

**Miscellaneous Publication**

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# **Records of the Zoological Survey of India**

**THE *ISOTIMA*-COMPLEX  
(HYMENOPTERA : ICHNEUMONIDAE)**

**by**

**J. K. JONATHAN**

**Issued by The Director  
Zoological Survey of India, Calcutta**

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**RECORDS  
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ZOOLOGICAL SURVEY OF INDIA**

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**J. K. JONATHAN**



*Edited by the Director, Zoological Survey of India*  
1980

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## INTRODUCTION

The Ichneumonidae is one of the largest families among insects. There are an estimated 60,000 species in the world fauna, of which about 8,000 are believed to occur in India, where the great variety of climatic and other environments offer advantageous conditions for the life of these insects. These insects are parasitic on the larvae and pupae of other insects, except a few which are parasitic on spiders or their eggs. As they develop on other insects, they kill the host by feeding on the host's body fluids, then spin their own cocoons, pupate, and emerge as adult ichneumonids. By their parasitic habits, they destroy a large number of agricultural and forest pests and thus constitute one of the major forces for preventing the undue increase of noxious species. Under well balanced conditions, a tendency for a potentially destructive insect to increase to dangerous limits permits an increase in its ichneumonids and other natural enemies, and these in turn tend to effect a reduction of the pest. The details of this type of natural control are not well known. A little knowledge of them has been gained and with it some ability to apply biological control against insect pests. Because of the importance of natural enemies in biological control processes, any increase in our knowledge of them has potential practical value.

As a group, members of *Isotima*-Complex are external parasites of prepupae or pupae. *Isotima javensis* (Rohwer) (now *Gambroides javensis*) is one of the most important parasites of sugar cane top-shoot borer. The species of *Isotima*-Complex are known to parasitise many hosts such as *Tryporyza nivella*, *T. nivella intacta*, *T. innotata*, *Proceras venosata* and *Chilotraea infuscatellus*.

The present work includes a revision of world species of *Isotima*-Complex, taxonomy of which is in a state of confusion. Lack of properly conducted surveys and the absence of research material and identification manuals in the past slowed down new research and also prevented the easy finding and understanding the facts already known. The present work was therefore, undertaken with the view to revise a group of genera of tribe Goryphini, subtribe Goryphina.

This monographic treatment of the *Isotima*-Complex, which is attempted here, was made possible by the material received from Gupta collection, which was collected during 1965-1975, under the supervision of Dr. V. K. Gupta, university of Delhi, by a team of workers, the author was one of the team members. This collection is supplemented by bor-

rowing further material from Dr. H.K. Townes, U.S.A. and also from various museums of the world. Many other types were also available here on loan. A list of museums which kindly loaned their material for the present study is given below together with the abbreviations used for the museums in the text.

A LIST OF MUSEUMS FROM WHERE SPECIMENS HAVE BEEN BORROWED  
FOR STUDY

| <i>Abbreviations used in the text for<br/>the location of the specimens</i> | <i>Name of Institution and address</i>                                                                                |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1. BANGALORE                                                                | Commonwealth Institute of Biological control, Indian Station, Ballery Road, Bangalore, India.                         |
| 2. BETREM                                                                   | Personal collection of Dr. J.G. Betrem, 65 Rubensstraat, Deventer, Holland.                                           |
| 3. BRUSSELS                                                                 | Institut Royal de Science Naturelle de Belgique, 31 Rue Vautier, Brussels 4, Belgium.                                 |
| 4. BUDAPEST                                                                 | Magyar Nemzeti Muzeum, Baross—Utca 13, Budapest VIII, Hungary.                                                        |
| 5. DEHRADUN                                                                 | Forest Research Institute, New Forest, Dehra Dun, Uttar Pradesh, India.                                               |
| 6. EBERSWALDE                                                               | Institut Fur Pflanzenschutzforschung, Abt. Taxonomic der Insekten, 13 Eberswalde, Schicklerstvasse 5, D.D.R. Germany. |
| 7. GUPTA                                                                    | Dr. V.K. Gupta Collection, Department of Zoology, University of Delhi, Delhi—7, India.                                |
| 8. HONOLULU                                                                 | Bernice P. Bishop Museum, Honolulu 17, Hawaii, U.S.A.                                                                 |
| 9. LEIDEN                                                                   | Rijksmuseum van Natuurlijke Historie, 2 Raamsteeg, Leiden, Netherlands.                                               |
| 10. MUNICH                                                                  | Zoologische Sammlung des Bayerischen Staates, Menzinger Strasse 67, München 19, West Germany.                         |

- |               |                                                                                  |
|---------------|----------------------------------------------------------------------------------|
| 11. SAPPORO   | Institutum Entomologicum, Hokkaido University, Sapporo, Japan.                   |
| 12. STOCKHOLM | Naturhistoriska Riksmuseum (Entomologiska avdelningen), Stockholm 50, Sweden.    |
| 13. TOWNES    | American Entomological Institute, 5950, Warren Road, Ann Arbor, Michigan, U.S.A. |
| 14. Z.S.I.    | Zoological Survey of India, 34, Chittaranjan Avenue, Calcutta—12, India.         |

#### THE AREA OF STUDY

The genera of *Isotima*-Complex are known from Oriental and Ethiopian regions. All the taxa known are included in the text. The specimens available for the study from the Oriental region were from the Indian sub-continent (India, Burma, etc.); Sundaland (Malaya, Borneo, Java, etc.); Indo-chinese subregion (including Taiwan) and the Philippines. The specimens from Ethiopian region were from Madagascar and Ghana.

## MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

The morphological terms used in the present work are based on Townes (1969), Kamath and Gupta (1972), Jonathan and Gupta (1973), Gupta and Maheshwari (1977). They have described and illustrated the majority of the taxonomic terms commonly used for the Ichneumonidae. Those pertinent to the present work are reviewed below and illustrated for ready reference in figures 1 & 2.

1. *Frons* : The area between the eyes, extending from the lower margin of median ocellus to lower margin of antennal sockets.

2. *Face* : The area between the lower margin of antennal socket and clypeal groove.

3. *Clypeus* : The area above the mouth opening and below the face.

4. *Vertex* : The top part of head.

5. *Antennal scrobe* : The depressed areas behind each antennal sockets.

6. *Semicircular carina* : A carina bounding each antennal scrobe, which may be simple or highly specialized.

7. *Malar space* : The space between the lower margin of the eye and the base of mandible.

8. *Pronotum* : It is a triangular plate extending laterally to the tegulae; this can be divided into three areas; (i) The *pronotal collar*, which is more or less raised front margin of the pronotum, just behind the head, (ii) the *upper margin* of pronotum is the upper area of pronotum towards mesoscutum and (iii) the area down towards the base of fore coxa is known as *lower margin*.

9. *Epomia* : It is a carina on the pronotal collar, obliquely extending to the upper margin.

10. *Mesoscutum* : It is a large broadly convex plate-like area, which has a pair of converging grooves, the *notauli* (singular *notaulus*).

11. *Scutellum* : A median, subtriangular, raised part of mesonotum behind mesoscutum.

12. *Lateral carina of Scutellum* : A carina usually extends on lateral sides of scutellum from base to apex.

13. *Mesopleurum* : This term in ichneumonids mean ordinarily only the mesepisternum, which comprises most of the mesopleurum.

14. *Speculum* : A weakly raised, polished or less strongly sculptured area on the upper hind part of the mesepisternum.

15. *Sternaulus* : A horizontal groove on the lower edge of the meso-

pleurum starting at the prepectal carina and extending backwards, sometimes reaching the base of the coxa.

16. *Prepectal carina* : A carina near the front of the mesothorax, crossing the mesosternum near the front and extending upward towards the base of subtegular ridge.

17. *Subtegular ridge* : A transverse ridge near the upper edge of the mesopleurum, beneath the tegula and base of the fore wing.

18. *Juxtacoxal carina* : It is an arched carina cutting off a lenticular area of the lower part of the metapleurum.

19. *Propodeum* : It is morphologically the first segment of the abdomen, but is topographically part of thorax. Two transverse carinae divide the propodeum into basal, median and apical regions.

20. *Apophysis of the propodeum* : The lateral projections like horns, teeth, crest or tubercles near its midlength, situated at the hind end of the second lateral area or sublaterally on the apical transverse carina.

21. *First abdominal tergite* : The first tergite typically has 3 pair of longitudinal carinae: (i) the *dorso-median carinae* are a pair on the upper side, (ii) the *dorso-lateral carinae* lies one on each side, at the level of the spiracle and (iii) the *ventro-lateral carina* is present on each side at the lower edge of the first tergite. The length of the first tergite is measured from the centre of the insertion area of the extensor tendons to the extreme apex on the mid-line, and the width is measured at its widest point, which is nearly always close to the apex. The widened hind part of the first tergite behind the spiracles is the *postpetiole*.

22. *Wing cells and veins* : as shown in the figure.

23. *Ovipositor sheath* : The two outside, covering parts of ovipositor. The length of the ovipositor sheath in relation to the length of the hind tibia is used to indicate the length of the ovipositor itself. The length of ovipositor sheath is the same as the length of the exerted part of the ovipositor.

24. *Male genitalia* : as in figure.

FIG. 1

## A. Front view of head of an Ichneumonid.

- |                     |                        |
|---------------------|------------------------|
| a. Vertex           | h. Antennal sockets    |
| b. Frons            | i. Median ocellus      |
| c. Face             | j. Lateral ocellus     |
| d. Malar space      | k. Eye                 |
| e. Clypeus          | l. Semicircular carina |
| f. Mandible         | m. Antennal scrobe     |
| g. Epistomal suture |                        |

## B. Rear view of head of an Ichneumonid.

- |                   |                      |
|-------------------|----------------------|
| a. Vertex         | d. Temple            |
| b. Occiput        | e. Occipital carina  |
| c. Foramen magnum | f. Hypostomal carina |

## C. Side view of thorax of an Ichneumonid.

## AREAS

- |                               |                              |
|-------------------------------|------------------------------|
| 1. Median lobe of mesoscutum  | 10. Propleurum               |
| 2. Lateral lobe of mesoscutum | 11. Mesopleurum              |
| 3. Scutellum                  | 12. Speculum                 |
| 4. Metascutellum              | 13. Mesepimeron              |
| 5. Hind margin of metanotum   | 14. Mesosternum              |
| 6. Tegula                     | 15. Metapleurum              |
| 7. Subtegular ridge           | 16. Basal area of propodeum  |
| 8. Pronotal collar            | 17. Middle area of propodeum |
| 9. Upper margin of pronotum   | 18. Apical area of propodeum |

## CARINAE and GROOVES

- |                       |                               |
|-----------------------|-------------------------------|
| a. Notaulus           | g. Juxtacoxal carina          |
| b. Epomia             | h. Pleural carina             |
| c. Prepectal carina   | i. Basal carina of propodeum  |
| d. Mesopleural pit    | j. Apical carina of propodeum |
| e. Mesopleural suture | k. Apophysis                  |
| f. Sternaulus         |                               |

## D. Side view of abdomen

- |                         |                          |
|-------------------------|--------------------------|
| a. First tergite        | d. Ventro-lateral carina |
| b. Dorso-lateral carina | e. Spiracle              |
| c. Dorso-median carina  | f. Second tergite        |

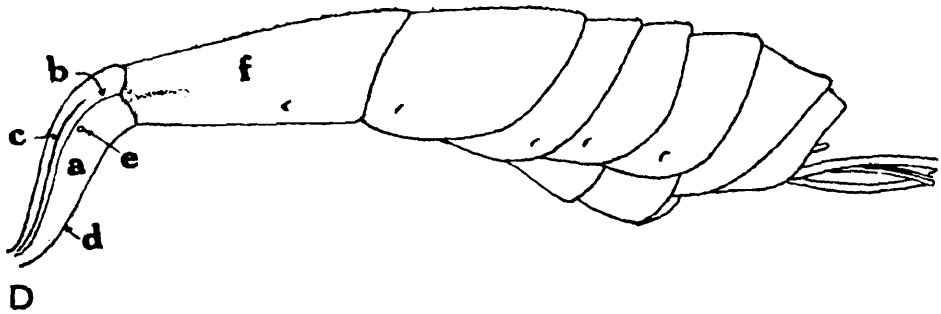
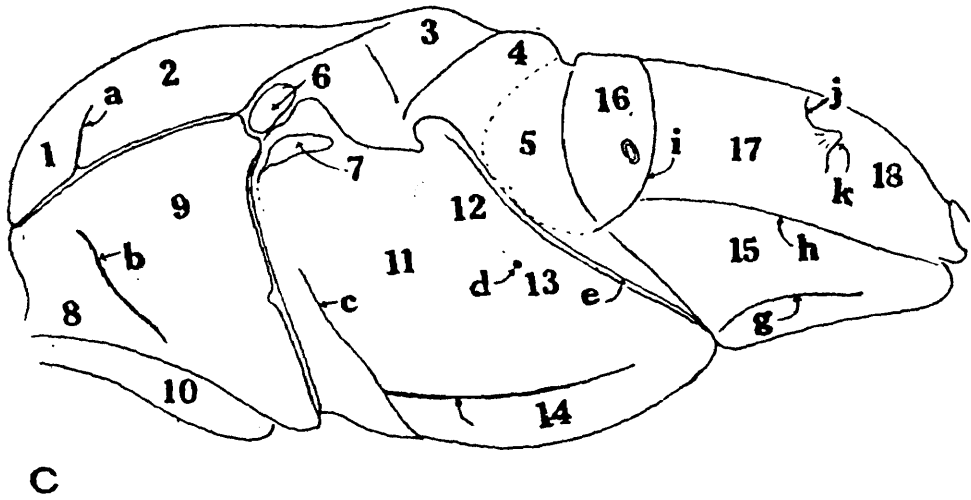
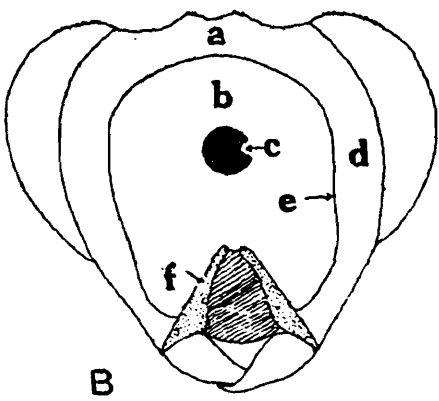
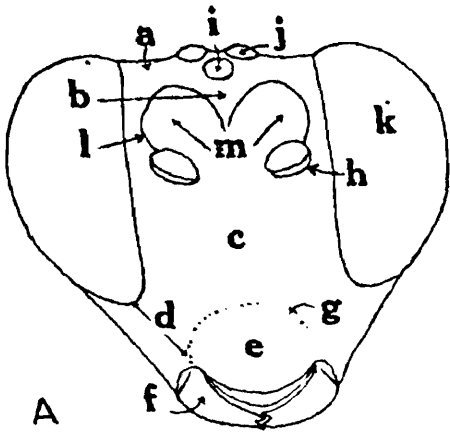


FIG. 2

## E. Fore and hind wings of an Ichneumonid.

## VEINS

| <i>Forewing</i>        | <i>Hindwing</i>   |
|------------------------|-------------------|
| ab=Costa               | ab=Costella       |
| cd=Subcosta            | cde=Subcostella   |
| efg=Metacarpus         | ef=Metacarpella   |
| hijf=Radius            | dgh=Radiella      |
| klmn=Cubitus           | jkl=Cubitella     |
| opqv=Discoideus        | mn=Discoidella    |
| qrs=Subdiscoideus      | kg=Intercubitella |
| co=Medius              | tj=Mediella       |
| tu=Submedius           | op=Submediella    |
| uv=Brachius            | pq=Brachiella     |
| beh=Stigma             | rs=Axillus        |
| do=Basal vein          | jmp=Nervellus     |
| ik=First intercubitus  |                   |
| jm=Second intercubitus |                   |
| pk=Discocubitus        |                   |
| lr=Second recurrent    |                   |
| ou=Nervulus            |                   |
| pqv=Postnervulus       |                   |

## CELLS

| <i>Forewing</i>         | <i>Hindwing</i>      |
|-------------------------|----------------------|
| 1=Radial cell           | 12=Constellan cell   |
| 2=Median cell           | 13=Radiellan cell    |
| 3=Discocubital cell     | 14=Mediellan cell    |
| 4=Areolet               | 15=Cubitellan cell   |
| 5=Third cubital cell    | 16=Discoidellan cell |
| 6=Second discoidal cell | 17=Submediellan cell |
| 7=Third discoidal cell  | 18=Brachiellan cell  |
| 8=Submedian cell        | 19=Anellan cell      |
| 9=First brachial cell   | 20=Postellan cell    |
| 10=Second brachial cell |                      |
| 11=Anal cell            |                      |

## F. Ovipositor of an Ichneumonid.

a. Shaft, b. Upper valve, c. Lower valve, d. Nodus, e. Teeth

## G. Male genitalia of an Ichneumonid.

## 1. Aedeagus

spt=Spatha, pr=Paramere, erg=Ergot

## 2. Gonororceps

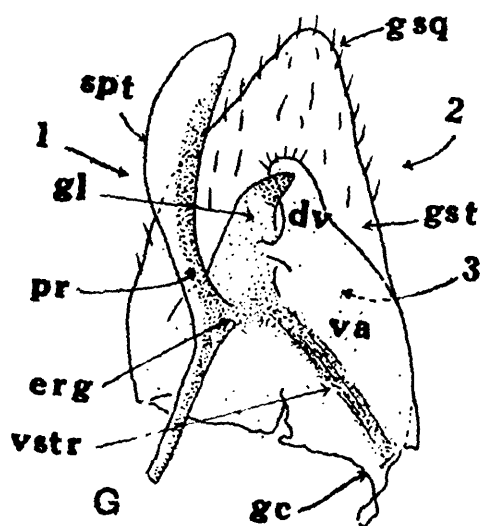
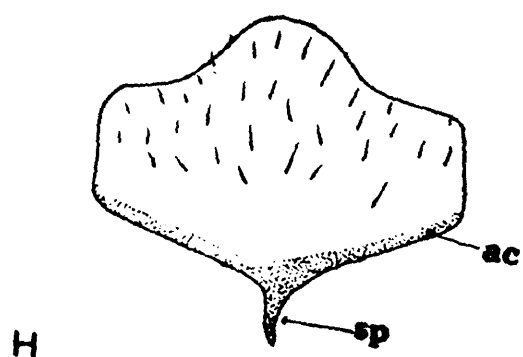
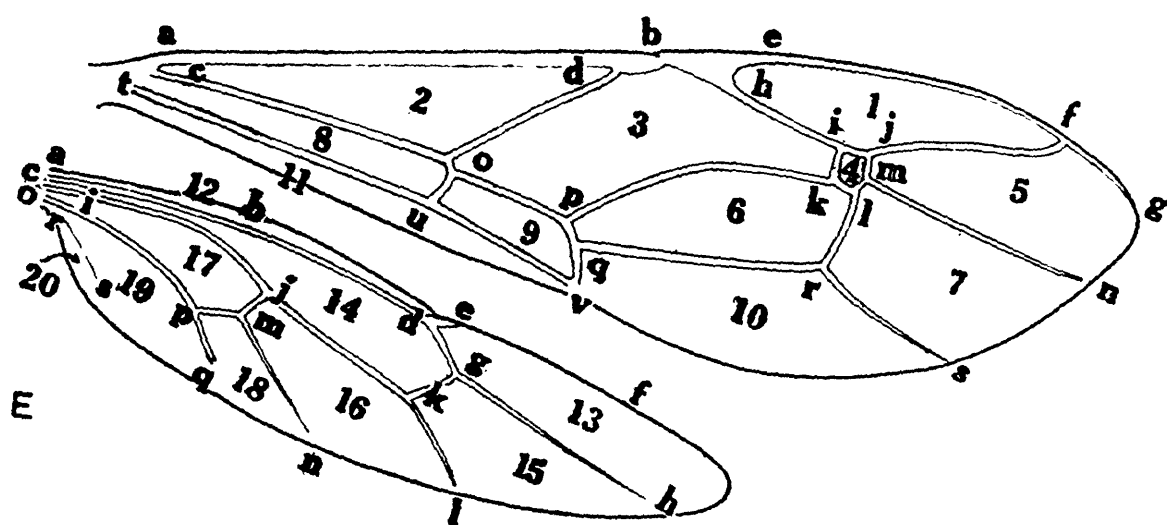
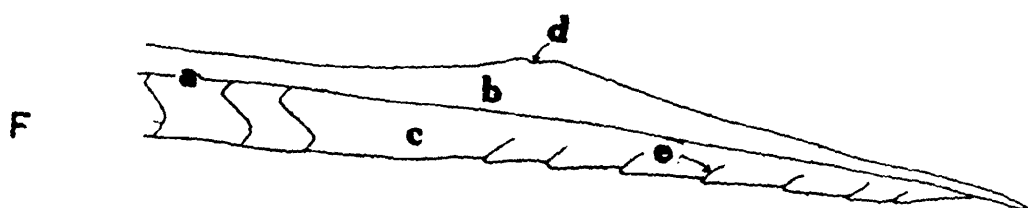
gsq=Gonosquama, gst=Gonostipes, gc=Gonocardo

## 3. Volsella

gl=Gonolacinia, dv=Distivolseller apodeme, va=Ventral area of basivolsella, vstr=Basivolsella strut

## H. Ninth sternum or genital plate.

sp=Spiculum, ac=Anticosta



# THE *ISOTIMA*-COMPLEX

## HISTORICAL RESUME

Foerster (1868) described *Isotima* without including any species. Ashmead (1905) described four species from Philippines under *Isotima*, of which *I. albicineta* was selected by Townes (1957) as the type species of *Isotima*. He further synonymized *Formostenus* Uchida (1931) and *Fotsiforia* Seyrig (1952) with *Isotima* Foerster. Townes, Townes and Gupta (1961) synonymized *Gambroides* Betrem (1941) and *Vadonina* Seyrig (1952) with this genus. Townes, Townes and Gupta (1961) included fourteen species and one unnamed species from Oriental region and two species from Ethiopian region under this genus, and characterized the genus, by having a crescentric shallow area above each antennal socket that is bordered dorsally by a semicircular carina, the carina simple in the female but usually projecting as a flange or tooth in male; frons also have a weak median vertical groove or carina.

The above generic treatment of *Isotima* resulted in the placement of many diverse species under it. A recent study of the types and many other undescribed species from the Oriental and Ethiopian regions revealed several points of difference between the typical species of *Isotima* (as characterized by the type-species) and other included species, notably in the shape of clypeus, shape of frons, epomia, propodeum, first abdominal tergite, brachiella, nervulus, nervellus, ovipositor and also the general texture of the body. According to the present study *Gambroides* Betrem (= *Vadonina* Seyrig), *Formostenus* Uchida and *Fotsiforia* Seyrig are separable from *Isotima* Foerster. These four genera are collectively grouped under the *Isotima*-Complex.

## SYSTEMATIC POSITION

The *Isotima* belongs to the subtribe Goryphina, tribe Goryphini of the subfamily Gelinae of Townes (=Cryptini).

Among the Goryphina, there is a closely related group of genera, which have often been confused with *Isotima*, because of their close resemblance. These are *Goryphus*, *Perjiva*, *Skeatia*, *Phaedraspis*, *Melcha* and *Isotima*. They have the following characters in common:

Clypeus evenly arched to moderately convex, its apical margin entire, truncate or simple with or without tooth-like projection; frons moderately, to strongly shallow behind antennal sockets, this shallow area sometimes

bounded by a distinct carina as in *Isotima* (one species of *Goryphus* has a weak carina); vertex broad or narrow; mandible with equal or subequal teeth; epomia present or absent; upper margin of pronotum normal, sometimes moderately to strongly swollen; propodeum short or longish, basal carina complete, apical carina complete or interrupted in the middle, apical carina represented by lateral crest or tooth-like apophysis; first tergite always with a lateral tooth at base; ovipositor long, slender, pointed to stout.

The related genera mentioned above can be distinguished by the following key:

1. Frons with a semicircular carina above each antennal socket that encloses a shallow basin, the carina in males often developed or specialized into flanges or absent. Oriental and Ethiopian . . . . . *Isotima*-Complex
- Frons without a semicircular carina above each antennal socket . . . . . 2
2. *Sternaulus* reaching only  $0.4 \pm$  the distance to the middle coxa; epomia entirely absent; first abdominal segment short, about  $2 \times$  as long as wide at apex, its spiracles close to the apex than to each other, ovipositor tip heavy, its upper valve convex. Ethiopian and Oriental . . . . . *Allophatnus* Cameron
- Sternaulus* reaching almost up to the middle coxa, or at least extending beyond 0.5 the distance to middle coxa; epomia present . . . . . 3
3. Antennal flagellum of male strongly flattened apically or in the apical half; petiole narrow, its lateral side sloping inwards and not bounded by carinae (whole petiole evenly arched); propodeal apophysis long, sharp and pointed; in profile the propodeal slope in an even plane; ovipositor slender, pointed and sometimes slightly curved. Indo-Papuan . . . . . *Melcha* Cameron
- Antennal flagellum of male normal, not flattened and similar to that in female; ventro-lateral carina of petiole strong and its ventral side not as sloping inwards; propodeal apophysis usually short and blunt, crest-like, pointed and longer in most of *Skeatia* species; propodeum in profile evenly arched; ovipositor usually stouter; upper valve thicker, tapering in *Skeatia* species . . . . . The *Goryphus*-Complex 4
4. Apex of clypeus broadly truncate, with a small subapical median tooth; spiracle of first abdominal tergite at mid-length or a little behind; ovipositor strongly compressed laterally (like a blade). Oriental . . . . . *Perjiva* Jonathan & Gupta
- Apex of clypeus not truncate, without a subapical tooth; spiracle of first abdominal tergite always behind the mid-length; ovipositor not so strongly compressed and blade-like . . . . . 5
5. First abdominal tergite less than  $2 \times$  as long as wide at apex, and postpetiole much wider at base (width=distance between spiracles) than long (length=distance between spiracle and apex); ovipositor tip usually short and blunt, and not so pointed, propodeal apophysis generally crest-like. Old world tropics and Subtropics . . . . . *Goryphus* Holmgren
- First abdominal tergite  $2 \times$  or more as long as wide at apex, and postpetiole as wide or less wider than long at base; ovipositor tip usually long and pointed, propodeal apophysis largely long and pointed, rarely crest-like, Oriental . . . . . *Skeatia* Cameron

The genera of *Isotima*-Complex have the following characters in common:

Body moderately stout to slender; clypeus moderately convex, apical margin weakly arched, sometimes weakly truncate, apical margin without median irregularity or tooth; frons with a semicircular carina above each antennal socket, that encloses a shallow basin, this carina in males often developed or specialized into flanges or horns; genal carina strongly sinuate, joining oval carina a distance above base of mandible; mandible short, the lower tooth slightly sometimes distinctly shorter than upper tooth. Epomia long to short or sometimes obscured. Lateral carina of scutellum usually confined to its base or extending as much as 0.75 its length. Sternaulus reaching up to the middle coxa, sometimes short obscured; prepectal carina extending 0.4 to 0.9 the height of mesopleurum. Basal carina of propodeum complete, apical carina complete or rarely obsolescent, often elevated sublaterally as a crest, propodeal spiracle circular or short elliptic. Areolet usually square to somewhat pentagonal, 0.4-0.75 as high as the portion of second recurrent vein above bulla; second intercubitus faint, second recurrent subvertical, vertical or moderately curved in the middle; nervulus usually interstitial, may be distad or basad of basal vein; nervellus intercepted between lower 0.4 and upper 0.28; brachiella long, short, or often absent. First tergite short to moderately long, stout to slender; petiole quadrate or cylindrical; spiracle close to the apex than to each other, or close to each other than to the apex; a lateral tooth present at base; its dorso-lateral, ventro-lateral and median dorsal carinae present, usually short but sometimes weak or blunt. Ovipositor various, moderately short to long, with distinct nodus, tip short to long pointed, tip sometimes straight or decurved, teeth on lower valve usually distinct.

Townes *et al.* 1961 and Townes & Townes 1973 included 16 species under *Isotima* from the world fauna (genus is only known from Ethiopian and Oriental regions). Of these, nine species are treated under *Isotima*, two under *Formostenus*, four under *Gambroides* and one under *Fotsiforia*. The genera of *Isotima*-Complex can be distinguished by the following key:

#### KEY TO THE GENERA OF *ISOTIMA*-COMPLEX

1. Epomia long, strong and reaching upper margin of pronotum, then turned mesad, where it ends in a weak elevation (view from top) : nervulus basad of basal vein, sloping towards the base, brachiella present, reaching more than half the distance from nervellus to wing margin Fotsiforia Seyrig  
Epomia short, weak to strong or sometimes obscured, not reaching upper margin of pronotum and not ending in an elevation; nervulus various, brachiella absent or in the form of a small stump, if present extending less than

half the distance from nervellus to wing margin (except in *Indostenus\**, but here nervellus is broken at its upper 0.3) . . . . . 2

2. Epomia and sternaulus obscured (absent) or almost indistinct; prepectal carina short, extending as much as 0.5 the height of mesopleurum; first abdominal tergite short and stout, about  $2 \times$  as long as wide at apex, postpetiole as long as or a little longer than wide at base; nervulus distinctly apicad of basal vein; nervellus intercepted at its upper 0.36; brachiella entirely absent; ovipositor long, compressed, tip slightly upcurved . . . . .

Gambroides Betrem

Epomia and sternaulus distinctly present; prepectal carina long, extending as much as 0.95 or to the base of subtegular ridge; first abdominal tergite short to long, stout to slender, about 2 to  $3 \times$  as long as wide at apex, postpetiole longer than wide or wider than long; nervulus and nervellus conditions various; brachiella present or absent; ovipositor moderately short to long, tip straight or sometimes curved . . . . . 3

3. First abdominal segment short and thick in shape, about 2 to  $2.5 \times$  as long as wide at apex, petiole short, quadrate, its spiracles close to the apex than to each other; thorax short and robust; abdomen depressed; ovipositor tip short to long, less pointed, tip never curved . . . . .

Isotima Foerster

First abdominal segment long and slender in shape, about  $3 \times$  as long as wide at apex, petiole long usually tubular, its spiracles close to each other than to the apex; thorax long and slender; abdomen largely spindle shaped; ovipositor tip long and pointed and usually straight and sometimes curved . . . . .

Formostenus Uchida

## 1. Genus *Fotsiforia* Seyrig (Fig. 3, Map I)

*Fotsiforia* Seyrig, 1952, *Mem. Acad. Malgache*, **19** : 190. Type : *Fotsiforia carinifrons* Seyrig. Original designation.

TAXONOMY : Seyrig, 1952 : 190. Townes, 1957 : 109. Townes *et. al.*, 1961 : 144. Townes, 1970 : 265. Townes & Townes, 1973 : 105.

This genus has a strong and long epomia, which is reaching up to the upper margin of pronotum, then turned mesad, usually ending in an elevated area. Brachiella is complete and reaching more or less up to the wing margin. Apical margin of clypeus weakly truncate. The first abdominal tergite is about  $2 \times$  as long as broad at apex, postpetiole broader than long. Nervulus is always basad of basal vein.

Head moderately large, broader than long; face in the middle and sublaterally weakly raised; clypeus weakly convex, apical margin impressed, blunt (weakly truncate) without any tooth or irregularity; mandible thick, teeth small, more or less equal, pointed; frons sloping outwards from the median ocellus; appears to be more horizontal; antennal scrobe shallow bounded by a distinct carina; epomia strongly reaching to upper margin, then turned mesad forming an elevation; lateral carina of scutellum either confined to its base or extending more than  $0.75 \times$  its length; prepectal carina extending  $0.75 \times$  or more, the height of mesopleurum,

sternaulus extending 0.5 to 1.0 the base of middle coxa; both the transverse carinae of propodeum present, apical carina present or sometimes absent in the middle, carina moderately to strongly turned forward in the middle, apophysis low crest-like to strong and long; first abdominal tergite short, about 2× as long as broad at the apex, its spiracles close to the apex than to each other, spiracles somewhat projecting, base of the tergite with lateral tooth-like projections, dorsolateral carina present, extending the full length or sometimes short, dorso-median carina present or absent, ventro-lateral carina weakly or strongly present; second abdominal tergite longer than first, about 1.25× as long as first tergite; areolet somewhat broader than high, pentagonal, second intercubitus faint, distinctly shorter than first, second recurrent vein strongly curved in the middle, nervulus basad of basal vein, somewhat sloping towards the base, nervulus broken at or little below or above the middle, brachella present, extending more than 0.5 the distance to wing margin. Ovipositor moderately long, weakly arched in the middle or straight, tip long and lower valve with series of teeth.

*Length* : ♀, 6.5-8 mm; fore wing 4.5-6 mm; ovipositor sheath about 1.5 mm.

*Type-species* : *Fotsiforia carinifrons* Seyrig.

*Fotsiforia* Seyrig was synonymized with *Isotima* Foerster by Townes (1957). Its status is now restored.

This is a small genus, known by a single species from Madagascar and Ghana. In addition, five new species are described here from India and the Philippines. These can be distinguished by the following key:

KEY TO THE SPECIES

- 1. Thorax wholly, or atleast propodeum deep orange or red . . . . . 2  
  Thorax black, variously marked with yellow . . . . . 4
- 2. Thorax wholly deep orange without any marking; abdominal tergite also largely deep orange with yellow apical bands; hind tibia without a basal band; mesoscutum with fine aciculations; mesopleurum largely rugose; apical carina of propodeum obscured in the middle; apophysis strong and high.  
  Madagascar, Ghana . . . . . 1. *carinifrons*  
  Not as above . . . . . 3
- 3. Pronotum in the middle largely smooth and shiny with 2-3 striations; mesopleurum in the middle largely closely punctate, punctures running into striations; clypeus and mesopleurum, black. India . . . . . 2. *mysorensis*\*  
  Pronotum subpolished, closely trans-striate in the middle; mesopleurum finely trans-wrinkled in the middle; basal half of clypeus, yellow; mesopleurum red. India . . . . . 3. *assamensis*\*
- 4. Frons rugose; malar space rough, about 0.8× the basal width of mandible; mesopleurum finely striate. In males : orbital yellow mark encircling the whole orbit; pronotal collar broadly yellow; all the abdominal tergites yellow

\*Described as new.

- at apex; hind tibia with its basal 0.2 yellow. India . . . 4. *sundrica*\*
- Frons largely smooth; malar space granulose, about  $0.6 \times$  the basal width of mandible; mesopleurum largely rugoso-punctate (female of *similis* not known). In males : orbital mark interrupted behind the eye; pronotal collar with a small mark below; all the abdominal tergites not yellow at apex, atleast sixth tergite entirely black; hind tibia with its basal 0.33 pure white 5
5. Male : Speculum on mesopleurum yellow; mandible black; hind tibial spur yellowish-brown; fourth to sixth tergites entirely black, Philippines . . . 5. *flavifrons*\*
- Male : Speculum on mesopleurm black; mandible yellow; hind tibial spur black; fourth and fifth tergites with complete or incomplete bands at apex, sixth tergite entirely black. Philippines . . . 6. *similis*\*

### 1. *Fotsiforia carinifrons* Seyrig (Fig. 4a-d)

*Fotsiforia carinifrons* Seyrig, 1952, *Mem. Acad. Malgache*, 39 : 190. ♂, ♀, des., fig. Type : ♀, Madagascar : "Romalambara" (PARIS).

*Isotima carinifrons* : Townes, 1957, *Proc. Ent. Soc. Washington*, 59 : 109. syn.; Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 144. syn.; Townes, 1970, *Mem. Amer. Ent. Inst.*, 12 : 265. syn. Townes & Townes, 1973, *Mem. Amer. Ent. Inst.*, 19 : 105.

This species is distinguished by having thorax entirely deep orange without any markings, hind tibia without a basal band. Mesoscutum with fine aciculations, mesopleurum largely rugose. The propodeal apophysis are high and strong and apical carina is obscured in the middle.

*Female*: Body covered with thick pile of short hairs. Face weakly rugose, regulose at sides; clypeus weakly rugoso-punctate; malar space rough,  $0.8 \times$  the basal width of mandible; frons subpolished, largely granulose with few weak punctures in the middle; antennal scrobe moderately deep, bounded by moderately strong carina, scrobes with a median longitudinal groove, ocellar triangle and vertex behind the triangle densely punctate, vertex at sides tending to be rugulose with indistinct punctures; temple mat and dull; thorax longer in profile, largely moderately strongly rugose type; pronotal scrobe trans-striate, epomia ending in a weak elevated area; mesoscutum weakly rugose, with fine transaciculations all over; scutellum subpolished, sparsely and shallowly punctate, its lateral carina extending to its full length; metascutellum smooth and shiny; prepectal carina extending about  $0.75 \times$  the height of mesopleurum, sternaulus extending not beyond 0.75 the distance to middle coxa; propodeum distinctly wrinkled, area at side and towards apex appears to be transwrinkled, area basad of basal carina tending to be reticulate, apophysis long, moderately strong, flat somewhat beak-like, spiracle of moderate size, longish; apical carina straight in the middle; areolet small, wider than high, about  $0.3 \times$  as high as the portion of second recurrent vein

above bulla, nervulus basad, nervellus intercepted slightly above the middle (Fig. 4d); first abdominal tergite smooth and shiny, its dorso-median and dorsolateral carinae quite distinct, second tergite subpolished, densely and minutely punctate, third tergite with dense shallow punctures at base, tending to be mat towards the apex, following tergites mat and subpolished; ovipositor sheath about  $0.45 \times$  as long as hind tibia.

Dark orange. Antennae with scape to third flagellar segment dark orange, fourth and fifth segments black, sixth to thirteenth segments pure white, following segments (Fig. 4a) black with brown in front; face (Fig. 4b), frons, temple, mandible in the middle, subtegular ridge, apices of all the abdominal tergites, yellow; vertex, ocellar triangle, occiput, black; second and third tergites with brown patches in the middle; legs dark orange (Fig. 4c).

*Male* : Not known.

*Length* : ♀, 9.5 mm; fore wing 7.0 mm; ovipositor sheath 1.75 mm.

*Specimens examined* : 2♀♀, MADAGASCAR : nr. Rogez, 900 m, 1♀ (homotype of *Fotsiforia carinifrons* Seyrig, det. by H. Townes), xi. 1946 (TOWNES). Ramalambara, ♀ (Holotype examined by Dr. V.K. Gupta and supplied the notes to author), x. 1938 (PARIS).

*Distribution* : MADAGASCAR.

## 2. *Fotsiforia mysorensis*, sp. nov. (Fig. 4e-g)

This species is characterized by having mesopleurum in the middle largely closely punctate, punctures running into striations; malar space about  $0.7 \times$  the basal width of mandible; propodeum largely reticulate, and by having clypeus and mesopleurum black.

*Female* : Face rugulose, clypeus closely punctate at base, punctures tending to be shallow and sparse towards the apex, extreme apex smooth and subpolished, apical margin impressed; malar space rough and granulose  $0.7 \times$  the basal width of mandible; mandible largely subpolished, with few punctures, teeth more or less equal; frons with area around ocelli somewhat rugoso-punctate, at sides largely smooth with faint indication of shallow punctures, a groove extending down from median ocellus to the middle of antennal sockets; vertex closely punctate; temple subpolished, thickly punctate, punctures towards the base of mandible coalescent; pronotum largely smooth and shiny except few trans-striae in the middle, striae its extreme upper margin rugulose and pronotal collar faintly punctate, epomia strongly reaching to upper margin, then turned mesad forming an elevation; mesoscutum subpolished minutely punctate; scutellum subpolished much shallowly and sparsely punctate, lateral carina confined to its base only; metascutellum subpolished, hardly punctate; mesopleurum subpolished, lower half in the middle densely and strongly punctate,

punctures running into striations, upper half in the middle shallowly and sparsely punctate, striate along the anterior margin of speculum and also along prepectal carina, speculum shiny with faint punctures, mesosternum coarsely punctate, prepectal carina extending 0.75 the height of mesopleurum; metapleurum subpolished finely wrinkled, juxtacoxal carina present; propodeum between basal carina and apex finely reticulate, basad of basal carina coarsely and shallowly punctate, punctures running into striations, extreme base smooth and shiny, apical carina weak, evenly and moderately arched in the middle, basal carina strong, turned forward in the middle, spiracle longish, apophysis low crest-like; first abdominal tergite short, smooth and shiny at apex and base, coarsely and shallowly punctate in the middle, second and third tergites closely punctate, following tergites subpolished; areolet broader than high, about  $0.7 \times$  as high as the portion of second recurrent vein above bulla, intercubiti parallel, second intercubitus faint, nervulus distinctly basad, nervellus intercepted at the middle; ovipositor sheath about  $0.6 \times$  as long as hind tibia.

Black. Fifth to tenth flagellar segments white above; face (Fig. 4f) completely, mandible (except at the apex), orbital stripes extending from temple to the base of antennal sockets including semicircular carina, pronotal collar, upper margin of pronotum, tegula, subtegular ridge, speculum, scutellum, metascutellum, base of hind wing narrowly along the lateral margins, propodeum with two lateral marks on apophysis, apices of first, second abdominal tergites, sixth tergite narrowly in the middle, seventh and eighth tergites wholly, third tergite with faint irregular band at apex (Fig. 4e) pale yellow or yellow; base of hind wing except a mark, metapleurum, propodeum, first abdominal tergite (except the apical yellow band) dark orange; first tergite blackish in the middle; fore coxa and first trochanteral segment, yellow; its second trochanteral segment, femur, tibia and tarsus yellowish-brown, except its fifth tarsal segment dark brown; middle coxa and first trochanteral segment, yellow, second trochanteral segment blackish-brown, femur dark orange, tibia and tarsus yellowish-brown; hind (Fig. 4g) coxa dark orange with a blackish mark apicolaterally, trochanter largely piceous, femur dark orange with its extreme apex and base dark brown, tibia brown, its extreme base and apical  $0.2$  dark brown and with a sub-basal yellowish band, tarsus yellow, clouded with fuscous, its fifth segment dark brown.

*Male* : Unknown.

*Length* : ♀, 7.5 mm; fore wing 5.5mm; ovipositor sheath 1.75 mm.

*Holotype* ♀, INDIA : KARNATAKA : Bhagmandala, 853m, 12.xii.1965, J.K. Jonathan, Coll.No. J110 (GUPTA).

*Distribution* : INDIA : Karnataka.

### 3. *Fotsiforia assamense*, sp. nov. (Fig. 5a-c)

This species is close to *Fotsiforia mysorensis*\*. It can be distinguished by having pronotum subpolished, closely trans-striate in the middle; mesopleurum finely trans-wrinkled in the middle; propodeum finely wrinkled and mesopleurum largely red (Fig. 5a).

*Female*: Face dull, ruguloso-punctate; clypeus subpolished, its apical 0.25 smooth and shiny, basally shallowly punctate, punctures not well distinct, apical margin impressed and truncate; malar space strongly granulose,  $0.6\times$  the basal width of mandible; mandible subpolished with more or less equal teeth; frons with area around ocelli somewhat rugose, at sides shallowly punctate; vertex distinctly closely punctate; temple strongly rugoso-punctate; pronotum subpolished closely trans-striate in the middle, finely obliquely striato-punctate above at upper margin, lower margin smooth; mesoscutum distinctly punctate; scutellum faintly punctate, lateral carina confined to its base; metascutellum punctate; mesopleurum subpolished, lower half up to sternaulus and along anterior margin of speculum finely trans-wrinkled with punctures in between, upper half in the middle largely smooth with sparse minute punctures, area along prepectal carina trans-wrinkled, area just above sternaulus near prepectal carina punctate, punctures running into irregular striations, speculum shallowly and sparsely punctate, mesosternum closely punctate, punctures tending to be coalescent, just below sternaulus rugoso-punctate, prepectal carina extending  $0.75$  the height of mesopleurum; metapleurum strongly rugose, juxtacoxal carina present; propodeum between basal carina and apex wrinkled, basad of basal carina closely rugoso-punctate, apical carina strongly turned forward in the middle, basal carina more or less straight, spiracles roundish, apophysis very low crest-like; first abdominal tergite short about  $2.5\times$  as long as broad at apex, spiracles highly projecting and close to the apex than to each other, dorso-median longitudinal carinae absent, tergite smooth and shiny at base, distinctly punctate in the middle, puncture tending to be shallow and sparse towards the apex, second and third tergites closely punctate, following tergites subpolished; areolet broader than high, more than  $0.6\times$  as high as the portion of second recurrent vein above bulla, intercubiti subparallel, second intercubitus faint, nervulus distinctly basad of basal vein; nervellus intercepted at the middle, brachiella present; ovipositor sheath  $0.6\times$  as long as hind tibia.

Black. Antenna with scape and first to third flagellar segments yellowish-brown, below sixth to fifteenth segments (fifth slightly apically) white above; face (Fig. 5b) wholly, clypeus basally, mandible (except at the apex), temple below near the base of mandible, two orbital stripes extending from vertex to the base of antennal sockets, upper margin of

pronotum, pronotal collar narrowly above and broadly below, subtegular ridge, tegula, speculum, scutellum, metascutellum, two lateral triangular marks on propodeum (Fig. 5a), apices of first to third abdominal tergites with bands, sixth tergite narrowly at apex in the middle, seventh and eighth tergites broadly, yellow or dirty yellow; mesopleurum, base of hind wing, metapleurum, metanotal rim, propodeum and first abdominal tergite (except prepectus of mesopleurum blackish, and as mentioned for others above), reddish; middle lobe of mesoscutum also with reddish tinge; fore coxa and trochanters whitish-yellow; femur, tibia and first, second tarsal segments dark yellow, tibia above and rest of tarsus infusate, fifth tarsal segment dark brown; middle coxa and trochanter whitish-yellow, femur light orange, tibia yellow, infusate above (tarsus broken); hind leg (Fig. 5c) with coxa reddish, with a apicoventral black mark, its first trochanteral segment yellow with a piceous mark above, second segment largely blackish-brown, femur reddish-brown, its extreme apex and base blackish, with a basal yellow band, tarsus whitish-yellow except third segment faintly subapically, fourth and fifth segments blackish or black.

*Male* : Unknown.

*Length* : ♀ 6.5mm; fore wing 4.5mm; ovipositor sheath about 1.75 mm.

*Holotype* ♀, INDIA : ASSAM : Charduar Forest near Rangapara, 24.iv. 1966, J.K. Jonathan, Coll. No. J136 (GUPTA).

*Distribution* : INDIA : Assam.

#### 4. *Fotsiforia sundrica*, sp. nov. (Fig. 5d-g)

This species can be distinguished by having malar space  $0.8 \times$  the basal width of mandible; frons rugose, mesopleurum finely striate, nervellus intercepted at its lower 0.4; face, frons along the eye margin, vertex temple, malar space, mandible broadly, yellow (Fig. 5e).

*Female* : Face largely rugose, somewhat trans-rugose in the middle; clypeus thickly and deeply punctate, shallowly punctate at sides; malar space rough,  $0.8 \times$  the basal width of mandible; frons weakly rugose; vertex dull, shallowly punctate; temple thickly punctate, punctures running into rugosities towards the base of mandible; pronotum subpolished, striate, obliquely and finely striate at the upper margin; lower margin smooth; mesocutum minutely punctate, subpolished; scutellum largely smooth and subpolished, its lateral carina confined to its base; mesopleurum largely finely striate, above with few punctures, speculum shiny, sparsely and minutely punctate, prepectal carina extending  $0.8 \times$  the height of mesopleurum; metapleurum trans-rugose, juxtacoxal carina present, propodeum between basal carina and apex finely wrinkled, at some places tending to be reticulate, basad of basal carina rugosopunctate, punc-

tures more defined towards the base, both the transverse carinae complete, apical carina strongly turned forward in the middle, the carina laterally forming weak sublateral crests, spiracle small oval; areolet little higher than wide, about  $0.45\times$  as high as the portion of second recurrent vein above bulla, nervulus basad, nervellus intercepted at its lower  $0.4\times$ ; first abdominal tergite with dorso-median longitudinal carinae weakly present, tergite smooth and shiny at apex and base, middle area shallowly punctate, second and third tergites closely punctate, following tergites subpolished; ovipositor sheath  $0.55\times$  as long as hind tibia.

**Black.** Fifth to eleventh flagellar segments white above; face (Fig. 5e), clypeus (except in the middle to apical margin), frons broadly along the eye margin, this mark extending on vertex as narrow orbital stripes, mandibles, except the teeth, malar space, upper margin of pronotum, pronotal collar, scutellum, metascutellum, base of hind wing, tegula, subtegular ridge, a somewhat trilobate mark on propodeum (Fig. 5d), apices of first to third and sixth tergites, seventh and eighth tergites wholly, yellow; fore and middle legs largely dark yellow, except fore and middle coxae and their trochanters light yellow; and fore tibia and tarsus, middle femur, tibia and tarsus largely, infusate; hind leg (Fig. 5f) largely light orange, its coxa apicobasally, first trochanteral segment, femur at apex, tibia largely (except a yellow subbasal band), fourth and fifth tarsal segments, dark brown to blackish; wings clear hyaline.

**Male :** The carinae above antennal sockets highly expanded and high like flanges; pronotum subpolished sparsely but distinctly punctate, and with few striae in the middle groove; mesoscutum deeply punctate; mesopleurum shiny with sparse and deep punctures, near speculum and above sternaulus rugosopunctate, speculum smooth and polished; metapleurum punctate; propodeum largely rugose, basad of basal carina with few punctures, apical carina and lateral crests obscured; genitalia as in figure 5g.

**Black.** Eleventh to twentyeight flagellar segments white; head largely (except ocellar triangle, area around the triangle, vertex, and back of head, black), pronotal collar upper margin of pronotum, subtegular ridge, upper part of speculum, tegula, scutellum, metascutellum, base of hind wing, apices of all the abdominal tergites, fore and middle coxae and their trochanters, yellow; fore femur dark yellow, tibia and tarsus yellowish-brown, its fifth tarsal segment dark brown; middle femur and tibia brownish-yellow, somewhat infusate above, its tarsus brown; hind coxa and femur orange, except coxa below and apex, femur at its apical  $0.2$ , trochanters largely, blackish; hind tibia dark brown with a yellow subbasal band, tarsus white, except its fifth segment dark brown; propodeum dark orange, except black at base.

*Length* : ♀, 8mm; fore wing 6mm; ovipositor sheath 1.5 mm. ♂, 7.5 mm; fore wing 5.5 mm.

*Holotype* ♀, INDIA : UTTAR PRADESH : Garjia, 610m, 26-29. iv. 1969, V.K. Gupta, Coll. No. 339 (GUPTA). *Allotype* ♂, data same as for holotype, Coll. No. 335 (GUPTA). *Paratypes* 1♀, 3♂♂. INDIA: UTTAR PRADESH : Garjia, 610m, 1♂. 10.iv. 1968, D. Ram, Coll. No. 302b; Grajia 610m, in Dibri village, 2♂♂, 13-14. iv. 1968, D. Ram, Coll. Nos. 305 & 306; Sat tal, 1371m, in Kumaon Hills, 1♀, 6. v. 1969, V.K. Gupta, Coll. No. 43 (GUPTA).

*Distribution* : INDIA : Uttar Pradesh.

