

*State Fauna Series 3*

# FAUNA OF WEST BENGAL

PART-8

INSECTA

(Trichoptera, Thysanoptera, Neuroptera, Hymenoptera and Anoplura)

*Edited by*

The Director  
Zoological Survey of India, Calcutta



Zoological Survey of India  
Calcutta  
1999

## **CITATION**

Editor—Director, 1999. *Fauna of West Bengal—Part 8*, i-iv, 1-442 pp.  
(Published—Director, ZSI, Calcutta)

Published : March, 1999

ISBN : 81-85874-21-2

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### **PRICE**

**Indian Rs. 1,000.00**

**Foreign \$ 70 ; £ 50**

Published at the Publication Division by the Director, Zoological Survey of India, 234/4, AJC Bose Road, 2nd MSO Building, (13th Floor), Nizam Palace, Calcutta-700 020 after laser typesetting by Neat Point Photocomposers, Calcutta-700 045 and printed at Govt. of India Press, Chandigarh.

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## **INSECTA : TRICHOPTERA**

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### **INTRODUCTION**

Trichoptera, popularly known as Caddisflies, spend their larval and pupal stages mainly in fresh water. The adults are entirely terrestrial and resemble small moths. They are generally not considered as an economically important group. The larvae, however, feed mainly on algae, fungi, bacteria on decaying leaves, fine organic particles and small invertebrates. Thus, the energy transfer at several levels in aquatic ecosystem by the trichoptera larvae are significant in the nutrition of fish, water-fowl and other aquatic vertebrates. Their involvement in many parts of food-web in diverse freshwater habitats also make the trichopteran component of a freshwater community a sensitive indicator of change. Therefore, the trichopterans play important ecological roles in freshwater.

Altogether 26 families are known from India, of which 11 families in 3 superfamilies are represented in ten districts out of sixteen from West Bengal (vide map). Due to paucity of the material from faunistic surveys it is not possible at present to include 24-Parganas, Haora, Hooghly, Nadia, Midnapur and Coochbihar districts. However, if sufficient material from these districts are available in near future, these will be published separately. Faunal exploration upon which this work is based, is far from complete because the total West Bengal fauna is certainly larger than now known. However, the material received from different survey parties of Zoological Survey of India and also the material present in the National Zoological Collections have been incorporated in this paper. All the material including types will be deposited in the National Zoological Collections of Zoological Survey of India in due course.

This paper deals with 46 species distributed over 30 genera under 11 families and 3 superfamilies. A brief review are presented on earlier investigations and collection and preservation. Diagnostic characters and classification, is given along with geographical distribution for each species. Illustrations of the male genitalia are presented to help positive identification and the literature review\* of some species have been incorporated.

### **EARLIER INVESTIGATIONS**

Data for identification of adult Trichoptera in India are widely scattered in the literature. The most useful references for the entire India are the works of Betten (1909) Martynov (1935, 1936), Banks (1931), Schmid (1970), Malicky (1984), and Wiggins (1968).

### **COLLECTION AND PRESERVATION**

Trichopterans are found in the neighbourhood of rivers, streams, ponds, lakes, etc. They are either crepuscular or nocturnal and generally concealed during the day. Certain species, however, appear in sunlight during the morning or afternoon. They may be collected from foliage and rushes bordering water sources, the bushes and branches of trees overhanging water or isolated trees short distance from water, crevices of the bark, underside of the bridges, under stone or from the artificial light sources at night.

- i) **Methods of collection** : Trichoptera may be collected by the following methods :
- (a) **Sweeping** : Sweeping with hand net usually yields satisfactory results while collecting insects from foliage.
  - (b) **Beating** : Beating could also be used to dislodge insects from foliage or trees. Usually a long stick is used to beat the plant and a tray, or umbrella or white cloth, according to convenience, may be kept below to collect the insect. These insects are picked up individually either with forceps or with the help of brushes moistened with 75% alcohol.
  - (c) **Aerial netting** : Butterfly nets are most widely used to collect these insects on wings.
  - (d) **Light traps** : An artificial light, like petromax gas light or mercury vapour light may be used to attract Caddisflies to cloth during the attracted insects may be easily picked up by hand. Electric street light may also provide scope for collecting these insects.
- ii) **Methods of Preservation** : After collection, large and hard bodied specimens are preserved in dry condition after being killed in cyanide bottles or benzene vapour while the small and soft-bodied ones are sometimes preserved in 80% alcohol though more usually they are also killed and preserved as the large sized insects. It is always preferable to preserve these insects in dry condition. The specimens preserved dry are kept in paper envelope while those in wet preservative, are kept in small vials containing 80% alcohol. The collections brought to the laboratory are prepared for study and permanent storage. First the dry specimens are relaxed in proper relaxing box, then the specimens should be set and pinned displaying as far as possible most of the taxonomic characters. Depending upon the size of the specimens the appropriate pins are to be used. The specimens should be pinned through the middle of the mesothorax. It is always necessary to have labels providing information about locality, date, name of collector and habit etc. attached with individual specimen. For permanent preservation the dry specimens may be kept in any standard size insect box with necessary chemicals (Naphthalene, Liquid Benzene, Camphor Carbolic) to check the growth of fungus and damage from other insects. Specimens preserved in alcohol may be kept in individual vials with proper labelling.

### DIAGNOSTIC CHARACTERS

Adult Caddis flies are hairy with moth-like appearance, but may be distinguished from them by the structure of mouth-parts and wing venation; head with a pair of compound eyes : ocelli (Fig. 2) : 3, when present; antennae long, filiform and multisegmented; mouth parts : poorly developed; maxillary palpi (Fig. 1) : 5 segmented, fewer segments in males of many families; labial palpi : 3 segmented; two pairs of wings (Figs. 3, 4) : clothed generally with hairs and scales; folded roof-like over body at rest; with many longitudinal and a few crossveins; hind pair often broader; legs slender (Fig. 5) long, tibiae with spurs, tarsi 5 segmented; abdomen: 10-segmented; the last segments are considerably modified and constitute the outer genital armature, male genitalia as in (Figs. 6-8).

### REVIEW ON CLASSIFICATION

Kolenati (1859) proposed two suborders Aequipalpia and Inequipalpia. Martynov (1924, 1930) interpreted Kolenati's (Lit.Cit.) classification as an artificial and proposed instead two suborders Annulipalpia and Integrepalpia. Ross (1967) subdivided both suborders into three superfamilies, Rhyacophiloidea, Hydropsychoidea and Limnephiloidea. The classification of Ross (1967) is used in this paper. Corresponding to this classification the Trichoptera of West Bengal are placed into 11

families. In this connection it may be mentioned that Rhyacophiloidea has been placed in integrepalpia (Ross, 1967) though this superfamily has been placed by Martynov (1924) and Schmid (1980) in Annulipalpia. Arctopsychidae has not been considered as a family and the genus *Arctopsyche* has been placed in the family Hydropsychidae instead of Arctopsychidae.

Key to families of the superfamily HYDROPSYCHOIDEA

1. Adults with ocelli .....2  
    Adults without ocelli .....3
2. Mesoscutum without setal warts; apical segment of maxillary palpi well developed, usually much longer than other segments; tibial spurs 0-2, 4,4 .....PHILOPOTAMIDAE  
    Mesoscutum with setal warts; apical segment of maxillary palpi shorter than above tibial spurs 3, 4, 4 .....STENOPSYCHIDAE
3. Mesoscutum with a pair of rounded setal warts .....POLYCENTROPIDAE  
    Mesoscutum without setal warts .....HYDROPSYCHIDAE

Key to families of the superfamily RHYACOPHILOIDEA

1. Discoidal cell of forewing opened; tibial spurs 3, 3, 4 .....RHYACOPHILIDAE  
    Discoidal cell of forewing closed; tibial spur 0-2, 4, 3-4 .....GLOSSOSOMATIDAE

Key to families of the superfamily LIMNEPHILOIDEA

1. Adults with ocelli .....2  
    Adults without ocelli .....3
2. Maxillary palpi usually 4 segmented in males; tibial spurs 2, 4, 4 .....PHRYGAENIDAE  
    Maxillary palpi 3 segmented in males; tibial spurs 0-1, 1-3, 1-4 .....LIMNEPHILIDAE
3. Antennae as long as or slightly shorter than wings.....SERICOSTOMATIDAE  
    Antennae much longer than wings.....4
4. Tibial spurs 2, 4, 2-4, .....CALAMOCERITIDAE  
    Tibial spurs 0-2, 2, 2-4, .....LEPTOCERIDAE

Superfamily HYDROPSYCHOIDEA

Family PHILOPOTAMIDAE

Key to Genera

1. Spurs 1, 4, 4; hind wing with apical forks 1, 2, 3 and 5 .....*Chimarra* Leach  
    Spurs 2, 4, 4; hind wing with apical forks 2, 3, and 5 .....*Dolophilodes* Ulmer

Genus *Chimarra* Leach

Key to the species of the genus *Chimarra* Leach

1. Phallus with two internal chitinous rod-like structures .....2  
    Phallus without any chitinous rod-like structures .....3
2. Inferior appendages in male with two short black teeth .....*kumaonensis* Martynov  
    Inferior appendages in male without teeth .....*diaphana* sp. nov.

3. Side pieces of tenth segment with three composite plate like processes; upper apical portion of inferior appendages with acute inner angle .....*aberrans* Martynov  
 Side pieces of tenth segment without plate like process; upper apical portion of inferior appendages blunt and without acute inner angle .....*reyangensis* sp.nov.

### 1. *Chimarra aberrans* Martynov

1935. *Chimarra aberrans* Martynov, *Rec. Indian Mus.* 37 : 126-128, Figs. 31, 32.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas, 1 Female, no date, (Coll. C. Lynch); Goke, F.R.H. Singla, 1 Male, 20. iv. 1973 (Coll. H. S. Sharma & party).

*Length of forewing* : 7 mm.

*Distribution* : India: West Bengal (Darjiling); Uttar Pradesh and Himachal Pradesh.

*Remarks* : The specimens agrees well with the description given by Martynov (1935), but the colour of the head, maxillary palpi, antennae and thorax in the specimen examined is black instead of brown as referred to by Martynov (1935). The size of the forewing is also slightly larger (7 mm.) than the specimens described by Martynov (5-5.5 mm.).

### 2. *Chimarra kumaonensis* Martynov

(Figs. 11-13)

1935. *Chimarra kumaonensis* Martynov, *Rec. Indian Mus.* 37 : 124-126, Figs. 29-30.

*Material examined* : West Bengal, Darjiling, Hima Falls, 4 km. W. of Ghoom Bhanjang, 2150 m; 1 Male, 21.iii.1973 (Coll. P.K. Maiti & party).

*Length of forewing* : 6 mm.

*Distribution* : India : West Bengal (Darjiling); Uttar Pradesh: (Kumaon).

*Remarks* : The species agrees well with the description including male genitalia (Figs. 11-13) as given by Martynov (1935), but the colouration of head and thorax and also the spots in the forewing vary. In the examined specimen the colouration of head and thorax is black instead of brown and all the spots except the spot at arculus are absent. The species constitutes a new locality record for West Bengal.

### 3. *Chimarra reyangensis* sp. nov.

(Figs. 14-19)

Head and thorax black brown; antennae brown with pale brownish annulations; forewings: (Fig. 18) black brown with whitish spots at the crossvein between m-cu, thyridium and at arculus; Rs arcuate in its middle; Dc elongated, closed but narrowing at base; a white almost rounded whitish area between the 2nd and 3rd apical fork; nygma round; hind wings: Dc almost of equal size of forewing; legs: (Fig. 19) dark brown; spurs 1, 4, 4; abdomen : brownish-yellow.

*Genitalia* (Figs. 14-16); male tergite 9 narrow with concave wing margin; tergite 10 broad dorsally; side pieces of sternite 10 projecting backwards in the form of two short brown processes; at middle of sternite 10 a short process with two small projections at apex present; inferior appendages long, basal joints longer than apical which is much shorter than basal and somewhat curved; phallus thick; female : apex of the abdomen as in fig. 17.

**Material examined** : Male : Holotype: West Bengal, Darjiling Reyang, F. R. H., 275 m; 25 iii. 1973 (Coll. H. S. Sharma & party); allotype : Female (Loc. as in Holotype); paratype : 1 Male, 3 Females (Loc. as in Holotype).

**Length of forewing** : 8 mm.

**Distribution** : India : West Bengal (Darjiling).

**Remarks** : White rounded area between the 2nd and 3rd apical fork and the genitalia in male distinguish this species from all other species of *Chimarra*.

#### 4. *Chimarra diaphana* sp. nov. (Figs. 20-27)

Head and thorax black; antennae black; forewings (Fig. 26) : black brown clothed with short hairs, R curved in its basal part, a diaphanous spot present between Rs and origin of R; a white hyaline streak present between R<sub>3</sub> + 4 and the base of 5th fork; Dc broad and triangular; without nygma; hind wings : (Fig. 27) Dc short and triangular, clothed with short black hairs; legs (Fig. 20) : black brown, spurs 1, 4, 4; abdomen : black.

**Genitalia** (Figs. 21-25) : Male : tergite 9 narrow; tergite 10 broad parallel sided and narrowly divided at middle and provided with a pair of elongated leaf-like internal appendages, the outer one of which with a bud like projection at base; phallus exerted, membranous, bearing two sclerotised rod-like structure laterally; inferior appendages long; basal joint shorter than the apical joint which is about three times longer than basal; the tip forming a somewhat hook-shaped structure.

**Material examined** : Male : Holotype: West Bengal, Goomti, near Kurseong, 1250 m. at light, 22. iv. 1981 (Coll. R. K. Varshney & party); allotype : Female (Loc. as in Holotype); paratype : 2 Male (Loc. as in Holotype).

**Length of forewing** : 6 mm.

**Distribution** : India; West Bengal (Kurseong).

**Remarks** : The structure of the male genitalia and the presence of diaphanous spot between R and Rs. clearly distinguish this species from all other species of the genus *Chimarra*.

#### Genus *Dolophilodes* Ulmer

#### 5. *Dolophilodes indicus* Martynov

1935. *Dolophilodes indicus* Martynov, *Rec. Indian Mus.* 37 : 122, Fig. 26.

**Material examined** : West Bengal, Darjiling, 1 Male, no date, (Coll. C. Lynch).

**Length of forewing** : 7 mm.

**Distribution** : India : West Bengal (Darjiling); Punjab.

**Remarks** : One specimen of the species has been studied from old National Collections of Z. S. I. The specimen is badly damaged. But the study of the male genitalia of the specimen confirms the identity of the species. The species, however, constitutes a new locality record from West Bengal.

Genus *Dolophiliella* Ulmer\*6. *Dolophiliella relictæ* Martynov

1935. *Dolophiliella relictæ* Martynov, *Rec. Indian Mus.* 37 : 121, 122, Fig. 25.

*Distribution* : India : West Bengal (Kurseong).

*Remarks* : Martynov (1935) described the species from Kurseong. The male genital segments and appendages is considered as the main distinguishing feature separating it from all other species of this genus.

## Family STENOPSYCHIDAE

## Key to Genera

Spurs 3, 4, 4 in Male ..... *Stenopsyche* MacLachlan  
Spurs 0, 4, 4 in Male..... *Parastenopsyche* Kuwayama

Genus *Stenopsyche* MacLachlanKey to species of the genus *Stenopsyche* MacLachlan

1. Phallus quadrilobed ..... *quadrilobata* Martynov  
Phallus simple or bilobed ..... 2  
2. Phallus bilobed without spinules ..... *grisseipennis* MacLachlan  
Phallus simple but with numerous spinules ..... *splendida* Martynov

7. *Stenopsyche grisseipennis* MacLachlan

1866. *Stenopsyche grisseipennis* MacLachlan, *Trans. Ent. Soc.; Lond.* (3) 5 : 265, pl. 17, Fig. 5.

*Material examined* : West Bengal, Darjiling, Tukdah F. R. H. Compound, 1500 m; 1 Male, 24, 26. iii. 1973, (Coll. P. K. Maity, H. S. Sharma & party); Reyang, F. R. H. Compound, 275 m; 1 Male, 28. iii. 1973; Goke, F. R. H. Compound, Singla, 1 Female 16. iv. 1973 (Coll. H. S. Sharma & party); Sukna, 1 Female 13. ii. 1975, (Coll. H. K. Bhowmik & party).

*Length of Forewing* : Male 25 mm; Female 22 mm.

*Distribution* : India : West Bengal (Darjiling, Kurseong and Calcutta); Sikkim, Himachal Pradesh: (Kulu); Assam.

*Remarks* : The species is widely Distributed in India particularly in the North Eastern Region.

8. *Stenopsyche quadrilobata* Martynov

1935. *Stenopsyche quadrilobata* Martynov, *Rec. Indian Mus.*, 37 : 131-132. Fig. 36.

*Material examined* : West Bengal Darjiling, Kalimpong, Eastern Himalayas, 4500 ft, 1 Male, 24. iv, 10. v. 1915 (Coll. F. H. Gravely), Tukdah, F. R. H. Compound, 1500 m., 1 Male. 26, iii. 1973 (Coll. H. S. Sharma & party)

*Length of forewing* : 24 mm.

*Distribution* : India : West Bengal (Darjiling).

**Remarks :** Specimens from the same area as that of the type confirm its distribution in West Bengal. The minor variation in the brown colourations of maxillary palpi instead of yellow as referred to by Martynov (1935) may be a local variation.

**9. *Stenopsyche splendida* Martynov**  
(Figs. 9-10)

1935. *Stenopsyche splendida* Martynov, *Rec. Indian Mus.*, 37 : 133-134, Fig. 37.

**Material examined :** West Bengal, Darjiling, Goke, F. R. H. Compound, 8 Males, 1 Female, 20. iii. 16, 18, 20. iv. 1973; Tukdah F. R. H. 1500 m., 2 Males, 26. iii. 1973; Reyang F. R. H. Compound, 275 m, 2 Males, 28. iii. 1973; Singla F. R. H., at light, 5 Males, 2, 3, i, 1976, (Coll. G. S. Arora and H. S. Sharma & party).

**Length of forewing :** Male, Female - 25mm.

**Distribution :** India : West Bengal (Darjiling); Karnataka;

**Remarks :** The male genitalia (Figs. 9-10) is distinctive and confirms the identity of the species. The species was reported from North Kanara district of Karnataka by Martynov (1935). Present new locality record from Darjiling of West Bengal denotes that the species may be present in other states if a well extensive faunistic survey is conducted.

**Genus *Parastenopsyche* Kuwayama**

**10. *Parastenopsyche similis* (Ulmer)**

1927. *Stenopsyche similis* Ulmer, *Entomol. Mitt.*, 16 : 175, pl.v, Fig .8.

1935. *Parastenopsyche similis*, Martynov, *Rec. Indian Mus.*, 37 : 136, Fig. 39.

**Material examined :** West Bengal, Kurseong, Eastern Himalayas, 4700 ft, 1 Male, 14-17. iv. 1911, (Coll. N. Annandale); Darjiling, Singla, F. R. H., 2 Males. 3. i. 1976, (Coll. G. S. Arora & party).

**Length of forewing :** 20 mm.

**Distribution :** India : West Bengal (Darjiling and Kurseong); Punjab; Himachal Pradesh : (Kangra valley).

**Remarks:** The specimens from Darjiling agree with the description, including the male genitalic characters of the specimen from Kurseong referred to by Martynov (1935).

**\*11. *Parastenopsyche montana* (Navas)**

1931. *Stenopsyche montana* Navas, *Mem. pont. Acad. Sci. N. Lincei*; 16 : 932, Fig. 50.

1935. *Parastenopsyche montana*, Martynov, *Rec. Indian Mus.*, 37 : 205.

**Distribution :** India: West Bengal (Darjiling).

**Remarks :** Navas (1931) originally described the species along with the figures of male genitalia. The description and the figures of genitalia confirmed the species as a valid one. Martynov (1935) placed the species under the genus *Parastenopsyche* Kuwayama in his list of species of Trichoptera Annulipalpia from continental India.

## Family POLYCONTROPIDAE

## Key to Genera

1. Hindwings with apical froks 1, 2 and 5 present .....*Plectrocnemia* Stephens  
 Hindwing with apical forks 2 and 5 present .....*Dipseudopsis* Walker

Genus *Plectrocnemia* Stephens\*12. *Plectrocnemia aurea* Ulmer

1905. *Plectrocnemia aurea* Ulmer, *Stettin. Ent. Zeit.*, 66 : 101, pl, iv, Figs. 130-131.

*Distribution* : India : West Bengal (Darjiling) and Sikkim.

*Remarks* : Ulmer (1905 and 1907) recorded the species from Darjiling and Sikkim. Martynov (1935) also reported the species from Darjiling district of West Bengal.

13. *Plectrocnemia obliquofasciata* Martynov

1935. *Plectrocnemia obliquofasciata* Martynov, *Rec. Indian Mus.*, 37 : 154.

*Material examined* : West Bengal : Darjiling, Type series, 2 Females, no date (Coll. C. Lynch).

*Length of forewing* : 14 mm.

*Distribution* : India : West Bengal (Darjiling) and Punjab.

*Remarks* : Distinct narrow brown stripes in the basal cell somewhat interrupted by a distinct oblique narrow pale yellow stripes, brown stripes in the thyridial cell and at the end of CuA are the most distinctive characters for the specific identification of the females. The study of female type series reveals that the colour of the antennae and palpi is dark brown instead of yellow as referred to by Martynov (1935).

Genus *Dipseudopsis* Walker\*14. *Dipseudopsis recta* Martynov

1935. *Dipseudopsis recta* Martynov, *Rec. Indian Mus.*, 37 : 163-164, Fig. 65.

*Distribution* : India : West Bengal (Puruliya); Bihar (Chakradharpur).

*Remarks* : Martynov (1935) described the species as new to Science from Chotanagpur, Bihar. He also reported a male and a female specimen from Puruliya under Chotanagpur of Bihar. But it may be mentioned here that 'Purulia' comes under the jurisdiction of West Bengal. Thus, Martynov (Loc. cit.) recorded the species from both the states of West Bengal and Bihar.

## Family HYDROPSYCHIDAE

## Key to Genera

1. Spurs 1, 4, 4; without discoidal cell in hindwing.....*Amphipsyche* MacLachlan  
 Spurs 2, 4, 4; with discoidal cell in hind wing .....2  
 2. Hindwing with apical forks 1, 2, 3 and 5 .....3  
 Hindwing with apical forks 2, 3 and 5; without discoidal cell in hind wing.....  
 .....*Macronema* Pictet

3. Adult without maxillary palpi .....4  
 Adult with maxillary palpi .....5
4. Forewing without false costal crossveins; Sc uniting at its end with R into one common vein; 2nd fork with a minute triangular cell .....*Paraethaloptera* Martynov  
 Forewing with false costal crossvein; Sc and R not uniting to form a common vein; base of pedicel of first and second apical forks with a minute triangular cell .....*Aethaloptera* Brauer
5. Maxillary palpi with 3rd and 4th joint long; 6 than above .....7  
 Maxillary palpi with 3rd and 4th joint shorter than above.....7
6. Inferior appendages short and broad .....*Arctopsyche* MacLachlan  
 Inferior appendages long and curved .....*Diplectrona* Westwood
7. Genitalia in male with titillator; 2nd anal vein of forewing normal .....*Hydropsyche* Pictet  
 Genitalia in male without titillator; 2nd anal vein of forewing obsolete in part.....  
 .....*Hydromanicus* Brauer

#### Genus *Amphipsyche* MacLachlan

#### Key to species of the genus *Amphipsyche* MacLachlan

1. Hind wing with false 1st fork sessile; legs with 1, 4, 2 spurs phallus without leaf-like upper lobes .....*bengalensis* Martynov  
 Hindwing with first fork pedicellate; number of spurs in leg different .....2
2. Hind wing with false 1st fork having short pedicel; legs with 1, 4, 3, spurs; phallus with leaf-like upper lobes .....*indica* Martynov  
 Hind wing with 1st fork having long pedicel; legs with 0, 4, 3 spurs .....*tricalcarata* Martynov

#### 15. *Amphipsyche bengalensis* Martynov

1935. *Amphipsyche bengalensis* Martynov, *Rec. Indian Mus.*, 37 : 201, Fig. 106.

*Material examined* : West Bengal, Calcutta, at light, 2 Males, Type series, 10. vi. 07 (Coll. R. Hodgart).

*Length of forewing* : 12 mm.

*Distribution* : India : West Bengal (Calcutta).

*Remarks* : The genitalia in males and also the venation of the wings are the distinctive characters for differentiating this species with all other species of *Amphipsyche*.

#### 16. *Amphipsyche tricalcarate* Martynov

1935. *Amphipsyche tricalcarata* Martynov, *Rec. Indian Mus.*, 37 : 197-198.

*Material examined* : West Bengal, Bankura, Mukutmanipur, 9 Females, 20. xi. 1981 (Coll. H. K. Bhowmik & party).

*Length of forewing* : 10 mm.

*Distribution* : India : West Bengal (Bankura); Orissa (Puri).

*Remarks* : The species is recorded for the first time from West Bengal. Unfortunately, no male specimens were available for study.

17. *Amphipsyche indica* Martynov  
(Figs. 1-8)

1935. *Amphipsyche indica* Martynov, *Rec. Indian Mus.* 37 : 199-201, Figs. 103-105.

*Material examined* : West Bengal, Bankura, Mukutmanipur, 20 Males, 10 Females 28. x. 1985 (Coll. M. Datta & party) and 20, ix. 1985 (Coll. H. K. Bhowmik & party).

*Length of forewing* : Male, Female – 9-11 mm.

*Distribution* : India : West Bengal (Bankura) : Bihar.

*Remark* : The species is for the first time recorded from West Bengal.

Genus *Macronema* Pictet

Key to species of the genus *Macronema* Pictet

- 1 Anterior wing with two bands; apical portion without any spot ..... *fastosum* Walker  
Anterior wing with more than two bands; apical portion with spots ..... *pseudoneura* Brauer

Key to subspecies of the species *M. fastosum* Walker

1. Forewing with a black band before middle and a black band near apex.....  
..... *fastosum fastosum* Walker  
Forewing with a dark brown band at middle and at apex ... *fastosum bifasciatum* Martynov

18. *Macronema fastosum fastosum* Walker

1853. *Macronema fastosum* Walker, *Cat. Brit. Mus.*, p. 76.

*Material examined* : West Bengal, Kurseong, E. Himalayas, 5000 ft., 2 Males, 2 exs. (abdomen missing), 21-29. v. 1906 (Coll. F. H. Gravely).

*Length of forewing* : 10 mm.

*Distribution* : India : West Bengal (Darjiling and Kurseong); Meghalaya (Khasi Hills); Sikkim; Java and Hongkong.

*Remarks*: The author while studying the named collections at Zoological Survey of India encountered a couple of female specimens and other two (without abdomen), from Kurseong, West Bengal. The forewing of the aforesaid specimens are without a large oval yellow spot and an oblique brown branch as indicated by Martynov (1935) in the description of *Macronema fastosum* forma *fuscum*. But the brown apex of forewing and the presence of brown stripe at middle of the wing behind R led the authors to consider the specimen as *Macronema fastosum fastosum* Walker.

19. *Macronema fastosum bifasciatum* Martynov

1935. *Macronema fastosum bifasciatum* Martynov, *Rec. Indian Mus.*, 37 : 189.

*Material examined* West Bengal, Darjiling, Pashok, 2000 ft. 1 Male, Type, 26. v. 1914 (Coll. F. H. Gravely).

*Length of forewing* : 8 mm.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : The authors agrees with the description given by Martynov. However, some of their observations on the subspecies are recorded here : Vertex with yellow hairs; antenna brown; thorax dark brown; membrane of both wing with yellow pubescens; legs yellow but femora brown.

## 20. *Macronema pseudoneura* Brauer

1865. *Macronema pseudoneura* Brauer, *Verh. Zool. bot. Gesellsch. Wien.*, 15 : 420.

*Material examined* : West Bengal, Jalpaiguri, Chelapata, 1 Male (1 ex. damaged), 13. x. 1987 (Coll. S. K. Tandon & party)

*Length of forewing* : 10 mm.

*Distribution* : India: West Bengal (Jalpaiguri) and Karnataka, Sri Lanka.

*Remark* : The species is recorded for the first time from West Bengal.

## Genus *Paraethaloptera* Martynov

### 21. *Paraethaloptera gracilis* Martynov

1935. *Paraethaloptera gracilis* Martynov, *Réc. Indian Mus.* 37 : 193-194, Figs. 97-98.

*Material examined* : West Bengal, Birbhum, Mallarpur, 1 Female. 4. iv. 1986 (Coll. M. S. Shishodia & party).

*Length of forewing* : 6 mm.

*Distribution* : India : West Bengal (Birbhum); Bihar (Chotanagpur).

*Remarks* : Martynov (1935) described the species from Bihar based on four female specimens. But the authors for the first time have recorded a single female specimen of the species from West Bengal.

## Genus *Aethaloptera* Brauer

### 22. *Aethaloptera sexpunctata* Kolenati

1859. *Setodes sexpunctata* Kolenati, *Gen. species Trichop.* 2 : 266.

1909. *Aethaloptera sexpunctata*, Betten, *Rec. Indian Mus.* 3 : 234, pl. 14, Figs. 10-12.

*Material examined* : West Bengal, Darjiling, 2123m. 1 Male, 30. xii. 1975 (Coll. G.K. Srivastava & G. S. Arora); Bardhaman, Bolgana, 1 Male. 9. xii. 1985 (Coll. B. N. Das); Murshidabad, Azimgang, 1 Male, 5. ii. 1986, Rajput, Jangipur, 1 Male, 10. ii. 1986 (Coll. I. J. Gupta & party ); West Dinajpur, Raiganj, Kodgram, 1 Male, 14. xii. 1986; Malda, Sahapur, 1 Female, 18. xii. 1986 (Coll. B. C. Das & party).

*Length of forewing* : 7 mm.

*Distribution* : India : West Bengal (Darjiling, West Dinajpur, Murshidabad, Bardhaman, Malda) and Bihar. Elsewhere : Upper Burma.

*Remark* : The species is for the first time recorded from West Bengal.

Genus *Arctopsyche* MacLachlan23. *Arctopsyche lobata* Martynov

1930. *Arctopsyche lobata* Martynov, *Proc. Zool. Soc. London*, p. 77. Figs. 20-21.

1935. *Arctopsyche lobata*, Martynov, *Rec. Indian Mus.*, 37 : 170.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas, 1 Male, 1 Female, no data, (Coll. C. Lynch). Darjiling, 2000 ft. 1 Male, 11. vi. 1914 (Coll. F. G. Gravely).

*Length of forewing* : 11-12 mm.

*Distribution* : India : West Bengal (Darjiling); Uttar Pradesh; Punjab.

*Remarks* : The authors have examined the material referred to by Martynov (1935) from Darjiling District and the length of forewing of both male and female specimen is given. Difference in the structure of preanal appendages as indicated by Martynov (Loc. cit). may be confirmed if more specimens of the species is available in future from the area under consideration.

Genus *Diplectrona* Westwood.24. *Diplectrona marginata* (Betten)

1909. *Hydromanicus marginatus* Betten, *Rec. Indian Mus.*, 3 : 236, pl. 15, Fig. 13.

1935. *Diplectrona Marginata*, Martynov, *Rec. Indian Mus.*, 37 : 181-182.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas, 1 Female, no date, (Coll. C. Lynch), Kurseong, Eastern Himalayas, 4700-5000 ft, 1 ex (damaged), 22. vi. 1910 (Coll. N. Annandale).

*Length of forewing* : Female -- 8 mm.

*Distribution* : India West Bengal (Darjiling); Uttar Pradesh (Dehradun) and Himachal Pradesh (Simla Hills).

*Remarks* : The species was described by Betten (1909) under the genus *Hydromanicus* Brauer. But Martynov (1935) placed the species under the genus *Diplectrona* Westwood. This placement is justified by the presence of open median cell of the hindwing and long lateral filament in the abdomen. However, out of two specimens examined by authors from West Bengal, one is badly damaged. The other specimen studied by the authors agrees well with the description given by Martynov (1935).

Genus *Hydropsyche* PictetKey to species of the genus *Hydropsyche* Pictet

- 1 Size smaller; expanse not more than 14 mm; each of the two appendages of phallus in male genitalia terminated by a strong chitinous hook .....*indica* Betten  
 Size longer; expanse more than 15 mm. two appendages of phallus without hook.....  
 .....*kaznakovi* Martynov

25. *Hydropsyche indica* Betten

1909. *Hydropsyche indica* Betten, *Rec. Indian Mus.*, 3 : 234, figs. 1-4.

*Material examined* : West Bengal, Kurseong, 1 Male, 1 Female, v. 1906 (Coll. N. Annandale); Darjiling, Reyang, F. R. H. Compound, 6 Males, 5 Females, 28. iii. 1973 (Coll. H. S. Sharma & party).

*Length of forewing* : 6 mm; Length of the body 5 mm.

*Distribution* : India : West Bengal (Darjiling and Kurseong).

*Remarks* : Betten (1909) described the species based on two specimens. The authors have studied quite a large number of specimens from Darjiling. The specimens agree well with the description given by Betten (Loc. cit.) excepting for the size which are smaller both in length of the body as well as in the expanse of the forewing.

## 26. *Hydropsyche kaznakovi* Martynov

(Figs. 28-30)

1915. *Hydropsyche kaznakovi* Martynov, *Ann. Mus. Zoology. Acad. Imper. Sci.*, **19** : 411, Figs. 6-7.

*Material examined* : West Bengal, Kalimpong, Agricultural seed Farm, 2 Males, 21. ii. 1973 (Coll. H. K. Bhowmik & party); Darjiling, Rangpo F. R. H. , 500 m.; 2 Males, 3 Females, 15. xii. 1975 (Coll. G. K. Srivastava & G. S. Arora & party).

*Length of forewing* : 8-11 mm.

*Distribution* : India : West Bengal (Darjiling). Elsewhere : Persia and Pakistan.

*Remarks* : The species is a new record for India. The Specimens from India are identical with the description including genitalia (Figs. 28- 30) given by Martynov (1935).

## \*27. *Hydropsyche obscura* Martynov

1935. *Hydropsyche obscura* Martynov, *Rec. Indian Mus.*, **37** : 171-173. Fig. 75.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : As the species is not available for study hence the authors reserve their comments.

## Genus *Hydromanicus* Brauer

### Key to species of the Genus *Hydromanicus* Brauer

Antenna black with an oblique white mark in each segment; phallus truncated at apex  
.....*truncatus* Betten

Antenna yellow ringed with brown; without any oblique white mark in each segment; phallus blunt at apex.....*orientalis* Betten

## 28. *Hydromanicus truncatus* Betten

1909. *Hydromanicus* Betten, *Rec. Indian Mus.*, **3** : 235, pl. xv. Figs. 5-8.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas, 200, 300, no date (Coll. C. Lynch); Ghumti, 4500 ft. 1 Male, vii. 1911. (Coll. F. H. Gravely); Sureil, 5000 ft., 1 Male, 11-31. x. 1971 (Coll. N. Annandale & F. H. Gravely), Kurseong, 1700 ft., 1 Female, 19. vi. 1919 (Coll. N. Annandale).

*Length of forewing* : 8 mm.

*Distribution* : India : West Bengal (Darjiling and Kurseong).

**Remarks :** Betten (1909) described the species from the material collected from Kurseong, West Bengal. Later, Martynov (1935) reported the species from Kurseong and Darjiling of West Bengal and recorded the variations with respect to venation and colouration of the wings and also described the male genitalia in details. Authors on re-examination of the material considered it as a good species.

### 29. *Hydromanicus orientalis* Betten

1909. *Hydromanicus orientalis* Betten, *Rec. Indian Mus.*, 3 : 237, pl. xv. Figs. 14-16.

**Material examined :** West Bengal, Kurseong, 1 Male (Type). - v. 1906, (Coll. N. Annandale).

**Length of forewing :** 7 mm.

**Distribution :** India: West Bengal (Kurseong).

**Remarks :** The figures of male genitalia of *Hydromanicus orientalis* as given by Betten (1909) lead the present authors to consider *H. orientalis* as a good species. However, some of the observations on the study may be recorded as follows : Maxillary palpi brown with yellow hairs specially predominant in first two basal segments. Antenna yellow ringed with brown but the basal segment completely brown with yellow hairs.

### Genus *Amphipsychella* Martynov

#### \*30. *Amphipsychella extrema* Martynov

1935. *Amphipsychella extrema* Martynov, *Rec. Indian Mus.*, 37 : 202-203, Figs. 107-109.

**Distribution :** India : West Bengal (Calcutta).

**Remarks :** The genus *Amphipsychella* Martynov has been described on the basis of females of Type species *A. extrema* Martynov. The reduced condition of maxillary palpi and formula of spurs distinguish *Amphipsychella* from the genus *Amphipsyche* MacLachlan. But the genitalia in males is a good diagnostic character for species identity. As the specimens are not available for comparison the authors reserve their comments.

### Superfamily RHYACOPHILOIDEA

#### Family RHYACOPHILIDAE

#### Genus *Rhyacophila* Pictet

#### Key to species of the genus *Rhyacophila* Pictet

Size smaller; length of forewing 5 mm; inferior appendages in male with two joints but without any tubercle; apical fork of forewing beginning only a little earlier than 1st ...*rhombica* Martynov

Size larger; length of forewing 12- 15 mm; inferior appendages in male without second joint but with 2-3 small tubercles at middle of inner margin; 1st and 2nd apical fork of forewing beginning at the same level .....*digitata* Martynov

### 31. *Rhyacophila rhombica* Martynov

1935. *Rhyacophila rhombica* Martynov, *Rec. Indian Mus.*, 37 : 98-99, Fig. 5.

**Material examined :** West Bengal, Darjiling, 7000 ft., 1 Male, 7. vi. 1971 (Coll. E. Brunetti).

**Length of forewing :** 5 mm.

**Distribution** : India : West Bengal (Darjiling).

**Remarks** : The authors have studied the type but due to damaged condition of the specimen they are unable to study the genitalia. However, they agree with the description given by Martynov (1935) with regard to wings.

### 32. *Rhyacophila digitata* Martynov

1935. *Rhyacophila digitata* Martynov, *Rec. Indian Mus.*, 37 : 102-103, Fig. 8.

**Material examined** : West Bengal, Darjiling, 6 Males (type series), no date (Coll. C. Lynch).

**Length of forewing** : 12-15 mm.

**Distribution** : India : West Bengal (Darjiling).

**Remarks** : The study of types reveals that *Rhyacophila digitata* Martynov, is a good species.

### Genus *Synagapetus* MacLachlan.

### 33. *Synagapetus himalayanus* Martynov

1935. *Synagapetus himalayanus* Martynov, *Rec. Indian Mus.*, 37 : 107-108.

**Distribution** : India : West Bengal (Darjiling).

**Remarks** : The species was described by Martynov (1935) as new to science based on a single female specimen. As the males of the species have not been studied so the authors reserve their comments.

### Family GLOSSOSOMATIDAE

### Genus *Glossosoma* Curtis

### 34. *Glossosoma fissum* Martynov

(Figs. 30-33)

1935. *Glossosoma fissum* Martynov, *Rec. Indian Mus.*, 37 : 106-107, Fig. 11.

**Description** : Female : Head black; antennae : brown; maxillary palpi : brownish; 3rd joint longest, 4th joint nearly half of the 3rd, 5th joint about three fourth of the length of 3rd; thorax: black brown; wings : (Fig. 31) brown, membrane with scanty yellow hairs, costal margin with black hairs, venation dark brown; forewing : discoidal cell broad, 3rd fork acute, crossvein between the discoidal cell and pedicel of third fork, crossvein between media and cubitus and also arculus with milk white spot; hindwing: paler than forewing; 2nd fork acute, 3rd fork longer than its pedicel; legs : (Fig. 32) yellowish brown with a few shiny yellow hairs; spurs dark brown; abdomen : brown.

**Female genitalia** : (Fig. 33) as in figure.

**Material examined** : West Bengal, Darjiling, Youth Hostel Campus, Ghoombhanjan, 7000 ft, 2 Females, 29. v. 1975 (Coll. J. K. Jonathan & party).

**Length of forewing** : 9 mm.

**Distribution** : India : West Bengal (Darjiling); Uttar Pradesh (Dehradun).

**Remark** : The females of the species is for the first time recorded from India.

Superfamily LIMNAPHILOIDEA  
 Family PHRYGAENIDAE  
 Genus *Eubasilissa* Martynov  
 35. *Eubasilissa machlachlani* (White)

1862. *Neuronina machlachlani* White, *Proc. Ent. Soc. Lond.*, P. 26.

1939. *Eubasilissa machlachlani*, Martynov, *Proc. zool. Soc. Lond. No. 5*, pt. 1, pp. 87, 111, pl. 1, Fig. 1.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas, 1 Male, date nil, (Coll. C. Lynch).

*Length of forewing* : 33 mm.

*Distribution* : India : West Bengal (Darjiling); Western Himalayas; Himachal Pradesh (Kulu).

Genus *Neurocyta* Navas  
 36. *Neurocyta arenata* Navas

1916. *Neurocyta arenata* Navas, *Mem. Acad. Cienc. Art. Barcelona.*, 12 (13) : 240-241, Fig. 1.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : Mosely (1935) referred to this species commenting that Navas has not given the figures of the genitalia. The type, a male in Navas's collection in the Barcelona Museum was unavailable for study. It is therefore not possible to comment on the species.

Family LIMNAPHILIDAE  
 Genus *Phylostenax* Mosely  
 \*37. *Phylostenax himalus* Mosely

1935. *Phylostenax himalus* Mosely, *Entomologist* 68 : 184.

*Distribution* : India : West Bengal (Darjiling); Uttar Pradesh (Kumaon) and Panjab.

*Remarks* : Martynov (1936) studied two females of the species and found the difference in the formula of spurs between the two genera *Phylostenax* Mosely and *Pseudostenophylax* Martynov. He (loc. cit) found no difference even in the structure of male genital appendages between *Phylostenax himalus* Mosely and *Pseudostenophylax fumosus* Martynov. Therefore the authors after due consideration of spurs formula retain the species under the genus *Phylostenax* Mosely as the material is not available to them for study.

Family SERICOSTOMATIDAE  
 Key to Genera

1. First joint of antenna extraordinarily long and equal to the length of remaining segments ..... *Dinarthrum* MacLachlan  
 First joint of antenna short as compared to above ..... 2
2. Forewing with Cu A<sub>2</sub> and apical forks 1, 3 and 5 ..... *Paraphlegopteryx* Ulmer  
 Forewing with Cu A<sub>2</sub> lacking and with apical fork no. 1, 2 and 3... *Indocrunoecia* Martynov

Genus *Dinarthrum* MacLachlan38. *Dinarthrum (Indodinarthrum) latum* Martynov

1936. *Dinarthrum (Indodinarthrum) latum* Martynov, *Rec. Indian Mus.*, 38 : 283-284, Figs. 53, 54.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas, 1 Male, 11. vi. 1914 (Coll. F. H. Gravely).

*Distribution* : India : West Bengal (Darjiling); Punjab.

*Remarks* : The type material in National Zoological Collection is in badly damaged condition and unsuitable for study. Hence no Comment on the species is possible.

Genus *Indocrunoceia* Martynov39. *Indocrunoceia heterolepidia* Martynov

1936. *Indocrunoceia heterolepidia* Martynov, *Rec. Indian Mus.*, 38 : 293-295, Figs. 66, 67.

*Material examined* : West Bengal, Darjiling, Eastern Himalayas 1 Female (Type), no date, (Coll. C. Lynch).

*Length of forewing* : 7 mm.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : Only one female from the type series was available for study and the characters enumerated by Martynov (1936) are agreeing with the present specimen. However, some of the characters not mentioned by Martynov (*Loc. cit.*) may be summarised as follows : Ocelli present, the costal margin and the apex of the forewing with yellowish hair which are longer at apex. Yellowish hairs on the costal, apical and posterior margin of hindwing longer and more dense than that of forewing; legs yellow but the forelegs brown, spurs 2, 4, 4.

Genus *Dinarthrella* Ulmer\*40. *Dinarthrella betteni* Martynov

1936. *Dinarthrella betteni*, Martynov, *Rec. Indian Mus.*, 38 : 286-288.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : Martynov (1936) described the species based on a single male specimen from Darjiling district of West Bengal. No further material is available for study.

\*41. *Dinarthrella (Maniconeura) destructa* Ulmer

1906. *Maniconeura destructa* Ulmer, *Notes Leyden Mus.*, 28 : 28

1936. *Dinarthrella (Maniconeura) destructa* Martynov, *Rec. Indian Mus.* 38 : 303.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : Ulmer (1906) described this species from a single male from Darjiling under the genus *Maniconeura*. Later Martynov (1936) placed it in the genus *Dinarthrella* and regarded *Maniconeura* as a subgenus. No further material is available for comments.

Genus *Paraphlegopteryx* Ulmer\*42. *Paraphlegopteryx compositus* Martynov

1936. *Paraphlegopteryx compositus* Martynov, *Rec. Indian Mus.*, **38** : 291-293, Figs. 63-65.

*Distribution* : India : West Bengal (Darjiling).

*Remarks* : The species closely resembles *Paraphlegopteryx tonkinensis* Ulmer, with particular reference to the wing venation as referred to by Martynov (1936) though the more specialised venation of posterior wing distinguishes this species from *P. tonkinensis* Ulmer. The difference in the male genitalic features between the two were not stated by Martynov (1936).

## Family CALAMOCERTIDAE

Genus *Ganonema* MacLachlan\*43. *Ganonema salsum* Betten

1909. *Ganonema salsum* Betten, *Rec. Indian Mus.*, **3** : 238.

*Distribution* : India : West Bengal (Darjiling); Assam; Uttar Pradesh (Kumaon and Garhwal); Bhutan.

*Remarks*: Betten (1909) originally described the species from Assam. Martynov (1936) studied the species from different parts of India, redescribed it along with illustrations and confirmed it as a good species.

## Family LEPTOCERIDAE

## Key to Genera

Inferior appendages with two segments, spurs 2, 2, 2, ..... *Triplectides* Kolenati  
 Inferior appendages with single segments spurs 0-2, 2-1, 2-2 ..... *Oeceti* MacLachlan

Genus *Triplectides* Kolenati44. *Triplectides magnus* (Walker)

1909. *Notanotolica magna* Walker, *Rec. Indian Mus.*, **3** : 239.

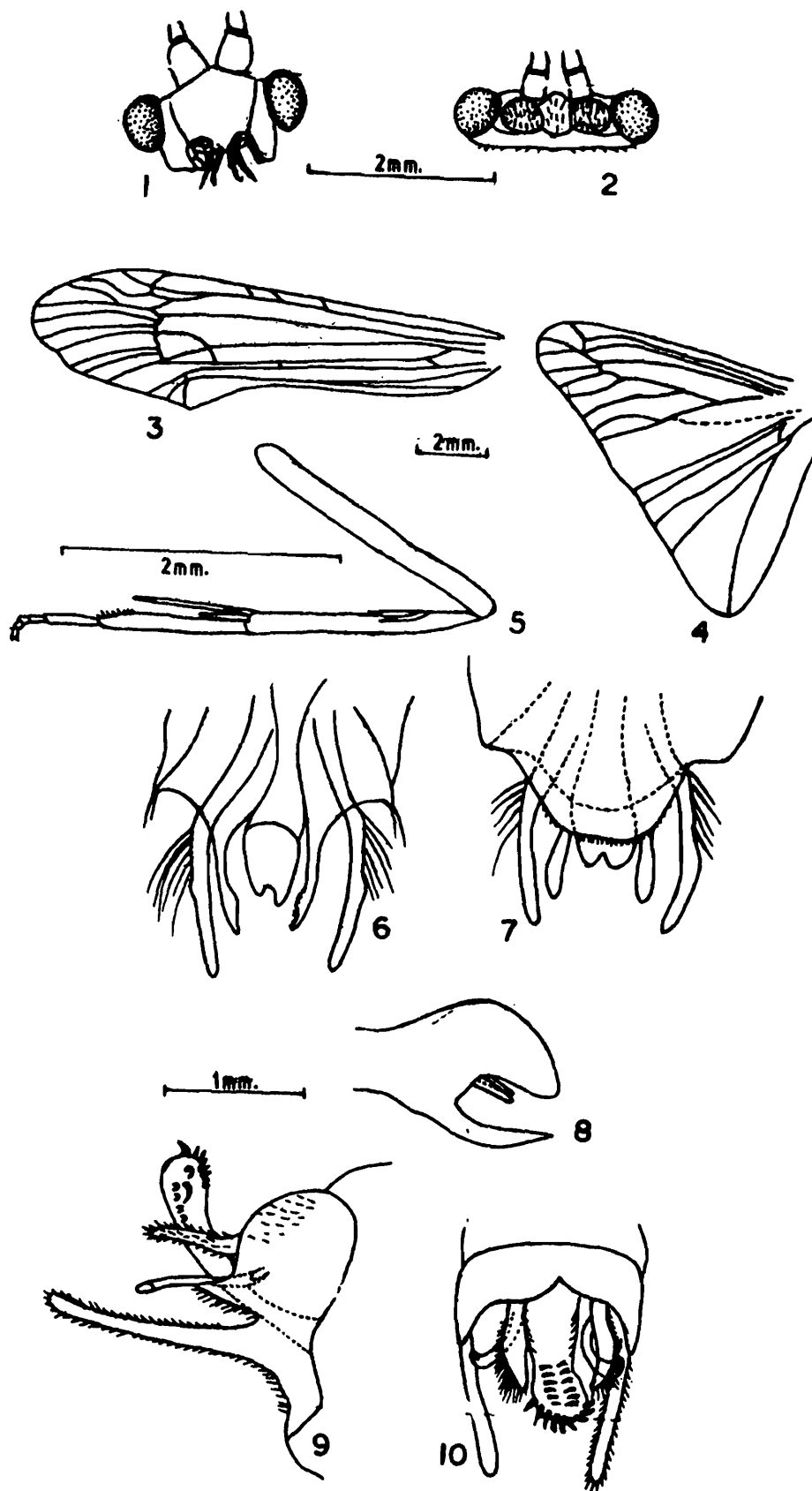
1982. *Triplectides magnus* (Walker), *Mem. natu. mus. Vict. no.* **43** : 65, Figs. 5, 6, 56, 85.

*Material examined* : West Bengal, Calcutta, at light, 2 Females, 28. ii. 1911, 11.iii. 1985 (Coll. F.H. Gravely) : 1 Female, 17. ii. 1926 (Coll. R. B. S. Sewell) : 1 Male, 1 Female, Birbhum, Gopalpur, Eglegram Forest, 24. 1. 86 (Coll. S. B. Ray & party).

*Length of forewing*: 15 mm.

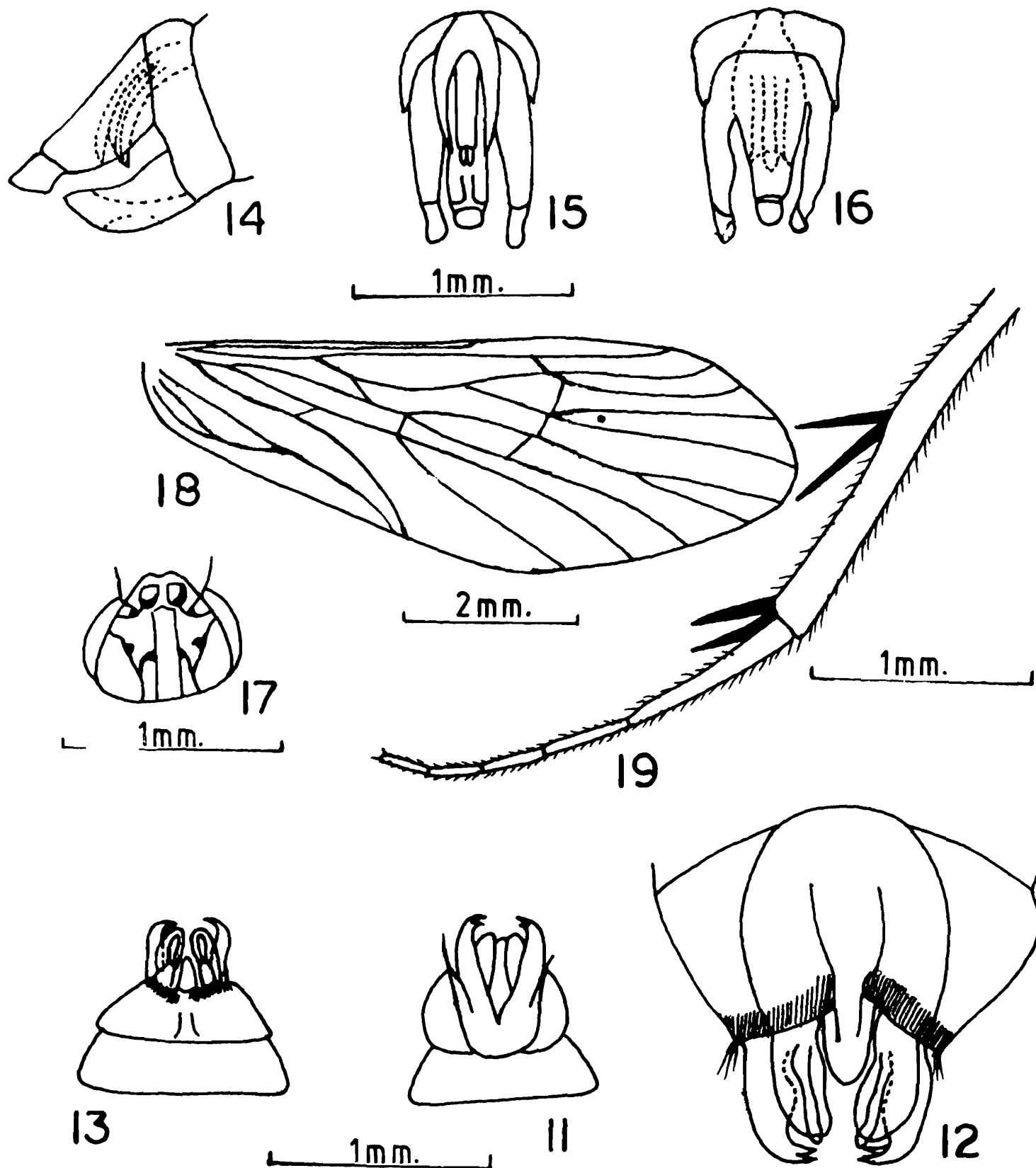
*Distribution* : India : West Bengal (Calcutta, Birbhum); Bihar and Orissa.

*Remarks* : Martynov (1936) already referred to about the species as *Notanotolica magna* Walker collected from West Bengal, Bihar and Orissa. The authors have examined three specimens from Calcutta studied by Martynov and also two examples of a male and a female have been studied from the recent collections of Birbhum. It constitutes a new locality record from the districts mentioned above. Neboiss (1983) placed *Notanotolica magna* (Walker) in synonymy under *Triplectides magnus* (Walker).



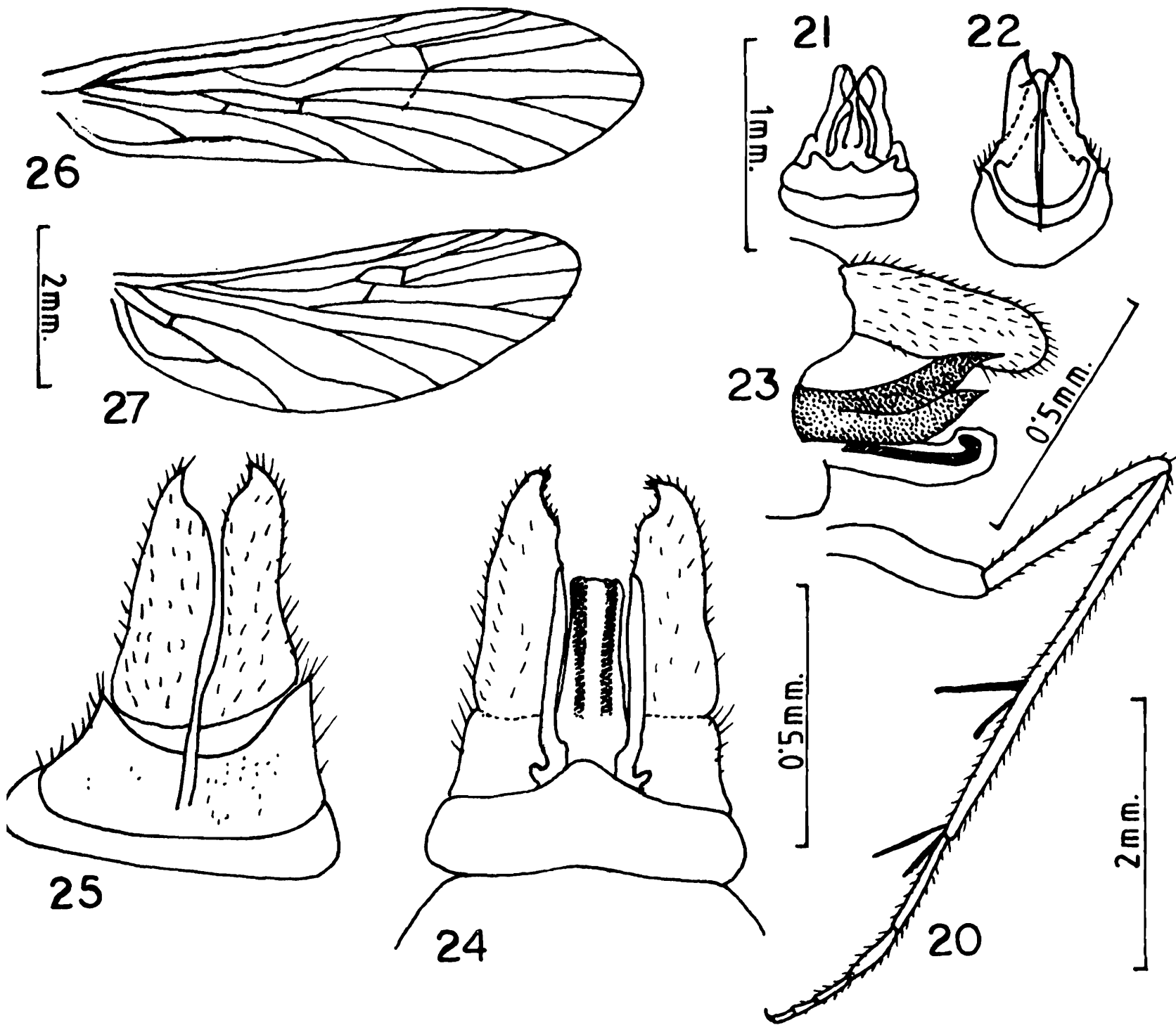
Figs. 1-8 *Amphipsyche indica* : 1. head, dorsal, 2. head, frontal 3. forewing 4. hindwing 5. hind leg 6. genitalia male, ventral 7. genitalia male, dorsal 8. penis, lateral.

Figs. 9-10. *Stenopsyche splendida*: 9. genitalia male, lateral 10. genitalia male, ventral

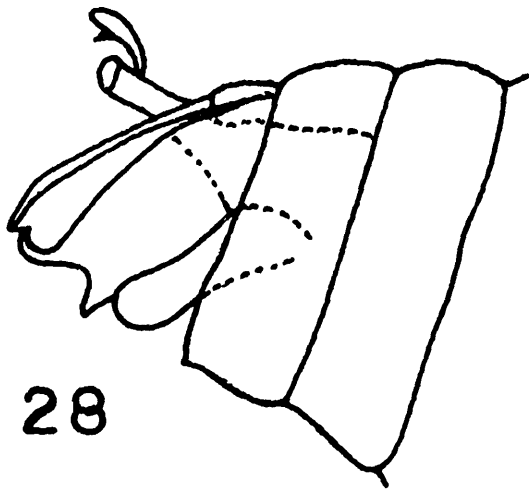


Figs. 11-13 *Chimarra kumaonensis* : 11. genitalia male, dorsal 12. genitalia male, dorsal 12. genitalia male, dorsal, magnified 13. genitalia male, ventral.

Figs. 14-19 *Chimarra reyangensis* sp. nov. 14. genitalia male, lateral 15. genitalia male, ventral 16. genitalia male, dorsal 17. apex of abdomen, female, caudal 18. forewing 19. part of hind tibia and tarsus.

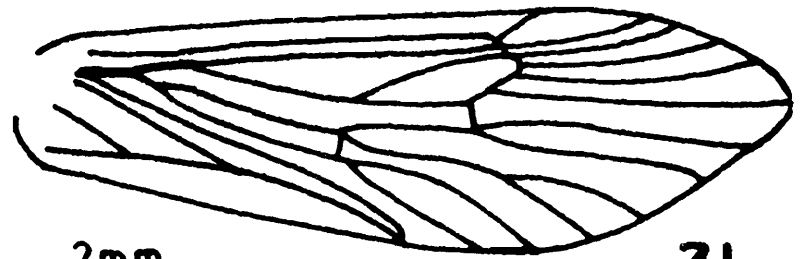


Figs. 20-27. *Chimarra diaphana* sp. nov. 20. hind leg 21. genitalia male, ventral 22. genitalia male, dorsal 23. genitalia male, lateral 24. genitalia male, dorsal, magnified 26. forewing 27. hindwing.



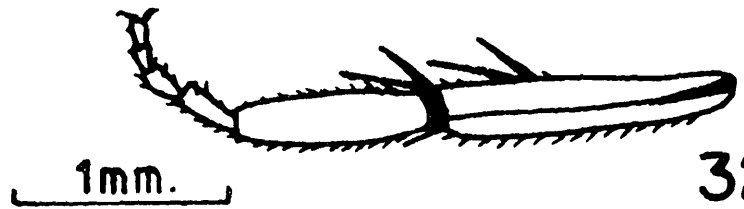
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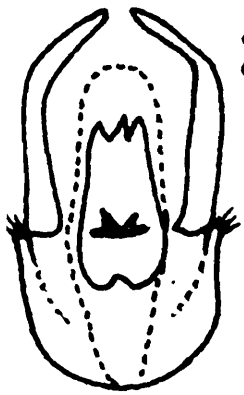
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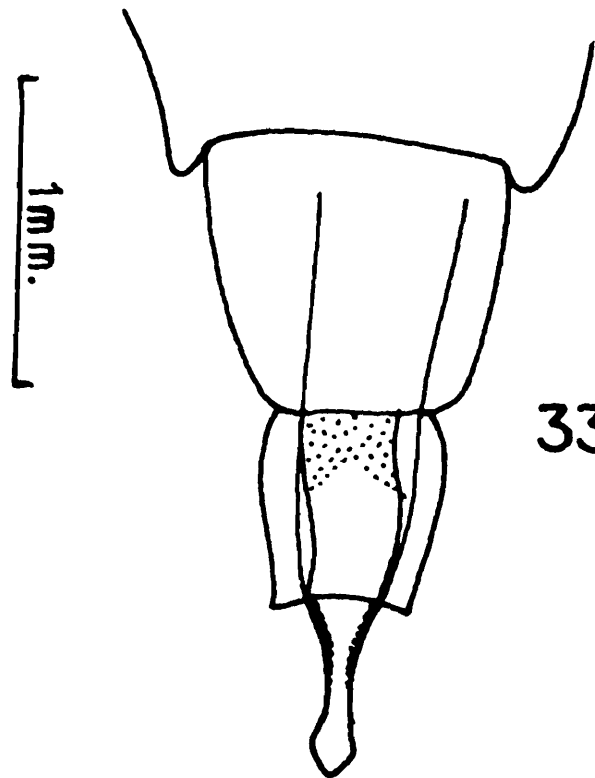
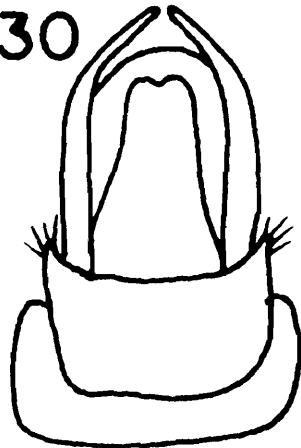
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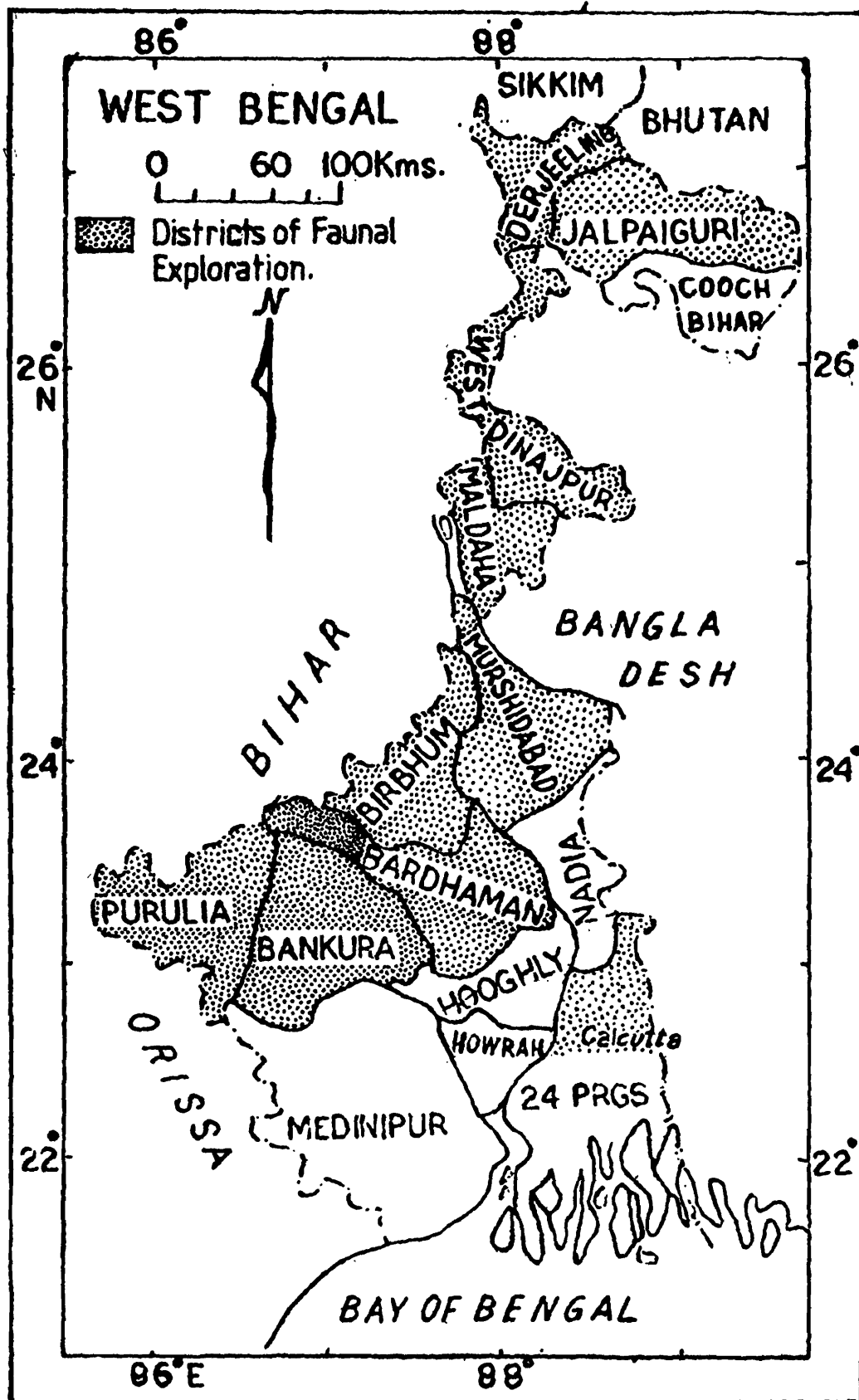


1mm.

33

Figs. 28-30. *Hydropsyche kaznakovi*: 28. genitalia male, lateral 29. genitalia male, ventral 30. genitalia male, dorsal.

Figs. 31-33. *Glossosoma fissum* : 31. forewing 32. hindleg 33. apex of abdomen, female, dorsal.



Distribution of Caddisflies in West Bengal State

45. *Oecetis* sp.

*Distribution* : India : West Bengal (Calcutta).

*Remarks* : Martynov (1936) referred to a female specimen of the genus and presumed the species as a new one. But probably due to nonavailability of more specimens including the males, he could not confirm the identity of the specimen up to species level.

Genus *Setodes* Rambur

\*46. *Setodes unispina* Martynov

1936. *Setodes unispina* Martynov, *Rec. Indian Mus.*, 38 : 257- 259, Figs. 19-21.

*Distribution* : India : West Bengal (Puruliya)..

*Remarks* : The species is not available for study. But the description as well as illustration of wings and male genitalia as given by Martynov (1936) confirm it to be a good species.

## SUMMARY

The paper deals with the taxonomic account along with earlier investigation, collection and preservation, diagnostic characters, review on classification and geographical distribution of Trichoptera from ten districts of West Bengal. The paper incorporates 46 species distributed over 30 genera under 11 families and 3 superfamilies. Out of a total of 33 species examined, two species have been described new to science under the genus *Chimarra*, a species, namely, *Hydropsyche kaznakovi* Martynov, has been recorded for the first time from India and a female of the species, *Glossosoma fissum* Martynov has been reported for the first time from India. Besides, 8 species constitute new locality records for West Bengal and thirteen species have been reviewed from literature, due to the paucity of material for study. Keys to all the taxa examined and their morphovariations wherever necessary, have been provided. Relevant Illustrations and references have also been incorporated.

## ACKNOWLEDGEMENT

The authors are indebted to the Director, Zoological Survey of India for kindly providing them necessary laboratory facilities for carrying out the work and also to Dr. A. Neboiss, Curator, Department of Entomology, Museum of Victoria, Division of Natural History, Australia for critically reviewing the paper.

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## INSECTA : THYSANOPTERA

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### INTRODUCTION

The present monograph is the outcome of the studies based on the extensive collections made by a number of survey parties of the Zoological Survey of India and collections received from Universities & other research institutions from almost all the districts of West Bengal. We have also incorporated the species described or recorded from the State by previous workers. The collections ranges from Sunderbans to the foothills of Himalayas upto the elevation of 2100 M.

The present studies revealed the presence of 124 species under 77 genera from West Bengal.

#### a) Review of literature on Thysanoptera of West Bengal

The first record of thrips from West Bengal dates back to 1913 when Bagnall described *Lefroythrips lefroyi* (Bagnall) [= *Physothrips lefroyi* Bagnall] and he in his subsequent studies (1918a, 1918b, 1921b, 1926 & 1934) added 6 more new species and recorded 1 species. Moulton (1929, 1933) described 4 new species including 2 new genera (*Projectothrips* & *Monilothrips*). Ramakrishna & margabandhu (1939) described 1 new species. In the recent past Bhatti (1967a, 1967b, 1977, 1978a, 1978b & 1982) described 13 new species including 3 new genera (*Ajothrips*; *Biltothrips* & *Zaniothrips*) and recorded 4 species. Ananthakrishnan (1969a, 1969b, 1971a, 1972, 1973a, 1973b & 1973c) described 7 new species including 2 new genera (*Ablemothrips* & *Ocythrips*) and recorded 6 species. Ananthakrishnan & Jagadish (1970a, 1970b) described 4 new species. Mound (1976) described 2 new species under the genus *Dichromothrips*. Sen (1977) described 1 new species. Muralledharan & Sen (1978) described 1 species. Sen Gupta & Pramanik (1981) recorded 1 species. Okajima (1987) described 1 new species and recorded 2 species under the genus *Holothrips*. Recently Sen et al (1988) in the "*Thysanoptera Fauna of North-Eastern India*" have recorded 30 more species from North Bengal. Besides Sen (1978) described the male of *Monilothrips Kempfi* Moulton.

#### b) Discussion

An analysis of the species treated in the present account shows that 41 new species have been described from West Bengal, of which 20 species are endemic and the other 21 species have been reported from elsewhere, Later on and 39 species have been recorded for the first time from West Bengal. *Pseudodendrothrips ornatissimus* Schmutz is recorded for the first time from India. Altogether 8 new genera - *Ajothrips* Bhatti; *Biltothrips* Bhatti; *Zaniothrips* Bhatti; *Lefroythrips* Prisener; *Projectothrips* Moulton; *Monilothrips* Moulton; *Ablemothrips* Ananthakrishnan and *Ocythrips* Ananthakrishnan have been described from the State of which 3 genera - *Ajothrips*, *Biltothrips* and *Ocythrips* are endemic and the other 5 genera have been reported from elsewhere later on.

Altogether 691 species of thrips pertaining to 250 genera under 5 families are known from India, out of which 124 species pertaining to 77 genera under 4 families are represented in West Bengal. The family Adiheterothripidae is not recorded from the State. At the time of undertaking the project 55

species were known from West Bengal, collected mostly from Darjeeling Dt.; Calcutta and Sibpore Botanical Garden. During the course of the present studies another 30 species have been added from North Bengal and incorporated in *Thysanoptera Fauna of North-East India* (Sen et al, 1988). As a result of the present studies altogether 124 species under 77 genera are known to occur in West Bengal and thus added another 39 species excluding 30 species recorded in Sen et al (1988).

### MATERIAL AND METHODS

Thrips inhabit a variety of habitats like flowers, leaves, dry leaf - litters, decaying barks and twigs, aerial roots, grass, within plant galls and a few are predaceous feeding mostly on mites, thrips, coccids, white flies and psocids. The specimens of thrips have been collected from almost all the districts of West Bengal. The common methods used for collection of thrips is by beating foliage or inflorescence, dead and decaying or fungus infested branches of trees on a stiff hard board/plastic sheet and picking the material by a fine moistened camel hair brush and preserved in 70% alcohol. The preserved material is mounted for microscopic studies. For mounting, the material is first treated in 5% KOH solution (10% for very dark specimens) from few hours to overnight depending upon the chitinisation; the treated material is then washed in distilled water several times to remove the trace of KOH. The material is then dehydrated in ascending grades of alcohol (50%, 70%, 90%, and absolute) cleared in clove oil and mounted in Canada balsum with utmost care, so that and wings are well spread.

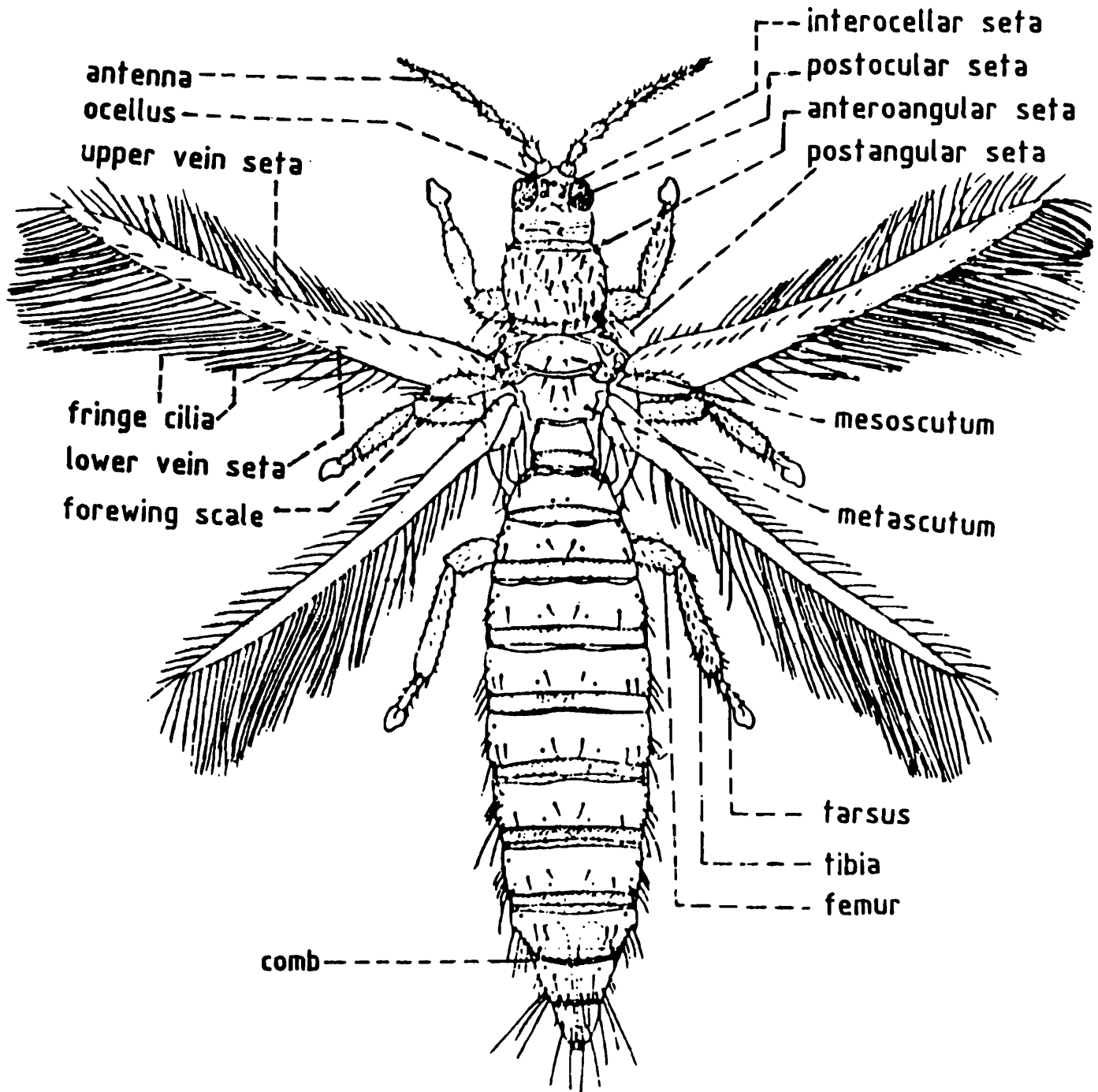
The list of collections studied districtwise is as follows :

*Bankura Dt.* : S.Sen & Party (1985); Dr. P.Mukherjee & Party (1986); *Birbhum Dt.* : S.Sen & Party (1981) ; S.B.Roy & Party (1986); *Burdwan Dt.* : C.C. Adhikary (1988); *Calcutta* : a number of collections from in and around the city; *Coochbehar Dt.* : C. K. Sen Gupta (1980, 1981, 1982, 1983, 1984); *Darjeeling Dt.* : Dt. T Sen Gupta (1974); Dr. J. K. Jonathan & Party (1974), 1976), Dr. G.K. Srivastava & Party (1976), A. R. Bhaumik & Party (1978), S. S. Saha (1979); Dr. B. C. Das & Party (1986), Neora Valley Survey, 1982 (Dr. R. K. Packer & D. K. Mondal) ; *West Dinajpore Dt.* : T R. Mitra & Party (1987); *Hooghly Dt.* : S. Sen & Party (1978), Dr. D. K. Nath (1980), *Howrah Dt.* : Sibpore Botanical Garden (S. Sen & Party 1981, 1982, 1984; K. C. Banerjee & S. Dutta, 1989); *Jalpaiguri Dt.* : Dt. T Sen Gupta (1974); Dr. B. C. Das & Party (1986); *Midnapore Dt.* : Dr. S. Biswas & Party (1983), Dr. S. K. Raut (1985); *Murshidabad Dt.* : Dr. S. Sen & Party (1983); S. Bhattacharyya (1988); *Nadia Dt.* : Bethuadahari (A. K. Roy, 1978; Y N. Gupta, 1979), Kalyani (Prof. S. Chakraborty, 1985, 1986, Prof. S. K. Ghosh, 1989); *Purulia Dt.* : C. C. Adhikari (1984), S. Sen & Party (1985); 24 Parganas (North) Dt. : D. R. Maulik (1982), Dr. M. K. Banerjee (1986), 24 Parganas (South) Dt. : Dr. N. Muraleedharan & Party (1978), S. & Party (1981), 1984), Sunderban Tiger Reserve Survey, 1983 (S. S. Saha), Chuksar Is. (Prof. A. Chowdhury, 1984), N. K. Pramanik (1987).

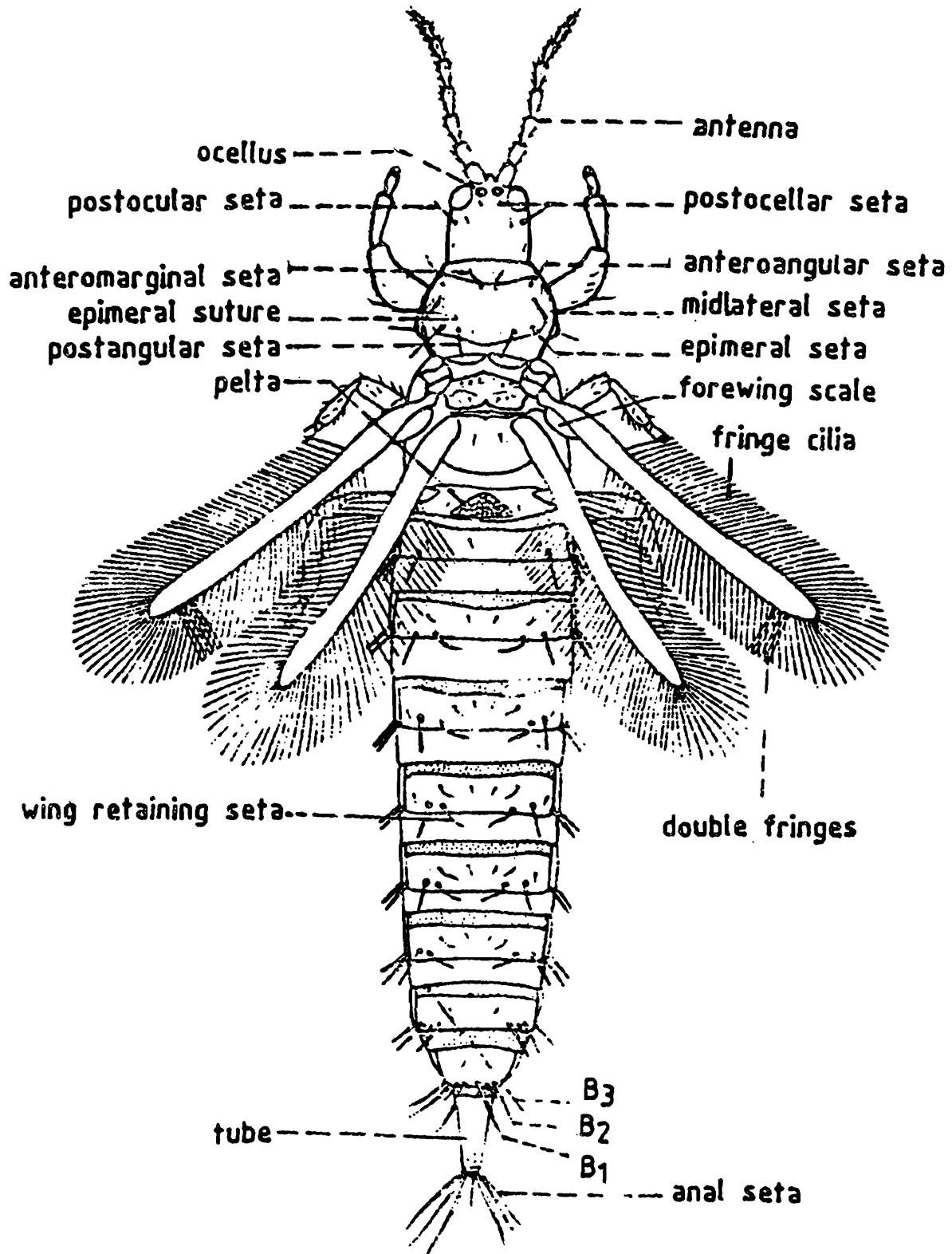
### MORPHOLOGY AND TERMINOLOGY

The terminology used in the keys and description of species conform to the established and well accepted earlier works, (Mound et al, 1976; Ananthakrishnan & Sen, 1980; Palmer et al, 1989). Test-figures 1 & 2 depict a general view of typical-terebrentian and tubuliferan respectively where all the important characters have been indicated with labels of benefit to use the keys.

All measurements are in microns unless otherwise mentioned.



Text Fig. 1. Dorsal view of typical Terebrantian



Text Fig. 2. Dorsal view of a typical Tubuliferan

## Key to the Families and Subfamilies

1. Abdominal segments X tubular, female without saw like oviposter. Forewings without veins and setae.....(Suborder Tubulifera) Family PHLAEOTHIRIPIDAE  
 Maxillary styles uniformly thin, never broadended; narrower than labial palps.....  
 .....Subfamily PHLAEOTHERIPINAE  
 Maxillary styles thickened; band like; broadened at apex, broader than labial palps .....  
 .....Subfamily IDOLOTHRIPINAE  
 Abdominal segment X rarely tubular. Female always with saw like oviposter. Forewings with veins and setae on veins (Suborder Terebrania) .....2
2. Oviposter curved upwards. Forewings broad and rounded at apex; foremargin without the fringe of long hairs. Antenna 9-segmented; segments 3 & 4 with elongated sensory areas .....  
 .....Family AELOTHRIPIDAE  
 Wings districtly widened towards apex, racket shaped. Antennae stout with rigid setae on intermediate segments .....Subfamily MYMAROTHRIPINAE  
 Wings about parallel sided, sometimes slightly narrowed at basal half, but never racket like. Antennae more or less slender without rigid setae; terminal segments forming an unit .....  
 .....Subfamily AELOTHRIPINAE  
 Oviposter curved downwards. Wing more or less pointed at apex; foremargin with the fringe of hairs present. Antennae 6-9 segmented.....3
3. Antenal segment moniliform; style absent; segments 3 & 4 with a tympanum like area at apex, without sense cones. Fore and hind femora enlarged. Ovipositer weak.....  
 .....Family MEROTHRIPIDAE  
 Antennal segments not moniliform; style 1-3 segmented distinct; segments 3 & 4 with simple or forked sense cones. Ovipositer well developed..... Family THRIPIDAE  
 Terminal antennal segments not long and thin. Dorsum of body not polygonally reticulate, almost with transverse striae.....Subfamily THRIPINAE  
 Terminal antennal segments not long and thin needle-like. Dorsum of body deeply reticulate with polygonal areas.....Subfamily PANCHAETOTHRIPINAE

## Key to the genera of the Family Aeolothripidae

1. Forewings almost parallel sided, with cross bars. Terminal antennal segments forming an unit; segments 3 & 4 with linear sensoria. Maxillary palpi 3 - segmented; labial palpi 4 - segmented. Abdominal sternite VII of female with 2 pairs of accessory setae close to mid line and no accessory setae laterally; sternites II-VI without accessory setae .... *Aelothrips* Haliday  
 Forewings not parallel sided, clearly widened at apex, racket shape. Antennae stout with conspicuous rigid setae. Maxillary palpi 8-segmented; labial palpi 4-segmented.....  
 ..... *Mymarothrips* Bagnall

## SYSTEMATIC ACCOUNT

Order THYSANOPTERA

Suborder TEREBRANTIA

Family AEOLOTHRIPIDAE

Genus 1. *Aeolothrips* Haliday1836. *Aeolothrips* Haliday, *Ent. Mag.*, 3 : 451Key to the Species of *Aeolothrips*

1. Prothorax dark. Antennal segment 5 distinctly shorter than 4 and about as long as the terminal 4 segments together; segment 4 about 4-4.5 times as long as broad; segment 2 pale at apex; segment 3 dark in distal third. Body pigment orange to light crimson. Setae on abdominal tergite IX not longer than the claspers ..... *intermedius* Bagnall  
Bagnall Prothorax pale yellow. Sensory area of antennal segment 3 & 4 long extending at least to the middle of the segment. Femora mostly pale. Cross-bar on forewings short usually as long as broad. Abdomen mostly dark.....*collaries* Preisner

1. *Aeolothrips collaris* Priesner1919. *Aeolothrips fasciatus collaris* Priesner, *Sitz. Ber. math. naturwiss. Kl. Akad. Wiss. Wien*, (1) 128 (2-3) : 110.1919. *Aeolothrips fulvicollis* Bagnall, *Ann. Mag. nat. Hist.* (9) 4 : 253-254.1928. *Aeolothrips fulvicollis* : Ayyar, *Mem. Dept. Agri. India. Ent. Ser.*, 10 (7) : 247.1964. *Aeolothrips collaris* : Bhatti, *Bull. Ent.*, 5 : 18.1984. *Aeolothrips collaris* : Zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 78.1988. *Aeolothrips collaris* : Sen et al, *Rec. Zool. Surv. India. Occl. pap.*, 100 : 3-4.

*Specimen studied* : Murshidabad Dt. : 4 Females (Z. S. I. Reg. Nos. 1801-1802/H17; 1821/H17, 1874/H17) Murshidabad, 28. 3. 1983, Coll. S. Sen & Party.

*Distribution* : India : West Bengal (Murshidabad); Widely distributed. Elsewhere : Bangladesh; Egypt; Palestine; Cyprus, Yugoslavia.

*Remarks* : This species is recorded for the first time from West Bengal.

2. *Aeolothrips intermedius* Bagnall1934. *Aeolothrips intermedius* Bagnall, *Eng. Mon. Mag.*, 70 : 1231948. *Aeolothrips intermedius* Priesner, *Bull. Eng. Egypte*, 32 : 3281964. *Aeolothrips intermedius* Bhatti, *Bull. Eng.* 18: 191968. *Aeolothrips intermedius* Mound, *Bull. Br. Mus. nat. Hist. Ent. Suppl.*, 11 : 11

*Specimen studied* : Birbhum Dt. : 1 Male (Z. S. I. Reg. 4383/H17, Nalhati, 21. 1. 1986, coll, S. Sen & Party. Murshidabad Dt. : 2 Females (Z. S. I. Reg. Nos. 1822-1823/H17) Krishnapur hat para, 24. 3. 1983, coll. S. Sen & Party. 2 Females (Z. S. I. Reg. No. 1848/H17; 1928/H17) Katra, 23. 3. 1983, coll. S. Sen & Party. 1 Female (Z. S. I. Reg. No. 4393/H17) Baharampur, 3. 3. 1987, coll. S. Bhattacharyya.

**Distribution** : India : West Bengal (Birbhum, Murshidabad) ; Punjab. Elsewhere : Widely distributed in Europe.

**Remarks** : This species is recorded for the first time from West Bengal, hitherto known in India only from Punjab. Bhati (1964) recorded this common European species from India and since then the species was not reported anywhere from India.

### Genus 2. *Mymarothrips* Bagnall

1928. *Mymarothrips* Bagnall, *Ann. Mag. nat. Hist.*, (10) 1 : 306.

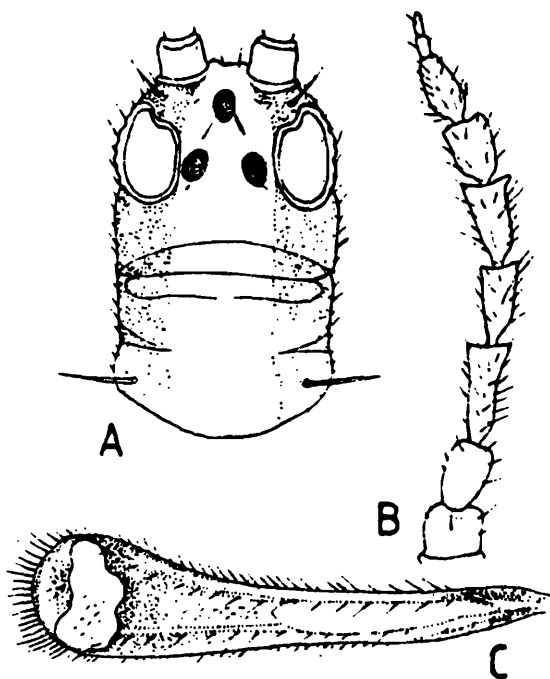
### 3. *Mymarothrips garuda* Ramakrishna & Margabandhu (Text-figure 3)

1931. *Mymarothrips garuda* Ramakrishna & Margabandhu. *J. Bombay nat. Hist., Soc.* 34 (4) : 1031.

**Specimen studied** : Midhanpre Dt. : 3 Females (Z. S. I. Reg. Nos. 3030-3032/H17) Tamluk, 10. 5. 1985, coll. Dr. S. K. Raut.

**Distribution** : India : West Bengal (Medinipur); Tamil Nadu.

**Remarks** : This species is recorded for the first time from West Bengal, hitherto restricted only in Tamil Nadu.



Text-Fig. 3. *Mymarothrips garuda* R&M. A. Head and pronotum. B. Antenna. C. Forewing

## Family MEROTHIRIPIDAE

Genus 3. *Merothrips* Hood

1912. *Merothrips* Hood, *Proc. Ent. Soc. wash.*, 14 (3) : 132.

4. *Merothrips indicus* Bhatti & Ananthkrishnan

1975. *Merothrips indicus* Bhatti & Ananthkrishnan, *Oriental Ins.*, 9 (1) : 32-35.

General body colour pale brown; head dark brown; antennal segments 1 & 3-8 concolourous with head, 2 pale yellow, legs yellow; wings pale brown. All setae hyaline. Head a little longer than wide. Eyes with more than 40 ommatidia; inter ocellar setae very long. Antennal segments 3 & 4 with a large sensorium at apex. Pronotum without sculpture at anterior portion and sculptured in hind portion; posteroangular setae long. Meso- and metanotum completely sculptured. Fore- and hind femora stout. Fore wings with 20-22 costal, 15 upper vein and 12-15 lower vein setae respectively. Abdominal tergites I-VII completely sculptured with transverse lines.

*Specimen studied* : Howrah Dt. : 2 Females (Z. S. I. Reg. No. 253-254/H17) Botanical Garden, Sibpore, 6. 2. 1979, coll. Dr. N. Muralidharan.

*Distribution* : India : West Bengal (Haora); Tamil Nadu and Kerala.

*Remarks* : This species is recorded for the first time from West Bengal.

## Key to the Genera of Family Thripidae

1. Dorsum of body not polygonally reticulate, at most with transverse striae. Antennae 7 or 8 segmented, rarely 9 segmented; terminal segments not long and thin (Subfamily Thripinae) ....2  
Dorsum of body deeply reticulate with polygonal areas. Terminal antennal segments long and thin, needle like (Subfamily Panchaethripinae) .....31
2. Wings dendrothripoid (posterior margin of forewings straight, costal margin curved at apex), forewings narrow with only a faint upper vein. Antennae 9-segmented, long and narrow, segments 3 & 4 with forked sense cones. Maxillary palpi 2-segmented. Prothorax with well developed transverse striae and with a pair of moderately well developed posterpaternal setae. Hind tarsi much elongate. Abdominal tergites laterally sculptured; tergites II-VIII with a short median pair of closely placed setae. (Tribe Dendrothripini).....*Pseudodendrothrips* Schmutz.  
Wings not dendrothripoid (Costal margin of forewings straight) .....3
3. Abdomen with dense rows of microtrichia (Tribe Sericothripini).....4  
Abdomen without dense rows of microtrichia (Tribe Thripini).....5
4. Prothoracic setae short. Spinula present only on mesosternum. Antennae 8-segmented, style 2-segmented. Forewings with two longitudinal veins, lower vein with only a few scattered setae. Males sometime with a sickle like lateral appendage on abdominal segment IX.....  
.....*Scirtothrips* Shull  
Prothorax with two strong setae at each posterior angle. Spinula present on meso and metasternum. Lower vein of forewings with numerous setae.....*Ajothrips* Bhatti

5. Prothorax without any major setae, sometimes with one or more moderately long wetae at hind angles. Forewings with weak setae. (Subtribe Anaphothripina) .....6  
 Prothorax with major setae and with one or two conspicuous setae at hind angles and usually with 2-6 pairs of postermarginal setae. (Subtribe Thripina)..... 10
6. Pronotum without any strong setae. Wings and ocelli absent in both sexes. Abdominal tergites with numerous small scattered setae; sternites with accessory setae; dorsal setae on segment IX fine.....*Aptinothrips* Haliday  
 Pronotum with a least one conspicuous setae at hind angle.....7
7. Pronotum with one conspicuous setae at hind angle. Head not produced at front. Antennae 8-segmented; males showing various sexual dimorphism (segment 4 or 5 clearly asymmetrical; segment 1 sometimes enlarged). Foretibiae in one or both sexes with a tooth at apex.....  
 ..... *Exothrips* Priesner  
 Pronotum with 2 conspicuous setae at hind angle .....8
8. Antenna 6-segmented 6 much longer than the rest of segments. Head a little produced in front. Upper vein of forewings with interrupted series of setae.....*Priesneriola* Ananthakrishnan  
 Antennae 8-segmented .....9
9. Head small, strongly transverse. Prothorax very much enlarged; mouthcome long reaching much beyond prosterum. Foretibiae with a tooth at apex, more conspicuous in males .....  
 .....*Rhamphothrips* Karny  
 Head, mouthcome and prothorax normal. Antennae 8-segmented. Wings not very broad; setae on veins weak. Abdominal tergum IX of female without at pair of well developed mediodorsal setae; segment IX of males often with one or two pairs of stout horn-like setae.....  
 .....*Anaphothrips* Uzel
10. Antennae 7-segmented, very rarely 8-segmented due to secondary split of the style .....28  
 Antennae 8-segmented, style 2-segmented ..... 11
11. Maxillary palpi 2-segmented.....12  
 Maxillary palpi 3-segmented..... 16
12. Head with a short process. Wings slender, strongly curved.....13  
 Head without process. Wings not curved ..... 15
13. Meso - and metasterna with spinula ..... 14  
 Meso - and metasterna without spinula. Antennals segments 3 & 4 with simple sense cones. Foretibiae at inner apex with long trifid spur. Fema divided. Wings sparsely set with setae (forewings chaetotaxy; costa with 8-11; upper vein with 6-7 and lower vein with 4--5 setae respectively).....*Organothrips* Hood
14. Abdominal segment VIII of males with lateral horn-like process .....*Dorcadothrips* Preisner  
 Abdominal segment VIII of males without lateral process. Anterior margin of pronotum without prominent setae. Body vividly coloured .....*Trichromothrips* Priesner.
15. Spinula present on mesosternum, absent on metasternum. Head partly with polygonal reticulations. Anteroangulars of pronotum shorter than anteromarginals. Wings banded, narrow and with strong setae. Antennae very slender, style thin.....*Ayyaria* Karny  
 Spinula present on meso and metasternum. Head and pronotum transversely striate. Fema undivided. Forewings with long costal setae, upper vein with a few basal setae and three scattered distal setae. Abdominal tergite on sides covered with dense rows of microtrichia. Sterna II-VI of females (II-VII of males ) completely covered with microtrichia. Segment IX of abdomen with atleast 9 pairs of major setae in females 6 pairs in males on dorsum; segment X with at least 4 pairs of major setae.....*Billothrips* Bhatti.

16. Forewings with a regular series of setae on both veins.....17  
Forewings without a regular series of setae.....18
17. Abdominal segment X tube like and longitudinally split through its entire length. Metascutum, abdominal tergites and sternites strongly hexagonally reticulate. Head constricted behind eyes, cheeks bulged. Abdominal sternites III-VIII of males with one subapical glandular areas. Terminal setae on abdominal tergite long and stout.....*Ctenothrips* Franklin  
Abdominal segment X not tube like. Metascutum and abdomen not hexagonally reticulate. Pronotum with 4 strong setae on each side an anteroangular, an anteromarginals and two postangulans; anteromarginals shorter than postangulans.....*Frankliniella* Schmutz
18. Pronotum always with 6 long setae on each side. Forewings with 2 brown spots, sometimes taking the form of bands.....*Scolothrips* Hinds  
Pronotum always with 6 long setae at posterior angles (rarely anteromarginals conspicuous) ....  
.....19
19. Abdominal segments II-VIII with an incomplete comb. Antennal segment 6 enlarged; segment 2 of style very long .....*Projectothrips* Moulton  
Almost segment VIII with a comb, complete or incomplete .....20
20. Lower vein with a regular series of setae Lower vein with only 4 setae atmost.....27
21. Intermediate antennal segments (generally segments 3 and 4) elongate, bottle like and with long slender sense cones .....22  
Antennae normal; sense cones on segments 3 and 4 moderately long.....23
22. Segment 2 of style very long, 2.5-3 times as long as segment 1. Antennal segment 4 more bottle - like. Anteromarginals longer than anteroangulans.....*Aroidothrips* Ananthakrishnan  
Style shorter, Antennal segments 3 and 4 more elongate and bottle-like; segment 5 broad at apex, 6 narrowed at base; sense cones on segments 3 and 4 mostly a broad 'U' Spinula present on meso and metasternum.....*Dichromothrips* Priesner
23. Mouthcone normal, not surpassing prosternum.....25  
Mouthcone long, usually surpassing prosternum.....24
24. Spinula present on meso and metasternum. Antennal segment 1 with a pair of dorsal setae near distal margin, antennae of male rarely 7 segmented. Pronotum with 2 pairs of postmarginal setae .....*Mycterothrips* Trybom  
Spinula absent on meso and metasternum. Tergite IX of male with a conical, narrow upraised process bearing two stout horns .....*Tusothrips* Bhatti
25. Glandular areas on abdominal sternites of males absent. Antennal segment 3 of both sexes short and stalked; segments 4-6 of males much enlarged and setose .....  
.....*Craspedothrips* zur Strasser  
Glandular areas distinct in males.....26
26. Postoculars in two rows males with 6 setae on abdominal tergum IX.....  
.....*Lefroyothrips* Preisner  
Postoculars in a single row. Head parallel sided, males with cheeks narrowed posteriorly. Antennae showing sexual dimorphism.....*Megalurothrips* Karny
27. Wings banded. Setae on forewings moderately long; scale of wing with only 3 setae.....  
.....*Bathrips* Bhatti  
Wings without bands; setae on veins particularly on lower vein very well developed. Sense cones on antennal segments 3 and 4 very long. Spinula present on meso and absent on metasternum.....*Euphysothrips* Bagnall

28. Head produced in front. Sense cones on antennal segments 3 & 4 simple. Maxillary palpi 3 segmented. Wings banded.....*Bolacidothrips* Priesner  
Wings not produced in front .....29
29. Spinula on meso- and metasternum absent or weakly developed on mesosternum only. Maxillary palpi 2 segmented. Antennal segment 2 with middorsal seta .....  
.....*Stenchaetothrips* Bagnall  
Spinula present on meso- and absent on metasternum.....30
30. Posterior margin of abdominal tergites I-VII with teeth or scallops. Head small.....  
.....*Microcephalothrips* Crawford  
At most tergite VIII with a comb; tergites without posterior marginal flange. Forelegs unarmed ..  
.....*Thrips* Haliday
31. Body without polygonal reticulations, but with strong wrinkles...*Rhipiphorothrips* Morgan  
Body distinctly polygonally reticulate.....32
32. Antennae 7 segmented, style 1 segmented .....33  
Antennae 8 segmented, style 2 segmented .....34
33. Forewings with callosities. Body short and stout. Four terminal segments of antennae forming a conical unit.....*Retithrips* Marchal  
Head narrowed, posteriorly rounded; vertex with a hump - like production. Antennal segments 5-7 forming an unit; sense cones on 3 and 4 simple. Males with glandular areas on abdominal sternites.....*Astrothrips* Karny
34. Wings without veins or setae, but with microtrichia .....*Phibalothrips* Hood  
Wings with or without conspicuous veins, but with short and well developed setae.....35
35. Abdominal segment X long and tubiform and setae on segment IX & X long and exceptionally stout. Forewings with long and dark setae.....*Panchaetothrips* Bagnall  
Abdominal segment X normal setae .....36
36. Head with a conspicuous reticular, collar - like band at posterior margins.....37  
Head without a collar - like band at posterior margin.....38
37. Antennae 8-segmented. Head more elongate. Abdominal thorn-like setae.....  
.....*Monilothrips* Moulton  
Antennae 7 to 8 segmented; segment 4 very characteristic broad at base, with a narrow elongated neck beyond middle. Pronotal setae long and well developed. Abdominal tergite of male with 3 pairs of thorn - like setae and tubercles .....*Zaniothrips* bhatti
38. Vertex with a strong thick occipital ridge; cheeks shorter than eyes. Forewings with 2 pale cross - bands, apex brown, upper vein with a gap between setae. Abdominal tergite II-VII with prominent scalloped areas.....*Helionothis* bagnall  
Head without ridge.....39
39. Head with anastomosing striations. Forewings without cross-bands; both the veins with a continuous row of setae. Abdominal tergite VIII with a complete comb of microtrichia .....  
.....*Selenothrips* Karny  
Head with polygonal reticulations. Forewings dark with 2 pale bands, apex dark and with strong setae on costa and upper vein. Legs banded. Abdominal tergites with a antecostal ridge...  
.....*Caliothrips* Daniel

Family THRIPIDAE  
Subfamily THRIPINAE  
Genus 4. *Ajothrips* Bhatti

1967. *Ajothrips* Bhatti, *Bull. Ent.*, 8 (1) : 58

Key to the Species of *Ajothrips* (After Bhatti 1967)

1. Only abdominal segments 8-10 dark brown; 7 dark except anterolateral part; 2-6 darkening progressively; extensive orange pigment present; body setae slightly shaded. Posteroangulars shorter; outer 42-51, inner 63 long respectively. Forefemora 64-66 wide.....*karma* Bhatti  
Body strikingly bicolourous, with dark brown abdomen; orange pigment lacking; body setae quite dark. Posteroangulars longer, outer 55-58 and inner 70-73 long respectively. Forefemora 74 wide .....

5. *Ajothrips gara* Bhatti

1967. *Ajothrips gara* Bhatti, *Bull.* 8 (1) : 61-63.

1988. *Ajothrips gara* : Sen et al, *Rec. zool. Surv. India, Occl. Pap.* 100 : 7

*Specimen studied* : Darjeeling Dt. : 4 Males, 3 Females (Z. S. I. Reg. No. 1620-1626/H17) Darjeeling, 29. 8. 1979, coll. S.S.Saha. 24 Parganas Dt. : 1 Male, 1 Females (Z. S. I. Reg. Nos. 1415-1416/H17) Hauberia VIII., 26. 2. 1978, coll. N. K. Pramanik.

*Distribution* : India : West Bengal : Haora Dt. Darjeeling Dt.

6. *Ajothrips karma* Bhatti

1967. *Ajothrips karma* Bhatti, *Bull. Ent.*, 8 (1) : 60-61.

*Specimen studied* : Murshidabad Dt. : 3 Females (Z. S. I. Reg. Nos. 1705/H17, 1965-66/H17) Mohammad Para Vill. , 24. 3. 1983, coll. S. Sen & Party.

*Distribution* : India : West Bengal : Haora and Murshidabad Dt.

Genus 5. *Anaphothrips* Uzel

1895. *Anaphothrips* Uzel, *Monogr. Ord. Thysanoptera* : 142.

7. *Anaphothrips sudanensis* Trybom

1911. *Anaphothrips sudanensis* Trybom, *Results Swedish Zool. Exped. Egypt*, pt. 4 : 14

1912. *Euthrips flavicinctus* Karny, *Marcellia*, 11 : 115-117.

1968. *Anaphothrips sudanensis* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.) Suppl.*, 11 : 21.

1978. *Anaphothrips sudanensis* : Bhatti, *Senckenbergiana biol.*, 59 (1-2) : 88.

1984. *Anaphothrips sudanensis* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 79.

1988. *Anaphothrips sudanensis* : Sen et al, *Rec. zool. Surv. India, Occl. pap.*, 100 : 8.

*Specimen studied* : Bankura Dt. : 2 Females (Z. S. I. Reg. Nos. 3035-36/H17) Baghajole vill., 8. 11. 1985, coll. S. Sen & Party. Calcutta : 4 Females (Z. S. I. Reg. Nos. 942/H17; 2600/H17; 4152/H17; 4184/H17) 6. 4. 1978; 23. 3. 1984, coll. C. K. Sen Gupta and N. K. Pramanik.

Murshidabad, 23. 3. 1983, coll. S.Sen & Party. 24 Parganas Dt. : 1 Female (Z.S. I. Reg. No. 2049/H17) Narendrapur, 29. 3. 1984, coll. N. K. Pramanik. Purulia Dt. : 2 Females (Z. S. I. Reg. Nos. 4073/H17; 4350/H17) Puruliya, 3. 11. 1985, coll. S. Sen & Party.

*Distribution* : India : West Bengal : Bankura, Calcutta, Murshidabad, Purulia, 24 Parganas (South); Widely distributed. Elsewhere : Bangladesh; Sudan; Morocco; Egypt; Somalia; South Africa; Taiwan; Central Asia; Sri Lanka; Java; Sumatra; Australia; Puctrorico; Trinidad; Cuba.

*Remarks* : This species is recorded for the first time from West Bengal.

#### Genus 6. *Aptinothrips* Haliday

1836. *Aptinothrips* Haliday, *Ent. mag.*, 3 : 445.

#### 8. *Aptinothrips rufus* (Gmelin)

1790. *Thrips rufus* Gmelin, *Syst. Nat.*, Ed. 13 : 1.

1836. *Aptinothrips rufus* Haliday, *Ent. mg.* 3 : 445.

1895. *Aptinothrips rufus* var., *connaticornis* Uzel, *Mon. Ord. Thysanoptera* : 154.

1918. *Aptinothriprufus* var, *connaticornis* : Bagnall, *Ann. mag nat. Hist.*, (9) 1 : 205

1928. *Aptinothrips rufa* var, *connaticornis* : Ramakrishna, , *Mem. Dept. Agri. India Ent. ser.*, 10 : 267

1963. *Aptinothrips rufus* : Ananthakrishnan, *Treubia*, 26 (2) : 797-101.

*Distribution* : India : West Bengal : Darjeeling. Elsewhere : Europe, North America.

*Remarks* : Bagnall (1928a) recorded this species from India as well as from West Bengal.

#### Genus 7. *Aroidothrips* Ananthakrishnan

1960. *Aroidothrips* Ananthakrishnan *J. nat. Hist. Soc.*, 57 (3) : 562-563.

#### 9. *Aroidothrips longistylus* Ananthakrishnan

1960. *Aroidothrips longistylus* Ananthakrishnan, *J. Bombay nat. Hist. Soc.*, 57 (3) : 562-563.

*Specimen studied* : Midnapore Dt. : 3 Females (Z. S. I. Reg. Nos. 3025-27/H17) Tamluk, 11. 5. 1985, coll. Dr. S. K. Raut.

*Distribution* : India : West Bengal (Medinipur); Tamil Nadu (Kodaikanal).

*Remarks* : This species is recorded for the first time from West Bengal.

#### Genus 8. *Ayyaria* Karny

1926. *Ayyaria* Karny, *Mem. Dept. Agri. India Ent. ser.*, 9 : 193.

#### 10. *Ayyaria chaetophora* Karny

1926. *Ayyaria chaetophora* Karny, *Mem. Dept. Agri. India Ent. Ser.*, 9 : 193.

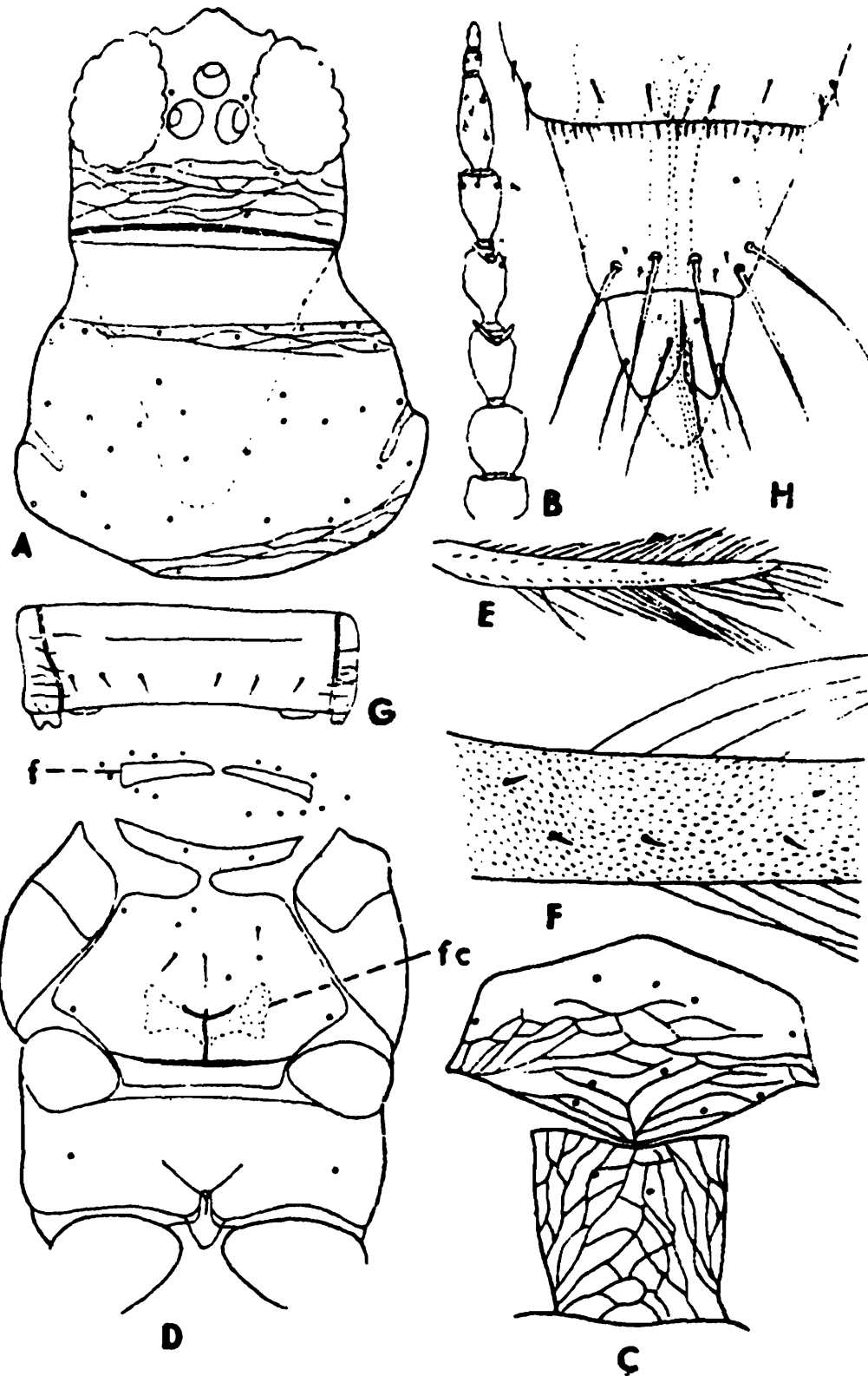
1939. *Ayyaria chaetophora* : Ramakrishna & Margabandhu, *Rec. Indian Mus.*, 41 (1) : 23.

1945. *Ayyaria chaetophora* : Shumsher, *Indian J. Ent.*, 7 (1-2) : 162.

1963. *Ayyaria chaetophora* : Ananthakrishnan, *Treubia*, 26 (2) : 80 & 101.

1984. *Ayyaria chaetophora* : Zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 80.

*Specimen studied* : Bankura Dt. : 1 Male (Z. S. I.Reg. No. 4132/H17) Bishnupur, 27. 7. 1986, coll. Dr. P. Mukherjee. Puruliya Dt. : 1 Male (Z.S. I. Reg. No. 54213/H17) Puruliya, 1. 11. 1985,



Text figure 4. *Anaphotrips sudanensis* Trybom. A. Head and pronotum. B. Antenna. C. Meso- and metanotal sculpture. D. Meso- and metasternum. E. Forewing. F. Protin of forewing enlarged. G. Abdominal segment VI. H. Terminal abdominal segments. f. Fera. fc. Ferca.

coll. S. Sen & Party. 24 Parganas, Dt. (South) : 2 Females (Z. S. I. Reg. Nos. 936-937/H17) Habberia Vill., 2. 7. 1978, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Bankura, Puruliya, 24 Parganas (South)]; Tamil Nadu, Kerala. Elsewhere : Bangladesh.

*Remarks* : This species is recorded for the first time from West Bengal.

#### Genus 9. *Bathrips* Bhatti

1962. *Bathrips* Bhatti, *Bull. Ent.* 3 : 34.

#### 11. *Bathrips melanicornis* (Shumsher)

1945. *Taeniothrips melanicornis* Shumsher, *Indian J. Ent.* 7 (1-2) : 179-181.

1962. *Bathrips melanicornis* : Bhatti, *Bull. Ent.*, 3 : 34-35.

1963. *Bathrips melanicornis* : Ananthakrishnan, *Treubia*, 26 (2) : 101.

*Specimen studied* : Murshidabad Dt. : 2 Females (Z. S. I. Reg. Nos. 4388-4389/H17) Baharampur, ex, Mulberry leaf, 3. iii. 1987, coll. S. Bhattacharyya.

*Distribution* : India : West Bengal (Murshidabad) ; Punjab; Tamil Nadu. Elsewhere : Burma.

*Remarks* : This species is recorded for the first time from West Bengal and a serious pest of Mulberry.

#### Genus 10. *Biltothrips* Bhatti

1973. *Biltothrips* Bhatti, *Oriental Ins.*, 7 (3) : 439.

#### 12. *Biltothrips minutus* (Bhatti)

1967. *Sericothrips minutus* Bhatti, *Thysanoptera Nova Indica* : 10.

1973. *Biltothrips minutus* : Bhatti, *Oriental Ins.*, 7 (3) : 439.

*Distribution* : India : West Bengal, Sibpore Botanical Garden, Haora Dt.,

#### Genus 11. *Bolacidothrips* Preisner

1930. *Bolacidothrips* Preisner, *Bull. Soc. R. Ent. Egypt.*, 14 (1) : 6.

#### 13. *Bolacidothrips graminis indicus* Ananthakrishnan

1966. *Bolacidothrips graminis indicus* Ananthakrishnan, *Bull. Ent.*, 7 : 32-33.

General body colour yellow; head, thorax and abdominal apex deep; prothorax and mesothorax with orange tinge; antennal segments 1-4 yellow, 5-7 dark brown; forewings with weak band.

Head produced in front of eyes. Eyes bulged; cheeks with a clear notch behind eyes. Antennae 7-segmented, sensecones on segments 3 & 4 simple.

Prothoracic inner posteroangulals longer than the outer. Spinula present on mesothorax and absent on metathorax. Forewings chaetotaxy-costa with 19-20, upper vein with 11 (7+1+2+1 or 7+1+1+1+1) and lower vein with 11 setae respectively.

*Specimen studied* : Bankura Dt. : (Z.S. I. Reg. Nos. 4010/H17) Sonamukhi Forest, 7. 11. 1985, coll. S. Sen & Party. 1 Female (Z. S. I. Reg. No. 4011/H17) Kumardanga, 6. 11. 1985, coll. S. Sen

& Party. Nadia Dt. : 2 Females (Z. S. I. Reg. Nos. 41232-4124/H17) Kalyani, June, 1986, coll. Dr. A. K. Mukherjee.

*Distribution* : India : West Bengal (Bankura, Nadia); Kerala; Tamil Nadu; Maharashtra ; Gujarat.

*Remarks* : This species is recorded for the first time from West Bengal.

#### Genus 12. *Craspedothrips* zur Strassen

1966. *Craspedothrips* zur Strassen, *Senckenbergiana biol.*, **47** : 443.

1967. *Toxothrips* Bhatti, *Thysanoptera Nova Indica* : 16.

1978. *Craspedothrips* : Bhatti, *Oriental Ins.*, **12** (2) : 163-165.

#### 14. *Craspedothrips minor* (Bagnall)

1921. *Physothrips minor* Bagnall, *Ann. Mag. nat. Hist.*, (9) : 8 : 393.

1926. *Physothrips minor* : Karny, *Mem. Dept. Agri. India Ent. Ser.* **9** (6) : 196.

1945. *Taeniothrips minor* : Sumsher, *Indian J. Ent.*, **7** (1-2) : 165.

1968. *Craspedothrips minor* : Mound, *Bull. Br. Mus. nat. Hist. (Eng) Suppl.*, **11** : 32-33.

1967. *Toxothrips ricinus* Bhatti, *Thysanoptera Nova Indica* : 16-17.

1978. *Craspedothrips minor* : Bhatti, *Oriental Ins.*, **12** (2) : 165-166 & 194.

1984. *Craspedothrips minor* : zur Strassen & Harten, *Senckenbergiana biol.*, **65** (1-2) : 81.

*Specimen studied* : Birbhum Dt. : 1 Female (Z. S. I. Reg. No. 1669/H17) Ballavpur forest Nursery, 19. 21. 1981, coll. S. Sen & Party.

*Distribution* : India : West Bengal (Birbhum, Haora) ; Karnataka; Tamil Nadu; Delhi; Punjab, M. P. Elsewhere : Bangladesh, Indonesia.

*Remarks* : Bhatti (1967) described *Toxothrips ricinus* Bhatti from West Bengal.

#### Genus 13. *Ctenothrips* Franklin

1097. *Ctenothrips* Franklin, *Ent. News*, **18** : 247.

#### 15. *Ctenothrips niger* Kudo

1977. *Ctenothrips siger* Kudo, *Kontyu*, **45** (1) : 1-4.

1988. *Ctenothrips niger* : Sen et al, *Rec. zool. Surv. India, Occl. Pap.*, **100** : 8-9.

*Female (Macropterous & Brachypterous)* General body colour blackish brown; forewings dark brown with a pale band near by fork; all setae dark brown.

Head about as long as wide; cheeks strongly constricted behind eyes then bulged at postocular setae level again concave at middle; surface reticulate with irregular transverse lines. Eyes large about half of head length. Postoculars very well developed, i & ii as long as interocellars and iv very long. Mouthcone long, almost reaching the base of prosternum. Antennae 8-segmented; segment 3 longest; segments 3 & 4 with forked sense cones.

Prothorax about as long as head and wider than head; anterior margin with 2 pairs of setae, inner much longer than the outer; posteroangular 2 pairs; surface well developed. Meso and metanotum

hexagonally reticulate; median pair of metanotal setae placed along anterior margin. Spinula present only on mesosternum. Forewings slender, narrowed towards apex and pointed; both the veins with regular series of setae.

Abdominal tergites and sternites sculptured with hexagonal reticulations. Tergite VIII with a regular comb. Segment X tube like; completely divided longitudinally.

*Specimen studied* : 6 Females (Z. S. I. Reg. No.s 1244-1249/H17) Tongu, Darjeeling Dt, 15. 5. 1976, coll. Dr. J. K. Jonathan.

*Distribution* : India : West Bengal, (Darjiling Dt.). Elsewhere : Nepal.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

#### Genus 14. *Dichromothrips* Priesner

1932. *Dichromothrips* Preisner, *Stylops* 1 : (10)

1976. *Dichromothrips* : Mound, *Biol. J. Linn. Soc.*, 8 (3) : 246-248.

#### Key to the Species of *Dichromothrips*

1. Pronotum with 2 pairs of long and subequal posteroangular setae. Posterolateral margins of abdominal tergites II-VII with well developed fringe of microtrichia. Abdominal sternites of males without glandular areas ..... *nakahari* Mound  
Pronotum with only one pair of much smaller posteroangular setae. Posterolateral margins of abdominal tergites without fringe of microtrichia. Abdominal sternites of males with a pair of round glandular areas and on sternite VI joined medially ..... *indicus* Mound.

#### 16. *Dichromothrips indicus* Mound

1976. *Dichromothrips indicus* Mound *Biol. J. Linn. Soc.*, 8 (3) : 255-256.

1988. *Dichromothrips indicus* : Sen *et al*, *Rec. zool. Surv. India Occl. Pap.*, 100 : 9-10.

*Male (Macropterous)* : General body colour yellow; head brown; base of antennal segments 2-4 yellow, 3 faintly shaded medially; meso and metathorax pale brown; all legs yellow; abdominal segment II and median area of III-IV pale brown, IX brownish yellow; middle and tip of forewings dark, subapical area colourless.

Head 145 long, 165 wide. Ocellar setae III arising just inside ocellar triangle and close at base. Antennal segment 3-8 : 80, 97, 55, 75, 13 & 16 long respectively.

Prothorax 142 long, 200 wide, pronotal sculpture weak with a few lines medially near anterior margin. Postangular one pair 70 long. Metanotum reticulate medially with about three transverse lines of sculpture near anterior margin; median setae arising at anterior margin. Forewings with 1 median and 2 distal setae in the upper vein.

Abdominal tergite II sculptured medially and laterally. Lateral setae of tergite IX thorn like; posteroangular setae slender and median setae small. Sternites III-VI with a pair of round glandular areas and joined medially on segment VI.

*Distribution* : India : West Bengal (Kalimpong, Darjiling Dt.).

### 17. *Dichromothrips nakahari* Mound

1976. *Dichromothrips nakahari* Mound, *Boil. J. Linn. Soc.*, 8 : 258-259.

*Macropterous Female (Male)* : General body colour brown with red hypodermal pigment in thorax; antennal segments 3-5 with pale sub basal ring, 3-4 with neck yellow to light brown; all tibiae and tarsi yellow; median abdominal segments pale; body setae dark. (General body colour yellow; head, distal antennal segments and mediau area of abdominal segments III-VIII with brownish shade).

Head 190 (145) long, wide. Antennal segments 3-4 with elongate apex, 5 broad at apex, Ocellar setae arising within the triangle. Pronotum weakly sculptured, 190 (145) long. Posteroangulars very well developed outer 80 (45) and inner 95 (55) long respectively and with 2 pairs of postermarginal setae. Metanotum weakly reticulate, median setae 65 long placed at anterior margin. Forewings 1.3 mm (800) long, upper vein with 13 (10+1+2) setae. Abdominal tergites II-VII with several microtrichia on posterior margin laterally; tergite VIII with a group of about 10 microtrichia anterolateral to spiracle; sternite VII with median and submedian setae in front of posterior margin. The male without sternal glandular areas.

Total Body length : 2 : 1 (1.35) mm.

*Distribution* : India : West Bengal (Calcutta).

### Genus 15. *Dorcadothrips* Priesner

1932. *Dorcadothrips* Priesner *Bill. R.Ent. Soc. Egypt.*, 16 : 49.

#### Key to the Species of *Dorcadothrips*

1. Abdominal sternites with accessory setae. Forewings with a dark cross-band just before the middle and with 20-24 costal, 7-10 (3+3+2 or 4+3+1+2 or 3+2+2) upper vein & 10-11 lower vein setae. Maxillary palpi 2-segmented. Abdominal tergites sculptured only or extreme sides, sculpture on intermediate tergites extend medially only upon submedium setae.....*indicus* Bhatti
- Abdominal sternites without accessory setae. Forewings with 3 cross-band and with 21 costal, 8-9 (6-7+2) upper vein & 10-11 lower vein setae. Abdominal sternites III-VII of male with a transversely elongated gland area in the middle just behind antecostal line and 2 round areas laterally along each side.....*fasciatus* Bhatti.

### 18. *Dorcadothrips fasciatus* Bhatti

1967. *Dorcadothrips fasciatus* Bhatti, *Thysanoptera Nova Indica* : 21.

*Distribution* : West Bengal (Sibpore, Haora Dt.).

### 19. *Dorcadothrips indicus* Bhatti

1932. *Dorcadothrips caespitis* Presner, *Bull. Soc. Ent. Egypt.*, 16 : 45-51.

1965. *Dorcadothrips caespitis* : Ananthkrishnan, *Bill. Ent.* 6 : 28.

1978. *Dorcadothrips indicus* Bhatti, *Oriental Ins.*, 12 (3) : 423-426.

*Distribution* : India : West Bengal (Haora) ; M. P.; Maharashtra; Karnataka & Andhra Pradesh.

Genus 16. *Exothrips* Priesner

1939. *Exothrips* Priesner, *Rev. zoll. bot. Afr.*, **32** (32) : 162.

20. *Exothrips hemavarna* (Ramakrishna & Margabandhu)

1931. *Oxythrips hemavarna* Ramakrishna & Margabandhu, *J. Bombay nat. Hist. Soc.*, **34** (4) : 1036.

1942. *Anaphothrips (Chaetanaphothrips) hemavarna* : Shumsher, *Indian J. Ent.* **4** (2) : 128-129

1956. *Exothrips madrasensis* Ananthakrishnan, *Zool. Ann*, **157** (7-8) : 130-133.

1962. *Exothrips hemavarna* : Sakimura & Ananthakrishnan, *Bull. Ent.*, **3** : 53-56.

*Specimen studied* : Bankura Dt. 1 Female (Z. S. I. Reg. No. 4286/H17) Kumardanga, 6. 11. 1985, coll. S. Sen & Party. Howrah Dt. : 1 Female (Z. S. I. Reg. No. 4130/H17) Sibpore Botanical garden, 16. 2. 1984, coll. N. K. Pramanik.

*Distribution* : India : West Bengal (Bankura, Haora); Tamil Nadu; M. P. Maharashtra; Delhi; Chandigarh.

*Remarks* : This species is recorded for the first time from West Bengal.

Genus 17. *Frankliniella* Karny

1910. *Frankliniella* Karny, *Mitt. Nat. ver. Univ. Wien.*, **8** (2) : 46.

1984. *Frankliniella* : Moulton, *Revue Ent.*, **19** : 15-114.

Key to the Species of *Frankliniella*

1. Abdominal tergite VIII with comb, but sparse. Body brown, antennal segments 1 & 2 dark brown, 3-5 yellow, 6-8 brown; legs mostly yellow with femora, mid and hind tibiae dark in middle; forewing clear; males yellow.....*intonsa* (Trybom)
- Abdominal tergite VIII without comb. Head yellow; thorax orange yellow to orange brown; antennae mostly brown; segment 2 darkest, 3 & 4 lighter; abdomen brown; legs concolous with body; foretibiae and all tarsi yellowish brown; forewings yellowish brown; males coloured as in females but thorax and antenna lighter.....*schultzei* (Trybom)

21. *Frankliniella intonsa* (Trybom)

1895. *Thrips intonsa* Trybom, *Ent. Tidskr.*, **16** (3) : 188.

1912. *Frankliniella intonsa* : Karny, *Zool. Anz.* **4** (4) : 334.

1984. *Frankliniella intonsa* : zur Strassen & Harten, *Senckenbergiana biol.*, **65** (1-2) : 82-83.

1988. *Frankliniella intosa* : Sen et al, *Rec. Zool. Surv. India, Occl. Pap.*, **100** : 10.

*Specimen studied* : Birbhum Dt. : 1 Female (Z. S. I. Reg. No. 1577/H17) Adityapur, 17. 12. 1981, coll. S. Sen Coochbehar Dt. : 7 Females, 2 Males (Z. S. I. Reg. Nos. 1706-1710/H17, 1754-175/H17) Coochbehar Dt. : 30 10. 1982, coll. C. K. Sengupta Darjeeling Dt. : 1 Male (Z. S. I. Reg. Nos. 1852-53/H17) Madhupur, 25. 3. 1983, coll. S. Sen & Party, 1 Female (Z. S. I. Reg. No. 1906/H17) Mohamad Para Vill., 24. 3. 1983, coll. S. Sen & Party, 2 Females (Z. S. I. Reg. No. 1929-30/3074/H17) Narendrapur, 21, 2. 1984, coll. S. Sen & Party.

*Distribution* : India : West Bengal [Birbhum, Coochbhar, Darjeeling, Murshidabad, 24-Parganas (South)]; Bihar. Elsewhere : Bangladesh; Japan : Korea; W. Europe.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

## 22. *Frankliniella schultzei* Trybon

1910. *Physopus schultzei* Trybon, *Denksch. med. naturw. Ges. Jena*, **16** : 151.,

1948. *Frankliniella schultzei* : Moulton, *Rev. de Ent.*, **19** (1-2) : 100.

1923. *Frankliniella dampfi* : Preisner, *Ent. Mitt.*, **12** : 64.

1968. *Frankliniella schultzei* : Mound, *Bull. Br. Mus. nat. Hist. (Ent) Suppl.*, **11** : 39.

1980. *Frankliniella schultzei* : Sen, *Rec. Zool. Surv. India*. **77** : 343-344.

1984. *Frankliniella schultzei* : Zur Strassen & Harten, *Senckenbergiana biol.*, **65** : (1-2) : 83.

*Specimen studied* : Calcutta : 2 Females (Z. S. I. Reg. Nos. 1008/H17) 28. 2. 1978; 9.4.1978; coll. N. K. Pramanik & C. K. Sen Gupta. 24 Parganas (South) : 12 Females (Z. S. I. Reg. Nos. 4266-77/H17) Kakdwip, 19. 7. 1987, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Calcutta, 24-Parganas (South)]. Elsewhere : Ghana, Bangladesh; Uganda ; U. K; South Australlia.

*Remarks* : This species is recorded for the first time from West Bengal.

## Genus. 18. *Lefroyothrips* Priesner

1938. *Lefroyothrips* Priesner, *Treubis*, **16** (4) : 499.

## 23. *Lefroyothrips lefroyi* (Bagnall)

1913. *Physothrips lefroyi* Bagnall, *Ann. mag. nat. Hist.*, (8) **12** : 292.

1928. *Taeniothrips (Physothrips) lefroyi* : Ramkrishna, *Mem. Dept. Agri. India Ent. Ser.*, **10** (7) : 258.

1929. *Taeniothrips lefroyi* : Moulton, *Rec. Indian Mus.*, **31** (4) : 374.

1969. *Amblythrips lefroyi* : Bhatti, *Oriental Ins.*, **3** (4) : 374.

1974. *Ceratothrips lefroyi* : Jacoet-Guillarmod, *Ann. Cope Prov. Mus. (nat. Hist.)* **7** (3) : 735.

1978. *Lefroyothrips lefroyi* : Bhatti, *Oriental Ins.*, **12** (2) : 194.

1988. *Lefroyothrips lefroyi* : Sen *et al*, *Rec. zool Surv. India, Occl. Pap.*, **100** : 11.

