segmented, subapical segment longer than apical, apical segment truncate at apex. Eyes in profile somewhat obliquely straight at basoventral angle. Antennae with first segment wider than long, second segment longer than wide, sensory organs with lobe-like processes.

Pronota with lateral carinae on disc, not as anterolateral margins, each with 8-58 pits. Meso- and metanota without pit. Anterior wing pads each with 2-14 pits near notum, 0-13 pits laterad. Posterior wing pads each with 0-10 pits near notum. Procoxae slender, ridged. Mesocoxae slender, ridged, each with process at basoventral angle. Pro- and mesofemora at ventral margins one side expanded ventrad, 2 rows toothed. Metacoxa plus meron crescent-shaped, immovable, with meracanthus. Metatrochanters ridged, ridges rather short, gradually shorting to apex. Metatibiae compressed, longitudinal ridged, each with 1-5 lateral teeth. Spinal formula of hind leg (6-10)-(2-23)-(2-3). Second metatarsal segment conical at apex. Pretarsi with claws widely divergent apically, claw 2-setose. Arolium reaching over apices of claws, with paired setae.

Abdomen 9-segmented. Abdominal tergites III-VIII each side with (0-7)-(1-8)-(1-9)-(1-9)-(11-1)-(6-0) pits respectively, pits more laterad. Abdominal pleurites III-VIII each with (0-7)-(0-5)-(0-5)-(0-6)-(0-5)-(0-6) pits respeetively. Abdominal segment VII each side with a wax-pore plate on membraneous area or not at all, if present, plate elongate or reduced to include only 2 pores. Abdominal tergite VIII reduced in with wax-pore plate species, entire in without species. Ninth abdominal segment each side with 0-6 pits. Anal combs lobe-like, arising laterad.

Habitat: On leaves.

Nymphs of Issidae is the thesis presented by Chiou-Ling Cheng in partial fulfillment of the requirements for the degree of Master of Agriculture. For promotion she was urgent need of publication, this part published else where. Family definition is cited here for complement.

118. ***Eusarima fanda*** Yang (Fig. 113)