##### 5. *Fotsiforia flavifrons*, sp. nov. (Fig. 6a-d)

This is a distinct species, having largely smooth frons, vertex and pronotum; mesopleurum rugoso-punctate; propodeum reticulate in the middle and metapleurum being finely wrinkled. The frons broadly except the scrobe and hind tibia with a broad basal band, yellow (Fig. 6-b).

*Female* : Face weakly rugose, at sides also with undefined shallow and small punctures; clypeus rugose with minute shallow punctures, smooth and subpolished at apex; frons smooth and subpolished with faint indication of sparse and shallow punctures, ocellar triangle rugulose; antennal scrobe smooth, frons with a median groove extending down from the median ocellus to middle of antennal scrobe; vertex mat and subpolished, temple closely punctate tending to be smooth above; malar space rugulose  $0.6 \times$  the basal width of mandible; pronotum largely smooth and shiny, except pronotal scrobe with 4-5 trans-striations, extreme upper margin with fine oblique rugosities; mesoscutum subpolished, minutely and sparsely punctate; scutellum shiny, with indication of sparse punctures, lateral carina confined to its base only; metascutellum smooth and shiny; mesopleurum largely finely transrugoso-punctate, speculum polished with faint indication of sparse punctures, mesosternum with minute and close punctures, prepectal carina extending more than  $0.75 \times$  the height of mesopleurum; metapleurum finely and closely wrinkled, juxta-coxal carina present; propodeum between basal carina and apex coarsely reticulate, basad of basal carina with moderately large and deep punctures, apical carina making a acute angle in the middle, apophysis crest-like, basal carina strong, evenly arched in the middle, spiracle longish-oval; first abdominal tergite shiny with sparse shallow punctures in the middle, at base and apex broadly smooth, tergite about  $2 \times$  as long as wide at apex, spiracles close to each other than to apex; second tergite densely punctate, third tergite with dense and shallow punctures, following tergite mat and subpolished; fore wing with areolet small,

about  $0.5\times$  as high as the portion of second recurrent vein above bulla, nervulus  $0.3\times$  basad of basal vein, nervellus intercepted slightly below the middle; ovipositor sheath  $0.6\times$  as long as hind tibia.

Black. Antennae with scape, pedicel, first second and apical segments brownish in front; its fifth to sixteenth segments above, white; face (Fig. 6b) with an oval mark above, frons broadly except the scrobe, vertex along the eye margin, upper margin of pronotum, pronotal collar, tegula, scutellum, subtegular ridge, speculum, apical  $0.75\times$  of metapleurum and propodeum (Fig. 6a) apices of first, second and sixth tergites, and seventh and eighth tergites wholly, yellow. Fore and middle legs with coxae and trochanters yellow, their femora, tibiae and tarsi yellowish-brown, except their third to fifth tarsal segments darker; hind leg (Fig. 6c) largely blackish-brown except its tibia with broad basal band and its first and second tarsal segments pale yellow; wings clear hyaline.

*Male* : Essentially similar to female in structure and colour except more slender and weakly sculptured, frontal carina specialized, high and flange-like; vertex behind the ocellar triangle minutely punctate; temple shiny, minutely and closely punctate, punctures tending to be sparse above; mesopleurum shiny, its lower  $0.5$  minutely and closely punctate, above, smooth, with few short striae along the speculum and prepectal carina; metapleurum shallowly and closely punctate, tending to be rugose towards the hind coxa.

Black. Antennal flagellum with fifth to twentythird segments white; face with a broad trilobed mark, orbital mark on vertex extending  $0.5$  down on temple, pronotum with small mark below, apices of first to third tergites and seventh tergite wholly, yellow (Fig. 6 d); fore and middle legs with coxae and trochanters, whitish-yellow, their femora tibiae and tarsi deep yellow, hind coxa blackish with a brown mark above, trochanter blackish, femur yellowish-brown at its basal  $0.6$  and its apical  $0.4$  dark brown, tibia brown except its basal  $0.3$  pure white, tarsus pure white with its fifth segment dark brown rest similar to female.

*Length* : ♀, 8 mm; fore wing 5.5 mm; ovipositor sheath 1.5 mm. ♂, 8.2 mm; fore wing 5.6 mm.

*Holotype* ♀, PHILIPPINES : MINDORO : S. Luis Calapan, 17. iv. 1954, H.,M. & D. Townes (TOWNES). *Allotype* ♂, same data as holotype, 14. iv. 1954 (TOWNES).

*Distribution* : PHILIPPINES : Mindoro.

#### 6. *Fotsiforia similis*, sp. nov. (Fig. 6e)

Extremely similar and sympatric to *Fotsiforia flavifrons*\* and distin-

guished mainly by its male (female being unknown) by having speculum on mesopleurum black; mandible yellow; hind tibial spur black, fourth and fifth tergites with complete or incomplete bands and sixth tergite being entirely black (Fig. 6e).

*Male* : Body subpolished; face rugoso-punctate; clypeus minutely and sparsely punctate, its extreme apex smooth; mandible with few scattered punctures; malar space granulose,  $0.75 \times$  the basal width of mandible; frontal carina much specialized, high like a flange, frons sparsely and shallowly punctate, ocellar triangular area rugoso-punctate; vertex minutely and closely punctate; temple finely punctate, punctures denser towards the base of mandible; pronotum largely smooth, except its extreme upper margin and pronotal collar shallowly and coarsely punctate, scrobe with three strong striae; mesoscutum finely distinctly punctate; scutellum sparsely punctate; metascutellum with few indistinct punctures; mesopleurum in its basal 0.5 trans-striato-punctate, upper 0.5 including speculum largely smooth and shiny, with few scattered minute punctures along the prepectal carina and near the base of hind wing; metapleurum somewhat reticulate towards the base of hind coxa, coarsely and closely punctate towards base, area above middle coxa smooth, juxta-coxal carina present; propodeum between basal carina and apex finely wrinkled, tending to be reticulate towards the apex, the area basad of basal carina with strong punctures, spiracle longish-oval; first abdominal tergite subpolished with shallow oval punctures in the middle, its apex and base smooth; second tergite with dense and shallow punctures, following tergites mat and subpolished; areolet small pentagonal, about  $0.6 \times$  as high as the portion of second recurrent vein above bulla, nervellus basad of basal vein by 0.3 its own length, nervellus intercepted at its lower 0.4.

Black. Antenna with tenth to twenty-sixth flagellar segment pure white; face almost wholly (Fig. 6e), frons, (including frontal flange-like carina), vertex and upper 0.6 of temple along the eye margin, pronotal collar below, upper margin of pronotum, tegula, subtegular ridge, base of hind wing, scutellum, metascutellum, apices (Fig. 6e) of first of fourth tergites, seventh tergite wholly and apical margin of fifth with an irregular band, yellow. Metapleurum and propodeum largely brownish-yellow, except propodeum basad of basal carina in the middle blackish-brown; fore and middle coxae and trochanters, pale yellow, their femora tibiae and tarsi deep yellow, femore and tibiae with a line above and tarsi largely brownish; hind coxa and femur brownish-yellow, except coxa below, trochanter, extreme apex of femur, apical 0.75 of tibia and apical 0.5 of fifth tarsal segment dark blackish-brown; basal 0.25 of tibia and rest of tarsus pure white.

*Female* : Unknown.

*Length* : ♂, 7.5 mm, fore wing 5.5 mm.

*Holotype*: ♂, PHILIPPINES : MINDANAO : Cotabato, Parang, 13.i.1954,  
H. K. Townes (TOWNES).

*Distribution* : PHILIPPINES : Mindanao.

## 2. Genus *Gambroides* Betrem (Fig. 7, Map II)

*Gambroides* Betrem, 1941, *Treubia*, 18 : 67. Type : *Eripternimorpha javensis*  
Rohwer. Original designation.

*Vadonina* Seyrig, 1952, *Mem. Acad. Malgache*, 39 : 181. Type : *Vadonina*  
*nimbipennis* Seyrig. Original designation. Syn. by Townes *et al.*, 1961.

TAXONOMY : Betrem, 1941 : 67. Townes *et al.*, 1961 : 144. Townes, 1970 : 265.  
Townes & Townes, 1973 : 105.

This genus can readily be distinguished by the absence of distinct epomia, moderately shallow notauli, the absence of sternaulus, prepectal carina extending not beyond 0.5 the height of mesopleurum. First abdominal tergite gradually broadened from base to apex and the post-petiole is almost quadratic. Nervellus is intercepted above the middle. Thorax is much longer in profile.

Head of moderate size, about as broad as long; clypeus evenly convex, apical margin impressed, without a median tooth or any irregularity; mandible short and thick, teeth subequal, lower tooth little shorter than upper; frons flat, not depressed, shallow area above each antennal socket bordered by a semicircular carina, carina always simple in both the sexes; epomia on pronotum obscured; notauli shallow; scutellum flat to moderately convex, its lateral carina extending not beyond its basal 0.3, prepectal carina short extending not more than 0.5 the height of mesopleurum, sternaulus almost obscured or short and weak as in *nimbipennis*; basal carina of propodeum always present, apical carina present or absent, apophysis weak, crest-like, spiracle small, oval; areolet moderately large, about 1.3 as high as the portion of second recurrent vein above bulla, pentagonal, second intercubitus faintly present, nervulus apical or distad of basal vein, nervellus intercepted at its upper 0.36-0.4; mediella moderately to strongly arched, brachiella usually entirely absent except in *nimbipennis* extending 0.5 the distance to wing margin; first tergite short and stout, about 2× as long as wide at apex, lateral tooth present at base, dorso-median and dorso-lateral and ventro-lateral carinae distinctly present, tergite quadrate in cross-section at base, post-petiole more or less as long as wide; ovipositor long, compressed, tip slightly upcurved and with a distinct nodus.

*Length* : ♀, 7-9.5 mm; fore wing 5-6.5 mm; ovipositor sheath about 2.5-3 mm.

Type-species : *Eripternimorpha javensis* Rohwer.

This is moderately a small genus. It occurs in the Oriental and Ethiopian regions.

*Gambroides* Betrem was synonymized with *Isotima* Foerster by Townes (1957). Its status is now restored because of the differences enumerated above. *Vadonina* Seyrig, from Madagascar is a junior synonym of it. This genus includes *Erepternimorpha dammermani* Rohwer (1918), *Erepternimorpha javensis* Rohwer (1918) and *Vadonina nimbipennis* Seyrig, 1952. Betrem (1941) also included here *Isotima chilonis* : Townes *et al.*, 1961. There are a few specimens of apparently an undescribed species and subspecies.

### KEY TO THE SPECIES

1. Brachiella present, extending more than 0.5 the distance to wing margin; nervulus distad of basal vein; body largely densely and deeply punctate, malar space about  $0.72 \times$  the basal width of mandible; abdomen black, seventh tergite with a white apical band. Madagascar, Ghana  
1. *nimbipennis*
- Brachiella absent; nervulus apicad of basal vein; body largely granulate. 2
2. Apical carina of propodeum present; first abdominal tergite red or blackish and without an apical yellow band. . . . 3
- Apical carina entirely absent; first abdominal tergite with a narrow or moderately broad apical band. 4
3. First abdominal tergite red; malar space about  $0.75 \times$  the basal width of mandible; mesoscutum black; middle and hind coxae, trochanters and femora, red. India . . . . 2. *rangaparensis*\*
- First abdominal tergite black; malar space about  $0.6 \times$  the basal width of mandible; mesoscutum red; middle and hind coxae red, rest all of legs black. Taiwan, Philippines 3. *chilonis*
4. First abdominal tergites red with narrow apical yellow band (sometimes band not well defined); scutellum less convex (than *dammermani*), distinctly punctate. India, Java, Hawaii? . . . . 4. *javensis*
- First abdominal tergite black, with a distinct yellow band; scutellum convex (more than *javensis*) without distinct punctures. Java, Philippines  
. . . . . 5. *dammarmani*

### 1. *Gambroides nimbipennis* (Seyrig) (Figs. 8 a-c)

*Vadonina nimbipennis* Seyrig, 1952, *Mem. Acad. Malgache*, 39 : 181. ♀. des. fig.

Type : ♀, Madagascar : "Marsansitra" (PARIS).

*Isotima nimbipennis* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 144. syn. Townes, 1970, *Mem. Amer. Ent. Inst.*, 12 : 269. syn.

This species can easily be recognised by having body largely densely punctate, brachiella extending more than 0.5 the distance to wing margin and malar space about  $0.72 \times$  the basal width of mandible.

*Female* : Head of moderate size, about as broad as long, densely and minutely punctate, clypeus evenly convex, apical margin impressed and truncate; antennal scrobe moderately finely trans-striato-punctate, semi-circular carina of scrobe not very well defined; frons with a median longitudinal carina; vertex and temple subpolished, punctate, punctures little sparser; malar space appears to be granuloso-punctate, about  $0.72 \times$  the basal width of mandible; distance between median and lateral ocellus  $0.55 \times$  the distance between lateral ocelli; thorax as a whole largely densely punctate; scutellum moderately convex, subpolished, sparsely and distinctly punctate, its lateral carina extending to its basal  $0.2$ ; metapleurum largely rugose, somewhat rugoso-punctate towards the base, juxtacoxal carina absent; basal carina of propodeum fine, strongly turned forward in the middle, carina interrupted in the base, apical carina almost absent, except laterally present as weak crests; propodeum largely weakly rugose, tending to be rugoso-wrinkled towards the apex, spiracles oval; nervulus distad of basal vein, hind wing with brachiella present; first abdominal tergite with sparse shallow punctures between spiracles and base, puncture coalescent towards spiracles, postpetiole smooth and shiny, spiracles little closer to each other than to apex; second and third tergites with dense moderately deep punctures, fourth tergite with dense and shallow punctures, following tergites mat and subpolished; wings as in figure 8a; ovipositor sheath about  $1.0 \times$  as long as hind tibia.

Black. Fifth to eighth flagellar segments white above; thorax and first abdominal (Fig. 8a) segment bright red; abdomen black, its seventh tergite with a white band; legs in general red except fore leg largely black, its femur and tibia reddish-brown above; middle leg black with base of coxa red; hind leg (Fig. 8b) with coxa red, trochanter black, femur red, its extreme apex black; tibia and tarsus black except tibia at its inner margin red; clear hyaline, forewing with a brown spot near the areolet and also at extreme apex.

*Male* : Essentially similar to female, except head and thorax with moderately deep punctures. Genitalia as in figure 8c.

Black. Antenna entirely black; face and frons along the eye margin with yellow strips; first abdominal segment sometimes red to blackish; apical  $0.75$  of seventh tergite yellow; legs in general similar to female, sometimes hind femur more reddish-brown.

*Length* : ♀, 12 mm; fore wing 7.5 mm; ovipositor sheath 3.5 mm. ♂, 11 mm; fore wing 7 mm.

*Specimens examined* : 1 ♀, 7 ♂♂. GHANA : Dowhenya, 6 ♂♂, 1 ♀, ix.1973, reared from larvae of *Maliarpha* sp. on sugarcane. Madagascar : near Rogez, 900 m, 1 ♂, v. 1946, C. Lamberton (GUPTA).

*Distribution* : South Africa & Madagascar.

*Host* : *Maliarpha* sp.

**2. Gambroides rangaparensis, sp. nov. (Fig. 8d,e)**

This species is very close to *Chilonis* in having apical carina of propodeum present, but it can be recognised by its first abdominal tergite, middle and hind coxae, trochanters and femora red; black mesoscutum. Malar space is about  $0.75 \times$  the basal width of mandible.

*Female* : Face dull, thickly and strongly punctate all over; clypeus thickly punctate at the base, sparsely punctate towards the apex, apical margin impressed and truncate; mandible punctate, punctures running into striations, teeth subequal, malar space rough,  $0.8 \times$  the basal width of mandible; frons dull thickly and strongly punctate; vertex distinctly punctate, distance between median and lateral ocelli  $0.6$  as compared to the distance between lateral ocelli; temple distinctly punctate; pronotum in its upper half thickly punctate with few trans-striae in the middle groove, pronotal collar somewhat irregularly wrinkled, lower margin smooth and shiny, epomia absent; mesoscutum coarsely punctate; scutellum subpolished, coarsely punctate, lateral carina extending to its basal  $0.25$  or less, metascutellum subpolished very minutely punctate; mesopleurum rugose, tending to be coarser above towards the subtegular ridge, area below sternaulus closely punctate tending to be smoother below, sternaulus very short and shallow, prepectal carina extending  $0.5$  the height of mesopleurum; metapleurum rugulose, juxtacoxal carina absent; propodeum between basal carina and apex coarsely rugose, tending to be somewhat wrinkled above in the middle, area basad of basal carina shiny with few scattered shallow punctures; basal carina strongly arched in the middle, apical carina weakly present, apophysis absent, spiracles moderately large longish oval; first abdominal tergite subpolished, at apex smooth and shiny, both the dorsal longitudinal carinae present; second and third tergites coarsely punctate, punctures tending to be shallow towards the apex, fourth tergite minutely punctate, smooth at its apical  $0.5$ , following tergites subpolished; fore wing with areolet pentagonal,  $1.1 \times$  as high as the portion of second recurrent vein above bulla, intercubiti slightly convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted above the middle, brachiella absent; ovipositor sheath about  $1.0 \times$  as long as hind tibia.

Black. Sixth to ninth antennal segments (six segment only at the apex and ninth at the base) white above; whole of head, pronotum, mesoscutum, tegula and anterior half of mesopleurum, black, posterior half of mesopleurum, scutellum, metascutellum, metapleurum, propodium and first abdominal tergite, reddish (Fig. 8d); second abdominal tergite at the apex, seventh and eighth tergites broadly in the middle, (some times sixth tergite also faintly at the apex in the middle), yellow; fore leg more or less blackish or black, except tibia slightly yellowish below;

middle coxa, trochanter and femur reddish, except trochanter with blackish marks, tibia and tarsus blackish; hind (Fig. 8e) coxa, trochanter and femur reddish, except trochanter and apex of femur blackish, tibia and tarsus black; fore wing with a brown cross band below stigma.

*Male* : Unknown.

*Length* : ♀, 8 mm; fore wing 5 mm; ovipositor sheath 2.5 mm.

*Holotype* ♀, INDIA : ASSAM : Rangapara, Sonajuli Tea estate, 30.iv. 1966, Tek Chand, Coll. No. T 223 (GUPTA). *Paratypes* 2 ♀♀. Same data as holotype except 1 ♀, 20.iv.1966, D. Ram, Coll No. T 188 and 1 ♀, 20.iv.1966, D.T. Tikar Coll. No. T 191 (GUPTA).

*Distribution* : INDIA : Assam.

### 3 *Gambroides chilonis* : (Townes)

This species is close to *rangaparensis*\* in having apical carina on propodeum and first abdominal tergite without an apical yellow band. It also resembles *javensis* in its colour pattern. It can be distinguished by having malar space about  $0.6 \times$  the basal width of mandible, mesoscutum, middle and hind coxae largely red.

*Male* : Face punctate; clypeus subpolished, with minute and sparse punctures, tending to be smooth and shiny towards the apex; antennal scrobe with fine striations, frons granulose, with dense punctures, less denser towards the eye margin; vertex closely punctate behind the ocellar triangle, sparsely at sides; temple distinctly punctate, punctures above small and close, tending to be large and sparse towards the base of mandible; malar space granulose, about  $0.6 \times$  the basal width of mandible; mandible at base deeply punctate; pronotum distinctly punctate, interspaces about  $1.0 \times$  their own diameter, pronotal groove with few irregular rugosities, pronotal collar smooth and shiny except its extreme margin with a few scattered punctures; mesoscutum evenly minutely and closely punctate; scutellum subpolished punctate, lateral carina extending to its basal  $0.2$ ; metascutellum smooth; mesopleurum punctate to rugoso-punctate; prepectal carina short, sternaulus not distinct; speculum with fine aciculations; metapleurum finely wrinkled, juxtacoxal carina weak; propodeum with area between basal carina and apex finely wrinkled, apical carina and apophysis present or absent, basal carina present, strongly arched in the middle; area basad of basal carina with few scattered punctures, spiracle moderately large and oval; first abdominal tergite short about  $2 \times$  as long as wide at apex, spiracles close to each other than to apex; tergite largely smooth except for a few indistinct punctures near the spiracles; second to fifth tergites minutely and closely punctate, punctures on fourth and fifth tergites tending to be shallow, following tergites mat and subpolished; areolet pentagonal, about  $1.5 \times$  as high as the portion

of second recurrent vein above bulla, intercubiti parallel, nervulus slightly distad of basal vein, nervellus intercepted at its upper 0.4; brachiella absent.

*Female* : Similar to male except as mentioned under *chilonis philippina*\*.

Two subspecies are recognised, viz., *Gambroides chilonis chilonis* from Taiwan and *Gambroides chilonis philippina*\* from Philippines. The two differ only in the degree of sculpture and colour as given below:

#### KEY TO THE SUBSPECIES (Males)

- |                                                                                                                          |                                        |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Face along the eye margin reddish; all the coxae red; mesopleurum moderately and strongly rugose. Taiwan                 | <b>3a. <i>chilonis chilonis</i></b>    |
| Face entirely black; fore coxa black; middle and hind coxae largely red; mesopleurum finely rugoso-punctate. Philippines | <b>3b. <i>chilonis philippina</i>*</b> |

#### **3a. *Gambroides chilonis chilonis* (Townes *et al.*) (Fig 9 a, b)**

- Gambrus rufithorax* Uchida, 1931, *Jour. Faculty Agr. Hokkaido Imp. Univ.* 30 : 172. ♂. Name preocc. in *Isotima* by Szepligeti, 1910. des., fig. Types : ♂, Formosa : Kohekirin; Sinhwa; Hokko (SAPPORO). Hosts : *Proceras venosata*; *Chilotraea infuscatellus*. Sonan, 1944, *Bul. Govt. Agr. Res. Inst. Taiwan*, 222 : 15. Hosts : *Chilotraea infuscatellus*; *Proceras venosata*.
- Goryphus rufithorax* Uchida, 1932, *Jour. Faculty Agr. Hokkaido Imp. Univ.*, 33 : 142. syn.
- Gambroides rufithorax* Betrem, 1941, *Treubia*, 18 : 67. syn. Hosts : *Diatraea innotata*; *Chilotraea infuscatellus*.
- Isotima chilonis* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 144. new name.

*Male* : Punctures in the middle of face dense and tending to be rugoso-punctate, at sides sparsely punctate; scutellum sparsely and shallowly punctate; mesopleurum moderately and strongly rugose; apical carina and apophysis of propodeum absent.

Black : Colour extremely similar to *javensis* Row. Antenna, head pronotum, mesoscutum, scutellum, mesopleurum largely black, except face on both side, mandible except the tip, mesopleurum posteriorly above middle coxa and along mesopleural suture up to speculum and rest of thorax, red; abdomen (Fig. 9a) black, with first tergite reddish at base, first to third and seventh abdominal tergites with yellow apical bands; legs with all the coxae dirty red, fore and middle legs with their trochanters and femora blackish, rest reddish-brown; hind trochanter, femur, tibia and tarsus blackish (Fig. 9b).

*Female* : Unknown.

*Length* : ♂, 9.0 mm; fore wing 5.0 mm.

*Specimen examined* : TAIWAN : Hakko, 1 ♂ (type of *Gambrus rufithorax* Uchida), 19.v.1922, Coll. M. Ishida (SAPPORO).

*Distribution* : TAIWAN.

*Hosts* : *Proceras venosata*; *Chilotraea infuscatellus* and *Diatraea innotata*.

### 3b. *Gambroides chilonis philippina*, sub sp. nov. (Figs 9c, d)

Essentially similar to *Chilonis chilonis* in sculpture and colour except as below :

*Male* : Face and clypeus with minute and dense punctures, clypeus only at the extreme apex smooth; mesopleurum finely rugoso-punctate in its upper half, its lower half with dense and shallow punctures, scutellum subpolished with evenly spaced fine punctures; propodeum with a fine apical carina. Genitalia as in figure 9d.

Black. Similar to *chilonis chilonis* except as follows : Face entirely black; scutellum (Fig. 9c) also tending to be blackish; fore leg including coxa black; middle and hind legs black, except the middle and hind coxae, red (except the hind coxa black at the apex).

*Female* : Similar to male in all respect except as follow : pronotum with close shallow punctures, punctures running into striations; pronotal scrobe with a few striations mesopleurum and metapleurum rugulos type; speculum on mesopleurum sparsely and shallowly punctate; propodeum between basal carina and apex finely wrinkled, basad of basal carina with large punctures, extreme base with a smooth and shiny areas first abdominal tergite  $2\times$  as long as wide at apex, second and third tergites densely punctate, following mat and subpolished; wing venation as of *chilonis chilonis*; ovipositor sheath about  $1.2\times$  as long as hind tibia.

*Length* : ♀, 7.5 mm; fore wing 5.5 mm; ovipositor sheath 3 mm. ♀ 7.5 mm; fore wing 5.5 mm.

*Holotype* ♀, PHILIPPINES : LUZON : Pangasinan, Son Manuel, 4.ii.1953, H. & M. Townes. *Allotype* ♂, same data as holotype, 3.ii.1953 (TOWNES).

*Distribution* : PHILIPPINES.

### 4. *Gambroides javensis* (Rohwer) (Fig. 9e-h)

*Eripternimorpha javensis* Rohwer, 1918, *Proc. U.S. Natl. Mus.*, 54 : 564. ♀. key, des. Type : ♀, Java : Pasurocan (WASHINGTON). Host : *Scirpophaga nivella intacta*. Hazelhoff, 1929. *Jaarv. Proefsta. Oost-Java Suikerindus*, 1928 : 102. biol. Java. Host : Topborer of sugarcane. Dammerman, 1929, *The agricultural zoology of the Malay Archipelago* p. 67. Host : *Scirpophaga nivella*. Moritsugu, 1931, Rpt. *Dept. Agr. Govt. Res. Inst. Formosa*, 50 : 45. biol. Hawaii [occurrence in Hawaii doubtful] Host. *Scirpophaga nivella*. Hart, 1933, *Meded. Proefsta. v. Java-Suikerindus*, 1933 : 792. biol. Host : *Scirpophaga*

*nivella intacta*. Kalshoven and Vecht, 1950, *De plagen van de culturgewassen in Indonesie*, 1 : 426. Host : *Scirpophaga nivella intacta*.

*Melcha ornatipennis* Dutt, 1919, *Bull. Agr. Res. Inst. Pusa*, India 89 : 8. Misdet. of *ornatipennis* Cameron. India : Pusa and Chapra in Bihar. Host : *Scirpophaga nivella*. Dutt, 1923, *Mem. Dept. Agr. India (Ent.)* 8 : 23. Misdet. of *ornatipennis* Cameron. India : Chapra, Pusa, Baghowine and Laheria Sarai in Bihar. Host : *Scirpophaga nivella*. Isaac, 1937, *Sci. Rpts. Imp. Agr. Res. Inst.* New Delhi, 1936-37 : 176. Misdet. of *ornatipennis* Cameron. India : Karnal in Haryana. Host : *Scirpophaga* sp. Mathur, 1942, *Indian Jour. Ent.*, 4 : 234, ♂, ♀. Misdet. of *ornatipennis* Cameron. biol. India : Punjab; Delhi; Uttar Pradesh; Bihar. Host : *Scirpophaga* sp. Ahmad and Mathur, 1946, *Indian Jour. Ent.*, 7 : 21. ♂, ♀. Misdet. of *ornatipennis* Cameron. des., fig. biol. Host : *Scirpophaga nivella*. Rao & Kurian, 1951, *Indian Jour. Ent.* 13 : 76. ♂, ♀. Misdet. of *ornatipennis* Cameron. des., fig. India : Agra in U.P. Host : *Scirpophaga nivella*. Vazirani, 1952, *Jour. zool. Soc. India*, 4 : 101. Misdet. of *ornatipennis* Cameron. biol. India : Tollygunge in Calcutta. Host : *Dineutus unidentatus*. Rao, 1953, *Indian Forest Rec. (n.s., Ent.)* 8 : 213. ♀. Misdet. of *ornatipennis* Cameron. des. India : Calcutta.

*Gambroides javensis* Betrem, 1941. *Treubia*, 18 : 67. syn.

*Isotima javensis* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 145. syn.

This species is very close to *rangaparensis*\*. It can be recognized by the absence of apical carina of propodeum and first abdominal tergite being red, with a distinct yellow apical band.

*Female* : Face dull, closely punctate, punctures small and at some places running into striations; clypeus subpolished, closely punctate, apical margin impressed and truncate; malar space granulose,  $0.6 \times$  the basal width of mandible; mandible closely punctate, punctures coalescent, teeth subequal, blunt at the apices; frons dull, closely punctate in the middle, sparsely at sides; antennal scrobe with fine striations; vertex subpolished minutely and sparsely punctate, distance between median and lateral ocelli 0.6 as compared to the distance between lateral ocelli; temple distinctly punctate, punctures above small and close tending to be sparse and large towards the base of mandible; pronotum closely punctate except the lower margin smooth and shiny, and posterior margin in the middle groove irregularly rugoso-punctate, epomia indistinct; mesoscutum deeply and closely punctate; scutellum with deep punctures, lateral carina extending to its basal 0.3; metascutellum shiny, not distinctly punctate; mesopleurum from subtegular ridge up to the middle obliquely rugose, in the middle tending to be trans-rugose, further below up to mesosternum minutely and closely punctate, punctures running into fine rugosities, speculum shiny and sparsely punctate, sternaulus not well defined, prepectal carina extending 0.6 the height of mesopleurum, metapleurum weakly and finely rugose, juxtacoxal carina not distinctly present; propodeum with area between basal carina and apex finely wrinkled,

area basad of basal carina shiny with scattered shallow punctures, area around spiracles closely punctate, apical carina more or less absent; basal carina moderately arched in the middle, spiracles moderately large and oval; first abdominal tergite short, about  $2 \times$  as long as broad at the apex, spiracles close to each other than to the apex, tergite largely smooth and shiny, except in the middle and apico-laterally sparsely and shallowly punctate, second to fifth tergites punctate, punctures weak on fourth and fifth tergites, following tergites subpolished; areolet, pentagonal, about  $1.0 \times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent nervulus interstitial, nervellus intercepted distinctly above the middle, brachiella absent; ovipositor sheath about  $1.2 \times$  as long as hind tibia.

Black. Antenna with sixth to ninth flagellar segments white above; thorax beyond a vertical line drawn approximately from the anterior margin of scutellum (sometimes whole of thorax except pronotal collar red), propodum and first abdominal tergite, red; (sometime colour of first tergite variable, its apex with a narrow yellow apical band and further below slightly light brownish) a mark on pronotal collar above, apex of second tergite, apex of sixth narrowly in the middle, seventh and eighth tergites broadly in the middle, yellow; (Fig. 9e, f) fore leg largely dark brown to blackish, except femur above and apically, tibia largely below brownish-yellow; middle coxa red, trochanter, tibia and tarsus blackish, except tibia below and at apex yellowish, femur reddish-brown with a dark brown line above; hind coxa and femur largely reddish except a small mark at the extreme apex of femur brown, trochanter, tibia and tarsus dark brown to blackish (Fig. 9g); wings hyaline fore wing with a large brownish spot below stigma.

*Male* : Essentially similar to female; head completely all over closely punctate; mesopleurum and mesostenum closely punctate except above ruguloso-punctate; first tergite largely granulose at the middle, with a few punctures, apex and base smooth and shiny, second to seventh tergites punctate, rest of body structure almost similar to female. Genitalia as in figure 9h.

Black. Antenna without a band, its basal segments light brownish below; fore leg with coxa, trochanter and tibia yellow or dark yellow except coxa at base and apex blackish, femur brownish-yellow, tending to be yellow toward the apex, and a mark at the base above dark brown, tarsus dark yellow its apical segments slightly infusate; middle coxa red, trochanter reddish-yellow, femur reddish-brown, slightly brownish at base above, tibia yellow except apical  $0.33$  and whole of tarsus dark brown, hind leg similar to female; apices of first to third tergites and seventh tergite broadly yellow; brown spot in fore wing very faint or basent, rest of body colour exactly similar to female.

*Length* : ♀, 9.5 mm; fore wing 6 mm; ovipositor sheath 3.5 mm. ♂, 9 mm; fore wing 5.5 mm.

*Specimens examined* : 16 ♀♀, 7 ♂♂, INDIA : ASSAM : Gauhati, 8 ♀♀, 3 ♂♂, 18. iv. 1966, M.K. Kamath, Coll. No. K 88. TAMIL NADU: Pugalur, 3 ♀♀, i. 1964, V.K. Gupta, Sugar cane Top borer (GUPTA). MEGHALYA: Jauharabad, 1 ♀, 11. viii. 1960, ex. sugar cane borer. UTTAR PRADESH: Lucknow, 1 ♀, 1 ♂, viii. 1962, ex. *Scirpophaga nivella*, sugar cane borer; Hardoi, 3 ♀♀, i. 1963, ex. *Scirpophaga nivella*. ORISSA: Bhubaneshwar, 1 ♂, v. 1962 and 1 ♂, iv. 1964. KARNATKA: Mandya. 1 ♀, iii. 1962, ex. *Scirpophaga nivella*, Coll. No. 18239 C.I.E. (C.I.B.C. Bangalore).

*Distribution* : INDIA: Assam, Karnataka, Tamil Nadu, Orissa, Uttar Pradesh. Also reported from Java and Hawaii.

*Hosts*: *Tryporyza nivella* and *Dineutus unidentatus*.

## 5. *Gambroides dammermani* (Rohwer)

*Eripternimorpha dammermani* Rohwer, 1918, *Proc. U.S. Natl. Mus.*, **54** : 565. ♀. key, des. Type : ♀, Java : Cheribon (WASHINGTON). Host : *Scirpophaga innotata*. Goot, 1925, *Meded. Inst. v. Plantenziekten*, **66** : 87. des, biol. Indonesia. Host : *Scirpophaga innotata*. Dammerman, 1929, *The agricultural zoology of the Malay Archipelago* p. 354. fig. Host : *Scirpophaga innotata*. Lopez, 1931, *Ann. Rpt. Res. But. Philippine Sugar Assoc.*, 1930-31 : 255, 271, 272. Philippines. Host : *Scirpophaga nivella intacta*.

*Gambroides dammermani* Betrem, 1941, *Treubia*, **18** : 67. syn. Hosts : *Scirpophaga nivella intacta*; *S. innotata*.

*Isotima? dammermani* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, **1** : 144.

This species is distinguished from *javensis* by having first abdominal tergite black, with an apical band and scutellum much convex, without distinct punctures.

*Female* : Face and clypeus closely punctate, clypeus at apex smooth, punctures on face running into striations towards antennal sockets; malar space granulate,  $0.7 \times$  the basal width of mandible; frons sparsely punctate, punctures above running into striations, at sides smooth; vertex subpolished weakly punctate; temple distinctly punctate; pronotum weakly and closely punctate, punctures at upper margin and pronotal collar running into fine striations, middle groove or scrobe smooth above except few striae below, epomia not distinct; mesoscutum shallowly punctate; scutellum evenly convex (more than *javensis*) without distinct punctures, lateral carina not extending beyond its basal  $0.3$ ; metascutellum subpolished; mesopleurum largely rugose with few weak punctures, below subtegular ridge transrugose, speculum also weakly rugose, prepectal carina extending about  $0.5$  the height of mesopleurum; metapleurum transrugose, juxta coxal carina present; propodeum (less strongly sculptured than *javensis*),

between basal carina and apex weakly rugose, rugoso-punctate laterally above, basal carina arched, carina strongly turned forward but absent in the middle, area basad of basal carina rugulose; first tergite  $2\times$  as long as broad at the apex, spiracles close to each other than to apex, tergite dorsally smooth and shiny with few scattered punctures in the middle and apico-laterally, second and third tergites densely punctate, following tergites mat; wings as in *javensis*, except areolet higher than broad, about  $1.2\times$  as high as the portion of second recurrent vein above bulla.

Black. Thorax beyond a vertical line drawn approximately from the posterior margin of scutellum to apex of propodeum red; apex of first tergite with a distinct apical band; rest of the colour similar to *javensis*.

*Male* : Unknown.

*Length* : ♀, 9 mm, fore wing 5.5 mm; ovipositor broken.

*Specimen examined* : 1 ♀, JAVA : BOGOR, Keloeardari pohanpadi, 17. viii. 1918, Coll. P.V.d.g. (BETREM).

*Distribution* : JAVA. Also reported from PHILIPPINES.

*Hosts* : *Tryporyza nivella*, *T.n. innotata* and *T.n. intacta*.

### 3. Genus *Isotima* Foerster (Fig. 10, Map III)

*Isotima* Foerster 1868, *Verh. Naturh. Ver. Rheinlande*, **25**, 182. Type : *Isotima albicineta* Ashmead. Designated by Townes, 1957.

TAXONOMY : Townes, 1957 : 109. Townes *et al.*, 1961 : 144. Townes, 1970 : 256. Townes & Townes, 1973 : 105.

This is a distinct genus, mainly characterized by its short epomia, sternaulus extending up to the base of middle coxa; first tergite being short and stout, about 2 to  $2.5\times$  as long as broad at the apex, post-petiole broader than long (Fig. 10c); nervellus intercepted usually at or below the middle, and the absence of brachiella (Fig. 10a).

Head moderately large, as broad as long or little broader or longer than broad (Fig. 10b); clypeus of moderate size, convex, apical margin impressed, apex moderately arched, without a median irregularity; frons sloping from the base of median ocellus to antennal sockets, usually with a weak median vertical groove or carina, also with a semicircular carina (Fig. 10b) above each antennal socket that encloses a shallow basin, this carina in male often developed or specialized into flanges or horns; mandible short to moderately long, lower tooth slightly shorter than upper tooth; lateral part of pronotal collar moderately wide and moderately convex, epomia short, reaching down on to collar, but never reaching the upper margin of pronotum; lateral carina of scutellum extending to its basal 0.2 to 0.75; prepectal carina extending beyond 0.5 the height of mesopleurum, sternaulus extending up to the base of middle coxa. Both the transverse carinae (Fig. 10c) of propodeum present, basal

carina strong and complete, apical carina complete or obsolescent in the middle, with weak or moderate sublateral crests; first abdominal tergite short, and stout, with a lateral tooth at base, about  $2 \times$  or rarely  $2.5 \times$  as long as broad at the apex, its spiracles close to the apex than to each other, tergite at base usually quadrate in cross-section, its dorso-median, dorso-lateral and ventro-lateral carinae present, usually sharp but sometimes weak or blunt, the dorso-lateral and ventro-lateral carinae complete, the median dorsal carina reaching to or beyond spiracle, sometime ventro-lateral angulation weak (edge rounded). Areolet (Fig. 10a) usually square to somewhat pentagonal, the second intercubitus present but faint, second recurrent vein vertical or subvertical, nervulus usually interstitial but may be little distad or basad of basal vein, nervellus intercepted usually at or below the middle, mediella strongly arched, brachiella absent; ovipositor tip moderately short, with distinct nodus and usually distinct oblique ridges or teeth on lower valve (Fig. 10d).

*Length* : ♀, 5-9.5 mm; fore wing 3.5-6.5 mm; ovipositor sheath 2-3.5mm.

*Type-species* : *Isotima albicineta* Ashmead.

This is a moderately large genus. It occurs in the Oriental region.

The following species are referable to this genus : *Isotima albicineta* Ashmead, 1905; *Neomesostenus pusillus* Szépligeti, 1916 (= *Neomesostenus persimilis* Szépligeti, 1916); *Gambrus quadratus* Szépligeti, 1908; *Goryphus ruficollis* Holmgren, 1868; *Gambrus rufithorax* Szépligeti, 1910; *Goryphus taiwanellus* Uchida, 1932 and *Cryptus tricolor* Brullé, 1846. *Hemiteles tripartitus* Brullé, 1846 was not available for the study. Its placement in *Isotima* is therefore tentative. It has not been included in the text because of nonavailability of type or any other material of this species. The species given within parenthesis are new synonyms.

In addition, twelve species are described as new. Species of *Isotima* form three distinct species groups: (A) The Bicarinata Group, (B) The Tricolor Group and (C) The Albicineta Group. Species falling under these three groups can be distinguished by the following key:

#### KEY TO THE SPECIES

1. Semicircular carina behind each antennal scrobe highly specialized in female, projecting like a flange. Frons along the eye margin and its semicircular carina marked yellow. BICARINATA GROUP. 3  
     Semicircular carina normal. 2
2. Mesopleurum largely rugose, rugoso-punctate or wrinkled; scutellum normal, wings clear hyaline or marked with faint fuscous marks. TRICOLOR GROUP 5  
     Mesopleurum largely smooth and shiny; scutellum pyramidal in shape; fore wing with broad dark fuscous marks. ALBICINETA GROUP. 16

3. Nervellus intercepted at the middle; lateral carina of scutellum marked yellow; malar space about  $0.4 \times$  the basal width of mandible; lateral carina of scutellum extending to its basal 0.65. India. . . . . **1. bicarinata\***  
 Nervellus intercepted distinctly below the middle, lateral carina of scutellum not marked; malar space about  $0.53$  to  $0.56 \times$  the basal width of mandible; lateral carina of scutellum extending to its basal 0.5. . . . . **4**
4. Areolet large, about  $0.85 \times$  as high as the portion of second recurrent vein above bulla; pronotum strongly striate; mesopleurum strongly rugose; pronotum black with collar yellow. India. . . . . **2. rufipleuralis\***  
 Areolet small about  $0.7 \times$  as high as the portion of second recurrent vein above bulla; pronotum with few fine striations; mesopleurum weakly rugose to rugulose; pronotum largely reddish-orange, except the collar yellow. India. . . . . **3. kamathi\***
5. Nervellus intercepted at or above the middle . . . . . **6**  
 Nervellus intercepted distinctly below the middle . . . . . **10**
6. Frons densely and moderately strongly punctate; nervellus intercepted far above the middle ( $0.3-0.4$ ); hind leg largely black. . . . . **7**  
 Frons granulose to strongly rugose; nervellus intercepted at the middle; hind leg with atleast the femur red. . . . . **8**
7. Pronotum trans-rugose in middle; mesopleurum closely punctate; metapleurum and propodeum closely punctate; first abdominal tergite with distinct dorso-median carinae; flagellum without a band; hind coxa and first tergite (except the apical band), black. Males with first to third tergites with apical yellow bands. India . . . . . **4. punctata\***  
 Pronotum coarsely trans-striate; mesopleurum rugoso-punctate in the middle; metapleurum rugose; propodeum rugoso-reticulate; first tergite without dorso-median carinae; flagellum with a white band, hind coxa basally and first tergite largely, red. Males with first to fourth tergites with apical yellow bands. India . . . . . **5. annulata\***
8. Thorax entirely red, except propleuram black; frons little raised in the middle; lateral carina of scutellum extending to its basal 0.7; areolet large about  $0.9 \times$  as high as the portion of second recurrent vein above bulla; nervellus intercepted at the middle. India. Java . . . . . **6. ruficollis**  
 Thorax not entirely red, atleast its propleurae and pronotum always black. . . . . **9**
9. Lateral carina of scutellum marked yellow at base and middle coxa yellow; (Face thickly punctate, frons rough and rugose and propodeum largely reticulate in the middle). India . . . . . **7. panhalensis\***  
 Lateral carina of scutellum not marked; middle coxa red; (First tergite without an apical band, pronotal collar wholly black with no yellow spot above). India . . . . . **8. emaculata\***
10. Lateral carina of scutellum extending to its basal 0.75 . . . . . **11**  
 Lateral carina extending to its basal 0.2 to 0.6. . . . . **13**
11. First abdominal tergite with narrow apical band, thorax largely red; mesopleurum and metapleurum finely wrinkled, juxtacoxal carina obscured; speculum on mesopleurum smooth and shiny. India, Burma, Java, Philippines, Taiwan and Krakatau . . . . . **9. rufithorax**  
 First abdominal tergite without a distinct yellow apical band, except some-

- times in *pusilla*, where the colour of first tergite highly variable; thorax with atleast pronotum and sometimes mesoscutum and prepectus also, black; mesopleurum rugose or rugoso-wrinkled, speculum sparsely and minutely punctate, juxtacoxal carina well defined. . . . . 12
12. Pronotal collar almost wholly, tegula, subtegular ridge, yellow; mesoscutum black; first tergite usually wholly red. Male: abdominal tergites first to seventh or atleast first to fourth and seventh with yellow apical bands. India, Burma. . . . . 10. *pusilla*
- Pronotal collar above with a small yellow mark; tegula, subtegular ridge and mesoscutum largely red; first tergite red at apex. Male : abdomen uniformly deep orange except seventh tergite black with a yellow apical spot. India . . . . . 11. *difficilis*\*
13. Lateral carina of scutellum confined to its basal 0.2; fore coxa reddish or reddish-brown; first abdominal tergite without a distinct moderately broad apical band, except sometimes in *semirufa*\*, narrow band of reddish-yellow colour present; hind femur red with its apical 0.3-0.5, black. . . . . 14
- Lateral carina of scutellum extending to its basal about 0.5; fore coxa yellow; first abdominal tergite with a distinct yellow apical band; hind femur red (except narrowly at apex blackish in *quadrata*) or wholly brownish (as in *taiwanella*). . . . . 15
14. Frons obliquely rugoso-punctate in the middle; pronotum largely rugoso-wrinkled in the middle, punctate above with running striations; mesoscutum wholly black; hind coxa red, black at apex. China, in lit. "Indes Orientalis". . . . . 12. *tricolor*
- Frons finely obliquely wrinkled in the middle; pronotum reticulo-punctate in the middle, distinctly punctate above; mesoscutum with middle lobe in front with reddish hue; hind coxa wholly red. India, China . . . 13. *semirufa*\*
15. Antennal scrobe smooth and shiny; frons strongly rugoso-striate; vertex smooth and subpolished; propodeum largely reticulate; pronotal collar, subtegular ridge and sometimes face in the middle, yellow; hind femur reddish. India, Java. . . . . 14. *quadrata*
- Antennal scrobe shiny with few fine trans-striations; frons largely granulose, with a few scattered punctures; vertex finely punctate; propodeum strongly wrinkled; pronotum wholly, subtegular ridge and face black; hind femur almost wholly dark brown. Taiwan. . . . . 15. *taiwanella*
16. Antennal flagellum always with a white band; males largely similar to female, and largely red in colour. . . . . 17
- Antennal flagellum without a white band; males unusually black (with no red colour) . . . . . 18
17. Semicircular carina behind antennal scrobes in males high and scale-like, their fore and middle coxae largely yellow, fore wing clear hyaline. In female : face distinctly punctate; frons rugose in the middle; pronotum largely smooth with few striae in middle. Philippines. . . 16. *albicineta*
- Semicircular carina moderately short, conical or knobe-like in males; their fore and middle coxae red; fore wing banded as in female. In female : face striato-punctate, rugoso-punctate below antennal sockets; frons rugulose; pronotum largely obliquely striate. Philippines . . . 17. *palawanensis*\*
18. Apical carina of propodeum straight between the apophysis, not turned for-

ward in the middle; propodeum largely weakly rugose. In male : middle and hind femora with a yellow line ventrally; face with a yellow mark near the base of antennal sockets. Philippines **18. variegata\***

Apical carina moderately to strongly turned forward in the middle; propodeum strongly rugoso-wrinkled. In male : middle and hind femora uniformly brown to dark brown (no yellow line ventrally), face black. Philippines **19. isarogae\***

#### A. THE BICARINATA GROUP

This group is characterised by having semicircular carina behind antennal scrobe highly specialized, projecting like a flange in female. Frons along the eye margin and its semicircular carina marked yellow.

The following three new species are referable to this group from India.

##### 1. *Isotima bicarinata*, sp.nov. (Fig. 11a-d)

This species is close to *Isotima rufipleuralis\** and *Isotima kamathi\**. It can be recognized by having nervellus intercepted at the middle, malar space about  $0.4 \times$  the basal width of mandible. Lateral carina of scutellum marked yellow at base.

*Female* : Face subpolished thickly punctate, punctures in the middle coalescent and tending to be rugoso-punctate; clypeus subpolished, punctate, punctures dense at the base and sparse towards the apex, extreme apex smooth and shiny, apical margin wavy, not entire, notched in the middle, impressed; malar space granulose,  $0.44 \times$  the basal width of mandible; mandible longitudinally puncto striate, teeth subequal, lower tooth slightly shorter than upper; frons strongly rugose in the middle, smooth at sides, a groove extending down from median ocellus to the middle of antennal sockets, semicircular carina above each antennal sockets moderately broad and high like a flange; vertex subpolished, shallowly and closely punctate; temple thickly punctate; pronotum subpolished coarsely trans-striate in the middle lower margin shiny, shallowly and minutely punctate, upper margin distinctly closely punctate, pronotal collar smooth and subpolished, epomia moderately strong, not reaching up to upper margin; mesoscutum subpolished, distinctly minutely punctate; scutellum subpolished, distinctly minutely punctate; scutellum subpolished, shallowly punctate, lateral carina extending to its basal  $0.65$ ; metascutellum subpolished, faintly punctate; mesopleurum weakly to strongly rugose tending to be wrinkled, area just below subtegular ridge, somewhat finely rugoso-punctate, area below speculum along the mesopleural suture trans-striate, speculum shiny, with scattered minute punctures,

just below sternaulus rugoso-punctate, mesosternum subpolished, minutely punctate; metapleurum subpolished, irregularly trans-striate, juxtacoxal carina present; area between basal carina and apex of propodeum closely wrinkled, at sides below apophysis transwrinkled, at places tending to be reticulate area basad of basal carina closely punctate, punctures running into longitudinal striations, spiracle large and oval, both apical and basal carinae arched in the middle, apophysis crest-like; first abdominal tergite short, about  $2\times$  as long as broad at the apex, both the dorsal longitudinal carinae present, smooth and shiny at apex and base, coarsely punctate in the middle, second tergite closely punctate, third and fourth shallowly punctate, punctures on second tergite more crowded at the base, following tergites subpolished; areolet (Fig. 11a) about  $0.7\times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted at the middle, brachiella absent; ovipositor sheath about  $1.0\times$  as long as hind tibia.

Black. Antenna with fourth to ninth flagellar segments white above; semicircular carina (Fig. 11c) on frons completely, two lateral stripes extending from the level of lateral ocelli and joining mark of semicircular carina, pronotal collar (Fig. 11b) except below, tegula, subtegular ridge, base of lateral carina of scutellum, apices of first and second abdominal tergites, seventh and eighth tergites broadly in the middle, yellow: posterior half of mesopleurum (variable), whole of scutellum, metascutellum, base of hind wing, propodeum and base of first abdominal tergite, red or reddish (Fig. 11b); fore coxa and trochanter yellow, femur, tibia and tarsus brown, except femur at the extreme base, tibia above, blackish and fifth tarsal segment dark brown; middle coxa and trochanter largely reddish except above yellowish; femur light brown, tibia and tarsus blackish, except tibia below mixed with yellow and apical half of fifth tarsal segment dark brown; hind coxa reddish, trochanter yellowish with broad black marks, femur yellowish-brown, with a blackish mark at the apex, tibia and tarsus largely blackish-brown, except tibia below in the middle mixed with yellow; wings light brownish, hyaline.