*Specimen studied* : Darjiling Dt. : 9 Females (Z. S. I. Reg. Nos. 1294-1299/H17, 1321-1323/H17) Mahanadi, Darjiling Dt., 9. 1. 1976, coll. Dr. G. K. Srivastava. 9 Females 2 Males (Z. S. I. Reg. Nos. 1375-1378/H17 1627-1629/H17 & 4466/H17) Darjiling, 2. 11. 1979, coll. S. S. Saha.

*Distribution* : India : West Bengal (Darjiling); Dehra Dun (U. P.). Elsewhere : China; Formosa; Sumatra; Java.

## Genus 19. *Megalurothrips* bagnall

1915. *Megalurothrips* Bagnall, *Ann. Mag. nat. Hist.*, (8) **15** : 389.

1969. *Megalurothrips* : Bhatti, *Oriental Ins.*, **3** (3) : 240.

24. *Megalurothrips distalis* (Karny)

1913. *Taeniothrips distalis* Karny, *Naturgesch* (A), **79** (2) : 122-124.  
 1926. *Taeniothrips distalis* : Karny, *Mem. Dept. Agri. India ent. Ser.*, **9** (6) : 196.  
 1969. *Megalurothrips distalis* : Bhatti, *Oriental Ins.*, **3** (3) : 241.  
 1984. *Megalurothrips distalis* : zur Strassen & Harten *Senckenbergiana biol.*, **65** (1-2) : 83-84.  
 1988. *Megalurothrips distalis* : Sen *et al.*, *Rec. zool. India Occl. Pap.*, **100** : 12.

*Specimen studied* : Bankura Dt. : 9 Females, 4 Males (Z. S. I. Reg. Nos. 4134-4146/H17) Bishnupur, 27. 8. 1986 & 6. 9. 1986, coll. Dr. P. Mukhopadhyay, 2 Females, 2 Males (Z. S. I. Reg. Nos. 4168-4171/H17) Lokepur, 6. 9. 1986, coll. Dr. P. Mukhopadhyay. Birbhum Dt. : 2 Females (Z. S. I. Reg. Nos. 1598-1599/H17) Sanghatput, 18. 12. 1981, Coll. S. Sen, 3 Females (Z. S. I. Reg. Nos. 4095-4104/H17) 3. 11. 1977; 20. 2. 1979, 12. 3. 1987 coll. C. K. Sen Gupta and N. K. Pramanik, Coochbehar Dt. : 4 Females (Z. S. I. Reg. Nos. 1607/H17, 1663; 1664/H17; 1519/H17) Mckligunj, 3. 10. 1981; 30. 11. 1981, coll. C. K. Sen Gupta. Darjiling Dt. : 1 Female (Z. S. I. Reg. No. 330/H17) Darjiling, 10. 3. 1974, coll. Dr. H. K. Bhowmik. 4 Females (Z. S. I. Reg. Nos. 1630-1633/H17) Pashoke, 31. 3. 1978; 4. 4. 1978; 7. 4. 1978, coll. A. R. Bhowmik. 2 Females (Z. S. I. Reg. Nos. 1386-1387/H17) Mirik, 5. 6. 1980, coll. R. N. Tiwary. 2 Females (Z. S. I. Reg. Nos. 1254-1255/H17) Rangirum, 24. 5. 1974; 25. 5. 1974, coll. Dr. J. K. Jonathan. Jalpaiguri Dt. : 3 Females (Z. S. I. Reg. Nos. 1300-1302/H17) Hashimara, 2. 12. 1974, coll. Dr. T. Sen Gupta. Murshidabad Dt. : 3 Females, 3 Males (Z. S. I. Reg. No. 1813-15/H17; 1824-26/H17) Murshidabad, 23. 3. 1983, coll. S. Sen 7 Females (Z. S. I. Reg. Nos. 1854-55/H17); 1879-81/H17; 1897/H17) Madhupur, 25. 3. 1983, coll. S. Sen & Party. 1 Female (Z. S. I. Reg. No. 1896/H17) Satinakandi Vill., 25. 3. 1983, coll. S. Sen 24 Parganas Dt. (South) : 2 Females (Z. S. I. Reg. Nos. 939/H17; 1698/H17) Hatberia Village, 2. 7. 1978, 16. 11. 1981, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Bankura, Birbhum, Calcutta, Coochbehar, Darjiling, Jalpaiguri, Murshidabad, 24 Parganas, (South)]; widely distributed. Elsewhere : Very widely distributed from Japan to Australia on one hand and to South Asia on the other hand.

Genus 20. *Megaphysothrips* Ramakrishna & Margabandhu

1939. *Megaphysothrips* Ramk. & Marg., *Rec. Indian Mus.*, **41** (1) : 25.

25. *Megaphysothrips subramanii* Ramakrishna & Margabandhu

1939. *Megaphysothrips subramanii* Ramk. & Marg. *Rec. Indian mus.*, **41** (1) : 25.  
 1959. *Euphysothrips* (*Megaphysothrips*) *subramanii* : Ananthakrishnan, *Zool. Anz.*, **162** (9-100) : 317.  
 1966. *Megaphysothrips subramanii* : Ananthakrishnan & Jagadish, *Indian J. Ent.*, **28** (2) : 255.  
 1988. *Megaphysothrips subramanii* : Sen *et al*, *Rec. zool. Surv. India, Pap.*, **100** 13-14.

*Specimen studied* : Coochbehar Dt. : 3 Females, 3 Males (Z. S. I. Reg. Nos. 1751-1753/H17; 1946-1947/H17; 1955/H17) Tapurhat, 25. 10. 1982, coll. C. K. Sen Gupta. 6 Females, 1 Males (Z. S. I. Reg. Nos. 1995-2000/H17; 4165/H17) Saradevi., 31. 12. 1983, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Coochbehar); Karnataka; Tamil Nadu.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

Genus 21. *Microcephalothrips* Bagnall

1926. *Microcephalothrips* Bagnall, *Ann. Mag. nat. Hist.*, (9) 18 : 113.  
 1926. *Stylothrips* Karny, *Mem. Dept. Agri. India Ent. Ser.*, 9 (6) : 205.  
 1949. *Microcephalothrips* : Preisner, *Bull. Soc. Found Ent. Egypte*, 33 : 149.

26. *Microcephalothrips abdominalis* (Crawford)

1910. *Thrips abdominalis* Crawford, *Pomona College J. Ent.*, 2 (1) : 157.  
 1926. *Microcephalothrips abdominalis* : Bagnall, *Ann. Mag. nat. Hist.*, (9) 18 : 113.  
 1926. *Stylothrips brevialpis* karny, *Mem. Dept. Agri. India Ent. Ser.*, 9 (6) : 206.  
 1945. *Microcephalothrips brevialpis* : Shumsher, *Indian J. Ent.*, 7 : 168.  
 1963. *Microcephalothrips abdominalis* : Ananthkrishnan, *Treubia* 26 (2) : 105.  
 1984. *Microcephalothrips abdominalis* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 84.  
 1988. *Microcephalothrips abdominalis* : Sen et al, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 14.

*Specimen studied* : Birbhum Dt. : 7 Females (Z. S. I. Reg. Nos. 1578-1582/H17; 1596/H17, 1670/H17) Rampurhat, 18. 12. 1981, coll. S. Sen. 3 Females (Z. S. I. Reg. Nos. 1597/H17; 1612-1613/H17) Ballapur, 19. 12. 1981, coll. S. Sen. 2 Females (Z. S. I. Reg. Nos. 1636-1637/H17) Bakreswar, 16. 12. 1981, coll. S. Sen. Calcutta : 1 Female (Z. S. I. Reg. Nos. 1422/H17) Murshidabad, 23. 3. 1983, coll. S. Sen Purulia Dt. : 9 Females (Z. S. I. Reg. Nos. Kulipal, 22. 1. 1985, coll. C. C. Adhikary. 24 Parganas Dt. (South) : 1 Females (Z. S. I. Reg. No. 3088/H17) Narendrapur, 21. 2. 1984, coll. S. Sen. & Party.

*Distribution* : India : West Bengal [Birbhum, Calcutta, Murshidabad, Puruliya, 24 Parganas (South)]. Elsewhere : Widely distributed in the tropics and subtropics on compositae flowers.

*Remarks* : This species is recorded for the first time from West Bengal.

Genus 22. *Mycterothrips* Trybom

1910. *Mycterothrips trybom*, *Denkchr. med. naturw. Ges. Jena*, 4 (1) : 158.

27. *Mycterothrips setiventris* (Bagnall)

1918. *Physothrips setiventris* Bagnall, *Bull. ent. Res.*, 9 : 61-63.  
 1945. *Taeniothrips setiventris* : Shymsher, *Indian J. Ent.*, 7 (1-2) : 5.  
 1963. *Physothrips setiventris* : Ananthkrishnan, *Treubia*, 26 (2) : 106.  
 1968. *Physothrips setiventris* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.) Suppl.*, 11 : 49.

*Distribution* : India : West Bengal, (Ringtong, Darjiling Dt.); Bihar (Pusa).

Genus 23. *Organothrips* Hood

1940. *Organothrips* Hood, *Proc. Hawaii ent. Soc.*, 10 (3) : 423.

28. *Organothrips indicus* Bhatti  
(Text Figure 5)

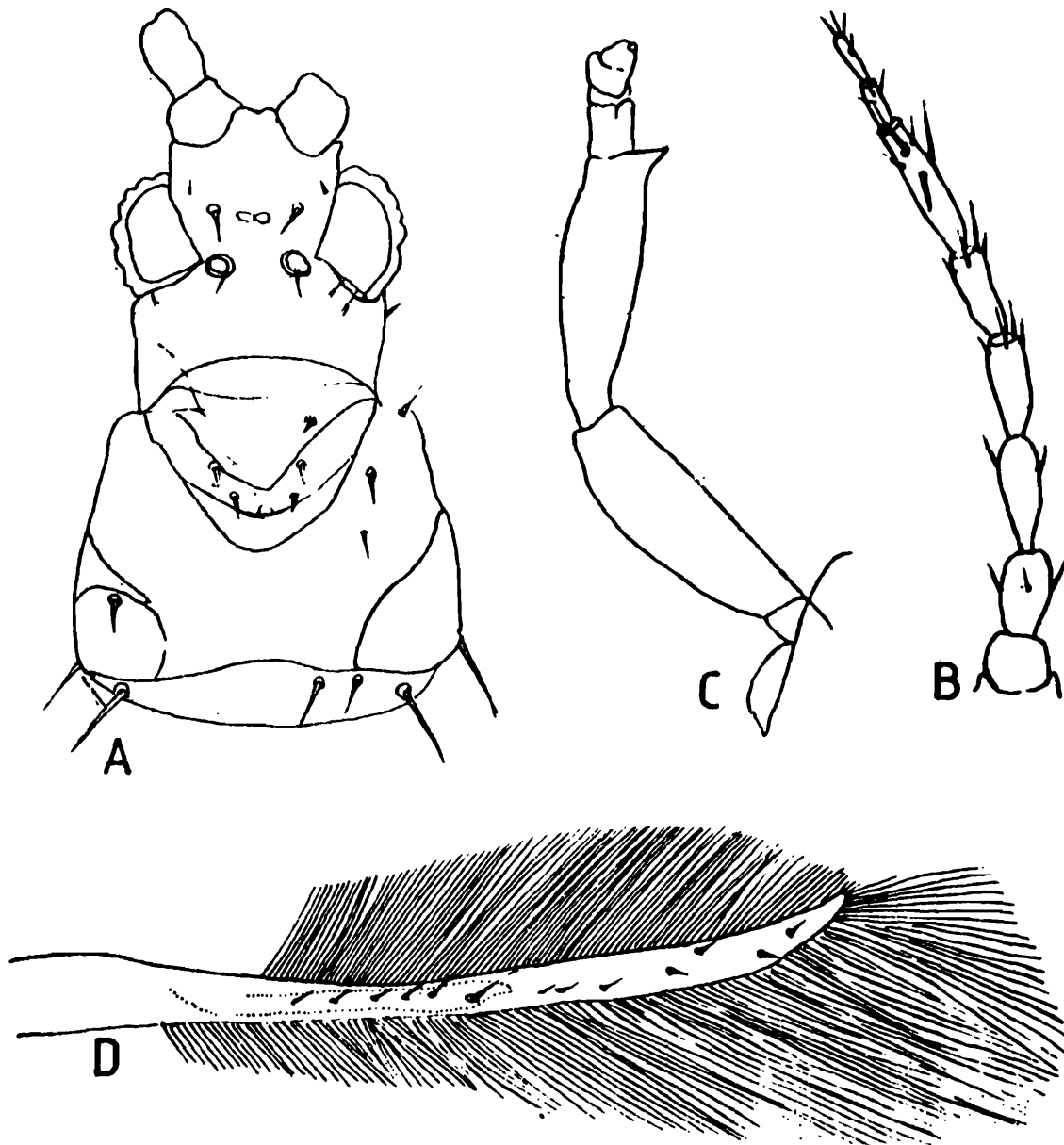
1974. *Organothrips indicus* Bhatti, *Oriental Ins.*, 8 (2) : 151.  
 1984. *Organothrips indicus* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 84.  
 1988. *Organothrips indicus* : Sen et al. *rec. zool. Surv. India, Occl. Pap.*, 100 : 15.

*Specimen studied* : Calcutta : 1 Female (Z. S. I. Reg. Nos. 2058/H17) 17. 8. 1979, coll. N. K. Pramanik. Coochbehar Dt. : 1 Female (Z. S. I. Reg. No. 2091/H17) Coochbehar 15. 5. 1984, coll.

C. K. Sengupta. Howrah Dt. : 1 Female (Z. S. I. Reg. No. 2057/H17) Botanical Garden, 27. 3. 1984, coll. N. K. Pramanik. 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 2059/H17) Hatberia Vill., 18. 9. 1980, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Calcutta, Coochbehar, Howrah, 24-Parganas (South),  
Elsewhere : Bangladesh.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.



Text Fig. 5. *Organothrips indicus* Bhatti A. & C. Head and pronotum. B. Antenna. C. Forewing.

Genus 24. *Priesneriola* Ananthakrishnan

1964. *Priesneriola* Ananthakrishnan, *Bull. Ent.*, **5** : 54.

29. *Preisneriola o'niellae* Ananthakrishnan

1964. *Preisneriola o'niellae* Ananthakrishnan, *Bull. Ent.*, **5** : 52-54.

1981. *Priesneriola o'niellae* : Sen Gupta & Pramanik, *Bull zool. Surv. India*, **4** (1) : 119-120.

*Specimen studied* : Calcutta : 8 Females (Z. S. I. Reg. Nos. 1004-1007/H17, 1423/H17; 3076/H17; 3084/H17) 8. 12. 1977; 7. 3. 1978, coll. N. K. Pramanik & C. K. Sen Gupta.

*Distribution* : India : West Bengal (Calcutta); Tamil Nadu.

*Remarks* : Sen Gupta & Pramanik (1981) recorded this species from West Bengal.

Genus 25. *Projectothrips* Moulton

1929. *Projectothrips* Moulton, *Rec. Indian Mus.*, **31** : 95.

30. *Projectothrips pruthi* Moulton

1929. *Projectothrips pruthi* Ramakrishna & Margabandhu, *Rec. Indian Mus.*, **41** : 28.

1945. *Projectothrips pruthi* : Shumsher, *Indian J. Ent.*, **7** (1-2) : 162.

*Distribution* : India : West Bengal (Sibpore, Haora Dt.); Tamil Nadu.

Genus 26. *Pseudodendrothrips* Schmutz

1913. *Pseudodendrothrips* Schmutz, *Sitz. Akad. Wiss.*, **122** (7) : 998.

31. *Pseudodendrothrips ornatissimus* Schmutz

1918. *Pseudodendrothrips ornatissimus* Schmutz, *Sitz. Akad. Wiss. Wien.* **122** (7) : 999-1001.

1936. *Pseudodendrothrips ornatissimus* : Ananthakrishnan, *Treubia*, **26** (2) : 106.

1984. *Pseudodendrothrips ornatissimus* zur Strassen & Harten, *Senckenbergiana biol.*, **65** (1-2) : 85.

*Specimen studied* : Murshidabad Dt. : 3 Females (Z. S. I. Reg. Nos. 4390-4392/H17) Baharampur, ex. Mulberry leaf, 3. iii. 1987, coll. S. Bhattacharyya.

*Distribution* : India : West Bengal (Murshidabad). Elsewhere : Sri Lanka; Burma; Bangladesh.

*Remarks* : This species is recorded for the first time from India and serious pest of Mulberry.

Genus 27. *Rhamphothrips* Karny

1913. *Rhamphothrips* Karny, *Zeit. Wiss. Insektenbiol.*, **10** (8-9) : 123.

1977. *Peirsothrips* Bhatti, *oriental Ins.*, **11** (4) : 556-569.

1978. *Rhamphothrips* : Bhatti, *Oriental Ins.*, **12** (3)

Key to the Species of *Rhamphothrips*

- Foretibiae at apex on inner side with a tooth stronger in males. Abdominal tergite IV-VI of males with laterally directed tooth.....*pardus* (Bhatti)  
Foretibiae without tooth abdominal tergite IV-VIII of males with laterally directed teeth  
.....*parviceps* (Hood)

**32. *Rhamphothrips pardus* (Bhatti)**

1967. *Perisothrips pardus* Bhatti, *Thysanoptera Nova India* : 13.

1977. *Perisothrips pardus* : Bhatti, *Oriental Ins.*, 11 (4) : 573-574.

1978: *Rhamphothrips pardus* : Bhatti, *Oriental Ins.*, 12 (3) : 291.

General body colour pale yellow inclusive of legs; antennal segments 1-3 pale yellow, 4-6 brown lighter at base, 7-8 brown; forewings clear all setae subhyaline.

Interocellar setae placed within ocellar triangle, slightly ahead of anterior margins of hind ocelli. Pronotum of male 5 times as long as head and in females about 3 times as long as head. Median pair of metanotal setae places slightly back of anterior margin forefemura enlarged and in male with 2 teeth at base. Foretibiae of male at apex on inner side with a strong inwardly curved tooth and in females with a fairly stout tooth. Abdominal tergite III & IV of male posteriorly directed teeth medially; V & VI medially with posteriorly directed teeth and submedially with laterally directed teeth; VII & VIII medially with poorly developed posteriorly directed teeth and submedially with strong elongate teeth directed backward & inward. Median pair of setae on abdominal sternite VII of female well developed.

*Distribution* : India : West Bengal (Sibpore Botanical Garden, Haora Dt.).

**33. *Rhamphothrips parviceps* Hood**

1919. *Perssothrips parviceps* Hood, *Ins. Inscit. menstr.*, 7 (4-6) : 92-93

1977. *Perisothrips parviceps* : Bhatti, *Oriental ins.*, 11 (4) : 575-577

1978. *Rhamphothrips parviceps* : Bhatti, *Oriental Ins.*, 12 (3) : 291-293.

*Distribution* : India : West Bengal (Sibpore, Haora Dt.), Tamil Nadu, Maharashtra, M. P., Delhi.

**Genus 28. *Scirtothrips* Shull**

1909. *Scirtothrips* Shull, *Ent. News*, 20 (5) : 222.

**34. *Scirtothrips dorsalis* Hood**

1919. *Scirtothrips dorsalis* Hood, *Insect. Inscit. menstr.*, 7 : 90-91.

1964. *Scirtothrips dorsalis* : Dev, *Indian J. Ent.*, 26 : 84-94.

1981. *Scirtothrips dorsalis* : Mound & Palmer, *Bull. ent. Res.* 71 : 475-476.

1984. *Scirtothrips dorsalis* : Sen *et al* *Rec. zool. Surv. India, Occl. pap.*, 100 : 16.

*Specimen studied* : Calcutta 2 Females (Z. S. I. Reg. Nos. 948/H17; 1424/H17) 6. 4. 1978, coll. N. K. Pramanik & C. K. Sen Gupta. Coochbehar Dt. : 3 Females (Z. S. I. Reg. Nos. 1325/H17; 1514/H17; 1758/H17) Coochbehar, 3. 10. 1980, 10. 10. 1980; 20. 10. 1982, coll. C. K. Sen Gupta. Purulia Dt. : 1 Female (Z. S. I. Reg. No. 4333/H17) Balarampur, 2. 11. 1985, coll. S. Sen Gupta & Party. 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 4278/H17) Kakdwip, 19. 7. 1978, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Calcutta, Coochbehar, Puruliya, 24 Parganas (South)] : Tamil Nadu; Kerala; Karnataka; Assam; Delhi. Elsewhere : Pakistan; Bangladesh; Sri Lanka; Thailand; Java; New Guinea; Solomon Is.; Japan; Australia.

*Remarks* : This species is a serious pest of Chillis. Sen *et al* (1988) recorded this species from West Bengal.

Genus 29. *Scolothrips* Hinds

1902. *Scolothrips* Hinds, *Proc. U. S. Nat. Mus.*, 26 : 157.

Key to the Species of *Scolothrips*

1. Body bicolourous; head, pterothorax, base of abdominal segments VI-VIII dark grey, rest pale yellow; body with profuse pigmentation; wings with a fuscous infumation up to middle, with a small hyaline patch beyond base, middle region broadly transparent, thin fuscous almost to apex, extreme tip clear.....*asura* (Ramakrishna & Margabandhu)  
 Body unicolours; abdominal tergites with brown shadings at foremargin and with lateral spots; legs pale yellow; forewings with two dark cross-bands.....*rhagebianus* Priesner

35. *Scolothrips asura* Ramakrishna & Margabandhu

1931. *Scolothrips asura* Ramakrishna & Margabandhu, *J. Bombay nat. Hist. soc.*, 34 (4) : 1035.

1945. *Scolothrips asura* : Shumsher, *Indian J. Ent.*, 7 : 163.

1950. *Scolothrips asura* : Priesner, *Bull. Soc. Fouad Ent. Egypte*, 34 : 56.

1984. *Scolothrips asura* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 87.

1988. *Scolothrips asura* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 16-17.

*Specimen studied* : Bankura Dt. : 4 Female (Z. S. I. Reg. Nos. 3038-41/H17) Bagajole Vill., 8. 11. 1985, coll. S. Sen & Party. Coochbehar Dt. : 1 Female (Z.S. I. Reg. No. 1719/H17) Mckligunj, 16. 10. 1982, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Bankura, Coochbehar); Tamil Nadu. Elsewhere : Bangladesh.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

36. *Scolothrips rhagebianus* Priesner

1984. *Thrips sexmaculatus* Pergande, *Trans. St. Louis Acad.*, 5 : 542.

1926. *Scolothrips sexmaculatus* : Karny, *Mem. Dept. Agri. India Ent. Ser.*, 9 (6) : 195.

1945. *Scolothrips sexmaculatus* : Shumsher, *Indian J. Ent.*, 7 (1-2) : 163.

1950. *Scolothrips indicus* Priesner, *Bull. Soc. Ent. Egypte* 34 : 48-49.

1950. *Scolothrips rhagebianus* Priesner, *Bull. Soc. Ent. Egypte* 34 : 46-48.

*Specimen studied* : 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 2055/H17) Narendrapur, 29. 3. 1984, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [24 Parganas (South)]; Tamil Nadu. Elsewhere; Egypt.

*Remarks* : This species is recorded for the first time from West Bengal.

Genus 30. *Stenchaetothrips* Bagnall

1926. *Stenchaetothrips* Bagnall, *Ann. Mag. nat. Hist.*, (9) 18 : 107.

1982. *Stenchaetothrips* : Bhatti, *Oriental Ins.*, 16 (4) : 385-391.

Key to the Species of *Stenchaetothrips*

1. Body yellow. Abdominal tergite II-VII on sides of posterior margin and on entire posterior margin with dentate microtrichia ..... *indicus* (Ramakrishna & Margabandhu)  
Head and thorax light to dark brownish ..... 2.
2. Antennal segment 6 yellow at base. Posterior margin of abdominal tergite VI & VII with prominent teeth, poorly developed at middle and on tergites I-V with short teeth at sides. Maxillary palpi 3 segmented. Metascutum with closely placed longitudinal lines of sculpture; median pair of setae on metanotum placed behind anterior margin ..... *divisae* Bhatti  
Antennal segment 6 dark brown ..... 3
3. Fore wings entirely dark grayish brown. All tibiae brown ..... *biformis* (Bagnall)  
Forewings pale at base. All tibiae yellow. Postocular seta 1 longer than 2. Metanotum with campani form sensillae. Pronotum along anterior margin and surface without very conspicuous setae ..... *bambusae* Shumsher)

37. *Stenchaetothrips bambusae* (Shumsher)

1945. *Thrips bambusae* Shumsher, *India J. Ent.*, 7 (1-2) : 182-183.

1962. *Chloethrips bambusae* : Bhatti, *Bull. Ent.*, 3 : 42-46.

1970. *Baliothrips bambusae* : Bhatti, *Oriental Ins.*, 3 (4) : 374.

1982. *Stenchaetothrips bambusae* : Bhatti, *Oriental Ins.*, 16 (4) : 395.

*Specimen studied* : 24 Parganas Dt. (South) : 3 Females (Z. S. I. Reg. Nos. 1798-1800/H17) Malancha, Sonarpur, 27. 12. 1978, coll. Dr. N. Muraleedharan.

*Distribution* : Indian : West Bengal [24 Parganas (South)]; Tamil Nadu; Rajasthan. Elsewhere : Burma.

*Remarks* : This species is recorded for the first time from West Bengal.

38. *Stenchaetothrips biformis* (Bagnall)

1913. *Bagnallia biformis* Bagnall, *J. econ. Biol.*, 8 (4) : 237-238.

1916. *Thrips oryzae* Williams, *Bull. ent. Res.*, 6 : 353-355.

1957. *Baliothrips biformis* : Preisner, *Zool. Anz.*, 159 (7-8) : 162.

1970. *Baliothrips biformis* : Bhatti, *Oriental Ins.*, 3 (4) : 374.

1975. *Chloethrips blandus* zur Strassen *Senckenbergiana biol.*, 56 (1-3) : 78-80.

1982. *Stenchaetothrips biformis* : Bhatti, *Oriental Ins.*, 16 (4) : 397-401.

1988. *Stenchaetothrips biformis* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 17.

*Specimen studied* : Howrah Dt. 2 Females (Z. S. I. Reg. Nos. 4128-4129/H17) Sibpore Botanical Garden, 16. 2. 1984, coll. N. K. Pramanik. Nandi Dt. 5 Female (Z. S. I. Reg. No. 3080-83/H17; 3071/H17) Bethuadahari, 11. 8. 1978, coll. Dr. A. K. Roy. 24 Parganas Dt. (South) : 2 Females (Z. S. I. Reg. No. 926/H17; 938/H17) Hatberia Village, 26. 2. 1978, 18. 9. 1980, coll. N. K. Pramanik. Calcutta : 3 Females 1 Female (Z. S. I. Reg. Nos. 943-946/H17; 4154-55/H17) 17. 8. 1977; 23. 3. 1984, coll. N. K. Pramanik & C. K. Sen Gupta. 1 Female, 1 Male (Z. S. I. Reg. Nos. 4186-4187/H17) Bongaon, 3. 9. 1986, coll. M. K. Banerjee.

**Distribution** : India : West Bengal [Calcutta, Haora, Nadia, 24 Parganas (South)]. Elsewhere : Bangladesh; Nepal; Indonesia; Taiwan; Philippines; Japan; England; Rumania.

**Remarks** : This species is a serious pest of rice specially the seedlings growing in shallow water or in humid surrounding in the South-East Asian Countries. Bhatti (1982) recorded this species from West Bengal.

### 39. *Stenchaetothrips divisae* Bhatti

1982. *Stenchaetothrips divisae* Bhatti, *Oriental Ins.*, 16 (4) : 404-405.

**Distribution** : India : West Bengal (Sibpore Botanical Garden, Haora Dt.).

### 40. *Stenchaetothrips indicus* (Ramakrishna & Margabandhu)

1931. *Fulmekiola indica* Ramk. & Marg., *J. Bombay nat. Hist. Soc.*, 34 (4) : 1034-1035.

1957. *Thrips indica* : Ananthakrishnan, *Indian J. Ent.* 18 (4) : 338-339.

1962. *Chleothrips indicus* : Bhatti, *Bull. Ent.*, 3 : 42.

1970. *Baliothrips indicus* : Bhatti, *Oriental Ins.*, 3 (4) : 375.

1980. *Stenchaetothrips indicus* : Bhatti & Mound, *Bull. Ent.*, 21 (1-2) : 15.

1982. *Stenchaetothrips indicus* : Bhatti, *Oriental Ins.*, 16 (4) : 407.

**Distribution** : India : West Bengal (Sibpore, Haora Dt.); Andhra Pradesh; Delhi; Karnataka; Maharashtra.

**Remarks** : Bhatti (1982) recorded this species from West Bengal.

### Genus 31. *Thrips* Linnaeus (Map 2)

1758. *Thrips Linnaeus*, *Systema Naturae*, Ed. 10 : 457.

1980. *Thrips* Bhatti, *Syst. Ent.*, 5 : 112-113.

### Key to the Species of *Thrips*

1. Mouthcone very long and narrow, surpassing base of prosternum; maxillary palpi long and slender.....*beharensis* (Ramakrishna & Margabandhu)  
Mouthcone normal, not surpassing base of prosternum.....2
2. Abdominal sternites with accessory setae .....3  
Abdominal sternites without accessory setae.....7
3. Upper vein of forewings with an almost continuous row of setae. Abdominal sternites III-VI each with 1-3 accessory setae on either side and sternites II and VII without accessory setae; abdominal tergite IX of males with a stout blackish seta on either side. Body brown .....*orientalis* Bagnall  
Upper vein of forewing with a gap in the row of setae.....4
4. Body dark brown .....5  
Body pale yellow.....6

5. Antennal segments 4 & 5 light yellow in proximal third, segment 3 yellow; head and thorax light orange, abdomen dark; wings dark, clear at base; males yellow. Postocular seta 1 very well developed, longer and stronger than other postoculars. Forewings with 10-11 (7-8+3) upper and 12-13 lower vein setae. Abdominal sternites with 6-10 pairs of accessory setae .....*hawaiiensis* (Morgan)  
Antennal segment 5 dark and segment 6 shorter than 4. Posterior seta 1 not specially developed, similar to other postoculars. Forewings with 10-11 (7-8+3) upper and 15-16 lower vein setae. Abdominal sternites with 3-15 accessory setae arranged in one or two irregular transverse rows .....*andrewsi* (Bagnall)
6. Abdominal laterotergites IV-VI each with 2-4 accessory setae. Antennal segments 2 & 3 yellow; abdominal segment X dark brown in distal half. Metascutum longitudinally striate and with a pair of campaniform sensilla. Accessory setae on abdominal sternites VII arranged in two rows and comb on tergite VIII absent in middle .....*apicatus* Priesner  
Laterotergites without accessory setae. Antennal segments 1 & 2 yellow, 4-5 basally yellow & brown beyond, 6-7 brown; abdominal segment IX in posterior half and X wholly brown. Median pair of metanotal setae placed ahead of anterior margin. Forewings with 10 (7+3) upper and 10-13 lower vein setae .....*coloratus* Schmutz
7. All abdominal tergites or at least tergites II & III shaded .....8  
Abdominal tergites without shades .....9
8. Forewings with a dark cross-band starting beyond the basal third and occupying half the wing length and with 10 (7+3) upper at 11-12 lower vein setae. Abdominal segments II-VI deep blackish brown. Antennae dark grayish brown. Body yellow .....*attacus* Bhatti  
Forewing without cross bands and upper vein of forewings with 4-7 distal setae. Median pair of metanotal setae placed ahead of anterior margin. Prothoracic postangular setae short and stout. Abdominal laterotergites with rows of ciliate microtrichia and comb on tergite VIII complete and termites III-V of males each with a gland area. Body yellow .....*tabaci* Lindeman
9. Forewings with 2 brownish cross bands alternately with 3 clear areas and upper vein with 2 distal setae. Body yellow .....*latis* Bhatti  
Forewings without cross-band and upper vein with 3 distal setae; forewings chaetotaxy upper vein with 10 (4+3+3) and lower vein with 11-15 setae respectively. Interocellar setae placed within the ocellar triangle. Pronotum without specially developed dark and stout setae on anterior margin and sides; surface strongly setose. Body yellow .....*flavus* Schrank

#### 41. *Thrips andrewsi* (Bagnall)

1921. *Physothrips andrewsi* Bagnall, *Ann. Mag. nat. Hist.*, (9) 8 : 394-395.

1986. *Taeniothrips andrewsi* : Mound, *Bull. Br. Mus. Nat. Hist. (Ent.) Suppl.*, 11 : 53

1969. *Thrips andrewsi* : Bhatti, *Oriental Ins.*, 3 (4) : 380

1980. *Thrips andrewsi* : Bhatti, *Syst. Ent.*, 5 : 120-122.

1988. *Thrips andrewsi* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 19.

*Macropterous female (male)* : General body colour dark brown; antennal segments 1, 5, 6, 7 & 8 concolourous with the body, 2 brown distally yellow, 4 yellow proximally and brown distally, 5 brown with a clear subbasal ring; forefemora, all tibiae and tarsi yellow, midfemora shaded at outer margin, hindfemora with dark brownish shade; forewings greyish brown, clear at base; body setae dark.

(General body colour yellow; antennal segments 1-3 pale yellow, 4 grey in distal third, 5-8 grey, 5 & 6 with dark basal ring; legs yellow; body setae dark).

Head broader than long. Antennae 8-segmented, rarely 7-segmented. Pronotum longer than head and broader than long; inner posteroangular subequal to little longer than outer, with 3 pairs of posteromarginal setae and disc without any conspicuous setae. Inner pair of metanotal setae placed at anterior margin and longer than outer; sculpture made of longitudinal lines. Forewings with 29-34 (25-28) costal, 10 (4+3+3) upper vein; 15-16 (11-15) lower vein setae. Abdominal sterna with accessory setae, arranged in one or two irregular transverse rows. Comb on abdominal antennae a few minute hairs are present at middle of posterior margin. Stern III-VII of male with dumbbell shaped glandular area.

*Distribution* : India : West Bengal (Darjiling); Punjab; Chandigarh; H. P.; U. P.

#### 42. *Thrips apicatus* Priesner

1934. *Thrips apicatus* Priesner, *Natur. Tidschr. Ned. Ind.*, 94 (2) : 264.

1945. *Thrips apicatus* : Shumsher, *Indian J. Ent.*, 7 (1-2) : 171.

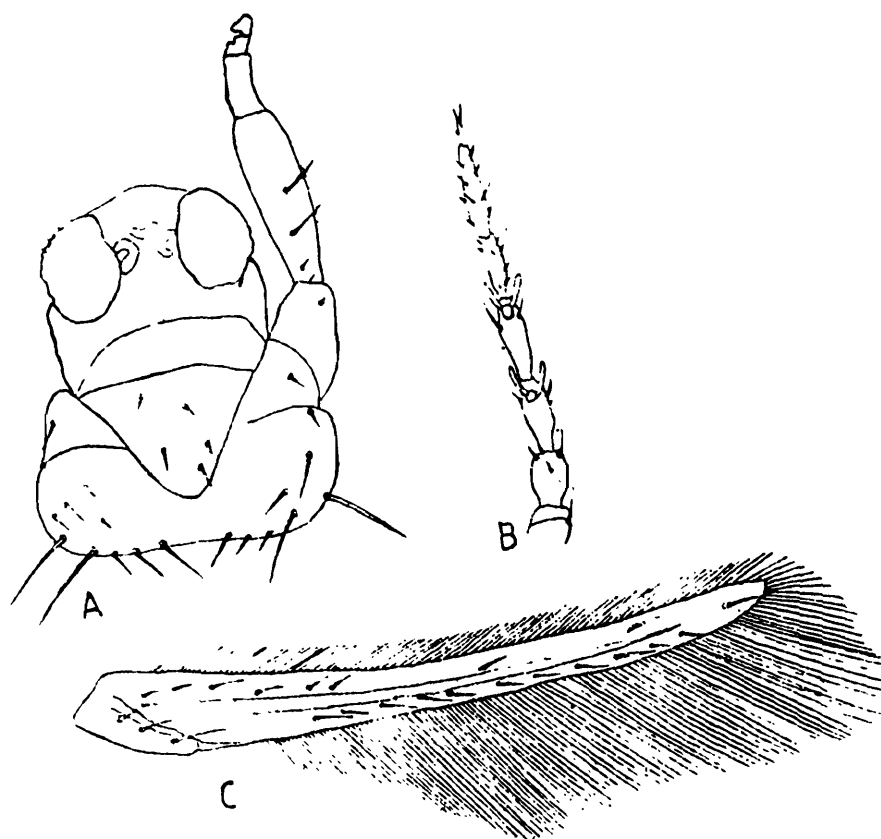
1980. *Thrips apicatus* : Bhatti, *Syst. Ent.* 5 : 122-124.

1984. *Thrips apicatus* : zur Strassen & Harten, *Senckenbergiana biol.* 65 (1-2) : 87-88.

*Specimen studied* : Birbhum Dt. : 1 Female (Z. S. I. Reg. No. 1779/H17) Kourabela, Rampurhat, 18. 12. 1981, coll. S. Sen & Party.

*Distribution* : India : West Bengal (Birbhum); Andhra Pradesh; Tamil Nadu; Kerala; M. P.; Delhi. Elsewhere : Thailand; Bangladesh.

*Remarks* : This species is recorded for the first time from West Bengal.



Text-fig. 6. *Thrips atactus* Bhatti. A. Head and pronotum. B. Antenna.

43. *Thrips atactus* Bhatti  
(Text-figure 6)

1967. *Thrips atactus* Bhatti, *Thysanoptera Nova Indica* : 17

1980. *Thrips atactus* : Bhatti, *Syst.Ent.*, 5 : 126-127.

*Specimen studied* : Howrah Dt. : Holotype Female (Z. S. I. Reg. No. 8181/H8) Sibpore Botanical Garden, ex *Wadelia* sp., 10. 3. 1963, coll. J. S. Bhatti.

*Distribution* : India : West Bengal (Haora).

44. *Thrips beharensis* Ramakrishnan & Margabandhu

1939. *Oxyrrhinothrips beharensis* Ramakrishnan & Margabandhu, *Rec. Indian Mus.*, 41 (1) : 29-30

1942. *Thrips (Oxyrrhinothrips) beharensis* : Shumsher, *Indian J. Ent.*, 4 (1) : 29-30

1980. *Thrips beharensis* : Bhatti, *Syst. Ent.*, 5 : 127.

1988. *Thrips beharensis* : Sen *et al*, *Rec. zool.Surv. India, Occl. Pap.*, 100 : 20.

*Specimen studied* : Bankura Dt. 2 Females (Z. S. I. Reg. Nos. 4196-4197/H17) Sonamukhi, 7. 9. 1985, coll. S. Sen & Party. Howrah Dt. : 1 Female (Z. S. I. Reg.No. 4127/H17) Sibpore Botanical Garden, 16. 2. 1984, coll. N. K. Pramanik. Murshidabad Dt. : 3 Females (Z. S. I. Reg. Nos. 1917-19/H17) Mohamadpara Vill., 24. 3. 1983, coll. S. Sen & Party. 2 Females (Z. S. I. Reg. Nos. 1920-21/H17) Madhupur, 25. 3. 1983, coll. S. Sen & Party.

*Distribution* : India : West Bengal (Bankura, Haora, Murshidabad); Bihar; Sikkim.

*Remarks* : This species is recorded for the first time from West Bengal.

45. *Thrips coloratus* Schmutz

1913. *Thrips coloratus* Schmutz, *Sitz. Akad. Wiss.Wien.*, 122 (7) : 1013-1015.

1926. *Thrips melanurus* Bagnall, *Ann. Mag. nat. Hist.*, (9) 18 : 111-112.

1968. *Thrips coloratus* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.) Suppl.* 11 : 62.

1980. *Thrips coloratus* : Bhatti, *Syst. Ent.*, 5 : 130-132.

1988. *Thrips coloratus* : Sen *et al*, *Rec. zool.Surv. India, Occl. Pap.*, 100 : 20.

*Specimen studied* : Murshidabad Dt. : 3 Females, 1 Male (Z. S. I. Reg. No. 1824/H17; 1883-85/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen & Party.

*Distribution* : India : West Bengal (Darjiling, Murshidabad), Punjab, H. P., Maharashtra, Meghalaya. Elsewhere : Sri Lanka; Pakistan; Thailand; Laos; Indonesia; Japan.

*Remarks* : Bagnall (1926) described *Thrips melaneurus* from Darjiling.

46. *Thrips flavus* Schrank

1776. *Thrips flavus* Schrank, *Beitr. zur. Natur.* : 31-33.

1928. *Thrips nilgiriensis* Ramakrishna *Mem. Dept. Agri. India, Ent. Ser.*, 10 (7) : 262-263.

1945. *Taeniothrips rhopalantennalis* Shumsher, *Indian J. Ent.*, 7 : 181-182.

1969. *Thrips flavus* : Bhatti, *Oriental Ins.*, 3 (4) : 380-384.

1980. *Thrips flavus* : Bhatti, *Syst. Ent.*, 5 : 133-136.

1988. *Thrips flavus* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 20-21.

*Specimen studied* : Bankura Dt. : 1 Male ( Z. S. I. Reg. No. 4091/H17) Vishnupur, 6. 11. 1985, coll. S. Sen & Party. Birbhum Dt. : 3 Females (Z. S. I. Reg. Nos. 1795-1797/H17) Kankalitala, 17. 12. 1981, coll. S. Sen & Party. Darjeeling Dt. : 5 Females (Z. S. I. Reg. Nos. 4057-4061/H17) Mirik, 19. 4. 1986; 20. 4. 1986, coll. Dr.B.C. Das & Party. Murshidabad Dt. : 9 Females, 2 Males (Z. S. I. Reg. Nos. 1828-1834/H17; 1890-92/H17; 1967/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen & Party. 1 Male (Z. S. I. Reg. No. 1835/H17) Krishnapur hat para, 24. 3. 1983, coll. S. Sen & Party. 1 Female ( Z. S. I. Reg. No. 1922/H17) Madhupur Vill. 25. 3. 1983, coll. S. Sen & Party. 6 Females (Z. S. I. Reg. No. 1933-38/H17) Kalabagan, 23. 3. 1983, coll. S. Sen & Party. 24 Parganas Dt. (South) 4 Females, 1 Male (Z. S. I. Reg. Nos. 2022-25/H17; 3089/H17) Narendrapur, 21. 2. 1984, coll. S. Sen.

*Distribution* : India : West Bengal [Bankura, Birbhum, Darjiling, 24 Parganas (South)]; Punjab; H. P.; J & K; Tamil Nadu; Meghalaya; Sikkim. Elsewhere. Pakistan; Nepal; Korea; Japan; Europe; N. America; Malawi; Madcira.

*Remarks* : This species is recorded for the first time from West Bengal.

#### 47. *Thrips hawaiiensis* (Morgan)

(Text-figure 7)

1913. *Euthrips hawaiiensis* Morgan, *Proc. U. S. nat. Mus.*, 46 : 3

1913. *Thrips florum* Schmutz, *Sitz Akad. Wiss.*, 122 (7) : 1003-1004.

1966. *Thrips hawaiiensis* : Ananthakrishnan & Jagadish, *Ent. Tidskr.*, 87 (1-2) : 88.

1969. *Thrips hawaiiensis* : Bhatti, *Oriental Ins.*, 3 (3) : 381.

1980. *Thrips hawaiiensis* : Bhatti, *Syst. , Ent.*, 5 : 137-140.

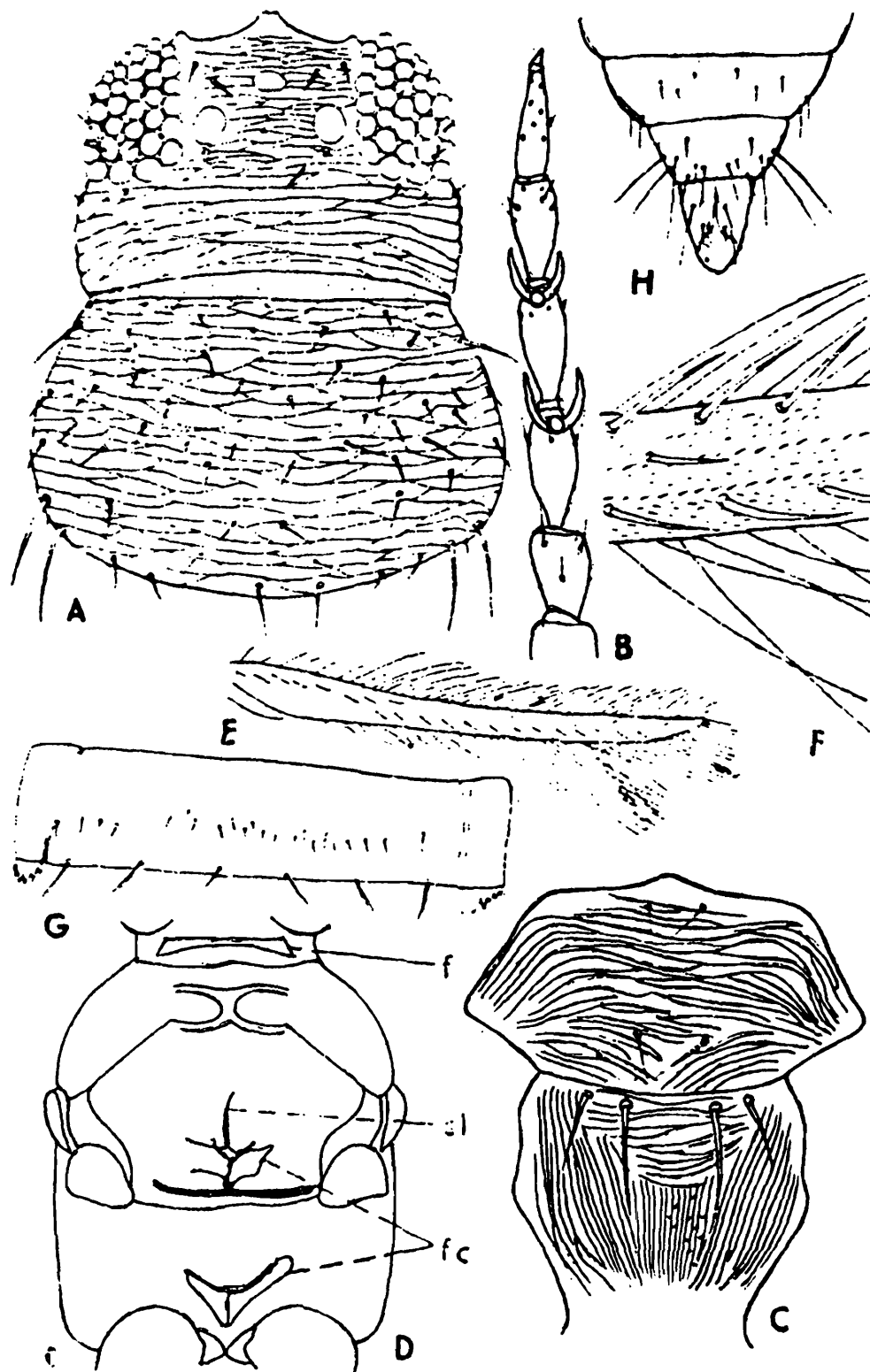
1980. *Thrips hawaiiensis* : Sen, *Rec. zool. Surv. India*, 77 : 344.

1984. *Thrips hawaiiensis* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 88.

*Specimen studied* : Bankura Dt. : 3 Females (Z. S. I. Reg. Nos. 4012-4014/H17) Sonamukhi Forest, 7. 11. 1985, coll. S. Sen & Party. BirbhumDt. : 1 Female (Z. S. I. Reg. No. 1605/H17) Rampurhat, 18. 12. 1981, coll. 1 Female (Z. S. I. Reg. No. 915/H17) Adityapur, 17. 12. 1981, coll. S. Sen. Calcutta 1 Female (Z. S. I. Reg. No. 915/H17) Calcutta, 13. 20. 2977, coll. C. K. Sen Gupta & N. K. Pramanik. Darjiling Dt. : 1 Female (Z. S. I. Reg. No. 782/H17) Sonada, Darjiling, 24. 3. 1978, coll. A. R. Bhaumik. 8 Females (Z. S. I. Nos. 217-221/H12) Darjiling, ex. rose fl., 22. 4. 1973, coll. H. S. Sharma. 2 Females (Z. S. I. Reg. Nos. 1252-1253/H17) Darjiling, 26. 5. 1974, coll. Dr. J. K. Jonathan. Purulia Dt. : 2 Females (Z. S. I. Reg. Nos. 4071-4072/H17) Boragdi Vill., 3. 11. 1985, coll. S. Sen. & Party. Murshidabad, 23. 3. 1983, coll. S. Sen. 3 Females (Z. S. I. Reg. Nos. 1836-1838/H17) Krishnapur Hat Para, 24. 3. 1983, coll. S. Sen. 2 Females (Z. S. I. Reg. No. 1856/H17; 1886/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen. 4 Females (Z. S. I. Reg.Nos. 1887-89/H17) Katra, 23. 3. 1983, coll. S. Sen. 24 Parganas Dt. : (North) : 2 Females (Z. S. I. Reg. No. 1661-1662/H17) Habra, 13. 8. 1982, coll. D. R. Maulik. 24 Parganas Dt. : (South) : 2 Females (Z. S. I. Reg. Nos. 1552-1553/H17) Baruipur, 13. 11. 1981, coll. S. Sen.

*Distribution* : India : West Bengal [Bankura, Birbhum, Calcutta, Darjiling, Murshidabad, Puruliya, 24 Parganas (South) : Widely distributed, Elsewhere : Bangladesh; Pakistan; Sri Lanka; Indonesia; Thailand; Laos; Malayasia; Tahiti; New Guina; Norfolk Is.; Nigeria; Angola; Mozambique; Uganda; Sierra Leone; China; Japan.

*Remarks* : This species is recorded for the first time from West Bengal.



Tex.-fig. 7. *Thrips hawaiiensis* (Morgan) A. Head and pronotum. B. Antenna. C. Meso- and metanotal sculpture. D. Meso- and metasternum. E. Forewing. F. Portion of forewing enlarged. G. Abdominal segment VI. H. Terminal abdominal segments. f. = Ferna. fc.= Ferca. sl.= Spinula.

48. *Thrips latis* Bhatti

1967. *Thrips latis* Bhatti, *Thysanoptera Nova Indica* : 17-18.

1969. *Thrips ignobilis* Ananth. & Jagadish, *Zoll Anz.*, 182 (1-2) : 116-117.

1978. *Trips latis* : Bhatti & Ananthakrishnan, *Entomon*, 3 (2) : 234.

*Distribution* : India : West Bengal : [Sibpore (Haora Dt.) ; Tamil Nadu.

49. *Thrips orientalis* (Bagnall)

1915. *Isoneurothrips orientalis* Bagnall, *Ann. Mag. nat. Hist.* (8) 15 : 593.

1926. *Isoneurothrips orientalis* ; Karny, *Mem. Dept. Agri. India Ent. Ser.*, 9 (6) : 197.

1926. *Trips (Isoneurothrips) Orientalis* : Shumsher, *Indian J. Ent.* 7 (1-2) : 169.

1980. *Thrips orientalis* : Bhatti, *Syst. Ent.* 5 : 150-151.

*Specimen studied* Calcutta : 15 Females (Z. S. I. Reg. Nos. 4983/H8; 5013-14/H8; 5055/H8; 5104/H8) Agri. Horticultural Garden, Alipore, ex. *Lantana* flower, 23. 4. 1965, 27. 12. 1965, coll. S. Sen 24 Parganas Dt. (South) : 3 Females. 2 Males (Z. S. I. Reg. Nos. 2016-20/H17) Narendrapur, 21. 2. 1984, coll. S. Sen.

*Distribution* : West Bengal [Calcutta, 24 Parganas (South)]; Tamil Nadu; Maharashtra; Punjab; Delhi, Elsewhere : Malayasia; Thailand; China; Indonesia; Hawaii; Tanzania.

*Remarks* : This species is recorded for the first time from West Bengal and very common on Compositae.

50. *Thrips tabaci* Lindemann

1939. *Thrips tabacil* Lindemann, *Bill. Soc. Imp. Nat., Moscow*, 1 : 61.

1960. *Ramaswamiahiella kallarensis* Ananthakrishnan, *J. Bombay nat. Hist. Soc.* 57 (3) : 557-558.

1980. *Thrips tabaci* : Bhatti, *Syst. Ent.*, 5 : 157-158.

*Specimen studied* : Calcutta : 1 Female (Z. S. I. Reg. No. 4158/H17) 23. 3. 1984, coll. N. K. Pramanik.

*Distribution* : India : West Bengal (Calcutta); widely distributed. Elsewhere : Cosmopolitan.

*Remarks* : *Thrips tabaci* Lind. is a serious pest of cotton and recorded for the first time from West Bengal.

Genus 32. *Trichromothrips* Priesner

1930. *Trichromothrips* Priesner, *Bill. Soc. ent. Egypt.*, 14 (1) : 9.

51. *Trichromothrips arorai* Bhatti

(Text-figure 8)

1967. *Trichromothrips arorai* Bhatti, *Thysanoptera Nova Indica*, 19-20.

Body bicolourous; head brown, cheeks dark; antennal segments 1-2 brown, 3, 6-8 light brown, 4-5 yellow at base and light brown distally, prothorax yellow, margin dark brown; fore and hindfemora yellow, midfemora brown, all tibiae light brown, all tarsi yellow; forewings grey; pterothorax and abdominal segments I-VI yellow, rest dark brown.

Head the product; cheeks concave below eyes. Antennal segments very segments very long and narrow. Mouthcone very short and broad. Prothoracic postangular setae subequal. Forewings narrow; setae weak; forewings chaetotaxy: costa with 23-25, upper vein with 7 or 8 (5+2 or 6+2), lower vein with 12 setae respectively. Abdominal segment IX long.

*Specimen studied* : Haora Dt. : Holotype Female (Z. S. I. Reg. No. 8183/H8) Sibpore Botanical Garden, ex. grass, March, 1963, coll. J. S. Bhatti.

*Distribution* : India : West Bengal (Haora).

### Genus 33. *Tusothrips* Bhatti

1967. *Tusothrips* Bhatti, *Thysanoptera Nova Indica* : 16.

### 52. *Tusothrips setiprivus* (Karny)

1926. *Mycterothrips setiprivus* Karny, *Mem. Dept. Agri. India Ent. Ser.*, 9 : (6) : 200-201.

1970. *Tusothrips setiprivus* : Bhatti, *Oriental Ins.*, 3 (4) : 378.

1978. *Tusothrips setiprivus* : Bhatti, *Oriental Ins.*, 12 (1) : 16-17.

*Distribution* : India : West Bengal (Sibpore, Haora Dt.), Tamil Nadu.

*Remarks* : Bhatti (1978a) recorded this species from West Bengal.

### Subfamily PANCHAETOTHRIPINAE

### Genus 34. *Astrothrips* Karny

1921. *Astrothrips* Karny, *Treubia*, 1 (94) : 215.

### Key to the Species of *Astrothrips*

1. Antennae clearly 8-segmented, antennal segments 1, 3, 5 yellow, 6-8 dark brown, Abdominal sternites IV-VII of males with glandular area.....*asiaticus* (Bhatti)
- Antennae 6-segmented; antennae yellow, conical apex shaded with brown. Abdominal sternites V-VII of males with glandular area.....*parvilimbus* Standard & Mitri

### 53. *Astrothrips asiaticus* (Bhatti)

1967. *Semiothrips asiaticus* Bhatti, *Thysanoptera Nova Indica* : 7.

1975. *Astrothrips asiaticus* : Wilson, *Mem. Amer. ent. Inst.*, 23 : 43-46.

1984. *Astrothrips asiaticus* : zur Strassen & Harten, *Senckenbergiana biol*, 65 (1-2) : 79.

General body colour dark brown; prothorax and abdominal segments IX & X lighter; antennal segments 1, 3-5 yellow, 2 light brown, 6-8 brown; forewings golden yellow at base and with 2 dark cross bands. Antennae clearly 8-segmented, only exception amongst all other species of *Astrothrips*; segments 3 & 4 with simple sense cones. Pronotum with raised sculpture only on anterior margin, posterior margin smooth without any raised sculpture. Abdominal sternites IV-VII of males each with 'U' shaped glandular area.

*Distribution* : India : West Bengal : (Sibpore Botanical Garden, Haora) ; Kerala; Tamil Nadu; Maharashtra and M. P. Elsewhere : Bangladesh.

54. *Astrothrips parvilimbus* Stannard & Mitri

1962. *Astrothrips parvilimbus* Stannard & Mitri, *Trans. Amer. ent. Soc.* 88 : 197-199.

1975. *Astrothrips parvilimbus* : Wilson, *Mem. Amer. ent. Inst.*, 23 : 52-53.

1980. *Astrothrips parvilimbus* : Sen, *Rec. zool. Surv. India*, 77 : 345.

General body colour dark yellowish brown; antennae yellow, conical tip shaded brown, forewings with 3 dark cross bands, middle and tip pale; all tarsi and distal half of tibiae yellow. Antennae 6-segmented; segment 3 with slender basal part shorter than the swollen part, narrow tip of segment 4 shorter & wider and more abruptly constricted than apex of 3, segments 3 & 4 with simple sense cones. Abdominal segments V-VII each with 'U' shaped glandular area.

*Specimen studied* : Bankura Dt. : 1 Female (Z.S. I. Reg. No. 3037/H17) Baghajole Vill., 8. 11. 1985, coll. S. Sen & Party. 1 Female (Z. S. I. Reg. No. 4001/H17); Onda, 6. 11. 1985, coll. S. Sen & Party. Birbhum Dt. : 5 Females (Z. S. I. Reg. Nos. 1570-1571/H17; 1593-94/H17; 1653/H17) Rampurhat, 18. 12. 1981, coll. S. Sen & Party. 1 Female (Z. S. I. Reg. No. 1595/H17) Kendubilwa, 16. 12. 1981, coll. S. Sen. 1 Male (Z. S. I. Reg. No. 1635/H17) Bakreswar, 16. 12. 1981, coll. S. Sen, Murshidabad Dt. : 2 Females (Z. S. I. Reg. Nos. 1805-1806/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen & Party. 3 Females (Z. S. I. Reg. Nos. 1849-1851)/H17) Madhupur, 25. 3. 1983, coll. S. Sen. & Party, 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 3073/H17) Bakrahat Vill., 9. 1. 1983, coll. N. K. Pramanik.

*Distribution* : West Bengal [Bankura, Birbhum, Murshidabad, 24 Parganas (South)]; Southern India; Andaman Is.

*Remarks* : This species is recorded for the first time from West Bengal.

Genus 35. *Caliothrips* Daniel

1904. *Caliothrips* Daniel, *Ent. News.*, 15 (9) : 296.

Key to the species of *Caliothrips*

1. Extreme of forewings white; setae on venis strong and curving towards hind margin of wing. Legs brown except distal half of tibiae and all tarsi white.....*luckmanni* Wilson  
Extreme apex of forewings brown. Forefemora dark brown at base and yellow at extreme tip; all tibiae brown, distal third yellow; all tarsi yellow.....*indicus* (Bagnall)

55. *Caliothrips indicus* (Bagnall)

1913. *Heliethrips indicus* Bagnall, *Ann. Mag. nat. Hist.*, (8) 12 : 291.

1926. *Heliethrips indicus* : Karny, *Mem. Dept. Agri. India Ent.*, Ser. 9 (6) : 193.

1927. *Heliethrips indicus* : Hood, *Psyche*, 34 (6) : 233.

1963. *Caliothrips indicus* : Ananthakrishnan, *Treubia*, 26 (2) : 114.

1975. *Caliothrips indicus* : Wilson, *Mem. Amer. Ent. Inst.*, 23 : 80-85.

1984. *Caliothrips indicus* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 : (1-2) : 81.

*Specimen studied* : Calcutta : 1 Female (Z. S. I. Reg. No. 4263/H17) 12. 9. 1978, coll. N. K. Pramanik. Murshidabad Dt. : 2 Females (Z. S. I. Reg. Nos. 1894-95/H17) Satinakandi Vill. 25. 3. 1983, coll. S. Sen & Party. 24 Parganas Dt. (South) : 5 Females (Z. S. I. Reg. Nos. 2050-54/H17) Narendrapur, 29. 3. 1984, coll.

**Distribution** : India : West Bengal [Calcutta, Murshidabad, 24 Parganas (South)]. Widely distributed. Elsewhere : Bangladesh.

**Remarks** : This species is recorded for the first time from West Bengal.

**56. *Caliothrips luckmanni* Wilson**  
(Text-fig. 9)

1975. *Caliothrips luckmanni* Wilson, *Mem. Amer. ent. Inst.*, 23 : 86-87.

**Specimen studied** : Calcutta : 1 Female (Z. S. I. Reg. No. 1567/H17) 6. 4. 1978, coll. N. K. Pramanik & C. K. Sen Gupta.

**Distribution** : India : West Bengal (Calcutta), M. P. & Tamil Nadu.

**Remarks** : This species is recorded for the first time from West Bengal.

**Genus 36. *Helionothrips* Bagnall**

1932. *Helionothrips* Bagnall, *Ann. Mag. nat. Hist.*, 10 (10) : 506.

**57. *Helionothrips kadaliphilus* (Ramakrishna & Margabandhu)**

1931. *Helionothrips kadaliphilus* Ramakrishna & Margabandhu, *J. Bombay nat. Hist. Soc.*, 34 : 1033-1034.

1945. *Helionothrips kadaliphilus* : Shumsher, *Indian J. Ent.*, 7 : 175.

1957. *Helionothrips kadaliphilus* : Ananthakrishnan, *Zool. Anz.* 159 (5) : 98-100.

1968. *Helionothrips kadaliphilus* : Bhatti, *Oriental Ins.*, 2 (1) : 35.

1975. *Helionothrips kadaliphilus* : Wilson, *Mem. Amer. ent. Inst.*, 23 : 130-131.

1988. *Helionothrips kadaliphilus* : Sen *et al.*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 22.

**Specimen studied** : Darjiling Dt. : 1 Female (Z. S. I. Reg. No. 777/H17) Darjiling, 24. 3. 1978, coll. A. R. Bhaumik. 1 Female (Z. S. I. Reg. No. 1250/H17) Rangirum, coll. Dr. J. K. Jonathan.

**Distribution** : India : West Bengal (Darjiling); Tamil Nadu; Kerala; Maharashtra; Manipur.

**Remarks** : *H. kadaliphilus* is a serious pest of banana. Sen *et al* (1988) recorded this species from West Bengal.

**Genus 37. *Monilothrips* Moulton**

1929. *Monilothrips* Moulton, *Rec. Indian Mus.*, 31 93-94.

**58. *Monilothrips kempi* Moulton**  
(Text-fig. 10)

1929. *Monilothrips kempi* Moulton, *Rec. Indian Mus.*, 31 : 94-95.

1952. *Monilothrips kempi* : Bailey & Cott, *Bull. Calif. Dept. Agri.*, 41 (3) : 2

1959. *Monilothrips kempi* : Hood & Jacot-Guillarmed, *J. ent. Soc. Sth. Afr.*, 22 (2) : 489.

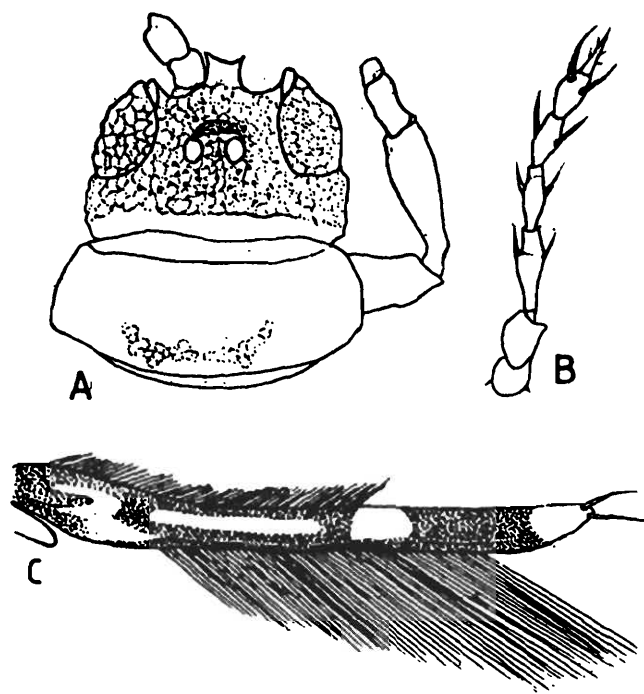
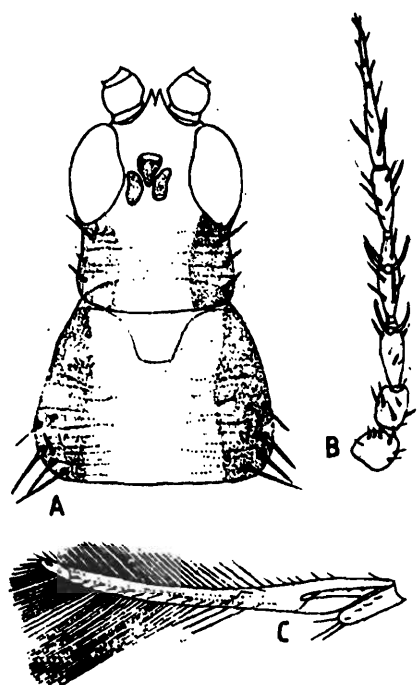
1972. *Monilothrips kempi* : Bhatti, *Oriental Ins.*, 6 (1) : 72.

1975. *Monilothrips kempi* : Wilson, *Mem. Amer. ent. Inst.*, 23 : 173.

1978. *Monilothrips kempi* : Sen, *Bull zool. Surv. India*, 1 (1) : 43-45.

1988. *Monilothrips kempi* : Sen *et al*, *Rec. zool. Surv. Occl. Pap.*, 100 : 23-24.

**Macropterous Female (Male)** : General body colour uniformly orange brown; antennal segments 1-4 (1-3 and base of 4-5) whitish yellow and rest unicolorous to the body; legs yellow with a shade of orange brown at middle of all femora and mid & hind tibiae (legs golden yellow); wings yellowish along margin and whitish at middle. All setae dark.



Text fig. 8. *Trichormotbrips arorai* Bhatti. Halotype, Female. A Head and pronotum. B. Antenna. C. Forewing.

Text fig. 9. *Caliothrips luckmanni* Wilson A. Head and pronotum B. Antenna C. Forewing.

**Head** broader than long, distinctly produced in front between bases of antennae, anterior margin of projection concave; cheeks slightly archad; posterior margin of head with a conspicuous reticulated collar-like band. Eyes large, little extended ventrally. Antennae 8-segmented; segments 3 & 4 vase shaped, 5 elongate & clavate, 6 short, terminal segment of style elongate. Mouthcone broad; maxillary palpi 3-segmented.

**Prothorax** transverse with 2 pairs of anteroangulars, one directed forward and the other backward; 2 posteroangulars, outer about half as long as inner. Forewings with continuous row of setae in both veins.

**Abdominal** tergite II with a distinct dark brown line along anterior margin and the line on tergites I placed away from the anterior margin; tergtes II-VIII reticulated. Tergite IX of male with 6 strong specialised setae disposed as follows : 4 middle (2 in upper row, 2 in lower row) and the other 2 placed laterally.

**Specimen studied** : Darjiling Dt. : Holotype Female (Z. S. I. Reg. No. 154/H8) Sureil, Mongpu, April, 1917, coll. S. W. Kemp. 6 Females, 2 Males (Z. S. I. Reg. Nos. 125-126/H12; 403-407/H12; 1251/H17) Rangirum, 25. 5. 1974, 7. 6. 1975, coll. Dr. J. K. Jonathan, 2 Females, 1 Male (Z. S. I. Reg. Nos. 388-390/H12) Manibhanjang, Darjiling Dt. 19. 5. 1975, coll. Dr. J. K. Jonathan. 2 Females (Z.S. I. Reg. Nos. 298-400/H12) Ghoombhanjan, 30. 5. 1975, coll. Dr. J. K. Jonathan.

**Distribution** : India : West Bengal (Darjiling); Mussorie (U.P.) Elsewhere : Lesotho (Africa); California (Amirica).

**Remarks** : In India, *M. kempii* is restricted to Himalayas (Eastern & Western).

### Genus 38. *Panchaetothrips* Bagnall

1912. *Panchaetothrips* Bagnall, *Rec. Indian Mus.*, 7 : 258.

### 59. *Panchaetothrips indicus* Bagnall

1912. *Panchaetothrips indicus* : Bagnall, *Rec. Indian Mus.*, 7 : 258-260.

1928. *Panchaetothrips indicus* : Ramakrishnan, *Mem. Dept. Agri. Indian Ent. Ser.*, 7 (10) : 273.

1975. *Panchaetothrips indicus* : Wilson, *Mem. Amer. ent. Inst.*, 23 : 188-189.

1979. *Panchaetothrips indicus* : Kudo, *Oriental Ins.*, 13 (3-4) : 350.

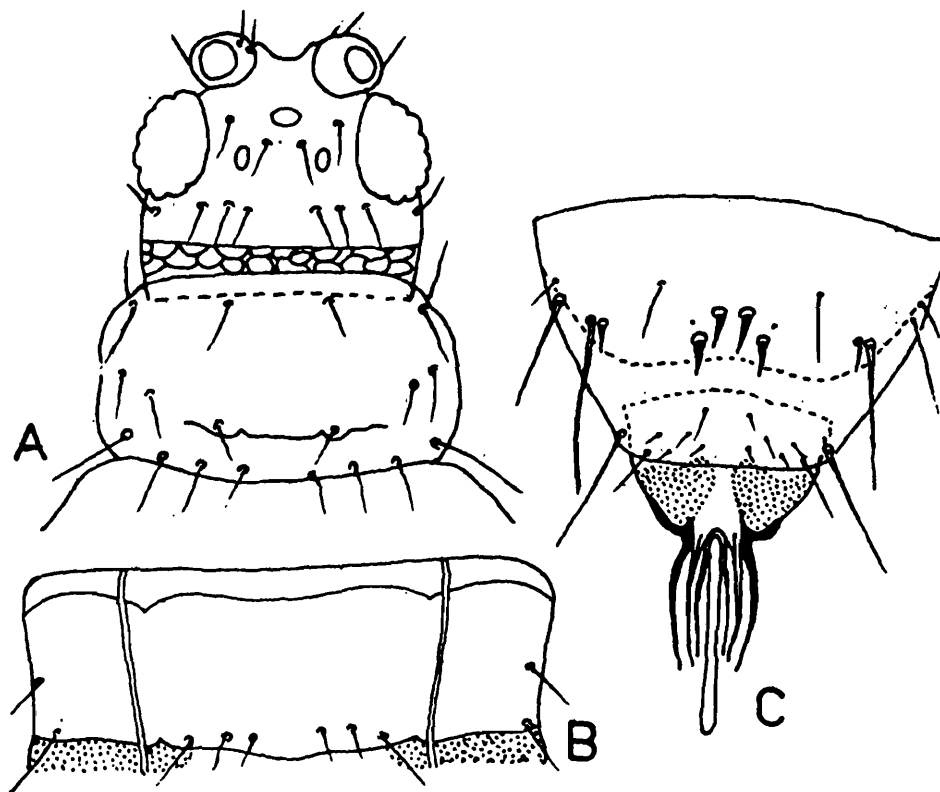
1984. *Panchaetothrips indicus* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 85.

1988. *Panchaetothrips indicus* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 25.

**Specimen studied** : Bankura Dt. : 5 Females (Z. S. I. Reg. Nos. 3042-46/H17) Jamuna Vill., 8.11.1985, coll. Sen & Party. 2 Females (Z. S. I. Reg. Nos. 4015-4016/H17) Kumardanga, 6.11.1985, coll. S. Sen & Party. Birbhum Dt. : 2 Females (Z. S. I. Reg. Nos. 1654-1655/H17) Rampurhat, 18.12.1981, coll. S. Sen & Party.

**Distribution** : India : West Bengal (Bankura, Birbhum); Tamil Nadu, Kerala, Bihar, Assam, Manipur. Elsewhere : Bangladesh, Thailand, S. China.

**Remarks** : This species is recorded for the first time from West Bengal.



Text-fig. 10. *Monilothrips kempii* Moulton. A. Head and Pronotum. B. Abdominal sternum V. C. Terminal abdominal segments of male.

#### Genus 39. *Phibalothrips* Hood

1918. *Phibalothrips* Hood, *Mem. Queensland Mus.*, 6 : 125.

1925. *Reticulothrips* Faure, *Sth. Afr. J. nat. Hist.*, 5 : 145.

1937. *Phibalothrips* : Jacot-Guillarmod *Publ. Univ. pretoria, Ser. Nat Sci.*, 3 : 10.

#### 60. *Phibalothrips peringueyi* (Faure)

1925. *Reticulothrips peringueyi* Faure, *Sth. Afr. J. nat. Hist.*, 5 : 145-150.

1931. *Reticulothrips peringueyi* : Remakrishna & Margaandhu, *J. Bombay nat. Hist. Soc.*, 34 (4) : 1034.

1975. *Phibalothrips peringueyi* : Wilson, *Mem. Amer. ent. Inst.* 23 : 197-198.

1979. *Phibalothrips peringueyi* : Kudo, *Oriental Ins.*, 13 (3-4) : 350-151.

1984. *Phibalothrips peringueyi* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 85.

1988. *Phibalothrips peringueyi* : Sen *et al. Rec. zool. Surv. India, Occl. Pap.*, 100 : 25-26.

*Specimen studied* : Coochbehar Dt. : 1 Female (Z. S. I. Reg. Nos. 1744/H17) Mekligunj, 16.10.1982, coll. C. K. Sen Gupta. 24 Parganas Dt. (South) : 2 Females (Z. S. I. Reg. Nos. 920-921/H17) Hatberia Village, 18.9.1980, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Coochbehar, 24 Parganas (South)]; Tamil Nadu; Delhi ; M.P. Elsewhere : South Africa; Bangladesh; Sri Lanka; Thailand; Philippines; Hongkong; Taiwan.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

#### Genus 40. *Retithrips* Marchal

1910. *Retithrips* Marchal, *Bull. Soc. Ent. Egypte*, 2 (1) : 17.

**61. *Retithrips syriacus* Mayet**

1890. *Thrips (Heliothrips) syriacus* Mayet, *Les Insectes de la Vigna* : 451.  
 1930. *Retithrips syriacus* : Bodenheimer, *Monogr. zur Agnew Ent.* **10** : 168.  
 1954. *Retithrip syriacus* : Seshadri & Ananthkrishnan, *Indian J. Ent.*, **16** (3) : 213.  
 1975. *Retithrips syriacus* : Wilson, *Mem. Amer. ent. Inst.* **23** : 214-218.  
 1980. *Retithrips syriacus* : Sen, *Rec. zool. Surv. India*, **77** : 345-346.  
 1984. *Retithrips syriacus* : zur Strassen & Harten, *Senckenbergiana biol.*, **65** (1-2) : 86.  
 1988. *Retithrips syriacus* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, **100** : 26.

*Specimen studied* : Birbhum Dt. : 1 Female (Z. S. I. Reg. No. 1585/H17) Sanghatpur, 18.12.1981, coll. S.Sen. 1 Female (Z. S. I. Reg. No. 1687/H17) Bakreswar, 16.12.1981, coll. S. Sen. Coochbehar Dt. : 16 Females, 3 Males (Z. S. I. Reg. Nos. 995/H17; 1037/H17; 1520-23/H17; 1557-59/H17; 1608/H17; 1735-40/H17; 2001/H17 & 2014-2015/H17) 7.10.1981, 19.10.1981, 30.12.1981; 25.10.1982, 31.12.1983, coll. C. K. Sen Gupta 24 Parganas Dt. (South) : Sundarban Tiger Reserve, 16.9.1983, coll. S. S. Saha.

*Distribution* : India : West Bengal (Birbhum, Coochbehar, 24 Parganas (South)). Elsewhere : Bangladesh; Syria ; Egypt; East Africa; South Africa; Brazil.

**Genus 41. *Rhipiphorothrips* Morgan**

1913. *Rhipiphorothrips* Morgan, *Proc. U. S. nat. Mus.*, **46** (2008) : 17.

**62. *Rhipiphorothrips cruentatus* Hood**

1919. *Rhipiphorothrips cruentatus* Hood, *Insect. Inscit. menstr.*, **7** : 94-96.  
 1937. *Rhipiphorothrips cruentatus* : Rahman & Bharadwaj, *Indian J. agric. Sci.*, **7** : 633.  
 1975. *Rhipiphorothrips cruentatus* : Wilson, *Mem. Amer. ent. Inst.*, **23** : 222-224.  
 1980. *Rhipiphorothrips cruentatus* : Sen, *Rec. zool. Surv. India*, **77** : 346.  
 1984. *Rhipiphorothrips cruentatus* : zur Strassen & Harten, *Senckenbergiana biol.*, **65** (1-2) : 86.  
 1988. *Rhipiphorothrips cruentatus* : Sen *et al* *Rec. zool. Surv. India Occl. Pap.*, **100** : 27.

*Specimen studied* : Birbhum Dt. : 3 Females, 1 Male (Z. S. I. Reg. Nos. 1573-1576/H17) Sanghatpur, 18. 12. 1981, coll. S. Sen. 9 Females, 1 Male (Z. S. I. Reg. Nos. 1938-1643/H17) Kourobela, 18. 12. 1981, coll. S. Sen. Calcutta : 3 Females, 2 Males (Z. S. I. Reg. Nos. 922-925/H17; 1671/H17) 24. 8. 1980, 2. 8. 1980, 2. 8. 1982, coll. C.K. Sen Gupta. Coochbehar Dt. : 5 Females, 3 Males (Z. S. I. Reg. Nos. 1038/H17; 1507/H27; 1711-1714/H17; 1742-1743/H17) Coochbehar, 18. 10. 1980; 2. 10. 1981; 16. 10. 1982; 20. 10. 1982, coll. C. K. Sen Gupta. Darjiling Dt. : 1 Female (Z. S. I. Reg. No 4178/H17) Mirik, 20. 4. 1986, coll. Dr. B. C. Das. 24 Parganas Dt. (South) 1 Male (Z. S. I. Reg. No. 1538/H17) Narendrapur. 13. 11. 1981, coll. S. Sen.

*Distribution* : India : West Bengal [Birbhum, Calcutta, Coochbehar, Darjiling, 24 Parganas (South)]; Tamil Nadu; Kerala; Karnataka. Elsewhere : Sri Lanka; Afghanistan; Bangladesh; Pakistan.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

**Genus 42. *Selenothrips* Karny**

1911. *Heliothrips (Selenothrips)* Karny, *Ent. Rundschau*, **28** : 179.  
 1913. *Selenothrips* : Hood, *Insect. Inscit. menstr.*, **1** (12) : 150.

63. *Selenothrips rubrocinctus* (Giard)

1901. *Physopus rubrocinctus* Giard, *Bull.Soc.Ent. France*, 15 : 263-265.  
 1908. *Ileliothrips rubrocinctus*; : Franklin, *Proc. U.S. nat. Mus.*, 33 (1590) : 719-723.  
 1911. *Ileliothrips (Selenothrips) rubrocinctus* : Karny, *Ent. Rundschau*, 28 : 179-180.  
 1913. *Selenothrips rubrocinctus* : Hood, *Insecut. Inscit. menstr.*, 1 (12) : 150.  
 1975. *Selenothrips rubrocinctus* : Wilson, *Mem. Amer. ent. Inst.*, 23 : 230-234.  
 1979. *Selenothrips rubrocinctus* : Kudo, *Oriental Ins.*, 13 (3-4) : 355.  
 1980. *Selenothrips rubrocinctus* : Sen, *Rec. zool. Surv. India*, 77 : 346.  
 1984. *Selenothrips rubrocinctus* : zur Shrasen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 87.  
 1988. *Selenothrips rubrocinctus* : Sen *et al*, *Rec. zool. Surv. India Occl. Pap.* 100 : 27-28.

*Specimen studied* : Birbhum Dt. : 1 Female (Z. S. I. Reg. No. 1572/H17) Kendubilwa, 16. 12. 1981. coll. S. Sen. & Party. Coochbehar Dt. 38 Females (Z.S. I. Reg. No.s 991-43/H17; 1384-85/H17; 1508-13/H17; 1524-32/H17; 1560/H17; 1609-11/H17; 1722-23/H17; 1747-48/H17; 2002-05/H17) Coochbehar, 10. 10. 1980, 15. 10. 1980, 2. 10. 1981, 7. 10. 1981, 30. 12. 1981, 20.10.1982, 25. 10. 1982, 31. 12. 1983, coll. C. K. Sen Gupta. 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 1543/H17) Narendrapur, 13. 11. 1981, coll. S. Sen. 4 Females (Z. S. I. Reg. Nos. 1942-45/H17) Holdi Camp, Sunderban Tiger Reserve, 16. 9. 1983, coll. S. S. Saha.

*Distribution* : India : West Bengal [Birbhum, Coochbehar, 24 Parganas (South)]; Andaman Is.; Manipur. Elsewhere : Burma; Sri Lanka; Honduras; Bangladesh; Philippines; Taiwan; Thailand; Mexico.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

Genus 43. *Zaniothrips* Bhatti

1967. *Zaniothrips* Bhatti, *Thysanoptera nava Indica* : 6.

64. *Zaniothrips ricini* Bhatti

1977. *Zaniothrips ricini* Bhatti, *Thysanoptera nova Indica* : 6.

*Specimen studied* : Medinipur Dt. : 3 Females (Z. S. I. Reg. No. 2097/H17; 3028-29/H17) Tamluk, ex. Betel leaf, 28. 1. 1985, coll. S. K. Raut.

*Distribution* : India : West Bengal (Haora, Medinipur); M.P.

*Remarks* : Bhatti (1967) described *Zaniothrips ricini* from Jabalpure (M.P.) and Sibpore Botanical Garden. Howrah (West Bengal) and since then the species was not reported from any where. This species was collected from Castor leave in both the localities whereas the present record is from Betel leaves.

## Key to the Genera of the Family PHALAEOTHRIPIDAE

1. Distance between hind coxae greater than that separating either of other coxae. Antennae 5-segmented. Vertex with 4-6 prominent setae. Fore and hind tarsi with a downwardly directed claw at .....*Stephanothrips* Trybom  
 Distance of hind coxae less than that of middle coxae .....2
2. Maxillary styles slender, never broadened. (Subfamily Phylacothripinae).....3  
 Maxillary styles broad, band-like (Subfamily Idolothripinae).....28

3. Fore wings banded, narrow, more widened at base. Males with a well a developed spur or tooth on inner side of forefemora; major females also with weak spur.....*Aleurodothrips* Franklin  
Wings not banded.....4
4. Body setae fimbriate and short. Head polygonally reticulate, broadest behind eyes; cheeks convex, warty; eyes directed forward; maxillary styles oculad, meeting at middle; praepectus absent. Pronotum 0.6 times as long as head ..... *Azaleothrips* Ananthakrishnan  
Body seae pointed, knobbed or blunt .....5
5. Maxillary styles very short, confined to mouthcone. Head wider than long; antennal segment 3 as long as 2, segment 6 longest and longer than 7 & 8 together, 7 & 8 closely joined but completely separated by a suture; major males with a ventral horn-like projection between the bases of antennae. Prothorax very much enlarged, much longer than pterothorax. Males with a prominent tooth at the middle of the posterior margin of abdominal tergite IX .....  
.....*Sophiothrips* Hood  
Maxillar styles long, retracted into head capsule .....6
6. Sensecones on antennal segment 3 numerous, arranged in a ring. Forefemora with a stout tooth at base on inner margin of females; males with a strong tooth at base and one at apex of forefemora; forecoxae prolonged considerably in oedymorous males.....  
.....*Ecacanthothrips* Bagnall  
Sensecones on antennal segment 3 atleast 2-4 in number.....7
7. Intermediate antennal segments thin. Foretarsi unarmed in both sexes. Mesopraesternum degenerate to well developed. Wings comparatively narrow....*Stigmothrips* Ananthakrishnan  
Intermediate antennal segments well developed and partly elongate.....8
8. Head with a clear notch behind eyes.Eyes strongly bluged. Postoculars 2 pairs outer long and thin. Pronotum much shorter than head, pronotal setae well developed, long, thin & pointed. Forewings parallel sided without double fringes.Abdomen, with long, thin almost flagelliform lateral setae, about as long as B1-B3 of segment IX .....*Ocythrips* Ananthakrishnan  
Head withoutnotch behind eyes or only with a slight one.....9
9. Checks always with a few warts mostly at base bearing small setae or non-warty, but with 1-4 strong setae or checks crenulate..... 10  
Checks without warts and strong setae, atleast with small scattered setae or smooth ..... 12
10. Checks warty, bearing a few setae, mostly at base. Forefemora and foretibiae armed in the males with 2 subapical femoral teeth and a basal, median & apical tibial teeth, much more developed in oedymorous forms. Prothoracic setae well developed and dilated at tip.....  
.....*Hoplandrothrips* Hood  
Checks not warty, mostly crenulate. Forefemora strongly enlarged in both sexes, often much wider than head ..... 11
11. Mouthcone rounded; maxillary styles mesad, wide apart. Head much broader; cheeks slightly but distinctly indented behind eyes; eyes slightly bulged behind forming an angular projection; postoculars longer than eyes. Foretibiae much shorter with an inner tubercle at apex; foretarsi with a strong dagger-like tooth in both sexes. B2 of abdominal segment IX of male short but exceptionally stout .....*Pegothrips* Sen & Muraleedharan  
Mouthcone pointed; maxillary styles mesad, broadly separate. Forefemora of female much wider than head; foretibiae normal, not short, with a small tubercle to a well developed bifid tooth; foretarsi with a strong tooth .....*Arrhenothrips* Hood

12. Foretarsi unarmed in both sexes ..... 13  
 Foretarsi armed in both sexes or armed only in males ..... 14
13. Head 1.1.-1.7 times as long as broad and almost twice as long as pronotum. Forefemora mostly thin..... *Liothrips* Uzel  
 Head shorter. Pronotum heavy and much longer than head. Forefemora of oedymcerous males armed with 1 or 2 well developed teeth or tubercles; forefemora strongly enlarged in the males; foretarsi of females mostly unarmed. Mouthcone rounded to pointed.....  
 ..... *Hoplothrips* Serville  
 Oedymcerous males when present without forefemoral or foretibial teeth..... 15
15. Pronotum with twisted striae. Postoculars usually one pair, occasionally two pairs. Mouthcone very broadly rounded ..... *Gynaikothrips* Karny  
 Pronotum without twisted striae, atmost with transverse striae..... 16
16. Tube very much longer than head. Head very little produced and with a clear notch behind eyes; checks wide behind eyes. Tube pilose. Integument strongly sculptured..... *Leeuwenia* Karny  
 Tube shorter than head or as long as head..... 17
17. Forewings slightly narrowed at base and parallel sided beyond middle (Mesothripine)..... 18  
 Forewings with a constriction at middle (Haplothripine) ..... 20
18. Forefemora at middle with a prominent tooth; foretibiae with one or two tooth-like projections near middle; foretarsi armed ..... *Euoplothrips* Hood  
 Forefemora and foretibiae unarmed..... 19
19. Head long, more than twice as long as pronotum and parallel sided. Antennal segments 7 & 8 forming a close unit. Maxillary styles oculad, closely approximate. Foretarsi unarmed in both sexes..... *Ablemothrips* Ananthakrishnan  
 Head not elongate, atmost as long as pronotum. Checks constricted at base and slightly spinose. Forefemora usually enlarged. Wings narrow..... *Mesothrips* Zimmerman
20. Mouthcone short and broad..... 21  
 Mouthcone pointed ..... 25
21. Foretibiae with one or two distinct teeth; forefemora sometimes with a hump at base.....  
 ..... *Podothrips* Hood  
 Foretibiae unarmed ..... 22
22. Maxillary styles short, retracted just above mouthcone. Checks convex, serrate. Foretarsi with tooth only in males ..... *Antillothrips* Stannard  
 Maxillary styles not short, retracted far into head capsule and mostly connected by maxillary bridge. Checks not convex. Mouthcone not very short. Pronotum about as long as head. Cephalic and pronotal setae usually well developed. Foretarsi with or without teeth ..... 23
23. Antennal segment 3 almost symmetrical. Forefemora of females enlarged, reduced in gynaeccoid males and more enlarged in oedymcerous males. Foretarsal tooth when present directed forward ..... 24  
 Antennal segment 3 not very symmetrical. Forefemora of females usually simple, atmost enlarged in males. Forewings with or without double fringes..... *Haplothrips* Serville

24. Antennal segment 8 constricted at base. Anal setae not very long, almost as long as tube. Small forms.....*Xylaplothrips* Priesner  
Antennal segment 8 broad at base; 7 & 8 closely united. Hind femora usually enlarged. Anal setae long and fine about twice as long as tube.....*Karnyothrips* Watson
25. Mouthcone triangular, pointed, reaching base of prosternum. Head as in *Haplothrips* or a little longer.....*Neoheegeria* Schmutz  
Mouthcone distinctly biconcave. Head more elongate.....26
26. Abdominal terga II-VII with 2 pairs of wing retaining setae. Phallus with membranous pseudovirga.....*Membrothrips* Bhatti  
Abdominal terga II-VII with more than 2 pairs of wing retaining setae. Phallus with membranous pseudovirga.....27
27. Forefemora enlarged Antennal segment 3 stout and with 2-3 sense cones. Metanotal sculptured not closely striate. Forewings with accessory fringes.....*Dolichothrips* Priesner  
Forefemora slender. Antennal segment 3 slender, much longer than 4 and 2 sense cones. Metanotal sculpture closely striate.....*Dolicholepta* Priesner
28. Maxillary styles moderately thick, a little thicker than the Phlaeothripines. Antennal segments 7 & 8 forming an unit, sometimes with an indistinct suture.....29  
Maxillary styles thick, at least as thick as labial palps.....30
29. Antennal segment 3 with 3 sense cones and segment 4 with 4 sense cones ....*Holothrips* Karny  
Antennal segment 3 & 4 with 4 sense cones.....*Oidanothrips* Moulton
30. Antennae 7 segmented, segment 7 strongly constricted at base. Eyes reduced to 4-6 facets in apterous forms; brachypterous and macropterous forms rare with larger eyes. Metanotum well developed with 1-3 pairs of major setae. Abdominal tergite each with one pair of wing retaining setae .....*Allothrips* Hood  
Antennae clearly 8-segmented .....31
31. Checks clearly incut behind eyes. Head a little produced in front. Eyes small in apterous forms, well developed in macropterous specimens. Mouthcone broadly rounded; maxillary styles widely separate 'V' like. Praepectus absent. Prothoracic setae short. Forewings when present without double fringes.....*Loyolaia* Ananthakrishnan  
Checks normal.....32
32. Head not or very little produced .....33  
Head distinctly produced.....35
33. Tube convex, heavy and bearing tubercles laterally. Fore tarsal tooth large in males, small or absent in females.....*Neosmerinthothrips* Schmutz  
Tube with straight margin.....34
34. Maxillary styles broadly separate 'V' like. Metanotal median setae usually small. Foretarsal tooth present in male, absent in females .....*Nesothrips* Kirkaldy  
Maxillary styles not 'V' like, somewhat close at middle. Antennal segment 4 with 4 sense cones. Fore tarsi with a tooth in males, present or absent in females. Tuber shorter. Usually large dark species.....*Ethirothrips* Karny

35. Head production short. Mesothorax of male with a distinct forked process, absent in gynaecoid males. Cheeks strongly setose in oedymorous males, weak in gynaecoid. Oedymorous males with very well developed forefemora and with strong setae; foretibiae with numerous denticles on inner margin and foretarsal tooth very strong ..... *Dinothrips* Bagnall  
 Head production of varried length, often more pronounced. Forefemora of males on outer margin with a sickle -like seta; foretarsal tooth well developed in males, reduced or absent in females. Antennal segments 3 & 4 in oedymorous males with strongly developed setae general setae well developed ..... *Elaphrothrips* Buffa

Suborder TUBULIFERA  
 Family PHLAEOTHRIPIDAE  
 Subfamily UROTHRIPINAE  
 Genus 44. *Stephanothrips* Trybom

1912. *Stephanothrips* Trybom, *Arkiv. f. Zool.*, 7 (33) : 42.

65. *Stephanothrips occidentalis* Hood & Willams

1925. *Stephanothrips occidentalis* Hood & Willams, *Psyche*, 32 : 69.  
 1967. *Stephanothrips occidentalis* : Ananthakrishnan, *Ann. Soc. ent. Fr. (N.S.)*, 3 (1) : 237.  
 1973. *Stephanothrips occidentalis* : Ananthakrishnan, *Occl. Publ., Ent. Res. Unit., Loyola College, Madras* : 75.  
 1981. *Stephanothrips occidentalis* : Murallendharan & Sen, *Rec. zool. Surv. India*, 79 : 227.  
 1982. *Stephanothrips occidentalis* : Muralecdharan, *Rec. zool. Surv. India*, 79 : 381.

*Distribution* : India : West Bengal (Kalimpong, Darjiling Dt.); Tamil Nadu; Kerala; Andhra Pradesh; Tripura; Manipur.

*Remarks* : Ananthakrishnan (1973) recorded this species from Kalimpong.

Subfamily PHLAEOTHRIPIINAE  
 Genus 45. *Ablemothrips* Ananthakrishnan

1969. *Ablemothrips* Ananthakrishnan, *Oriental Ins.*, 3 (3) : 289.

66. *Ablemothrips maxillatus* Ananthakrishnan

1969. *Ablemothrips maxillatus* Ananthakrishnan, *Oriental Ins.*, 3 (3) : 289-290.  
 1973. *Ablemothrips maxillatus* Ananthakrishnan, *Occl. Publ. 2* : Ent. Res. Unit. Loyola College Madras : 19  
 1988. *Ablemothrips maxillatus* : Sen *et al*, *Rec. zool. Surv. India Occl. Pap.*, 100 : 35-36.

Female (Macropterous) : General body colour brown with scattered pigment; antennal segments brown except segment 3 pale to clear yellow with base shaded weak to dark brown; legs brown except base & distal thirds of tibiae and all tarsi yellow; wings pale grey, darker in distal third. All setae hyaline and knobbed.

*Head* very long about 1.7 times as long as wide and more than twice longer than pronotum; parallel sided; cheeks with 3-4 pairs of sharp setae. Postoculars short, placed at inner margin of eyes.

Antennae 8-segmented, segments 7 & 8 forming a close unit. Mouthcone short and broad; maxillary styles occluded, entire length closely approximate.

*Pronotum* short with twisted striae. Prothoracic setae short; anteroangulars; anteromarginals, midlaterals and posteroangulars almost subequal, epimerals a little longer. Forefemora not much enlarged; foretarsi unarmed. Forewings mesothripinae, without double fringes.

*Distribution* : India : West Bengal (Kalimpong, Darjiling Dt.); Tamil Nadu.

#### Genus 46. *Aleurodothrips* Franklin

1909. *Aleurodothrips* Franklin, *Ent. News.*, 20 : 228.

#### 67. *Aleurodothrips fasciapennis* (Franklin)

1908. *Crypthrips fasciapennis* Franklin, *Proc. U. S. nat. Mus.*, 33 : 727

1909. *Aleurodothrips fasciapennis* : Franklin, *Ent. News.*, 20 : 228.

1964. *Aleurodothrips fasciapennis* : Ananthakrishnan, *Oppusc Ent. Suppl.*, 25 : 26.

1980. *Aleurodothrips fasciapennis* : Sen, *Rec. zool. Surv. India*, 77 : 346-347.

*Specimen studied* : Haora Dt. : 1 Female (Z. S. I. Reg. No. 44933/H17) Sibpore, ex. Pandanus, 27.1.1972, coll. T. N. Ananthakrishnan.

*Distribution* : India : West Bengal (Haora); Kerala; Tamil Nadu; Andaman Is. Elsewhere : Barbados Is.; Belgium.

#### Genus 47. *Antillothrips* Stannard

1957. *Antillothrips* Stannard, *Illinois biol. Monogr.* 25 : 35-36.

1965. *Xenothrips* Ananthakrishnan, *Bull, Ent.*, 6 : 53.

1976. *Antillothrips* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 231.

#### Key to the Species of *Antillothrips*

1. Body brown. Mesopraesternum well developed. B2 of abdominal segment IX pointed.....  
..... *varius* (Ananthakrishnan & Jagadish)
- Body bicolourous. Prothoracic anteromarginals well developed and expanded at tip.....  
..... *nayari* (Ananthakrishnan)

#### 68. *Antillothrips nayari* (Ananthakrishnan)

1958. *Xylaplothrips nayari* Ananthakrishnan, *Proc. ent. Soc. Wash.*, 60 (6) : 278-280.

1976. *Antillothrips nayari* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 235.

*Specimen studied* : Calcutta : 2 Females, 2 Males (Z. S. I. Reg. Nos. 1335-1336/H17; 1400-1401) Jadavpur, 27.7.1978, Coll. Dr. N. Muralcedharan. Hughli Dt. : 1 Female (Z. S. I. Reg. No. 1339/H17) Jagannathati, 26.7.1978, Coll. S. Sen.

*Distribution* : India : West Bengal (Calcutta, Hughli); Kerala.

*Remarks* : This species is recorded for the first time from West Bengal.

69. *Antillothrips varius* (Ananthakrishnan & Jagadish)

1969. *Xylaplothrips varius* Ananthakrishnan & Jagadish, *Zool. Anz.*, **182** (1-2) : 132.

1972. *Xylaplothrips nefrans* Ananthakrishnan, *Oriental Ins.*, **6** (4) : 442-443.

1976. *Antillothrips varius* : Pitkin, *Bull Br. Mus. nat. Hist. (Ent.)* **34** (4) : 235-237.

*Specimen Studied* : Calcutta 1 Female (Z. S. I. Reg. No. 1672/H17) 20.1.1978, coll. N. K. Pramanik & C. K. Sen Gupta

*Distribution* : India : West Bengal (Calcutta); Kerala; U. P.

*Remarks* : This species is recorded for the first time from West Bengal.

Genus 48. *Arrhenothrips* Hood

1919. *Arrhenothrips* Hood, *Insec. Inscit. Menstr.*, **7** (4-6): 98.

70. *Arrhenothrips longisetis* Sen

1977. *Arrhenothrips longisetis* Sen, *Entomon*, **2** (1) : 93-94.

1988. *Arrhenothrips longisetis* : Sen *et al*, *Rec.Zool. Surv. India, Occl. Pap.*, **100** : 42-43.

*Female (Macropterous)* : General body colour brown; head and apex of abdomen dark; tube blackish brown except tip; all femora, mid- and hindtibiae, mid- and hind tarsi brown; foretibiae yellow with brownish shade, foretarsi yellow; antennal segment 1 & 8 brown, 2 brown dark in basal half and paler distally, 3-7 yellow, wings pale grey infumate. All setae dark brown and blunt.

*Head* about 1.5 times longer than broad; surface strongly striate. Eyes little bulged and slightly extended ventrally. Postoculars blunt, about half as long as eyes. Antennal segments 3-7 pedicellate. Mouthcone pointed; mixillary stylets retracted mesad, 'V' shaped.

All the prothoracic setae very well developed, slightly knobbed except posteroangulars blunt; mid laterals, posteroangulars and epimerals incurved. Fore wings narrow with 18-26 double fringes; basal wing setae very well developed, slightly knobbed. Mesaprastrernum incomplete restricted to two lateral sclerites. Pelta apparently pyramid shaped.

*Specimen studied* : Darjiling Dt. : Holotype (Z. S. I. Reg. No. 353/H12); paratypes 6 Females (Z. S. I. Reg. Nos. 354-359/H12) Chunabati Forest Rest House, 17.2.1974, coll. Dr. H. K. Bhowmik.

*Distribution* : India : West Bengal (Darjiling).

Genus 49. *Azaleothrips* Ananthakrishnan

1964. *Azaleothrips* Ananthakrishnan, *Entomal. Ts. Arg.* **85** (3-4) : 220-221.

71. *Azaleothrips amabilis* Ananthakrishnan  
(Text-figure-11)

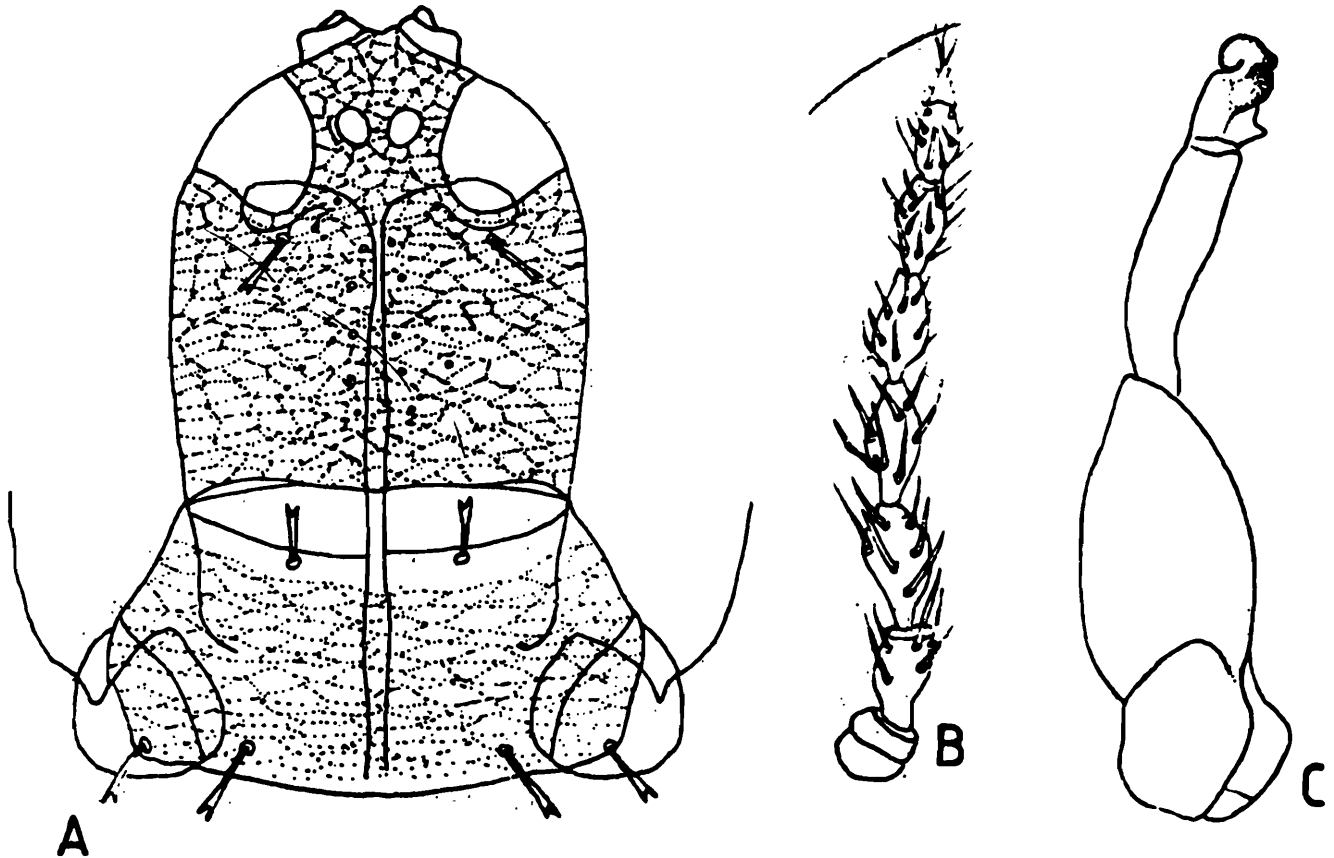
1964. *Azaleothrips amabilis* Ananthakrishnan, *Entomol. Tx.Arg.*, **85** (3-4) : 220-221.

1973. *Azaleothrips amabilis* : Ananthakrishnan, *Occl. Publ. Ent., Res., Unit, Loyola College, Madras*, **2** : 23-24.

1982. *Azaleothrips amabilis* : Muraleedharan, *Rec. zool. Surv. India*, **79** : 376.

1988. *Azaleothrips amabilis* : Sen *et al*, *Rec. zool. Surv. India. Occ. Paper*, **100** : 43.

*Head* about as long as wide across cheeks; cheeks convex, widest at cheeks, narrowed across eyes and base; cheeks weak warty and with few small spines. Eyes directed forward. Postoculars very short, fimbriate. Prothorax much shorter than head, all prothoracic setae short and fimbriate. Forefemora moderately stout, foretarsus with a small tooth. Forewings with 5-8 double fringes; basal wings setae B1-B2 small and dilated at tip. Tube shorter than head and anal setae about as long as tube.



Text.-fig. A 11. *Azaleothrips amabilis* Ananthkrishnan A. Head and pronotum. B. Antenna. C. Forewing.

*Specimen studied* : Calcutta 1 Female, 1 Male, (Z.S.I. Reg. No. 1373/H17; 1566/H17) 20.9.1977, coll. Dr. N. Muraleedharan; N. K. Pramanik & C. K. Sen Gupta. Darjiling Dt. : 1 Male (Z. S. I. Reg. No. 111/H17) Rongtong, Kurseong; coll. Dr. T. N. Ananthkrishnan.

*Distribution* : India : West Bengal (Calcutta, Darjiling); Tamil Nadu; Kerala; Goa; Maharashtra; M. P.; U. P.; Manipur.

*Remarks* : Ananthkrishnan (1973) recorded this species from West Bengal.

### Genus 50. *Dolichothrips* Karny

1912. *Dolichothrips* Karny, *Zool. Znz.*, 40 : 299.

#### Key to the species of *Dolichothrips*

1. Body with red hypodermal pigmentation. All tibiae yellow. Foretarsal tooth small. Forewings with 8 double fringes ..... *malhavii* Ananthkrishnan  
 Body without red pigmentation ..... 2
2. All tibiae yellow. Basal wing setae longer than the distal width of forewings.....  
 ..... *citripes* (Bagnall)  
 Mid-and hindtibiae uniformly brown. Postangulars three times as long as anteromarginals. Forewings with 9 double fringes ..... *fumipennis* (Bagnall).

72. *Dolichothrips citripes* (Bagnall)

1921. *Neoheegeria citripes* Bagnall, *Ann. Mag. nat. Hist.* (9) 7 : 360-361.  
 1939. *Dolichothrips gracilipes* Ramakrishna & Margabandhu, *Indian J. Ent.*, 1 (3) : 46-47.  
 1954. *Dolichothrips (Dolicholepta) gracilipes* : Ananthakrishnan, *J. zool., Soc. India*, 6 (2) : 162.  
 1968. *Dolichothrips citripes* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.) suppl.*, 11 : 88.  
 1978. *Dolichothrips citripes* : Bhatti, *Entomon*, 3 (2) : 224.

*Specimen studied* : Calcutta : 5 Female (Z. S. I. Reg. Nos. 8592/H8, 1231-34/H17) 4.5.1963; 4.5.1964, coll. Dr. T. N. Ananthakrishnan.

*Distribution* : India : West Bengal; Orissa; Tamil Nadu; Bihar.

*Remarks* : This species is recorded for the first time from West Bengal.

73. *Dolichothrips fumipennis* (Bagnall)

1921. *Neoheegeria fumipennis* Bagnall, *Ann. Mag. nat. Hist.* (9) 7 : 360.  
 1928. *Neoheegeria fumipennis* : Ramakrishna, *Mem. Deppt. Agri. India Ent. Ser.* 10 (7) : 288.  
 1968. *Dolichothrips fumipennis* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.)*, *Suppl.* 11 : 89.

*Distribution* : West Bengal (Kurseong, Darjiling Dt.)

74. *Dolichothrips malhavii* Ananthakrishnan

1961. *Dolichothrips malhavii* Ananthakrishnan, *Zool. Anz.* 167 (7-8) : 266-268.  
 1978. *Dolichothrips malhavii* : Bhatti, *Entomon*, 3 (2) : 224.  
 1988. *Dolichothrips malhavii* : Sen *et al.*, *Rec. zool. Surv. India, Occl., Pap.*, 100 : 51.

*Specimen studied* : Coochbehar Dt. : 2 Female (Z. S. I. Reg. Nos. 1724-1725/H17) Mekligunj, 16. 10. 1982. coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Coochbehar Dt.); Uttar Pradesh.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

Genus 51. *Ecacanthothrips* Bagnall

1909. *Ecacanthothrips* Bagnall, *Ann. soc. Ent. Belg.*, 52 : 348.  
 1978. *Ecacanthothrips* : Plamar & Mound, *Bull. Br. Mus. nat. Hist. (Ent.)* 37 (5) : 156-158.

75. *Ecacanthothrips tibialis* (Ashmead)

1905. *Idolothrips tibialis* Ashmead, *Ent. News*, 16 : 20.  
 1908. *Acanthothrips sanguineus* Bagnall, *Ann. Mag. nat. Hist.*, (8) 1 : 362.  
 1909. *Ecacanthothrips sanguineus* : Bagnall, *Ann. Soc. ent. Belg.*, 52 : 348.  
 1943. *Ecacanthothrips sanguineus* : Bagnall, *Rec. Indian Mus.*, 8; (3) : 201.  
 1978. *Ecacanthothrips tibialis* : Palmer & Mound, *bull. Br. Mus. nat. Hist. (Ent.)* 37 (5) : 161-162.  
 1988. *Ecacanthothrips tibialis* : Sen *et al Rec. zool. Surv. India Occl. Pap.*, 100 : 52-53.

*Specimen examined* : Bankura Dt. : 1 Female (Z. S. I. Reg. Nos. 4147/H17) Radhanagar, 31. 8. 1986. coll. P. Mukhapadhyaya. Birbhum Dt. : 6 Females, 1 Male (Z. S. I. Reg. Nos. 1568-69/H17; 1614-16/H17; 1688-69/H17) Ballavpur, 19. 12. 1981, coll. S. Sen & Party. Darjiling Dt. : 3 Females (Z. S. I. Reg. Nos. 928-930/H17) Darjiling, 24. 3. 1978, coll. A. R. Bhaumik.

**Distribution** : India : West Bengal (Bankura, Birbhum, Darjiling); Kerala; Tamil Nadu; Meghalaya; Tripura; Manipur. Elsewhere : Sri Lanka; Taiwan; China; Vietnam; Philippines; Borneo; Japan; New Guinea; Indonesia; Singapore; Mauritius; Tanzania; Australia.

**Remarks** : Sen *et al.* (1988) recorded this species from West Bengal.

#### Genus 52. *Euoplothrips* Hood

1918. *Euoplothrips* Hood, *Mwm. Queensld. Mus.*, 6 : 143.

#### 76. *Euoplothrips malabarica* Ramakrishna & Margabandhu

1931. *Euoplothrips malabarica* Ramk. & Marg., *J. Bombay nat. Hist. Soc.*, 34 (4) : 1039-1040.

**Specimen studied** : Hoara Dt. : 6 Females (Z. S. I. Reg. Nos. 4494-99/H17) Sibpore Botanical Garden, 5.9.1988, coll. K. C. Banerjee & S. Dutta.

**Distribution** : India : West Bengal (Haora); Tamil Nadu.

**Remarks** : This species is recorded for the first time from West Bengal. *Euoplothrips malabarica* is very rare species. Ramakrishna & Margabandhu described the species from Southern India in the year 1931 and since then there is no report of this species from any where else and from the first record since discovery of the species and also first record out of the type locality of the species.

#### Genus 53. *Gynaikothrips* Karny

1900. *Mesothrips* Zimmerman, *Bull. Inst. Bot. Buit.*, 7 : 12.

1915. *Gynaikothrips* Karny, *Zeit. F. Wiss. Ins.*, 10 : 324.

1974. *Gynaikothrips* : Ananthakrishnan & Muraleedharan, *Oriental Ins. Suppl.*, 4 : 5-7.

#### Key to the Species of *Gynaikothrips*

1. Head much longer than wide; tube very long, 1.5 times longer than head. Postoculars two pairs, outer as long to longer than eyes; inner pair shorter. All prothoracic setae except anteromarginals very well developed. Forewings faintly tinged yellow with 22-24 double fringes.....*bengalensis* Ananthakrishnan  
Head shorter, about as long as wide.....2
2. All tibiae yellow. Head not very short, tube shorter than head. Postoculars two pairs subequal, shorter than eyes. Maxillary stylets retraced upto the level of postoculars, close at middle. Forewings faint yellow.....*flavitibia* Moulton  
All tibiae not yellow, mid- and hind tibiae yellow. Head shorter, tube very little than head. Postoculars two pairs, subequal shorter than eyes. Maxillary stylets not close at middle. Forewings transparent with 12-14 double fringes..... *malabaricus* Ramakrishna.

#### 77. *Gynaikothrips bengalensis* Ananthakrishnan

1973. *Gynaikothrips bengalensis* Ananthakrishnan, *Oriental Ins.*, 7 (4) : 543-544.

1981. *Gynaikothrips bengalensis* : Muraleedharan & Sen, *Rec. zool. Surv. India*, 79 : 211.

1984. *Gynaikothrips bengalensis* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 89.

1988. *Gynaikothrips bengalensis* : Sen *et al.*, *Rec. zool. Surv. India Occl. Pap.*, 100 : 56-57.

General body colour black; antennal segments 1-2 brown, 3 pale brown; 4-8 yellow; wings faint yellow. All setae blunt.

*Head* elongate about 1.6 times as long as wide. Postoculars 2 pairs, the outer pairs long about as long as eyes and the inner pair about half as long as eyes. Mouthcone broadly rounded; maxillary styles mesad, 'V' shaped.

*Prothorax* shorter than head, about 2/3rd of head length. All prothoracic setae except anteromarginals very well developed; anteroangulars & midlaterals and also equimerals & posteroangulars subequal. forewings with 17-24 double fringes and basal wing setae B1-B3 well developed. Tube very long about 1.5 times longer than head.

Specimen studied : Calcutta : 3 Females Paratypes (Z. S. I. Reg.Nos. 1465-1467/H17) Alipore, 1. 9. 1972, coll. Dr. T. N. Ananthkrishnan. 7 Females, 4 Males (Z. S. I. Reg. Nos. 4432-38/H17; 4451-52/H17; 4485-86/H17) Alipore Zoo Garden; 9. 6. 1977, 20. 9. 1977, 29. 9. 1977, coll. N. K. Pramanik & C. K. Sen Gupta.

*Distribution* : India : West Bengal (Calcutta). Elsewhere : Bangladesh.

#### 78. *Gynaikothrips flavitibia* Moulton (Text fig. 12)

1929. *Gynaikothrips flavitibia* Moulton, *Rec. Indian Mus.*, 31 : 99.

1974. *Gynaikothrips uzeli* : Ananth. & Muralcedharan, *Oriental Ins. Suppl.*, 4 : 7

Specimen studied : Calcutta : Holotype Female (Z. S. I. Reg. Nos. 582/H12) Allotype 2 (Z. S. I. Reg. Nos. 149/H12; 583/H12) Paratypes 7 Females, 1 Male (Z. S. I. Reg. Nos. 94-101/H12) 8.8.1914, coll. E. Rose.

*Distribution* : India : West Bengal (Calcutta).

*Remarks* : Ananthkrishnan & Muralcedharan (1974) placed *G. flavitibia* under *G. uzeli* Zimmerman. Since *Gynaikothrips flavitibia* differs from *G. uzeli* by all prothoracic setae well developed, only the tibiae yellow and maxillary stylets close at middle, the species status of *G. flavitibia* is revalidated.

#### 79. *Gynaikothrips malabaricus* Ramakrishna

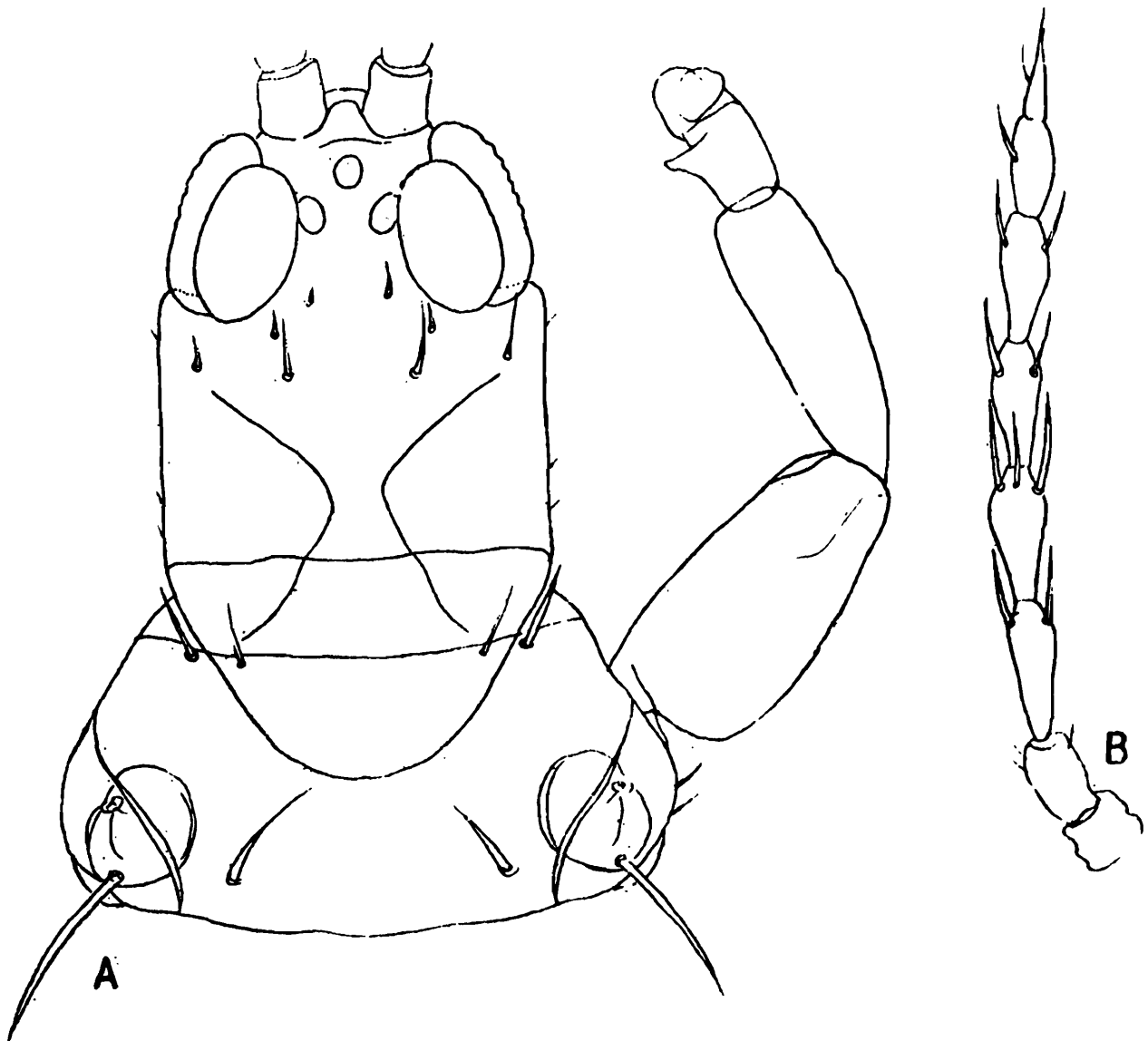
1928. *Gynaikothrips malabaricus* Ramakrishna, *Mem. Dept. Agri. India Ent. Ser.*, 10 (7) : 302-303.

1974. *Gynaikothrips malabaricus* : Ananth. & Muralcedharan, *Oriental Ins. Suppl.*, 4 : 7, fig. 4.

*Specimen studied* : Birbhum Dt. 3 Females (Z. S. I. Reg. Nos. 1677-1679/H17) Adityapur, 17.12.1981, coll. S. Sen & Party. Calcutta 9 Females (Z. S. I. Reg. Nos. 683-691/H17) ex. Ficus sp. leaves, 6. 10. 1978, coll. Dr. M. S. Shishodia. Nandia Dt. : 1 Female (Z. S. I. Reg. Nos. 1794/H17) Sugarcane Research Station, Bethuadahari, 6. 9. 1979, coll. Y N. Gupta.

*Distribution* : India West Bengal (Birbhum, Calcutta, Nadia); North Malabar.

*Remarks* : This species is recorded for the first time from West Bengal.



Text-fig. 12. *Gynaikothrips flavitibia* Moulton. A. Head and Pronotum. B. Antenna.

Genus 54. *Haplothrips* Amyot & Serville  
(Map 3)

1843. *Haplothrips* Amyot & Serville, *Hist. nat. Ins. Hemipteres* : 640.

1976. *Haplothrips* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, 34 (4) : 244-245.

Key to the Species of *Haplothrips*

- 1. Forewings without double fringes. (Subgenus *Trybomiella*) .....2
- Forewings with double fringes (Subgenus *Haplothrips*) .....4

2. Abdominal tergites III-VII with one pair of well developed wing retaining setae. Body bicolourous. Antennal segments 3 & 4 with 0 + 1 & 2 + 2 + 1 sensecones respectively.....  
..... *apicalis* (Bagnall)  
Abdominal tergites III-VII with two pairs of well developed wing retaining setae.....3
3. Midlaterals well developed. B1 of abdominal tergite IX slightly expanded at tip.....  
..... *articulosus* Bagnall  
Midlaterals vestigial. B1 of abdominal tergite IX pointed at tip ..... *claresetis* Prisener.
4. Antennal segment 3 with 0 + 1 sensecone.....5  
Antennal segment 3 with 1 + 1 or 1 + 2 sensecones .....6
5. Mid- and hindtibiae brown. Antennal segments 1, 2, 7 & 8 brown, 3 brownish yellow; 4, 5, 6 successively darker. Pronotal setae mostly pale. Aedeagus of male simple.....  
..... *ganglbaueri* Schmutz
6. Antennal segment 3 very short, 1.1 times as long as wide; segments 3-5 yellow, 6 brownish yellow, 7-8 brown. All tarsi pale brown. B1 of abdominal tergite IX pointed *gowdeyi* (Franklin)  
Antennal segment 3 not short, normal; segment 3 yellow, 4-6 yellow with slightly brownish shade. All tarsi yellow. B1 of abdominal tergite IX blunt to slightly expanded at tip .....  
..... *tenuipennis* Bagnall.

#### 80. *Haplothrips apicalis* (Bagnall)

1915. *Hindsiana apicalis* Bagnall, *Ann. Mag. nat. Hist.*, (8) 15 : 323.

1933. *Haplothrips (Hindsiana) apicalis* : Priesner, *Rec. Indian Mus.*, 35 (3) : 361-363.

1962. *Haplothrips (Trybomiella) apicalis* : Ananthakrishnan, *Proc. 1st All. India Congress, Zool.*; 473-475.

1976. *Haplothrips (Trybomiella) apicalis* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 255-257.

*Specimen studied* : Calcutta : 4 Females, 2 Males (Z. S. I. Reg. Nos. 953-954/H17; 4156-4159/H17) 17.8.1977; 23.3.1984, coll. N. K. Pramanik & C. K. Sen Gupta.

*Distribution* : India : West Bengal (Calcutta); Uttar Pradesh; Tamil Nadu; Maharashtra; Gujarat. Elsewhere : Pakistan.

*Remarks* : This species is recorded for the first time from West Bengal.

#### 81. *Haplothrips articulosus* Bagnall

1926. *Haplothrips articulosus* Bagnall, *Ann. Mag. nat. Hist.*, (9) 18 : 548-549.

1968. *Haplothrips (Trybomiella) articulosus* : Mound, *Bull. Br. Mus. nat. Hist. (Ent. Suppl.)*, 11 : 109.

1976. *Haplothrips (Trybomiella) articulosus* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 257.

*Specimen studied* : Birbhum Dt. : 2 Females, (Z. S. I. Reg. Nos. 1780-1781/H17), Bakreswar, 16.12.1981, coll. S. Sen & Party. Calcutta : 1 Females, (Z. S. I. Reg. No. 4188/H17 ( 23.3.1984, coll. N. K. Pramanik.

*Distribution* : India : West Bengal (Birbhum, Calcutta); Andhra Pradesh. Elsewhere : Tanzania, Kenya; Sierraleone.

*Remarks* : This species is recorded for the first time from West Bengal.

### 82. *Haplothrips ceylonicus* Schmutz

1913. *Haplothrips ceylonicus* Schmutz, *Sitz. Akad. Wien.* 122 : 1038-1039.

1964. *Haplothrips ceylonicus* : Ananthakrishnan, *Oppuse. ent. Suppl.*, 25 : 48.

1976. *Haplothrips (haplothrips) ceylonicus* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 248-249.

*Specimen studied* : Bankura Dt. : 5 Females, 1 Male, (Z. S. I. Reg. Nos. 3064-69/H17) Jamuna Vill., 8. 11. 1985, coll. S. Sen & party. 1 Female, (Z. S. I. Reg. No. 4017/H17) Sonamukh Forest, 7. 11. 1985, coll. S. Sen & party. 1 Female, (Z. S. I. Reg. No. 4149/H17), Lokepur, 6. 9. 1988, coll. P. Mukhopadhyay. Murshidabad Dt. : 2 Females, 2 Males (Z. S. I. Reg. Nos. 1857-58/H17); 1909-1-/H17), Krishnapur Hat Para, Murshidabad, 23. ?. 1983, coll. S. Sen & party. Puruliya Dt. : 1 Female, 1 Male, (Z. S. I. Reg. Nos. 4069-4070/H17) Baragdi Vill., 3. 11. 1985, coll. S. Sen & party. 1 Female, (Z. S. I. Reg. No. 4198/H17), Sapua Vill., 2. 11. 1985, coll. S. Sen & party. 24 Parganas Dt. (South) : 2 Females, (Z. S. I. Reg. Nos. 1550-1551/H17) Baruipur, 13. 11. 1981, coll. S. Sen. 1 Female (Z. S. I. Reg. No. 3090/H17) Hatberia Vill., 2. 7. 1978, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Bankura, Murshidabad, Puruliya, 24 Parganas (South)]; Tamil Nadu. Elsewhere : SriLanka; Java; Sumatra.

*Remarks* : This Species is recorded for the first time from West Bengal.

### 83. *Haplothrips clarisetis* Priesner

1930. *Haplothrips clarisetis* Preisner, *Bull. Soc. ent. Egypte* : 273-238.

1955. *Haplothrips clarisetis* : Faure, *J. ent. Soc. 5th Aft.* 18 : 223-230.

1969. *Haplothrips (Trybomiella) clarisetis* : Ananthakrishnan, *C. S. I. R. zool. Monogr.*, 1 : 138.

1976. *Haplothrips (Trybomiella) Clarisetis* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 258-259.

*Specimen studied* : Birbhum Dt. : 5 Females (Z. S. I. Reg. Nos. 1644-1648/H17) Bakreswar, 16. 12. 1981, coll. S. Sen & party. 24. Parganas Dt. : (South) ; 2 Females (Z. S. I. Reg. Nos. 4105-4106/H17) Chuksar Is., Sunderbans, VIII. 1984, coll. Prof. Amallesh Chowdhury.

*Distribution* : India : West Bengal [Birbhum, 24 Parganas (South)]; U.P. Gujarat; Tamil Nadu. Elsewhere : South Africa, Egypt.

*Remarks* : This species is recorded for the first time from West Bengal.

### 84. *Haplothrips ganglbaueri* Schmutz

1913. *Haplothrips ganglbaueri* Schmutz, *Sitz. Akad. Wiss. Wien*, 122 : 1034.

1928. *Zygothrips andhra* Ramakrishnan, *Mem. Dept. Agri. India Ent. Ser.*, 10 : 290-291.

1933. *Haplothrips priesnerianus* Bagnall, *ann. Mag. nat. Hist.*, 10 (6) : 327-328.

1976. *Haplothrips ganglbaueri* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 249-250.

1980. *Haplothrips ganglbaueri* Sen, *Rec. zool., Surv. India*, 77 : 350.

1982. *Haplothrips ganglbaueri* : Sen, *Rec. zool. Surv. India*, 77 : 507.

1984. *Haplothrips ganglbaueri* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 89-90.

1988. *Haplothrips ganglbaueri* : Sen *et al*, *Rec. zool. Surv. India Occl. pap.*, 100 : 58-59.

*Specimen studied* : Bankura Dt. : 8 Females (Z. S. I. Reg. Nos. 3047-54/H17) Baghajole Vill., 8. 11. 1985, coll. S. Sen & party. 2 Females (Z. S. I. Reg. Nos. 4004-4005/H17) Onda, 6. 11. 1985,

coll. S. Sen & party. Birbhum Dt. : 2 Females, 1 Male (Z. S. I. Reg. Nos. 1589-1590/H17; 1660/H17) Rampurhat, 18. 12. 1981, coll. S. Sen. 9 Females, 1 Male, (Z. S. I. Reg. Nos. 1591-1592/H17); 1617-1619/H17; 1680/H17; 1782-84/H17); 1786-87/H17), Ballavpur, 19. 12. 1981, coll. S. Sen. 1 Male (Z. S. I. Reg. No. 1681/H17) Bakreswar, 16. 12. 1981, coll. S. Sen. Calcutta : 1 Female (Z. S. I. Reg. No. 3087/H17), 23. 11. 1977, coll. N. K. Pramanik & C. K. Sen Gupta. Coochbehar Dt. : 7 Females, 2 Males (Z. S. I. Reg. Nos. 1815-18/H17; 1533-54/H17; 1666-67/H17), Coochbehar, 7. 10. 1981, coll. C. K. Sen Gupta. Darjiling Dt. : 1 Female (Z. S. I. Reg. Nos. 1390-91/H17) Darjiling, 14. 8. 1979, coll. S. S. Saha. 3 Females (Z. S. I. Reg. Nos. 4054-56/H17) Mirik, 19. 4. 1986, coll. Dr. B. C. Das Jalpaiguri Dt. : 3 Females (Z. S. I. Reg. Nos. 335-337/H12) Hashimara, 2. 12. 1974, coll. Dr. T. Sen Gupta. Murshidabad Dt. : 11 Females (Z. S. I. Reg. Nos. 1842-1845/H17; 1893/H17; 1903-04/H17; 1959-63/H17) Murshidabad, 23. 3. 1983, coll. S. Sen 4 (Z. S. I. Reg. Nos. 1899-1902/H17) Satinakandi Vill., 25. 3. 1983, coll. S. Sen. 1 Female, 1 Male (Z. S. I. Reg. No. 1968-69/H17) Mohamed Para Vill., 24. 3. 1983, coll. S. Sen. Puruliya Dt. : 3 Females, 3 Males (Z. S. I. Reg. Nos. 4063-4068/H17) Purulia, 3. 11. 1985, coll. S. Sen & party. 24 Parganas Dt. : (South) : 2 Females, 1 Male (Z. S. I. Reg. Nos. 916-918/H17) Hatberia Village, 18. 9. 1980, coll. N. K. Pramanik. 4 Females (Z. S. I. Reg. Nos. 1540042/H17; 2021/H17) Narendrapur, 13. 11. 1981; 21. 2. 1984, coll. S. Sen.

*Distribution* : India : West Bengal [Bankura, Birbhum, Calcutta, Coochbehar, Darjiling, Jalpaiguri, Murshidabad, Puruliya, 24 Parganas (South)]. Widely distributed. Elsewhere : Bangladesh; Sri Lanka; Pakistan; Java; Solomon Is; Philippines.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

#### 85. *Haplothrips gowdeyi* (Franklin)

1908. *Anthothrips gowdeyi* Franklin, *Proc. U. S. nat. Mus.*, 33 : 724.

1921. *Haplothrips gowdeyi* : Watson, *Flat. Ent.*, 4 : 38.

1939. *Haplothrips gowdeyi* : Ramakrishna & Margabandhu, *Indian J. Ent.*, 1 (3) : 47-48.

1976. *Haplothrips gowdeyi* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 250-252.

1980. *Haplothrips gowdeyi* : Sen, *Rec. zool. Surv. India*, 77 : 350.

1984. *Haplothrips gowdeyi* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 90.

*Specimen studied* : Bankura Dt. : 2 Females (Z. S. I. Reg. Nos. 4150-4151/H17), Lokepur, 6. 9. 1986, coll. Dr. P. Mukhopadhyay. Birbhum Dt. : 2 Females (Z. S. I. Reg. Nos. 1649-1650/H17) Sanghatpur, 18. 12. 1981, coll. S. Sen & party. 4 Females (Z. S. I. Reg. Nos. 1682-1684/H17; 1788-/H17) Rampurhat, 18. 12. 1981, coll. S. Sen & party. Puruliya Dt. : 4 Females (Z. S. I. Reg. Nos. 4207-10/H17) Sapura Vill., 2. 11. 1985, coll. S. Sen & party.

*Distribution* : India : West Bengal (Bankura, Birbhum, Puruliya); Tamil Nadu; Rajasthan; Andaman Is. Elsewhere : Sri Lanka; Bangladesh.

*Remarks* : This species is recorded for the first time from West Bengal.

#### 86. *Haplothrips tenuipennis* Bagnall

1981. *Haplothrips tenuipennis* Bagnall, *ann. Mag. nat. Hist.*, (9) 1 : 210.

1976. *Haplothrips tenuipennis* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 254-255.

1980. *Haplothrips tenuipennis* : Sen, *Rec. zool. Surv. India*, 77 : 350-351.

1984. *Haplothrips tenuipennis* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 90.

1988. *Haplothrips tenuipennis* : Sen *et al Rec. zool. Surv. India. Occl. Pap.*, 100 : 59.