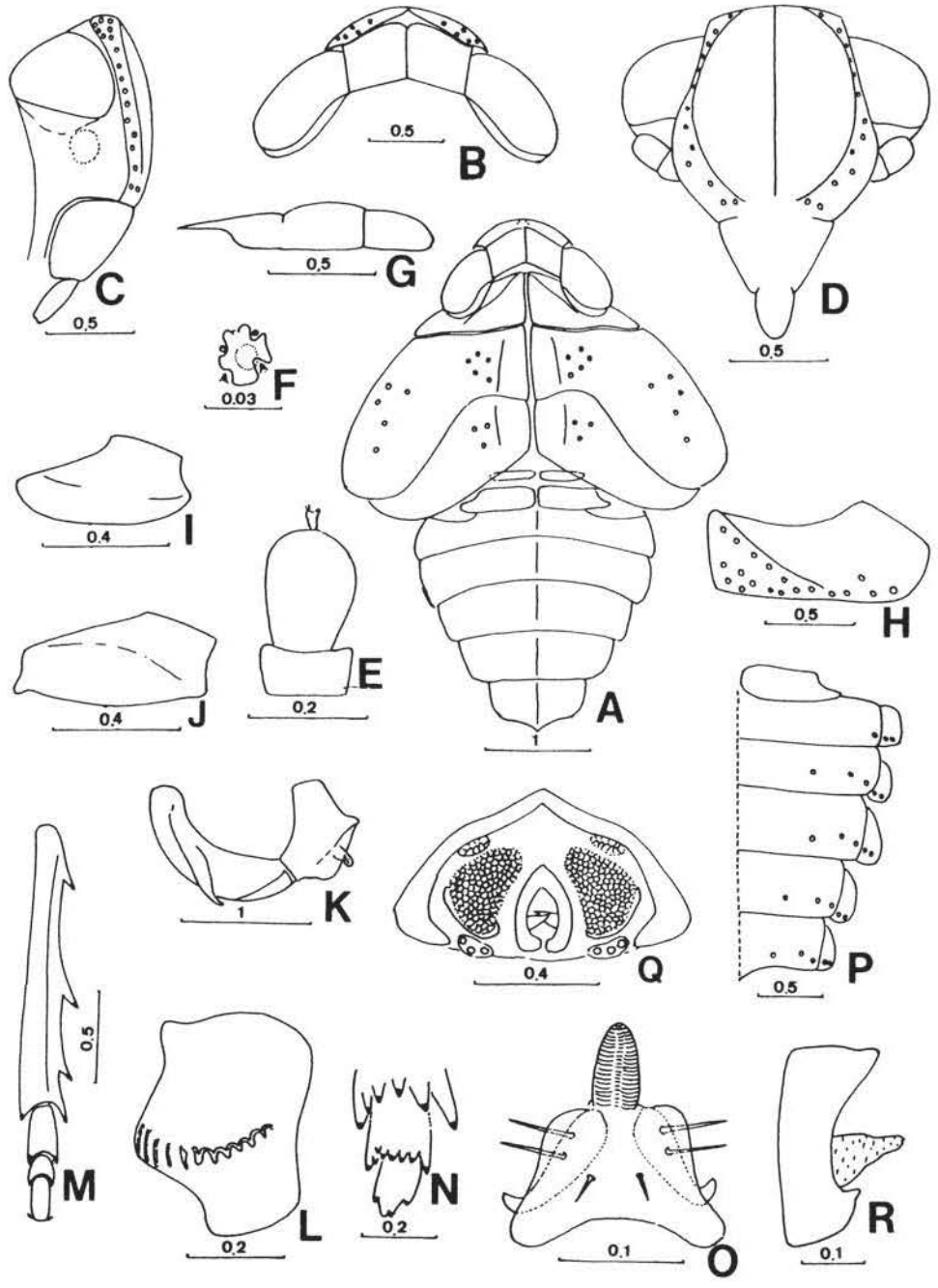

Fig. 113. *Eusarima fanda* Cheng and Yang A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, antenna; F, sensory organ of antenna; G, rostrum, H, pronotum, flat surface; I, procoxa; J, mesocoxa; K, metacoxa plus meron; L, metatrochanter; M, metatibia and tarsi; N, apex of metatibia and tarsi, ventral view; O, pretarsus, ventral view; P, abdominal tergites II-VII and pleurites III-VII, flat surface; Q, abdominal segments VII-IX, caudal view; R, ninth abdominal segment, lateral view. (unit = mm.)

Eusarima fanda Yang, 1993, Issidae of Taiwna: 144.
-: Cheng and Yang , 1992, J. Taiwan Mus. 45(1):48.

Specimen examined: Fifth instar nymph: 1, Taipei city, Yangmingshan, 15-IX-1988, S.C. Tsaur.

Determination: 1 male adult emerged from nymph, determined by C.T. Yang from comparison of male genitalia.

119. **Issidae** sp. 1. (Fig. 114)

General color uniform yellowish green.

Vertex only slightly wider than long in middle line, anterior margin strongly angulate medially, median carina distinct at basal two-thirds. Frons 1.6 times longer than wide, lateral carinae straight, submedian carinae subparallel with lateral carinae, after middle converging to apex, median carina distinct at basal half. Each side of frons with about 33 pits. Rostrum 4-segmented, subapical segment 1.2 times longer than apical.

Pronota each with about 29 pits. Anterior wing pads each with 12 pits near notum, 10 pits laterad. Posterior wing pads each with 7 pits near notum. Profemora at ventral margins without spines. Mesofemora at ventral margins each with 4-12 spines respectively, another rows without spine. Metatibiae each with 3 lateral teeth, relative distance of teeth about 2.4: 1. Spinal formula of hind leg (8-9)-7-2. Claw 2-setose.

Abdominal tergites III-VII bear each side 2-4-4-4-4 pits respectively. Abdominal pleurites III-VIII bear each 3-2-2-3-3-4 pits respectively. Abdominal segments VII-VIII bear each side a wax-pore plate, of VII about one-fifth of VIII. Ninth abdominal segment rather wide, each side with 3 pits, 2 dorsal, 1 ventral.

Length of body: 4.8 mm.

Length of anterior wing pad: 1.58 mm.