*Male* : Pronotum largely smooth and shiny except with few faint trans-striae in the middle; mesopleurum largely polished, with coarse sparse punctures, area along prepectal carina above and area above speculum rugoso-punctate, speculum polished faintly minutely punctate; metapleurum and base of hind wing coarsely punctate, propodeum largely reticulo-punctate, basad of basal carina subpolished and sparsely minutely punctate; first abdominal tergite dull, following tergites punctate, punctures on second and third tergites more crowded, and tending to be shallow on the following tergites, rest of the body structure similar

to female; genitalia as in figure 11d.

Black. Antennal flagellum without a band on the middle segments; face, clypeus, malar space, mandible (except at apex), temple semicircular carina on frons, lateral stripes on frons, upper margin of pronotum and pronotal collar broadly, tegula, subtegular ridge, scutellum and lateral carina, metascutellum, apices of first to fifth (sometimes sixth faintly), seventh and eighth abdominal tergites broadly in the middle, yellow; rest of thorax (except mesoscutum which is black), base of first abdominal tergite dark orange; legs colour similar to female except slightly lighter in shade.

*Length* : ♀, 5.5-9 mm; fore wing 4-6 mm; ovipositor sheath 2.5-4 mm. ♂, 5-9 mm; fore wing 3-5.5 mm.

*Holotype* ♀ and *Allotype* ♂, INDIA : TAMIL NADU : Palni in Palni Hills, 26. xi. 1966, J.K. Jonathan Coll. No. J 189 (GUPTA). *Paratypes* 39♀♀, 47♂♂. INDIA : TAMIL NADU : Palni in Palni Hills, 16♀♀, 25♂♂, 25-27. xi. 1966, J.K. Jonathan, Coll. Nos. J. 188-190; 15♀♀, 21♂♂, 25-27. XI. 1966, M.K. Kamath, Coll. Nos. K 140-142. KERALA : Walayar Forest 3♀♀, 2♂♂, 8-14.xii. 1966, J.K. Jonathan, Coll. Nos. J197, 199 & 200; 5♀♀, 2♂♂, 8-14.xii. 1966, M.K. Kamath, Coll. Nos. K 148-51 (GUPTA).

*Distribution* : INDIA : Kerala and Tamil Nadu.

## 2. *Isotima rufipleuralis*, sp. nov. (Fig. 11e-i)

This species is close to *Isotima kamathi*\* in having nervellus intercepted below the middle and lateral carina of scutellum not marked. It can be recognised by having strong striae on pronotum, mesopleurum being strongly rugose and thorax with more of black markings.

*Female* : Face dull, rugoso-punctate in the middle, at sides distinctly punctate; clypeus distinctly punctate, punctures close at the base, tending to be sparse towards the apex, apex smooth and shiny, apical margin impressed, somewhat truncate or notched in the middle; malar space granulose,  $0.55 \times$  the basal width of mandible; mandible moderately broad, strongly puncto-striate, teeth more or less equal; frons rough and rugoso-punctate in the middle and at sides of median ocellus, at sides toward eye margin shallowly punctate, a groove extending down from the base of median ocellus to [middle of antennal sockets, semicircular carina broad and high like a flange; vertex subpolished much shallowly and closely punctate; temple distinctly punctate; pronotum dull, coarsely trans-striate in the middle, lower and upper margin shallowly punctate, upper margin also with faint indication of fine oblique striations, epomia moderately strong, not reaching to upper margin, pronotal collar largely smooth, shallowly punctate above; mesoscutum subpolished dis-

tinctly minutely punctate; scutellum subpolished, minutely punctate, lateral carina extending to its basal 0.5; metascutellum smooth and subpolished; mesopleurum strongly rugose, area in the middle with weak punctures, postero-ventral part just below speculum trans-rugose and antero-ventral part just above sternaulus subpolished, minutely punctate, mesosternum subpolished minutely and sparsely punctate, prepectal carina extending 0.62 the height of mesopleurum; metapleurum subpolished, finely trans wrinkled, juxtacoxal carina present; propodeum with area between basal carina and apex irregularly wrinkled, somewhat trans-wrinkled below apophysis and sides, basad of basal carina except the extreme base strongly punctate, punctures near basal carina running into striations, punctures around spiracle very close and coalescent, spiracle large and oval, apical carina evenly arched, apophysis crest-like, basal carina evenly arched, but slightly dipped in the middle; first abdominal tergite short, little less than  $2 \times$  as long as broad at the apex, both dorso-longitudinal carinae present, tergite smooth and shiny at apex and base, punctate in the middle, punctures sparse in the middle, close near the spiracles, second and third tergites minutely and densely punctate, punctures on third tergite very shallow, following tergites subpolished; areolet (Fig. 11e) pentagonal, about  $0.85 \times$  as high as the portion of second recurrent vein above bulla; intercubiti more or less parallel, second intercubitus faint, nervulus interstitial, nervellus intercepted below the middle, brachiella absent; ovipositor sheath about  $1.2 \times$  as long as hind tibia.

Black. Fourth to ninth antennal segments (fourth segment only with its apical half) white above; semicircular carina (Fig. 11g) above on frons completely, two lateral stripes extending from the level or even below the level (variable) of median ocellus and joining semicircular mark, subtegular ridge, tegula, apices of first and second abdominal tergites, seventh and eighth tergites broadly, yellow (Fig. 11f); mesopleurum largely (except prepectus, mesosternum, black, sometimes colour may be more extensive), base of hind wing, scutellum, metascutellum, metapleurum, propodeum (except basad of basal carina largely black), extreme base of first abdominal tergite, dark orange; fore coxa and trochanter, yellow; femur, tibia and tarsus brown, tibia above, tarsus wholly clouded with fuscous; middle coxa and trochanter dirty yellow; femur, tibia and tarsus same as of fore leg; hind coxa (Fig. 11h) and trochanter brownish-orange, with a mark apico-laterally and both the trochanteral segments largely above, blackish; femur dark orange tending to be brownish-orange towards the base, tibia and tarsus yellowish-brown, both highly infuscate, and tibia at its base and apex, brown or dark brown.

*Male* : Similar to female but more polished, and slender; malar space

0.6 × the basal width of mandible; frons strongly and sparsely punctate with few longitudinal striae extending down from the base of median ocellus; vertex distinctly and sparsely punctate; pronotum largely polished with few short rugae in the middle groove and faint punctures on pronotal collar and upper margin; scutellum subpolished distinctly punctate, lateral carina extending to its basal 0.2; mesopleurum with minute sparse punctures, in the middle, upper half and mesosternum smooth and shiny, few short trans-striae along the anterior margin of speculum; metapleurum largely smooth and shiny except few minute punctures above; propodeum finely reticulate, basad of basal carina smooth and shiny with faint sparse punctures; first abdominal tergite smooth and shiny with shallow punctures in the middle, rest of the tergites distinctly and closely punctate, punctures tending to be shallow towards the last tergite; genitalia as in figure 11i.

Black. Antennae completely black; face, clypeus, malar space, mandible except at apex, temple semicircular carina, and lateral stripes, pronotal collar broadly, tegula, subtegular ridge, apices of all the abdominal tergites, yellow; thorax largely dark orange, except mesoscutum anteriorly, propodeum basad of basal carina, black (black colour variable, may be extensive in some); basal half of first abdominal tergite yellowish-orange; legs colour much similar to female, except all the tarsi dark brown or blackish and tending to be still more darker towards the apical segments, apex of hind femur with a black mark.

*Length* : ♀, 4.5-8.5 mm; fore wing 3.5-7.5 mm; ovipositor sheath about 1.5-3.0 mm. ♂, 5-8 mm; fore wing 4-5 mm.

*Holotype* ♀, INDIA: KARNATAKA: Bhagmandla, 853 m, 15.xi.1965, M.K. Kamath, Coll. No. K60 (GUPTA). *Allotype* ♂, same data, 12.xii.1965, D.T. Tikar, Coll. No. T 132 (GUPTA). *Paratypes* 127 ♀♀, 61 ♂♂. INDIA : KARNATAKA : Mercara, 1219 m, 19 ♀♀, 4 ♂♂, 10-19.xii.1965, M.K. Kamath, Coll. Nos. K55, 59, 62-64; 5 ♀♀, 3 ♂♂, 10-14.xii.1965, D.T. Tikar, Coll. Nos. T130, 133-134; 4 ♀♀, 2 ♂♂, 10-14.xii.1965, J.K. Jonathan, Coll. Nos. J108, 109, 112; Murnard, 609 m, 5 ♀♀, 2 ♂♂, 11.xii.1965, M.K. Kamath, Coll. No K56; 3 ♀♀, 1 ♂, D.T. Tikar, Coll. No. T131; 3 ♀♀, 1 ♂, J. K. Jonathan, Coll. No. J109; Kottegehar, 640 m, 4 ♀♀, 1 ♂, 2.xii.1965, M. K. Kamath, Coll. No. K54; 3 ♀♀, 1 ♂, 29-30.xi.1965, D. T. Tikar, Coll. Nos. T121, 122; 20 ♀♀, 5 ♂♂, 29.xi. to 2.xii.1965, J. K. Jonathan, Coll. Nos. J104, 105, 107; Bhagmandla, 853 m, 10 ♀♀, 6 ♂♂, 12-16.xii.1965, M. K. Kamath, Coll. Nos. K57, 58, 60, 61; 1 ♂, 12.xii.1965, D.K. Tikar, Coll. No. T132; 5 ♀♀, 10 ♂♂, 12-13.xii.1965, J. K. Jonathan, Coll. Nos. J110, 111; Londa, 609 m, 4 ♀♀, 1 ♂, 23-24.xi.1965, D. T. Tikar, Coll. Nos. T117, 118; 6 ♀♀, 23.xi.1965, J. K. Jonathan, Coll. No. J101; Khemmangundi, 3 ♀♀, 2.xii.1965, D. T. Tikar, Coll. No.

T123; Mudigera, 604 m, 1 ♂, 1.xii.1965, J. K. Jonathan, Coll. No. J106; Santaverri, 1219 m, 1 ♂, 6.xii.1965, D. T. Tikar, Coll. No. T126. MAHARASHTRA: Panhala Fort 914 m, 1♀, 17.xi.1965, M. K. Kamath, Coll. No. K45; KARNATAKA: Gunji, 609 m, 4 ♀♀, 3 ♂♂, 22-24.xi.1965, M. K. Kamath, Coll. Nos. K47, 49; 2 ♀♀, 1 ♂, 24.xi.1965, J. K. Jonathan, Coll. No. J102; 1 ♀, 22.xi.1965, D. T. Tikar, Coll. No. T116; Anmod, 762 m, 1 ♀, 27.xi.1965, D. T. Tikar, Coll. No. T120 (GUPTA); Ammathi, 1000 m, S. Coorg, 2 ♀♀, ii.1952, Coll. P. S. Nathan (TOWNES). TAMIL NADU: Oothu in Kodai Hills, 1158 m, 6 ♀♀, 1 ♂, 3-4.xii.1966, M. K. Kamath, Coll. Nos. K146, 147; 9 ♀♀, 1 ♂, 3-4.xii.1966, J. K. Jonathan, Coll. Nos. J195; 196; Yercaud in Shevaroy Hills, 1371 m, 7 ♂♂, 2 ♀♀, 20-23.xi.1966, J. K. Jonathan, Coll. Nos. J184-187; 2 ♂♂, 21-22.xi.1966, M. K. Kamath, Coll. Nos. K137, 138. KERALA: Watapara in Walayar forest, 1 ♀, 14.xii.1966, J.K. Jonathan, Coll. No. J200; Thekkady Sanc., 975 m, 2 ♀♀, 30.xii.1965, M. K. Kamath, Coll. No. K67; 1 ♂, xii.1964, V.K. Gupta. U.P.: Dehra Dun, 2 ♂♂, 7.iv.1967, M. K. Kamath, Coll. No. K164; 2 ♂♂, D. T. Tikar, Coll. No. 320; 1 ♂, J. K. Jonathan, Coll. No. J201; Mohakampur, 1 ♂, 9.iv.1967, J. K. Jonathan, Coll. No. J205; Garjia, 1 ♂, 10.iv.1965, D. T. Tikar, Coll. No. T10; DELHI : 1 ♂, 18.iii.1966, M. K. Kamath Coll. No. K 155 (GUPTA).

*Distribution:* INDIA : Delhi, Karnataka, Kerala, Maharashtra, Tamil Nadu and Uttar Pradesh.

### 3. *Isotima kamathi*, sp. nov. (Fig. 12a-d)

This species is recognised from its closely related species *Isotima rufipleuralis*\* by having mesopleurum and pronotum weakly sculptured, thorax and first tergite largely reddish-orange.

*Female* : Face dull, rugoso-punctate in the middle, punctate at sides, sometimes punctures at sides not well formed; clypeus subpolished, sparsely punctate, punctures tending to be few towards the apex, apical margin smooth and shiny impressed, somewhat weakly notched in the middle; malar space finely granulose,  $0.53 \times$  the basal width of mandible; mandible longitudinally striato-punctate, teeth subequal; frons with area below and at sides of median ocellus rugoso-punctate, rugae longitudinally extending, extreme sides of frons smooth and subpolished, a groove extending down from median ocellus to the middle of antennal sockets, semicircular carina above each antennal sockets moderately broad and high like flange; vertex subpolished, indistinctly punctate; temple shallowly punctate; pronotum subpolished, finely trans-striate in the middle, upper margin faintly and obliquely striate, upper and lower margin faintly punctate, pronotal collar largely smooth except for a few punctures above, epomia moderately strong, not reaching to

upper margin; mesoscutum subpolished; scutellum subpolished, shallowly punctate, lateral carina extending to its basal 0.5; metascutellum subpolished; mesopleurum weakly rugose tending to be rugulose above near subtegular ridge, and striate below speculum along mesopleural suture, speculum subpolished, faintly minutely punctate, area just below sternaulus somewhat rugoso-punctate, further below subpolished, faintly minutely and sparsely punctate; prepectal carina extending  $0.7 \times$  the height of mesopleurum; metapleurum subpolished, trans-rugose, juxta-coxal carina present; propodeum between basal carina and apex finely wrinkled, below apophysis trans-wrinkled, basad of basal carina subpolished, distinctly and sparsely punctate, spiracles moderately large and oval, apical and basal carinae evenly arched in the middle; apophysis crest-like; first abdominal tergite short, about  $2 \times$  as long as broad at the apex, spiracles as close to each other as to the apex, both the dorsal longitudinal carinae present, tergite subpolished, base and apex smooth and shiny, hardly few punctures in the middle, second tergite with densely crowded punctures, third tergite shallowly punctate, following tergites subpolished; areolet (Fig. 12a) about  $7 \times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted below the middle, brachiella absent; ovipositor sheath about  $0.75 \times$  as long as hind tibia.

Black. Antenna with fourth to eleventh flagellar segments white above; semicircular carina on frons (Fig. 12c) completely, two lateral stripes extending from the level of median ocellus and joining mark of semicircular carina, pronotal collar (except below), subtegular ridge, tegula (sometimes subtegular ridge and tegula, dark orange), apices of first and second abdominal tergites with apical band, third tergite also with an apical band, but the latter is not uniform, seventh and eighth tergites broadly in the middle, yellow (Fig. 12b); whole of thorax largely dark orange, except pronotum along its posterior margin with a triangular mark, whole of mesoscutum largely (variable), prepectus below and sometimes mesosternum anteriorly, black; first abdominal tergite yellowish-brown at base; fore coxa and first trochanteral segment dirty yellow; femur, tibia and tarsus yellowish-brown, except tibia and tarsus highly infusate, its fifth tarsal segment dark brown; middle coxa and first trochanteral segment dark yellow, except first trochanteral segment with a blackish mark; second trochanteral segment, femur and tibia dark orange, tending to be light brown, with femur at the apex above and tibia broadly above blackish, tarsus infusate, its fifth segment dark brown; hind coxa, trochanter and femur dark orange, except trochanter with two marks, femur at extreme base and apex blackish, tibia and tarsus brown, except tibia broadly at apex, extreme base and above blackish, fifth tarsal seg-

ment dark brown above (Fig. 12d).

*Male* : Unknown.

*Length* : ♀, 6.5 mm; fore wing 4.5 mm; ovipositor sheath about 2 mm.

*Holotype* ♀, INDIA : KERALA : Walayar Forest, 9.xii.1966, J.K. Jonathan, Coll. No. J198 (GUPTA). *Paratypes* 5 ♀♀. INDIA : KERALA : Walayar Forest, 1 ♀, 10.xii.1966, M.K. Kamath, Coll. No. K150; Thekkedy, 1 ♀, 30.xii.1965, M.K. Kamath, Coll. No. K67. KARNATAKA: Mercara, 1219 m, 3 ♀♀, 17-19.xii.1965, M.K. Kamath, Coll. Nos. K62&64 (GUPTA).

*Distribution*: INDIA: Kerala and Karnataka.

## B. THE TRICOLOR GROUP

This group is characterized by having mesopleurum largely rugose, rugoso-punctate or wrinkled; scutellum normal; wings clear hyaline or marked with faint fuscous marks.

The following species are referable to this group:

*Neomesostenus pusillus* Szépligeti, 1916 (= *N. persimilis* Szépligeti, 1916); *Gambrus quadratus* Szépligeti, 1908; *Goryphus ruficollis* Holmgren, 1868; *Gambrus rufithorax* Szépligeti, 1910; *Goryphus taiwanellus* Uchida, 1932 and *Cryptus tricolor* Brullé, 1846. The species given within parenthesis is a new synonym.

In addition six new species are described.

### 4. *Isotima punctata*, sp. nov. (Fig. 12e-h)

This species is similar and sympatric to *Isotima annulata*\* in having nervellus intercepted far above the middle, body densely punctate and legs largely black, but it can be distinguished by having pronotum trans-rugose in the middle, mesopleurum densely punctate, metapleurum and propodeum also closely punctate and first tergite with distinct dorso-median carinae. Antennal flagellum of female without a white band, hind coxa and first tergite (except its apical band) black; male with first to third tergites with apical bands.

*Female* : Face, clypeus, frons, vertex, malar area and temple densely punctate; malar space 0.85 the basal width of mandible; apical margin of clypeus impressed not evenly arched but truncate; mandible minutely punctate at the base, teeth more or less equal; pronotum trans-rugose in the middle, upper margin somewhat obliquely finely rugulose, epomia strong reaching up to upper margin; mesoscutum and scutellum densely punctate; lateral carina of scutellum extending to its basal  $0.45 \times$ ; metascutellum minutely punctate; mesopleurum densely punctate, punctures coalescent, speculum subpolished sparsely and shallowly punctate, anterior margin of speculum with short striae, area below sternaulus distinctly coarsely punctate, prepectal carina extending  $0.75 \times$  the height of mesopleurum; metapleurum closely punctate, punctures shallow and

coalescent, juxtacoxal carina present; propodeum subpolished, area between basal carina and apex closely punctate, punctures moderately deep and at some places coalescent, area basad of basal carina around spiracles puncto-rugose, extreme base in the middle smooth and shiny, basal carina strong and complete evenly arched in the middle, apical carina complete, weak in the middle evenly arched, apophysis very low, spiracles small and round; first abdominal tergite smooth and subpolished, second and third tergite closely punctate, fourth tergite coarsely and shallowly punctate, punctures tending to be shallow and indistinct towards the apex, following tergites subpolished; fore wing (Fig. 12e) with areolet pentagonal, about  $1.0\times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent, second intercubitus faint, nervulus slightly distad, nervellus intercepted  $0.35\times$  above the middle, brachiella absent; ovipositor sheath about  $0.7\times$  as long as hind tibia.

Black. Antennal flagellum without a white band; head completely black; thorax (Fig. 12f) completely red, except pronotal collar along the margin slightly blackish, apices of first and second abdominal tergites, seventh and eighth tergites broadly, yellowish; fore leg with coxa light brown below and dark brown above, trochanter and femur dark brown, except each trochanteral segment along the margins and femur at the apex lighter, tibia and tarsus yellowish-brown, its fifth tarsal segment dark brown; middle coxa and first trochanteral segment reddish, second trochanteral segment, femur, tibia and tarsus dark brown except the apical half of femur and basal half of tibia light brown; hind leg (Fig. 12g) more or less black, except femur and tibia lighter at subbasal area; fore wing light brownish at its apical half.

*Male* : Whole of head thickly punctate, punctures much coalescent; lateral carina of scutellum extending to its basal  $0.25$  ; apex of first abdominal tergite subpolished with scattered shallow punctures, second to sixth tergites coarsely punctate, seventh and eighth tergites indistinctly punctate, rest of the body structure similar to female. Genitalia as in figure 12 h.

Black. Scape above on its outside, mandible at the base, apices of first to third abdominal tergites, seventh and eighth tergites broadly, yellow or dirty yellow ; fore coxa and trochanter yellow; femur, tibia and tarsus dark yellow, except femur light brownish above; middle coxa and trochanter yellow, femur, tibia and tarsus yellowish-brown, its femur, tarsus slightly darker ; hind leg largely black, except first trochanteral segment wholly and little of second segment and tibia at the base yellowish, rest of the body colour similar to female.

*Length* : ♀, 6 mm; fore wing 4 mm; ovipositor sheath about 1.5 mm. ♂, 7mm; fore wing 4 mm.

*Holotype* ♀ and *Allotype* ♂, INDIA : UTTAR PRADESH : Muradnagar,

4.xi.1965, S. Gupta, Coll. No.135 (GUPTA). *Paratypes* 17 ♀♀, 3 ♂♂. Dehradun, 600 m, 5 ♀♀, 7-8. vi. 1972, Malti Bhargava, Coll. No. 422 & 424 ; 2 ♀♀, 8.vi.1972, Sharda Maheshwari, Coll. No. 423 ; New Forest (F.R.I., Dehradun), 2 ♀♀, 1 ♂, 18-23.xi.1962, V.K. Gupta, Coll. Nos. 19-21. Muradnagar, 1 ♀, 1 ♂, 4 & 17.xi.1965, V K. Gupta, Coll. Nos. 135 & 136 ; 1 ♂, 14.ix.1966, Doli Ram, Coll. No. 228. Garjia, 609 m, 1 ♀, 21.iv. 1967, J.K. Jonathan, Coll. No. J216 KARNATAKA : Santaverry, 1219 m, 1 ♀, 6.xii. 1965, D.T. Tikar, Coll. No. T126. ASSAM : Rangapara Sonajuli T.E., 3 ♀♀, 20.iv. 1966, J.K. Jonathan, Coll. No. J132 and M.K. Kamath, Coll. No. K89 ; 1 ♀, 28.iv.1966, D.T. Tikar, Coll. No. T211 (GUPTA). PHILIPPINES : Manila, 1 ♀, 21.xii. 1952, Townes family (TOWNES).

*Distribution* : INDIA : Assam, Karnataka and Uttar Pradesh. PHILIPPINES.

### 5. *Isotima aunulata*, sp. nov. (Fig. 12i)

Essentially similar to *Isotima punctata*\* in sculpture and colour except as below.

*Female* : Frons with distinct oblique striations below median ocellus ; pronotum subpolished, coarsely trans-striate, its extreme upper margin with fine oblique rugulae and minute punctures ; mesopleurum in the middle rugoso-punctate, rest densely punctate, anterior to speculum above striate ; metapleurum weakly rugose, juxtacoxal carina weak ; propodeum between basal carina and apex rugoso-reticulate, basad of basal carina rugulose with few punctures ; first abdominal tergite smooth, dorso-median carinae absent, second and third tergites densely punctate, following tergites mat and subpolished.

Black. Antennal flagellum with segments sixth to tenth white above ; maxillary palpi yellowish, with its fifth apical segment brownish ; hind coxa black with its basal 0.4 red ; first abdominal tergite broadly red at base.

*Male* : Similar to female except more slender, abdominal tergites first to fourth with yellow apical bands ; genitalia as in figure 12 i.

*Length* : ♀ 4-6.5 mm ; fore wing 3-4.75 mm ; ovipositor sheath 0.9-1.2 mm. ♂, 5 mm ; fore wing 4.5 mm.

*Holotype* ♀ and *Allotype* ♂, INDIA : UTTAR PRADESH : Dehradun 600 m, 1.vi. 1972, Sharda Mahashwari, Coll. No. 423 (GUPTA). *Paratypes* 9 ♀♀, 2 ♂♂. same data as holotype, 2 ♀♀, 7.vi. 1972. and 5 ♀♀, 8.vi. 1972 ; 2 ♀♀, 8.vi. 1972, Malti Bhargava, Coll. No. 424 ; 1 ♂, 18.vi.1966, D.T. Tikar, Coll. No. T264. PUNJAB : Bhatinda, 1 ♂, 20.v. 1962; S.K. Gupta (GUPTA).

*Distribution* : INDIA : Punjab and Uttar Pradesh.

## 6. *Isotima ruficollis* (Holmgren) (Fig. 13a-c)

*Goryphus ruficollis* Holmgren, 1868, *Kongliga svenska fregatten Eugenie's resa*. . . ., 2 : 400. ♂, ♀. des. Type : ♀, Java (STOCKHOLM); Roman, 1907, *In* Wiren and others : *Zoologische Studien*. . . .T. Tullberg zum 65. Geburtstage gewidmet & c., p. 80. ♂, ♀. Key, des., fig.

*Isotima ruficollis* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 146.

This is a distinct species having thorax almost entirely red; frons little raised in the middle; lateral carina of scutellum extending to its basal, 0.7 areolet large, about  $0.9 \times$  as high as the portion of second recurrent vein above bulla and nervellus is intercepted at the middle.

*Female* : Face weakly rugoso-punctate, punctures weak and not well distinct, clypeus sparsely and minutely punctate; at apex smooth and shiny; mandible rough, lower tooth slightly shorter than upper, malar space granulose, about  $0.6 \times$  the basal width of mandible; frons in the middle slightly raised, largely rugoso-punctate with few oblique carinae starting from the base of median ocellus, at side weakly ruguloso-punctate; vertex minutely and closely punctate; temple minutely punctate; pronotum coarsely striate in the middle, upper and lower margins and pronotal collar above weakly rugoso-punctate, punctures extremely shallow and not well defined, epomia strong reaching to upper margin; mesoscutum shiny, minutely and sparsely punctate, punctures sometimes not well defined; scutellum shiny, sparsely and shallowly punctate, lateral carina extending to its basal 0.7; metascutellum smooth and subpolished; mesopleurum largely rugose, an oval area little below subtegular ridge and speculum subpolished, much shallowly and sparsely punctate, prepectal carina extending 0.75 the height of mesopleurum, area below sternaulus finely aciculo-punctate, sternaulus extending up to the base of middle coxa; metapleurum coarsely trans-rugose, tending to be finely wrinkled, juxtacoxal carina complete; propodeum between basal carina and apex finely wrinkled to finely reticulate, area basad of basal carina shiny with few scattered punctures, spiracle oval, small; both the transverse carinae complete and arched in the middle, apical carina laterally forming crest-like apophysis; first abdominal tergite about  $2 \times$  as long as wide at apex, tergite dorsally shiny with few punctures in the middle and apico-laterally, both longitudinal carinae present; second and third tergites densely punctate, following tergites mat and subpolished; areolet pentagonal (Fig. 13a) about  $0.9 \times$  as high as the portion of second recurrent vein above bulla, nervellus intercepted at the middle, brachiella absent; ovipositor sheath about  $0.8 \times$  as long as hind tibia.

Black. Antenna with fifth to tenth segment white; whole of thorax red, except the propleurum and sometimes pronotal collar, mesosternum

and tegula black; apices of first, second, seventh and eighth tergites, yellowish (Fig. 13b); legs (Fig. 13c) largely reddish, except fore and middle legs with their trochanters and tarsi, brown; hind trochanter, apex of femur, whole of tibia and tarsus, brown to dark brown (legs colour variable), fore wing with a light brown spot below stigma.

**Male** : Face and clypeus densely punctate; frons with coalescent punctures and also with striae radiating from ocellar area; vertex and temple densely punctate; mesoscutum closely punctate, punctures running into striations; mesopleurum densely and shallowly punctate, speculum shiny sparsely punctate; metapleurum densely and shallowly punctate, second to fifth tergites punctate, punctures much shallow on fourth and fifth tergites, following tergites mat and subpolished, rest similar to female.

Black. Mandible except the apex; pronotal collar above, apices of first, second and seventh tergites, yellowish; fore leg largely brownish; middle coxa and trochanter reddish-orange, rest of middle-leg brown; hind leg largely dark brown, wings without brownish spot.

**Length** : ♀, 6.5-9 mm; fore wing 4.5-6.5 mm; ovipositor sheath 2-3.5 mm; ♂, 4.5 mm; fore wing 3 mm. \*

**Specimens examined** : 11 ♀♀, 1 ♂. JAVA : No other data, 1 ♀, 1 ♂ (Types of *Goryphus ruficollis* Holmgren) (STOCKHOLM). Bogor, Dudukdjava, 280 m, 1 ♀, 22.ix.1953; Bodjong djengkel, 300 m, 1 ♀, 20.ix.1953; Tjikaret, 400 m, 1 ♀, 20.ix.1953, Coll. J.v.d. Vecht (LEIDEN). PHILIPPINES : COTABATO : Pikit, 1 ♀, 20.iii.1953 (Homotype of *Goryphus ruficollis* Holm, det. by H. Townes) (TOWNES). INDIA : UTTAR PRADESH : Garjia, 609 m, 1 ♀, 20.iv.1967, J.K. Jonathan Coll. No. J215; 1 ♀, 23.iv.1967, V.K. Gupta, Coll. No. 269; 1 ♀, 22.iv.1967, M.K. Kamath, Coll. No. K. 173; 1 ♀, 20.iv.1967, D.T. Tikar, Coll. No. T. 327; Dehra Dun, New Forest, 1 ♀, 19.vi.1966, D.T. Tikar, Coll. No. T. 267. HIMACHAL PRADESH : Palampur, 1200 m, 1 ♀, 18.vi.1963, V.K. Gupta (GUPTA).

**Distribution** : INDIA : Himachal Pradesh and Uttar Pradesh. PHILIPPINES and JAVA.

## 7. *Isotima panhalensis*, sp. nov. (Fig. 13d-f)

This species can easily be distinguished by having yellow marks at the base of lateral carina of scutellum (Fig. 13d) and fore and middle coxae are also yellow. Face thickly punctate, frons rough and rugose, propodeum is largely reticulate in the middle.

**Female** : Face thickly punctate in the middle, tending to be coarsely rugose above near antennal sockets and also at sides, punctures below running into striations; clypeus subpolished with sparse shallow punctures, apical margin impressed and wavy, mandible longitudinally punctostriate, teeth subequal; malar space  $0.55 \times$  the basal width of mandible;

frons strongly rugose and rough in the middle, at sides granulo-punctate, punctures few and shallow; vertex smooth and subpolished distinctly punctate; pronotum subpolished, trans-striate, striae tending to be irregular and wrinkled, upper margin with few coarse punctures, pronotal collar largely smooth, epomia strong reaching to upper margin; mesoscutum subpolished minutely punctate; scutellum subpolished punctate, lateral carina extending to its basal 0.25; metascutellum subpolished indistinctly punctate; mesopleurum coarsely rugose, tending to be wrinkled along the prepectal carina, area below sternaulus subpolished, minutely punctate, speculum subpolished minutely and shallowly punctate, area above middle coxa along the mesopleural suture with transverse striae, prepectal carina extending  $0.75 \times$  the height of mesopleurum; metapleurum rugose tending to be somewhat finely trans-wrinkled, juxtacoxal carina present; propodeum between basal carina and apex reticulate, area basad of basal carina in the middle subpolished with few scattered punctures, area around and behind spiracle distinctly and closely punctate, basal carina strong slightly curved in the middle, apical carina not distinct in the middle, apophysis crest-like, spiracle moderately large, oval; first abdominal tergite subpolished somewhat mat, apex smooth and shiny except with few scattered punctures, both the dorsal longitudinal carinae present, second and third tergites closely punctate, following tergites subpolished; fore wing with areolet pentagonal,  $0.8 \times$  as high as the portion of second recurrent vein above bulla, intercubiti parallel, second intercubitus faint, nervulus interstitial, nervellus intercepted at the middle, brachiella absent (Fig. 13g); ovipositor sheath about  $0.9 \times$  as long as hind tibia.

Black. Antenna with fourth to ninth flagellar segments white above; head, pronotum (except a small yellowish mark at the top of pronotal collar), mesoscutum, ventral area below sternaulus and prepectus of mesopleurum completely, black; lateral carina of scutellum (Fig. 13e), rest of mesopleurum (Fig. 13d), apices of first and second abdominal tergites, seventh and eighth tergites broadly in the middle, yellow; fore leg with coxa and first trochanteral segment yellow, second trochanteral segment, its femur and tibia, dark yellow, except tibia infusate above, tarsus brownish and fifth tarsal segment dark brown; middle leg with coxa and trochanter yellow, trochanter infusate, femur yellowish-brown, tibia and tarsus brownish, fifth tarsal segment dark brown; hind coxa, trochanter and femur (Fig. 13f) dark orange or reddish, except first trochanteral segment dark brown; tibia and tarsus blackish-brown, fifth tarsal segment dark brown; fore wing faintly in the middle and its apex light brownish.

*Male* : Unknown.

*Length* : ♀, 8 mm; fore wing 5.5 mm; ovipositor sheath 3 mm.

*Holotype* ♀ and *Paratype* ♀, INDIA : MAHARASHTRA : Panhala Fort,

17 & 18.xi.1965, Colls. J.K. Jonathan and M.K. Kamath, Coll. No. J90 & K46 (GUPTA).

*Distribution* : INDIA : Maharashtra.

**8. *Isotima emaculata*, sp. nov. (Fig. 13g-i)**

This species can be recognised from its allied species by the absence of yellow marks at the base of lateral carina of scutellum and by not having a yellow band at the apex of first tergite. The pronotal collar is wholly black with no yellowish spot above.

*Female* : Face closely punctate all over, punctures in the middle running in to striations; clypeus subpolished, coarsely punctate, tending to be sparse at the apex, apical margin impressed, smooth and shiny, wavy, somewhat notched in the middle; mandible closely punctate with longitudinal striations, teeth subequal, lower tooth slightly shorter than the upper; malar space granulo-punctate,  $0.66 \times$  the basal width of mandible; frons strongly rugose and rough with scattered punctures, sometimes in the middle punctate with irregularly running striae, and at sides shallowly and closely punctate, antennal scrobe with fine aciculations; vertex dull, closely and shallowly punctate; temple strongly punctate; pronotum subpolished, coarsely trans-wrinkled, somewhat obliquely wrinkled above, upper margin with sparse shallow punctures, lower margin distinctly coarsely punctate, pronotal collar also sparsely and shallowly punctate, epomia moderately strong, reaching to upper margin; mesoscutum subpolished, minutely punctate; scutellum subpolished, coarsely punctate, lateral carina extending to its basal  $0.45$ ; metascutellum hardly punctate; mesopleurum subpolished, strongly rugose, tending to be closely wrinkled, sometimes area below sternaulus minutely punctate, speculum subpolished minutely punctate, prepectal carina extending  $0.75 \times$  the height of mesopleurum; metapleurum densely wrinkled, at some places tending to be reticulate, juxtacoxal carina present; propodeum between basal carina and apex weakly reticulate, below apophysis somewhat trans-wrinkled, area basad of basal carina smooth and shiny, below and around spiracles with coarse deep punctures, punctures tending to be coalescent, apical carina largely weak, at sides present as low crest-like apophysis, basal carina more or less straight, slightly curved in the middle, spiracles moderately large and round; first abdominal tergite subpolished with scattered shallow punctures in middle; second and third tergites closely, fourth tergite faintly punctate, following tergites subpolished; fore wing (Fig. 13g) with areolet pentagonal,  $0.85 \times$  as high as the portion of second recurrent above bulla, intercubiti slightly convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted at the middle, brachiella absent; ovipositor long, sheath  $0.85 \times$  as long as hind tibia.

Black. Antenna with fifth to ninth segments (fifth segment only at its apex) white above; head completely black; pronotum largely black except slightly at the upper margin and posterior area reddish, sometimes whole of pronotum black (colour variable); mesoscutum colour variable, largely black to red; tegula black except reddish at the base; mesopleurum, scutellum, metascutellum, metapleurum and propodeum (Fig. 13h), red; first abdominal tergite black, except dorsally at the apex and base red; second tergite with an apical band, seventh and eighth tergites broadly in the middle (Fig. 13h) yellow; fore leg largely blackish, except coxa at base reddish, femur at apex and tibia below light brownish-yellow; middle coxa and femur reddish, except coxa at apex and femur with a line above, black; its trochanter largely, tibia and tarsus completely blackish; hind coxa (Fig. 13i) and femur, red, except coxa at base and apex, femur at apical 0.25, or sometimes wholly, black; trochanter, tibia and tarsus black; fore wing with light brown band in the middle.

*Male* : Unknown.

*Length* : ♀, 9.5 mm; fore wing 5.5 mm; ovipositor sheath 2.5 mm.

*Holotype* ♀, INDIA : KARNATAKA : Londa, 609 m, 24.xi.1965, D.T. Tikar, Coll. No. T 118 (GUPTA). *Paratype* ♀, same data as holotype, 23.xi. 1965, M.K. Kamath, Coll. No. K 48 (GUPTA).

*Distribution* : INDIA : Karnataka.

## 9. *Isotima rufithorax* (Szépligeti) (Fig. 14a-c)

*Gambrus rufithorax* Szépligeti, 1910, *Notes Leyden Mus.*, 32 : 100. ♂ key, des. Type ♂, Krakatau Is. in Sunda Strait (BUDAPEST).

*Mesostenus rufithorax* Szépligeti, 1916, *Ann. Mus. Natl. Hungarici*, 14 : 329. key.

? *Goryphus taiwanellus* f. *rufithorax* Uchida, 1932, *J. Facul. Agr. Hokkaido Imp. Univ.*, 33 : 178 ♀, Name preocc. in *Isotima* by Szépligeti, 1910 and by Uchida, 1931. des. Lectotype : ♀, Taiwan : Tainan, May 7, 1912 (EBERSWALDE). Syn. by Townes, Townes & Gupta in 1961.

*Isotima rufithorax* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 146.

This and the following species of this group resembles very closely to each other in colour and sculpture. But it can easily be separated from others in having mesopleurum and metapleurum finely wrinkled, juxta-coxal carina obscured. The thorax is largely red and first abdominal tergite with a distinct yellow apical band (Fig. 14a).

*Female* : Face weakly rugoso-punctate, punctures large and shallow; clypeus subpolished, closely and shallowly punctate, its apical margin sinuate and notched in the middle; mandible punctate; malar space strongly granulose, about  $0.6 \times$  the basal width of mandible; frons dull, obliquely rugose in the middle, rugulose at sides; antennal scrobes moderately deep, smooth and shiny; vertex mat and dull; temple

strongly and closely punctate; pronotum subpolished, trans-rugose, rugulose at upper margin, pronotal collar and lower margin largely smooth; mesoscutum largely smooth and shiny with no distinct punctures; scutellum and metascutellum smooth and shiny; lateral carina of scutellum extending to its basal 0.75; mesopleurum largely finely wrinkled, area above middle coxa with fine striation, speculum smooth and shiny, prepectal carina extending  $0.7 \times$  the height of mesopleurum, sternaulus extending up to the base of middle coxa; metapleurum strongly rugose, juxtacoxal carina not well defined among the rugae, propodeum with area between basal carina and apex reticulate, tending to be wrinkled towards the apex, area basad of basal carina near spiracles rugoso-punctate, in the middle smooth, spiracle moderately large and longish-oval, both the transverse carinae strong, evenly arched in the middle; apophysis moderately strong and high; first abdominal tergite largely smooth and subpolished; second tergite densely punctate, third tergite closely and shallowly punctate at base, its apical region and the following tergites mat and subpolished; fore wing with areolet moderately large, pentagonal, intercubiti convergent, areolet about  $1.0 \times$  as high as portion of second recurrent vein above bulla, nervulus interstitial or little apicad of basal vein, nervellus intercepted at its lower 0.4, brachiella absent, ovipositor sheath about  $0.9 \times$  as long as hind tibia.

**Black.** Antennal flagellum with fifth to seventh segments (variable, sometimes fourth to ninth segments) yellowish above; head entirely black except sometimes face above with reddish hue; thorax red, pronotal collar above and subtegular ridge yellow, colour variable, sometimes propleurum, pronotum partly or largely, mesoscutum also partly, black; first tergite black, broadly red at base and sides, colour variable, sometimes red colour confined to its base only; apices of abdominal tergites first, second, seventh and eighth broadly in the middle, yellow (Fig. 14a); legs in general reddish-brown; fore coxa dirty yellow, its femur and tibia with a broad dark brown line above; hind coxa, femur and tibia largely reddish, except coxa and femur at apex, trochanter and tarsus largely dark brown, wings hyaline with a broad light brown mark in the middle and at the extreme apex, brownish (Fig. 14b).

**Male:** Essentially similar to female, more slender and polished; clypeus sparsely and shallowly punctate; frons with semicircular carina modified into horn-like processes; vertex and temple shiny with sparse and shallow punctures; pronotum and mesoscutum smooth and shiny; mesopleurum shiny, largely sparsely and shallowly punctate, weakly rugoso-punctate in the middle; metapleurum shiny, sparsely and minutely punctate; juxtacoxal carina present, abdominal tergites second and third at base densely and shallowly punctate, rest similar to female. Genitalia as in figure 14c.

**Black.** Antennal flagellum without a band; face, clypeus, mandible,

temple except above, frons along the eye margin, carina above antennal scrobe, pronotal collar, subtegular ridge, apices of first to fourth tergites and fifth narrowly and faintly, yellow; thorax largely deep orange, except sometimes pronotum and mesoscutum with black; first tergite deep orange with a small to extensive black mark above in the middles; legs in general reddish-yellow, except fore and middle coxae yellow and their tarsi largely brown, hind leg with trochanter, femur at apex, tibia largely at base and apex and tarsus largely, brown; wings largely clear hyaline, except infusate at the apex.

*Length* : ♀, 6 mm (7 mm in Lit.); fore wing 4.5 mm; ovipositor sheath 2.75 mm. ♂, 5-6.5 mm; fore wing 3.5-4 mm.

*Specimens examined* : 9 ♀♀ 5 ♂♂. PHILIPPINES : NEGROS : Negros Oriental, Mt. Canlaon, 1,100 m, 1 ♂ (Homotype of *Gambrus rufithorax* Szép., det by H. Townes), 30. iv. 1953, Colls. H., M. & D. Townes. LUZON : Laguna, Los Banos, 1 ♂, 19. vii. 1952, Townes family; Manila, 1 ♀ (Homotype of *Goryphus taiwanellus rufithorax* Uchida, det. by H. Townes), 24. ii. 1953, Townes family. MINDORO : S. Luis Calapan, 1 ♀ 13. iv. 1954, Colls. H., M. & D. Townes. MT. PROVINCE : Benaue, 2 ♀♀, 31. xii. 1953 and 1 ♂, 1. i. 1954, Colls. H.M. & D. Townes. Mt. S. Thomas, 2,200 m, near Benaue, 1 ♂, 4. iv. 1953, Colls. H.M. & D. Townes. Son Manuel, Pangasinan 1 ♀, 3.ii. 1953, H., & M. Townes. LEYTE : Tacloban, 1 ♀, 12. viii. 1952 H. Townes. W. JAVA : Mt. Gede slopes, 1000 m, 1 ♀, i. 1935, Native, Colln. INDIA : TAMIL NADU : Anamalai Hills, 1220-1520 m, 1 ♀, 26. vi. 1946 P.S. Nathan (All above TOWNES). N.E. BURMA : Maymyo 800 m, 1 ♀, xii. 1937, Gernd Heinrich (GUPTA). W. JAVA : Bogor, Dudukdjawa, 1 ♂, v. 1954, J. v. d. Vecht (LEIDEN).

*Distribution* : PHILIPPINES, JAVA, BURMA, INDIA. Also known from KRAKATAU and TAIWAN.

# 10. *Isotima pusilla* (Szépligeti) (Fig. 14 d-f)

*Neomesostenus pusillus* Szépligeti, 1916, *Ann. Mus. Natl. Hungarici*, 14 : 294. ♂, key, des. Type : ♂, India : Bombay (BUDAPEST).

*Neomesostenus minutus* Szépligeti, 1916, *Ann. Mus. Natl. Hungarici*, 14 : 294, ♂, key, des. Type ♂, India; Matheran in Bombay (BUDAPEST). Syn. by Townes, Townes & Gupta (1961).

*Neomesostenus persimilis* Szépligeti, 1916, *Ann. Mus. Natl. Hungarici*, 14 : 294. ♂, key, des. Lectotype : ♂, India : Bombay (BUDAPEST). New synonymy.

*Isotima persimilis* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 145.

*Isotima pusilla* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 145.

This species is very close to *Isotima quadrata* (Szépligeti) and *I. difficilis*\*, but can be recognized by the characters mentioned in the key.

*Female* : Body subpolished; face rugoso-punctate in the middle, coarsely punctate at sides, clypeus with moderately strong sparse to close punctures, smooth at extreme apex, apical margin sinuate; malar space granulose, about  $0.6 \times$  the basal width of mandible; mandibles longitudinally striate, with punctures in between the striae; frons variable, obliquely rugoso-striate to moderately granuloso-punctate; antennal scrobes deep, smooth and shiny; vertex closely punctate; temple minutely and closely punctate; pronotum subpolished, its sculpture somewhat variable, trans-wrinkled to irregularly wrinkled, wrinkles weak to moderately strong, upper margin with very fine wrinkles and distinct punctures, lower margin and collar minutely and sparsely punctate, mesoscutum with weak minute sparse, punctures; scutellum flat to moderately arched, minutely and sparsely punctate, its lateral carina extending to its basal  $0.7-0.75$ ; metascutellum smooth and shiny; mesopleurum largely rugoso-reticulate, trans-striate above near middle coxa and mesopleural suture, speculum shiny minutely and sparsely punctate, prepectal carina extending about  $0.7 \times$  the height of mesopleurum, sometimes extending up to the base of subtegular ridge; metapleurum moderately strongly rugoso-reticulate, juxtacoxal carina present; propodeum between basal carina and apex moderately strongly reticulo-wrinkled, below apophysis and at sides trans-wrinkled, basal of basal carina smooth in the middle, at sides near spiracle shallowly and closely punctate, spiracle of moderate size, both the transverse carinae complete, apical carina strongly evenly arched in the middle, apophysis moderately strongly high, crest-like; first abdominal tergite smooth, except apicolaterally and sometimes in the middle shallowly punctate; second and third tergites densely and minutely punctate; following tergites mat and subpolished; areolet of moderate size, about  $0.85 \times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted at its lower  $0.4$ , brachiella entirely absent; ovipositor long, stout, its sheath about  $0.9 \times$  as long as hind tibia.

Black. Antenna with pedicel above, fourth to ninth flagellar segments (sometimes tenth also), white above; head entirely black; pronotum, mesoscutum, and anterior portion of mesopleurum, black, the black colour on mesopleurum greatly variable, it may be little more or less extensive; rest of thorax and first abdominal segments bright red (except sometime first tergite with more or less of black colour (variable); first tergite with no apical yellow band; pronotal collar, subtegular ridge, apex of second tergite, seventh and eighth tergites broadly, yellow (Fig. 14d); legs in general red; fore coxa and trochanter

yellowish; its femur tibia and tarsus dirty yellow with a light brownish hue; middle coxa and trochanter reddish-yellow; femur reddish, tibia and tarsus yellowish-brown, tarsus tending to be more darker; hind coxa, trochanter and femur red, except trochanter broadly marked, femur narrowly at apex, and tibia (except towards the base) and tarsus largely dark brown (Fig. 14e); wings brownish hyaline, with a faint cloud near the areolet and at extreme apex.

*Male* : Essentially similar to female in their sculpture but show great degree of differences in their colour. Frons moderately strongly rugoso-punctate, frontal carina high, flange-like; mesopleurum shiny, weakly rugose with moderately deep punctures, speculum smooth and shiny; metapleurum coarsely rugose; fourth abdominal tergite also shallowly and densely punctate, rest similar to female. Genitalia as in figure 14f.

Black. Antenna with scape yellow, flagellum entirely black; face, clypeus, mandible except the tip, frons along the eye margin including frontal carinae, temple in its lower 0.75, pronotal collar, apices of all the abdominal tergites (as in *pusilla*) or apices of first to fifth and seventh tergites (as in *persimilis*) or apices of first to fourth and seventh tergites (as in *minutus*), yellow; rest of thorax and legs largely reddish-yellow or deep orange, except thorax with mesoscutum largely (as in *minutus*) or partly (as in many other specimens), blackish or black; legs, with fore, middle coxae and trochanters yellow, middle tarsus dark brown; hind trochanter with two small spots, its femur at the extreme apex, tibia narrowly at base and largely towards the apex and whole of tarsus dark brown.

Length : ♀, 3.5-7.25 mm; fore wing 3-5 mm; ovipositor sheath 1.25-2.5 mm. ♂, 4.5-7.5 mm; fore wing 3-5.5 mm.

*Specimens examined* : 8 ♀♀, 8 ♂♂. INDIA MAHARASHTRA : Bombay, 2 ♂♂ (Lectotypes of *Neomesostenus pusilla* Szép. 1916 and *N. persimilis* Szép.) (BUDAPEST); 4 ♂♂, 6. xi 1965, J.K. Jonathan (Homotypes of *N. pusilla*, det. by V.K. Gupta) (GUPTA). BIHAR : Ranchi, Namkum. 1 ♂, 11. i. 1957 (Homotype of *N. pusilla*, det. by H. Townes), V.K. Gupta; 1 ♂, 28. iv. 1956, V.K. Gupta; 2 ♀♀, 5-13. xi. 1955, C. Tirky; 1 ♀, 21. x. 1957, C. Tirky. BURMA : Mt. Popa, 600-1000 m, 4 ♀♀, x. 1937, G. Heinrich; Mt. Victoria, 1 ♀, iii. 1931, G. Heinrich (TOWNES).