*Specimen studied* Bakura Dt. : 1 Female (Z. S. I. Reg. No. 4107/H17) Bishnupur, 6. 11. 1985, col. S. Sen & party. Birbhum Dt. : 2 Females (Z. S. I. Reg. Nos. 1651-1652/H17) Kendubilwa, 16. 12. 1981, coll. S. Sen., 5 Females (Z. S. I. Reg. Nos. 1789-1793/H17) Ballavpur Forest Nursery, 19. 12. 1981, colls. S. Sen. Calcutta : 1 Female (Z. S. I. Reg. No. 952/H17), 13. 1. 1977, coll. N. K. Pramanik & C. K. Sen Gupta. Darjiling Dt. : 1 Female (Z. S. I. Reg. No. 831/H17) Rajbari, 15. 7. 1979, coll. S. S. Saha, Murshidabad Dt. : 1 Male (Z. S. I. Reg. No. 1846/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen & party. 1 Male (Z. S. I. Reg. No. 1912/H17) Mohammad para Vill., 24. 3. 1983, coll. S. Sen & party. Puruliya Dt. 6 Females (Z. S. I. Reg. Nos. 4108-4111/H17; 4247-48/H17) Puruliya, 1. 11. 1985, coll. S. Sen & party.

*Distribution* : India : West Bengal (Bankura, Birbhum, Calcutta, Murshidabad, Puruliya); Maharashtra; Rajasthan, Andaman Is. Elsewhere : Bangladesh; Java.

### Genus 55. *Hoplandrothrips* Hood

1912. *Hoplandrothrips* Hood, *Proc. ent. Soc. Wash.*, 14 : 145.

#### 87. *Hoplandrothrips graminis* Ananthakrishnan

1964. *Hoplandrothrips graminis* Ananthakrishnan, *Entomol. Ts. Arg.*, 85 (1-2) : 105-106.

1964. *Hoplandrothrips priesneri* Ananthakrishnan, *Proc. R. ent. Soc. Lond. (B)*, 25 : 75-76.

1959. *Hoplandrothrips indicus* Ananthakrishnan, *Zool. Anz.*, 162 (9-10) : 320-322.

1965. *Hoplandrothrips graminis* : Ananthakrishnan, *Bull. Ent.* 6 : 159.

1982. *Hoplandrothrips graminis* : Sen, *Rec. zool. Surv. India*, 79 : 507.

1988. *Hoplandrothrips graminis* : Sen *et al* *Rec. zool. Surv. India Occl. Pap.*, 100 : 61-62.

*Specimen studied* : Calcutta : 1 Female (Z. S. I. Reg. No. 1374/H17) 20. 2. 1979, coll. Dr. N. Muralcedharan, Darjiling Dt. : 3 Females, 1 Male (Z. S. I. Reg. Nos. 932-935/H17) Darjiling, 24. 3. 1978, coll. A. R. Bhaumik.

*Distribution* : India : West Bengal (Calcutta, Darjiling); Tamil Nadu; Kerala.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

### Genus 56. *Karnyothrips* Waston

1922. *Karnyia* Waston, *Flat. Ent.*, 6 (1) : 6.

1924. *Karnyothrips* Waston, *Univ. Fla. Agri. Exxp. Stn. Bull.*, 168 : 23.

#### Key to the Species of *Karnyothrips*

1. Forewings with double fringes. Prothorax brown.....2  
Forewings without double fringes. Prothorax yellow. Body bicolourous. Antennal segments 3 & 4 with 0 + 1 and 1 + 2 sensecones respectively .....*alpha* Pitkin.
2. Antennal segments 3 & r with 1 + 1 and 1 + 1 + 1 sensecones respectively. B1 of abdominal tergite IX pointed or blunt. Body bicolourous .....*melaucus* (Bagnall)  
Antennal segments 3 & 4 with 0 + 1 and 1 + 2 + 1 sensecones respectively. B 1 of abdominal tergite IX expanded at tip. Body bicolourous.....*mucidus* (Ananthakrishnan & Jagadish.)

88. *Karnyothrips alpha* Pitkin

1976. *Karnyothrips alpha* Pitkin, *bull. Br. Mus. nat. Hist. (Ent.)*, 34 (4) : 261-262.

*Specimen studied* : 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 3093/H17) Bakrahat Vill., 9. 1. 1983, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [24 Parganas (South)]; Kerala; Tamil Nadu.

*Remarks* : This species is recorded for the first time from West Bengal.

89. *Karnyothrips melaleucus* (Bagnall)

1911. *Hindsiana melaleuca* Bagnall, *Entomologists mon. Mag.*, 47 : 61-62.

1927. *Karnyothrips melaleucus* : Hood, *Pan. Pacif. Ent.*, 3 : 176.

1976. *Karnyothrips melaleucus* : Pitkin, *Pitkin, Bull. Br. Mus. nat. Hist. (Ent.)* 34 (4) : 263.

1980. *Karnyothrips melaleucus* : Sen, *Rec. zool. Surv. India*, 77 : 351.

1982. *Karnyothrips melaleucus* : Sen, *Tec. zool. Surv. India*, 79 : 507-508.

1988. *Karnyothrips melaleucus* : Sen *et al Rec. zool. Surv. India, Occl. Pap.*, 100 : 65.

*Specimen studied* : Calcutta : 1 Female (Z. S. I. Reg. No. 1563/H17) Mekligunj, 30. 12. 1981, coll. C. K. Sen Gupta. Haora Dt. : 1 Female (Z. S. I. Reg. No. 4162/H17) Sibpore Botanical Garden, 16. 2. 1984, coll. N. K. Pramanik. 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 927/H17) Hatberia Village, 18. 9. 1980, coll. N. K. Pramanik. 1 Female (Z. S. I. Reg. No. 1549/H17) Baruipur, 13. 11. 1981, coll. S. Sen 1 (Z. S. I. Reg. No. 3085/H17) Bakargat Vill., 9. 1. 1983, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Calcutta, Coochbehar, 24 Parganas (South)]; Tamil Nadu; Kerala; Andaman Is. : Elsewhere : Denmark; Vietnam; China; North America; Hawaii Is.; South Africa; Egypt.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

90. *Karnyothrips mucicus* (Ananthkrishnan & Jagadish)

1971. *Zylaplothrips mucidus* Ananthkrishnan & Jagadish, *Zool. znz.*, 186 : 260-261.

1976. *Karnyothrips mucidus* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, 34 (4) : 264.

1982. *Karnyothrips mucidus* : Sen, *Rec. zool. Surv. India*, 79 : 508.

1988. *Karnyothrips mucidus* : Sen *et al, Rec. zool. Surv. India. Occl. pap.* 100 : 65.

*Specimen studied* : Coochbehar Dt. : 2 Females (Z. S. I. Reg. Nos. 989/H17 & 1330/H17) Coochbehar, 10. 10. 1980, coll. C. K. Sen Gupta. Hughli Dt. : 2 Females (Z. S. I. Reg. Nos. 1337-1338/H17) Maheshpur & Debanandapur, 26. 7. 1978, coll. S. Sen.

*Distribution* : India : West Bengal (Coochbehar, Hughli); Kerala.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

Genus 57. *Leeuwenia* Karny

1912. *Leeuwenia* Karny, *Marcellia*, 11 : 161.

91. *Leeuwenia karnyiana* Prisener

1925. *Leeuwenia karnyi* Ramakrishna, *J. Bombay nat. Hist. Soc.*, 30 : 791-792.

1929. *Leeuwenia karnyiana* Priesner. *Treubia*, 10 (4) : 448.

1970. *Leeuwenia ramakrishnae* : zur Strassen & Harten, *Senckenbergiana biol.*, 56 (1-3) : 82.

1988. *Leeuwenia karnyiana* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 65-66.

*Specimen studied* : Coochbehar Dt. : 1 Female (Z. S. I. Reg. No. 1728/H17) Coochbehar, 20. 10. 1982, coll. C. K. Sen Gupta.

*Distribution* : West Bengal (Coochbehar); Tamil Nadu; Karnataka; Assam.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

Genus 58. *Liothrips* Uzel  
(Map 4)

1895. *Liothrips* Uzel, *Mon, Ord. Thys.* : 261.

Key to the Species of *Liothrips*

1. Head more elongate 1.5 times as long as broad.....2  
Head shorter .....3
2. Postoculars longer than eyes. Forewings clouded with 9-12 double fringes. Antennal segment 3 five times as long as wide. Mesopraesternum constricted at middle. Tube as long as head.....  
.....*himalyanus* Ananthakrishnan & Jagadish  
Postoculars shorter than eyes. Forewings transparent with a median brown streak and with 13-18 double fringes. Mesopraesternum incomplete, represented as two lateral sclerites. Tube shorter than head .....*aberrans* Muraleedharan & Sen.
3. All tibiae not yellow, only foretibiae and apices of mid & hindtibiae yellow. Antennal segments 3 yellow, 4-5 proximal half yellow. Anteromarginals & anteroangulars almost subequal and also epimirals & postangulars. Postoculars shorter than eyes.  
Mesopraesternum narrowed. Forewings with 11-20 double frings. Setae on abdominal segment IX shorter than tube.....*morulus* Ananthakrishnan & Jagadish

92. *Liothrips aberrans* Muraleedharan & Sen

1978. *Liothrips aberrans* Muraleedharan & Sen, *Bull. zool. Surv., India*, 1 (3) : 259-261.

1988. *Liothrips aberrans* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 68-69.

*Female (Male)* : General body colour brown; all femora, mid and hindtibiae brown, foretibiae and all tarsi yellow; antennal segments 1 & 2 brown, 3 yellow 4-6 yellow with distal half brownish, 7 & 8 pale brown; wings transparent with a median brown steak. All setae dark brown, mostly pointed.

*Head* long, 380-392 (384-360) long, 268-280 (252) wide across eyes, 272-292 (252) across cheeks and 240-264 (212-216) across base; cheeks finely crenulate with 1-2 setae. Eyes large 120 (104) long, 80-96 (80) wide; all ocelli 28 (24-28) wide. Postoculars 104-112 (80-88) long. Antennal segments 1-8 length (width).

	I	II	III	IV
Female :	40-48 (56-60)	72-84 (40);	160 (36-40);	156-160 (44-48)
Male :	40 (48056);	60-80 (36);	136-148 (32);	136-140 (40-44)
	V	VI	VII	VIII
Female :	128 (44);	100 (44);	80-84 (32-36);	44-52 (16-20)
Male :	100-112 (40);	80-100 (36);	72-76 (28-32);	40 (16-20)

Mouthcone pointed; maxillary styles occluded, close at middle.

Prothorax shorter than head, 200-252 (212-200) long, 256-276 (22-260) wide at anterior margin and 408-420 (340-400) at posterior margin. Prothoracic chaetotaxy : anteroangulars 92-96 (80-88), anteromarginals 84-100 (80-88), midlaterals 116-180 (120-140), posteroangulars 200-208 (168-172) and epimerals 180-212 (164-176) long respectively. Forewings 1.19-1.39 mm. (1.08 mm) long, 10 (112-120) wide at middle with 13-18 (14) double fringes; basal wing setae B1-B3; 148-160 (120); 160-188 (160) and 156-180 (132) long respectively. Mesopraesternum incomplete, restricted to two triangular sclerites.

Abdomen 595-680 (476-561) wide at base, 578-629 (425-527) at middle, 317-425 (289-340) across segment VIII and 248-260 (160-190) across segment IX. Pelta roughly triangular, B1-B3 of segment IX : 190-200 (148-200); 180-200 (80-172) and 180-200 (260) long respectively. Tube 340 (320-360) long; anal setae 220-240 (190-200) long.

Total body length : 3.52-3.57 (3.11-3.33) mm.

*Specimen studied* : Holotype Female (Z. S. I. Reg. No. 1/H17) allotype Male (Z. S. I. Reg. No. 2/H17) paratypes 2 Females (Z. S. I. Reg. Nos. 5-6/H17) Dow Hill, Darjiling Dt. : 30. 4. 1976, coll. A. R. Bhaumik.

*Distribution* : India : West Bengal (Darjiling); Sikkim.

### 93. *Liothrips himalayanus* Ananthkrishnan & Jagdish

1970. *Liothrips himalayanus* Ananthkrishnan & Jagdish, *Oriental Ins.*, 4 (3) : 259-260.

1988. *Liothrips himalayanus* : Sen *et al. Rec. zool. Surv. India, Occl. Pap.*, 100 : 74-76.

General body colour brown, antennal segments, 1, 2, 7 & 8 brown, 3 yellow, 4-6 proximal half yellow and distal half brown; all femora mid and hind tibiae brown, foretibiae and all tarsi yellow; wings with a grey longitudinal band along middle all setae hyaline and pointed.

Head 1.5 times as long as wide. Eyes large. Postoculars exceedingly long. Much longer than eyes. Maxillary stylets retracted upto the level of postoculars, close at middle.

Prothoracic anteroangulars longer than anteromarginals; posteroangulars and epimerals subequal. Mesoprosternum constricted at middle. Forewings, with 8-15 double fringes. Tube as long as head.

*Specimen studied* : Darjiling Dt. : 1 Female (Z. S. I. Reg. No. 185/H12) Lava, 4. 6. 1974, coll. Dr. J. K. Jonathan. 12 Females (Z. S. I. Reg. Nos. 130-137/H12; 182-184/H12; 1331/H17) Rangirum, 25. 5. 1974; 7. 6. 1976, coll. Dr. J. K. Jonathan. 2 Females, 1 Male (Z. S. I. Reg. Nos. 2026-2028/H17) Darjiling, 6. 4. 1978, coll. A. R. Bhaumik.

*Distribution* : India : West Bengal (Darjiling).

94. *Liothrips morulus* Ananthakrishnan & Jagadish

1970. *Liothrips morulus* Ananthakrishnan & Jagadish, *Oriental Ins.*, 4 (3) : 261-262.

1988. *Liothrips morulus* : Sen *et al.* *Rec. zool. Surv. India, Occl. Pap.* 100 : 77-78.

General body colour brown; antennal segments 1, 2, 7 & 8 brown, 3 yellow, 4 & 5 proximal half yellow distal half grey, 6 brown with yellow base; legs brown except apices of foretibiae and all tarsi yellow; wings shaded grey with median transverse longitudinal band. All setae dark and blunt.

Head 1.3 times as long as wide. Postoculars shorter than eyes. maxillary styles ocular, close at middle. Prothoracic anteroangulars & anteromarginals and as also posteroangulars and epimerals almost subequal. Forewings with 11-20 double fringes. Mesopraesternum complete, narrowed at middle. Pelta pyramid shaped. Tube shorter than head, setae on abdominal segment IX shorter than tube.

*Specimen studied* : Darjiling Dt. : Paratype Female (Z. S. I. Reg. No. 46/H17) Kurseong, 23. 4. 1969, coll. Dr. T. N. Ananthakrishnan. Paratype Male (Z. S. I. Reg. No. 47/H17) Darjiling, 21. 4. 1969, coll. Dr. T. N. Ananthakrishnan.

*Distribution* : India : West Bengal (Darjiling).

59. *Membrothrips* Bhatti

1978. *Membrothrips* Bhatti, *Entomon*, 3 (2) : 226-227.

95. *Membrothrips indicus* (Hood)

1919. *Neoheegeria indica* Hood, *Insec. Inscit. menstr.*, 7 (3) : 96-98.

1935. *Dolichothrips indicus* : Priesner, *Philippine J. Sci.*, 57 : 363.

1978. *Membrothrips indicus* : Bhatti, *Entomon*, 3 (2) : 227.

1988. *Membrothrips indicus* : Sen *et al.* *Rec. zool. Surv. India, Occl. Pap.*, 100 : 79.

*Specimen studied* : Bankura Dt. : 1 Female (Z. S. I. Reg. No. 4367/H17) Belboni, 3. 9. 1986, coll. P. Mukhopadhyay & party. Coochbehar Dt. : 19 Females (Z. S. I. Reg. Nos. 990/H17; 1668/H17; 1775-1777/H17; 1948-1953/H17; 2006-2012/H17; 2092/H17) Coochbehar, 12. 10. 1980; 2. 10. 1981, 25. 10. 1982; 16. 10. 1982; 1. 1. 1984; 15. 5. 1984, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Bankura, Coochbehar); Tamil Nadu.

*Remarks* : Sen *et al.* (1988) recorded this species from West Bengal.

Genus 60. *Mesothrips* Zimmerman

1920. *Mesothrips* Zimmerman, *Bull. Inst. Bot. Buit.*, 7 : 16.

1976. *Mesothrips* : Ananthakrishnan, *Oriental Ins.*, 10 (1) : 185-191.

96. *Mesothrips jordani* Zimmerman

1900. *Mesothrips jordani* Zimmerman, *Bull. Inst. Bot. Buitenz.*, 7 : 16.

1965. *Mesothrips jordani* : Ananthakrishnan & Ramamurthi, *J. Bombay nat. Hist. Soc.*, 62.

1973. *Mesothrips jordani* : Ananthakrishnan, *Oriental Ins.*, 7 (4) : 544-545.

1981. *Mesothrips jordani* : Muraleedharan & Sen, *Rec. zool. Surv. India*, 79 : 222.

*Specimen studied* : Calcutta : 5 Males (Z. S. I. Reg. Nos. 4439-41/H17; 4453-54/H17) Alipore Zoo Garden 20. 9. 1977, coll. N. K. Pramanik & C. K. Sen Gupta.

*Distribution* : India : West Bengal (Calcutta); Karnataka; Tamil Nadu; Tripura.

*Remarks* : Ananthkrishnan (1973) recorded this species from West Bengal.

### Genus 61. *Neoheegeria* Schmutz

1909. *Neoheegeria* Schmutz, *Ann. Mus. Wien.* 23 : 344.

#### 97. *Neoheegeria montana* Ananthkrishnan & Jagadish

1970. *Neoheegeria montana* Ananthkrishnan & Jagadish, *Oriental Ins.*, 4 (3) : 262-264.

1988. *Neoheegeria montana* : Sen et al *Rec. zool. Surv. India, Occl. Pap.*, 100 : 92-93.

General body colour brown; antennal segments 1, 2, 7 & 8 brown, 3 yellow, 4-6 proximal half yellow distally brown; wings transparent except extreme base yellow. All setae dark and blunt.

Head longer than wide. Eyes large, Postoculars very well developed, as long to longer than eyes. Sensecones on antennal segments well developed, sensecones formula : 3 : 1 + 2, 4 : 2 + 2, 4 & 6 : 1 + 2. Mouthcone narrowly rounded. Prothorax shorter than head. All the prothoracic setae well developed; anteroangulars longer than anteromarginals, posteroangulars and epimerals subequal. Fore tarsi with a very minute tooth. Forewings with 8-12 double fringes. Pelta triangular with apex flat.

*Specimen studied* : Darjiling Dt. : 1 Female, 1 Male, (Z. S. I. Reg. Nos. 3071-72/H17) Kurseong, 24. 4. 1969, coll. Dr. T. N. Ananthkrishnan.

*Distribution* : India : West Bengal (Darjiling).

### Genus 62. *Ocythrips* Ananthkrishnan

1972. *Ocythrips* Ananthkrishnan *Oriental Ins.*, 6 (4) : 440-441.

#### 98. *Ocythrips rarus* Ananthkrishnan

1972. *Ocythrips rarus* Ananthkrishnan, *Oriental Ins.*, 6 (4) : 441-442.

1988. *Ocythrips rarus* : Sen et al *Rec. zool. Surv. India, Occl. Pap.*, 100 : 93-94.

*Female (Macropterous)* : Body light brown; antennal segments except 3 brown, yellowish brown; all femora brownish at middle, yellowish brown at proximal and distal end, all tibiae and tarsi yellow tinged with brown; wings clouded. All body setae very long, thin, brown and pointed.

Head Much wider than long. Postoculars two pairs, outer very long and thin. Mouthcone elongate, rounded; maxillary styles retracted upto the level of postoculars, wide apart.

Prothorax much shorter than head, about 0.6 times as long as head; anteromarginals shorter than anteroangulars; midlaterals, posteroangulars and epimerals very long and thin. Foretarsi unarmed. Forewings without double fringes. Lateral abdominal setae characteristic very long and thin.

*Distribution* : India : West Bengal, (Kalimpong, Darjiling Dt.).

Genus 63. *Pegothrips* Sen & Muraleedharan

1977. *Pegothrips* Sen & Muraleedharan, *Entomon*, 1 (2) : 175.

99. *Pegothrips meghalaya* Sen & Muraleedharan  
(Text - figure 13)

1977. *Pegothrips meghalaya* Sen & Muraleedharan, *Entomon*, 1 (2) : 175-178.

1988. *Pegothrips meghalaya* : Sen *et al.* *Rec. zool. Surv. India Occl. Pap.*, 100 : 94-96.

*Female (Male)* : General body colour dark brown; antennal segment 1 dark brown, 2 dark brown at proximal half and margin, 3-8 yellow; all tibiae, mid and hind tibiae dark brown, foretibiae yellow with a brownish shade at proximal half and margin, all tarsi yellow; wings clear. All setae hyaline to light brown and pointed.

Head longer than broad; checks finely crenulate with 2-5 minute setae. Eyes small with slight angular projection behind. Median ocellus overhanging between bases of antennae. Postoculars thin, pointed and longer than eyes. Antennal segments 3-6 sub-pedicellate, 4-6 symmetrical. Mouthcone short and broad; maxillary styles retracted mesad 'V' shaped.

Prothoracic anteroangular setae placed away from the lateral margin; anteromarginals vestigial; other prothoracic setae well developed. Foretibiae with a tubercle at apex; foretarsi with a downward curved dagger like tooth. Forewings broad, uniformly wide with 2-4 fringes. Mesopraesternum incomplete, restricted to two very small sclerites. Pelta roughly triangular with apex flat. B2 of abdominal segment IX of male exceptionally about.

*Specimen studied* : Darjiling Dt. : 3 Females, 1 Male (Z. S. I. Reg. Nos. 1392-1393/H17; 1676/H17) Sukhna, 30. 10. 1979, coll. Dr. P. Kulkarni.

*Distribution* : India : West Bengal (Darjiling); Meghalaya; Uttar Pradesh.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

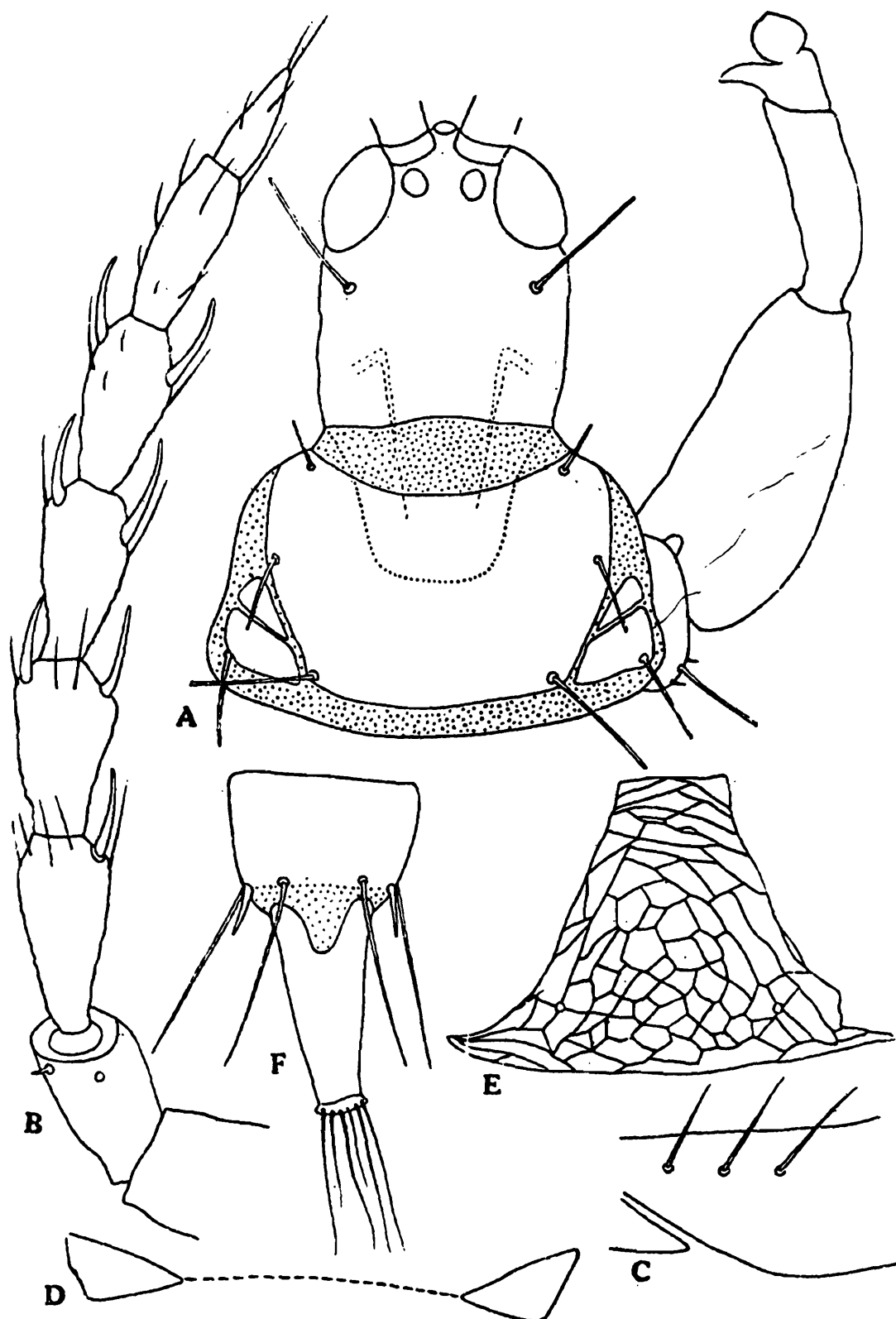
Genus 64. *Podothrips* Hood

1913. *Podothrips* Hood, *Insec. Inscit. memstr.*, 1 (6) : 67-68.

1974. *Podothrips* : Ritchi, *J. Ent. (B)*. 43 (2) : 261-282.

Key to the Species of *Podothrips*

1. Body bicoloured .....2  
Body unicolours, brown. Antennal segment 3 with one sensecone. Forefemora occasionally with a basal hump on inner margin. Forewings with double fringes..... *lucasseni* Kruger
2. Forewings with double fringes. Forefemora brown at proximal half; meso and metanotum in sides & upper region brown.....*odonasicola* Kurosawa  
Forewings without double fringe. Head, prothorax, sides of pterothorax and last three segments of abdomen brown, all legs yellow. Antennal segment 4 with 3 sensecones.....  
..... *bicolor* Seshadri & Anarithkrishnan



Text-fig. 13. *Pegothrips meghalaya* Sen & Muraleedharan. A. Head and pronotum. B. Antenna C. Basal wing setae. D. Mesopraesternum E. Pelta. F. Segment IX. of abdomen and tube of male.

100. *Podothrips bicolor* Seshadri & Ananthkrishnan

1954. *Podothrips bicolor* Seshadri & Ananthkrishnan, *Indian J. Ent.*, 16 (3) : 221-224.

1964. *Podothrips bicolor* : Ananthkrishnan, *Oppuse. ent. Suppl.*, 25 : 75.

1974. *Podothrips bicolor* : Ritchie, *J. Ent.*, (B) : 43 (92) : 271.

*Specimen studied* : Birbhum Dt. : 3 Females (Z. S. I. Reg. Nos. 1690-1692/H17) Adityapur, 17. 12. 1981, coll. S. Sen. 1 Female, 2 Males (Z. S. I. Reg. Nos. 949-1692/H17; 1565/H17) 8. 12. 1977; 4. 2. 1978, coll. N. K. Pramanik & C. K. Sen Gupta. Murshidabad Dt. : 1 Female, (Z. S. I. Reg. No. 1864/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen & party. 24 Parganas Dt., (South) : 2 Males (Z. S. I. Reg. Nos. 919/H17; 1699/H17) Hatberia Village, 18. 9. 1980; 16. 11. 1981, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Birbhum, Calcutta, Hughli, Haora]; Tamil Nadu, Karnataka. Elsewhere : Singapore.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

101. *Podothrips lucasseni* (Kruger)

1890. *Phoethrips lucasseni* Kruger, *Ber. vers. Stn. Zuck. Rohr. W. Java* 1 : 105.

1938. *Podothrips (Kentroneothrips) lucasseni* : Priesner, *Bull. Soc. ent. Egypte*, 21 : 68.

1974. *Podothrips lucasseni* : Ritchie, *J. Ent.* (B), 43 (2) : 273-274.

1984. *Podothrips lucasseni* : zur Strassen & Harten, *Senckenbergiana biol.*, 65 (1-2) : 90.

1988. *Podothrips lucasseni* : Sen *et al.*, *Rec. zool. Surv. India occl. pap.*, 100 : 97.

*Specimen studied* : Birbhum Dt. : 2 Females (Z. S. I. Reg. Nos. 1583-1584/H17) Sanghatpur, 18. 12. 1981, coll. S. Sen. Calcutta : 2 Females (Z. S. I. Reg. Nos. 949-1692/H17; 1565/H17) 8. 12. 1977; 4. 2. 1978, coll. N. K. Pramanik & C. K. Sen Gupta. Coochbehar Dt. : 1 Female (Z. S. I. Reg. No. 1864/H17) Topkhana, Murshidabad, 23. 3. 1983, coll. S. Sen & Party. 24 Parganas Dt., (South) : 2 Males (Z. S. I. Reg. Nos. 919/H17; 1699/H17) Hatberia Village, 18. 9. 1980; 16. 11. 1981, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Birbhum, Calcutta, Coochbehar, Murshidabad, 24 Parganas (South)]; Tamil Nadu; Andhra Pradesh; Tripura. Elsewhere : Bangladesh; Java; Malaya; Thailand; Australia.

*Remarks* : Sen *et al* (1988) recorded this species from West Bengal.

102. *Podothrips odonaspicola* (Kurosawa)

1937. *Haplothrips (Hindsiana) odonaspicola* Kurosawa, *Kontyu*, 11 : (3) : 266.

1968. *Podothrips odonaspicola* : O'Neill, *Proc. ent. Soc. Wash.*, 70 (2) : 125.

1974. *Podothrips odonaspicola* : Ritchie, *J. Ent.*, (B), 43 (2) : 277.

1980. *Podothrips odonaspicola* : Sen, *Rec. zool. Surv. India*, 77 : 352.

1988. *Podothrips odonaspicola* : Sen *et al* *Rec. zool. Surv. India, Occl. Pap.*, 100 : 97.

*Specimen studied* : Birbhum Dt. : 3 Females (Z. S. I. Reg. Nos. 1696/H17; 1769-1770/H17) Kankalitala, 17. 12. 1981, coll. S. Sen & party. Coochbehar Dt. : 1 Female (Z. S. I. Reg. No. 1730/H17) Tapurhat, 25. 10. 1982, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Birbhum, Coochbehar); Andaman Is. Elsewhere : Japan.

*Remarks* : Sen *et al.* (1988) recorded this species from West Bengal.

Genus 65. *Rhyncothrips* Hood

1912. *Rhyncothrips* Hood, *Proc. ent. Soc. Wash.*, 14 : 141.

103. *Rhyncothrips champakae* Ramkrishna & Margabandhu

1939. *Rhyncothrips champakae* Ramakrishna & Marg., *Indian J. Ent.*, 1 (3) : 44-46.

*Distribution* : India : West Bengal (Kalimpong, Darjiling Dt.).

Genus 66. *Sophiothrips* Hood

1933. *Sophiothrips* Hood, *J. New York Ent. Soc.* 51 (2) : 197.

1938. *Nanothrips* Faure, *Publ. Univ. Pretoria nt. Sci.*, 4 : 3.

1982. *Sophiothrips* : Maound & Walker, *Syst. Ent.*, 7 : 349.

104. *Sophiothrips nigrus* Ananthkrishnan

1971. *Sophiothrips nigrus* Ananthkrishnan, *Oriental Ins.*, 5 (2) : 197.

1977. *Nanothrips nigrus* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.)*, 36 (4) : 180.

1988. *Sophiothrips nigrus* : Sen *et al Rec. zool. Surv. India, Occl. Pap.*, 100 : 98.

*Apterous Female (Male)* : General body colour almost uniformly brown except apices of all femora, antennal segments 1-3 and proximal halves of segenets 4-6 brownish yellow.

*Head* 117-140 (94-140) long 140-148 (120-140) wide across eyes, 143-156 (125-140) across checks and base. Eyes 47-50 (47-52) long, 40-45 (50) wide. Postoculars 30-35 (45-50) long Antennal segments 3-8 length (width).

	III	IV	V
<i>Female</i> :	45-55 (28-30);	42-50 (28-30);	45-50 (28-30)
<i>Male</i> :	50-55 (25-26);	43-55 (25-27);	45-53 (25-26)
	VI	VII	VIII
<i>Female</i> :	58-63 (28-30);	28-33 (18-20);	25 (8-10)
<i>Male</i> :	52-63 (25-26);	25-38 (15-17);	25 (8-10)

Mouthcone 140 (109-156) long; 140-150 (170) wide across base and 62-70 (60-70) across base; maxillary styles short, not retracted into the head capsule.

Prothorax 156-187 (140-202) long, 172-195 (156-187) wide at anterior margin 281-291 (234-296) at posterior margin. Prothoracic chaetotaxy : anteroangulars and anteromarginals equal 18-20 (13-15); midlaterals and posteroangulars equal 15-16 (15-18) and epimerals 50-54 (45-50) long respectively. Forefemora 62-70 (62-94) wide, foretarsal tooth 3-6 (13-30) long. Pterothorax 172-204 (172-187) long, 296-312 (250-258) wide across meso and metathrax.

B1-B3 of abdominal segment IX : 88-90 (86-100); 80-85 (20-25) and 100-104 (113-125) long respectively. Tube 117-140 (109-125) long; anal setae 70-75 (62) long.

Total body length : 1.4-1.7 (1.1-1.4) mm.

*Distribution* : India : West Bengal; (Kurseong, Darjiling Dt.).

Genus 67. *Stigmothrips* Ananthkrishnan

1964. *Stigmothrips* Ananthkrishnan, *Ent. Ts. Agr.*, 85 (3-4) : 231.

1971. *Stigmothrips* : Ananthkrishnan, *J. zool. Soc. India*, 23 (2) : 175-185.

105. *Stigmothrips infirmus* Ananthkrishnan

1971. *Stigmothrips* Ananthkrishnan, *J. zool. Soc. India*, **23** (2) : 181-183.

1973. *Stigmothrips infirmus* : Ananthkrishnan, *Occl. Publ. 2, Ent. Res. Unit. Loyola Collage, Madras* : 62-63.

1988. *Stigmothrips infirmus* : Sen *et al. Rec. zool. Surv. India, Occl. Pap.*, **100** : 99.

General body colour brown; except all tibiae, tarsi also all femora of pale yellow; antennal segments 1, 2, 7 & 8 brown, 3 yellow, 4, 5, 6 yellow at base & brown distally; wings transparent. Body with red pigmentation. All setae hyaline, knobbed.

Head a little longer than broad. Eyes moderately developed. Postoculars very short. Mouthcone broadly rounded; maxillary styles retracted upto the level of postoculars. Prothorax much shorter than head. All the prothoracic setae well developed. Foretarsi unarmed in both sexes. Forewings with 2-4 double fringes; basal wing setae B1 & b2 subequal and B3 almost twice as long as B1 & B2. Abdominal sternite VIII of male with a large glandular area.

*Distribution* : India : West Bengal (Kurseong, Darjiling Dt.).

Genus 68. *Xylaplothrips* Priesner

1928. *Haplothrips (Xylaplothrips) Priesner, Thys. Europas* : 572.

1964. *Xylaplothrips* Priesner, *Bestimmungs pucher zur Bodensauna Europas*, **2** : 171.

1976. *Xylapthrips* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, **34** (4) : 268.

Key to the Species of *Xylaplothrips*

1. Anteromarginals well developed .....2  
Anteromarginals vestigial. Body brown; antennal segments 3-6 yellow in basal half, pale brown distally; midtibiae yellow at base and distal half, hindtibiae yellow at extreme base and apex. Antennal segments 3 & 4 with 1 + 2 and 2 + 1 + 1 sensecones respectively.....  
..... *inquilinus* (Priesner)
2. Antennal segments 4 & 5 brown .....3  
Antennal segments 4 & 5 pale yellow. Body brown. Antennal segments 3 & 4 with 1 + 2 and 2 + 1 + 1 sense cones respectively.....*pictipes* (Bagnall)
3. Foretarsi armed. Head and thorax brown; all tibiae and tarsi yellow; abdominal segments III-IX distinctly paler than head with median transverse brown patches; wings grey. Mesopraesternum reduced. B1-B3 of abdominal segments IX pointed. Antennal segments 3 & 4 with 1 + 2 and 2 + 2 sense cones respectively.....*pusillus* Ananthkrishnan & Jagadish  
Foretarsi unarmed. Head and pronotum brown, concolourous or slightly darker than antennal segments 4-8; wings shaded grey; anteromedian region of abdominal segments II-VIII with brownish patches. Mesopraesternum reduced. Antennal segments 3 & 4 with 1 + 1 sense cones. B1-B2 of abdominal segment IX pointed.....*debilis* Ananthkrishnan & Jagadish

106. *Xylaplothrips debilis* Ananthkrishnan & Jagadish

1971. *Xylaplothrips debilis* Anantha. & Jagadish, *Zool. Anz.*, **186** : 266.

1976. *Xylaplothrips debilis* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, **34** (4) : 268-269.

1988. *Xylaplothrips debilis* : Sen *et al. Rec. zool. Surv. India, Occ. Pap.*, **100** : 106.

*Specimen studied* : Coochbehar Dt. : 2 Females (Z. S. I. Reg. Nos. 1954/H17; 2013/H17) Tapurhat, Coochbehar, 25. 10. 1992; 1. 1. 1984, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Coochbehar); Kerala; Andhra Pradesh.

*Remarks* : Sen *et al.*, (1988) recorded this species from West Bengal.

#### 107. *Xylaplothrips inquilinus* (Priesner)

1921. *Haplothrips inquilinus* Priesner, *Treubia*, **11** : 4.

1966. *Xylaplothrips inquilinus* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, **34** (4) : 272-273.

*Specimen studied* : 24 Parganas Dt. : (South) : 1 Female (Z. S. I. Reg. No. 1539/H17) Narendrapur, 13. 11. 1981, coll. S. Sen.

*Distribution* : India : West Bengal [24 Parganas (South)]; Tamil Nadu; Kerala; Andhra Pradesh.

*Remarks* : This species is recorded for the first time from West Bengal.

#### 108. *Xylaplothrips pictipes* (Bagnall)

1919. *Haplothrips pictipes* Bagnall, *ann. Mag. nat. Hist.*, (9) **4** : 273-274.

1968. *Neoheegeria pictipes* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.)*, *Suppl.*, **11** : 139.

1969. *Xylaplothrips pictipes* : Pitkin, *Bull. B. Mus. nat. Hist. (Ent.)*, **34** (4) : 274.

1988. *Xylaplothrips pictipes* : Sen *et al. Rec. zool. Surv. India, Occ. Pap.*, **100** : 106.

*Specimen examined* : Coochbehar Dt. : 8 Females, 2 Males (Z. S. I. Reg. Nos. 983-988/H17; 1050/H17; 1535-1537/H17) Coochbehar, 10. 10. 1980, 15. 10. 1980; 17. 10. 1980; 7. 10. 1981, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal (Coochbehar); Kerala; Karnataka.

*Remarks* : Sen *et al.* (1988) recorded this species from West Bengal.

#### 109. *Xylaplothrips pusillus* Ananthakrishnan & Jagadish

1969. *Xylaplothrips pusillus* Ananthakrishnan & Jagadish, *Zool. Anz.*, **182** (1-2) : 125-126.

1976. *Xylaplothrips pusillus* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, **34** (4) : 274-276.

1988. *Xylaplothrips pusillus* : Sen *et al. Rec. zool. Surv. India, Occ. Pap.*, **100** : 106-107.

*Specimen studied* : Coochbehar Dt. : 5 Females (Z. S. I. Reg. Nos. 1760-1763/H17) Coochbehar, 20. 10. 1982, coll. C. K. Sen Gupta. 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 3086/H17) Bakrahat Vill., 9. 1. 1983, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Coochbehar, 24 Parganas (South)]; Andhra Pradesh; Kerala; Manipur; Assam.

*Remarks* : Sen *et al.* (1988) recorded this species from West Bengal.

### Subfamily IDOLOTHRIPINAE

#### Genus 69. *Allothrips* Hood

1908. *Allothrips* Hood, *Bull. Ill. at. Hist. Surv.*, **8** : 372-373.

1957. *Allothrips* Standard, *ill. Biol. Monogr.*, **25** : 91-93.

1972. *Allothrips* : Mound, *J. Aust., ent. Soc.*, **11** : 23-36.

110. *Allothrips pillichellus bicolor* Ananthakrishnan

1964. *Allothrips bicolor* Ananthakrishnan, *Oppuse. ent. Suppl.*, 25 : 83-84.

1972. *Allothrips pillichellus bicolor* : Mound, *Aust. ent. soc.* II : 34-35.

1973. *Allothrips bicolor* : Ananthakrishnan, *Occl. Publ.*, 2 *Ent. Res. Unit, Loyola College, Madras* : 78.

1988. *Allothrips pillichellus bicolor* : Sen *et al*, *Rec. zool. Surv. India, Occ. Pap.*, 100 : 106-107.

*Distribution* : India : West Bengal (Kalimpong, Darjiling Dt.); Tamil Nadu; Kerala; Karnataka; Andhra Pradesh.

*Remarks* : Ananthakrishnan (1973) recorded this species from West Bengal.

Genus 70. *Dinothrips* Bagnall

1908. *Dinothrips* Bagnall, *Trans. nat. Hist. Soc. Northumb*, 3 : 190.

111. *Dinothrips juglandis* Moulton

1908. *Dinothrips juglandis* Moulton, *Indian For. Rec.* 119 : 6.

1983. *Dinothrips juglandis* : Mound & Palmer, *Bull. Br. mus. nat. Hist. (Ent)*, 46 (1) : 64.

*Distribution* : India : West Bengal (Lopchu, Darjeeling Dt.). Elsewhere : Burma.

Genus 71. *Elaphrothrips* Buffa

(Map 6)

1909. *Elaphrothrips* Buffa, *Redia*, 5 : 162-163.

1973. *Elaphrothrips (Cradothrips)* Ananthakrishnan, *Pacific Insects*, 15 : 273.

1978. *Elaphrothrips* : Palmer & Mound, *Bull. Br. Mus. nat. Hist. (Ent.)* 37 (5) : 171-174.

Key to the Species of *Elaphrothrips*

1. Forefemora of females with a distinct tooth at middle of inner margins, males without; Oedymcrous males with a sickle-like seta at apex of forefemora. Cephalic production very short. All tibiae dark..... *insignis* Ananthakrishnan  
Forefemora of females unarmed .....2
2. Cephalic production pronounced about 0.9-1.2 times as long as wide. Oedymcrous males without sickle-like seta at apex of forefemora; all tibiae basally more brownish and yellowish beyond middle. Antennal segment 3 yellow with a tinge of brown at apex; 4 & 5 yellow at proximal half and brown beyond..... *denticollis* (Bagnall)  
Cephalic production much shorter, distinctly wider than long almost 0.5 times as long as wide3
3. Foretarsi of females unarmed; all tibiae basally more brownish and yellowish distinctly. Antennal segment 3 yellowish with a tinge of brown at apex; 4 & 5 yellow at proximal half and brown distally. Pronotal anteroangulars, midlaterals, epimerals and posteroangulars almost subequal ..... *curvipes* Priesner  
Foretarsi of females armed. Antennal segment 3 brown with distal tip yellow, 4 & 5 proximal half yellow and brown distally. All tibiae uniformly brownish. Body setae brown.....  
..... *procer* Schmutz

112. *Elaphrothrips curvipes* Priesner

1929. *Elaphrothrips curvipes* Priesner, *Treubia*, **11** : 206.  
 1973. *Elaphrothrips secus* Ananthakrishnan, *Pacific Insects*, **15** (2) : 278.  
 1978. *Elaphrothrips productus* Priesner, *Konowia*, **14** : 170.  
 1978. *Elaphrothrips denticollis* : Palmer & Mound, *Bull. Br. Mus. nat. Hist. (Ent.)*, **37** (5) : 179-180.  
 1981. *Elaphrothrips denticollis* : Muraleedharan & Sen, *Rec. Indian Mus.*, **79** : 209.  
 1988. *Elaphrothrips denticollis* : Sen *et al.* *Rec. zool. Surv. India, Occl. Pap.*, **100** : 113.

*Specimen studied* : Coochbehar Dt. : 5 Females, 2 Males, (Z. S. I. Reg. Nos. 999-1000/H17; 1044-1048/H17), Coochbehar, 12. 10. 1980, coll. C. K. Sen Gupta. Darjiling Dt. : 1 Female (Z. S. I. Reg. No. 461/H17) Rangpo, 16. 4. 1976, coll. A. R. Bhowmik.

113. *Elaphrothrips denticollis* (Bagnall)

1909. *Dacaiothrips denticollis* Bagnall, *Trans. nat. Hist. Soc. Northumb*, **3** : 527.  
 1934. *Elaphrothrips beelsoni* Ramakrishna, *Indian For. Rec.*, **20** (4) : 7.  
 1935. *Elaphrothrips productus* Priesner, *Konowia*, **14** : 170.  
 1978. *Elaphrothrips denticollis* : Palmer & Mound, *Bull. Br. Mus. nat. Hist. (Ent.)* (5) : 179-180.  
 1981. *Elaphrothrips denticollis* : Muraleedharan & Sen, *Rec. Indian Mus.*, **79** : 209.  
 1988. *Elaphrothrips denticollis* : Sen *et al.*, *Rec. zool. Surv. India, Occl. Pap.*, **100** : 113.

*Specimen studied* : Bankura Dt. : 1 Female (Z. S. I. Reg. No. 4148/H17) Redhanagar, 31. 8. 1986, coll. Dr. P. Mukhopadhyay. Medinipur Dt. : 1 Female (Z. S. I. Reg. No. 3070/H17) Medinipur, coll. Dr. S. Biswas.

*Distribution* : India : West Bengal (Bankura; Medinipore); Kerala; Karnataka; Assam; Meghalaya; Sikkim; Tripura. Elsewhere : Sri Lanka; Burma; Malaya; Java; Suba; Borneo.

*Remarks* : This species is recorded for the first time from West Bengal.

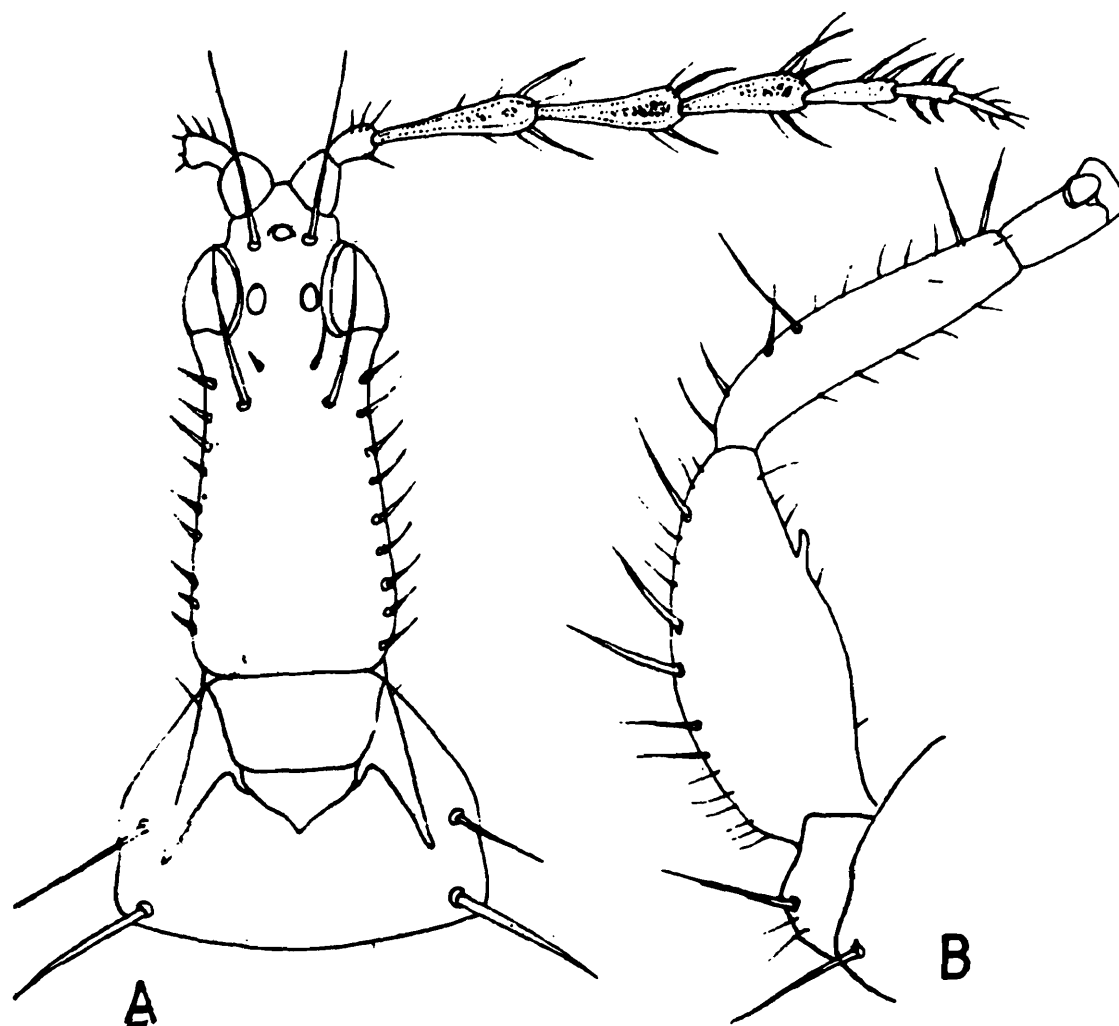
114. *Elaphrothrips (Cradothrips) insignis* Ananthakrishnan  
(Text fig. 14)

1973. *Elaphrothrips (Cradothrips) insignis* Ananthakrishnan, *Pacific Insects.*, **15** (2) : 173.  
 1983. *Elaphrothrips insignis* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, **46** (1) : 67.  
 1988. *Elaphrothrips insignis* : Sen *et al.*, *Rec. zool. Surv. India, Occl. Pap.*, **100** : 113-113.

*Specimen studied* : Darjiling Dt. : 1 Female, 1 Male (Z. S. I. Reg. Nos. 1866-1867/H17) Mouchowki Beat, Neora Valley, 6. 12. 1982. coll. Dr. R. K. Kacker & D. K. Mondal.

*Distribution* : India : West Bengal (Darjiling); Uttar Pradesh.

*Remarks* : Sen *et al.* (1988) recorded this species from West Bengal. It is a very rare species known only from Almora. U. P. Ananthakrishnan (1973b) erected a subgenus for this species, characterised by the presence of tooth on the inner margin of forefemora of female. This species has not been reported from anywhere else since discovery and the present record from Neora Valley forms the first report outside its type locality.



Text-fig. 14. *Elaphrothrips insignis* Ananthakrishnan A. Head, antenna and pronotum. B. Forewing.

### 115. *Elaphrothrips procer* (Schmutz).

1913. *Dicaiothrips procer* Schmutz, *Sitz. Akad. Wiss. Wien*, 122 : 1063.

1954. *Elaphrothrips eranthemii* Seshadri & Ananthakrishnan, *Indian J. Ent.*, 14 (3) : 224.

1968. *Elaphrothrips procer* : Mound, *Bull. Br. Sus. nat. Hist. (Ent.)*, *Suppl.*, 11 : 98.

1982. *Elaphrothrips procer* : Muraleedharan, *Rec. zool. Surv. India*, 79 : 378.

1988. *Elaphrothrips procer* : Sen *et al.* *Rec. zool. Surv. India, Occl. Pap.*, 100 : 114.

*Specimen studied* : Coochbehar Dt. : 3 Females, (Z. S. I. Reg. Nos. 1665/H17; 1726/H17; 1719/H17) Mekligunj, 26. 10. 1982; 25. 10. 1982; 30. 11. 1981, coll. C. K. Sen Gupta. Darjiling Dt. : 1 Male (Z. S. I. Reg. No. 1865/H17) Neora Valley, 6. 12. 1982, coll. Dr. R. N. Kacker & D. K. Mondal. Haora Dt. : 4 Females, 4 Males (Z. S. I. Reg. Nos. 1432-1438/H17); Sibpore Botanical Garden, 19. 06. 1981, 1. 12. 1982, coll. S. Sen Nadia Dt. : 1 Female, 1 Male (Z. S. I. Reg. Nos. 3007-3008/H12) Kalyani, coll. Dr. S. Chakraborty. 24 Parganas Dt. (South) : 1 Female (Z. S. I. Reg. No. 941/H17) Hatberia Village, 2. 7. 1978, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Coochbehar, Darjiling, Haora, Nadia, 24 Parganas (South)]; Kerala; Karnataka; Tamil Nadu; Maharashtra; Manipur; Sikkim. Elsewhere : Sri Lanka.

*Remarks* : Sen *et al.* (1988) recorded this species from West Bengal.

Genus 72. *Ethiothrips* Karny

1925. *Liothrips (Ethiothrips)* Karny, *Bull. ent. Res.*, 16 : 133.

1983. *Ethiothrips* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 54-58.

Key to the Species of *Ethiothrips*

1. Forewings infumate and with 25-27 double fringes. Body setae especially postoculars, midlaterals, posteroangulars, epimerals and basal wing setae of forewings exceptionally long.....  
..... *longisetis* Ananthakrishnan & Jagadish.
- Forewings transparent and with 10-15 double fringes. Body setae moderate, not exceptionally long.....  
..... *obscurus* (Schmutz)

116. *Ethiothrips longisetis* (Ananthakrishnan & Jagadish)

1970. *Diceratothrips (Diceratothrips) longisetis* Ananthakrishnan & Jagadish, *Oriental Ins.*, 4 (3) : 268-269.

1988. *Ethiothrips longisetis* : Sen *et al. Rec. zool. Surv. India, Occl. Pap.*, 100 : 115-116.

General body colour brown inclusive of antennae and legs except extreme base of antennal segment 3 and foretarsal tooth yellow; wings infumate with a longitudinal streak at middle. All setae hyaline and pointed.

*Head* 1.6-1.7 times longer than wide; checks narrow at base. Postoculars very long, about 3 times longer than eyes. Mouthcone short and broad; maxillary styles retracted little above middle of head capsule and close at middle. Prothorax short about half the length of head. Prothoracic midlaterals, posteroangulars and epimerals exceptionally long. Foretarsi with a moderate tooth. Forewings with 25-27 double fringes and basal wing setae exceptionally long.

*Distribution* : India : West Bengal (Darjiling).

117. *Ethiothrips obscurus* (Schmutz)

1913. *Ischyrothrips obscurus* Schmutz, *Sitz. akad. Wiss. Wien.* 122 : 1974-76.

1931. *Dichaetothrips Indicus* Ananthakrishnan, *Zool. Anz.*, 167 (7-8) : 269-270.

1970. *Dicheratothrips (Dichaetothrips) indicus* : Ananthakrishnan & Jagadish, *Oriental Ins.*, 4 (3) : 273-274.

1983. *Ethiothrips obscurus* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 57.

General body colour dark brown antennal segments 1, 2, 7 & 8 brown, 3 & 4 yellow to brownish yellow; tibiae and all tarsi yellow to brownish yellow; wings entirely transparent. All setae hyaline, pointed to blunt.

*Head* 1.5 times longer than wide. Checks weakly serrate with minute spines, dorsum with weak transverse striations laterally. Sense cones on antennal segments 3 & 4 moderately developed, sense cone formula : 3 : 1 + 1 : 4 : 2 + 2, 5 : 1 + 2, 6 : 1 + 1. Prothorax much shorter than head. All prothoracic setae moderately developed, epimerals and posteroangulars subequal. Foretarsal tooth moderate. Forewings with 10-15 double fringes.

*Specimen studied* : 24 Parganas Dt. : (South) : 1 Female (Z. S. I. Reg. No. 940/H17) Hatberia Village, 2. 7. 1978, coll. N. K. Pramanik. Calcutta : 1 Female (Z. S. I. Reg. No. 1431/H17) 6. 4. 1978, coll. C. K. Sen Gupta.

*Distribution* : India : West Bengal [Calcutta; 24 Parganas (South)]; Tamil Nadu and Andhra Pradesh.

*Remarks* : This species is recorded for the first time from West Bengal.

### Genus 73. *Holothrips* Karny

1911. *Holothrips* Karny, *Zool. Anz.*, **38** : 502.

1987. *Holothrips* : Okajima, *Bull. Br. Mus. nat. Hist. (Ent.)*, **54** (1) : 1-74.

### Key to the Species of *Holothrips*

1. Postocellar setae long and stout, much longer half the length of postocular setae. Head longer. 1.4-1.5 as long as broad postocular setae sharply pointed at tip. Pelta bell-shaped with a pair of micropores..... *quadrisetis* Okajima
- Postocellar setae minute .....2
2. Pelta with a pair of micropores; bell-shaped. Postocular setae very long, about half the length of head; pointed at tip.....*nepalensis* (Pelikan)
- Plea without micropores; slender with apex flat. Postocular setae not very long, a little longer than eyes; blunt at tip .....*fumidus* (Ananthakrishnan)

### 118. *Holothrips fumidus* (Ananthakrishnan)

1972. *Polyphemothrips fumidus* Ananthakrishnan, *Oriental Ins.*, **6** (4) : 429-430.

1983. *Holothrips fumidus* : Okajima, *Bull. Br. Mus. nat. Hist. (Ent.)* **54** (1) : 28-29.

*Distribution* : India : West Bengal (Darjiling), Uttar Pradesh. Elsewhere : Nepal.

*Remarks* : Okajima (1987) recorded this species from West Bengal.

### 119. *Holothrips quadrisetis* Okajima

1987. *Holothrips quadrisetis* Okajima, *Bull. Br. Mus. nat. Hist. (Ent.)*, **54** (1) : 43-44.

*Female (Macropterous)* : General body colour dark brown; antennal segments 1 & 7 dark brown, 2 yellow, 3 yellow at basal half & shaded brown distally, 4-6 dark brown with base yellow; all tibiae yellow at proximal third and shaded brown distally; wings infumate; all setae hyaline except anal setae darker.

*Head* long about 1.5 times as long as broad; sculptured posterolaterally; cheeks almost straight, weakly narrowed at base. Postocellar setae very long and stout, much longer than half the length of postocular setae. Mouthcone pointed. Pelta bell-shaped with two micro pores. Tube 0.75-0.80 as long as broad, almost straight, anal setae shorter than tube.

*Distribution* : India : West Bengal (Darjiling).

120. *Holothrips nepalensis* (Pelikan)

1970. *Adelothrips nepalensis* Pelikan, *Kumbhu Himal*, 3 : 366-368.

1983. *Holothrips nepalensis* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 94.

1987. *Holothrips nepalensis* : Okajima, *Bull. Br. Mus. nat. Hist. (Ent.)*, 54 (1) : 35-36.

*Distribution* : India : West Bengal (Tiger Hills, Darjiling Dt.). Elsewhere : Nepal.

*Remarks* : Okajima (1987) recorded this species from Darjiling Dt. and forms the first record from West Bengal as well as from India hitherto known only from Nepal.

Genus 74. *Loyolaia indica* Ananthkrishnan

1964. *Loyolaia indica* Ananthkrishnan, *Entomol. Ts. Arg.*, 85 (1-2) : 106-107.

121. *Loyolaia indica* Ananthkrishnan

1964. *Loyolaia indica* Ananthkrishnan, *Entomol. Ts. Arg.*, 85 (1-2) : 107-108.

1983. *Loyolaia indica* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 38.

*Specimen studied* : Nadia Dt. : 3 Females, (Z. S. I. Reg. Nos. 3009-3011/H17) Kalyani, coll. S. Chakraborty.

*Distribution* : India : West Bengal (Nadia); Tamil Nadu.

*Remarks* : This species is recorded for the first time from West Bengal and forms the first record outside its type locality.

Genus 75. *Neosmerinthothrips* Schmutz

1913. *Neosmerinthothrips* Schmutz, *Sitz. Akad. Wiss. Wien*, 122 : 1951.

122. *Neosmerinthothrips fructuum* Schmutz

1913. *Neosmerinthothrips fructuum* Schmutz, *sitz. Akad. Wiss. wien*, 122 : 1052-53.

1935. *Nesothrips formosensis karnyi* Prisner, *Phillip. J. Sci.*, 57 (3) : 370.

1964. *Hesothrips formosensis karnyi* : Ananthkrishnan, *Opuse. ent. Suppl.*, 25 : 102.

1973. *Nesothrips formosensis karnyi* : Ananthkrishnan, *Occl. Publ. 2, Ent. Res. Unit., Loyola College, Madras* : 117.

1974. *Neosmerinthothrips fructuum* : Mound, *Bull. Br. Mus. nat. Hist. (Ent.)* 31 (5) : 152-153.

*Specimen studied* : Birbhum Dt. : 1 Female (Z. S. I. Reg. Nos. 1697/H17) Sanghatpur, 18. 12. 1981, coll. S. Sen & party. Calcutta : 1 Male, 3 Females (Z. S. I. Reg. Nos. 940-95/H17; 1001-1002/H17), 13. 10. 1977, 20. 2. 1978, coll. N. K. Pramanik & C. K. Sen Gupta. Nadia Dt. : 1 Female, 1 Male (Z. S. I. Reg. Nos. 3012-3013/H17) Kalyani, coll. S. Chakraborty.

*Distribution* : India : West Bengal (Birbhum, Calcutta, Hughli, Nadia); Andhra Pradesh; Kerala; Karnataka, Tamil Nadu, Madhya Pradesh.

*Remarks* : Ananthkrishnan (1973) recorded this species from Alipore and Chandannagar (West Bengal).

Genus 76. *Nesothrips* Kirkaldy

1097. *Nesothrips* Kirkaldy, *Proc. Hawaii ent. soc.* 1 : 103.  
1913. *Rhaebothrips* Karny, *H. Sauter's Formosa. Ausbeute Suppl. ent.*, 2 : 128.  
1983. *Nesothrips* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 47.

123. *Nesothrips lativentris* (Karny)

1913. *Rhaebothrips lativentris* Karny, *H. Sauter's Formosa Ausbente Suppl. ent.*, 2 : 128.  
1971. *Rhaebothrips lativentris* : Sakimura, *Pacific Insects*, 13 (2) : 393-398.  
1973. *Rhaebothrips lativentris* : Ananthakrishnan, *Occl. Pub.*, 2 : *Ent. Res. Unit. Loyola College, Madras* : 127-128.  
1981. *Rhaebothrips lativentris* : Muraleedharan & Sen, *Rec. zool. India*, 79 : 227.  
1983. *Nesothrips lativentris* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 48.  
1988. *Nesothrips lativentris* : Sen *et al.* *Rec. zool. Surv. India, Occl. Pap.*, 100 : 118-119.

General body colour dark brown; foretibiae lighter, extreme base and tip of all tibiae lighter, all tarsi yellowish brown; antennal segments 1, 6 & 8 dark greyish brown, 2 distally lighter, 3-5 yellowish brown, 4 weakly at distal fourth, 5 dark grey brown at distal half to two third; wings pale brownish with a longitudinal brown streak; extreme tip of tube light brown. All setae brownish yellow and pointed.

*Head* about 1.5 times as long as broad. Postoculars very long about 1.5 times longer than eyes. Prothorax of females and gynaecoid males half as long as head and in oedymorous males two third as long as head. All prothoracic setae except anteromarginals well developed. Forefemora of oedymorous males strongly bent inwards; foretarsi of female unarmed and armed in males, tooth longer in oedymorous males. forewings with 13-21 double fringes. Pelta hat-shaped.

*Specimen studied* : Birbhum Dt. : 2 Females, 1 Male (Z. S. I. Reg. Nos. 1586-1588/H17) Sanghatput, 18. 12. 1981, coll. S. Sen. 1 Female (Z. S. I. Reg. No. 1686/H17) Rampurhat, 18. 12. 1981, coll. S. Sen. Coochbehar Dt. : 3 Females, 1 Male (Z. S. I. Reg. Nos. 996-998/H17); 1049/H17), Coochbehar, 10. 10. 1980; 12. 10. 1980, coll. C. K. Sen Gupta. Dt. : 1 Female (Z. S. I. Reg. No. 1259/H17) Jagannathbati, 26. 7. 1978, coll. S. Sen. Haora Dt. : 2 Females, 2 Males (Z. S. I. Reg. Nos. 1439-1442/H17) Sibpore Botanical Garden, 19. 6. 1981, coll. S. Sen. West Dinajpore Dt. : 1 Female (Z. S. I. Reg. No. 4442/H17) Raigunj, 2. 12. 1987, coll. T. R. Mitra & party. 24 Parganas Dt. (South) : 7 Females (Z. S. I. Reg. Nos. 3094-4000/H17) Bakrahat Vill., 9. 1. 1983, coll. N. K. Pramanik.

*Distribution* : India : West Bengal [Birbhum; Coochbehar; Hughli; Haora; West Dinajpore; 24 Parganas (South)]; Andhra Pradesh; Tripura. Elsewhere : Mauritius; Philippines; Japan; Guam, Queensland; Hawaii; Jamaica; Virgin Is.

*Remarks* : Ananthakrishnan (1973) recorded this species for the first time from India from Chandannagar (Hughli Dt.) and Calcutta.

Genus 77. *Oidanothrips* Moulton

1944. *Oidanothrips* Moulton, *Occl. pap. Bernie P. Bishop Mus. Hawaii*, 17 : 308-309.  
1983. *Oidanothrips* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 64 (1) : 95.

### 124. *Oidanothrips megacephalus* (Ananthakrishnan)

1969. *Polyphemothrips megacephalus* Ananthakrishnan, *Oriental Ins.*, 3 (3) : 303-304.

1973. *Polyphemothrips megacephalus* : Ananthakrishnan, *Occl. Publ.*, 2, *Ent. Res. Unit, Loyola College Madras* : 54.

1983. *Oidanothrips megacephalus* : Mound & Palmer, *Bull. Br. Mus. nat. Hist. (Ent.)*, 46 (1) : 96.

1988. *Oidanothrips megacephalus* : Sen *et al*, *Rec. zool. Surv. India, Occl. Pap.*, 100 : 120-121.

*Female (Macropterous)* : General body colour brown, except proximal half of antennal segment 3 and all tarsi yellow and with profuse hypodermal pigments; wings uniformly shaded grey. All setae hyalin and pointed.

*Head* 2.3 to 2.4 times as long as wide. Eyes large; ocellar cone strongly developed. Postoculars very long and fine. Mouthcone broadly rounded; maxillary styles ocular, almost meeting at middle. Prothoracic anteroangulars short and curved, antromarginals vestigial. Foretarsal tooth well developed. Forewings with very large number (50-62) double fringes.

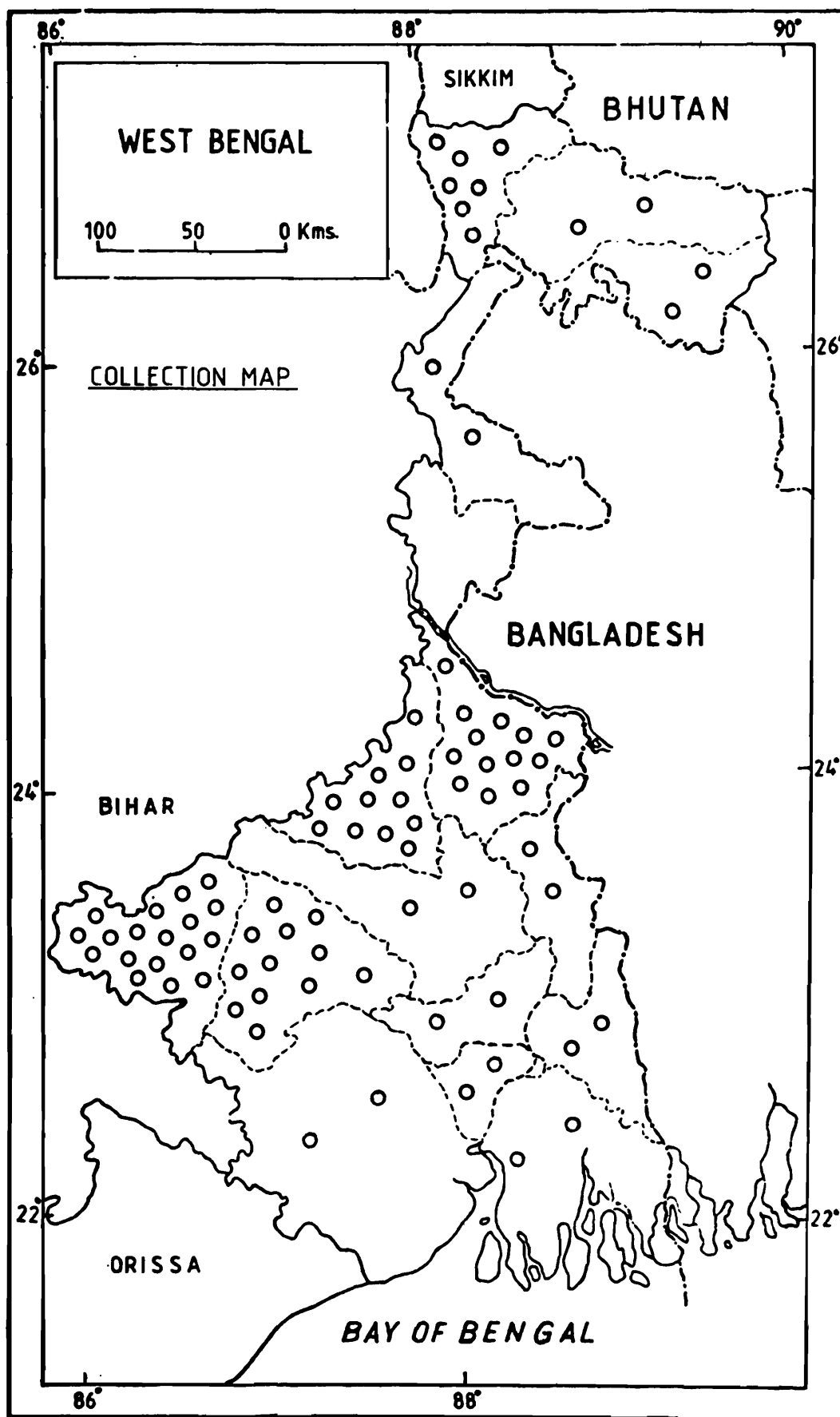
*Distribution* : India : West Bengal. (Kalimpong, Darjiling Dt.).

### SUMMARY

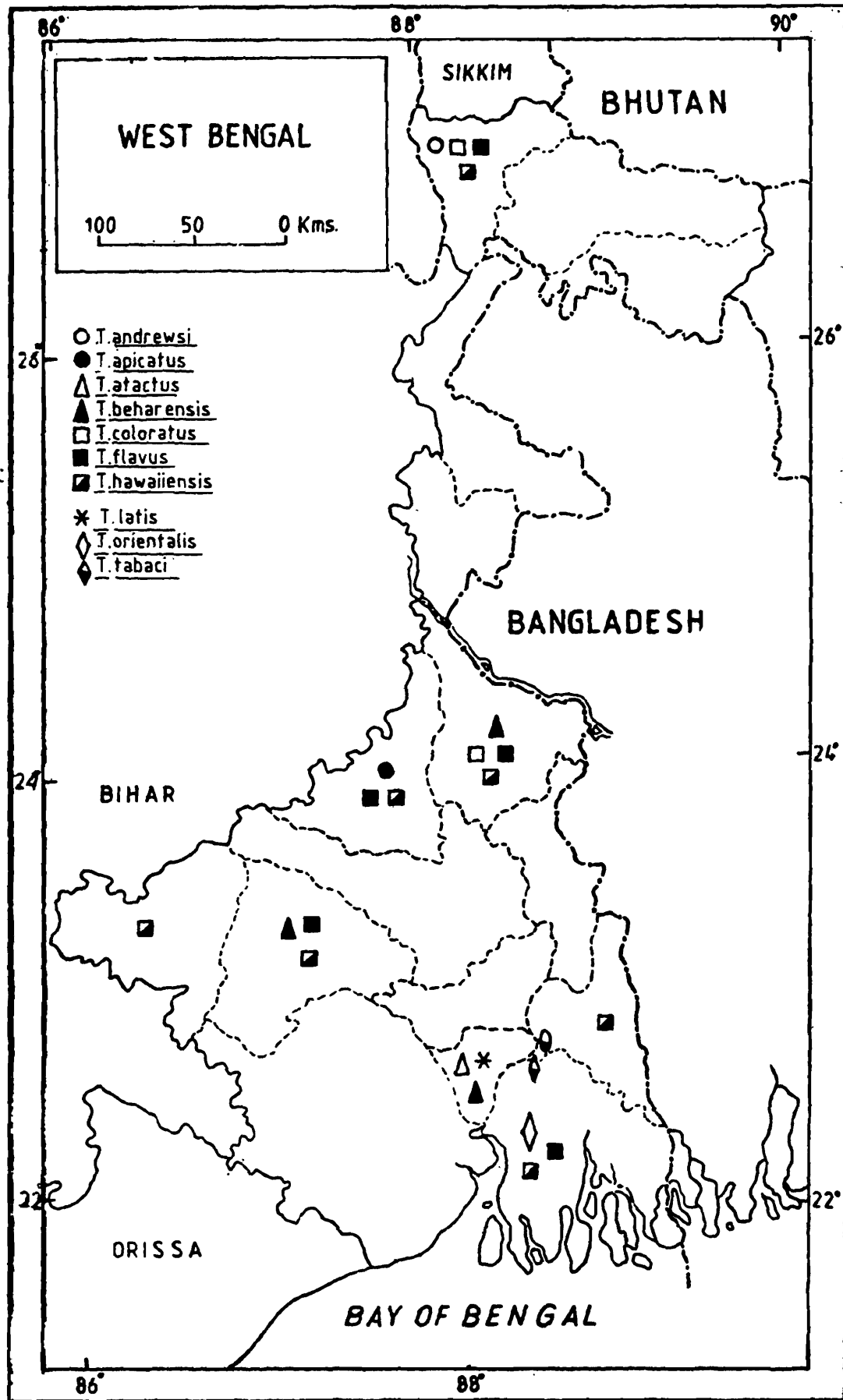
The monograph deals with the Thysanoptera fauna of West Bengal. Altogether 124 species pertaining to 77 genera under 4 families have been recorded. Before undertaking the work only 85 species (including 30 species incorporated in "Thysanoptera from N.E. India) were known from the state and as a result of the present studies another 39 species have been added and 1 species have been recorded for the first time from India. Key to the families, genera and species and description of some of the species described from the state have been provided.

### ACKNOWLEDGEMENTS

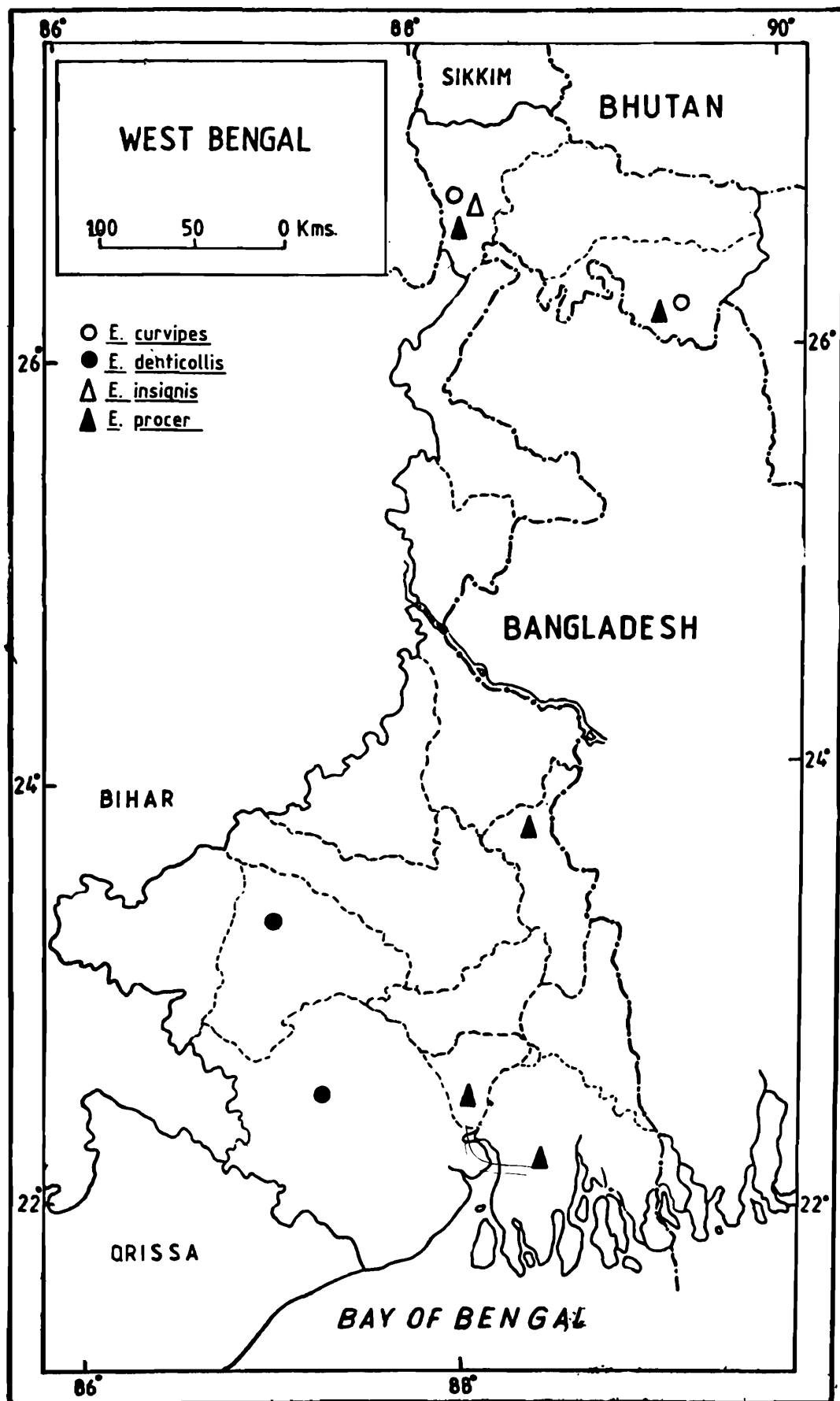
We are grateful to the Director, Zoological Survey of India, for providing necessary for carrying out the work. We are indebted to Prof. T N. Ananthakrishnan, Director & INSA Senior Scientist, Entomology Research Institute, Madras for offering valuable suggestions. We express our sincere gratitude to Dr. S. K. Bhattacharyya, Scientist-SF; Dr. A. K. Ghosh, Scientist-SF; Dr. B. Dutta, Scientist-SE; Dr. S. K. Tandon, Scientist-SE; Dr. K. Rai, Scientist-SE and Dr. B. C. Das, Scientist-SD for encouragements and various help. We are thankful to Shri Arun Ghosh, Senior Artist for preparations of diagrams.



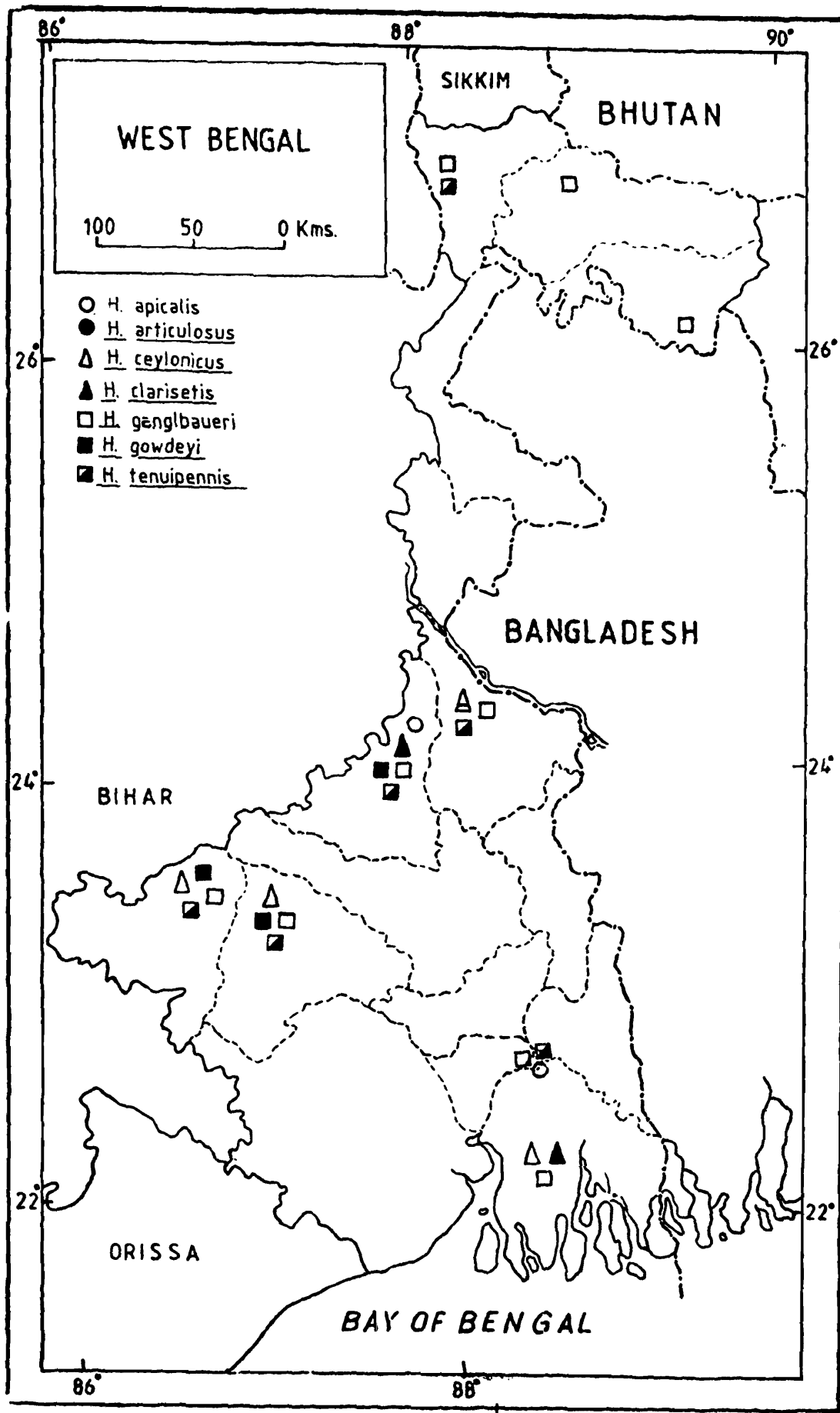
Map. 1. Collection localities



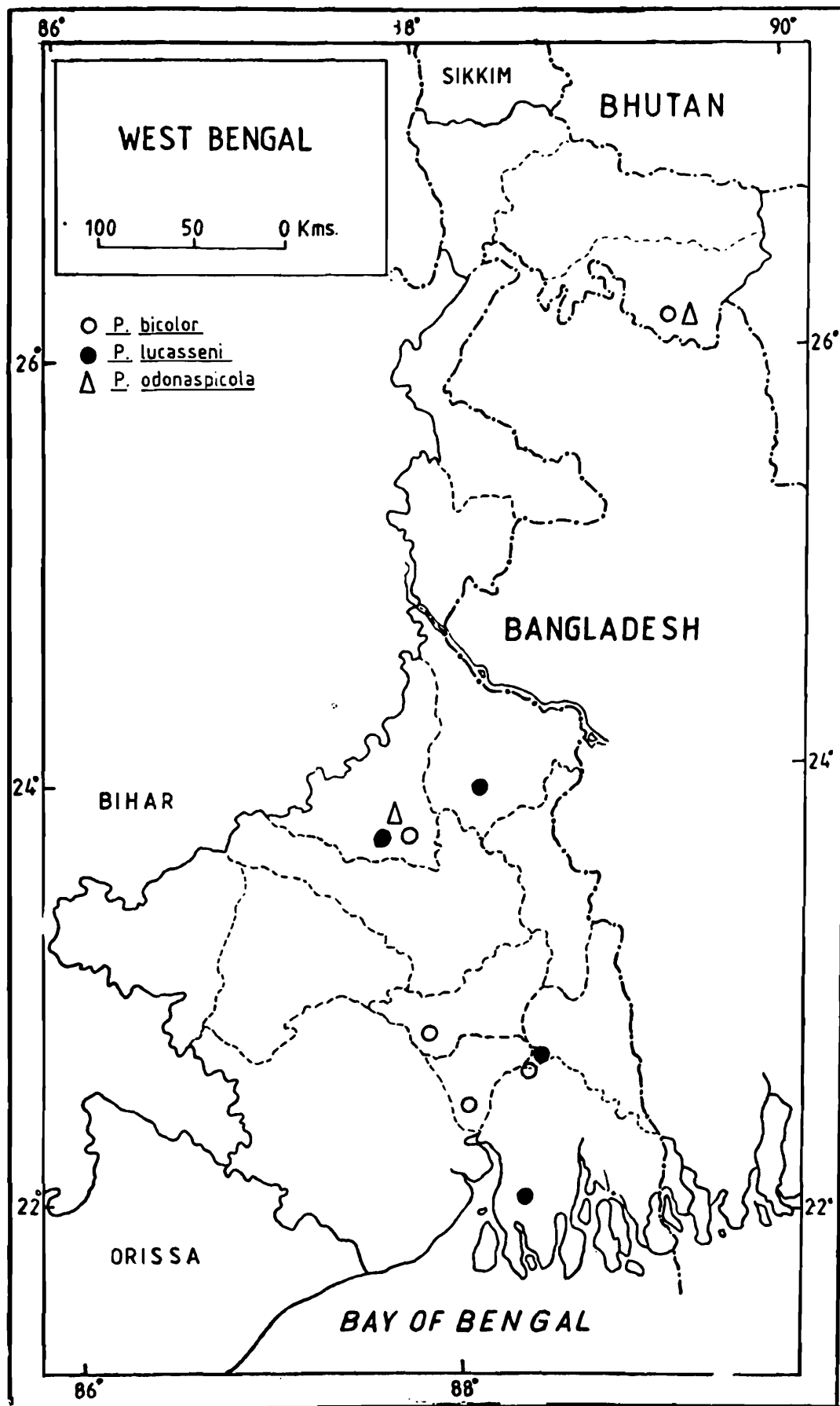
Map. 2. Distribution of *Thrips* species in West Bengal.



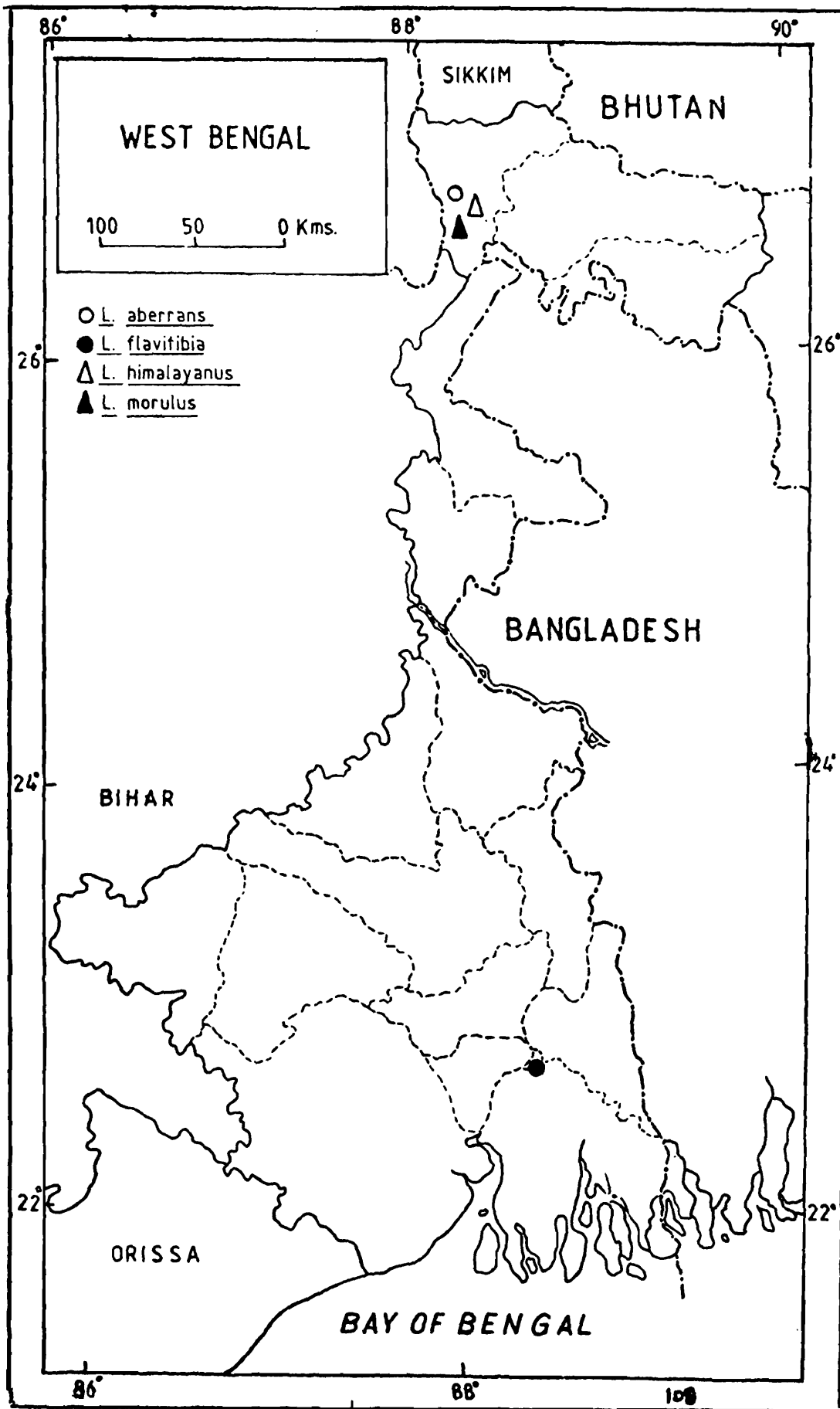
Map. 3. Distribution of *Haplithrips* species in West Bengal



Map. 4. Distribution of *Liothrips* species in West Bengal.



Map. 5. Distribution of Podothrips species in West Bengal.



Map. 6. Distribution of *Elaphrothrips* species in West Bengal.

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## INSECTA : NEUROPTERA

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### INTRODUCTION

Neuroptera, in general, exhibits carnivorous habits and depredates on different insect groups which thrive on diverse types of habitats. West Bengal with a varied types of topography and vegetation is an abode of various insect orders including both beneficial and injurious ones. One of these beneficial orders of insects and valuable allies of man is Neuroptera, because these insects are mostly predacious on insect pests of plantations including crops both in their larval and adult stages.

In view of the foregone facts, the present study has been envisaged on Neuroptera from West Bengal to provide a check-list of neuropteran fauna from twelve districts (*Vide* Map) of the aforesaid state on the basis of the material collected recently by different staff members including the author from the Zoological Survey of India and also the material, both named and unnamed present in the National Zoological Collections. The system of classification has been principally adapted after Imms (1925). In this connection it may be stated that the author has already published the account of the myrmeleontid fauna from Eastern India including West Bengal (*Vide* Ghosh, 1984) and the result of his study on the Ascalaphids and Chrysopids have been sent for publication from the area mentioned above. This Check list includes the species of the aforesaid families already studied by him from West Bengal and also the collection available to him in recent years on twelve families of Neuroptera from the concerned state.

This list incorporates the account of 73 species in 48 genera and 12 families with a brief review on earlier investigation, topography and vegetational pattern of West Bengal, collection and preservation, external morphology and terminology, keys to taxa of the material actually examined during the present study and the taxa reviewed from the literature marked with asterisk (\*). Besides, the geographical distribution including the new locality records and also original and current references of each species have been dealt with. Under distribution column, for a few species where the exact locality data were not provided by the earlier workers, the areas, as given in the original literature have been quoted.

This account, it is hoped, will provide a ready reference to those interested on the neuropteran fauna of West Bengal.

### EARLIER INVESTIGATION

The taxonomic study of the group from the state has received very little attention excepting for a few records made by Walker (1853), Weele (1908), Fraser (1922), Navas (1910, 1912, 1914-1915, 1923, 1929-1930), Kimmins (1949) and recent contributions made on the family Myrmeleontidae (Ghosh, 1984), family Ascalaphidae and family Chrysopidae (Ghosh : In press) from Eastern India.

## TOPOGRAPHY

The state of West Bengal with an area of 8700 Sq. Kms. lies approximately between 21°35 and 27°14 N. lat., 86°35 E. long. It has sixteen districts including Calcutta. Physiographically, the major land forms of West Bengal includes in the North, the lofty mountain ranges and low hills of Himalayas; along the entire length from North to South, the gangetic plains; on the West the lateritic uplands with scrub jungles; and in South, the sandy coast with Mangrove forest (Maity, 1983). These land forms may be summarised as follows :

1. *Mountain* : The orogenic movement is fundamentally responsible for the upheaval of Himalayas including the north-eastern mountain ranges of India. Generally, this range in West Bengal may be basically classified into two topographical features, namely, high hills and foot hills. The high hills are well-represented in Darjeeling. The Darjeelign range of the Himalaya extends particularly from the Senchal Peak (2,615m) to the Terai at a minimum elevation of about 180m. with dense forests.

2. *Plains* : The plains in West Bengal are represented by the gangetic and coastal plains. The gangetic plain is linked with Assam valley through north Bengal. The coastal plain includes the extensive mangrove zones particularly at the Sundarbans near the gangetic delta where the coast line is indented. On the other hand the topography also exhibits it facies changes into very hard and wide beaches with less plantation as at Digha in Midnapore.

## VEGETATIONAL PATTERN

The vegetational zones may be of following types :

1. *Mixed type* : These are confined to the mountains and slopes of varied altitudes at Darjeeling of West Bengal. This type mainly includes the evergreen forests chiefly represented by the pine-groves at higher temperate elevations and the tropical deciduous forests showing timber plantation e.g. bamboos, oaks, teaks and allied hardwoods. The evergreen forests, in particular, merge with alpine type in gradual sequence of attainment of heights where the plantations are highly marked by shrubs and herbs of stunted growth. Terrace cultivation, fruits and beverage are no less common.

But in the plain of West Bengal the floristics are rather exclusively composed of tropical elements including cereals, pulses and fruits characteristics of the gangetic plain.

2. *Tidal type* : These are confined to the mangrove zones along the coasts of Bay of Bengal upto the delta particularly in the Sunderban areas of West Bengal.

## COLLECTION AND PRESERVATION OF NEUROPTERA

For the collection of Neuroptera one should have some idea about their habits and habitats. Several species of Neuroptera are diurnal but a great majority rest during the day and take wing at or just following sunset. They may be collected from herbage, bushes, trees, different types of vegetation including crops and also from the artificial light at night.

i) *Methods of collection* : Neuroptera may be collected by the following methods :

(a) *Sweeping* : Sweeping with a proper net yields satisfactory results while collecting insects from herbage.

(b) *Beating* : Beating is usually employed to dislodge insects from foliage or trees. Usually a long stick is used to beat the plant part and a tray, or umbrella or white cloth, according to convenience, may be kept below to collect the insects. These insects are picked up individually either with forceps or with the help of a brush moistened with 80% alcohol.

(c) *Aerial netting* : Butterfly nets are most widely used to collect these insects on wings.

(d) *Light traps* : An artificial light like Petromax gas light, if placed on a white malmal cloth in the field at evening will attract a number of insects and these may be easily picked up by hand. Electric lamp-post may also be checked up to collect these insects.

ii) *Methods of Preservation* : After collection, large and hard-bodied specimens are preserved in dry condition after being killed in cyanide bottles or benzene vapour while the small and soft-bodied ones are sometimes preserved in 80% alcohol though more usually they are also killed and preserved as the large sized insects. It is always preferable to preserve both these groups of insects in dry condition. The specimens preserved dry are kept in paper envelopes while those, in wet condition, are kept in a small vial containing 80% alcohol. When the collection has been brought to the laboratory it has to be made ready for study and permanent storage. First step is to relax the material in proper relaxing box, then the specimens should be set and pinned displaying as far as possible most of the taxonomic characters. Depending upon the size of specimens the appropriate pins are to be used. The specimens should be pinned through the middle of the mesothorax. It is always necessary to have labels providing information about locality, date, name of collector and of habit etc, attached with individual specimen. For permanent preservation, the dry specimens may be kept in any standard size insect box with necessary chemicals (Naphthaline, Liquid Benzene, Camphor-carbolic) to check the growth of fungus and damage from other insects. Specimens preserved in alcohol may be kept as such with locality label in each individual vial.

### EXTERNAL MORPHOLOGY AND TERMINOLOGY

Some of the morphological features, relevant to the present study are given below. Different authors used different terminologies in respect of wings, male and female genitalia. In the present study the excellent works by Comstock (1918), Tillyard (1926) and Markl (1954) on wings and that of Tjeder (1970) on male and female genitalia have been consulted.

Neuropterans are small, medium-sized or sometimes large soft-bodied insects. The body of neuroptera is divisible into head, thorax and abdomen.

#### Head

*Head* (Fig. 1) : Hypognathus with biting mouth parts which sometimes produced in the form of a rostrum in the family Nemopteridae.

*Vertex* (Fig. 9, v) : Arched dorsally.

*Frons* (Fig. 1, fr.) : Separated laterally from the genae by frontal sutures and anteriorly from the clypeus by the clypeofrontal suture.

*Clypeus* (Fig. 1, clp.) : Divided into a large postclypeus and a smaller anteclypeus.

**Labrum** (Fig. 2) : Lying in front of the clypeus and narrower than it.

**Mouth parts** : formed of a pair of well-developed and chitinised mandibles (Fig. 3), a pair of maxillae (Fig. 4), each consisting of cardo, stipes, galea, lacinia and five segmented palpus, and a labium (Fig. 5) consisting of submentum, mentum, prementum, ligula (reduced or absent) and a pair of 3-segmented palpi.

**Compound eyes** (Fig. 1, e) : large, prominent, widely separated and placed laterally on either side of the epicranium (Fig. 1, ep); ocelli when present, 3.

**Antennae** (Figs. 6, 7) elongate or short, filiform (e.g. Chrysopidae), moniliform (e.g. Hemerobiidae), pectinate (e.g. males of Dilaridae) and clavate or capitate (e.g. Ascalaphidae and Myrmeleontidae); antennae divisible into three regions, viz., scape or first segment, pedicel or second segment and flagellum composed of other segments.

## Thorax

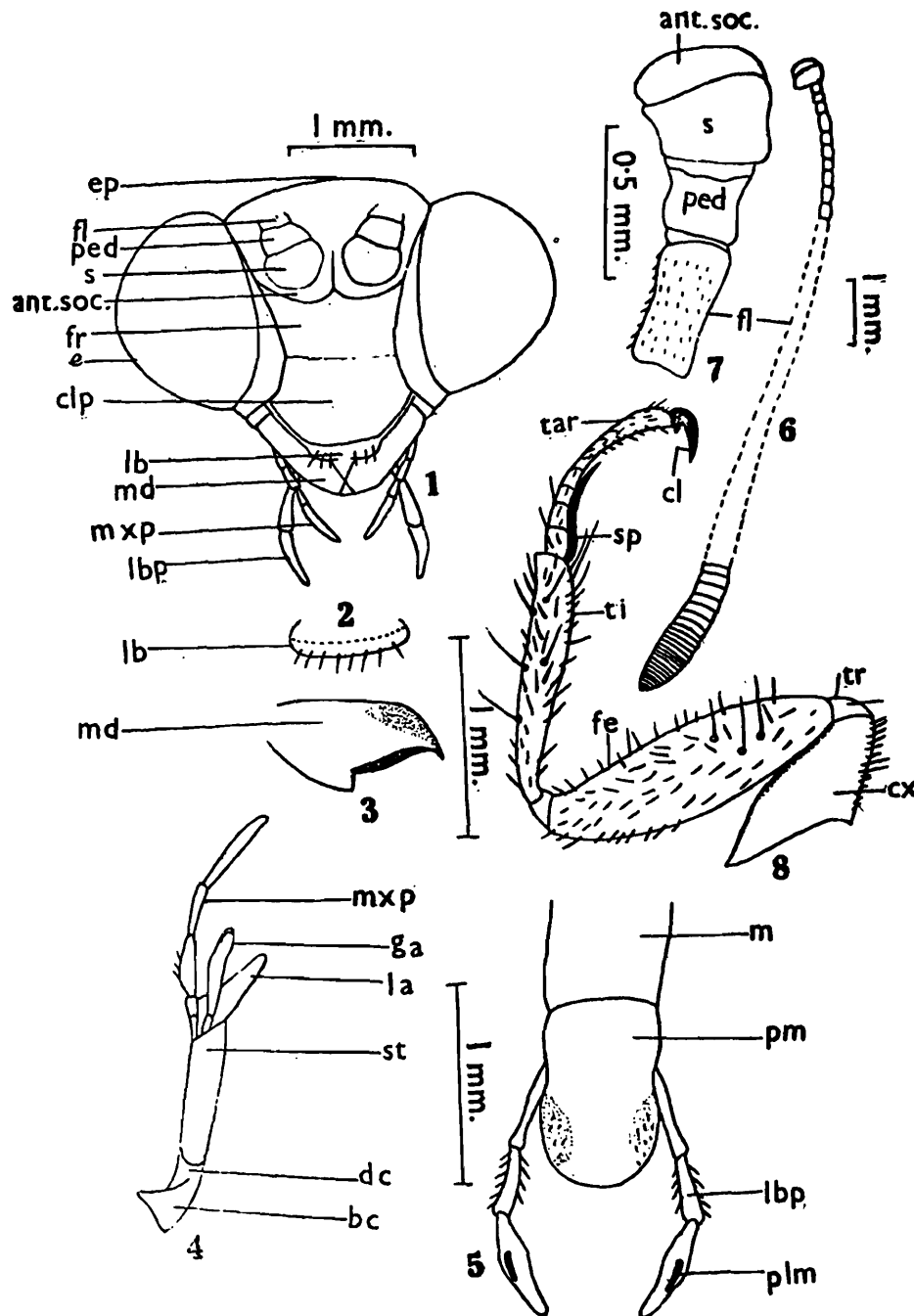
**Thorax** (Fig. 9) consisting of three well-defined segments, e.g. prothorax, mesothorax and metathorax; prothorax short or elongate; meso- and metathorax distinct but sometimes not sharply demarcated. **Wings** (Fig. 10-11) : Two pairs, usually subequal or membranous (hindwing elongate and filiform in Nemopteridae, reduced in *Conwentzia* of Coniopterygidae or in some of the genera of Hemerobiidae); these at rest held vertically over dorsum; generally hyaline, sometimes variably clouded or covered by powdery secretion (Coniopterygidae), with or without spots; veins and cross veins generally with micro- or macrotrichia; margin with fringes, with (Hemerobiidae, Sisyridae) or without trichosors (Chrysopidae, Myrmeleontidae, Ascalaphidae); cross veins numerous (Osmylidae, Myrmeleontidae, Ascalaphidae) or a few (Coniopterygidae, Sisyridae); branches of longitudinal veins generally with (Suborder Planipennia) or without (Suborder Megaloptera) furcations at margin; wing-coupling apparatus with distinct jugal lobe in forewing and frenulum in the form of haired extension in hindwing (Sisyridae) or slightly to markedly reduced (Coniopterygidae, Osmylidae); venation : costa (c) costal area broad or narrow; numerous costal veins (absent in Coniopterygidae), these simple (Chrysopidae, Mantispidae, Ascalaphidae) and forked (Osmylidae, Hemerobiidae, Myrmeleontidae); forewing sometimes with a recurrent humeral veinlet (some genera of Hemerobiidae); pterostigma pronounced or ill-defined; subcosta (Sc) : a strong vein meeting c near apex (Dilaridae, Sisyridae, Hemerobiidae, Chrysopidae) ending in costal margin before pterostigma (Inocellidae) or joining radius 1 near apex of wing and then continuing as one vein (Corydalidae, Osmylidae, Ascalaphidae, Myrmeleontidae); radius 1 (R<sub>1</sub>) : long, parallel and close to Sc; united with Sc at apex (*vide supra*) or running separately (Sisyridae, Hemerobiidae, Dilaridae, Chrysopidae); radial sector (Rs) : usually pectinately branched, these sometimes forming anterior banksian line (Myrmeleontidae); media (M) : at most twice branched with branches sometimes forked; such forks seldom unite to form intra-median cell or im and then these forks beyond im fuse with branches of Rs forming pseudomedia or Psm (Chrysopidae); Cubitus (Cu) : sometimes basal forking near base forming cup (Myrmeleontidae), Cu again forked and forming Cu<sub>1</sub> and Cu<sub>2</sub> (Myrmeleontidae), branches of Cu<sub>1</sub> sometimes forming posterior banksian line in Cubital field (Myrmeleontidae), Cu<sub>2</sub> sometimes shortened (Myrmeleontidae), well developed (Corydalidae, Osmylidae, Dilaridae, Sisyridae, Ascalaphidae etc.);

pseudocubitus (Psc) consisting of a number of branches of Rs, branches of M and Cu<sub>1</sub> (Chrysopidae); anal (A) : 1A, 2A and 3A usually present; gradates : one or more series of cross veins running obliquely across wing usually on its distal half and more or less parallel with outer margin (Hemerobiidae, Chrysopidae, Osmylidae etc.). Legs (Fig. 8) : well-developed, slender or stout; forelegs being raptorial in family Mantispidae; each leg consisting of coxa, trochanter, femur, tibia and tarsus; forecoxae widely separated but coxae of the subsequent legs closely approximated and more closely associated with the main body of the thorax; tibiae generally with spurs; tarsi 5-segmented and sometimes provided with claws.

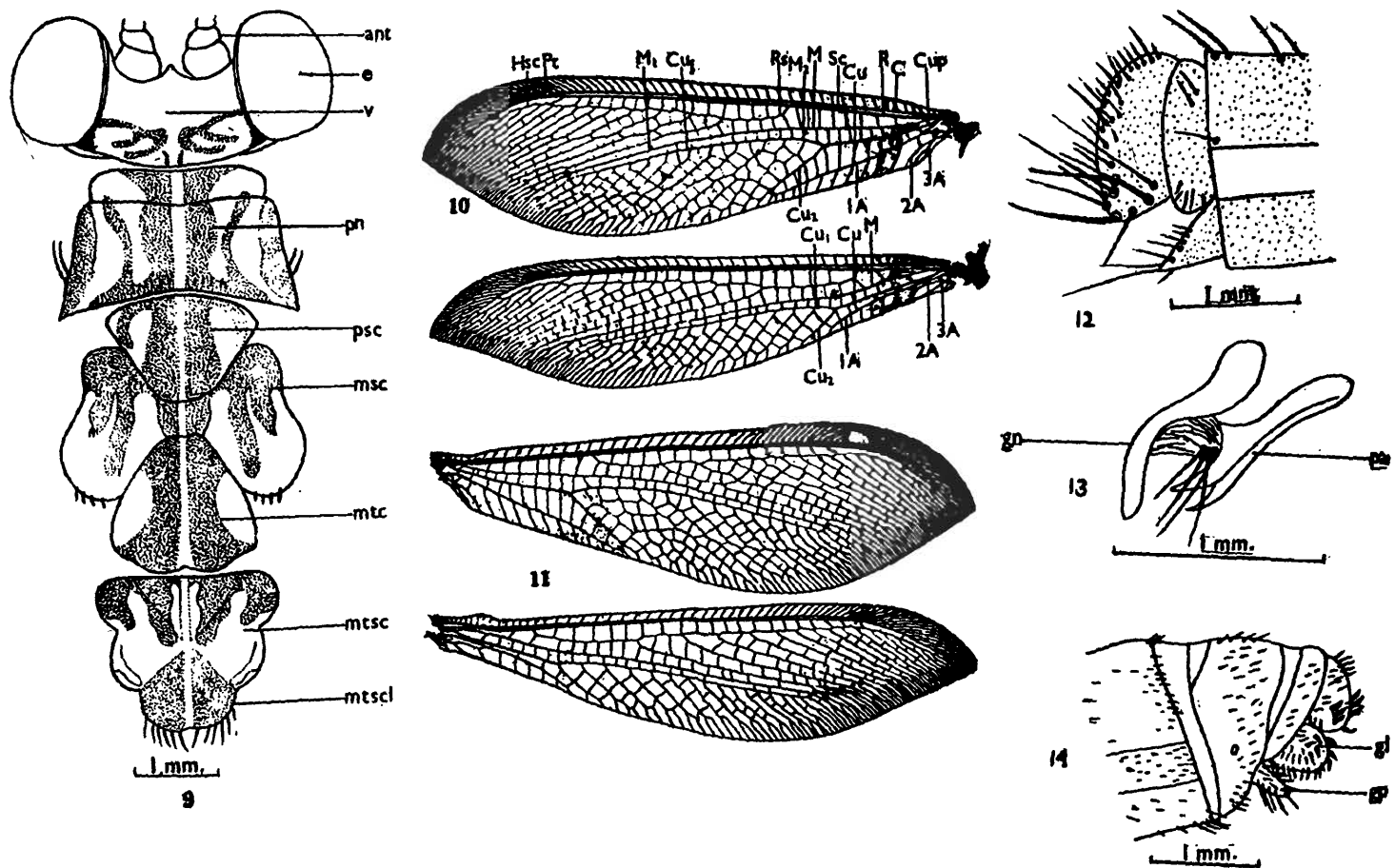
### Abdomen

*Abdomen* : 10-segmented, long and narrow; 1st segment short and membranous, but segments 2-8 well developed, 9th and 10th segments modified in various ways; 8 pairs of abdominal spiracles on segments 1-8.

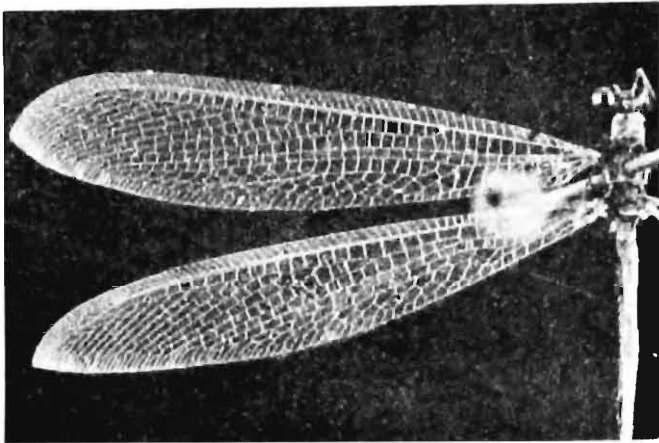
*Male genitalia* (Figs. 12-13) : 8th segment discleritous and usually separated from 9th which either synscleritous or discleritous; frequently, 9th tergite middorsally divided into a pair of plates; 9th sternite in majority of Neuroptera appearing as a simple plate of half ring, or an elongated one, covered from above by lower part of membrane that forms hind body wall of abdominal end; phallic structures usually situated between anus and 9th sternite; gonarcus of phallic complex, present in all families; situated dorso-basally as a generally arch-shaped structure with its arches directed downwards or inwards, may be divided dorsally into a pair of plates; when undivided, its median part frequently ending in a backwardly directed tooth-like process, mediuncus; each arch of gonarcus may have a lateral process, entoprocessus; in many genera, additional vertically movable structure, arcessus, attached to gonarcus below its central part present; below the gonarcus or fused with it a pair of parameres (pa) usually present; a peculiar organ, hypandrium internum present in most families and situated at base of ductus ejaculatorius just at the place where two gonoducts unite; anal segment present as three processes, e.g., anoprocessus (uppermost), catoprocessus (lowermost) and cercus (middle) in Corydalidae, united into a single large plate, ectoproct, in most Neuroptera, and cercus reduced to a callus-cerci bearing trichobothria; *Female genitalia* (Fig. 14) : 8th segment frequently appearing as a dorsal half rings; the tergite with often downwardly prolonged sides, which sometimes fused. The sternite generally missing; below 8th tergite instead of the sternite, a subgenital plate often divided longitudinally into a pair of plates present; 9th tergite appearing as half ring or longitudinally divided; very often lateral part of tergite reaching under surface of abdomen; two pairs of gonapophyses, e.g. gonapophyses laterales (gl.) and gonapophyses posteriores (gp.) from 9th segment forming long ovipositors in some families; more commonly gonapophyses laterales present as pair of short or elongated plates, proceeding from lower hind margin of 9th segment or in some Nemopteridae, ventrally behind secondary 8th sternite and below 9th tergite; lower parts of 9th segment and usually also gonapophyses laterales enclosing the genital chamber containing the openings of the common oviducts and bursa copulatrix; the spermatheca usually strongly sclerotised and pigmented, being very different in shape in different families; anal segment shaped much as in male; generally, however, each ectoproct appearing as a plate without processes and with or without a callus-cerci, and with trichobothria.



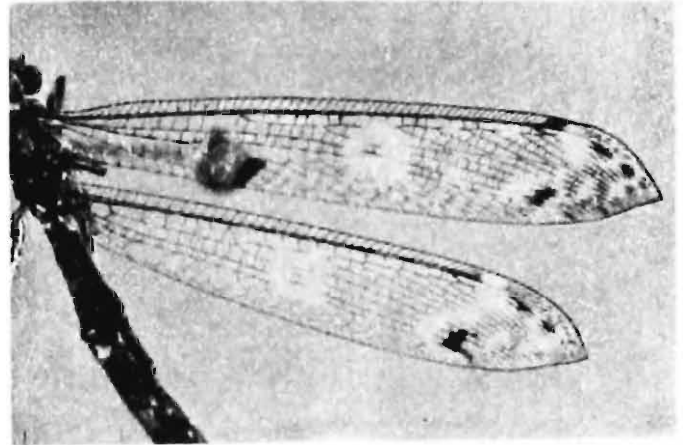
Figs. 1–8. *Distoleon verendus* (Walker). 1. Head (ep., epicranium; fl., flagellum; ped., pedicel; s., scape; ant. soc., antennal socket; fr., frons; e., compound eye; clp., clasper; lb., labrum; md., mandible; mxp., maxillary palpus; lbp., labial palpus); 2. Labrum (lb); 3. Mandible (md.); 4. Maxilla (mxp., maxillary palpus; ga., galea; la., lacinia; st., stipes; dc., distal cardo; bc., basal cardo); 5. Labium (m., mentum; pm., prementum; lbp., labial palpus; plm., palpomacula); 6. Antenna (fl., flagellum); 7. Parts of antenna magnified (an. soc., antennal socket; ped., pedicel; fl., flagellum); 8. Fore leg (cx., coxa; tr., trochanter; fe., femur; ti., tibia; sp., spur; tar., tarsus; cl., claw).



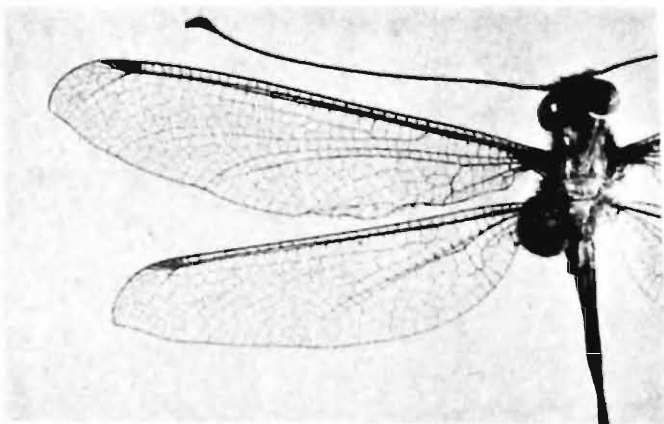
**Figs. 9–14.** 9. Head, prothorax meso- and metathorax (ant., antenna; e., eye; v., vertex; pn., pronotum; psc., prescutum of mesothorax; msc., mesoscutum of mesothorax; met., mesoscutellum of mesothorax; mtsc., metascutum of metathorax; mtscl., metascutellum of metathorax). 10. Fore wing (C., costa; R., radius; Sc., subcosta; Rs., radial sector; M., media; M<sub>1</sub>., anterior media; M<sub>2</sub>., posterior media; Cu., cubitus; Cu<sub>1</sub>., anterior cubitus; Cu<sub>2</sub>., posterior cubitus; Cup., basal fork of cubitus; 1A., first anal; 2A., second anal; 3A., third anal; pt., pterostigma; Hsc., hypostigmatic cell); hindwing - notation as in fig. 10; 11. fore and hind wing of female. 12. Tip of abdomen, male, lateral view; 13. Male genitalia (gn., gonarcus; pa., paramere); 14. Tip of abdomen, female, lateral view (gl. gonapophyses laterales; gp., gonapophyses posteriores).



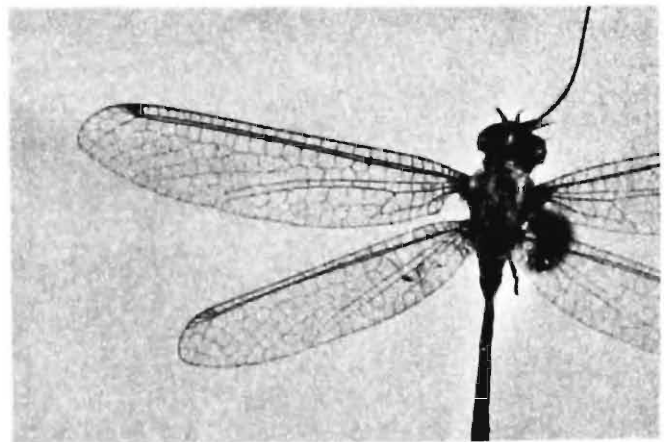
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Figs. 15–18. 15. *Myrmeleon assamensis* Ghosh; 16. *Distoleon sambalpurensis* Ghosh; 17. *Acheron trux trux* (Walker); 18. *Suphalomitus verbosus* (Walker).

## SYSTEMATIC ACCOUNT

## Key to Suborders

- Branches of veins rarely bifurcated at margin of wings; radial sector with a few additional branches..... MEGALOPTERA
- Branches of veins usually bifurcated at margin of wings; radial sector generally with numerous branches.....PLANIPENNIA

## Suborder MEGALOPTERA

## Family CORYDALIDAE Burmeister

Key to genera of the family *Corydalidae*

- Antennae pectinate in males but subserrate in females; head without tooth laterally; wings always with three crossveins between Radius I and Radial sector ..... *Neochauliodes* Weele
- Antennae never pectinate, moniliform; head with a spine or tooth laterally; wings with more than three radial crossveins between Radius I and Radial sector..... *Corydalus* Latreille

Genus I. *Neochauliodes* Weele

1909. *Neochauliodes* Weele, *Notes Leyden Mus.*, 30 : 259.

Type species : *Neochauliodes sinensis* (Walker)

*Distribution* : Bangladesh, Bhutan, China, India, Indonesia, Insulinde and Korea.

*Remark* : Only a single species of this genus is known from West Bengal.

1. *Neochauliodes simplex* (Walker)

1853. *Chauliodes simplex* Walker, *Cat. Brit. Mus. Neur.*, 2 : 200.

1981. *Neochauliodes simplex*, Ghosh, *Bull. Zool. Surv. India*, 4 (2) : 201.

*Distribution* : India : West Bengal (Darjeeling); Meghalaya. Bangladesh (Sylhet).

*Remark* : Ghosh (1981) recorded the species for the first time from India in Meghalaya State. It is now being recorded from West Bengal.

Genus II. *Corydalus* Latreille

1802. *Corydalus* Latreille, *Hist. nat. crus. et Ins.*, 3 : 290.

Type species : *Corydalus cornutus* (Linnaeus)

*Distribution* : America; China and India.

*Remark* : Only a single species is reported from West Bengal under the genus.

2. *Corydalus territans* Needham

1909. *Corydalus territans* Needham, *Rec. Indian Mus.*, 3 : 193.

*Distribution* : India : West Bengal (Darjeeling); Arunachal Pradesh and Sikkim.

*Remark* : The species is for the first time recorded from West Bengal.

## Suborder PLANIPENNIA

## Key to families of the suborder PLANIPENNIA

1. Wings and almost whole body covered with whitish waxy powder; veins and cross veins few in number; costal area without or with one or two cross veins near the root; veins with no terminal twiggings; very small insects with less than 10 mm. in wing expanse.....**CONIOPTERYGIDAE**  
Wings and body not covered with whitish powder; veins and cross veins usually numerous; costal area with many cross veins; veins usually with terminal twiggings; medium-sized or larger insects with more than 10 mm. in wing expanse .....2
2. Hindwings ribbon-like and much longer than forewing..... **NEMOPTERIDAE**  
Hindwings not ribbon-like and usually not longer than forewing.....3
3. Antennae moniliform or filliform, rarely pectinate, never clubbed, nor with thickened apex .....4  
Antennae gradually thickened towards apex or filliform with thickened apex ..... 10
4. Forewing normal and cursorial; prothorax short; femur not strongly thickened.....5  
Forewing raptorial; prothorax usually greatly elongated; femur strongly thickened.....  
.....**MANTISPIDAE**
5. Forewing with two or more apparent sectors arising from Radius .....6  
Forewing with only a single sector arising from Radius .....7
6. Antennae in both sexes moniliform; ocelli absent; with a few crossveins in wings; ovipositor not exerted.....**HEMEROBIIDAE**  
Antennae in males pectinate, in females otherwise; vertex with three prominent ocellus-like tubercles; with numerous crossveins in wings; ovipositor exerted and long .....**DILARIDAE**
7. Ocelli present; discal area of wings with many crossveins.....**OSMYLIDAE**  
Ocelli absent; discal area of wings with only a few crossveins .....8
8. Costal crossveins forked in forewing; cubitus 1 in hindwing parallel to hind border for a long distance.....**BEROTHIDAE**  
Costal crossveins usually not forked in forewing; cubitus 1 in hindwing not parallel to hind border .....9
9. Wing margin with trichosors or small hairy thickenings between tips of veins; crossvein between radius and media in hindwing long and placed longitudinally ..... **SISYRIDAE**  
Wing margin without trichosor or small hairy thickening; crossvein between radius and media in hind wing short and placed obliquely and transversely..... **CHRYSOPIDAE**
10. Antennae short, weakly clubbed or flattened towards apex; hypostigmatic cell in forewing elongate .....**MYRMELEONTIDAE**  
Antennae long, strongly clavate apically; hypostigmatic cell not elongated and differentiated .....  
.....**ASCALAPHIDAE**

## Family CONIOPTERYGIDAE

## Key to genera of the family CONIOPTERYGIDAE

1. Only one radio-medial crossvein in middle of forewing.....2  
Two radio-medial crossvein in middle of forewing ..... *Coniocompsa* Enderlein
2. M of hindwing unforked..... *Coniopteryx* Gertis  
M of hindwing forked ..... *Semidalis* Enderlein

Genus III. *Coniocompsa* Enderlein

1905. *Coniocompsa* Enderlein, *Zool. Anz.*, **29** : 225.

Type species : *Coniocompsa vesiculigera* Enderlein

*Distribution* : Hawaiian Islands in the East to Cape verde Islands in the West.

*Remark* : A single species of the genus is known from West Bengal.

3. *Coniocompsa indica* Withycombe

1925. *Coniocompsa indica* Withycombe, *Mem. Dept. Agric. India*, **9** : 7.

1977. *Coniocompsa indica*, Ghosh & Sen, *Rec. zool. Surv. India*, **9** : 7.

*Distribution* : India : West Bengal (Burdwan & Nadia); Tamil Nadu; Bihar.

*Remark* : Ghosh & Maulik (1985) recorded the species for the first time from West Bengal.

Genus IV. *Coniopteryx* Curtis

1934. *Coniopteryx* Curtis, *British Entomology*, **11**, pl. 528.

Type species : *Coniopteryx teneiformis* Curtis

*Distribution* : World-wide.

*Remark* : A single species of the genus is known from West Bengal.

4. *Coniopteryx (Coniopteryx) exigua* Withycombe

1925. *Coniopteryx exigua* Withycombe, *Mem. Dept. Agric. India*, **9** : 12.

1977. *Coniopteryx (Coniopteryx) exigua*, Ghosh & Sen, *Rec. zool. Surv. India*, **73** : 273.

*Distribution* : India : West Bengal (24-Parganas & Hooghly); Bihar; Jammu & Kashmir. Nepal; Pakistan.

*Remark* : Ghosh & Maulik (1985) recorded the species for the first time from West Bengal.

Genus V. *Semidalis* Enderlein

1905. *Semidalis* Enderlein, *Weiner Entomol. Zeitung*, **24** : 197.

*Distribution* : World-wide excepting for the Australian Region.

*Remark* : A single species of this genus is known from West Bengal.

5. *Semidalis aleyrodiformis* (Stephens)

1936. *Coniopteryx aleyrodiformis* Stephens, *Illustration of British Entomology, Mandibulata*, London, **6** : 240.

1977. *Semidalis aleyrodiformis*, Ghosh & Sen, *Rec. zool. Surv. India*, **73** : 280.

**Distribution** : India : West Bengal (24-Parganas, Burdwan & Nadia), Jammu & Kashmir; Bihar. Palaeartic Region : Norway, Sweden, Finland, Denmark, England, Scotland, Netherland, Luxemburg, France, Germany, Switzerland, Australia, Poland, Czechoslovakia, Jugoslavia, Rumania, Italy, Greece, Bulgaria, Turkey, Cyprus, USSR, Japan, China; Oriental Region; Taiwan, Nepal, Thailand and Malaya.

**Remark** : Ghosh and Maulik (1985) recorded the species for the first time from West Bengal.

Family NEMOPTERIDAE

Genus VI. *Croce* MacLachlan

1885. *Croce* MacLachlan, *Proc. ent. Soc. Lond.*, p. 378.

Type species : *Nemoptera filipennis* Westwood

**Distribution** : Africa; Australia; India; Iraq.

**Remark** : Only a single species of the genus is reported so far from West Bengal.

#### 6. *Croce filipennis* (Westwood)

1841. *Nemoptera filipennis* Westwood, *Proc. Zool. Soc. Lond.*, p. 13.

1921. *Croce filipennis*, Dover, *Rec. Indian Mus.*, 22 : 298.

1977. *Croce filipennis*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 298.

**Distribution** : India : West Bengal (Calcutta); Uttar Pradesh; Maharashtra; Gujarat; Orissa; Bihar.

Family MANTISPIDAE

Key to genera of the family MANTISPIDAE

Radial cells of both wings long and narrow; cubitus in hindwing not bending down towards first anal; both cubitus and first anal being connected with a crossvein; prothorax short and stout .....  
..... *Climaciella* Enderlein

Radial cells of both wings wide and somewhat angulated; cubitus in hindwing bending down towards first anal; cubitus either touching first anal or connected with it by a short crossvein; prothorax slender.....  
..... *Mantispa* Illiger

Genus VII. *Climaciella* Enderlein

1910. *Climaciella* Enderlein, *Stettin. ent. Ztg.*, 71 : 360.

Type species : *Mantispa brunnea* Say.

**Distribution** : Africa; China; India; Indonesia; Insulinde; Japan and Malay archipelago.

**Remark** : A single species of this genus is so far reported from West Bengal.

#### 7. *Climaciella quadrituberculata* (Westwood)

1852. *Mantispa quadrituberculata* Westwood, *Trans. R. etc. Soc. Lond.*, (N. S.) 1 : 264.

1962. *Climaciella quadrituberculata*, Kuwayama, *Pacif. Insects*, 4(2) : 379-381.

**Distribution** : India : West Bengal (Darjeeling). China; Indonesia; Insulinde; Japan; The Philippines and Vietnam.

**Remark** : Walker (1853) reported the species from "North Bengal" The author, however, on the basis of the material at hand records it from Darjeeling District of West Bengal.

#### Genus VIII. *Mantispa* Illiger

1798. *Mantispa* Illiger, Kugelann, *Verzeichniss der Kafer Preussens Gebaur*, Halle, p. 409.

Type species : *Mantispa styriaca* Poda

**Distribution** : Africa; America; Australia; China; India; Indonesia; New Guinea; The Philippines; Russia; Sri Lanka and Taiwan.

**Remark** : Three species of this genus are recorded from West Bengal and the distinguishing features of two species actually examined may be given in the following key. Remaining species has been reviewed from literature.

#### Key to species of the genus *Mantispa* Illiger

1. With dark streak on underside of mid-and hind femora; base of mid-and hind tibiae dark; pterostigma of wings dark brown ..... *femoralis* Banks
- Without dark streak on underside of mid-and hind femora; mid-and hind tibiae without dark base; pterostigma of wings reddish..... *indica* Westwood

#### 8. *Mantispa indica* Westood

1852. *Mantispa indica* Westwood, *Trans. R. ent. Soc: Lond.*, (N.S.) 1 : 268.

1933. *Mantispa indica*, Banks, *Indian Forest Rec.* (18) 6 : 2.

**Distribution** : India : West Bengal (24-Parganas & Darjeeling); Assam; Karnataka and Western Himalayas. Nepal.

#### 9. *Mantispa femoralis* Banks

1933. *Mantispa femoralis* Banks, *Indian Forest Rec.*, (18) 6 : 2.

1977. *Mantispa femoralis*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 283.

**Distribution** : India : West Bengal (24-Parganas); Karnataka.

**Remark** : The species is for the first time recorded from West Bengal.

#### \* 10. *Mantispa alicante* Banks

1913. *Mantispa alicante* Banks, *Trans. Am. ent. Soc*; 39 : 208.

1977. *Mantispa alicante*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 282.

**Distribution** : West Bengal, South India, Bihar.

**Remark** : Due to lack of relevant material for study the author reserves his comment on the species.

### Family HEMEROBIIDAE

#### Key to genera of the family HEMEROBIIDAE

1. Ninth tergite in male produced into a long distal projection; aedeagus absent ..... *Psectra* Hagen
- Ninth tergite in male not produced; aedeagus present..... 2

2. Ninth sternite in male very much elongated, tubular and produced beyond apex of anal plate;  $M_{3+4}$  and  $Cu_1$  in hindwing separated.....*Mixomicromus* Ghosh
- Ninth sternite in male short and not produced beyond apex of anal plate;  $M_{3+4}$  and  $Cu_1$  in hindwing fused.....*Micromus* Rambur

#### Genus IX. *Psectra* Hagen

1866. *Psectra* Hagen, *Stettin Ent. Zeit.*, 27 : 376.

Type species : *Hemerobius diptera* Burmeister.

*Distribution* : Europe; Siberia; North America; Asia Minor, Japan; India; Sri Lanka; Borneo; Malaya; The Philippines and Solomon Islands.

*Remark* : A single species is hitherto recorded from West Bengal.

#### 11. *Psectra iniqua* (Hagen)

1859. *Hemerobius iniqua* Hagen, *Verh. zool. bot. Ges. Wien.*, 9 : 208.

1966. *Psectra iniqua*, Tjeder, *South African animal Life*, 8 : 329.

*Distribution* : India : West Bengal (Calcutta and 24-Parganas); Bihar; South India; Sri Lanka; Thailand and Taiwan.

*Remark* : Needham (1909) described *Annandalia curta* from Calcutta and Nakahara (1960) gave an elaborate account of *Annandalia iniqua* Hagen from the material received by him from the Oriental region. Banks (1932) stated that *curta* Needham is the same as *iniqua* (Hagen) described from Sri Lanka. Kimmins examined the male genitalia of a specimen present in the British Museum collections and advocated his view that the male of *Annandalia* examined by him is a *Psectra* and the genus *Annandalia* should be sunk as a synonym of *Psectra*. On the basis of my study of the species *iniqua* from 24-Parganas, West Bengal, I am rather convinced to place the species under the genus *Psectra*.

#### Genus X. *Mixomicromus* Ghosh

1977. *Mixomicromus* Ghosh, *Proc. Indian Acad. Sci.*, 86B (no. 4) : 235.

Type species : *Mixomicromus lampus* Ghosh.

*Distribution* : India.

*Remark* : Ghosh (1977) erected the genus from the material collected during Maharashtra Survey. Only a single species is reported from West Bengal.

#### 12. *Mixomicromus lampus* Ghosh

1977. *Mixomicromus lampus* Ghosh, *Proc. Indian Acad. Sci.*, 86B (no. 4) : 235-237, figs., 1-10.

*Distribution* : India : West Bengal (24-Parganas and Burdwan); Maharashtra.

*Remark* : Ghosh (1977) described the species as new to science. It is for the first time recorded from West Bengal.

Genus XI. *Micromus* Rambur

1842. *Micromus* Rambur, *Hist. nat. Ins. Neur.*, 416.

Type species : *Hemerobius variegatus* Fabricius.

*Distribution* : World-wide.

*Remark* : A single species of the genus is recorded from West Bengal.

13. *Micromus timidus* Hagen

1853. *Micromus timidus* Hagen, *verh. K. Preuss. Akad. Wiss. zu Berlin*, p. 418.

1966. *Micromus timidus*, Tjeder, *South African Animal Life*, 8 : 313.

*Distribution* : South and Central Africa; Malagasy; Seychelles; India (West Bengal : Calcutta; 24-Parganas; Burdwan; South India) Sri Lanka; Thailand; Malaya; Sumatra; Java; Bali; Taiwan; Timor Island; Okinawa Island; The Philippines; Buru Island; New Guinea; Australia; New Caledonia; New Hebrides; Fiji and Somoa Islands.

*Remark* : The species is for the first time recorded from West Bengal. Tjeder (1966) gave an elaborate illustrative account of this species.