Specimen examined: Fifth instar nymph: 1, U.S.A. Ariz. mi. 10. Hitchcock Hwy. Sta. Catalina Mts. 15-VII-1965, L. B. & C. W. O'Brien. (specimen was sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien as Issidae.

120. ***Thionia*** (?) sp. 1. (Fig. 115)

General color brown. Wing pads at apical margins, dorsal aspect of abdomen dark brown. Ventral aspect of body yellow.

Vertex 1.2 times wider than long in middle line, anterior margin angulate forward medially, median carina feeble. Frons 1.6 times longer at longest part than widest part, submedian carinae reaching to level of antennae, set close to lateral carinae, in ventral view not covered lateral carinae, median carina reaching to middle. Each side of frons with about 41 pits. Frontoclypeal suture turned dorsad medially. Rostrum 4-segmented, subapical segment 0.85 times shorter than apical.

Pronota each with a humeral carina and 22 pits. Anterior wing pads each with 7 pits near notum, 8 pits laterad. Posterior wing pads each with 5 pits near notum. Pro- and mesofemora at ventral margins each with 17, 34 spines respectively, another rows each with 18, 9 spines respectively. Pro- and mesotibiae blade-shaped, longitudinal ridged. Metatibiae each with 4 lateral teeth, relative distance between teeth about 1-1-1. Spinal formula of hind leg 7-(7-8)-3. Meta-claw 2-setose.