*Additional specimens examined* : 400 ♀♀, 71 ♂♂. INDIA : RAJASTHAN : Dholpur, 32 ♀♀, 4 ♂♂, 14-15.x.1965, V.K. Gupta, Coll. Nos. 133, 134; 10 ♀♀, 5 ♂♂, same date, M.K. Kamath, Coll. Nos. K30, 31; 20 ♀♀, 1 ♂ same date, D.T. Tikar, Coll. Nos. T87, 88; 30 ♀♀, 9 ♂♂, 12-15.x.1965, J.K. Jonathan, Coll. Nos J82-84, 86; Silliserh near Alwer, 5 ♀♀, 5.ix.1956, D.T. Tikar, Coll. No. T66; 10 ♀♀, 1 ♂, same date, J.K. Jonathan, Coll. No. J66; 6 ♀♀, 1 ♂, same date, V.K. Gupta, Coll. No. 129. UTTAR PRADESH : Agra, 58 ♀♀,

3♂♂, 9-16.x.1965, D.T. Tikar, Coll. Nos. T83, 84, 90; 34♀♀, 4♂♂, 9-10.x. 1965, J.K. Jonathan, Coll. Nos. J79, 80; 19♀♀, 2♂♂, same date, M.K. Kamath, Coll. Nos. K23, 25; Muradnagar, 32♀♀, 18♂♂, 4 & 30.xi.1965, Colls. V.K. Gupta, S.K. Gupta, S. Gupta, Malti Bhargawa and D. Ram, Coll. Nos. 135, 136, 143; 1♀, 3♂♂, 24.viii.1966, D. Ram, Coll. No. T269; 2♀♀, 14.ix.1964, D. Ram, Coll. No. T228 and 1♀, 11. xii.1965, D. Ram, Coll. No. T146; 2♀♀, 1♂, 7 & 14.ix. 1966, J.K. Jonathan, Coll. Nos. J174, 175; 1♀, 19.ix.1967, J.K. Jonathan, Coll. No. J228; Garjia, 609m, 13♀♀, 21-24.iv. 1967, V.K. Gupta, Coll. Nos. 267-271; 21♀♀, 21-24.iv.1967, J.K. Jonathan. Coll. Nos. J216-219; 8♀♀, 20-24.iv. 1967, M.K. Kamath. Coll. Nos. K171, 173-176; 4♀♀, 20-23.iv.1967, D.T. Tikar, Coll. Nos. T327, 328, 330, 331; Harbertpur, 2♀♀, 1♂, 12-13.iv.1967, J.K. Jonathan, Coll. No. J209, 211; 1♀, 13.iv.1967, M.K. Kamath, Coll. No. K169; Mohakampur, 1♀, 9.iv.1967, M.K. Kamath, Coll. No. K166; 1♀, 3.iv.1967, D.T. Tikar, Coll. No. T321; Bulandshaher, 3♀♀, 3♂♂, 17.xi.1965, D. Ram, Coll. No. 137; Jeolikote in Kumaon Hills, 1219 m, 1♀, 7.v.1964, V.K. Gupta; Dehra Dun, 1♀, 10.vi. 1967, J.K. Jonathan, Coll. No. J207; 1♀, 13.vi. 1962, V.K. Gupta, Coll. No. 10; 1♀, 1.iv.1966, V.K. Gupta, Coll. No. 157 (GUPTA); 4♀♀, 22.iv. to 14.v.1913, F.Z. Coll.; Saharanpur, 1♀, no other date, G.D. Bhasin (DEHRADUN). DELHI : Shakti Nagar, 9♀♀, 4♂♂, 20.x. to 1.xii.1967, M.K. Kamath, Coll. Nos. K186, 187, 190, 192; 9♀♀, 9.x. to 21.xii. 1967, D.T. Tikar, Coll. Nos. T335, 337, 338, 342, 345; 2♀♀, 2.xii.1967, D. Ram, Coll. No. T348. Azadpur, 2♀♀, 3♂♂, 28.xi.1967, D. Ram & M.K. Kamath, Coll. Nos. T346 & K184; 1♀, 8.xi.1967, D.T. Tikar, Coll. No. T343; Delhi, 1♀, 11.ix.1962, V.K. Gupta ; 1♀, 31.i.1966, D. Ram, Coll. No. 150 and 1♀, 11.ix.1956, R. Menon; BIHAR : Ranchi, Namkum, 21♀♀, 19.xi. to 29.xii.1965; 3♀♀, 19.i.-25.i.1966; 3♀♀, 1♂, v to ix. 1967 all collected by S.N. Gupta and C. Tirky; 8♀♀, 3.i. to 15.ii.1956; 1♀, ii.1957; 2♀♀, i. to xii.1958, all collected by V.K. Gupta. TAMIL NADU : Palni in Palni Hills, 1♀, 1♂, 25-26.xi.1966, M.K. Kamath, Coll. No. K140, 141. KERALA : Walayar Forest, Watapara, 2♀♀, 14.xii.1966, M.K. Kamath, Coll. No. K151; 1♀, x.1962, P.S. Nathan. MAHARASHTRA : Bombay, 1♀, 5.xi.1965, J.K. Jonathan, Coll. No. J87; Matheran, 914m, 1♀, 8.ix.1965, J.K. Jonathan, Coll. No. J89; 1♀, 2♂♂, 8-10. xi.1965, M.K. Kamath, Coll. No. K37; 4♀♀, 16, 8-11.xi.1965, D.T. Tikar, Coll. Nos. T103, 105, 106; Mahabaleswar, 137m, 1♀, 13.xi.1965, M.K. Kamath, Coll. No. K43; 1♀, 14.xi.1965, D.T. Tikar, Coll. No. T110; Chikalda in Satpura Hills, 1096m, 1♀, 15.i.1967, M.K. Kamath, Coll. No. K160; 1♀, 22.x.1965, D.T. Tikar, Coll. No. T94; 2♀♀, 21-24. xii. 1965, D.T. Tikar, Coll. No. T296, 302; 1♀, 20.xii.1966, Ghom, Coll. No. T295; 1♀ 16.i.1967, D.T. Tikar, Coll. No. T 315. KARNATAKA : Kottegehar, 640m, 1♀, 30.xi.1965, J.K. Jonathan, Coll. No. J105. PUNJAB : Nagrota, 914m, 1♀, 5.vii.1965, V.K. Gupta (GUPTA). Chhanga Monga, 1♀, 30.vii. 1928, R.N. Mathur (Dehradun).

ASSAM : Rangapara, Sonajuli Tea Estate, 2♀♀, 1♂, 23-29.iv.1966, J.K. Jonathan, Coll. Nos. J135, 141; 1♀, 1♂, 24.iv.1966, D. Ram, Coll No. T198 (GUPTA). BURMA : Yanaungmyin. Res., 1♀, 1.xii.1930, R.H.O. Coll., ex. *H. macharalis* (DEHRADUN).

*Distribution* : INDIA : Assam, Rajasthan, Bihar, Tamil Nadu, Kerala, Karnataka, Delhi and Uttar Pradesh. BURMA.

This species is widely distributed and occurs abundantly in India, it is also known from Burma. The specimens have been collected from various parts, mainly from the plains, up to the altitude of 1200m.

*Host* : *Hapalia macharalis*.

### 11. *Isotima difficilis*, sp. nov. (Fig. 15a-b)

This species is distinguished from *Isotima pusilla* (Széplegeti) by having a small yellow mark on pronotal collar above; thorax except pronotum largely red (Fig. 15a). The abdominal tegites of male uniformly deep orange, except the seventh tergite black with a apical yellow spot.

*Female* : Face dull, rugoso-punctate in the middle, closely punctate at sides, punctures tending to be coalescent; clypeus subpolished closely punctate at base, sparsely punctate towards the apex, apical margin impressed, wavy, notched in the middle; malar space granulose,  $0.7 \times$  the basal width of mandible; mandible longitudinally striate with punctures in between the striae, teeth subequal, lower tooth slightly shorter than above; frons in the middle below ocellar area obliquely rugose, at sides shallowly punctate; vertex mat; temple closely punctate, tending to be rugoso-punctate or punctures running into striation towards the base of mandible; pronotum subpolished, in the middle with few trans-wrinkles or irregular wrinkles, upper margin obliquely and finely rugose or wrinkled; lower margin shiny, few sparse rugae and minute punctures, pronotal collar above with coarse shallow punctures, epomia strong, but not reaching to upper margin; mesoscutum subpolished, minutely and sparsely punctate; scutellum subpolished, minutely punctate, lateral carina extending to its basal 0.7; metascutellum subpolished; mesopleurum subpolished, rugose, area just below subtegular ridge finely wrinkled, further below an area with few sparse punctures and with fine and weak running striations, speculum subpolished with sparse punctures, prepectus ruguloso-punctate, mesosternum minutely punctate, prepectal carina extending 0.85 the height of mesopleurum; metapleurum somewhat coarsely transwrinkled, sometimes rugose, juxtacoxal carina present; propodeum between basal carina and apex finely wrinkled, basad of basal carina shiny with scattered punctures, area around spiracles somewhat rugulose, spiracles oval, apical carina strongly arched, carina weak in the middle, apophysis crest-like, basal carina

more or less straight except slightly turned forward in the middle; first tergite smooth and shiny at apex and base, in the middle weakly mat with very few scattered punctures, at sides between dorso-median and lateral carina distinctly granulo-punctate; second and third tergites closely punctate, punctures on second tergite more crowded, following tergites subpolished; areolet pentagonal,  $1.0 \times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted slightly below the middle, brachiella absent; ovipositor long, its sheath about  $0.75 \times$  as long as hind tibia.

Black. Antenna with fourth to ninth flagellar segments white above; whole of head, propleurae and pronotum, black, extreme upper and posterior margin of pronotum sometimes reddish, black colour may be little more extensive, extending up to subtegular ridge, prepectal carina and anterior part of mesoscutum; rest of thorax including propodeum red, extreme upper corner of pronotal collar with a small mark, second abdominal tergite, seventh and eight tergites broadly, yellow (Fig.15a); colour of first abdominal tergite greatly variable, its apical half red (sometimes reddish-yellow at the extreme apex), and basal half black, sometimes whole tergite black except narrowly at apex red; fore coxa reddish-yellow, with a dark brown mark apico-laterally, its first trochanteral segment dark brown, second segment and femur reddish-brown, except femur darker in its basal half, tibia and whole of tarsus blackish, except tibia below yellow; middle coxa reddish, trochanter largely brownish, femur reddish (sometimes reddish-brown), tibia and tarsus blackish, except tibia narrowly below light brown; hind coxa reddish to dark reddish-brown, its apex blackish, trochanter largely black, femur light reddish-brown to dark reddish-brown, its apical 0.1-0.3 blackish, tibia and tarsus black, except tibia below in the middle lighter in shade; wings hyaline, fore wing faintly at the apex and with a distinct cloud in the middle near areolet, light brown.

*Male*: Essentially similar to the female; face rugose; clypeus subpolished with few scattered shallow punctures; frons rugoso-punctate; carina above antennal scrobe high flange-like; vertex mat and subpolished; pronotum largely smooth and shiny; mesopleurum closely punctate, punctures tending to be sparse towards the subtegular ridge; metapleurum finely wrinkled; first abdominal tergite smooth, second to sixth tergites granulose, with dense shallow punctures, seventh tergite mat subpolished; genitalia as in figure 15b.

Body largely orange in colour. Antennal flagellum blackish, except scape, pedicel and first segment brownish-yellow in front. Head yellow, except frons in middle and vertex wholly, black; second to seventh abdominal tergites subbasally, all the tarsi and hind tibia narrowly at base and broadly at apex dark brown; apex of seventh tergite with a yellow

spot; wings clear hyaline.

*Length* : ♀, 5-7 mm, fore wing 3.5-4.4 mm; ovipositor sheath 2mm. ♂, 5.5 mm; fore wing 4.5 mm.

*Holotype* ♀, INDIA : WEST BENGAL : Tista-Kalimpong route, 22.v. 1966. M.K. Kamath Coll. No. K114 (GUPTA). *Allotype* ♂, same locality and date as holotype, V.K. Gupta, Coll. No. 183 (GUPTA). *Paratypes* 33♀♀. INDIA : ASSAM : Rangapara, Sonajuli Tea Estate, 3♀♀, 25.iv.1966, M.K. Kamath, Coll. Nos. K94; 11♀♀, 20-30.iv.1966, J.K. Jonathan, Coll. Nos. J132, 133, 137, 139, 140, 143; 12♀♀, 20-30.iv.1966, D. Ram Coll. Nos. T188, 194, 198, 206, 209, 212, 220; 2♀♀, 27.iv.1966, Tek Chand, Coll. No. T210; 2♀♀, 20 & 25.iv.1966, D.T. Tikar, Coll. Nos. T.187 & 201; Tarajuli Tea Estate, 3♀♀, 26.vi.1966, M.K. Kamath, Coll. No. K95 (GUPTA).

*Distribution* : INDIA : Assam and W Bengal.

## 12. *Isotima tricolor* (Brullé) (Fig. 15c, d)

*Cryptus tricolor* Brullé 1846, *In Lepeletier : Historire naturelle des insectes. Hymenopteres*, 4 : 195 "♂" = ♀. des. Type : ♀, "Indes orientales" (PARIS).

*Cryptus* (?) *tricolor* : Schmiedeknecht, 1908, *Genera Insectorum*, 75 : 32. syn.

*Isotima tricolor* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 146.

This species is very much similar to *Isotima semirufa*\*. It is distinguished by having frons obliquely rugoso-punctate in the middle; pronotum largely rugoso-wrinkled in the middle. It has mesoscutum wholly black and hind coxa red, with black at apex (Fig. 15c,d).

*Female* : Face densely rugoso-punctate; clypeus sparsely punctate, subpolished, apical margin impressed, polished; mandible longitudinally striate; frons strongly and obliquely rugoso-punctate in the middle, rugulose at sides, antennal scrobe without aciculations (smooth and shiny); vertex closely and shallowly punctate, dull; temple shallowly and coarsely punctate; malar space granulose,  $0.66 \times$  the basal width of mandible; pronotum strongly rugoso-wrinkled in the middle, scrobe densely punctate above with running striations, towards the lower margin with a impunctate smooth and shiny area, pronotal collar with coarse irregular punctures with running striations; mesoscutum subpolished, minutely and closely punctate; scutellum minutely and shallowly punctate, its lateral carina confined to its basal 0.2; metascutellum smooth and shiny; mesopleurum with moderately strong rugae, speculum smooth, prepectal carina extending more or less up to the base of subtegular ridge; metapleurum moderately strongly rugose, tending to be finely wrinkled, juxtacoxal carina present; propodeum between basal carina and apex moderately reticulate, at sides somewhat wrinkled, area basad

of basal carina rugoso-punctate, punctures coarse, much coalescent and not well defined, spiracle of moderate size, round; apical carina fine, bow-shaped, apophysis crest-like; first abdominal tergite largely mat and subpolished, second tergite closely punctate, third tergite closely and shallowly punctate, following tergites mat and subpolished; fore wing with areolet moderately large, pentagonal, intercubiti convergent, areolet about  $1.2 \times$  as high as the portion second recurrent vein above bulla, nervulus interstitial, nervellus intercepted at or slightly below the middle, brachiella absent; ovipositor sheath about  $1.1 \times$  as long as hind tibia.

Black. Antenna with scape, pedicel, first and second flagellar segments, yellowish-brown; fifth to eighth flagellar segments yellowish above; head, pronotum, mesoscutum and anterior 0.25 of mesopleurum entirely black; rest of thorax red; first tergite usually black with a red patch on postpetiole dorsally, sometimes this red patch more extensive; apices of first tergite narrowly, second tergite moderately, seventh and eighth tergites broadly in the middle, yellow (Fig. 15c); legs in general red with brown to black markings; fore leg reddish-brown, except coxa at base and femur at apex reddish; middle leg largely red with coxa at apex narrowly, femur at extreme apex and below, and whole of tibia and tarsus blackish; hind leg red, except coxa at apex, trochanter largely, apical 0.33 and sometimes more than 0.75 of femur, whole of tibia and tarsus, black (Fig. 15d); fore wings with a broad mark near areolet, a mark at base and apex, light brown.

*Male* : Unknown.

*Length* : ♀, 9mm; fore wing 6mm; ovipositor sheath 2.5 mm.

*Specimens examined* : 6♀♀. CHINA : Shaowu Hsien, Fukien, 1200-1500 m, 3♀♀, 2-13.iv.1942 and 2♀♀, 21-31.v.1942, Coll. T.C. Maa; Yim Na San, E. Kwantung, 1♀ (Homotype of *Cryptus tricolor* Brullé, det. by H. Townes), 12.iv.1936 (TOWNES).

*Distribution* : CHINA. In literature Brulle reported "Indes Orientales" probably Indo-chinese region.

### 13. *Isotima semirufa*, sp. nov. (Fig. 15e,f)

This species is chiefly recognized by having frons obliquely wrinkled in the middle; pronotum reticulo-punctate and distinctly punctate above. The mesoscutum is with a reddish hue in front of middle lobe and hind coxa wholly red (Fig. 15e).

*Female* : Face dull, punctate in the middle, punctures large and close, sometimes coalescent, at sides and above near antennal sockets rugoso-punctate; clypeus subpolished, at base and in the middle sparsely punctate, apex smooth and shiny, apical margin impressed, wavy, notched in the middle, malar space rugulose,  $0.7 \times$  the basal width of mandible;

mandible longitudinally punctate; frons in the middle below ocellar area somewhat finely obliquely wrinkled with a few punctures, at sides largely granulose with a few shallow scattered punctures; vertex minutely punctate; temple deeply and sparsely punctate, subpolished; pronotum in the middle reticulo-punctate and above distinctly and closely punctate, punctures tending to be coalescent, sometimes wrinkled, lower area shiny with minute scattered punctures, pronotal collar with faint punctures, epomia not reaching to upper margin; mesoscutum subpolished, minutely punctate; scutellum punctate; lateral carina extending to its basal 0.2; metascutellum subpolished, hardly punctate; mesopleurum largely strongly rugose at some places tending to be wrinkled, area below subtegular ridge minutely and sparsely punctate, triangular area just above sternaulus near to prepectal carina subpolished and minutely punctate, trans-striate along mesopleural suture, speculum shiny, minutely and sparsely punctate, area just below sternaulus finely wrinkled with punctures, mesosternum sparsely punctate, prepectal carina extending 0.7 the height of mesopleurum; metapleurum subpolished, somewhat trans-wrinkled, juxtacoxal carina present; propodeum between basal carina and apex largely wrinkled, tending to be reticulate between apical and basal carinae, at sides and below apophysis trans-wrinkled, basal of basal carina subpolished, punctate, punctures large and moderately deep, at sides punctures running into striations, spiracles large and longish, apical carina strongly arched in the middle, apophysis crest-like, basal carina moderately turned forward in the middle; first abdominal tergite short about  $2\times$  as long as broad at apex, dorso-median longitudinal carinae ending at the level of spiracles, tergite largely smooth and shiny, except in the middle with few large shallow punctures, lateral area between longitudinal carinae near spiracle strongly granulose with scattered shallow punctures, second and third tergites closely punctate, punctures on second tergite more crowded, fourth tergite shallowly punctate at base, following tergites subpolished; areolet pentagonal, about  $1.2\times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent, nervulus interstitial, nervellus intercepted at the middle, brachiella absent; ovipositor long, its sheath about  $0.9\times$  as long as hind tibia.

Black. Antenna with first and second segments of flagellum brownish, fifth to ninth segments white above; whole of head, propleurae, pronotum, mesoscutum, prepectus, subtegular ridge, and area below that, black; rest of mesopleurum, base of hind wing, metanotal rim, scutellum, metascutellum, metapleurum, and propodeum, red; first abdominal tergite colour greatly variable, red to black; apices of first (sometimes faint), second tergites, sixth narrowly in the middle, seventh and eighth tergites broadly, yellow; fore leg largely reddish-brown, except second trochanteral segment, a line on tibia above and whole of tarsus dark brown;

middle coxa, trochanter and femur red, except femur at extreme apex dark brown, tibia and tarsus dark brown or blackish, except tibia narrowly below yellowish; hind coxa and femur red, except a mark at the apex of coxa and apical 0.35 of femur blackish, trochanter largely, tibia and tarsus wholly dark brown or blackish (Fig. 15e); wings hyaline, fore wing with a cloud in the middle near areolet and at apex, brownish.

*Male* : Face subpolished, shallowly punctate, punctures tending to be coalescent in the middle; clypeus weakly punctate at base, rest smooth and shiny; malar space granulose, 0.55 the basal width of mandible; mandible largely polished with few coarse punctures, semicircular carina on frons high and flange-like, frons sub-polished with few shallow scattered punctures; vertex smooth and shiny; temple shiny, with sparse minute punctures; pronotum largely polished except in the middle and at upper margin punctate, epomia short; mesoscutum subpolished minutely punctate; scutellum flat, sparsely, minutely punctate; lateral carina confined to its base; metascutellum smooth and subpolished; mesopleurum ruguloso-punctate, mesosternum coarsely punctate, speculum subpolished, prepectal carina extending 0.6 the height of mesopleurum; metapleurum coarsely punctate, punctures very close and coalescent, juxtacoxal carina present; propodeum between basal carina and apex reticulo-punctate, basal of basal carina largely smooth and shiny, at sides towards spiracles punctate, apical and basal carinae slightly arched in the middle, spiracles large and oval; first abdominal tergite long and slender, smooth and shiny, second to seventh abdominal tergites punctate, punctures tending to be shallow towards the tip of abdomen, wings similar to female. Genitalia is in figure 15f.

Largely light orange. Antenna brownish-yellow; head black, except clypeus and mandible, yellow; abdomen blackish, except first, seventh and eighth tergites completely and apices of second to sixth tergites, yellow; fore coxa and femur light orange, rest yellow, except fifth tarsal segment at apex brownish; middle leg largely orange, except tarsus [light brownish; hind coxa, trochanter and femur reddish-yellow, femur with a mark at its extreme apex, tibia and tarsus dark yellow except tibia at apex and extreme base, and fifth tarsal segment at apex, fuscous.

*Length* : ♀, 5.5-9 mm, fore wing 4.5-6 mm; ovipositor sheath 2.5-3.5mm. ♂, 8-9 mm; fore wing 5-5.5 mm.

*Holotype* ♀, INDIA : ASSAM : Rangapara, Sonajuli Tea Estate, 27.iv. 1966, M.K. Kamath, Coll. No. K96 (GUPTA). *Allotype* ♂; same data as holotype, J.K. Jonathan, Coll. No. J139 (GUPTA). *Paratypes* 34♀♀, 57♂♂. INDIA: ASSAM : Rangapara, Sonajuli Tea Estate, 5♀♀, 17♂♂, 25-30.vi.1966, D.T. Tikar, Coll. Nos. T201, 205, 208, 219, 224; 6♀♀, 9♂♂, 20-29.iv.1966, J.K. Jonathan, Coll. Nos. J132, 137, 139, 141; 6♀♀, 11♂♂, 22-30.iv.1966, D. Ram, Coll. Nos. T192, 194, 202, 206, 209, 216, 220; 4♀♀, 5♂♂, 20-27.iv.

1966, M.K. Kamath, Coll. Nos. K89, 92, 94, 96; 5♀♀, 3♂♂, 25-30.iv.1966, Tek Chand, T203, 207, 210, 223; 3♂♂, 27.iv.1966, V.K. Gupta, Coll. No. 164; Rangapara, Tarajuli Tea Estate, 1♀, 26.iv.1966, V.K. Gupta, Coll. No. 163; 2♀♀, 26.iv.1966, M.K. Kamath, Coll. No. K95; 1♀, 3♂♂, 26.iv.1966, J.K. Jonathan, Coll. No. J138; Charduar Forest near Rangapara, 3♀♀, 5♂♂, 24-30.iv.1966, M.K. Kamath, Coll. Nos. K93, 99 (GUPTA). ORISSA : Jeypore, 520 m, 1♂, ix.1958, P.S. Nathan. CHINA : Yim Na San, E. Kwantung, 1♂, 14.iv.1936 (TOWNES).

*Distribution* : INDIA : Assam, Orissa. CHINA.

#### 14. *Isotima quadrata* (Szépligeti) (Fig. 15g)

*Gambrus quadratus* Szépligeti, 1908, *Notes Leyden Mus.*, 29 : 293. ♀. Key des. Type : ♀, Java : Semarang (BUDAPEST); Szépligeti, 1910, *Notes Leyden Mus.*, 32 : 98. key, Java : Jakarta.

*Mesostenus quadratus* Szépligeti, 1916, *Ann. Mus. Natl. Hungarici*, 14 : 334. ♀. Name procc. in *Isotima* by Szépligeti, 1908, key, des. Lectotype : ♀, Java : Semarang (Budapest, the same specimen as type of *Gambrus quadratus* Szépligeti). India : Matheran in Bombay.

*Mesostenus szépligeti* Betrem, 1941 *Treubia*, 18 : 51 New name for *Mesostenus quadratus*. key.

*Isotima quadrata* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 146.

This species can be recognized from other allied species viz., *Isotima pusilla* and *Isotima taiwanella* by having the following characters : Lateral carina of scutellum extending to its basal about 0.6; frons strongly rugoso-striate; antennal scrobe smooth and shiny; vertex smooth; propodeum largely reticulate. The pronotal collar, subtegular ridge, and face usually in the middle are yellow.

*Female* : Face all over weakly rugoso-punctate; clypeus subpolished, coarsely and shallowly punctate; malar space granulose,  $0.6 \times$  the basal width of mandible; frons with moderately strong rugoso-striae, at sides strongly granulose, with a median groove extending from the base of median ocellus; antennal scrobes deep, smooth and shiny; vertex mat and subpolished; temple ruguloso-punctate, punctures moderately coarse and shallow; pronotum coarsely trans-striate in the middle, obliquely striate to rugoso-striate above, extreme upper margin with undefined coarse shallow punctures, appears to be weakly rugoso-punctate, extreme lower margin largely smooth, pronotal collar rough; mesoscutum subpolished, indistinctly punctate; scutellum and metascutellum largely smooth, lateral carina of scutellum extending to its basal 0.6; mesopleurum all over weakly to strongly rugose, minutely punctate below sternaulus, speculum subpolished with few weak punctures, prepectal carina extending  $0.75 \times$  the height of mesopleurum; metapleurum gose,

juxtacoxal carina present; propodeum between basal carina and apex weakly reticulate, sometimes reticulation is so weak that area appears to be finely wrinkled, area basad of basal carina near the spiracles rugoso-punctate, spiracle small longish-oval, both the transverse carinae arched in the middle, apical carina weak or absent in the middle, laterally present as weak crests; first abdominal tergite largely mat and subpolished, with scattered shallow punctures in the postpetiolar area, tergite moderately broad at apex, second and third tergites densely punctate, following tergites mat and subpolished; areolet moderately large, pentagonal, about  $1.0 \times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted below, or sometimes near the middle, brachiella absent; ovipositor long, sheath about  $0.75 \times$  as long as hind tibia.

Black. Antenna dark brown to black, with fourth to ninth flagellar segments white above; head entirely black, except sometimes with a reddish-yellow hue in front; pronotum, mesoscutum and sometimes mesopleurum near subtegular ridge, black; rest of the thorax red, pronotal collar above, apices of first, second, seventh and eighth tergites yellowish-white (Fig. 15g); legs in general reddish; fore coxa somewhat reddish-yellow, its tarsus brownish; middle tarsus with a line above and tarsus wholly brown, hind trochanter faintly, femur at its extreme apex, tibia largely towards the apex and tarsus wholly dark brown; wings hyaline with a yellowish hue, fore wing with a broad light brownish spot near the areolet.

*Male* : Unknown.

*Length* : ♀, 5.5-9.0 mm; fore wing 4-6 mm; ovipositor sheath 1.5-2.5mm.

*Specimens examined* : 6♀♀. JAVA : Semarang, ♀ (Type of *Gambrus quadratus* Szépligeti) (BUDAPEST); Semarang, 1♀, 1905, E. Jacobson (Co-type of *Gambrus quadratus* Szépligeti) (LEIDEN). Batavia, 1♀, xi.1908, E. Jacobson, (det. as *Gambrus quadratus* by Szépligeti in Feb. 1910); G. Tjmerang, Djampang Tengah, 1♀, iv.1938, J.v.d. Vecht (LEIDEN). Melang, 2♀♀, iv. 1933, J. G. Betrem (one ♀ in GUPTA Colln., one ♀ in TOWNES Colln.)

*Distribution* : INDONESIA : Java. In literature INDIA.

### 15. *Isotima taiwanella* (Uchida) (Fig. 16a.b)

*Goryphus taiwanellus* Uchida, 1932, *J. Faculty Agr. Hokkaido Imp. Univ.*, 33 :177. ♀. des, fig. Lectotype ♀, Taiwan : Kankau (EBERSWALDE).

*Isotima taiwanella* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 146.

Very similar to *Isotima quadrata*, but can be recognized by having frons largely granulose with few scattered punctures; antennal scrobes with fine trans-striations; propodeum strongly wrinkled. The pronotum, subtegular ridge and face are black and hind femur almost wholly dark brown (Fig. 16a, b).

*Female* : Face finely rugoso-punctate in the middle, at sides rugulose; clypeus subpolished, sparsely and minutely punctate, smooth and shiny towards the apex; malar space granulose, about  $0.6\times$  the basal width of mandible; antennal scrobes moderately deep, shiny with few transverse striations; frons largely granulose with scattered coarse punctures; vertex subpolished, finely punctate; temple subpolished, minutely and closely punctate, punctures running into weak striations; pronotum subpolished, somewhat trans-rugose, finely wrinkled above, pronotal collar and lower margin largely smooth, epomia strong and long; mesoscutum minutely, closely punctate, subpolished; scutellum and metascutellum smooth and shiny; lateral carina of scutellum extending to its basal  $0.5$ ; mesopleurum largely with moderately strong rugae, speculum shiny with minute scattered punctures, prepectal carina extending  $0.6\times$  the height of mesopleurum; metapleurum moderate to strongly wrinkled, at some places appears to be reticulate, juxtacoxal carina present to its full length; propodeum between basal carina and apex with moderately strong wrinkles, at some places appear to be reticulate, laterally apicad of apical carina somewhat trans-wrinkled, apical carina sinuate, complete, apophysis crest-like, spiracle small oval, area basad of basal carina subpolished with undefined coalescent punctures; first abdominal tergite largely smooth and subpolished with few minute punctures near the spiracles, both the longitudinal carinae present; second and third tergites closely punctate, following tergites mat and subpolished; areolet moderately large pentagonal, about  $1.0\times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted at its lower  $0.4$ , brachiella entirely absent; ovipositor sheath about  $0.9\times$  as long as hind tibia.

Black. Antenna reddish brown, its fourth to seventh flagellar segments whitish above; head, pronotum, mesoscutum, prepectus, subtegular ridge, black; rest of thorax and base of first abdominal tergite, red; apices of first, second, seventh and eighth broadly in the middle, yellow (Fig. 16a); legs in general brownish; except fore coxa and trochanter yellow, fore coxa at base black, its femur dark brown above; middle leg with coxa red and rest reddish-brown; hind coxa red with a dark brown mark at apex, femur reddish-brown, except its apical  $0.7$  dark brown, tibia and tarsus dark brown (Fig. 16b); wings hyaline with a brownish-yellow hue.

*Male* : Unknown.

*Length* : ♀, 7.25 mm; fore wing 5 mm; ovipositor sheath 2.25 mm.

*Specimens examined* : 2 ♀♀. TAIWAN : Kankau (Koshun) (1 ♀ Lectotype and 1 ♀ Co-type of *Goryphus taiwanellus* Uchida), vii.1912, Coll. H. Sauter (EBERSWALDE).

*Distribution* : TAIWAN.

## C. THE ALBICINETA GROUP

This group is characterized by having mesopleurum largely smooth and shiny; scutellum pyramidal in shape; Fore wing with broad dark fuscous marks.

Only one species viz., *Isotima albicincta* Ashmead, 1905, is referable to this group. In addition three new species are described.

### 16. *Isotima albicincta* Ashmead (Fig. 16c-f)

*Isotima albicincta* Ashmead, 1905, *Proc. U.S. Natl. Mus.*, 29 : 409. ♀. des. Type : ♀, Philippines : Manila on Luzon (WASHINGTON); Townes, 1957, *Proc. Ent. Soc. Washington*, 59 : 109. syn. Townes, Townes & Gupta, 1961, *Amer. Ent. Inst.* 1 : 144 syn.

*Isotima cincticornis* Ashmead 1905, *Proc. U. S. Natl. Mus.*, 29 : 409. ♀. des. Type : ♀, Philippines : Manila on Luzon (WASHINGTON).

*Phygadeuon* (*Phygadeuon*) *albicinctus* (!) Schmiedeknecht, 1908, *Genera Insectorum*, 75 : 84. syn.

This species is closely related to *Isotima palawanensis*\*. It can be recognised by having face distinctly punctate, frons rugose in the middle, pronotum largely smooth with few striae in the middle. In male : frontal carinae high, scale-like; and fore and middle coxae are largely yellow.

*Female* : Face subpolished, weakly and sparsely punctate; clypeus with few minute punctures, apical margin impressed; malar space weakly granulose,  $0.63 \times$  the basal width of mandible; mandible weakly longitudinally striate, teeth almost equal; frons obliquely rugose, distinctly granulose at sides; vertex and temple polished without punctation; pronotum largely smooth and shiny, except the middle groove with few coarse striations, epomia strong, but not reaching the upper margin; mesoscutum smooth and subpolished; scutellum subpolished, lateral carina extending to its basal 0.3; metascutellum smooth and subpolished; mesopleurum smooth, except few striae along the speculum, prepectal carina extending  $0.85$  the height of mesopleurum; metapleurum wrinkled, juxtacoxal carina strong; propodeum distinctly wrinkled, tending to be reticulate; area basad of basal carina largely smooth, both the transverse carinae complete, apical carina forming crest-like apophysis; first abdominal tergite  $2.5 \times$  as long as broad at apex, tergite dorsally smooth and shiny; second tergite granulose, following tergites mat and subpolished, areolet pentagonal, about  $1.0 \times$  as high as the portion of second recurrent

vein above bulla, intercubiti convergent, and second intercubitus faint, nervulus interstitial, nervellus intercepted at the middle, brachiella absent; ovipositor tip straight, sheath about  $0.8 \times$  as long as hind tibia.

Black. Antenna dark brown, its first, fifth to seventh flagellar segments whitish above; whole of thorax and first tergite reddish; apices of first, second (band interrupted or deeply narrowed in the middle), seventh and eighth tergites, yellow (Fig. 16c); legs largely reddish-brown, except fore leg with its trochanteral segments, femur and tibia above and tarsus wholly, dark brown; middle leg same as fore leg, except tibia and tarsus wholly dark brown; hind leg (Fig. 16d) with its trochanter, tibia and tarsus dark brown. Fore wing with a broad dark-brown band in the middle and another smaller band towards the base, and also narrowly at the apex; hind wing clear.

*Male*: Similar to female, except frons shiny in the middle, frontal carina high, scale-like (Fig. 16e), sparsely puncto-rugulose, area laterad to lateral ocellus distinctly punctate; temple distinctly punctate; pronotum sparsely punctate at its extreme upper margin; scutellum sparsely and minutely punctate. Genitalia as in figure 16 f.

Black. Face with a trilobed mark, propleurum, pronotal collar, apices of first to third and seventh abdominal tergites (fourth tergites faintly), fore and middle coxae and trochanters, hind leg largely dark-brown; fore wing without any band (clear hyaline).

*Length* : ♀, 5.5-8.5 mm; fore wing 4-6 mm; ovipositor sheath about 2.0-2.5 mm. ♂, 6 mm, fore wing 4.5 mm.

*Specimens examined* : 49 ♀♀, 16 ♂♂. PHILIPPINES : MINDORO : Alcate, Victoria, 3 ♀♀, 6-11.iv.1954, H.M. & D. Townes; San Luis Calapan, 2 ♀♀, 15.iv.1954, and 1 ♀, 4.v.1954, H.M. & D. Townes. LUZON : Los Banos, Laguna, 4 ♂♂, 11 ♀♀, 29.xi.1952; 1 ♀, 29.viii.1952; 6 ♀♀, 8 ♂♂, 1-23.ii.1953; 1 ♀, 2 ♂♂, 7.iii-17.x.1953, all above Townes family; 1 ♀, ix.1916, F.X. Williams; 1 ♀, no data, P.I. Baker, Mt. Province nr. Kias, 2 ♀♀, 24.xi.1953, Townes family (TOWNES); 1 ♂, 24.xi.1953, Townes family. Los Banos, Laguna, 1 ♂, 17.x.1953, Townes family (GUPTA). Los Banos, 1 ♀, ix.1915, F. Muir; 3 ♀♀, ix.1916 and 1 ♀, ix. 1917, F.X. Williams; Laguna, Agriculture College, 2.ix.1931, 1 ♀, F.C. Hadden; Manila, 1 ♀, 15.ix.1945, H.E. Milliron; Bagulo (20 miles South-West), 1 ♀, 2.x.1945, H.E. Milliron (HONOLULU). NEGROS ORIENTAL : Mt Canlaon 1100 m, 3 ♀♀, 29 & 30.iv.1953 and 1 ♀, 8.v.1953, H.M. & D. Townes; ANTIPOLLO : Riz., 1 ♀, 1.iii.1953, Townes family; Novaliches Riz., 1 ♀, 6.ix.1952, H. Townes. Tagaytay, Btg., 1 ♀, 8.ii.1953, Townes family. Gapan N. Ecija, 1 ♀, 1954, A. concepcien. Barbara, Pangasinan 1 ♀, 3.ii.1958, H.M. & D. Townes. Clark Field, Pamp, 1 ♀, 20.xii.1952, H.M. & D. Townes (TOWNES). MINDANAO : Agusan, S. Fransisco, 1 ♀, 12.xi.1959, L.W. Quate (HONOLULU).

*Distribution* : PHILIPPINES : Mindoro, Luzon, Negros, Mindanao.

**17. *Isotima palawanensis*, sp. nov. (Fig. 17 a, b)**

This species can be distinguished from *Isotima albicineta*, by having face striato-punctate in the middle, rugoso-punctate below antennal sockets; frons largely rugulose; pronotum obliquely finely striate. In male: frontal carina short, conical or knob-like; fore and middle coxae are largely red.

*Female* : Body subpolished; clypeus sparsely and minutely punctate, smooth and shiny towards the apex; face somewhat closely and shallowly punctate, punctures running into fine striations, area below antennal sockets somewhat rugoso-punctate; antennal scrobes moderately deep and bounded by moderately strong carinae; frons strongly granulose all over, rugulose in the middle; vertex mat and dull; temple shiny, minutely and sparsely punctate, malar space granulose, about  $0.5 \times$  the basal width of mandible; pronotum largely obliquely striate, except pronotal collar, and lower margin of pronotum smooth and shiny, epomia short and not so well defined among the striae; mesoscutum, scutellum and metascutellum smooth, lateral carina of scutellum extending to its basal  $0.2$ ; mesopleurum shiny with minute shallow punctures, punctures not so well defined in the middle region, prepectal carina extending  $0.8 \times$  the height of mesopleurum; metapleurum and area between basal and apical carinae of propodeum finely wrinkled, area apicad of apical carina somewhat reticulate, area basad of basal carina smooth except area around spiracles somewhat rugulose, spiracles small, oval; apical carina weakly arched in the middle, apophysis moderately high crest-like; areolet small, pentagonal about  $0.75 \times$  as high as the portion of second recurrent vein above bulla; nervulus interstitial, nervellus intercepted at its lower  $0.45$ , brachiella absent; first abdominal tergite about  $2 \times$  as long as wide at apex, spiracles almost as close to each other as to apex, petiolar area quadrate, dorsal carinae present, tergite dorsally smooth and shiny; second tergite granulose subpolished, following tergites mat and subpolished; ovipositor sheath about  $0.8$  as long as hind tibia.

Black. Antenna reddish-brown, except its first and second flagellar segments white above; head entirely black, thorax and all the coxae red; rest of legs reddish-brown, except all the trochanters, femora and tibiae marked with dark brown on outer side; fore and middle tibiae and tarsi blackish-brown, except for more of reddish tinge in the middle below, its tarsus deep reddish-brown except the basis of all the segments narrowly yellowish; first abdominal tergite red, sometimes brownish near the spiracles; apices of first, second, seventh and eighth abdominal tergites with apical bands, yellow; fore wing with a broad band in the middle, another

band towards the base and also its apical margin, dark brown; apical margin of hind wing faintly brownish.

*Male* : Similar to female, except more slender and weakly sculptured, antennal scrobes weak, its carina raised into a low knob-like process (Fig. 17a), frons and vertex largely smooth and shiny, pronotum with few striae along the posterior margin; epomia short, distinct. Genitalia as in figure 17b.

Black. Antennae more reddish basally; face just below antennal sockets with a reddish or reddish-yellow mark; pronotal collar, apices of first to third and seventh tergites, yellow. Legs with fore and middle tibiae, yellowish; hind leg wholly blackish-brown except its coxa, red; fore wing with similar bands as in female.

*Length* : ♀, 7-7.5 mm; fore wing 4.75-5.25 mm; ovipositor sheath 1.75-2.20 mm. ♂, 5.7 mm; fore wing 4-4.75 mm.

*Holotype* ♀, PHILIPPINES : PALAWAN : Pto. Princessa, 7.xii.1952, H. Townes (TOWNES). *Allotype* ♂, same data as for holotype, 10.xii.1952 (TOWNES). *Paratypes* 6 ♀♀, 8 ♂♂. PHILIPPINES : PALAWAN : Pto. Princessa, 2 ♀♀, 5 ♂♂, 7-12.iii.1952, H. Townes. Babuyan, 3 ♂♂, 6.xii.1952, H. Townes. Tagburos, 1 ♀, 11.xii.1952, H. Townes. NEGROS : Negros Oriental, Mt. Canlaon, 1200 m, 3 ♀♀, 28.iv-7.v.1953, H.M. & D. Townes (TOWNES).

*Distribution* : PHILIPPINES : Palawan and Negros.

### 18. *Isotima variegata*, sp. nov. (Fig. 17. c-e)

This species is very much similar to *Isotima isarogae*\* in colour and sculpture. It can be distinguished by having propodeum largely weakly rugose, its apical carina more or less straight. In male : face with a yellow mark above, and middle and hind femora ventrally broadly yellow.

*Female* : Body subpolished; clypeus with few scattered minute punctures; face closely but shallowly punctate; face above moderate to strongly rugoso-striate; frons strongly granulose at sides, rugose in the middle; antennal scrobe moderately deep, bounded by simple carina; vertex dull and mat; temple subpolished minutely punctate; malar space granulose,  $0.7\times$  as wide as basal width of mandible; pronotum smooth and subpolished with short but strong ridges in the groove, epomia short and not defined among the ridges, mesoscutum, scutellum, metascutellum smooth, lateral carina of scutellum extending to its basal 0.3; mesopleurum smooth and shiny, prepectal carina extending  $0.7\times$  the height of mesopleurum, sternaulus 0.65 the length of mesopleurum; metapleurum trans-wrinkled; area between apex and basal carina of propodeum rugose, area basad of basal carina smooth, apical carina almost straight (Fig. 17c), apophysis crest-like, spiracle rounded; areolet moderately

large, pentagonal, about  $1.0 \times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted at its lower 0.4, brachiella absent; first abdominal tergite about  $2.1 \times$  as long as wide at apex, tergite smooth and shiny, dorsal carinae weakly present, second tergite weakly granulose, third and following tergites mat and subpolished; ovipositor sheath about  $0.7 \times$  as long as hind tibia.

Black. Head and antenna black except scape, pedicel and basal two joints of flagellum, reddish-yellow; thorax, legs and first abdominal tergite, red or reddish-yellow, except as follows: all the trochanters, fore femur largely, middle and hind femora narrowly at bases, all tibiae and tarsi, blackish-brown; fore tibia with a narrow yellowish line on its outer side; abdominal tergites first, second, seventh and eighth with apical bands, yellowish; band on second tergite narrowed in the middle; fore wing with broad darker band in the middle, a narrow light band towards the base and a still narrow and lighter band at apex, brown.

*Male*: Essentially similar to female except more slender; antennal scrobe very shallow, its carinae short and not encircling the whole of scrobe; frons and vertex smooth and shiny; metapleurum somewhat rugoso-punctate; propodeum weakly wrinkled; first tergite smooth and shiny, second and following tergites mat and subpolished. Genitalia as in figure 17e.

Colour differs from female to a greater degree. Body black except as follows: scape, pedicel and first joint of flagellum, yellowish; face with a mark above, first tergite faintly at apex, second and third with narrow apical band, seventh tergite with a longitudinal line (colour of abdomen variable, marks on tergites sometimes faint and small), apical 0.5 of fore coxa, trochanter, a line on femur and tibia, tarsus largely (except its first segment at base and fifth segment largely blackish), middle and hind coxae (except middle narrowly and hind broadly black at base), middle trochanter, a broad line on middle femur and tibia below, hind trochanter and femur below, yellow (Fig. 17d).

*Length*: ♀, 4.5-7 mm; fore wing 3.5-5 mm; ovipositor sheath 1.25-2 mm. ♂, 3.2-4 mm; fore wing 3.25-3.65 mm.

*Holotype* ♀, PHILIPPINES Is.: NEGROS: Negros Oriental, Mt. Canlaon, 1100 m, 30.iv.1953, H.M. & D. Townes (TOWNES). *Allotype* ♂, same data as for holotype, except 2.iv.1953 (TOWNES). *Paratypes* 3 ♀♀, 19 ♂♂. same data as for holotype, collected during 28.iv-9.v.1953 (TOWNES).

*Distribution*: PHILIPPINES: Negros.

### 19. *Isotima isarogae*, sp. nov. (Fig. 17f-h)

This species is extremely similar to *Isotima variegata*\*; except for the following differences:

*Female* : Face rugulose in the middle, granulose at sides, sometimes with scattered weak punctures; pronotum largely smooth; with few coarse oblique rugae above; metapleurm coarsely transrugose; propodeum between basal carina and apex moderately strongly rugoso-wrinkled, apical carina strongly arched in the middle (Fig. 17f); nervellus intercepted at the middle.

Colour similar to *I. variegata*.

*Male* : Largely smooth and shiny; face and clypeus shallowly punctate, antennal scrobe shallow, carina weak and knobe-like; frons, vertex and temple shiny; propodeum in the middle weakly rugoso-reticulate. Genitalia as in figure 17h.

Colour similar to the males of *variegata*, except face entirely black; legs largely yellowish-brown to dark brown; their femora and tibiae without yellow line ventrally (Fig. 17g).

*Length* : ♀, 5-10 mm; fore wing 4.5-6.5 mm; ovipositor sheath about 1.5-3.5 mm. ♂, 4.5; fore wing 4 mm.

*Holotype* ♀, PHILIPPINES : LUZON : Mt. Isarog, Camarines Sur., 500-600 m, 11.iv.1963, H.M. Torrevillas (HONOLULU). *Allotype* ♂, same data as holotype, 25.iv.1963 (HONOLULU). *Paratypes* 8 ♀♀, 6 ♂♂. PHILIPPINES : Mt. Isarog, 20 km E. of Naga, 500-600 m, 3 ♀♀, 9.iv.1963; Isarog, 500-750 m, 6 ♂♂, 4-26.iv.1963 and 2 ♀♀, 4-18.v.1963; Mt. Iriga, 500-600 m, 2 ♀♀, 10-17.iv.1962, all above collected by H.M. Torrevillas (HONOLULU). NEGROS : Negros Oriental, Mt. Canlaon, 1200 m, 1 ♀, 9.v.1953, H.M. & D. Townes (TOWNES).

*Distribution* : PHILIPPINES : Luzon, Negros.

#### 4. Genus *Formostenus* Uchida (Fig. 18a-c)

This genus is characterized mainly by the shape of first abdominal tergite being long and slender, postpetiole much longer than wide at base (Fig. 18a). The abdomen is usually long and somewhat spindle-shaped. Brachiella vein present and is usually short, but sometimes extending beyond 0.5 the distance to wing margin. The ovipositor tip is long and pointed and usually curved (Fig. 18c).

Head moderately large, as long as broad or sometimes much longer than broad; clypeus convex, apical margin impressed, apex arched, without median irregularity; frons sloping towards the antennal sockets, weakly arched or sometimes depressed, usually with a median vertical groove, with a crescentic concave area above each antennal socket, bordered dorsally by an arched carina, the carina sometimes projecting as flange or tooth, especially in males; mandible (Fig. 18b) with subequal teeth, lower tooth mostly shorter than upper; epomia on pronotum moderately strong and long, but not reaching the upper margin of pronotum; scutellum modera-

tely to strongly arched, its lateral carina extending to its basal 0.33-0.66, sometimes confined to its base only; prepectal carina extending 0.6-0.9 the height of mesopleurum, sternaulus usually extending up to the base of middle coxa except unusually short and weak in *Indostenus*\*; both the transverse carinae of propodeum usually present, carinae rather straight and complete, sometimes apical carinae obsolescent in the middle as in *Indostenus* (Fig. 18a), apophysis crest-like to moderately high and pointed, spiracle small to large, oval to longish, slit-like; first abdominal tergite long and cylindrical about  $3\times$  as long as broad at apex, petiole rounded and tubular, spiracles close to each other than to apex (post-petiole longer than broad), tergite at base somewhat rounded or oval in cross-section, dorso-median carina usually present but sometimes faint or absent, dorsolateral carina always present, ventro-lateral carina weakly to strongly present, this carina in most species tending to be more ventral rather than lateral, ventro-lateral angulation not very acute, but rounded; areolet small to large, pentagonal, second intercubitus faintly present, second recurrent vein subvertical, nervulus usually interstitial, sometimes slightly distad or basad of basal vein, nervellus intercepted at or above the middle, sometimes slightly below the middle; mediella moderately strongly arched, brachiella present, sometimes like a small stump (Fig. 18a); ovipositor tip long and pointed, teeth on lower valve in most species not well defined, extreme tip straight to curved downward (Fig. 18c).

*Length* : ♀, 7.5-14 mm; fore wing 6-10mm; ovipositor sheath about 2 mm.

*Type-species* : *Formostenus angularis* Uchida.

This is a moderately large genus, known to occur in the Oriental Region. In Oriental Region this genus is widely distributed in Indian subcontinent and is also known from Burma, Java, Borneo, Philippines, Taiwan and China.

*Cryptus decens* Tosquinet, 1903 and *Mesostenus* (*Formostenus*) *angularis* Uchida, 1931 are the only known species referable to this genus. In addition twenty one new species are described. The genus is divisible into two subgenera viz., *Formostenus* Uchida, 1931 and *Indostenus*\*. A key to subgenera and species is as follows :

#### KEY TO THE SUBGENERA AND THE SPECIES

1. Apical carina of propodeum absent; nervellus intercepted at its upper 0.2; nervulus opposite to basal vein; brachiella present and exceptionally extending beyond 0.5 the distance to wing margin (Body largely black, except a broad apical band at the apex of second tergite, seventh and eighth tergites narrowly at apex, yellow) India, Java, Philippines.