\* Genus XII. *Neuronema* MacLachlan

1869. *Neuronema* MacLachlan, *Entomologists mon. Mag.*, 6 : 27.

Type species : *Hemerobius decisus* Walker

*Distribution* : Japan; Formosa; Western China; India.

*Remark* : A single species of this genus is recorded so far from West Bengal.

\* 14. *Neuronema decisum* (Walker)

1859. *Hemerobius decisus* Walker, *Trans. R. ent. Soc. Lond.*, (N.S.) 5 : 185.

1977. *Neuronema decisum*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 289.

*Distribution* : India : West Bengal (Darjeeling); Punjab.

*Remark* : A careful look into Kimmins (1943) publication reveals that MacLachlan (1869) was justified in transferring Walker's species to the genus *Neuronema*.

## Family DILARIDAE

Genus XIII. *Dilar* Rambur

1842. *Dilar* Rambur, *Hist. nat. Ins. Neur.*, p. 445.

Type species : *Dilar nevadensis* Rambur

*Distribution* : Europe; India; Taiwan and Japan.

*Remark* : A single species of this genus so far recorded from West Bengal.

15. *Dilar hornei* MacLachlan

1859. *Dilar hornei* MacLachlan, *Entomologists mon. Mag.*, 5 : 240.

1977. *Dilar hornei*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 281.

*Distribution* : India : West Bengal (Darjeeling; North-west Himalayas).

**Remark** : The species is for the first time recorded from West Bengal.

### Family OSMYLIDAE

#### Key to genera of the family OSMYLIDAE

1. Costal crossveins united by transverse veinlets to form several irregular rows of small cellules....  
..... ***Hyposmylus*** MacLachlan
- Costal crossveins without transverse veinlets; only with a single row of costal cells.....2
2. Wings without hyaline fenestrate patches and with or without embossed spot on hind margin of forewing.....***Spilosmylus*** Kolbe
- Wings with hyaline fenestrate patches and without any embossed spot on hind margin of forewing..... ***Thyridosmylus*** Kruger

#### Genus XIV. *Hyposmylus* MacLachlan

1870. *Hyposmylus* MacLachlan, *Entomologists mon. Mag.*, 8 : 200.

Type species : *Osmylus punctipennis* Walker.

**Distribution** : India and Japan.

**Remark** : Only a single species is recorded from West Bengal.

#### 16. *Hyposmylus punctipennis* (Walker)

1859. *Osmylus punctipennis* Walker, *Trans. R. ent. Soc. Lond.*, (N.S.) 5 : 183.

1977. *Hyposmylus punctipennis*, MacLachlan, *Entomologists mon. Mag.*, 6 : 200.

**Distribution** : India : West Bengal (Darjeeling); Meghalaya.

**Remark** : The species, so far reported, is endemic in India.

#### Genus XV. *Spilosmylus* Kolbe

1897. *Spilosmylus* Kolbe, *Dietrich Reimer*, 3 : 32.

Type species : *Spilosmylus africanus* Kolbe

**Distribution** : Africa; Australia; China; Taiwan; India; Sri Lanka; Indonesia; Japan; New Guinea; The Philippines.

**Remark** : One indetermined species from West Bengal are reported in the paper.

#### 17. *Spilosmylus* sp.

**Remark** : A single interesting female specimen from Darjeeling district of West Bengal is available for study. Due to the paucity of material particularly of male it is not possible by the author to describe the species at the moment. However, the distinctive features of the forewing may be given as follows : Presence of brown spot on both side of pterostigma and the brownish patches in the space between Sc and R; the absence of brown horny tubercle and presence of prominent brown clouds beyond middle of cubital cell and in the inner and outer gradate series.

Genus XVI. *Thyridosmylus* Krüger1913. *Thyridosmylus* Krüger, *Stettin. ent. ztg.*, 74 : 87.Type species : *Osmylus langii* MacLachlan*Distribution* : India.

*Remark* : Altogether three species have so far been recorded from West Bengal of which the distinguishing features of two species are given in the following key and the remaining species is reviewed from literature due to lack of relevant material for study.

Key to species of the genus *Thyridosmylus* KrügerVenation of forewing almost entirely darkbrown .....*perspicillaris* (Gerstaecker)Venation of forewing pale, marked with piceous dots of the hair bases .....*langii* MacLachlan18. *Thyridosmylus perspicillaris* Gerstaecker1884. *Osmylus perspicillaris* Gerstaecker, *MT. Vorpomm., Rugen*, 16 : 46.1977. *Thyridosmylus perspicillaris*, Ghosh & Sen, *Rec. zool. Surv. India.*, 73 : 286.*Distribution* : India : West Bengal (Darjeeling), Sikkim, Tamil Nadu; Kerala.*Remark* : The following subspecies is recorded from West Bengal.19. *Thyridosmylus perspicillaris minor* Kimmins1942. *Thyridosmylus perspicillaris minor* Kimmins, *Ann. Mag. nat. Hist.*, 11(9) : 851-852.1977. *Thyridosmylus perspicillaris minor*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 286.*Distribution* : India : West Bengal (Darjeeling).

*Remark* : Kimmins (1942) recorded the subspecies from Sikkim. But the present report from Darjeeling constitutes a new locality record for West Bengal.

20. *Thyridosmylus langii* MacLachlan1870. *Osmylus langii* MacLachlan, *Entomologists mon. Mag.*, 6 : 197.1977. *Thyridosmylus langii*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 286.*Distribution* : India : West Bengal (Darjeeling).

*Remark* : Kimmins (1942) recorded the species from North India and also described a new subspecies namely, *T. langii angustus* from Meghalaya. So, the report of the species from Darjeeling constitutes a new locality record for West Bengal.

## Family BEROETHIDAE

Genus XVII. *Berotha* Walker1859. *Berotha* Walker, *Trans. ent. Soc. Lond.*, (N.S.) 5 : 186.Type species : *Berotha insolita* Walker.*Distribution* : Oriental region.*Remark* : A single species of this genus is known from West Bengal.

21. *Berotha insolita* Walker1859. *Berotha insolita* Walker, *Trans. ent. Soc. Lond.*, (N.S.) 5 : 187.1983. *Berotha insolita*, Aspöck, *Ann. Naturhist. Mus. Wien.*, 84/B : 456.*Distribution* : India : West Bengal (Burdwan Meghalaya; Abor (E. Himalayas); Karnataka).*Remark* : The species is for the first time recorded from West Bengal.

## Family SISYRIDAE

Genus XVIII. *Sisyra* Burmeister1839. *Sisyra* Burmeister, *Handb. Entomon.*, 2 : 975.Type species : *Hemerobius fuscatus* Fabricius.*Distribution* : Africa; Australia; China; Cuba; Europe; Honduras; India; Japan; Lower Amazonas; North America and the Philippines.*Remark* : A single species of this genus is so far recorded from West Bengal.22. *Sisyra indica* Needham1909. *Sisyra indica* Needham, *Rec. India. Mus.*, 3 : 206.1977. *Sisyra indica*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 287.*Distribution* : India : West Bengal (Calcutta).

## Family CHRYSOPIDAE

## Key to the genera of the family CHRYSOPIDAE

1. Pseudomedia of forewing merging with inner gradate series of crossveins; jugal lobe of forewing large ..... *Nothochrysa* MacLachlan  
Pseudomedia of forewing merging with outer gradate series of crossveins; jugal lobe of forewing absent ..... 2
2. Costal area at first narrow, then gradually widening ..... 3  
Costa steep at base ..... *Ankylopteryx* Brauer
3. Forewing with only three rows of gradate veinlets ..... 4  
Forewing with irregularly distributed gradate veinlets over the disc ..... *Tumeochrysa* Needham
4. Small to medium-sized insects; intra-median cell usually subtriangular; basal subcostal crossvein beyond medio-cubital crossvein ..... 5  
Robust species, usually large to very large; intramedian cell usually subquadrangular; basal subcostal crossvein located about midway between first medio-cubital crossvein and furcation of media ..... 8
5. Sternite 8 & 9 in male completely fused ..... 6  
Sternite 8 & 9 in male separated by intersegmental membrane ..... *Chrysopa* Leach
6. Genitalia in male with tignum ..... 7  
Genitalia in male without tignum ..... *Glenochrysa* Esben-Petersen

7. Genitalia in male with gonapsis.....*Anisochrysa* Nakahara  
 Genitalia in male without gonapsis .....*Chrysoperla* Steinmann
8. Gonarcus in male with entoprocessus.....*Brinkochrysa* Tjeder  
 Gonarcus in male without entoprocessus .....*Italochrysa* Principi

**Genus XIX. *Nothochrysa* MacLachlan**

1868. *Nothochrysa* MacLachlan, *Trans. ent. Soc. Lond.*, p. 195.

Type species : *Chrysopa fulviceps* Stephens

*Distribution* : Great Britain; North America and India.

*Remark* : A single species of the genus, as recorded by Needham (1909) from West Bengal is dealt with here.

**23. *Nothochrysa indigena* Needham**

1909. *Nothochrysa indigena* Needham, *Rec. Indian Mus.*, 3 : 203.

1977. *Nothochrysa indigena*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 297.

*Distribution* : India : West Bengal (Calcutta).

*Remark* : Recently, the author redescribed the species along with the illustrations of the wings and genitalia and confirmed that Needham (1909) was justified to include the species *indigena* under the genus *Nothochrysa*. The paper has been communicated for publication (*vide* Ghosh : in press).

**Genus XX. *Ankylopteryx* Brauer**

1864. *Ankylopteryx* Brauer; *Verh. zool. bot. Ges. Wien.*, 14 : 889.

Type species : *Chrysopa venusta* Hagen

*Distribution* : Africa; China; Cambodia; India; Malagasy; Malaysia; The Philippines; Singapore and Taiwan.

*Remark* : A single species of this genus has so far been reported from West Bengal.

**24. *Ankylopteryx octopunctata* (Fabricius)**

1793. *Hemerobius octopunctatus* Fabricius, *Ent. Syst.*, 2 : 85.

1981. *Ankylopteryx octopunctata*, Ghosh, *Bull. zool. Surv. India*, 3 (3) : 269.

*Distribution* : India : West Bengal (Calcutta, 24-Parganas, Nadia, Burdwan); South India; Western Himalayas; Andamans, Lakshadweep Island. China; Insulinde.

**Genus XXI. *Tumeochrysa* Needham**

1909. *Tumeochrysa* Needham, *Rec. Indian Mus.*, 3 : 204.

Type species : *Tumeochrysa indica* Needham

*Distribution* : India and China.

*Remark* : A single species was described by Navas (1930) from West Bengal as *Chrysoplecta cirerai*. Banks (1940) synonymised *Chrysoplecta* Navas with *Tumeochrysa* Needham. Hence the species, *Tumeochrysa cirerai* is dealt with here.

\* 25. *Tumeochrysa cirerai* (Navas)1930. *Tumeochrysa cirerai* Navas, *Rev. Acad. Sci.*, 13 : 43.1977. *Tumeochrysa cirerai*, Ghosh & Sen, *Rec. zool. Surv. India*, 93 : 296.*Distribution* : India : West Bengal (Darjeeling).*Remark* : Due to lack of relevant material for study it is not possible to make any comment on the species.Genus XIII. *Chrysopa* Leach1815. *Chrysopa* Leach, *Artikel entomology-Brewster, Edinburgh Encyclopaedia*, 9(1) : 138.Type species : *Chrysopa perla* (Linnaeus)*Distribution* : Palaearctic, Oriental (India) and Nearctic region of the globe.*Remark* : A single species, namely, *Chrysopa septempunctata* Wesmael is hitherto known under the genus *Chrysopa* s. str. But other four species mentioned below are also kept under this genus due to the paucity of material specially that of males at hand. However, amongst a total of five species considered here only three species have been actually examined and other two species have been reviewed from literature.Key to species of the genus *Chrysopa* Leach

1. Intra-median cell ending beyond first radio-medial crossvein..... *septempunctata* Wesmael  
    Intra-median cell ending on or before first radio-medial crossvein..... 2
2. Inner row of gradate crossveins in forewing nearer to outer row than to radial sector.....  
    ..... *virgestes* Banks  
    Inner row of gradate crossveins in forewing equidistant to both outer row and radial sector.....  
    ..... *ignobilis* Walker

26. *Chrysopa septempunctata* Wesmael1841. *Chrysopa septempunctata* Wesmael, *Bull. 1' Acad. Brux.*, 8 : 210.1977. *Chrysopa septempunctata*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 294.*Distribution* : India : West Bengal (Darjeeling); Europe; Iran; Mauritius; Turkestan.*Remark* : The species is for the first time recorded from West Bengal.27. *Chrysopa virgestes* Banks1911. *Chrysopa virgestes* Banks, *Proc. ent. Soc. Wash.*, 13 : 103.1977. *Chrysopa virgestes*, Ghosh & Sen, *Rez. zool. Surv. India*, 73 : 295.*Distribution* : India : West Bengal (Darjeeling, Burdwan); Assam and Karnataka*Remark* : The author has recorded it from West Bengal and the paper is in press.28. *Chrysopa ignobilis* Walker1858. *Chrysopa ignobilis* Walker, *Trans. ent. Soc. Lond.*, 5 : 183.1977. *Chrysopa ignobilis*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 392.

*Distribution* : India : West Bengal (Calcutta).

*Remark* : The species was recorded from West Bengal. Walker (1858) reported the species from "Hindustan" without specifying the exact locality.

\* 29. *Chrysopa notata* Navas

1910. *Chrysopa notata* Navas, *Broteria S. Fiel.* 9 : 55.

1977. *Chrysopa notata*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 293.

*Distribution* : India : West Bengal (Darjeeling).

*Remark* : Navas (1910a) described the species from West Bengal. Due to the dearth of material it is not possible to provide comment on the species.

\* 30. *Chrysopa guttata* (Navas)

1929. *Cintameva guttata* Navas, *Rev. Acad. Sci.*, 13 : 42.

1977. *Chrysopa guttata*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 296.

*Distribution* : India : West Bengal (Darjeeling).

*Remark* : The author reserves his comment on the species as the material is not available for study.

Genus XXIII. *Glenochrysa* Esben - Petersen

1920. *Glenochrysa* Esben-Petersen, *Ann. South Afr. Mus.*, 17 : 520.

Type species : *Glenochrysa typica* Esben-Petersen.

*Distribution* : Africa; Sunda Islands; India; Australia; North America; West Indies.

*Remark* : A single species is hitherto recorded from India.

31. *Glenochrysa marmorata* (Needham)

1909. *Eremochrysa marmorata* Needham, *Rec. Indian Mus.*, 3 : 205.

1940. *Glenochrysa marmorata* Kimmins, *Ann. Mag. nat. Hist.*, 11 (5) : 449.

*Distribution* : India : West Bengal (Nadia); Assam; South Andamans.

*Remark* : The author recorded the species from West Bengal and the paper is in press.

Genus XXIV. *Anisochrysa* Nakahara

1955. *Anisochrysa* Nakahara, *Kontyu*, 23 (4) : 145.

Type species : *Anisochrysa paradoxa* Nakahara

*Distribution* : Africa; Europe; Asia including India; Australia; Islands in the Pacific.

*Remark* : Two species under the genus have been reported from West Bengal.

Key to species of the genus *Anisochrysa* Nakahara

Gradate crossveins of forewing black; all other crossveins black at each end; gena with red mark ..

.....*alcestes* Banks

Gradate crossveins of forewing and majority of other crossveins pale; gena with black mark.....  
 .....*boninensis* Okamoto

**32. *Anisochrysa alcestes* (Banks)**

1911. *Chrysopa alcestes* Banks, *Proc. ent. Soc. Wash.*, **13** : 102.

*Distribution* : India : West Bengal (Burdwan); Bonin Island.

*Remark* : The author has recorded this species for the first time West Bengal and suggested new combination under the genus *Anisochrysa* Nakahara (Ghosh, 1990).

**33. *Anisochrysa boninensis* (Okamoto)**

1914. *Chrysopa boninensis* Okamoto, *Jour. coll. Agr. Tohoku univ.*, **6** : 62.

*Distribution* : Japan; Ryuku Is., Bobin Is., Chagos Is., Central and South Africa, Cape verde Is., Taiwan, India : West Bengal (24-Parganas).

*Remark* : The author has recorded this species from India including West Bengal and suggested new combination under the genus *Anisochrysa* Nakahara (Ghosh, 1990).

**Genus XXV. *Chrysoperla* Steinmann**

1964. *Chrysoperla* Steinmann, *Ann. Hist. nat. Mus. Nation. Hung. zool.*, **56** : 260.

Type species : *Chrysopa carnea* Stephens

*Distribution* : All major zoogeographical regions of the globe.

*Remark* : A single species of this genus is hitherto recorded from West Bengal.

**34. *Chrysoperla orestes* (Banks)**

1911. *Chrysopa orestes* Banks, *Proc. ent. Soc. Wash.*, **13** : 102.

*Distribution* : India : West Bengal (Nadia, 24-Parganas, Burdwan); Bihar; Orissa.

*Remark* : The author recorded the species (Ghosh, 1990) from West Bengal and suggested new combination with the genus *Chrysoperla* Steinmann.

**Genus XXVI. *Brinkochrysa* Tjeder**

1966. *Brinkochrysa* Tjeder, *South Afr. Life*, **12** : 360.

Type species : *Chrysopa (Brinkochrysa) beri* Tjeder

*Distribution* : India; Micronesia; South Africa; Congo; Cape verde Islands.

*Remark* : A single species of the genus has been reported from West Bengal.

**35. *Brinkochrysa scelestes* (Banks)**

1911. *Chrysopa scelestes* Banks, *Proc. ent. Soc. Washington*, **13** : 103.

*Distribution* : India : West Bengal (Darjeeling); Bihar. Micronesia.

*Remark* : The author not only recorded the species from West Bengal but also combined the species with the genus *Brinkochrysa* Tjeder (Ghosh, 1990).

Genus XXVII. *Italochrysa* Principi1946. *Italochrysa* Principi, *Bull. Ist. Ent. univ. Bologna*, 15 : 86.*Distribution* : India, Abyssinia, Central and South Africa, Japan, Palestine, Iran, The Sunda Islands, China, Australia.*Remark* : The genus was for the first time recorded from West Bengal (*vide* Ghosh, 1990). But the species has not been determined due to the lack of relevant material for study.36. *Italochrysa* sp.*Distribution* : India : West Bengal (Darjeeling).Genus XXVIII. *Chrysopidia* Navas1910. *Chrysopidia* Navas, *Broteria*, 9 : 54.Type species : *Chrysopidia nigrata* Navas*Distribution* : India and Nepal.*Remark* : Two species of this genus are hitherto reported from West Bengal.\* 37. *Chrysopidia nigrata* Navas1910. *Chrysopidia nigrata* Navas, *Broteria*, 9 : 55.1977. *Chrysopidia nigrata*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 295.*Distribution* : India : West Bengal (Darjeeling).*Remark* : No comment is possible due to the dearth of material for study.\* 38. *Chrysopidia numerosa* Navas1914. *Chrysopidia numerosa* Navas, *Rusak. ent. Obozr.*, 14 : 11.1977. *Chrysopidia numerosa*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 295.*Distribution* : India : West Bengal (Darjeeling).*Remark* : *vide* Supra.

## Family MYRMELEONTIDAE

## Key to genera of the family MYRMELEONTIDAE

1. Hindwing with a single crossvein before origin of radial sector ..... 7  
    Hindwing with four or more crossveins before origin of radial sector.....2
2. In hindwing first anal not connected directly to hindmargin by crossveins but to postanal by a series of crossveins..... *Palpares* Rambur  
    In hindwing, first anal connected directly to hindmargin by several crossveins.....3
3. Spurs of hind tibia longer than basal joint of tarsus and curved; body very hairy.....  
    .....*Centroclisis* Navas  
    Spurs of hind tibia not longer than basal joint of tarsus and almost straight; body less hairy .....4

4. Branches of radial sector bent to form a straight line through middle of apical part of wings .....5  
 No such line through apical part of wings.....6
5. Wings rather elongate, apex of forewing pointed; wing membrane speckled or with streaks along gradates and not heavily marked or banded..... *Cueta* Navas  
 Wings short and broad; forewing rounded at apex; wing membrane heavily marked or banded with dark brown.....*Nesoleon* Banks
6. Radial sector arising before cubital fork in forewing; large number of costal cells with connecting veinlets before pterostigma of forewing.....*Hagenomyia* Banks  
 Radial sector arising much beyond cubital fork in forewing; costal cells mostly simple and without connecting veinlets before pterostigma of forewing .....: *Myrmeleon* Linnaeus
7. Forks of cubitus in forewing parallel for a distance; first anal also parallel to these forks .....  
 .....*Creoleon* Tillyard  
 Fork of cubitus in forewing divergent; first anal not parallel to upper fork of cubitus..... 8
8. Forewing with anterior banksian line.....*Gatzara* Navas  
 Forewing without anterior banksian line.....9
9. Spurs of hind tibia hardly longer than basal two tarsal segments taken together.....  
 .....*Neuroleon* Navas  
 Spurs of hind tibia always longer than basal two tarsal segments taken together.....  
 .....*Distoleon* Banks

#### Genus XXIX. *Palpares* Rambur

1842. *Palpares* Rambur, *Hist. nat. Ins. Neuropt.*, p. 365.

Type species : *Myrmeleon libelluloides* Latreille

*Distribution* : India; Western & Eastern Africa; Lebanon; Yemen; Iran; Pakistan.

*Remark* : The genus comprises of two species from West Bengal of which one has been examined and the other has been reviewed from literature.

#### 39. *Palpares pardus* (Rambur)

1842. *Myrmeleon pardus* Rambur, *Hist. nat. Ins. Neuropt.*, p. 375.

1984. *Palpares pardus*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, no, 52 : 12.

*Distribution* : India : West Bengal (Bankura, Birbhum, Jalpaiguri; North-Western Himalayas); Madhya Pradesh; Maharashtra; Southern Peninsula; Orissa; Bihar; Sikkim; "North India"

#### \* 40. *Palpares patiens* Walker

1853. *Myrmeleon patiens* Walker, *Cat. Brit. Mus. neur.*, p. 305.

1984. *Palpares patiens*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, no. 52 : 12.

*Distribution* : India : West Bengal; "North India"; Orissa.

**Remark** : Due to the paucity of material from West Bengal it is not possible by the author to examine the species from the state.

Genus XXX. *Centroclisis* Navas

1909. *Centroclisis* Navas, *Bull. Catalana Hist. Nat.*, 6 : 71.

Type species : *Acanthaclisis cervina* Gerstaecker.

**Distribution** : India and Africa

**Remark** : Two species of this genus are hitherto known from India which may be differentiated with the following key.

Key to species of the genus *Centroclisis* Navas

Pronotum longer than broad and more or less dark; forewing with a distinct black mark before pterostigma, at apex of media and first cubitus and also second cubitus.....*horridus* (Walker)

Pronotum broader than long and yellow; forewing with a broad, median, longitudinal, dark brown stripe; forewing without black mark as above.....*eustalacta* (Gerstaecker)

41. *Centroclisis horridus* (Walker)

1853 *Myrmeleon horridus* Walker, *Cat. Brit. Mus. Neur.* p. 336.

1984 *Centroclisis horridus*, Ghosh, *Rec. zool. Surv. India*, Occ. paper, No. 52 : 36.

**Distribution** : India : West Bengal (Calcutta, Midnapur), Tamil Nadu; Orissa; Bihar; Assam.

42. *Centroclisis eustalacta* (Gerstaecker)

1863. *Acanthaclisis eustalacta* Gerstaecker, *Stettin ent. ztg.*, 24: 378.

1984. *Centroclisis eustalacta*, Ghosh, *Rec. zool. Surv. India*, Occ. Paper, No. 52: 37.

**Distribution** : India : West Bengal (Midnapur); Uttar Pradesh; Orissa; Lakshadweep Island.

**Remark** : The species is for the first time recorded from West Bengal.

Genus XXXI. *Nesoleon* Banks

1909. *Nesoleon* Banks, *J. N. York, ent. Soc.*, 17: 4.

Type species : *Nesoleon braunsi* Banks

**Distribution** : India; North Africa; Taiwan.

**Remark** : A single species is hitherto reported from West Bengal.

43. *Nesoleon perpunctatus* Banks

1931. *Nesoleon perpunctatus* Banks, *Psyche*, 38: 60.

1984. *Nesoleon perpunctatus*, Ghosh, *Rec. zool. Surv. India*, Occ. paper No. 52:32.

**Distribution** : India : West Bengal (Bankura, Midnapur); Bihar; Madhya Pradesh; Andhra Pradesh.

**Remark** : The species is for the first time recorded from West Bengal.

Genus XXXII. *Hagenomyia* Banks

1911. *Hagenomyia* Banks, *Ann. ent. Soc. Ann.*, 4: 8.

Type species : *Myrmeleon tristis* Hagen

*Distribution* : India; Africa; China; Korea; Japan and Australia.

*Remark* : Two species of this genus are hitherto reported from West Bengal, of which one has been examined and the other has been reviewed from literature.

44. *Hagenomyia sagax* (Walker)

1853. *Myrmeleon sagax* Walker, *Cat. Brit. Mus. Neur.*, p. 382.

1971. *Hagenomyia sagax*, Nakahara, *Kontyu*, 39(1): 61.

*Distribution* : India : West Bengal (Darjeeling); Himachal Pradesh; Uttar Pradesh; Assam; Taiwan.

\*45. *Hagenomyia monticolla* (Navas)

1937. *Baliga monticolla* Navas, *C.R. Congr. int. zool.* 12: 1475.

1984. *Hagenomyia monticolla*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No.52: 21.

*Distribution* : India : West Bengal (Darjeeling).

*Remark* : The species has not been studied by the author from West Bengal due to the non-availability of the material at hand from the State. For other comments on the species, Ghosh (1984) may be consulted.

Genus XXXIII *Myrmeleon* Linnaeus

1867. *Myrmeleon* Linnaeus, *Syst. nat., Ed.* 12:313.

Type species : *Myrmeleon formicarius* Linnaeus

*Distribution* : World-wide.

*Remark* : Four species including one indetermined, are reported from West Bengal of which the specimens determined upto species level may be differentiated with the following key.

Key to species of the genus *Myrmeleon* Linnaeus

1. Pronotum blackish dorsally and without black stripe; pterostigma indistinct in both wings; majority of veins and crossveins in forewing with brown bands .....2  
 Pronotum yellow with two longitudinal black stripes at middle; pterostigma distinct in both wings; majority of veins and crossveins in forewing without brown bands ..... *assamensis* Ghosh
2. Vertex completely black; forewing without brown mark near pterostigma .....*montanus* Navas  
 Vertex black but with two yellow spots; forewing with a brown mark near pterostigma .....  
 ..... *clothilde* Banks

46. *Myrmeleon assamensis* Ghosh

1984. *Myrmeleon assamensis* Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52: 23.

*Distribution* : India : West Bengal (Darjeeling); Assam.

*Remark* : The species (Fig. 15) is for the first time recorded from West Bengal.

47. *Myrmeleon clothilde* Banks

1913. *Myrmeleon clothilde* Banks, *Trans. Amer. ent. Soc.*, 39: 223.

1984. *Myrmeleon clothilde*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52: 22.

*Distribution* : India : West Bengal (Darjeeling, Hooghly); Himachal Pradesh; Bihar; Orissa.

*Remark* : The species is for the first time reported from West Bengal.

48. *Myrmeleon montanus* Navas

1914. *Myrmeleon montanus* Navas, *Ann. Soc. Sci*, 38: 234.

1984. *Myrmeleon montanus*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52: 24.

*Distribution* : India : West Bengal (Darjeeling).

49. *Myrmeleon* sp.

*Distribution* : India : West Bengal (Nadia and Howrah District).

*Remark* : Literature being inaccessible four specimens collected from Nadia and Howrah Districts remain unidentified.

\*50. *Myrmeleon pulverulentus* Rambur

1842. *Myrmeleon pulverulentus* Rambur, *Hist. nat. Ins. Neuropt.* p. 392.

1984. *Myrmeleon pulverulentus*, Ghosh, *Rec. zool. Surv. India*, No. 52: 25.

*Distribution* : India : West Bengal.

*Remark* : vide Ghosh (1984).

\*51. *Myrmeleon punctulatus* Rambur

1842. *Myrmeleon punctulatus* Rambur, *Hist. nat. Ins. Neuropt.*, P.405.

1984. *Myrmeleon punctulatus*, Ghosh, *Rec. zool. Surv. India*, No. 52: 25.

*Distribution* : India : West Bengal); Orissa.

*Remark* : vide Ghosh (1984).

Genus XXXIV. *Creoleon* Tillyard

1918. *Creoleon* Tillyard, *Proc. Linn. Soc. N.S. Wales*, 43: 436.

Type species : *Myrmeleon lungdunense* Villers

*Distribution* : India; Italy; Spain; North Africa; Israel; Sri Lanka.

*Remark* : A single species is so far reported from West Bengal.

**52. *Creoleon griseus* (Klug)**

1834. *Myrmeleon griseus* Klug, *Symb. Phys.*, 4, tafel 36, fig. 8.

1984. *Creoleon griseus*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52: 40.

*Distribution* : India : West Bengal (Bankura); Maharashtra; Tamil Nadu; Madhya Pradesh; Orissa; Bihar; "North India" Egypt; Sudan; Isreal; Iran.

**Genus XXXV. *Gatzara* Navas**

1915. *Gatzara* Navas, *Mem. R. Acad. Cienc. Artes Barcelona*, 11: 373.

1984. *Gatzara*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52: 33.

Type species : *Gatzara jubilaea* Navas

*Distribution* : India.

*Remark* : Only a single species is so far reported from West Bengal.

**53. *Gatzara jubilaea* Navaas**

1915. *Gatzara jubilaea* Navas, *Mem. R. Acad. Cienc. Artes Barcelona*, 11 (No. 23): 386.

1984. *Gatzara jubilaea*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, no. 52: 34.

*Distribution* : India : West Bengal (Darjeeling).

**Genus XXXVI. *Neuroleon* Navas**

1909. *Neuroleon* Navas, *Act. Mem. Congr. Nat. Esp.*, 1: 184.

Type species : *Myrmeleon arenarius* Navas

*Distribution* : Spain; Rumania; Greece; North Africa; Malagasy; Saudi Arabia; Iran; Afghanistan; Pakistan; India; Indonesia; Malayasia and Micronesia.

*Remark* : Only a single species is reported from West Bengal.

**54. *Neuroleon guernii* Navas**

1914. *Neuroleon guernii* Navas, *Russk. ent. Obozr.*, 14: 319.

1984. *Neuroleon guernii*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52: 44.

*Distribution* : India : West Bengal (Midnapur); Rajasthan; Maharashtra; Orissa; and Sri Lanka.

*Remark* : The species is for the first time reported from West Bengal.

**Genus XXXVII. *Distoleon* Banks**

1901. *Distoleon* Banks, *Ann. ent. Soc. Am.*, 3 : 42.

Type species : *Distoleon verticollis* Banks.

*Distribution* : South-east Europe; Africa; Saudi Arabia; Iran; Afghanistan; Korea; Japan; India; Burma; The Philippines and Australia.

*Remark* : Four species of the genus are hitherto reported from West Bengal of which three have been actually examined and the ohter species has been reviewed from literature.

Key to species of the genus *Distoleon* Banks

1. Pterostigma of both wings rosy; pronotum with four irregular pitchy stripes; apex of both wings acute..... *verendus* (Walker)  
     Pterostigma of both wings yellowish or whitish with a brown mark at base; pronotum with three yellow stripes ..... 2
2. Wings with milk-white spaces and cross-veins in those spaces yellow; hindwing with a lance-shaped brown mark at apex of first cubitus and media..... *sambalpurensis* Ghosh  
     Wings without milk-white spaces and crossveins unicolorous throughout; hindwing without brown mark as above..... *audax* (Walker)

55. *Distoleon verendus* (Walker)1853. *Myrmeleon verendus* Walker, *Cat. Brit. Mus. Neur.*, p. 342.1984. *Distoleon verendus* Ghosh, *Rec. Zool. Surv. India, Occ. paper* no. 52 : 49.*Distribution* : India : West Bengal (Bankura); Himachal Pradesh; Uttar Pradesh; "North India"; Orissa.*Remark* : The species is for the first time recorded from West Bengal.56. *Distoleon sambalpurensis* Ghosh1984. *Distoleon sambalpurensis* Ghosh, *Rec. zool. Surv. India. Occ. paper*, No. 52 : 50.*Distribution* : India : West Bengal (Darjeeling); Orissa.*Remark* : The species (Fig. 16) is for the first time recorded from West Bengal.57. *Distoleon audax* (Walker)1853. *Myrmeleon audax* Walker, *Cat. Brit. Mus. Neur.*, p. 338.1980. *Distoleon audax*, Ghosh, *Rec. zool. Surv. India*, 77 : 253.*Distribution* : India : West Bengal (24-Parganas, Darjeeling), and "Nepal"*Remark* : The species is for the first time recorded from West Bengal.\*58. *Distoleon cerdo* (Gerstaecker)1983. *Formicaleo cerdo* Gerstaecker, *Mitt. naturk. ver. Neu vorpomm. u. Rugen*, p. 127.1984. *Distoleon cerdo*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52 : 55.*Distribution* : India : West Bengal.*Remark* : Vide Ghosh (1984).Genus XXXVIII. *Negrokus* Navas1930. *Negrokus* Navas, *Memorie Accad. pont., Nuovi Lincei*, (2) 14 : 420.Type species : *Negrokus lebasii* Navas*Distribution* : India.*Remark* : Only a single species is so far known from West Bengal.

**\*59. *Negrokus lebasi* Navas**

1930. *Negrokus lebasi* Navas, *Memorie Accad. pont., Nuovi Lincei*, (2) 14 : 321.

1984. *Negrokus lebasi*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52 : 54.

*Distribution* : India : West Bengal (Darjeeling).

*Remark* : *Vide* Ghosh (1984).

**Genus XXXIX. *Allogama* Banks**

1943. *Allogama* Banks, *Bol. ent. venezolana*, 2 : 166.

Type species : *Gama irene* Banks.

*Distribution* : India.

*Remark* : A single species is so far known from West Bengal.

**\*60. *Allogama irene* (Banks)**

1939. *Gama irene* Banks, *Bull. Mus. comp. zool. Harv.*, 85 (7) : 456.

1984. *Allogama irene*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52 : 42.

*Distribution* : India : West Bengal and Karnataka.

*Remark* : *Vide* Ghosh (1984).

**Genus XXX. *Layahima* Navas**

1912. *Layahima* Navas, *Broteria*, 10 : 36

Type species : *Layahima nebulosa* Navas

*Distribution* : India.

*Remark* : Only a single species is known from West Bengal.

**\*61. *Layahima nebulosa* Navas**

1912. *Layahima nebulosa* Navas, *Broteria*, 10 : 36.

1984. *Layahima nebulosa*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52 : 34.

*Distribution* : India : West Bengal (Darjeeling).

*Remark* : *Vide* Ghosh (1984).

**Genus XXXXI. *Talorus* Navas**

1923. *Talorus* Navas, *Memorie Accad. pont., Nuovi Lincei*, (2) 35 : 35.

Type species : *Talorus oberthuri* Navas

*Distribution* : India.

*Remark* : A single species is known from West Bengal.

**\*62. *Talorus oberthuri* Navas**

1923. *Talorus oberthuri* Navas, *Memorie Accad. pont., Nuovi Lincei*, (2) 6 : 35.

1984. *Talorus oberthuri*, Ghosh, *Rec. zool. Surv. India, Occ. paper*, No. 52 : 27.

*Distribution* : India : West Bengal (Darjeeling).

*Remark* : *Vide* Ghosh (1984).

Genus XXXXI. *Dolicholeon* Navas.1929. *Dolicholeon* Navas, *Rev. Accad. Cienc.*, 12 : 199.Type species : *Formicaleo substigmalis* Navas.*Distribution* : India.\*63. *Dolicholeon substigmalis* Navas1929. *Dolicholeon substigmalis* Navas, *Rev. Accad. Cienc.*, 12 : 191.1977. *Dolicholeon substigmalis*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 305.*Distribution* : India : West Bengal and Maharashtra.

*Remark* : The genus *Dolicholeon* was erected by Navas (1929) with the type-species *F. substigmalis* Navas. The description provided by Navas (1929) justifies the inclusion of the species *substigmalis* in the genus *Dolicholeon*.

## Family ASCALAPHIDAE

## Key to genera of the family ASCALAPHIDAE

1. Ectoproct in both sexes short ..... 2  
    Ectoproct in both sexes specially in male long ..... 5
2. Pterostigma of wings short, as long as high; apical field broad in both wings..... 3  
    Pterostigma long, not less than twice as long as high; apical field narrow in both wings..... 4
3. Body long and densely hairy; wing tip obtuse and angular; hindwing distinctly broadened at hind margin; antenna long, reaching pterostigma of forewing in length..... *Agrionosoma* Weele  
    Body short and sparsely hairy; wing tip rounded; hindwing not broadened at hind margin; antenna short, not reaching pterostigma of forewing in length ..... *Suhalacsa* Hagen
4. Abdomen of male as long as or longer than hindwing; antenna straight; legs slender .....  
    ..... *Suhalomitus* Weele  
    Abdomen of male distinctly shorter than hindwing; antenna in either sex specially in male distinctly bent; legs stout ..... 6
5. Wing tip angular; abdomen longer than wings in male; antenna denticulate internally at base .....  
    ..... *Acheron* Lefebvre  
    Wing tip rounded; abdomen much shorter than wings; antenna without teeth at base .....  
    ..... *Hybris* Lefebvre
6. Wings appendiculate; spur of hind tibia as long as first two tarsal segments taken together .....  
    ..... *Glyptobasis* MacLachlan  
    Wings not appendiculate; spur of hind tibia as long as or shorter than first tarsal segment.....  
    ..... *Ascalaphus* Fabricius

Genus XXXXII. *Agrionosoma* Weele1908. *Agrionosoma* Weele, *Cat. Coll. Selys*, 8 : 169.Type species : *Agrionosoma swinhoei* Weele*Distribution* : India and Thailand.*Remark* : A single species under the genus has been recorded from West Bengal.64. *Agrionosoma dohrni* Weele1908. *Agrionosoma dohrni* Weele, *Cat. Coll. selys*, 8 : 171.1977. *Agrionosoma dohrni*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 323.*Distribution* : India : West Bengal (Darjeeling); Sikkim.*Remark* : Ghosh (1988) recorded this species from West Bengal.Genus XXXXIII. *Suhalacsa* Lefebvre1842. *Suhalacsa* Lefebvre, *Guer. Mag. zool.*, 4 : 92.Type species : *Ascalaphus flaviceps* Leach*Distribution* : India, Africa, Israel, Taiwan, Indonesia, the Philippines and Australia.*Remark* : A species of the genus has been recorded from West Bengal.65. *Suhalacsa orsedice* Banks1924. *Suhalacsa orsedice* Banks, *Proc. Acad. nat. Sci.*, 66 : 617.1977. *Suhalacsa orsedice*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 325.*Distribution* : India : West Bengal (Darjeeling).*Remark* : Ghosh (1988) recorded the species from West Bengal.Genus XXXXIV. *Suphalomitus* Weele1908. *Suphalomitus* Weele, *Cat. coll. Selys*, 8 : 181.Type species : *Suphalomitus verbosus* (Walker)*Distribution* : India, Africa, Malagasy, Sri Lanka, the Philippines and Australia.*Remark* : Two species of this genus have been reported from West Bengal and they may be differentiated by the following Key.Key to species of the genus '*Suphalomitus* WeeleSecond abdominal segment with tuft of black bristles; labrum and clypeus brownish; dense blackish-brown hairs between the antennal bases.....*brevis* KimminsSecond abdominal segment without tuft of black bristles; labrum and clypeus yellowish; greyish hairs between the antennal bases .....*verbosus* (Walker)66. *Suphalomitus brevis* Kimmins1949. *Suphalomitus brevis* Kimmins, *Ann. Mag. nat. Hist.*, (12) 2 : 15.1977. *Suphalomitus brevis*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 325.

**Distribution** : India : West Bengal (Darjeeling); Tamil Nadu, Karnataka, Kerala. Sri Lanka.

**Remark** : Ghosh (1988) reported this species from Darjeeling, West Bengal.

#### 67. *Suphalomitus verbosus* (Walker)

1853. *Ascalaphus verbosus* Walker, *Cat. Brit. Mus. Neur.*, p. 425.

1977. *Suphalomitus verbosus*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 325.

**Distribution** : India : West Bengal (Darjeeling); Meghalaya; Karnataka. Sri Lanka and East Indies.

**Remark** : Ghosh (1988) recorded the morphovariation of the species (fig.18) with regard to coouration of the wing.

#### Genus XXXV. *Acheron* Lefebvre

1842. *Acheron* Lefebvre, *Guer. Mag. zool.*, 92 : 5.

Type species : *Ascalaphus trux* Walker

**Distribution** : India, China, Bangladesh, Bhutan, Burma, Malay.

**Remark** : The nomino-typical subspecies (Fig. 17) is hitherto reported from West Bengal.

#### 68. *Acheron trux trux* (Walker)

1853. *Ascalaphus trux* Walker, 1853, *Cat. Brit. Mus. Neur.*, p. 452.

1908. *Acheron trux* Weele, *Cat. coll. Selys*, 8 : 228.

**Distribution** : India : West Bengal (Darjeeling); Sikkim; Assam; Meghalaya.

#### Genus XXXXVI. *Hybris* Lefebvre

1842. *Hybris* Lefebvre *Guer. Mag. zool.* 92 : 6.

Type species : *Ascalaphus javanus* Burmeister.

**Distribution** : India, China, Indonesia, Insulinde and Japan.

**Remark** : Only one species is hitherto reported from West Bengal.

#### 69. *Hybris angulata* (Westwood)

1848. *Ascalaphus (Ogcogaster) angulatus* Westwood, *Cabinet. Orient. ent.*, p. 69.

1977. *Hybris angulata*, Ghosh & Sen, *Rec. zool. Surv. India*, 73 : 322.

**Distribution** : India : West Bengal (Darjeeling; 24-Parganas), Assam; Meghalaya. Bangladesh and Burma.

**Remark** : Ghosh (1988) recorded the species from West Bengal.

#### Genus XXXXVII. *Glyptobasis* MacLachlan

1871. *Glyptobasis* MacLachlan, *J. Linn. Soc.*, 11 : 238.

Type species : *Ascalaphus dentifera* Westwood.

**Distribution** : India, Burma and Sri Lanka.

**Remark** : A single species is hitherto reported from West Bengal.

70. *Glyptobasis deptifera* (Westwood)1848. *Ascalaphus (Ogcogaster) dentifera* Westwood, *Cabinet. Oriental ent.*, p. 69.1983. *Glyptobasis dentifera* Ghosh, *Bull. zool. Surv. India*, **80** : 297.

*Distribution* : India : West Bengal (Calcutta); Punjab; Uttar Pradesh; Maharashtra; Madhya Pradesh; Kerala; Karnataka.

Genus XXXXVIII. *Ascalaphus* Fabricius1770. *Ascalaphus* Fabricius, *Syst. Ent.*, p. 313.Type species : *Myrmeleon barbarus* Linnaeus

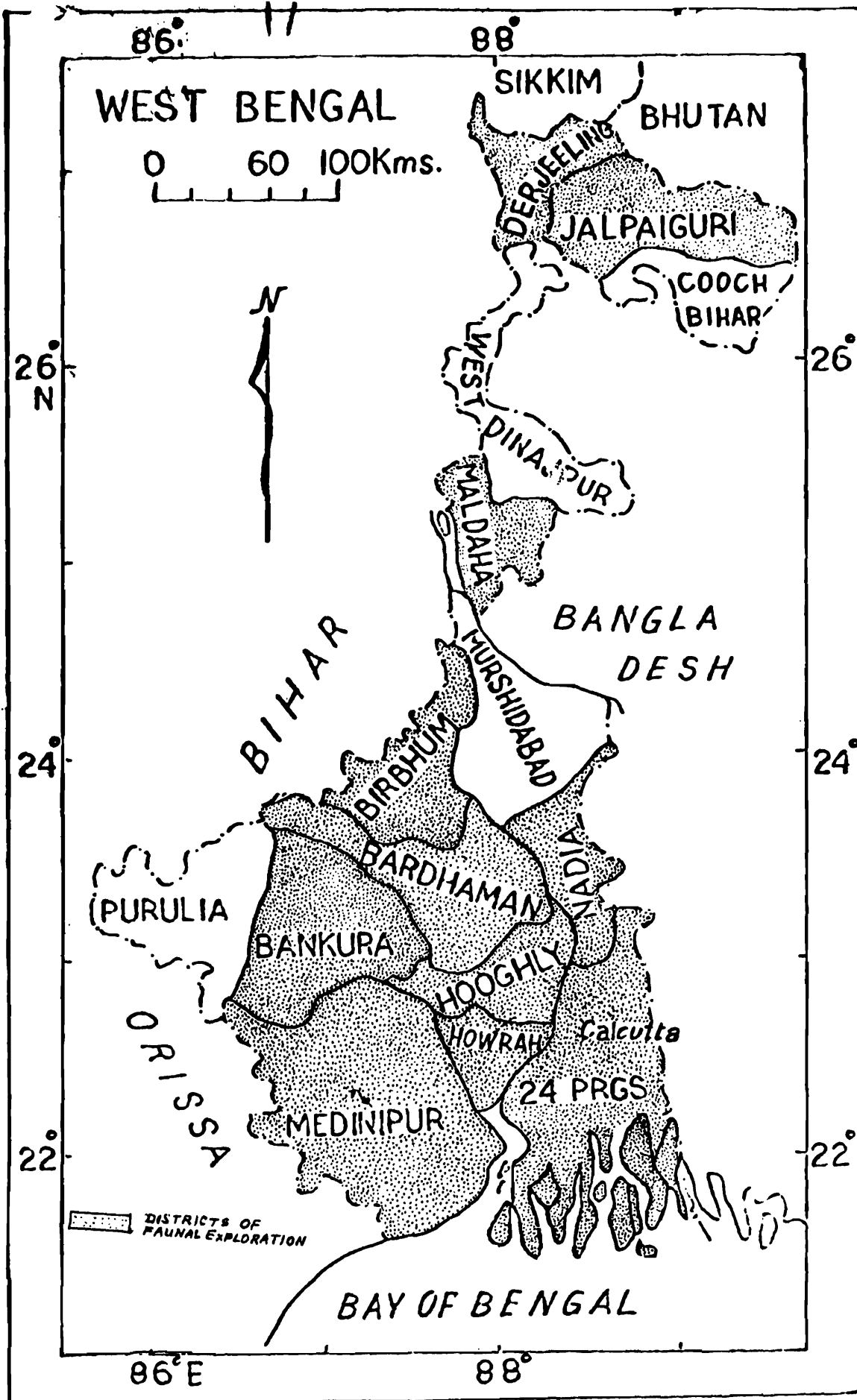
*Distribution* : Africa (except south-western and central parts of Sahara), Malagasy, Israel, India, Sri Lanka, Malaya, Sumatra, Java, the Philippines and Japan.

*Remark* : Four species are so far reported from West Bengal which may be differentiated with the following key. Tjeder (1972) merged the genus *Helicomitus* MacLachlan under the genus *Ascalaphus* Fabricius. So, the author (Ghosh, 1988) considered all the Indian species of *Helicomitus* under the genus *Ascalaphus*.

Key to species of the genus *Ascalaphus* Fabricius

1. Posterior lobe of prothorax in male normal in size without any process; mesoscutum also in male without any process .....2  
 Posterior lobe of prothorax in male large with two rounded processes; mesoscutum in male with a small triangular process on either side..... *prothoracicus* Kimmins
2. Fourth tergite of abdomen in male very much swollen ..... *abdominalis* Kimmins  
 Fourth tergite of abdomen in male generally not swollen or very slightly swollen.....3
3. Fourth and fifth tergite of abdomen in male without long, black setae; angle of anal lobe of forewing very much obtuse ..... *dicax* (Walker)  
 Fourth and fifth tergite of abdomen in male with long, black setae; angle of anal lobe of forewing less obtuse ..... *sinister* (Walker)

71. *Ascalaphus prothoracicus* (Kimmins)1949. *Helicomitus prothoracicus* Kimmins, *Ann. Mag. nat. Hist.*, (12) **2** : 6.*Distribution* : India : West Bengal (Darjeeling, Calcutta and Howrah); Assam; Sikkim.*Remark* : Ghosh (1988) reported the species from Sikkim Assam and West Bengal.72. *Ascalaphus abdominalis* (Kimmins)1949. *Helicomitus abdominalis* Kimmins, *Ann. Mag. nat. Hist.*, (12) **2** : 4.*Distribution* : India : West Bengal (Malda); Karnataka; Orissa.*Remark* : Ghosh (1988) recorded the species for the first time from West Bengal.



73. *Ascalaphus dicax* Walker

1853. *Ascalaphus dicax* Walker, *Cat. Brit. Mus. Neur.*, p. 423.

1983. *Ascalaphus dicax*, Ghosh, *Bull. zool. Surv. India*, **80** : 298.

*Distribution* : India (Himachal Pradesh; Uttar Pradesh; Assam; Orissa; West Bengal : Calcutta; Nadia); Asia minor; Beirut; Iraq; Saudi Arabia; South-east Asia including China; Bangladesh (Sylhet); Sri Lanka; the Phillippines, Sulawesi; Sumatra; Western Java; other islands of Indo-Malayan area; Papua and new Guinea; Mollucus.

*Remark* : Ghosh (1983) referred to the species under the genus *Ascalaphus* Fabricius.

74. *Ascalaphus sinister* Walker

1853. *Ascalaphus sinister* Walker, *Cat. Brit. Mus. Neur.*, p. 424.

1983. *Ascalaphus sinister*, Ghosh, *Bull. Surv. India*, **80** : 298.

*Distribution* : India : West Bengal (Darjeeling); Maharashtra; Madhya Pradesh and other areas of North India; Sri Lanka.

## SUMMARY

The paper incorporates a consolidated list of 73 species of neuroptera belonging to 48 genera and 12 families under a couple of suborders of the order Neuroptera from West Bengal. Of these, 54 species have been actually examined and 17 species have been reviewed from literature due to the lack of material at hand for study. Amongst the material examined, 19 species have been established as new locality records for West Bengal. Besides, a brief review on the earlier investigation of Neuroptera, topography and vegetational pattern of the concerned state has been made. Over and above, collection and preservation, external morphology and terminology, keys to all the taxa examined, geographical distribution, remarks wherever necessary, and suitable literature references have been provided.

## ACKNOWLEDGEMENT

The author is highly grateful to the Director, Zoological Survey of India for kindly providing him the laboratory facilities in the work.

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## **INSECTA : HYMENOPTERA : VESPIDAE**

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### **INTRODUCTION**

The family Vespidae belongs to superfamily Vespoidea which includes true wasps. The superfamily Vespoidea is one of the seven recently recognised superfamilies of aculeate Hymenoptera. Carpenter (1982) considered Vespidae as the only family under the superfamily Vespoidea. The family Vespidae is divided into five subfamilies, viz., Euparagiinae, Masarinae, Stenogastrinae, Vespinae and Polistinae. The former two subfamilies do not occur in India. There are about 700 species known under Vespidae from the world.

The complex social organisation and nest architecture make these wasps fascinating insects. Whereas their painful sting may, sometimes, prove fatal yet their venom has its utilization in immunisation. Despite their interesting features and economic importance, they are chiefly predators of insect larvae and some of the species serve as effective predators for the control of some insect pests of agricultural crops.

Our knowledge about these wasps is very poor. The important works available on Indian wasps are by Bingham (1897), Das and Gupta (1977, 1983, 1989). Besides, some contributions on wasps of Oriental region are by van der Vecht (1935-1979), Archer (1980-1987), Kojima (1982-1988), Yamane *et al.* (1974-1987) and Williams (1983-1988).

An attempt has been made to provide consolidate information on the Vespidae fauna of the State of West Bengal, India. The present work is based on the collection of this family made by several survey parties of the Zoological Survey of India and material received from other institutions in India. A major collection of this family was received through the mopping survey of West Bengal by A. K. Sanyal and party, 1983; M. Prasad and party, 1984, 1986, 1987; K.K. Roy and party, 1984, 1986; M. Dutta and party, 1985; T.R. Mitra and party, 1986, 1987; K.P. Mukherjee and party, 1986; M.S. Shishodia and party, 1986; S.K. Tandon and party, 1987, other surveys and old "Museum Collection" of Zoological Survey of India.

The family Vespidae is characterised by the following characters : antennae 13-segmented in male and 12-segmented in female; eyes emarginate; pronotum extending back to tegula, and mesopleurum without any oblique suture; wings longitudinally folded in repose (except in Masarinae and Stenogastrinae), fore wing with first discoidal cell elongate and longer than submedian cell, hind wing with an anal cell and enclosed cells; legs of normal proportions and without spines, trochanters not divided and trochantellus absent, middle tibiae with one or two apical spurs, tarsal claws toothed, bifid or simple; thorax and gaster joined together by a long and slender or short petiole, the latter without any scales or nodes; gaster with spiracles on 1-7 segments and a sting without sheaths; male genitalia with characteristic spiniform parameres.

## SYSTEMATICS

There are about 700 species of Vespidae known from the world and are classified under five subfamilies. In India, the family is represented by about 135 species/subspecies, 11 genera/subgenera under three subfamilies.

In West Bengal, the Vespidae is represented by only two subfamilies, viz., Vespinae and Polistinae. The present work records 35 species/subspecies from this region under 6 genera and 8 subgenera.

The keys to the subfamilies, tribes, genera, species and subspecies are provided for the identification of various taxa of this region. Illustrations of taxonomic terms used in the present work, distributional tables and maps are included for ready reference.

## MATERIAL AND METHODS

Most wasps are found in tropical climate and only a few representatives are reported from temperate climate. The members of this family build nests of various shape, size and of variety of material. Each nest has a colony, where one and more females, males and several workers live together. These wasps could be collected by locating their nests in houses, trees, shrubs etc. They are active fliers and visit flowers for honey dew and nectar. They also fly over the ground surface in search of larvae and grubs. During such visits these wasps are caught by insect-net and preserved dry in paper envelopes. All vespids are set, pinned and labelled in usual manner and stored in insect drawer/boxes for study purposes.

*Male genitalia* : The male genitalia show variation in its various components, especially in the presence and absence of spine on paramere. The methodology for the extraction and mounting of male genitalia is as follows :

Genital capsule could be extracted after relaxing the specimen for about 24 to 48 hours. The genitalia is pulled out through the apical aperture with the help of a pair of forceps by applying pressure to the third and the following gastral segments. The genitalia and subgenital plate are left in 10% KOH solution over night or boiled in 10% KOH for 3-4 minutes. The genitalia is washed in distilled water to remove KOH and mounted on a slide after dehydration.

### Abbreviations used in the text

- Sex : M, F, W are used to cite male, female and worker sex of the taxa described by the author.
- preocc. : The name is preoccupied by an earlier author.
- new name : The name used is proposed as replacement for an earlier published name, which is preoccupied and unavailable.
- n. comb. : The species was transferred to another genus for the first time by that author.
- n. status : The present status of the species was either advocated for the first time or was revised in the reference in question.

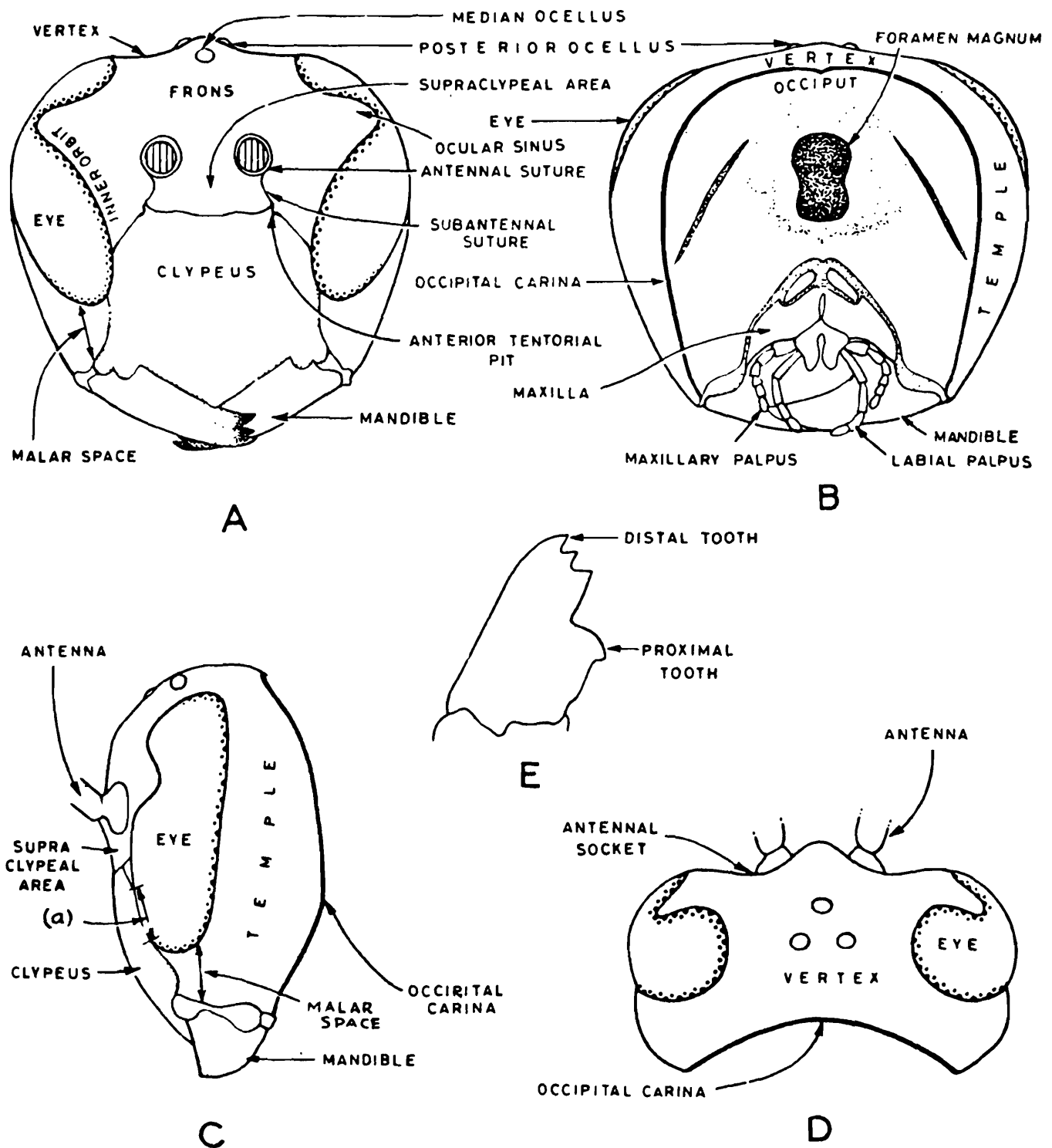


Fig. 1. Structure of head of Vespidae : A, front view; B, posterior view; C, side view – (a) lateral margin of clypeus that lies along inner eye margin; D, dorsal view; E, mandible (after Das and Gupta, 1989).

## Explanation of various parts shown in figure 2.

- A. Thorax, side view.  
 B. Propodeum, dorsal view.  
 C. Fore wing.  
 D. Hind wing.

**Fore wing veins**

AB	=	costa
CD	=	subcosta
EFG	=	metacarpus
WKHYXZ	=	cubitus
MNT <sup>1</sup> F	=	radius
PQRW	=	discoideus
RLO	=	subdiscoideus
CS	=	medius
UV	=	submedius
VW	=	brachius
BME	=	stigma
SWD	=	basal vein
KN	=	first intercubitus
XT	=	second intercubitus
ZT	=	third intercubitus
QH	=	first recurrent vein
YL	=	second recurrent vein
PV	=	nervulus
QRW	=	postnervulus
MN	=	first abscissa of radius
Nt	=	second abscissa of radius

**Hind wing veins**

ab	=	costella
cde	=	subcostella
ef	=	metacarpella
dgh	=	radiella
jkl	=	cubitella
mn	=	discoideella
pq	=	brachiella
ij	=	mediella
op	=	submediella
kg	=	intercubitella
jmp	=	nervellus

- E. Leg.  
 F. Fifth tarsal segment.  
 G. Gaster (of *Polistes adustus*).  
 H. First gastral sternite, ventral view.  
 I. Male genitalia (of *Vespa tropica*).  
 J. Male subgenital plate.

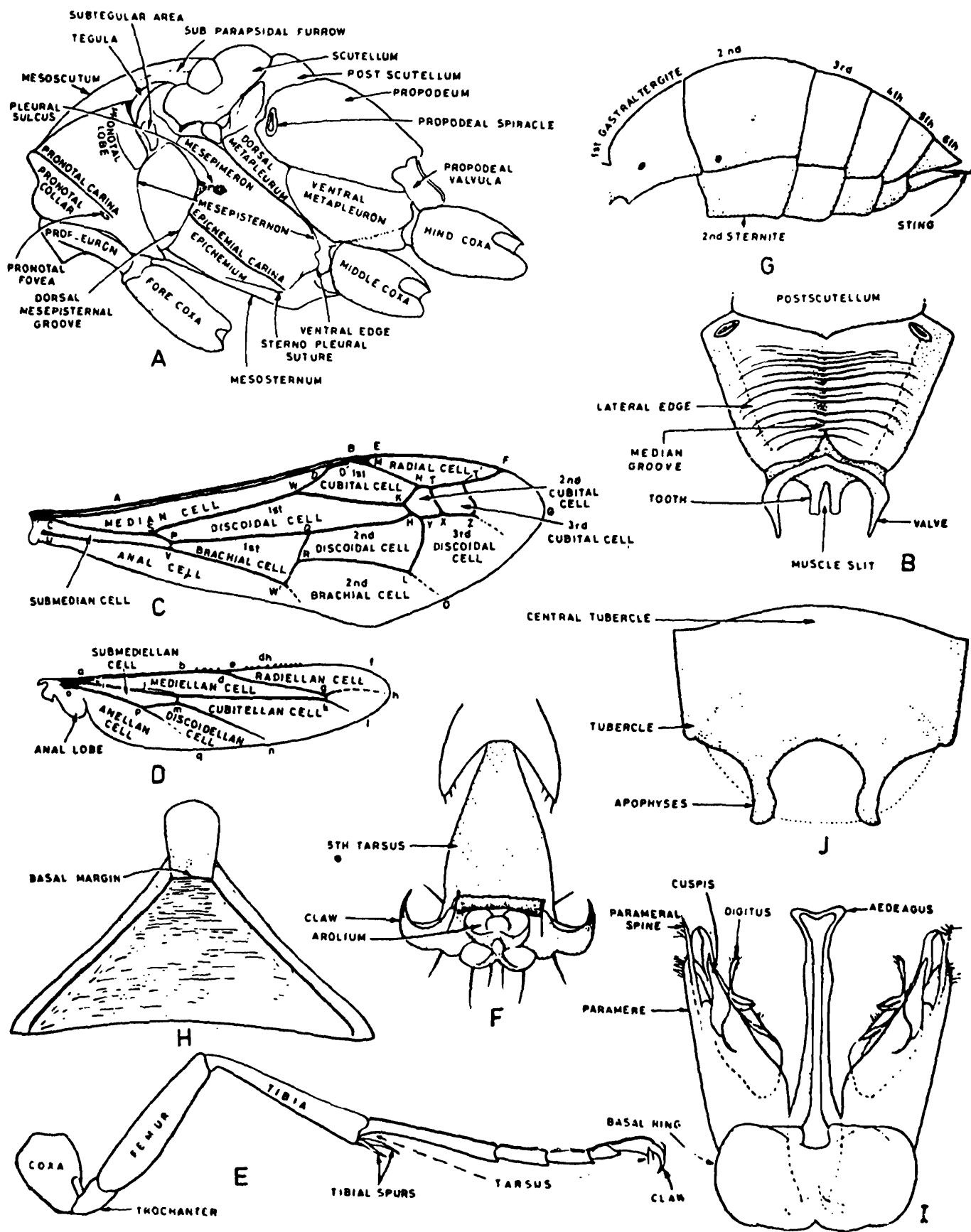


Fig. 2. Structure of thorax, wings, legs and male genital organs (after Das and Gupta, 1989).

- key. : A key is provided in the publication to identify the species.  
 syn. : The synonymy or taxonomic position of the species.  
 des. : The species is described or there is a descriptive note.  
 fig. : The species is illustrated in whole or in part.

### TAXONOMIC TERMINOLOGY

The morphological terms used in the present work are mainly based on the works of Richards (1956, 1973), Sehgal (1963), van der Vecht (1941, 1975) and Das and Gupta (1989). The morphological terms used in the text are illustrated in figures 1 and 2.

### SYSTEMATIC ACCOUNT

Family VESPIDAE

Subfamily 1. **Polistinae**

Tribe 1. **Polistini**

Genus 1. *Polistes* Latreille, 1802

Subgenus 1. *Polistes (Nygmpolistes)* Richards, 1973

1. *tenebricosus sulcatus* Smith, 1852

Subgenus 2. *Polistes (Megapolistes)* van de Vecht, 1968

2. *olivaceus* (De Geer, 1773)

3. *wattii* Cameron, 1900

4. *rothneyi rothneyi* Cameron, 1900

5. *rothneyi sikkimensis* van der Vecht, 1968

Subgenus 3. *Polistes (Stenopolistes)* van der Vecht, 1972

6. *nigritarsis* Cameron, 1900

Subgenus 4. *Polistes (Polistella)* Ashmead, 1904

7. *adustus* Bingham, 1897

8. *stigma tamula* (Fabricius, 1798)

9. *strigosus atratus* Das and Gupta, 1989

10. *sagittarius* Saussure, 1853

Tribe 2. **Ropalidiini**

Genus 2. *Ropalidia* Guérin, 1838

Subgenus 5. *Ropalidia (Anthreneida)* White, 1841

11. *marginata marginata* (Lepelletier, 1836)

12. *brevita* Das and Gupta, 1989

13. *santoshae* Das and Gupta, 1989

14. *artifex artifex* (Saussure, 1853)

15. *rufocollaris rufocollaris* (Cameron, 1900)  
 16. *stigma stigma* (Smith, 1858)  
 17. *sumatrae lugubris* (Smith, 1858)  
 18. *variegata variegata* (Smith, 1852)  
     Subgenus 6. *Ropalidia (Icarielia)* Dalla Torre, 1904  
 19. *scitula* Bingham, 1897  
     Tribe 3. **Polybiini**  
     Genus 3. *Parapolybia* Saussure, 1853  
 20. *indica indica* (Saussure, 1853)  
 21. *varia* (Fabricius, 1787)  
     Subfamily 2. **Vespinae**  
     Genus 4. *Vespa* Linnaeus, 1758  
     Subgenus 7. *Vespa (Nyctovespa)* van der Vecht, 1959  
 22. *binghami* Buysson, 1905  
     Subgenus 8. *Vespa (Vespa)* Linnaeus, 1758  
 23. *affinis affinis* (Linnaeus, 1764)  
 24. *analisis nigrans* Buysson, 1903  
 25. *basalis* Smith, 1852  
 26. *bicolor* Fabricius, 1787  
 27. *mandarinia magnifica* Smith, 1852  
 28. *orientalis* Linnaeus, 1771  
 29. *tropica tropica* (Linnaeus, 1758)  
 30. *tropica leefmansi* van der Vecht, 1957  
 31. *tropica haematodes* Bequaert, 1936  
 32. *variabilis fumida* van der Vecht, 1959  
 33. *velutina nigrithorax* Buysson, 1905  
     Genus 5. *Vespula* Thomson, 1869  
 34. *orbata orbata* Buysson, 1902  
     Genus 6. *Provespa* Ashmead, 1903  
 35. *anomala* (Saussure, 1853)

### Family VESPIDAE

#### Key to the Subfamilies of VESPIDAE

1. Hind wing usually with an anal lobe. Hind coxa without a dorsal carina. Mesepimeron not completely or not at all separated from the mesepisternum. Dorsal episternal groove and

epicnemial carina present or absent. Gaster petiolate or subpetiolate. 1st tergite gradually curving from base to apex. Occipital carina always present. Apical margin of clypeus in female gradually tapering into a sharp or blunt tooth. Apical margin of postscutellum not at all or weakly produced in the middle of propodeum at base. Propodeum transversely rugose and curved at sides, its apical orifice elongate. Mandibles smaller, not expanded apically. Male antenna with a hook-like bend at apex. Smaller, more slender species with nest consisting of a single horizontal or vertical naked comb that is not enclosed by papery envelopes (*Ropalidia* has species which may build an envelope round the comb; some species have more than one comb).....

..... 1. POLISTINAE

Hind wing without an anal lobe. Hind coxa with a dorsal carina on posterior surface. Mesepimeron completely separated from mesepisternum. Dorsal episternal groove and epicnemial carina always absent. Gaster sessile. 1st tergite anteriorly truncate with an anterior vertical face and a posterior horizontal face, the two making a right angle. Occipital carina absent dorsally; usually present laterally but may or may not be reaching the base of mandible. Apical margin of clypeus broadly truncate or emarginate medially forming two lateral sharp or blunt lobes. Apical margin of postscutellum produced in the middle forming a long triangular lobe in the basal part of propodeum. Propodeum almost vertical and without rugosities, with a circular apical orifice. Mandibles large with an expanded apical margin. Male antenna straight apically, without a hook-like bend. Larger, stouter species with nest consisting of several combs on a horizontal plane and wrapped by a papery envelope. .... 2. VESPINAE

### Subfamily 1. POLISTINAE

These are commonly called paper wasps. The nests consist of a single comb which is not enclosed in a paper envelope. In most of the Temperate Zone species the nests are annual, each being founded by one or more overwintering females. One of the females becomes dominant and is the only one to lay eggs.

The normal larval food consists of dismembered caterpillars. Some species of *Polistes* exert considerable predator pressure on economically important insects such as the tobacco horn-worm and cotton ballworm. In an attempt to utilize the wasps as a biological control agent, shelters are sometimes placed in cultivated fields to afford resting sites to founding females (Krombein and Burks, 1979).

**Diagnostic characters** : Body usually elongate; apical margin of clypeus tapering into a sharp or blunt tooth. Occipital carina always present; apical margin of postscutellum truncate to weakly produced in the middle at the base of propodeum; mesepisternum not completely or not at all separated from mesepisternum. Hind wing usually with an anal lobe; 1st gastral segment petiolate or subpetiolate.

### Key to the Tribes of POLISTINAE

1. First gastral segment always petiolate and usually strongly swollen apically; pronotal lobe apically in front of tegula without a carina; dorsal episternal groove always absent; subtegular

area basally in front of pronotal lobe not margined with a carina; second gastral tergite and sternite usually fused ..... **Ropalidiini**

— First gastral segment either petiolate or subpetiolate; pronotal lobe apically in front of tegula with a distinct carina; dorsal episternal groove either present or absent; subtegular area basally in front of pronotal lobe margined with distinct carina, second gastral tergite and sternite never fused..... 2

2. First gastral segment subpetiolate; shorter than second segment; muscle slit of propodeum long and narrow; subdiscoideus joins postnervulus at or close to middle, mesepisternum with or without epicnemial carina; apical margin of postscutellum usually almost truncate..... **Polistini**

— First gastral segment petiolate; not shorter than second segment; muscle slit of propodeum short and wider; subdiscoideus joins postnervulus below middle; mesepisternum without epicnemial carina; apical margin of postscutellum weakly produced in the middle just at the base of propodeum ..... **Polybiini**

**Tribe 1. Polistini**

This tribe is represented by a single genus in Indian subregion.

**Genus 1. *Polistes* Latreille**

This genus is subdivided into eleven subgenera (Richards, 1973, 1978). Of these, six are represented in Indian subregion. In West Bengal four subgenera have been reported. These can be recognised by the following key.

**Key to the Subgenera of *Polistes***

1. Pronotal fovea present; clypeus not extending far beyond the anterior tentorial pits; anal lobes of hind wing large and separated from the rest of the wing membrane by a smooth incision ..... 2
- Pronotal fovea absent; clypeus extending far beyond the anterior tentorial pits; anal lobe of hind wing more or less reduced ..... 3
2. Mesepisternum without epicnemial carina. Subgenital plate, in males, not squarish, narrow at apex, without apophyses, digitus long and narrow..... ***Nygmopolistes*** Richards
- Mesepisternum with distinct epicnemial carina. Subgenital plate, in males, squarish, with a pair of apophyses; digitus basally wide..... ***Megapolistes*** van der Vecht
3. Anal lobe of hind wing much reduced, at apex rounded, separated from the rest of the wing membrane by a wide gap. Interocellar distance as long as, or less than the diameter of posterior ocellus. First gastral sternite without a well developed margin at base..... ***Stenopolistes*** van der Vecht
- Anal lobe of hind wing large, apex nearly straight and separated from the rest of the wing

membrane by a small gap. Interocellar distance more than the diameter of posterior ocellus. First gastral sternite usually bounded by well developed margin at base.....***Polistella*** Ashmead

Subgenus 1. ***Polistes (Nygmpolistes)*** Richards

1973. *Polistes (Nygmpolistes)* Richards. *Rev. Bras. Ent.*, **17** (13) : 91, 93, 98, 99.

Type-species : *Polistes sulcatus* Smith, 1852 (= *Polistes rugifrons* Cameron, 1900).

This is a small subgenus represented by a single species, viz., *P. (N.) tenebricosus* Lepeletier in whole of Oriental region. Three subspecies, viz., *tenebricosus tenebricosus* Lepeletier, *tenebricosus hoplitus* Saussure and *tenebricosus sulcatus* Smith are known from Oriental region. Of these, only one subspecies *tenebricosus sulcatus* is reported from the state of West Bengal.

1. ***Polistes (Nygmpolistes) tenebricosus sulcatus*** Smith

1852. *Polistes sulcatus* Smith. *Trans. Ent. Soc. London*, (2) **2** : 38, M, F, des. Type : F, China : Near Ning-po-foo (London).

1989. *Polistes (Nygmpolistes) tenebricosus sulcatus* : Das and Gupta. *Oriental Ins. Mongr.*, **11** : 49.

**Diagnostic characters** : Female. Antennae black, its first, second and third segments apically reddish. Head reddish, with a black mark on frons and vertex. Pronotum reddish with a black mark below. Gaster reddish, its basal half of first tergite, second tergite at base, first, second and third sternites (except for two reddish marks on both sides), black. Legs in general black, except apical half of fore femur, fore tibia, middle and hind tibiae apically, all tarsi, reddish. Wings wholly yellowish.

**Material examined** : India : West Bengal : Darjiling District : Singla, 425 m., 1 ex., 1912, Reg. No. 1106/H<sub>3</sub>, coll. Lord Carmichael; Rangeet Valley, 2000-2300 m., 1 ex., 29. v. 1916, Reg. No. 1107/H<sub>3</sub>, coll. F. H. Gravely.

**Distribution** : India : West Bengal (Darjiling District), Assam, Kashmir, Meghalaya, Sikkim, Uttar Pradesh. Elsewhere : China, Java, Japan, Nepal.

**Remarks** : This subspecies is mainly found in the hilly areas.

Subgenus 2. ***Polistes (Megapolistes)*** van der Vecht

1968. *Polistes (Megapolistes)* van der Vecht. *Bijdr. Dierk.*, **38** : 97.

Type-species : *Vespa olivaceus* (De Geer, 1773).

This is a moderate size subgenus and widely distributed in Oriental region. Three species known from Indian region are also reported from West Bengal. These can be recognised by the following key (Das and Gupta, 1989 : 51).

Key to the Species of ***Polistes (Megapolistes)***

Transverse striations of propodeum strong; metapleuron ventrally with distinct punctures. In males : apophyses longer than wide, with sparse pubescence ..... *rothneyi* Cameron  
 Transverse striations of propodeum weak; metapleuron ventrally impunctate or with scattered fine punctures..... 2

2. Occipital carina in female incomplete. In males apophyses flattened and spatulate at apex, shiny and without pubescence.....*olivaceus* (De Geer)
- Occipital carina in female complete. In males apophyses long and narrow with dense pubescence ..... *wattii* Cameron

### 2. *Polistes (Megapolistis) olivaceus* (De Geer)

1773. *Vespa olivaceus* De Geer. *Mem. Hist. Insect*, 3 : 582, fig. Type : Sex ? (Stockholm).

1989. *Polistes (Megapolistes) olivaceus* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 52.

*Material examined* : India : West Bengal : Haora District : Botanical Garden, 1 ex., 4. iv. 1957, coll. M.A.M., Reg. No. 2437/H3; Haora, 6 exs., 3. vii. 1964, S. Ali and party; Nadia District : Phulia, 1 ex., 4. xi. 1966, coll. D. K. Ghosal; Ranaghat, 4 exs., 18. viii. 1965, coll. D. K. Mondal and party; Hugli District : Bhadrassar, 4 exs., 5. xii. 1964, coll. A. N. T. Joseph and party; North 24-Pargs. District : Titagarh, 1 ex., 19. vii. 1965, coll. K.K. Ray; South 24-Pargs. District : Subhasgram, 15 exs., 10. viii. 1965, coll. K.K. Ray.

*Distribution* : India : West Bengal (Calcutta, Darjiling, Hugli, Haora, Murshidabad, Nadia, North and South 24-Parganas Districts), Assam, Himachal Pradesh, Kashmir, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh. Elsewhere : Widely distributed in Oriental region and Oceanic islands. Richards (1978) recorded a few specimens from Australia and New Zealand.

*Remarks* : This species is very close to *P. wattii*. It can be distinguished by the characters given in the key.

### 3. *Polistes (Megapolistes) wattii* Cameron

1900. *Polistes wattii* Cameron. *Ann. Mag. Nat. Hist.*, (7) 6 : 416, F, des. Type : F, India : West Bengal (London and Oxford).

1989. *Polistes (Megapolistes) wattii* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 53.

*Distribution* : India : West Bengal (Calcutta), Delhi, Gujarat, Himachal Pradesh, Meghalaya, Orissa, Uttar Pradesh. Elsewhere : China, Iran, Pakistan.

*Remarks* : This species is recognised by uniformly yellow colour of head and thorax. Occipital carina in female complete; apophyses of male subgenital plate long and narrow, not flattened at apex and densely pubescent.

### *Polistes (Megapolistes) rothneyi* Cameron

Das and Gupta (1989) reported five subspecies from India. Of these, two subspecies are known from West Bengal. These can be distinguished by the following key.

#### Key to the Subspecies of *rothneyi*

1. Propodeum black or without narrow yellow marks. First gastral tergite reddish with black base and a median transverse black line; mesepisternum usually with one large reddish mark above dorsal episternal groove.....*rothneyi rothneyi* Cameron

- Propodeum black with four reddish or yellow marks. First gastral tergite black with broad yellowish apical band; mesepisternum with three reddish marks .....  
 ..... *rothneyi sikkimensis* van der Vecht

#### 4. *Polistes (Megapolistes) rothneyi rothneyi* Cameron

1900. *Polistes rothneyi* Cameron. *Ann. Mag. Nat. Hist.*, (7) 6 : 410, M, des. Type : M, India : West Bengal : Barrackpore (Oxford).  
 1989. *Polistes (Megapolistes) rothneyi rothneyi* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 56.

*Material examined* : No material of this subspecies was available for study from West Bengal.

*Distribution* : India : West Bengal (North 24-Parganas District), Delhi, Meghalaya, Uttar Pradesh. Elsewhere : Nepal.

#### 5. *Polistes (Megapolistes) rothneyi sikkimensis* van der Vecht

1968. *Polistes (Megapolistes) rothneyi sikkimensis* van der Vecht. *Bijdr. Dierk.*, 38 : 100, 102, F, key, des., distr. Type : F, India : Sikkim, Ranjit Valley (London).  
 1989. *Polistes (Megapolistes) rothneyi sikkimensis* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 57.

*Material examined* : India : West Bengal : Darjiling District : Rambhi, 1 female, 8. vi. 1976, coll. S. Biswas.

*Distribution* : India : West Bengal (Darjiling District), Assam, Bihar, Meghalaya, Sikkim. Elsewhere : Nepal.

#### Subgenus 3. *Polistes (Stenopolistes)* van der Vecht

1972. *Polistes (Stenopolistes)* van der Vecht. *Entomological Essays to Commemorate the retirement of Professor K. Yasumatsu*, p. 89, 101.

Type-species : *Polistes lateritius* Smith, 1857.

Das and Gupta (1989) reported three species, viz., *hasianus* Cameron, *nigritarsis* Cameron and *delhiensis* Das and Gupta from India. Of these, *nigritarsis* Cameron has been reported from West Bengal.

#### 6. *Polistes (Stenopolistes) nigritarsis* Cameron

1900. *Polistes nigritarsis* Cameron. *Ann. Mag. Nat. Hist.*, (7) 6 : 413, M, des. Type : M, India : West Bengal : Barrackpore (Oxford).  
 1989. *Polistes (Stenopolistes) nigritarsis* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 64.

*Diagnostic characters* : Female. Body covered with golden pubescence. Integument reddish-brown. The following are yellow : a large mark at the base of mandible, clypeus wholly, inner orbits narrowly, malar space, temple towards the base of mandible, basal and apical margins of pronotum, a mark on tegula, scutellum and postscutellum broadly at base, two large mark on mesopleuron, mark on subtegular area, another on dorsal metapleuron and a line on ventral metapleuron, propodeum with two large spots, fore femur above, middle and hind femora at apex, fore tibia at apex, fore tarsus, basal 0.66 of middle metatarsus, first gastral tergite at sides, apical margin of first four gastral tergites, first sternite and narrow band on second and third sternites. The following are blackish-brown : Occiput,

mesoscutum at apex a line along the median scutal groove, mesepimeron, subtegular area, suture between meso- and metapleuron, propodeum, middle tarsus, hind tarsus, first and second gastral tergites at base, third and fourth, fifth and sixth tergites. Wings blackish with a fuscous cloud.

First gastral tergite not angled at base; interocellar distance 0.5x the diameter of posterior ocellus; anal lobe of hind wing separated from the rest of the wing membrane by a wider gap.

*Distribution* : India : West Bengal (Darjiling and North 24-Parganas), Meghalaya.

*Remarks* : No material of this species was available for study from West Bengal. Das and Gupta (1989) gave a detailed description of this species.

Subgenus 4. *Polistes (Polistella)* Ashmead

1904. *Polistella* Ashmead. *Proc. U.S. Natl. Mus.*, 28 : 133.

Type-species : *Polistes manilensis* Saussure, 1853.

Eight species are known from the Indian subregion. Of these, four species are reported from West Bengal. These may be distinguished by the following key.

Key to the Species/Subspecies of *Polistes (Polistella)*

1. Gaster black, first to fifth gastral tergites with red bands; legs not completely black. In males, subgenital plate with central tubercle; apical antennal segments 1.5x as long as 12th segment....  
..... *adustus* Bingham
- Gaster coloured other than black..... 2
2. Fore wing with subapical fuscous cloud; median groove of propodeum shallow with close fine transverse striations; first gastral tergite about as long as wide. First gastral sternite without distinct margin at base. Tergite 2 and 3 with small basal spot. Tergites 1, 3 and 4 extensively yellow marked..... *stigma tamula* (Fabricius)
- Fore wing without subapical fuscous cloud; apical margin of gastral tergites without yellow bands..... 3
3. Pronotum ribbed; head narrower than thorax; second gastral tergite almost yellow. In males, subgenital plate with a broad central tubercle. (Thorax black with pronotum, an elongated broad mark on mesoscutum, scutellum, postscutellum and broad marks on propodeum, reddish).....  
..... *strigosus atratus* Das and Gupta
- Pronotum not ribbed; head about as wide as thorax; second gastral tergite entirely reddish-brown. In males, subgenital plate with a small central tubercle ..... *sagittarius* Saussure

7. *Polistes (Polistella) adustus* Bingham

1897. *Polistes adustus* Bingham. *Fauna British India, Hymenoptera*, 1 : 397, F, key, des.

1989. *Polistes (Polistella) adustus* : Das and Gupta, *Oriental Ins. Monogr.*, 11 : 70.

*Material examined* : India : West Bengal : Darjiling District : Kurseong, 1 male, Reg. No. 2596/12.

*Distribution* : India : West Bengal (Darjiling District), Delhi, Himachal Pradesh, Meghalaya, Uttar Pradesh, Sikkim. Elsewhere : Nepal.

#### 8. *Polistes (Polistella) stigma tamula* (Fabricius)

1798. *Vespa tamula* Fabricius. *Ent. Syst. Suppl.*, : p. 263, F, des. Type : F, "In India Orientali, Dom Daldorff" (Kiel).

1989. *Polistes (Polistella) stigma tamula* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 76.

*Material examined* : India : West Bengal : Puruliya District : Puruliya, 1 ex., 7.xi.1985, coll. M. Dutta and party; Bankura District : Bankura, 1 ex., 6.ix.1986, coll. R.S.Burman and party; Jalpaiguri District : Pakuahat, 1 ex., 16.vi.1987, coll. K.P. Mukherjee and party; Hugli District : Bandal, 1 female, 28. x. 1965, coll. P. Parui.

*Distribution* : India : West Bengal (North 24-Parganas, Bankura, Hugli, Puruliya, Jalpaiguri Districts), Delhi, Himachal Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh and throughout the greater part of India. Elsewhere : Aru Is., Burma, Ceram, China, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Taiwan, Thailand.

*Remarks* : This subspecies is conspicuous and separable from all other subspecies by the extensive yellow areas of the gastral segments 3 and 4; mesopleurum with ventral yellow marks (Petersen, 1987).

#### 9. *Polistes (Polistella) strigosus atratus* Das and Gupta

1989. *Polistes (Polistella) strigosus atratus* Das and Gupta. *Oriental Ins. Monogr.*, 11 : 81, M, F, des., fig., map. Type : F, India : Tripura (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Singla, 456 m., 1 female, 1912, 1 male, 1913, coll. Lord Carmichael; Siliguri, 1 female, 1.vii. 1906, Reg. No. 9845/14.

*Distribution* : India : West Bengal (Darjiling District), Assam, Bihar, Manipur, Sikkim, Tripura, Uttar Pradesh.

#### 10. *Polistes (Polistella) sagittarius* Saussure

1853. *Polistes sagittarius* Saussure. *Études Famille Vespides*, 2 : 56, F, des. Types : F, China. "Indes Orientales" (Geneva).

1989. *Polistes (Polistella) sagittarius* : Das and Gupta. *Oriental Ins. Mongr.*, 11 : 82.

*Material examined* : India : West Bengal : Darjiling District : Singla, 467 m., 1 female, 1912 (No other data).

*Distribution* : India : West Bengal (Darjiling and North 24-Parganas Districts), Assam, Delhi, Himachal Pradesh, Manipur, Nagaland, Tripura, Uttar Pradesh. Elsewhere : Burma, China, Greece, Hong Kong, Malaya, Nepal, Sulawesi, Thailand.

### Tribe 2. **Ropalidiini**

This tribe is represented by a single genus, *Ropalidia* Guérin (= *Icaria* Saussure), which is widely distributed in the tropical parts of the old World.

Genus 2. *Ropalidia* Guérin

This genus is subdivided into five subgenera, viz., *Ropalidia* (*Anthreneida*) White, *R. (Icarielia)* Dalla Torre, *R. (Paraicaria)* Gribodo, *R. (Polistratus)* Cameron and *R. (Ropalidia)* Guérin. Of these, first three subgenera occur in Indian subregion. In the state of West Bengal only two subgenera, viz., *R. (Anthreneida)* and *R. (Icarielia)* have been reported (Das and Gupta, 1989). A key to the subgenera and species of *Ropalidia* is given below :

Key to the Subgenera and Species of *Ropalidia*

1. Mesopleurum with a distinct epicnemial carina.....(Subgenus *Anthreneida* White)..... 2
- Mesopleurum without an epicnemial carina..... (Subgenus *Icarielia* Dalla Torre).....
- Propodeum rugose at sides and finely trans-striate in the middle; scutellum and postscutellum orange-red; median groove of propodeum wide .....*scitula* Bingham
2. Propodeum at base with a pair of carinae ..... 3
- Propodeum without carinae at base ..... 4
3. Second gastral tergite reddish-brown with narrow yellow fascia, rarely brownish-black. In males, clypeus nearly as wide as long.....*marginata marginata* (Lepeletier)
- Second gastral tergite with a broad yellow fascia. In males, clypeus wider than long. (Second gastral tergite 2.1-2.2x as wide as gastral petiole. In males, apical antennal segment less strongly curved and blunt at apex .....*brevita* Das and Gupta
4. Second gastral tergite and sternite not fused ..... 5
- Second gastral tergite and sternite fused ..... 8
5. Median groove of propodeum deep and almost complete; gastral petiole 1.7x as long as wide .....  
.....*santoshae* Das and Gupta
- Median groove not so deep, obsolete at base; gastral petiole more than 2x as long as wide..... 6
6. Second gastral tergite strongly raised in the middle .....*artifex artifex* (Saussure)
- Second gastral tergite normal..... 7
7. Third antennal segment at least 3x as long as wide at apex; sides of second gastral tergite marked with yellow at base .....*rufocollaris rufocollaris* (Cameron)
- Third antennal segment less than 3x as long as wide at apex; sides of second gastral tergite marked variously. (Body reddish with black and yellow markings; gastral petiole not predominantly black) .....*stigma stigma* (Smith)
8. Suture between second gastral tergite and sternite distinctly visible all along its course; ocellocular distance 3x as long as interocellar distance. (Radial cell dark brown; temple smooth; propodeum also smooth in the middle, at side weakly punctate; second gastral tergite more rugosely punctate).....*sumatrae lugubris* (Smith)

- Suture between second gastral tergite and sternite visible only at base: ocellocular distance 1.2-2.2x the interocellar distance. (Median line of median groove of propodeum not distinct, groove wider in the middle; temple as wide as eye in profile)..... *variegata variegata* (Smith)

Subgenus 5. *Ropalidia* (*Anthreneida*) White

1841 *Anthreneida* White. *Ann. Mag. Hist.*, (1) 7 : 321.

Type-species : *Vespa sumatrae* Weber, 1801 (= *Anthreneida coronata* White, 1841).

This is a large subgenus, widely distributed in the Oriental, Wallacea and the Australian regions. Eight species are known from West Bengal.

11. *Ropalidia* (*Anthreneida*) *marginata marginata* (Lepeletier)

1793. *Vespa ferruginea* Fabricius. *Ent. Syst.*, 2 : 280, des. Type : F (Copenhagen); preocc. by *Vespa ferruginea* Gmelin, 1770 and Oliver, 1791.

1836. *Epipona marginata* Lepeletier. *Hist. Nat. Ins. Hymenoptera*, 1 : 541, M, F, des. Type : ? (Loc. unknown).

1989. *Ropalidia* (*Anthreneida*) *marginata marginata* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 118.

*Material examined* : India : West Bengal : Medinipur District : Jhargram, 5 exs., 7.ix.1985, coll. S. Biswas and party.

*Distribution* : India : West Bengal (Calcutta, Medinipur and North 24-Parganas Districts), Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu. Elsewhere : Burma, Ceram, Indo-China, Flores, Kalimantan, Malacca, Malaya, Pakistan, Sri Lanka, Sulawesi.

*Remarks* : This subspecies is different from another subspecies, viz., *marginata rufitarsis* van der Vecht from Burma in having second gastral tergite reddish-brown with a narrow yellow apical fascia; fore coxa yellow in front; scutellum and postscutellum with yellow marks.

12. *Ropalidia* (*Anthreneida*) *brevita* Das and Gupta

1989. *Ropalidia* (*Anthreneida*) *brevita* Das and Gupta. *Oriental Ins. Monogr.*, 11 : 121, M, F, des. Type : M, India : Delhi (Gupta).

*Distribution* : India : West Bengal (Haora and Darjiling Districts), Assam, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Orissa, Sikkim, Uttar Pradesh.

*Remarks* : No material of this species was available for study from West Bengal. This species can easily be distinguished by the characters as mentioned in the key.

13. *Ropalidia* (*Anthreneida*) *santoshae* Das and Gupta

1989. *Ropalidia* (*Anthreneida*) *santoshae* Das and Gupta. *Oriental Ins. Monogr.*, 11 : 123, M, F, des. Type : M, India : Meghalaya : Shillong (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Pashok, 1 female, 26.v-14.vi. 1916, coll. F. H. Gravely.

*Distribution* : India : West Bengal (Darjiling District), Arunachal Pradesh, Meghalaya, Sikkim.

14. *Ropalidia (Anthreneida) artifex artifex* (Saussure)

1853. *Icaria variegata* Saussure. *Études Famille Vespides*, 2 : 25, W=F. des. Java; preocc. by Smith, 1852.  
 1853. *Icaria artifex* Saussure. *Études Famille Vespides*, 2 : 236, des. Type : W, Java (Geneva).  
 1962. *Ropalidia (Anthreneida) artifex artifex* : van der Vecht. *Zool. Verh.*, 57 : 91; Das and Gupta, 1989. *Oriental Ins. Monogr.*, 11 : 124.

**Distribution** : India : West Bengal (North 24-Parganas District), Karnataka, Maharashtra, Sikkim, Uttar Pradesh. Elsewhere : Burma, Java.

**Remarks** : This is a little known species (Bingham, 1897 : 388, 389), closely resembling *R. stigma*. This species has second gastral tergite strongly raised apically in the middle; temple 0.75x as wide as eye in profile; third antennal segment 2.5x as long as wide at apex; male antenna with tyloids (Das & Gupta, 1989).

15. *Ropalidia (Anthreneida) rufocollaris rufocollaris* (Cameron)

1900. *Icaria rufocollaris* Cameron. *Ann. Mag. Nat. Hist.*, (7) 6 : 497. F, des. Type : F, India : Meghalaya : Khasi Hills (London).  
 1989. *Ropalidia (Anthreneida) rufocollaris rufocollaris* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 125.

**Material examined** : India : West Bengal : Darjiling District : Singla, 455 m., 1 female, 1912; Pashok, 1 female, 26.v.1914, coll. F.H. Gravely; 1 female, 3.vi. 1930, coll. S.L. Hora.

**Distribution** : India : West Bengal (Darjiling District), Assam, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh. Elsewhere : Burma, Thailand, Tibet.

**Remarks** : This species is characterized by having a yellow mark at the base of second gastral tergite; sides of propodeum and mesoscutum, black. Das and Gupta (1989) gave a detailed description of this species.

16. *Ropalidia (Anthreneida) stigma stigma* (Smith)

1858. *Polybia stigma* Smith. *J. Proc. Linn. Soc. Zool.*, 2 : 114, M. Type : M, Malaysia : Sarawak (Oxford).  
 1989. *Ropalidia (Anthreneida) stigma stigma* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 127.

**Material examined** : No material of this species was available for study from West Bengal.

**Distribution** : India : West Bengal (North 24-Parganas District), Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tripura, Uttar Pradesh. Elsewhere : Burma, Indonesia, Indo-China, Malaysia, Philippines, Sri Lanka, Thailand.

**Remarks** : This species is chiefly recognised by having body reddish with black and yellow markings. Das and Gupta (1989) gave a detailed description of this species.

17. *Ropalidia (Anthreneida) sumatrae lugubris* (Smith)

1858. *Icaria lugubris* Smith. *J. Proc. Linn. Soc. Zool.*, 2 : 115, F, des. Lectotype : F, Kalimantan (Oxford).  
 1922. *Ropalidia krishna* Dover and Rao. *J. Asiat. Soc. Bengal*, (N.S.), 18 : 246, F, des. Type : F, India : West Bengal : Calcutta (Calcutta). Syn. by Dover, 1925.  
 1989. *Ropalidia (Anthreneida) sumatrae lugubris* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 136.

*Material examined* : India : West Bengal : Calcutta, 1 female, (Type : *R. krishna* Dover & Rao), xi. 1920, coll. C. Dover.

*Distribution* India : West Bengal (Calcutta). Elsewhere : Kalimantan.

18. *Ropalidia (Anthreneida) variegata variegata* (Smith)

1852. *Epipona variegata* Smith. *Ann. Mag. Nat. Hist.*, (2) 9 : 48, F, des. Type : F, India : Maharashtra : Poona (London).

1989. *Ropalidia (Anthreneida) variegata variegata* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 144.

*Material examined* : India : West Bengal : Calcutta : Calcutta, 3 females, 3 males, 24.ix.1976, coll. M. Chaudhury; Eden Gardens, 1 female, 21.xi.1959, coll. A.P. Kapur.

*Distribution* : India : West Bengal (Calcutta), Bihar, Delhi, Gujarat, Karnataka, Maharashtra, Madhya Pradesh, Punjab, Tamil Nadu, Uttar Pradesh. Elsewhere : China, Nepal, Pakistan.

*Remarks* : Das and Gupta (1989) gave a detailed description of this subspecies.

Subgenus 6. *Ropalidia (Icarielia)* Dalla Torre

1904. *Icarielia* Dalla Torre. *Genera Insectorum*, 19 : 72.

Type-species : *Icaria flavopicta* Smith, 1857.

1989. *Ropalidia (Icarielia)* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 148.

This subgenus is represented by a single species in West Bengal.

19. *Ropalidia (Icarielia) scitula* Bingham

1897. *Icaria scitula* Bingham. *Fauna British India, Hymenoptera*, 1 : 387, 392, W, key, des. Type : W, India : Sikkim : Ranjit Valley (London).

1989. *Ropalidia (Icarielia) scitula* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 152.

*Diagnostic characters* : Body black, with a line on inner margin of mandible; a line along the inner eye orbit, yellow. Pronotum (except the triangular black marks on sides), scutellum, postscutellum (except the triangular black area), red. Legs in general dark brown. Propodeum finely transversely striated with rugosities at sides. Median groove wide at base and narrow at apex. Temple 0.5x as wide as eye in profile; third antennal segment more than 2x as long as wide at apex; second gastral tergite obliquely cut off at apex. Frons and mesoscutum dull with close fine reticulate punctures; clypeus with scattered punctures (Das and Gupta, 1989).

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim. Elsewhere : Burma.

*Remarks* : No material of this species was available for study from West Bengal. Das and Gupta (1989) gave a brief description of this species.

Tribe 3. **Polybiini**

This tribe is represented by three genera, viz., *Parapolybia* Saussure, *Polybioides* Buysson and *Belonogaster* Saussure in India. Only one genus, viz., *Parapolybia* has been reported from West Bengal.

Genus 3. *Parapolybia* Saussure1853. *Parapolybia* Saussure. *Études Famille Vespides*, 2 : 207.Type-species : *Polybia* (*Parapolybia*) *indica* (Saussure, 1853).

Three species, viz., *indica* (Saussure), *varia* (Fabricius) and *nodosa* van der Vecht are distributed in India. Of these, *indica* and *varia* are reported from West Bengal. These can be identified by the following key.

Key to the Species of *Parapolybia*

1. Occipital carina complete, interocular distance more at clypeus than at vertex level; petiole 1.3x as long as head width.....*indica indica* (saussure)
- Occipital carina incomplete; interocular distance at clypeus about as long as or shorter than at vertex level; petiole shorter than head width ..... *varia* (Fabricius)

20. *Parapolybia indica indica* (Saussure)1853. *Polybia indica* Saussure. *Études Famille Vespides*, 2 : 207, F, des., Fig. Type : F, China (Paris).1989. *Parapolybia indica indica* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 178.

*Material examined* : India : West Bengal : Puruliya District : Ajodhya, 2 exs., 2-3 xi.1985. coll. M. Dutta and party.

*Distribution* : India : West Bengal (Puruliya District), Assam, Meghalaya. Elsewhere : Burma, China, Indonesia, Korea, Japan.

*Remarks* : This subspecies is characterised by having second and the following gastral tergites with yellow spots.

21. *Parapolybia varia* (Fabricius)1787. *Vespa varia* Fabricius. *Mant. Insect.*, 1 : 293, des. Type : China (Copenhagen).1989. *Parapolybia varia* : Das and Gupta. *Oriental Ins. Monogr.*, 11 : 180.

*Material examined* : India : West Bengal : Darjiling District: Darjiling, 1 female, 7.iv.1973, coll. H.S. Sharma & party; Ghumti, 1219 m., 1 female, vii. 1911, coll. F.H. Gravely; Pashok, 2 females, 3.vi.1930, coll. S.L. Hora.

*Distribution* : India : West Bengal (Darjiling and North 24-Parganas District), Assam, Delhi, Himachal Pradesh, Meghalaya, Manipur, Punjab, Sikkim, Uttar Pradesh. Elsewhere : Burma, China, Indonesia, Malaysia, Philippines, Japan, Luichow Is., Nepal.

*Remarks* : This is a highly variable species, several colour variants have been identified from various localities (Das and Gupta, 1989).

## Subfamily 2. VESPINAE

This is morphologically the most specialized subfamily of the social wasps. Component species are commonly called hornets (those nesting above ground) and yellow jackets (those nesting usually

subterraneously). The nests consist of several to many combs of hexagonal cells composed of paper; cells constructed early in the year may be used for several larvae in succession. The combs are usually enclosed in a paper envelope. The nests are annual, new queens and males being produced late in the summer or early in the fall; the newly fertilized queens overwinter and begin new nests in the spring. There are relatively a few precise records of the nests used to feed vespine larvae; apparently dismembered and masticated adult Diptera and honeybees are commonly used; the wasps may also obtain bits of flesh from fresh and decaying carcasses. Adult vespines feed on liquid foods, primarily nectar or honey; some species are known to prey upon adult honey bees, which they kill and extract nectar from the crop.

*Diagnostic characters* : Apical margin of clypeus broadly truncate or concave medially and emarginate laterally, ending in two rounded lateral lobes; mandibles short and wide; maxillary palp 6-segmented; labial palp 4-segmented; antenna 12-segmented in female and worker and 13-segmented in male; mesepimeron separated from mesepisternum by a suture; hind margin of postscutellum produced in the middle forming a long, triangular lobe wedged in the upper part of the propodeum; gaster subsessile, first tergite with a distinct edge or rounded angle between the anterior vertical and the posterior horizontal face.

This subfamily is represented by four genera : *Vespa*, *Provespa*, *Dolichovespula* and *Vespula*. Only three genera have been reported from West Bengal. These can be recognised by the following key.

#### Key to the Genera of VESPINAE

- 1 Head small, with short vertex and narrow temples; ocelli very large, posterior ocelli much closer to the eyes than to each other, about as far from the occiput as from the eyes; carina on hind coxa incomplete, absent ventrally from posterior surface; fore wing with large stigma, basal vein joining subcosta close to stigma; first cubital cell very long, as long as the distance of its apex to the tip of the wing; first gastral segment cup-shaped, the tergite convex anteriorly. Coloration uniformly brown, clypeus sometimes brownish. Nocturnal in habits. Colonies founded by swarming ..... *Provespa* Ashmead
- Head large, with long vertex and broad temples; ocelli normal (except in *Vespa binghami*); interocellar distance shorter than ocellocular distance; hind coxa with a carina on its posterior surface; fore wing with short to inconspicuous stigma, basal vein joining subcosta at a distance of 1.0-3.0 x the length of stigma; first cubital cell shorter than the distance between its apex and the tip of fore wing; first gastral segment transverse, the tergite truncate and abruptly sloping anteriorly. Coloration predominantly yellow, brown and/or black. Large size, length varying from 14-40 mm. Diurnal in habits. Colonies founded by female only ..... 2
2. Large sized wasps, usually over 20 mm long; clypeus with short hairs; pronotal carina strong and bent forward dorsally, with a pit near its lower 0.3; hind wing with hamuli originating before the tip of subcostella. Male antenna with tyloids..... *Vespa* Linnaeus
- Medium sized wasps, less than 20 mm long; clypeus with long hairs on its whole surface; pronotal carina weak or absent; hind wing with hamuli originating at the tip of subcostella. Male antenna without distinct tyloids, antenna with long scape..... *Vespula* Thomson

Genus 4. *Vespa* Linnaeus

This genus is divided into two subgenera : *Vespa* (*Vespa*) Linnaeus and *Vespa* (*Nyctovespa*) van der Vecht, and both are represented in West Bengal. A key to the subgenera is given below :

Key to the Subgenera of *Vespa*

(Female and Worker)

1. Ocelli large; interocellar distance a little longer than the ocellocular distance; malar space short. Nocturnal in habits.....Subgenus *Nyctovespa* v. d. Vecht  
 — Ocelli small; interocellar distance shorter than the ocellocular distance. Diurnal in habits.....  
 ..... Subgenus *Vespa* Linnaeus

(Male)

1. Antenna without tyloids; 13th segment longer than 12th segment, curved; interocellar distance about equal to ocellocular distance; ocelli large; apical gastral segments without incisions or emarginations, the last segment almost evenly rounded apically. Nocturnal in habits .....  
 .....Subgenus *Nyctovespa* v. d. Vecht  
 — Antenna with tyloids; 13th segment neither long nor curved; ocelli small; interocellar distance smaller than ocellocular distance; one or more apical gastral segments of male emarginate medially. Diurnal in habits ..... Subgenus *Vespa* Linnaeus

Subgenus 7. *Vespa* (*Nyctovespa*) van der Vecht

1959. *Vespa* (*Nyctovespa*) van der Vecht. *Zool Meded.*, **36** (13) : 210.

Type-species : *Vespa binghami* Buysson, 1905.

22. *Vespa* (*Nyctovespa*) *binghami* Buysson

1905. *Vespa binghami* Buysson. *Ann. Soc. Ent. France*, **73** : 488, 491, 523, F, W, key, des. Lectotype : F, Burma (Paris).

1959. *Vespa* (*Nyctovespa*) *binghami* : van der Vecht. *Zool. Meded.*, **36** (13) : 210, F, M, W, lectotype design., des., fig.

**Diagnostic characters** : Nocturnal species. Ocelli large; antenna of male without tyloids; 3-11 segments with a few short hairs on the inner side, 12th and 13th segments with a dark and shiny area on the inner side, 13th segment longer than 12th, curved and somewhat flattened. Clypeus emarginate, its apical half in female and worker densely punctate; lateral margins of interantennal shield rounded; temples wider than eye in profile; apical gastral segments without any emargination; last gastral segment evenly rounded apically. Body covered with reddish pubescence. Head yellowish to yellowish-brown; antenna reddish-brown; thorax, legs, gaster, reddish to reddish-brown; 6th tergite yellow to reddish-brown (Das and Gupta, 1989).

**Material examined** : India : West Bengal : Darjiling District : Darjiling, 2000-2300 m., 1 ex., xi. 1941, Reg. No. 2270/H<sub>3</sub>, coll. H.A. Hafiz, det. v. d. Vecht, 1959 (damaged ex.).

**Distribution** : India : West Bengal (Darjiling District). Elsewhere : Burma, China.

Subgenus 8. *Vespa (Vespa)* Linnaeus1758. *Vespa* Linnaeus. *Systema Naturae*, (10th Ed.), 1 : 343.Type-species : *Vespa crabro* Linnaeus, 1758.1904. *Macrovespa* Dalla Torre. *Genera Insectorum*, 11 : 64.Type-species : *Vespa crabro* Linnaeus, 1758.

Eighteen species are recognised from India. Of these, nine species are known to occur in the state of West Bengal. *Vespa (V.) variabilis* subspecies *fumida* van der Vecht could not be incorporated in the key.

Key to the Species of *Vespa (Vespa)*

(Female and Worker : antenna 12-segmented, gaster 6-segmented)

(After van der Vecht, 1957, 1959)

1. Apical margin of clypeus with a broad and deep apical emargination, forming lateral lobes and with a median triangular tooth projecting only half the length of the lateral lobes. 6th gastral segment yellow ..... *analis* Fabricius
- Apical margin of clypeus emarginate or broadly truncate, but without a median tooth ..... 2
2. Head strongly widened and produced behind the eyes; temple in profile view more than 2x as wide as eye. Clypeus coarsely punctate, strongly emarginate apically; temple and mesopleurum finely and sparsely punctate in lower half..... *mandarinia* Smith
- Head normal; temple almost 1.5x as wide as eye ..... 3
3. Clypeus coarsely punctate or lower vertical area of pronotum with distinct transverse striations; thorax black and head black to red, not marked with yellow; gaster brown with tergite 2 yellow ..  
..... 4
- Clypeus subpolished, with scattered punctures; lower vertical area of pronotum without distinct transverse ridges; head, thorax and gaster black to brown, with reddish or yellow areas..... 5
4. Apical margin of clypeus hairy and with a blunt triangular tooth on each side of the median emargination; body covered with stiff hairs; pronotum with strong transverse striations in its lower vertical area near the pronotal pit; tergite 2 yellow ..... *tropica* (Linnaeus)
- Apical margin of clypeus less hairy, with short rounded lobes on each side of the median emargination; striations on pronotum fine to indistinct. (Vertex, temple, mesoscutum, scutellum, postscutellum, metapleuron and propodeum granuloso-punctate) ..... *affinis* (Linnaeus)
5. Clypeus rather flat and elongate, as wide as long or little longer, with moderate sized punctures, yellow. Hairs on head and thorax short, sparse, bristle-like; gaster dorsally almost without hairs. Body brown with clypeus, frons and tergites 3-4 yellow ..... *orientalis* Linnaeus
- Clypeus convex, wider than long, not elongate, its lateral emarginations short, punctures on clypeus fine. Head and thorax dorsally covered with dense, long black or yellowish-brown hairs; gaster dorsally with hairs; body largely black or yellow ..... 6

- 6. Gaster largely black; apical half of clypeus impunctate, its apical emargination shallow and without lateral lobes; middle tibia with long hairs, hairs longer than the width of tibia; postscutellum brown. Body hairs yellowish-brown.....*basalis* Smith
- Gaster black or yellow; apical 0.33 of clypeus with more crowded punctures, its apical margin clearly emarginate forming lateral lobes; middle tibia with a few long hairs. Body hairs black..... 7
- 7. Gaster largely yellow; frons, vertex and mesoscutum sparsely hairy; gaster covered with dense erect hairs; hairs on second tergite about as long as the width of hind basitarsus; body largely yellow with mesoscutum black..... *bicolor* Fabricius
- Gaster largely black; frons, vertex and mesoscutum with dense long hairs; gaster with short, less conspicuous hairs; hairs on second tergite shorter than the width of hind basitarsus; body extensively black, or the mesoscutum partly orange-yellow..... *velutina* Lepeletier

(Males : antenna 13-segmented, gaster 7-segmented)

- 1. Head large and swollen (as in the worker). (Malar space comparatively longer, tyloids present on segments 4-13, apical margin of 6th and 7th tergites shallowly emarginate) ..... *mandarinia* Smith
- Head normal..... 2
- 2. Sides of clypeus not touching the eyes, separated from them by narrow extensions of inner orbits..... 3
- Sides of clypeus touching the eyes ..... 5
- 3. Emargination of 6th gastral sternite broad and semi-elliptical, its sides curving gradually towards sides of hind margin; fourth antennal segment with only the basal tyloid; clypeus rather coarsely punctate ..... *tropica* (Linnaeus)
- Emargination of 6th gastral sternite as wide as deep, with angular edges; fourth antennal segment with 2 tyloids; clypeus finely punctate..... 4
- 4. Body yellow, vertex and mesoscutum black; junction of postscutellum and propodeum with a Y-shaped black mark ..... *bicolor* Fabricius
- Body more extensively black, or mesoscutum partly orange-yellow ..... *velutina* Lepeletier
- 5. Antenna long and slender, fourth segment 2.0x as long as wide, without tyloids; clypeus sparsely and shallowly punctate; middle and hind tibiae densely covered with long hairs..... *basalis* Smith
- Antenna relatively short, fourth segment less than 2.0x as long as wide, with 2 distinct tyloids; clypeus more closely punctate; middle and hind tibiae with short and sparse hairs..... 6
- 6. Metapleurum densely covered with well defined punctures; seventh gastral tergite with a short sharp median apical notch..... *affinis* (Linnaeus)

- Metapleurum almost impunctate; seventh gastral tergite without any median notch. Apical margin of clypeus depressed, the depression often produced medially into a groove reaching middle of clypeus; incision of 6th sternite semi-elliptical, wider than deep ..... *analis* Fabricius

23. *Vespa (Vespa) affinis affinis* (Linnaeus)

1764. *Apis affinis* Linnaeus. *Mus. Ludovicae Ulricae Reginae*, p. 417, F. des. Type : F (Uppsala).  
1936. *Vespa affinis affinis* : Bequaert. *Treubia*, **15** : 347, key, syn., des., fig., several localities in China, Taiwan, Sumatra, Kalimantan, Sulawesi, Moluccas, West Irian, Sri Lanka, India.  
1983. *Vespa (Vespa) affinis affinis* : Das and Gupta. *Oriental Ins.*, **17** : 435, cat. with synonymical ref.

*Distribution* : India : West Bengal (Calcutta), Bihar, Maharashtra. Elsewhere : Burma, Indo-China, Malaysia, Indonesia, Philippines, Taiwan, Australia, Nepal, Sri Lanka.

*Remarks* : This subspecies is usually confused with *Vespa cincta* (= *Vespa tropica tropica*).

24. *Vespa (Vespa) analis nigrans* Buysson

1903. *Vespa nigrans* Buysson. *Bull. Soc. Ent. France*, 1903 : 175, M, des. Type : M, China (Paris).  
1939. *Vespa analis nigrans* : Bequaert. *Trans. Amer. Ent. Soc.*, **65** : 41, key, fig., tax.  
1939. *Vespa analis* (subsp) *barbouri* Bequaert. *Trans. Amer. Ent. Soc.*, **65** : 40, W, key, des. Type : W. India : Sikkim (Cambridge). Syn. by Das and Gupta, 1989.  
1983. *Vespa (Vespa) analis nigrans* : Das and Gupta. *Oriental Ins.*, **17** : 437, syn., ref.  
1989. *Vespa analis nigrans* : Das and Gupta. *Oriental Ins. Monogr.*, **11** : 208.

*Distribution* : India : West Bengal (Darjiling District), Assam, Meghalaya, Sikkim, Uttar Pradesh. Elsewhere : Burma, China, Laos, Malaysia, Nepal.

*Remarks* : No material of this subspecies was available for study from West Bengal.

25. *Vespa (Vespa) basalis* Smith

1852. *Vespa basalis* Smith. *Trans. Ent. Soc. London (N.S.)*, **2** (2) : 46, F, des. Type : F, Nepal (London).  
1852. *Vespa obliterated* Smith. *Trans. Ent. Soc. London (N.S.)*, **2** (2) : 47. Type : W. "Indes Orientales" (London). Syn. by Bingham, 1897.  
1983. *Vespa (Vespa) basalis* : Das and Gupta. *Oriental Ins.*, **17** : 438, syn.

*Material examined* : India : West Bengal : Jalpaiguri District : Alipurduar (Rajabhatkhawa), 1 male, 22.xi.1983, coll. A.K. Sanyal and party; Puruliya District : Ajodhya, 4 exs., 3-4.xi. 1985, coll. M. Dutta and party.

*Distribution* : India : West Bengal (Darjiling, Jalpaiguri, Puruliya and North 24-Parganas Districts), Arunachal Pradesh, Assam, Meghalaya, Sikkim. Elsewhere : Burma, China, Indo-China, Nepal, Sri Lanka, Taiwan, Thailand.

26. *Vespa (Vespa) bicolor* Fabricius

1787. *Vespa bicolor* Fabricius. *Mant. Insectorum*, **1** : 288, des. Type : ? sex, "in China D. Pflug" (Copenhagen).  
1905. *Vespa auraria* var. *citriventris* Buysson. *Ann. Soc. Ent. France*, **73** : 552, F, W, des. Lectotype (designated by v. d. Vecht, 1959) : F, India : Sikkim (Paris). India : West Bengal : Darjiling; China. Syn. by Das and Gupta, 1989.

1983. *Vespa (Vespa) bicolor bicolor* : Das and Gupta. *Oriental Ins.*, **17** : 439, cat., syn.

*Material examined* : India : West Bengal : Darjiling District : Singla, 425 m., 5 exs., 1912-13, coll. Lord Carmichael, Reg. Nos. 1039/H<sub>3</sub>; 1043/H<sub>3</sub>; Jalpaiguri District : Kathambari, Gazaldobe, 1 ex., 9.x.1987, coll. S.K. Tandon and party.

*Distribution* : India : West Bengal (Jalpaiguri and Darjiling Districts), Assam, Meghalaya, Sikkim, Uttar Pradesh. Elsewhere : Bhutan, China, Indo-China, Japan.

*Remarks* : This species is readily recognised by having body colour predominantly yellow with head and thorax black dorsally and body dorsally covered with dense blackish hairs.

### 27. *Vespa (Vespa) mandarinia magnifica* Smith

1852. *Vespa magnifica* Smith. *Trans. Ent. Soc. London (N.S.)* **2** (2) : 45, des. Type : Nepal (London).

1959. *Vespa (Vespa) mandarinia magnifica* : van der Vecht. *Zool. Meded.*, **36** (13) : 220; Das and Gupta, 1983. *Oriental Ins.*, **17** : 440, cat., syn.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 2000 m., 1 ex., 28. iv 14. v. 1915, coll. F. H. Gravely; Singla, 425 m., 1 ex., 1913, coll. Lord Carmichael.

*Distribution* : India : West Bengal (Darjiling District), Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya. Elsewhere : Bhutan, Burma, China, Malaysia, Nepal, Sri Lanka, Taiwan, Thailand.

*Remarks* : This is a distinct subspecies having the head orange-red, thorax black and abdomen reddish-brown with narrow apical bands on 1st to 5th tergites; the tip of gaster yellowish-brown.

### 28. *Vespa (Vespa) orientalis* Linnaeus

1771. *Vespa orientalis* Linnaeus. *Mant. Plantarum altera*. **2** : 540, W, des. Type : W, "Vespa ex oriente" (Linn. Soc., London).

1983. *Vespa (Vespa) orientalis* : Das and Gupta. *Oriental Ins.*, **17** : 441, cat., syn., distr.

*Material examined* : India : West Bengal : Medinipur District : Gorbeta, 3 exs., 15-16.iii.1984, coll. K.K. Roy and party; Bankura District : Simlapal, 1 ex., 31.x.1985, coll. M. Dutta and party; Bishnupur, 1 ex., 25.x.1986, coll. T.R. Mitra and party; Birbhum District : Illambazar, 1 ex., 14.iii.1986, coll. K.P. Mukherjee and party; Palispur, 1 ex., 3.x.1987, coll. M. Prasad and party; Malda District : Mehidipur, 4 exs., 20.vii.1986 and Chachal, 3 exs., 20.vii.1986, coll. M.S. Shishodia and party; Barddhaman District : Adrahati, 10 exs., 8.ix.1986, coll. K.K. Ray and party; Puruliya District : Khejurdanga, 1 ex., 2.xii. 1986, coll. T.R. Mitra and party.

*Distribution* : India : West Bengal (Medinipur, Bankura, Birbhum, Malda, Barddhaman, Calcutta and Puruliya Districts), Bihar, Delhi, Punjab, Uttar Pradesh. Elsewhere : Egypt, Pakistan, Middle East and Mediterranean region.

*Remarks* : This is a most common hornet species of Northern India. Commonly seen in sweetmeat shops and houses.

***Vespa (Vespa, tropica) (Linnaeus)***

This is one of the most common hornet of the Oriental region. They are large black or reddish-brown wasps with first and second or only second gastral segment partly or wholly orange or orange-brown. Three subspecies are recorded from West Bengal and these can be identified by the following key (Das and Gupta, 1989).

**Key to the Subspecies of *Vespa (Vespa) tropica***

1. Head and antennae mostly dark red or reddish-brown; pronotum and scutellum usually more or less reddish or reddish-brown ..... *tropica haematodes* Bequaert
- Head, antennae and thorax wholly black..... 2
2. Orange band on 2nd sternite deeply emarginate basally, the dark basal area extending to or beyond the middle of the sternite, the band often divided in the middle by a dark line; infuscated area at base of wing relatively small; first discoidal cell almost entirely yellowish .....  
..... *tropica tropica* (Linnaeus)
- Second sternite more extensively orange, the dark area at base not reaching the middle of the segment; wings more extensively infuscated; first discoidal cell almost entirely infuscated .....  
..... *tropica leefmansi* van der Vecht

**29. *Vespa (Vespa) tropica tropica* (Linnaeus)**

1758. *Sphex tropica* Linnaeus. *Systema naturae*, (10 ed.), 1 : 571, F, des. Type : F. "in Indiis" (Uppsala).
1775. *Vespa cincta* Fabricius. *Systema Entomologiae*, p. 362. India : Malabar (Not of De Geer, 1773 or Drury, 1775). misdet.; Bingham, 1897. *Fauna British India, Hymenoptera*, 1 : 402, F. W. des., fig.
1936. *Vespa tropica tropica* : Bequaert. *Treubia*, 15 : 328, key, des, fig.; Das and Gupta, 1989. *Oriental Ins. Monogr.*, 11 : 218, syn., des., distr.

**Material examined** : India : West Bengal : Darjiling District : Singla, 425 m., 3 exs., ii. 1913, Reg. Nos. 1065/H<sub>3</sub>, 1068/H<sub>3</sub>, 1069/H<sub>3</sub>, coll. Lord Carmichael; Calcutta : Calcutta & its environs, 1 ex., 17. viii. 1904, 2 exs., 26. ix. 1904, Reg. Nos. 3356/15 - 3358/15; 1 ex., 16. x. 1928, Reg. No. 45/H<sub>3</sub>, coll. R.H.; 1 ex., 1930, Reg. No. 1073/H<sub>3</sub>, coll. unknown (Z.S.I. collection); 2 exs., no other data (Mus. collection); South Entally, 28 exs., 27. xi. 1904, coll. G. Haultain; North 24-Parganas District : Palta, Jafarpur, 3 exs., 8. xii. 1965, Reg. Nos. 5048/H<sub>3</sub>, 5208/H<sub>3</sub>, 5209/H<sub>3</sub>, coll. R. P. Ghosh; South 24-Parganas District : Subhasgram, 1 ex., 10. viii. 1965, Reg. No. 3188/H<sub>3</sub>, coll. K. K. Ray; Baruipur, 4 exs., 18. ix. 1965, coll. G. N. Saha; Sonarpur, 2 exs., 26. xi. 1965, coll. R. N. Tiwari; Haora District : Bally, 2 exs., 13. x. 1930, coll. S. Banerjee; Andul, 1 ex., 28. ix. 1964, Reg. No. 2706/H<sub>3</sub>, coll. G. S. Arora; Hugli District : Tribeni, 1 ex., 31. vii. 1909 (Mus. Collection).

**Distribution** : Indian : West Bengal (Darjiling, Calcutta, Haora, Hugli, North and South 24-Parganas Districts), Meghalaya. Elsewhere : Bhutan, Burma, Hong-Kong, Indo-China, Malaysia, Indonesia, Wallacea, Australian and Palaearctic regions.

30. *Vespa (Vespa) tropica leefmansi* van der Vecht

1957. *Vespa tropica leefmansi* van der Vecht. *Zool. Verh.*, 34 : 19, M, F, W, key, des. Type : F, Sumatra : Padang (Leiden).

1983. *Vespa (Vespa) tropica leefmansi* : Das and Gupta. *Oriental Ins.*, 17 : 445, cat., syn.

**Material examined** : India : West Bengal : Darjiling District : Naxal Bari, 1 ex., 7.iv.1984, coll. M. Prasad and party; Puruliya District : Ajoydhya, 1 ex., 12.xi. 1985, coll. M. Dutta and party; Birbhum District : Palispur, 1 ex., 3.x.1987 and Tarapith, 2 exs., 7.x.1987, coll. M. Prasad and party; North 24-Parganas District : Rahara, 1 ex., 25.x.1987, coll. S.B. Roy; West Dinajpur District : Malan, 1 ex., 30.xi.1987, coll. T.R. Mitra and party.

**Distribution** : India : West Bengal (Birbhum, Darjiling, North 24-Parganas, Puruliya and West Dinajpur Districts), Arunachal Pradesh, Assam, Sikkim, Tamil Nadu. Elsewhere : Burma, Thailand, Indo-China, Malaysia.

31. *Vespa (Vespa) tropica haematodes* Bequaert

1936. *Vespa tropica* var. *haematodes* Bequaert. *Treubia*, 15 : 338, M, F, W. key, des. Type : F, India : Himachal Pradesh : Kulu (Cambridge, Mass.).

1983. *Vespa (Vespa) tropica haematodes* : Das and Gupta. *Oriental Ins.*, 17 : 445, cat., syn.

**Distribution** : India : West Bengal (Calcutta, Darjiling Districts), Bihar, Himachal Pradesh, Haryana, Karnataka, Kerala, Pandicherry, Tamil Nadu. Elsewhere : Burma, China, Indo-China, Nepal, Pakistan, Sri Lanka.

**Remarks** : This subspecies is recognised by having head and antenna red or reddish-brown; pronotum dorsally and scutellum, reddish or reddish-brown; mesoscutum usually with two short reddish-brown lines or spots; first tergite narrowly yellow at apex. No material of this subspecies was available for study from West Bengal.

32. *Vespa (Vespa) variabilis fumida* van der Vecht

1959. *Vespa variabilis fumida* van der Vecht. *Zool Meded.*, 36 (13) : 228, W, des. Type : W, Bhutan : Padong (Paris). India : West Bengal : Darjiling.

1983. *Vespa (Vespa) variabilis fumida* : Das and Gupta. *Oriental Ins.*, 17 : 445, cat., distr.

**Distribution** : India : West Bengal (Darjiling District). Elsewhere : Bhutan.

**Remarks** : This subspecies superficially resembles the sympatric *V. mandarinia magnifica* and *V. analis nigrans*, both of which have distinct narrow pale apical bands on gastral tergites (Das and Gupta, 1989).

33. *Vespa (Vespa) velutina nigrithorax* Buysson

1905. *Vespa auraria* var. *nigrithorax* Buysson. *Ann. Ent. Soc. France*, **73** : 553, M, F, W, des. Lectotype (selected by van der Vecht, 1957) : F, India : Darjiling (Paris).
1957. *Vespa velutina nigrithorax* : van der Vecht. *Zool. Verh.*, **34** : 35, 37, M, F, W, lectotype design., key, des.
1983. *Vespa (Vespa) velutina nigrithorax* : Das and Gupta. *Oriental Ins.*, **17** : 446, cat., syn., references, distr.

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Bhutan, China, Taiwan, Hong Kong, Vietnam.

*Remarks* : This is a little known subspecies and no material of this subspecies was available for study from West Bengal. Das and Gupta (1989) provided a brief description of this subspecies.

Genus 5. *Vespula* Thomson

1869. *Vespula* Thomson. *Opuscula Ent.*, **1** : 79.  
Type-species : *Vespa austriaca* Panzer, 1799.
1881. *Pseudovespa* Schmiedeknecht. *Ent. Nachr.*, **7** : 314.  
Type-species : *Vespa austriaca* Panzer, 1799.
1938. *Paravespula* Blüthgen. *Konowia*, **16** : 271.  
Type-species : *Vespa vulgaris* Linnaeus, 1758.
1943. *Allovespula* Blüthgen. *Stettiner Ent. Ztg.*, **104** : 149.  
Type-species : *Vespa rufa* Linnaeus, 1758.
1982. *Ruguvespula* Archer. *Kontyu.*, **50** : 264. Syn. by Carpenter, 1987.  
Type-species : *Vespa koreensis* Radoszkowski, 1887.

The member of this genus are commonly called yellow jackets. They make their nests in the ground or in cavities. This genus is represented by a single subspecies in West Bengal.

34. *Vespula orbata orbata* (Buysson)

1902. *Vespa orbata* Buysson. *Bull. Soc. Ent. France*, 1902 : 140. F. des.
1925. *Vespa minuta* Dover. *J. Asiat. Soc. Bengal (N.S.)*, **20** : 304, des., fig. Type: W ? Burma (London). Syn. by Archer, 1982.
1982. *Vespula orbata orbata* : Archer. *Kontyu.*, **50** : 268, M, F, W. Lectotype design., key, des., fig. Localities in India, Burma and Nepal; Das and Gupta, 1989. *Oriental Ins. Monogr.*, **11** : 242, F, W, des., syn., distr.

*Diagnostic characters* : Interocellar distance 0.5 the diameter of an ocellus; frontal suture indistinct or absent; clypeus shallowly emarginate, its lateral angles somewhat projecting; mesoscutum sparsely punctate; propodeum striato-punctate. Body dorsally tricolored, black, brown and yellow. Head in general yellowish-brown, vertex darker, eye margin, malar space and clypeus yellow. Mesoscutum

brown anteriorly and black posteriorly; scutellum yellowish-brown with a black mark in the middle; postscutellum black with a narrow yellow line; mesepisternum and mesepimeron with a dorsal brown spot; fore leg yellowish-brown, its coxa, trochanter and femur blackish-brown dorsally; middle and hind legs blackish-brown with apices of femora and tarsi yellowish; 1st and 2nd tergites blackish-brown with yellow apical bands; 3rd to 5th tergites black with broad apical yellowish-brown bands; last tergite wholly yellowish-brown (Das and Gupta, 1989).

**Distribution** : India : West Bengal (Darjiling District), Assam, Uttar Pradesh. Elsewhere : Burma, Nepal.

**Remarks** : No materials of this subspecies was available for study from West Bengal. Das and Gupta (1989) gave a detailed description of this taxon.

#### Genus 6. *Provespa* Ashmead

1903. *Provespa* Ashmead. *Ent. News*, **14** : 182.

Type-species : *Vespa anomala* Saussure, 1853 (= *V. dorylloides* Saussure, 1853).

This genus is known by a single species, viz., *P. anomals* (Saussure), which is described as below.

#### 35. *Provespa anomala* (Saussure)

1853. *Vespa anomala* Saussure. *Études Famille Vespides*, **2** : 112, F, des., fig. Type : F, Java (London).

1853. *Vespa dorylloides* Saussure. *Études Famille Vespides*, **2** : 256.

1989. *Provespa anomala* : Das and Gupta. *Oriental Ins. Monogr.*, **11** : 227.

**Diagnostic characters** : Female and worker : Body largely impunctate, covered with dense silky pubescence. Head short, not wider than thorax, eyes almost touching the base of mandibles. Clypeus large, squarish, its apical margin bilobed; ocelli large; gaster long and narrow.

Body brownish-yellow. Antenna, inner emarginate area of eye, area around ocellar triangle, hind margins of 1-3 gastral tergites, yellowish-brown. Wings hyaline. Coloration variable in this species.

**Material examined** : India : West Bengal : Darjiling District : Kurseong, 3 exs., Reg. Nos. 1530/14, 1532/14 and 1538/14, no other data; Bhutbari, 1 ex., 14. ix. 1959, Reg. No. 3519/H<sub>3</sub>, coll. B.K. Tikadar.

**Distribution** : India : West Bengal (Darjiling District), Sikkim and Uttar Pradesh. Elsewhere : Burma, Indonesia, Malaysia.