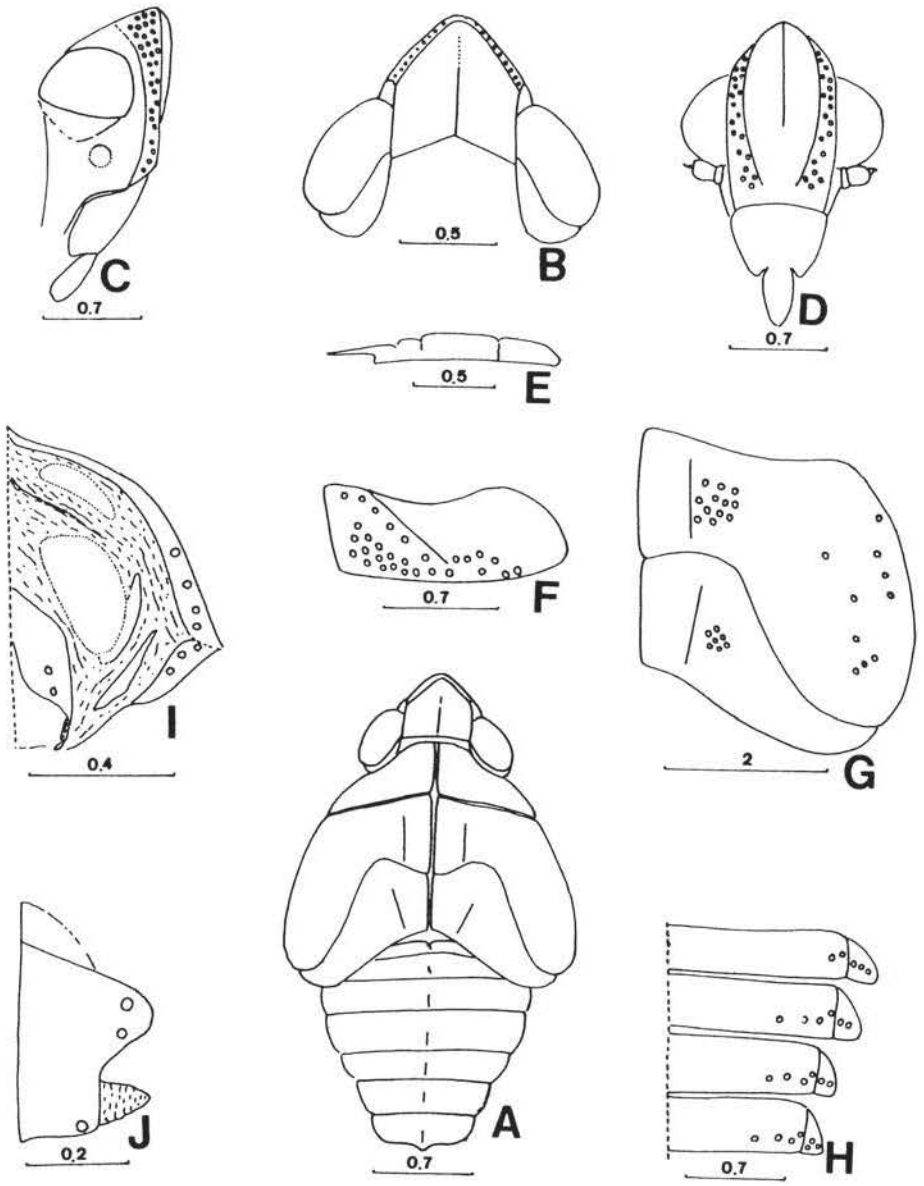

Fig. 114. .Issidae sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum, flat surface; G, wing pad, flat surface; H, abdominal tergites and pleurites III-VI, flat surface; I, abdominal segments VII-IX, caudal view; J, ninth abdominal segment, lateral view. (unit = mm.)