Subgenus *Indostenus*\* 1. *nigrus*\*

Apical carina of propodeum present; nervellus intercepted at or slightly above

or below the middle; nervulus opposite or little distad of basal vein; brachiella absent or present as a small stump. Subgenus *Fomostenus*. 2

2. Thorax black, with or without markings 3  
 Thorax not entirely black, partly or entirely red, or at least its propodeum and the area at the base of hind wing red 8
3. Thorax without any mark, except scutellum and metascutellum with reddish or yellowish hue. 4  
 Thorax with various marks 6
4. Body, especially antenna, head and legs covered with long erect hair, hair more than  $1.3 \times$  as long as the thickness of antenna; metapleurum finely wrinkled; face entirely black; fore and middle coxae reddish. China 2. *pubescens*\*  
 Body not covered with such long hair; metapleurum transrugose or trans-wrinkled; face along the eye margin yellow; fore and middle coxae yellow or dirty yellow. 5
5. Pronotum and mesopleurum trans-striate; scutellum minutely punctate, lateral carina short, extending to its basal 0.3; metapleurum finely trans-striate; propodeum largely, weakly and finely wrinkled. India 3. *cherraensis*\*  
 Pronotum strongly and irregularly wrinkled; mesopleurum strongly rugose; scutellum with much minute and sparse punctures in the middle and with few short striae at sides, extending from the lateral carina; lateral carina extending to its basal 0.7; metapleurum strongly trans-wrinkled. India. 4. *rugosus*\*
6. Apices of all the abdominal tergites with apical yellow bands; scutellum entirely red; hind coxa, trochanter and femur black; nervellus intercepted at its upper 0.35. Sabah. 5. *piceus*\*  
 Apices of all the abdominal tergites not with apical bands; scutellum completely or faintly yellowish-brown; hind coxa, trochanter and femur light brown to dark brown; nervellus intercepted at its middle or slightly above the middle. 7
7. Face completely yellow; pronotal collar, metapleurum and propodeum black, metapleurum trans-striate; propodeum strongly reticulo-wrinkled; abdominal tergites broad, abdomen spindle shaped. India, Burma. 6. *flavofasciatus*\*  
 Face in the middle and along the eye margin, pronotal collar, propodeum between apical carina and apex, metapleurum above the base of hind coxa, yellow; metapleurum and propodeum finely wrinkled. India. 7. *flavorbitalis*\*
8. Malar space  $1.0 \times$  the basal width of mandible; scutellum minutely and sparsely punctate, its lateral carina extending to its basal 0.45; nervellus intercepted slightly above the middle. All the abdominal tergites with yellow apical bands; hind coxa, trochanter and femur entirely black. 9  
 Not as above; usually first, second, seventh and eighth tergites with apical bands; hind coxa, trochanter and femur not entirely black, usually reddish to brown or atleast the coxa partly red. 10
9. Frons in the middle raised, rough and obliquely wrinkled; vertex behind ocellar triangle closely punctate; mesopleurum with moderately strong rugae, more strong towards the base of middle coxa; prepectal carina extending about 0.85 the height of mesopleurum; thorax blackish in front; first tergite blackish; length 14mm. Java 8. *decens*

Frons in the middle not raised, finely wrinkled; vertex smooth; mesopleurum weakly trans-rugose above, finely wrinkled towards the base of middle coxa; prepectal carina extending 0.6 the height of mesopleurum; thorax entirely red; first tergite reddish; length 10 mm. Taiwan. **9. angularis**

10. Pronotum, mesoscutum and mesopleurum black. **11**

Thorax almost wholly red, except sometimes mesoscutum with dark brown or blackish tinge. **13**

11. Nervellus intercepted at its lower 0.4; semicircular carinae (in female) above each antennal scrobe specialized into high flanges; malar space about  $0.57 \times$  the basal width of mandible; lateral carina of scutellum confined to its base; scutellum yellow. India. **10. bidentatus\***

Nervellus intercepted above the middle, semicircular carina simple; malar space more than  $0.57 \times$  the basal width of mandible; lateral carina of scutellum extending to its basal 0.5 to 0.75; scutellum red. **12**

12. Pronotum coarsely striate, its extreme upper margin somewhat rugose; mesopleurum largely trans-striate; lateral carina of scutellum extending to its basal 0.75; propodeum between basal carina and apex strongly wrinkled; base of hind wing, metapleurum and propodeum red, without any blackish marks. India. **11. striatus\***

Pronotum with few coarse striae in the middle, its upper half (0.5) finely rugose; mesopleurum largely rugose; lateral carina of scutellum extending to its basal 0.5; propodeum between basal carina and apex finely wrinkled; base of hind wing, lower margin of metapleurum and apex of propodeum, blackish. India. **12. rugipectus\***

13. Fore wing clear hyaline; malar space  $1.1 - 1.5 \times$  the basal width of mandible; ovipositor tip long and pointed **14**

Fore wing with a broad band in the middle, a narrow band towards the base and also narrowly at apex, dark brown to blackish; malar space  $0.5-0.6 \times$  the basal width of mandible; ovipositor tip short. **19**

14. Abdominal tergites shiny, third and following tergites smooth, without any punctation **15**

Abdominal tergites dull or subpolished, third tergite usually densely punctate, following mat **16**

15. Mesopleurum with sparse, shallow and minute punctures; sternalus extending 0.5 the distance to middle coxa; upper margin of pronotum largely finely punctate; first abdominal tergite finely punctate; pronotum and mesoscutum orange with blackish hue. Burma. **13. malaise\***

Mesopleurum finely trans-aciculate; sternalus extending 0.75 the distance to middle coxa; upper margin of pronotum finely aciculate with fine punctures in between the aciculi; first abdominal tergite smooth (without punctures) and polished; pronotum and mesoscutum orange, without blackish hue. Burma. **14. aciculatus\***

16. Face in the middle rugoso-punctate; malar space about  $1.0 \times$  the basal width of mandible; frons obliquely striate (face along the eye margin whitish; thorax entirely orange). Burma. **15. rufescens\***

Face in the middle rugulose to rugose (without any puncture); malar space about  $1.33 \times$  the basal width of mandible; frons rugose. **17**

17. Pronotum largely rugulose, except few short striae in the middle groove; occipital carina sharply bent at lower end; lateral carina of scutellum ex-

tending less than half (0.4); (mesopleurum largely with weak trans-rugae, mesopleural pit deep; prepectal carina about 0.55 the height of mesopleurum; propodeum finely wrinkled). Burma. . . . . **16 burmensis\***

Pronotum distinctly striate all over; occipital carina evenly arched; lateral carina of scutellum extending more than half (0.5-0.6) the length of scutellum. . . . . **18**

18. Propodeal spiracle circular and protruding; third abdominal tergite minutely and uniformly punctate, tergite largely dull; propodeum coarsely rugose. Burma. . . . . **17. tanypetiolatus\***

Propodeal spiracle elongate, not protruding; third abdominal tergite not uniformly punctate, punctures largely confined to its baso-lateral area, tergite in the middle impunctate and subpolished; propodeum finely rugose. Burma. . . . . **18. kambaitiensis\***

19. Pronotal collar, antennal scrobe and middle tibia broadly above, yellow; frons depressed, eyes prominently high above the level of vertex. Philippines. . . . . **19. depressus\***

Pronotal collar not yellow, usually red; antennal scrobe and middle tibia without yellow markings; frons uniformly sloping from median ocellus towards antennal scrobe; eyes almost in level of vertex. . . . . **20**

20. Antennal flagellum without a band in female. . . . . **21**  
Antennal flagellum with a whitish band in female. . . . . **22**

21. Pronotum largely obliquely striate; malar space  $0.63 \times$  the basal width of mandible; metapleurum moderately to strongly rugoso-striate, about  $0.55 \times$  as high as the portion of second recurrent vein above bulla. Male: all coxae largely red at base; fore and middle trochanters, black. Philippines . . . . . **20. townesi\***

Pronotum largely smooth and shiny except few striae along the posterior margin; extreme upper margin of pronotum finely aciculate; malar space  $0.5 \times$  the basal width of mandible; metapleurum weakly rugose. Males: all the coxae almost black; fore and middle trochanters whitish. Philippines . . . . . **21. fuscipennis\***

22. Frons granulose; malar space  $0.6 \times$  the basal width of mandible; pronotum largely smooth, except pronotal scrobe with rugosities; lateral carina confined to its base only; propodeum weakly rugoso-wrinkled; apical band on second tergite broad and uniform, white. Male: thorax entirely black. Philippines. . . . . **22. problematicus\***

Frons rugulose, malar space  $0.5 \times$  the basal width of mandible; pronotum rugose in the middle groove, lateral carina extending to its basal  $0.3$ ; propodeum strongly rugoso-wrinkled, tending to be reticulate in the middle; apical band on second-tergite not so broad, much narrowed in the middle, yellowish. Male: thorax entirely, red. Philippines . . . . . **23. cotabatensis\***

#### 4a. Subgenus *Indostenus*, nov. (Fig. 18, Map IV)

Upper tooth of mandible much longer, about  $3 \times$  longer than the lower tooth; apical carina of propodeum absent; nervellus intercepted at its upper  $0.2$ ; nervulus opposite to basal vein; brachiella long and extending more than  $0.5$  the distance to wing margin.

This subgenus at present is known from India, Java and the Philippines by a new species, which is described below.

**1. *Formostenus (Indostenus) nigrus*, sp. nov. (Fig 18 a-d)**

This species is distinguished by having body black, except apical bands on second, seventh and eighth abdominal tergites, yellow. The apical carina of propodeum absent, nervellus intercepted far above the middle (0.2) and brachiella long.

*Female* : Face and clypeus strongly and coarsely trans-rugose; clypeus moderate to strongly convex, subpolished with few punctures at apex; malar space rough,  $1.0 \times$  the basal width of mandible; mandible subpolished, hardly punctate; frons all over strongly rough and wrinkled; vertex somewhat granulose tending to be rugose near ocellar triangle, with few scattered shallow punctures; temple strongly rugose; pronotum irregularly wrinkled in the lower half, upper half tending to be obliquely and coarsely striate, epomia moderately strong, pronotal collar subpolished, somewhat minutely punctate; mesoscutum strongly rugose along the margins of each lobe, finely rugose in the middle of each lobe, notauli not well defined; scutellum moderately convex, strongly reticulate; its apex subpolished with minute punctures, lateral carina extending to its basal 0.7; metascutellum subpolished, minutely punctate; mesopleurum wrinkled, at some places tending to be reticulate, below sternaulus finely rugoso-punctate, prepectal carina extending 0.6 the height of mesopleurum; metapleurum strongly wrinkled to reticulate, juxtacoxal carina absent; propodeum finely reticulate, at some places wrinkled, below apophysis trans-wrinkled, area basad of basal carina reticulo-punctate, apophysis moderately high and conical; basal carina complete, evenly arched, spiracle large and longish; fore wing (Fig, 18a) with areolet pentagonal, intercubiti more or less parallel, second intercubitus faint; first abdominal tergite smooth and shiny basally, apically granuloso-punctate, punctures shallow and running into striations, second and third tergites closely and finely punctate, punctures tending to be shallow and indistinct towards the apices, following tergites subpolished; ovipositor tip long and pointed, ovipositor sheath  $0.33 \times$  as long as hind tibia.

Whole of body black, except seventh to eleventh flagellar segments (seventh segment only at its extreme apex) white above; a broad apical band at the apex of second abdominal tergite, seventh and eighth tergites narrowly at apices, yellow. Wing slightly light brownish.

*Male*: Similar to female, except that the flagellum without a white band and apices of second and seventh tergites yellow. Genitalia as in figure 18d.

*Length*: ♀, 10-12 mm; fore wing 7-9 mm; ovipositor sheath about 2 mm.

♂, 9.5-13 mm; fore wing 6-8 mm.

*Holotype* ♀, INDIA: ASSAM : Rangapara, Sonajuli Tea Estate, 21. iv. 1966, M.K. Kamath, Coll. No. K90 (GUPTA). *Allotype* ♂, W. JAVA: Wijn Koops Boy, xi. 1932 (TOWNES). *Paratypes* 9 ♀♀, 3♂♂. Locality same as the holotype, 2 ♀♀, 20-21. iv. 1966, M.K. Kamath, Coll. Nos. K89 & 90; 4 ♀♀, 20-21. iv. 1966, D.T. Tikar, Coll. Nos. T187 & 189; 1♀, 20. iv. 1966, D. Ram Coll. No T188; 1♀, 21. iv 1966, J.K. Jonathan, Coll. No. J133 (GUPTA). JAVA: 1 ♀, data not clear (LEIDEN). Bandoeng, 700 m, 1 ♂, 28-31. vi. 1941, J. Olthof. PHILIPPINES: MINDORO: Alcate, Victoria, 1 ♂, 5. iv. 1954., H., M. & D. Townes. LUZON : Manila, 1 ♂, 18. i. 1953, Townes family (TOWNES).

*Distribution* : INDIA, JAVA and PHILIPPINES.

#### 4b. Subgenus *Formostenus* Uchida (Map IV)

*Formostenus* Uchida, 1931, *Jour. Faculty Agr. Hokkaido Imp. Univ.*, 30: 180.

Type : *Mesostenus* (*Formostenus*) *angularis* Uchida. Original designation.

TAXONOMY : Uchida, 1931: 180. Townes, 1957 : 108. Townes *et al.* 1961 : 144.

Townes, 1970 : 265.

Teeth of mandible subequal; apical carina of propodeum present; nervellus condition various; nervulus opposite or little distad of basal vein; brachiella absent or present as a small stump.

This subgenus occurs in Oriental Region.

Two species are referable to this subgenus, viz., *Cryptus decens* Tosq., 1903 and *Mesostenus* (*Formostenus*) *angularis* Uchida, 1931. In addition twenty new species are described.

#### 2. *Formostenus* (*Formostenus*) *pubescenus*, sp. nov. (Fig. 19a)

This species has body covered with long erect hair, latter more than  $1.3 \times$  as long as the thickness of antenna. The body largely black except a band on flagellum, apices of first, second, sixth, seventh and eighth tergites, yellow; legs in general reddish-brown.

*Female* : Body, especially antennae, head and legs covered with long erect hairs, more than  $1.3 \times$  as long as the thickness of antenna (Fig. 19a); clypeus moderately convex, smoother towards apex, sparsely punctate with few trans-striation; face in the middle rugose, rugoso-punctate at sides, fine oblique striations running from the base of antennal sockets; frons largely granulose with few scattered punctures at sides, finely wrinkled in the middle below median ocellus; antennal scrobe broad, shiny, bounded with moderately raised carina; temple below weakly trans-rugoso-punctate; malar space granulose, about  $1.0 \times$  as long as basal width of mandible; pronotum subpolished, weakly rugose at its upper and lower margin, coarsely striate in the middle, epomia strong; mesoscutum mat;

scutellum distinctly punctate, its lateral carina extending to its basal 0.7; mesopleurum moderate to strongly rugoso-striate, prepectal carina extending  $0.75 \times$  the height of mesopleurum, sternaulus extending almost up to the base of middle coxa; metapleurum finely wrinkled, juxtacoxal carina present; area between basal carina and apex of propodeum coarsely wrinkled, both the transverse carinae strong and arched in the middle, apophysis strong and moderately high, area basad of apical carina near spiracles with fine irregular striae; areolet small, pentagonal, about  $0.7 \times$  as high as the portion of second recurrent vein above bulla; nervellus interstitial, nervellus intercepted at its middle, brachiella short, like a small stump; first abdominal tergite dorsally mat and subpolished, second tergite granulate, following tergites granulate to smooth and shiny; ovipositor sheath about  $0.5 \times$  as long as hind tibia.

Black. Antennae with fifth to ninth segments white; scutellum and metascutellum with reddish-brown tinge; legs in general reddish-brown, except fore and middle legs light in shade; all the coxae with more reddish tinge; hind femur at apex and hind tibia largely blackish-brown; hind tarsus yellowish, its fourth and fifth segments brownish; apices of first, second and sixth, seventh and eighth tergites largely, yellowish.

*Male*: Unknown.

*Length* : ♀, 10.5 mm, fore wing 7.5; ovipositor sheath 3.0 mm.

*Holotype* ♀, CHINA: HONG SAN: Kiangai, 30. vii. 1936 (TOWNES).

*Paratype* ♀, same data as holotype, 29. vi 1936 (TOWNES).

*Distribution* : CHINA.

### 3. *Formostenus* (*Formostenus*) *cherraensis*, sp. nov. (Fig. 19b-d)

This species is very close to *Formostenus rugosus*\*. It can be distinguished by having lateral carina of scutellum short, extending about 0.3 at its base; pronotum and mesopleurum trans-striate and propodeum largely with fine wrinkles.

*Female* : Face finely rugose, tending to be strong towards the antennal sockets and smoother towards the sides of face; clypeus subpolished, minutely and sparsely punctate, apical margin impressed, truncate in the middle; malar space granulate,  $1.2 \times$  the basal width of mandible; frons with its middle area little raised, somewhat rugulose, at sides subpolished, hardly punctate; vertex subpolished, indistinctly punctate; temple subpolished, minutely and sparsely punctate; pronotum coarsely trans-striate in the middle, upper and lower margin finely rugulose, extreme lower corner subpolished, pronotal collar subpolished, epomia moderately strong, not reaching to upper margin; mesoscutum subpolished, minutely punctate; scutellum subpolished, minutely punctate, lateral carina extending to its basal 0.33; metascutellum subpolished, with few minute

punctures; mesopleurum dull, very finely trans-striate, tending to be rugulose in the middle, speculum subpolished, minutely and sparsely punctate, area below sternaulus ruguloso-punctate, prepectal carina extending 0.75 the height of mesopleurum; metapleurum dull, finely trans-rugose, rugae stronger along the juxtacoxal carina and along pleural carina, juxtacoxal carina present; propodeum between apical and basal carinae finely wrinkled, wrinkles coarser along the carinae and at sides, area between apical carina and apex coarsely wrinkled, trans-wrinkled at sides, basad of basal carina subpolished, in the middle with shallow, sparse punctures, at sides finely aciculate, aciculi circular around spiracles, spiracle large longish, apical carina strong complete, evenly arched in the middle, basal carina strong, more or less straight; first abdominal tergite smooth and subpolished, except few punctures at apex and near spiracles, second and third tergites dull, finely and closely punctate, punctures tending to be indistinct towards the apex, following tergites subpolished; fore wing with areolet pentagonal, about  $0.75 \times$  as high as the portion of second recurrent vein above bulla, intercubiti slightly convergent, nervulus interstitial (or slightly distad), nervellus intercepted at the middle, brachiella vein present faintly; ovipositor tip long, pointed and curved, sheath about  $0.6 \times$  as long as hind tibia.

Black. Apical half of fourth to ninth flagellar segments white above; face (Fig. 19c) dark brownish-black with two lateral yellow stripes; a mark on metapleurum just above hind coxa, apices of first and second abdominal tergites, third tergite baso-laterally, sixth narrowly at apex, seventh and eighth tergites broadly, yellow (Fig. 19b); fore leg with coxa, trochanter, femur and tibia dark yellow, except tibia above and whole of tarsus fuscous, fifth tarsal segment dark brown; middle coxa, trochanter, femur, dirty yellow, except femur and trochanter fuscous above, tibia and tarsus fuscous, its fifth tarsal segment dark brown; hind coxa, trochanter and femur brownish-yellow, except coxa above, trochanteral segments largely, femur at its upper half and at apex, dark brown; tibia dark blackish-brown, lighter below, tarsus yellow, its fourth segment at apex and fifth segment wholly, dark brown (Fig. 19d).

*Male* : Unknown.

*Length* : ♀, 10-14 mm; fore wing 7.5-10 mm, ovipositor sheath about 2.5-3 mm.

*Holotype* ♀, INDIA: MEGHALAYA: Cherrapunji, 1235 m, 5. iv. 1966, M.K. Kamath, Coll. No. K 77 (GUPTA). *Paratype* ♀, ASSAM: No locality: (it may be now in Meghalaya), Coll. F. Victor (MUNICH).

*Distribution* : INDIA : Meghalaya and Assam?.

#### 4. *Formostenus* (*Formostenus*) *rugosus*, sp. nov. (Fig. 19e-g)

This species is distinguished by having pronotum strongly and

irregularly wrinkled; scutellum minutely and sparsely punctate with few striae on sides, its lateral carina extending to its basal 0.7 and metapleurum strongly trans-wrinkled.

*Female* : Face strongly rugose in the middle, at sides more or less smooth; clypeus subpolished, at base near the groove rugose, shallowly and sparsely punctate towards the apex, extreme apex smooth and shiny, apical margin weakly impressed in the middle; malar space granulose,  $1.1 \times$  the basal width of mandible; mandible subpolished, indistinctly punctate; frons subpolished, rugoso-punctate in the middle, at sides smooth with few scattered shallow punctures; vertex subpolished and smooth, temple distinctly punctate; pronotum strongly and irregularly wrinkled, at upper margin closely wrinkled, epomia strong, not reaching to upper margin; mesoscutum subpolished, faintly punctate; scutellum subpolished, minutely punctate, basal half with few short lateral transverse striae extending from the lateral carina towards the middle, lateral carina extending to its basal 0.68; metascutellum subpolished, minutely punctate; mesopleurum strongly rugose, tending to be wrinkled, speculum minutely punctate, a deep depression present above speculum, prepectal carina extending 0.9 the height of mesopleurum; metapleurum strongly trans-wrinkled, juxtacoxal carina present; propodeum with area between basal and apical carinae strongly irregularly wrinkled, between apical carina and apex somewhat strongly trans-wrinkled, basal of basal carina shiny with few scattered punctures, punctures near basal carina coalescent, spiracle moderately large, oval with a semicircular carina around, apical and basal carinae complete and more or less straight, apophysis crest-like; first abdominal tergite subpolished and smooth, somewhat granulose toward the apex, second tergite shallowly, closely and minutely punctate, following tergites smooth and subpolished; fore wing with areolet pentagonal, about  $0.55 \times$  as high as the portion of second recurrent vein above bulla, intercubiti parallel, nervulus distad, nervellus intercepted slightly above the middle, brachiella present as a minute stump; ovipositor tip long, pointed, curved, its sheath about 0.5 as long as hind tibia.

Black. Antenna with fourth to tenth flagellar segments white above; head completely black, except faint mark on either side of face and temple below, dirty yellow (Fig. 19f); apices of first and second abdominal tergites, third tergite along the lateral margins, sixth narrowly at apex, seventh and eighth broadly, yellow (Fig. 19e); fore leg with coxa and first trochanteral segment and femur, yellowish-orange, tibia and tarsus yellow, mixed with fuscous above, its fifth tarsal segment dark brown; middle leg with coxa yellow, trochanter and femur yellowish-brown, tibia and tarsus blackish with yellow hue, its fifth tarsal segment dark brown; hind coxa and trochanter dark brown, except trochan-

teral segments with blackish marks above, femur dark brown tending to be more blackish-brown towards the apex, tibia blackish, except subbasal area with yellowish hue, tarsus yellow, its fourth segment apically and fifth segment wholly, dark brown (Fig. 19g); wings light yellowish hyaline.

*Male* : Unknown.

*Length* : ♀, 12.5 mm; fore wing 4 mm; ovipositor sheath 3 mm.

*Holotype* ♀, INDIA : ASSAM : Rangapara, Charduar Forest, 30. iv. 1966, D.T. Tikar, Coll. No. T 225 (GUPTA).

*Distribution* : INDIA : Assam.

##### 5. *Formostenus (Formostenus) piceus*, sp. nov. (Fig. 20a-c)

This is a distinct species having nervellus (Fig. 20a) intercepted at its upper 0.4; lateral carina of scutellum extending more than 0.66 at its base; malar space  $1.2 \times$  the basal width of mandible; apices of all the abdominal tergites with yellow apical bands, and scutellum and meta-scutellum, red (Fig. 20a).

*Female* : Face dull, finely rugose, tending to be rugulose at sides; clypeus dull at base, shiny towards the apex, base shallowly and sparsely punctate, apical margin impressed; malar space granulose,  $1.2 \times$  the basal width of mandible; mandible sparsely punctate, teeth subequal, lower tooth slightly shorter than upper; frons subpolished with two sublateral elevated areas and few punctures; vertex minutely punctate, punctures tending to be sparse laterally; temple deeply punctate, striate towards the base of mandible; pronotum largely finely wrinkled, epomia short and strong; mesoscutum very minutely punctate; scutellum subpolished, moderately convex, minutely punctate, lateral carina extending to its basal 0.66; mesopleurum largely rugose, speculum subpolished, sparsely and minutely punctate, just below sternaulus finely striate, further below minutely punctate, prepectal carina extending beyond the middle; metapleurum coarsely transwrinkled, juxtacoxal carina present; propodeum between basal carina and apex coarsely wrinkled, basad of basal carina shiny with few punctures and longitudinal striae, a circular carina around each spiracle; spiracles oval, projecting; both the transverse carinae strong, basal carina with stumps of median longitudinal carinae at base, apical carina laterally forming strong and high apophysis; first abdominal segment long, dorso-median carinae absent, spiracles projecting, tergite dorsally smooth and shiny, granulose near the spiracles, second strongly and third tergite weakly granulose, following mat and subpolished; areolet about  $0.9 \times$  as high as the portion of second recurrent vein above bulla, intercubiti parallel, second intercubitus faint, nervulus distinctly distad, nervellus intercepted distinctly above the middle (0.35), brachiella absent (Fig. 20a); ovipositor short, tip long, pointed and curved, sheath

about 0.35 as long as hind tibia.

Black. Antenna with fourth to ninth flagellar segments whitish; scutellum and metascutellum, red; face in the middle and laterally, apices of all the abdominal tergites, fore caxa apically, its trochanter faintly, first to fourth segments of hind tarsus, yellowish; rest of body black (Fig. 20b&c).

*Male*: Unknown.

*Length*: ♀, 12.5 mm; fore wing 10.5 mm; ovipositor sheath 2 mm.

*Holotype* ♀, SABAH (N. Borneo): Mt. Kinabalu, Kenkok, 1000 m, 25.iv. 1929, H.M. Pendlebury (GUPTA).

*Distribution*: SABAH (=N. Borneo).

## 6. *Formostenus (Formostenus) flavofasciatus*, sp. nov. (Fig. 20d-f)

This species can be recognized from the allied species, *F. flavorbitalis*\*, by having face completely yellow; pronotal collar, metapleurum and propodeum black; metapleurum trans-striate and propodeum moderately strongly reticulo-wrinkled. The abdomen is spindle shaped.

*Female*: Face subpolished, weakly rugose, rugae somewhat diverging, at sides sparsely and shallowly punctate; clypeus subpolished, less convex, sparsely punctate, smooth and shiny at apex, apical margin in the middle impressed; malar space granulose,  $1.0 \times$  the basal width of mandible, mandible subpolished, punctate with longitudinal striations, teeth subequal; frons subpolished, closely and shallowly punctate in the middle, punctures running into striations, at sides largely smooth with few scattered minute punctures; vertex subpolished; temple shallowly punctate; pronotum subpolished, trans-striate in the middle, lower margin shallowly and minutely punctate, upper margin closely punctate, punctures running into striations, epomia moderately strong, not reaching up to upper margin, pronotal collar smooth and shiny above; mesoscutum subpolished; scutellum subpolished, minutely punctate, lateral carina extending to its basal 0.5; mesopleurum subpolished, finely striolate in the middle of lower half, upper half and near prepectal carina, and also near speculum finely rugose, speculum subpolished, faintly minutely punctate, area below sternaulus distinctly and minutely punctate, prepectal carina extending  $0.72 \times$  the height of mesopleurum; metapleurum largely trans-striate to rugoso-striate, extreme base of metapleurum subpolished and distinctly punctate, juxtacoxal carina strongly reticulo-wrinkled, area between apical carina and apex coarsely irregularly rugose, basad of basal carina smooth and shiny except few punctures, spiracle moderately large and oval, both the carinae more or less straight and complete, apical carina weak in the middle, apophysis crest-like; first abdominal tergite smooth and shiny dorsally, second tergite closely punctate, third tergite punctate at sides and smooth in the middle, following tergites smooth and subpolished;

fore wing with areolet pentagonal, about  $0.9 \times$  as high as the portion of second recurrent vein above bulla, second intercubitus faint, intercubiti slightly convergent, nervellus intercepted slightly above the middle, nervulus interstitial, brachiella present as a minute stump; ovipositor tip long, pointed, curved, sheath about  $0.4 \times$  as long as hind tibia.

Black. Fifth to ninth flagellar segments white above; face with a trilobed mark, malar space, temple boardly, frons with two lateral stripes which extends from the level of median ocellus and joins with facial mark (Fig. 20e), edge of pronotal collar slightly, tegula, subtegular ridge, mesopleurum (Fig. 20d) with a curved elongate mark extending up to the base of middle coxa, sometimes this mark faint, lower corner of speculum slightly, a mark on metapleurum just above middle coxa, apices of first and second abdominal tergites and sometimes third to fifth abdominal tergites laterally, sixth tergite narrowly at apex, seventh and eighth tergites broadly, yellow or dirty yellow (Fig. 20d); scutellum, metascutellum wholly, area around and apicad of apical carina of propodeum, extreme base of first abdominal tergite, yellowish-brown to dark brown; fore leg with coxa and first trochanteral segment yellow, except first trochanteral segment with a fuscous mark, second trochanteral segment and femur light brown, tibia and tarsus brown with fuscous hue; middle coxa yellow, trochanter largely infusate, femur light brown, tibia and tarsus dark brown; hind coxa brown, trochanteral segments largely blackish, femur brown tending to be darker towards the apex, tibia blackish, except in the middle with light yellow hue, tarsus pale, its fourth segment at apex and fifth wholly, brown (Fig. 20f).

*Male* : Unknown.

*Length* : ♀, 10-12 mm; fore wing 8-10 mm; ovipositor sheath 2-2.5 mm.

*Holotype* ♀, INDIA : SIKKIM : Gangtok, 1676 m, 16.v.1966, V.K. Gupta, Coll. No. 480 (GUPTA). *Paratypes* 11♀♀. INDIA : SIKKIM : Gangtok, 1676 m, 3♀♀, 13-14.v.1966, D.T. Tikar, Coll. Nos. T248 & 251; 4♀♀, 11-19.v.1966, J.K. Jonathan Coll. Nos. J148, 153. WEST BENGAL : Rangiroon near Darjeeling 1905 m, 1 ♀, 26.v.1966, J.K. Jonathan, Coll. No. J158. UTTAR PRADESH : Chaubatia, 1943 m, in Kumaon Hills, 1 ♀, 4. iii. 1965, D. Ram, Coll. No. 94 (GUPTA). BURMA : Mt. Victoria, 1400-2200 m, 1♀, iii.1938 and 1 ♀, vi.1938, Gerd Heinrich (TOWNES).

*Distribution* : INDIA : Sikkim, West Bengal, Uttar Pradesh. BURMA.

## 7. *Formostenus* (*Formostenus*) *flavorbitalis*, sp. nov. (Fig. 21a-c)

This species is close to *F. flavofasciatus*\* in general appearance, but can be distinguished by having metapleurum and propodeum between basal carina and apex finely wrinkled. The pronotal collar, mesopleurum

above the base of middle coxa, propodeum between apical carina and apex, metapleurum above the base of hind coxa and first abdominal segment ventrally, yellow.

*Female* : Face subpolished, obliquely rugose, granulose at sides; clypeus punctate at base, smooth at apex, apical margin impressed; malar space granulose,  $0.71 \times$  the basal width of mandible; mandible weakly longitudinally striato-punctate, lower tooth distinctly shorter than upper; frons finely striate with punctures in between the striae, at sides granulose; vertex very minutely punctate behind ocellar area, at sides smooth; temple distinctly punctate, striate towards the base of mandible; pronotum striate, striae tending to be irregular above, pronotal collar somewhat rugose, epomia strong; mesoscutum subpolished; scutellum minutely and shallowly punctate, lateral carina extending at its basal  $0.5$ ; metascutellum smooth; mesopleurum largely closely trans-striate, speculum sparsely and shallowly punctate, below sternaulus with few punctures, prepectal carina extending up to the base of subtegular ridge; metapleurum wrinkled, juxtacoxal carina weakly present; propodeum between basal carina and apex finely wrinkled, basal of basal carina largely smooth and shiny with few scattered punctures in the middle and near the spiracles, apical and basal carina strong, straight and complete, apical carina laterally forming moderately strong crest-like apophysis; first abdominal tergite with dorso-median longitudinal carinae absent, tergite dorsally smooth and subpolished; second tergite strongly granulose, following tergites mat or subpolished; areolet pentagonal,  $0.5 \times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted at the middle, brachiella present, but not extending more than half the distance from nervellus to the wing margin; ovipositor tip curved, sheath  $0.66 \times$  as long as hind tibia.

Black. Antenna with fifth to ninth flagellar segments above, white; face (Fig. 21b) in the middle and along the eye margin, clypeus faintly, frons along the margin, mark not extending beyond the level of semi-circular carina, mandible at base, temple around malar space, pronotal collar, tegula, scutellum, metascutellum, subtegular ridge, base of hind wing above, mesopleurum along the mesopleural suture, metapleurum above hind coxa, propodeum between apical carina and apex (Fig. 21a), first abdominal segment at apex and base and also ventrally, apices of tergites second, sixth narrowly, seventh and eighth broadly, yellow; fore leg with coxa and trochanter yellow, femur, tibia and tarsus, brownish-yellow; middle coxa yellow, trochanter, femur, tibia and tarsus slightly dark brownish-yellow; hind coxa and femur reddish-brown, trochanter and tibia largely brown, except tibia yellowish below, tarsus yellowish-

brown (Fig. 21c).

*Male* : Unknown.

*Length* : ♀, 8 mm; fore wing 6 mm; ovipositor sheath 2 mm.

*Holotype* ♀, INDIA : MEGHALAYA : Shillong (Bot. Garden) in Khasi Hills, 1400 m. 31.iii.1966. J. K. Jonathan, Coll No. J 119 (GUPTA).

*Distribution* : INDIA : Meghalaya.

## 8. *Formostenus* (*Formostenus*) *decens* (Tosquinet) (Fig. 21 d)

*Cryptus decens* Tosquinet 1903, *Mem. Soc. Ent. Belgique*, 10 : 179. ♀. des.

Type : ♀. Java : Mt. Gedeh, 4000 ft. (BRUSSELS).

*Ancaria langicornuta* Betrem, 1941, *Treubia*, 18 : 89. [♀]. des. in key. Type : ♀, Java : Wijnkoops Bay (BETREM). Synonymised by Townes *et al.* (1961).

*Isotima decens* : Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.* 1 : 145.

This species is close to *Formostenus angularis* (Uchida) in having all the abdominal tergites with yellow apical band hind coxa, trochanter and femur, black. It is recognised by its face being raised in the middle, vertex behind the ocellar area closely punctate and mesopleurum strongly rugose. It has thorax black in front and first tergite largely blackish (Fig. 21 d).

*Female* : Face subpolished, rugose in the middle, rugulose at sides, convex in the middle, a V-shaped groove in the middle under the base of antennae; clypeus moderately convex, shiny, apical margin impressed, minutely and sparsely punctate at basal half; mandible somewhat trans-rugose, teeth subequal; malar space granulose,  $1.0 \times$  the basal width of mandible; frons in the middle rough and obliquely wrinkled, along the eye margin rugulose; vertex behind ocellar triangle closely punctate, at sides subpolished; temple coarsely punctate; pronotum largely in the middle coarsely trans-striate, lower margin distinctly punctate, extreme upper margin strongly rugose with few punctures, epomia strong; meso-scutum subpolished, minutely and sparsely punctate, punctures along the notaulus running into fine striations; scutellum minutely and sparsely punctate, lateral carina extending to its basal 0.45; metascutellum without distinct punctures; mesopleurum subpolished, strongly rugose, speculum minutely and sparsely punctate, area below sternaulus weakly punctate and along sternaulus trans-rugose, sternaulus extending up to the base of middle coxa, prepectal carina extending  $0.85 \times$  the height of mesopleurum; metapleurum strongly rugose, tending to be wrinkled, juxtacoxal carina complete; propodeum between basal carina and apex with fine oblique wrinkles, basad of basal carina largely smooth and polished, except around spiracle with few longitudinal ridges, both the transverse carinae complete and strong, apical carina laterally forming conical apophysis, spiracle large roundish; first abdominal tergite with

dorso-median carina faintly present, tergite shiny, without distinct punctures, except at apex mat, second tergite densely and shallowly punctate, punctures tending to be indistinct towards the apex, third tergite at extreme base closely and shallowly punctate, rest of third tergite and the following tergites mat and subpolished; areolet pentagonal,  $0.7 \times$  as high as the portion of second recurrent vein above bulla, second intercubitus faint, nervulus interstitial, nervellus intercepted slightly above the middle; brachiella present as a small stump; ovipositor tip pointed, ovipositor sheath about 0.6 as long as hind tibia.

Black. Antenna with fourth to tenth flagellar segments white above; face just below antennal sockets, apices of all the abdominal tergites (band on third to sixth tergites narrow) yellowish; thorax from an oblique line drawn from the base of subtegular ridge to middle coxa to apex of propodeum, red; pronotum above and mesoscutum in the middle of each lobe with reddish tinge (Fig. 21d); fore leg with its coxa and first trochanteral segments yellowish, except coxa at the back black, second trochanteral segment, femur, tibia and tarsus, brownish; middle leg same as fore leg except its femur dark brown; hind coxa, trochanter, femur and tibia largely dark brown, except tibia sub-basally yellowish, first to fourth tarsal segments whitish, fifth segment brown; wings yellowish hyaline.

*Male* : Unknown.

*Length* : ♀, 14 mm; fore wing 12.5 mm; ovipositor sheath 2.5 mm.

*Specimens examined* : 2♀♀, JAVA: Mt. Gedeh, 1♀ (Type of *Cryptus decens* Tosquinet), J. Tosquinet Colln. (BRUSSELS). Mt. Bengbeng, Djampang Weten, 1 ♀, vii.1930 (Homotype of *Cryptus decens* Tosq. and *Ancaria longicornuta* Betrem, det. by H. Townes, 1958) (TOWNES).

*Distribution* : JAVA.

## 9. *Formostenus* (*Formostenus*) *angularis* (Uchida) (Fig. 21e)

*Mesostenus* (*Formostenus*) *angularis* Uchida, 1931, *J. Faculty Agr. Hokkaido Imp. Univ.* 30 : 180. ♀. key, des., fig. Type : ♀, Formosa (Taiwan) : Kuraru (Sapporo).

*Isotima angularis* : Townes : 1957, *Proc. Ent. Soc. Washington*, 59 : 108 syn., des.; Townes, Townes & Gupta, 1961, *Mem. Amer. Ent. Inst.*, 1 : 144 syn.

This species differs from *F. decens* (Tosq.) in having frons finely wrinkled and not raised in the middle; vertex smooth; mesospleurum weakly trans-rugose above, finely wrinkled towards the base of middle coxa. Its thorax is entirely red and first tergite largely reddish.

*Female* : Head longish in profile; face weakly rugose; clypeus subpolished, minutely and sparsely punctate; malar space granulose,  $1.1 \times$  the basal width of mandible; frons finely wrinkled in the middle, smooth

at sides, antennal scrobes smooth, its carina normal; vertex smooth and subpolished; temple subpolished, minutely and closely punctate, punctures with longitudinally running striations towards the base of mandible; pronotum trans-striate in the middle, finely wrinkled above, rugulose towards the lower margin; mesoscutum mat and subpolished with deep notauli; scutellum and metascutellum smooth, lateral carina not extending beyond its basal 0.5; mesopleurum somewhat weakly trans-rugose above, finely wrinkled below; speculum smooth, prepectal carina extending  $0.6 \times$  the height of mesopleurum; metapleurum with dense and fine wrinkles, juxtacoxal carina present; propodeum between basal carina and apex finely wrinkled, basad of basal carina largely smooth, spiracle roundish, both the transverse carinae present, apical carina more or less straight, apophysis moderately high, crest-like; first tergite with dorsal carinae not well defined, petiole rounded, tergite smooth and shiny; second tergite minutely and densely punctate, surface appears to be granulate, following tergites mat; (fore wings missing in the type specimen; the information is based on original description given by Uchida, 1931) areolet quadrate, nervulus interstitial, nervellus intercepted at the middle, brachiella present as a small stump; ovipositor moderately long, its tip pointed and curved, sheath about  $0.55 \times$  as long as hind tibia.

Black (thorax entirely red). Antennal flagellum with segments fourth to tenth white, rest of antenna dark brown. Head dark reddish-brown in front, black at the back; face in the middle and at sides, yellowish; first abdominal segment red, brownish dorsally; apices of all the abdominal tergites yellow; fore leg yellow, its tarsus brownish; middle coxa and trochanter dirty yellow, rest blackish-brown; hind coxa, trochanter and tibia, dark blackish-brown, femur black and tarsus yellow except its fifth segment brown (Fig. 21e).

*Male* : Unknown.

*Length* : ♀, 10 mm; fore wing (missing); ovipositor sheath 1.25 mm.

*Specimen examined* : TAIWAN : Kuraru, ♀ (Type of *Mesostenus* (*Formostenus*) *angularis* Uchida) (SAPPORO).

*Distribution* : TAIWAN.

#### 10. *Formostenus* (*Formostenus*) *bidentatus*, sp. nov. (Fig. 22a-d)

Distinguished from other species by having semicircular carinae (in females) above each antennal scrobe specialized into high flanges (Fig. 22a); nervellus intercepted at its lower 0.4; malar space  $0.57 \times$  the basal width of mandible. Head and anterior half (0.5) of thorax is black.

*Female* : Face dull, thickly punctate, punctures coalescent and running into striations; clypeus subpolished, moderately and evenly convex,

sparsely punctate, apical margin impressed, truncate in the middle; malar space granulose above, punctate below,  $0.57 \times$  the basal width of mandible; mandible thickly punctate, teeth subequal, lower tooth slightly shorter than above; semicircular carinae enclosing shallow area above each antennal sockets specialized into flanges; frons largely closely punctate, punctures in the middle coalescent and running into striations, at extreme sides near eye margin strongly granulo-punctate; vertex subpolished, shallowly and sparsely punctate; temple subpolished, distinctly punctate, punctures tending to be coalescent toward the base of mandible; pronotum subpolished, coarsely trans-striate in the middle, upper margin closely punctate, lower margin shiny and minutely punctate, epomia moderately strong, not reaching to upper margin; mesoscutum subpolished, minutely punctate; scutellum polished, with sparse minute punctures, lateral carina of scutellum confined to its base only; metascutellum subpolished, mesopleurum subpolished, transversely rugoso-striate, tending to be finer below towards the sternaulus, speculum subpolished, shallowly and sparsely punctate, area just above sternaulus near prepectal carina subpolished and somewhat ruguloso-punctate, below sternaulus dull, sparsely and shallowly punctate, prepectal carina extending  $0.75 \times$  the height of mesopleurum; metapleurum irregularly wrinkled, juxtacoxal carina present; propodeum between basal carina and apex finely wrinkled, extreme base of propodeum smooth and shiny, area just basad of basal carina with shallow punctures, spiracle moderately large and oval, apical and basal carinae complete and more or less straight, apophysis crest-like; first abdominal tergite largely smooth and subpolished, except granulose near the spiracles, dorso-median longitudinal carinae faint; second and third tergites shallowly and closely punctate, following tergites subpolished; fore wing with areolet pentagonal,  $0.75 \times$  as high as the portion of second recurrent vein above bulla; intercubiti slightly convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted below the middle, brachiella absent (Fig. 22b); ovipositor long, tip long and pointed, sheath about  $0.7 \times$  as long as hind tibia.

Black. Fifth to eleventh flagellar segments white above; head, pronotum including propleurum, mesoscutum, mesopleurum, a mark above on metapleurum (this mark quite extensive, extending beyond pleural carina over the side of propodeum), base of hind wing completely, black; scutellum, metascutellum, apex of second abdominal tergite, sixth tergite narrowly in the middle, seventh and eighth broadly, yellow; rest of metapleurum and propodeum reddish; first abdominal tergite at base and apex brownish-yellow (Fig. 22c); fore leg in general yellow, except tibia and tarsus above light fuscous, and fifth tarsal segment dark brown; middle leg with coxa, trochanter and femur dark yellow, tibia yellowish below and infusate above, tarsus largely blackish-brown, except apices

of all its tarsal segments lighter in shade; hind coxa dark orange except its apical half blackish; trochanteral segments largely, femur and tibia blackish, except femur below and tibia at base lighter in shade mixed with brown; tarsus white, except basal 0.25 of first and fifth segment wholly dark brown or blackish (Fig. 22d).

*Male* : Unknown.

*Length* : ♀, 7.5 mm; fore wing 6 mm; ovipositor sheath 2 mm.

*Holotype* ♀, INDIA : ASSAM : Rangapara, Charduar Forest, 29.iv. 1966, V. K. Gupta, Coll. No. 165 (GUPTA).

*Distribution* : INDIA : Assam.

# 11. *Formostenus* (*Formostenus*) *striatus*, sp. nov. (Fig. 22e-h)

This species is close to *Formostenus rugipectus*\*, in having nervellus intercepted above the middle, semicircular carina simple and similar body colour in general. It is distinguished by having mesopleurum largely trans-striate, propodeum in the middle strongly wrinkled. The basal area of hind wing, metapleurum and propodeum are wholly, red (Fig. 22g).

*Female* : Face rugose in the middle, at sides more or less smooth, with few scattered shallow punctures; clypeus subpolished, moderately arched; apical margin impressed, with scattered punctures; malar space granulose,  $0.87\times$  the basal width of mandible; mandible subpolished, punctate, punctures running in to longitudinal striations, upper tooth of mandible longer than the lower; frons with area below median ocellus irregularly longitudinally striate or rugoso-striate, at sides granulose; vertex subpolished, hardly punctate; temple distinctly punctate; pronotum subpolished coarsely trans-striate in the middle, rugose at the extreme lower margin, epomia strong, reaching up to upper margin; mesoscutum largely subpolished, faintly punctate; scutellum subpolished, minutely punctate, lateral carina extending to its basal 0.75; metascutellum impunctate; mesopleurum coarsely striate, upper half of mesopleurum weakly rugoso-striate, speculum subpolished with shallow minute punctures, area below sternaulus smooth and subpolished except fine striae along the sternaulus; prepectal carina extending  $0.7\times$  the height of mesopleurum; metapleurum trans-wrinkled, juxtacoxal carina faintly present; area between basal carina and apex of propodeum strongly wrinkled, tending to be reticulate, especially in the basal half of propodeum, area basad of basal carina largely smooth and shiny except with few punctures near spiracles and in the middle, apical and basal carinae strong, apophysis moderately high, crest-like, spiracles moderately large and round; first abdominal tergite dull, without distinct punctures, somewhat granulose, both dorsal carinae distinctly present; second and third tergites finely and densely punctate, following tergites subpolished; fore wing with areolet pentagonal,  $0.63\times$  as high as

the portion of second of recurrent vein above bulla, intercubiti slightly convergent, nervulus more or less interstitial, nervellus intercepted slightly above the middle, brachiella absent (Fig. 22c); ovipositor tip long, pointed and curved, sheath  $0.55 \times$  as long as hind tibia.

**Black.** Fifth to ninth flagellar segments (fifth segment only at the apex) white above; head completely black (Fig. 22f); pronotal collar slightly at the top, tegula, fore and middle coxae, apices of first and second abdominal tergites, sixth tergite faintly and narrowly at apex, seventh and eighth tergites more or less wholly, yellow; whole of propodeum, scutellum and metascutellum, base of hind wing, mesopleurum just above middle coxa, red (Fig. 22g); fore leg with first trochanteral segment light yellow with infusate mark above, second trochanteral segment, whole of femur, dark yellow, tibia and tarsus light yellow and infusate all over; middle leg with trochanter and femur dark yellow, except trochanteral segments with dark brown marks, tibia and tarsus infusate; hind coxa (except at the base, red), trochanter largely, femur and tibia, dark brown or blackish, except femur reddish-brown at its base and tibia yellowish at its base below, hind tarsus pale yellow, its fourth slightly and fifth segments completely dark brown (Fig. 22h).

*Male* : Unknown.

*Length* : ♀, 9-9.5 mm; fore wing 7-8 mm; ovipositor sheath 2.5 mm.

*Holotype* ♀, INDIA : MEGHALAYA : Cherrapunji in Khasi Hills, 1235, 3.iv.1966, J.K. Jonathan, Coll. No. J121 (GUPTA). *Paratypes* 4 ♀♀. INDIA : MEGHALAYA : Cherrapunji in Khasi Hills, 1235 m, 2 ♀♀, 5 & 7.iv.1966, D.T. Tikar, Coll. Nos. T170 & 174; 2 ♀♀, 6 & 7.iv.1966, M.K. Kamath, Coll. Nos. K78 & 79 (GUPTA).

*Distribution* : INDIA : Meghalaya.

## 12. *Formostenus* (*Formostenus*) *rugipectus*, sp. nov. (Fig. 23a, b.)

This species is recognized from *F. striatus*\* by having mesopleurum largely rugose, lateral carina of scutellum extending to its basal 0.5, propodeum between its basal carina and apex finely wrinkled. The base of hind wing, metapleurum below and propodeum at extreme apex are black (Fig. 23b).

*Female* : Face dull, largely rugose, sometimes tending to be rugoso-punctate at sides; clypeus subpolished, sparsely punctate, apical margin impressed; malar space granulose,  $0.8 \times$  the basal width of mandible; mandible subpolished, with few longitudinal striae, teeth subequal, lower tooth slightly shorter than upper frons shallowly and closely punctate, punctures running into longitudinal striations, at sides distinctly granulose; vertex subpolished; temple distinctly punctate, punctures towards the base of mandible running into striations; pronotum coarsely striate in the

middle, its upper half finely rugose, extreme lower margin and pronotal collar subpolished and smooth, epomia moderately strong, not reaching to upper margin; mesoscutum subpolished, hardly punctate; scutellum minutely and shallowly punctate, lateral carina extending to its basal 0.5; metascutellum subpolished; mesopleurum coarsely rugose, tending to be finer above, speculum subpolished and minutely punctate, below sternaulus subpolished, faintly punctate, prepectal carina extending  $0.75 \times$  the height of mesopleurum; metapleurum rugose, tending to be rugoso-punctate towards the base and somewhat trans-rugose towards the apex, juxtacoxal carina present, area below juxtacoxal carina somewhat finely rugoso-punctate, rugae tending to the transverse; propodeum between basal carina and apex finely wrinkled, basad of basal carina smooth and subpolished, area behind spiracles with irregular punctures, apical carina completely arched in the middle, apophysis low and crest-like, basal carina more or less straight, spiracles moderately large and oval; first abdominal tergite with its basal 0.33 smooth and shiny, rest granulose, dorso-median and dorso-lateral carinae distinctly present; second tergite closely, third tergite faintly punctate, following tergites smooth and subpolished; fore wing with areolet pentagonal  $0.75 \times$  as high as the portion of second recurrent vein above bulla, intercubiti convergent, second intercubitus faint, nervulus interstitial, nervellus intercepted slightly above the middle, brachiella absent (except a minute stump) (Fig. 23a); ovipositor tip long, pointed, curved, its sheath about  $0.4 \times$  as long as hind tibia.

Black. Fifth to ninth flagellar segments white above; whole of head, pronotum, mesoscutum, mesopleurum (sometimes less extensively), lower half of metapleurum, apical part of propodeum, black; rest of propodeum and metapleurum, scutellum and metascutellum, reddish (Fig. 23b); first abdominal tergite at base brownish; apices of first and second tergites, third tergite narrowly at lateral margins, sixth tergite narrowly at apex, seventh and eighth broadly, yellow (Fig. 23b); fore leg with coxa and first trochanteral segment yellow, second trochanteral segment, femur, tibia and tarsus, dark yellow, except fifth tarsal segment dark brown, while whole of tibia and tarsus clouded with fuscous; middle leg with coxa yellow, trochanter brown, femur tibia and tarsus reddish-yellow, fifth tarsal segment dark-brown; hind leg largely reddish-brown, except apical 0.33 of femur darker, tibia brown except its subbasal area yellowish-brown, tarsus yellow, its fifth segment dark brown.

*Male* : Unknown.

*Length* : ♀, 8.5 mm; fore wing 6 mm; ovipositor sheath about 1.5 mm.

*Holotype* ♀, INDIA : MEGHALAYA : Cherrapunji in Khasi Hills, 1235 m, 6.iv.1966, M.K. Kamath, Coll. No. K78 (GUPTA). *Paratypes* 2 ♀♀. Data as holotype, 1 ♀, 7.iv.1966, M.K. Kamath, Coll. No. K79 and 1 ♀ 3.iv.1966, D. Ram, Coll. No. T167 (GUPTA).

*Distribution* : INDIA : Meghalaya.