**Remarks** : This is the first record of this species from West Bengal.

TABLE SHOWING DISTRIBUTION OF SPECIES / SUBSPECIES OF VESPIDAE IN WEST BENGAL

Sl. No.	Systematic List	Darjiling	Jalpaiguri	Koch Bihar	West Dinajpur	Maldah	Murshidabad	Birbhum	Bardhaman	Nadia	Puruliya	Bankura	Hugli	North 24-Parganas	South 24-Parganas	Haora	Calcutta	Medinipur
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Subfamily 1. Polistinae

Tribe 1. Polistini

Genus 1. Polistes Latreille, 1802

Subgenus 1. Polistes (Nygmpolistes)

Richards, 1973

1. *tenebricosus sulcatus* Smith, 1852

x

Subgenus 2. Polistes (Megapolistes) van der

Vecht, 1968

2. *olivaceus* (De Geer, 1773)

x

x

x

x

x

x

x

3. *wattii* Cameron, 1900

x

4. *rothneyi rothneyi* Cameron, 1900

x

5. *rothneyi sikkimensis* van der Vecht, 1968

x

Subgenus 3. Polistes (Stenopolistes) van der

Vecht, 1972

6. *nigritarsis* Cameron, 1900

x

x

Subgenus 4. Polistes (Polistella) Ashmead, 1904

7. *adustus* Bingham, 1897

x

8. *stigma tamula* (Fabricius, 1798)

x

x

x

x

x

9. *strigosus atratus* Das and Gupta, 1989

x

10. *sagittarius* Saussure, 1853

x

x

Tribe 2. Ropalidiini

Genus 2. Ropalidia Guérin, 1838

Subgenus 5. Ropalidia (Anthreneida) White, 1841

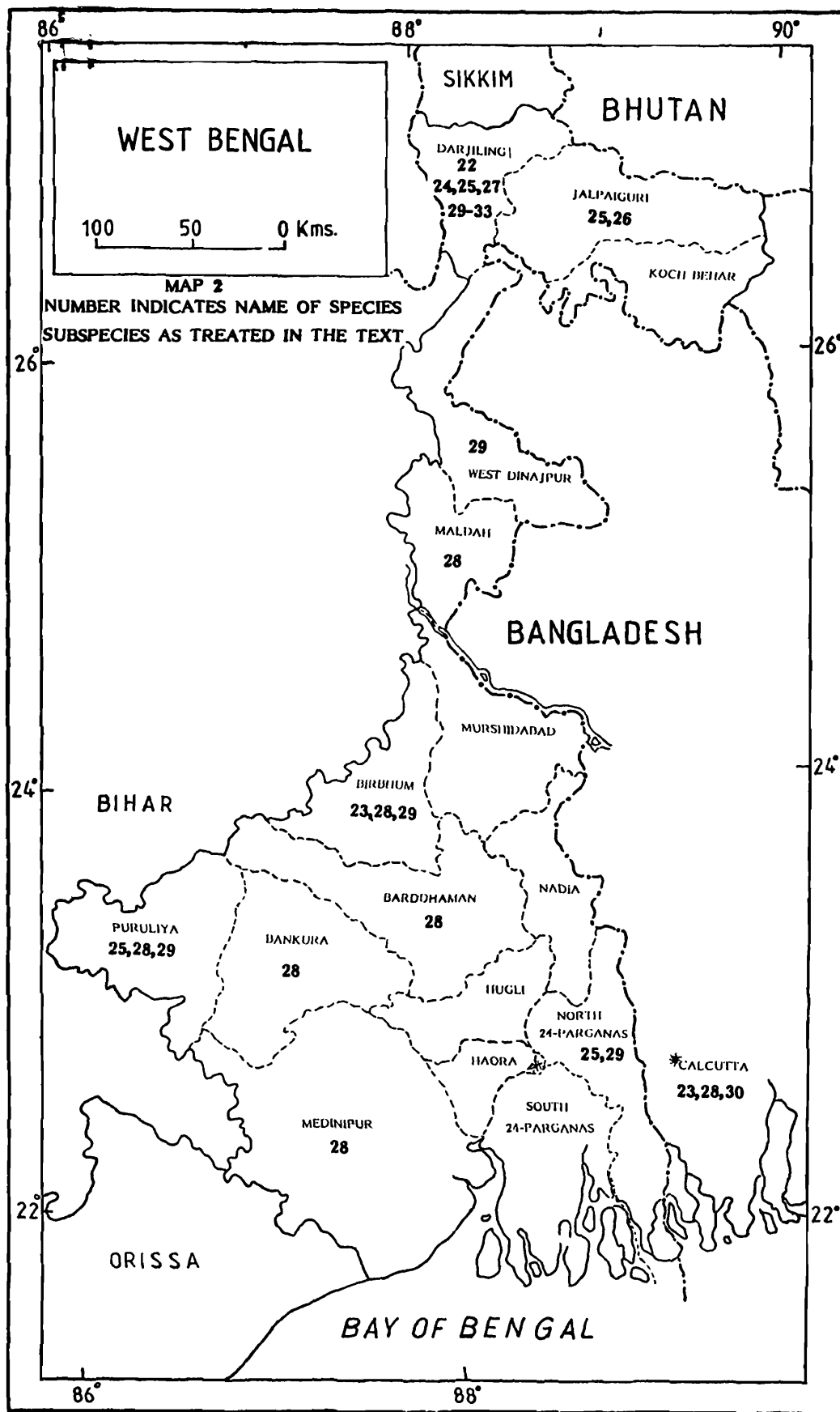
11. *marginata marginata* (Lepeletier, 1836)

x

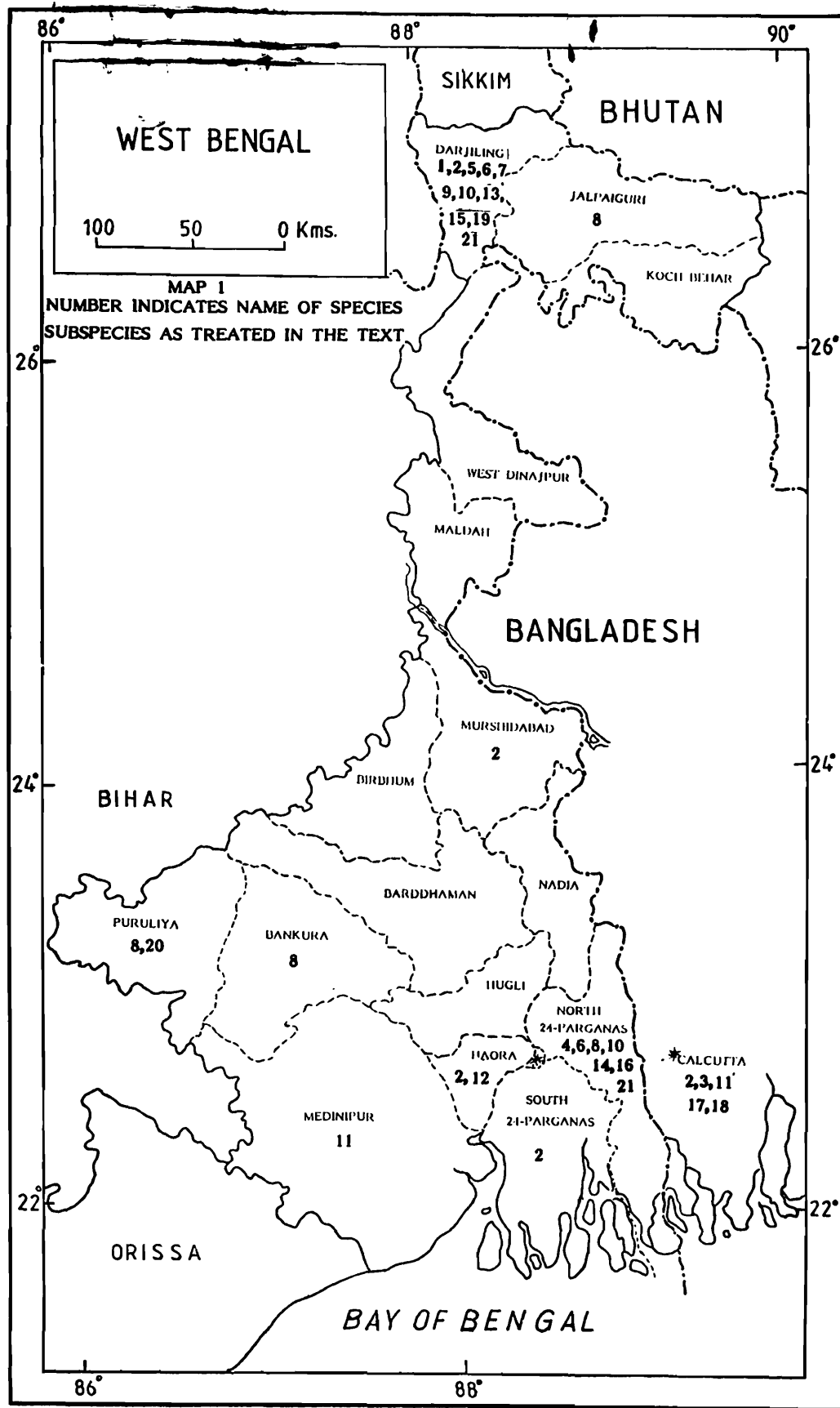
x

x

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
12. <i>brevita</i> Das and Gupta, 1989	x														x		
13. <i>santoshae</i> Das and Gupta, 1989	x																
14. <i>artifex artifex</i> (Saussure, 1853)													x				
15. <i>rufocollaris rufocollaris</i> (Cameron, 1900)	x																
16. <i>stigma stigma</i> (Smith, 1858)													x				
17. <i>sumatrae lugubris</i> (Smith, 1858)																x	
18. <i>variegata variegata</i> (Smith, 1852)																x	
Subgenus 6. <i>Ropalidia</i> ( <i>Icarielia</i> ) Dalla Torre, 1904																	
19. <i>scinula</i> Bingham, 1897	x																
Tribe 3. <b>Polybiini</b> Genus 3. <b>Parapolybia</b> Saussure, 1853																	
20. <i>indica indica</i> (Saussure, 1853)										x							
21. <i>varia</i> (Fabricius, 1787)	x												x				
Subfamily 2. <b>Vespinae</b> Genus 4. <b>Vespa</b> Linnaeus, 1758 Subgenus 7. <b>Vespa</b> ( <i>Nyctovespa</i> ) van der Vecht, 1959																	
22. <i>binghami</i> Buysson, 1905	x																
Subgenus 8. <b>Vespa</b> ( <i>Vespa</i> ) Linnaeus, 1758																	
23. <i>affinis affinis</i> (Linnaeus, 1764)																x	
24. <i>analis nigrans</i> Buysson, 1903	x																
25. <i>basalis</i> Smith, 1852	x	x								x			x				
26. <i>bicolor</i> Fabricius, 1787	x	x															
27. <i>mandarinia magnifica</i> Smith, 1852	x																
28. <i>orientalis</i> Linnaeus, 1771					x		x	x		x	x					x	x
29. <i>tropica tropica</i> (Linnaeus, 1758)	x											x	x	x	x	x	
30. <i>tropica leefmansi</i> van der Vecht, 1957	x			x			x			x			x				
31. <i>tropica haematodes</i> Bequaert, 1936	x															x	
32. <i>variabilis fumida</i> van der Vecht, 1959	x																
33. <i>velutina nigrithorax</i> Buysson, 1905	x																
Genus 5. <b>Vespula</b> Thomson, 1869																	
34. <i>orbata orbata</i> (Buysson, 1902)	x																
Genus 6. <b>Provespa</b> Ashmead, 1903																	
35. <i>anomala</i> (Saussure, 1853)	x																



Map 1. Number Indicates Name of Species/Subspecies of Subfamily Polistineae, as Treated in the Text.



Map 2. Number Indicates Name of Species/Subspecies of Subfamily Vespinae, as Treated in the Text.

## SUMMARY

The present paper deals with the Vespidae fauna of West Bengal. Altogether 35 species and subspecies under 6 genera and 8 subgenera belonging to 2 subfamilies are treated in the text. The keys for identification of subfamilies, tribes, genera, subgenera, species and subspecies are provided. Distributional table, maps and illustrations of morphological characters are included for ready reference. *Provespa anomala* (Saussure) has been recorded here for the first time from West Bengal.

The family Vespidae contains potter wasps, paper wasps, hornets or yellow jackets. Most of these wasps are beneficial, since the insects they feed their larvae are mostly injurious or atleast not useful species. By their predatory habits they destroy a large number of insect pests and may be used as effective predators for the control of some of the species.

## ACKNOWLEDGEMENTS

We are grateful to Dr. A.K. Ghosh, Director, Zoological Survey of India for providing all the facilities to carry out this research work. We are thankful to Dr. S.K. Bhattacharyya, Scientist SG, formerly incharge Entomology, for guidance and encouragement. We are also thankful to Dr. J.R.B. Alfred, Scientist SG, Shri S. Gurunathan, P.P.O. and Shri I.J. Gupta for helping us in various ways.

We acknowledge the generous supply of literature and other publications from Dr. (Mrs.) Bina Pani Das (Delhi).

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(Note : For detailed Bibliography, Das and Gupta, 1989 may be consulted).

**INSECTA : HYMENOPTERA : SCOLIIDAE**

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**INTRODUCTION**

The family Scoliidae belongs to superfamily Scoliioidea, which includes one of the most attractive groups of wasps. The superfamily Scoliioidea is one of the seven recently recognised superfamilies of aculeate Hymenoptera. This superfamily is recognised by having 4 families, viz., Scoliidae, Tiphidae, Mutillidae and Sapygidae, in India.

The members of the family Scoliidae are commonly known as hairy wasps, usually black in colour, marked with spots or bands of yellow, white or red. Their wings are usually dark with a metallic iridescence. The members of this family are world-wide in distribution and their larvae are entirely ectoparasitic on the larvae of Scarabaeidae. Because of their parasitic habits, they occupy a position intermediate between Parasitica and Aculeata, and it may be possible to exploit them for biological control of insect pests.

Our knowledge about these wasps is very limited. Bingham (1897) made an attempt to provide an account of family Scoliidae. Betrem (1928) did a pioneering monographic work on the Indo-Australian genera and species of this family. Addition of more taxa, changes in the systematic position and classification in more natural groups were significant contributions made by several workers namely : Betrem and Bradley (1964); Bradley (1964-1974); Guiglia (1965) and Krombein (1963-1978).

The members of this family are distinguished quite readily from other wasps by having wing membrane beyond the cells closely striolate and the meso- and metasternum form a flat plate overlying the bases of the middle and hind coxae.

This family is known by two subfamilies, viz., Campsomerinae and Scoliinae in Indian subregion. In India, the family is represented by 14 genera, 70 species and 29 subspecies. In West Bengal the family Scoliidae is represented by 21 species/subspecies under 9 genera.

**MATERIAL AND METHODS**

An attempt has been made to provide a consolidated information on the Scoliid fauna of the state of West Bengal, India. The material for this work was available at the Zoological Survey of India and material received from other institutions in India and abroad on loan for study. The material was

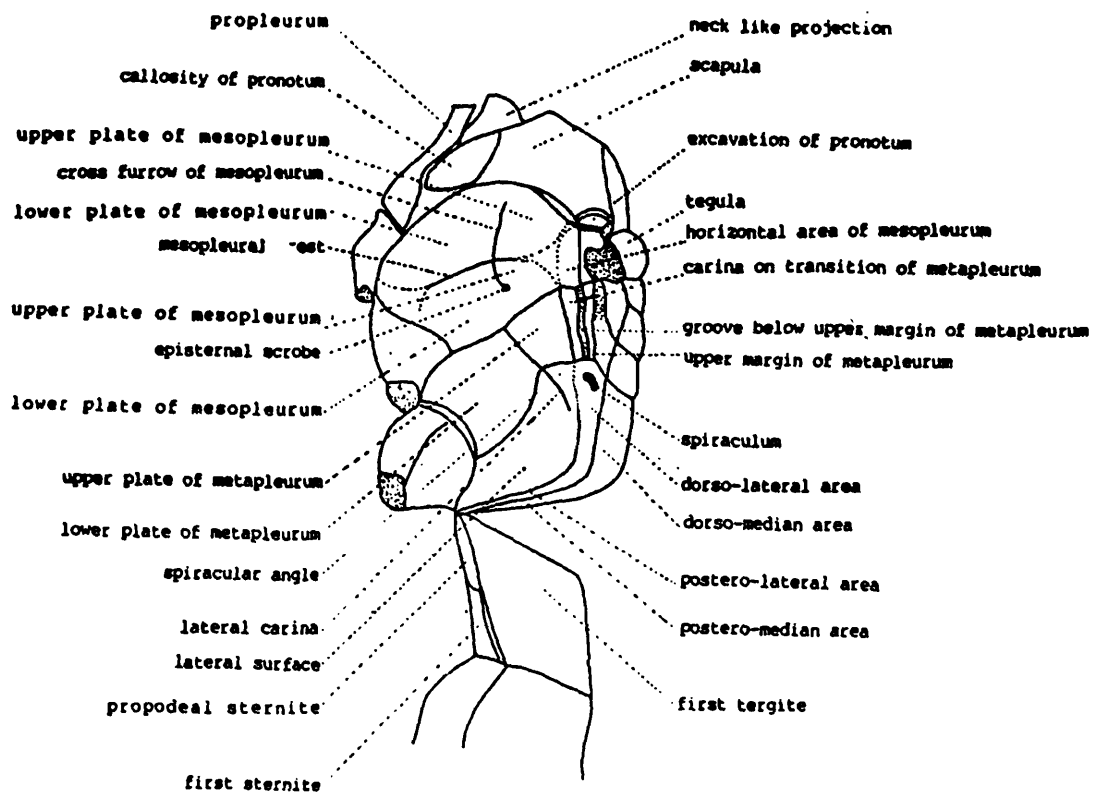
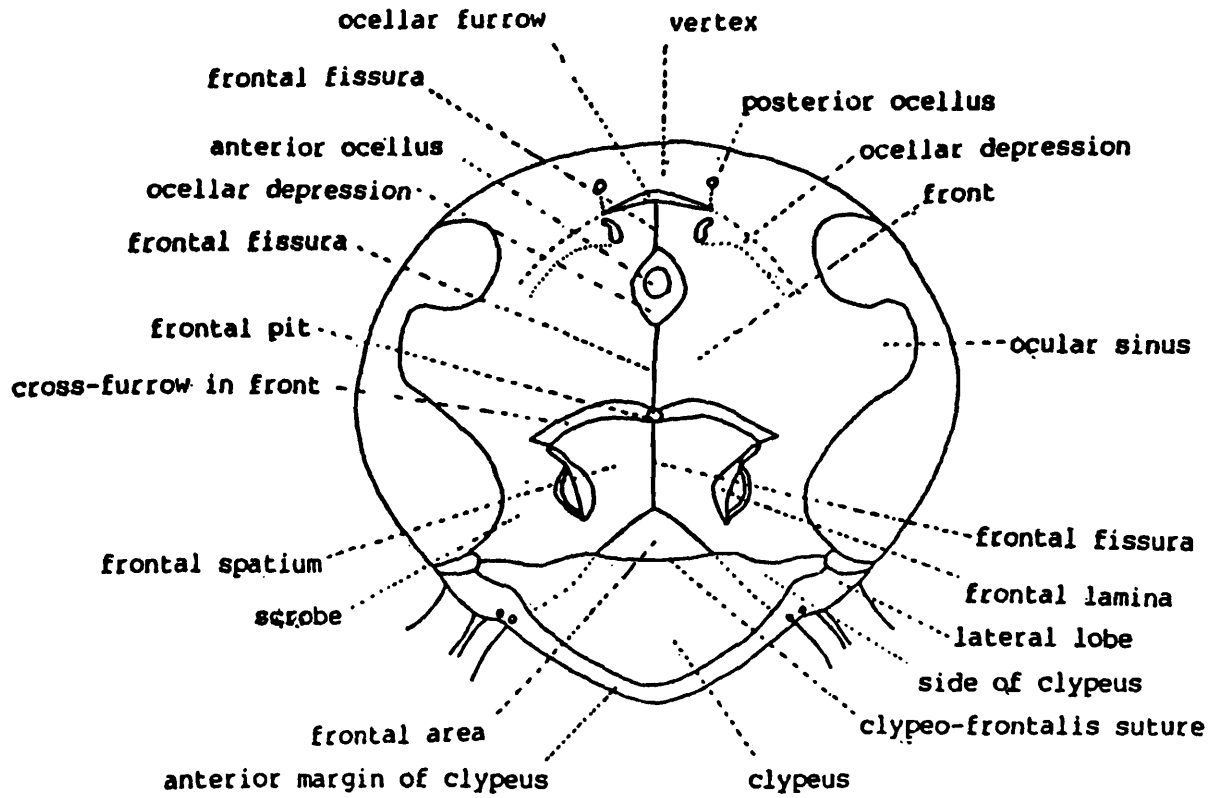


Figure 1. Anterior view of head of a scoliid.

Figure 2. Lateral view of thorax of a scoliid.

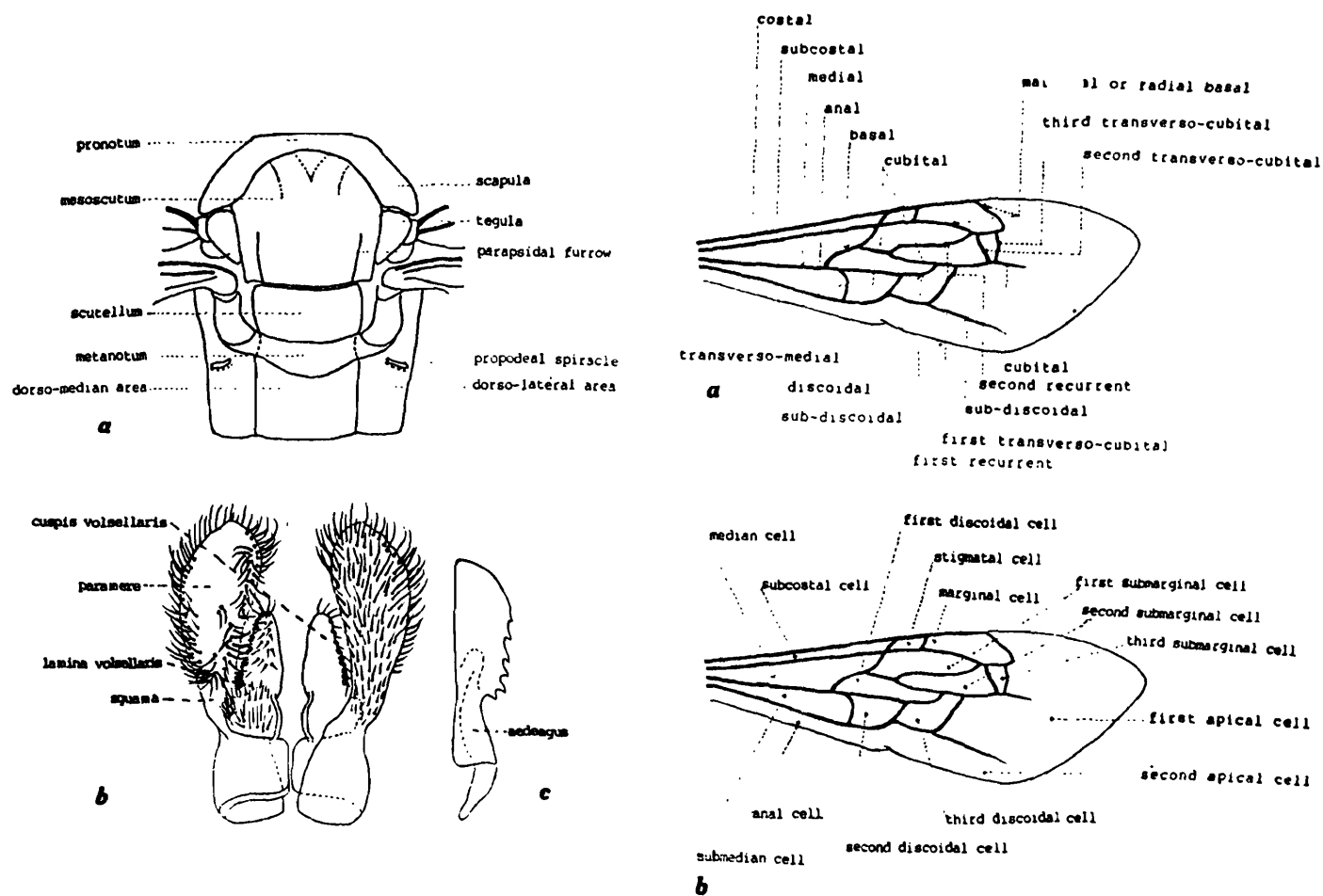


Figure 3. a, Dorsal view of thorax of a scoliid; b, male genitalia, ventral aspect at left, dorsal aspect at right; c, aedeagus.

Figure 4. Diagrammatic view of fore wing : a, various veins; b, various cells.

mainly received through mopping survey of West Bengal by B. K. Tikader, 1959; H. C. Ghosh and party, 1965; R. K. Kacker, 1965; P. K. Maiti and party, 1965; C. S. Roy, 1965; B. C. Nandi and party, 1971; H. S. Sharma and party, 1973; B. N. Das, 1974; H. K. Bhowmik and party, 1974, 1976; J. K. Jonathan and party, 1974; R. C. Basu and party, 1977; A. N. T. Joseph and party, 1978; A. R. Bhowmik and party, 1978; S. S. Saha, 1979 and S. K. Gupta, 1982. In addition to mopping survey material, collections made by N. Annandale, 1968; J. T. Jenkins, 1909; Lord Carmichael, 1912-1913; F. H. Gravely, 1916; S. L. Hora, 1930 and C. F. C. Beeson, 1935 were also available for study.

The list of the museums who loaned their material for this study is given below :

Copenhagen	Zoologisk Museum, Universitetsparken-15, D. K. Kobenhavn, Denmark.
Honolulu	Bernice P. Bishop Museum Honolulu 17, Hawaii, U.S.A.
Stockholm	Naturhistoriska Riksmuseum (Entomologiska avdelningen). Stockholm 50, Sweden.

An attempt has also been made to provide keys to the subfamilies, genera, species and subspecies for the identification of various taxa recorded from West Bengal. Illustrations of taxonomic terms used in the present work, distributional tables and maps are given for ready reference.

#### TAXONOMIC TERMINOLOGY

The morphological terms followed by Betrem (1928) and Krombein (1978) are used in the present work. The morphological terms used in the text are illustrated in figures 1-4.

#### SYSTEMATIC ACCOUNT

Family SCOLIIDAE

1. Subfamily **Campsomerinae**

1. Genus *Phalerimeris* Betrem
  1. *Phalerimeris phalerata phalerata* (Saussure)
2. Genus *Micromeriella* Betrem
  2. *Micromeriella marginella marginella* (Klug)
3. Genus *Sericocampsomeris* Betrem
  3. *Sericocampsomeris stygia stygia* (Illiger)
4. Genus *Campsomeriella* Betrem
  4. (*Campsomeriella*) *collaris collaris* (Fabricius)
  5. (*Annulimeris*) *annulata* (Fabricius)
5. Genus *Megacampsomeris* Betrem
  6. *Megacampsomeris shillongensis* Betrem
  7. *Megacampsomeris prismatica* (Smith)

- 2. Subfamily **Scoliinae**
- 6. Genus ***Liacos*** Guérin
  - 8. (*Liacos*) *erythrosoma erythrosoma* (Burmeister)
- 7. Genus ***Austroscolia*** Betrem
  - 9. *Austroscolia ruficeps ruficeps* (Smith)
- 8. Genus ***Megascolia*** Betrem
  - 10. (*Regiscolia*) *fulvifrons* (Saussure)
  - 11. (*Regiscolia*) *azuria christiana* (Guiglia & Betrem)
- 9. Genus ***Scolia*** Fabricius
  - 12. (*Discolia*) *cyanipennis* Fabricius
  - 13. (*Discolia*) *nobilis nobilis* Saussure
  - 14. (*Discolia*) *cruenta* Klug
  - 15. (*Discolia*) *fasciatopunctata dunensis* Betrem
  - 16. (*Discolia*) *formosicola lebongensis* Betrem
  - 17. (*Discolia*) *histrionica desidiosa* (Bingham)
  - 18. (*Discolia*) *affinis* Guérin
  - 19. (*Discolia*) *elizabethae* Bingham
  - 20. (*Discolia*) *quadripustulata* Fabricius
  - 21. (*Discolia*) *carmichaeli* Betrem

Family **SCOLIIDAE**

Key to the subfamilies of **SCOLIIDAE**

- 1. Second recurrent vein of fore wing not coalesced above with first recurrent vein, sometimes absent; sexual dimorphism well developed; males more slender, with various yellow markings; thorax with silvery or golden tomentose. Female : upper mesopleural plate when viewed from above not conically produced, rarely with a distinct dorsal surface, the juncture of anterior and posterior surface of lower plate sharply crested; integument of abdomen black, except sometimes marked with yellow. Male : volsella divided in middle into apical and basal parts by a transverse suture; head, thorax, abdomen and legs with yellow markings ..... 1. **CAMPSOMERINAE**
- Second recurrent vein of fore wing frequently lacking, if present coalescing with first recurrent vein; sexual dimorphism not so marked, males comparatively more stout than in Campsomerinae, with various yellow markings; thoracic tomentum not silvery or golden. Female : upper mesopleural plate conically produced and with a distinct dorsal surface, the juncture of anterior and posterior surface of lower plate rounded; abdominal integument black or with red spots. Male : volsella not divided by a suture, though often constricted in middle;

head, thorax, abdomen and legs with yellow markings on some species, many species with red markings on abdomen, some entirely black .....2. SCOLIINAE

2. Subfamily CAMPSOMERINAE

Key to the Genera of Campsomerinae

*Females*

1. Upper plate of metapleurum entirely impunctate, transition between its dorsal and vertical areas either sharp and marked by carina or the transition very gradual .....2
- Upper plate of metapleurum usually punctate above, transition between its vertical and dorsal areas gradual to blunt, usually sharp anteriorly and gradual posteriorly .....4
2. Upper plate of metapleurum entirely impunctate, transition between its dorsal and vertical areas very gradual; transition between the dorsal area and vertical portion of mesopleurum gradual, somewhat elevated medially; transition between dorso-lateral area and vertical surface of propodeum rounded, without any distinct carina except for an apical indication; spurs and spines on tibiae white; wings hyaline, fore wing somewhat yellowish anteriorly; vestiture predominantly white .....2. *Micromeriella* Betrem
- Upper plate of metapleurum impunctate, transition between its dorsal and vertical areas sharp and marked by a distinct or high carina .....3
3. Lateral carina of propodeum abbreviated or extended up to spiracle; head behind the ocelli impunctate; dorso-median area of propodeum triangularly protruded posteriorly; posterior surface of propodeum impunctate to finally and sparsely punctate; longer spur of hind tibia black, white or testaceous, usually blunt or acute but rarely slightly spatulate at the apex. Fore wing yellowish hyaline to entirely fuscous, often basally hyaline and apically fuscous .....4. *Campsomeriella* Betrem
- Lateral carina of propodeum extended beyond the spiracle; head behind the ocelli with scattered to close punctures; dorso-median area of propodeum not triangularly protruded posteriorly; posterior surface of propodeum closely punctate atleast above; longer spur of hind tibia black or testaceous, usually blunt at the apex. Fore wing usually dark brown .....3. *Sericocampsomeris* Betrem
4. Front in front of anterior ocellus with a group of deep punctures; scapulae without shallow longitudinal grooves; lateral carina extended beyond the spiracles; carina along the outer margin of the dorsum of propodeum distinct but not high; longer spur of hind tibia straight, acute or somewhat blunt at the apex; first submarginal cell almost entirely setose; basal abdominal tergites usually with yellow or reddish brown bands ..... 1. *Phalerimeris* Betrem
- Front in front of anterior ocellus usually without any group of deep punctures; scapulae with shallow longitudinal grooves; carina along the outer margin of dorsum of propodeum very strong and high, and extended posteriorly up to the upper half of the postero-lateral area, with a deep groove along the inner side; dorso-median area of propodeum sometimes with a median

tubercle posteriorly; second submarginal cell bare, setose only above. Integument usually entirely black, sometimes basal tergites with yellow apical bands; vestiture usually yellowish or yellowish-brown, rarely entirely black; thorax especially the dorsum of propodeum with long vestiture. Wings hyaline to dark brown ..... 5. *Megacampsomeris* Betrem

### 1. Genus *Phalerimeris* Betrem

1967. *Campsomeris* subgenus *Phalerimeris* Betrem. *Bull. British Mus. (Nat. Hist.) Ent.*, **20**(7) : 294-295.

Type-species : *Elis (Campsomeris) phalerata* Saussure, 1858.

1974. *Phalerimeris* Betrem : Bradley. *Revue Suisse Zool.*, **81**(20) : 460, (*Phalerimeris* raised to generic status).

Type-species : *Elis (Campsomeris) phalerata phalerata* Saussure, 1858. Original designation.

This genus is widely distributed in the Oriental region and also occurs in New Guinea and adjacent Islands. The females of this genus can be easily distinguished from that of *Megacampsomeris* in having a group of deep punctures in front of anterior ocellus.

Of the three species known from Indian subregion, *P. phalerata* Saussure, *P. madurensis* Betrem and *P. lantschneri* (Dalla Torre), only *P. phalerata* subspecies *phalerata* saussure has been recorded from West Bengal.

### 1. *Phalerimeris phalerata phalerata* (Saussure)

1858. *Elis (Campsomeris) phalerata* Saussure. *Ann. Soc. Ent. France* (3) **6** : 233. Female (not male) (Copenhagen).

1897. *Elis iris* (Lepeletier) : Bingham. *Fauna of British India, Hym.*, **1** : 94. Male, Female (Specimens from North India, Burma and Java only).

1911. *Campsomeris albopilosa* Rohwer, *Proc. U.S. Nat. Mus.*, **39** : 480. Male, Java. (Synonymised by Betrem, 1928 : 103).

1972. *Phalerimeris phalerata phalerata* (Saussure) : Bradley. *Revue Suisse Zool.*, **81**(20) : 460.

**Diagnostic characters : Female** : Length 12-18 mm. Black, antennae, tibiae and tarsi reddish; first three tergites with narrow apical orange bands, that on second narrowed toward sides. Erect vestiture reddish-golden, except black on the last abdominal segment and pygidium. Tomentum golden. Wings yellowish, apex of fore wing with large, dark well defined mark.

**Male** : Length 10-16 mm. Black, abdomen with faint blue reflection. The yellow marks are as follows : Clypeus (except for a small to large median triangular area), a line along lower inner eye orbit, scrobes, a long mark on gena, pronotum broadly along its posterior margin, a minute posterio-lateral mark on mesoscutum, a narrow anterior band on scutellum, small anterior spot on metanotum, fore coxa, apical mark on fore femur below, middle femur with narrow stripes above and below, outer surface of fore and middle tibiae, posterior bands on first four tergites, band on first tergite usually covering apical half, band on third emarginate on sides, fourth band narrow and sometimes interrupted in the middle, rarely posterio-lateral spots on fifth tergite also; second, third and usually fourth sternites with narrow apical lateral spots, spots on second and third sternites sometimes united in the middle, that on fourth widely separated in the middle. Erect vestiture pale, except black on last three abdominal tergites. Wings slightly infumated; fore wing usually with a very light subapical mark.

**Material examined** : India : West Bengal : Darjiling dist. : Singla, 1 female, vii. 1912, Lord Carmichael, Runjeet Valley, 1 male, 29.v. 1916; Pashok, 1 male, 26.v.-14.vi. 1916, F. H. Gravely. Bijanbari, 2 males, 21.v. 1974, J. K. Jonathan and party. Rangpo, 1 male, 31.v. 1974, J. K. Jonathan and party (Z.S.I. Calcutta). Kalimpong, near Teesta, 3 males, 15.xii. 1934, R. Malaise (Stockholm Mus.). Jalpaiguri dist. : Chapramari Forest, 2 males, 30.iv. 1971, B. C. Nandi (Z.S.I. Calcutta).

**Distribution** : India : West Bengal (Darjiling and Jalpaiguri districts), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Meghalaya, Sikkim, Tripura, Uttar Pradesh. Elsewhere : Burma, China, Nepal, Thailand, Taiwan, Sulawesi Is.

**Remarks** : This is a widely distributed subspecies in North India. This subspecies breeds throughout the year, attaining peak population during May-June.

## 2. Genus *Micromeriella* Betrem

1964. *Campsomeris* subgenus *Micromeris* Betrem. *Ann. Mus. Civico. Stor. Nat. Genova*, **75** : 186, 188, 189 (nomen nudum).

Type-species : *Scolia marginella* Klug, 1805.

1972. *Micromeriella* Betrem. *Mon. Ned. Ent. Ver. No. 6* : 166. des. key. (New name for *Micromeris* Betrem, name preoccupied in Mollusca by Conard, 1866).

Type-species : *Scolia marginella* Klug, 1805 (*Micromeriella marginella marginella* Klug). Original designation.

This genus is widely distributed in S.E. Palaearctic, African and Oriental regions, and is also known from Moluccas. In the Orient, the genus is represented by a single species, viz., *Micromeriella marginella* (Klug). *Micromeriella marginella* is a polytypic species. Seven subspecies are known; of these, *marginella marginella* (Klug) is reported from West Bengal.

### 2. *Micromeriella marginella marginella* (Klug)

1810. *Scolia marginella* Klug. *Beitr. Naturk.*, **2** : 214. Male, India. (Berlin).

1858. *Elis (Campsomeris) hirsuta* Saussure. *Ann. Soc. Ent. France*, (3) **6** : 234. Female, India : Tranquebar (Copenhagen).

1974. *Micromeriella marginella marginella* (Klug) : Bradley. *Revue Suisse Zool.*, **81**(2) : 443.

**Diagnostic characters** : Female : Length 9-14 mm. Integument black, sometimes mandibles, anterior rim of the clypeus and antennal flagellum reddish-brown. First three abdominal tergites with yellow apical bands. Vestiture erect, white, sparse, usually white fringes at the apices of first to fourth tergites, sometimes fifth tergite also with similar fringes; pygidium sometimes with reddish setae.

**Male** : Length 6-12 mm. Integument black. Antennal flagellum sometimes red. The following are yellow : mandible at their bases; clypeus except for a small to large black area in the middle; a small to large mark on callosities; pronotum except at its anterior margin; scutellum and metascutellum; first coxa below, sometimes small spots on second and third coxae; linear spots above on all the femora; first and second tibiae wholly and third with a linear spot or sometimes wholly; usually first tarsus and second metatarsus, sometimes all the three tarsi, apical bands on first to fifth or first to sixth tergites, the bands on second and third tergites broader and deeply emarginate anteriorly in the

middle, in small specimens bands narrow; second to fourth or second to sixth sternites with narrow apical bands, bands on the fourth sternite usually interrupted in the middle.

*Material examined* : India : West Bengal : Darjiling district : Siliguri, 4 females, 29.vi. 1.vii. 1906. Dametin, 3 males, 12.ix. 1978, A.N.T. Joseph and party.

*Distribution* : India : West Bengal (Darjiling district), Bihar, Gujrat, Karnataka, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu. Elsewhere : Sri Lanka.

*Remarks* : This subspecies is restricted to the Indian subcontinent. The female is characterized by the clear wings with yellowish anterior margin and sparse white vestiture, except on last two abdominal segments. The male is distinguished by its small size, narrow pale yellow bands on first five tergites.

### 3. Genus *Sericocampsomeris* Betrem

1941. *Campsomeris* Subgenus *Sericocampsomeris* Betrem. *Notes Ent. Chionoise*, 8(4) : 91-92 des.

Type-species : *Scolia quadriguttulata* Burmeister, 1854.

1972. *Sericocampsomeris* Betrem. *Mon. Ned. Ent. Ver.* 6 : 12.

Type-species : *Scolia stygia* Illiger, 1802 = (*Scolia quadriguttulata* Burmeister, 1854).

This is a moderate sized genus, widely distributed in Oriental region, and is also known from Southern China and Sulawesi. It is known by three species in India viz., *S. rubromaculata* (Smith), *S. bella* (Bingham), *S. stygia* (Illiger), *S. flavomaculata* Gupta and Jonathan. Only one subspecies, *S. stygia stygia* (Illiger) is known from West Bengal.

### 3. *Sericocampsomeris stygia stygia* (Illiger)

1802. *Scolia stygia* Illiger. *Mag. Ins.*, 1 : 195. Type Female. Tranqueber (Berlin).

1854. *Scolia 4-guttulata* Burmeister. *Abh. Naturf. Ges. Halle*, 1(4) : 21. Female. Java (Halle).

1855. *Scolia luctuosa* Smith. *Cat. British Mus. Hym.*, 3 : 101. Type Female. Silhet (London)

1905. *Campsomeris sericeps* Cameron. *Tidjschr. Entom.*, 48 : 55. Type Female. Java (Artis).

1915. *Dielis javanica* Leefmans. *Meded. Lab. V. Plantenziekten*, 13 : 62. Type Female. Java.

1972. *Sericocampsomeris stygia stygia* : Betrem in Betrem and Bradeley. *Mon. Ned. Ent. Ver.* 6 : 12.

*Diagnostic characters* : Female : Length 31-35 mm. Integument black, usually with paired lateral yellow spots on third and fourth tergites. Vestiture black, except scrobes and declivous portion of the vertex with silvery white tomentum. Wings dark brown.

*Male* : Length 25 mm. The following are yellow : Clypeus except narrowly along anterior margin, pronotum dorsally, broad bands in the middle of scutellum and metanotum, a stripe on first and second tibiae on outer side, narrow apical bands on first to fourth tergites, lateral spots on second and third sternites. Vestiture white. Wings brownish.

*Material examined* : India : West Bengal : Darjiling district : Rangpo, 1 male, 7.iv. 1973, H. S. Sharma and party.

*Distribuion* : India : West Bengal (Darjiling district), Sikkim, Tripura, South India. Elsewhere : Burma, Indonesia.

*Remarks* : This species is readily recognized by having four spots on abdomen.

#### 4. Genus *Campsomeriella* Betrem

1941. *Campsomeris* subgenus *Campsomeriella* Betrem. *Notes Ent. Chionoise*, **8**(4) : 86-87.

Type-species : *Scolia thoracica* Fabricius, 1787.

1967. *Campsomeriella* Betrem. *Entom. Bericht*, **27** : 25-29.

Type- species : *Scolia thoracica* Fab. [*Campsomeriella* (*Campsomeriella thoracica* (Fab.))].

This genus is widely distributed in the African, Southern Palaearctic and Indo-Australian Regions, except Australia. This genus is divided into four subgenera viz., *Campsomeriella* Betrem, *Annulimeris* Betrem, *Rodriguimeris* Betrem and *Madonimeris* Betrem. Of these, *Campsomeriella* and *Annulimeris* are widely distributed in Indian subregion.

One subspecies and one species is known under these two subgenera. These can be distinguished by the following key.

#### Key to the Subgenera and Species/Subspecies

##### Female

1. Basal portion of the lateral carina of propodeum not extending up to spiracles; impunctate areas behind the callosities usually large; spurs of middle and hind tibiae black or testaceous .....  
..... subgenus *Campsomeriella* Betrem. ....Wings dark brown, abdominal vestiture black  
..... *collaris collaris* (Fabricius)
- Basal portion of the lateral carina of propodeum extending somewhat beyond the spiracles; impunctate areas behind the callosities small to very small; spurs of middle and hind tibiae white.....subgenus *Annulimeris* Betrem. ....Integument black, abdominal vestiture white. Abdominal segments with apical white fringe..... *annulata* (Fabricius)

##### Male

1. Apical sternites with copulatory brushes.....subgenus *Campsomeriella* Betrem.  
.....Pronotum, scutellum and metanotum with yellow marks; apical yellow bands on the basal tergites comparatively broad..... *collaris collaris* (Fabricius)
- Apical sternites without copulatory brushes.....subgenus *Annulimeris* Betrem. ....First to fifth abdominal tergites with broad to narrow basal bands ..... *annulata* (Fabricius)

#### 4. *Campsomeriella* (*Campsomeriella*) *collaris collaris* (Fabricius)

1775. *Tiphia collaris* Fabricius. *Syst. Ent.*, p. 354. Type Female. Malabar (Copenhagen).

1845. *Colpa parvula* Lepeletier. *Hist. nat. Ins. Hym.*, **3** : 548. Type Male, Indes. (Type probably lost). Syn. by Betrem and Bradley, 1964.

1967. *Campsomeriella* (*Campsomeriella*) *collaris* : Betrem. *Entom. Bericht.*, **27** : 29. (*Campsomeriella* raised to generic rank and *collaris* placed in subgenus *Campsomeriella*).

**Material examined** : India : West Bengal : Calcutta district : Salt Lake City, Baisakhi, 19 males, 7 females, 1-13.v.1982 and 4 females, 3 males, 1-3.vii. 1982, S.K. Gupta; Dum Dum Park, 5 females, 3.v.1982 and 1 female, 1 male, 27.vi.1982, S.K. Gupta; Dhapa, 2 males, 23.vii.1961, S. Ali; Eden Gardens, 1 female, 30.iv.1962, S.N.P. & K.D.C.; Alipur, 1 female, 17.ii.1954, S. Ali. South 24 Parganas : Kankondingee in Sunderbans, 2 females, 15-18.xi.1909 and Basanti F.S., 1 female, 16.xi.1909, J.T. Jenkins. Birbhum District : Santinekatan, 1 female, 1 male, 14.ix.1974, B.N. Das and party. Darjiling district : Monpong, 1 female, 16.iii.1974, H.K. Bhowmik and party; Bijanbari, 1 male, 20.v.1974, J.K. Jonathan and party; Siliguri, 1 male, 3-4.vi.1911, N. Annandale; 1 male, 1.vii.1907; 1 female, 1 male, 29.vi.1906, Museum Collection; Sukna, 1 male, 2.vii.1908, N. Annandale; Teesta, 1 male, 31.v.1980, S.K. Gupta.

**Distribuion** : India : West Bengal (Calcutta, Birbhum, Darjiling districts, South 24 Parganas), Arunachal Pradesh, Andhra Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh. Elsewhere : Bangladesh, Burma, Nepal, Sri Lanka.

**Remarks** : This is the most abundant and widely distributed Indian scoliid, breeding throughout the year in all the ecosystems and areas of low to very heavy rainfall. This species can be easily recognised by having the integument of the female black, the wings dark fuscous with strong blue reflections and the occiput and pronotum with conspicuous erect white setae. Males have more extensive yellow marks on abdomen.

#### 5. *Campsomeriella* (*Annulimeris*) *annulata* (Fabricius)

1793. *Tiphia annulata* Fabricius. *Ent. Syst.*, 2 : 225. Type female. China (Copenhagen).  
 1845. *Campsomeris servillei* Lepeletier. *Hist. nat. Ins. Hym.*, 3 : 501. Type female. Java (Italy).  
 1901. *Elis aglaea* Cameron. *Proc. Zool. Soc. London*, 2 : 19. Type male. Malaya.  
 1967. *Campsomeris* (*Annulimeris*) *annulata* (Fabricius) : Betrem. *Entom. Berich.*, 27 : 29. (*Campsomeriella* raised to generic rank; *annulata* placed under new subgenus *Annulimeris* Betrem).

**Material examined** : India : West Bengal : Darjiling district : Bijanbari, 10 males, 19-20.v.1980, S.K. Gupta; Singla, 1 male, 1913, Lord Carmichael.

**Distribution** : India : West Bengal (Darjiling district), Arunachal Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Kashmir, Meghalaya, Sikkim, Tripura, Uttar Pradesh. Elsewhere : Bangladesh, Burma, China, Indonesia, Korea, Malaysia, Nepal, Taiwan.

**Remarks** : This is the only species under the subgenus *Annulimeris* Betrem. This species is widely distributed in North India and also distributed from Bangladesh to Japan.

#### 5. Genus *Megacampsomeris* Betrem

1928. *Campsomeris* subgenus *Megacampsomeris* Betrem, *Treubia*, 9 (suppl.) : 138.  
 Type-species : *Tiphia grossa* Fabricius, 1804.  
 1972. *Megacampsomeris* Betrem : Betrem in Betrem and Bradley. *Mon. Ned. Ent. Ver.* No. 6 : 167.  
 (*Megacampsomeris* raised to generic status).  
 Type-species : *Tiphia grossa* Fabricius, 1804 [= *Megacampsomeris grossa* (Fab. 1804)]. Original designation.

This is a moderately large genus, represented by 7 species and 2 subspecies from India. However, only two species viz., *Megacampsomeris shillongensis* (Betrem) and *M. prismatica* (Smith) are known from the state of West Bengal. These can be identified by the following key.

#### Key to the Species

1. Basal abdominal tergites with reddish-yellow apical bands. Fore wing without a light brown mark at the apex ..... *shillongensis* (Betrem)
- Basal abdominal tergites without such bands. Fore wing with a light brown mark at the apex ..... *prismatica* (Smith)

#### 6. *Megacampsomeris shillongensis* (Betrem)

1928. *Campsomeris* (*Megacampsomeris*) *shillongensis* Betrem. *Treubia*, 9 (suppl.) : 155. Type female. India : Shillong (New Delhi).

1972. *Megacampsomeris shillongensis* Betrem : Betrem and Bradley. *Mon. Ned. Ent. Ver.*, No. 6 : 165. (*Megacampsomeris* raised to generic status).

*Material examined* : India : West Bengal : Darjiling district : Pedong, 1200 m., 2 males, 10.ix. 1978; Lava, 1 male, 11.ix. 1978, all A.N.T. Joseph and party; Darjiling, 2 males, 15-23.x. 1981, K.D. Ghorpade; Sureli, 1420 m., 1 male, 11-31.x. 1917, N. Annandale; Pashok, 715, 1 male, vi. 1916, Hartless (det. as *C. lindenii* by Betrem); Gajoli, 1 male, 17.x. 1977, P. Roy; Lahha, 1 male, 11.ix. 1959, B. K. Tikader; Kalimpong, 2 males, 29.x. 1981, C.A. Viraktamath; Algarh, 1 male, 27-29.x. 1981, S. Viraktamath.

*Distribution* : India : West Bengal (Darjiling district), Manipur, Meghalaya, Sikkim. Elsewhere : Burma, Nepal.

*Remarks* : This species is characterised by having basal tergites in female with yellow apical bands. This is the first record of this species from West Bengal and the male is recorded here for the first time. This species is originally known by a pair of female from Shillong in Meghalaya.

#### 7. *Megacampsomeris prismatica* (Smith)

1855. *Scolia prismatica* Smith, *Cat. Hym. British Mus.*, 3 : 102, China : Shanghai (London).

1928. *Campsomeris* (*Megacampsomeris*) *prismatica* : Betrem. *Treubia*, 9 (suppl.) : 152-153. Male, female. Java, Sumatra, Borneo, Sulawesi, Malakka, North India, Taiwan and Japan.

1972. *Megacampsomeris prismatica* (Smith) : Betrem in Betrem and Bradley. *Mon. Ned. Ent. Ver.*, 6 : 164. (*Megacampsomeris* raised to generic level).

*Material examined* : India : West Bengal : Darjiling district : Darjiling, 1 female, 2 males, 22.ix.1908 and 1 female, 20.v.1917, Brunetti; Pashok, 3 males, 6.v.-14.vi.1916, F.H. Gravely; Ghoom, 4 males, vii.1911, F.H. Gravely; Kurseong, 1 female, 1 male, 4.vii.1908, N. Annandale; Lava, 5 males, 11.ix.1978, A.N.T. Joseph; Gaytoli, 1 female, 17.x.1977, P. Roy; Mirik, 1 female, 22.vi.1978, P. Halder; Kalimpong, Deleo Hill, 1 male, 5.v.1976, L.K. Sharma; Rambhi, 1 male, 8.vi.1976, S. Biswas (all in Z.S.I. Calcutta).

**Distribution** : India : West Bengal (Darjiling district), Arunachal Pradesh, Himachal Pradesh, Kashmir, Manipur, Meghalaya, Orissa, Sikkim, Uttar Pradesh. Elsewhere : Burma, China, Honshu, Indonesia, Japan, Korea, Malaysia, Nepal, Philippines, Taiwan.

**Remarks** : This species is different from *M. shillongensis* (Betrem) by the absence of apical bands on basal abdominal tergites. This is a widely distributed species in Oriental region.

## 2. Subfamily SCOLIINAE

### Key to the Genera of Scoliinae

1. Fore wing with two marginal cells and one recurrent vein .....9. *Scolia* Fabricius
- Fore wing with three marginal cells .....2
2. Fore wing with two recurrent veins, the second recurrent, however, joins the first so that the second submarginal cell receives only one vein ..... 6. *Liacos* Guerin
- Fore wing with one recurrent vein.....3
3. Very large species (female 27-33 mm; male 19-30 mm.) with reddish-yellow integumental markings on head and posterior abdominal segments ..... 8. *Megascolia* Betrem
- Small species, with integument entirely black .....3. *Austroscolia* Betrem

### 6. Genus *Liacos* Guerin

1838. *Scolia* subgenus *Liacos* Guerin. *Voy. d. Cog. Zool.*, 2 : 246.

Type-species : *Scolia (Liacos) dimidiata* Guerin, 1938.

1903. *Tetrascolia* Ashmead. *Cand. Entom.* : 7.

Type-species : *Scolia (Liacos) dimidiata* Guerin, 1938 [= *Liacos analis analis* (Fabricius, 1807)].  
Original designation.

This genus is widely distributed in Indo-Australian Region and is also found in tropical Africa. This genus is represented by a single species viz., *L. erythrosoma* (Burmeister) from Indian subcontinent.

*Liacos erythrosoma* is a polytypic species, widely distributed in the Oriental Region. Three subspecies have been recorded from India viz., *L.e. erythrosoma* (Burmeister), *L. e. fulvopicta* Cameron and *L. e. aurantica* Micha. Of these, *L. erythrosoma erythrosoma* has been recorded from West Bengal.

### 8. *Liacos erythrosoma erythrosoma* (Burmeister)

1854. *Scolia erythrosoma* Burmeister. *Abh. Naturf. Ges. Halle.*, 1 : 15. Type male. Padang, Sumatra (Halle).

1855. *Scolia (Scolia) penangensis* Saussure. *Mem. Soc. Phys. Hist. Nat. Geneva*, 14 : 39, Type female, Penang (Geneva).

1927. *Liacos erythrosoma rufocoronata* Micha. *Mitt. Zool. Mus. Berlin*, 13 : 58. Type female, Pulo Penang (Berlin).

1927. *Liacos erythrosoma sikkimensis* Micha. *Mitt. Zool. Mus. Berlin*, 13 : 59. Type male and female. Burma, India, Sikkim, Assam (Berlin).

1927. *Liacos erythrosoma vulpes* Micha. Mitt. Zool. Mus. Berlin, 13 : 59. Type male. West Sumatra, Kambag (Berlin).
1927. *Liacos erythrosoma borneensis* Micha. Mitt. Zool. Mus. Berlin, 13 : 59. Type male and female. Borneo (Berlin).
1927. *Liacos erythrosoma hainana* Micha. Mitt. Zool. Mus. Berlin, 13 : 60. Type female. Hainan (Berlin).
1966. *Liacos erythrosoma erythrosoma* (Burmeister) : Bradley and Betrem. Beitr. zur. Entom., 16 : 75. n. comb.

**Diagnostic characters :** Female : Length 21-23 mm. Integument black. The following are red : usually a pair of large rounded spots on first tergite, sometimes the tergite entirely, second tergite except for a pair of lateral spots and a median spot, sometimes second tergite entirely and third to sixth tergites wholly, usually sides or whole of second sternum and whole of third to sixth sternite. Vestiture black, red to fiery red on red integument of abdomen. Wings dark brown with golden reflections.

**Material examined :** India : West Bengal : Darjiling district : Senchal lake, 1 female, 16.iv. 1972, Swapan Das; Bijanbari, 1 male, (no data), S. K. Gupta.

**Distribution :** India : West Bengal (Darjiling district), Arunachal Pradesh, Manipur, Sikkim, Tamil Nadu. Elsewhere : Burma, Indonesia, Malaysia, Hainan, Malacca, Nepal.

**Remarks :** This is a widely distributed species in Oriental Region. It can be differentiated from all other subspecies by having golden reflections on the wings and comparatively extensively reddish integument and vestiture of the abdomen.

#### 7. Genus *Austroscolia* Betrem

1927. *Scolia* subgenus *Austroscolia* Betrem. Tijdschr. Entom., 70 (Verslag) : xcvi.
- Type-species : *Scolia ruficeps* Smith.
1967. *Austroscolia* Betrem : Betrem in Bradley and Betrem. Bull. British Mus. (Nat. Hist.) Ent., 20(7) : 293, (*Austroscolia* raised to generic status).
- Type-species : *Scolia nitida* Smith, 1859, subsequent designation.

This moderate sized genus is widely distributed in the Indo-Australian Region, and is also known from China and Africa.

Three species are known from Oriental Region, viz., *A. ruficeps* (Smith) from Indian subcontinent, Southeast Asia, Philippines and China; *A. nudata* (Smith) from India, Burma and Nepal and *A. ignota* (Betrem) from Sri Lanka. Of these, *A. ruficeps* subspecies *ruficeps* (Smith) is reported from West Bengal.

#### 9. *Austroscolia ruficeps ruficeps* (Smith)

1855. *Scolia ruficeps* Smith. Cat. Hym. British Mus., 3 : 111. Type male and female. Philippines (London).
1927. *Triscolia ruficeps impressifrons* Micha. Mitt. Zool. Mus. Berlin, 13 : 100. Type male. Burma (London). Syn. by Bradley, 1972.
1927. *Triscolia rufipes nigropilosa* Micha. Mitt. Zool. Mus. Berlin, 13 : 100. Type male. India : Sikkim (London). Syn. by Bradley, 1972.

**Diagnostic characters** : Female : Length 18-21 mm; male : 12-20 mm. Integument black. head deep red; thorax and abdomen with iridescent blue and purple tints in certain lights; wings brown with a golden effulgence.

Head smooth, with a few scattered punctures; thorax closely, abdomen more sparsely punctate; clypeus closely punctate at the sides.

**Material examined** : India : West Bengal : Darjiling district : Siliguri, 1 female, Museum collection, No. 106/15, no other data.

**Distribution** : India : West Bengal (Darjiling district), Sikkim. Elsewhere : Burma, Philippines.

#### 8. Genus *Megascolia* Betrem

1928. *Scolia* subgenus *Triscolia* Saussure : Betrem. *Treubia*, 9 (suppl.) : 224.

Type-species : *Scolia flavifrons* Fabricius, 1775.

1928. *Scolia* subgenus *Triscolia* section *Megascolia* Betrem. *Treubia*, 9 (suppl.) : 239.

Type-species : *Scolia procer* Illiger, 1802.

1964. *Megascolia* Betrem : Betrem and Bradley. *Zool. Meded.*, 39 : 437 (raised to generic status).

Type-species : *Scolia procer* Illiger, 1802. Original designation.

This genus is widely distributed in the Oriental Region and is also known from Southern Palaearctic and Mediterranean regions. This genus is subdivided into two subgenera viz., *M. (Megascolia)* s. str. and *M. (Regiscolia)* Betrem and Bradley.

This genus is represented by two species under subgenus *Regiscolia* from West Bengal.

#### Subgenus *Regiscolia* Betrem and Bradley

1928. *Scolia* subgenus *Triscolia* section *Triscolia* Saussure: Betrem. *Treubia*, 9 (suppl.): 228.

Type-species : *Scolia flavifrons* Fabricius, 1775.

1964. *Megascolia* subgenus *Regiscolia* Betrem and Bradley. *Zool. Meded.*, 39 : 441.

Type-species : *Scolia flavifrons* Fabricius, 1775 [= *Megascolia (Regiscolia) flavifrons flavifrons* Fabricius, 1775].

This subgenus is widely distributed in the Oriental Region and is also known from Mediterranean and Southern Palaearctic regions. Two taxa are known under this subgenus from West Bengal. These can be distinguished by the following key :

#### Key to the Species/Subspecies

1. Fore wing with two submarginal cells ..... *fulvifrons* (Saussure)
- Fore wing with three submarginal cells. (Vestiture on apical tergites red or reddish-yellow; populations from North India)..... *azuria christiana* (Guiglia and Betrem)

#### 10. *Megascolia (Regiscolia) fulvifrons* (Saussure)

1855. *Scolia (Lacosi) fulvifrons* Saussure. *Mem. Soc. Phys. Hist. Nat. Geneve*, 14 : 43. Type female; Indes Orientales. (Geneva).

1855. *Scolia personata* Smith. *Cat. British Mus. Hym.*, 3 : 91 Type male; Sylhet (London).  
 1964. *Megascolia (Regiscolia) fulvifrons* (Saussure) : Betrem and Bradley. *Zool. Meded.*, 39 : 444.

**Distribution** : India : West Bengal (Darjiling district), Assam, Sikkim. Elsewhere : Bangladesh, Burma, Singapore.

**Remarks** : No material of this species was available from West Bengal. This species is a rather unique member of this subgenus in that it has only two marginal cells in the fore wing in both sexes. This species is restricted to himalayan ranges of India and Burma. Bingham (1897) however, recorded it from Singapore also.

#### 11. *Megascolia (Regiscolia) azuria christiana* (Guiglia and Betrem)

1892. *Scolia (Triscolia) rubiginosa* Fabricius : Magretti, *Ann. Mus. Civico St. Nat. Geneva.* 32 : 236. Type male and female. Burma.  
 1964. *Megascolia (Regiscolia) azurea christiana* (Guiglia and Betrem). Betrem and Bradley. *Zool. Meded.*, 39 : 444.

**Material examined** : India : West Bengal : **Darjiling** district : Rangpo, Andheri Khola, 500 m, 1 female, 9.vi. 1973, H.S. Sharma and Party; **Reang**, 300 m, 1 male, 28.iii. 1973, H.S. Sharma and party; Sonada, 1 female, 24.iii. 1978, A.R. Bhowmik; Mahanandi, 1 female, 26.iii. 1978, A.R. Bhowmick (all in Z.S.I. Collection); Sukna, 1 female, v. 1966, J.& M. Sed Lacey (Bishop Museum).

**Distribution** : India : West Bengal (Darjiling district), Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Manipur, Tripura, Uttar Pradesh. Elsewhere : Bangladesh, Burma, Nepal.

**Remarks** : This subspecies is widely distributed in Northern India and also occurs in Burma, Bangladesh and Nepal. Both the sexes of this taxon can be easily differentiated by having pygidium with reddish hairs.

### 9. Genus *Scolia* Fabricius

This genus is represented by two subgenera viz., *Scolia* sensu Betrem (1928) and *Discolia* Saussure in the Indian subregion. In the state of West Bengal this genus is represented by 10 species/subspecies. All these taxa fall under subgenus *Discolia* Saussure.

#### Subgenus *Discolia* Saussure

1863. *Scolia* subgenus *Discolia* Saussure. *Soc. Ent. France, Ann.* (4) 3 : 18.

**Type-species** : *Scolia nobilitata* Fabricius. Designated by Betrem and Bradley, 1964.

This subgenus is widely distributed in most geographical regions of the world. About 40 species/subspecies are known under this subgenus from India. Of these, 10 are recorded from West Bengal. This can be distinguished by the following key.

#### Key to the Species/Subspecies of *Scolia (Discolia)*

1. Vestiture entirely white in both sexes ..... *carmichaeli* Betrem
- Vestiture not entirely white, it is mixed with either white or black or reddish-yellow or all.....2

2. Abdomen entirely black .....3
- Abdomen with first to fourth tergites, or second to fourth and sometimes fifth tergite also with paired red spots or broad bands; except sometimes second and third tergites entirely black .....4
3. Antenna black; postscutellum and horizontal median area of propodeum with large closer punctures; median tubercle present at base of horizontal section of first abdominal tergite .....  
..... *cyanipennis* Fabricius
- Antennal flagellum entirely orange-red; scutum with large quadrate smooth space posteriorly; postscutellum and horizontal median area of propodeum almost entirely smooth, with very scattered fine punctures; median tubercle at base of horizontal section of first abdominal tergite well developed ..... *affinis* Guirin
4. First to fourth abdominal tergites with apical bands, reddish-yellow; apical band on second tergite very broad and deeply notched in the middle ..... *histrionica desidiosa* Bingham
- First abdominal tergite without an apical band; second to fourth or sometimes fifth tergite with paired red spots or broad bands; or sometimes second and third tergites entirely black .....5
5. Second and sometimes third abdominal tergite almost entirely black, fourth tergite with a narrow reddish-brown band.....6
- Second to fifth abdominal tergites variously marked.....7
6. Third tergite with a distinct band, and sometimes fourth tergite also with a narrow reddish-yellow band. (Abdomen with blue reflection, vestiture predominantly black).....  
..... *elizabethae* Bingham
- Third tergite almost entirely black, fourth with a narrow band along posterior margin in male and a pair of posterolateral spots in female..... *lebongensis* Betrem
7. Front almost impunctate, fissura frontalis extending half way to anterior ocellus; scutellum with a large, median impunctate space on posterior half; second to fifth abdominal tergites variously marked.....8
- Lower half of front with scattered to sub-contiguous punctures; fissura frontalis stronger; second abdominal tergite black; third and fourth with paired red spots .....9
8. Second abdominal tergite occasionally with a pair of red spots, third with a narrow to broad red band; fourth usually with a narrower red band but occasionally entirely black .....  
..... *faciatopunctata dunensis* Betrem
- Second to fourth or sometimes fifth tergites also in female with reddish yellow band (Median lobe of the anterior rim of clypeus widely emarginated)..... *cruenta* Klug
9. Antenna black..... *quadripustulata* Fabricius
- Antenna with scapus and first two flagellar segments reddish- brown .....  
..... *nobilis nobilis* Saussure

### 12. *Scolia (Discolia) cyanipennis* Fabricius

1804. *Scolia cyanipennis* Fabricius. *Syst. Piez* : 244. Type female "Tranqueber" (Copenhagen).  
 1845. *Scolia caerulans* Lepeletier. *Hist. Nat. Ins. Hym.*, 3 : 526. Type male; "Indes" (Turin). syn. by Bradley, 1964.  
 1964. *Scolia (Discolia) cyanipennis* Fabricius : Betrem and Bradley. *Zool. Meded.* 40 : 92.

*Material examined* : India : West Bengal : Medinipur : Mecheda, 1 male, 26.x. 1976, S. Biswas. South 24 Parganas: Canning, 1 female, 15.viii. 1965, R.K. Kacker. Calcutta, 1 female, 25.v. 1909, Mus. Colln.; 1 female, 3.iii. 1906, S. Ribeiro; Calcutta, Eden Gardens, 1 female, 19.viii. 1968, C.S. Roy.

*Distribution* : India : West Bengal (Medinipur, Calcutta districts and South 24 Parganas), Himachal Pradesh, Jammu and Kashmir and South India, Sikkim. Elsewhere : Sri Lanka.

*Remarks* : The female of this species is easily identified, for it is the only species of *Scolia* with the antenna, body and vestiture entirely black. This species occurs only in the Indian subcontinent.

### 13. *Scolia (Discolia) nobilis nobilis* Saussure

1858. *Scolia nobilis* Saussure, *Ann. Soc. Ent. France*, (3) 6 : 214. Type female (sex not stated). "Les Indes Orientales" (Copenhagen).  
 1964. *Scolia (Discolia) nobilis nobilis* Saussure : Betrem and Bradley. *Zool. Meded.*, 40 : 92.

*Material examined* : India : West Bengal : Darjiling district : Singla, 500 m, 1 female, 1913 (no dates), Lord Carmichael.

*Distribution* : India : West Bengal (Darjiling district), Sikkim.

*Remarks* : This typical and rare subspecies is known from hilly areas of Darjiling and Sikkim. This species is mainly recognised by having frontal spatium above, front, ocular sinus, vertex except the ocellar triangle, paired spots on third and fourth tergites, yellow. Scapus and first two antennal segments, frontal laminae, tegulae and legs reddish-brown. Wings yellowish hyaline with purplish reflection.

### 14. *Scolia (Discolia) cruenta* Klug

1805. *Scolia analis* Klug. *Beitr. Naturk.*, 1 : 36. Type female, Poona.  
 1810. *Scolia cruenta* Klug. *Beitr. Naturk.*, 2 : 168 (new name for *S. analis* Klug, 1805).  
 1852. *Scolia fervida* Smith. *Ann. Mag. Nat. Hist.* (2) 9 : 46. Type female (London).  
 1864. *Scolia (Discolia) stizus* Saussure in Saussure and Sichel. *Cat. Spec. gen. Scolia* : 118. Type female (Copenhagen). **New synonymy.**  
 1928. *Scolia (Scolia) berlandi* Betrem. *Treubia*, 9 (suppl.) : 311. Type female. Bellary (Karnataka) (Paris).  
 1964. *Scolia (Discolia) cruenta* Klug : Betrem and Bradley. *Zool. Meded.* 40 : 93.

*Material examined* : India : West Bengal : Darjiling district : Kurseong, 6 females, 5 males, 20.x. 1935, C.F.C. Beeson. Jalpaiguri district: Lataguri, 3 males, 22.viii. 1934, N.C. Chatterjee; Mangpoo, 1 male, 24.viii. 1979, S. S. Saha. Nadia district: Kalyani, 1 female 20.vii. 1965, M.C. Ghosh. Calcutta: Salt Lake, 20 females, 15 males, 15.vi-5.vii. 1982, S.K. Gupta.

**Distribution** : India : West Bengal (Darjiling, Jalpaiguri and Calcutta districts), Bihar, Delhi, Karnataka, Madhya Pradesh, Maharashtra, Pondicherry, Tamil Nadu, Uttar Pradesh. Elsewhere : Nepal.

**Remarks** : This species is widely distributed in India and also occur in Nepal. The female can be differentiated in having reddish-yellow broad bands on second to fourth or fifth tergites. Median lobe of the anterior rim of the clypeus widely emarginated.

15. *Scolia (Discolia) fasciatopunctata dunensis* Betrem, comb. nov.

1928. *Scolia (Scolia) dunensis* Betrem. *Treubia*, **9** (suppl.) : 270. Type male. Dehra Dun. (Calcutta).

1964. *Scolia (Discolia) dunensis* Betrem : Betrem and Bradley. *Zool. Meded.* **40** : 92.

**Material examined** : India : West Bengal : Calcutta, 2 females, no data, Mus. collection.

**Distribution** : India : West Bengal (Calcutta), Delhi, Himachal Pradesh, Orissa, Uttar Pradesh.

**Remarks** : The female of this subspecies is differentiated by having a narrow to broad band on third tergite. Wing dark brown. In male third tergite entirely black and wings light brown.

16. *Scolia (Discolia) lebongensis* Betrem

1928. *Scolia (Scolia) lebongensis* Betrem. *Treubia*, **9** (suppl.): 305. Type female.

1941. *Scolia (Discolia) formosicola lebongensis* : Betrem. *Notes Ent. Chionoise*, **8** (4) : 135.

**Material examined** : India : West Bengal : Darjiling district: Pedong, 1150 m, 1 female, 10.ix. 1978, A.N.T. Joseph; Mirik, 2000 m, 1 male, 21.ix. 1974, H.K. Bhowmik and party.

**Distribution** : India : West Bengal (Darjiling district).

**Remarks** : This subspecies is known from Lebong in Darjiling district only. This subspecies is mainly recognised by having second and third tergites almost entirely black, fourth tergite with a narrow band along posterior margin in male and a pair of posterolateral spots in female.

17. *Scolia (Discolia) histrionica desidiosa* (Bingham)

1896. *Scolia desidiosa* Bingham. *J. Linn. Soc. Zool.*, **25**: 424. Type female. Sikkim (London). Bingham, :897. *Fauna of British India Hym.*, **1** : 36. Male, female.

1928. *Scolia (Scolia) decorata desidiosa* : Betrem : *Treubia*, **9** (suppl.) : 321. Male, female (specimens from North India and Burma only).

1941. *Scolia (Discolia) histrionica desidiosa* : Betrem. *Notes Ent. Chionoise*, **8** (4) : 135.

**Material examined** : India : West Bengal : Darjiling district : Singla, 450 m, 2 males, vii. 1912, Lord Carmichael; 1 male, 18.iv. 1973, H.S. Sharma and party.

**Distribution** : India : West Bengal (Darjiling district), Assam, Arunachal Pradesh, Uttar Pradesh.

**Remarks** : This subspecies is known from North India and Burma only.

1864. *Scolia (Discolia) aureipennis* Lepeletier : Saussure and Sichel. *Cat. Spec. Gen. Scolia* : 109 (misidentification of *S. aureipennis* Lepeletier, *S. jurinei* Synonymised under here).

1978. *Scolia (Discolia) affinis* Guerin : Krombein. *Smithsonian Contr. Zool.* **283** : 31.

**Material examined** : India : West Bengal : Darjiling district : Singla, 1 male, 1913, Lord Carmichael. Nadia district : Ranaghat, 1 female, 18.viii. 1965. P.K. Maity and party; Kalyani, 2 females, 20.viii. 1965, H.C. Ghosh and party. North 24 Parganas : Barrackpore, nr. Rly. Station, 1 female, 1 male, 12.vi. 1982, S.K. Gupta; Footala, 1 male, 8.viii. 1981, S.K. Gupta. Calcutta : Dhapa, 1 male, 23.viii. 1961, S. Ali; Salt Lake City, Baisakhi, 3 females, 7 males, 27.vi-8.vii. 1982, S.K. Gupta; Eden Gardens, 1 male, 30.vi.1964, P.K. Maity and party; Calcutta Maidan, 1 male, 16.vii. 1912 and 1 male, 8.viii. 1911, F.H. Gravely. South 24 Parganas : Sagar Island, Mandir Tala, 1 male, 16.vi. 1977, R.C. Basu and party.

**Distribution** : India : West Bengal (Darjiling, Calcutta, South & North 24 Parganas and Nadia districts), Assam, Bihar, Delhi, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Orissa, Punjab, Sikkim, Tamil Nadu, Tripura, Pondicherry and Uttar Pradesh. Elsewhere : Burma, Nepal.

**Remarks** : This is one of the most common and widely distributed scoliid. The female can be easily distinguished by having orange-red antennal flagellum and integument and vestiture entirely black.

### 19. *Scolia (Discolia) elizabethae* Bingham

1897. *Scolia elizabethae* Bingham. *Fauna British India Hym.*, **1** : 78. Type female, male. Burma, Sikkim (London).

1928. *Scolia (Scolia) elizabethae* var *maculicollis* Betrem. *Treubia*, **9** (suppl.); 303. Type male. Sikkim (Calcutta). **New synonymy.**

1964 *Scolia (Discolia) elizabethae* : Betrem and Bradley. *Zool. Meded.*, **40** : 93 (subgeneric assignment).

**Material examined** : India : West Bengal : Darjiling district : Pashok, 1 female, 3.vi. 1930, S.L. Hora; Singla 1 female, 1913, Lord Carmichael.

**Distribution** : India : West Bengal (Darjiling district), Sikkim.

**Remarks** : The female of this species is easily recognised by having body integument black and abdomen with weak blue reflection. Antennal flagellum, posterior half of frontal spatium, front and vertex wholly, a band on third tergite, sometimes a narrow band on fourth tergite also, red or reddish-yellow. Vestiture predominantly black, sometimes with white hairs on occiput, sides of thorax, legs and sternites. Wings dark brown with purplish reflection.

### 20. *Scolia (Discolia) quadripustulata* Fabricius

1782. *Scolia 4-pustulata* Fabricius. *Spec. Ins.*, **1** : 453.

1928. *Scolia (Scolia) obscuropunctata* Betrem. *Treubia*, **9** (suppl.) : 308-309. Type female (holotype in Leiden museum, paratypes in Artis and Calcutta). Syn. by Betrem, 1973.

1928. *Scolia (Scolia) kumaoensis* Betrem. *Treubia*, **9** (suppl.) : 309. India (Calcutta).

1978. *Scolia (Discolia) quadripustulata* : Krombein. *Smithsonian Contr. Zool.*, **283** : 38.

**Material examined** : India : West Bengal : Nadia district : Kalyani, 1 female, 20.vii. 1965, H.C. Ghosh and party.

**Distribution** : India : West Bengal (Nadia district), Karnataka, Meghalaya, Tamil Nadu, Uttar Pradesh. Elsewhere : Sri Lanka.

**Remarks** : This is a rare but a widely distributed species. The female is easily distinguished from any of the other mostly black species of *Scolia*, by having red spots on the black abdomen.

### 21. *Scolia (Discolia) carmichaeli* Betrem

1928. *Scolia (Scolia) carmichaeli* Betrem. *Treubia* 9 (suppl.) : 286-287. Type male, female. India : West Bengal and Sikkim (Calcutta).

1964. *Scolia (Discolia) carmichaeli*: Betrem and Bradley. *Zool. Meded.*, 40 : 92.

**Material examined** : India : West Bengal : Darjiling district : Singla, 500 m, 1 male, 1913, Lord Carmichael. Pashok : holotype, allotype, paratype in Z.S.I., Calcutta.

**Distribution** : India : West Bengal (Darjiling district), Arunachal Pradesh, Sikkim.

**Remarks** : This is a rare species and its distribution is restricted to North-East India. It is one of the Indian species of the genus *Scolia* in which head is almost entirely red in both sexes. It can be differentiated from all other such species in having entirely white vestiture in both the sexes.

## SUMMARY

This paper deals with the Scoliidae fauna of West Bengal. Altogether 21 species/subspecies under 9 genera and two subfamilies are treated in the text. The keys for the identification of subfamilies, genera, species and subspecies are provided. Distributional maps and illustrations of morphological characters are included for ready reference.

Two species of *Scolia (Discolia)* have been synonymized as follows : *stizus* Saussure with *cruenta* Klug and *elizabethae* var *maculicollis* Betrem with *elizabethae* Bingham.

The Scoliid wasps are external parasites of Scarabaeidae in the soil or in decaying wood. It is hoped that many of these may be economically exploited for the biological control of these pests.

## ACKNOWLEDGEMENTS

We are grateful to Dr. A. K. Ghosh, Director, Zoological Survey of India and Chief coordinator, fauna of West Bengal for guidance, encouragement and for providing all the facilities to carry out this research work. We are thankful to Dr. S. K. Bhattacharyya, Scientist 'SF (Retd.)' Dr. J.R.B. Alfred, Scientist 'SG' and Shri G. Sivagurunathan, P.P.O. (Retd.) for helping us in various ways.

**Table Showing Distribution of Species/Subspecies of Scoliidae in West Bengal**

Sl. No.	Systematic List	Darjiling	Jalpaiguri	Koch Bihar	West Dinajpur	Maldah	Murshidabad	Birbhum	Bardhaman	Nadia	Puruliya	Bankura	Hugli	North 24 Parganas	South 24 Parganas	Haora	Calcutta	Medinipur
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

I. Subfamily Campsomerinae

1. Genus *Phalerimeris* Betrem

1. *phalerata phalerata* (Sanssure)                      ×      ×

2. Genus *Micromeriella* Betrem

2. *marginella marginella* (klug)                      ×

3. Genus *Sericocampsomeris* Betrem

3. *stygia stygia* (Illiger)                              ×

4. Genus *Campsomeriella* Betrem

1. Subgenus *Campsomeriella* Betrem

4. *collaris collaris* (Fabricius)                      ×    ×    ×    ×

2. Subgenus *Annulimeris* Betrem

5. *annulata* (Fabricius)                                  ×

5. Genus *Megacampsomeris* Betrem

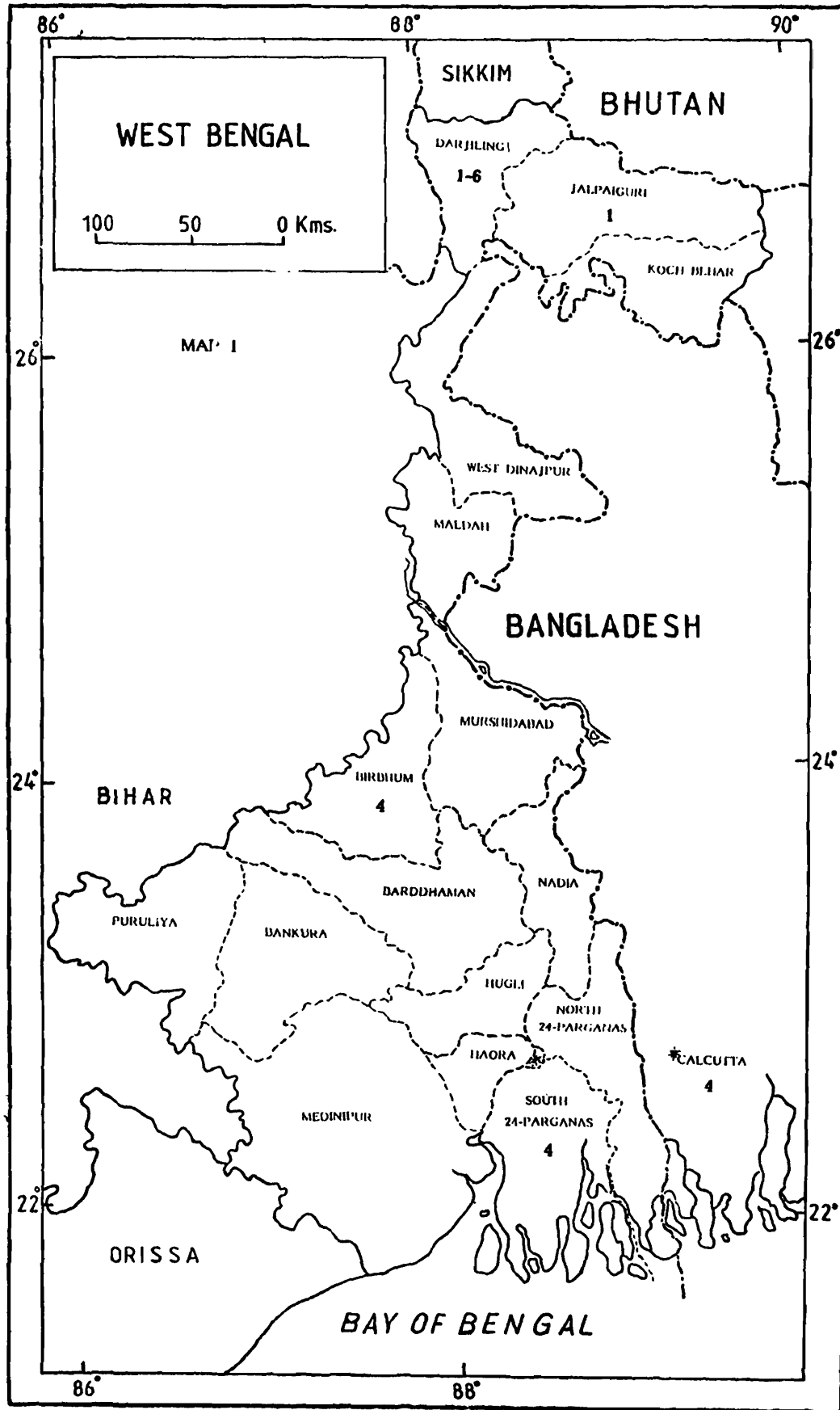
6. *shillongensis* Betrem                                ×

7. *prismatica* (Smith)                                ×

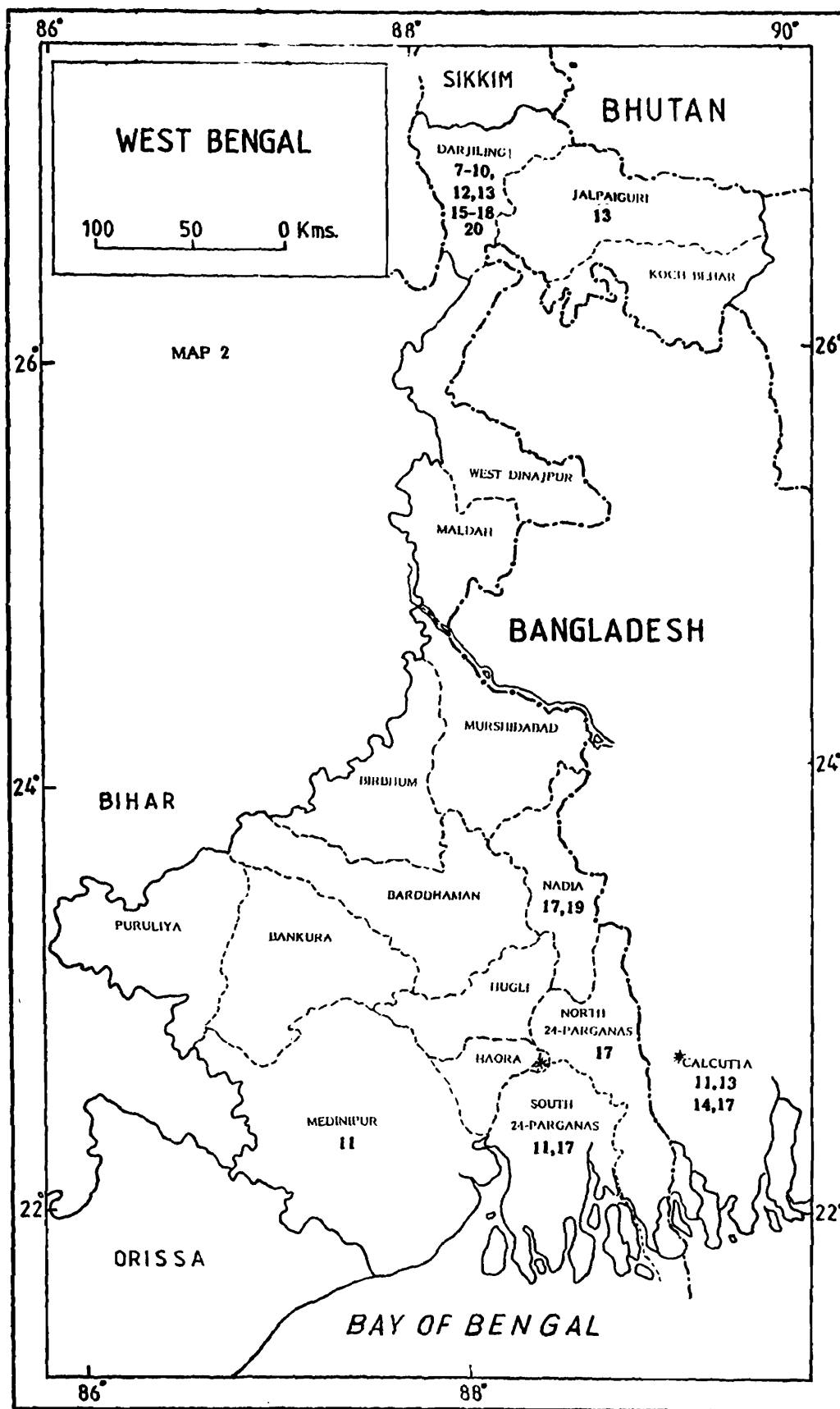
II. Subfamily Scoliinae

6. Genus *Liacos* Guerin

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
8. <i>erythrosoma erythrosoma</i> (Burmeister)	×																
7. Genus <i>Austroscolia</i> Betrem																	
9. <i>ruficeps ruficeps</i> (Smith)	×																
8. Genus <i>Megascolia</i> Betrem																	
3. Subgenus <i>Regiscolia</i> Betrem & Bradely																	
10. <i>fulvifrons</i> (Sanssure)	×																
11. <i>azuria christiana</i> (Guiglia & Betrem)	×																
9. Genus <i>Scolia</i> Fabricius																	
4. Subgenus <i>Discolia</i> Betrem & Bradely																	
12. <i>cyanipennis</i> Fabricius														×		×	×
13. <i>nobilis nobilis</i> Sanssure	×																
14. <i>cruenta</i> Klug	×	×														×	
15. <i>fasciatopunctata dunensis</i> Betrem																×	
16. <i>formosicola lebongensis</i> Betrem	×																
17. <i>histrionica desidiosa</i> (Bingham)	×																
18. <i>affinis</i> Guerin	×								×				×	×		×	
19. <i>elizabethae</i> Binham	×																
20. <i>quadripustulata</i> Fabricius									×								
21. <i>carmichaeli</i> Betrem	×																



Map 1. Distribution of taxa of subfamily Campsomerinae in West Bengal. Number indicates the name of the taxa as treated in the text.



Map 2. Distribution of taxa of subfamily Scoliinae in West Bengal. Number indicates the name of the taxa as treated in the text.

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## INSECTA : HYMENOPTERA : FORMICIDAE

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### INTRODUCTION

The present work is based on the collection of Ants (FORMICIDAE), made by various survey parties of Zoological Survey of India from West Bengal (INDIA), mainly from Mopping Survey of various districts, local surveys of Calcutta and its surroundings, and exclusive survey of Darjiling district (H.S. Sharma & R.N. Tiwari 1973, P.K. Maity & R.N. Tiwari 1973, G.K. Srivastava & P.K. Maity 1973-74, J.K. Jonathan & Party 1974 and G.K. Srivastava & G.S. Arora 1976 and others). This also includes a huge lot of ants collected by Lord Carmichael, 1913.

George Alexander James Rothneyi (1889) worked on Indian ants and later on A. Forel (1900 a, 'b, 'c) published a comprehensive work on the Formicidae of India & Ceylon. C.T. Bingham (1903) published his valuable work on Fauna of British India including Burma & Ceylon and gave details about distribution of species included.

Successive workers like Jerdon (1851), Mukherjee (1927), Karawajew (1926, '27, '28), Wheeler (1927, '28), Menozzi (1935), Donisthorpe (1942a, '42b), Smith (1948), Brown, Jr. (1954, '57, '59a), Wilson (1964), Taylor (1965, '66, '68), Collingwood (1970), Baroni Urbani (1977a, '77b), Bolton (1977) Tiwari *et al.* (1977a, '77b, '77c, '86a, '86b) and Imai *et al.* (1984) have made valuable contribution on the Indian Fauna of Formicidae. But no one has exclusively studied Formicidae Fauna of West Bengal. This is a first attempt by the present authors to contribute to the knowledge of Formicidae Fauna of West Bengal. The entire material studied under this project, have been deposited in the collection of Zoological Survey of India, Calcutta.

### SYSTEMATICS

The Formicidae is one of the largest families of the order Hymenoptera and is represented throughout the world because of its cosmopolitan nature. Hardly there is any land mass on earth-surface which is devoid of ants. About 498 species were recorded so far from India including Burma & Ceylon under 79 genera, of which 60 species were recorded earlier from West Bengal. The present collection including 'Fauna of British India' (Bingham, 1903) comprises of a few thousand examples spreading over 128 species and 47 genera under 7 subfamilies, viz., Dorylinae, Cerapachyinae, Ponerinae, Dolichoderinae, Pseudomyrmecinae, Myrmicinae and Formicinae.

Till date 11 subfamilies have been recognised throughout the world; 10 of these, are living and 1 extinct (Sphecomyrminae). Out of these 11 subfamilies, our study represents 7 subfamilies, mentioned above. Out of 128 species reported here, 42 species alongwith the subspecies are recorded for the first time from West Bengal including 10 genera.

Detail information regarding 'Material examined' about the species recorded from the 'Fauna of British India' (Bingham, 1903) could not be furnished here, because there is no such mention in the said Fauna against the species recorded.

The key to the Tribes, Subfamilies, Genera and Species are provided here. But key to the species are not given, where the genus is represented by a single species.

The mode of arrangement of the species is followed as in 'Fauna of British India' The taxa marked with asterics in the Systematic Account are the new records from West Bengal. Illustrations given in the text are – Fig. 1, after Ettershank (1966) and Figs. 2-6, after Bingham (1903).

Systematic arrangement : The subfamilies included in this work are arranged in the following order :

1. Dorylinae
2. Cerapachyinae
3. Ponerinae
4. Dolichoderinae
5. Pseudomyrmecinae
6. Myrmicinae
7. Formicinae

#### MORPHOLOGY OF ANTS

*Introduction* : Morphologically ants are at once distinguished from other aculeate Hymenoptera by a remarkable modification of the one or two segments of the abdomen immediately following the median segment or propodium. This modification of the anterior portion of the abdomen consists in the almost complete detachment of one or two segments from the rest of the abdomen to form a highly flexible pedicel composed of one or two nodes. In the majority of the genera of the family Formicidae, the attachment of the pedicel to the median segment in front and to the rest of the abdomen behind is extremely constricted and narrow, giving great freedom of movement to both thorax and abdomen properly. When the pedicel is formed of two segments, a similar constriction lies between the two. In certain low forms of primitive ants like *Myopopone*, *Amblyopone*, etc., the node of pedicel is attached by the whole of its posterior face to the succeeding segment of the abdomen, showing an approximation to the stiffer and more ponderous form of abdomen possessed by fossorial wasps of the family Scoliidae.

Ants like other social Hymenopterans such as Honey-bees and wasps, exhibit the maximum degree of social pattern and thus are differentiated into following three forms :

1. The female or perfect fertile female – ♀
2. The male – ♂
3. The worker or so called Neuter – ♂

The workers are undeveloped female and are invariably wingless and generally have the thorax more or less modified and different from the thorax of male or female. On shape and size, they are further differentiated into :

- a) Worker minor – ♀ min.
- b) Worker major – ♀ maj.
- c) Soldier – 2♂

The parts of the head, thorax and abdomen in an ant are homologous with those in other Hymenopterous insects, but are generally modified. The given figures (Figs. 1-4) give illustrations of some of the various parts assumed by these, with details of the parts of which they are composed. The lettering in all the figures is alike and refers to the same parts.

**Morphology** : The *thorax* in ants varies enormously in shape and development of the component parts. The thorax of a worker differs markedly from the thorax of female or male of the same species.

The thorax of ants of different subfamilies, vary greatly in the structures and as such no typical diagram of an ant serves the purpose. However, in order to give different body structures, *Solenopsis* sp. has been selected as a typical form and the terms related to identification have been elaborately illustrated (Fig. 1).

### Mouth-parts

**Mandible** : The various parts of the mandible are shown in Fig. 1b. The most distal tooth is termed the *apical*, and the rest are *sub-apical teeth*; dental formulae are coded in the form "1 + 3", indicating one apical and three sub-apical.

The basal shaft of the mandible bears several characters of classificatory importance. The *Mandalus* is a small, unpigmented, apparently membranous lacuna which may contain the orifice of the duct from the mandibular gland. In shape, the mandalus may be linear, key-hole shaped or even triangular (Fig. 1b).

**Trulleum** : Distal to the mandalus is a large more or less basin shaped depression called Trulleum, bounded laterally and distally by the blade of the mandible and medially by *Canthellus* (Fig. 1b).

**Canthellus** : It is a raised ridge running distal from the base of the mandible (Fig. 1b).

**Labrum** : The labrum (Fig. 2F) is movably articulated below the median area of the clypeus and folds up under the closed mandibles, forming with the exposed plates of the labio-maxillary complex, a tight seal over more delicate mouth parts and buccal opening.

**Maxillary and labial palpi** : The palpal formula is a valuable character in identification. The old palpal formula is out dated and not in practice (Figs. 2 E, F).

A variable amount of fusion between segments which can not be seen in dried material is clear in immersed preparation (Kusnezov, 1954a, 1954b). As this fusion is important for phylogenetic reasoning the palpal formula is coded in a way, that indicates three degree of fusion.

- i) Separate segment or s
- ii) Partial fusion or p
- iii) Complete fusion or c

“4, 3” represents four freely articulated maxillary segments and three freely articulated labial segments.

### Body-parts

**Wings** : To the mesothorax at the sides above are attached in the ♀ and ♂, the *forewings*, and to the sides of the metathorax the *hindwings*; the nerve venations of the wings is less complete than in most of the Aculeata.

In the forewing, the radial, costal, medial and two submedial cells are always complete; others are variable and may or may not be present, complete or incomplete. (Figs. 1c, 3 A, B, D).

**Legs** : Three pairs of legs are present in all sexes containing following parts.

Coxae, trochanter, single jointed femora, tibiae, tibial calcaria, which may or may not be present on all the legs, are often double, and may be pectinate or simple, tarsi with 5 joints, the apical joint armed with two claws, which may be pectinate, dentate or simple (Figs. 3 E–G).

**Abdomen** : The abdomen in ♀ and ♂ is composed of 6 segments, in the ♂ of 7 visible segments and is like the rest of the parts in ants, very variable, generally more massive and comparatively longer in the ♀; smaller and more slender in the ♂ than in the ♀ (Figs. 4 A–E).

### Other-terms

(Figs. 1 a–d)

**Inferior propodeal plates** : These are pair of flanges or plate like structures placed vertically on either side of the foramen of petiole. [Synonymous terms are “lamellae”, “rounded lamella”, “meta-pleural lobes” and “meta-sternal lobes” - Kempl].

**Levator foramen** : It is a partially separated channel in the roof of the propodeal foramen, into which fits a ligament that elevates the petiole.

**Median meta-sternal process** : It is heavily sclerotised and consists of longitudinal grooved extension of the meta-sternum and is meant to receive the sub-petiolar process of the petiole.

**Median meso-sternal process** : It is ventrally and posteriorly directed elaboration of the anterior margin of the mesonotum, its function is unknown.

**Sub-petiolar process** : It is a structure originating from the ventral surface of the petiole. It consists of - 1) an anterior ventral transverse ridge, and 2) posterior ventral transverse ridge which is actually an elaboration of the posterior sternal margin of the post-petiolar segment.

The post-petiole articulates by a ball and socket joint with the gaster (or abdomen), the “ball” of the gaster generally being concealed within the “socket” of the post-petiole.

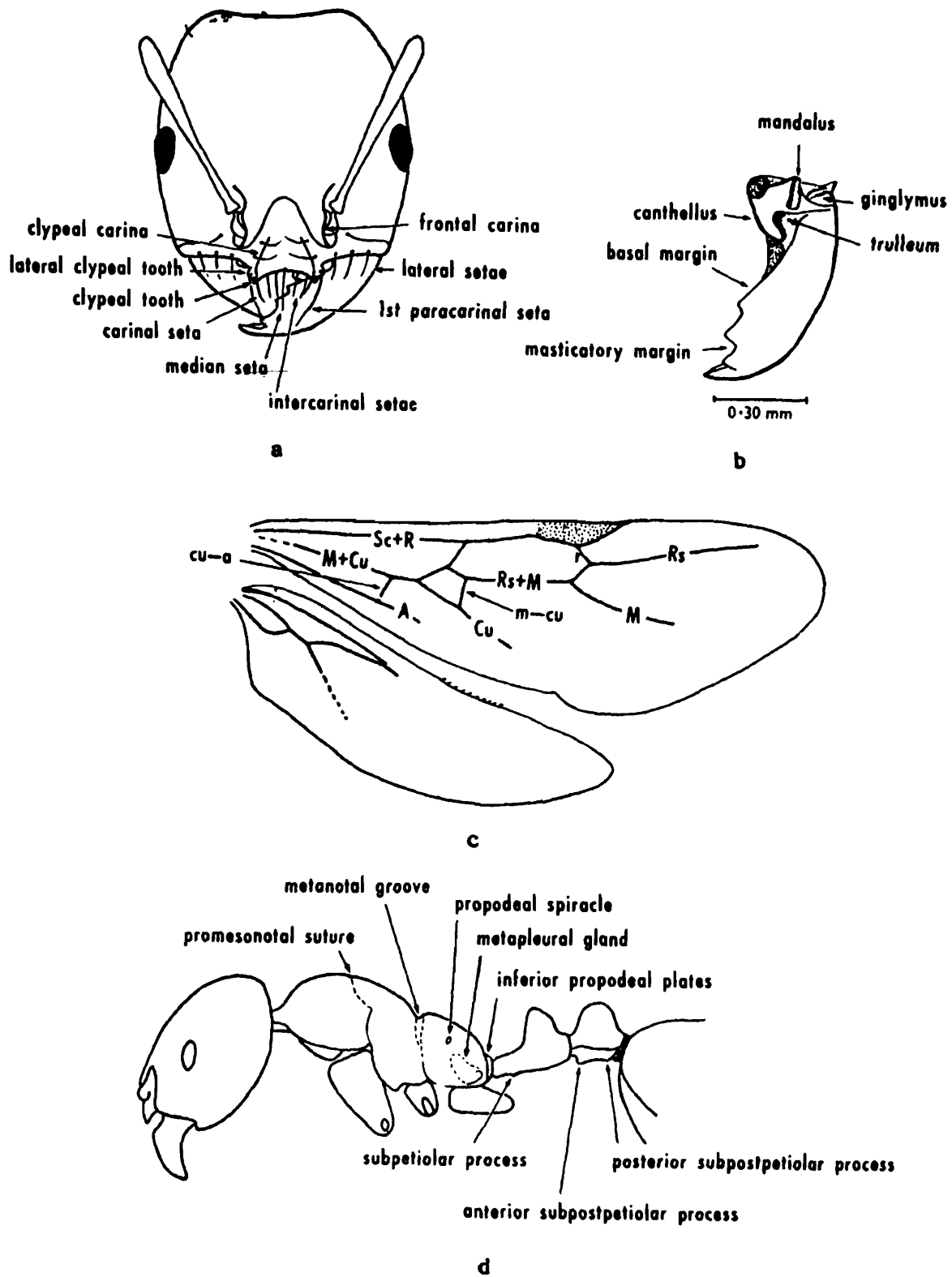


Fig. 1. a – Head of a typical ant (*Solenopsis* sp. worker) showing various parts; b – Mandible of *Solenopsis* sp. worker; c – Wing venation of fore and hind wings of *Solenopsis* sp. female; d – body parts of a typical ant (*Solenopsis* worker).

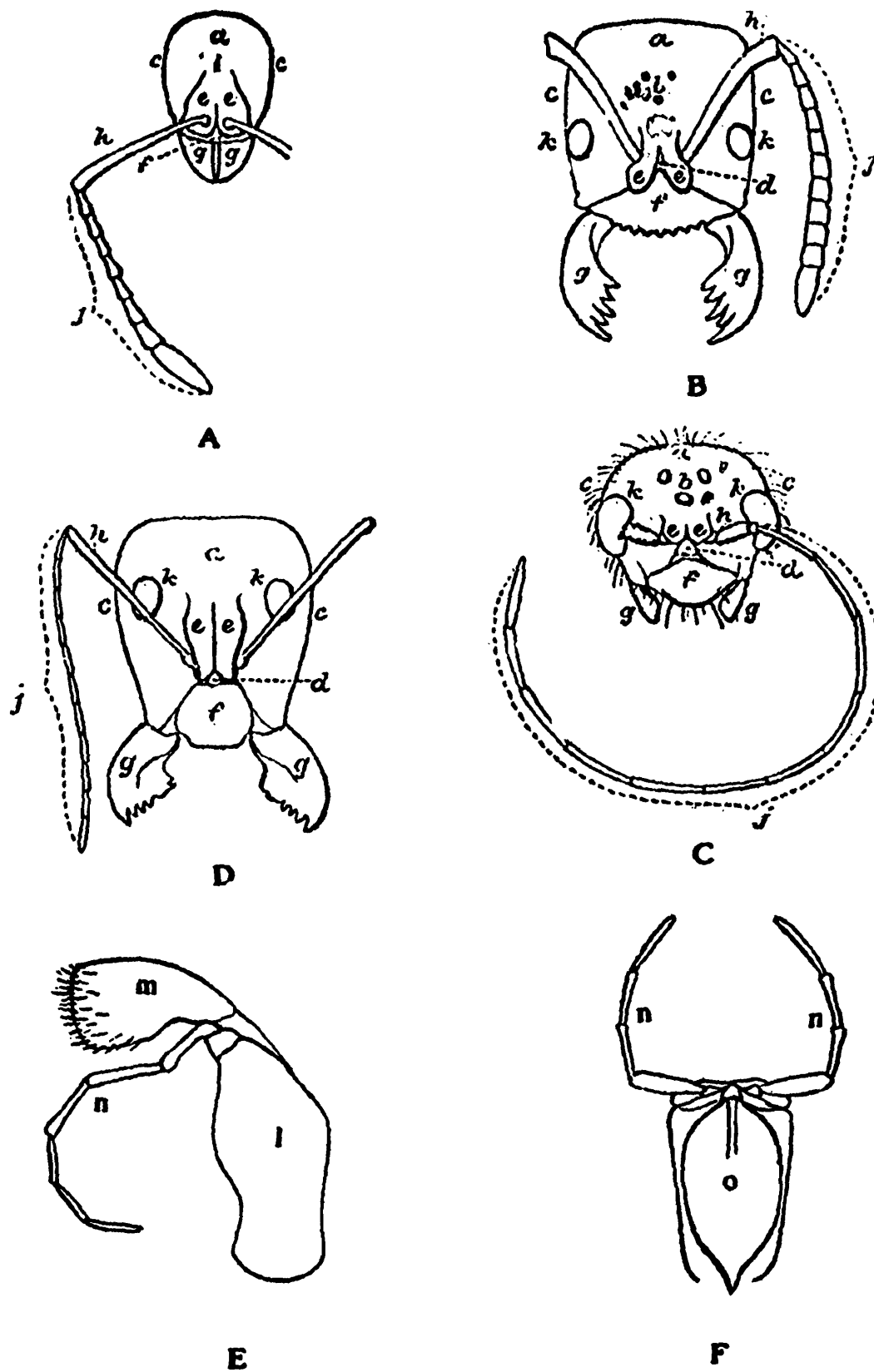


Fig. 2. A – Head of a Dorylinae worker; B – Head of a Ponerinae female; C – Head of a Ponerinae male; D – Head of a Camponotinae worker; E – Mouth parts (Maxilla) of Camponotinae; F – Mouth parts (Labium) of Camponotinae. a, vertex; b, ocelli; c, sides of head; d, frontal area; e, antennal carinae; f, clypeus; g, mandible; h, scape; j, flagellum; k, compound eye; l, stipes; m, galea; n, palpus (palpi); o, ligula.

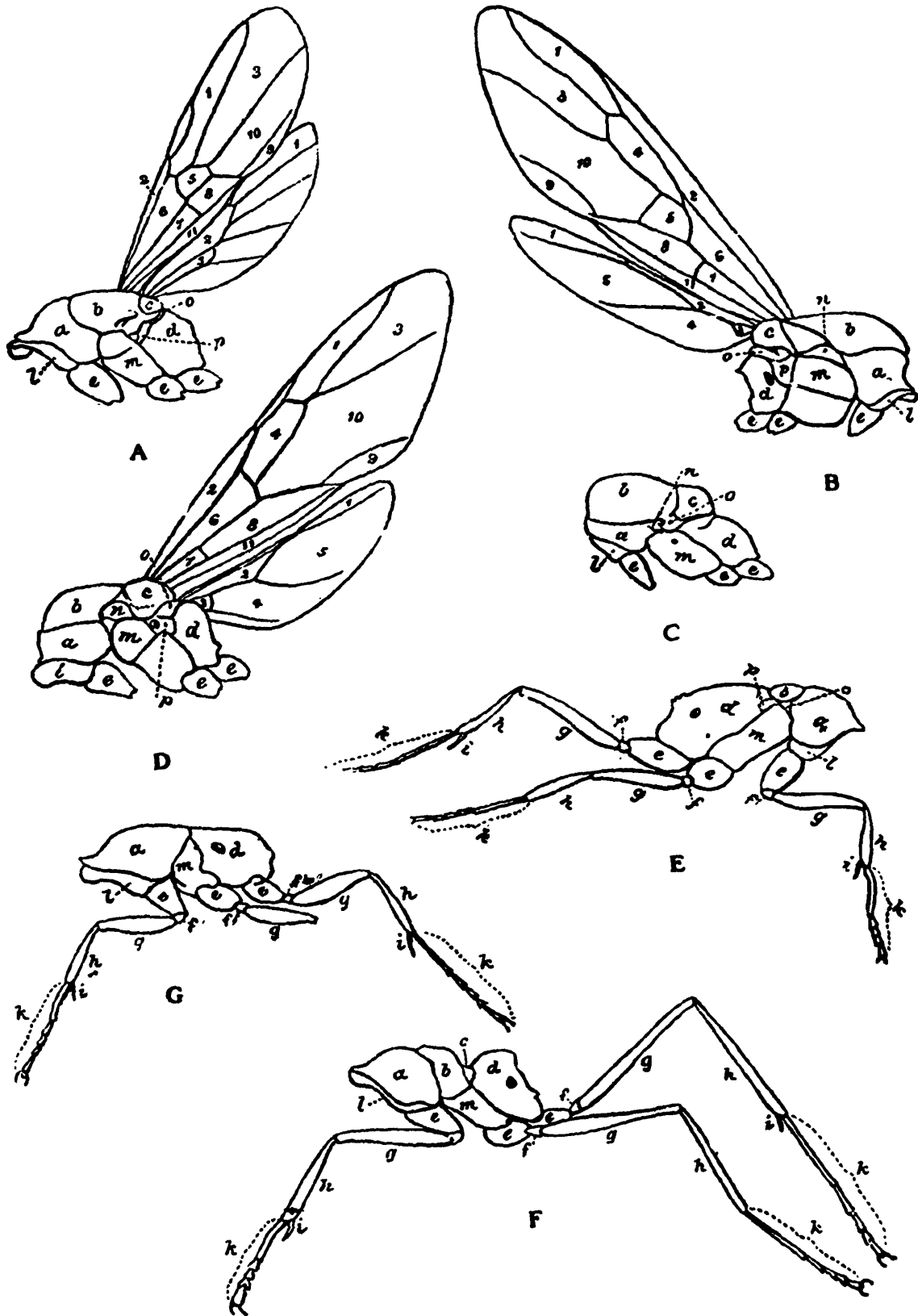


Fig. 3. A – Thorax and wings of Ponerinae female; B – Thorax and wings of Myrmicinae female; C Thorax of Ponerinae male; D Thorax and wings of Camponotinae female; E – Thorax of Ponerinae worker; F – Thorax and legs of Dolichoderinae worker; G – Thorax and legs of Dorylinae worker. a, pro-thorax; b, meso-thorax; c, scutellum; d, median segment; l, pro-pleurae; m, meso-pleurae; p, meta-pleurae; f, trochanters; g, femora; h, tibiae; i, tibial calcaria; k, tarsi.

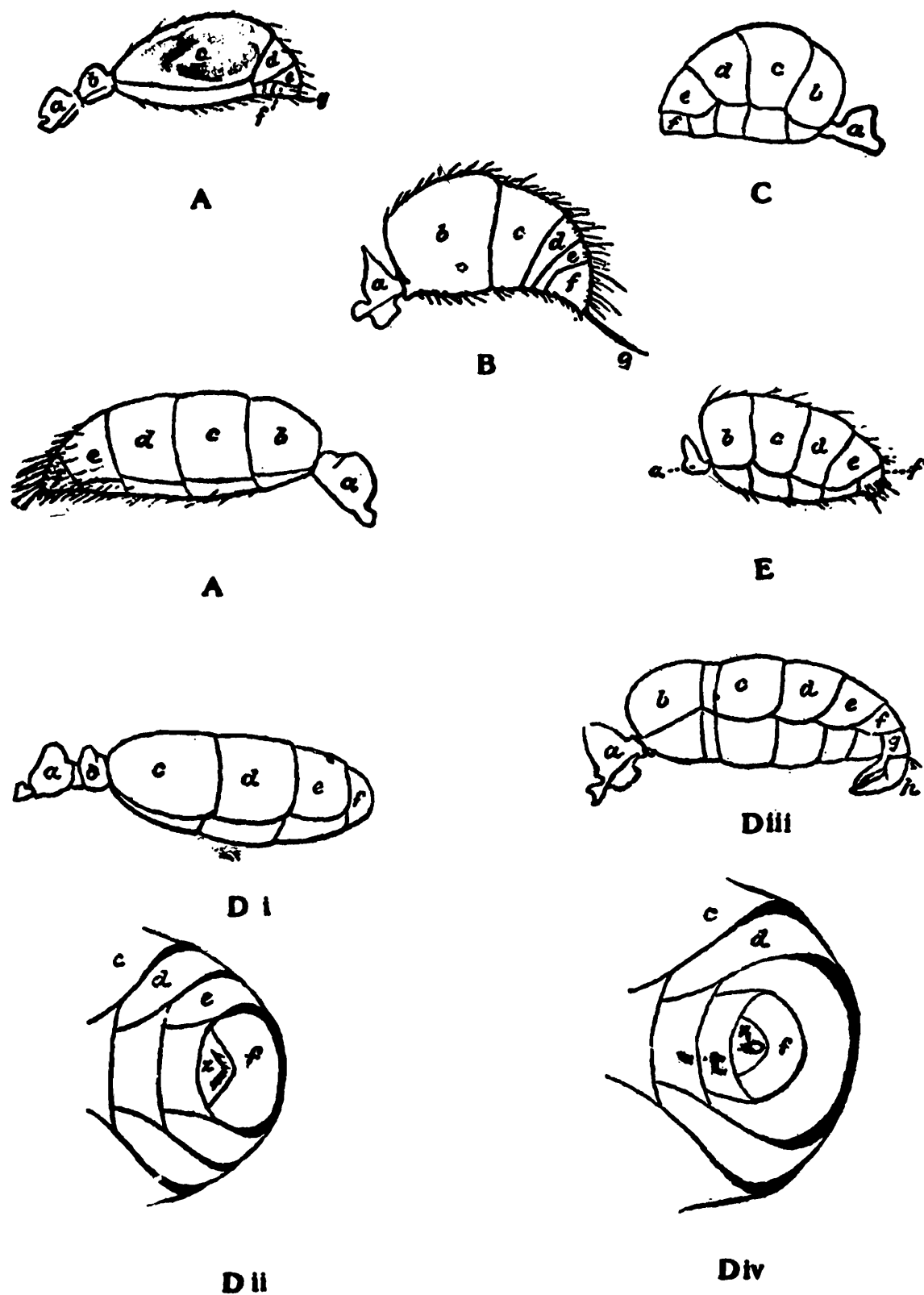


Fig. 4. A – Abdomen of dorylinae worker; B – Abdomen of Ponerinae worker; C – Abdomen of Dolichoderinae worker; D (i) & (ii) – Abdomen of Myrmecinae; (iii) – Abdomen of Ponerinae male; (iv) – Abdomen of camponotinae female; E – Abdomen of Camponotinae worker.

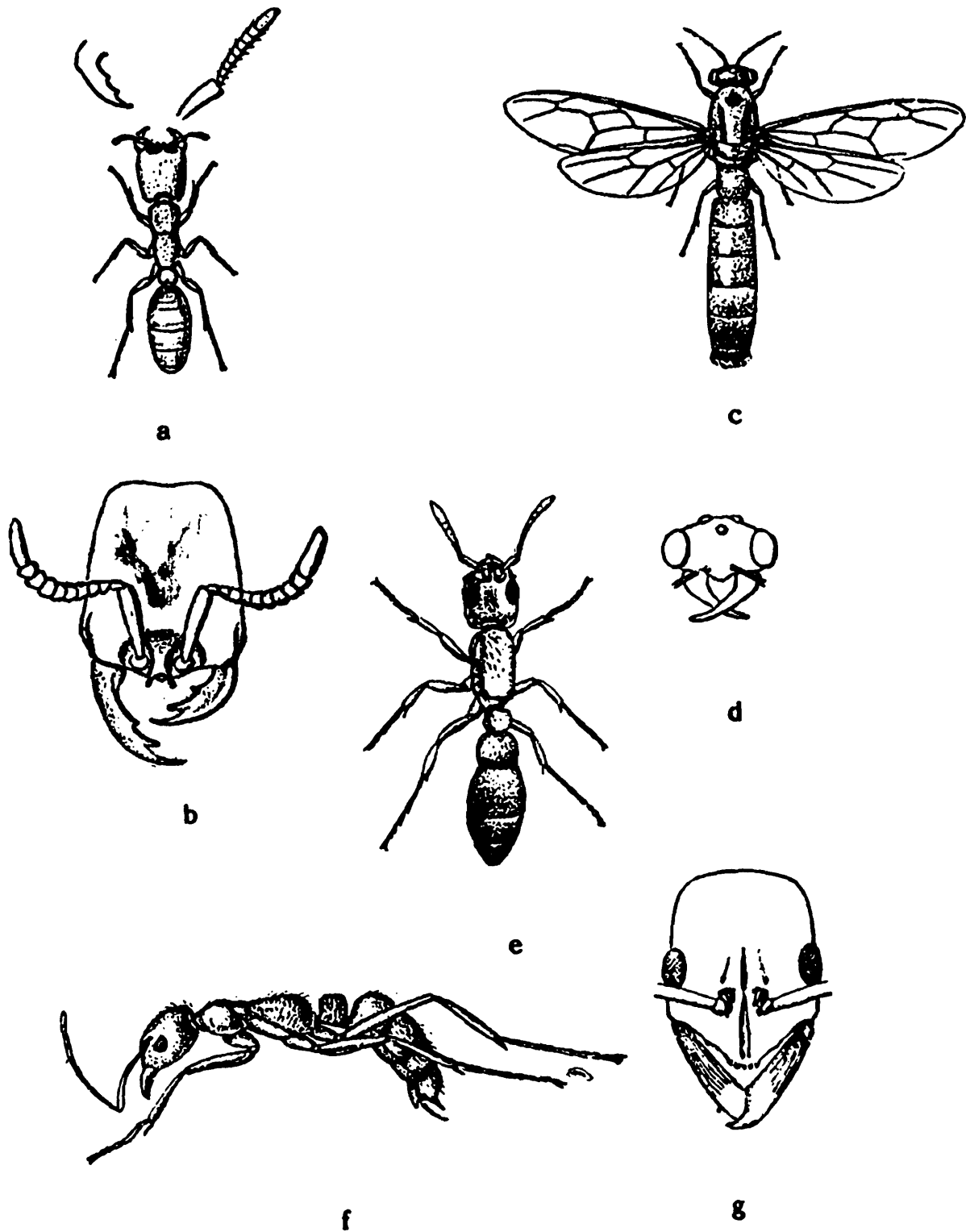


Fig. 5. a – A representative of subfamily Dorylinae (*Dorylus* sp. worker); b – Head of *Dorylus* sp. worker; c – Winged form of *Dorylus* sp. male; d – Head of winged form of *Dorylus* sp. male; e – A representative of subfamily Cerapachyinae (*Lioponera* sp. worker); f – A representative of subfamily Ponerinae (*Leptogenys* sp. worker); g – Head of *Leptogenys* sp. worker.

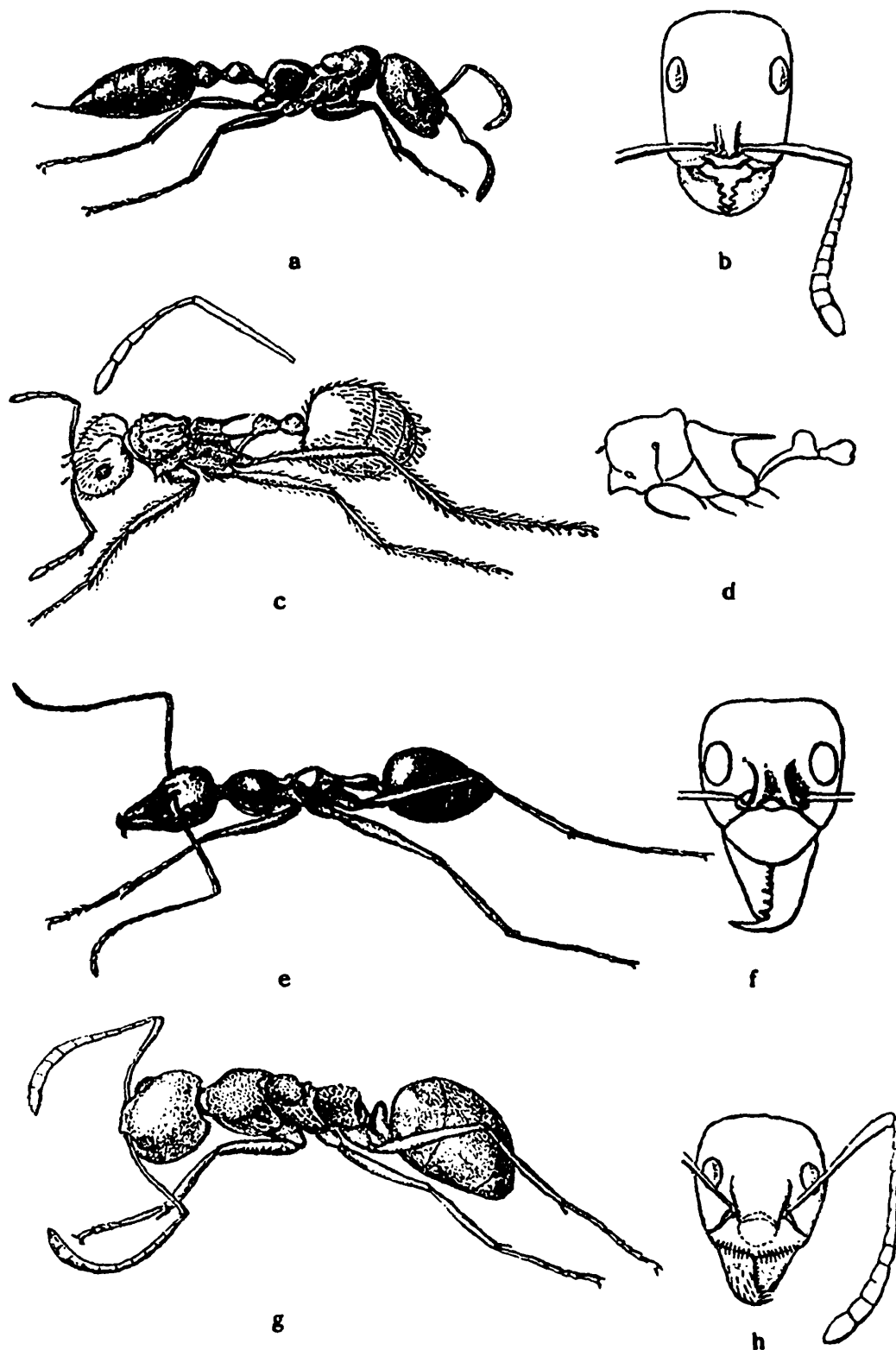


Fig. 6. a – A representative of subfamily Pseudomyrmecinae (*Tetraponera* sp. worker); b – Head of *Tetraponera* sp. worker; c – A representative of subfamily Myrmicinae (*Myrmicaria* sp. worker); d – Thorax and petiole of *Myrmicaria* sp. worker; e – A representative of subfamily Formicinae (*Oecophylla* sp. worker); f – Head of *Oecophylla* sp. worker; g – A representative of subfamily Dolichoderinae (*Dolichoderus* sp. worker); h – Head of *Dolichoderus* sp. worker.

## METHODOLOGY

a) *Collection and preservation* : The mode of collection and preservation of ants in detail is avoided here due to paucity of space. However, the specimen may be collected while sweeping the insect nest for general collection of ants or may be exclusively collected from different habitat by forceps and brush soaked with spirit. Bigger specimen belonging to subfamilies Ponerinae, Dorylinae, Dolichoderinae and some of Formicinae may be preserved in Insect packets and necessary preservative applied, but most of the ants belonging to Myrmecinae, Formicinae and other subfamilies are preferably preserved in spirit in glass vials (preferably 5 ml. Homoeopathic vial with velvet corks).

As the key for identification is mostly based on ♀♀ (except few ♂ based keys); while collecting winged forms of ants, i.e., ♀ and ♂, every possible attempts are made to collect associated non-winged forms, i.e., ♀♀; otherwise identification of isolated winged forms where workers are not collected specific identification becomes difficult rather impossible.

(b) *Method of Study* : It is necessary to relax the specimen fully for study at high magnification. The method applied here for study is reasonably rapid and does not cause excessive damage or discolouration to the specimen.

Material required are saturated ammonia solution, glycerine, Barber's or Ward's fluid and dissecting equipments.

The specimen is removed from the pin and placed in ammonia in a rubber stoppered vial of suitable size. Depending on the size of the specimen, it will be flexible and workable in 3-30 minutes. The specimen is removed to Barber's or Ward's fluid and examined at suitable magnification; the head is grasped with forceps and the mandible well separated; the labio-maxillary complex can now be removed and finally the labrum is removed; one antenna is dissected off and all the parts except mandible are removed to glycerine in a cavity slide. One mandible is air dried and mounted in the point with the specimen; the mandible is mounted with the "trulleum" in an exposed position. The parts in glycerine are stored after examination, in a genitalia vial in the absolute minimum of glycerine. The vial is mounted on the same pin through the cork end of vial at an angle of 45°, to prevent the glycerine running upto the cork. Wings of ♀ and ♂ of any are mounted in canada balsum on slides under coverslips. If the wings of dried specimen are undistorted, they may be wetted with xylene and mounted immediately. The distorted wings are relaxed, dried and then mounted (Ettershank, 1966).

## SYSTEMATIC ACCOUNT

## Family FORMICIDAE

## I. Subfamily DORYLINAE Forel

1. Genus *Dorylus* Fabricius

1. *Dorylus (Typhlopone) labiatus* Shuckard
2. *Dorylus (Alaopone) orientalis* Westwood

2. Genus *Aenictus* Shuckard

3. *Aenictus clavitibia* Forel

4. *Aenictus shuckardi* Forel
5. *Aenictus brevicornis* (Mayr)
- II. Subfamily CERAPACHYINAE Forel
  3. Genus *Lioponera* Mayr
  6. *Lioponera longitarsus* Mayr
  7. *Lioponera parva* Forel
  - III. Subfamily PONERINAE Lepeletier
    4. Genus *Anochetus* Mayr
    8. *Anochetus madaraszi* Mayr
    9. *Anochetus punctiventris* Mayr
    5. Genus *Bothroponera* Mayr
    10. *Bothroponera bispinosa* (Smith)\*
    11. *Bothroponera rufipes* (Jerdon)
    12. *Bothroponera sulcata* (Frauenfeldi)
    13. *Bothroponera tesserinoda* (Emery)\*
    6. Genus *Diacamma* Mayr
    14. *Diacamma rugosum* var. *sculptum* (Jerdon)
    15. *Diacamma scalpratum* (Smith)\*
    16. *Diacamma vagans* (Smith)
    - \*\* 7. Genus *Ectomyrmex* Mayr
    17. *Ectomyrmex javana* Mayr\*
    18. *Ectomyrmex javana materna* Forel\*
    8. Genus *Brachyponera* Emery
    19. *Brachyponera jerdoni* (Forel)
    20. *Brachyponera luteipes* (Mayr)\*
    9. Genus *Leptogenys* Roger
    21. *Leptogenys (Lobopelta) birmana* Forel\*
    22. *Leptogenys (L.) chinensis* Mayr\*
    23. *Leptogenys (L.) diminuta* (Smith)\*
    24. *Leptogenys (L.) diminuta hodgsoni* Forel\*
    25. *Leptogenys (L.) diminuta striatula* Emery\*
    26. *Leptogenys (L.) kitteli* Mayr\*
    27. *Leptogenys (L.) minchini* Forel
    28. *Leptogenys (L.) ocellifera* (Roger)\*
    29. *Leptogenys (L.) punctiventris* Mayr
    30. *Leptogenys (L.) roberti coonoorensis* Forel\*

- \*\* 10. Genus *Odontomachus* Latreille
- 31. *Odontomachus monticola* Emery\*
- 11. Genus *Platythyrea* Roger
- 32. *Platythyrea wroughtoni* var. *victoriae* Forel
- 12. Genus *Ponera* Latreille
- 33. *Ponera confinis* Roger
- 34. *Ponera truncata* Smith\*
- 35. *Ponera* sp.
- 13. Genus *Sphinctomyrmex* Mayr
- 36. *Sphinctomyrmex taylori* Forel
- \*\* 14. Genus *Stictoponera* Mayr
- 37. *Stictoponera menadensis bicolor* Emery\*
- 15. Genus *Amblyopone* Erichson
- 38. *Amblyopone rothneyi* Forel
- IV. Subfamily DOLICHODERINAE Forel
- 16. Genus *Bothriomyrmex* Emery
- 39. *Bothriomyrmex walshi* Forel
- 40. *Bothriomyrmex wroughtoni dalyi* Forel
- \*\* 17. Genus *Dolichoderus* Lund
- 41. *Dolichoderus bituberculatus* (Mayr)\*
- \*\* 18. Genus *Iridomyrmex* Mayr
- 42. *Iridomyrmex anceps* (Roger)\*
- V. Subfamily PSEUDOMYRMECINAE Emery
- 19. Genus *Tetraponera* Smith
- 43. *Tetraponera (Tetraponera) allaborans* (Walker)
- 44. *Tetraponera (T.) binghami* (Forel)\*
- 45. *Tetraponera (T.) nigra* (Jerdon)
- 46. *Tetraponera (T.) rufonigra* (Jerdon)\*
- VI. Subfamily MYRMICINAE Lepeletier
- 20. Genus *Acidomyrmex* Emery
- 47. *Acidomyrmex rothneyi* (Forel)
- 21. Genus *Aphaenogaster* Mayr
- 48. *Aphaenogaster* sp.
- 22. Genus *Cataulacus* Smith
- 49. *Cataulacus (Cataulacus) latus* Forel

23. Genus *Crematogaster* Lund

- 50. *Crematogaster contemta* Mayr
- 51. *Crematogaster subnuda* Mayr
- 52. *Crematogaster buddhae* Forel
- 53. *Crematogaster dohrni rogenhoferi* Mayr
- 54. *Crematogaster ebenina* Forel\*
- 55. *Crematogaster flava* Forel\*
- 56. *Crematogaster rothneyi* Mayr
- 57. *Crematogaster wroughtoni* Forel\*

24. Genus *Paratopula* Wheeler

- 58. *Paratopula ceylonica* (Emery)

25. Genus *Lophomyrmex* Emery

- 59. *Lophomyrmex quadrispinosus* Jerdon

26. Genus *Meranoplus* Smith

- 60. *Meranoplus bicolor* (Guérin)
- 61. *Meranoplus rothneyi* Forel\*

\*\* 27. Genus *Messor* Forel

- 62. *Messor barbarus* (Linnaeus)\*

28. Genus *Monomorium* Mayr

- 63. *Monomorium floricola* (Jerdon)\*
- 64. *Monomorium latinode* Mayr\*
- 65. *Monomorium orientale* Mayr

\*\* 29. Genus *Myrmica* Latreille

- 66. *Myrmica rugosa* Mayr\*

30. Genus *Myrmicaria* Saunders

- 67. *Myrmicaria brunnea* Saunders

31. Genus *Oligomyrmex* Mayr

- 68. *Oligomyrmex asinus* Forel
- 69. *Oligomyrmex bengalensis* Forel
- 70. *Oligomyrmex rothneyi* Forel

32. Genus *Pheidole* Westwood

- 71. *Pheidole (Pheidole) hospita* Bingham
- 72. *Pheidole (P.) fervens* Smith\*
- 73. *Pheidole (P.) jucunda* Forel
- 74. *Pheidole (P.) latinoda* Roger
- 75. *Pheidole (P.) mus* Forel

- 76. *Pheidole (P.) roberti* Forel\*
- 77. *Pheidole (P.) rogersi* Forel
- 78. *Pheidole (P.) spathifera* Forel
- 79. *Pheidole (P.) sulcaticeps* Roger
- 80. *Pheidole (P.) watsoni* Forel
- 81. *Pheidole (P.) wood-masoni* Forel
- 33. Genus *Pheidologeton* Mayr
- 82. *Pheidologeton affinis* (Jerdon)
- 83. *Pheidologeton diversus* (Jerdon)
- 34. Genus *Solenopsis* Westwood
- 84. *Solenopsis geminata* (Fabricius)
- 85. *Solenopsis wroughtoni* Forel
- 35. Genus *Tetramorium* Mayr
- 86. *Tetramorium christiei* Forel
- 87. *Tetramorium simillimum* (Smith)
- 88. *Tetramorium smithi* Mayr
- 36. Genus *Triglyphothrix* Forel
- 89. *Triglyphothrix obesa* (E. André)
- 90. *Triglyphothrix lanuginosa* (Mayr)
- VII. Subfamily FORMICINAE Lepeletier
- 37. Genus *Camponotus* Mayr
- 91. *Camponotus angustata* (Mayr)
- 92. *Camponotus angusticollis* (Jerdon)\*
- 93. *Camponotus arrogans* (Smith)
- 94. *Camponotus compressus* (Fabricius)\*
- 95. *Camponotus dichrous* Forel\*
- 96. *Camponotus invidus* Forel\*
- 97. *Camponotus irritans* (Smith)\*
- 98. *Camponotus oblongus* (Smith)\*
- 99. *Camponotus rothneyi* (Forel)
- 100. *Camponotus rufoglaucus dolenda* Forel\*
- 101. *Camponotus sericeus* (Fabricius)\*
- 102. *Camponotus* sp.
- 38. Genus *Polyrhachis* Smith
- 103. *Polyrhachis clypeata* Mayr
- 104. *Polyrhachis laevissima* Smith

105. *Polyrhachis mayri* Roger  
 106. *Polyrhachis simplex* Mayr  
 107. *Polyrhachis thrinax* Roger  
 108. *Polyrhachis tibialis* Smith  
 109. *Polyrhachis tubericeps* Forel  
 \*\* 39. Genus *Lasius* Fabricius  
 110. *Lasius alienus* (Forster)\*  
 \*\* 40. Genus *Myrmecocystus* Wesmael  
 111. *Myrmecocystus setipes* Forel\*  
 41. Genus *Paratrechina* Motschoulsky  
 112. *Paratrechina aeta* (Forel)  
 113. *Paratrechina bourbonica* (Forel)  
 114. *Paratrechina indica* (Forel)  
 115. *Paratrechina taylori* (Forel)  
 116. *Paratrechina longicornis* (Latreille)  
 42. Genus *Oecophylla* Smith  
 117. *Oecophylla smaragdina* (Fabricius)  
 43. Genus *Acantholepis* Mayr  
 118. *Acantholepis capensis simplex* Forel  
 119. *Acantholepis frauenfeldi* (Mayr)  
 \*\* 44. Genus *Anoplolepis* Santschi  
 120. *Anoplolepis longipes* (Jerdon)\*  
 45. Genus *Plagiolepis* Mayr  
 121. *Plagiolepis dichroa* Forel  
 122. *Plagiolepis rothneyi* Forel

\*\* Genus newly recorded from West Bengal.

\* Species/Subspecies newly recorded from West Bengal.

#### Key to the Subfamilies

1. Pedicel of the abdomen one-jointed..... 2  
    Pedicel of the abdomen two-jointed ..... 6
2. A more or less marked constriction between basal two segments of abdomen ..... 3  
    No constriction between basal two segments of abdomen ..... 4
3. Elongate, slender and subcylindrical; scape usually short and stout, antennal fossa more or less encircled by a lateral carina on the cheek (rarely obsolete); posterior surface of head usually with a

distinct carina running ventrally from each dorso-lateral corner; dorsal surface of thorax with sutures indistinct or absent; pygidium margined laterally and posteriorly with a row of large or small (but always distinct) spines ..... CERAPACHYINAE

Without this combination of characters..... PONERINAE

4. Opening at posterior end of gaster (acidopore) terminal, circular and usually surrounded by a fringe of hairs..... FORMICINAE

Opening at posterior end of gaster (acidopore) transverse, slit-like ..... 5

5. Eyes never present, blind..... DORYLINAE

Eyes always present ..... DOLICHODERINAE

6. Elongate, often very slender; eyes very large and elongate; clypeus with a rounded upper margin, not prolonged upward between the frontal carinae; frontal carinae usually close together, usually narrow and not expanded laterally to cover the antennal insertions, antennae short .....

..... PSEUDOMYRMECINAE

Without this combination of characters; frontal carinae usually large, nearly always covering the antennal insertions and nearly always well-separated ..... MYRMICINAE

I. Subfamily DORYLINAE Forel

(Figures 5 a–d)

Key to the Genera

♀♀

1. Pedicel one-jointed..... *Dorylus*  
 Pedicel two-jointed..... *Aenictus*

♂♂

1. Of comparatively large size, length over 18 mm.; node of pedicel convex..... *Dorylus*  
 Smaller, length under 13 mm.; node of pedicel concave, sometimes merely longitudinally grooved or bi-lobed, never convex ..... *Aenictus*

1. Genus *Dorylus* Fabricius

1793. *Dorylus* Fabr., *Ent. Syst.*, 2 : 194.

Key to the Species

♀♀

1. Antennae ♀ maj. 11-, ♀ min. 10-jointed..... *D. labiatus*  
 Antennae ♀ maj. and ♀ min. 9-jointed ..... *D. orientalis*

♂♂

1. 2nd joint of flagellum of antennae pubescent beneath..... *D. labiatus*  
 2nd joint of flagellum of antennae not pubescent beneath, polished and shining..... *D. orientalis*

Subgenus (a) *Typhlopone* Westwood

1840. *Typhlopone* Westwood, *Introd. Class. Ins.*, 2 : 219.