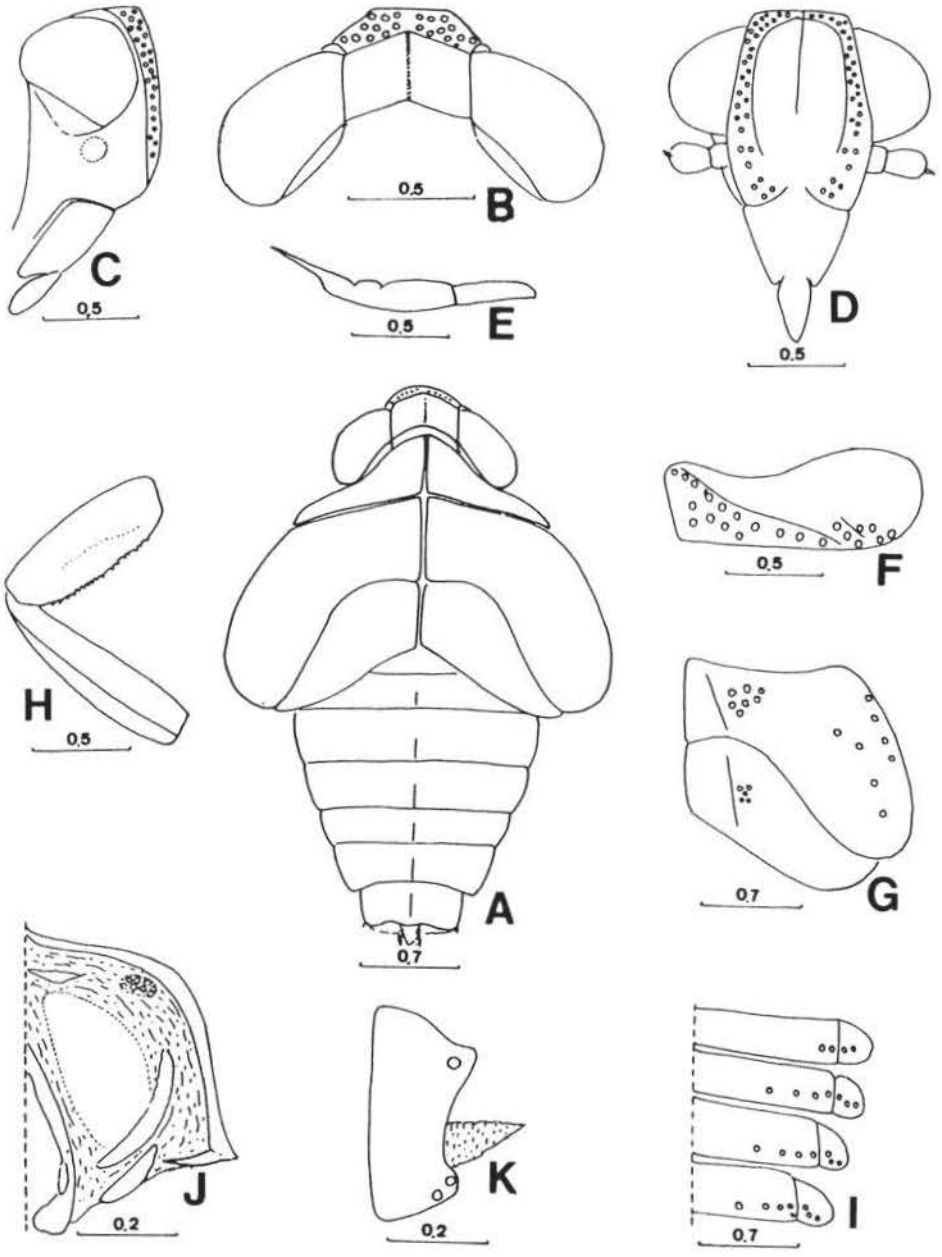

Fig. 115. *Thionia* (?) sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum, flat surface; G, wing pad, flat surface; H, profemur and tibia; I, abdominal tergites and pleurites III-VI, flat surface; J, abdominal segments VII-IX, caudal view; K, ninth abdominal segment, lateral view.(unit = mm.)

Abdominal tergites III-VII bear each side 2-4-5-5-5 pits respectively. Abdominal III-VIII bear each 2-3-3-3-3-6 pits respectively. Abdominal segments VII-VIII each side with a wax-pore plate respectively, wax-pore plate of VII rather small, each with 8-9 pores. Ninth abdominal segment each side with 3 pits, 1 dorsal, 2 ventral.

Length of body: 3.97 mm.

Length of anterior wing pad: 1.30 mm.

Specimen examined: Fifth instar nymph: 1, Dominica ca.2600' Morne Trois Pitons N.P. Fresh water Lake, 17-VIII-1986, C. W. & L. B. O'Brien. (specimen was sent by L. B. O'Brien)

Determination: Determined by L. B. O'Brien as probably *Thionia*.

121. **Caliscelini** sp. 1. (Fig. 116)

General color dark brown. Vertex each side with 2 black marks. pronota each with a elongate ovate black mark. Dorsal aspect with median line somewhat paler on thoracic nota and abdominal tergites V, VII-VIII which bordered pale black margins. Frons at basal half with 2 transverse black bands, apical half yellowish brown. Latest tarsal segment black.

Vertex with anterior margin semicircular, 1.8 times wider at base than long in middle line, median carina feeble. Frons nearly as long in middle line as wide at widest part. Submedian carinae reaching to above level of antennae. Median carinae reaching nearly to frontoclypeal suture. Each side of frons with 12 pits. Rostrum short, with subapical segment 1.7 times longer than apical, apical segment slightly longer than wide.

Pronota each with 18 pits, 17 confined inner side of lateral carina, single one laterad. Anterior wing pads each with 17 pits near notum, without pit laterad. Posterior wing pads each with single pit near notum, another one laterad. Mesocoxae without basoventral process. Metatibiae indistinctly longitudinal ridged, each with single lateral tooth. Spinal formula of hind leg 5-2-2. First metatarsal segment ventroapical half with many sac-like, transparent structure, claw unisetose.

Abdominal tergites IV-VIII each side with 4-7-8-10-1 pits respectively, pits only 1-2 laterad, others mesad. Abdominal pleurites present, only in VIII with a pit. Abdominal sternites IV-VII each side with a rounded plate respectively, in VIII with a transverse plate. Abdominal segments VI-VIII without wax-pore plate. Abdominal tergite VIII entire. Ninth abdominal segment each side with 2 pits, 1 dorsal, 1 ventral.

Length of body: 3.2 mm.

Length of anterior wing pad: 0.6 mm.

Specimen examined: Fifth instar nymph: 1, Argentina Gorr. km. 1324, Hwy.12. I-23-1989, C. W. & L. B. O'Brien and G. Wibmer. (specimen was sent by L. B. O'Brien.)

Determination: Determined by L. B. O'Brien, 1991, as Caliscelini, Issidae.