**13. Formostenus (Formostenus) malaisei, sp. nov. (Fig. 23c-e)**

This and the following five species from Burma closely resemble each other in having wings largely clear hyaline, without dark patches on fore wing, body weakly sculptured and also in having a very similar colour pattern.

This species can be recognized from its closely allied species *Formostenus aciculatus*\* by having mesopleurum minutely punctate, sternaulus short (0.5) and pronotum and mesoscutum orange with blackish hue (Fig. 23e).

*Female* : Face weakly rugose, rugoso-punctate in the middle; clypeus shallowly and sparsely punctate, smooth and shiny towards the apex; malar space granulo-punctate,  $1.5 \times$  the basal width of mandible, lower tooth of mandible shorter than upper, teeth pointed; middle area of frons slightly raised, subpolished, minutely and sparsely punctate, at sides mat with few punctures; vertex subpolished; temple sparsely punctate; pronotum trans-striate in the middle, its upper and lower margin minutely punctate; mesoscutum subpolished without distinct punctures; scutellum very minutely and shallowly punctate, its lateral carina extending to its basal  $0.35$ ; mesopleurum minutely and sparsely punctate, punctures on speculum distinct, prepectal carina extending  $0.7 \times$  the height of mesopleurum, sternaulus extending about  $0.5$  the distance to midcoxa; meta-pleurum with indistinct punctures, juxtacoxal carina short; propodeum between apical and basal carinae ruguloso-punctate, punctures moderately deep and large, area between apical carina and apex subpolished, both the transverse carinae complete, apophysis moderately large and conical, spiracle oval; first abdominal tergite largely smooth without punctures, dorso-median and dorso-lateral carinae distinct, ventro-lateral carina present in the upper half, petiole rounded, following tergites shiny, second tergite wholly and third tergite laterally closely and weakly punctate, rest all smooth; areolet about  $0.7 \times$  as high as the portion of second recurrent vein above bulla, nervulus slightly distad of basal vein, nervellus intercepted slightly below the middle, brachiella as small stump (Fig. 23c). Ovipositor tip long and pointed, tip curved, sheath about  $0.5 \times$  as long as hind tibia.

Orange. Fifth to ninth flagellar segments white above; face and clypeus largely reddish-brown, except face faintly in the middle and distinctly along the eye margin yellow; rest of the head blackish-brown. (Fig. 23d); mesoscutum and pronotum blackish (colour variable); apices of abdominal tergites first and second, third at sides, sixth narrowly in the middle, seventh and eighth wholly, yellow; first tergite reddish except in

the middle, brown, rest of abdomen black (Fig. 23c); legs largely reddish-brown, except fore coxa yellowish and middle and hind legs infusate.

*Male* : Unknown.

*Length* : ♀, 11-12 mm; fore wing 9.5-10 mm; ovipositor sheath 2 mm.

*Holotype* ♀, N.E. BURMA : Kambaiti, 2000 m, iv. 1934, Coll. Malaise (STOCKHOLM). *Paratypes* 2 ♀♀. 1 ♀, 26.v.1934 and 1 ♀, 16.v.1939, other data as holotype (STOCKHOLM).

*Distribution* : BURMA.

#### 14. *Formostenus* (*Formostenus*) *aciculatus*, sp. nov. (Fig. 23f, g)

This species has mesopleurum finely trans-aciculate, sternaulus extending 0.75 the distance to middle coxa, upper margin of pronotum finely aciculate with fine punctures, first abdominal tergite smooth and polished. The pronotum and mesoscutum (Fig. 23g) orange, without any blackish hue.

*Female* : Face finely obliquely rugose, at sides rugulose; clypeus shiny, sparsely punctate; malar space granulose,  $1.6 \times$  the basal width of mandible; lower tooth of mandible slightly smaller than upper; frons in the middle distinctly punctate with finely running striations, lateral area mat; vertex subpolished, smooth; temple distinctly and sparsely punctate, punctures with longitudinally running striations towards the base of mandible; pronotum coarsely trans-striate in the middle, minutely and weakly punctate at the upper and lower margin, punctures at upper margin running into fine aciculations; mesoscutum shiny, impunctate; scutellum obscurely punctate, its lateral carina extending to its basal 0.26; mesopleurum finely aciculate, punctate below and above sternaulus and at speculum, prepectal carina extending  $0.7 \times$  the height of mesopleurum, sternaulus extending  $0.75 \times$  the distance to middle coxa, mesopleural pit just below speculum deep and rounded; metapleurum weakly trans-aciculate in the middle, juxtacoxal carina faintly (or absent) present; propodeum largely smooth and polished with few scattered shallow punctures, and weakly striate below each crest like apophysis, apical carina somewhat weak in the middle, spiracle oval and moderately large; first tergite shiny, impunctate, petiole rounded, its dorso-median carinae absent, following tergites polished, without punctures; areolet higher than wide, about  $0.5 \times$  as high as the portion of second recurrent vein above bulla, nervulus slightly distad of basal vein, nervellus intercepted at the middle, brachiella present as a small stump; ovipositor tip long pointed and curved, its sheath  $0.5 \times$  as long as hind tibia.

Orange. Fifth to tenth flagellar segments white above; head (Fig. 23f) largely blackish-brown, except face in the middle and at sides, yellow; apices of first and second abdominal tergites, seventh and eighth tergites

wholly, yellow (Fig. 23g); legs largely dark orange, except apical segments of fore and middle legs, hind coxa at apex, trochanter, femur and tibia largely, brownish; hind tarsus yellowish, its third segments at apex, fourth and fifth wholly brown; first abdominal tergite subapically and rest of abdomen black.

*Male* : Unknown.

*Length* : ♀, 11-11.5 mm; fore wing 9.5 mm; ovipositor sheath 2 mm.

*Holotype* ♀, N.E. BURMA : Kambaiti, 1800 m, 13.vi.1934, Coll. Malaise (STOCKHOLM). *Paratypes* 4 ♀♀. N.E. BURMA : Kambaiti, 2000 m, 1 ♀, 8.vi.1934; 1 ♀, 9.iv.1934 and 2 ♀♀, 23-26.v.1934, all collected by Malaise (STOCKHOLM).

*Distribution* : BURMA.

### 15. *Formostenus* (*Formostenus*) *rufiscens*, sp. nov.

This species has face rugoso-punctate in the middle; malar space about  $1.0 \times$  the basal width of mandible; frons obliquely striate. The face is white along the eye margin and thorax entirely orange.

*Female* : Face ruguloso-punctate, punctures shallow and not well defined, area along the eye margin smooth, clypeus subpolished, sparsely and shallowly punctate; malar space granulose, about  $1.1 \times$  the basal width of mandible; frons with strong striations, extending from the ocellar area to downward, at sides granulose, scrobe smooth and shiny; vertex and upper 0.5 of temple smooth and shiny, lower 0.5 of temple sparsely and shallowly punctate, punctures moderately coarse; pronotum trans-striate in the middle, upper area irregularly weakly striate, lower margin broadly smooth and shiny, epomia short and strong; mesoscutum and metascutellum smooth; scutellum minutely and sparsely punctate, its lateral carina extending to its basal 0.25; mesopleurum subpolished, indistinctly punctate, the middle area weakly trans-rugose, short ridges along the inner margin of prepectal carina and along the upper margin of speculum; prepectal carina extending  $0.66 \times$  the height of mesopleurum; metapleurum largely with moderate and strong trans-rugae, juxtacoxal carina present; propodeum between basal carina and apex with moderately strong wrinkles, tending to be trans-wrinkled apico-laterally, basad of basal carina smooth; spiracle small, oval; first tergite dorsally smooth and shiny; second and third tergites granulose and dull, following tergites mat and subpolished; areolet moderately large, about  $0.66 \times$  as high as the portion of second recurrent vein above bulla; nervulus basad of basal vein, nervellus intercepted almost at the middle, brachiella present as a small stump; ovipositor tip long, pointed and straight, sheath about  $0.5 \times$  as long as hind tibia.

Head and thorax largely deep orange. Antenna dark brown, except

scape and basal two flagellar segments, yellowish-brown, sixth to ninth flagellar segments white above; face along the eye margin yellow; frons above, vertex, back of head and temple above dark brown to blackish; first abdominal tergite orange; apices of first narrowly, second broadly, sixth narrowly in the middle, seventh and eighth tergites almost wholly, yellow; legs in general deep orange, except hind leg with apical 0.5 of femur and tibia at base broadly dark brown.

*Male* : Unknown.

*Length* : ♀, 10 mm; fore wing 8 mm; ovipositor sheath 2 mm.

*Holotype* ♀, N.E. BURMA : Kambaiti, 2000 m, 7.iv.1934, Coll. Malaise (STOCKHOLM).

*Distribution* : BURMA.

#### 16. *Formostenus* (*Formostenus*) *burmensis*, sp. nov. (Fig. 24a-c)

This species is characterized by having pronotum largely rugulose, occipital carina sharply bent at lower end, mesopleurum weakly trans-rugose and propodeum finely wrinkled.

*Female* : Face weakly rugose, somewhat rugoso-punctate towards the clypeal groove, rugulose towards the eye margin; clypeus subpolished, shallowly and sparsely punctate, smooth towards the apex; malar space granulose,  $1.3 \times$  the basal width of mandible; mandible with few scattered punctures, teeth subequal; frons in the middle longitudinally rugose, granulose at sides; vertex minutely punctate just behind ocellar triangle, rest subpolished and smooth; temple sparsely punctate, tending to be striate or rugose towards the base of mandible; pronotum with few weak trans-striae in the middle, rugulose above and at lower margin, epomia short and strong; mesoscutum smooth and subpolished; scutellum without distinct punctures, lateral carina extending to its basal 0.5; metascutellum smooth; mesopleurum weakly trans-rugose, below sternaulus indistinctly punctate, speculum hardly punctate, mesopleural pit deep, prepectal carina extending  $0.55 \times$  the height of mesopleurum; metapleurum wrinkled, tending to somewhat trans-wrinkled, juxtacoxal carina present; propodeum between basal carina and apex wrinkled, basad of basal carina smooth and shiny, except weakly rugose around spiracles, spiracles longish oval, both the transverse carinae strong and straight, apical carina forming lateral crests; first abdominal tergite long, dorso-median carinae weak, petiole rounded, ventro-lateral carina present; tergite granulose, smooth and shiny at base, second and third tergites minutely and densely punctate, following mat and subpolished; areolet pentagonal  $0.7 \times$  as high as the portion of second recurrent vein above bulla, second intercubitus faint, nervulus interstitial, nervellus intercepted slightly above or below the middle (variable), brachiella present as a minute stump; ovi-

positor short, heavy near nodus, tapering towards the tip, sheath  $0.5 \times$  as long as hind tibia.

**Black.** Antenna brownish with fifth to ninth segments white above; face (Fig. 24a) and clypeus in middle, whole of thorax (Fig. 24b), first abdominal segment at base, reddish or dark orange; head largely black with reddish hue; abdomen black, except apices of first, second and sixth, seventh and eighth entirely, yellow; fore leg largely reddish except coxa and trochanter yellowish, and tarsus infusate; middle leg reddish, its femur, tibia and tarsus slightly infusate; hind leg reddish-brown, coxa red, except apically, trochanter, femur and tibia towards the apex dark brown; tarsus yellowish, its apical segments at apex brownish (Fig. 24c).

*Male* : Unknown.

*Length* : ♀, 8.5 mm; fore wing 7mm; ovipositor sheath 1.5 mm.

*Holotype* ♀, N.E. BURMA : Kambaiti, 2000m, 9.vi.1934, Coll. Malaise (STOCKHOLM). *Paratypes* 7 ♀♀. N.E. BURMA : Kambaiti. 2000m, 5 ♀♀, 14-23.v.1934 and 2 ♀♀, 4-8. vi.1934, all collected by Malaise (STOCKHOLM).

*Distribution* : BURMA.

### 17. *Formostenus (Formostenus) tanypetiolatus*, sp. nov. (Fig. 24d)

This species is close to *F. kambaitiensis*\*. It is recognized by having propodeal spiracles circular and protruding, third abdominal tergite uniformly minutely punctate, propodeum coarsely rugose and nervulus interstitial.

*Female* : Face distinctly rugose below the antennal sockets, in the middle rugulose, at sides mat with few scattered punctures; clypeus subpolished, sparsely punctate; malar space granulose,  $1.33 \times$  the basal width of mandible; lower tooth of mandible distinctly smaller than the upper; middle area of frons little raised, this area rough and rugose, frons at sides mat; vertex smooth and subpolished; temple sparsely and shallowly punctate; pronotum distinctly striate, striae somewhat circular; mesoscutum subpolished, smooth; scutellum minutely and sparsely punctate, lateral carina extending to its basal 0.5; mesopleurum finely striate, speculum shiny, with few weak punctures, prepectal carina extending  $0.66 \times$  the height of mesopleurum, sternaulus extending 0.75 the distance to middle coxa; metapleurum trans-rugose, juxtacoxal carina present; propodeum between basal carina and apex distinctly rugose, somewhat trans-rugose below apical carina, apophysis crest-like, basad of basal carina smooth and shiny, spiracle rounded and protruding, both the transverse carinae complete and straight; first abdominal tergite smooth and shiny, dorso-median carinae absent, petiole rounded, second and third tergites minutely and densely punctate, punctures on third tergite tending to be

more shallow, following tergites subpolished and mat; areolet about as high as wide, about  $0.57 \times$  as high as the portion of second recurrent vein above bulla nervulus interstitial to basal vein (Fig. 24d); nervellus intercepted at the middle, brachiella present, extending  $0.3$  the distance to wing margin; ovipositor tip long, straight and pointed, sheath  $0.6 \times$  as long as hind tibia.

Orange. Fifth to ninth flagellar segments white above; frons, vertex, mesoscutum, sometimes pronotum also, with blackish hue; apex of second tergite (sometimes apex of first tergite also), seventh and eighth tergites wholly, yellow; legs largely reddish-brown, except their tibia and tarsi tending to be brownish; hind tarsus dark yellow, with the apex of its fourth segment and fifth segment largely brown; rest of abdomen, except as mentioned above, black.

*Male* : Unknown.

*Length* : ♀, 11.5 mm, fore wing 10 mm; ovipositor sheath 2 mm.

*Holotype* ♀, N.E. BURMA : Kambaiti, 2000 m, 9.vi.1934, Coll. Malaise (STOCKHOLM). *Paratype* ♀, same data as holotype (STOCKHOLM)

*Distribution* : BURMA.

#### 18. *Formostenus (Formostenus) kambaitiensis*, sp. nov. (Fig. 24e)

This species is recognized by having mesopleurm aciculate; propodeal spiracles elongate, not protruding; third tergite only laterally minutely punctate and nervulus distad of basal vein.

*Female* : Face weakly rugose in the middle, smooth with few punctures at sides; clypeus sparsely punctate; malar space granulose  $1.33 \times$  the basal width of mandible; lower tooth of mandible little smaller than the upper; middle area of frons little raised, largely rugose, with few undefined punctures, at sides mat; vertex subpolished, smooth, except with minute sparse punctures just behind ocellar triangle; temple distinctly sparsely punctate, punctures running into striations towards the base of mandible; pronotum largely striate, striae tending to be finer towards the upper margin, lower margin minutely and sparsely punctate; mesoscutum shiny and smooth; scutellum much minutely and sparsely punctate, its lateral carina extending to its basal  $0.33$ ; mesopleurum very finely and weakly aciculate, area just below subtegular ridge and speculum, minutely punctate, prepectal carina extending  $0.75 \times$  the height of mesopleurum, sternaulus extending  $0.7$  the distance to middle coxa; metapleurum finely trans-rugose, juxtacoxal carina distinctly present; propodeum between basal carina and apex rugose, tending to finely wrinkled towards the apex, basad of basal carina largely smooth and shiny, except few punctures around spiracle, spiracle elongate; both the transverse carinae complete, apophysis conical; first abdominal tergite

smooth and shiny, dorso-median longitudinal carinae absent, petiole rounded; second tergite wholly and third tergite laterally closely punctate, middle of third tergite and the following tergites mat; areolet of fore wing about as high as wide, about  $0.57 \times$  as high as the portion of second recurrent vein above bulla, nervulus distad of basal vein (Fig. 24e), nervellus intercepted at the middle, brachiella present as a small stump; ovipositor tip long, pointed and straight; sheath about  $0.5 \times$  as long as hind tibia.

Orange. Fifth to ninth flagellar segments white above; head largely black, except face and clypeus reddish-brown and face along the eye margin with elongated yellow marks; thorax dark orange, except pronotum, mesoscutum and area around subtegular ridge with moderately dark blackish hue; apices of first and second abdominal tergites, third tergite laterally, seventh and eighth wholly, yellow; legs in general reddish-brown, except fore coxa yellowish; apices of all the tarsi and hind leg wholly tending to be brown; first abdominal tergite subapically with a dark brown mark.

*Male* : Unknown.

*Length* : ♀, 11 mm; fore wing 9.5. mm; ovipositor sheath 2mm.

*Holotype* ♀, N.E. BURMA : Kambaiti, 2000 m, 26.iv.1934, Coll. Malaise (STOCKHOLM).

*Distribution* : BURMA.

### 19. *Formostenus (Formostenus) depressus*, sp. nov. (Fig. 25a-e)

This and the following species are somewhat extralimital as they show some affinities with the species of *Albicineta* group of *Isotima*.

This species is chiefly recognized by having pronotal collar, a mark on antennal scrobe, a line above on fore and middle tibia, whitish-yellow. The eyes are prominently high above the level of vertex (Fig. 25a-c).

*Female* : Body subpolished, clypeus minutely and closely punctate; face minutely and densely punctate in the middle, somewhat sparsely at sides; frons strongly rugose in the middle, weakly at sides; vertex shiny, minutely and closely punctate; mandible closely punctate; malar space granulate,  $0.63 \times$  the basal width of mandible; antennal scrobe moderately deep, bounded by a strong semicircular carina; pronotal scrobe obliquely striate, collar shiny, minutely and sparsely punctate, upper margin of pronotum granulate, epomia strong, extending up to upper margin; mesoscutum smooth; scutellum smooth and shiny, its lateral carina extending to its basal  $0.25$ ; metascutellum smooth and shiny; mesopleurum rugulose, tending to be rugose along the prepectal carina above, speculum with minute indistinct punctures, area below subtegular ridge trans-

striate, prepectal carina extending 0.85 the height of mesopleurum; meta-pleurum strongly trans-rugose, juxtacoxal carina strong; propodeum between apex and basal carina finely wrinkled, area basad of basal carina rugulose, apical carina complete, bow-shaped, apophysis moderately strong and conical, spiracle oval; areolet pentagonal, about  $0.85\times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted almost at the middle, brachiella absent; first abdominal tergite with dorso-median carinae faintly present near the spiracle, dorsolateral carinae present except at the petiolar area, tergite largely smooth and shiny except few scattered punctures near the spiracle, second tergite strongly granulose, third and the following tergites mat and subpolished; ovipositor tip long and pointed, sheath about  $1.5\times$  as long as hind tibia.

Black. Antenna with fourth to tenth flagellar segments white above, its scape and first segment reddish-brown; antennal scrobe (Fig. 25a) with two semilunar marks; pronotal collar above, apices of first, second, seventh and eighth tergites broadly, yellow; thorax bright red except propleurae and pronotal scrobe below, black (Fig. 25b), legs black, except fore coxa at base, and middle and hind coxae largely (except narrowly at apex, black), red; fore and middle tibiae (Fig. 25c) with an elongated line in front and hind first to third tarsal segments white; fore wing with a broad band in the middle and another band towards the base, its apical margin narrowly, dark brown; hind wing clear hyaline, apically brownish (Fig. 25d).

*Male* : Essentially similar to female except more slender and polished; clypeus with few punctures; face with sparse shallow punctures, carina above antennal scrobe more specialized and high. Genitalia as in figure 25e.

Face near the antennal sockets and along the eye margin, yellow; eighth to seventeenth flagellar segments, white; pronotum without any black mark, fore and middle tibiae largely yellowish-white, except at their extreme base and apex black.

*Length* : ♀, 9.5-13 mm; fore wing 7.5-9.5 mm; ovipositor sheath 4-6 mm. ♂, 8.5-12 mm; fore wing 6-8 mm.

*Holotype* ♀, PHILIPPINES : LUZON : Laguna, Los Banos, 13.xii.1963, H. and M. Townes (TOWNES). *Allotype* ♂, same data as holotype, 17.x.1953, Townes family (TOWNES). *Paratypes* 9♀♀, 17♂♂. same data as holotype, 1♀, 2♂♂, 22.xi.1953, H. and M. Townes; 2♂♂, 18.x.1953 and 1♂, 19.ix.1963, Townes family. NEGROS : Negros Oriental, Mt. Canlaon, 3600', 1♂, 30.iv.1953; 8♀♀. 5♂♂, 1-8.v.1953, all collected by H., M. & D. Townes. KALINGA : Mt. Prov., 1♀, 3.iii.1953, M.C. Townes. Benaue, Mt. Prov., 1♀, 30.xii.1953, H., M. & D. Townes (TOWNES). NEGROS: Negros Oriental, Mt. Talinas, 1020m, 1♀, 1♂, 29.vii.1958, H.E. Milliron. LUZON :

Camarines Sur, Mt. Iriga, 1♂, 26.iv.1962, H. M. Torreallas (HONOLULU).

*Distribution* : PHILIPPINES Luzon, Negros.

**20. *Formostenus (Formostenus) townesi*, sp. nov. (Fig 25f)**

This species resembles *F. fuscipennis*\*, because of the absence of a band on flagellum. It is distinguished by largely striate pronotum, metapleurum strongly rugoso-striate. In males all the coxae are largely red at base, and fore and middle trochanters black.

*Female*: Body subpolished; face in the middle shallowly and closely punctate, punctures below antennal sockets dense and running into rugosities; clypeus subpolished, minutely and sparsely punctate; frons strongly granulose all over, moderately strong rugae in the middle; vertex mat and dull; temple shiny, without distinct punctation; malar space  $0.63 \times$  the basal width of mandible; pronotum obliquely striate, tending to be wrinkled in the middle, pronotal collar and its lower margin largely smooth; and subpolished; epomia strong, not reaching up to extreme upper margin of pronotum; mesoscutum, scutellum, metascutellum smooth; lateral carina of scutellum extending  $0.3$  at its base; mesopleurum largely smooth and shiny except short ridges along the inner margin of prepectal carina and along the anterior margin of speculum, prepectal carina extending  $0.8 \times$  the height of mesopleurum, sternaulus extending  $0.75$  the length of mesopleurum; metapleurum and propodeum between apex and basal carina with moderately strong rugoso-striae, area basad of basal carina smooth and subpolished, apical carina strong and acutely arched in the middle, apophysis short and crest-like, spiracle roundish; areolet pentagonal, about  $0.55 \times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted slightly above the middle, brachiella absent; first abdominal tergite little less than  $3 \times$  as long as wide at apex, spiracle close to each other than to apex, petiole ventrally rounded, tergite dorsally smooth and shiny, dorso-lateral carinae moderately long and strong, dorso-median carinae weak; second tergite granulose, third and the following tergites mat and subpolished; ovipositor moderately long, its tip pointed, ovipositor sheath  $0.83 \times$  as long as hind tibia.

Black. Antenna entirely black, except first flagellar segment yellowish in front; head entirely black; thorax and base of first tergite reddish, except propleura largely and pronotal collar, black; apices of first, second, seventh and eighth tergites, yellowish; legs largely black, except their coxae, red; fore tibia with an elongate yellow line below; basal  $0.5$  of hind first tarsal segment and the bases of following segments, yellowish; fore wing with a broad band in the middle, another band towards the base and its extreme apex, dark-brown; apical margin of hind wing faintly brownish.

*Male* : Essentially similar to female except smaller and more slender; face and clypeus more shiny with few minute punctures; antennal scrobe shallow, carina normal; vertex and temple shiny with minute and very sparse punctures; thorax weakly sculptured; propodeum tending to be reticulate. Genitalia as in figure 25f.

Colour similar to female, except face broadly reddish-yellow in the middle; thorax entirely red, with no black marking; middle coxa apically and apical more than 0.6 of hind coxa black; fore and middle tibiae broadly yellowish on their outer side; hind tarsus almost black; apical margin of first to third and seventh abdominal tergites, white; wings with similar markings as in female.

*Length* : ♀, 8.5 mm; fore wing 7 mm; ovipositor sheath 2.5 mm. ♂, 7.5 mm; fore wing 5.75mm.

*Holotype* ♀, PHILIPPINES: LUZON: Mt. Polis, 1650 m, 29. xii. 1958, H.,M. & D. Townes (TOWNES). *Allotype* ♂, MINDORO ORIENTALIS: Ilong, Mt. Halcon, 1350m, 9. v. 1954, M. & D. Townes (TOWNES). *Paratypes* 1 ♀, 2 ♂♂. 1 ♀, same data as holotype; ♂, same data as Allotype, 11. v. 1954. NEGROS : Negros Oriental, Mt. Canlaon, 1080 m, 1♂, 2. v. 1953, all collected by H.,M. & D. Townes (TOWNES).

*Distribution* : PHILIPPINES : Luzon, Mindoro and Negro.

## 21. *Formostenus* (*Formostenus*) *fuscipennis*, sp. nov. (Fig.26a-d)

This species can be recognized from *F. townesi*\*, by having pronotum largely smooth and shiny, its extreme upper margin finely aciculate, malar space  $0.5 \times$  the basal width of mandible and metapleurum weakly rugose. In males, all the coxae are almost black and fore and middle trochanters whitish.

*Female* : Clypeus subpolished, minutely and sparsely punctate; face coarsely and shallowly punctate, punctures running into rugosities, at sides with sparse shallow punctures; antennal scrobes deep, bounded by simple carina; frons dull, strongly granulose; vertex mat and subpolished; temple shiny, minutely punctate; malar space granulose,  $0.6 \times$  as wide as the basal width of mandible; pronotum largely smooth and shiny, except few striae along the posterior margin, its extreme upper margin finely aciculate; mesoscutum, scutellum and metascutellum smooth and shiny except some rugosities near the base of subtegular ridge, prepectal carina extending  $0.75 \times$  the height of mesopleurum; lateral carina of scutellum extending  $0.3 \times$  at its base; metapleurum weakly rugose; propodeum between basal carina and apex with moderately strong wrinkles, area basad of basal carina smooth, apical carina evenly arched, apophysis moderately strong, crest-like, spiracles moderately large and oval, areolet pentagonal, about  $0.4 \times$  as high as the portion of second recurrent

vein above bulla, nervulus opposite or little distad of basal vein, nervellus intercepted nearly at the middle, brachiella absent (Fig. 26b); first abdominal tergite less than  $3 \times (2.5 \times)$  as long as wide at apex, tergite smooth, petiolar area rounded, dorsal carinae weakly present, second tergite granulose, following tergites mat, and subpolished; ovipositor sheath about  $0.85 \times$  as long as hind tibia.

**Black.** Antennal flagellum without any band, except its first and second segments yellowish in front; head entirely black; thorax wholly and more than basal 0.5 of first tergite, red or reddish; apices of second, third tergites, seventh and eighth tergites broadly, yellowish (Fig. 26a); fore wing with a board band in the middle and a narrow band towards the base and its apex also narrowly, dark brown; hind wing clear hyaline; fore and middle coxae reddish except their extreme apices blackish; fore and middle femora reddish-brown, except near the bases and under areas, dark-brown, rest of fore and middle legs blackish-brown; fore tibia with a yellowish line below; hind leg with coxa reddish, rest largely blackish-brown, with bases of each tarsal joint yellow.

**Male :** Similar to female, except frons shiny with few scattered punctures and a median groove; pronotum largely smooth and shiny with few short ridges in the middle; metapleurum smooth and shiny with some rugosities near the base of hind coxa; fore wing with nervulus slightly distad of basal vein, nervellus intercepted slightly below the middle; second tergite densely punctate, following tergites mat and subpolished. Genitalia as in figure 26 c.

**Black.** Face with an oval yellow mark in the middle; mesosternum and metasternum black; first to third and seventh tergites with yellow apical bands; legs in general dark brownish-black, with fore and middle trochanters wholly and a line above on their tibiae, whitish (Fig. 26 d); wings with similar markings as in female.

**Length :** ♀, 6.5-7.5 mm; fore wing 4.25-5.5 mm; ovipositor sheath 2.0-2.5 mm. ♂, 4.25-6.75 mm; fore wing 3.25-4.5 mm.

**Holotype** ♀, PHILIPPINES : LUZON : LOS Banos, Laguna, 17.x.1953, Townes family (TOWNES), **Allotype** ♂, MINDORO : Alcate, Victoria, 10.iv.1954, H.,M. & D. Townes (TOWNES). **Paratypes** 11 ♀♀, 10 ♂♂. LUZON : LOS Banos, Laguna, 2 ♀♀, 19-22. ix. 1953; 1 ♀, 18.x.1953, all above collected by H.,M. & D. Townes. Mt. Province, Benaue, 1 ♀, 1.i.1954, H.,M & D. Townes; 1 ♀, 1905, W. Beyer. Mt. Polis, 1 ♀, 29.xii.1953, H.,M. & D. Townes (TOWNES). Mt. Isarog, Camarines Sur, 20 km E. of Naga, 500-600 m, 1 ♀, 7.iv.1963, H.M. Torrevillas (HONOLULU). MINDORO: Alcate, Victoria, 5 ♂♂, 7-11.iv.1954, H.,M. & D. Townes; S. Luis Calapan, 2 ♂♂, 15 & 16.iv.1954 and 3 ♂♂, 4.v.1954, H.,M. & D. Townes. NEGROS : Negros Oriental, Mt. Canlaon, 1000 m, 1 ♀, 7.v.1953, H.,M. & D. Townes (TOWNES).

*Distribution* : PHILIPPINES : Luzon, Mindoro and Negros.

**22. *Formostenus (Formostenus) problematicus*, sp. nov. (Fig. 26 e)**

This species is very close to *F. cotabatensis*\* It can be recognized by having frons granulose, pronotum largely smooth and apical band on second tergite broad and uniform. The colour of male is entirely different from the male of *cotabatensis*. In this species male is almost black, with no red markings.

*Female* : Body subpolished, clypeus shiny with minute sparse punctures; face coarsely punctate, punctures above near antennal sockets very dense and area appears to be rugoso-punctate; antennal scrobe not so deep, bounded by simple carina; frons strongly granulose; vertex almost smooth and shiny; temple shiny, sparsely and minutely punctate; malar space granulose,  $0.6 \times$  the basal width of mandible; pronotum shiny, pronotal collar and lower margin smooth, upper margin of pronotum minutely punctate, pronotal scrobe in the middle with few rugosities, epomia moderately long and strong but not reaching extreme upper margin; mesoscutum, scutellum and metascutellum smooth; lateral carina of scutellum more or less confined to its base; mesopleurum largely smooth and shiny except for few short ridges anterior to the speculum, sternaulus extending  $0.7$  the length of mesopleurum, prepectal carina extending  $0.7$  the height of mesopleurum; metapleurum weakly rugose except its basal  $0.3$  smooth; propodeum between apex and basal carina rugoso-wrinkled, tending to be finely wrinkled towards the apex, area basad of basal carina near the spiracles with undefined shallow punctures, apical carina moderately strong, strongly arched in the middle, apophysis low crest-like, spiracle small roundish; areolet pentagonal, small, about  $0.5 \times$  as high as the portion of second recurrent vein above bulla, nervulus interstitial, nervellus intercepted at the middle, brachiella absent; first abdominal tergite with dorsal carinae present except indistinct towards the apex, tergite smooth and shiny; second tergite granulose, third and following tergites mat and subpolished; ovipositor moderately long and its tip pointed; ovipositor sheath  $0.9 \times$  as long as hind tibia.

Black. Antenna with fourth to ninth flagellar segments white above; scape, pedicel and first flagellar segment reddish-yellow in front; head almost entirely black; thorax, all the coxae and basal  $0.25$  to  $0.5$  of first abdomen tergite, red; legs blackish-brown, except hind femur with reddish tinge and bases of hind tarsal segments narrowly white; fore wing with a broad band in the middle, another band towards the base and its apical margin narrowly, dark brown; hind wing apically brownish.

*Male* : Essentially similar to female in sculpture but differs in colour. Face with distinct coarse punctures, punctures not running into

rugosities; propodeum distinctly wrinkled. Genitalia as in figure 26c.

Black. Colour entirely different from female. Body entirely black, except for two oval spots along the carina of antennal scrobe, pronotal collar above, apices of first to third and seventh tergites, a line on outer margin of fore and middle tibiae, white; antennal scape reddish in front; wing markings similar to female except lighter in shade.

*Length* : ♀, 6.5-8 mm; fore wing 3.5-5.5 mm; ovipositor sheath 1.5-2.5 mm. ♂, 4-7.5 mm; fore wing 3.5-5 mm.

*Holotype* ♀ and *Allotype* ♂, PHILIPPINES : NEGROS : Negros Oriental, Mt. Canlaon. 1200 m, 8.v.1953, H. M. & D. Townes (TOWNES). *Paratypes* 14 ♀♀, 13 ♂♂. Same data as holotype, 3 ♀♀, 2 ♂♂, 29.iv.-7.v.1953. LUZON : Laguna, Los Banos, 2 ♀♀, 25.x.-29.xi.1952 & 4 ♀♀, 19.ix.-22.xi.1953. Mt. Province, Benaue, 2 ♂♂, 22.xi.1952 and 1 ♀, 31.xii.1953. Mt. S. Thomas, 2200 m, near Benaue, 1 ♀, 28.xii.1952 and 1 ♂, 4.iv.1953. Mt. Polis, 2000 m, 1 ♂, 29.xii.1953 and 1 ♀, 1.ii.1954. Talubin, 2 ♂♂, 27.xii.1953. Tagaytay, Btg., 1 ♂, 4.x.1953. PALAWAN : Pto. Princessa, 1 ♂, 7.xii.1952. MINDORO : Alcate, Victoria, 2 ♀♀, 2 ♂♂, 5-10.iv.1954. S. Luis Calapan, 1 ♂, 14.iv.1954, all collected by H. Townes and family (TOWNES).

*Distribution* : PHILIPPINES : Negros, Luzon, Mindoro and Palawan.

### 23. *Formostenus* (*Formostenus*) *cotabatensis*, sp. nov. (Fig. 26 f)

This species is distinguished by having frons granulose, pronotum rugose, propodeum strongly rugoso-wrinkled and tending to be reticulate in the middle. The apical band on first tergite narrowed in the middle; in males the thorax is largely red.

*Female* : Body subpolished; clypeus with few minute scattered punctures, face ruguloso-punctate in the middle, punctures at sides not well defined; frons strongly rugose in the middle, rugulose at sides, antennal scrobe deep, bounded by simple carina; vertex dull, mat; temple shiny, minutely and sparsely punctate; malar space granulose, 0.5× the basal width of the mandible; mandible shallowly coarsely punctate, punctures running into weak ridges; pronotal scrobe rugose in the middle, pronotal collar smooth and shiny, upper margin of pronotum with indistinct punctures; epomia strong but not reaching upper margin of the pronotum; mesoscutum, scutellum, metascutellum smooth; lateral carina of scutellum extending to its basal 0.3; mesopleurum almost smooth and shiny except few short carinae along the anterior margin of speculum; metapleurum and propodeum strongly rugoso-wrinkled, wrinkles tending to be reticulate in the middle of propodeum, except extreme base of metapleurum and area basad of basal carina of propodeum smooth, both the transverse carinae strong and bow-shaped, apophysis short and crest-like,

spiracle oval; areolet pentagonal about  $0.5 \times$  as high as the portion of second recurrent vein above bulla, nervulus slightly apicad of basal vein, nervellus intercepted at or slightly above the middle, brachiella absent; first abdominal tergite with dorso-median carina faintly present between spiracle and base, dorso-lateral carinae present except faint towards the base, tergite largely smooth and shiny, second tergite granulose, third and fourth tergites mat and subpolished; ovipositor long and pointed, ovipositor sheath about  $1.0 \times$  as long as hind tibia.

Black. Antenna with fourth to eighth flagellar segments white above, its scape and first segment reddish-brown in front; face in the middle above with reddish hue; thorax and base of first tergite reddish-yellow or red; apices of first, second, seventh and eighth tergites broadly yellow, band on second tergite narrowed in the middle; fore and middle coxae reddish, their trochanters, tibiae and tarsi, blackish, femora reddish except their bases and apices narrowly dark brown; hind coxa red, except black at apex above, rest of leg entirely black, except its first to third tarsal segments narrowly at their bases yellowish-white; fore wing with a broad band in the middle and a narrow band towards the base and also narrowly at apex, dark brown; hind wing clear hyaline except brownish apically.

*Male* : Essentially similar to female except more slender and polished; metapleurum weakly rugose. Genitalia as in figure 26 f.

Black. Flagellum without any white band; face broadly red in the middle; fore and middle tibiae on outer side, apices of first, second, third and seventh abdominal tergites broadly, yellow; wings with similar markings as in female.

*Length* : ♀, 7.85 mm; fore wing 5-6 mm; ovipositor sheath 2-2.5 mm. ♂, 4.5-8 mm; fore wing 3.5-5.5 mm.

*Holotype* ♀, PHILIPPINES : COTABATO : PIKIT, 13.vi.1953, H. Townes (TOWNES). *Allotype* ♂, same data as holotype. *Paratypes* 9 ♀♀, 16 ♂♂, same data as holotype, 3 ♀♀, 1 ♂, 13.vi.1953. Parang, 4 ♂♂, 23.iii.1953 and 1 ♀, 16.vi.1953. NEGROS : Negros Oriental, Mt. Canlaon, 1,100 m, 4 ♂♂, 7-9.v.1953, H.,M. & D. Townes. MINDORO : San Luis, Calapan, 1 ♀, 4 ♂♂, 13-18.iv.1954, H.,M. & D. Townes. LUZON : Los Banos, Laguna, 1 ♂, 23.ix.1953; 1 ♀, 1 ♂, 8 & 22.xi.1953. and 1 ♂, 18.x.1953, H.,M. & D. Townes. Mt. Makiling, 1 ♂, no other data, Baker (TOWNES). Mt. Province, Abatan, Buguias, 60 km S. of Bontoc 1800-2000 m, 1 ♀, 12.v.1964, H.,M. Torre-villas (HONOLULU).

*Distribution* : PHILIPPINES : Cotabato, Mindoro, Negros and Luzon.

This species superficially resembles *Isotima albicineta* Ashmead, and can be confused with that species. The two can be distinguished by the length of first abdominal segment, shape of petiole, postpetiole, and males with fuscous marking on wings in this species.

TABLE 1. DISTRIBUTIONAL TABLE  
OF INDIAN SPECIES OF THE  
GENERA OF ISOTIMA-COMPLEX

[illegible]

TABLE 2. DISTRIBUTIONAL TABLE OF  
THE WORLD SPECIES AND SUBSPECIES  
OF THE GENERA OF ISOTIMA-COMPLEX

[illegible]

| SPECIES AND SUBSPECIES | Indian subregion |       |          |        | Indonesia/Malaysia |          |       | Philippines |         |          |         |        |          | African    |           |
|------------------------|------------------|-------|----------|--------|--------------------|----------|-------|-------------|---------|----------|---------|--------|----------|------------|-----------|
|                        | India            | Burma | S. China | Taiwan | Java               | Krakatau | Sabah | Luzon       | Mindoro | Mindanao | Palawan | Negros | Cotabato | Madagascar | S. Africa |
| palawanensis*          |                  |       |          |        |                    |          |       |             |         |          | ×       | ×      |          |            |           |
| panhalensis*           | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| punctata*              | ×                |       |          |        |                    |          |       | ×           |         |          |         |        |          |            |           |
| pusilla (Szep.)        | ×                | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| quadrata (Szep.)       | ×                |       |          |        | ×                  |          |       |             |         |          |         |        |          |            |           |
| ruficollis (Holm.)     | ×                |       |          |        | ×                  |          |       |             |         |          |         |        |          |            |           |
| rufipleuralis*         | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| rufithorax (Szep.)     | ×                | ×     |          | ×      | ×                  | ×        |       | ×           |         |          |         |        | ×        |            |           |
| semirufa*              | ×                |       | ×        |        |                    |          |       |             |         |          |         |        |          |            |           |
| taiwenella (Uchida)    |                  |       |          | ×      |                    |          |       |             |         |          |         |        |          |            |           |
| tricolor (Brulle)      |                  |       | ×        |        |                    |          |       |             |         |          |         |        |          |            |           |
| variegata*             |                  |       |          |        |                    |          |       |             |         |          |         |        | ×        |            |           |
| Genus Formostenus      |                  |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| Uchida                 |                  |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| Subgen. Formostenus    |                  |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| Uchida                 |                  |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| aciculatus*            |                  | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| angularis (Uchida)     |                  |       |          | ×      |                    |          |       |             |         |          |         |        |          |            |           |
| bidentatus*            | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| burmensis*             |                  | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| cherraensis*           | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| cotabatensis*          |                  |       |          |        |                    |          |       | ×           |         |          |         |        | ×        | ×          |           |

| SPECIES AND SUBSPECIES      | Indian subregion |       |          |        | Indonesia/Malaysia |          |       | Philippines |         |          |         |        |          | African    |           |
|-----------------------------|------------------|-------|----------|--------|--------------------|----------|-------|-------------|---------|----------|---------|--------|----------|------------|-----------|
|                             | India            | Burma | S. China | Taiwan | Java               | Krakatau | Sabah | Luzon       | Mindoro | Mindanao | Palawan | Negros | Cotabato | Madagascar | S. Africa |
| decens (Tosq.)              |                  |       |          |        | ×                  |          |       |             |         |          |         |        |          |            |           |
| depressus*                  |                  |       |          |        |                    |          |       | ×           |         |          |         | ×      |          |            |           |
| flavofasciatus*             | ×                | ×     | •        |        |                    |          |       |             |         |          |         |        |          |            |           |
| flavorbitalis*              | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| fuscipennis*                |                  |       |          |        |                    |          |       | ×           | ×       |          |         | ×      | ×        |            |           |
| kambaitiensis*              |                  | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| malaisei*                   |                  | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| piceus*                     |                  |       |          |        |                    |          | ×     |             |         |          |         |        |          |            |           |
| problematicus*              |                  |       |          |        |                    |          |       | ×           | ×       |          | ×       | ×      |          |            |           |
| pubescenus*                 |                  |       | ×        |        |                    |          |       |             |         |          |         |        |          |            |           |
| rufiscens*                  |                  | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| rugipectus*                 | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| rugosus*                    | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| striatus*                   | ×                |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| tanypetiolatus*             |                  | ×     |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| townesi*                    |                  |       |          |        |                    |          |       |             | ×       |          |         | ×      |          |            |           |
| Subgen. <i>Indostenus</i> * |                  |       |          |        |                    |          |       |             |         |          |         |        |          |            |           |
| nigrus*                     | ×                |       |          |        | ×                  |          |       | ×           | ×       |          |         |        |          |            |           |

### SUMMARY

It is a revision of World genera and species of *Isotima*-Complex. The *Isotima*-Complex and its related genera have now been studied in detail and the identity and synonymy of the various genera have been established. This has resulted in the recognition of four generic groups falling within the old definition of *Isotima*-Complex. *Gambroides* Betrem (= *Vadonina* Seyrig), *Formostenus* Uchida and *Fotsiforia* Seyrig, which were considered as synonyms of *Isotima*, have been revalidated. Altogether 53 species under 4 genera are treated in this revision from the World. Of these 39 species are new to science. The total number of species reported from India are 26, of which 21 are new.

The species of *Isotima*-Complex contain many parasites of pests associated with our agricultural crops as well as forest. With proper knowledge of their species, hosts, distribution etc., it is hoped that many of these may be economically exploited for the biological control of pests.

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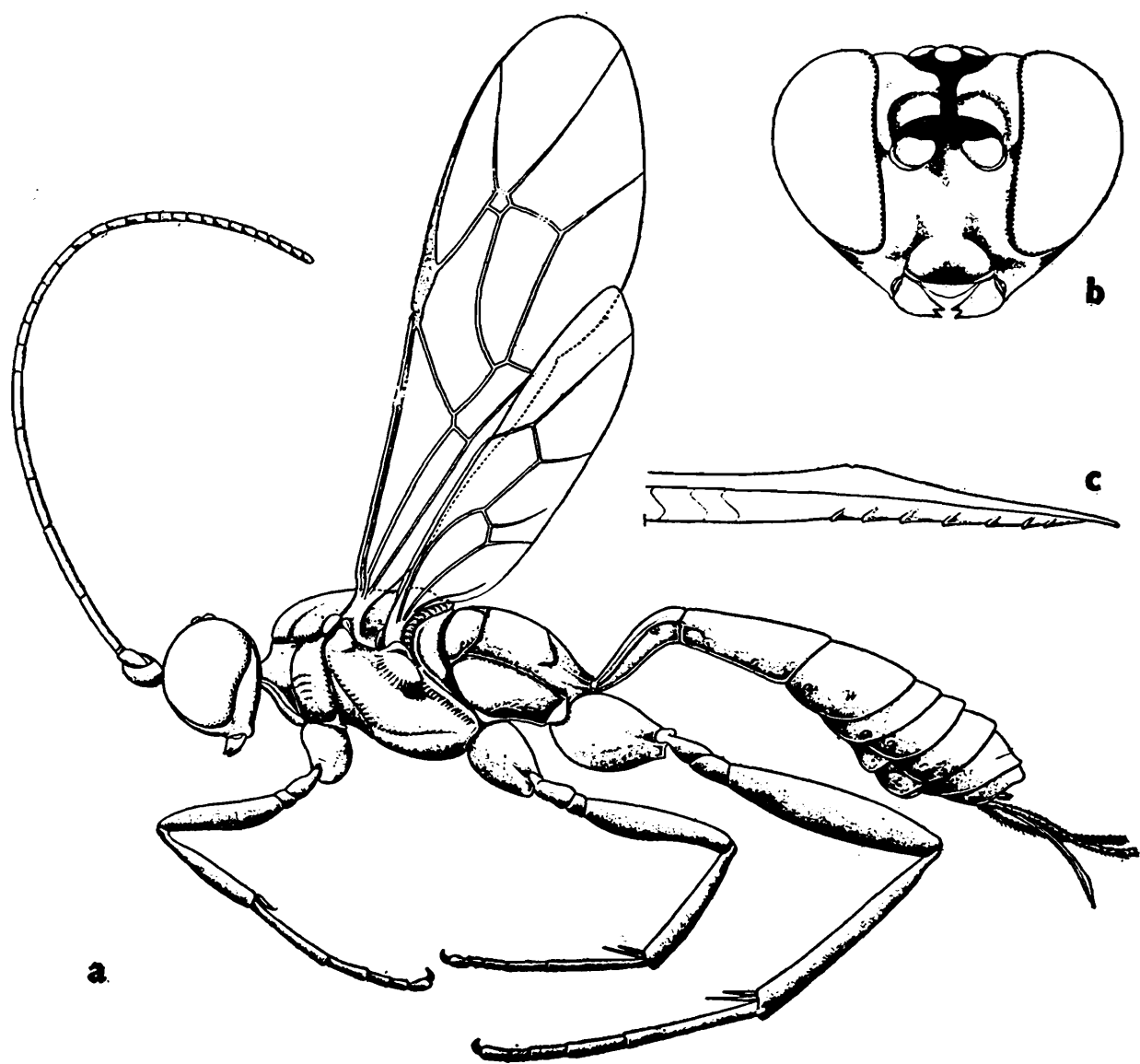


Fig. 3. *Fotsiforia assamense* : a, body side view; b, front view of head; c, ovipositor.

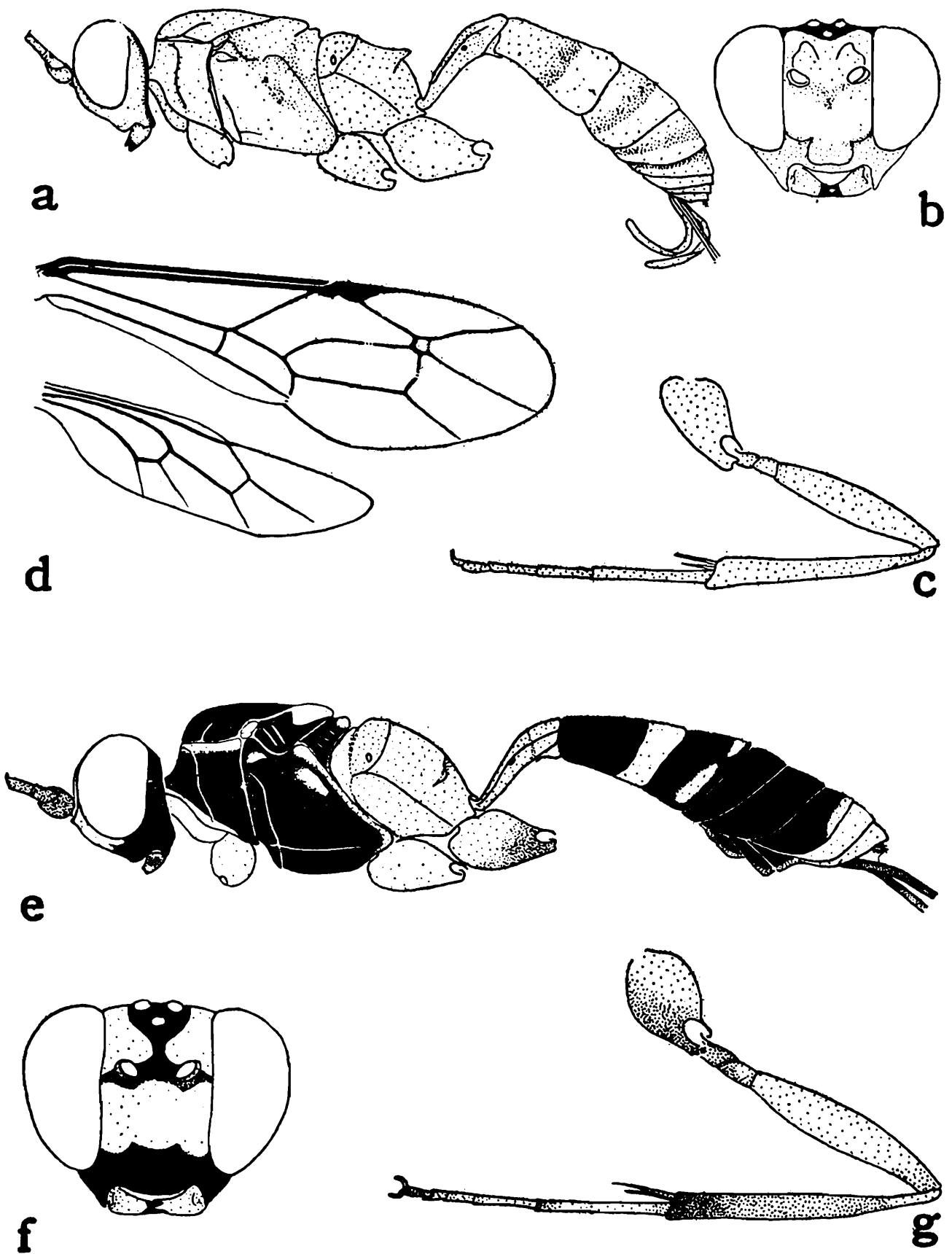


Fig. 4. *Fotsiforia carinifrons* : a, body side view; b, front view of head; c, hind leg; d, fore and hind wings. *F. mysorens* : e, body side view; f, head front; g, hind leg.