1. *Dorylus (Typhlopone) labiatus* Shuckard

1840. *Dorylus labiatus* Shuckard, *Ann. Nat. Hist.*, 5 : 319, ♂

1903. *Dorylus labiatus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 2, figs., ♂♀.

1910. *Dorylus (Typhlopone) labiatus*, Emery, *Genera Insect.*, 102 : 15.

1951. *Dorylus (Typhlopone) labiatus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 11.

*Material examined* : India : West Bengal : 3 ♀♀, Darjiling, Sukhia Pokri, Balson Basti (1800 m.), 19.iii.1973, coll. P. K. Maity and Party, ex. Soil.

*Distribution* : India : West Bengal (Darjiling, Calcutta), whole continent of India.

*Remarks* : Wilson (1964) also reported this species alongwith the synonyms from Calcutta, Ahmedabad and Delhi.

Subgenus (b) *Alaopone* Emery

1881. *Alaopone* Emery, *Ann. Mus. Stor. Nat. Genova*, 16 : 274.

2. *Dorylus (Alaopone) orientalis* Westwood

1835. *Dorylus orientalis* Westwood, *Proc. Zool. Soc. Lond.*, 3 : 72, ♂

1903. *Dorylus orientalis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 4, ♂♀.

1910. *Dorylus (Alaopone) orientalis*, Emery, *Genera Insect.*, 102 : 15.

1951. *Dorylus (Alaopone) orientalis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 9.

*Material examined* : India : West Bengal : 20 ♀♀, Darjiling, Ghombhanjan Forest Nursery, 17.iii.1973, coll. P. K. Maity and Party, ex. Soil; 2 ♀♀, Nadia, Kalyani, 7.vi.1990, coll. R. Sur.

*Distribution* : India : West Bengal (Darjiling, Haora, Nadia), throughout India. Elsewhere : Borneo, Burma, China, Java, Malay Peninsula, Nepal, Sri Lanka, Sumatra.

*Remarks* : Wilson (1964) also reported this species alongwith the synonyms from Shibpur (Haora), Orissa, Madras and Poona.

2. Genus *Aenictus* Shuckard

1840. *Aenictus* Shuckard, *Ann. Mag. Nat. Hist.*, 5 : 268.

Key to the Species

♂♂

1. Posterior boarder of hypopygium broadly emarginate ..... *A. shuckardi*  
 Posterior boarder of hypopygium entire, not emarginate ..... *A. clavitibia*

♀♀

*A. brevicornis* ..... is the only representative of worker form, and hence no separate key is given.

### 3. *Aenictus clavitibia* Forel

1901. *Aenictus clavitibia* Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 467, 472, ♂

1903. *Aenictus clavitibia*, Bingham, *Fauna Brit. India, Hym.*, 2 : 14, ♂

1951. *Aenictus clavitibia*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 14.

*Material examined* : Nil.

*Distribution* : India : West Bengal (North 24-Parganas). Elsewhere : Burma.

*Remarks* : Bingham (1903) reported this species from "Bengal, Barrackpore"

### 4. *Aenictus shuckardi* Forel

1901. *Aenictus shuckardi* Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 467, 471, ♂

1903. *Aenictus shuckardi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 12, ♂

1951. *Aenictus shuckardi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 17.

*Distribution* : India : West Bengal. Elsewhere : Burma, Singapur.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

### 5. *Aenictus brevicornis* (Mayr)

1878. *Typhlatta brevicornis* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 668, ♀.

1903. *Aenictus brevicornis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 21, ♀.

1951. *Aenictus (Aenictus) brevicornis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 11.

*Diagnostic Characters* : ♀. TL 2.5-3 mm. Reddish or fulvous Yellow. Mandibles, antennae and legs a little paler. Head smooth and shining; thorax only sculptured. Head rectangular, very broad posteriorly; mandibles with 3 distinct teeth; antennae very short and massive; scape of antennae very short, about  $\frac{1}{2}$  length of head without mandible. Thorax narrower than head; pronotum convex, smooth and shining; mesonotum posteriorly and metanotum delicately rugulose; legs short, rather robust. Nodes of pedicel rounded; abdomen elongate, oval and massive.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Assam, Karnataka, Maharashtra, Kerala, U.P.

*Remarks* : Bingham (1903) reported this species from "Calcutta" Wilson (1964) also reported this species from Assam, Agra, Calcutta, Calicut and Bangalore.

## II. Subfamily CERAPACHYINAE Forel

(Figure 5e)

3. Genus *Lioponera* Mayr1878. *Lioponera* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 666.

## Key to the Species

1. Head half as long as broad; antennae with sub-apical joint of the flagellum longer than broad.....  
 ..... *L. longitarsus*
- Head twice as long as broad; antennae with the sub-apical joint of the flagellum as long as broad...  
 ..... *L. parva*

6. *Lioponera longitarsus* Mayr1878. *Lioponera longitarsus* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 667, ♀♀.1903. *Lioponera longitarsus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 27, ♀♀♂1951. *Lioponera longitarsus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 21.*Distribution* : India : West Bengal, Karnataka, Maharashtra. Elsewhere : Sumatra.*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.7. *Lioponera parva* Forel1900. *Lioponera longitarsus* var. *parva* Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 330, ♀♂1903. *Lioponera parva*, Bingham, *Fauna Brit. India, Hym.* 2 : 27, ♀♂1951. *Lioponera parva*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 21.*Material examined* : Nil.*Distribution* : India : West Bengal, Tamil Nadu, U.P.*Remarks* : Bingham (1903) reported this species and mentioned only "Bengal" as its locality in 'The Fauna of British India, Vol. II'

## III. Subfamily PONERINAE Lepeletier

(Figures 5 f, g)

## Key to the Genera

1. Antennal carinae not widened anteriorly, not covering base of the antennae.....  
 ..... *Sphinctomyrmex*
- Antennal carinae widened apart, more or less covering base of antennae ..... 2
2. Pedicel not free, a strong constriction but no flexible joint between pedicel and abdomen....  
 ..... *Stigmatomma*
- Pedicel free, with a flexible joint between it and the abdomen..... 3

3. Mandibles articulated close together in the middle of front margin of the head..... 4  
 Mandibles articulated wide apart at lateral angles of front margin of head..... 5
4. Head very large and massive, rectangular, longer than broad, more or less emarginate posteriorly; mandibles with three massive teeth at apex; antennal hollows confluent posteriorly; node of pedicel conical, terminating in a spine above..... *Odontomachus*  
 Head somewhat irregularly rectangular, broader in front, deeply emarginate posteriorly forming two distinct lateral lobes; mandibles with two long teeth; antennal hollows not confluent posteriorly; node of pedicel moderately thick, oval in shape .....*Anochetus*
5. Claws pectinate ..... *Leptogenys*  
 Claws not pectinate..... 6
6. Posterior margin of clypeus not distinctly defined..... *Platythreya*  
 Posterior margin of clypeus distinctly defined by a suture ..... 7
7. Node of pedicel bispinous posteriorly..... *Diacamma*  
 Node of pedicel not bispinous, sometimes denticulate posteriorly ..... 8
8. Posterior coxae armed with a spine ..... *Stictoponera*  
 Posterior coxae unarmed..... 9
9. Episternum of mesothorax separated from sternum by a suture..... *Ectomyrmex*  
 Episternum of mesothorax not separated from sternum.....10
10. Posterior tibiae with only one spur..... *Ponera*  
 Posterior tibiae with two spur .....11
11. Meso-metanotal suture obsolete..... *Bothroponera*  
 Meso-metanotal suture well marked..... *Euponera*

#### 4. Genus *Anochetus* Mayr

1861. *Anochetus* Mayr, *Europ. Formicid.* : 53.

#### Key to the Species

1. Basal abdominal segment smooth or only very lightly punctured, shining, not opaque at base .....  
 ..... *A. madaraszki*  
 Basal abdominal segment closely punctured, opaque ..... *A. punctiventris*

### 8. *Anochetus madaraszi* Mayr

1897. *Anochetus madaraszi* Mayr, *Term. Fuet.*, **20** : 424, ♀.  
 1903. *Anochetus madaraszi*, Bingham, *Fauna Brit. India, Hym.*, **2** : 43, ♀ ♂  
 1911. *Anochetus (Anochetus) madaraszi*, Emery, *Genera Insect.*, **118** : 109.  
 1951. *Anochetus madaraszi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 40.

*Material examined* : India : West Bengal : 15 ♀♀, Barddhaman, Purbatotti, 9.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Barddhaman, Haora), Western India. Elsewhere : Sri Lanka.

*Remarks* : Imai et al. (1984) reported this species from Botanical Garden, Haora.

### 9. *Anochetus punctiventris* Mayr

1878. *Anochetus punctiventris* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **28** : 659, ♀.  
 1903. *Anochetus punctiventris*, Bingham, *Fauna Brit. India, Hym.*, **2** : 41, ♀ ♀.  
 1951. *Anochetus punctiventris*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 41.

*Distribution* : India : West Bengal, Sikkim, Southern and Western India. Elsewhere : Indo-China.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

### 5. Genus *Bothroponera* Mayr

1862. *Bothroponera* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **12** : 717.

#### Key to the Species

1. Posterior margin of node of pedicel armed with a number of blunt processes ..... 2  
 Node of pedicel simple, unarmed..... 3
2. Metanotum armed with a blunt tooth or a spine on each side..... *B. bispinosa*  
 Metanotum unarmed..... *B. rufipes*
3. 1st joint of flagellum of antennae distinctly longer than 2nd joint..... *B. sulcata*  
 1st joint of flagellum of antennae equal to, not longer than 2nd joint..... *B. tesserinoda*

### 10. *Bothroponera bispinosa* (Smith)\*

1858. *Pachycondyla bispinosa* Smith, *Cat. Hym. Brit. Mus.*, **6** : 107, ♀.  
 1903. *Bothroponera bispinosa*, Bingham, *Fauna Brit. India, Hym.* **2** : 97 ♀.  
 1951. *Bothroponera bispinosa*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 49.

*Material examined* : India : West Bengal : 2 ♀♀, Darjiling, March, 1973, coll. H. S. Sharma and Party.

*Distribution* : India : West Bengal (Darjiling), Assam, Siwalik Hills. Elsewhere : Burma.

11. *Bothroponera rufipes* (Jerdon)

1851. *Ponera rufipes* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 119, ♀.  
 1858. *Pachycondyla rufipes*, Smith, *Cat. Hym. Brit. Mus.*, 6 : 106.  
 1903. *Bothroponera rufipes*, Bingham, *Fauna Brit. India, Hym.*, 2 : 96, ♀.  
 1911. *Pachycondyla (Bothroponera) rufipes*, Emery, *Genera Insect.*, 118 : 76-77.  
 1951. *Bothroponera rufipes*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 50.

*Material examined* : India : West Bengal : 1 ♀, Darjiling, Singla (430 m.), Feb., 1913, coll. Lord Carmichael; 8 ♀♀, Darjiling, Singla (430 m.), April, 1913, coll. Lord Carmichael; 1 ♀, Darjiling, Singla (430 m.), June, 1913, coll. Lord Carmichael; 7 ♀♀ Darjiling, Tista River (300 m.), 1.iv.1973, coll. H.S. Sharma and Party; 2 ♀♀, Darjiling, 3 km East of Rangpo F.R.H. (600 m.), April, 1973, coll. H. S. Sharma and Party; 12 ♀♀, Darjiling, Gorubathan, Bhutiabari, 19.xii.1973, coll. G. K. Srivastava and P. K. Maity; 5 ♀♀ Darjiling, Jhulang (400 m.), 23.xii.1973, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Darjiling, Bijanbari, Daga Tea Estate, 21.v.1974, coll. J. K. Jonathan and Party; 3 ♀♀, Darjiling, Reyang F.R.H., 19.v.1976, coll. H.S. Sharma and Party; 14 ♀♀, Nadia, Bahadurpur Forest, 23.x.1976, coll. D. K. Guha and A. K. Sanyal.

*Distribution* : India : West Bengal (Darjiling, Haora, Nadia), Western India, from Kanara to Malabar, Himalayas from Siwaliks to Assam, throughout India. Elsewhere : Burma, Sri Lanka.

12. *Bothroponera sulcata* (Frauenfeldt)

1867. *Ponera sulcata* Frauenfeldt, *Verh. Zool.-bot. Ges. Wien.*, 17 : 441, ♀.  
 1903. *Bothroponera sulcata*, Bingham, *Fauna Brit. India, Hym.*, 2 : 98, ♀♂  
 1911. *Bothroponera (Bothroponera) sulcata*, Emery, *Genera Insect.*, 118 : 78.  
 1951. *Bothroponera sulcata*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 51.

*Material examined* : India : West Bengal : 3 ♀♀, Calcutta, Eden Gardens, 7.vi.1965, coll. A.N.T. Joseph; 2 ♀♀, South 24-Parganas, Subhasgram, 10.viii.1965, coll. K. K. Ray and Party; 2 ♀♀, South 24-Parganas, Garia Rly. Stn., 17.x.1976, coll. D. K. Guha; 2 ♀♀, Nadia, Krishnanagar, 22.x.1976, coll. D. K. Guha; 1 ♀, Nadia, Krishnanagar, Bahadurpur Forest, 23.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Calcutta, Nadia, South 24-Parganas), North-West Provinces and Central-Western India.

13. *Bothroponera tesserinoda* (Emery) \*

1877. *Ponera tesserinoda* Emery, *Ann. Mus. Stor. Nat. Genova*, 9 : 368, ♀.  
 1878. *Ponera tesserinoda*, Mayr, *Verh. Zool.-bot. Ges. Wien.*, 18 : 661, 663, ♀.  
 1903. *Bothroponera tesserinoda*, Bingham, *Fauna Brit. India, Hym.*, 2 : 97, ♀♂  
 1911. *Pachycondyla (Bothroponera) tesserinoda*, Emery, *Genera Insect.*, 118 : 78.  
 1951. *Bothroponera tesserinoda*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 51.

*Material examined* : India : West Bengal : 1 ♀, Nadia, Krishnanagar, 13.viii.1965, coll. S.P.

Chakraborty and K. D. Chatterjee; 3 ♀♀, Haora, Santragachi, 30.viii.1970, coll. R. N. Tiwari and R. K. Singh; 1 ♀, Birbhum, Sriniketan, 6.x.1974, coll. B. N. Das and Party; 1 ♀, Birbhum, Bolpur, Makrampur, 7.x.1974, coll. B. N. Das and Party; 1 ♀, Barddhaman, Kuchulpukur, 14.viii. 1976, coll. D. K. Guha; 2 ♀♀, South 24-Parganas, Narendrapur, R. K. Mission Camp, 22.viii.1976, coll. D. K. Guha; 2 ♀♀, North 24-Parganas, Durganagar Rly. Stn., 29.viii.1976, coll. D. K. Guha; 2 ♀♀, Barddhaman, Jagatpur, 30.ix.1976, coll. D. K. Guha; 10 ♀♀, Barddhaman, Jagatpur, 4.x.1976 and 14.x.1976, coll. D. K. Guha; 16 ♀♀, Barddhaman, Purbatotti, 9.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Barddhaman, Birbhum, Haora, Nadia, North-24 Parganas, South 24-Parganas), Assam, U.P., Southern India. Elsewhere : Burma, Sri Lanka.

#### 6. Genus *Diacamma* Mayr

1862. *Diacamma* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 718.

#### Key to the Species

1. First abdominal segment not striate..... *D. scalpratum*  
     First abdominal segment striate with striae in concentric arches from back to front..... 2
2. Nodal spines attenuate at base, pointing obliquely outwards, and forming a distinct angle with the upper surface of the node..... *D. rugosum*  
     Nodal spines rather thick at base, pointing backwards in continuation of the upper surface of the node, not obliquely outwards..... *D. vagans*

#### 14. *Diacamma rugosum* var. *sculptum* (Jerdon)

1851. *Ponera sculpta* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 117, ♀.

1900. *Diacamma rugosum*, Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 318, ♀.

1903. *Diacamma sculptum*, Bingham, *Fauna Brit. India, Hym.*, 2 : 80, ♀.

1951. *Diacamma rugosum* var. *sculptum*, Chapman and Capco, *Monogr. Inst. Sci. Tech.*, Manila (Check List Ants Asia), 1 : 56.

*Material examined* : Nil.

*Distribution* : India : West Bengal (North-24 Parganas), Karnataka, Maharashtra, Sikkim. Elsewhere : Philippines, Sri Lanka.

*Remarks* : Bingham (1903) reported this species from "Barrackpore, Bengal."

#### 15. *Diacamma scalpratum* (Smith) \*

1858. *Ponera scalprata* Smith, *Cat. Hym. Brit. Mus.*, 6 : 84, pls, Fig. ♀.

1862. *Diacamma scalpratum*, Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 718.

1903. *Diacamma scalpratum*, Bingham, *Fauna Brit. India, Hym.*, 2 : 77, Figs. ♀ ♂

1951. *Diacamma scalpratum*, Chapman and Capco, *Monogr. Inst. Sci. Tech.*, Manila (Check List Ants Asia), 1 : 60.

*Material examined* : India : West Bengal : 49 ♀♀, Darjiling, Sukna (286 m.), April-May, 1913, coll. Lord Carmichael; 4 ♀♀, Darjiling, Gorubathan Mal Forest (329 m.), 18.xii.1973, coll. G. K. Srivastava and P. K. Maity; 2 ♀♀, Darjiling, Gorubathan, Bhutiabari, 19.xii.1973, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Darjiling, Chunabati, 27.xii.1973, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Barddhaman, Jagatpur, 14.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Barddhaman, Darjiling), Assam, Sikkim. Elsewhere : Burma.

#### 16. *Diacamma vagans* (Smith)

1860. *Ponera vagans* Smith, *Journ. Proc. Linn. Soc.*, 4 : 103, ♀.

1903. *Diacamma vagans*, Bingham, *Fauna Brit. India, Hym.*, 2 : 81, Fig. ♀ ♂.

1911. *Diacamma rugosum vagans*, Emery, *Genera Insect.*, 118 : 67.

1984. *Diacamma vagans*, Imai *et al.*, *Jpn. J. Genet.*, 59 : 5, 14.

*Material examined* : India : West Bengal : 23 ♀♀, Darjiling, Singla (430 m.), March-June, 1913, coll. Lord Carmichael; 5 ♀♀, Darjiling, Sukna (286 m.), April 1913, coll. Lord Carmichael; 1 ♀, Calcutta, Manikganj, 6.xii.1962, coll. M. Ghosh and S. Ali; 1 ♀, Calcutta, Jadavpur, 24.iv.1963, coll. H. L. Palit; 1 ♀, South 24-Parganas, Subhasgram, 10.viii.1965, coll. K. K. Ray and Party; 6 ♀♀, Haora, Botanical Garden, 31.viii.1965, coll. K. S. Pradhan and K. V. Lakshmi Narayan; 1 ♀, North 24-Parganas, Gobardanga, 18.ix.1965, coll. H. Ghosh and Party; 1 ♀, Hugli, Chandan Nagar, 28.ix.1965, coll. K. S. Pradhan and Party; 3 ♀♀, Haora, 15 New Deal Lane, 11.iv.1970; coll. A. K. Jaiswal; 1 ♀, Darjiling, 1 km. East from Reyang F.R.H., on the Western Banks of Tista River (275 m.), 29.iii.1973, coll. H. S. Sharma and Party; ex. Rotten log; 3 ♀♀, Darjiling, Reyang, Rambi Hills (390 m.) 31.iii.1973, coll. H. S. Sharma and Party; 9 ♀♀, Darjiling, Rangpo F.R.H. (600 m.) and its surroundings, 5.iv.-7. iv.1973, coll. H. S. Sharma and Party; 1 ♀, Darjiling, Bijanbari and its surroundings, 19.v.-21.v.1974, coll. J. K. Jonathan and Party; 1 ♀, Darjiling, Andherikhola (500 m.), 30.v.1974, coll. J. K. Jonathan and Party; 2 ♀♀, Murshidabad, Beldanga, 5.xii.1974, coll. A. K. Hazra; 4 ♀♀, Darjiling, Singla, Karmaktar (450 m.), 3.i.1976, coll. G. K. Srivastava and G. S. Arora; 3 ♀♀, Calcutta, 34/H Suren Sarker Road, 16.vi.1976, coll. D. K. Guha; 1 ♀, Barddhaman, Kuchulpukur, 14.viii.1976, coll. D. K. Guha; 2 ♀♀, Barddhaman, Golapbag Forest Office, 15.viii.1976, coll. D. K. Guha; 6 ♀♀, South 24-Parganas, Narendrapur, R. K. Mission Camp, 22.viii.1976, coll. D. K. Guha; 2 ♀♀, North 24-Parganas, Durganagar Rly. Stn., 29.viii.1976, coll. D. K. Guha; 1 ♀ Barddhaman Jagatpur, 30.ix.-4.x.1976, coll. D. K. Guha; 4 ♀♀, Barddhaman Purbatotti, 9.x.1976, coll. D. K. Guha; 4 ♀♀, South 24-Parganas, Garia Rly. Stn., 17.x.1976, coll. D. K. Guha; 4 ♀♀, Nadia, Krishnanagar, 22-23.x.1976, coll. D. K. Guha; 10 ♀♀, Nadia, Bahadurpur Forest, 23.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Barddhaman, Calcutta, Darjiling, Haora, Hugli, Murshidabad, Nadia, North 24-Parganas, South 24-Parganas), Orissa, Maharashtra, Sikkim. Elsewhere : Nepal.

**\*\* 7. Genus *Ectomyrmex* Mayr**

1867. *Ectomyrmex* Mayr, *Tijdschr. v. Ent.*, **10** : 830.

**17. *Ectomyrmex javana* Mayr \***

1867. *Ectomyrmex javanus* Mayr, *Tijdschr. v. Ent.*, **10** : 84, pls., fig., ♀.

1903. *Ectomyrmex javanus*, Bingham, *Fauna Brit. India, Hym.*, **2** : 86, ♀♀.

1911. *Pachycondyla (Ectomyrmex) javana*, Emery, *Genera Insect.*, **118** : 79.

1951. *Ectomyrmex javana*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 61.

**Diagnostic characters** : ♀. TL 9-11 mm. Black; the mandibles, antennae and legs chestnut red. Head short, broad and sculptured; mandibles with 10 or 11 small teeth. Thorax with the pronotum strongly concave and transversely striate; rest of the thorax longitudinally striate; legs with femora and tibiae cylindrical. Node of pedicel transversely striate in the middle. Abdomen but for the pubescence highly polished, smooth and shining.

**Material examined** : India : West Bengal : 2 ♀♀, Darjiling, Singla (430 m.), Feb. 1913, coll. Lord Carmichael; 2 ♀♀, Darjiling, Sukna (286 m.), May, 1913, coll. Lord Carmichael; 1 ♀, Darjiling, Kurseong, Eagle's cage (1430 m.), 9.iii.1924, coll. D. N. Chopra; 2 ♀♀, Darjiling, Rangpo, 8.iv.1973, coll. H. S. Sharma and Party; 2 ♀♀, Darjiling, Singla, Goke F.R.H. (450 m.), 20.iv.1973, coll. H. S. Sharma and Party; 1 ♀, Darjiling, Gorubathan, Daling coat, 20.xii.1973, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Darjiling, Thulong (400 m.), 23.xii.1973, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Darjiling, Kalimpong (1115 m.), 3.i.1974, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Darjiling, Rangpo, Andherikhola (500 m.), 30.v.1974, coll. J. K. Jonathan and Party.

**Distribution** : India : West Bengal (Darjiling), Assam. Elsewhere : Burma, China, Java, Malayan subregion, Sumatra.

**18. *Ectomyrmex javana materna* Forel \***

1900. *Ectomyrmex javana maternus* Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 321, ♀.

1903. *Ectomyrmex maternus*, Bingham, *Fauna Brit. India, Hym.*, **2** : 87, ♀.

1911. *Pachycondyla (Ectomyrmex) javana*, Emery, *Genera Insect.*, **118** : 79.

1951. *Ectomyrmex javana materna*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 61.

**Diagnostic characters** : ♀. TL 8.5-9 mm., closely resembles *E. javana*; but slightly smaller and more slender. Mandibles with 7 comparatively large teeth. Pronotum has the striae concentric and not transverse.

**Material examined** : India : West Bengal : 1 ♀, Darjiling, Rambhi, 14.iii.1973, coll. H. S. Sharma and Party; 1 ♀, Darjiling, Singla F.R.H., 18.iv.1973, coll. H. S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling), Assam. Elsewhere : Burma, China, Hongkong.

8. Genus *Brachyponera* Emery

1901. *Euponera*, subg. *Brachyponera* Emery, *Ann. Soc., Ent. Belg.*, **45** : 43.  
 1903. *Brachyponera*, Bingham, *Fauna Brit. India, Hym.*, **2** : 101; Brown, 1958, *Acta Hymenopterologica*, **1** class (1) : 21 (Syns); Wilson, 1959, *Bull. Mus. Camp. Zool. Harvard, Cambridge*, **119** (1958) : 347 (Syns.).

## Key to the Species

1. Scape of antennae long, extending well beyond the top of the head.....*B. luteipes*  
 Scape of antennae shorter, extending only to the top of the head .....*B. jerdoni*

19. *Brachyponera jerdoni* (Forel)

1900. *Ponera jerdoni* Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 324, ♀.  
 1903. *Brachyponera jerdoni*, Bingham, *Fauna Brit. India, Hym.*, **2** : 102, ♀.  
 1951. *Euponera (Brachyponera) jerdoni*, Chapman and Capco, *Monogr. Inst. Sci. Tech, Manila (Check List Ants Asia)*, **1** : 63.

*Distribution* : India : West Bengal, Assam, Southern and Western India.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in "The Fauna of British India, Vol. II", however, mentioned only "Bengal" as its locality.

20. *Brachyponera luteipes* (Mayr) \*

1862. *Ponera luteipes* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **12** : 722, ♀ ♀.  
 1901. *Euponera (Brachyponera) luteipes*, Emery, *Ann. Soc. Ent. Belg.*, **45** : 47.  
 1903. *Brachyponera luteipes*, Bingham, *Fauna Brit. India, Hym.*, **2** : 101, fig., ♀ ♀ ♂  
 1951. *Euponera (Brachyponera) luteipes*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 63.

*Material examined* : India : West Bengal : 7 ♀♀, Darjiling, Rambhi, 14.iii.1973, coll. H. S. Sharma and Party; 1 ♀, Darjiling, Andheri Khola, 15.iii.1973, coll. H. S. Sharma and Party; 1 ♀, Darjiling, Slip Forest, 24.iii.1973, coll. P. K. Maity and Party; 10 ♀♀, Darjiling, Rangit Tea Estate (558 m.), 22.iv.1973, coll. H. S. Sharma and Party; 3 ♀♀, Darjiling, Jhalung (400 m.), 23.xii.1973, coll. G. K. Srivastava and Maity; 7 ♀♀, Darjiling, Lava, Rasiium Forest (1772 m.), 1.i.1974, coll. G. K. Srivastava and P. K. Maity; 2 ♀♀, Darjiling, Darjchowk Burning Ghat (572 m.), 15.v.1974, coll. J. K. Jonathan and Party; 1 ♀, Darjiling, Sukia Pokri (2000 m.), 28.ix.1974, coll. H. K. Bhowmik and Party; 3 ♀♀, Barddhaman, Purbatotti, 9.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Barddhaman, Darjiling), Nicobar Island, throughout India. Elsewhere : Burma; Java, Malay Peninsula, Milu, Philippines, Sri Lanka, Sumatra.

9. Genus *Leptogenys* Roger

1861. *Leptogenys* Roger, *Berl. Ent. Zeitschr.*, **5** : 12.

Subgenus *Lobopelta* Mayr

1862. *Lobopelta* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **12** : 733.

## Key to the Species

1. Node of pedicel squamiform, compressed longitudinally, its upper margin narrow, obtuse..... 2  
Node of pedicel not compressed longitudinally, broader above, subcubical with anterior and posterior margin..... 3
2. Medial joints of flagellum of antennae distinctly longer than broad..... *L. (L.) ocellifera*  
Medial joints of flagellum of antennae not longer than broad..... *L. (L.) birmana*
3. Head more or less striate ..... 4  
Head either punctured or smooth & shining ..... 5
4. Clypeus more or less distinctly carinate or subcarinate ..... *L. (L.) diminuta*  
Clypeus not carinate..... *L. (L.) kitteli*
5. Basal abdominal segment punctured..... *L. (L.) punctiventris*  
Basal abdominal segment not punctured, smooth .... 6
6. Node of pedicel short, broader than long or about as broad as long..... *L. (L.) roberti*  
Node of pedicel elongate, with a sloping curve from back to front, vertically truncate posteriorly ...  
..... 7
7. Apex of median lobe of clypeus transversely truncate, sometimes bidentate..... *L. (L.) chinensis*  
Apex of median lobe of clypeus ending in a blunt obtusely rounded point, not transversely truncate..... *L. (L.) minchini*

21. *Leptogenys (Lobopelta) birmana* Forel \*

1900. *Leptogenys birmana* Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 305, 310, ♀.

1903. *Lobopelta birmana*, Bingham, *Fauna Brit. India, Hym.*, **2** : 58, Figs. ♀ ♂

1911 *Leptogenys (Lobopelta) birmana*, Emery, *Genera Insect.*, **118** : 102.

1951 *Leptogenys (Lobopelta) birmana*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), **1** : 32.

*Material examined* : India : West Bengal : 1 ♀, Hugli, Sheoraphuly, 29.xii.1964, coll. K. R. Rao and Party; 3 ♀♀, Barddhaman, Kuchulpukur, 14.viii.1976, coll. D. K. Guha; 13 ♀♀, Barddhaman, Golapbag, 15.viii.1976, coll. D. K. Guha; 15 ♀♀, Barddhaman, Purbatotti, 9.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Barddhaman, Hugli), Assam. Elsewhere : Burma.

22. *Leptogenys (Lobopelta) chinensis* Mayr \*

1870. *Lobopelta chinensis* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **20** : 965, ♀.

1900. *Leptogenys chinensis*, Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 308, ♀ ♂

1903. *Lobopelta chinensis*, Bingham, *Fauna Brit. India, Hym.*, **2** : 69, ♀ ♂

1911 *Leptogenys (Lobopelta) chinensis*, Emery, *Genera Insect.*, **118** : 103.

1951. *Leptogenys (Lobopelta) chinensis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), **1** : 33.

**Material examined** : India : West Bengal : 2 ♀♀, North 24-Parganas, Palta, Jafarpur, 8.xii.1965, coll. R. P. Ghosh; 1 ♀ Barddhaman, Kuchulpukur, 14.viii.1976, coll. D. K. Guha; 3 ♀♀ Barddhaman, Jagatpur, 30.ix.1976, coll. D. K. Guha; 5 ♀♀, Nadia, Krishnanagar, Bahadurpur Forest, 23.x.1976, coll. D. K. Guha.

**Distribution** : India : West Bengal (Barddhaman, Nadia, North 24-Parganas), more or less whole India, except drier portions of Central and Western India. Elsewhere : China, Japan, Philippines, Sri Lanka.

**23. *Leptogenys (Lobopelta) diminuta* (Smith) \***

1857. *Ponera diminuta* Smith, *Journ. Proc. Linn. Soc. Lond. Zool.*, **2** : 69, ♀.

1862. *Lobopelta diminuta*, Mayr, *Verh. Zool.-bot. Ges. Wien.*, **12** : 734.

1911. *Leptogenys (Lobopelta) diminuta*, Emery, *Genera Insect.*, **118** : 103.

1951. *Leptogenys (Lobopelta) diminuta*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 33.

**Material examined** : India : West Bengal : 2 ♀♀, Haora, Santragachhi, 30.viii.1970, coll. R. N. Tiwari and R. K. Singh; 2 ♀♀, Darjiling, Kalimpong, 24.xi.1971, coll. K. P. Jaiswal; 6 ♀♀, Darjiling, Takdah Slip forest (430 m.), 24.iii.1973, coll. P. K. Maity and Party; 14 ♀♀, Darjiling, Rangpo (600 m.), 5-7.iv.1973, coll. H. S. Sharma and Party; 3 ♀♀ Darjiling, Chunabati, 27.xii.1973, coll. G. K. Srivastava and P. K. Maity; 1 ♀, Darjiling, Rambhi (344 m.), 6.i.1974, coll. G. K. Srivastava and Party.

**Distribution** : India : West Bengal (Darjiling, Haora), throughout India, except Punjab and dry desert Portion of Central India. Elsewhere : Burma, Borneo, China, Malacca, New Guinea, Philippines, Sri Lanka, Sumatra.

**Key to the Subspecies of *L. (L.) diminuta***

1. Head strongly constricted posteriorly, distinctly narrower across the occiput than in front .....  
..... *L. (L.) diminuta hodgsoni*
- Head not constricted posteriorly, as broad across the occiput as in front.....  
..... *L. (L.) diminuta striatula*

**24. *Leptogenys (Lobopelta) diminuta hodgsoni* Forel \***

1900. *Lobopelta diminuta hodgsoni* Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 308, 315.

1903. *Lobopelta hodgsoni*, Bingham, *Fauna Brit. India, Hym.*, **2** : 62, ♀.

1911. *Leptogenys (Lobopelta) diminuta hodgsoni*, Emery, *Genera Insect.*, **118** : 103.

1951. *Leptogenys (Lobopelta) diminuta hodgsoni*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 35.

**Material examined** : India : West Bengal : 10 ♀♀, Darjiling, Rangpo (600 m.), 5.iv.1973, coll. H. S. Sharma and Party; 2 ♀♀ Darjiling, Rangit Tea Estate (1950 m.), 22.iv.1973, coll. H. S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling). Elsewhere : Burma, Pegu, Singapore, Yoma.

**25. *Leptogenys (Lobopelta) diminuta striatula* Emery \***

1894. *Leptogenys striatula* Emery, *Ann. Mus. Civ. Stor. Nat. Genova*, **34** : 462, ♀.  
 1903. *Lobopelta striatula*, Bingham, *Fauna Brit. India, Hym.*, **2** : 63, ♀.  
 1911. *Leptogenys (Lobopelta) diminuta striatula*, Emery, *Genera Insect.*, **118** : 103.  
 1951. *Leptogenys (Lobopelta) diminuta striatula*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 35.

*Material examined* : India : West Bengal : 3 ♀♀, Barddhaman, Jagatpur, 11.vi.1976, coll. D. K. Guha; 7 ♀♀, Darjiling, Reyang Nallah (375 m.), 30.iii.1973, coll. H. S. Sharma and Party.

*Distribution* : India : West Bengal (Barddhaman, Darjiling). Elsewhere : Burma.

**26. *Leptogenys (Lobopelta) kitteli* Mayr \***

1870. *Lobopelta kitteli* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **20** : 966, ♀.  
 1903. *Lobopelta kitteli*, Bingham, *Fauna Brit. India, Hym.*, **2** : 60, ♀.  
 1911. *Leptogenys (Lobopelta) kitteli*, Emery, *Genera Insect.*, **118** : 104.  
 1951. *Leptogenys (Lobopelta) kitteli*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 36.

*Material examined* : India : West Bengal : 1 ♀, North 24-parganas, Durganagar, 29.viii.1976, coll. D. K. Guha; 6 ♀♀, Nadia, Krishnanagar, Anjanpara, 22.x.1976, coll. D. K. Guha; 1 ♀, Nadia, Krishnanagar, Chowdhury Para, 23.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Calcutta, Nadia, North 24-Parganas), Assam, Himachal Pradesh, Sikkim, U.P. Elsewhere : Burma, China.

**27. *Leptogenys (Lobopelta) minchini* Forel**

1900. *Leptogenys minchini* Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 308, 313, ♀ ♂  
 1903. *Lobopelta minchini*, Bingham, *Fauna Brit. India, Hym.*, **2** : 70, ♀.  
 1951. *Leptogenys (Lobopelta) minchini*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 37.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Haora). Elsewhere : Burma, China.

*Remarks* : Imai et al. (1984) reported the species, *Leptogenys minchini* from Botanical Garden, Haora.

**28. *Leptogenys (Lobopelta) ocellifera* (Roger) \***

1861. *Ponera ocellifera* Roger, *Berl. Ent. Zeit.*, **5** : 13, ♀.  
 1900. *Leptogenys ocellifera*, Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 305, 309.  
 1903. *Lobopelta ocellifera*, Bingham, *Fauna Brit. India, Hym.*, **2** : 57, ♀ ♂  
 1911. *Leptogenys (Lobopelta) processionalis*, Emery, *Genera Insect.*, **118** : 104-105.  
 1951. *Leptogenys (Lobopelta) ocellifera*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 38.

*Material examined* : India : West Bengal : 48 ♀♀, Hugli, Bandel, Debanandapur, 26.x.1964, coll. A.N.T. Joseph and Party; 24 ♀♀, Hugli, Sheoraphuly, 29.xii.1964, coll. K. R. Rao and Party; 2 ♀♀, Haora, Eksara Stn. (Martin Rly.), 21.viii.1974, coll. R. N. Tiwari; 3 ♀♀, Nadia, Krishnanagar Rajbari, 22.x.1976, coll. D. K. Guha.

*Distribution* : India : West Bengal (Haora, Hugli, Nadia), nearly throughout India. Elsewhere : Sri Lanka.

### 29. *Leptogenys (Lobopelta) punctiventris* Mayr

1878. *Lobopelta punctiventris* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **28** : 666, ♀.

1903. *Lobopelta punctiventris*, Bingham, *Fauna Brit. India, Hym.*, **2** : 64, ♀.

1951. *Leptogenys (Lobopelta) punctiventris*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 38.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Sikkim. Elsewhere : Philippines.

*Remarks* : Bingham (1903) reported this species from "Calcutta"

### 30. *Leptogenys (Lobopelta) roberti coonoorensis* Forel \*

1900. *Leptogenys coonoorensis* Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 306, 311, ♀.

1903. *Lobopelta coonoorensis*, Bingham, *Fauna Brit. India, Hym.*, **2** : 68, ♀.

1951. *Leptogenys (Lobopelta) roberti coonoorensis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 38.

*Material examined* : India : West Bengal : 5 ♀♀, Darjiling, Reyang F.R.H., Western Bank of Tista river (275 m.), 29.iii.1973, coll. H.S. Sharma and Party, ex. Rotten logs.

*Distribution* : India : West Bengal (Darjiling), Nilgiri Hills, Western India.

### \*\* 10. Genus *Odontomachus* Latreille

1805. *Odontomachus* Latreille, *Hist. Nat. Crust. Ins.*, **13** : 257.

### 31. *Odontomachus monticola* Emery \*

1891. *Odontomachus monticola* Emery, *Ann. Soc. Ent. Fr.*, **60** : 560, ♀.

1900. *Odontomachus punctulatus*, Forel, *Journ. Bombay Nat. Hist. Soc.*, **13** : 58, ♀.

1976. *Odontomachus monticola*, Brown, *Studia ent.*, **19** : 105 (Syns.).

*Diagnostic characters* : ♀. TL 11-13 mm. Dark castaneous or reddish brown; the mandible, antennae and legs reddish yellow. Pilosity almost wanting, pubescence very sparse and short. Head rectangular, broader in front. Mandibles robust, elongated, turning at tip almost at right-angle, the apical teeth large followed by a small tooth, the inner margins of mandibles with 7 or 8 small distinct teeth. Thorax with concentric striae on pronotum, meso- and metanotum transversely striate. Node of pedicel smooth, slightly compressed, very convex in front, the apex of the node with a spine slightly pointing backwards; abdomen large smooth and shining, rounded and strongly convex above.

*Material examined* : India : West Bengal : 5 ♀♀, Darjiling, Takdah Slip Forest, 24.iii.1973,

coll. P.K. Maity and Party; 1 ♀, Darjiling, Pandam Tea Estate, 23.iv.1973, coll. H.S. Sharma and Party; 1 ♀, Darjiling, 6 km. East of Rangpo F.R.H., 8.iv.1973, coll. H. S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling), Assam, Meghalaya, Sikkim. Elsewhere : Burma, China, Siam.

**Remarks** : Bingham (1903) reported both the species, *O. monticola* and *O. punctulatus* separately. Subsequently, Emery (1911) and Chapman and Capco (1951) also reported both the species. But later on, Brown (1976) introduced some new synonyms including *punctulatus* under the species, *O. monticola*.

### 11. Genus *Platythyrea* Roger

1863. *Platythyrea* Roger, *Berl. Ent. Zeitschr.*, 7 : 172.

#### 32. *Platythyrea wroughtoni* var. *victoriae* Forel

1900. *Platythyrea victoriae* Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 315, ♀.

1903. *Platythyrea victoriae*, Bingham, *Fauna Brit. India, Hym.*, 2 : 75, ♀.

1951. *Platythyrea wroughtoni* var. *victoriae*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 49.

**Diagnostic characters** : ♀ TL 4.5 mm. Black with silky pruinosity, opaque; the mandibles, antennae, legs and apex of abdomen brownish yellow; pilosity reduced to a few short erect yellow hairs at the apex of the abdomen. Head slightly emarginate posteriorly; antennal carinae distinctly more swollen and broader. Thorax elongate, broad and strongly convex in front; legs short and stout. Node of pedicel truncate at both the ends, about once and a half as long as broad, the apex posteriorly above medially pinched up into an obtuse point; abdomen rather massive.

**Distribution** : India : West Bengal, Karnataka, Western India.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" for its locality.

### 12. Genus *Ponera* Latreille

1805. *Ponera* Latreille, *Hist. Nat. Crust. Ins.*, 13 : 257.

#### Key to the Species

1. Body testaceous yellow; eyes very minute; clypeus medially tuberculate; thorax above distinctly flat and depressed ..... *P. confinis*
- Body dark castaneous brown; eyes comparatively large; clypeus carinate, carina bifurcate; thorax above distinctly rounded and convex ..... *P. truncata*

### 33. *Ponera confinis* Roger

1860. *Ponera confinis* Roger, *Berl. Ent. Zeitschr.*, 4 : 284, ♀.

1903. *Ponera confinis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 91, ♀♀.

1951. *Ponera confinis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 69.

**Distribution** : India : West Bengal, Karnataka, Western India. Elsewhere : Oceania, Sri Lanka, Sumatra.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

### 34. *Ponera truncata* Smith \*

1860. *Ponera truncata* Smith, *Journ. Proc. Linn. Soc. Lond. Zool.*, 4 : 72, ♀.

1903. *Ponera truncata*, Bingham, *Fauna Brit. India, Hym.*, 2 : 90, ♀.

1951. *Ponera truncata*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 73.

**Material examined** : India : West Bengal : 50 ♀♀, Darjiling, 3 km. West of Takdah Slip Forest (1500 m.), 24.iii.1973, coll. P. K. Maity and Party.

**Distribution** : India : West Bengal (Darjiling). Elsewhere : Burma, Celebes, Java.

### 35. *Ponera* sp.

**Diagnostic characters** : ♀. TL 2.5-3.5 mm. The present species is very similar to *P. confinis*, but differs from the same in clypeus medially not tuberculate; pro-meso and meso-metanotal suture very indistinct; node of pedicel flat, longer than broad and abdomen oval in shape.

**Material examined** : India : West Bengal : 7 ♀♀, Puruliya, Bongabari, 14.ix.1987, coll. M. Prasad.

**Distribution** : India : West Bengal (Puruliya).

### 13. Genus *Sphinctomyrmex* Mayr

1866. *Sphinctomyrmex* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 16 : 895.

### 36. *Sphinctomyrmex taylori* Forel

1900. *Sphinctomyrmex taylori* Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 328, ♀.

1903. *Sphinctomyrmex taylori*, Bingham, *Fauna Brit. India, Hym.*, 2 : 25, ♀.

**Diagnostic characters** : ♀. TL 5-5.5 mm. Body colour brownish yellow, covered by erect, short, pale hairs; pubescence entirely wanting. Head, thorax, node of pedicel and abdominal segments coarsely punctured. Head longer than broad. Antennae very massive and thick. Thorax without distinctive sutures. Node of pedicel square in shape, slightly rounded at the corners, convex above. Abdomen and 2nd succeeding segment with fine punctures; pygidium not deeply bifurcate.

**Distribution** : India : West Bengal.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

### \*\* 14. Genus *Stictoponera* Mayr

1887. *Ectatomma* (*Stictoponera*) Mayr, *Verh. Zool.-bot. Ges. Wien.*, 37 : 539.

1900. *Stictoponera*, Emery, *Ann. Mus. Civ. Stor. Nat. Genova*, 40 : 662.

37. *Stictoponera menadensis bicolor* Emery \*

1889. *Ectatomma (Stictoponera) bicolor* Emery, *Ann. Mus. Civ. Stor. Nat. Genova*, 27 : 493, ♀.  
 1903. *Ectatomma bicolor*, Bingham, *Fauna Brit. India, Hym.*, 2 : 83, ♀.  
 1951. *Stictoponera menadensis bicolor*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 30.

**Diagnostic characters** : ♀. TL 5.5-6 mm. Head, thorax, legs and pedicel ferruginous red; abdomen jet black. Scattered erect hairs on the head, thorax and abdomen. Head broader posteriorly than in front; antennae with the 1st joint of the flagellum longer than the 2nd. Thorax about the length of the abdomen, short, broad, arched above; the apical face of metanotum feebly denticulate. Pedicel longer than broad; abdomen curved.

**Material examined** : India : West Bengal : 1 ♀, Darjiling, Rangpo (600 m), 1.iv.1974, coll. J. K. Jonathan and Party.

**Distribution** : India : West Bengal (Darjiling), Assam. Elsewhere : Burma, China, Malay Peninsula, Philippines.

15. Genus *Amblyopone* Erichson

1842. *Amblyopone* Erichson, *Arch. Naturg.*, 8 : 260.  
 1859. *Stigmatomma* Roger, *Berl. Ent. Zeitschr.*, 3 : 250.

38. *Amblyopone rothneyi* Forel

1900. *Amblyopone rothneyi* Forel, *Journ. Bombay Nat. Hist. Soc.*, 13 : 55, ♀.  
 1903. *Stigmatomma rothneyi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 37, ♀.  
 1951. *Stigmatomma rothneyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 25.

**Diagnostic characters** : ♀. TL 8.5-9 mm. (including mandibles). Body colour black; mandibles the antennae, antennal carinae, the legs and apices of the abdominal segments ferruginous. Head, thorax and abdomen finely and densely punctured. Head moderately convex, mandibles obliquely striate. Eyes comparatively large; flagellum of antennae long, nearly half as long as mandibles.

**Distribution** : India : West Bengal, Sikkim. Elsewhere : China, Philippines.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) reported this species under the genus *Stigmatomma* and mentioned only "Bengal" as its locality. Subsequently, Brown (1958, '60) reclassified the tribe Amblyoponini and introduced some new synonyms including *Stigmatomma* under the genus *Amblyopone*. Though Arnoldi (1968) treated *Stigmatomma* as a subgenus under the genus *Amblyopone*, but Taylor (1987) accepted the view of Brown (1958, '60).

## IV. Subfamily DOLICHODERINAE Forel

(Figures 6g, h)

## Key to the Genera

1. Base of the abdomen gibbous, overhanging the pedicel.....*Bothriomyrmex*  
 Base of the abdomen not gibbous, not overhanging the pedicel..... 2

2. The mesonotum short, and raised above the level of pronotum, often longitudinally sulcate; metanotum laterally compressed, cuneiform, with a basal face more or less horizontal, and an apical face truncate, vertical, often concave ..... *Dolichoderus*

The mesonotum viewed from the side somewhat cylindrical, and slopping backwards from the pro-mesonotal suture; metanotum not laterally compressed, not cuneiform, rounded, its basal face passing into the obliquely truncate slopping apical face by a more or less rounded curve.....

..... *Iridomyrmex*

#### 16. Genus *Bothriomyrmex*

1865. *Bothriomyrmex* Emery, *Ann. Mus. Zool. Univ. Nap.*, 5 : 117.

#### Key to the Species

1. Head, thorax and abdomen brownish black; mandibles armed with 7-teeth..... *B. walshi*  
 Head, thorax and abdomen yellow or brownish yellow; mandibles armed with 4-teeth .....  
 ..... *B. wroughtoni dalyi*

#### 39. *Bothriomyrmex walshi* Forel

1895. *Bothriomyrmex walshi* Forel, *Journ. Bombay Nat. Hist. Soc.*, 9 : 469, ♀.

1903. *Bothriomyrmex walshi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 306, ♀.

1951. *Bothriomyrmex walshi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 187.

*Distribution* : India : West Bengal, Sikkim.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### 40. *Bothriomyrmex wroughtoni dalyi* Forel

1895. *Bothriomyrmex wroughtoni dalyi* Forel, *Journ. Bombay Nat. Hist. Soc.*, 9 : 469, ♀.

1903. *Bothriomyrmex dalyi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 307, ♀.

1951. *Bothriomyrmex wroughtoni dalyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 188.

*Distribution* : India : West Bengal, Western India.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### \*\* 17. Genus *Dolichoderus* Lund

1831. *Dolichoderus* Lund, *Ann. Sc. Nat.*, 23 : 130.

#### 41. *Dolichoderus bituberculatus* (Mayr) \*

1862. *Hypoclinea bituberculata* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 705, pl., figs., ♀.

1903. *Dolichoderus bituberculatus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 295, figs., ♀.

1912. *Dolichoderus (Hypoclinea) bituberculatus*, Emery, *Genera Insect.*, 137 : 13.

1951. *Dolichoderus (Hypoclinea) bituberculatus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 182.

**Diagnostic characters** : ♀. TL 3-3.5 mm. Head and thorax black, legs dark reddish brown, node of pedicel and abdomen dark brown. Head, thorax and abdomen covered with sparsely scattered erect black hairs with abundant fine silky pale pubescence. Head broadly oval; mandibles triangular, teeth minute; eyes very flat and not prominent, anteriorly placed. Pronotum more or less flat; mesonotum longitudinally sulcate, the sides raised into tubercles; metanotum sub-equal, the sides flat and margined. Node of pedicel smooth and shining.

**Material examined** : India : West Bengal : 50 ♀♀, Darjiling, 1 km. West of Reyang F.R.H. (375 m.), 30.iii.1973, coll. H. S. Sharma and Party; 50 ♀♀, Darjiling, 6 km. East of Rangpo F.R.H., 8.iv.1973, coll. H. S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling), Sikkim, Western India. Elsewhere : Burma, Celebes, Java.

#### \*\* 18. Genus *Iridomyrmex* Mayr

1858. *Formica* (Part) Smith, *Journ. Linn. Soc.*, 3 : 137.

1862. *Iridomyrmex* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 702.

#### 42. *Iridomyrmex anceps* (Roger) \*

1863. *Formica anceps* Roger, *Berl. Ent. Zeitschr.*, 7 : 164, ♀.

1893. *Iridomyrmex anceps* Dalla Torre, *Cat. Hym., Leipzig*, 7 : 168.

1903. *Iridomyrmex anceps*, Bingham, *Fauna Brit. India, Hym.*, 2 : 298, fig., ♀.

1951. *Iridomyrmex anceps*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 188.

**Diagnostic characters** : ♀. TL 3.5-4.5 mm. Head, thorax and abdomen dark castaneous brown, with a beautiful metallic refulgence in certain lights; antennae very much and legs slightly paler reddish brown. Pubescence fine and silky. Head with the mandibles triangular, very much longer than broad; mandibles elongate, the masticatory and outer margins nearly equal; eyes placed laterally and a little forward. Thorax elongate, narrow and in profile widely emarginate at the meso-metanotal suture; the metanotum remarkably raised and forming a round gibbosity. Node of pedicel broader than long, slightly inclined to the front, flat at both the ends, as thick above as at base. Abdomen broadly oval, only slightly convex above.

**Material examined** : India : West Bengal : 1 ♀, Medinipur, Jhargram, Jambani forest, 3.x.1984, coll. A. K. Hazra and Party.

**Distribution** : India : West Bengal (Medinipur), Assam, throughout India except in the North-West Provinces and the Punjab. Elsewhere : Burma, Java, Malaysia, Sri Lanka.

V. Subfamily PSEUDOMYRMECINAE Emery  
(Figures 6 a, b)

19. Genus *Tetraponera* Smith

1852. *Tetraponera* (pt.) Smith, *Ann. Mus. Nat. Hist.*, (2) 9 : 44.

Subgenus *Tetraponera* Smith

1852. *Tetraponera* (pt.) Smith, *Ann. Mus. Nat. Hist.*, (2) 9 : 44.

1900. *Sima*, Subg. *Tetraponera*, Emery, *Ann. Mus. Stor. Nat. Genova*, 40 : 673.

Key to the Species

1. Ocelli present in workers.....*T. (T.) rufonigra*  
Ocelli not present in workers ..... 2
2. Head narrower posteriorly than in front; pilosity fairly abundant ..... *T. (T.) binghami*  
Head posteriorly as broad as in front, or broader than in front; pilosity very sparse ..... 3
3. Petiole anteriorly of 1st node shorter than node itself; in profile, metanotum not higher than pro-mesonotum .....*T. (T.) allaborans*  
Petiole anteriorly of 1st node as long as, but distinctly not longer than the node itself; the metanotum higher than pro-mesonotum..... *T. (T.) nigra*

43. *Tetraponera (Tetraponera) allaborans* (Walker)

1859. *Pseudomyrma allaborans* Walker, *Ann. Mus. Nat. Hist.*, 4 : 375, ♂

1863. *Sima compressa*, Roger, *Berl. Ent. Zeitschr.*, 7 : 179.

1903. *Sima allaborans*, Bingham, *Fauna Brit. India, Hym.*, 2 : 113, ♀.

1951. *Tetraponera (Tetraponera) allaborans*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 78.

*Material examined* : India : West Bengal : 3 ♀♀, Nadia, Kalyani, 9.vii.1985, coll. S. Chakraborty.

*Distribution* : India : West Bengal (Nadia), Western India. Elsewhere : Burma, China, Java, Philippines, Singapore, Sri Lanka, Sumatra.

44. *Tetraponera (Tetraponera) binghami* (Forel) \*

1902. *Sima binghami* Forel, *Rev. Suisse Zool.*, 10 : 243, ♀ ♂ ♀.

1921. *Sima (Tetraponera) binghami*, Emery, *Genera Insect.*, 174 A : 25.

1951. *Tetraponera (Tetraponera) binghami*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 79.

*Material examined* : India : West Bengal : 8 ♀♀, Darjiling, Reyang river (300 m.), 28.iii.1973, coll. H. S. Sharma and Party; ex. Rotten log.

*Distribution* : India : West Bengal (Darjiling), Assam. Elsewhere : Burma, China, Pegu Yoma, Shan States.

45. *Tetraponera (Tetraponera) nigra* (Jerdon)1851. *Eciton nigra* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 112, ♀.1903. *Sima nigra*, Bingham, *Fauna Brit. India, Hym.*, 2 : 110, ♀ ♀.1951. *Tetraponera (Tetraponera) nigra*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 80.

*Distribution* : India : West Bengal, Maharashtra, Malabar Coast, Sikkim. Elsewhere : Burma, Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

46. *Tetraponera (Tetraponera) rufonigra* (Jerdon) \*1851. *Eciton rufonigrum* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 111, ♀.1863. *Sima rufonigra*, Roger, *Verz. Formic.* : 25.1903. *Sima rufonigra*, Bingham, *Fauna Brit. India, Hym.*, 2 : 108, ♀ ♀.1921. *Sima (Sima) rufonigra*, Emery, *Genera Insect.*, 174 A : 23.1951. *Tetraponera (Tetraponera) rufonigra*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 81.

*Material examined* : India : West Bengal : 1 ♀, North 24-Parganas, Barasat, Bamunmura, 20.v.1965, coll. M. S. Shishodia and B. K. Biswas; 3 ♀♀, North 24-Parganas, Naihati, 13.vii.1965, coll. K. K. Ray; 1 ♀, South 24-Parganas, Canning, 18.x.1965, coll. A.N.T. Joseph; 1 ♀, South 24-Parganas, Budge Budge, 19.i.1966, coll. D. K. Mandal and party; 1 ♀, South 24-Parganas, Budge Budge, 24.i.1967, coll. K. R. Das and Party; 3 ♀♀, Calcutta, Eden Gardens, 19.viii.1968, coll. G. S. Arora and C. S. Roy; 1 ♀, Calcutta, 15.vii.1985, coll. L. K. Ghosh.

*Distribution* : India : West Bengal (Calcutta, North 24-Parganas, South 24-Parganas), throughout India. Elsewhere : Burma, Cambodia, China, Java, Sri Lanka, Sumatra.

## VI. Subfamily MYRMICINAE Lepeletier

(Figures 6 c, d)

## Key to the Genera

1. Antennae less than 12-jointed.....2
- Antennae 12-jointed..... 10
2. Antennae 11-jointed.....3
- Antennae less than 11-jointed.....7
3. Lateral margins of head and thorax denticulate and spiny.....*Cataulacus*
- Lateral margins of head and thorax not dentate or spiny .....4
4. Pedicel attached to dorsal surface of abdomen..... *Crematogaster*
- Pedicel attached to middle of front or to ventral surface of abdomen.....5
5. Pronotum armed with spines or teeth..... *Lophomyrmex*
- Pronotum unarmed.....6

6. Club of antennae formed of apical 2-joints of flagellum.....*Phidologeton*  
 Club of antennae formed of apical 3-joints of flagellum.....*Tetramorium*, pt.
7. Antennae 10-jointed.....*Solenopsis*  
 Antennae less than 10-jointed ..... 8
8. Club of flagellum well-defined; antennae 9-jointed.....9  
 Club of flagellum not well defined; antennae 7-jointed .....*Myrmicaria*
9. Antennal furrow lateral and deep.....*Meranoplus*  
 No antennal furrow..... *Oligomyrmex*
10. Erect hairs on body trifold ..... *Triglyphothrix*  
 Erect hairs on body not trifold, simple..... 11
11. Flagellum of antennae scarcely thickened towards apex, without distinct club ..... 12  
 Flagellum of antennae with distinct club ..... 14
12. Calcaria of posterior pair of legs pectinate.....*Myrmica*  
 Calcaria of posterior pair of legs not pectinate, simple ..... 13
13. Metanotum unarmed or at most bidentate.....*Messor*  
 Metanotum armed with 2-short spines.....*Aphaenogaster*
14. Clypeus bicarinate.....*Monomorium*  
 Clypeus not bicarinate, occasionally with one carina..... 15
15. Neuters or workers strongly dimorphous.....*Pheidole*  
 Neuters or workers monomorphous ..... 16
16. Maxillary palpi 5-jointed; erect hairs on body clavate; no antennal furrow .....*paratopula*  
 Maxillary palpi 5-jointed; erect hairs on body not clavate; antennal furrow generally present... 17
17. 1st joint of pedicel with an appendix beneath.....*Acidomyrmex*  
 1st joint of pedicel without any appendix beneath.....*Tetramorium*

## 20. Genus *Acidomyrmex* Emery

1951. *Acidomyrmex*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 173.

### 47. *Acidomyrmex rothneyi* (Forel)

1902. *Rhoptromyrmex wroughtoni*, race *rothneyi* Forel, *Rev. Suisse. Zool.*, 10 : 232, ♀.

1903. *Tetramorium rothneyi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 177, ♀.

1951. *Acidomyrmex rothneyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 173.

*Diagnostic characters* : ♀. TL 2.5 mm. Brownish yellow; head and thorax finely longitudinally striate; the node of pedicel delicately rugulose, abdomen smooth, highly polished. Head broader posteriorly, mandibles triangular, antennae thick and comparatively long. Thorax comparatively short, broad and convex anteriorly; metanotal spines short, stout, divergent.

*Material examined* : India : West Bengal : 3 ♀♀, Darjiling, 12.iii.1973, coll. P. K. Maity and H. S. Sharma.

*Distribution* : India : West Bengal (Darjiling), Karnataka and Western India. Elsewhere : Burma.

*Remarks* : Chapman and Capco (1951) also reported this species and mentioned only "Bengal" as its locality.

### 21. Genus *Aphaenogaster* Mayr

1853. *Aphaenogaster* Mayr, *Verh. Zool.-bot. Ver. Wien.*, 3 : 107.

#### 48. *Aphaenogaster* sp.

*Diagnostic characters* : ♀. TL 5-6 mm. Closely resembles to *A. rothneyi*, but differs a little in following characters.

Colour more or less reddish brown; mandibles, antennae and legs deep red. Head and thorax coarsely reticulate and striated.

*Material examined* : India : West Bengal : 5 ♀♀, Darjiling, 1 km. East of Reyang F.R.H. (275 m.), 29.iii.1973, coll. H.S. Sharma and Party.

*Distribution* : India : West Bengal (Darjiling).

### 22. Genus *Cataulacus* Smith

1853. *Cataulacus* Smith, *Trans. Ent. Soc. ser. 2*, 2 : 225.

#### 49. *Cataulacus (Cataulacus) latus* Forel

1892. *Cataulacus latus* Forel, in *Grandidier, Hist. Phys. Nat. Pol. Madagascar*, 20 : 144.

1903. *Cataulacus latus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 121, ♀ ♀.

1951. *Cataulacus (Cataulacus) latus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)* 1 : 85.

*Diagnostic characters* : ♀. TL 5-6 mm. Dull dead ink-black, with a mere touch of castaneous brown at the apex of the scape and of the flagellum of antennae and at the joints of the legs. Head much broader than long, occiput widely emarginate; mandibles subtriangular, antennae stout. Pronotum broader than long; the side of metanotum denticulate and prolonged posteriorly into long laminate spines, pointing backwards and curved a little upwards.

*Distribution* : India : West Bengal, Orissa. Elsewhere : Burma.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

### 23. Genus *Crematogaster* Lund

1831. *Crematogaster* Lund, *Ann. Sc. Nat.*, 23 : 132.

#### Key to the Species

- |                        |   |
|------------------------|---|
| 1. Head square.....    | 2 |
| Head rectangular ..... | 3 |

2. Scape of antennae upto the top of the head..... *C. dohrni*  
 Scape of antennae extending beyond the top of the head.....*C. ebenina*
3. Club of antennae 4-jointed..... *C. wroughtoni*  
 Club of antennae 3-jointed..... 4
4. Head smooth and shining ..... 5  
 Head not smooth, sculptured ..... 7
5. Metanotal spines curved a little downwards and inwards.....*C. contemta*  
 Metanotal spines short, straight, not curved..... 6
6. Dull yellowish brown, pilosity very sparse..... *C. buddhae*  
 Dark chestnut-red, pilosity almost entirely wanting ..... *C. subnuda*
7. Pale yellow colour; pilosity almost entirely wanting; first flattened joint of pedicel with the sides strongly arched, nearly semicircular ..... *C. flava*  
 Rufo-ferruginous colour; pilosity abundant; first flattened joint of pedicel with sides rounded.....  
 .....*C. rothneyi*

#### 50. *Crematogaster contemta* Mayr

1878. *Crematogaster contemta* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 681, ♀.

1903. *Crematogaster contemta* Bingham, *Fauna Brit. India, Hym.*, 2 : 130, ♀.

1951. *Crematogaster (Acrocoelia) brunnea contemta*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 87.

*Distribution* : India : West Bengal, Western India. Elsewhere : Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'the Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### 51. *Crematogaster subnuda* Mayr

1878. *Crematogaster subnuda* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 680, 682, ♀.

1903. *Crematogaster subnuda*, Bingham, *Fauna Brit. India, Hym.*, 2 : 129, ♀.

1922. *Crematogaster (Acrocoelia) brunnea subnuda*, Emery, *Genera Insect.*, 174 B : 149.

1951. *Crematogaster (Acrocoelia) brunnea subnuda*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 88.

*Material examined* : India : West Bengal : 2 ♀♀, Jalpaiguri, Rajabhatkhawa, 13.i.1987, coll. V. D. Srivastava and Party.

*Distribution* : India : West Bengal (Calcutta, Jalpaiguri), Assam and throughout India. Elsewhere : Burma, Sri Lanka.

*Remarks* : Chapman and Capco (1951) also reported this species from "Calcutta"

52. *Crematogaster buddhae* Forel

1902. *Crematogaster buddhae* Forel, *Rev. Suisse Zool.*, 10 : 206, ♀.  
 1903. *Crematogaster buddhae*, Bingham, *Fauna Brit. India, Hym.*, 2 : 132, ♀.  
 1951. *Crematogaster (Acrocoelia) buddhae*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 89.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Sikkim, North-West Himalayas.

*Remarks* : Bingham (1903) reported this species from "Calcutta"

53. *Crematogaster dohrni rogenhoferi* Mayr

1878. *Crematogaster rogenhoferi* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 681, ♀.  
 1903. *Crematogaster rogenhoferi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 141, ♀.  
 1951. *Crematogaster (Acrocoelia) dohrni rogenhoferi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 90.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Assam, Sikkim, Western India. Elsewhere : Burma, Sri Lanka, Sumatra.

*Remarks* : Bingham (1903) reported this species from "Calcutta"

54. *Crematogaster ebenina* Forel \*

1902. *Oxygyne ebenina* Forel, *Rev. Suisse Zool.*, 10 : 199, ♀ ♀.  
 1902. *Crematogaster (Oxygyne) ebenina*, Forel, *Journ. Bombay Nat. Hist. soc.*, 14 : 679.  
 1903. *Crematogaster ebenina*, Bingham, *Fauna Brit. India, Hym.*, 2 : 133, ♀.  
 1922. *Crematogaster (Oxygyne) ebenina*, Emery, *Genera Insect.*, 174 B : 157.  
 1951. *Crematogaster (Oxygyne) ebenina*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 100.

*Material examined* : India : West Bengal : 50 ♀♀, Darjiling, Singla (400 m.), 18.iv.1973, coll. H. S. Sharma and Party; 17 ♀♀, Jalpaiguri, Rajabathkhawa, 13.i.1987, coll. V. D. Srivastava and Party.

*Distribution* : India : West Bengal (Darjiling, Jalpaiguri), Karnataka, Sikkim, Western India. Elsewhere : Burma.

55. *Crematogaster flava* Forel \*

1886. *Crematogaster flava* Forel, *Journ. Asiat. Soc. Bengal*, 55 : 248.  
 1903. *Crematogaster flava*, Bingham, *Fauna Brit. India, Hym.*, 2 : 142, ♀.  
 1922. *Crematogaster (Acrocoelia) dohrni rogenhoferi*, var. *flava*, Emery, *Genera Insect.*, 174 B : 151.  
 1951. *Crematogaster (Acrocoelia) dohrni* var. *flava*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 90.

*Material examined* : India : West Bengal : 30 ♀♀, Darjiling, 1 km. South-West of Goke F.R.H., Singla, 18.iv.1973, coll. H.S. Sharma and Party.

*Distribution* : India : West Bengal (Darjiling), Assam, Orissa, Sikkim. Elsewhere : Nepal.

56. *Crematogaster rothneyi* Mayr

1878. *Crematogaster rothneyi* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 681, 685, ♀.

1903. *Crematogaster rothneyi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 140, ♀.

1951. *Crematogaster (Acrocoelia) rothneyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 93.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta, Haora), Gujarat, Maharashtra, Sikkim.

*Remarks* : Bingham (1903) reported this species from "Calcutta" Subsequently, Imai *et al.* (1984) also reported this species from Botanical Garden, Haora.

57. *Crematogaster wroughtoni* Forel \*

1902. *Crematogaster wroughtoni* Forel, *Rev. Suisse Zool.*, 10 : 206, ♀♀.

1903. *Crematogaster wroughtoni*, Bingham, *Fauna Brit. India, Hym.*, 2 : 128, ♀♀.

1951. *Crematogaster (Paracrema) wroughtoni*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 102.

*Material examined* : India : West Bengal : 10 ♀♀, Darjiling, 1973, coll. P. K. Maity and H. S. Sharma.

*Distribution* : India : West Bengal (Darjiling), Western India.

24. Genus *Paratopula* Wheeler

1919. *Paratopula* Wheeler, *Bull. Mus. Harvard Coll.*, 63 : 114.

58. *Paratopula ceylonica* (Emery)

1901. *Atopomyrmex ceylonicus* Emery, *Deutsch. ent. Zeitschr.* : 144.

1902. *Leptothorax taylori*, Forel, *Rev. Suisse zool.*, 10 : 228.

1919. *Paratopula ceylonicus*, Wheeler, *Bull. Mus. Harvard Coll.*, 63 : 144.

1988. *Paratopula ceylonica*, Bolton, *Entomol. Mon. Mag.*, 124 : 138 (Syns.).

*Diagnostic characters* : ♀. TL 5-10 mm. Body colour entirely pale yellow. Head, thorax and pedicel coarsely reticulate; base of the abdomen finely longitudinally striate. Head without mandibles rectangular; mandibles triangular. Antennae short and thick; club of flagellum formed of apical three joints. Thorax slightly convex above, meso-metanotal suture very distinct; metanotal spines slender, obtuse at apex. 1st node of pedicel cubical, 2nd node sub-quadrate; abdomen oval, convex.

*Distribution* : India : West Bengal (Calcutta).

*Remarks* : The material of this species could not be available for our study. Bingham (1903) reported the species, *Atopomyrmex ceylonicus* from "Calcutta", but in case of *Leptothorax taylori*, he (1903) mentioned only "Bengal" as its locality.

25. Genus *Lophomyrmex* Emery

1892. *Lophomyrmex* Emery, *Ann. Mus. Civ. Gen.*, 22 : 114.

59. *Lophomyrmex quadrispinosus* Jerdon

1851. *Lophomyrmex quadrispinosus* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 111, ♀.  
 1903. *Lophomyrmex quadrispinosus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 195, ♀.  
 1951. *Lophomyrmex quadrispinosus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 155.

**Diagnostic characters** : ♀. TL 3-3.5 mm. Head and abdomen chestnut or reddish brown; thorax, legs and pedicel brownish yellow. Head smooth and shining, a little longer than broad; mandibles striate at base, the masticatory margin dentate. The anterior lateral angles of pronotum furnished with divergent horizontal short spines or teeth; the basal portion of metanotum short, widening posteriorly; metanotal spines long, acute and slightly curved. Pedicel rather long, the nodes sculptured; abdomen broadly oval.

**Material examined** : Nil.

**Distribution** : India : West Bengal (Calcutta), Karnataka, Orissa, Sikkim, U.P.

**Remarks** : Bingham (1903) reported this species from "Calcutta"

26. Genus *Meranoplus* Smith

1845. *Cryptocerus* (part) Guérin, *Iconoger. Regne. Anim. Insect.*, 7 : 4.  
 1853. *Meranoplus* (part) Smith, *Trans. Ent. Soc. Lond.*, (2) 2 : 224.  
 1865. *Meranoplus*, Mayr, *Novara Reise. Formicid.* : 26.

## Key to the Species

1. Clypeus convex in the middle, obscurely bicarinate; mesonotum armed posteriorly with 2 long acute spine; metanotal spine small and acute; first node of pedicel smooth, viewed from side triangular, and second node globose.....*M. bicolor*  
 Clypeal carinae less wide apart, monocarinate; mesonotum armed posteriorly with only comparatively 2 short teeth; metanotal spine slender and longer than half the metanotum; first node of pedicel squamiform, very slightly conical, 2nd node twice as broad as long .....*M. rothneyi*

60. *Meranoplus bicolor* (Guérin)

1845. *Cryptocerus bicolor* Guérin, *Iconoger. Regne. Anim. Insect.*, 7 : 425.  
 1853. *Meranoplus bicolor*, Smith, *Trans. Ent. Soc. Lond.*, (2) 2 : 224, pl., fig.  
 1903. *Meranoplus bicolor*, Bingham, *Fauna Brit. India, Hym.*, 2 : 168, fig., ♀ ♀ ♂.  
 1951. *Meranoplus bicolor*, Chapman and Capco, *monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 112.

**Material examined** : India : West Bengal : 1 ♀, Medinipur, Jhargram, Jambani forest, 3.x.1984, coll. A. K. Hazra and Party; 2 ♀♀, Bankura, Around Simlipal F.R.H., 24.xii.1985, coll. D. K. Mandal and Party.

**Distribution** : India : West Bengal (Bankura, Haora, Medinipur). Elsewhere : Burma.

**Remarks** : Imai et al. (1984) also reported this species from Botanical Garden, Haora.

61. *Meranoplus rothneyi* Forel \*

1902. *Meranoplus rothneyi* Forel, *Rev. Suisse Zool.*, **10** : 241, ♀.  
 1903. *Meranoplus rothneyi*, Bingham, *Fauna Brit. India, Hym.*, **2** : 170, ♀.  
 1922. *Meranoplus rothneyi*, Emery, *Genera Insect.*, **174 B** : 228.  
 1951. *Meranoplus rothneyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), **1** : 113.

**Material examined** : India : West Bengal : 2 ♀♀, Calcutta, Eden Gardens, 3.v.1965, coll. K. K. Ray and P. K. Biswas; 1 ♀, North 24-Parganas, Barasat, Bamunmura, 20.v.1965, coll. M. S. Shishodia and B. K. Biswas; 2 ♀♀, North 24-Parganas, Bangaon, Dhakapara, 9.vii.1965, coll. K. K. Ray and P. K. Biswas; 2 ♀♀, North 24-Parganas, Naihati, 13.vii.1965, coll. K. K. Ray; 1 ♀, Nadia, Krishnanagar, 13.viii.1965, coll. S. P. Chakraborty and Party; 1 ♀, Hugli, Chandannagar, 9.xi.1965, coll. K. K. Ray; 1 ♀, Calcutta, Dum Dum Airport, 24.xi.1965, coll. P. Parui and J. Singh.

**Distribution** : India : West Bengal (Calcutta, Hugli, Nadia, North 24-Parganas). Elsewhere : China.

\*\* 27. Genus *Messor* Forel

1890. *Aphaenogaster*, subg. *Messor* Forel, *Ann. Soc. Ent. Belg.*, **34** : C. R. 68.  
 1895. *Stenamma*, subg. *Messor* (part), Emery, *Zool. Jahrb. Syst.*, : 8.  
 1903. *Messor*, Bingham, *Fauna Brit. India, Hym.*, **2** : 277.

62. *Messor barbarus* (Linnaeus) \*

1767. *Formica barbara* Linn., *Syst. Nat. 12th ed.*, **1** : 962.  
 1886. *Aphaenogaster barbara*, Linn., var. *punctata* Forel, *Journ. Asiat. Soc. Bengal*, **4** : 248, ♀.  
 1903. *Messor barbarus*, var. *instabilis*, Bingham, *Fauna Brit. India, Hym.*, **2** : 278, ♀ ♀ ♂.  
 1921. *Messor barbarus*, Emery, *Genera Insect.*, **174 A** : 69.  
 1951. *Messor barbarus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), **1** : 136.

**Diagnostic characters** : ♀. TL 4-9 mm. Dark shining red, the abdomen in some specimens black, the scape of the antennae and the tarsi pale. Pilosity almost entirely wanting, reduced to a very few erect soft, not obtuse hairs on the underside of the head and abdomen and on the thorax above. Mandibles finely longitudinally striated, massive, outer margin strongly curved, the masticatory margin dentate. Thorax narrower than the head but massive, pronotum rounded in front; mesonotum raised anteriorly above the level of the pronotum, posteriorly steeply sloped, with a transverse impression; meso-metanotal suture deeply marked; metanotum never with spines, apex truncate. 1st node of pedicel conical, rounded above; 2nd node broader, rounded above.

**Material examined** : India : West Bengal : 19 ♀♀, North 24-Parganas, Naihati, Goalpara, 15.ii.1966, coll. R. P. Ghosh.

**Distribution** : India : West Bengal (North 24-Parganas). Elsewhere : Central Europe.

28. Genus *Monomorium* Mayr

1855. *Monomorium* Mayr, *Verh. Zool.-bot. Ver. Wien.*, **5** : 452.

## Key to the Species

1. Antennae 11-jointed, scape of antennae not reaching the top of the head; 2nd node of pedicel subglobose, broader than long.....*M. orientale*
- Antennae 12-jointed, scape of antennae reaching the top of the head; 2nd node of pedicel broader than 1st node ..... 2
2. Body length 1.5-2 mm.; body colour varying from reddish brown to dark brown; pilosity almost entirely wanting; clypeus convex, carina just visible .....*M. floricola*
- Body length 3-3.7 mm.; body colour light castaneous brown; pilosity moderate; clypeus anteriorly arched, medial carina almost obsolete.....*M. latinode*

63. *Monomorium floricola* (Jerdon) \*

1851. *Atta floricola* Jerdon, *Madras. Journ. Lit. Sc.*, 17 : 107, ♀.

1866. *Monomorium specularis*, Mayr, *Sitzungsb. Akad. Wiss. Wien.*, 53 (1 Abth.) : 509, ♀.

1903. *Monomorium floricola*, Bingham, *Fauna Brit. India, Hym.*, 2 : 211, ♀.

1922. *Monomorium (Monomorium) floricola*, Emery, *Genera Insect.*, 174 B : 172.

1987. *Monomorium floricola*, Bolton, *Bull. Br. Mus. (Nat. Hist.) Entomol.*, 54 (3) : 390 (Syns.).

*Material examined* : India : West Bengal : 7 ♀♀, Haora, Santragachi, May, 1989, coll. R. N. Tiwari; 12 ♀♀, Calcutta, Lake Gardens, Lilly Pool, 7.vi.1990, coll. R. N. Tiwari; 20 ♀♀, Calcutta, Lake Terrace, 10.viii.1990, coll. S. K. Tiwari and R. N. Tiwari.

*Distribution* : India : West Bengal (Calcutta, Haora). Elsewhere : Sri Lanka.

64. *Monomorium latinode* Mayr \*

1872. *Monomorium latinode* Mayr, *Ann. Mus. Stor. Nat. Genova*, 2 : 152, ♀.

1903. *Monomorium latinode*, Bingham, *Fauna Brit. India, Hym.*, 2 : 211, ♀.

1922. *Monomorium (Monomorium) latinode*, Emery, *Genera Insect.*, 174 B : 171.

1987. *Monomorium latinode*, Bolton, *Bull. Br. Mus. (Nat. Hist.) Entomol.*, 54 (3) : 429 (Syns.).

*Material examined* : India : West Bengal : 5 ♀♀, Haora, Santragachi, May, 1989, coll. R. N. Tiwari; 8 ♀♀, Calcutta, Lake Gardens, Lilly Pool 7.vi.1990, coll. R. N. Tiwari; 14 ♀♀, Calcutta, Lake Terrace, 10.viii.1990, coll. S. K. Tiwari and R. N. Tiwari.

*Distribution* : India : West Bengal (Calcutta, Haora). Elsewhere : Burma, Sri Lanka.

65. *Monomorium orientale* Mayr

1878. *Monomorium orientale* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28 : 670, ♀.

1903. *Monomorium orientale*, Bingham, *Fauna Brit. India, Hym.*, 2 : 207, ♀.

*Distribution* : India : West Bengal, North-West Himalayas. Elsewhere : Burma.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

\*\* 29. Genus *Myrmica* Latreille1804. *Myrmica* (part) Latreille, *Nouv. Dict. Hist. Nat.*, 24 : 175.1855. *Myrmica*, Mayr, *Verh. Zool.-bot. Ver. Wien.*, 5 : 396.• 66. *Myrmica rugosa* Mayr \*1865. *Myrmica rugosa* Mayr, *Reise Novera Formicid.* : 19, nota, ♀.1903. *Myrmica rugosa*, Bingham, *Fauna Brit. India, Hym.*, 2 : 268. ♀.1921. *Myrmica (Myrmica) rugosa*, Emery, *Genera Insect.*, 174 A : 40.1951. *Myrmica rugosa*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 129.

**Diagnostic characters** : ♀. TL 5.5-6 mm. Brownish black to jet-black; mandibles, antennae and legs dark castaneous; head, thorax and pedicel striate, rugose, abdomen highly polished, smooth and shining; pilosity pale, rather long and plentiful on the head, thorax and abdomen, shorter and oblique on the antennae and legs. Head convex, broadly sub-oval, with a distinct posterior margin; masticatory margin of mandibles denticulate, the apical tooth very acute; the scape of antennae not passing beyond the top of the head. Thorax elongate, impressed at meso-metanotal suture; metanotal spines long, pointing backwards and slightly curved. Pedicel elongate. Abdomen oval.

**Material examined** : India : West Bengal : 14 ♀♀, Darjiling, Ghoombhanjan, Durbin forest (2100 m.), 22.iii.1973, coll. P. K. Maity and Party, ex. soil.

**Distribution** : India : West Bengal (Darjiling), entire Himalayas along the length.

30. Genus *Myrmicaria* Saunders1841. *Myrmicaria* Saunders, *Trans. Ent. Soc.*, 3 : 57.67. *Myrmicaria brunnea* Saunders1841. *Myrmicaria brunnea* Saunders, *Trans. Ent. Soc.*, 3 : 57, ♂1903. *Myrmicaria brunnea*, Bingham, *Fauna Brit. India, Hym.*, 2 : 118, ♀♀♂1951. *Myrmicaria brunnea*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 124.

**Diagnostic characters** : ♀. TL 5.5-8 mm. Body colour chestnut brown, shining. The masticatory margin of mandibles armed with 4 acute teeth; antennae 7-jointed. The pronotum anteriorly convex and rounded above, with the anterior lateral angles above and below marked by distinct tubercles or spines; the posterior lateral angles of the basal portion of compressed metanotum armed with an acute oblique spine. The nodes of pedicel smooth, conical; the first node with a long petiole anteriorly and a very short petiole posteriorly. Abdomen broadly oval.

**Distribution** : India : West Bengal, Southern India. Elsewhere ; Sri Lanka, Sumatra.

**Remarks** : The material of this species of could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

31. Genus *Oligomyrmex* Mayr1867. *Oligomyrmex* Mayr, *Tijds. v. Ent.*, 10 : 110.

## Key to the Species

1. Body colour more or less brown; length over 5 mm.; head barely longer than broad.....  
 ..... *O. bengalensis*
- Body colour more or less yellow; length under 5 mm.; head longer than broad..... 2
2. Scape of antennae not reaching upto the top of the head, lacking by 1/3 of head length; 1st node of pedicel squamiform; 2nd node not broader than long, rounded .....*O. rothneyi*
- Scape of antennae barely reaching halfway of the head, lacking by 1/2 of the head length; 1st node of pedicel broader than long; 2nd node much broader than long, transverse ..... *O. asinus*

68. *Oligomyrmex asinus* Forel

1902. *Oligomyrmex asinus* Forel, *Rev. Suisse Zool.*, **10** : 214.

1903. *Oligomyrmex asinus*, Bingham, *Fauna Brit. India, Hym.*, **2** : 156, ♀♀.

*Distribution* : India : West Bengal.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

69. *Oligomyrmex bengalensis* Forel

1902. *Oligomyrmex bengalensis* Forel, *Rev. Suisse. Zool.*, **10** : 217.

1903. *Oligomyrmex bengalensis*, Bingham, *Fauna Brit. India, Hym.*, **2** : 154, ♀ ♂.

*Distribution* : India : West Bengal.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

70. *Oligomyrmex rothneyi* Forel

1902. *Oligomyrmex rothneyi* Forel, *Rev. Suisse. Zool.*, **10** : 218, ♀.

1903. *Oligomyrmex rothneyi*, Bingham, *Fauna Brit. India, Hym.*, **2** : 156, ♀ ♂.

1951. *Oligomyrmex (Oligomyrmex) rothneyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 157.

*Material examined* : Nil.

*Distribution* : India : West Bengal (North 24-Parganas).

*Remarks* : Bingham (1903) reported this species from "Barrackpore"

32. Genus *Pheidole* Westwood

1841. *Pheidole* Westwood, *Ann. Nat. Hist.*, **6** : 87.

Subgenus *Pheidole* S. str.,

1921. *Pheidole*, Subg. *Pheidole*, Emery, *Genera Insect.*, **174 A** : 93 (Syns.).

**Key to the Species**

1. 1st joint of pedicel with a projection or appendix beneath.....2  
    1st joint of pedicel with no projection or appendix beneath.....3
2. Body colour dark brown to almost black; scape of antennae reaching less than 2/3rd of the distance between its insertion and the top of the head; metanotal spines clavate and obtuse.....  
    .....*P. (P.) spathifera*  
    Body colour chestnut red; scape of antennae reaching half of the distance between its insertion and the top of the head; metanotal spines erect and stout..... *P. (P.) latinoda*
3. Pro-and mesonotum forming a single convexity; transverse mesonotal furrow obsolete.....4  
    Pro-and mesonotum not forming a single convexity; transverse mesonotal furrow or ridge or carina, or at any rate the latter always present .....7
4. Head shield-shaped; very broad posteriorly; antennal groove well marked, coarsely sculptured.....  
    .....*P. (P.) hospita*  
    Head rectangular; antennal groove very indistinct or absent.....5
5. Occiput smooth and shining.....*P. (P.) wood-masoni*  
    Occiput more or less sculptured.....6
6. Head anteriorly bidentate; scape of antennae barely 1/3rd as long as the distance from its insertion to the top of the head; 2nd node of pedicel a little wider and larger..... *P. (P.) watsoni*  
    Head anteriorly not dentate; scape of antennae half the distance between point of insertion and the top of the head; 2nd node of pedicel as broad as long.....*P. (P.) mus*
7. Vertex with transverse impression broad and very distinct..... *P. (P.) sulcaticeps*  
    Vertex of head not transversely impressed, or with only a slight impression .....8
8. Lateral pronotal tubercles distinct, but not prominent; the mesonotal transverse groove and ridge nearly obsolete .....*P. (P.) rogersi*  
    Lateral pronotal tubercles quite or nearly obsolete; the mesonotal transverse groove and ridge very distinct.....9
9. The mandibles smooth; metanotal spines very long and acute .....*P. (P.) roberti*  
    The mandibles minutely striate or punctured; metanotal spines short and acute..... 10
10. Pilosity very sparse; the scape of antennae falling short of the top of the head by about a third of its length.....*P. (P.) jucunda*  
    Pilosity short but very abundant; the scape of antennae reaches about three-fourth of the distance between its insertion and the top of the head..... *P. (P.) fervens*

**71. *Pheidole (Pheidole) hospita* Bingham**

1903. *Phidole hospita* Bingham, *Fauna Brit. India, Hym.*, 2 : 238, 2♂.

1951. *Pheidole (Pheidole) hospita*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 142.

*Material examined* : India : West Bengal : 10 ♀♀, Puruliya, 14.ix.1987, coll. M. Prasad.

*Distribution* : India : West Bengal (Calcutta, Puruliya).

*Remarks* : Bingham (1903) also reported this species from "Calcutta"

**72. *Pheidole (Pheidole) fervens* Smith \***

1858. *Pheidole fervens* Smith, *Cat. Hym. Brit. Mus.*, 6 : 176.

1867. *Pheidole javana* Mayr, *Tijdsch. v. Ent.*, 10 : 98, 2♀.

1903. *Phidole javana*, Bingham, *Fauna Brit. India, Hym.*, 2 : 262, 2♀.

1967. *Pheidole (Pheidole) fervens*, Wilson and Taylor, *Pacific Ins. Monogr.*, 14 : 45.

*Material examined* : India : West Bengal : 10 ♀♀, Darjiling, Takdah Slip forest (1500 m.), March, 1973, Coll. P. K. Maity and Party.

*Distribution* : India : West Bengal (Darjiling). Elsewhere : Burma, Java, Sunda Islands.

**73. *Pheidole (Pheidole) jucunda* Forel**

1885. *Pheidole jucunda* Forel, *Journ. Asiat. Soc. Bengal*, 54 : 179, 2♂.

1903. *Phidole jucunda*, Bingham, *Fauna Brit. India, Hym.*, 2 : 256, 2♀.

1951. *Pheidole (Pheidole) jucunda*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 144.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Sikkim, Western India. Elsewhere : Sri Lanka.

*Remarks* : Bingham (1903) reported this species from "Calcutta"

**74. *Pheidole (Pheidole) latinoda* Roger**

1863. *Pheidole latinoda* Roger, *Berl. Ent. Zeitschr.*, 7 : 195, 2♂.

1903. *Phidole latinoda*, Bingham, *Fauna Brit. India, Hym.*, 2 : 235, 2♀.

1951. *Pheidole (Pheidole) latinoda*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 144.

*Distribution* : India : West Bengal (Haora). Elsewhere : Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Imai et al. (1984) reported the species, *Pheidole latinoda* from Botanical Garden, Haora.

**75. *Pheidole (Pheidole) mus* Forel**

1902. *Pheidole mus* Forel, *Rev. Suisse Zool.*, 10 : 173, 191, 2♀♂

1903. *Phidole mus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 242, 2♀♂

1951. *Pheidole mus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 146.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta),-Karnataka.

*Remarks* : Bingham (1903) reported this species only from "Calcutta" and "Kanara"

**76. *Pheidole (Pheidole) roberti* Forel \***

1902. *Pheidole roberti* Forel, *Rev. Suisse Zool.*, **10** : 183, ♀ 24.

1903. *Phidole roberti*, Bingham, *Fauna Brit. India, Hym.*, **2** : 259, 24 ♀.

1921. *Pheidole (Pheidole) roberti*, Emery, *Genera Insect.*, **174 A** : 93.

1951. *Pheidole (Pheidole) roberti*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 149.

*Material examined* : India : West Bengal : 1 ♀, Darjiling, Singla, Goke (450 m.), 21.iv.1973, coll. H.S. Sharma and Party.

*Distribution* : India : West Bengal (Darjiling), Karnataka, Sikkim.

**77. *Pheidole (Pheidole) rogersi* Forel**

1902. *Pheidole rogersi* Forel, *Rev. Suisse Zool.*, **10** : 181, 197, 24 ♀.

1903. *Phidole rogersi*, Bingham, *Fauna Brit. India, Hym.*, **2** : 258, 24 ♀.

1951. *Pheidole (Pheidole) rogersi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 149.

*Distribution* : India : West Bengal, North-West Provinces.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

**78. *Pheidole (Pheidole) spathifera* Forel**

1902. *Pheidole spathifera* Forel, *Rev. Suisse Zool.*, **10** : 168, 187, 24 ♀ ♀ ♂

1903. *Phidole spathifera*, Bingham, *Fauna Brit. India, Hym.*, **2** : 232, 24 ♀ ♀ ♂.

1951. *Pheidole (Pheidole) spathifera*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 150.

*Material examined* : Nil.

*Distribution* : India : West Bengal (North 24-Parganas), Assam, Western India. Elsewhere : Burma, Pegu yoma, Sri Lanka.

*Remarks* : Bingham (1903) reported this species from "Barrackpore"

**79. *Pheidole (Pheidole) sulcaticeps* Roger**

1863. *Pheidole sulcaticeps* Roger, *Berl. Ent. Zeitschr.*, **7** : 193, 24.

1903. *Phidole sulcaticeps*, Bingham, *Fauna Brit. India, Hym.*, **2** : 251, 24 ♀.

1951. *Pheidole (Pheidole) sulcaticeps*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 151.

*Distribution* : India : West Bengal, North-West Provinces. Elsewhere : Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

80. *Pheidole (Pheidole) watsoni* Forel

1902. *Pheidole watsoni* Forel, *Rev. Suisse Zool.*, 10 : 171, 189, 2 ♀♀ ♂  
 1903. *Phidole watsoni*, Bingham, *Fauna Brit. India, Hym.*, 2 : 237, 2 ♀.  
 1951. *Pheidole (Pheidole) watsoni*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 152.

*Distribution* : India : West Bengal. Elsewhere : Burma, Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II,' however, mentioned only "Bengal" as its locality.

81. *Pheidole (Pheidole) wood-masoni* Forel

1885. *Pheidole wood-masoni* Forel, *Journ. Asiat. Soc. Bengal*, 54 : 180, 2 ♀.  
 1903. *Phidole wood-masoni*, Bingham, *Fauna Brit. India, Hym.*, 2 : 241, 2 ♀♀ ♂.  
 1951. *Pheidole (Pheidole) wood-masoni*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 152.

*Distribution* : India : West Bengal (Haora). Elsewhere : Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Imai et al. (1984) reported the species, *Pheidole Woodmasoni* from Botanical Garden, Haora.

33. Genus *Pheidologeton* Mayr

1862. *Phidologeton* Mayr, *Verh. Zool.-bot. Ges. Wien*, 12 : 750.

## Key to the Species

1. Colour dark chestnut brown; length over 2.5 mm ..... *P. diversus*  
 Colour light brownish yellow; length under 2.5 mm ..... *P. affinis*

82. *Pheidologeton affinis* (Jerdon)

1851. *Oecodoma affinis* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 110, ♀ 24.  
 1903. *Phidologiton affinis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 164, 2 ♀♀ ♂  
 1951. *Pheidologeton affinis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 158.

*Distribution* : India : West Bengal, Assam, Western India. Elsewhere : Burma, Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

83. *Pheidologeton diversus* (Jerdon)

1851. *Oecodoma diversus* Jerdon, *Madras Journ. Lit. Sci.*, 17 : 109, ♀.  
 1903. *Phidologiton diversus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 162, 2 ♀♀ ♂.  
 1951. *Pheidologeton diversus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 159.

*Distribution* : India : West Bengal (Haora), Karnataka, Maharashtra. Elsewhere : Burma, Malaysia.

**Remarks** : The material of this species could not be available for our study. Imai *et al.* (1984) reported this species from Botanical Garden, Haora.

#### 34. Genus *Solenopsis* Westwood

1841. *Solenopsis* Westwood, *Ann. Mag. Nat. Hist.*, 6 : 87.

##### Key to the Species

1. Length over 3 mm.....*S. geminata*  
 Length under 3 mm.....*S. wroughtoni*

#### 84. *Solenopsis geminata* (Fabricius)

1804. *Atta geminata* Fabricius, *Syst. Piez.* : 423, ♀.

1862. *Formica geminata*, Roger, *Berl. Ent. Zeitschr.*, 6 : 289, ♀ ♀ ♂.

1903. *Solenopsis geminata*, Bingham, *Fauna Brit. India, Hym.*, 2 : 158, fig., 2 ♀ ♀ ♂

1951. *Solenopsis geminata*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 168.

**Material examined** : India : West Bengal : 4 ♀♀, Calcutta, Eden Gardens, 3.v.1965, coll. K. K. Ray and P. K. Biswas; 7 ♀♀, North 24-Parganas, Barasat, Bamunmura, 20.v.1965, coll. M. S. Shishodia and B. K. Biswas; 1 ♀, North 24-Parganas, Bangaon, Dhakapara, 9.vii.1965, coll. M. M. Ghosh and Party; 8 ♀♀, North 24-Parganas, Naihati, 13.vii.1965, coll. K. K. Ray and P. K. Biswas; 13 ♀♀, North 24-Parganas, Barrackpore, Harisabha Road, 29.ix.1965, coll. O.B. Chhotani; 1 ♀, North 24-Parganas, Naihati, Goalpara, 15.ii.1966, coll. R. P. Ghosh; 13 ♀♀, Darjiling, Reyang, Banks of Tista River (600 m.), 1.iv.1973, coll. H. S. Sharma and Party; 1 ♀, Calcutta, 15.vii.1985, coll. L. K. Ghosh; 6 ♀♀, Jalpaiguri, Rajabathkhawa, 13.i.1987, coll. V.D. Srivastava and Party.

**Distribution** : India : West Bengal (Calcutta, Darjiling, Haora, Jalpaiguri, North 24-Parganas).  
 Elsewhere : Spread pretty nearly over the tropics of two hemispheres.

**Remarks** : Imai *et al.* (1984) also reported the species from the campus of Calcutta University, Calcutta.

#### 85. *Solenopsis wroughtoni* Forel

1902. *Solenopsis wroughtoni* Forel, *Rev. Suisse Zool.*, 10 : 214.

1903. *Solenopsis wroughtoni*, Bingham, *Fauna Brit. India, Hym.*, 2 : 159, ♀.

**Distribution** : India : West Bengal, Orissa.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### 35. Genus *Tetramorium* Mayr

1855. *Tetramorium* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 5 : 423.

##### Key to the Species

1. Antennae 11-jointed.....*T. smithi*  
 Antennae 12-jointed ..... 2

2. Body colour dark brown or black; clypeus not carinate or toothed; the scape of antennae not reaching the top of the head; first node of pedicel distinctly longer than broad..... *T. christiei*

Body colour reddish yellow to light brown; clypeus either carinate or toothed; the scape of antennae extending to the top of the head; first node of pedicel as broad as or a little broader than long .....

.....*T. simillimum*

#### 86. *Tetramorium christiei* Forel

1902. *Tetramorium christiei* Forel, *Rev. Suisse Zool.*, **10** : 232, ♀.

1903. *Tetramorium christiei*, Bingham, *Fauna Brit. India, Hym.*, **2** : 178, ♀.

1951. *Tetramorium christiei*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1** : 175.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling), Sikkim.

*Remarks* : Bingham (1903) reported this species only from "Darjeeling" and "Sikhim"

#### 87. *Tetramorium simillimum* (Smith)

1851. *Myrmica simillimum* Smith, *List Brit. Anim. Brit. Mus.*, **6** : 118, ♀.

1903. *Tetramorium simillimum*, Bingham, *Fauna Brit. India, Hym.*, **2** : 185, ♀.

1977. *Tetramorium simillimum*, Bolton, *Bull. Br. Mus. nat. Hist. (Ent.)*, **36** (2) : 131 (Syns.); Bolton, 1980, *Bull. Br. Mus. nat. Hist. (Ent.)*, **40** (3) : 320 (Syns.).

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta). Elsewhere : Ethiopian and Indo-Malayan regions, Oceania.

*Remarks* : Bingham (1903) recorded the species within the limits from "Calcutta"

#### 88. *Tetramorium smithi* Mayr

1878. *Tetramorium smithi* Mayr, *Verh. Zool.-bot. Ges. Wien.*, **28** : 673, ♀.

1903. *Tetramorium smithi*, Bingham, *Fauna Brit. India, Hym.*, **2** : 188, ♀.

1977. *Tetramorium smithi*, Bolton, *Bull. Br. Mus. nat. Hist. (Ent.)*, **36** (2) : 90 (Syns.).

*Distribution* : India : West Bengal, Southern and Western India.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### 36. Genus *Triglyphothrix* Forel

1890. *Triglyphothrix* Forel, *Ann. Soc. Ent. Belge.*, **34** : C.R. 106.

#### Key to the Species

1. The metanotal spines long and slender; second node of pedicel closely punctured, opaque.....  
.....*T. obesa*

The metanotal spines short and slender; second node of pedicel smooth and shining, neither punctured, nor opaque.....*T. lanuginosa*

89. *Triglyphothrix obesa* (Er. André)

1887. *Tetramorium obesa* Er. André, *Rev. d'Ent.*, 6 : 294, ♀.

1903. *Triglyphothrix obesa*, Bingham, *Fauna Brit. India, Hym.*, 2 : 173, ♀.

1951. *Triglyphotrix obesa*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 178.

*Distribution* : India : West Bengal, Karnataka, Maharashtra.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

90. *Triglyphothrix lanuginosa* (Mayr)

1870. *Tetramorium lanuginosa* Mayr, *Verh. Zool.-bot. Ges. Wein.*, 20 : 972, ♀.

1902. *Triglyphotrix striatidens*, race *orissana* Forel, *Rev. Suisse Zool.*, 10 : 239, ♀.

1903. *Triglyphothrix orissana*, Bingham, *Fauna Brit. India, Hym.*, 2 : 174, ♀.

1951. *Triglyphotrix striatidens cressana*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 179.

1978. *Triglyphothrix lanuginosa*, Bolton, *Bull. Br. Mus. nat. Hist. (Ent.)*, 34 (5) 1976 : 350 (Syns.).

*Distribution* : India : West Bengal, Orissa.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II' however, mentioned only "Bengal" as its locality.

VII. Subfamily FORMICINAE Lepeletier

(Figures 6 e, f)

Key to the Tribe with Singular Genera

(Based on the workers)

1. Mandibular pattern almost like those of *Odontomachus*, very elongated, straight, linear, having at the extremity two large teeth and at the margin a few teeth wide apart, antennae 12-segmented, eyes large..... Tribe HYRMOTERATINI  
Alternate set of characters ..... 2
2. Antennae with 11 segments or less..... 3  
Antennae with 12 segments ..... 5
3. Flagellum thickened to the end with a club, more or less differentiated into 3 or 4 segments.....  
.....Tribe MYRMELACHISTINI  
Flagellum without differentiated club..... 4
4. Antennae with 9 segments; eye normal or small, placed a little to the side of the head.....  
..... Genus *Brachymyrmex*

- Antennae with 8-9 segments; eyes very large or with average length; crest & frontalis short and sparsed.....Tribe **DYMORPHOMYRMICINI**
- Antennae generally with 11 segments; sometimes with 10 or 8, but in this case the eyes of workers are very small or rudimentary and placed very much in front.....  
.....Tribe **PLAGIOLEPIDINI**
5. Epistome prolonged between the articulation of the antennae; frons absent; eyes large in worker; epinotum armed.....Tribe **SANTICHELLENI**
- Epistome not prolonged between the articulation of the antennae.....6
6. Metanotum forming a dorsal convexity which separates the mesonotum from the epinotum; pronotum provided with humeral grooves .....Genus **Notunchus**
- Metanotum distinct or fused with mesonotum in the epinotum, but not forming a dorsal groove .....7
7. Frontalis wide apart and highly differentiated, diverging towards the eyes but not reaching them; eye large, more or less reniform; placed in the posterior angle of the head .....  
.....Genus **Opisthopsis**
- Other set of characters.....8
8. Head more or less cordiform; eyes large; mandibles trigonal in shape, multidentate; antennae long, the scape passing much beyond the occiput, the last segment of the flagellum very much shorter than the proceeding one.....9
- Alternate set of characters ..... 10
9. Eyes large occupying almost the whole side of the head.....Tribe **GIGANTIOPINI**
- Eyes thick and convex, almost one-fourth of the side of the head.....Tribe **OECOPHYLINI**
10. Flagellum terminating in the club; the club not well differentiated, its last segment larger and thicker than the first .....Tribe **MYRMECHORHYNCHINI**
- Flagellum filiform, being thick imperceptibly towards the end..... 11
11. The insertion of the antennae placed at a distance more or less notable from the posterior of the epistome; clypeal fossa always separated from the antennal fossa.....Tribe **CAMPONOTINI**
- The insertion of antennae placed very close to the posterior angles of epistome; the clypeal fossa normally confluent with the antennal fossa..... 12
12. Falciform mandibles without masticatory margin; palpi short; maxilla 4-segmented, labrum 2-segmented.....Genus **Polyrgus**
- Mandibles more or less widely dentate; maxilla with 6 segments, labrum with 4 segments .... 13
13. Eyes placed at the middle or in front of the middle of the head.....Tribe **LASINI**
- Eyes placed behind or in the middle of the sides of the head..... 14

14. Gizzard with cup-like structure.....Genus *Melophorus*  
 Gizzard with straight sepals..... 15
15. Stigma of epinotum small, oval .....Tribe LASINI (Part)  
 Stigma of epinotum cleft internally..... Tribe FORMICINI

Tribe CAMPONOTINI

Key to the Genera

1. Basal segment of the abdomen less longer than the following segment; exceptionally with spiniform or dentiform appendices in the thorax or in the petiole ..... 2  
 Basal segment of the abdomen longer than the following, usually covering half the abdomen; generally with spiniform or dentiform appendices in the thorax and in the petiole; without dimorphism..... 4
2. Without dimorphism, body stout; head wide, truncated behind; back of the thorax depressed, sutures well visible, petiole with node; basal segment of the abdomen more or less longer than the following segment; colour often metallic .....*Calomyrmex* (Australian genus)  
 Without this set of characters ..... 3
3. Without dimorphism; head oval, sometimes prolonged in the form of a neck .....  
 .....*Dendromyrmex* (Neotropical genus)  
 Dimorphism more or less conspicuous, often extreme, very rarely absent, head having sometimes shape of previously described genera; but only in the minor workers.....*Camponotus*
4. Mesonotum grooved into a hole which is found between the pronotum and metanotum.....  
 .....*Hemioptica*  
 Thorax not giving this condition; the sutures are distinct on the back of the thorax, meso-epinotal suture obliterate; thorax and petiole usually armed with teeth or spines .....*Polyrhachis*

37. Genus *Camponotus* Mayr

1861. *Camponotus* Mayr, *Europ. Formicid.* : 35.

Key to the Species

1. Head anteriorly, obliquely and rather sharply truncate from just beyond the base of the clypeus ..  
 ..... 2  
 Head not truncate anteriorly..... 3
2. Head, thorax and abdomen black..... *C. angustata*  
 Head, thorax and abdomen yellowish brown .....*C. rothneyi*
3. Thorax viewed from side not forming regular arch; the metanotum horizontal, flat or slightly concave..... *C. sericeus*

- Thorax viewed from side forming a regular arch; the metanotum not horizontal..... 4
4. Head, thorax and abdomen entirely black, or yellow ..... 5  
 Head, thorax and abdomen never all black or all yellow ..... 7
5. Body colour entirely black; tibiae of the legs prismatic..... 6  
 Body colour entirely yellow; tibiae of the legs cylindrical ..... *C. invidus*
6. Length of ♀ maj. 11-16 mm.; head not forming a collar..... *C. compressus*  
 Length of ♀ maj. 17-21 mm.; head forming a distinct collar ..... *C. angusticollis*
7. Median lobe of clypeus produced anteriorly ..... 8  
 Median lobe of clypeus not produced anteriorly, short ..... 9
8. Head reddish yellow ..... *C. rufoglancus dolenda*  
 Head and 3rd following segments of abdomen black ..... *C. dichrous*
9. Tibiae cylindrical ..... *C. oblongus*  
 Tibiae compressed ..... 10
10. Node of pedicel conical..... *C. irritans*  
 Node of pedicel oval ..... *C. arrogans*

91. *Camponotus angustata* (Mayr)

1870. *Colobopsis angustata* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 20 : 924, ♀.

1903. *Colobopsis angustata*, Bingham, *Fauna Brit. India, Hym.*, 2 : 345, ♀.

1951. *Camponotus (Colobopsis) angustata*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 222.

*Material examined* : Nil.

*Distribution* : India : West Bengal (North 24-Parganas), Assam. Elsewhere : Burma, Malay.

*Remarks* : Bingham (1903) reported this species from "Bengal, Barrackpore"

92. *Camponotus angusticollis* (Jerdon) \*

1851. *Formica angusticollis* Jerdon, *Madras Journ. Lit. Sc.*, 17 : 120, ♀♀.

1903. *Camponotus angusticollis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 366, ♀♀.

1951. *Camponotus (Dinomyrmex) angusticollis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 229.

*Material examined* : India : West Bengal : 4 ♀♀, Darjiling, March 1973, coll. H.S. Sharma and Party.

*Distribution* : India : West Bengal (Darjiling), Assam, Central and Western India. Elsewhere : Burma.

93. *Camponotus arrogans* (Smith)

1858. *Formica arrogans* Smith, *Cat. Hym. Brit. Mus.*, 6 : 23, ♀.

1903. *Camponotus arrogans*, Bingham, *Fauna Brit. India, Hym.*, 2 : 357, ♀.

1951. *Camponotus (Tanaemyrmex) arrogans*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 243.

*Distribution* : India : West Bengal. Elsewhere : Burma, Malay Peninsula, Singapore.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### 94. *Camponotus compressus* (Fabricius) \*

1787. *Formica compressus* Fabricius, *Mant. Insect*, 1 : 307, ♀.

1903. *Camponotus compressus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 351, ♀ ♀ ♂

1951. *Camponotus (Myrmoturba) compressus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 244.

*Material examined* : India : West Bengal : 2 ♀♀, Darjiling, 3 km. South-East of Rangpo F.R.H. (600 m.), 10.iv.1973, coll. H.S. Sharma and Party; 2 ♀♀, Darjiling, 3 km. East of Rangpo F.R.H. (600 m.), April, 1973, coll. H. S. Sharma and Party; 14 ♀♀ maj. and 3 ♀♀ min., South 24-Parganas, Jharkhali, 22.iv.1986 (Day and Night), coll. B. N. Das and Party; 10 ♀♀, South 24-Parganas, Nafarganj (15 km. from Jharkhali), 22.iv.1986, coll. B. N. Das and Party; 23 ♀♀, South 24-Parganas, Joka, 30.iv.1986, coll. B. N. Das and Party; 1 ♀ maj. and 5 ♀♀ min., Bankura, Kamalpur, 10.ix.1986, coll. R. S. Barman and Party; 20 ♀♀, Calcutta, Lake Gardens, Lilly Pool, 12.viii.1990, coll. S. K. Tiwari; 10 ♀♀, Murshidabad, Berhampore, 5.iii.1991, coll. S. N. Ghosh.

*Distribution* : India : West Bengal (Bankura, Calcutta, Darjiling, Murshidabad, South 24-Parganas). Elsewhere : Borneo, Philippines.

#### 95. *Camponotus dichrous* Forel \*

1897. *Camponotus maculatus* Fabr., race *dichrous* Forel, *Bull. Soc. Vaud. Sc. Nat.*, 16 : 65, ♀.

1903. *Camponotus dichrous*, Bingham, *Fauna Brit. India, Hym.*, 2 : 356, ♀.

1925. *Camponotus (Myrmoturba) maculatus dichrous*, Emery, *Genera Insect.*, 183 : 101.

1951. *Camponotus dichrous*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 253.

*Material examined* : India : West Bengal : 5 ♀♀, Darjiling, Rangli Tea Estate (1450 m.), 25.iii.1973, coll. P. K. Maity and Party, ex. Stump of Katash (in Nepali) Plant.

*Distribution* : India : West Bengal (Darjiling).

#### 96. *Camponotus invidus* Forel \*

1892. *Camponotus invidus* Forel, *Journ. Bombay Nat. Hist. Soc.*, 7 : 225, ♀.

1903. *Camponotus invidus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 367, ♀.

1925. *Camponotus (Tanaemyrmex) invidus*, Emery, *Genera Insect.*, 183 : 93.

1951. *Camponotus (Tanaemyrmex) invidus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 246.

*Material examined* : India : West Bengal : 6 ♀♀, Darjiling, Andherikhola, Rangpo (500 m.), 9.iv.1973, coll. H. S. Sharma and Party; 2 ♀♀, Darjiling, Reyang F.R.H., banks of Reyang River

(300 m.), April, 1973, coll. H. S. Sharma and Party, ex. Rotten log; 5 ♀♀, Barddhaman, Jagatpur, 11.iv.1976, coll. D. K. Guha; 1 ♀, Medinipur, Jhargram, Jambani Forest, 3.x.1984, coll. A. K. Hazra and Party.

*Distribution* : India : West Bengal (Barddhaman, Darjiling, Medinipur), Orissa.

#### 97. *Camponotus irritans* (Smith) \*

1857. *Formica irritans* Smith, *Journ. Proc. Linn. Soc. Lond. Zool.*, 2 : 55, ♀.

1903. *Camponotus irritans*, Bingham, *Fauna Brit. India, Hym.*, 2 : 353, ♀.

1925. *Camponotus (Tanaemyrmex) irritans*, Emery, *Genera Insect.*, 183 : 98.

1951. *Camponotus (Tanaemyrmex) irritans*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check list Ants Asia), 1 : 246.

*Material examined* : India : West Bengal : 2 ♀♀, Darjiling, 1 km. East of Reyang F.R.H., Bank of Tista River (275 m.), 29.iii.1973, coll. H. S. Sharma and Party, ex. Rotten log.

*Distribution* : India : West Bengal (Darjiling). Elsewhere : Borneo, China, Java, Sri Lanka, Sumatra.

#### 98. *Camponotus oblongus* (Smith) \*

1858. *Formica oblongus* Smith, *Cat. Hym. Brit. Mus.*, 6 : 21, ♀.

1903. *Camponotus oblongus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 358, ♀.

1951. *Camponotus (Tanaemyrmex) oblongus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 249.

*Material examined* : India : West Bengal : 1 ♀, North 24-Parganas, Barrackpore, 7.vi.1990, coll. S. K. Pradhan.

*Distribution* : India : West Bengal (North 24-Parganas), Assam, Sikkim. Elsewhere : Bhutan, Burma, Singapore, Sri Lanka.

#### 99. *Camponotus rothneyi* (Forel)

1893. *Colobopsis rothneyi* Forel, *Journ. Bombay Nat. Hist. Soc.*, 7 : 435, ♀.

1903. *Colobopsis rothneyi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 346, ♀♀.

1951. *Camponotus (Colobopsis) rothneyi*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 226.

*Material examined* : Nil.

*Distribution* : India : West Bengal (North 24-Parganas), Orissa. Elsewhere : Japan, Singapore.

*Remarks* : Bingham (1903) reported this species and mentioned the habitat "Bengal, Orissa, Barrackpore"

#### 100. *Camponotus rufoglaucus dolenda* Forel \*

1892. *Componotus rufoglaucus dclendus* Forel, *Journ. Bombay Nat. Hist. Soc.*, 7 : 227, 238, ♀.

1903. *Camponotus dolendus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 364, ♀.

1925. *Camponotus (Myrmosericus) dolenda*, Emery, *Genera Insect.*, 183 : 106.

1951. *Camponotus (Myrmosericus) rufoglaucus dolenda*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 238.

**Material examined** : India : West Bengal : 4 ♀♀, Calcutta, Eden Gardens, 7.vi.1965, coll. A.N.T. Joseph; 1 ♀, South 24-Parganas, Lakshmikantapur, 15.x.1965, coll. S.P. Chakraborty and K. D. Chatterjee; 3 ♀♀, South 24-Parganas, Canning, 18.x.1965, coll. A.N.T. Joseph; 4 ♀♀, Calcutta, Dum Dum Airport, 24.xi.1965, coll. P. Parui and J. Singh; 10 ♀♀, Calcutta, Eden Gardens, 9.viii.1966, coll. K. K. Ray; 5 ♀♀, North 24-Parganas, Barrackpore, 7.x.1966, coll. O.B. Chhotani.

**Distribution** : India : West Bengal (Calcutta, North 24-Parganas, South 24-Parganas), Sikkim, North-West Himalayas.

#### 101. *Camponotus sericeus* (Fabricius) \*

1798. *Formica sericeus* Fabricius, *Ent. Syst. Suppl.* : 279.

1802. *Formica sericea*, Latreille, *Nat. Hist. Fourmis* : 117, pl. and fig.

1804. *Lasius sericeus*, Fabricius, *Syst. Piez.* : 416.

1862. *Camponotus sericeus*, Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 675, pl. and fig.

1903. *Camponotus sericeus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 376, fig. ♀♀ (Syns.).

1925. *Camponotus (Orthonotomyrmex) sericeus*, Emery, *Genera Insect.*, 183 : 125.

1951. *Camponotus (Orthonotomyrmex) sericeus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 242.

**Material examined** : India : West Bengal : 1 ♀, Calcutta, Eden Gardens, 3.v.1965, coll. K. K. Ray and P. K. Biswas; 6 ♀♀, North-24 Parganas, Barrackpore, Chandmari, 18.vi.1965, coll. K. K. Ray; 1 ♀, Darjiling, Rangpo, 10.iv.1973, coll. H.S. Sharma and Party; 1 ♀, Bankura, Simlipal, 24.xii.1965, coll. D. K. Mandal and Party.

**Distribution** : India : West Bengal (Bankura, Calcutta, Darjiling, North 24-Parganas). Elsewhere : Burma, Sri Lanka.

#### 102. *Camponotus* sp.

**Diagnostic characters** : ♀ TL 5-6 mm. Resembles ♀ min. of *C. sericeus* but differs in the followings.

Black, subopaque, without any granular appearance on the head and thorax. Pubescence on head, thorax and node of pedicel moderate. Head rectangular, somewhat longer than broad; anterior margin of clypeus not transverse, rather convex. Thorax elongated, not so broad in front; metanotum somewhat convex. Node of pedicel lower than the metanotum.

**Material examined** : India : West Bengal : 50 ♀♀, Darjiling, 3 km. South East of Rangpo F.R.H. (750 m.), 10.iv.1973, coll. H. S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling).

#### 38. Genus *Polyrhachis* Smith

1857. *Polyrhachis* (Part) Smith, *Journ. Proc. Linn. Soc. Lond. Zool.*, 2 : 58.

1862. *Polyrhachis*, Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 677.

#### Key to the Species

1. Thorax more or less rounded above, the sides not margined along their whole length ..... 2
- Thorax more or less flat above, the sides margined along their whole length ..... 5

2. Pronotum with a short tooth on each side; mesonotum and metanotum unarmed.....*P. laevissima*  
     Pro-and metanotum with a spine on each side; mesonotum unarmed..... 3
3. Pedicel spines wide-spreading, shaped so as to encircle front of abdomen .....*P. tubericeps*  
     Pedicel spines not so wide-spreading, not shaped so as to encircle the abdomen..... 4
4. Pubescence sparse, almost entirely wanting; node of pedicel without median spines..... *P. simplex*  
     Pubescence dense, silky, recumbent and silvery .....*P. tibialis*
5. Pronotum without spine ..... *P. clypeata*  
     Pronotum with spine; mesonotum unarmed..... 6
6. Pronotum with long spine; metanotum with a tooth or tubercle on each side; node of pedicel bispinate..... *P. mayri*  
     Pronotum with a short spine; metanotum with a lamina; node of pedicel tri-spinate .....*P. thrinax*

#### 103. *Polyrhachis clypeata* Mayr

1862. *Polyrhachis clypeata* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 683, ♀.

1903. *Polyrhachis clypeata*, Bingham, *Fauna Brit. India, Hym.*, 2 : 411, ♀♀.

1951. *Polyrhachis (Campomyrma) clypeata*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 257.

*Distribution* : India : West Bengal, Kerala, Western India. Elsewhere : Sri Lanka.

*Remarks* : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as is locality.

#### 104. *Polyrhachis laevissima* Smith

1858. *Polyrhachis laevissima* Smith, *Cat. Hym. Brit. Mus.*, 6 : 64, pl., fig., ♀.

1903. *Polyrhachis laevissima*, Bingham, *Fauna Brit. India, Hym.*, 2 : 402, fig., ♀ ♀ ♂

1925. *Polyrhachis (Cyratomyrma) laevissima*, Emery, *Genera Insect.*, 183 : 207.

1951. *Polyrhachis (Cryatomyrma) laevissima*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 264.

*Material examined* : India : West Bengal : 30 ♀♀, Jalpaiguri, Alipur Duar, Chachikhata, 15.i.1987, coll. V.D. Srivastava and Party.

*Distribution* : India : West Bengal (Jalpaiguri). Elsewhere : Borneo, Burma, Singapore.

#### 105. *Polyrhachis mayri* Roger

1863. *Polyrhachis mayri* Roger, *Verz. Formicid.* : 7, ♀.

1903. *Polyrhachis mayri*, Bingham, *Fauna Brit. India, Hym.*, 2 : 404, fig., ♀ ♀.

1925. *Polyrhachis (Myrma) mayri*, Emery, *Genera Insect.*, 183 : 201.

1951. *Polyrhachis (Myrma) mayri*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 272.

*Material examined* : India : West Bengal : 4 ♀♀, Darjiling, 3 km. South-East of Rangpo F.R.H. (750 m.), 10.iv.1973, coll. H.S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling). Elsewhere : Borneo, Burma, China, Java, Philippines, Sri Lanka. Sumatra.

106. *Polyrhachis simplex* Mayr

1862. *Polyrhachis simplex* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 12 : 682, ♀.  
 1903. *Polyrhachis simplex*, Bingham, *Fauna Brit. India, Hym.*, 2 : 394, ♀♀♂  
 1951. *Polyrhachis (Myrmhopla) simplex*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 297.

**Material examined** : India : West Bengal : 5 ♀♀, Darjiling, 1973, coll. P. K. Maity and H.S. Sharma.

**Distribution** : India : West Bengal (Darjiling). Elsewhere : Burma, Sri Lanka.

107. *Polyrhachis thrinax* Roger

1863. *Polyrhachis thrinax* Roger, *Berl. Ent. Zeitschr.*, 7 : 152, ♀.  
 1903. *Polyrhachis thrinax*, Bingham, *Fauna Brit. India, Hym.*, 2 : 410, ♀♀♂  
 1959. *Polyrhachis (Myrmothrinax) thrinax*, Brown, *Ent. News, Lancaster*, 70 : 104.  
 1959. *Polyrhachis (Myrmothrinax) thrinax* var. *mucronis* Donisth., Brown, *Ent. News, Lancaster*, 70 : 104.

**Distribution** : India : West Bengal, Karnataka, South India. Elsewhere : Burma, Java, Sri Lanka.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

108. *Polyrhachis tibialis* Smith

1858. *Polyrhachis tibialis* Smith, *Cat. Hym. Brit. Mus.*, 6 : 63, ♀.  
 1903. *Polyrhachis tibialis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 396, ♀♀.  
 1951. *Polyrhachis (Myrmhopla) tibialis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 298.

**Distribution** : India : West Bengal, Karnataka, South India. Elsewhere : Borneo, Burma, Malay, Sri Lanka.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II' however, mentioned only "Bengal" as its locality.

109. *Polyrhachis tubericeps* Forel

1893. *Polyrhachis tubericeps* Forel, *Journ. Bombay Nat. Hist. Soc.*, 8 : 26, ♀.  
 1903. *Polyrhachis tubericeps*, Bingham, *Fauna Brit. India, Hym.*, 2 : 391, ♀.  
 1951. *Polyrhachis (Myrmhopla) tubericeps*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 299.

**Material examined** : Nil.

**Distribution** : India : West Bengal (North 24-Parganas), North-West India.

**Remarks** : Bingham (1903) reported this species from "Bengal, Barrackpore".

Tribe LASIINI (Ashmead)

Key to the Genera

1. Eyes placed almost within middle or in front of the middle of the head.....***Paratrechina***  
   Eyes placed behind the middle of the head..... 2
2. Palpi very long; fourth segment of maxillary palpi hairy, at least of the length of following two segments taken together.....***Myrmecocystus***  
   Palpi variable, never very long; at least of the length of the ventral side of the head..... ***Lasius***

**\*\* 39. Genus *Lasius* Fabricius**

1804. *Lasius* (Part) Fabricius, *Syst. Piez.* : 415.

1861. *Lasius* Mayr, *Europ. Formicid.* : 29, 49.

**110. *Lasius alienus* (Forster) \***

1850. *Formica aliena* Forster, *Hym. Stud.*, 1 : 36, 71, ♀♀ ♂

1861. *Lasius alienus*, Mayr, *Europ. Formicid.* : 49.

1903. *Lasius alienus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 342, ♀.

1951. *Lasius (Lasius) niger alienus*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, 1 : 202.

1955. *Lasius (Lasius) alienus*, Wilson, *Bull. Mus. comp. Zool. Harv., Cambridge*, 113 : 86-89.

1989. *Lasius alienus*, Mackay et al., *E. J. Brill., Leiden, New York, etc. (Adv. in Myrmecology)* : 1-551.

**Diagnostic characters** : ♀ TL 2.5-3.5 mm. Reddish brown to dark brown; densely pubescent. Head without the mandibles quadrangular, the sides straight; the mandibles somewhat long, subtriangular, the masticatory margin oblique, dentate, antennae rather long, the scape extending beyond the top of the head by about one-quarter of its length. Thorax short and broad, the posterior face of metanotum particularly broad. Node of pedicel low, slightly convex anteriorly; abdomen very large and massive, strongly convex above.

**Material examined** : India : West Bengal : 58 ♀♀, Darjiling, Forest Nursery around Ghoombhanjan (2025 m.), 16.iii.1973, coll. P. K. Maity and Party.

**Distribution** : India : West Bengal (Darjiling), North-West Himalayas. Elsewhere : America, Europe, Japan.

**\*\* 40. Genus *Myrmecocystus* Wesmael**

1838. *Myrmecocystus* Wesmael, *Bull. Acad. Sc. Brux.*, 5 : 770.

**111. *Myrmecocystus setipes* Forel \***

1894. *Myrmecocystus viaticus*, race *setipes* Forel, *Journ. Bombay Nat. Hist. Soc.*, 8 : 401, ♀.

1903. *Myrmecocystus setipes*, Bingham, *Fauna Brit. India, Hym.*, 2 : 312, ♀.

1951. *Myrmecocystus setipes*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 203.

**Diagnostic characters** : ♀. TL 10-12 mm. Head, thorax, legs and node of pedicel dark red, abdomen black. Pilosity on the head, thorax and abdomen sparse, confined to a few scattered erect hairs, most numerous on the underside of the abdomen, legs densely setose and spinous; pubescence extremely minute and fine. Head without the mandibles quadrangular, the sides straight or very slightly convex; mandibles comparatively large, strongly dentate; the apical tooth remarkably long, curved and acute; maxillary palpi 6-jointed; 12-jointed antennae springing from just behind the posterior border of the clypeus. Thorax viewed from the side constricted in the middle, saddle-shaped, the sutures well marked; pronotum convex; mesonotum long, narrow; metanotum short, gibbous. Pedicel one-jointed, node rounded, not much raised; abdomen somewhat short, oval.

**Material examined** : India : West Bengal : 4 ♀♀, Haora, Santragachi, 12.ii.1989, coll. P.K. Tiwari and R.N. Tiwari; 6 ♀♀, Calcutta, Lake Gardens, 12.iv.1990, coll. S.K. Tiwari; 4 ♀♀, Murshidabad, Berhampore, 8.xii.1990, coll. S.N. Ghosh.

**Distribution** : India : West Bengal (Calcutta, Haora, Murshidabad), Punjab, Central India. Elsewhere : Persia.

#### 41. Genus *Paratrechina* Motschoulsky

1863. *Paratrechina* Motschoulsky, *Bull. Soc. Natural Moscou*, 36 : 13.

1958. *Paratrechina*, Brown, Jr., *Acta Hymenopterologica*, 1 (1) : 45 (Syns.).

#### Key to The Species

1. Body pale yellow in colour; head oval, narrowed posteriorly..... *P. taylori*  
Body brownish yellow in colour; head quadrangular, broad posteriorly..... 2
2. The scape of antennae hardly extending upto the top of the head..... *P. bourbonica*  
The scape of antennae clearly extending beyond the top of the head..... 3
3. The scape of antennae extending by more than half of its length ..... *P. longicornis*  
The scape of antennae extending approximately one-fourth of its length ..... 4
4. Mandible armed with 5 teeth..... *P. indica*  
Mandible armed with 6 teeth..... *P. aseta*

#### 112. *Paratrechina aseta* (Forel)

1902. *Prenolepis aseta* Forel, *Ann. Soc. Ent. Belg.*, 46 : 292, ♀.

1903. *Prenolepis aseta*, Bingham, *Fauna Brit. India, Hym.*, 2 : 332, ♀.

1951. *Nylanderia aseta*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 214.

**Material examined** : Nil.

**Distribution** : India : West Bengal (Darjiling), Sikkim.

**Remarks** : Bingham (1903) reported this species under the genus *Prenolepis* from "Sikkim" and "Darjeeling"

113. *Paratrechina bourbonica* (Forel)

1886. *Prenolepis nodifera bourbonica* Forel, *Ann. Soc. Ent. Belg.*, 30 : 210.

1894. *Prenolepis bourbonica* Forel, race *bengalensis* Forel, *Journ. Bombay Nat. Hist. Soc.*, 8 : 406.

1903. *Prenolepis bengalensis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 328, ♀.

1951. *Nylanderia bourbonica bengalensis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 215.

1967. *Paratrechina (Nylanderia) bourbonica*, Wilson and Taylor, *Pacific Ins. Monogr.*, 14 : 88.

1987. *Paratrechina bourbonica*, Taylor, *CSIRO Aust. Div. Entomol.*, Rep. No. 41 : 52.

**Material examined** : Nil.

**Distribution** : India : West Bengal. Elsewhere : Burma.

**Remarks** : Bingham (1903) reported the species, *Prenolepis bengalensis* and mentioned only "Bengal" as its locality.

114. *Paratrechina indica* (Forel)

1894. *Prenolepis indica* Forel, *Journ. Bombay Nat. Hist. Soc.*, 8 : 407.

1903. *Prenolepis indica*, Bingham, *Fauna Brit. India, Hym.*, 2 : 329, ♀ ♀ ♂.

1951. *Nylanderia indica*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 216.

1970. *Paratrechina (Nylanderia) indica*, Collingwood, *Khumbu Himal.*, 3 (3) : 379.

**Material examined** : India : West Bengal : 6 ♀♀, Darjiling, March, 1973, coll. H.S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling). Elsewhere : Sri Lanka.

115. *Paratrechina taylori* (Forel)

1894. *Prenolepis taylori* Forel, *Journ. Bombay Nat. Hist. Soc.*, 8 : 407, ♀♀ ♂

1903. *Prenolepis taylori*, Bingham, *Fauna Brit. India, Hym.*, 2 : 328, ♀♀ ♂.

1951. *Nylanderia taylori*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 217.

**Distribution** : India : West Bengal, Orissa, Western India. Elsewhere : Sri Lanka.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) reported the species, *Prenolepis taylori* and mentioned only "Bengal" as its locality.

116. *Paratrechina longicornis* (Latreille)

1802. *Formica longicornis* Latreille, *Nat. Hist. Fourmis.* : 113, ♀.

1903. *Prenolepis longicornis*, Bingham, *Fauna Brit. India, Hym.*, 2 : 326, ♀♀ ♂.

1951. *Paratrechina (Paratrechina) longicornis*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 218.

1987. *Paratrechina longicornis*, Taylor, *CSIRO Aust. Div. Entomol.*, Rep. No. 41 : 52.

*Distribution* : India : West Bengal (Calcutta), throughout India. Elsewhere : Oceania, Senegal.

*Remarks* : The material of this species could not be available for our study. Imai *et al.* (1984) reported this species from the campus of Calcutta University, Calcutta.

#### Tribe OECOPHYLINI

#### 42. Genus *Oecophylla* Smith

1860. *Oecophylla* Smith, *Journ. Proc. Linn. Soc. Lond. Zool.*, 4 (suppl.) : 101.

#### 117. *Oecophylla smaragdina* (Fabricius)

1775. *Formica smaragdina* Fabricius, *Syst. Ent.* : 828, ♀, pl., figs.

1860. *Oecophylla smaragdina*, Smith, *Journ. Proc. Linn. Soc. Lond. Zool.*, 4 (suppl.) : 102.

1903. *Oecophylla smaragdina*, Bingham, *Fauna Brit. India, Hym.*, 2 : 311, fig., ♀♀♂.

1951. *Oecophylla smaragdina*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 220.

*Diagnostic characters* : ♀. maj. TL 9.5-11 mm. Yellowish red. Head and thorax not pilose, abdomen with a few short erect hairs; pubescence very thin, fine and minute, rather whitish in colour; head, thorax, legs, node of pedicel and abdomen dull, subopaque. Head without the mandibles roundly quadrangular; mandibles long, with the masticatory margin very broad in proportion to length, dentate, the apical tooth acute and curved; clypeus strongly convex; antennae 12-jointed, filiform. Thorax elongate; pronotum convex, anteriorly narrowed into a collar; mesonotum constricted, narrow; metanotum rounded above, gibbous; legs long and slender. Pedicel elongate, incrassate in the middle, scarcely nodiform; abdomen short, oval.

*Material examined* : India : West Bengal : 50 ♀♀, Darjiling, Reyang F.R.H., 31.iii.1973, coll. H.S. Sharma and Party, ex. Plants; 100 ♀♀, Darjiling, 1 km. South of Rambhi (2150 m.), 12.iv.1973, coll. H.S. Sharma and Party, ex. Rotten log; 9 ♀♀, Haora, Kaijure, 24.i.1986, coll. B. Dutta and G. Sen; 4 ♀♀, Bankura, Indus, 5.iii.1986, coll. K. P. Mukherjee and Party; 36 ♀♀, Jalpaiguri, Alipur Duar, Rajabhathkhawa, 10.i.1987, coll. V.D. Srivastava and Party; 3 ♀♀, Jalpaiguri, Boxa Duar (Santalbari), 11.i.1987, coll. V.D. Srivastava and Party; 20 ♀♀, Calcutta, Safari Park, 5.iii.1989, coll. S.K. Tiwari; 12 ♀♀, Murshidabad, Beldanga, 15.v.1990, coll. S.N. Ghosh.

*Distribution* : India : West Bengal (Bankura, Calcutta, Darjiling, Haora, Jalpaiguri, Murshidabad), the whole India, except Desert & Treeless area. Elsewhere : Australia, Burma, China, Java, New Guinea, Sri Lanka.

*Remarks* : Imai *et al.* (1984) also reported this species from the campus of Calcutta University, Calcutta.

#### Tribe PLAGIOLEPIDINI

#### Key to the Genera

1. Epinotum more or less bituberculate or bispinuate; scale normally grooved or bicuspid.....  
.....*Acantholepis*

Epinotum not so ..... 2

2. Metanotum marked over the back by sutures; the meso-metanotal suture always profoundly impressed, but in some small species meta-epinotal suture more or less obliterate; species rarely dimorphic..... **Plagiolepis**

Metanotum more or less fused with the mesonotum; species often dimorphic and with extremely variable shape ..... **Anoplolepis**

#### 43. Genus *Acantholepis* Mayr

1861. *Acantholepis* Mayr, *Europ. Formicid.* : 42.

#### Key to the Species

1. Scape of antennae long, extending for more than half its length beyond the top of the head.....  
..... **A. frauenfeldi**
- Scape of antennae short, extending beyond the top of the head by not more than one-third of its length..... **A. capensis simplex**

#### 118. *Acantholepis capensis simplex* Forel

1892. *Acantholepis simplex* Forel, *Ann. Soc. Ent. Belg.*, 36 : 43, ♀.

1903. *Acantholepis simplex*, Bingham, *Fauna Brit. India, Hym.*, 2 : 317, ♀.