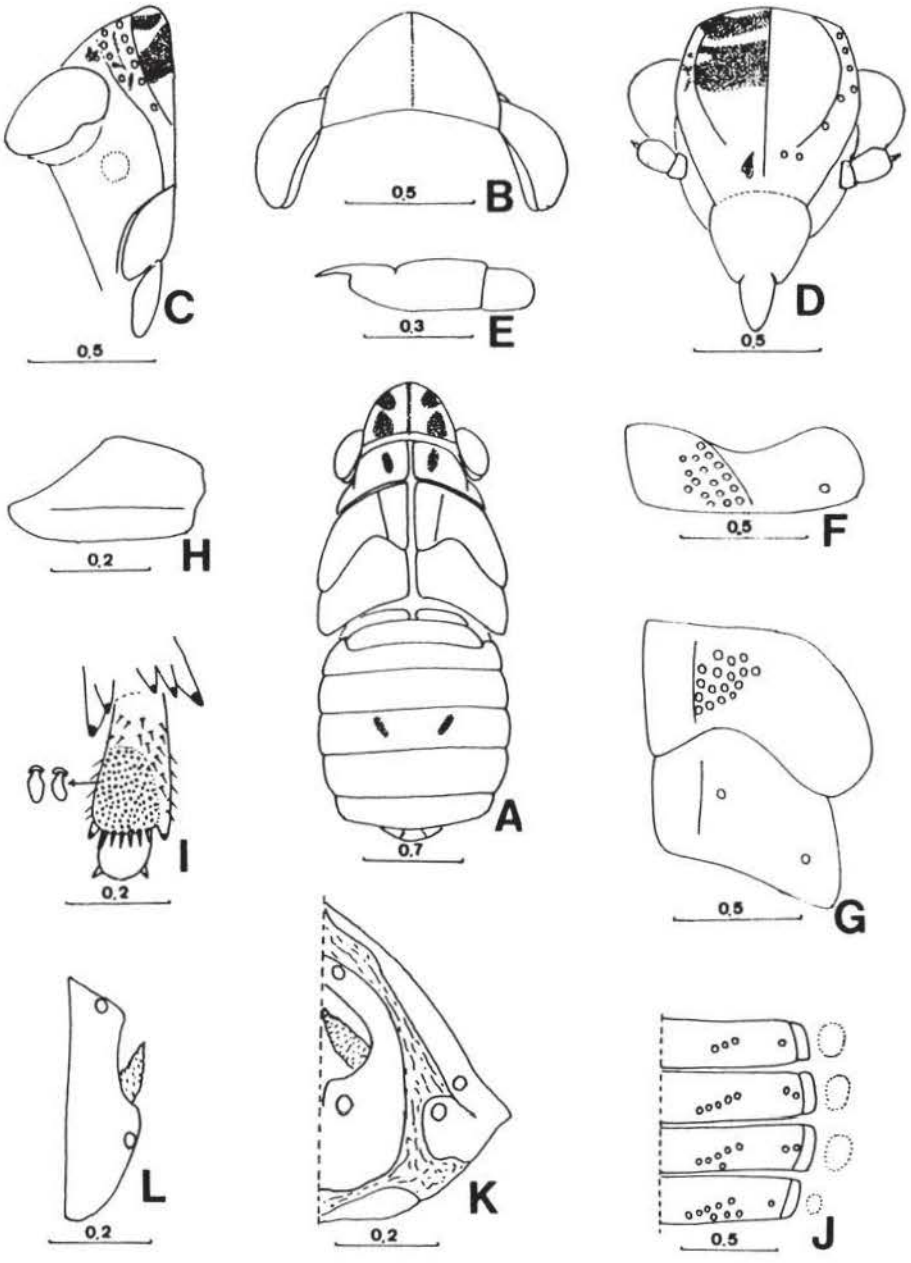

Fig. 116. Galiscelini sp.1. A, fifth instar nymph, dorsal view; B, head, dorsal view; C, the same, lateral view; D, the same, ventral view; E, rostrum, F, pronotum, flat surface; G, wing pad, flat surface; H, mesocoxa; I, apex of metatibia and first two tarsal segment, ventral view; J, abdominal tergites and pleurites IV-VII, flat surface; K, abdominal segments VIII-IX, caudal view; L, ninth abdominal segment, lateral view.(unit = mm.)