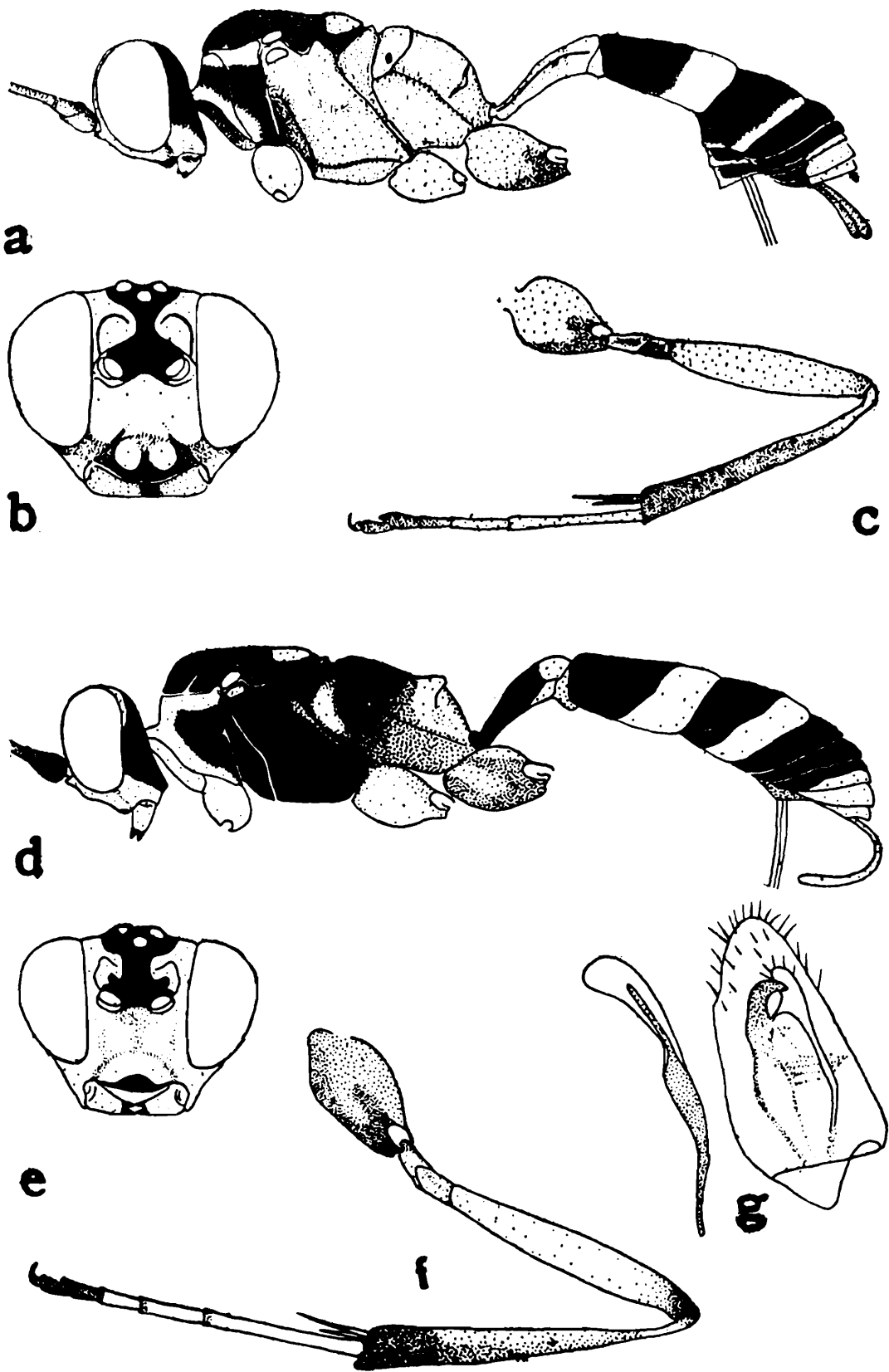


Fig. 5. *Fotsiforia assamense* : a, body side view; b, head front view; c, hind leg. *F. sundrica* : d, body side view; e, head front view; f, hind leg; g, male genitalia.

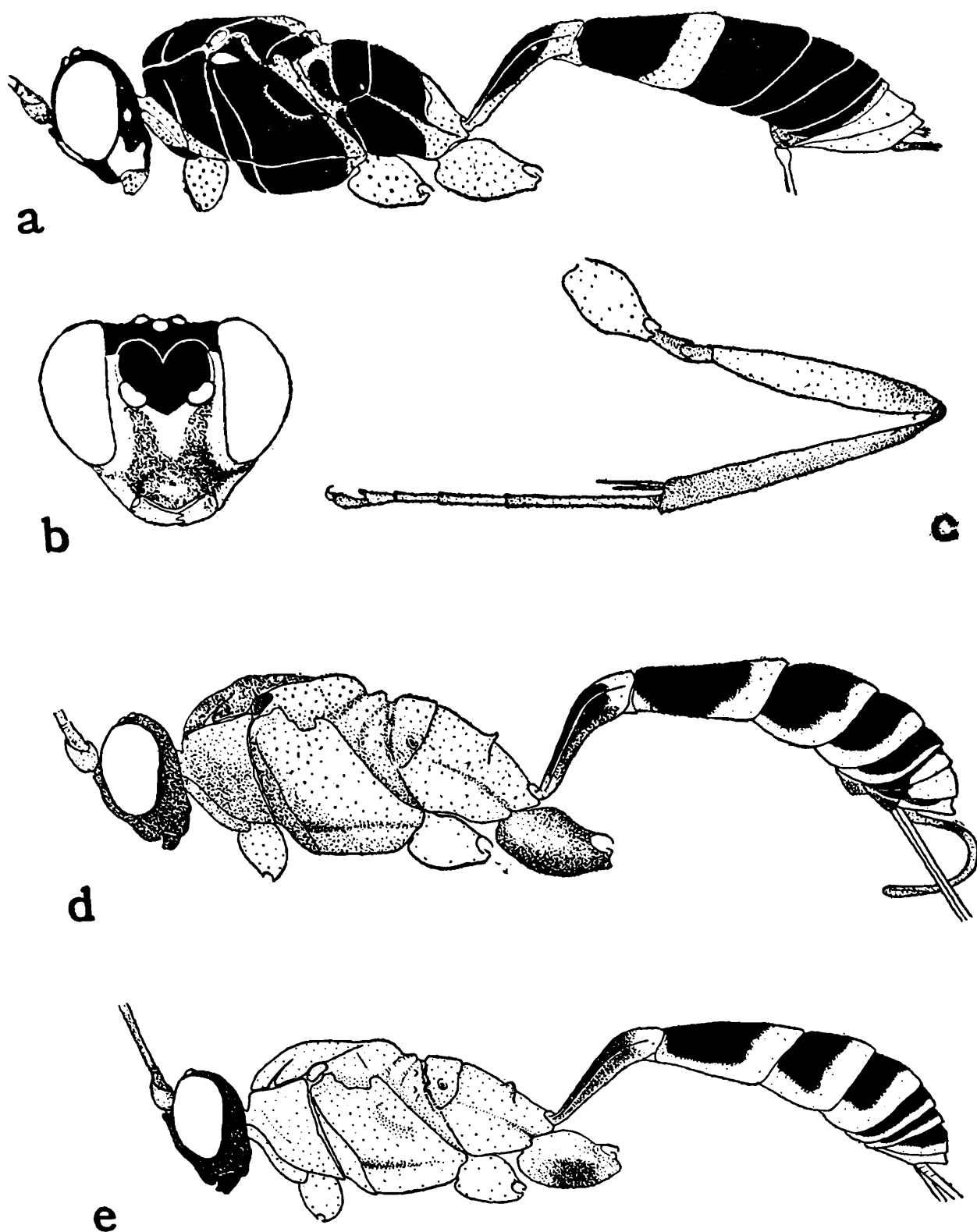


Fig. 6. *Fotsifoia flavifrons* : a, body side view; b, head front view; c, hind leg; d, body side view, male. *F. similis* : e, body side view, male.

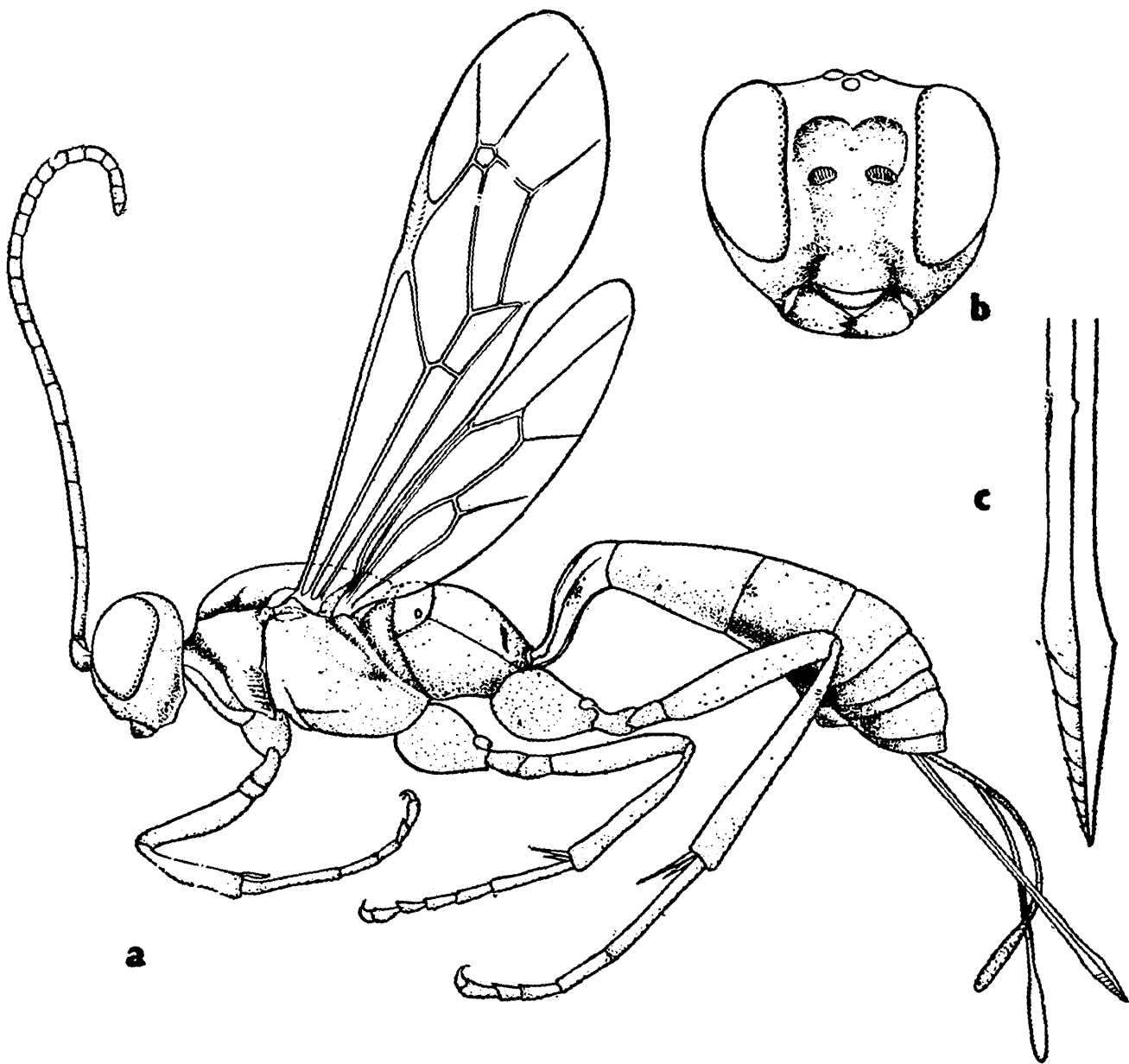


Fig. 7. *Gambroides javensis* (Rohwer) : a, body side view; b, head front view; c, ovipositor.

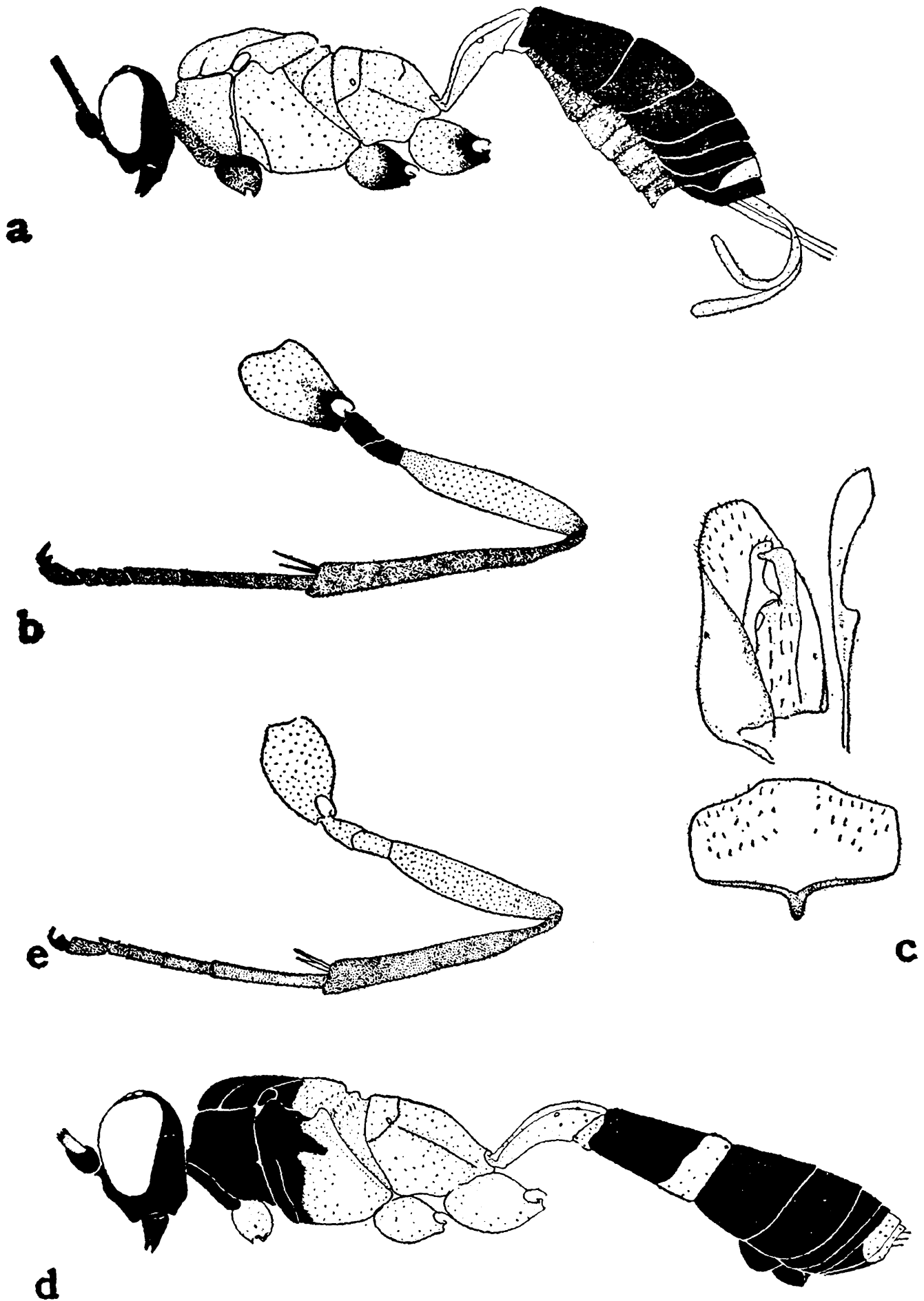


Fig. 8. *Gambroides nimbiopennis* : a, body side view; b, hind leg; c, male genitalia. *G. rangaparensis* : d, body side view; e, hind leg.

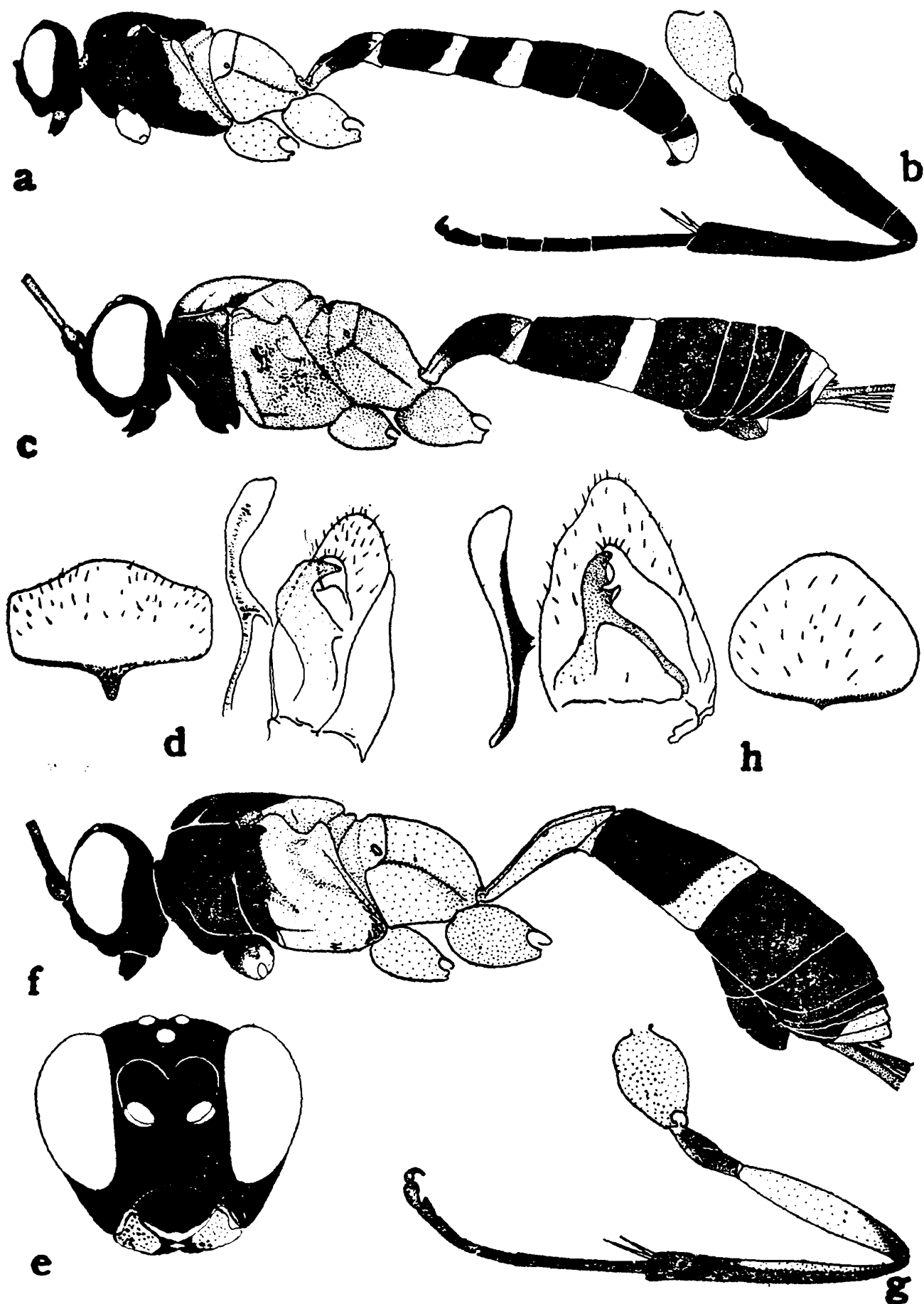


Fig. 9. *Gambroides chilonis chilonis* : a, body side view, male; b, hind leg, male. *G. c. philippina* : c, body side view; d, male genitalia. *G. javensis* : e, head front view; f, body side view; g, hind leg; h, male genitalia.

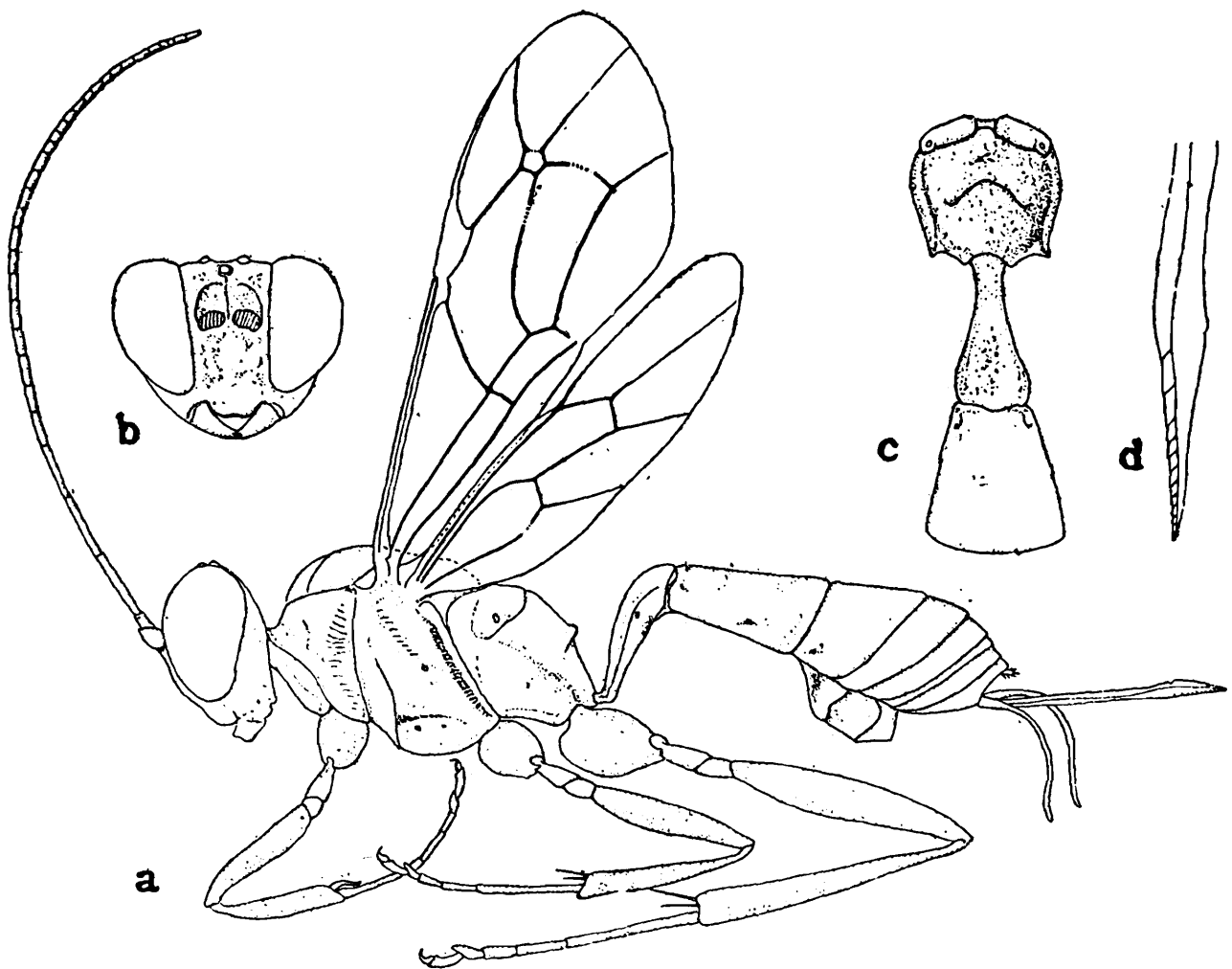


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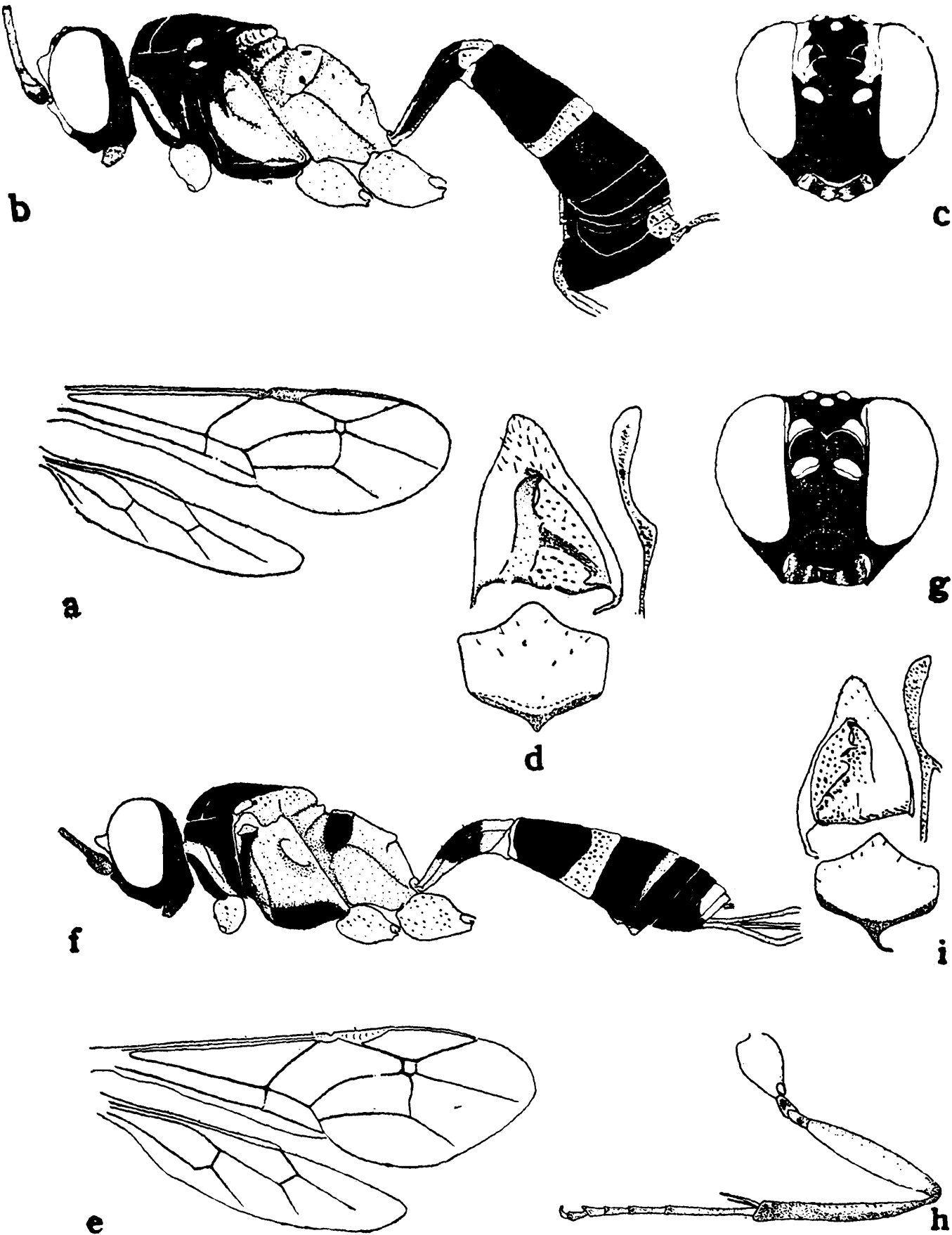


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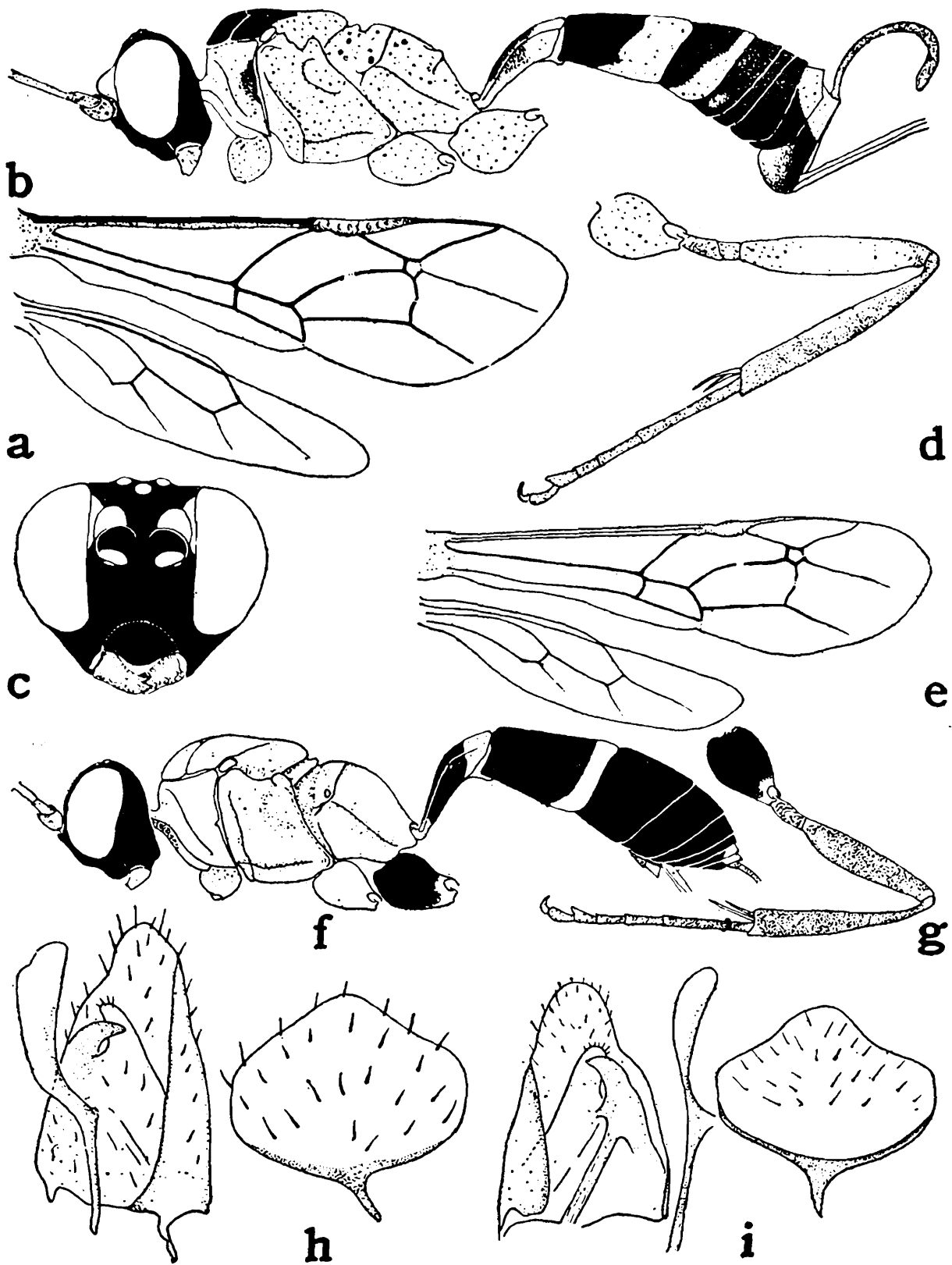


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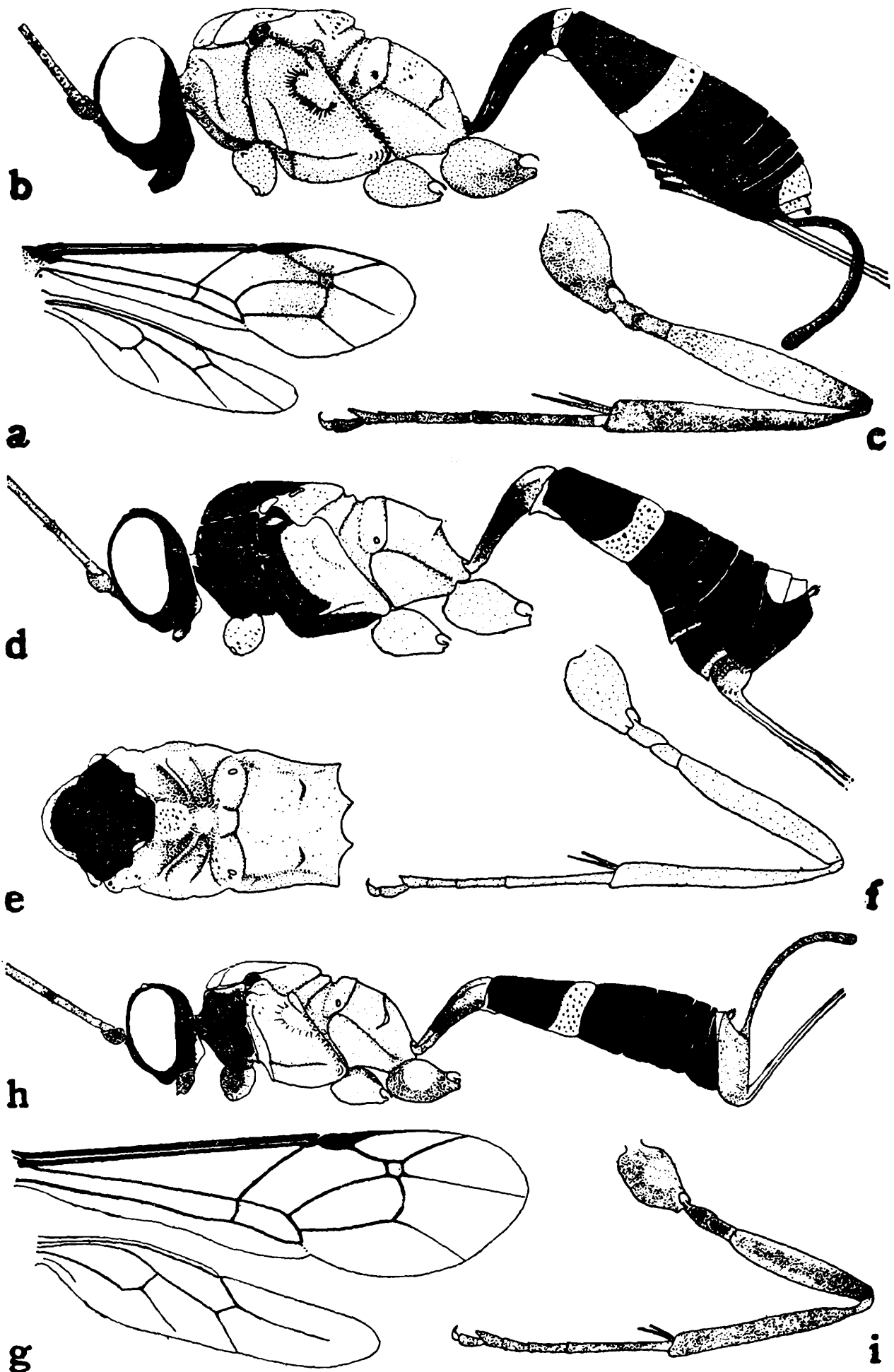


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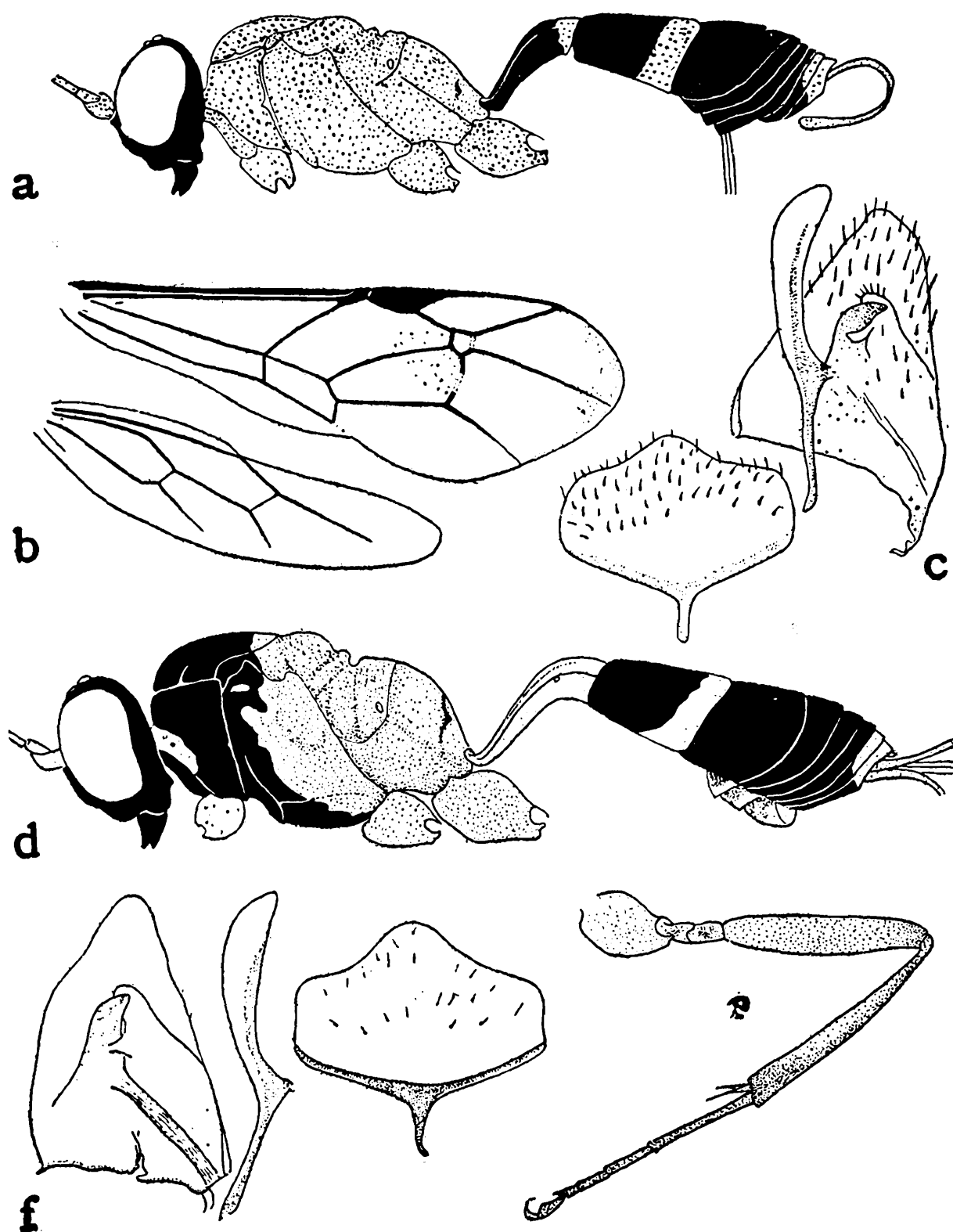


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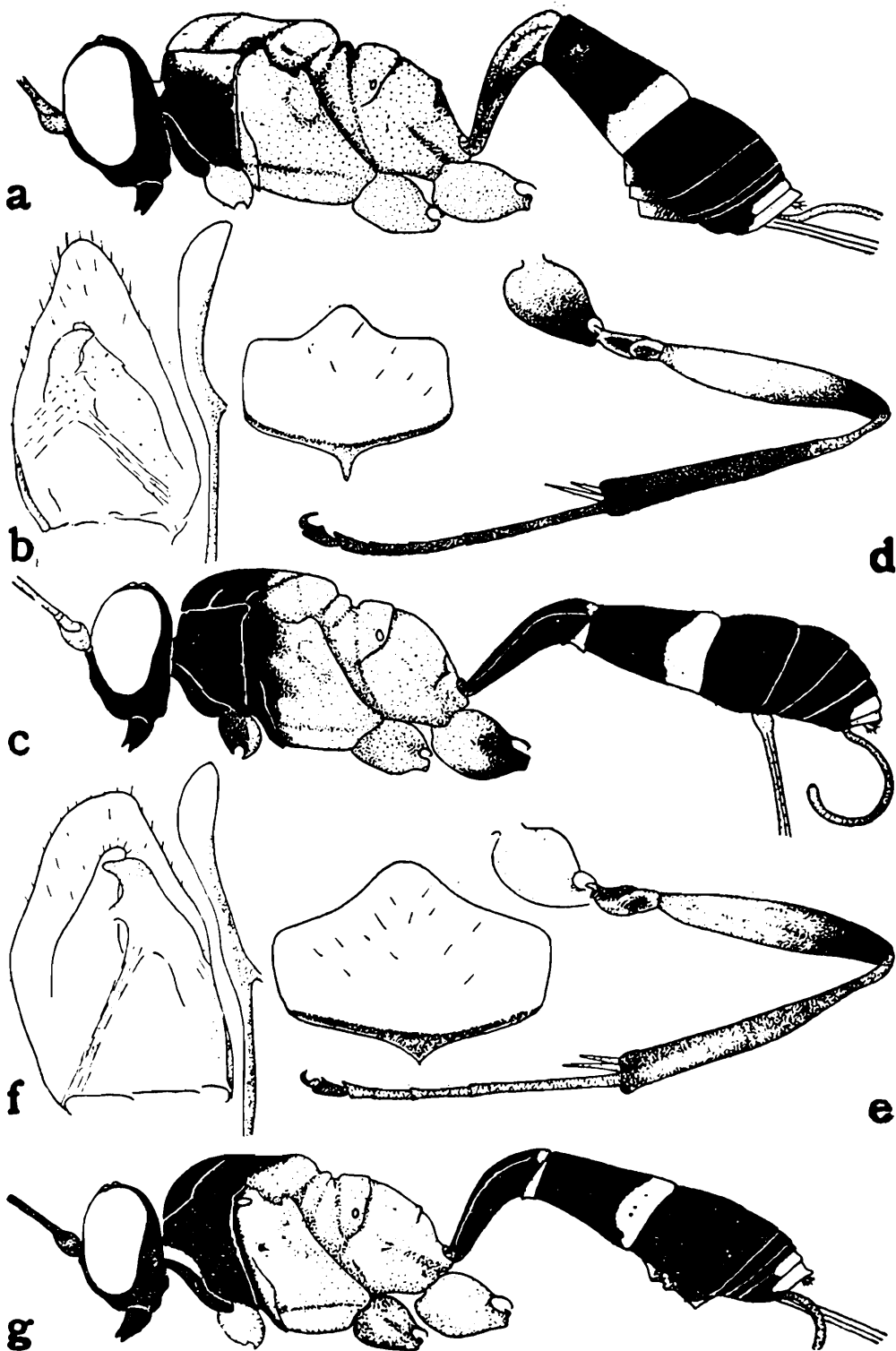


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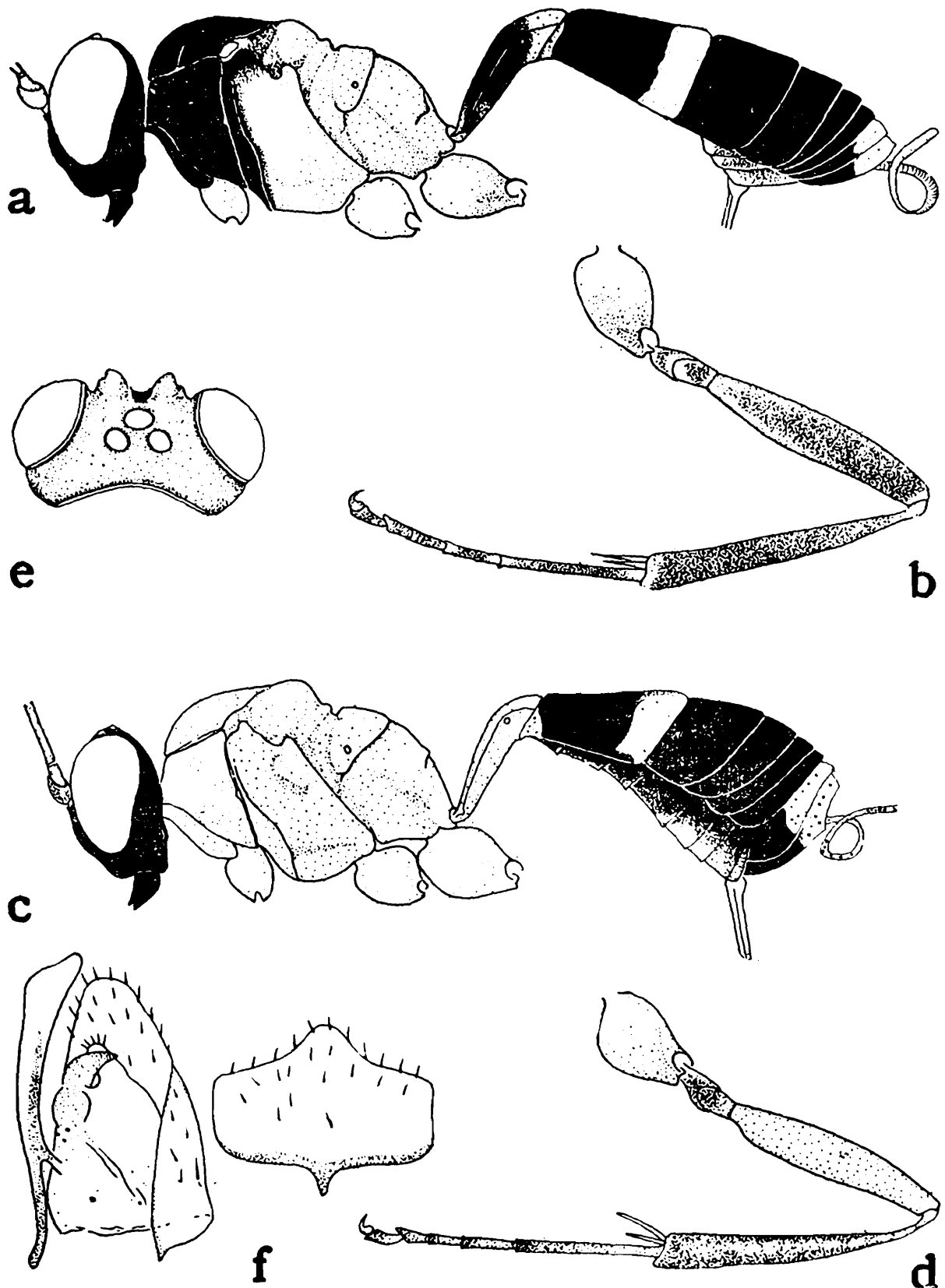


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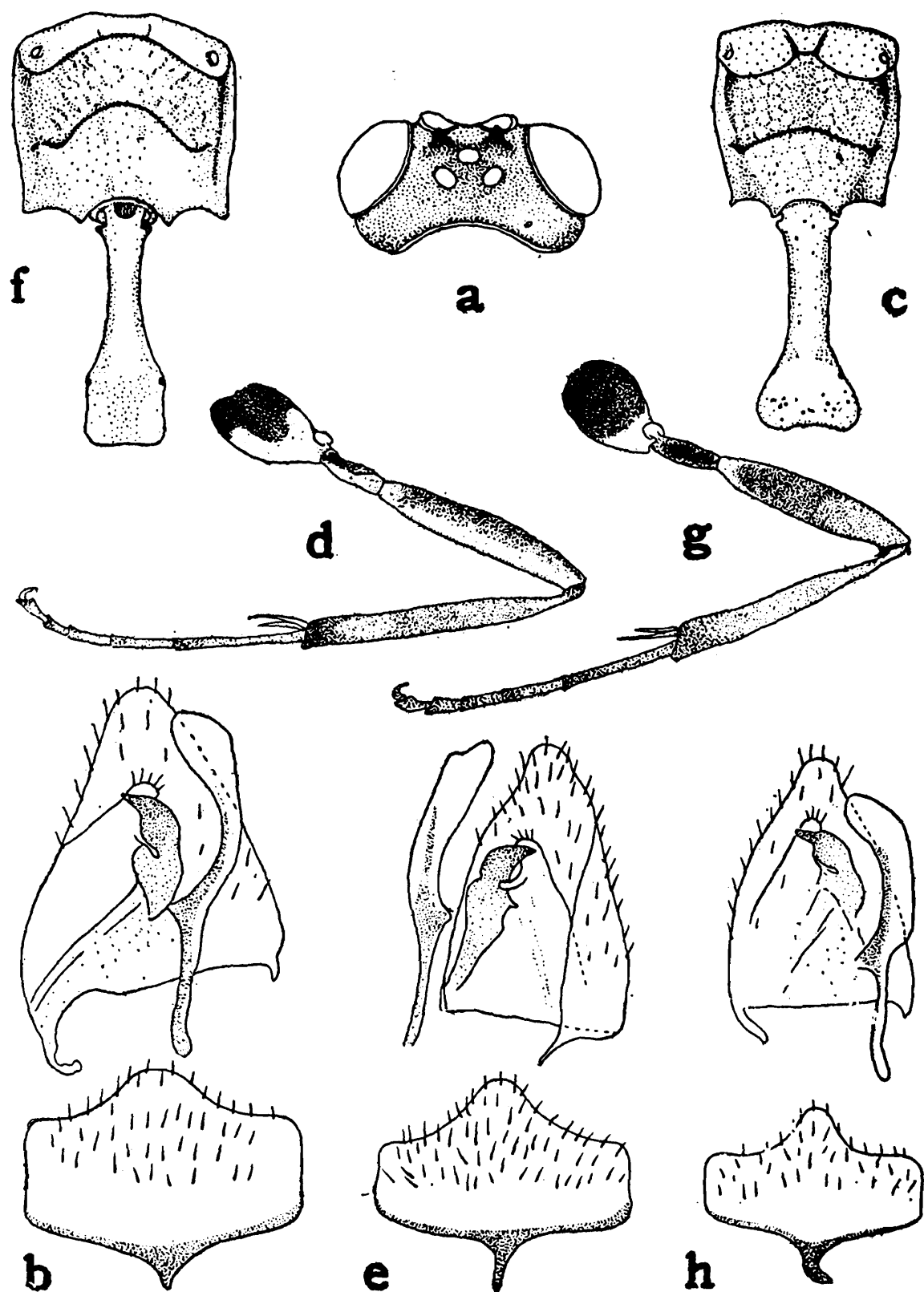