1951. *Acantholepis capensis simplex*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 210.

**Distribution** : India : West Bengal, Orissa, Northern India. Elsewhere : Arabia, North-Eastern Africa, Rhodesia.

**Remarks** : The material of this species could not be available for our study. Bingham (1903) in 'The Fauna of British India, Vol. II', however, mentioned only "Bengal" as its locality.

#### 119. *Acantholepis frauenfeldi* (Mayr)

1885. *Hypocheilichne frauenfeldi* Mayr, *Verh. Zool.-bot. Ver. Wien.*, 5 : 378, ♀.

1903. *Acantholepis frauenfeldi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 316, ♀♀.

**Material examined** : Nil.

**Distribution** : India : West Bengal (North 24-Parganas), confined chiefly to the Hills. Elsewhere : Northern Africa and Southern Europe.

**Remarks** : Bingham (1903) reported this species from "Barrackpore", collected by Rothneyi.

#### \*\* 44. Genus *Anoplolepis* Santschi

1914. *Plagiolepis*, Subg. *Anoplolepis* Santschi, *Voy. Alluand and Jeannel, Afr. Or. Hym.* : 123.

1925. *Anoplolepis*, Emery, *Genera Insect.*, 183 : 16.

120. *Anoplolepis longipes* (Jerdon) \*1851. *Formica longipes* Jerdon, *Madras Journ. Lit. Soc.*, 17 : 122, ♀.1903. *Plagiolepis longipes*, Bingham, *Fauna Brit. India, Hym.*, 2 : 320, ♀.1951. *Anoplolepis longipes*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 213.

**Diagnostic characters** : ♀. TL 3.5-4.5 mm. From pale honey-yellow to a light orange-yellow; abdomen above with a tinge of brown; head, thorax and abdomen very minutely and closely reticulate-punctate, but shining; pubescence wanting. Head oval, very rounded posteriorly, mandibles narrow, acutely dentate along the masticatory margin; eyes very prominent; antennae long, filiform, the joints of flagellum much longer than broad. Thorax narrow, elongate, constricted at the mesonotum; the meso-metanotal suture slightly emarginate, the metanotum rounded, convex and gibbous. Node of pedicel thick, low, conical, rounded above; abdomen broadly oval, short and massive.

**Material examined** : India : West Bengal : 5 ♀♀, Darjiling, March, 1973, coll. H.S. Sharma and Party.

**Distribution** : India : West Bengal (Darjiling), throughout India except the North-West areas. Elsewhere : Burma, Dutch New Guinea, Maffin Bay, Sri Lanka.

45. Genus *Plagiolepis* Mayr1861. *Plagiolepis* Mayr, *Europ. Formicid.* : 42.

## Key to the Species

1. Body length over 2 mm.; scape of the antennae short, extending very little beyond the top of the head ..... *P. rothneyi*  
 Body length under 2 mm.; scape of the antennae barely extending beyond the top of the head .....  
 ..... *P. dichroa*

121. *Plagiolepis dichroa* Forel1902. *Plagiolepis dichroa* Forel, *Rev. Suisse Zool.*, 10 : 235.1903. *Plagiolepis dichroa*, Bingham, *Fauna Brit. India, Hym.*, 2 : 323, ♀.1951. *Plagiolepis dichroa*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1 : 213.

**Material examined** : Nil.

**Distribution** : India : West Bengal (North 24-Parganas), Sikkim.

**Remarks** : Bingham (1903) reported this species and mentioned only "Bengal" as its locality. Subsequently, Chapman and Capco (1951) also reported this species from "Barrackpore, Bengal"

122. *Plagiolepis rothneyi* Forel1854. *Plagiolepis rothneyi*, Forel, *Journ. Bombay Nat. Hist. Soc.*, 8 : 414, ♀.1903. *Plagiolepis rothneyi*, Bingham, *Fauna Brit. India, Hym.*, 2 : 322, ♀.

*Material examined* : Nil.

*Distribution* : India : West Bengal, Western India.

*Remarks* : Bingham (1903) reported this species and mentioned only "Bengal" as its.

#### POST SCRIPT

Since completion of the manuscript and reading of Gallery-proof, some important references have come to the authors' notice. The taxa listed below have been reported by Wilson Jr. (1958) from Calcutta and Imai et al. (1984) from Botanical Garden, Haora.

#### 123. *Aenictus Pachycerus* (Smith)

1858. *Eciton pachycerus* Smith, *Cat. Hym. Brit. Mus.*, 6 : 153, ♀.

1903. *Aenictus pachycerus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 20, ♀, fig.

1958. *Aenictus pachycerus*, Wilson, *Pacific Ins.*, 6 (3) : 471, ♀ (Syns.).

*Distribution* : India : West Bengal (Calcutta), throughout India.

#### 124. *Anochetus graeffei* Mayr

1870. *Anochetus graeffei* Mayr, *Verh. Zool.-bot. Ges. Wien.*, 20 : 961, ♀.

1984. *Anochetus graeffei*, Imai et al., *Jpn. J. Genet.*, 59 : 5, 10.

*Distribution* : India : West Bengal (Haora). Elsewhere : Fuji, Java.

#### 125. *Centromyrmex feae* (Emery)

1889. *Spalacomymex feae* Emery, *Ann. Mus. Civ. Stor. Nat. Genova*, 27 : 491, pls., fig., ♀.

1903. *Centromyrmex feae*, Bingham, *Fauna Brit. India, Hym.*, 2 : 94, ♀♀♂.

1984. *Centromyrmex feae*, Imai et al., *Jpn. J. Genet.*, 59 : 5, 12.

*Distribution* : India : West Bengal (Haora). Elsewhere : Burma, China, Java, Philippines, Sri Lanka.

#### 126. *Cerapachys biroi* Forel

1907. *Cerapachys biroi* Forel, *Ann. Mus. Nat. Hung.*, 5 : 7, ♀.

1984. *Cerapachys biroi*, Imai et al., *Jpn. J. Genet.*, 59 : 5, 14.

*Distribution* : India : West Bengal (Haora). Elsewhere : Singapore.

#### 127. *Camponotus paria* Emery

1889. *Camponotus micans* Nyl., race *paria* Emery, *Ann. Mus. Civ. Stor. Nat. Genova*, 27 : 513, ♀.

1903. *Camponotus paria*, Bingham, *Fauna Brit. India, Hym.*, 2 : 364, ♀♀.

1984. *Camponotus paria*, Imai et al., *Jpn. J. Genet.*, 59 : 9, 26.

*Distribution* : India : West Bengal (Haora), throughout India. Elsewhere : Burma, China, Malacca, Sri Lanka.

128. *Camponotus taylori* Forel

1892. *Camponotus maculatus* Fabricius, race *taylori* Forel, *Journ. Bombay Nat. Hist. Soc.*, 7 : 229, 241, ♀.

1903. *Camponotus taylori*, Bingham, *Fauna Brit. India, Hym.*, 2 : 353, ♀.

1984. *Camponotus taylori*, Imai *et al.*, *Jpn. J. Genet.*, 59 : 9, 26.

*Distribution* : India : West Bengal (Haora), throughout India. Elsewhere : Burma, China, Sri Lanka.

## SUMMARY

The monograph deals with the Ants fauna collected from several districts of West Bengal. Altogether 128 ants species pertaining to 45 genera under 7 subfamilies have been reported. Before undertaking the present work a total of 60 species under 29 genera and 5 subfamilies were known from the state (Bingham, 1903). It also records 42 species along with the subspecies, under 21 genera and 5 subfamilies, from the first time from West Bengal. Out of 47 genera, 10 genera have also been recorded new to West Bengal. The taxa marked with asterics in the Systematic Account are new records from West Bengal. Key to identification of the subfamilies, tribes, genera and species dealt in the monograph and diagnostic features of the species described from the state have also been incorporated. A separate chart showing the distribution pattern of recorded species, district-wise is also included to have the distribution of the species at a glance. Besides this group being a rare group, the morphology and methodology have been separately dealt with, to provide the basic concept of this family.

## ACKNOWLEDGEMENTS

The authors acknowledge with thanks the guidance, kind encouragement and facilities provided to them by Dr. A. K. Ghosh, Director, Zoological Survey of India, Calcutta. A sense of indebtedness is extended to Dr. S.K. Bhattacharya, Additional Director (Scientist-SG) and Dr. A.K. Ghosh, Joint Director (Scientist-SF), Z.S.I., Calcutta for their assiduous guidance and constant supervision throughout the course of this investigation. Authors are also extremely grateful to Dr. J.K. Jonathan, Scientist-SE, Dr. T. Sengupta, Scientist-SE, Mr. K.K. Ray, Scientist-SD, Mr. S.B. Roy, Assistant Zoologist, Z.S.I. Calcutta for their sincere help, inspiration and valuable suggestions. A deep sense of gratitude is expressed to Mr. D.K. Mondal, Assistant Zoologist, Z.S.I. Calcutta for helping in translation of French literature, and to Dr. D.K. Guha, Lecturer, Vivekananda College, Burdwan, for helping in collection of ants from various places of West Bengal and identification those of, during his tenure of stay in this department. The authors are equally thankful to Mr. Sandeep Kr. Tiwari, Calcutta, son of senior author, for taking keen interest in collecting, preserving the specimen from various localities and for helping in different ways in preparation of manuscript, without which the work would not have been completed within the stipulated period and to Mr. P.N. Ray, Insect Setter, Z.S.I., Calcutta for helping in setting, pinning of the specimen for the study.

**Fauna of West Bengal (Insecta : Hymenoptera : Formicidae)**  
**District-wise Distribution**  
(Vide-Map)

Sl. No.	Name of the Species	Name of the district																
		Bankura	Bardhaman	Birbhum	Calcutta	Darjiling	Haora	Hugli	Jalpaiguri	Koch Bihar	Maldah	Medinipur	Murshidabad	Nadia	North 24-Parganas	Puruliya	South 24-Parganas	West Dinajpur
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

- |     |   |  |   |   |   |   |   |   |   |  |  |  |   |   |   |  |  |   |
|-----|---|--|---|---|---|---|---|---|---|--|--|--|---|---|---|--|--|---|
| 1.  | <i>Dorylus (Typhlopone) labiatus</i> Shuckard         |  |   |   | + | + |   |   |   |  |  |  |   |   |   |  |  |   |
| 2.  | <i>D. (Alaopone) orientalis</i> Westwood              |  |   |   |   | + | + |   |   |  |  |  |   | + |   |  |  |   |
| 3.  | <i>Aenictus clavitibia</i> Forel                      |  |   |   |   |   |   |   |   |  |  |  |   |   | + |  |  |   |
| 4.  | <i>A. shuckardi</i> Forel⊗                            |  |   |   |   |   |   |   |   |  |  |  |   |   |   |  |  |   |
| 5.  | <i>A. brevicornis</i> (Mayr)                          |  |   |   | + |   |   |   |   |  |  |  |   |   |   |  |  |   |
| 6.  | <i>Lioponera longitarsus</i> Mayr⊗                    |  |   |   |   |   |   |   |   |  |  |  |   |   |   |  |  |   |
| 7.  | <i>L. parva</i> Forel⊗                                |  |   |   |   |   |   |   |   |  |  |  |   |   |   |  |  |   |
| 8.  | <i>Anochetus madaraszi</i> Mayr                       |  | + |   |   |   |   | + |   |  |  |  |   |   |   |  |  |   |
| 9.  | <i>A. punctiventris</i> Mayr⊗                         |  |   |   |   |   |   |   |   |  |  |  |   |   |   |  |  |   |
| 10. | <i>Bothroponera bispinosa</i> (Smith)                 |  |   |   |   |   |   | + |   |  |  |  |   |   |   |  |  |   |
| 11. | <i>B. rufipes</i> (Jerdon)                            |  |   |   |   |   |   | + | + |  |  |  |   | + |   |  |  |   |
| 12. | <i>B. sulcata</i> (Frauenfeldi)                       |  |   |   | + |   |   |   |   |  |  |  |   | + |   |  |  | + |
| 13. | <i>B. tesserinoda</i> (Emery)                         |  | + | + |   |   |   | + |   |  |  |  |   | + | + |  |  | + |
| 14. | <i>Diacamma rugosum</i> var. <i>sculptum</i> (Jerdon) |  |   |   |   |   |   |   |   |  |  |  |   |   | + |  |  |   |
| 15. | <i>D. scalpratum</i> (Smith)                          |  | + |   |   |   |   | + |   |  |  |  |   |   |   |  |  |   |
| 16. | <i>D. vagans</i> (Smith)                              |  | + |   | + | + | + | + | + |  |  |  | + | + | + |  |  | + |
| 17. | <i>Ectomyrmex javana</i> Mayr                         |  |   |   |   |   |   | + |   |  |  |  |   |   |   |  |  |   |
| 18. | <i>E. javana materna</i> Forel                        |  |   |   |   |   |   | + |   |  |  |  |   |   |   |  |  |   |

Name of the species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
19. <i>Brachyponera jerdoni</i> (Forel)⊗																	
20. <i>B. luteipes</i> (Mayr)		+			+												
21. <i>Leptogenys (Lobopelta) birmana</i> Forel		+					+										
22. <i>L. (L.) chinensis</i> Mayr		+											+	+			
23. <i>L. (L.) diminuta</i> (Smith)					+	+											
24. <i>L. (L.) diminuta hodgsoni</i> forel					+												
25. <i>L. (L.) diminuta striatula</i> Emery		+			+												
26. <i>L. (L.) kitteli</i> Mayr				+									+	+			
27. <i>L. (L.) minchini</i> Forel						+											
28. <i>L. (L.) ocellifera</i> (Roger)						+	+						+				
29. <i>L. (L.) punctiventris</i> Mayr				+													
30. <i>L. (L.) roberti coonoorensis</i> Forel					+												
31. <i>Odontomachus monticola</i> Emery					+												
32. <i>Platythyrea wroughtoni var. victoriae</i> Forel⊗																	
33. <i>Ponera confinis</i> Roger⊗																	
34. <i>Ponera truncata</i> Smith					+												
35. <i>Ponera</i> sp.																+	
36. <i>Sphinctomyrmex taylori</i> Forel⊗																	
37. <i>Stictoponera menadensis bicolor</i> Emery					+												
38. <i>Amblyopone rothneyi</i> Forel⊗																	
39. <i>Bothriomyrmex walshi</i> Forel⊗																	
40. <i>B. wroughtoni dalyi</i> Forel⊗																	
41. <i>Dolichoderus bituberculatus</i> (Mayr)					+												
42. <i>Iridomyrmex anceps</i> (Roger)											+						
43. <i>Tetraponera (Tetraponera) allaborans</i> (Walker)													+				
44. <i>T. (T.) binghami</i> (Forel)					+												
45. <i>T. (T.) nigra</i> (Jerdon)⊗																	
46. <i>T. (T.) rufonigra</i> (Jerdon)				+										+		+	

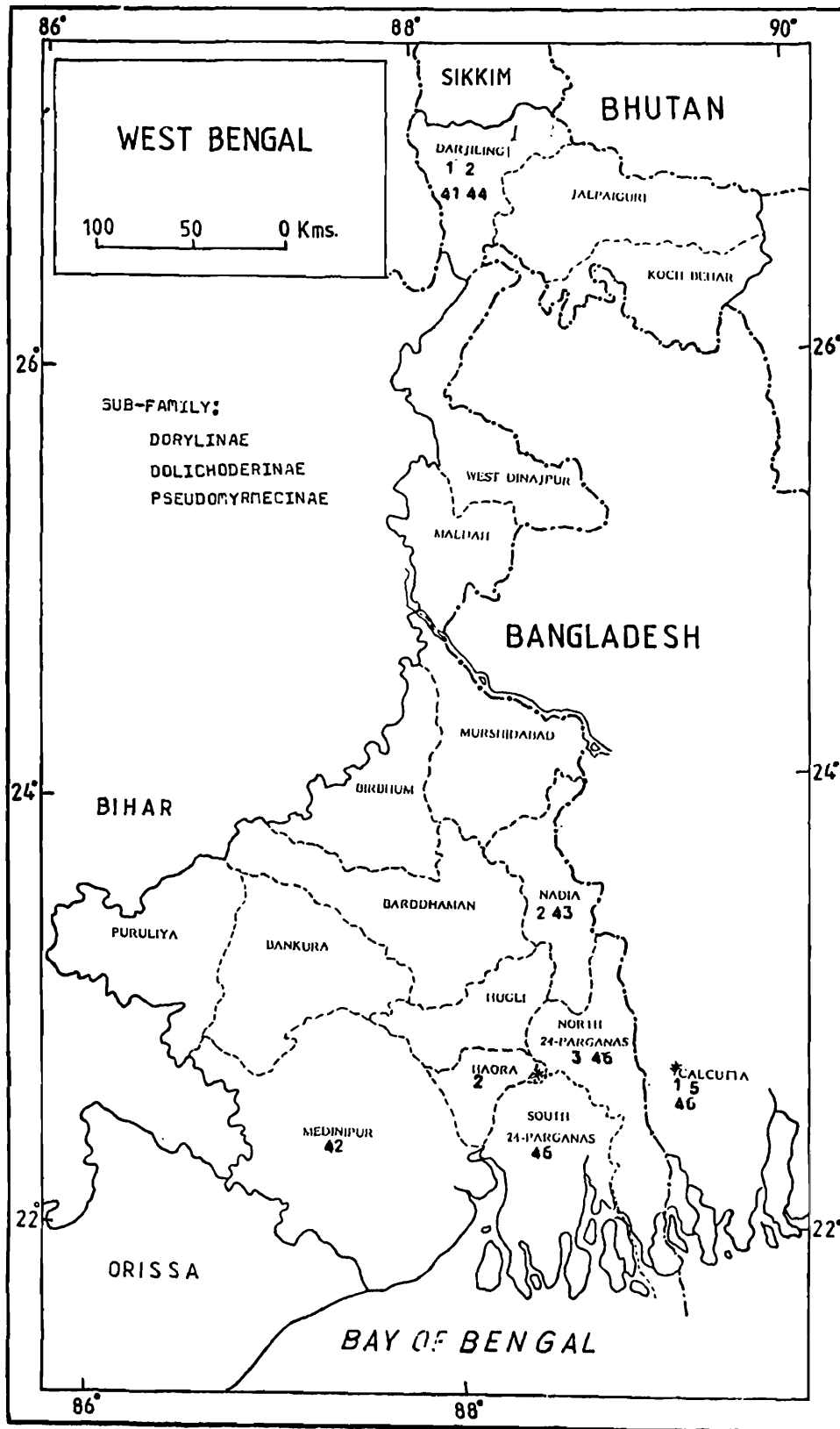
Name of the species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
47. <i>Acidomyrmex rothneyi</i> (Forel)					+												
48. <i>Aphaenogaster</i> sp.					+												
49. <i>Cataulacus (Cataulacus) latus</i> Forel⊗																	
50. <i>Crematogaster contemta</i> Mayr⊗																	
51. <i>C. subnuda</i> Mayr				+				+									
52. <i>C. buddhae</i> Forel				+													
53. <i>C. dohrni rogenhoferi</i> Mayr				+													
54. <i>C. ebenina</i> Forel					+			+									
55. <i>C. flava</i> Forel					+												
56. <i>C. rothneyi</i> Mayr				+		+											
57. <i>C. wroughtoni</i> Forel					+												
58. <i>Paratopula ceylonica</i> (Emery)				+													
59. <i>Lophomyrmex quadrispinosus</i> Jerdon				+													
60. <i>Meranoplus bicolor</i> (Guérin)	+					+					+						
61. <i>M. rothneyi</i> Forel				+			+						+	+			
62. <i>Messor barbarus</i> (Linnaeus)														+			
63. <i>Monomorium floricola</i> (Jerdon)				+		+											
64. <i>M. latinode</i> Mayr				+		+											
65. <i>M. orientale</i> Mayr⊗																	
66. <i>Myrmica rugosa</i> Mayr					+												
67. <i>Myrmicaria brunnea</i> Saunders⊗																	
68. <i>Oligomyrmex asinus</i> Forel⊗																	
69. <i>O. bengalensis</i> Forel⊗																	
70. <i>O. rothneyi</i> Forel														+			
71. <i>Pheidole (Pheidole) hospita</i> Bingham				+												+	
72. <i>P. (P.) fervens</i> Smith					+												
73. <i>P. (P.) jucunda</i> Forel				+													

Name of the species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
74. <i>P. (P.) latinoda</i> Roger						+											
75. <i>P. (P.) mus</i> Forel				+													
76. <i>P. (P.) roberti</i> Forel					+												
77. <i>P. (P.) rogersi</i> Forel⊗																	
78. <i>P. (P.) spathifera</i> Forel														+			
79. <i>P. (P.) sulcaticeps</i> Roger⊗																	
80. <i>P. (P.) watsoni</i> Forel⊗																	
81. <i>P. (P.) wood-masoni</i> Forel						+											
82. <i>Pheidologeton affinis</i> (Jerdon)⊗																	
83. <i>P. diversus</i> (Jerdon)						+											
84. <i>Solenopsis geminata</i> (Fabricius)				+	+			+					+	+			
85. <i>S. wroughtoni</i> Forel⊗					-												
86. <i>Tetramorium christiei</i> Forel					+												
87. <i>T. simillimum</i> (Smith)				+													
88. <i>T. smithi</i> Mayr⊗						+											
89. <i>Triglyphothrix obesa</i> (E. André)⊗																	
90. <i>T. lanuginosa</i> (Mayr)⊗																	
91. <i>Camponotus angustata</i> (Mayr)														+			
92. <i>C. angusticollis</i> (Jerdon)					+												
93. <i>C. arrogans</i> (Smith)⊗																	
94. <i>C. compressus</i> (Fabricius)	+			+	+							+				+	
95. <i>C. dichrous</i> Forel					+												
96. <i>C. invidus</i> Forel		+			+						+						
97. <i>C. irritans</i> (Smith)					+												
98. <i>C. oblongus</i> (Smith)																	
99. <i>C. rothneyi</i> (Forel)														+			
100. <i>C. rufoglaucus dolenda</i> Forel				+										+		+	
101. <i>C. sericeus</i> (Fabricius)	+			+	+									+			
102. <i>Camponotus</i> sp.					+												
103. <i>Polyrhachis clypeata</i> Mayr⊗																	

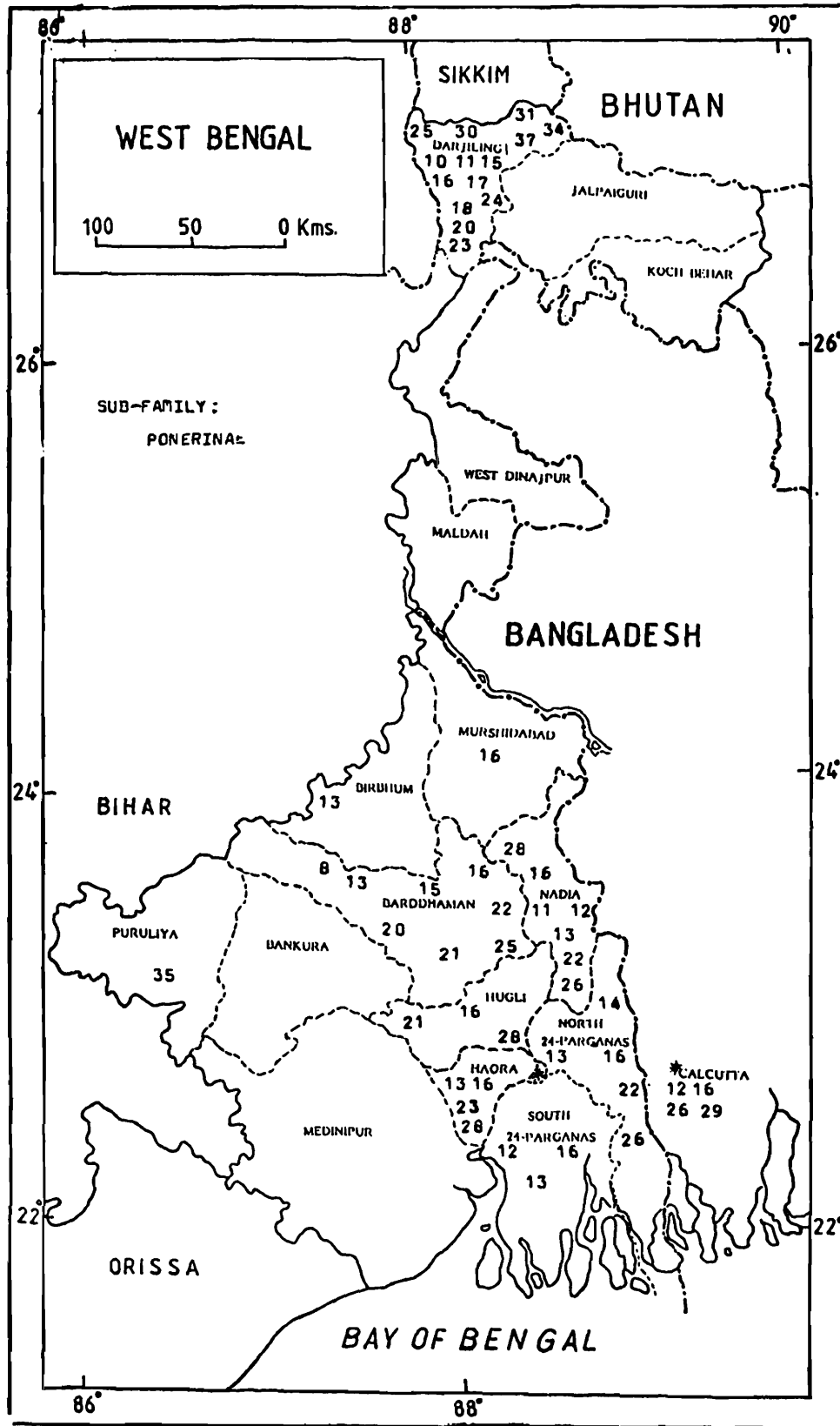
Name of the species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
104. <i>P. laevissima</i> Smith								+									
105. <i>P. mayri</i> Roger					+												
106. <i>P. simplex</i> Mayr					+												
107. <i>P. thrinax</i> Roger⊗																	
108. <i>P. tibialis</i> Smith⊗																	
109. <i>P. tubericeps</i> Forel														+			
110. <i>Lasius alienus</i> (Forster)					+												
111. <i>Myrmecocystus setipes</i> Forel				+		+						+					
112. <i>Paratrechina asea</i> (Forel)					+												
113. <i>P. bourbonica</i> (Forel)⊗																	
114. <i>P. indica</i> (Forel)					+												
115. <i>P. taylori</i> (Forel)⊗																	
116. <i>P. longicornis</i> (Latreille)				+													
117. <i>Oecophylla smaragdina</i> (Fabricius)	+			+	+	+		+				+					
118. <i>Acantholepis capensis simplex</i> Forel⊗																	
119. <i>A. frauenfeldi</i> (Mayr)														+			
120. <i>Anoplolepis longipes</i> (Jerdon)					+												
121. <i>Plagiolepis dichroa</i> Forel														+			
122. <i>P. rothneyi</i> Forel⊗																	
123. <i>Aenictus pachycerus</i> (Smith)				+		+											
124. <i>Anochetus graeffei</i> Mayr						+											
125. <i>Centromyrmex feae</i> (Emery)						+											
126. <i>Cerapachys biroi</i> Forel						+											
127. <i>Camponotus paria</i> Emery						+											
128. <i>C. taylor</i> Forel						+											

**Remarks :**

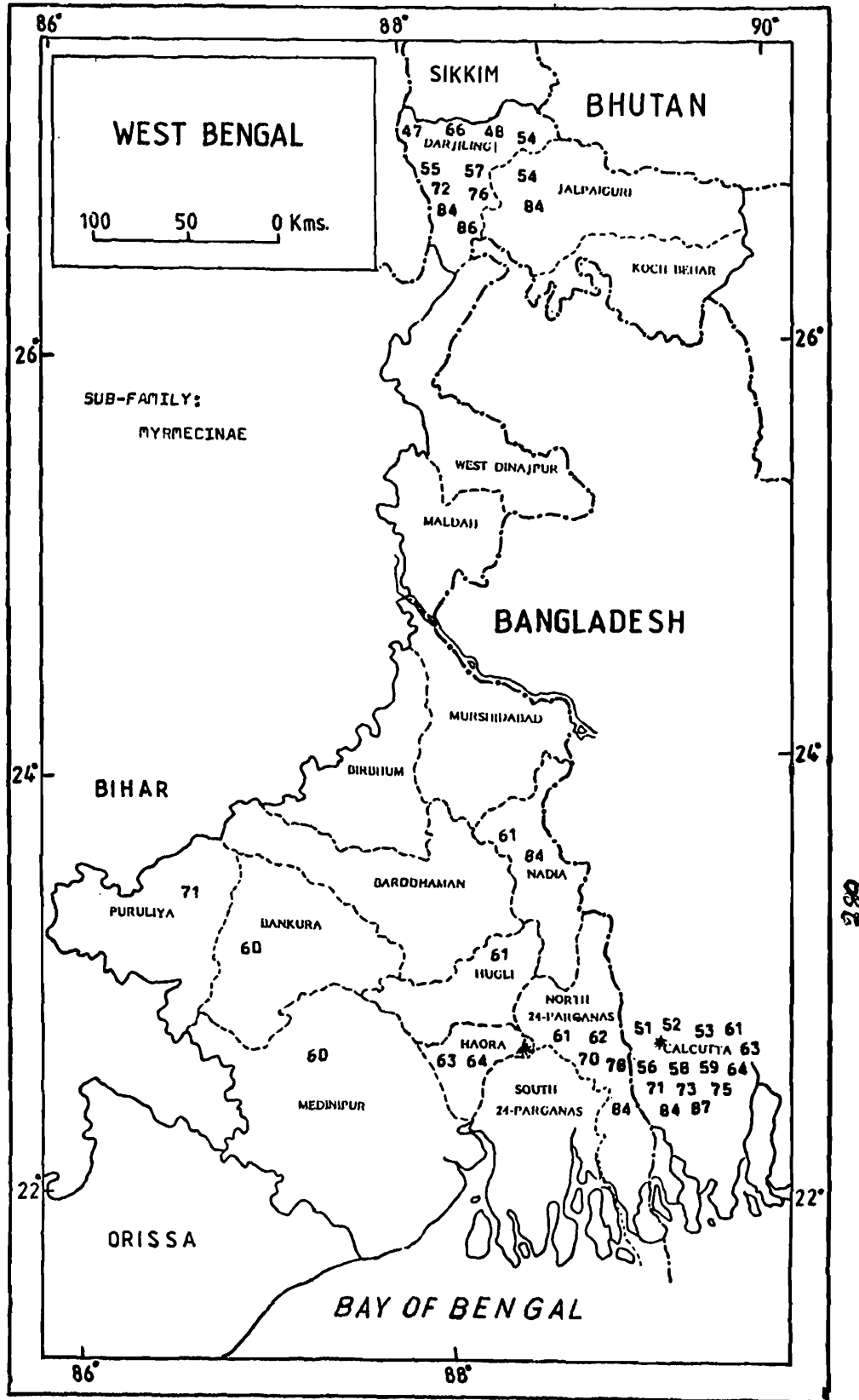
1. The species marked with the figure (⊗) does not bear any specific locality in 'The Fauna of British India, Vol. II.' Bingham (1903), however, mentioned only "Bengal" as their locality.
2. The distribution chart does not show the actual picture of ants' distribution. Darjiling, Calcutta and its surrounding districts have been intensively surveyed. In order to have a comprehensive account of ant fauna of West Bengal, it is desired that a thorough survey of those districts which are rarely represented or have been totally neglected should be resurveyed.



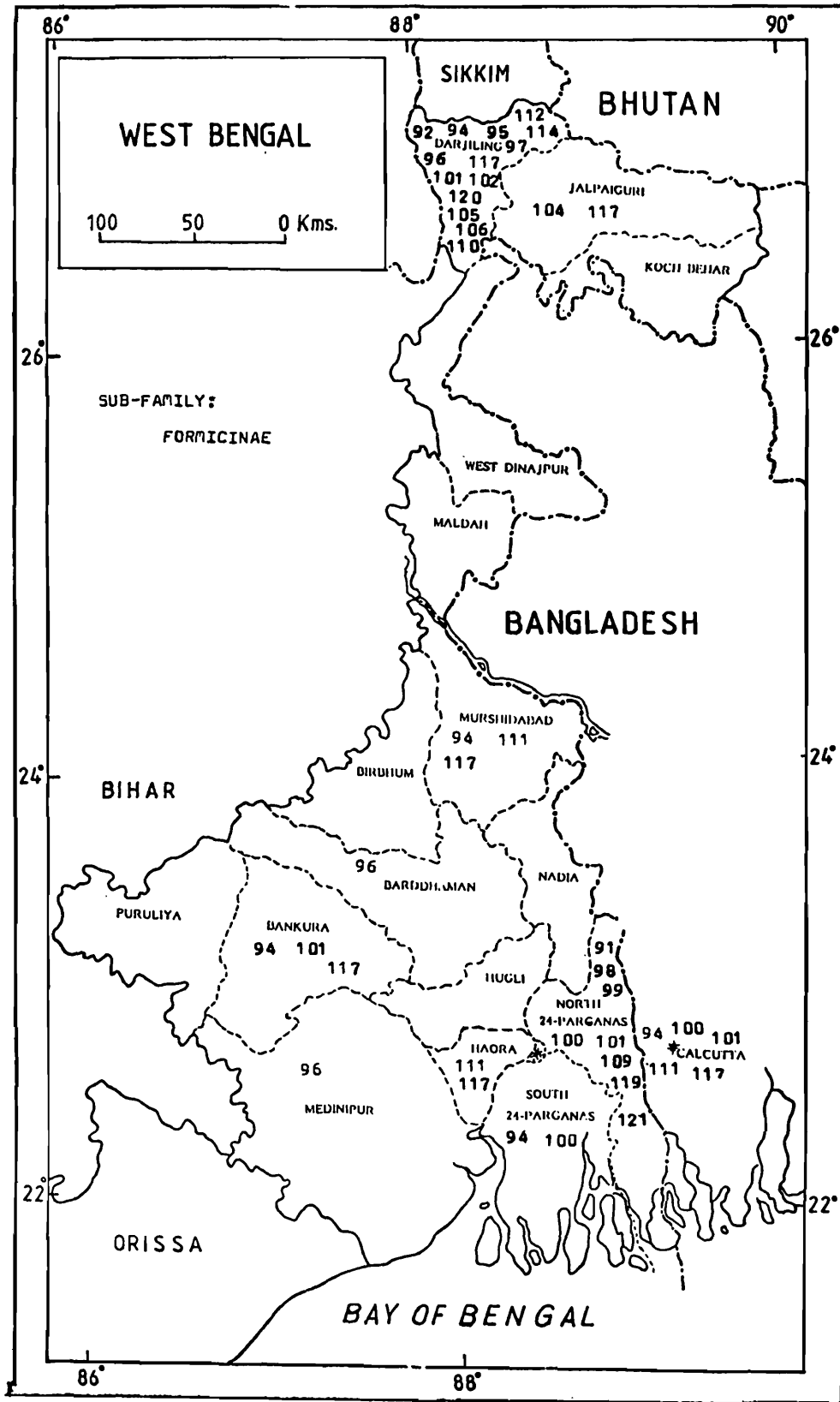
Map. 1. Distribution of taxa of subfamilies Dorylinae, Cerapachyinae, Dolichoderinae and Pseudomyrmecinae in West Bengal. Number indicates the name of the taxa as treated in the text.



Map. 2. Distribution of taxa of subfamily Ponerinae in West Bengal. Number indicates the name of the taxa as treated in the text.



Map. 3. Distribution of taxa of subfamily Myrmecinae in West Bengal. Number indicates the name of the taxa as treated in the text.



Map. 4. Distribution of taxa of subfamily Formicinae in West Bengal. Number indicates the name of the taxa as treated in the text.

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## **HYMENOPTERA : ICHNEUMONIDAE**

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### **INTRODUCTION**

The family Ichneumonidae of the order Hymenoptera is one of the largest of all animal groups. Of all the species of insects known from the world, 5-8% belong to family Ichneumonidae. The ichneumonids are associated with foliage and found mainly in cool, humid and temperate climate. They are parasitic in cocoons, usually of Lepidoptera, but also paracitize cocoons of Symphyta, Brachonidae, Ichneumonidae, Neuroptera, Diptera and spiders.

Till 1955, very limited research work was done on Ichneumonidae of Indian subregion. Morley (1913) published "Fauna of British India, Hymenoptera, Vol. III (Part I) Ichneumonidae" but did not give any comprehensive account of two important groups *viz.*, Cryptinae and Ichneumoninae. Cushman (1927), Rao (1953), Heinrich (1930-1965), Betrem (1932-1941), Cheesman (1938-1953), Perkins (1958-1963) and Porter (1963-1967) described a few more species under this family. Subsequently Townes (1969-1985), Kamath and Gupta (1972), Jonathan and Gupta (1973), Gupta and Tikar (1976), Gupta and Gupta (1977), Gupta and Maheshwary (1977), Chandra and Gupta (1977), Kaur and Jonathan (1979), Jonathan (1980), Gauld and Mitchell (1981) and Gupta and Gupta (1983) have published monographs and revisionary work on Ichneumonidae of Indian Subregion (Oriental).

An attempt has been made to consolidate our knowledge of the Ichneumonidae fauna of the state of West Bengal, India. The present work is based on the collection of this family made by several survey parties of the Zoological Survey of India and material received on loan/donation from various institutions from India and abroad. A major collection of this family was received through the mopping survey of West Bengal by H.S. Sharma & R.N. Tiwari, 1973; P.K. Maity & R.N. Tiwari, 1973; J.K. Jonathan & party, 1974, 1975 and old "Museum Collection" of Zoological Survey of India, which includes collections made by E. Brunetti (1908), N. Annandale (1911), Lord Carmichael (1913) and S.L. Hora (1930).

### **SYSTEMATICS**

It is estimated that 60,000 species of Ichneumonidae are known from the world and are classified in 26 subfamilies. In India the family is represented by about 1200 species and subspecies under 23 subfamilies.

The present study of the fauna of West Bengal reveals that about 15% of the species recorded from India are distributed in this region. The Ichneumonid species from this region were mainly recorded from Darjiling Hills and surrounding areas, from altitudes of 300m to 2500m. The present work

records 179 species from this region under 86 genera and 15 subfamilies. Darjiling district was explored extensively showing highest records of the taxa.

The keys to the subfamilies, tribes, genera and species are provided for easy identification of the species of this region. Illustrations of taxonomic terms used in the present work and distributional maps are included for ready reference.

### MATERIAL AND METHODS

Most ichneumonids prefer humid and temperate climate. They are active fliers except a few wingless forms. During the day time these ichneumonids can be spotted by the insect collector in the shrubs, bushes and in tall grasses, resting or flying about. In cool and humid forests and cultivated areas, the mopping survey parties collected these insects by sweeping insect nets through the vegetation. Certain species of ichneumonids are nocturnal and are attracted towards light during the night. These are collected in large numbers on light traps.

Specimens so collected are preserved dry in paper envelopes after killing in a jar with a cotton pad soaked with ethyl acetate or benzene. Some small forms are preserved in 70% alcohol.

All ichneumonids are set, pinned and labelled in usual manner and stored in insect drawer/boxes for study purposes.

*Male genitalia* in several cases was found to be very useful in identification of closely related genera and species. The methodology for the extraction and mounting of male genitalia is as follows :

Genital capsule could be extracted with the help of a needle, while the abdomen was held steady by means of a pair of forceps, after relaxing the specimen for about 24 hours. However, with this method subgenital plate may not be extracted well without being damaged. Therefore, it is better to cut the last 2 or 3 abdominal segments and keep the same in 10% KOH solution overnight. Following day, the gonoforceps, penis valves and subgenital plates are teased apart by a pair of fine needles and genitalia is mounted on a slide after thorough washing and dehydration.

#### (A) Abbreviations used in the text :

- |            |  |
|------------|--|
| Sex.       | “M” and “F” are used to cite the sex of the taxa described by the author.  |
| preocc.    | The name is preoccupied by an earlier author.  |
| new name.  | The name used is proposed as replacement for an earlier published name, which is preoccupied and unavailable.          |
| n. comb.   | The species was transferred to another genus for the first time by that author.  |
| n. status. | The present status of the species was either advocated for the first time or was revised in the reference in question. |
| key.       | A key is provided in the publication to identify the species.  |
| syn.       | The synonymy or taxonomic position of the species.   |
| des.       | The species is described or there is a descriptive note.   |
| fig.       | The species is illustrated in whole or part.   |

(B) In the text the location of individual specimen is indicated by the name of place for institutional collection and by the name of the owner for personal collection.

List of the museums :

<b>Amsterdam</b>	Afdeling Entomologie, Zoologisch Museum, Universiteit van Amsterdam, Plantage Middenlaan 64, Amsterdam 1004, The Netherlands.
<b>Bangalore</b>	Commonwealth Institute of Biological Control, Indian Station, P.O. Box 603, Bangalore 560 006, India.
<b>Berlin</b>	Museum fur Naturkunde der Humboldt-Universitat zu Berlin, DDR-104 Berlin, Invalidenstrasse 43, DDR Germany.
<b>Betrem</b>	Collections of Dr. J.G. Betrem – now at Leiden.
<b>Brussels</b>	Institut Royal des Sciences Naturelles de Belgique, Entomologie, Rue Vautier 31, B-1040 Bruxelles, Belgium.
<b>Budapest</b>	Termeszettudományi Múzeum Allattara (Zoological Department of the Hungarian Natural History Museum), 1088 Budapest, Baross-Utca 13, Hungary.
<b>Calcutta</b>	Zoological Survey of India, M-Block, New Alipore, Calcutta-700 053, India.
<b>Copenhagen</b>	Zoologisk Museum, Universitetsparken 15, DK 2100 Kobenhavn, Denmark.
<b>Dehra Dun</b>	Forest Entomology Branch, Forest Research Institute & Colleges, P.O. New Forest, Dehra Dun, U.P., India.
<b>Eberswalde</b>	Institut f. Pflanzenschutzforschung Kleinmachnow, Abt. Taxonomie der Insekten, DDR-13 Eberswalde-Finow 1, Schicklerstrasse 5. DDR Germany.
<b>Gainesville</b>	American entomological Institute, 3005 S.W. 56th Avenue, Gainesville, Florida 32608, U.S.A (The Townes Collection is on permanent deposit at the Institute and is being gradually incorporated there).
<b>Gupta</b>	Collections of Virendra Gupta, Located at the American Entomological Institute, 3005 S.W. 56th Avenue, Gainesville, Florida 32608, U.S.A.
<b>Heinrich</b>	Collections of Gerd Heinrich. Pre World War II collections are at Warsaw and post World War II collections were sold to Zoologische Staatssammlung, Munich, which see.
<b>Honolulu</b>	Bernice P. Bishop Museum, Department of Entomology, Honolulu, Hawaii 96819, U.S.A. Also contains the types previously at Hawaiian Sugar Planters Association, Honolulu.
<b>Leiden</b>	Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300 RA Leiden, The Netherlands.
<b>London</b>	Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7, 5 BD, England.

Munich	Zoologische Staatssammlung, Munchhausenstrabe 21, D-8000, Munchen 60, FDR Germany. (Heinrich's personal collection was sold to this Museum in 1980).
New Delhi	National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi 110 012, India.
Oxford	Hope Entomological Collections, University Museum, Oxford, OX1 3PW, England.
Sapporo	Entomological Institute, Faculty of Agriculture, Hokkaido University, Sapporo, Hokkaido, Japan.
Stockholm	Naturhistoriska Riksmuseet, Sektionen for Entomologi, 104 05 Stockholm Sweden.
Townes	Collection of Henry Townes - See Gainesville.
Warsaw	Instytut Zoologiczny, Polska Akademia Nauk, ul. Wilcza 64, Warszawa, Poland.
Washington	U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, U.S.A.
Wroclaw	Instytut Zoologiczny Uniwersytetu Sienkiewicza 21, Wroclaw, Poland.

### TAXONOMIC TERMINOLOGY

The morphological terms used in the present work are mainly based on Townes (1969); Kamath and Gupta (1972); Jonathan and Gupta (1973); Gupta and Tikar (1976); Gupta and Maheshwary (1977); Gupta and Gupta (1977); Chandra and Gupta (1977); Kaur and Jonathan (1979); and Jonathan (1980).

The morphological terms frequently used in the keys and descriptions are defined below and/or shown in the figures (Townes, 1969).

*Abdomen* : The segments usually comprising the abdomen of insects, but in ichneumonids not including the morphological first segment which has transferred to the thorax as the propodeum. Abdominal segments in ichneumonids are numbered from front to rear, with the first apparent segment (morphologically the second segment) termed the first segment.

*Apical transverse carina of the propodeum (or apical carina)* : The apical (hind) one of the two transverse carinae of the propodeum.

*Apophysis of the propodeum* : One of two teeth, horns, crests, or tubercles on each side of the propodeum near its midlength, situated at the hind end of the second lateral area or sublaterally on the apical transverse carina.

*Areola* : The median area on the propodeum that is enclosed by carinae, usually pentagonal or hexagonal in shape. The areola is bounded laterally by the median longitudinal carina, in front by the basal transverse carina, and behind by the apical transverse carina.

**Areolet** : A small cell in the center of the front wing, between the two intercubital veins.

**Basal area, or median basal area of propodeum** : The median area at the base of the propodeum, bounded on each side by the median longitudinal carinae and behind by the basal transverse carina.

**Basal transverse carina of the propodeum, or basal carina** : The basal (forward) one of the two transverse carinae of the propodeum.

**Bulla** : A weak, translucent section of a wing vein, marking the area where a fold or flexion line of the wing crosses.

**Cercus** : One of two very small finger-like appendages at the apex of the last abdominal tergite.

**Malar space** : Space between the mandibular socket and the lower edge of the compound eye, sometimes called the *gena*. The length of the cheek is measured from the lower edge of the mandibular socket, at its narrowest point.

**Clypeal fovea** : One of the two anterior tentorial pits, showing as a shallow impression in the groove between the clypeus and face, situated near the side a little mesad of the lower corner of the compound eye.

**Clypeus** : The area on the front aspect of the head, above the mouth opening and below the face, usually separated from the face by a shallow groove. The length of the clypeus from the face to the lower edge of the clypeus. The width of the clypeus is measured on the midline, from the bottom of the groove separating the clypeus from the face to the lower edge of the clypeus. The width of the clypeus is measured between its extreme corners at the upper sockets of the mandibles.

**Clasper** : The lateral, outside piece of the male genitalia.

**Collar** : The more or less raised, front margin of the pronotum, just behind the head. The collar crosses the dorsal aspect of the pronotum (where it usually is highest) and extends downward and obliquely backwards on each side.

**Costula** : A short transverse carina of the propodeum, on each side of the areola and separating the first from the second lateral area. The costula is the sublateral section of the basal transverse carina.

**Crest of the propodeum** : The same as the apophysis when the apophysis is carina-like.

**Epipleurum** : The thin margin of the second and following abdominal tergites. Epipleura may be completely continuous with the tergite or there may be a horizontal crease or groove that marks the division between the tergite and epipleurum. Epipleura may hang down or may be turned mesad to cover the lateral part of the under side of the abdomen. They may also be sharply inflexed against the overhanging edge of the tergite. In such cases they are usually very narrow or obsolescent.

**Epomia** : A carina on the side of the pronotum, obliquely crossing the trough in the side of the pronotum.

**Face** : Part of the front aspect of the head, between the eyes, extending from the lower margin of the antennal sockets to the groove separating the face from the clypeus. When the width and height of the face are compared, the width is measured at its narrowest point and height from clypeal foveae to the lower margins of the antennal sockets.

**First abdominal tergite** : When the length and width of this sclerite is compared, the length is measured from the centre of the insertion area of the extensor tendon to the extreme apex on the midline. (The extensor tendon inserts on the midline on the dorsal side, near the base of the tergite). The width of the first tergite is measured at its widest point, which is nearly always close to the apex. The first tergite typically has 3 pair of longitudinal carinae : The *median dorsal carinae* are a pair on the upper side, between the spiracles. The *dorsolateral carina* (one on each side) is in the position its name implies, at the level of the spiracle. The *ventrolateral carina* follows the lower edge of the tergite.

**Frons** : Part of the front aspect of the head, between the eyes, extending from the lower margin of the median ocellus to the lower margins of the antennal sockets.

**Gastrocoelus** : An impression on each side of the second abdominal tergite, near the base. The gastrocoelus includes the thyridium, the thyridium being the surface area with specialized sculpture and the gastrocoelus the impression itself.

**Genal carina** : The lower end of the occipital carina, ending either at the oral carina or at the lower mandibular socket.

**Glymma** : A groove or pit in the side of the first abdominal tergite, between its spiracle and base. For some unknown reason, the glymma is nearly always present when the first sternite is free from its tergite, and absent when the sternite is fused with its tergite. This is therefore a convenient way of determining whether the sternite is free (glymma present) or fused (glymma absent).

**Hamulus** : A small, bristle-like hook on the front edge of the hind wing that hooks into a channel on the hind edge of the front wing to join the two wings together. There are two series of hamuli : The *distal hamuli* number about 10, more or less, and are situated just distad of the base of metacarpella. The *basal hamuli* are on the apex of the costella vein, number one to about 6 (usually one), and are often weak or absent. In describing the hamuli the basal series is often ignored and the remarks refer only to the distal hamuli.

**Inclivous** : A term applied to a transverse wing vein, meaning that its front end is nearer the wing base than its hind end. If both ends are equally distant from the wing base the vein is *vertical*; if the front end is farther from the wing base than the hind end, the vein is *reclivous*.

**Juxtacoxal carina** : This is an arched carina cutting off a lenticular area of the lower part of the metapleurum. When complete, the carina arches between the bases of the hind and middle coxae.

**Lateral longitudinal carina of the propodeum** : The longitudinal carina of the propodeum lying between the median and pleural carinae. There is one lateral longitudinal carina on each side.

**Legs** : In describing the front, hind, top, and bottom aspects of leg segments, the legs are imagined as stretched out horizontally, at right angles to the body. This is an unnatural position but is the one used in taxonomic descriptions.

**Lower valve of the ovipositor** : The two lower valves of the ovipositor, one on each side, comprise the lower half of the ovipositor shaft. They are the same as the second valves of the ovipositor. At the tip of the lower valve is nearly always a series of oblique *ridges* or *teeth*.

*Median longitudinal carinae of the propodeum* : The median pair of longitudinal carinae of the propodeum.

*Mesepimeron* : The part of the mesopleurum behind the mesopleural suture, a narrow band that usually is ignored when describing the mesopleurum.

*Mesepisternum* : The part of the mesopleurum in front of the mesopleural suture, in ichneumonids occupying most of the mesopleurum and usually termed *mesopleurum*.

*Mesopleural fovea* : A pit or a short horizontal groove on the mesopleurum, at its mid-height, just in front of the mesopleural suture and below the speculum.

*Mesopleural suture* : A vertical or somewhat oblique groove near the hind edge of the mesopleurum, reaching from the middle coxal socket to the base of the front wing.

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

*Metapleurum* : The metapleurum is in two distinct parts. The lower division is the larger and ordinarily is the only part referred to when the metapleurum is mentioned. This lower part is an oval or subtriangular area on the side of the thorax, between the middle and hind coxae and extending up to the propodeum. The upper division of the metapleurum lies behind the upper half of the mesepimeron and below and a little behind the base of the hind wing. It is separated from the propodeum by a furrow.

*Nodus* : A dorsal prominence on the tip of the ovipositor, a short distance before the apex.

*Notaulus* : One of a pair of grooves on the mesoscutum, each beginning on the front margin to one side of the midline and extending backward. The notauli divided the mesoscutum into 3 parts : a median lobe between the two notauli and a lateral lobe on each side.

*Occipital carina* : A subcircular carina on the hind aspect of the head, between the vertex and hind margin of the compound eyes and the foramen magnum. The occipital carina is interrupted below by the mouth opening. Its two lower ends, next to the mouth opening, are called the genal carinae.

*Occiput* : The top part of the hind aspect of the head, extending from the vertex to the occipital carina.

*Ocellar triangle* : The raised triangular area containing the three ocelli.

*Oral carina* or *hypostomal carina* : One of two carinae on the lower part of the hind aspect of head, running from the lower mandibular socket to the foramen magnum.

*Orbit* : The part of the head next to a compound eye; an imaginary ring around each eye. The orbit can be divided into parts according to the part of the head involved, like frontal orbit (part of frons), facial orbit (part of face), vertical orbit (part of vertex), and temporal orbit (part of temple).

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

**Pectinate** : This term is applied to tarsal claws that have a series of small teeth on the under side. The teeth may be triangular or so elongate and close together that the claw appears like a comb. All or nearly all tarsal claws of ichneumonids are in fact pectinate, but often the teeth are few, crowded to the base of the claw, and so inconspicuous that a microscope slide preparation is required to show them clearly. The tarsal claws are said to be not pectinate or “simple” when no pecten teeth can clearly be seen without a microscope slide mount.

**Petiolar area** of the propodeum : The median area of the propodeum just above the abdominal attachment.

**Petiole** : The part of the first abdominal segment in front of the spiracle, when this part is relatively slender.

**Pleular area** : The lateral area of the propodeum, next to the metapleurum. The pleural area is divided theoretically into three parts, the first (front), second (middle), and third (hind) pleural areas. The first and second pleural areas are usually united. They contain the propodeal spiracle.

**Pleural carina** : The carina between the propodeum and metapleurum (lower portion of metapleurum).

**Postocciput** : Part of the hind aspect of the head, within the occipital carina.

**Postpecial carina** : A transverse carina on the mesosternum, just in front of the middle coxae. The carina may be complete, may be interrupted in front of each of the middle coxae, or may be obsolescent with only a short trace on each side near the coxal socket and perhaps a remnant at the midline.

**Postpetiole** : The widened hind part (behind the spiracle) of the first abdominal tergite when the tergite is relatively slender basally.

**Postscutellum** : The small median raised part of the metanotum, lying between the apex of the scutellum and the base of the propodeum.

**Prepectal carina** : A carina near the front of the mesothorax, crossing the mesosternum near the front, and extending upward on each side of the front part of the mesopleurum.

**Prepectus** : The part of the mesosternum and mesopleurum in front of the prepectal carina.

**Propodeal spiracle** : Measurements of the length and width are made to the centre of the surrounding rim. The opening itself is not the thing measured.

**Reclivous** : A term applied to a transverse wing vein, meaning that its front end is farther from the wing base than its hind end. If both ends are the same distance from the wing base the vein is *vertical*; if the front end is nearer the wing base than the hind end, the vein is *inclivous*.

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

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

**Sternaulus** : A horizontal groove on the lower edge of the mesopleurum, starting at the prepectal

carina and extending backwards, sometimes reaching the base of the middle coxa. The sternaulus is considered the dividing line between the mesosternum and the mesopleurum.

**Subgenital plate** : The last visible sternite, just in front of the genitalia of the male or the ovipositor of the female. This is the seventh sternite in males and the sixth sternite in females.

**Submetapleural carina** : This is on the lower margin of the lower division of the metapleurum, between the bases of the middle and hind coxae.

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

**Tegula** : A convex scale lying over the base of the front wing, on the front side.

**Thorax** : The three thoracic segments of most insects, plus the propodeum. The propodeum is morphologically the first segment of the abdomen but is topographically part of the thorax.

**Thyridium** : A scar-like area on each side of the second abdominal tergite, between its middle and base. The thyridium has a different surface sculpture than the rest of the tergite, lacking setiferous punctures, usually with a mat surface, and often slightly depressed. The third tergite rarely may also have thyridia.

**Trochanters** : The small segments between the coxa and femur. In ichneumonids there are usually two trochanters. The basal-most one is called the *first trochanter* and is the true trochanter. Distad of this is the *second trochanter*, which is derived from the basal part of the femur. In a few ichneumonids the second trochanter is not separated from the femur.

**Tyloid** : A definite sensory area on a segment of the flagellum of a male specimen, usually in the form of a longitudinally elliptic or linear raised area on the outer side of each of several segments near the midlength of the flagellum. Often the setae on the tyloid are short, dense, and of the sensory type. Tyloids occur usually in males of Gelinae, Ichneumoninae, and Diplazontinae, often in males of Microleptinae, and rarely in males of *Coccygomimus*. Their shapes and distribution frequently afford useful taxonomic characters.

**Vertex** : The top part of the head, between the upper corners of the compound eyes.

**Upper valve of the ovipositor** : The upper valve of the ovipositor is the dorsal half of the shaft of the ovipositor, composed of the two second valves fused together.

**Volsella** : A part of the male genitalia between the clasper and penis, its lateral edge attached to the clasper. At the apex of the volsella is a lobe called the *cusps*, and attached to its mesal side near the apex a separate piece, the *digitus*, is articulated.

**Wing veins and cells** : The Rohwer and Gahan system of terminology is used (1916. Proc. Ent. Soc. Washington 18 : 20-76). As this system applies to the Ichneumonidae, it is explained by figure 2. Measurements of the length of wing veins or sections of wing veins is made from the center of one juncture to the center of the next. Measurements of the width and height of the areolet are made within the boundary veins.

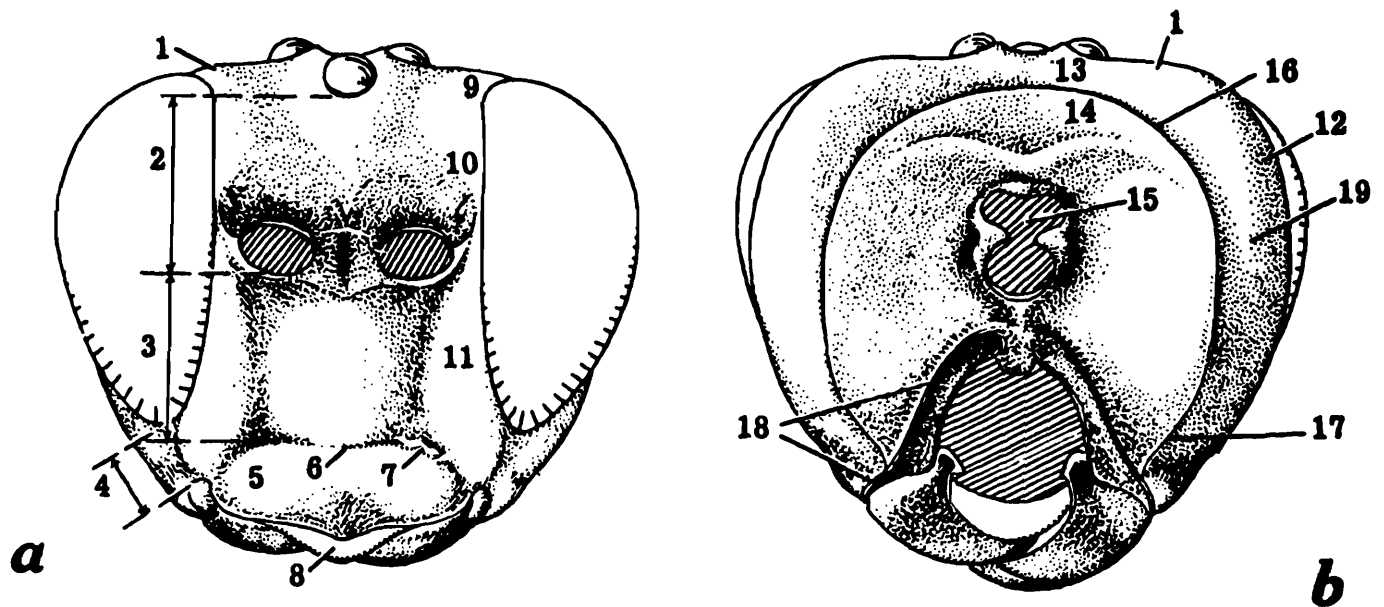


Figure a-b. Head of an ichneumonid, front and rear views (after Townes, 1969).

1. Vertex; 2. Frons; 3. Face; 4. Malar space; 5. Clypeus; 6. Groove between face and clypeus; 7. Clypeal fovea; 8. Labrum; 9, 10, 11 & 12. Orbit; 9. Vertical orbit; 10. Frontal orbit; 11. Facial orbit; 12. Temporal orbit; 13. Occiput; 14. Postocciput; 15. Foramen magnum; 16 & 17. Occipital carina; 17. Genal carina; 18. Hypostomal carina; 19. Temple.

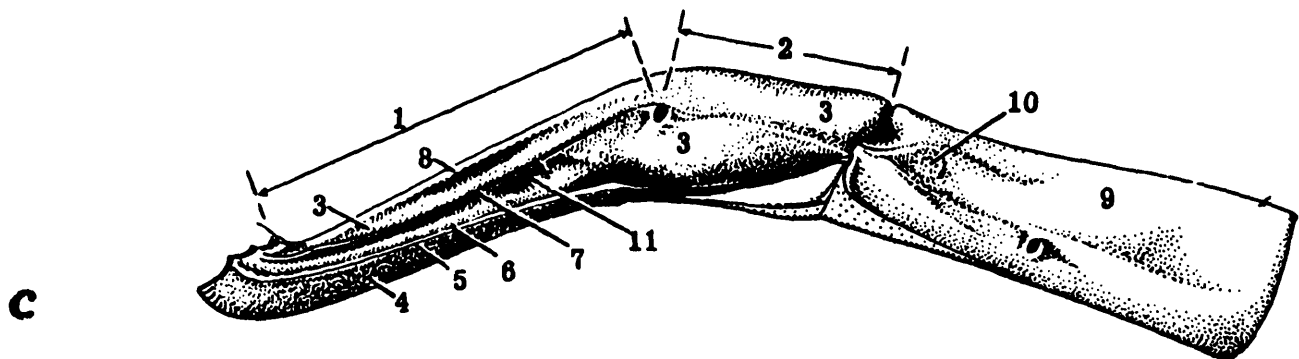


Figure 1, c. Abdominal segments 1 and 2, side view (after Townes, 1969).

1. Petiole; 2. Postpetiole; 3. Tergite 1; 4. Sternite 1; 5. Tergo-sternal suture; 6. Ventrolateral carina; 7. Dorsolateral carina; 8. Median dorsal carina; 9. Tergite 2; 10. Thyridium; 11. Glymma.

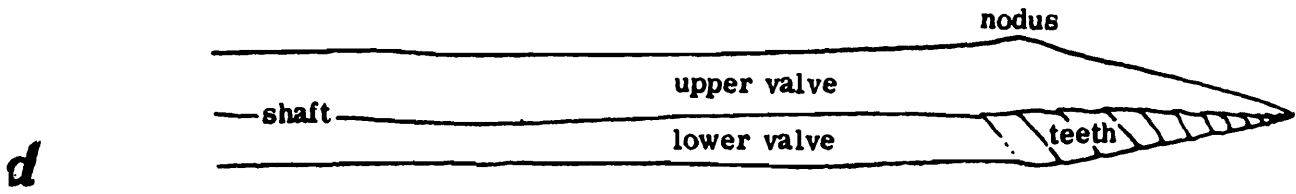


Figure 1, d. Ichneumonid ovipositor, diagramatic (after Townes, 1969).

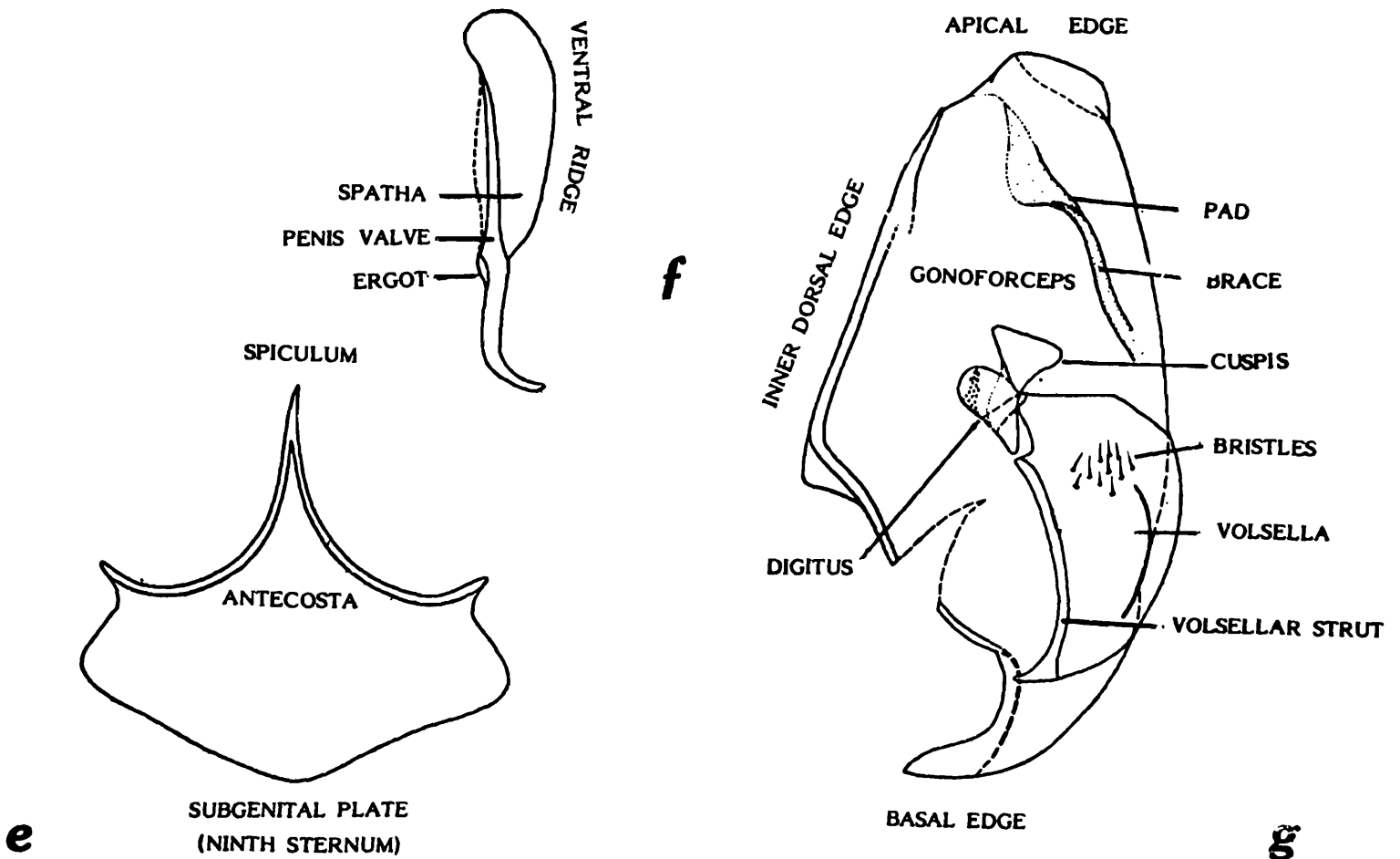


Figure 1, e-g. Male genitalia of an ichneumonid.

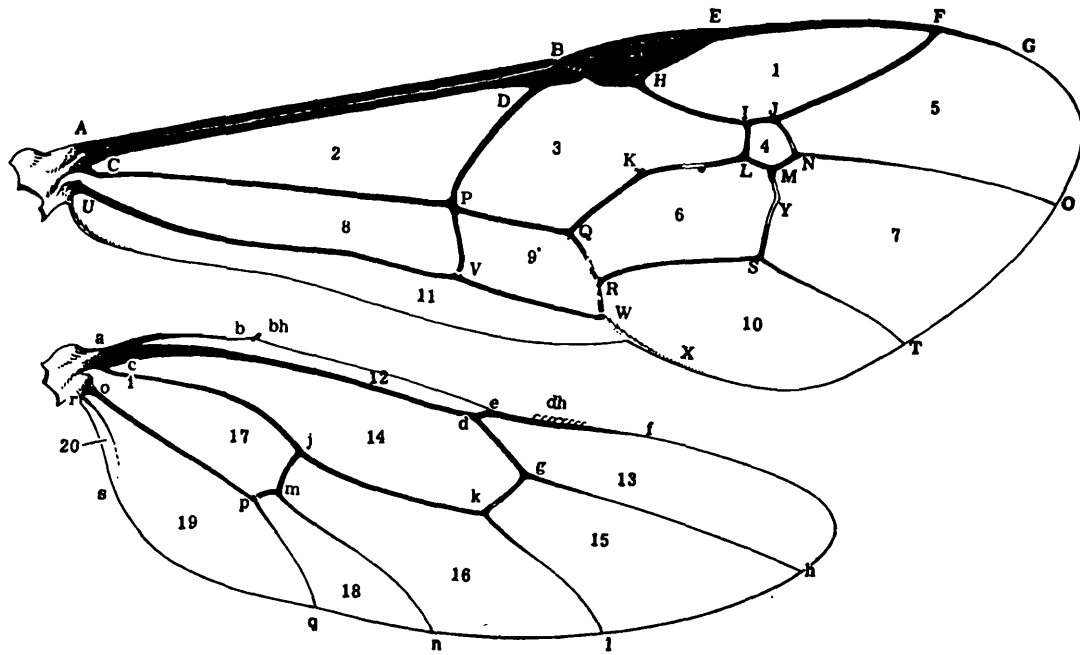


Figure 2. Wings of an ichneumonid (after Townes, 1969)

**Veins**

**Cells**

<b>Front Wing</b>		<b>Hind Wing</b>		<b>Front Wing</b>		<b>Hind Wing</b>	
AB	= Costa	ab	= Costella	1	= Radial cell	12	= Costellan cell
CD	= Subcosta	cde	= Subcistekka	2	= Median cell	13	= Radiellan cell
EFG	= Metacarpus	ef	= Metacarpella	3	= Discocubital cell	14	= Mediellan cell
HJF	= Radius	dgh	= Radiella	4	= Areolet (2nd cubital cell)	15	= Cubitellan cell
KLMNO	= Cubitus	jkl	= Cubitella	5	= Third cubital cell	16	= Discoidellan cell
PQRW	= Discoideus	mn	= Discoidella	6	= Second discoidal cell	17	= Submediellan cell
RST	= Subdiscoideus	kg	= Intercubitella	7	= Third discoidal cell	18	= Brachiellan cell
CP	= Medius	ij	= Mediella	8	= Submedian cell	19	= Anellan cell
UV	= Submedius	op	= Submediella	9	= First brachial cell	20	= Postellan cell
VWX	= Brachius	pq	= Brachiella	10	= Second brachial cell		
BEH	= Stigma	bh	= Basal hamulus	11	= Anal cell		
DP	= Basal vein	dh	= Distal hamuli	BEH	= Stigma		
IL	= First intercubitus	rs	= Axillus				
JN	= Second intercubitus	jmp	= Nervellus				
QL	= Discocubitus						
K	= Ramulus						
QK	= First recurrent vein						
MS	= Second recurrent vein						
Y	= A Bulla						
PV	= Nervulus						
QRW	= Postnervulus						

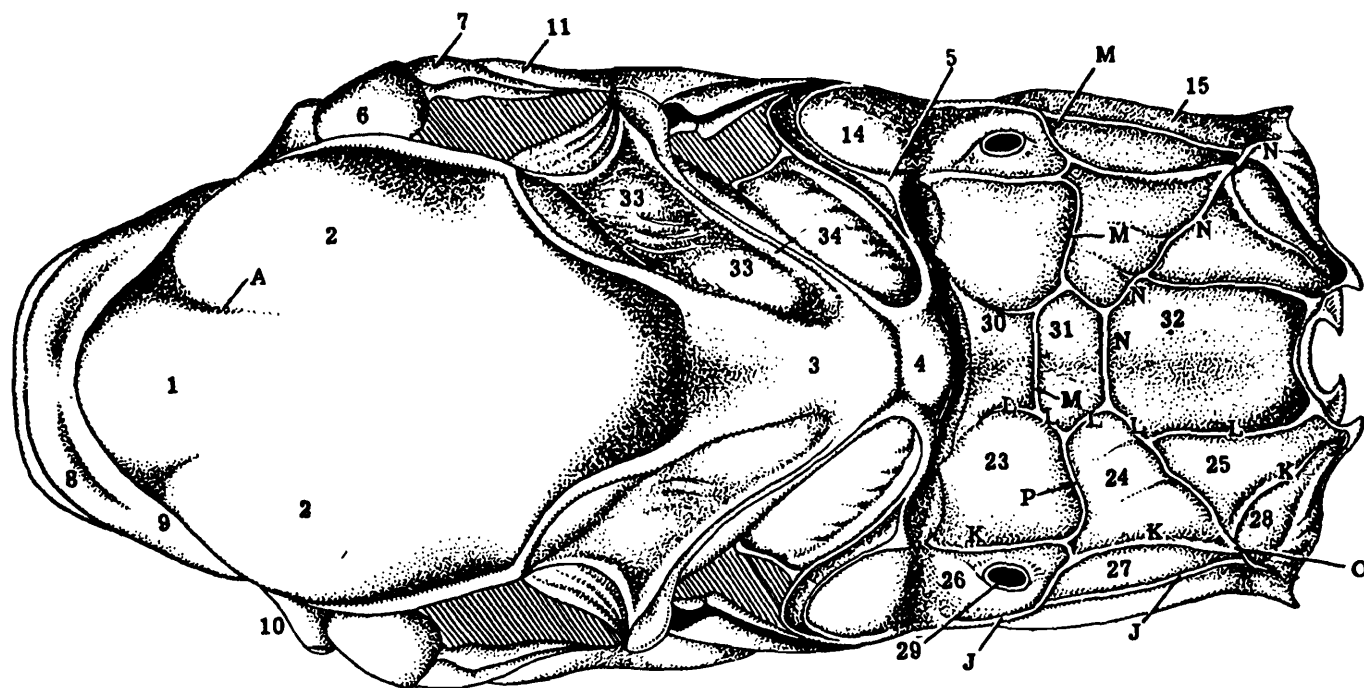


Figure 3. Thorax of an ichneumonid, dorsal view (after Townes, 1969).

**AREAS**

- 1. Median lobe of mesoscutum
- 2. Lateral lobe of mesoscutum
- 1 & 2. Mesoscutum
- 3. Scutellum
- 4. Postscutellum
- 5. Hind margin of mesonotum
- 6. Tegula
- 7. Subtegular ridge
- 8. Collar
- 8, 9, 10. Pronotum
- 10. Hind corner of pronotum
- 11. Mesopleurum (mesepisternum)
- 14. Upper division of metapleurum
- 15. Metapleurum (lower division of metapleurum)

- 23-32. Propodeum
- 23. First lateral area
- 24. Second lateral area
- 25. Third lateral area
- 26. First pleural area
- 27. Second pleural area
- 28. Third pleural area
- 29. Propodeal spricacle
- 30. Basal area
- 31. Areola
- 32. Petiolar area
- 33. Axillary trough of mesonotum
- 34. Axillary trough of metanotum

**CARINAE and GROOVE**

- J. Pleural carina
- K. Lateral longitudinal carina of propodeum
- L. Median longitudinal carina of propodeum
- M. Basal transverse carina of propodeum
- N. Apical transverse carina of propodeum
- O. Propodeal apophysis or crest
- P. Costula

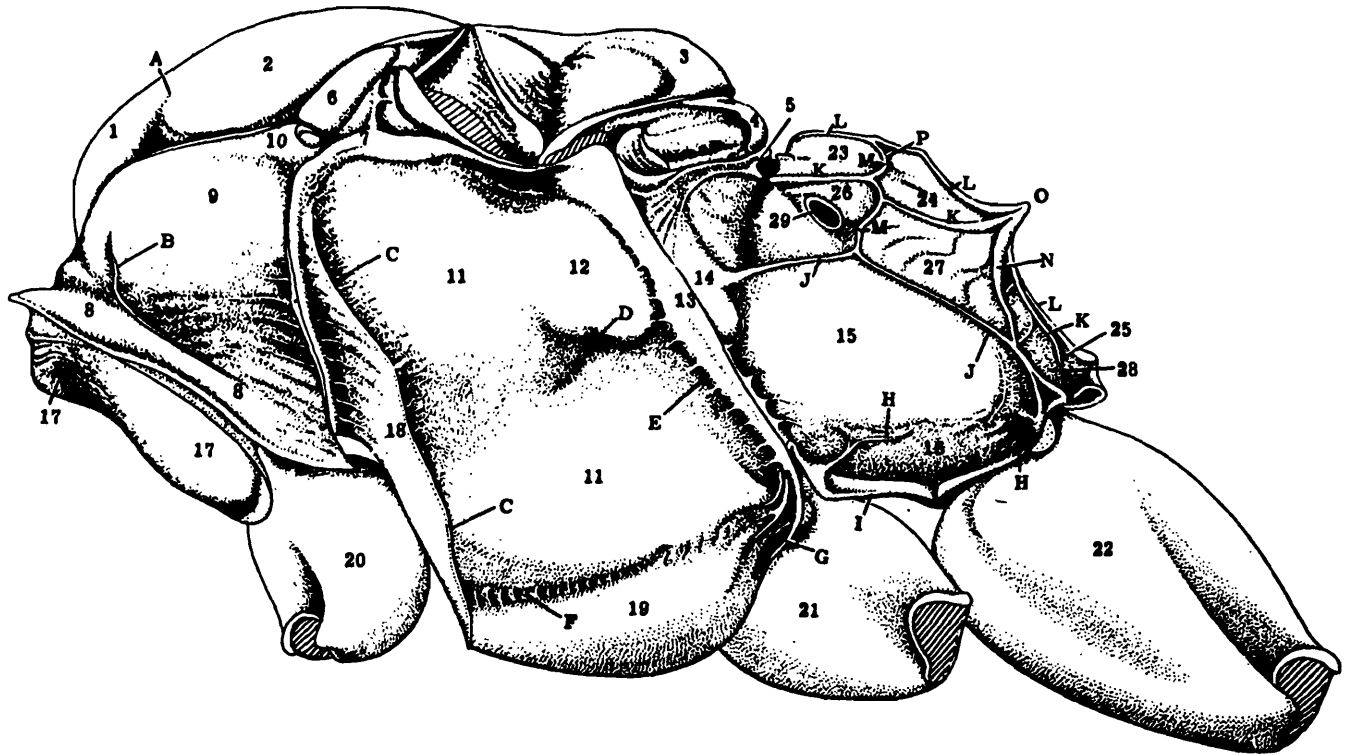


Figure 4. Thorax of an ichneumonid, side view (after Townes, 1969).

AREAS		CARINAE and GROOVES
1. Median lobe of mesoscutum	15. Metapleurum (lower division of metapleurum)	A. Notaulus
2. Lateral lobe of mesoscutum	16. Juxtacoxal area	B. Epomia
1 & 2. Mesoscutum	17. Propleurum	C. Prepectal carina
3. Scutellum	18. Prepectus	D. Mesopleural fovea
4. Postscutellum	19. Mesosternum	E. Mesopleural suture
5. Hind margin of metanotum	20. Front coxa	F. Sternaulus
6. Tegula	21. Middle coxa	G. Postpectal carina
7. Subtegular ridge	22. Hind coxa	H. Juxtacoxal carina
8. Collar	23-28. Propodeum	I. Submetapleural carina
8, 9 & 10. Pronotum	23. First lateral area	J. Pleural carina
10. Hind corner of pronotum	24. Second lateral area	K. Lateral longitudinal carina of propodeum
11, 12, & 18. Mesopleurum (Mesepisternum)	25. Third lateral area	L. Median longitudinal carina of propodeum
12. Speculum	26. First pleural area	M. Basal transverse carina of propodeum
13. Mesepimeron	27. Second pleural area	N. Apical transverse carina of propodeum
14. Upper division of metapleurum	28. Third pleural area	O. Propodeal apophysis or crest
	29. Propodeal spiracle	P. Costula

SYSTEMATIC ACCOUNT

Family ICHNEUMONIDAE

Key to the Subfamilies of ICHNEUMONIDAE

1. Clypeus and face forming a broad, rather weakly convex surface, the clypeus not separated by a distinct groove. Areolet rhombic, usually large. posterior mesosternal carina not complete. Tarsal claws more or less pectinate. First tergite with a large glymma, its spiracle near or a little behind the middle. Second and following tergites nearly always polished. Male clasper ending in a long rod; female subgenital plate large, triangular in profile ..... 7. MESOCHORINAE
- Not agreeing entirely with the above. (Face and clypeus usually narrower and with a more irregular surface, the clypeus usually separated by a groove. Areolet various, sometimes absent, seldom rhombic, or sometimes the wings reduced or absent. Posterior mesosternal carina complete or incomplete. Tarsal claws pectinate or not. First tergite with or without a glymma, its spiracle varying in position : near base, near middle, or near apex. Second and following tergites polished, mat, and/or punctate. Male clasper not ending in a long rod except in some species of *Nematopodius* and *Charops*, and rarely in other genera. Female subgenital plate various, often inconspicuous in side view) ..... 2
2. Spiracle of first abdominal tergite placed behind the midlength of the tergite. (Some genera are borderline in this character. These can be traced through either half of the couplet) ..... 3
- Spiracle of first abdominal tergite placed near the midlength of the tergite or definitely in front of the midlength.....12
3. Abdomen compressed, its third and fourth segments deeper than wide ..... 4
- Abdomen depressed or cylindric, its third and fourth segments wider than deep..... 8
4. Second brachial cell with a long spurious vein that parallels its hind margin. First intercubital vein (or the only intercubital vein that is present) joining cubital vein distad of second recurrent vein by a distance greater than half its length. Wings never reduced or absent. Epomia absent. Outer apical edge of front tibia without a spine or tooth. Medium to large sized species, usually paled brown in colour and with very large ocelli..... 6. OPHIONINAE
- Second brachial cell without a spurious vein or with only a short one. First intercubital vein joining cubital vein basad, opposite, or less than half its length distad of second recurrent vein, or if rarely it joins cubitus more than half its length beyond second recurrent, then the epomia is present and long (or wings sometimes reduced or absent)..... 5
5. Propodeum without areas bounded by regular carinae, with at most a transverse basal carina, its sculpture usually coarse and reticulate. Occipital carina usually at outer hind margin of temple so that the head is nearly as wide at this carina as at the eyes. Areolet absent. Hind tarsus often swollen, especially in males..... 6
- Propodeum usually areolated or with other carinae than the basal transverse one, its sculpture fine, not coarsely reticulate. Occipital carina (when present) in its normal location, so that the

- head is much narrower at this carina than at the eyes. Areolet present or absent. Hind tarsus usually not swollen ..... 7
6. Epipleurum of third tergite separated by a longitudinal crease just beneath the spiracle; intercubitus joining cubitus beyond second recurrent vein by a distance greater than 0.6 its length; middle tibia with one spur; dorsal part of occipital carina well below the hind ocelli; ovipositor sheath about 3x as long as apical depth of abdomen.....9. ANOMALONINAE
- Epipleurum of third tergite not separated by a crease; intercubitus joining cubitus basad, opposite, or sometimes distad of second recurrent vein by a distance greater than 0.6 its length; middle tibia with usually two spurs, but sometimes with one; dorsal part of occipital carina usually close to level of hind ocellus but sometimes well below; ovipositor sheath about 1 to 3.5 x as long as apical depth of abdomen ..... 10. GRAVENHORSTINAE
7. Tibial spurs inserted in a common area with the tarsus, the apex of each tibia thus having a single membranous insertion area. Clypeus usually confluent with face. Face usually black ..... 4. PORIZONTINAE
- Tibial spurs inserted in a separate area from that of the tarsus, the apex of each tibia thus having two insertion areas separated by a sclerotized bridge. Clypeus separated from face by a groove. Face usually more or less pale .....5. CREMASTINAE
8. Ovipositor tip with a dorsal subapical notch and the lower valve tip without distinct teeth. First sternite often not fused with its tergite.....3. BANCHINAE (a few genera)
- Ovipositor tip without a dorsal subapical notch, or with a weak notch and the lower valve tip bearing distinct teeth. First sternite fused with its tergite..... 9
9. Sternaulus short or absent, less than half as long as mesopleurum. Ovipositor not extending conspicuously beyond apex of abdomen, its sheath always rigid. Second intercubital vein present. Mandible with two teeth or sometimes only one. Clypeus usually broad and weakly convex, its apex usually rather broadly truncate or subtruncate, its apical margin not impressed.. ..... 15. ICHNEUMONINAE
- Sternaulus usually present and usually at least half as long as mesopleurum. Ovipositor usually extending conspicuously beyond apex of abdomen, its sheath flexible except when very short. Second intercubital vein present or absent. Mandible with two teeth. Clypeus various, usually moderately strongly convex and its apical margin usually impressed.....10
10. Second recurrent vein with two bullae or sometimes with one, nearly always sloping outward posteriorly so that posterodistal corner of second discoidal cell is somewhat longer and more pointed than anterodistal corner (in the few cases when second recurrent vein is vertical and with a single bulla the sternaulus reaches hind edge of mesopleurum a little above its lower hind corner, and/or the apical truncation of the scape is only moderately oblique, and/or the epipleurum of second tergite is turned mesad). Face of male rarely marked with white or yellow. Propodeum usually areolated, with longitudinal as well as transverse carinae..... 12. PHYGADEUONTINAE

- Second recurrent vein with a single bulla, usually not sloping outward posteriorly and usually meeting subdiscoidal vein at a right angle. Sternaulus, when it reaches hind edge of mesopleurum, ending just below lower hind corner of mesopleurum. Apical truncation of scape strongly oblique. Face of male frequently marked with white or yellow.....11
- 11. Dorsal rim of metanotum with a posterior sublateral, triangular projection, this projection opposite front end of sublateral longitudinal carina of propodeum (which is nearly always present.) Propodeum with longitudinal carinae as well as transverse carinae, or in some females only transverse carinae present but in these the basal transverse carina is weak or absent and the apical carina strong.....13. HEMIGASTERINAE
- Dorsal rim of matanotum without a posterior sublateral projection (though sometimes there is such a projection just below the dorsal rim). Propodeum without longitudinal carinae, if only one transverse carina is present on propodeum it is the basal carina rather than the apical one.....  
..... 14. MESOSTENINAE
- 12. Clypeus not separated from face by a groove, the face and clypeus either forming a smooth, strongly convex surface or with a large shield-shaped flat or concave area that is bounded by a carina ..... 8. METOPINAE
- Clypeus separated from face by a more or less distinct groove, or if rarely the groove is absent then the face is rather flat.....13
- 13. Upper tooth of mandible broad, more or less distinctly divided into an upper and lower point by a weak notch or impression on its apical margin, the mandible thus tending to appear 3-toothed. First tergite rectangular, not distinctly narrowed basad. Front wing 3.5 to 9.0 mm long. Ovipositor not extending beyond apex of abdomen.....11. DIPLAZONTINAE
- Upper tooth of mandible not divided into two points, the mandible thus 2-toothed or 1-toothed, or if rarely the upper tooth is more or less divided (some Banchinae and Scolobatinae), the first tergite is narrowed basad .....14
- 14. Upper valve of ovipositor with a subapical dorsal notch, not raised at the notch. Lower valve of ovipositor tip smooth or with very small inconspicuous teeth or ridges at the apex. Second recurrent vein with one bulla or rarely with two, the vein subvertical or inclivous. Tarsal claws usually pectinate. Submetapleural carina usually forming a strong lobe just behind middle coxa. Female subgenital plate in lateral view large and conspicuous. First sternite not fused with its tergite ..... 3. BANCHINAE (most genera)
- Upper valve of ovipositor without a subapical dorsal notch, or with a weak subapical notch that surmounts a raised nodus. Lower valve of ovipositor tip usually with conspicuous teeth or ridges.....15
- 15. Tarsal claws usually pectinate but sometimes simple, never with a large tooth. Clypeus often wide and with a marginal fringe of setae, without a median apical notch. First abdominal sternite nearly always free from its tergite. Eggs attached to host by a stalk or by a modification of the stalk .....2. TRYPHONINAE

- Tarsal claws not pectinate, in the female often with a large basal lobe. Clypeus various, sometimes with a median apical notch. Eggs not attached by a stalk. First sternite more or less free from its tergite (and the first tergite with a glymma), and/or the propodeum entirely without the basal transverse carina. Tarsal claws often with a tooth or basal lobe, especially in females ..  
.....1. PIMPLINAE

### 1. Subfamily PIMPLINAE

#### Key to the Tribes of Subfamily PIMPLINAE

1. Mesoscutum covered with sharp transverse wrinkles..... **Rhyssini**  
— Mesoscutum without transverse wrinkles (except in the extra-limital genus *Pseudorhyssa*), or sometimes with transverse wrinkles on only a small portion of its surface ..... 2
2. Prepectal carina absent; first tergite without a lateral longitudinal carina; upper part of temple with a scabrous area except in *Poemenia* .....**Neoxoridini**  
— Prepectal carina present; first tergite usually with a lateral longitudinal carina; upper part of temple without a scabrous area..... 3
3. Mesopleural suture without a distinct angulation near the middle, or if there is an angulation (in the genus *Xanthopimpla*) the tarsal claws each have an enlarged hair with flattened tip and the apex of mandible is twisted so that its lower tooth is towards the mouth..... **Ephialtini**  
— Mesopleural suture with a weak angulation near the middle; tarsal claws without an enlarged hair with a flattened tip, except in *Theronia* in which genus the mandible is not twisted..... 4
4. Tarsal claws of female without a basal tooth; tergites 2 to 4 with fine indistinct punctures, polished or in the extralimital genera strongly mat; areolet present.....**Theronini**  
— Tarsal claws of female, or at least the front claws of female, with a basal tooth; tergites 2 to 4 usually with rather coarse, distinct punctures; areolet present or absent ..... **Pimplini**

### Tribe PIMPLINI

#### Key to the Genera of Tribe Pimplini

1. Occipital carina absent above.....**Camptotypus** Kriechbaumer  
— Occipital carina present above, or sometimes obsolete only at the midline..... 2
2. Nervellus intercepted at or below the middle; ovipositor more or less compressed ..... 3  
— Nervellus intercepted near or above the middle ovipositor compressed or cylindrical..... 4
3. Second tergite with distinct oblique groove cutting off its baso-lateral corners; clypeus of male white or yellow; areolet receiving second recurrent vein usually at its outer corner, rarely the areolet absent; tip of dorsal valve of ovipositor, in profile, a little concave beyond the nodus; ridges of basal tooth of lower valve of ovipositor at about 15 degrees from the horizontal .....  
.....**Acropimpla** Townes

- Second tergite without oblique grooves cutting off its basolateral corners; clypeus of male black, blackish, or dark ferruginous; areolet always receiving second recurrent vein distinctly basad of its outer corner; tip of dorsal valve of ovipositor, in profile, convex or straight beyond the nodus, or occasionally a little concave; ridges of basal teeth of lower valve of ovipositor 20 to 90 degrees from the horizontal ..... *Scambus* Hartig
4. basal half or more of clypeus rather strongly convex; clypeus of male white or pale yellow; ovipositor somewhat compressed, its sheath about 0.3 to 0.7 as long as fore wing, the ridges of the basal teeth on its lower valve about 30 degrees from the horizontal; hind tibia usually with conspicuous banding ..... *Iseropus* Foerster
- Basal half of clypeus nearly flat; clypeus of male not white nor pale yellow; ovipositor subcylindric, its sheath about as long as or longer than front wing, the ridges of basal teeth on its lower valve mostly 40 to 90 degrees from the horizontal; hind tibia without conspicuous black and white band. (First sternite about 0.85x as long as its tergite; abdomen long) .....  
..... *Leptopimpla* Townes

#### 1. Genus *Leptopimpla* Townes

1961. *Leptopimpla* Townes, 1961, In Townes, Townes and Gupta. *Mem. Amer. Ent. Inst.*, 1 : 471.

Type-species : *Ephialtes longiventris* Cameron

#### 1. *Leptopimpla longiventris* (Cameron)

1908. *Ephialtes longiventris* Cameron. *Ztschr. System. Hymen. Dipt.*, 8 : 37. F. des. Type : F, India : Sikkim (London).

1976. *Leptopimpla longiventris* Gupta & Tikar. *Oriental Inst. Monogr.*, 1 : 28. M, F. key, syn., des., fig. India : Sikkim. West Bengal : Pashok, 600 m.; Darjiling, 1980 m. Nepal, Indonesia, Malaysia, Taiwan, Vietnam.

**Diagnostic characters** : Face shiny, punctate, pilose; frons and vertex sparsely punctate; mandible chisel-shaped; malar space less than 0.5 the basal width of mandible; pronotum largely smooth; mesoscutum shallowly punctate; scutellum distinctly punctate; mesopleurum hairy, shallowly punctate; propodeum longish, hairy, without any carina, strongly punctate. Nervellus intercepted at its upper 0.3 to 0.4; areolet wide; abdomen exceptionally long, first tergite 0.5 x as long as second tergite; ovipositor long and slender, ridges on its lower valve at right angle to its longitudinal axis. Clypeus, flagellum, apices of sixth and following tergites, apical corners of 1-5 tergites, tegula, hind corner of pronotum, scape and palpi, red or reddish-yellow; legs reddish.

**Material examined** : India : West Bengal : Darjiling Dist. : Pashok, 600 m, 6 Females, 16.v.-14.vi.1916 (Gupta). Andhrikhola near Rangpo, 3 Females, 1 Male, 9.iv.1973, H.S. Bhowmick and party (Z.S.I.).

**Distribution** : India : West Bengal (Darjiling Dist.), Sikkim. Elsewhere : Nepal, Burma, Malaysia, Indonesia, Vietnam, Taiwan.

**Remarks** : This is the only species known from Oriental Region and is recorded from West Bengal and Sikkim in India. The species is recognized by its long tubular abdomen and largely black body.

2. Genus *Iseropus* FoersterSubgenus *Iseropus* (*Gregopimpla*) Momoi

1965. *Gregopimpla* Momoi. In Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **5** : 601.

Type-species : *Pimpla* (*Epiurus*) *kuwanae* Veireck.

2. *Iseropus* (*Gregopimpla*) *himalayensis* (Cameron)

1899. *Pimpla himalayensis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 178. "M" = F. Key, des. Type : F, India : Meghalaya : Khasi Hills (Oxford).

1976. *Iseropus* (*Gregopimpla*) *himalayensis* : Gupta & Tikar. *Oriental Ins. Monogr.*, **1** : 105. M. F. n. status, key, des., fig. India : Meghalaya : Jaintia Hills; Khasi Hills. Assam. West Bengal : Darjiling, Sikkim, Himachal Pradesh; Dalhousie Hills : Khajjiar, Kashmir : Chattarnag. China.

1983. *Iseropus* (*Gregopimpla*) *himalayensis* : Gupta. *Contrib. Amer. Ent. Inst.*, **19**(7) : 55. M, F. key, des. Northern India. China, Japan, Korea.

*Diagnostic characters* : Face as long as wide, punctate in upper half; clypeus convex in basal 0.5, punctate, bilobed; antenna 30-segmented; pronotum shiny, smooth; mesoscutum shallowly punctate; mesopleurum shiny; scutellum convex; propodeum hairy, sparsely punctate in basal 0.5, punctoreticulate in basal 0.5 to 0.75; first tergite longer than wide at apex, strongly punctate, tubercles on 3-5 tergites distinct; ovipositor shorter than forewing, its upper valve slanting dorsally beyond nodus. Scape, tegula, hind corner of pronotum, all legs, reddish-yellow, except hind tibia and tarsus.

*Material examined* : No specimen of this species was available for study.

*Distribution* : India : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Sikkim, Assam, Meghalaya. Elsewhere : China, Korea, Japan.

*Remarks* : This species can be recognised by having legs in general moderately stout; hind tibia yellow, black subbasally and in spical 0.4. Propodeum and sides of tergites with short greasy hairs, its median carinae on its basal 0.5.

3. Genus *Scambus* HartigSubgenus *Scambus* (*Scambus*) Hartig

1938. *Scambus* Hartig. *Jahresber. Fortschar. Forstw. Forst. Naturk.*, **1** : 267.

Type-species : *Pimpla* (*Scambus*) *sagax* Hartig.

3. *Scambus* (*Scambus*) *lucidus* Gupta & Tikar

1968. *Scambus* (*Scambus*) *lucidus* Gupta & Tikar. *Oriental Ins.*, **1** : 222. F. key, des., fig. Type : F, India : Sikkim : Gangtok, 1600 m. (Gupta). India : West Bengal : Rangiroon, 1900 m.

1976. *Scambus* (*Scambus*) *lucidus* Gupta & Tikar. *Oriental Ins. Monogr.* **1** : 116. F. key, des., fig. India : Sikkim; West Bengal : Darjiling Hills.

*Diagnostic characters* : Vertex parallel sided and sloping behind; face as long as wide, smooth; pronotum, mesopleurum, metapleurum and propodeum polished and glabrous; mesoscutum smooth and hairy; scutellum smooth; propodeum longish, with a few scattered punctures; nervellus intercepted at its lower 0.3; first abdominal tergite as long as its apical width, following tergites strongly punctate with tubercles on 3-5 tergites; ovipositor slender, nodus weak.

Body in general dark brown, head, pronotum largely (except upper edge), metapleurum, propodeum, first tergite and apical margins of 2-5 tergites, black. Mesoscutum, scutellum, mesopleurum, red; tegula and all legs including coxae, yellow with their femora marked with light testaceous; ovipositor brown.

*Material examined* : India : West Bengal : Darjiling Dist. : Rangiroon, 1900 m, 2 Females, 25.v.1966, Colls. V. K. Gupta and J. K. Jonathan (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim.

*Remarks* : This species is easily distinguished by its smooth and polished propodeum and the median dorsal carinae parallel basally and diverging apically. Ovipositor tip with weak nodus. The thorax is largely reddish rather than black.

#### 4. Genus *Acropimpla* Townes

1960. *Acropimpla* Townes. *Bull U. S. N. Mus.*, 216(2) : 159.

Type-species : *Charitopimpla leucostoma* Cameron.

#### Key to the Species of *Acropimpla*

1. Propodeum with distinct median longitudinal carinae reaching up to the middle. Propodeum dorsolaterally strongly punctate. Abdominal tergites black with broad yellow bands. Propodeum and clypeus, black ..... *hapaliae* (Rao)
- Propodeum without median longitudinal carinae; propodeum convex and dorsally smooth and shiny. Abdomen and propodeum largely reddish and clypeus blackish-brown.....  
..... *uchidai* (Cushman)

#### 4. *Acropimpla hapaliae* (Rao)

1953. *Philopsyche hapaliae* Rao. *Indian Forest Rec. (N. S.) Ent.*, 8 : 168. F. des., Fig. Type : F, India : Karnataka : Malipatna, Coorg (Dehra Dun).

1976. *Acropimpla hapaliae* Gupta & Tikar. *Oriental Ins. Monogr.*, 1 : 151. M. F. key, des., fig. India : Uttar Pradesh : Garjia; Pawalgarh; Dehra Dun; Herbertpur. Himachal Pradesh : Nagrota; Khajjiar. Bihar : Ranchi Dist. : Namkum; Hasel; Bargaon; Ambera Bero. Rajasthan : Dholpur. Maharashtra : Chikalda; Panhala Fort; Devlali; Mahabaleshwar. Andhra Pradesh : Pasra. Karnataka : Londa; Gunji; Mallipatna; Tithimati. Tamil Nadu : Nilgiri Hills : Devala. West Bengal : Kalimpong. Burma.

*Material examined* : India : West Bengal : Darjiling District : Kalimpong, 2 Females, iii. 1963, C.I.B.C., Bengalore.

*Distribution* : India : West Bengal (Darjiling District), Karnataka, Uttar Pradesh, Himachal Pradesh, Bihar, Rajasthan, Maharashtra, Andhra Pradesh, Tamil Nadu. Elsewhere : Burma, China.

*Remarks* : This species can be recognised by the characters given in the key.

*Host* : *Hapalia machaeralis*.

#### 5. *Acropimpla uchidai* (Cushman)

1933. *Charitopimpla uchidai* Cushman. *Insecta Matsumurana*, 8 : 39. F. Key, des. type : F, Taiwan : Talin (= Taihorin) (Eberswalde).

1976. *Acropimpla uchidai* : Gupta & Tikar. *Oriental Ins. Monogr.*, 1 : 137. F. key, des., fig. Taiwan : Talin (= Taihorin). Burma : Kambaiti, 2000 m. India : Meghalaya : Cherrapunji, 1360 m. Sikkim : Gangtok, 1675 m. West Bengal : Darjiling Hills : Rangiroon, 2000 m. Uttar Pradesh : Bhowali, 1700 m. Nepal.

*Material examined* : India : West Bengal : Darjiling Dist. : Rangiroon, 1 Female, 26.v.1966, J. K. Jonathan, coll. No. J 156. (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Meghalaya. Elsewhere : Nepal, Burma, Taiwan.

*Remarks* : This species is distinguished by a white mark on dorsal part of prepectus and a white line along mesopleural suture, and also by the characters given in the key.

#### 5. Genus *Camptotypus* Kriechbaumer

1889. *Camptotypus* Kriechbaumer. *Ent. Nachr.*, 15 : 311.  
Type-species : *Camptotypus sellus* Kriechbaumer.

#### 6. *Camptotypus arianus arianus* (Cameron)

1899. *Pimpla ariana* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 157. F. key, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : Meghalaya : Khasi Hills (Oxford).
1906. *Erythropimpla himalayensis* Schulz. *Spolia Hymenopterologica*, 1906: 110. F. des. Type: F, India: West Bengal : Darjiling (Strasbourg). Syn. by Gupta & Tikar, 1976.
1976. *Camptotypus arianus arianus* : Gupta & Tikar. *Oriental Ins. Monogr.*, 1 : 188. M. F. n. status, key, syn., des., fig. India : Meghalaya : Khasi Hills. Nagaland : Naga Hills. Sikkim. West Bengal : Darjiling; Rangiroon. Kerala : Walayar Forest, S. Malabar, 300 m. Burma, Laos, N. Vietnam.

*Diagnostic characters* : Second abdominal tergite sparsely punctate, punctures distinctly separated from each other; third tergite less densely punctate than the fourth; abdomen in general more punctate type. Face narrowed near the clypeus and the inner orbital borders a little converging. Median dorsal carinae of first tergite also strong and high, and more strongly bent in the middle (at about an angle of 95 degree), thus forming raised humps and the carinae a little more distinct on the postpetiole.

This species is close to *C. arianus formosanus* (Matsumurana), and can be differentiated by the following characters : Wings light yellowish-brown with the margins tinged with black, sometimes a little more extensively so; stigma completely reddish-yellow.

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Assam, Meghalaya, Nagaland, Kerala. Elsewhere : Burma, Laos, Vietnam.

*Remarks* : This subspecies can be recognised by its light yellowish-brown wings with margins tinged with black, sometimes a little more extensively so; stigma completely reddish-yellow.

#### Tribe EPHIALTINI

#### Key to the Genera of Tribe Ephialtini

1. Labrum normally hidden when mandible is closed, somewhat inside the plane of the clypeus; mandible broad at tip and with the lower tooth not decidedly smaller than upper tooth ..... 2

- Labrum exposed, plate-like, in about the same plane as the clypeus; mandible tapered to a narrow tip and with the lower tooth much smaller than upper tooth ..... 3
2. Inner margin of eye weakly concave above antennal socket; trasal claws of female without a basal tooth..... *Coccygomimus* Saussure
- Inner margin of eye rather strongly concave at antennal socket; front taral claws of female usually with a large tooth. (Ovipositor straight; face and orbits of both sexes entirely black) .....  
.....*Itopectis* Foerster
3. Tip of mandible turned 90 degree, so that the lower tooth is inward; propodeum polished and usually with strong carinae; colouration usually yellow and usually with black spots.....  
.....*Xanthopimpla* Saussure
- Tip of mandible not or only slightly turned; propodeum punctate, striate, or mat and without carinae; colouration various. (Hind femur without a tooth beneath; nervellus far distad of basal vein).....*Ecthromorpha* Holmgren

#### 6. Genus *Itopectis* Foerster

1869. *Itopectis* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 164.

Type-species : (*Ichneumon scanicus* Villers) = *maculator* Fabricius.

#### 7. *Itopectis tibetensis* Perkins

1967. *Itopectis tibetensis* Perkins. *Mitt. Schweiz. Ent. Gesell.*, **30** : 325. F. des. Type : F, china : Tibet : Tropde, Rongshar Valley, 11,000 ft. (London).

1968. *Itopectis tibetensis* : Gupta. *Oriental Ins.*, **1** : 47 (1967). M, F. key, des., fig. India : Kashmir : Gulmarg, 2590 m. Himachal Pradesh : Simla Hills : Narkanda, 2745 m. Uttar Pradesh : Garhwal Hills : Bhyundar, 2440 m.; Ghangaria, 3200 m. West Bengal : Darjiling.

*Diagnostic characters* : Female and Male : antennal scape and body conspicuously pilose. Face punctate. malar space 0.6-0.7x the basal width of mandible. Mesoscutum, mesopleurum, metapleurum finely to coarsely punctate. Propodeal carinae parallel-sided, surface deeply punctate to rugoso-punctate. Abdomen coarsely punctate.

All tarsal segments black : tegula blackish at least in the apical half. Hind tibia black with a broad but incomplete whitish band. Hind tarsus black with first to fifth segments basally whitish; femur red without any black marking.

*Material examined* : India : West Bengal : Darjiling Dist. : Botanical gardens (Darjiling), Female 5.v.1966, J. K. Jonathan, no. J 146 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Uttar Pradesh. Elsewhere : Tibet.

#### 7. Genus *Coccygomimus* Saussure

1892. *Coccygomimus* Saussure. In. Grandidier : *Histoire Physique Naturelle et Politique de Madagascar*, **20** (Hymenopteres), Part 1, pl. 14, Fig.1.

Type-species : *Coccygomimus madecassus* Saussure.

Key to the Species of *Coccygomimus*

1. Ovipositor tip depressed and curved, its upper valve with distinct parallel transverse ridges. Scutellum flat dorsally. Epipleura narrow. Large species, 15-22 mm. Propodeal spiracles linear and elongate.....*The Habropimpla Group*.....(Hind coxa black with a large dorsal yellow mark. Fore and middle coxae yellow. Thorax and abdomen largely black with yellow marks .....  
.....*bilineatus* (Cameron)
- Ovipositor tip subcylindric, not depressed and not decurved. Scutellum convex to subconvex. Epipleura narrow or wide. Clypeus apically emarginate. Spiracles linear or oval..... 2
2. All epipleura narrow, linear, more than 3.0x as long as wide. Nervulus usually distad of basal vein. Hind tibia either wholly black, wholly yellow, or basally yellow and apically black, rarely with a submedian narrow yellow band. Propodeum usually elongate and with a lateral ridge. Propodeal spiracle usually linear or elongate oval. First tergite with or without dorsal hump.....*The Instigator Group*..... 3
- Fourth and fifth epipleura wider than 1-3, trapezoidal rather than rectangular, about 2.5 to 2.0x as wide as long, or nervulus interstitial or distad of basal vein, or hind tibia with a submedian yellow band. Propodeum without distinct lateral ridge and dorsal and pleural areas roundly merging with each other. Propodeal spiracles usually oval to elongate-oval.....  
*The Turionellae Group*..... 6
3. All legs and body in general black. Fore leg on innerside with yellowish marks. Abdominal tergites with sparse scattered punctures. Third tergite onwards with leathery wrinkles medially. Nervulus distad of basal vein by 0.2 its length and vertical.....*erebus* (Cameron)
- Not as above. Legs variously coloured, never wholly black ..... 4
4. Hind femora black. Hind tibiae yellow basally and black apically. Fore and middle legs, including femora yellow. abdomen with yellow apical bands on tergites. mesopleurum and abdomen closely punctate.....*carinifrons* (Cameron)
- All femora yellow, yellowish-brown, or red. abdomen black..... 5
5. All femora and tibiae yellow to orange-brown. Scutellum with or without a yellow spot. Nervulus distad of basal vein. Frons striate. Tegula partly to wholly yellowish-brown. Scutellum often marked yellow. Trochanters black.....*loathoe* (Cameron)
- All femora reddish and tibiae black or banded with black or yellow. Nervulus slightly distad of basal vein. Frons trans-striate. Tegula, scutellum and trochanters black.....*indra* (Cameron)
6. All coxae not black, variously marked. (Abdomen black with yellow apical stripes. Fore and middle coxae yellow with brown marks. Hind coxa black with a yellow dorsal mark. Mesopleurum finely punctate. Median dorsal carina of propodeum indistinct).....  
.....*flavipalpis* (Cameron)
- All coxae black..... 7
7. Mesopleurum polished, punctate. Mesoscutum and scutellum distinctly punctate. Frons striato-

punctate. Hind tibia with a submedian yellow band. Hind corner of pronotum yellow.....  
 .....*turionellae* (Linnaeus)

- Mesopleurum not shiny, leathery, its punctures tending to be ruguloso-punctate. Frons finely striate. Hind tibia brown with a faint yellow band. Pronotum wholly black.....  
 .....*cameroni* (Dalla-Torre)

#### 8. *Coccygomimus bilineatus* (Cameron)

1900. *Habropimpla bilineata* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 44(15) : 97. M. des. Type : M, India : Meghalaya : Khasi Hills (London).  
 1987. *Coccygomimus bilineatus* Gupta & Saxena, *Oriental Ins.*, 21 : 412. M, F. key, des., fig. Burma : Kambaiti. Nepal : Godavari. India : Localities in Himachal Pradesh; Meghalaya; Sikkim; Uttar Pradesh; West Bengal.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling, 1 Female, (no other data) (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh, Sikkim, Meghalaya. Elsewhere : Burma, Nepal, China.

*Remarks* : This species is distinguished by its black hind coxae with yellow dorsal marks and black propodeum with yellow markings. The wings are lightly tinged with yellow.

#### 9. *Coccygomimus cameronii* (Dalla-Torre)

1899. *Pimpla vidua* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43(3) : 180. M. Name preocc. by Walsh, 1873. key, des. Type : M, India : Meghalaya : Khasi Hills (Oxford).  
 1901. *Pimpla cameronii* Dalla Torre. *Catalogus Hymenopterorum*, 3 : 426. n. name.  
 1913. *Itopectis orientalis* Morley. *Fauna of British India, Hymenoptera*, 3 : 171. M. n. name, key, des. India : Meghalaya : Khasi Hills. Syn. by Townes & Townes, 1960.  
 1987. *Coccygomimus cameronii* : Gupta & Sexena. *Oriental Ins.*, 21 : 405. M, F. key, des., fig. Burma : Kambaiti, 2000 m. India : Localities in Assam; Himachal Pradesh; Karnataka; Meghalaya; Sikkim; Uttar Pradesh; West Bengal; Tamil Nadu. Indonesia, Nepal Taiwan.

*Material examined* : India : West Bengal : Darjiling Dist. : Several females and males from Alagarh, Darjiling, Rangiroon, Goom, Kalimpong (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh, Sikkim, Meghalaya, Assam, Karnataka, Tamil Nadu. Elsewhere : Nepal, Burma, Indonesia, Taiwan.

*Remarks* : This is one of the common species widely distributed in the Orient. This species can be easily recognised by the characters mentioned in the key.

#### 10. *Coccygomimus carinifrons* (Cameron)

1899. *Pimpla carinifrons* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43, 172. F. key, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : Meghalaya : Khasi Hills (London).  
 1922. *Ephialtes formosana* Cushman. *Philippine J. Sci.*, 20 : 590. F. des. biol. Type : F. (Washington). Syn. by Gupta, 1987.  
 1987. *Coccygomimus carinifrons* : Gupta & Sexena, *Oriental Ins.*, 21 : 386. M, F, key, des. India : Several Localities in Himachal Pradesh, Kashmir, Uttar Pradesh, West Bengal, Sikkim. Nepal, Burma, Taiwan.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Meghalaya. Elsewhere : Nepal, Burma, Taiwan.

*Remarks* : This species has yellow apical bands on abdominal tergites. Hind leg is black except for a broad band on tibia. The frons is smooth and shiny.

### 11. *Coccygomimus erebus* (Cameron)

1899. *Pimpla erebus* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 184. F. key, des. Type : F, India : Meghalaya : Khasi Hills (Oxford).

1987. *Coccygomimus erebus* : Gupta & Sexena, *Oriental Ins.*, **21** : 372. M, F. key, des., fig. Burma : Kambaiti. India : Localities in Kashmir; Himachal Pradesh; Uttar Pradesh; West Bengal.

*Material examined* : Nil.

*Distribution* : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Uttar Pradesh, West Bengal, Meghalaya. Elsewhere : Burma.

*Remarks* : This species has body and legs in general black, except for yellowish streaks on the inner side of fore femur and tibia. The abdomen is with a metallic shine. It can further be distinguished by the characters as mentioned in the key.

### 12. *Coccygomimus flavipalpis* (Cameron)

1899. *Pimpla flavipalpis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 174. M, F. key, des. Lectotype (designated by Townes, Townes & Gupta) : F, India : Meghalaya : Khasi Hills (London).

1913. *Phytodiaetoides megaera* Morley. *Fauna of British India, Hymenoptera*, **3** : 221. F. des., fig. Type : F, India : Meghalaya : Khasi Hills, 6000 ft. (London). Syn. by Townes & Townes, 1960.

1987. *Coccygomimus flavipalpis* : Gupta & Sexena, *Oriental Ins.*, **21** : 400. M, F. key, des., fig. Burma : Kambaiti, 1800-2000 m. India : Localities in Meghalaya; Sikkim; Tamil Nadu; Uttar Pradesh; West Bengal. Nepal : Godavari, 1500 m.

*Material examined* : Several females and males from India : West Bengal : Darjiling and Rangiroon (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Uttar Pradesh, Sikkim, Meghalaya, Tamil Nadu. Elsewhere : Nepal, Burma, Taiwan.

*Remarks* : This species has fore and middle coxae yellow, hind coxa black with a dorsal yellow spot. The propodeum has yellow apical spots and abdomen with yellow apical bands.

### 13. *Coccygomimus indra* (Cameron)

1899. *Pimpla indra* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 179. F. key, des. Type : F, India : Meghalaya : Khasi Hills (London).

1987. *Coccygomimus indra* : Gupta & Saxena. *Oriental Ins.*, **21** : 382. M, F. key, des., fig. India : Several localities in Kashmir; Himachal Pradesh; Uttar Pradesh; Delhi; Sikkim; West Bengal.

*Distribution* : India : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Delhi, Uttar Pradesh, Sikkim, Meghalaya. China.

**Remarks** : The material of this species could not be examined. Gupta & Saxena (1987) have redescribed this species in detail.

This species is recognised by having all femora red; fore and middle tibiae, hind tibia and tarsus black; and fore and middle tarsi reddish with black markings. The first abdominal tergite is narrow and with prominent dorsal hump in the middle.

#### 14. *Coccygomimus laothoe* (Cameron)

1897. *Pimpla laothoe* Cameron. *Mem. & Proc. Manchester lit. Phil. Soc.*, **41** (4) : 22. F, des. Type : F, India : Uttar Pradesh : Mussoorie (Oxford).

1897. *Pimpla nepe* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.* **41** (4) : 23. F, des., fig. Type : F, India : Uttar Pradesh : Mussoorie (Oxford). Syn. by Townes & Townes, 1960.

1899. *Pimpla poesia* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 176. F, key, des. Type : F, India : Meghalaya : Khasi Hills (Oxford). Syn. by Townes & Townes, 1960.

**Material examined** : Several females and males were seen in Gupta collection from Rangiroon, Singmari, Lebong and Kalimpong in Darjiling district.

**Distribution** : India : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar, Meghalaya, Tamil Nadu, Assam, Karnataka, Maharashtra, Manipur. Elsewhere : Pakistan, Sri Lanka, China, Taiwan, Burma, Tibet, Nepal, Indonesia.

**Remarks** : This is one of the common species in the Oriental Region. It is characterised by having the whole body strongly punctate, all legs red except for the black coxae and trochanters.

#### 15. *Coccygomimus turionellae* (Linnaeus)

1758. *Ichneumon turionellae* Linnaeus. *Systema Naturae*, Ed. 10, p. 564. F, des, Type : F, Sweden ? (Linnean Soc. London).

1987. *Coccygomimus turionellae* : Gupta & Saxena. *Oriental Ins.* **21** : 396. M ? F, key des, fig. Burma, Afghanistan, India : Kashmir, Uttar Pradesh.

**Distribution** : India : West Bengal (Darjiling District), Kashmir, Uttar Pradesh. Elsewhere : Burma, China, Japan, Korea, Ryukyus, Eurasia, Afghanistan.

**Remarks** : Morely (1913) recorded this species from Pashok in Darjiling district. No material of this species was available for study. Gupta & Saxena (1987) redescribed this species in detail.

#### 8. Genus *Echthromorpha* Holmgren

1868. *Echthromorpha* Holmgren. *Kongliga Svenska Fregatten Eugenie's Resa* **2**(1) : 406.

Type-species : (*Echthromorpha maculipennis* Holmgren) = *Ichneumon agrestoria fuscator* Fabricius.

#### 16. *Echthromorpha agrestoria notulatoria* (Fabricius)

1804. *Cryptus notulatorius* Fabricius. *Systema Piezatorum*, p. 77. F. des. Type : F, India : Tamil Nadu (Kiel).

1846. *Pimpla continua* Brulle. In *Lepeletier : Histoire Naturelle des Insectes, Hymenopteres* **4** : 92. (F). des. Type : F, locality ? (Paris). Syn. by Krieger, 1909.

1897. *Pimpla pulchrimaculata* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **41** (4) : 20. F. des. Type : F, Sri Lanka : Trincomalee (Oxford). Syn. by Townes, Townes & Gupta, 1961.

1897. *Pimpla bilineata* Koningsberger. *Meded uit's Lands Plantentuin*, **20** : 45, 46, 80. F. fig. Type : F, Indonesia. Syn. by Krieger, 1909.
1899. *Chrysopimpla ornatipes* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43(3)** : 186. M, F. des. Lectotype F, India : Meghalaya : Khasi Hills (London). syn. by Krieger, 1909.
1899. *Chrysopimpla persimilis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43(3)** : 188. "M" = F. des. Type : F, India : Meghalaya : Khasi Hills (Oxford). Syn. by Townes, Townes & Gupta, 1961.
1903. *Echthromorpha laeva* Cameron. *J. straits Branch Roy. Asiatic Soc.*, **39** : 135. M, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : M, Singapore (London). Syn. by Morley, 1913.
1905. *Echthromorpha robusta* Cameron. *J. Straits Branch Roy. Asiatic Soc.*, **44** : 120. F, des. Lectotype F. Indonesia : Borneo : Matang (London). Syn. by Townes, Townes & Gupta, 1961.
1905. *Echthromorpha maculipes* Cameron. *J. Straits Branch Roy. Asiatic Soc.*, **44** : 121. (F). des. Lectotype F, Malaysia : Sarawak : Kuching (London). Syn. with *laeva* by Morley, 1913.
1907. *Echthromorpha latibalteata* Cameron. *Trans. Linn. Soc. London*, (2) **12(1)** : 81. M, des. Type : M, Chagos Archipelago : Peros Banhos (London). Syn. by Townes, Townes & Gupta, 1961.
1909. *Echthromorpha notulatoria* var. *insulana* Krieger. *Mitt. Zool. Mus. Berlin*, **4** : 313. M, F, key, des. Fig. Lectotype F, Indonesia : Sumatra : Liangagas (Warsaw).
1913. *Echthromorpha notulatoria* : Morley. *Fauna British India, Hymenoptera*, **3** : 100. M, F, key, syn., des., biol. India : Sikkim. Mezoram : Aijal, Lushai Hills. Uttar Pradesh : Oudh. Meghalaya : Khasi Hills. West Bengal : Buxa Duars; Calcutta. Bihar : Pusa; Chapra; Samastipur. Maharashtra : Poona. Tamil Nadu : Samalkota. Karnataka : Bangalore. Burma, Sri Lanka, Singapore, Malaysia.

**Diagnostic characters** : Face shallowly and distinctly punctate. Clypeus apically truncate. Malar space 1.0x the basal width of mandible. Thorax mainly black. Mesoscutum with two elongate black marks. Propodeum yellowish-brown laterally, at base black, spiracles large, elongate. Abdomen black, with the apices of all segments yellow. Legs in general yellow.

**Material examined** : India : West Bengal : Baruipur near Calcutta, 1 Female, 8.xii.1966, K.R. Rao and party; Budge Budge, 1 Male, 5.xi.1966, A.N.T. Joseph (Calcutta).

**Distribution** : India : West Bengal (Calcutta, South 24-Parganas), Sikkim, Mizoram, Uttar Pradesh, Meghalaya, Bihar, Maharashtra, Tamil Nadu, Karnataka. Elsewhere : Sri Lanka, Burma, Thailand, Malaysia, Indonesia, China.

### 9. Genus *Xanthopimpla* Saussure

1892. *Xanthopimpla* Saussure. *In Grandider : Histoire Physique, Naturelle et Politique de Madagascar*, **20** : (Hymenopteres) Part 1.

Type-species : *Xanthopimpla nova* (!) = *hova* Saussure.

#### Key to the species of *Xanthopimpla*

1. Antennae not longer than body; areolet hardly petiolate..... 2
- Antennae longer than body, or areolet distinctly petiolate..... 7
2. Areola on propodeum not transverse, usually distinctly hexagonal ..... 3
- Areola more or less transverse and often not hexagonal..... 5
3. Body pale yellow. Ovipositor very short. Radius more distinctly sinuate, stigma in fore wing testaceous. .... *flavolineata* (Cameron)

- Body yellow with black spots. Ovipositor not very short. Radius not sinuate ..... 4
- 4. Ovipositor less than 0.5 the length of abdomen. Scutellum subpyramidal ..... *pedator* (Fabricius)
- Ovipositor 0.5 the length of abdomen. Scutellum simple convex ..... *regina* (Morley)
- 5. All the abdominal tergites (except 6th ) with two black spots ..... *stemma* (Thunberg)
- First and every alternate abdominal tergite with semicircular black spots on either side or complete bands ..... 6
- 6. Hind femora yellow with black markings.....*elegans elegans* (Cameron)
- Hind femora entirely yellow .....*punctata* (Fabricius)
- 7. Mesoscutum closely punctate basally .....*appendicularis appendicularis* (Cameron)
- Mesoscutum not or obsoletely punctate ..... 8
- 8. Areola on propodeum apically wanting. Notauli on mesoscutum obsolescent, confined to its base. Propodeum short ..... *honorata honorata* (Cameron)
- Areola on propodeum apically entire. Notauli on mesoscutum short but distinct..... 9
- 9. Small species, 6.0 mm. Hind femora yellow without black markings.....*nana nana* (Schulz)
- Moderately large species, 10.0. mm. Hind femora yellow with two elongate lines on the inner and outer half, and a narrow line at the apex, black.....*sikkimensis* (Cameron)

#### 17. *Xanthopimpla appendicularis appendicularis* (Cameron)

1899. *Pimpla appendicularis* Cameron. *Mem. Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 160. F. key, des. Type : F, India : Meghalaya : Khasi Hills (Oxford).
1899. *Xanthopimpla tigris* Krieger. *Sitzber. Naturf. Gesell. Leipzig*, 189/98 : 75, M, F. key, des. fig. Lectotype (designated by Townes et al., 1961); F, India : Meghalaya : Khasi Hills (Berlin).
1970. *Xanthopimpla appendicularis appendicularis* : Towne & Chiu. *Mem. Amer. Ent. Inst.*, 14 : 258. M,F, n. status, key, syn., fig. India : Meghalaya : Cherrapunji. Sikkim : Gangtok. Uttar Pradesh : Sat Tal, Jeolicote. West Bengal : Darjiling Hills : Rangiroon.

*Distribution* : India : West Bengal (Darjiling District), Uttar Pradesh, Sikkim, Meghalaya.

*Remarks* : Townes & Chiu (1970) reported this species from Rangiroon in Darjiling district. Morley (1913) gave a detailed description of this species.

#### 18. *Xanthopimpla elegans apicipennis* (Cameron)

1899. *Pimpla apicipennis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 161. F, key, des. Type : F, India : Meghalaya : Khasi Hills (Oxford).
1899. *Xanthopimpla fasciata* Krieger. *Sitzber. Naturf. Gesell. Leipzig*, 1897/98 : 92. M, F, key, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : Meghalaya : Khasi Hills (Berlin). Syn. by Townes & Chiu, 1970.

1970. *Xanthopimpla elegans apicipennis* Townes & Chiu. *Mem. Amer. Ent. Inst.* **14** : 247. M, F, n. status, key, syn. des., fig. India : Meghalaya : Dawki, Jaintia Hills. Assam : Rangapara, Charduar Forest. Nagaland : Dimapur-Manipur Road. Sikkim. West Bengal : Tista-Kalimpong Road. Uttar Pradesh : Garjia; New Forest, Dehra Dun. Karnataka : Ammathi, S. Coorg, 3100 ft. Tamil Nadu : Cherangode, Nilgiri Hills. Nepal, Burma, Laos, Thailand.

*Distribution* : India : West Bengal (Darjiling District), Uttar Pradesh, Sikkim, Assam, Meghalaya, Nagaland, Karnataka, Tamil Nadu, Nicobar Is. Elsewhere : Nepal, Burma, Thailand, Laos.

*Remarks* : This species is originally known from Khasi Hills in Meghalaya. Townes & Chiu (1970) reported this species from Darjiling district in West Bengal. No material of this species was available for study. It can be recognised by its hind femora yellow with black markings.

### 19. *Xanthopimpla flavolineata* Cameron

1907. *Xanthopimpla flavolineata* Cameron. *Tijdschr. v. Ent.*, **50** : 48. F, key, des. Type : F, Indonesia : West Irian : Merauke (Amsterdam).
1908. *Xanthopimpla emaculata* Szepliget. *Notes Leyden Mus.*, **29** : 256. F, key, des. Type : F, Indonesia : Java : Semarang (Budapest). Syn. by Townes & Chiu, 1970.
1913. *Xanthopimpla immaculata* Morley. *Fauna of British India*, Hymenoptera, **3** : 115. M, F, key, des. Type : F, India : Bihar (New Delhi). (Paratype seen in London). India : Bengal. Madhya Pradesh : Jabalpur. Tamil Nadu : Palur. Bangladesh : Dacca. Sri Lanka. Syn. under *emaculata* by Cushman, 1925.
1914. *Xanthopimpla hyalotila* Krieger. *Arch. f. Naturgesch.*, (A) **80** (6) : 35. key; (A) **80** (7) : 16. M, des., fig. Type : M, Australia : North Queensland (Berlin). Syn. by Townes & Chiu, 1970.
1925. *Xanthopimpla xanthostigma* Girault. *Insecutor Inscitiae Menstruus*, **13** : 38. F, des, Type : F, Australia : Queensland Amamoor forest (Brisbane). Syn. by Townes & Chiu, 1970.
1936. *Xanthopimpla xara* Cheesman. *Trans. R. Ent. Soc. London*, **85** : 179. F, des., fig. Type : F, New Hebrides : N. E. Malekula (London). New Hebrides : Malekula : South West Bay. Syn. by Townes & Chiu, 1970.
1953. *Metopius sesamiae* Rao. *Indian Forest. Rec. (N. S.) Ent.*, **8** : 184. M, des., fig. Type : M, India : Bangalore (Dehra Dun). Host : *Sesamia inferens*. syn. by Townes & Chiu, 1970.
1970. *Xanthopimpla flavolineata* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 114. M, F, key, syn., des., fig. Several localities in Australia; Bismarck Archipelago; Borneo; Caroline Islands; Sri Lanka; Hong Kong; India (Bihar, Orissa, Assam, Tamil Nadu, Kerala, Karnataka). Java : Lesser Sunda Islands, Malaya, Moluccas, New Caledonia, New Guinea, New Solomons and Taiwan.

*Distribution* : India West Bengal : Bihar, Orissa, Assam, Tamil Nadu, Kerala, Karnataka. Elsewhere : Indonesia, Malaya, New Caledonia, New Guinea, New Solomons, Taiwan.

*Remarks* : No specimen of this species was available for study. Morley (1913) described *X. immaculata* which was later synonymised with *flavolineata* by Cushman (1925).

*Host* : *Cnaphalocrocis medinatis*, *Pelopidas mathias*.

### 20. *Xanthopimpla honorata honorata* (Cameron)

1899. *Pimpla honorata* Cameron. *Mem. & Proc. Manchester lit. Phil. Soc.*, **43** (3) : 170. F, key, des., Type : F, India : Meghalaya (Oxford).
1908. *Xanthopimpla cera* Cameron. *Ztschr. System. Hymn. Dipt.*, **8** : 38. F, des, Type : F, India : Sikkim (London). Syn. by Townes & Chiu, 1970.

1908. *Xanthopimpla kriegneriana* Cameron. *Ztschr. System. Hymen. Dipt.*, **8** : : 38. F, des. Type : F, "Himalayas" (London).
1908. *Xanthopimpla binghami* Cameron. *Ztschr. System. Hymen. Dipt.*, **8** : 39. "M" = F. des. Type : F, India : Sikkim (London). Syn. by Townes & Chiu, 1970.
1970. *Xanthopimpla honorata honorata* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 206. M, F. Key, des. syn. fig. Several localities in India : Himachal Pradesh, Uttar Pradesh, Bihar, West Bengal, Assam, Meghalaya, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu, Kerala. Nepal, Thailand, Vietnam, Malaysia, Indonesia, Singapore, Philippines, Taiwan.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, U.P., Bihar, Assam, Meghalaya, Maharashtra, M.P., Karnataka. Kerala, Tamil Nadu. Elsewhere : Nepal, Thailand, Vietnam, Malaysia, Singapore, Philippines, Taiwan.

### 21. *Xanthopimpla nana nana* Schulz

1905. *Xanthopimpla prava* Cameron. *Spolia Zeylanica*, **3** : 136. Name preocc. by Krieger, 1899. M, des. Type : M, Sri Lanka : Peradeniya (London).
1906. *Xanthopimpla nana* Schulz. *Spolia Hymenopterologica* p. 114. n. name.
1907. *Xanthopimpla cameroni* Schmiedeknecht. *Genera Insectorum*, **62** : 39. n. name.
1908. *Xanthopimpla ornata* Szepligeti. *Notes Leyden Mus.*, **29** : 254. F, key, des. Type : F, Indonesia : Java : Semarang (Budapest). Syn. by Townes & Chiu, 1970.
1908. *Xanthopimpla pulchella* Szepligeti. *Notes Leyden Mus.*, **29** : 255. F, key, des. Type : F, Indonesia : Java : Semarang (Budapest). Syn. with *ornata* by Townes, Townes & Gupta, 1961.
1970. *Xanthopimpla nana nana* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 175. M, F, n. status, key, syn., des., fig. India : Bihar : Ranchi Dist. : Ambero-Bero; Namkum; Maheshpur; Ranchi. Assam : Charduar Forest, Rangapara. Meghalaya : Dawki, Jaintia Hills. Uttar Pradesh : Dehra Dun; Pawalgarh; Srinagar, Garhwal. Madhya Pradesh : Pachmarhi. Maharashtra : Bombay. Himachal Pradesh : Palampur. Kerala : Thekkady Sanctuary; Walayar Forest. West Bengal : Tista-Kalimpong Route. Indonesia, Thailand, S. Vietnam, Cambodia, Sri Lanka, Hong Kong, Nepal.

*Distribution* : India : West Bengal (Darjiling Dist., Kalimpong-Tista route), wide spread in most states. Elsewhere : Sri Lanka, Nepal, Thailand, Combdia, Vietnam, Hong Kong, Indonesia.

*Remarks* : This is a small species having hind femora entirely yellow.

### 22. *Xanthopimpla nigritarsis reciprocata* Townes & Chiu

1970. *Xanthopimpla nigritarsis reciprocata* Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 263. F. Key, des., fig. Type : F, India : West Bengal : Tista-Kalimpong route (Gupta).

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District).

### 23. *Xanthopimpla ochracea valga* Krieger

1914. *Xanthopimpla valga* Krieger. *Arch. f. Naturgesch.*, (A) **80**(6) : 41, 94. M. key, des., fig. Type : M, Indonesia : Sumatra : Sarik (Berlin).
1970. *Xanthopimpla ochracea valga* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 128. M, F. n. status, key, des., fig. India : West Bengal : "Tibben", Tista-Kalimpong route; India : Assam : Charduar Forest, Rangapara. Burma, Thailand, Indonesia, North Vietnam.

**Material examined** : No material or description of this species was available for study, therefore, this species could not be included in the key.

**Distribution** : India : West Bengal (Darjiling District), Assam. Elsewhere : Burma, Thailand, Indonesia, Vietnam.

#### 24. *Xanthopimpla pedator* (Fabricius)

1767. *Ichneumon punctator* Linnaeus. *Systema Naturae, Edition 12*, 1 (2) : 935. Name preocc. by Allioni, 1766. F. des. Type : F, "Indies" (Lost). Syn. by Fabricius, 1793.
1775. *Ichneumon pedator* Fabricius. *Systema Entomologiae*, p. 828. F. des. Type : F, India (Glasgow).
1822. *Ichneumon multipunctor* Thunberg. *Mem. Acad. Sci. St. Petersbourg*, 8 : 262. des. in key; 1824. 9 : 313. Eastern India & Cape of Good hope, n. name for *pedator*.
1899. *Xanthopimpla punctatrix* Kriger. *Sitzber. Naturf. Gesell. Leipzig*, 1897/98 : 85. F. key, des. Type : F, "Kaulun" (= Hong Kong : Kowloon) (Berlin). Syn. by Townes & Chiu, 1970.
1906. *Xanthopimpla punctatrix* Schulz. *Spoilia Hymenopterologica*, p. 114. Emendation.
1913. *Xanthopimpla pedator* Morley. *Fauna of British India, Hymenoptera*, 3 : 116. M, F. key, syn., des., fig. India : Uttar Pradesh : Mussoorie, 7000 ft. Bihar : Ranchi; Hazaribagh. Puri. Maharashtra : Nagpur; Poona. Tamil Nadu : Koilpati. Sikkim. Burma, Singapore, Hong Kong, Malaysia, Indonesia.
1970. *Xanthopimpla pedator* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, 14 : 39. M, F, key, syn., des., fig. China : Canton; Fuzhou; Kiantshou, Tsingtao; Ting-nu. India : Uttar Pradesh : Garjia; Pawalgarh. Bihar : Ranchi Dist. : Ranchi; Namkum; West Bengal : Tista-Kalimpong Route. Meghalaya : Khasi Hills. Karnataka : Ammathi; Coorg; Bhagmandla; Mysore; Chikkaballapura. Hong Kong, Indonesia, Macao, Malaysia, North Vietnam, Yuwan, Taiwan.