The other species examined and referred

1. *Tonga botelensis* Kato (examined)
2. *Tonga westwoodi* (Signoret) (examined)
3. *Ecapelopterum mirum* Chan and Yang (examined)
4. *Ecapelopterum yehyuensis* Cheng and Yang (examined)
5. *Neokodaiana chihpenensis* Yang (examined)
6. *Gelastyrella litaoensis* Yang (examined)
7. *Eusarima astuta* Yang (examined)
8. *Eusarima docta* Yang (examined)
9. *Eusarima mucida* Yang (examined)
10. *Eusarima* sp. 1. (examined)
11. *Eusarima casca* Yang (examined)
12. *Eusarima foetida* Yang (examined)
13. *Eusarima* sp. 3. (examined)
14. *Eusarima contonta* Yang (examined)
15. *Eusarima mythica* Yang (examined)
16. *Eusarima factiosa* Yang (examined)
17. *Eusarima* sp. 2. (examined)
18. *Eusarima rubricans* (Matsumura) (examined)
19. *Parasarima pallizona* (Matsumura) (examined)
20. *A-us* sp. 1. (examined)
21. *Gergithoides carinatifrons* Schumacher (examined)
22. *Gergithus* sp. 1. (examined)
23. *Gergithus* sp. 2. (examined)
24. *Gergithus formosanus* Metcalf (examined)
25. *Gergithus tessellatus* Matsumura (examined)
26. *Hemisphaerius formosus* Melichar (examined)
27. *Hemisphaerius kotoshonis* Matsumura (examined)
28. *Parahiracia sinensis* Ouchi (examined)
29. *Aphelonema fasciata* Chan and Yang (examined)
30. *Bruchomorpha oculata* Newman (Wilson and Mcpherson, 1981)

ACKNOWLEDGMENTS

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CHINESE ABSTRACT

蠟蟬總科若蟲,附述二新種並探討象蠟科成蟲

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摘 要

本文以若蟲特徵對蠟蟬總科及各科均作界定，其中僅 Kinnaridae, Achilixiidae 與 Gengidae 三科因無材料未作處理。在此共敘述、繪圖、補充或更正一百一十三種，另檢查、引用以前發表的七十種，其他二十八種僅參閱到文獻。附帶敘述分佈台灣的長翅蠟蟬科二新種：*Vekunta novensilis*,與*Mysidioides nymphalba*.並曾探討分佈台灣的象蜡科成蟲。另附科及其低階分類群檢索表。

關鍵詞：蠟蟬總科，若蟲

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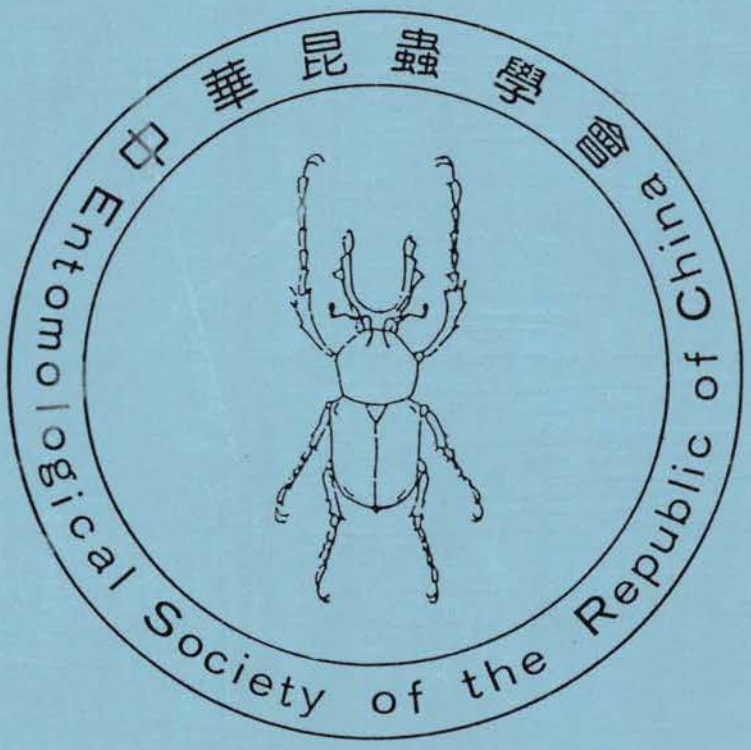
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