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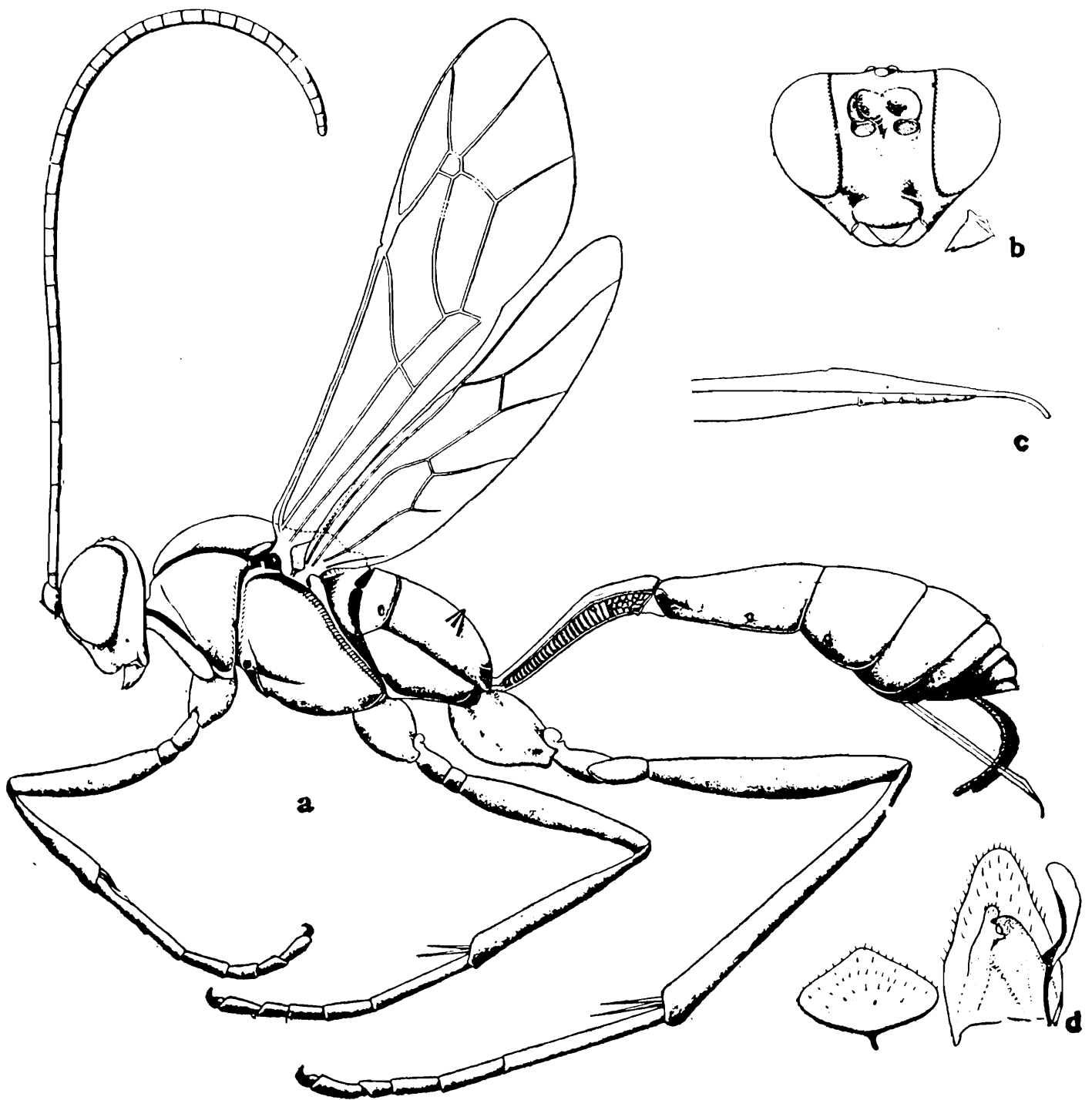


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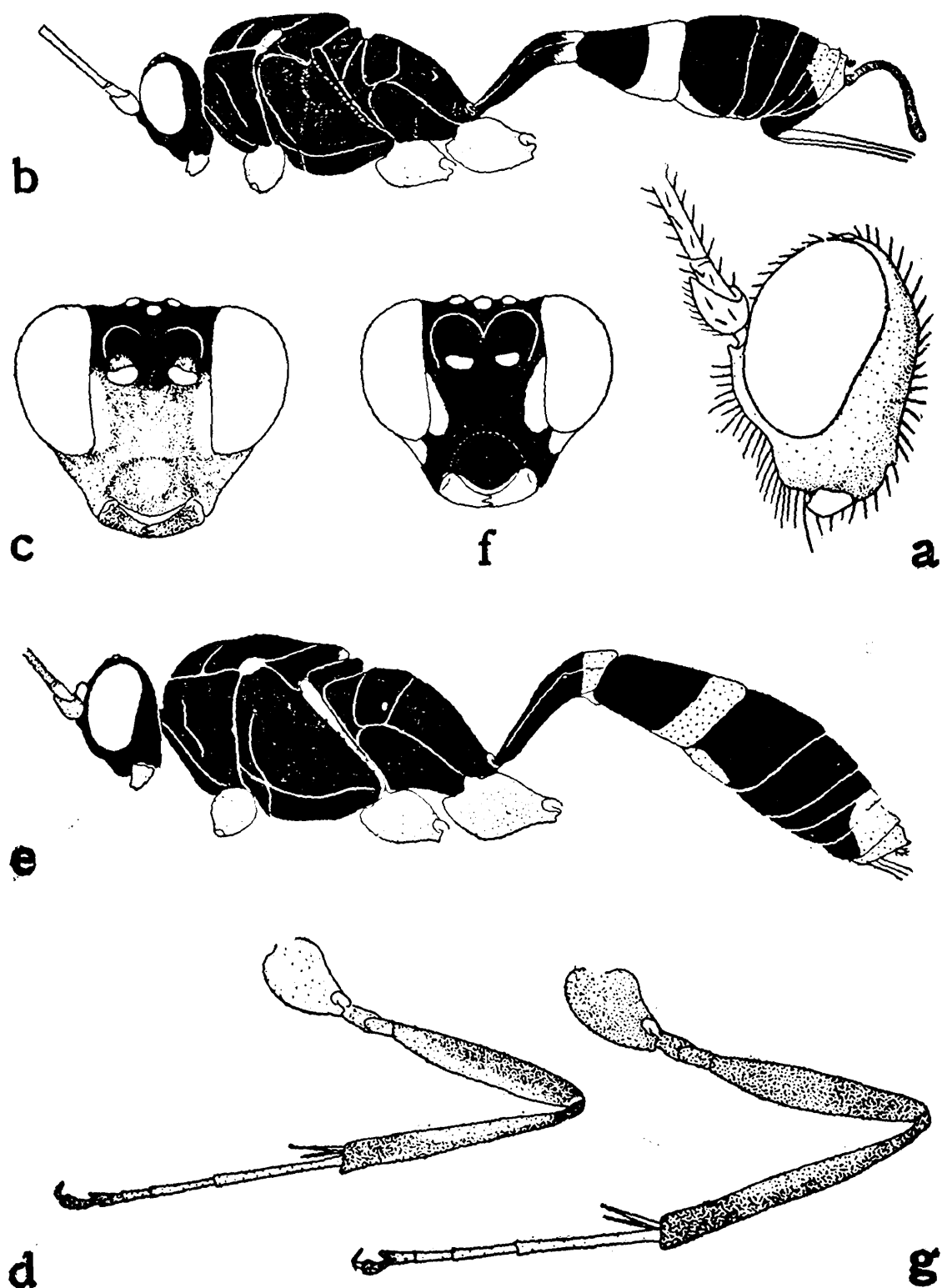


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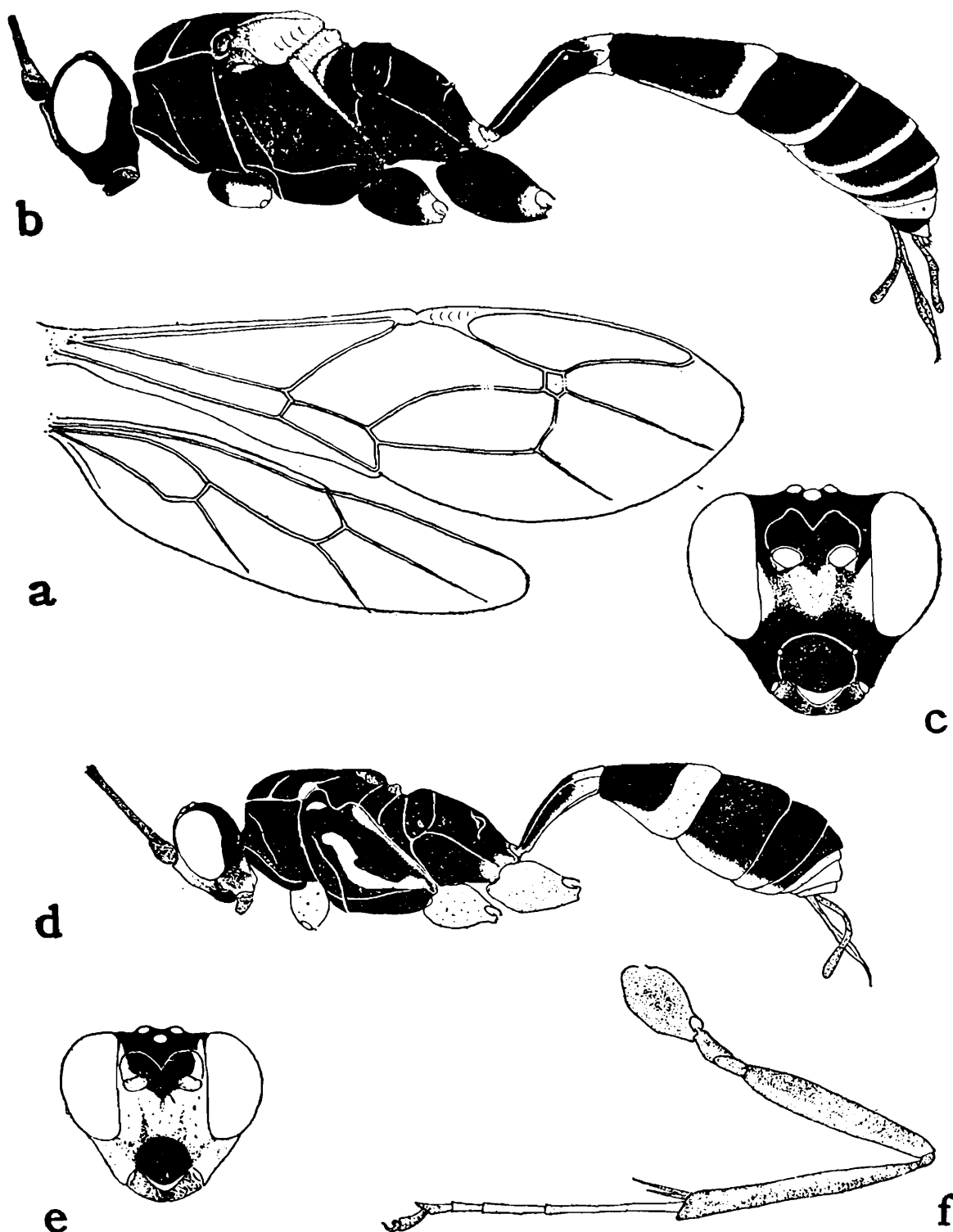
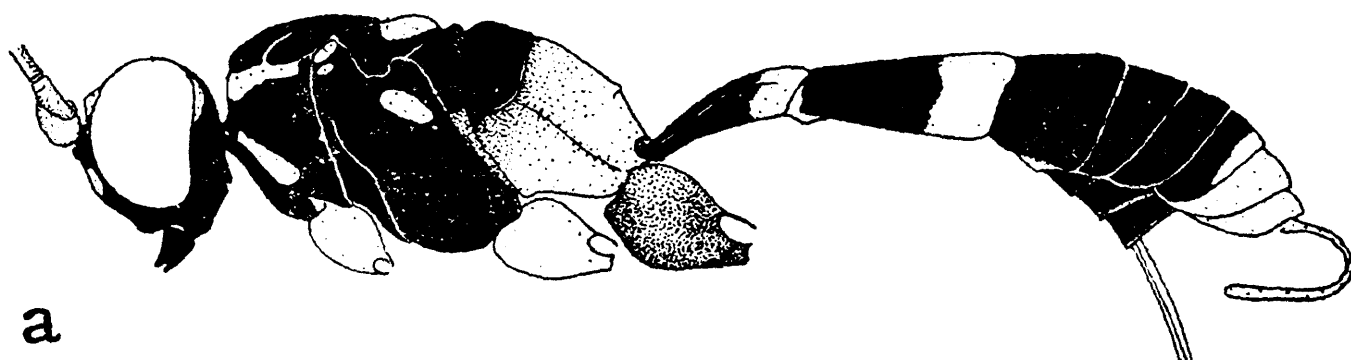
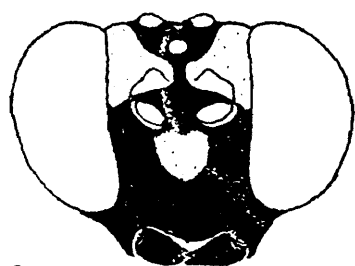


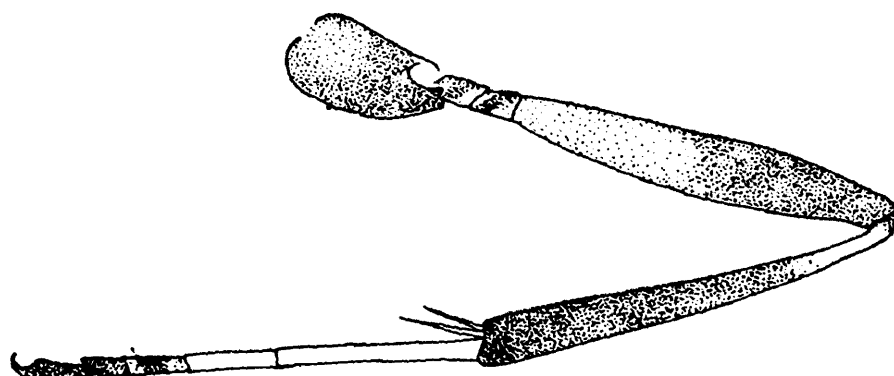
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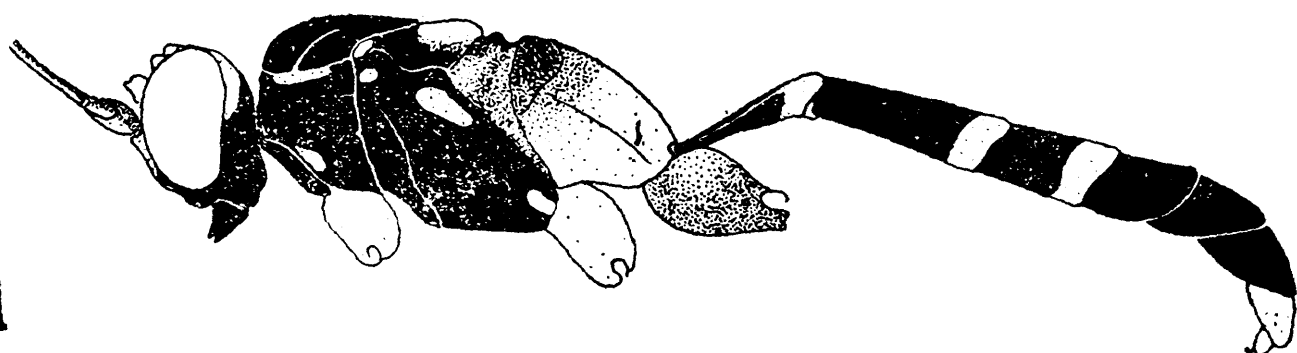
a



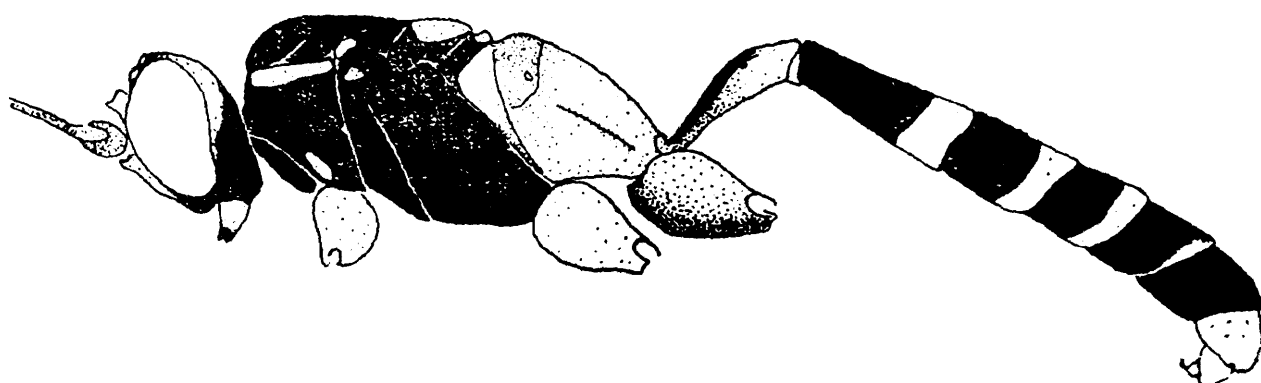
b



c



d



e

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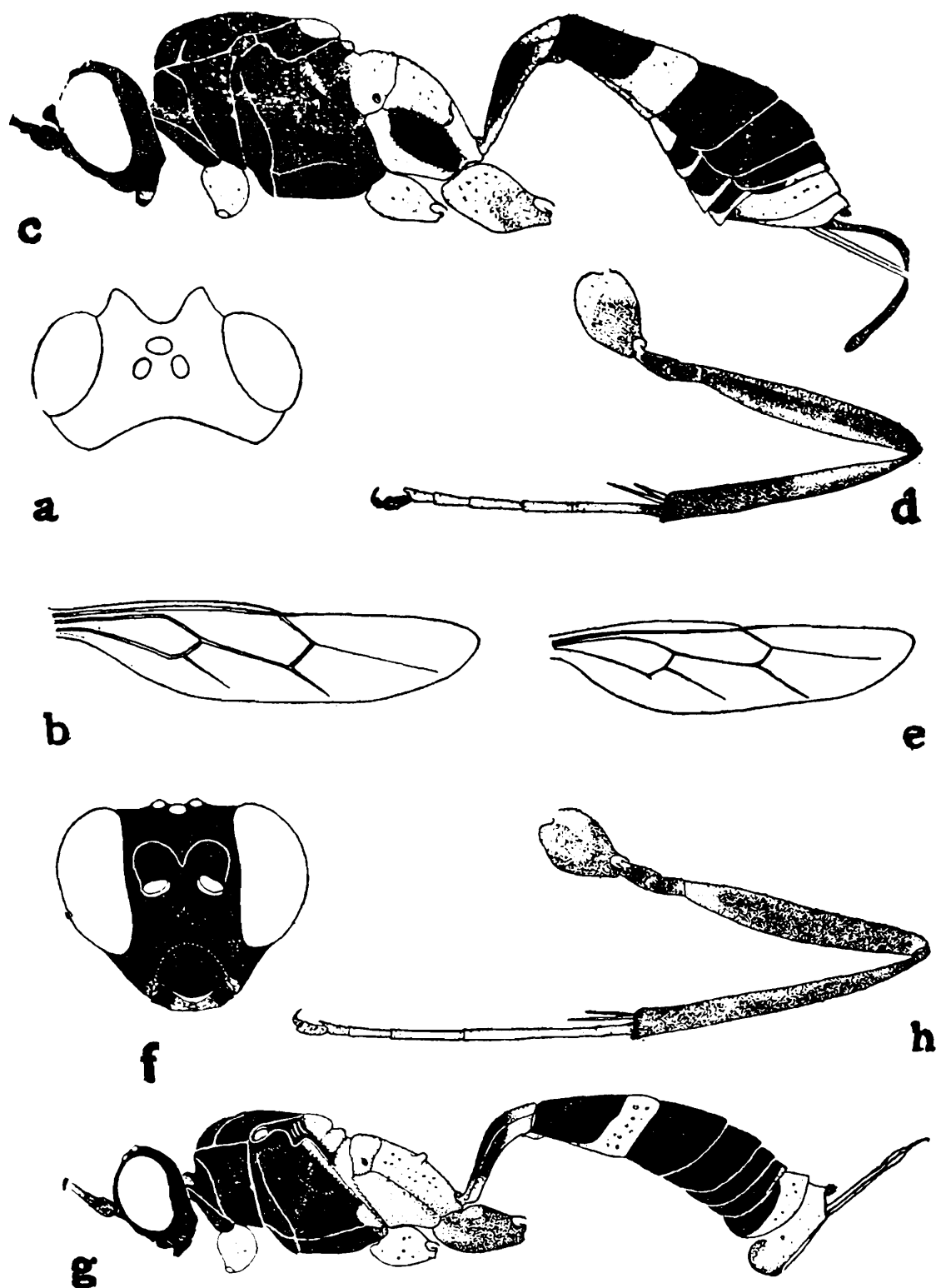


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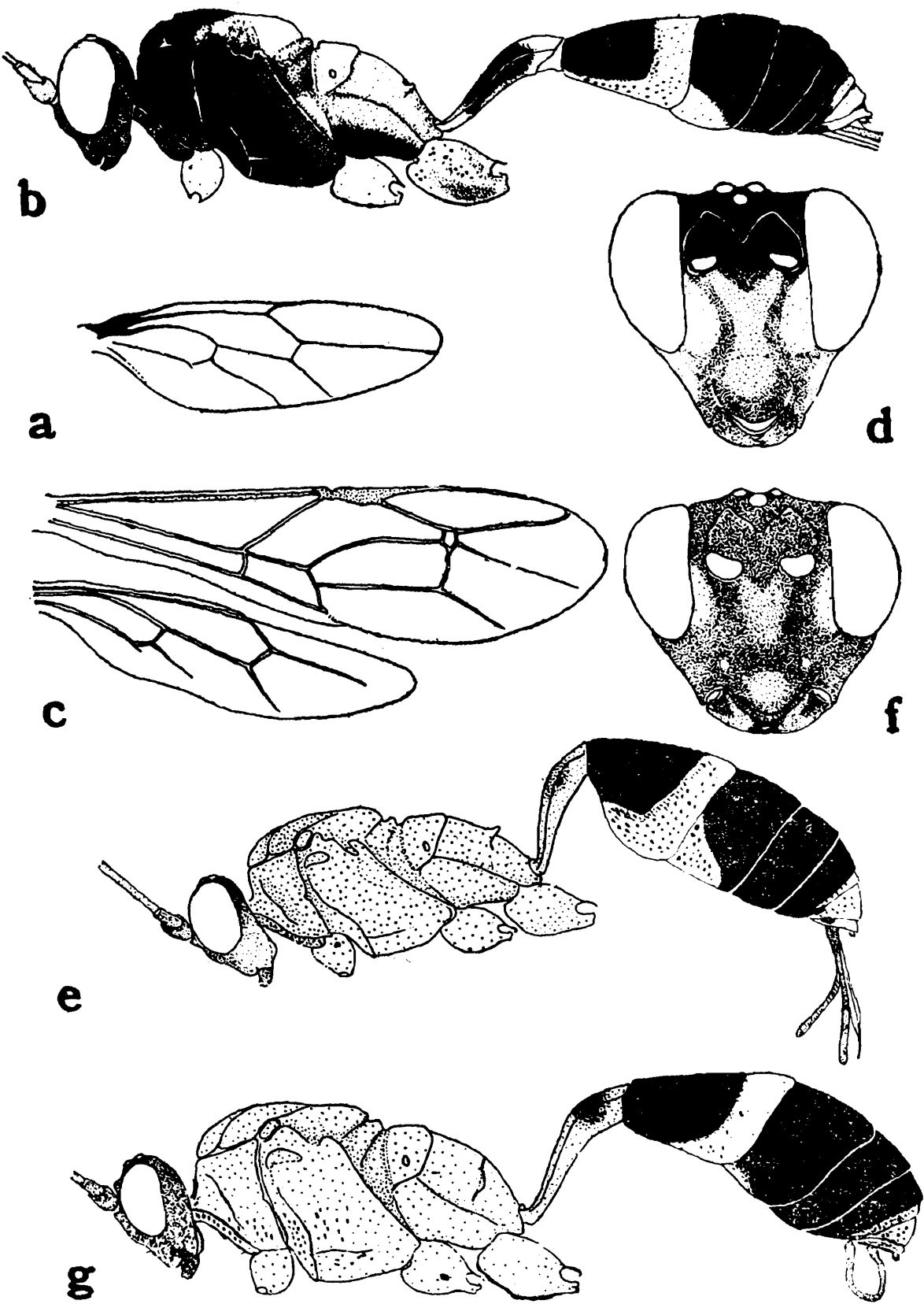


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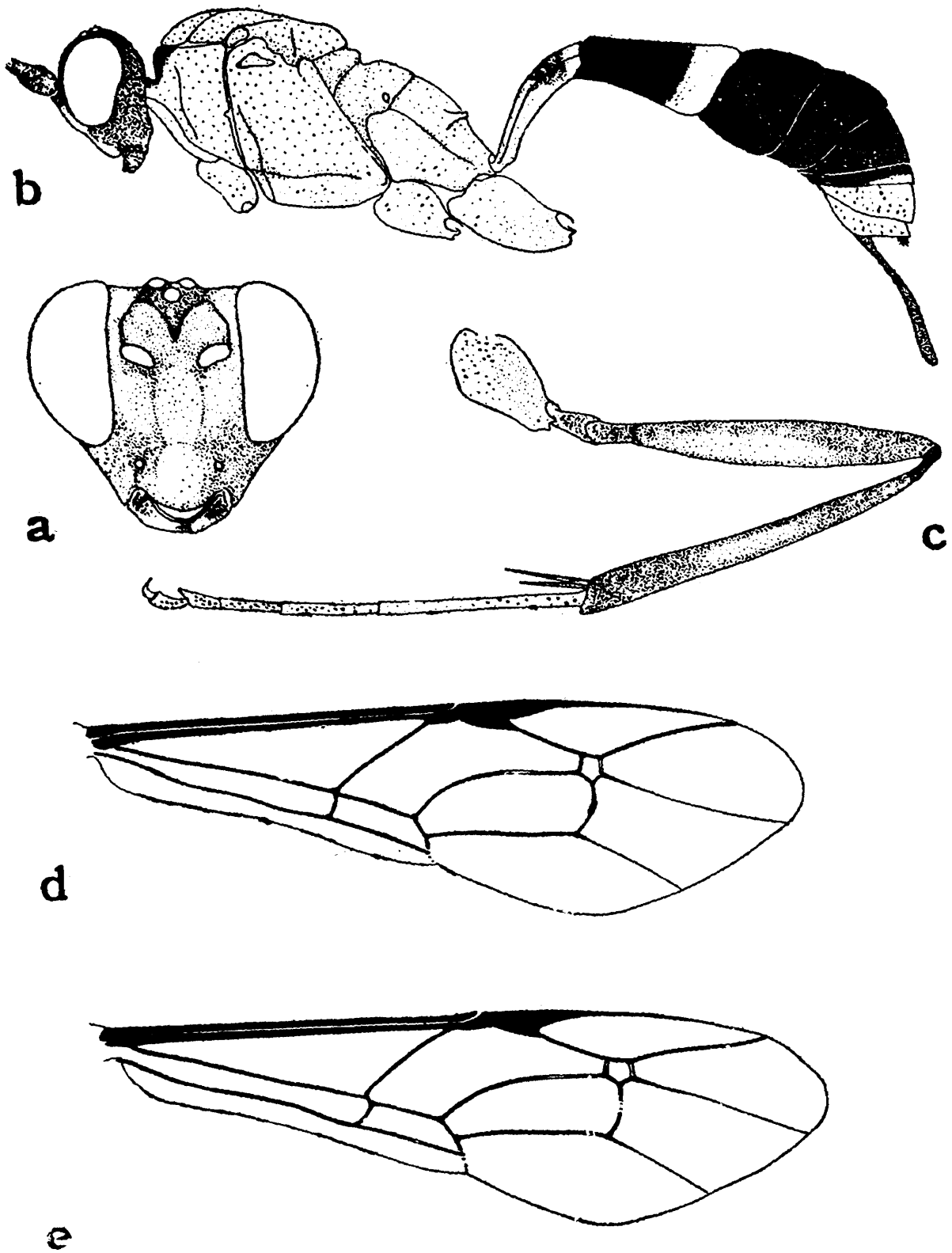


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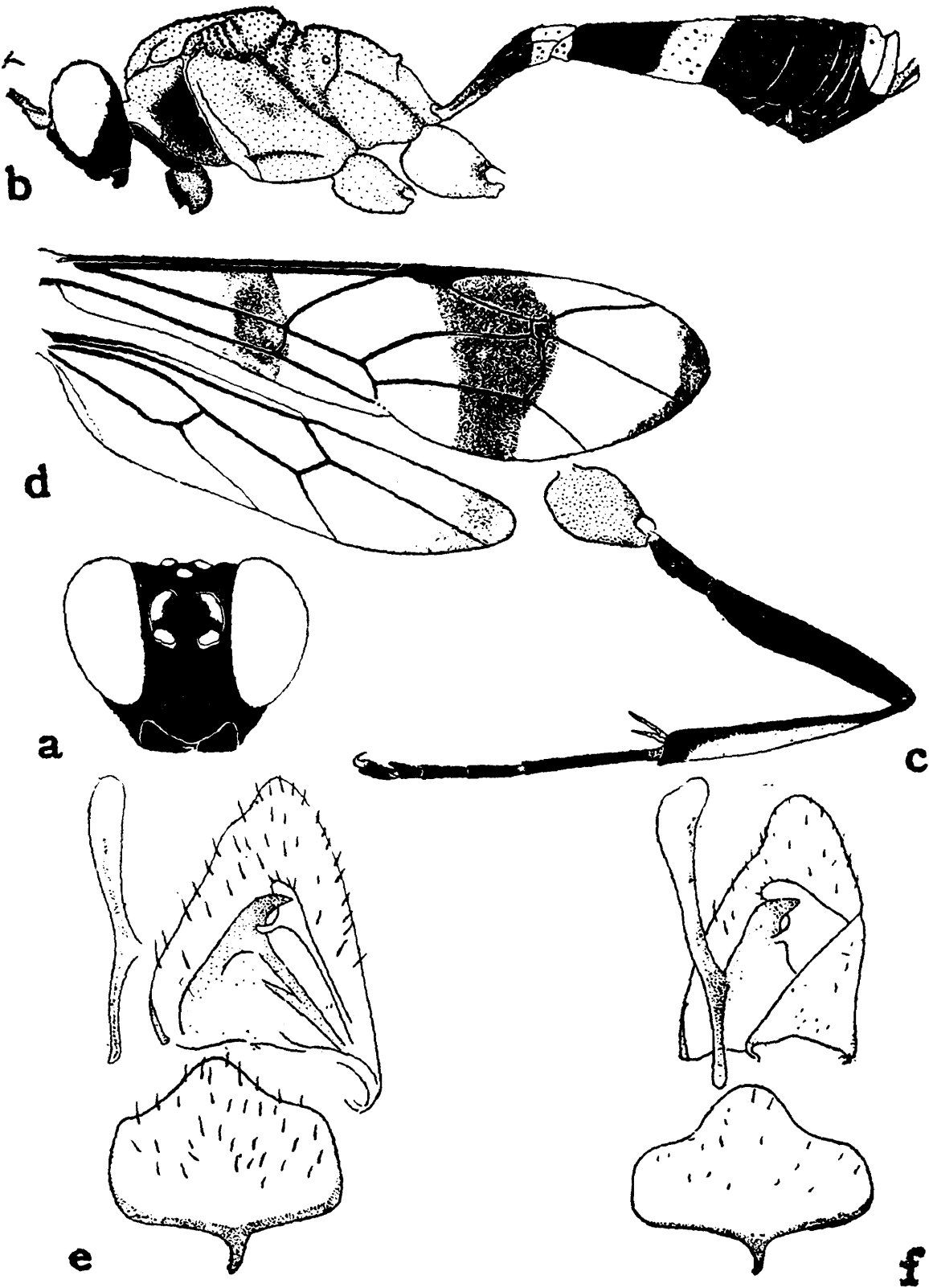


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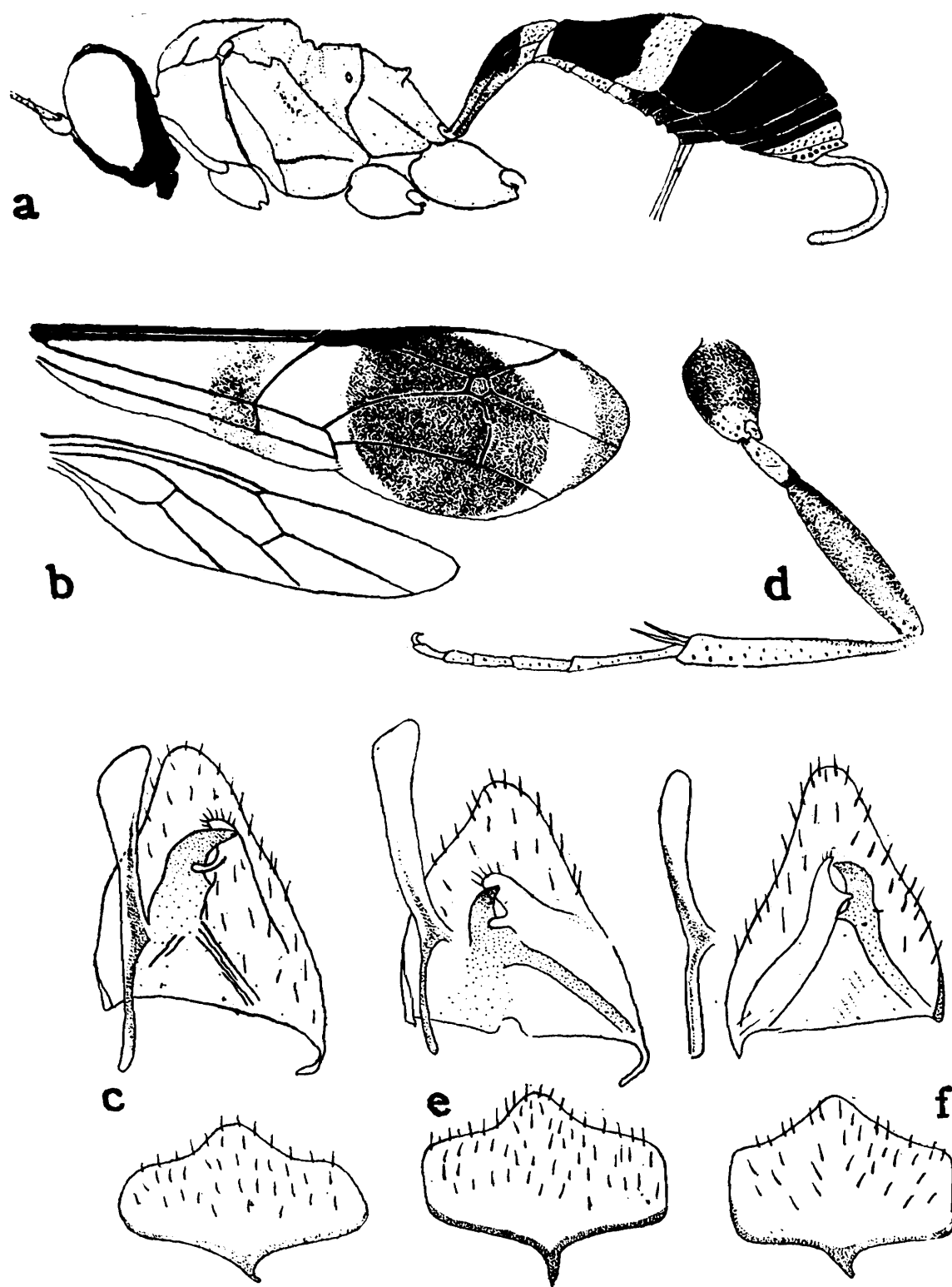
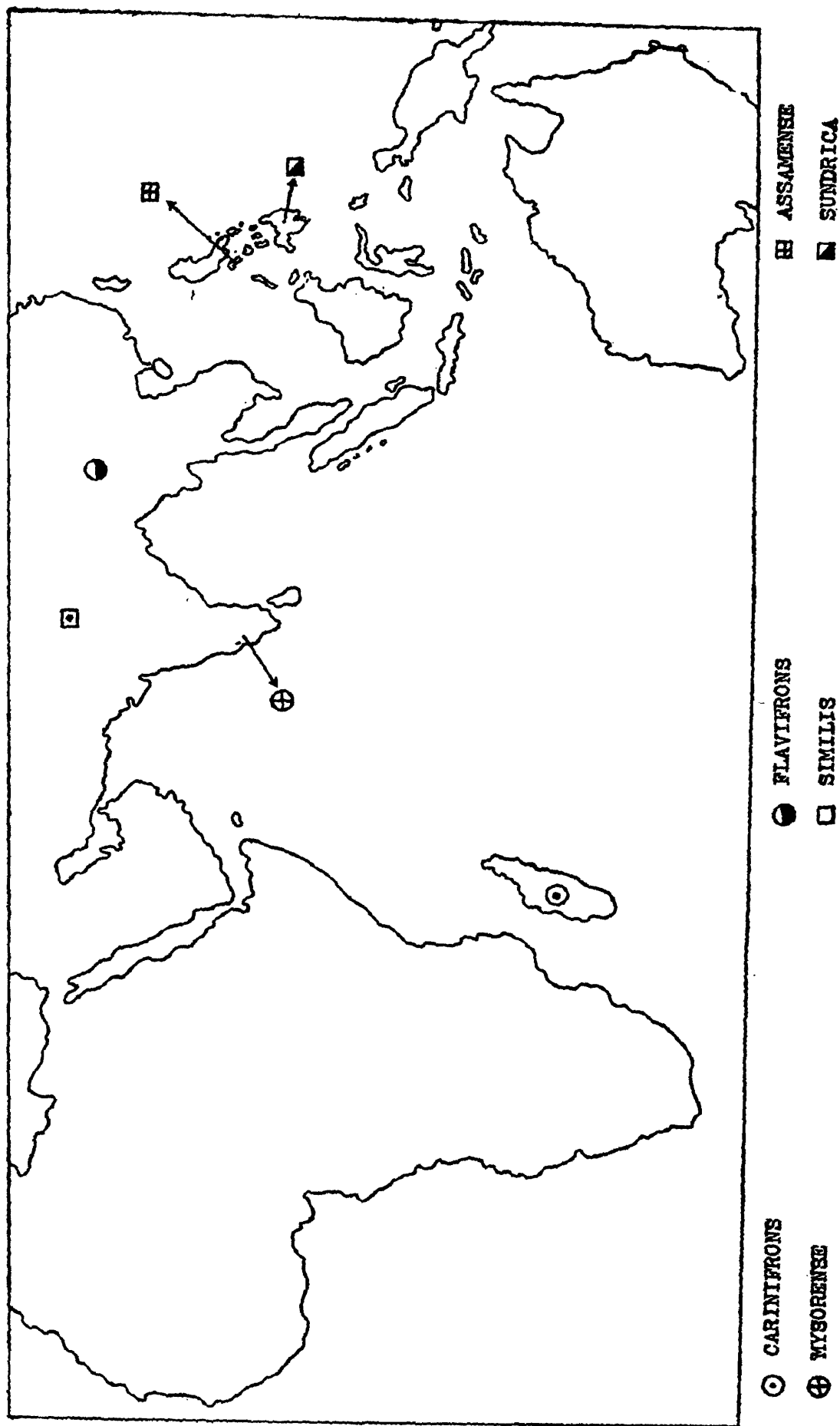
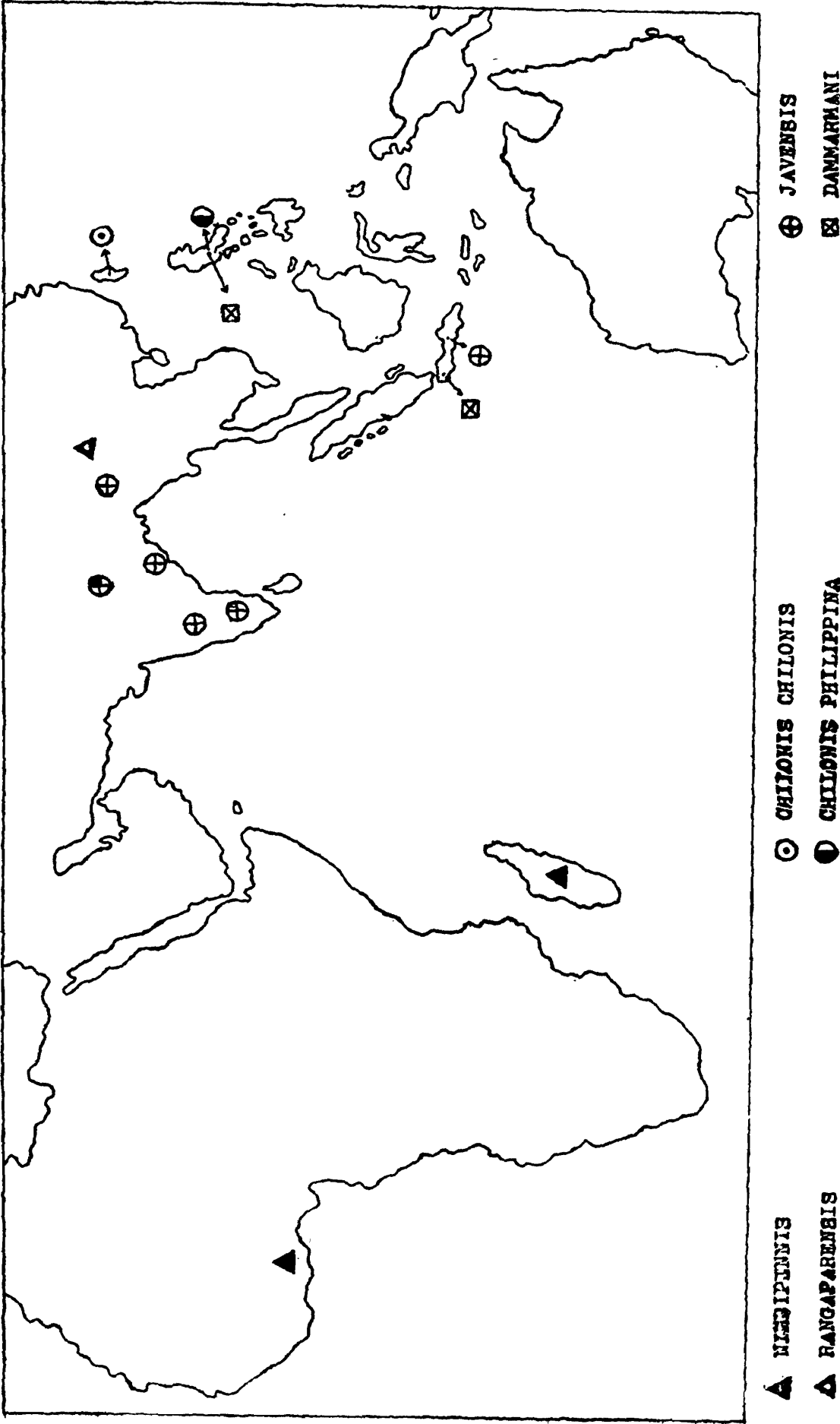


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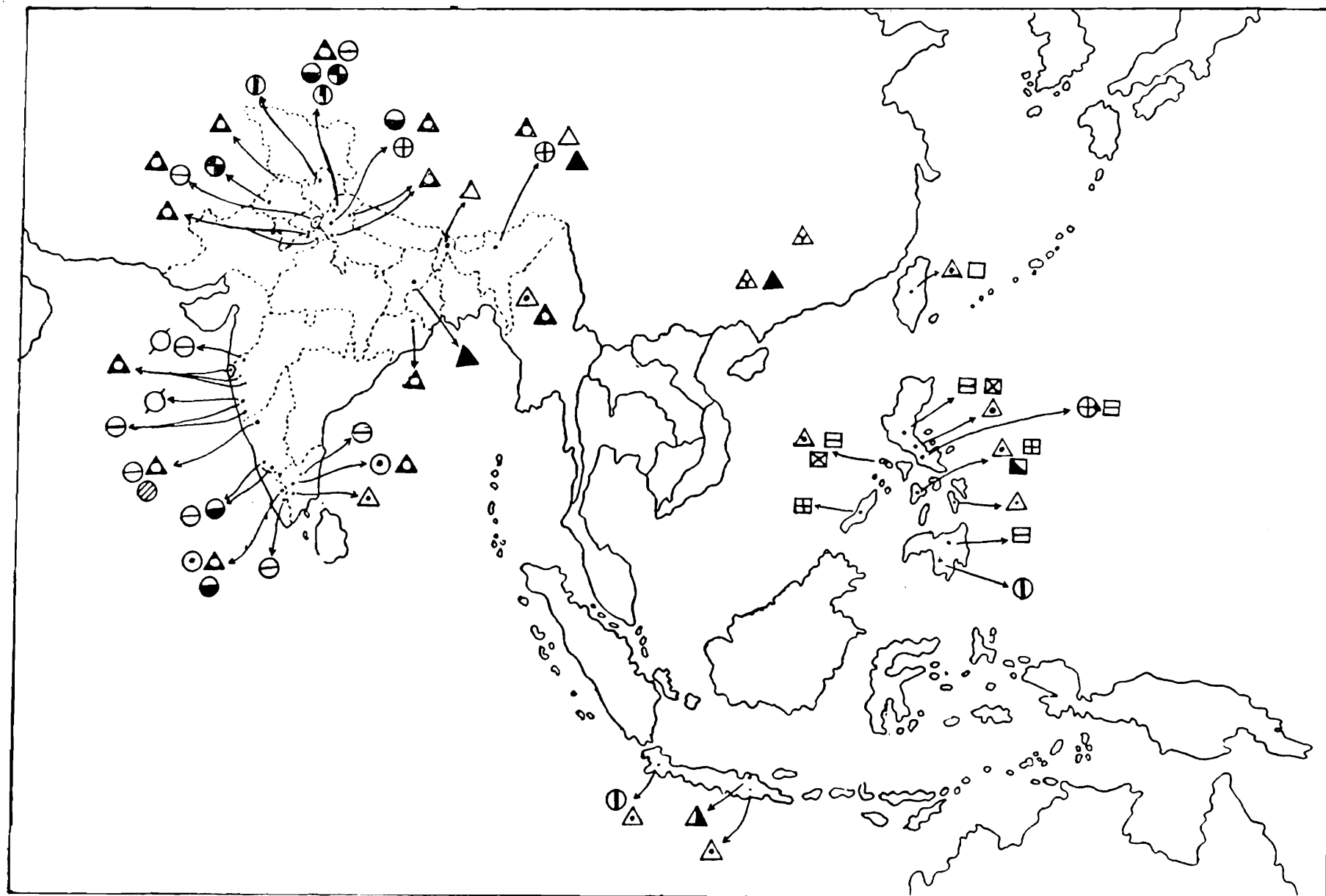
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MAP II. DISTRIBUTION OF THE SPECIES AND SUBSPECIES OF THE GENUS GAMBEROIDEA



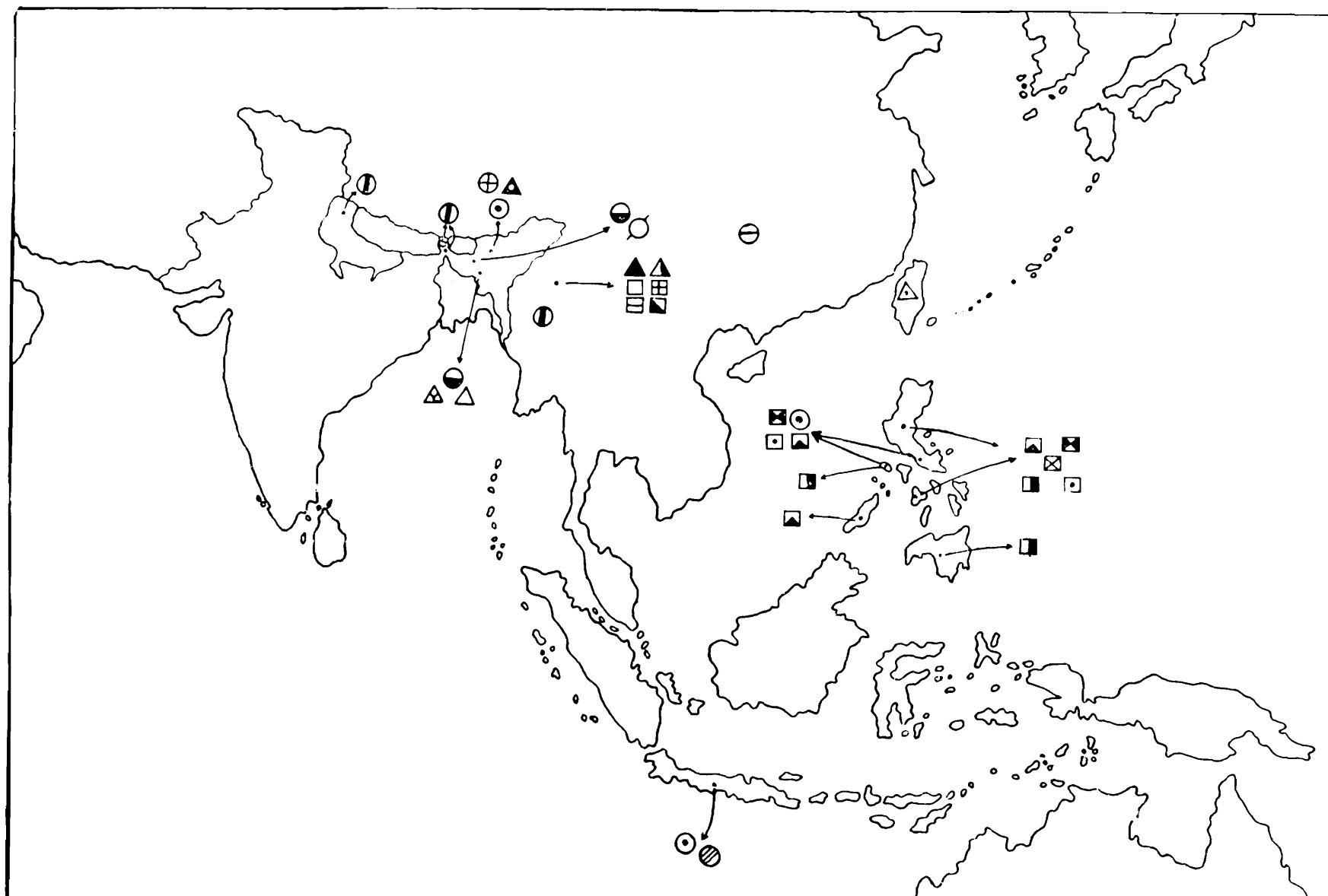
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- |                 |               |              |              |                |
|-----------------|---------------|--------------|--------------|----------------|
| ⊙ BICARINATA    | ⊙ ANNULATA    | △ RUFITHORAX | ▲ SEMIRUFA   | ⊞ PALAWANENSIS |
| ⊖ RUFIPLEURALIS | ① RUFICOLLIS  | ▲ PUSILLA    | ▲ QUADRATA   | ■ VARIEGATA    |
| ● KAMATHI       | ○ PANHALENSIS | △ DIFFICILIS | □ TAIWANELLA | ⊠ ISAROGE      |
| ⊕ PUNCTATA      | ⊗ EMACULATA   | △ TRICOLOR   | ⊞ ALBICINCTA |                |

MAP IV. DISTRIBUTION OF THE SPECIES OF THE GENUS FORMOSTENUS

MAP IV. DISTRIBUTION OF THE SPECIES OF THE GENUS FORTOGENUS



- |               |                  |              |                  |                 |
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| ⊖ PUBESCENS   | ○ FLAVORBITALIS  | △ RUGIPECTUS | ⊞ TANYPETIOLATUS | ▤ PROBLEMATICUS |
| ● CHERRAENSIS | ⊗ DECENS         | ▲ MALAISEI   | ▦ KAMBAITIENSIS  | ▥ COTABATENSIS  |
| ⊕ RUGOSUS     | △ ANGULARIS      | ▲ ACICULATUS | ⊠ DEPRESSUS      |                 |
| ⊙ PICEUS      | ▲ BIDENTATUS     | □ RUFISCENS  | ⊡ TOWNESI        |                 |

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