**Distribution** : India : West Bengal (Darjiling District), Bihar, Meghalaya, Karnataka, Tamil Nadu, Uttar Pradesh. Elsewhere : Pakistan, Burma, Vietnam, China, Malaysia, Singapore, Indonesia, Hong Kong, Taiwan.

**Remarks** : The specimens of this species were not seen. The species can be distinguished by having ovipositor half as long as abdomen and scutellum subpyramidal.

**Host** : *Sonthonnaxia leto*, *Antheraea frithi*, *Erionota thrax*, *Dendrolimus punctatus*, *D. spectabilis*.

#### 25. *Xanthopimpla punctata* (Fabricius)

1781. *Ichneumon punctatus* Fabricius. *Species Insectorum*, 1 : 437. (M) des. Type : M, India : "Coromandel" (Kiel, on deposit in Copenhagen).
1879. *Pimpla transversalis* Vollenhoven. *Stettiner Ent. Ztg.*, 40 : 146. M, f, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Indonesia : Sumatra (Leiden). Borneo. Indonesia : Lesser Sunda Is. : Timor. Tibet ? Syn. by Krieger, 1914.
1899. *Xanthopimpla ruficornis* Krieger. *Sitzber. Naturf. Gesell. Leipzig*, 1897/98 : 103. M, key, des. Type : M, Indonesia : Moluccas : Kai (Berlin). Syn. by Townes & Chiu, 1970.
1902. *Xanthopimpla (!) appendiculata* Cameron. *Fauna & Geogr. Maldive & Laccadive Archip.*, 1 (1) : 51. M, des. Lectotype : F, Leccadive Is. : Minikoi (London). Syn. by Krieger, 1914.
1903. *Xanthopimpla brunneiornis* Cameron. *J. Straits Branch Roy. Asiatic Soc.*, 39 : 139. F, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Malasia : Sarawak (London). Syn. by Krieger, 1914.
1905. *Xanthopimpla kandyensis* Cameron. *Spoilia Zeylanica*, 3 : 136. F, des. Type : F, Sri Lanka : Kandy (London). Syn. by Krieger, 1914.

1905. *Xanthopimpla maculiceps* Cameron. *Tijdschr. v. Ent.*, **48** : 37. M, des, Type : M, Indonesia : Java : Pasuruan (Amsterdam). Syn. by Krieger, 1914.
1906. *Xanthopimpla lissonota* Cameron. *J. Straits Branch Roy. Asiatic Soc.*, **46** : 115. F, des. Type : F, Malaysia : Sarawak : Kuching (London). Syn. by Townes, Townes & Gupta, 1961.
1908. *Neopimpla punctata* Kuroiwa. Provisional list of the Hymenoptera collected in Loochoo determined by Dr. Matsumura, p. 1. Nomen Nudum. Ryukyus. Okinawa.
1912. *Neopimplodes syleptae* Viereck. *Proc. U.S. Natl Mus.*, **42** : 151. F, des. Type : F, India : Karnataka : Malebannur (Washington). Host : *Syllepta derogata*. Syn. by Krieger, 1914.
1913. *Xanthopimpla punctata* : Morley. *Fauna of British India*, Hymenoptera, **3** : 124. M, F, key, Syn., des. Afghanistan. Pakistan : Lahore. India : Sikkim. Bihar : Pusa; Chapra. West Bengal : Calcutta. Madhya Pradesh : Betul; Raipur; Bilaspur; Bara-Seoni, nr. Balaghat. Gujarat : Surat. Tamil Nadu : Saidapet; Samalkota. Karnataka : Bangalore. South Andaman Is. Bangladesh, Sri Lanka, Burma, Singapore, Indonesia, Moluccas, Hong Kong, China, Taiwan, Philippines.
1915. *Phygadenon (!) punctator* Ishida. Report of the sugar cane borer in Formosa, **1** : 106; 2 pl. 16. M, F. Name preocc. by (Linnaeus) Schmiednecht, 1907. des, fig. Types : M, F. Taiwan (Sapporo).

*Material examined* : No specimen from West Bengal was available for study.

*Distribution* : India : West Bengal (Calcutta), Sikkim, Bihar, Madhya Pradesh, Gujarat, Tamil Nadu, Karnataka, South Andamans. Elsewhere : Pakistan, Sri Lanka, Burma, Singapore, Indonesia, Hong Kong, China, Taiwan, Philippines.

*Remarks* : This is a distinct species having yellow body with thorax and base of hind tibiae spotted black. First, third, fifth and seventh tergites with a pair of semicircular spots on either side.

*Host* : *Chilo sacchariphagus*, *C. suppressalis*.

#### 26. *Xanthopimpla regina* Morley

1913. *Xanthopimpla regina* Morley. *Fauna of British India*, Hymenoptera, **3** : 118, M, F, key, des. Type : F, Bangladesh : Sylhet (London), India : Bihar : Chapra. Nepal. Burma. Mandalay.
1914. *Xanthopimpla macrura* Krieger. *Arch. f. Naturgesch.*, (A) **80** (6) : 4, 42, 56. F, key, des., fig. Type : F, "Bolivia" (Berlin). (Correct type locality is in the Orient, probably Sikkim, cf. Townes, 1961). Syn. by Townes, Townes & Gupta, 1961.
1970. *Xanthopimpla regina* Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 43. M, F, key, des., Fig. India : West Bengal : Darjeeling Dist., 3000 ft. Assam, Sikkim. Laos, North Vietnam, Singapore, Indonesia, Taiwan, Thailand.

*Distribution* : India : West Bengal (Darjiling District), Bihar. Elsewhere : Nepal, Bangladesh, Burma, Thailand, Laos, N. Vietnam, Malaysia, Singapore, Indonesia, Taiwan.

*Remarks* : Morely (1913) reported this species from Darjiling dist. of West Bengal. No specimen from West Bengal was available for study. However, the species can be distinguished by having black markings on thorax; and abdomen and body largely strongly punctate.

#### 27. *Xanthopimpla sikkimensis* Cameron

1907. *Xanthopimpla sikkimensis* Cameron. *Tijdschr. v. Ent.*, **50** : 100.
1970. *Xanthopimpla sikkimensis* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, **14** : 154. M, F, key, des., fig. Burma : Moulmein Dist. : Kyando. India : Uttar Pradesh : Dehra Dun; Garjia. Sikkim. N. Vietnam.

*Material examined* : India : West Bengal : Sunderbans in 24 Parganas, 1 Male, 15.xi.1909, J.T. Jerkins.

*Distribution* : India : West Bengal (South 24-Parganas), Uttar Pradesh, Sikkim. Elsewhere : Burma, North Vietnam.

*Remarks* : This species can easily be distinguished by having hind femora yellow with two elongate lines on the inner and outer half and a narrow line at the apex, black.

### 28. *Xanthopimpla stemmator* (Thunberg)

1822. *Ichneumon stemmator* Thunberg. *Mem. Acad. Imp. Sci. St. Petersburg*, 8 : 262. key, des. Type : m, China (Uppasala).
1860. *Pimpla integrata* Smith. *J. Proc. Linn. Soc. London, Zool.*, 5 : 140. F. des. Type : F, Indonesia : Moluccas : Batjan (Oxford). Syn. by Townes et al., 1961.
1899. *Xanthopimpla thoracalis* Krieger. *Sitzber. Naturf. Gesell. Leipzig*, 1897/98 : 95. F, key, des. Type : F, Indonesia : Moluccas : Kai (Berlin). Syn. by Krieger, 1914.
1903. *Xanthopimpla maculifrons* Cameron. *J. Straits Branch Roy. Asiatic Soc.*, 39 : 138. F, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Malaysia : Sarawak : Kuching (London). Syn. by Townes & Chiu, 1970.
1906. *Xanthopimpla bimaculata* Cameron. *J. Straits Branch Roy. Asiatic Soc.*, 46 : 116. M, F. des. Lactotype (designated by Townes, Townes & Gupta, 1961) : F, Borneo (London). Malaysia : Sarawak : Kuching. Syn. by Krieger, 1914.
1907. *Xanthopimpla nursei* Cameron. *J. Bombay Nat. Hist. Soc.*, 17 : 592. F, des. Type : F, India : Maharashtra : Deesa (London). Syn. by Krieger, 1914.
1907. *Xanthopimpla maculifrons* Cameron. *J. Bombay Nat. Hist. Soc.*, 17 : 591. f. Name preocc. by Cameron, 1903. des. Type : F, India : Maharashtra : Deesa (London). Syn. by Morley, 1913.
1908. *Xanthopimpla facialis* Szepliget. *Notes Leyden Mus.*, 29 : 256. M, key, des. Type : M, Indonesia: Java: Semarang (Budapest). Syn. by Krieger, 1914.
1970. *Xanthopimpla stemmator* : Townes & Chiu. *Mem. Amer. Ent. Inst.*, 14 : 108. M, F, key, syn., fig. Several localities in Pakistan. India: Assam; Bihar; Delhi; Karnataka; Tamil Nadu; Gujarat; Maharashtra; Uttar Pradesh; Meghalaya; Sikkim; West Bengal; Kerala; Nepal, Malaysia, Sri Lanka, Bangla Desh, Indonesia, China, Hong Kong, Taiwan, Ryukyus, Singapore, Laos, Philippines.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Assam, Bihar, Delhi, Karnataka, Tamil Nadu, Gujarat, Maharashtra, Uttar Pradesh, Meghalaya, Sikkim, Kerala. Elsewhere : Pakistan, Nepal, Sri Lanka, Bangla Desh, Indonesia, Malaysia, China, Taiwan, Hong Kong, Singapore, Laos, Philippines.

*Remarks* : This species can be recognised by having yellow body with legs entirely immaculate, but thorax marked with black and two black spots on each of the abdominal tergites (except 6th).

### Tribe THERONINI

#### Key to the Genera of Tribe Theronini

1. Scutellum with lateral carina only at its basal corners or not extending more than 0.3 its length. Submetapleural carina rather gradually higher towards the middle coxa. Median section of apical carina of propodeum nearly always strong. (Sublateral longitudinal carina of propodeum present

- and complete basad of apical transverse carina, reaching up to the base of propodeum .....  
 ..... ***Theronia*** Holmgren
- Scutellum with lateral carina extending at least half its length. Submetapleural carina abruptly higher next to middle coxa, making a prominent lobe or tooth-like projection. Median section of apical carina of propodeum usually weak or absent..... 2
2. Mandibular teeth of equal length; prepectal carina distinct above the bend ..... ***Parema*** Gupta
- Mandibular teeth of unequal length, lower tooth longer than the upper tooth. Prepectal carina above the bend distinct or indistinct ..... ***Nomosphacia*** Gupta

#### 10. Genus *Theronia* Holmgren

1859. *Theronia* Holmgren. *Ofvers. Svenska Vetensk. Akad. Forh.*, **16** : 123.

Type-species : (*Pimpla flavicans* Fabricius) = *atalantae* Poda.

#### 29. *Theronia zebra iridipennis* Cameron

1907. *Theronia iridipennis* Cameron. *Tijdschr. v. Ent.*, **50** : 99. M, des. Type : M, India : Sikkim (London).

1913. *Orientotheronia rufescens* Morley. *Fauna of British India, Hymenoptera*, **3** : 146. M, F. Name preocc. in *Theronia* by Krieger, 1905. key, des. Type : M, Burma : Rangoon (London). India : Meghalaya; Sikkim. Burma : Mandalay. Hong Kong. syn by Townes et al., 1961. (one paratype from Sikkim, Bingham colln., and one specimen from Sikkim, Dudgeon colln., belong to *Nomosphacia zebroides zebroides*; specimen from Hong Kong belong to *zebra diluta*.)

1961. *Theronia zebra iridipennis* : Townes et al. *Mem. Amer. Ent. Inst.*, **1** : 766. Burma. India.

**Diagnostic characters** : Face distinctly punctate and pilose; clypeus smooth; antennae nearly as long as body. Thorax indistinctly punctate. Areola a little narrowed basally and weakly truncated apically. Scutellum and postscutellum indistinctly punctate. not convex, its lateral carina not extending beyond the centre. All the abdominal tergites with transverse tubercles. Ovipositor about half as long as abdomen.

This is a brownish-yellow species with reddish-yellow and black markings. Mesoscutum with longitudinal median and lateral reddish lines. Propodeum apically reddish, outer areas black. All the abdominal segments medially black with a yellow band at the apex. Legs in general yellow, hind coxae, apices of trochanters and femora beneath, black. Wings clear hyaline.

**Material examined** : Nil.

**Distribution** : India : West Bengal, Meghalaya, Sikkim. Elsewhere : Burma, Thailand, Vietnam.

#### 11. Genus *Parema* Gupta

1962. *Theronia (Parema)* Gupta. *Pacific Ins. Monogr.*, **4** : 54.

Type-Species : *Theronia (Parema) nigrobalteata nigrobalteata* Cameron.

30. *Parema nigrobalteata nigrobalteata* (Cameron)

1899. *Theronia nigrobalteata* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 153. F, des. Type : F, India : Meghalaya : Khasi Hills (Oxford).
1899. *Theronia gracilis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 154. (F), des. Type : F, India : Meghalaya : Khasi Hills (Oxford). Syn. by Townes, Townes & Gupta, 1961.
1906. *Theronia zebra* var. *continentalis* Krieger. *Ztschr. System. Hymen. Dipt.*, 6 : 236. M, F, des. in key. Lactotype (designated by Townes, Townes & Gupta, 1961) : F, Burma : (Toungoo, 3000 ft. in Karenni Dist.) (Berlin). India : West Bengal : Darjiling. Vietnam (Annam). Syn. by townes, Townes & Gupta, 1961.
1961. *Theronia nigrobalteata nigrobalteata* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 75. n. status. India. Burma. Vietnam.

*Diagnostic characters* : Face punctate; pro-and mesopleurae smooth and shiny; areola on propodeum subquadrate.

This is a pale yellow species with black markings, wings apically infumate and the stigma pale. Mesoscutum blackish, at sides yellow; lateral carina of scutellum and tegula, black; scutellum also at apex black. Abdomen reddish with apices of segments yellow; three basal segments at base black. Anterior legs yellow with their femora and the intermediate tibiae and tarsi deep yellow; hind coxa broadly black at base, trochanters apically, femora broadly in the middle and tibiae, red; tarsi infuscate.

*Distribution* : India : West Bengal (Darjiling District), Meghalaya.

*Remarks* : No specimen of this species was available from West Bengal for study. Morely (1913) gave a detailed account of this species, based on a female collected from Khasi Hills in Meghalaya.

12. Genus *Nomosphacia* Gupta

1962. *Theronia (Nomosphacia)* Gupta. *Pacific Ins. Monogr.*, 4 : 68.

Type-species : *Nomosphacia zebroides zebroides* (Krieger).

31. *Nomosphacia zebroides indicus* (Gupta)

1913. *Orientotheronia rufescens* Morley. *Fauna of British India*, Hymenoptera 3 : 146. M, key, des. (in part). (One paratype from Sikkim (Bingham) and one female from Sikkim, 1800 ft. (Dudgeon) belong here).
1961. *Theronia zebroides* subspecies. Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 78.
1970. *Nomosphacia zebroides indicus* Gupta. *Ichneumon Hunting in India*, p. 59, n. comb. India : West Bengal, Sikkim. Taiwan.

*Diagnostic characters* : Face narrow in the front, strongly punctate, hairy; clypeus smooth, truncate apically; mandible stout and punctate; malar space obsolete; eyes strongly emarginate; antennae as long as body. Thorax indistinctly punctate; propodeum with strong carinae, areola little narrowed basally and weakly truncate apically, apophysis obtuse, spiracle linear and of moderate size. Wings not clouded, areolet sessile.

Body black with yellow markings. Antennae reddish-yellow. Mesoscutum with longitudinal median lateral marks, yellow; propodeum apically reddish-yellow; all abdominal tergites centrally black, with a distinct transverse yellow line subapically. Legs in general yellow : hind coxa, apices of trochanters, femur beneath black; tarsi infumate.

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Taiwan.

*Remarks* : Gupta (1962, 1970) reported this species from Darjiling in West Bengal.

### Tribe NEOXORIDINI

#### Key to the Genera of Tribe Neoxoridini

1. Areolet in fore wing absent; ventral tooth on first abdominal sternite usually absent; second abdominal tergite usually punctate. Ovipositor subcylindric, not so strongly compressed ..... *Eugalta* Cameron
- Areolet in fore wing present; first abdominal sternite with a sharp tooth ventrally; second abdominal tergite mostly smooth and shiny, sometimes with a few scattered punctures. Ovipositor compressed laterally..... *Achorocephalus* Kriechbaumer

#### 13. Genus *Eugalta* Cameron

1899. *Eugalta* Cameron. *Mem. Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 135.

Type-species : *Eugalta strigosa* Cameron.

#### Key to the species of *Eugalta*

1. Facial yellow mark extending above along orbital borders; first abdominal sternite often with a blunt tooth-like formation. Mesopleurum punctate; propodeum rugoso-striate..... *linearis linearis* Morley
- Facial yellow mark not extending above along orbital borders; first abdominal sternite without any tooth-like formation. Mesopleurum rugoso-punctate; propodeum finely rugulose..... *longipes* Morley

#### 32. *Eugalta linearis linearis* Morley

1913. *Eugalta linearis* Morely. *Fauna of British India*, Hymenoptera, **3** : 73. M, F, key, des., fig. Type : F, India : Sikkim (London). India : Meghalaya : Mahjain, Khasi Hills, 1000-3000 ft.

1980. *Eugalta linearis linearis* : Gupta. *Oriental Ins.*, **14** : 102. M, F, key, des., fig. India : Sikkim. Meghalaya : Mahjain, Khasi Hills. West Bengal : Runjit Valley, 1000 ft.; Darjiling. "East Fort Darvant" Burma : Wetpyuya, 2800 ft.

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Meghalaya. Elsewhere : Burma.

*Remarks* : No specimen of this species was available from West Bengal for study. Gupta (1980) gave a detailed description of this species.

#### 33. *Eugalta longipes* (Cameron)

1906. *Bathymenis longipes* Cameron. *Entomologist*, **39** : 251. F. des. Type : F, India : Sikkim (London). Burma. Thailand.

1914. *Xorides indicus* Szepliget. *Ann. Mus. Nalt. Hungarici*, **12** : 422. F. des. Type : F, India : West Bengal : Darjiling (Budapest). Syn. by Townes, Townes & Gupta, 1961.

1980. *Eugalta longipes* : Gupta. *Oriental Ins.*, 14 : 98. M, f, key, des., fig. India : Sikkim. West Bengal : Darjiling. Burma : Maymyo; Mt. Victoria, 500 m. Thailand.

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Burma, Thailand.

*Remarks* : No material of this species was available for study. Gupta (1980) redescribed this species in detail.

#### 14. Genus *Achorocephalus* Kreichbaumer

1899. *Achorocephalus* Kreichbaumer. *Ent. Nachr.*, 25 : 295.

Type-species : *Achorocephalus cinctipes* Kreichbaumer.

#### 34. *Achorocephalus spinosus* (Cameron)

1899. *Eugalta spinosa* Cameron. *Mem. Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 139. f. des., fig. Type : F, Meghalaya : Khasi hills (Oxford).

1985. *Achorocephalus spinosus* : Gupta. *Oriental Ins.*, 19 : 324. n. comb.

*Diagnostic characters* : Face smooth, with a few punctures below antennal sockets; mesoscutum densely punctate, rugose in the middle; propodeum and metapleurum reticulo-rugose; first tergite rugulose; second punctate; first sternite with a subbasal tooth. Ovipositor compressed and long.

Body largely reddish and black. Face, inner orbit up to ocellar level, temple, pronotal collar, tegula, base of first tergite, apices of all the tergites, yellow. Vertex occiput, pronotum, propodeum, remaining portion of abdominal tergites, black. Mesoscutum, scutellum, metascutellum, mesopleurum, metapleurum largely reddish. Legs in general yellow with fore and middle femora, their tarsi, all coxae, hind femur, tibia apically and its apical two segments, black.

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Meghalaya. Elsewhere : Burma.

*Remarks* : The species is known by its types. No material was available for study. Gupta (1980) gave a detailed description of this species.

#### Tribe RHYSSINI

This tribe is represented by a single genus in the state of West Bengal.

#### 15. Genus *Cyrtorhyssa* Baltazar

1961. *Cyrtorhyssa* Baltazar. *Monogr. Natl. Inst. Sci. Technol. Manila*, 7 : 58.

Type-species : *Rhyssa mesopyrrha* Mocsary = *Cyrtorhyssa mesopyrrha* (Mocsary).

#### 35. *Cyrtorhyssa mollerii* (Bingham)

1899. *Coleocentrus mollerii* Bingham. *J. Bombay Nat. Hist. Soc.*, 12 : 116. F, des., fig. Type : F, India : (Runjit Valley, 1000 ft. Darjiling Dist., West Bengal) (Berlin). Burma : Tenasserim.

1972. *Cyrtorhyssa moellerii* : Kamath & Gupta. *Oriental Ins. Monogr.*, 2 : 195. F, key, des., fig. India : West Bengal : Darjiling Dist. : Runjit Valley.

*Diagnostic characters* : Face strongly transversely striated in its upper 0.6, lower 0.3 coarsely punctate; clypeus concave at apex, finely punctate; malar space 0.4; frons with a median carina and a semicircular groove; vertex with a few scattered punctures; scutellum strongly punctate; mesopleurum

sparsely punctate, propodeum largely smooth, with sparse punctures, and medially with a distinct, shallow groove on basal 0.8. Areolet in fore wing short triangular. First tergite smooth, following tergites mat, with sparse or coarse punctures ovipositor 1.9x the fore wing length.

Distinguishing colour characters are : ground colour of first 3 tergites black; tergite 2 and 3 with broad, subapical yellow bands; middle and hind femora in basal 0.5 black, rest yellow.

*Distribution* : India : West Bengal (Darjiling District), Elsewhere : Burma.

*Remarks* : Bingham (1898) described this species on a specimen from Ranjit Valley in Darjiling District (wrongly recorded as Sikkim) in West Bengal. The type was deposited in Berlin Museum. Subsequently the species was reported by Bingham from Tenasserim (Burma), and it is presumed that the specimen is either destroyed or lost. No further record of this species has been made during the recent surveys.

## 2. Subfamily TRYPHONINAE

This subfamily is represented by a single tribe in West Bengal.

### Tribe PHYTODIETINI

#### Key to the Genera of Tribe *Phytodietini*

1. Mandible not twisted, its lower tooth usually as large as upper tooth. Nervellus intercepted below the middle, rarely intercepted above the middle or not intercepted at all. Eye margin not definitely notched opposite the antennal socket. Ovipositor about 4.0 x as long as apical depth abdomen.....*Phytodietus* Gravenhorst
- Mandible twisted so that the upper tooth is considerably forward of the much shorter lower tooth. Nervellus intercepted above the middle. Eye margin notched opposite the antennal socket. Ovipositor 1.0 to 2.0 x as long as apical depth of abdomen.....*Netelia* Gray

#### 16. Genus *Phytodietus* Gravenhorst

##### Key to the Subgenera of *Phytodietus*

1. First tergite constricted between spiracle and base, the prespiracular portion rather narrow, sometimes the constriction absent; dorsolateral edge of first tergite mostly or entirely rounded, at least near the spiracle; first tergite 1.15 to 3.8 x as long as wide in female; ninth sternum without a desclerotized area at the base of speculum .....*Neuchorus* Uchida
- First tergite tapered from spiracle to base or sometime weakly constricted, the prespiracular portion rather wide; dorsolateral edge of first tergite 1.5 to 1.9x as long as wide in male, 1.3 to 1.6x as long as wide in female; ninth sternum with a spindle-shaped desclerotized area at speculum base .....*Phytodietus* Gravenhorst

##### Subgenus *Phytodietus* (*Neuchorus*) Uchida

1931. *Neuchorus* Uchida. *Ins. Matsumurana*, 5 : 143.

Type-species : *Neuchorus longicauda* Uchida.

36. *Phytodietus (Neuchorus) longicauda* (Uchida)

1931. *Neuchorus longicauda* Uchida. *Insecta Matsumurana*, 5 : 144. F. des. fig. Lectotype (designated by Townes, Momoi & Townes, 1965) : F, Japan : Hokkaido : Jozrnkei (Sapporo). Japan : Iwate.
1933. *Phytodietus pallidus* Cushman. *Insecta Matsumurana*, 8 : 25, F. des. Type : F, Taiwan : Talin (= Taihorin) (Eberswalde). Syn. by Momoi, 1970 as well as by Kaur & Jonathan, 1979.
1979. *Phytodietus (Neuchorus) longicauda* : Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 35. F. key, syn., des., fig. Japan. Taiwan : Taihorin. India : Uttar Pradesh : Kumaon Hills : Bhowali, 1700 m. Himachal Pradesh : Dalhousie Hills : Ahla, 2286m. West Bengal : Darjiling, Botanical Garden, 1971m.

**Diagnostic characters** : Face finely closely punctate in the middle. malar space 0.6x the basal width of mandible. Frons smooth, medially raised and depressed above antennal sockets. Epomia long and strong. Notaulus extending up to the middle of mesoscutum. Metapleurum obliquely striated. Propodeum finely to coarsely striated. Areolet subsessile, triangular; nervulus opposite or distal by its own thickness. Nervellus intercepted at its lower 0.25. First tergite about 2.0x as long as wide at apex.

The colour pattern is variable. Flagellum dark to blackish-brown in general. Face with a line in the middle, frons above antennal sockets, mark on temple, pronotum at its anterior corner and a large mark below, mesoscutum with three lines, scutellum at base and at sides, mesopleurum broadly in the middle and an irregular mark on mesosternum, propodeum broadly at apex and base, all the abdominal tergites with a submedian band, black. Legs in general yellow; hind coxae with a small to broad oval mark laterally, hind femora and tibiae reddish and its tarsus brown.

**Material examined** : India : West Bengal : Darjiling, Botanical Garden, 1 Female, 4.v.1966, D.T. Tikar, Coll. No. T 229 (Gupta).

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh. Elsewhere : Japan, Taiwan.

**Remarks** : Kaur & Jonathan (1979) published a revision of the tribe Phytodietini.

Subgenus *Phytodietus (Phytodietus)* Gravenhorst

1829. *Phytodietus* Gravenhorst. *Ichneumonologia Europaea*, 2 : 928.

Type-species : *Phytodietus astutatus* Gravenhorst.

37. *Phytodietus (Phytodietus) silvicola* Kaur & Jonathan

1979. *Phytodietus (Phytodietus) silvicola* Kaur & Jonathan. *Oriental Inst. Monogr.*, 9 : 52. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Dalhousie Hills : Kalatop, 2438 m. (Gupta). India : West Bengal : Darjiling, Botanical Garden, 1980 m.; Rangiroon, 1910 m.

**Diagnostic characters** : Face finely and closely punctate; clypeus sparsely punctate; malar space 0.66x the basal width of mandible; pronotum punctulate, epomia absent; notauli weak and short; mesoscutum, scutellum and metascutellum finely punctate. Propodeum granulose, punctate at base and apex, striate in the middle, lateral crests weak. Areolet petiolated; nervellus intercepted at its lower 0.2. First tergite 1.5x as long as broad at apex; all tergites smooth.

The following are yellow : Face below antennal sockets, frons along the orbits, pronotal collar below, a mark at the base of notauli and a mark in the middle of mesoscutum, scutellum at base and at sides and metascutellum, tegula, propodeum with a quadrangular mark, all tergites narrowly at apex. legs in general reddish-yellow.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling Botanical Gardens, 1980 m, 1 Female, 5.v.1966, V. K. Gupta; 2 Female 4, 5.v.1966, T. Chand; 2 males, 4, 5.v.1966, J. K. Jonathan; 2 males 5.v.1966, D. Ram, M. K. Kamath. Darjiling 1820 m, 1 Female (wrongly identified by Morely, 1913 as *Phytodietus coryphaeus* Gravenhorst. Rangiroon, 1910 m, 1 Male, 1 Female, 25, 27.v.1966, M. K. Kamath & J. K. Jonathan.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh.

*Remarks* : This species is close to *P. (Phytodietus) spinipes* (Cameron), from which it can be differentiated by its strongly mat and dull mesopleurum; notaulus present and body largely black with a few yellow markings.

## 16. Genus *Netelia* Gray

### Key to the Subgenera of *Netelia*

1. Pecten of hind tarsal claws extending beyond true apex, the endpoint of the claws being black and shorter than the penultimate point; temple flat or weakly convex ..... 2
- Pecten of hind tarsal claws not extending beyond the true apex; temple rather weakly to strongly convex ..... 3
2. Occipital carina absent; areolet present; notaulus distinct; epipleurum of the third tergite separated from the tergite by a crease running less than half the length of the tergite; mesopleurum mat, weakly punctate; nervulus more or less distad of basal vein; volsellar shoulder strong; inner surface of gonoforceps specialized ..... *Apatagium* Enderlein
- Occipital carina present; areolet absent; notaulus not impressed; epipleurum of third tergite separated from the tergite by a crease running the entire length of the tergite; mesopleurum strongly rugulose; nervulus opposite basal vein; volsellar shoulder weak; inner surface of gonoforceps unspecialized ..... *Monomacrodon* Cushman (Not recorded from West Bengal)
3. Occipital carina completely absent; lateral carina of scutellum usually extending less than half the length of scutellum ..... 4
- Occipital carina present (except in some species); lateral carina of scutellum present or absent, often present and extending to apex of scutellum ..... 6
4. Ovipositor 1.0x as long as apical depth of abdomen; hind tarsus 1.0x as long as its tibia; underside of first brachial cell bare ..... *Bessobates* Townes *et al.*
- Ovipositor 2.0x or more as long as the apical depth of abdomen; hind tarsus 1.2x as long as its tibia; underside of first brachial cell hairy ..... 5
5. Areolet absent; apical margin of male clasper without a spine; cuspis foot-shaped.....

- .....*Parabates* Foerster
- Areolet present apical margin of gonoforceps with or without a spine; cuspis never foot-shaped .  
.....*Longiterebates* Kaur & Jonathan
6. Nervulus opposite or a little basad of basal vein; brace and pad poorly differentiated .....  
.....*Prosthodocis* Enderlein
- Nervulus distad of basal vein, at least slightly so; brace and pad well-defined..... 7
7. Mesopleurum and propodeum at base strongly, densely punctate, granular; a few weak incomplete striations present or sometimes absent on propodeum; brace and pad transverse.....  
.....*Toxochiloides* Tolkanitz
- Mesopleurum weakly to moderately punctate, seldom granular; propodeum distinctly striated in its basal about 0.65; brace and pad more or less oblique..... 8
8. Lateral carina of scutellum reaching to its apex; thorax usually without definite yellow markings, rarely polished with fine, weak punctures. Underside of first brachial cell bare.....  
.....*Netelia* Gray
- Lateral carina of scutellum absent or reaching less than 0.7 the length of scutellum; thorax usually with definite yellow markings, mostly polished or mat with fine, weak punctures. Underside of first brachial cell with dense hair .....*Paropheltes* Cameron

Subgenus *Netelia* (*Apatagium*) Enderlein

1912. *Apatagium* Enderlein. *Stettin. Ent. Ztg.*, 73 : 115.

Type-species : *Apatagium tristrigatus* Enderlein.

Key to the species of *Netelia* (*Apatagium*)

1. Clypeus distinctly separated from the face by a groove, apically truncated in the middle. Head at back weakly inflated and roundly receding. Fore tibia less than 2.0x as long as its basitarsus, its tibial spur 0.4x as long as its basitarsus .....*inaequalis* Uchida
- Clypeus more or less confluent with face without a distinct groove, apically rounded. Head at back almost flat. Fore tibia more than 2.5x as long as its basitarsus, its apical spur 0.75x as long as its basitarsus.....*tristrigata* (Enderlein)

38. *Netelia* (*Apatagium*) *inaequalis* (Uchida)

1934. *Paniscus* (*Parabates*) *inaequalis* Uchida. *Insecta Matsumurana*, 8 : 113. F. key, des., fig. Type : F, Taiwan : Kiuhabon (Sapporo).

1961. *Netelia* (*Apatagium*) *inaequalis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 94. n. comb. Taiwan.

*Material examined* : India : West Bengal : Darjiling Dist., Lepchajagat, 2214m, 1 Female, 2.v.1975, J. K. Jonathan & party.

**Distribution** : India : West Bengal (Darjiling District), Uttar Pradesh. Elsewhere : Taiwan.

**Remarks** : Kaur & Jonathan (1979) revised the tribe Phytodietini and gave a detailed description of this species.

### 39. *Netelia (Apatagium) tristrigata* (Enderlein)

1912. *Apatagium tristrigatum* Enderlein. *Stettiner Ent. Ztg.*, **73** : 116. key, des. Type : F. Indonesia : Sumatra : Sukaranda (Warsaw).

1979. *Netelia (Apatagium) tristrigata* Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 80. M, F, key, syn., des., fig. Indonesia : Sumatra : Sukaranda. India : Sikkim : Gangtok, 1516 m. West Bengal : Darjeeling Dist. : Pashok, 606 m. Assam : Margherita.

**Material examined** : India : West Bengal : Darjiling Dist. : Pashok, 606m, 1 Male, 26.v-14.vi.1916, F. H. Gravely; 1 Female, 11.xi.1971, J. M. Julka & Party.

**Distribution** : India : West Bengal (Darjiling District), Assam, Sikkim. Elsewhere : Sumatra.

**Remarks** : Kaur & Jonathan (1979) revised the tribe Phytodietini and gave a detailed description of this species.

### Subgenus *Netelia (Bessobates)* Townes et. al.

1961. *Bessobates* Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 93.

Type-species : *Parabatus deceptor* Morley.

### 40. *Netelia (Bessobates) virgata* (Fourcroy)

1785. *Ichneumon virgatus* Fourcroy. *Entomologia Parisiensis*, p. 401. des. Type : sex?, France : Paris (Destroyed).

1913. *Parabatus amplus* Morley. *Revision of the Ichneumonidae in the British Museum*, **2** : 131. M, F, key, des. Type : F, China : Tibet : Yatung, 4500 ft. (London). India : Sikkim. Syn. by Kaur & Jonathan, 1979.

1979. *Netelia (Bessobates) virgata* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 91. M, F, key, syn., des., fig. Full references and hosts records pertaining to Palaearctic Region. India : Various localities in Himachal Pradesh, Kashmir, Uttar Pradesh, West Bengal, Sikkim & Arunachal Pradesh.

**Diagnostic character** : It is a very common species. It is distinguished by having semicircular pad, a reticulated sclerotized area between pad and inner margin of gonoforceps, many stout bristles on volsella, inner apical corner broadly rounded while its outer corner produced into a tooth and a not too broad penis valve. Body pale brown. Ocellar triangle clear. Mesoscutellar lobes usually shaded darker, stigma yellow or brown.

**Material examined** : India : West Bengal : Darjiling District : Lapchajagat, 2214 m, 1 male, 2.vi.1975. J. K. Jonathan & party. Ghoom-Bhanjang, Hima Falls, 1667 m, 1 Male, 2.v.1971, A. R. Bhowmick & party.

**Distribution** : India : West Bengal (Darjiling District), Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Arunachal Pradesh. Elsewhere : China, Japan, Korea, U.S.S.R., Europe.

*Host* : *Drepana cultaria* L., *Erannis defoliaria* Cl., *Eupithecia absinthiata* Curt., *Gonodontis bidentata* Cl., *Oporinia diluta* Schiff.

Subgenus *Netelia* (*Parabates*) Foersterz

1886. *Parabates* Foerster. *Verh. Naturh. Ver. Rheinlande*, 25 : 150.

Type-species : *Parabates nigricarpus* Thomson.

41. *Netelia* (*Parabates*) *foersteri* Kaur & Jonathan

1979. *Netelia* (*Parabates*) *foersteri* Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 97. M. key, des., fig.  
Type : India : West Bengal : Darjiling District : Rangiroon, 1910 m. (Gupta).

*Diagnostic character* : Male. Head slightly broader than long. Eyes rather broad in front. Face almost as long as broad, raised in the middle. Clypeus about 2.0x as broad as long, apically truncate. Malar space 2.0x the basal width of mandible. Frons with a groove. Temple broad and receding behind eyes. Thorax finely punctate. Propodeum short in profile, smooth. Fifth tarsal segment of fore leg 3.0x as long as broad, a little longer than the fourth and little shorter than the third tarsal segment. Fore and middle tarsal claws finely pectinate. Hind tarsal claw strongly bent at tip and coarsely pectinate. Nervulus distad of basal vein by its own width, weakly inclivous, submedian cell apically hairy. Gonoforceps broad, a triangular area present near the dorso-apical margin of gonoforceps, cuspis foot-shaped, penis valve with its ventral ramus broad in the middle.

*Material examined* : India : West Bengal : Darjiling District, Rangiroon, 1 Male, 25.v.1966, D. Ram (Gupta).

*Distribution* : India : West Bengal (Darjiling District).

Subgenus *Netelia* (*Longiterebates*) Kaur & Jonathan

1976. *Netelia* (*Longiterebates*) Kaur & Jonathan. *Oriental Ins.*, 10(1) : 33.

Type-species : *Netelia* (*Longiterebates*) *himalayensis* Kaur & Jonathan.

Key to the species of *Netelia* (*Longiterebates*)

1. Large species, 12-13 mm long. Fore fifth tarsal segments 4.0x as long as broad and 2.0x the length of fourth segment. Pronotal scrobe rugoso-punctate. Epomia short and strong. Submedian cell bare. In male gonoforceps apically rounded with a small spine at its dorso-apical edge; brace long, diagonally placed; pad small, triangular; cuspis with both dorsal and ventral apical corners produced ..... *grandis* Kaur & Jonathan
- Small species, about 8-9 mm. Fore fifth tarsal segment 3.0x or less as long as broad and 1.5x or less the length of preceding segments. Submedian cell hairy ..... 2
2. Thorax dull, mat. Discocubitus strongly curved; basal vein with a slight bend a little above the nervulus, thus joining the median vein vertically. (Propodeum long in profile, distinctly striated. Pronotal scrobes finely striated; epomia short. Nervulus opposite, vertical. Temple broadly swollen)..... *himalayensis* Kaur & Jonathan

- Thorax subpolished, closely punctate. Dicochubitus weakly curved; basal vein without a bend just before joining the median vein slantingly. (Nervulus opposite or slightly distad by its own width. Gonoforceps without a spine)..... *turgida* Kaur & Jonathan

#### 42. *Netelia (Longiterebates) grandis* Kaur & Jonathan

1913. *Parabates virgatus* : Morley. *Fauna of British India*, Hymenoptera, 3 : 358 (in part). Sikkim : Gangtok 6150 ft.; West Bengal : Kurseong, 6000ft. (cf. Kaur & Jonathan, 1979).

1979. *Netelia (Longiterebates) grandis* Kaur & Jonathan. *Oriental Ins. Monogr.* 9 : 99. M, F. key, des., fig. Type : F, India : West Bengal : Darjiling Botanical garden, 1980 m. (Gupta). India : West Bengal : Kurseong, 1820 m. Sikkim : Gangtok, 1766 m.; North Rishikhola, 994 m.

*Material examined* : India : West Bengal : Darjiling Botanical Garden, 2 Female, 1 Male, 4.v.1966, D. Ram, M. K. Kamath and D. T. Tikar (Gupta). Kurseong, 1 Male, 20.v.1909, D'Abreu (Calcutta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim.

*Remarks* : Kaur & Jonathan (1979) gave a detailed description of this species in their revision of the tribe Phytodietini.

#### 43. *Netelia (Longiterebates) himalayensis* Kaur & Jonathan

1976. *Netelia (Longiterebates) himalayensis* Kaur & Jonathan. *Oriental Ins.*, 10 : 35. M, F. des., fig. Type : Himachal Pradesh : Dalhousie Hills : Dhenkund, 2743 m. (Gupta). India : Himachal Pradesh : Dalhousie Hills : Several localities around Dalhousie; Simla Hills : Narkanda, 1750m. West Bengal : Darjiling Hills : Ghoom, 2000 m. Sikkim : Chhangu.

*Material examined* : India : West Bengal : Darjiling Dist., Lepchajagat, 2214 m, 1 Male, 25.v.1975, J. K. Jonathan & party.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Sikkim, Uttar Pradesh.

*Remarks* : This species is readily identified by its thin and narrow eyes. Lateral ocellus distad of eyes. Head and thorax dull and mat; thorax dark reddish-brown above. Gonoforceps with a small spine at its inner apical edge, and brace short and broad (Kaur & Jonathan, 1979).

#### 44. *Netelia (Longiterebates) turgida* Kaur & Jonathan

1979. *Netelia (Longiterebates) turgida* Kaur & Jonathan. *Oriental Ins. Monogr.* 9 : 104. M, F. key., des., fig. Type : F, India : Himachal Pradesh : Dalhousie Hills : Kalatop, 2438 m.; Dalhousie, 2132m.; Khajjiar, 1828 m. West Bengal : Darjiling Dist. : Takdali, 1500 m.

*Material examined* : India : West Bengal : Darjiling District : Takdali, 1500 m, 1 Female, 26.iii.1973, H. S. Sharma & party.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh.

*Remarks* : This species is recognised by its closely punctate thorax, propodeum striated, nervulus vertical; inner side of hind basitarsus in its basal 0.5 strongly swollen in males, a patch of several rows of close set of teeth present near the dorsal margin of gonoforceps, brace long and arched, pad dagger-shaped.

**Subgenus *Netelia (Prosthodocis)* Enderlein**

1912. *Prosthodocis* Enderlein. *Stettin Ent. Ztg.*, **73** : 104, 141.

Type-species : *Paniscus antefurcalis* Szepligeti.

**45. *Netelia (Prosthodocis) japonica* (Uchida)**

1928. *Parabates cristatus* var. *japonicus* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, **21** : 196. M, f. des., fig. Lectotype (designated by Uchida, 1934); F, Japan (Sapporo).

1979. *Netelia (Prosthodocis) japonica* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 108. M, F. key., des., fig., ref. India : West Bengal : Darjiling Dist. : Lepchajagat, 2214 m. Sikkim : Lachen, 2706 m.

**Diagnostic character** : Body pale brown. Mesoscutum and abdominal tergites dark brown; ocellar triangle clear except a black ring at the base of each ocellus; stigma brownish-yellow. Nervulus inclivous; first brachial cell bare below the fold; areolet petiolate; second recurrent strongly curved towards its lower end far distad of the upper end; nervellus intercepted at its upper 0.4. Fore fifth tarsal segment 0.75 x as long as its third; thorax mat and finely closely punctate. Gonoforceps spatulate at its dorso-apical corner.

**Material examined** : India : West Bengal : Darjiling District : Lepchajagat, 2214 m, 2 Males, 3.vi.1975 and 1 Male, 2.vi.1975, J. K. Jonathan & party.

**Distribution** : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Italy, Japan, Switzerland, Taiwan.

**Subgenus *Netelia (Toxochiloides)* Tolkanitz**

1974. *Toxochiloides* Tolkanitz. *Zool. Zhurnal*, **53** : 377.

Type-species : *Netelia krishtali* Tokanitz, 1971.

**46. *Netelia (Toxochiloides) latro latro* (Holmgren)**

1868. *Paniscus latro* Holmgren. *Kongliga Svenska Fregatten Eugenie's Resa*, **2** : 412. M, des. Type : M, Micronesia : Guam (Stockholm).

1899. *Paniscus ferrugineus* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 107. F, key, des. Type : F, India : Meghalaya : Khasi Hills (London). Syn. by Kaur & Jonathan, 1979.

1912. *Paniscus cameroni* Enderlein. *Stettiner Ent. Ztg.*, **73** : 123. M, F, key, des. Type : M, India : West Bengal : Calcutta (Warsaw). Syn. by Kaur & Jonathan, 1979.

1908. *Paniscus samoanus* Kohl. *Denkschr. Akad. Wiss. Wien*, **81** : 314. M, F, des., fig. Lectotype (designated by Townes, Townes & Gupta, 1961) : M, Samoa : Upolu (Vienna). Syn. by Morley, 1913.

1908. *Paniscus javanus* Szepligeti. *Notes Leyden Mus.*, **29** : 258. M, F, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : M, Indonesia : Java : Semarang (Budapest). Syn. by Townes, Townes & Gupta, 1961.

1979. *Netelia (Toxochiloides ?) latro latro* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 112. M, F. n. comb. key, syn., des., fig. Micronesia : Guam. India : several localities in Assam; Meghalaya; Sikkim; West Bengal; Bihar; Orissa; Andamans; Himachal Pradesh; Uttar Pradesh; Maharashtra; Karnataka : Tamil Nadu; Kerala. Bangla Desh.

**Diagnostic characters** : Body reddish-brown to brown. Ocellar triangle brownish-black to black.

Temple moderately broad and receding at back; occipital carina present; subapical crests weak or absent. Gonoforceps tapering towards apex with a sclerome bordering its dorsal margin in the lower half; brace long and narrow and weakly arched, placed transversely on gonoforceps; pad large and somewhat triangular placed near the middle of dorsal edge of gonoforceps; a sclerotized area present above the brace of gonoforceps and connected with the upper corner of pad; subgenital plate with broad speculum.

*Material examined* : India : West Bengal : Darjiling District : Sukhia Pokhri, 2130 m, 2 Females, 16.v.1971, A. K. Bhowmik & party. Pashok, 910 m, 1 Female, 26.v-14.vi.1916, F.H. Graveley. Kalimpong, 1 Male, (genitalia mounted), 12-13.vi.1930, S.L. Hora. Ghoom, 2275 m, 1 Females, 18.ix.1908, no other data. Darjiling, 1980 m, 1 Female, 17.x.1909, C. Paiva. Kurseong, 1820 m, 2 Females, 20.iv.1911, N. Annandale. Burdwan Dist., 1 Male, 13.xi.1910, B.L. Chaudhuri. Calcutta, 1 Male, Museum collection, Reg. No. 3586/19; 1 Female, Museum collection, Reg. No. 3593/19 (Calcutta). 1 Male, (holotype of *Paniscus cameroni* Enderlein); 1 Female (allotype of *Paniscus cameroni* Enderlein), No. 12/45 (Warsaw).

*Distribution* : India : West Bengal (Darjiling, Barddhaman, Calcutta districts), Andamans, Assam, Bihar, Himachal Pradesh, Kerala, Karnataka, Maharashtra, Meghalaya, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh.

Subgenus *Netelia* (*Netelia*) Gray

1860. *Netelia* Gray. *Ann. mag. nat. hist.*, (3) 5 : 341.

Type-species : *Paniscus inquinatus* Gravenhorst.

Key to the species of *Netelia* (*Netelia*)

1. Scutellar carinae extending 0.7 or more its length; occipital carina present or absent, when present usually touching oral carina ..... 2
- Not as above ..... 3
2. Hind tarsal claws gradually and evenly curved at apex, bent at less than a right angle from the direction of basal part; hind inner tibial spur about 0.4x as long as its basitarsus; ocellar triangle yellow or black like the main head and thorax colour. (A monochromatic brown species; nervulus distad by 0.4-0.5x its length, usually weakly inclinivous; lateral ocelli distad of eyes; notaulus base transrugose; ocellar triangle yellow)..... *fuscicornis* (Holmgren)
- Hind tarsal claws sharply curved at apex, bent at right angle from the direction of basal part or almost so; hind inner tibial spur 0.5x or more as long as its basitarsus; ocellar triangle usually black. (Occipital carina absent; temple weakly convex and sharply receding at back; thorax smooth and polished with the fine weak punctures; areolet more or less oblique; second recurrent almost straight. Gonoforceps with an apico-dorsal spine; pad small; penis valve with spatha rather short; subgenital plate 2.0x as wide as long and produced in the middle posteriorly).....  
..... *laevis* (Cameron)
3. Clypeus more than 2.5x as broad as long; eyes broad, about 2.5 as long as broad, in front.

- (Occipital carina moderate; tibial bristles moderate and rather sparse; pectination distinctly shorter than the claw tip. Brace moderately long and broad, extending up to the middle of gonoforceps and supporting a somewhat triangular pad connected with the apical sclerome .....  
 .....*kashmirensis* (Cameron)
- Clypeus less than 2.5x as broad as long, usually 2.0x so broad; eyes thin and narrow or large and broad in front ..... 4
4. Eyes thin and narrow in front about 3.0x as long as broad; head usually slightly longer than broad..... 5
- Eyes moderately to strongly broad and large in front, about 2.7 or less as long as broad; head usually slightly broader than long..... 7
5. Face 0.66x as long as broad; hind tibial spur 0.4x as long as basitarsus; metapleurum and propodeum rather short in profile and finely, closely striated, latter with strong subapical lateral crests; ocellar triangle yellow in female. Subgenital plate slightly protruding in the middle at its posterior end, broad and weakly curved in its upper half; pad long and narrow its extremities expanded and broadly attached to brace at its middle..... *opacula* (Thomson)
- Face 0.75x or more as long as broad; hind tibial spur 0.5x or more as long as basitarsus; metapleurum and propodeum about as long as high in profile and metapleurum with or without weak striations or rugosities; subapical lateral crests of propodeum weak or absent; ocellar triangle black in the female ..... 6
6. Mesoscutum clouded with black. (Propodeum coarsely striated in the middle; nervulus distad by 0.5x its length, weakly inclivous and arched; mesopleurum weakly punctate. Males with fine and dense pectination in all claws, not permitting the light to pass through; subgenital plate evenly rounded at its free posterior end.....*imitatrix* Kaur & Jonathan
- Mesoscutum not clouded with black. (Clypeal foveae and lateral ocelli more or less distad of eyes; propodeum depressed above and rather coarsely, irregularly striated in the middle. Subgenital plate in males truncated in the middle of its free posterior end; brace short reaching a little above the middle; inner apical surface of gonoforceps not sclerotized; all claws finely, densely pectinate) ..... *silantzewi* (Kokujev)
7. Fore and middle fifth tarsal segment distinctly longer, 1.25-1.5x as long as its third, and their claws long; hind fifth tarsal segment almost as long as its third in female..... 8
- Fore and middle fifth tarsal segment about as long as its third, sometimes slightly longer, about 1.15x its third; hind fifth tarsal segment distinctly shorter, about 0.75-0.8x as long as its third, in female ..... 9
8. Small species. Fore fifth tarsal segment 1.25x as long as its third segment. Claws in males coarsely pectinate in the middle. Gonoforceps without an apical spine ..... *intermedia* (Cameron)
- Moderately large species. Fore fifth tarsal segment as long as third segment. Claws densely pectinate. Gonoforceps with an apical spine..... *mirabilis* Kaur & Jonathan

9. Mesopleurum coarsely, closely punctate, the punctures separated by less than their own diameter, dull; propodeum usually coarsely, sparsely and irregularly striated. Subgenital plate truncated in the middle of its free posterior end.....10
- Mesopleurum finely to coarsely punctate; propodeum usually moderately regularly, closely striated. Subgenital plate rounded in the middle of its free posterior end.....12
10. Eyes rather board, about 2.5x as long as board; face almost as long as broad; fore fifth tarsal segment 3.5x as long as broad. Tarsal claws of male, finely evenly and densely pectinate not permitting the light to pass through; gonoforceps without an apico-dorsal spine, instead the dorsal border slightly extended a little below the apex; brace long and narrow; pad narrow and curved back above..... *corrugata* Kaur & Jonathan
- Eyes rather narrow, about 2.6-2.7 x as long as broad; face distinctly broader than long; fore fifth tarsal segment 2.5-3.0x as long as broad. Tarsal claws of male finely closely or a little coarsely and sparsely pectinate in the middle; gonoforceps with an apico-dorsal tooth, brace moderately broad and short; pad large somewhat triangular.....11
11. Pectination very coarse and sparse, about 10 pectines in each hind claw; clypeus depressed in the middle of its apical 0.4; propodeum more or less regularly and closely striated; nervulus vertical or weakly inclivous. Tarsal claws in the males distinctly coarsely and sparsely pectinate in the middle..... *carmichaeli* Kaur & Jonathan
- Pectination moderate, about 13 pectines in each hind claw; clypeus not depressed in the middle of its apical 0.4; propodeum coarsely, sparsely and somewhat irregular striated in the middle; nervulus more or less inclivous. Tarsal claws in males finely, evenly and densely pectinate, not permitting the light to pass through.....*rimosa* (Enderlein)
12. Small and delicate species; mesopleurum finely weakly punctate, polished; metapleurum smooth.....*rukmaniae* Kaur & Jonathan
- Small to large species; mesopleurum moderately coarsely and closely punctate, subpolished; metapleurum distinctly striated.....13
13. Pad moderately long and narrow, its end moderately to sharply pointed; gonoforceps with its dorsal edge bordered by a sclerome in its lower half.....*orientalis* (Cameron)
- Pad rounded situated in the middle or near dorsal edge of gonoforceps, at apex; gonoforceps with its entire dorsal edge bordered by a sclerome.....*rotunda* Kaur & Jonathan

(Note : *Netelia (Netelia) lineata* (Brulle) is not included in the key due to non-availability of sufficient information).

#### 47. *Netelia (Netelia) carmichaeli* Kaur & Jonathan

1979. *Netelia (Netelia) carmichaeli* Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 174. m, F. key, des., fig. Type : F, India : West Bengal : Darjiling (Calcutta). India : West Bengal : Darjiling Dist. : Singla, 455 m.

**Material examined** : India : West Bengal, Darjiling, 2133 m, 1 Female (holotype), 2.v.-vi.1913, Lord Carmichael; Singla, 1 male (allotype), vi.1913, Lord Carmichael and 6 females & 10 males same data as holotype (Calcutta).

**Distribution** : India : West Bengal (Darjiling District).

**Remarks** : This species is close to *N. (Netelia) rimosa* (Enderlein). It differ in its more broad last tarsal segment and its coarser and sparse pectination. (cf. Kaur & Jonathan, 1979).

#### 48. *Netelia (Netelia) corrugata* Kaur & Jonathan

1913. *Paniscus nigriventris* Morely. *Fauna of British India*, Hymenoptera, 3 : 349. (in part). (2 males from Bengal and Bombay misdet. and belong to *corrugata*, cf. Kaur & Jonathan, 1979 : 167.)

1979. *Netelia (Netelia) corrugata* Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 172. M, F. key, des. fig. Type : F, India : Uttar Pradesh : Kumaon Hills : Bhowali, 1700 m. (Gupta). India : Uttar Pradesh : Muradnagar; Kumaon Hills : Garjia, 606 m.; Dibri Village, Garjia; Jeolikote; 1212 m.; Bhowali, 1700 m.; Bulandshahar; Delhi. Bihar : Ranchi Dist. : Namkum; Ambera Bero; Pusa. West Bengal : Kurseong, 1516 m.; Darjiling, Botanical Garden, 1980 m. Meghalaya; Cherrapunji, 1360 m.; Shillong, 1516 m.

**Material examined** : India : West Bengal : Darjiling Dist., Darjiling Botanical garden, 1980 m, 1 Male, 8.v.1965, J. K. Jonathan; Kurseong, 1516 m, 1 Female, 1 Male, Reg. Nos. 1549/14, 1550/14 (Calcutta).

**Distribution** : India : West Bengal (Darjiling District), Bihar, Delhi, Meghalaya, Uttar Pradesh.

**Remarks** : This species is characterized by having broad eyes; face almost as long as broad; all claws in males densely pectinate. Kaur & Jonathan (1979) have provided a detailed description.

#### 49. *Netelia (Netelia) fuscicornis* (Holmgren)

1858. *Paniscus fuscicornis* Holmgren. *Svenska Vetensk. Akad. Handl., (N.F.)*, 2 (8) : 32. M, F. des. Lectotype : M (labelled by Townes, 1964), Sweden (Stockholm). Sweden : Ostergotland; Oland; Skane.

1878. *Paniscus quadrilineatus* Smith. *Hymenoptera. In India : Scientific results of the second Yarkand mission; based upon the collection and notes of the late F. Stoliczka. Part 9* : 21. F. des. Type : F, China : Sinkiang : Near Yarkand (Calcutta). Syn. by Kaur & Jonathan, 1979.

1878. *Paniscus unicolor* Smith. *Hymenoptera. In India : Scientific results of the second Yarkand mission; based upon the collection and notes of the late F. Stoliczka. Part 9* : 21. F. Name preocc. by Smith 1874. des. Type : F, Pakistan : Murree (Calcutta). Syn. by Kaur & Jonathan, 1979.

1899. *Paniscus longitarsis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 108. M. Key, des. Type : M, India : Himachal Pradesh : Simla (Oxford). Syn. by Kaur & Jonathan, 1979.

1913. *Paniscus renovatus* Morley. *Fauna of British India*, Hymenoptera, 3 : 354. F. n. name. for *unicolor* Smith. key, des. Pakistan : Murree.

1979. *Netelia (Netelia) fuscicornis* : Kaur & Jonathan. *Oriental Ins. Monogr.* 9 : 125. M. F. key, Syn., des., fig.

**Material examined** : India : West Bengal : Darjiling Dist., Darjiling, 2123 m, 1 Male, 6.viii.1909, C. Pavia, Reg. No. 3575/19; 1 Female, 26.v.1910, E. Brunette, Reg. No. 9002

(Calcutta). Botanical Gardens, 1980m, 1 Female, 4.v.1966, M.K. Kamath, K101; 1 Female, 1 Male, 8.v.1966, J.K. Jonathan, J 147; 1 Male, 8.v.1966, G. K. Agarwal; 2 Males, 8.v.1966, D.T. Tikar, T 239. Rangiroon, 1910m, 1 Female, 25.v.1966, J.K. Jonathan, J 157 (Gupta); 2 Females, 1 Male, 7-10.vi.1975, J.K. Jonathan & party. Ghoombhanjang, 2123m, 3 Females, 1 Male, 2.vi.1975, J.K. Jonathan & party. Monibhanjang, 1914m, 1 Female, 22.v.1975, J.K. Jonathan & party. Pashupati near Nepal border, 12-65m, 1 Male, 20.v.1975. J.K. Jonathan & Party. Ghoom, 2123m, 1 Female, 27.v.1975, J.K. Jonathan & party. Kurseong, 1429m, 1 Male, 30.iv.1971, A.K. Bhowmik & party; 1 Female, 1 Male, data unknown, Reg. Nos. 1633/14, 1529/14 (Calcutta).

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh, J & K., Sikkim, Uttar Pradesh. Elsewhere : Afghanistan, Belgium, China, England, Italy, Japan, Nepal, Pakistan, Russia, Spain, Sweden, Taiwan, Turkey.

**Remarks** : Kaur & Jonathan (1979) have provided a detailed description of this species.

#### 50. *Netelia* (*Netelia*) *imitatrix* Kaur & Jonathan

1979. *Netelia* (*Netelia*) *imitatrix* Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 153. M, F. key, des., fig. Type : F, India : West Bengal : Darjiling Dist. : Rangiroon, 1910 m. (Gupta). India : West Bengal : Darjiling, Botanical Garden.

**Material examined** : India : West Bengal : Darjiling Dist. : Rangiroon, 1910m, 1 Female (holotype), 25.v.1966, D. Ram; Botanical gardens, Darjiling, 1 Male (allotype), 4.v.1966, D.T. Tikar, T 229 (Gupta).

**Distribution** : India : West Bengal (Darjiling District).

**Remarks** : This species has mesoscutum clouded with black, mesopleurum weakly punctate, propodeal striations closer, subgenital plate rounded at its free posterior end and all claws densely pectinate in males.

#### 51. *Netalia* (*Netalia*) *intermedia* (Cameron)

1905. *Paniscus intermedius* Cameron. *Spolia Zeylanica*, 3 : 125. M, F. Lectotype (designated by Townes, Townes & Gupta, 1961) : M, Sri Lanka : Maskeliya (London).

1979. *Netalia* (*Netalia*) *intermedia* : Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 163. M, F. key, des., fig. India : various localities in Kerala, Tamil Nadu, Karnataka, Meghalaya, West Bengal.

**Material examined** : India : West Bengal : Darjiling District : Rangiroon, 1910m, 1 Female, 9.vi.1975, J.K. Jonathan & party (Calcutta).

**Distribution** : India : West Bengal (Darjiling District), J & K., Himachal Pradesh, Karnataka, Meghalaya, Tamil Nadu. Elsewhere : Sri Lanka.

**Remarks** : This is a small species with moderately broad eyes and moderate punctation; metapleurum smooth; fore fifth tarsal segment 1.25x as long as its third. All claws in males coarsely pectinate.

#### 52. *Netelia* (*Netelia*) *kashmirensis* (Cameron)

1906. *Paniscus montanus* Cameron. *J. Bombay Nat. Hist. Soc.*, 17 : 291. F. Name preocc. by Kokujev, 1899. des. Type : F, India : Kashmir, 5000-6000 ft. (London).

1906. *Paniscus kashmirensis* Cameron. *J. Bombay Nat. Hist. Soc.*, **17** : 291. F, des. Type : F, India : Kashmir (London). (Morley, 1913, synonymized *kashmirensis* under *montanus*, since the latter name is preocc., *kashmirensis* is the valid name).
1979. *Netelia (Netelia) kashmirensis* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 138. M, F, key, des., fig. India : Himachal Pradesh : Several localities in Kulu Valley; Simla Hills; and Dalhousie Hills. Uttar Pradesh : Garhwal Dist. : Nelang, 3640 m.; Bampa, 3185 m.; Akhrotrop, 1668 m.; Konari Pass, 3640 m.; Malari, 3033 m.; Dehra Dun Dist. : Mundali, 2730 m.; Gwaldom, 1990 m.; Kumaon Hills : Chaubattia, 2000 m; Jeolikote, 1213 m.; Bhowali, 1700 m.; Mussoorie, 2275 m.; Morta Village. Delhi : Roshanara Garden. Bihar : Ranchi Dist. : Ambera Bero; Namkum Tea Garden. West Bengal : Darjiling Dist. : Rangiroon, 1910 m.; Ghoombhanjang, 2123 m.; Monibhanjang, 2123 m.; Takdah. Sikkim : Sinotam, 813 m. Arunachal Pradesh : Subansiri Division : Tamon, 457 m. Karnataka : Bangalore. Kashmir.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1910 m, 28 Females, 1 Male, 23-26.v.19632, V.K. Gupta; 1 Female, 26.v.1966, M.K. Kamath, 1 Male, 27.v.1966 J.K. Jonathan. Darjiling Botanical Garden, 1980, 1 Female, 5.v.1966, M.K. Kamath; 1 Female, 1 Male, 5-6.v.1966 D.T. Tikar (Gupta). Ghoombhanjang, 2123m, 1 Female, 29.v.1975, J.K. Jonathan & party. Monibhanjang, 2123m, 1 Female, 29.v.1975, J.K. Jonathan & party. Takdah, 1 Female, 24.iii.1973, P.K. Maiti & party (Calcutta).

*Distribution* : India : West Bengal (Darjiling District), Arunachal Pradesh, Bihar, Delhi, Himachal Pradesh, Karnataka, Sikkim, Uttar Pradesh.

*Host* : *Adsiura* sp.

### 53. *Netelia (Netelia) laevis* (Cameron)

1905. *Paniscus laevis* Cameron. *Spolia Zeylanica*, **3** : 127. F, des. Type : F, Sri Lanka : Kandy (London).
1928. *Amebachia baibarana* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, **21** : 198. M, F, key, des., fig. Type : M, Taiwan : Meiyuan (= Baibara) (Sapporo). Taiwan : Kusukusu. Syn. by Kaur & Jonathan, 1979.
1979. *Netelia (Netelia) laevis* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 134. M, F, key, syn., des., fig. India : Meghalaya : Khasi Hills. Cherrapunji, 1360 m. Sikkim : Gangtok, 1700 m. West Bengal : Rangiroon, 1910 m.; Singla, 455 m.; Darjiling. Bihar : Ranchi Dist. : Namkum; Chapra. Tamil Nadu : Kodiar Hills : Oothu, 1160 m.; Palni Hills : Palni, 350 m. Kerala : Kottayam Dist. : Kuttikkanam; Kumily. Malaysia.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1910m, 1 Female, 26.v.1966, J.K. Jonathan, J 158 (Gupta). Singla, 3455m, 1 Male, 19.iv.1973, H.S. Sharma & party. Darjiling, Female, 20.x.1905, Reg. No. 9077/18 (Calcutta).

*Distribution* : India : West Bengal (Darjiling District), Bihar, Kerala, Meghalaya, Sikkim, Tamil Nadu. Elsewhere : Malaya, Sri Lanka, Taiwan.

*Remarks* : This is a small delicate species with occipital carina absent, temples narrow and hardly extending behind the eyes and it can further be distinguished by the characters given in the key.

### 54. *Netelia (Netelia) lineata* (Brulle)

1846. *Paniscus lineatus* Brulle. In Lepeletier : *Histoire Naturelle des. Insects. Hymenopteres*, **4** : 157. F, des. Type : F, India : Bengal (Paris).

1979. *Netelia (Netelia) lineata* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 192. F. key, des.

*Material examined* : Nil.

*Distribution* : India : West Bengal ? Tamil Nadu.

*Remarks* : This is a little known species. The description given by Brulle (1846) is not sufficient to place the species in the key.

#### 55. *Netelia (Netelia) mirabilis* Kaur & Jonathan

1979. *Netelia (Netelia) mirabilis* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 171. M. key, des., fig.  
Type : M, India : West Bengal : Darjiling Dist. : Rangiroon, 1910 m. (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1 Male (holotype) 26.v.1968, J.K. Jonathan JD 158 (Gupta) and 1 Male (paratype) same data as holotype, 23.v.1974 (Calcutta).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This is a moderately large species with eyes broad and swollen in front, claws in males densely punctate; gonoforceps with an apico-dorsal spine and subgenital plates more or less rhomboidal.

#### 56. *Netelia (Netelia) opacula* (Thomson)

1888. *Paniscus opaculus* Thomson. *Opuscula Entomologica*, **12** : 1199. F. des. Lectotype (labelled by Aubert, 1963) : F, Sweden : Lindholmen in Skane (Lund).

1913. *Paniscus testaceus* var. *opaculus* : Morley. *Revision of the Ichneumonidae in the British Museum*, **2** : 122-127. M, F. key, syn. Pakistan : Northwest Provinces, Punjab. India : Kashmir. Himachal Pradesh : Simla. Uttar Pradesh : Mossoorie. West Bengal : Darjiling; Calcutta. Assam. Maharashtra : Bombay. Karnataka : Bangalore. Sikkim. Bhutan, Tibet, Lower Burma, Sri Lanka, Malaya, Taiwan, Japan, Australia. (in part). (According to Gauld, 1984a : 79, this species does not occur in Australia).

1979. *Netelia (Netelia) opacula* : Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 143. M, F. key, des., fig., Eastern Palearctic syn., ref. & hosts. France : Digne; Maisons Laffitte. India : Himachal Pradesh : Manali, 1828 m.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District, Calcutta), Himachal Pradesh, Maharashtra, Sikkim, Uttar Pradesh, Punjab. Elsewhere : Afghanistan, Australia ? Burma, China, Italy, Japan, Korea, Romania, Russia, Spain, Sri Lanka, Sweden, Taiwan, Tibet.

*Remarks* : This species has thin narrow eyes in front; face wide, about 0.66x as long as wide, and ocellar triangle yellow in female. Propodeum short with dense striations. Pad long and narrow, subgenital plate protruding in the middle of its free posterior end.

#### 57. *Netelia (Netelia) orientalis* (Cameron)

1905. *Paniscus orientalis* Cameron. *Spolia Zeylanica*, **3** : 126. F. des. Type : F, Sri Lanka : Pundaluoya (London).

1979. *Netelia (Netelia) orientalis* : Kaur & Jonathan. *Oriental Ins. Monogr.* **9** : 181. M, F. key, syn., des., fig. India : Karnataka : Londa, 620 m.; Khemmangundi, 1430 m.; Santaverry, 1070 m.; Mercara, 1220 m.; Gunji, 610m; Bangalore. Maharashtra : Matheran, 915m; Satpura Hills :

Chikalda, 1100 m. Kerala : Walayar Forest, 305 m.; Watapara, Walayar Forest. Tamil Nadu : Palni Hills : Palni, 350 m.; Kodai Hills : Oothu, 1160 m.; Nilgiri Hills : Devbeta, 2134 m.; Shevaroy Hills : Yercaud, 1370 m.; Coimbatore, 424 m. Bihar : Ranchi Dist : Namkum; Ambera Bero. Uttar Pradesh : Kumaon Hills : Almora, 1668 m.; Jeolikote, 1220 m.; Dhunia; Pantnagar; Kotabagh; Pawalgarh; Bhowali, 700 m.; Ranman, 1370 m.; Mukteshwar, 2300 m.; Ramgarh, 2133 m.; Chaubattia, 2000 m.; Garhwal Hills : Konari Pass, 2640.; Dhak, 2425 m.; Barkot, 1220 m.; Garjia, 620 m.; Dehra Dun, 600 m.; Srinagar, 610 m.; Mohakampur; Herbertpur; Roorkee; Sikandrabad. Orissa : Mayurbhanj Dist. : Jenabil. Manipur : Ukhrul, 1945 m. Meghalaya : Khasi Hills : Shillong, 1454 m.; Happy Valley; Cherrapunji, 1360 m. Assam : Rangapara : Charduar Forest, Sonajuli Tea Estate; Mangaldai, Mazbat. West Bengal : Calcutta; Darjiling, Botanical Garden; Rangiroon, 1010 m.; Manibhanjang, Kalimpong, 1234 m.; Singla, 455 m.; Kurseong, 1516 m. Sikkim : Gangtok, 1700 m. Himachal Pradesh : Dalhousie, 2132 m.; Ahla, 2285 m.; Khajjiar, 1828 m.; Kalatop, 2438 m.; Kulu Valley : Manali, 1828 m.; Koti, 2438 m.; Rahla, 2743 m.; Marhi, 3640 m.; Kalpa Valley : Nichar, 2500 m.; Dhakuri, 2521 m.; Singla, 2743 m.; Simla Hills : Narkanda, 2700 m.; Kufri, 2500 m. Burma; China.

*Material examined* : India : West Bengal : Calcutta, 1 Male, Museum Collection, Reg. No. 3585/19. Botanical Garden, Darjiling, 1 Female, 12 Females, 7-10.vi.1975, J.K. Jonathan & party. Manibhanjang, 1 Male, 19.v.1975, J.K. Jonathan & party. Kalimpong, 1 Male, 9.viii, 1971, J.M. Julka & party. Singla, 1 Male, 17.iii.1973, H.S. Sharma & party. Kurseong, 3 Females, 21-29.v.1906, N. Annandale, Reg. Nos. 3572/19, 3573/19; 3 Female, 1 Male, Reg. Nos. 1634/14, 1645/14, 1646/14, 1543/14 (Calcutta). Darjiling, Botanical Garden, 1 Female, 2 Males, 5, 8.v.1966, M.K. Kamath, 1 Male, 5.v.1966, V.K. Gupta. Rangiroon, 1 Female, 1 Male, 24.v.1962, V.K. Gupta; 2 Females, 29.v.1966, D. Ram; 1 Female, 26.v.1966, M.K. Kamath (Gupta).

*Distribution* : India : West Bengal (Darjiling and Calcutta Districts), Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh. Elsewhere : Japan, Ryukyu Is., Sri Lanka, Taiwan.

*Host* : *Spodoptera litura* F.

### 58. *Netelia (Netelia) rimosa* (Enderlein)

1912. *Paniscus rimosus* Enderlein. Stettiner Ent. Ztg., 73 : 128. F. key, des. Type : F, Indonesia : Java : Pengalengan, 4000 ft. (Warsaw).
1979. *Netelia (Netelia) rimosa* : Kaur & Jonathan. Oriental Ins. Monogr., 9 : 177. M, F. key, des., fig. Java : Pengalengan, 1213 m. India : West Bengal : Darjeeling Dist. : Rangiroon, 1910 m.; Darjiling Botanical Garden, 1980 m.; Takdah, 1500 m.; Rangpo; nr. Ghoom, 1820-2133 m. Meghalaya : Khasi Hills : Cherrapunji, 1360 m. Himachal Pradesh : Kalpa Valley; Nichar, 2500 m.; Simla Hills : Chail, 2290 m.; Kufri, 2500 m.; Dalhousie Hills : Dalhousie, 2132 m.; Khajjiar, 1828 m. Uttar Pradesh : Kumaon Hills; Bhowali, 1700 m. Tamil Nadu : Kodai Hills : Oothu, 1160 m.; Shevaroy Hills; Yercaud, 1370 m. Kerala : Kottayam Dist. : Edapalayam. Bangladesh : Chittagong Hill tracts : Maini Mukh. Burma.

*Material examined* : India : West Bengal : Darjiling District, Rangiroon, 8 Females, 26-28.v.1966, J.K. Jonathan, J 157-160; 9 Females, 25-29.v.1966. D. Ram, Nos. 187, 190, 192, 195; 9 Females, 25-28.v.1966, M.K. Kamath, Nos. k 116-119; 2 Females, 25-27.v.1966, T. Chand, Nos. 186, 193; 5 Females, 25-27.v.1966, V.K. Gupta, Nos. 185, 191, 194 (Gupta); 1 Female, 9.vi.1975, J.K. Jonathan & party (Calcutta). Darjiling, Botanical Garden, 12 Females, 4-8.v.1966, J.K. Jonathan, Nos. J 145-147; 1 Female, 4.v.1966, T. Chand, T 228; 3 Females, 4-5.v.1966, D. Ram,

Nos. T 227, T 231; 2 Females, 5-6.v.1966, M.K. Kamath, Nos. K 101-104 (Gupta); 1 Female, 16.v.1974, J.K. Jonathan & party. Takdah, 1 Female, 1 Male, 26.iii.1973, H.S. Sharma & party, Rangpo, 1 Female, 1973, P.K. Maiti & party. Near Ghoom, 1823m, 1 Female, 11.vi. 1914, F.H. Gravely (Calcutta).

*Distribution* : India : West Bengal (Darjiling District) Himachal Pradesh, Kerala, Meghalaya, Tamil Nadu, Uttar Pradesh. Elsewhere : Bangla Desh, Burma, Java.

*Remarks* : This is a monochromatic, reddish-brown species.

#### 59. *Netelia (Netelia) rotunda* Kaur & Jonathan

1979. *Netelia (Netelia) rotunda* Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 187. M. key, des., fig. Type : M, India : Himachal Pradesh : Dalhousie Hills : Ahla, 2286 m. (Gupta). India : Himachal Pradesh : Kulu Valley : Manali, 1828 m.; Kalpa Valley : Nichar, 2500 m.; Nainikhud, 1372 m.; Simla Hills : Phagu, 2730 m.; Dalhousie Hills : Khajjiar, 1828 m. West Bengal : Darjiling, 1980 m.; Rangiroon, 1910 m.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 1980 m, 1 Male, T. Chand, No. T 238. Rangiroon, 1910 m, 1 Male, 23.vi.1962, V.K. Gupta (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh.

*Remarks* : This species is close to *N. (N.) orientalis* (Cameron) and can be distinguished by having gonoforceps with a sclerome paralleling its entire dorsal edge and pad more or less rounded and situated somewhat in the middle near apex.

#### 60. *Netelia (Netelia) rukmaniae* Kaur & Jonathan

1979. *Netelia (Netelia) rukmaniae* Kaur & Jonathan. *Oriental Ins. Monogr.*, **9** : 179. F. key, des., fig. Type : F, India : West Bengal : Darjiling, Botanical Garden, 1980 m. (Gupta).

*Material examined* : India : West Bengal : Darjiling Botanical Garden, 1980 m, 2 females (holo- and paratype), 4.v.1966, Colls D.T. Tikar, No. T 229 and T. Chand, No. T 228 (Gupta).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This small and delicate species is very close to *N. (N.) intermedia* in having smooth body with fine weak punctures. However, the fore and middle fifth tarsal segments are not longer than the third.

#### 61. *Netelia (Netelia) silantzewi* (Kokujev)

1899. *Paniscus silantewi* Kokujev. *Horae Soc. Ent. Rossicae*, **34** : 133, 138, M.F. Key, des., (Leningard).

1899. *Paniscus rossicus* Kokujev. *Horae Soc. Ent. Rossical*, **34** : 134, M, F, key. des.

1889. *Paniscus minor* Szepligeli. *Termeszetr. Fuz.*, **23** : 29 M, F. (Budapest).

*Material examined* : India : West Bengal : Darjiling Botanical Garden, 1980 m, 1 Female, 21.vi.1962, V.K. Gupta; Rangiroon, 1910 m, 1 Male, 25.v.1962, V.K. Gupta (Gupta). Manibhanjang, 1 Female, 21.v.1975, J.K. Jonathan & party (Calcutta).

*Distribution* : India : West Bengal (Darjiling District), Uttar Pradesh. Elsewhere : France, Hungary, Italy, Russia, Switzerland.

*Host* : *Apcheima hispidaria*, *Lycia hirtaria*, *L. pomonaria*, *Phigalia pilosaria*, *Tephрина arnacearia*.

Subgenus *Netelia* (*Paropheltes*) Cameron

1907. *Paropheltes* Cameron. *J. Bombay Nat. Hist. Soc.* 17 : 1011.

Type-species : *Paropheltes flavolineatus* Cameron.

Key to the species of *Netelia* (*Paropheltes*)

1. Thorax with definite yellow markings. Nervulus distad by more than 0.25x its length. Lateral carina of scutellum confined to its basal 0.33. First brachial cell wholly hairy. Gonoforceps apically tapering, without spine; cuspis rather long.....*guptai* Kaur & Jonathan
- Thorax without definite yellow markings. Nervulus distad by 0.2x its length. Lateral carina of scutellum beyond its 0.75 its length. First brachial cell without hair in the middle. Gonoforceps with a small spine at its dorso-apical corner; cuspis truncated at apex with both dorsal and ventral apical corners produced. .... *sikkimensis* Kaur & Jonathan

62. *Netelia* (*Paropheltes*) *guptai* Kaur & Jonathan

1979. *Netelia* (*Paropheltes*) *guptai* Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 201. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Dalhousie, 2132 m. (Gupta). India : Himachal Pradesh : Dalhousie Hills : Ahla, 2286 m.; Khajjiar, 1828 m.; Kalatop, 2438 m.; Simla Hills : Narkanda, 2700 m.; Kalpa Valley : Nichar, 2500 m. Uttar Pradesh : Kumaon Hills : Chaubattia, 2000 m.; Nainital, 2100 m.; Bhowali, 1700 m.; West Bengal : Darjiling, Botanical Garden, 1980 m.; Rangiroon, 1910 m. Sikkim : Gangtok, 1700 m.

*Material examined* : India : West Bengal : Darjiling Botanical Garden, 1980 m, 4 Females, 1 Male, 8.v.1966, J.K. Jonathan, No. J 147, D.T. Tikar, No. T 239, V.K. Gupta, No. 147 and D. Ram, No. T 240 (Gupta). Rangiroon, F.R.H., 1 Male, 10.vi.1975, J.K. Jonathan & Party (Calcutta), all above paratypes.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh, Sikkim.

*Remarks* : The genitalia of this species show affinities with subgenera viz., *Apatagium* and *Prosthodocis*, in having poorly developed brace and pad, while its cuspis and other external characters are typical of *Paropheltes*.

63. *Netelia* (*Paropheltes*) *sikkimensis* Kaur & Jonathan

1979. *Netelia* (*Paropheltes*) *sikkimensis* Kaur & Jonathan. *Oriental Ins. Monogr.*, 9 : 196. M, F. key, des., fig. Type : F, India : Sikkim : Gangtok, 1700 m. (Gupta). West Bengal : Darjiling Botanical Garden, 1980 m.

*Material examined* : India : West Bengal : Darjiling Botanical Garden, 1 Male (allotype), 5.v.1966, D. Ram Coll. No. T 231 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim.

*Remarks* : This species is having brown thorax without definite yellow markings.

## 3. Subfamily BANCHINAE

## Key to the Tribes of BANCHINAE

1. Tergites 2-4 each with a pair of deep oblique groove that converge anteriorly and diverge posteriorly ..... **Glyptini**  
 — Tergites 2-4 without deep grooves ..... 2
2. Nervellus intercepted at or below the middle, abdomen subcylindric..... **Lissonotini**  
 — Nervellus intercepted above the middle, abdomen compressed..... **Banchini**

## Tribe GLYPTINI

Key to the genera of Tribe **Glyptini**

1. Areolet present (Frons smooth, without a tubercle next to each antennal socket,.....  
 ..... **Teleutaea** Foerster  
 — Areolet absent. (Tergites 2-4 without a median longitudinal carina)..... **Glypta** Gravenhorst

17. Genus *Teleutaea* Foerster

1869. *Teleutaea* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 164.

Type-species : *Lissonota striata* Gravenhorst.

64. *Teleutaea prima* (Morley)

1913. *Glyptopimpla prima* Morley. *Fauna of British India*, Hymenoptera, **3** : 210. M. des. Type : M, India : West Bengal : Kurseong, 5000 ft. (Calcutta).

1961. *Teleutaea prima* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 201. India.

*Diagnostic characters* : This is a slender, yellow and black species. Head without frontal horn or tubercle. Notauli distinct. Propodeum punctate, medially bicarinate, apophysis absent. Petiolar area very short, spiracle small and circular. First abdominal tergites bicarinate to near its apex, following tergites triangularly impressed. Legs slender, claw pectinate. Nervellus intercepted at its base. Clypeus and mandible (except teeth), scape prosternum, mesosternum, yellow. Scutellum at sides and at apex, whole of postscutellum, yellow. Legs in general yellow with black dots on hind trochanter, femur, base and apex of tibia and whole of tarsus infuscate.

*Material examined* : India : West Bengal : Kurseong, viii.1908 (no other data), type of *Glyptopimpla prima* Morley.

*Distribution* : India : West Bengal (Darjiling District).

18. Genus *Glypta* Gravenhorst

1829. *Glypta* Gravenhorst. *Ichneumonologia Europaea*, **3** : 3.

Type-species : *Glypta sculpturata* Gravenhorst.

65. *Glypta nursei* Cameron

1902. *Glypta nurse* Cameron. *J. Bombay Nat. Hist. Soc.*, 14 : 425. M. des. Type : M, India : Himachal Pradesh : Simla, 7000 ft. (London).
1913. *Glypta nigrina* Morley. *Fauna of British India*, Hymenoptera, 3 : 211. M, F. misdet. of European *nigrina* Desvignes, key, syn. (in part), des., fig. India : West Bengal : Darjiling, 6000 ft.; Rangiroon, 5700 ft. Sikkim. Himachal Pradesh : Simla, 7000 ft.
1961. *Glypta nursei* Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 202. syn. India. Pakistan.

*Diagnostic characters* : Face and clypeus with silvery pubescence. Malar space as long as the basal width of mandible. Notauli absent. Propodeum punctate with all the areae distinct; areola hexagonal. Masopleurum punctate. Oblique impressions on abdomen deep. Body black. Clypeus, mandible and palpi bright yellow. Legs in general yellow; hind legs reddish, their tibiae and tarsal joints whitish. Wings with stigma dark brown.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling, 1 Female, ix. 1908, E. Brunetti.

*Distribution* : India : West Bengal (Darjiling District).

## Tribe LISSONOTINI

Key to the Genera of Tribe *Lissonotini*

1. First tergite slender, without a glymma, its spiracle at or behind the middle; hind margin of metasternum with a pair of long convergent teeth; propodeum always without carinae.....  
.....*Leptobatopsis* Ashmead
- First tergite moderately slender to stout, always with a glymma, its spiracle before the middle; hind margin of metasternum without convergent teeth; propodeum with or without carinae ..... 2
2. Occipital carina reaching directly to the base of mandible; propodeal spiracle elliptic; epomia present; areolet always present, its petiole nearly as long as the height of the areolet.....  
.....*Syzeuctus* Foerster
- Occipital carina joining the hypostomal carina above the base of mandible; propodeal spiracle round or oval; epomia absent or very weak; areolet present, with a short petiole..... 3
3. Ovipositor short, its sheath less than 0.6x as long as hind tibia; areolet always present. (Apical transverse carina of propodeum complete).....*Cryptopimpla* Taschenberg
- Ovipositor long to very long, its sheath always more than 0.6x as long as hind tibia; areolet present or absent. (Median dorsal carina of first tergite entirely absent)..*Lissonota* Gravenhorst

19. Genus *Lissonota* Gravenhorst

1829. *Lissonota* Gravenhorst. *Ichneumonologia Europaea*, 3 : 30.

Type-species : *Lissonota sulphurifera* Gravenhorst.

Key to the species of *Lissonota*

1. First tergite entirely with strong longitudinal striations; areolet sessile. Abdomen entirely black, except two apical tergites whitish above; petiolar area longitudinally striated; dorsal profile of first tergite moderately convex ..... *cracentis* Chandra & Gupta
- First tergite without longitudinal striations or with weak striations laterally; areolet petiolate. (Mesopleurum and metapleurum with large yellow marks; scutellum yellow; mesoscutum black with lateral margins yellow; abdomen black, first three tergites basally as well as apically red and the rest apically yellow ..... *minuenta* Morley

66. *Lissonota cracentis* Chandra & Gupta

1977. *Lissonota cracentis* Chandra & Gupta. *Oriental Ins. Monogr.*, 7 : 40. M, F. key, des., fig. Type : F, Nepal : Phulchowki, 2400 m. (Gupta). India : West Bengal : Darjiling Hills : Rangiroon, 1905 m. Sikkim : Gangtok, 1676 m. Burma : Kambaiti, 2000 m. Nepal : Godavari, 1500 m.

*Material examined* : India : West Bengal : Botanical Garden, Darjiling, 1 Male, 5.v.1966, T. Chand. Rangiroon, 1905m, 9 Males, 26.v.1966, J.K. Jonathan, D. Ram, V.K. Gupta; 6 Females and 19 Males, 27.v.1966, J. K. Jonathan, D. Ram, V.K. Gupta and T. Chand (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Burma, Nepal.

*Remarks* : This species can be distinguished by the blackish abdomen; second and third tergites strongly mat, flagellum with a yellow band, petiolar area longitudinally striated and dorsal profile of the first tergite moderately convex.

67. *Lissonota minuenta* Morley

1913. *Lissonota minuenta* Morley. *Fauna of British India*, Hymenoptera, 3 : 228. F. key, des. Type : F, India : West Bengal : Darjiling, 1829 m. (Calcutta).
1977. *Lissonota minuenta* Chandra & Gupta. *Oriental Ins. Monog.*, 7 : 48. F. key, des. India : West Bengal.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 1 Female (holotype), ix.1908, E. Brunetti (specimen badly damaged).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : The type is in a damaged condition with head missing and ovipositor broken. This species is with yellow markings on the thorax and abdomen; hind coxa black.

20. Genus *Cryptopimpla* Taschenberg

1863. *Cryptopimpla* Taschenberg, *Ztschr. f.d. Gesam. Naturw. Halle*, 21 : 292.  
Type-species : *Phytodietus blandus* Gravenhorst.

68. *Cryptopimpla taiwanensis* (Momoi)

1968. *Fintona taiwanensis* Momoi. *Kontyu*, 36 : 187. F. des., fig. Type : F, Taiwan : Fenkihu, Chiayi Hsien (Honolulu).
1977. *Cryptopimpla taiwanensis* Chandra & Gupta. *Oriental Ins. Monogr.*, 7 : 97. M, F. n. comb. key, des., fig. Burma : Mt. Victoria, 1000-1400 m. India : Himachal Pradesh : Dalhousie Hills : Ahla,

2286 m.; Dhenkund, 2743 m.; Kalatop, 2438 m.; Khajjar, 1828 m. Uttar Pradesh : Kumaon Hills : Bhowali, 1700 m.; Chaubattia, 2072 m.; Nainital, 2100 m. West Bengal : Darjiling Hills : Rangiroon, 1905 m.

*Diagnostic characters* : Body moderately large, areolet small, receiving the second recurrent vein near its outer end; antenna with a small band; thorax except the yellowish base of pronotal collar, basolateral mark of mesoscutum and subtegular ridge, black; abdomen black, first tergite basally as well as apically, second and third apically and last three tergites entirely, yellow; hind coxa red, blackish above apically, malar space 0.5x as long as the basal width of mandible.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1905m, 2 Females, 25-27.v.1966, D. Ram, J.K. Jonathan (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh. Elsewhere : Burma, Taiwan.

### 21. Genus *Syzeuctus* Foerster

1868. *Syzeuctus* Foerster. Verh. Naturh Ver. Rheinlande, **25** : 167.

Type-species : *Ichneumon maculatorius* Fabricius

#### Key to the species of the Genus *Syzeuctus*

1. Abdomen black, apical margins of tergites yellow; fore and middle femora without black lines (rarely middle femur blackish above). (Ovipositor sheath 4.0x as long as hind tibia; all tergites smooth and shiny with minute punctures; hind coxa and trochanter entirely orange-red; tergites 6-8 without yellow apical bands)..... *leptopunctatus* Chandra & Gupta
- Abdomen reddish or red with black markings; fore and middle femora with blackish lines on the posterior side. (Ovipositor shorter than abdomen; apical transverse carina of propodeum complete; all coxae and trochanters black, except the first pair yellow in front; body with long hairs)..... *villosus* Cameron

### 69. *Syzeuctus leptopunctatus* Chandra & Gupta

1977. *Syzeuctus leptopunctatus* Chandra & Gupta. *Oriental Ins. Monogr.*, **7** : 145. M, F. key, des., fig. Type : F, India : Uttar Pradesh : Kumaon Hills : Ramgarh, 2100 m. (Gupta). India : West Bengal : Barddhaman.

*Material examined* : India : West Bengal : Barddhaman, 1 male, 15.xi.1962, on paddy, C.I.B.C. collection (Bangalore).

*Distribution* : India : West Bengal (Barddhaman District), Uttar Pradesh.

*Remarks* : This species can be distinguished by having ovipositor sheath nearly 4.0x as long as hind tibia. Body punctures shallow and moderately dense; abdomen with very minute punctures, its tergites 6-8 without yellow apical bands and hind coxa and trochanter entirely orange-red.

### 70. *Syzeuctus villosus* (Cameron)

1899. *Meyva villosa* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 192. M. des. fig. Type : M, India : Meghalaya : Khasi Hills (Oxford).

1977. *Syzeuctus villosus* Chandra & Gupta. *Oriental Ins. Monogr.*, 7 : 141. M, F. key, des., fig. India : Himachal Pradesh : Dalhousie Hills, Khajjiar, 1920 m. West Bengal : Darjiling Hills : Rangiroon, 1904 m.

*Material examined* : India : West Bengal : Darjiling Dist. : Rangiroon, 1904m, 1 Female, 28.v.1966, D. Ram, colln. No. 195 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya.

*Remarks* : This species can be identified by having first tergite entirely and second basally and laterally black. Apical transverse carina of propodeum complete; ovipositor sheath shorter than the abdomen. Body hairy.

## 22. Genus *Leptobatopsis* Ashmead

1900. *Leptobatopsis* Ashmead, *Proc U.S. Natl. Mus.* 23 : 47.

Type-species : (*Leptobatopsis australiensis* Ashmead) = *indica* Cameron.

### 71. *Leptobatopsis indica* (Cameron)

1897. *Cryptus indicus* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 41 (4) : 15. M. des. Type : M, India : Uttar Pradesh : Mussoorie (Oxford).

1900. *Mesoleptus annulipes* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 44 (15) : 103. M. des. Type : M, India : Meghalaya : Khasi hills (London). Syn. by Morley, 1915.

1900. *Leptobatopsis australiensis* Ashmead. *Proc. U.S. Natl. Mus.*, 23 : 47. (F). des. in key. Type : F, Australia (Washington). Syn. by Cushman, 1933.

1900. *Leptobatopsis australiensis* Ashmead. *Proc. Linn. Soc. N. S. Wales*, 1900 : 349. F. des. Type : F (same specimen as above), Australia (Washington). Syn. by Cushman, 1933.

1903. *Nemeritis albovaria* Tosquinet, 1903. *Mem. Soc. Ent. Belgique*, 10 : 9. M, F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Indonesia : Sumatra : Pangherang-Pissang (Genoa). Syn. by Townes, Townes & Gupta, 1961.

1904. *Atropha clypearia* Ashmead. *Proc. U. S. Natl. Mus.*, 28 : 143. M, F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Philippines : Luzon : Manila (Washington). Syn. by Cushman, 1933.

1905. *Tanera annulipes* Cameron. *Spolia Zeylanica*, 3 : 141. F. des., Fig. Type : F, Sri Lanka : Hatton (London). Syn. by Morley, 1915.

1907. *Syzeuctus javanicus* Schmiedeknecht. *Genera Insectorum*, 62 : 82. M, F. des. Type : F, Indonesia : Java (Berlin). Syn. by Cushman, 1933.

1910. *Atropha (?) apicalis* Szepliget. *Notes Leyden Mus.*, 32 : 101. M, F. des. Type : F, Indonesia : Java : Jakarta (Budapest). Syn. by Cushman, 1933.

1913. *Syzeuctus annulipes* Morley. *Fauna of British India*, Hymenoptera, 3 : 236. M, F. n. comb., key, des., fig. India : Meghalaya : Khasi Hills, Bihar : Pusa; Chapra; Adra; Monghyr; Karmatar; Bhogaon. West Bengal : Calcutta. Karnataka : Mysore. Kerala : Tenmalai. Sri Lanka : Pundaluoya; Colombo; Peradiniya; Madulsima. Australia : Queensland.

1977. *Leptobatopsis indica* Chandra & Gupta. *Oriental Ins. Monogr.*, 7 : 171. M, F. key, des., fig. Several localities in Burma; India; China; Indonesia; Malaysia; and Philippines, Widely distributed.

*Diagnostic characters* : This is one of the most abundant species in the Oriental Region. The main distinguishing characters of the species are : Antenna without a yellow band; first flagellar segment about 6.0x as long as its apical depth; scutellum yellow, metascutellum black; tegula brown; metapleurum with an apical yellow spot; fore wing with a cloud at apex; nervulus basad of basal vein;

hind coxa, trochanter and basal half of femur red; tarsus black, basal half of its basitarsus yellow; hind tibia about 10x as long as its apical depth; first tergite about 3.7x and second 1.5x as long as their respective apical widths; third tergite in both sexes and fourth in male, black with yellow basal and apical bands.

*Material examined* : India : West Bengal : Barrackpore, 1 Female, 7.x.1966, O.B. Chhotani; Rangpo near Darjiling, 1 Female, 7.1983, H.S. Sharma & party (Calcutta).

*Distribution* : India : West Bengal (Darjiling Dist. and North 24-Parganas), Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Rajasthan, Tamil Nadu, Uttar Pradesh. Elsewhere : Australia, Burma, China, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Taiwan.

### Tribe BANCHINI

#### Key to the Genera of Tribe BANCHINI

1. Areolet broadly triangular, receiving the second recurrent vein at its apex; frons with a pair of vertical ridges between the antennal sockets; antennae short and stout, their median segments wider than long; upper tooth of mandible much broader than the lower tooth and weakly notched..... *Branchopsis* Rudow
- Areolet receiving the second recurrent vein near its middle; frons without any ridges; antennae long and slender, their median segments longer than wide; upper tooth of mandible pointed and usually almost equal to the lower tooth ..... *Exetastes* Gravehorst

#### 23. Genus *Branchopsis* Rudow

1886. *Branchopsis* Rudow. *Soc. Ent.*, 1 : 33.

Type-species : *Branchopsis crassicornis* Rudow.

#### 72. *Branchopsis ruficornis* (Cameron)

1905. *Ephonites ruficornis* Cameron. *Ztschr. System. Hymen. Dipt.*, 5 : 77. F. des. Type : F, India : Bihar : Pusa (London). Syn. by Townes, Townes & Gupta, 1961.

1977. *Branchopsis ruficornis* : Chandra & Gupta. *Oriental Ins. Monogr.*, 7 : 187. M, F. key, des., fig. India : Haryana : Gurgaon; Narnaul. Uttar Pradesh : Rampur Dist. : Chuna Khan; Garjia, 609 m.; Pawalgarh; Dehra Dun, 600 m.

*Diagnostic characters* : This species has the following characteristic features : Face densely punctate; clypeus smooth and shiny, its apex and base with long hairs; malar space 0.33x the basal width of mandible; occipital carina entire and strong; antennal flagellum 29-30 segmented. Thorax stout 2.0-2.5x as long as its width between the tegulae; epomia strong; mesoscutum in the middle densely punctate; propodeum short without carinae, spiracles elliptical. Legs stout. Abdomen beyond third segment compressed; all tergites smooth and shiny with short sparse hairs. Ovipositor sheath 0.1-0.3x as long as hind tibia. Body black, marked with yellow.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Haryana, Himachal Pradesh, Karnataka, Kashmir, Punjab, Rajasthan, Sikkim, Uttar Pradesh. Elsewhere : Pakistan.

#### 24. Genus *Exetastes* Gravenhorst

1892. *Exetastes* Gravenhorsts, *Ichneumonologia Europaea*, 3 : 395.

Type-species : *Ichneumon fornicator* Fabricius.

#### 73. *Exetastes illusor* Gravenhorst

1829. *Exetastes illusor* Gravenhorst. *Ichneumonologia Europaea*, 3 : 427. M, F. des. Lectotype : (designated by Townes, Momoi & Townes, 1965), M, Europe : ? (Wroclaw).

1977. *Exetastes illusor* : Chandra & Gupta. *Oriental Ins. Monogr.*, 7 : 209. M, F. key, des. India. Europe.

*Diagnostic characters* : Chandra & Gupta (1977) gave a brief description of this species, which is as follows : Head, thorax and all the coxae and trochanters entirely black; antennae without a yellow band; occipital carina joining hypostomal carina above the base of mandible; mesoscutum densely punctate; propodeum rugose; wings weakly clouded, areolet sessile; legs red except their coxae, trochanters and sometimes bases of femora blackish; hind tibia back, reddish basally; hind tarsus black; its third and fourth segments yellow; abdomen smooth and shiny, black, with first tergite apically and 2-4 tergites entirely, red; first tergite nearly 3.0x as long as its apical width; ovipositor sheath blackish-brown.

*Distribution* : India : West Bengal (Darjiling District), Elsewhere : Europe.

*Remarks* : This species is abundant in Europe, where it has been recorded parasitising the larvae of Bombycidae, Noctuidae and Pieridae. In India it has been recorded from Darjiling by Morely. Its occurrence in India is yet to be confirmed.

### 4. Subfamily PORIZONTINAE

#### Key to the tribes of subfamily PORIZONTINAE

1. Cross section of first abdominal segment near its basal 0.3 circular or depressed-oval; suture separating first abdominal sternite from its tergite tending to be lateral or subdorsal, at 0.3 the distance from base of the tergite lying at or above the mid height of the segment; first tergite never with a lateral pit in front of the spiracle ..... **Porizontini**
- Cross section of first abdominal segment near its basal 0.3 somewhat quadrate, trapezoidal, or triangular; suture separating first abdominal sternite from its tergite tending to be subventral, at the basal 0.3 of the segment lying below the mid height of the segment; first tergite with or without a lateral pit in front of its spiracle ..... 2
2. Spiracle of the first abdominal tergite basad or much basad of the apex of first sternite; petiole long, slender, cylindrical to subcylindrical or nearly so with dorso-lateral carina absent, usually without a glymma and with the suture present or absent, when present it is usually ventral to subventral in position ..... **Cymoducini**

- Spiracle of first abdominal tergite distad to far distad of the apex of first sternite; petiole usually quadrate, usually short and stout, dorso-lateral carina nearly always present, usually with a distinct glymma and with the suture separating its tergite from sternite always distinctly present below the mid height to ventro-lateral in position..... **Macrini**

### Tribe PORIZONTINI

#### Key to the Genera of Tribe PORIZONTINI

1. Eyes weakly or not at all emarginate opposite antennal sockets; ovipositor more than twice as long as apical depth of abdomen; temple wide, the head usually not lenticular; second lateral area of propodeum usually defined by a carina all around ..... 2
- Eyes rather strongly emarginate opposite antennal sockets; ovipositor less than twice as long as apical depth of abdomen; temple very narrow, the head lenticular; second lateral area of propodeum usually not defined by a carina all around..... 3
2. Combined areola and petiolar area of propodeum forming a broad, deep, concave trough; discoidella often not reaching basad to connect with nervellus; basal part of first abdominal segment somewhat prismatic..... **Sinophorus** Foerster
- Combined areola and petiolar area not forming a trough; discoidella nearly always connected with nervellus; basal part of first abdominal segment cylindrical. (Apex of male clasper rounded above; apex of propodeum usually not reaching middle of hind coxa).. **Campoplex** Gravenhorst
3. Central 0.3 or more of mesopleural suture impressed as a sharp groove; extreme basal part of first abdominal segment with sternite not occupying quite its entire depth, so that in side view the lateral suture is a little below upper edge of petiole; areolet present; lower outer angle of second discoidal cell usually acute..... **Casinaria** Holmgren
- Central 0.3 or more of mesopleural suture not impressed; extreme basal part of first abdominal segment with sternite occupying its entire depth, so that in side view lateral suture runs along the upper margin of petiole; areolet absent; lower outer angle of second discoidal cell at right angle..... **Charops** Holmgren

#### 25. Genus *Sinophorus* Foerster

1868. *Sinophorus* Foerster, *Verh. Naturh. Ver. Rheinlande*, **25** : 153.

Type-species : [*Limneria (Sinophorus) canarsiae* Ashmead] = *validus* Cresson.

#### 74. *Sinophorus nitidus* (Brischke)

1880. *Limneria nitida* Brischke. *Shr. Naturf. Gesell, Danzig (N.F.)*, **4** : 150. M, F. key, des. Type : M, F, Prussia (Destroyed).

1887. *Limneria tegularis* Thomson. *Opuscula Entomologica*, **11** : 1107. F. des. Type : F, Sweden : Skane (Lund). Syn. by Sanborne, 1984.

1905. *Limnerium quettaense* Cameron. *J. Bombay Nat. Hist. Soc.*, **17** : 280. M, F. key, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : M, Pakistan : Quetta (London). Syn. by Sanborne, 1984. (Sanborne also mentions as having designated the lectotype).

1925. *Pyracmon albicinctum* Viereck. *Canad. Ent.*, **57** (7) : 180 (key); 58 : 4. M, F. key, des. Types : M, F. Canada : British Columbia (Ottawa). Syn. by Sanborne, 1884.
1913. *Limnerium quettaense* Morley. *Fauna of British India*, Hymenoptera, **3** : 483. M, F. n. comb., key, des., fig. India : Himachal Pradesh : Kangra Valley, 4500 ft.; Simla, 7000 ft. Uttar Pradesh : Kasauli, 6300 ft. West Bengal : Darjiling, 6000 ft. Pakistan : Quetta. Occurrence in India not confined by Gupta and Maheshwary, 1977).
1984. *Sinophorus nitidus* Sanborne. *Mem. Amer. Ent. Inst.*, **38** : 271. M, F. key, syn., des., fig. Widely distributed in Palaearctic Region. Canada & U.S.A.

**Diagnostic characters** : No specimen was seen. Dr. V.K. Gupta studied the type specimen from Quetta in British Museum (Natural History). According to him the salient features of the species are : Face obsoletely punctate; frons and vertex closely and finely punctate; Ocellar triangle wide; interocellar distance about 2.0x the ocello-ocular distance; thorax closely punctate, areola coalescent with the petiolar area, unusually excavated, strongly trans-striate, with lateral area more strongly and irregularly striate; propodeal spiracle oval; postpetiole widened posteriorly.

Legs bright yellow; hind coxae and basal joints of trochanters black; hind tibia darker at apex; hind tarsus largely dark.

**Distribution** : India : West Bengal (Darjiling District). Elsewhere : Pakistan.

## 26. Genus *Campoplex* Gravenhorst

1829. *Campoplex* Gravenhorst, *Ichchneumonologia Europaea*, **3** : 453.

Type-species : (*Campoplex difformis* Gravenhorst) = *Ichneumon difformis* Gmelin.

### Key to the species of *Campoplex*

1. Face distinctly rugose; areola wider than long or as long as wide, distinctly constricted just below costulae; propodeum strongly rugose; propodeal carinae always strong and areola rugoso-striate; mesopleurum largely densely punctate. The *Homonae* Group.....(Hind tibia not distinctly banded, largely reddish to blackish-brown, femur reddish; median propodeal area rugoso-striate..... *indicus* Gupta & Maheshwary
- Face granulose to rugulose; areola appears longer; areolar carinae a little parallel-sided below costulae and then diverging or the carinae below costulae weak to indistinct..... 2
2. Median propodeal carinae widely diverging posteriorly and often weak to indistinct; areola not well formed; sometimes carinae stronger where propodeum strongly rugose to striate; otherwise weakly rugose to granulose .....The *Collinus* Group.....3
- Median propodeal carinae distinct and not widely diverging posteriorly, junction between areola and petiolar areas discersible and areola generally well formed, narrow and parallel sided; if side of areola incomplete, then stubs distinct; propodeum always distinctly granulose..... The *Phthoimacae* Group.....4
3. Prepectal carina strong and flange-like; prepectus short and smooth. (Clypeus granulose; face and clypeus combined, longer than wide; malar space short; median propodeal carinae strong; ovipositor short; propodeum with a shallow median trough).....  
.....*pseudocollinus* Gupta & Maheshwary

- Prepectal carina and prepectus normal in shape; prepectus rough. (Hind femur and trochanters orange-yellow; ovipositor long (2.3-3.8 mm); basal area long, triangular).....  
.....*oriens* Gupta & Maheshwary
4. Middle femur with a basal ring; metapleurum and propodeum coarsely granulose; propodeum and metapleurum densely hairy; malar space 0.8x the basal width of mandible.....  
.....*maximalus* Gupta & Maheshwary
- Middle femur yellowish-brown, except sometimes dark in the lower side, metapleurum and propodeum weakly hairy, with normal granulation; malar space 0.6-0.7x the basal width of mandible; hind femur and first tarsal segment black.....  
.....*septentrionalis septentrionalis* Gupta & Maheshwary

#### 75. *Campoplex indicus* Gupta & Maheshwary

1977. *Campoplex indicus* Gupta & Maheshwary. *Oriental Ins. Monogr.*, 5 : 41. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Kulu Valley : Manali, 1828 m. (Gupta). India : Himachal Pradesh : Dalhousie Hills : Upper Bakrota, 2438 m.; Khajjar, 1828 m.; Ahla, 2286 m.; Simla Hills : Simla, 2135 m.; Narkanda, 2750 m.; Kalpa Valley : Nichar, 2500 m. Uttar Pradesh : Kumaon Hills : Bhowali, 1700 m.; Kausani, 1880 m. West Bengal : Darjiling, 1981 m. Sikkim : Gangtok, 1676 m. Tamil Nadu : Nilgiri Hills : Devbetta, 1233 m.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling, 1981m, 1 Female (paratype), 5.v.1966, J.K. Jonathan, No. J146 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh, Sikkim, Tamil Nadu.

*Remarks* : This species is recognised by its almost unicolorous hind tibia and reddish femur in females.

#### 76. *Campoplex maximalus* Gupta & Maheshwary

1977. *Campoplex maximalus* Gupta & Maheshwary. *Oriental Ins. Monogr.*, 5 : 62. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Dalhousie, 2132 m. (Gupta). India : Himachal Pradesh : Manali, 1828 m.; Simla Hills : Narkanda, 2743 m.; Kalpa Valley : Between Nichar and Sungra, 2400 m.; Nichar Forest Rest House, 2500 m. Uttar Pradesh : Mussoorie, 2140 m.; Garhwal Hills : Bhyundar, 2743 m.; Gangaria, 3048 m. West Bengal : Darjiling Hills : Rangiroon, 1904 m. Meghalaya : Jaintia Hills : Jowai. Sikkim : Gangtok, 1677 m. Nepal, Taiwan.

*Material examined* : India : West Bengal : Darjiling Dist. : Rangiroon, 1904 m., 1 Female (paratype), 26.v.1966, J. K. Jonathan, No. J158. Darjiling, Botanical Garden, 1981 m., 1 Male (paratype), 4.v.1966, T. Chand, No. T 228 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Uttar Pradesh, Sikkim. Elsewhere : Nepal, Taiwan.

#### 77. *Campoplex oriens* Gupta & Maheshwary

1977. *Campoplex oriens* Gupta & Maheshwary. *Oriental Ins. Monogr.*, 5 : 55. M, F. key, des. fig. Type : F, India : Himachal Pradesh : Dalhousie Hills : Upper Bakrota (Gupta). India : Himachal Pradesh : Kangra Valley : Palampur, 1220 m.; Kulu Valley : Manali, 1828 m.; Simla Hills : Kufri,

2438 m.; Chail, 2286 m. Uttar Pradesh : Kumaon Hills : Jeolikote, 1220 m.; Kainchi, 1372 m.; Ramgarh, 2100 m.; Chaubattia, 2072 m.; Bhowali, 1700 m. West Bengal : Darjiling Hills : Rangiroon, 1904 m. Meghalaya : Khasi Hills : Shillong, 1463 m. Burma, Sri Lanka, Taiwan, China, Malaysia.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling, 1 Female (paratype), 6.v.1966, V.K. Gupta, No. 171. Rangiroon, 1904m, 1 Female (paratype), 26.v.1966, J.K. Jonathan, No. J 158 (Gupta).

*Distribution* : India : West Bengal (Darjiling District). Himachal Pradesh, Meghalaya, Uttar Pradesh. Elsewhere : Burma, China, Malaysia, Sri Lanka, Taiwan.

#### 78. *Campoplex pseudocollinus* Gupta & Maheshwary

1977. *Campoplex pseudocollinus* Gupta & Maheshwary. *Oriental Ins. Monogr.*, 5 : 51. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Simla Hills : Narkanda, 2743 m. (Gupta). India : Himachal Pradesh : Manali, 1828 m. West Bengal : Darjiling Botanical Garden, 1981 m. Burma.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling Botanical Gardens, 1981m, 1 Male (paratype), 6.v.1966, V.K. Gupta, No. 171 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh. Elsewhere : Burma.

*Remarks* : This species is distinguished by having prepectal carina in the form of a flange ending in a sharp depression behind front coxa; face granuloso-mat, and the face and clypeus combined are longer than the minimum width of face.

#### 79. *Campoplex septentrionalis septentrionalis* Gupta & Maheshwary

1977. *Campoplex septentrionalis septentrionalis* Gupta & Maheshwary. *Oriental Ins. Monogr.*, 5 : 64. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Kulu Valley : Koti, 2438 m. (GUPTA). India : Himachal Pradesh : Kulu Valley : Rahla near Koti, 2743 m. Meghalaya : Khasi Hills : Elephant Falls near Shillong, 1463 m. West Bengal : Darjiling Hills : Rangiroon, 1905 m.; Darjiling Botanical Garden, 1981 m. Sikkim : Gangtok, 1676m. Pakistan : Kuldana. Taiwan.

*Material examined* : India : West Bengal : Darjiling Dist. : Rangiroon, 1905m, 2 Males, 1 Female (paratypes), 26-27.v.1966, D. Ram, M.K. Kamath, Nos. 190, K 118. Botanical Garden, Darjiling, 1981m, 1 Female (paratype), 8.v.1966, M.K. Kamath, No. K 104 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Sikkim, Meghalaya. Elsewhere : Pakistan, Taiwan.

*Host* : Larva feedig on *O. dilatata*.

#### 27. Genus *Casinaria* Holmgren

1859. *Casinaria* Holmgren, *Ofvers. Svenska Ventensk. Akad. Forh.*, 15 : 325.

Type-species : *Campoplex tenuiventris* Gravenhorst.

#### Key to the species of *Casinaria*

1. Hind leg largely yellowish-brown. (Upper half of mesopleurum granuloso-rugulose, lower half

- weakly rugose; male genital claspers broad apically; interocellar distance 2x the ocello-ocular distance; malar space 0.6x the basal width of mandible) ..... *ashimae* Gupta & Maheshwary  
 — Hind leg largely black ..... 2
2. Hind tibia conspicuously white at base. (Mandible black; palpi yellowish-white; abdomen with the third, fourth and extreme apex of the second segment, red; postpetiole black) .....  
 ..... *minima* (Morley)  
 — Hind tibia not white at base..... 3
3. Mesopleurum rugoso-punctate; speculum shiny with trans-striations; malar space 0.2-0.3x the basal width of mandible; scape and pedicel, hind tibia, postpetiole, sides of second tergite and rest of abdomen, yellowish-brown ..... *indubia* (Morley)  
 — Mesopleurum granuloso-rugose; speculum largely or only anteriorly mat with short striations; malar space 0.6x the basal width of mandible; scape and pedicel, hind tibia largely and first and second tergites wholly, black; rest of abdomen wholly black..... *atrata* (Morley)

#### 80. *Casinaria ashimae* Maheshwary & Gupta

1977. *Casinaria ashimae* Maheshwary & Gupta. *Oriental Ins. Monogr.*, 5 : 162. M, F. key, des. Type : F, India : West Bengal : Darjiling : Botanical Garden, 1981 m. (Gupta). India : Uttar Pradesh : Chakrata, 1890 m. Sikkim : Gangtok, 1676 m. Taiwan.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, Botanical Garden, 1981m, 1 Female (holotype) 4.v.1966, D. Ram; 1 Male, (same data as holotype), 8.v.1966, D.T. Tikar, No. 239 (Gupta).

*Distribution* : India : West Bengal (Darjiling District). Elsewhere : Taiwan.

*Remarks* : The male genital claspers of this species are broad and not rod-like. The mesopleural sculpture coarse; metapleurum weakly rugose and dull.

*Host* : *T. huttoni*.

#### 81. *Casinaria atrata* Morley

1913. *Casinaria atrata* Morley. *Fauna of British India, Hymenoptera*, 3 : 476. M, F. des., fig. Type : F, India : Himachal Pradesh : Simla (London). India : West Bengal : Darjiling ?

1977. *Casinaria atrata* Maheshwary & Gupta., *Oriental Ins. Monogr.*, 5 : 152. M, F. key, des., fig. India : Uttar Pradesh : Mussoorie, 7500 ft.; Kumaon Hills : Bhowali, 1700 m. Himachal Pradesh : Dalhousie, 2132 m.

*Distribution* : Indian : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh. Elsewhere : Korea.

*Remarks* : No specimen of this species was available for study. However Morley (1913) reported two males from Darjiling in Z.S.I. collection.

#### 82. *Casinaria indubia* (Morley)

1913. *Trophocampa indubia* Morely. *Fauna of British India, Hymenoptera*, 3 : 475. F. des. Type : F, India : Uttar Pradesh : Kumaon Hills : Bhim Tal, 4500 ft. (Calcutta).

1977. *Casinaria indubia* : Maheshwary & Gupta. *Oriental Ins. Monogr.*, 5 : 149. M, F. key, des., fig. India : Bihar : Ranchi Dist : Namkum. Kerala : Nilambur. Karnataka : Tithimatti, S. Coorg. Walayar Forest : Watapara. Maharashtra : Matheran, 915 m.; Chikalda, 1067 m. Uttar Pradesh : Dehra Dun, New Forest; Lachiwala; Mussoorie, 2140 m.; Dibri Village, Garjia; Pawalgarh. Himachal Pradesh : Simla 2133 m.; Narkanda, 2750 m. West Bengal : Diana River. Nepal.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Karnataka, Kerala, Uttar Pradesh, Maharashtra, Himachal Pradesh. Elsewhere : Nepal, Burma.

*Remarks* : This species is recognized by having body granulose and black.

*Host* : *Glyphodes negatalis*; *Agrotera basinotata*; *Aurelea masurensis*; *Pyrausta machaeralis*; *Ostrinia nubilalis*; *Botyodes asialis*; *Hedylepta diemenalis*. Hyperparasite : *Breachymeria euplocae*.

### 83. *Casinaria minima* (Morley)

1913. *Campoplex minimus* Morley. *Fauna of British India*, Hymenoptera, 3 : 453. M, F. key, des. Type : F, India : West Bengal : Calcutta (Calcutta). India : Meghalaya : Shillong, 6000 ft. (Male paratype in B. M. (N. H.) apparently a different species resembling *C. formosana bharata*).

1977. *Casinaria minima* : Maheshwary & Gupta. *Oriental Ins. Monogr.*, 5 : 172. notes on Type, des.

*Material examined* : India : West Bengal : Calcutta, 1 Female (type), xii.1907, Rowland Turner (head and abdomen broken) (Calcutta).

*Distribution* : India : West Bengal (Calcutta), Sikkim. Elsewhere : Taiwan.

*Remarks* : This species is readily recognised by having hind tibia conspicuously white at base.

### 28. Genus *Charops* Holmgren

1859. *Charops* Holmgren, *Ofvers. Svenska. Vetensk. Akod. Forh.*, 15 : 324.

Type-species : (*Campoplex decipiens* Gravenhorst) = *cantator* De Geer.

#### Key to the species of *Charops*

1. Median propodeal carinae absent or very weakly present. Male claspers distinctly projecting beyond the tip of abdomen; claspers conspicuously long and rod-like at apex. Middle femur wholly yellow. The *Brachypterum* Group (Median propodeal carinae faintly indicated; hind femur and tibia yellowish-brown) ..... *bicolor* (Szepligeti)
- Median propodeal carina distinct. Male claspers not projecting out; claspers not long and rod-like apically. Middle femur blackish in the middle. The *Obtusus* Group. (Tegula yellow, face evenly rugulose, mesopleurum rugoso-reticulate).....*obtusus obtusus* Morley

### 84. *Charops bicolor* (Szepligeti)

1906. *Agrypon bicolor* Szepligeti. *Ann Mus. Natl. Hungarici*, 4 : 124. F. des. Type : F, Sri Lanka : Colombo (Budapest).

1921. *Gongropelma formosanum* Enderlein. *Stettiner Ent. Ztg.*, 82 : 13. F. des. Type : F, Taiwan : Kaohsiung (Warsaw). Syn. by Townes, Townes & Gupta, 1961.

1922. *Zacharops narangae* Cushman. *Philippine J. Sci.*, **20** : 593. M. F. des., biol. Type : F. Taiwan (Washington). Syn. by Townes, Townes & Gupta, 1961.
1971. *Charops bicolor* : Gupta & Maheshwary. *Oriental Ins.*, **4** (1970) : 469. M, F. key, des. fig. India : Himachal Pradesh : Manali, 1828 m. Uttar Pradesh : Ramnagar Forest Division : Garjia, 600 m.; Meerut; Bagpat Road. Andhra Pradesh : Samalkot; Rajamundry; Nagram; Sirpur; Nathpur. Bihar : Ranchi Dist. : Horhap Forest; Namkum. Tamil Nadu : Coimbatore, 425 m.; Karikal. West Bengal : Calcutta. Meghalaya : Khasi Hills : Shillong : Botanical Garden, 1465 m.; Cherrapunji, 1360 m. Bangalapurkhuri. Assam : Rangapara : Sonajuli Tea Estate. Kerala : Cananore.

*Material examined* : India : West Bengal : Calcutta, 2 Females, 4.xii.1956. V.K. Gupta.

*Distribution* : India : West Bengal (Calcutta), Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Kerala, Tamil Nadu, Uttar Pradesh. Elsewhere : Australia, China, Japan, Korea, Malaysia, Pakistan, Thailand, Sri Lanka.

*Remarks* : This species is recognised by having faint propodeal carinae; hind leg yellowish-brown; male claspers rod-like.

*Host* : *Naranga aenescens*, *Anomis flave*, *Pelopidas mathias*, *Psalis pennuatula*, *Mythimna loreyi*, *Spodoptera mauritia*, *Scirpophaga incertulas*.

*Secondary Parasites* : *Brachymeria* sp., *Trchomalopsis apanteloctenus*, *Eupteromalus* sp.

#### 85. *Charops obtusus obtusus* Morley

1913. *Charops obtusa* Morley. *Fauna of British India*, Hymenoptera, **3** : 436. M, F. key, des., fig., biol. Type : F, India : Gujarat : Surat (London). India : Uttar Pradesh : Mussoorie. Meghalaya : Khasi Hills. West Bengal : Calcutta. Maharashtra : Pune. Tamil Nadu. Sri Lanka. Burma : Karen Hills : Pegu, 3000-3700 ft.
1977. *Charops obtusa obtusa* : Maheshwary. *Oriental Ins. Monogr.*, **5** : 181. key, fig. India : Tamil Nadu : Coimbatore. West Bengal : Kurseong.

*Material examined* : No material of this species was available for study. However, Morley (1913) reported one female from Calcutta in West Bengal.

*Distribution* : India West Bengal (Calcutta), Assam, Bihar, Gujarat, Karnataka, Maharashtra, Meghalaya, Tamil Nadu, Uttar Pradesh. Elsewhere : Burma, Indonesia, Sri Lanka.

*Remarks* : This species is mainly recognised by having distinct carinae on propodeum and claspers in male not rod-like.

*Host* : *Virachola* sp.; *Ectropis bhurmitra*, *Euproctis scintillans*, *Terias silhetana*, *Orgyia postica*.

### Tribe CYMODUCINI

#### Key to the genera of CYMODUSINI

1. Eyes convergent ventrally and with sparse hairs, more strongly convergent and more distinctly hairy in females than in males; first tergite without a pit or groove in front of spiracle.....  
.....*Cymodusa* Holmgren
- Eyes subparallel within or weakly convergent, without hairs; first tergite usually with a pit or groove in front of spiracle..... 2

2. Ovipositor very long and slender, its sheath 1.5-2.0x as long as fore wing; second abdominal tergite longest; tarsal claws simple; first abdominal segment short, stout and quadrate .....  
..... *Menaka* Gupta & Gupta
- Ovipositor short and stout, its sheath 0.1-0.4x as long as fore wing; second abdominal tergite shorter or nearly equal to the first; tarsal claws pectinate; first abdominal segment long, cylindrical to subcylindrical or compressed oval, but never as above ..... 3
3. Transverse carina of prepectus nearly always sharp and complete, sometimes high and ridge-like cutting off a short lower part of prepectus from the upper part; lateral part of prepectal carina absent or short, not extending up to its anterior margin except in a few cases, where the glymma is deep; discoidella pigmented and distal hamuli 9-11 in number; suture separating first abdominal tergite from its sternite usually absent; median longitudinal carinae of propodeum absent, sometimes present between basal and apical transverse carinae but incomplete anteriorly and not touching the basal transverse carina; areolar area never defined; nervellus always distad of the basal vein by 0.25-0.8x its length..... *Delopia* Cameron
- Transverse carina of prepectus usually absent or weak and only anteriorly represented, so that prepectus is not divided into upper and lower parts; prepectal carina complete and sharply extending to the anterior margin of mesopleurum; suture separating first abdominal tergite from sternite always present; median longitudinal carinae of propodeum usually complete, sometimes incomplete to rarely absent; areolar area defined; nervellus opposite to distad of the basal vein by 0.15-0.4x its length..... *Kartika* Gupta & Gupta

### 29. Genus *Cymodusa* Holmgren

1859. *Cymodusa* Holmgren, *Ofvers. Svenska Vetensk. Akad. Forh.*, 15 : 327.

Type-species : *Cymodusa leucocera* Holmgren.

### 86. *Cymodusa josephi josephi* Gupta & Gupta

1974. *Cymodusa josephi josephi* Gupta & Gupta. *Oriental Ins.*, 8 : 7. F. key, des., fig. Type : F, India : West Bengal : Darjiling, Botanical Garden, 1980 m. (Gupta). India : West Bengal : Darjiling Hills : Rangiroon, 1900 m. Himachal Pradesh : Kulu Valley : Manali, 1828 m.

**Diagnostic characters** : Interocellar distance 1.25x the ocello-ocular distance, occipital carina joining hypostomal carina at a distance of 0.4x the basal width of mandible, malar space almost wanting, eyes in female almost touching the base of mandible. Head and thorax granulose, basal area of propodeum V-shaped and about 2.0x as long as wide, and areola as long as wide, widely open behind.

Flagellum 33-segmented; middle coxa wholly red; hind femur red to reddish-brown.

**Material examined** : India : West Bengal : Darjiling Dist. : Darjiling Botanical garden, 10 Females, 4-8.v.1966, Colls. J.K. Jonathan, V.K. Gupta, S. Gupta, T. Chand. Rangiroon, 3 Females, 27-29.v.1966, Colls. M.K. Kamath, J.K. Jonathan, D. Ram.

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh.

30. Genus *Menaka* Gupta & Gupta1971. *Menaka* Gupta & Gupta, *Oriental Ins.* 5 (1) : 111.Type-species : *Menaka nigrita* Gupta & Gupta.87. *Menaka nigrita* Gupta & Gupta1971. *Menaka nigrita* Gupta & Gupta. *Oriental Ins.*, 5 : 113. F. key, des., fig. Type : F, India : West Bengal : Darjiling : Botanical Garden, 1980 m. (Gupta).

**Diagnostic characters** : Head including face and clypeus shiny; occipital carina dipped medially above; clypeus produced apically in middle; malar space 1.0x the basal width of mandible; flagellum 35-segmented; pronotum, mesoscutum, mesopleurum finely punctate; petiolar area of propodeum wrinkled. Hind femur 5.5-6.2x as long as wide; longer hind tibial spur 3.0x as long as apical width of hind tibia. Abdomen long and slender; first tergite 3.6x the width of postpetiole, petiole quadrate, dorsally with a median and two faint lateral longitudinal depressions just before the level of spiracle. Ovipositor long. Body black, mandible except teeth yellow; fore, middle and hind legs wholly orange-yellow with the coxa and first trochanteral segment of hind leg, black.

**Material examined** : India : West Bengal : Darjiling, Botanical Garden, 2 Females 8.v.1966, V.K. & S. Gupta, No. 174 (Gupta).

**Distribution** : India : West Bengal (Darjiling District).

31. Genus *Delopia* Cameron1903. *Delopia* Cameron, *Ztschr. System. Hymen. Dipt.*, 2 : 304, 337.Type-species : *Delopia cariniscutis* Cameron.Key to the species of *Delopia*

1. Longer middle tibial spur 1.3-1.6x as long as the smaller spur; head swollen behind the eyes and almost quadrate; temple moderately to strongly swollen, weakly to not at all receding; face without a transverse carina below antennal sockets, instead there may be a median protuberance; suture separating first abdominal sternite from its tergite present or absent. Palpi, at least in female, black; tegula black; legs in female black, in males fore and middle legs usually ornamented with pale yellow ..... 2
- Longer middle tibial spur 2.0-2.5x as long as the smaller spur; head nearly always thin behind the eyes, lenticular or nearly so; temple nearly always strongly receding; face with a transverse carina just below antennal socket which is cleft in the middle, its median protuberance absent; suture separating first abdominal sternite from its tergite absent. Palpi pale yellow to yellowish-brown in both sexes; tegula yellow or black; species with the legs mainly red and black in both sexes..... 4
2. Propodeal spiracle short elliptic; face without a distinct median protuberance below antennal sockets; areolet small, receiving second recurrent vein distinctly distad of the middle to sometimes near apex; head and thorax covered with sparse, short pale pubescence; temple and vertex subpolished. The *Sumptuosa* Group..... *petiolator* (Fabricius)

- Propodeal spiracle large and linear; face with a distinct median protuberance below antennal sockets; areolet large, receiving second recurrent vein at middle or basad of it, head and thorax covered with a dense, long white pubescence; temple and vertex punctate. The *Buddha* Group. 3
- 3. Fore tibia red; abdomen from fifth segment onward red. Head not swollen behind the eyes.....  
.....*townesi* Gupta & Gupta
- Fore tibia yellowish-brown; abdomen largely red. Head distinctly swollen behind the eyes.....  
.....*cariniscutis* Cameron
- 4. Occipital carina joining directly at base of mandible; nervellus strongly reclivous.....The *Ceylonica* Group. (Apical 3 segments wholly black; temple medially strongly indented due to out bulging of occipital carina). .....*simlaensis* (Cameron)
- Occipital carina joining hypostomal carina before base of mandible at a distance of 0.25-0.8 the basal width of mandible; nervellus vertical, sometimes inclivous. The *Prytanes* Group ..... 5
- 5. Tegula yellow. (Abdominal tergites from third onward dorsally black; ventro-lateral carina on postpetiole extending anteriorly on petiole up to near its midlength; speculum finely striate).....  
.....*prytanes* (Cameron)
- Tegula black..... 6
- 6. Mandible broadly red; frons with median longitudinal carina; areolet petiolated, receiving second recurrent vein distad of the middle.....*cytaesis* (Cameron)
- Mandible black; frons without carina; areolet sessile, receiving second recurrent vein based of the middle.....  
.....*carinata* Gupta & Gupta

88. *Delopia carinata* (Gupta & Gupta)

1978. *Dusona carinata* Gupta & Gupta. *Oriental Ins. Monogr.*, 8 : 103. F. key. des., fig. Type : F, India : Himachal Pradesh : Dalhousie Hills : Ahla, 2286 m. (Gupta). India : Himachal Pradesh : Khajjiar, 1828 m. West Bengal : Darjiling Hills : Rangiroon, 1910 m. Nepal.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1910m, 1 Female, 26.v.1966, J. K. Jonathan (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh.

*Remarks* : This species is distinguished by having tegula and mandible black; frons without a carina; areolet sessile, receiving second recurrent vein basad of the middle.

89. *Delopia cariniscutis* Cameron

1903. *Delopia cariniscutis* Cameron. *Ztschr. System. Hymen. Dipt.*, 3 : 337. "F" = M. des. Type : M, India : West Bengal : Darjiling (London).

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species can be recognised by its fore tibia being yellowish-brown; abdomen

largely red and head distinctly swollen behind the eyes. Propodeal spiracle large and linear; face with a distinct median tubercle; head and thorax covered with long white pubescence.

90. *Delopia cytaesis* (Cameron)

1903. *Campoplex cytaesis* Cameron. *Ztschr. System. Hymen. Dipt.*, 3 : 339. F. des. Type : India : West Bengal : Darjiling (London).

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species can be distinguished by having tegula black; mandible red; frons with median longitudinal carina; areolet petiolate, receiving second recurrent vein distad of the middle.

91. *Delopia petiolator* (Fabricius)

1804. *Ophion petiolator* Fabricius. *Systema Piezatorum*, p. 140. F. des. Type : F, Austria (Kiel, on deposit in Copenhagen).

1858. *Campoplex lapponicus* Malmgren. *Svenska Vetensk. Akad. Handl.*, (4) 2 (8) : 37. M, F. des. Type : M, F, Sweden : Lapland (Stockholm). Syn. by Hinz, 1972.

1905. *Campoplex greeni* Cameron. *Spolia Zeylanica*, 3 : 127. F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Sri Lanka : Pundaluoya (London). Sri Lanka : Hatton. Syn. by Morley, 1915.

*Material examined* : No material was available for study.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh. Elsewhere : Japan, Pakistan, Sri Lanka.

*Remarks* : This is a little known species, mainly distinguished by its propodeal spiracles being short and elliptic; face without tubercle; areolet small, receiving second recurrent distad to the middle; head and thorax covered with sparse pale hairs.

92. *Delopia prytanes* (Cameron)

1903. *Campoplex prytanes* Cameron. *Ztschr. System. Hymen. Dipt.*, 3 : 339. F. des. Type : F, India : West Bengal : Darjiling (London).

1961. *Dusona prytanes* Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 232. n. comb. India.

*Material examined* : India : West Bengal : Darjiling District : Darjiling Botanical Garden, 2 Females, 1 Male (type), 4-6.v.1966, J.K. Jonathan, J145 and D.T. Tikar, T229 & 234 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Karnataka, Meghalaya, Sikkim, Tamil Nadu, Uttar Pradesh.

*Remarks* : This species is characterized by having the speculum finely striate; areolet petiolate; abdominal tergites from third onward wholly red.

93. *Delopia simlaensis* (Cameron)

1905. *Campoplex simlaensis* Cameron. *Ztschr. System. Hymen. Dipt.*, 5 : 282. F. des. Type : F, India : Himachal Pradesh : Simla (London).

1961. *Dusona simlaensis* Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 232. n. comb. India.

1978. *Dusona simlaensis* : Gupta & Gupta. *Oriental Ins. Monogr.*, 8 : 79. M, F. key, des., fig. India : Himachal Pradesh : Dalhousie Hills : Ahla, 2286 m.; Dhenkund, 2743 m.; Kalatop, 2438 m.; Upper Bakrota, 2438 m.; Kangra Hills : Dharmasala, 1220 m.; Simla Hills : Simla, 2133 m.; Chini Bungalow, 2620 m.; Kufri, 2498 m.; Narkanda, 2750 m.; Shilaru, 2600 m.; Kalpa Valley : Nichar, 2500 m.; Kulu Valley : Manali, 1828 m.; Bajaura; Rahla. Uttar Pradesh : Garhwal Hills : Barkot, 1220 m.; Bhyundar. 2450 m.; Govind Ghat, 1830 m.; Pipalkoti, 1310 m.; Mussoorie, 2100 m.; Dehra Dun, 610 m.; Uttar Kashi, Ranajeet; Kumaon Hills : Bhowali, 1700 m.; Garjia, 610 m.; Jeolikote, 1220 m.; Naini Tal, 2100 m.; Kausani, 1800 m.; Chaubattia, 2000 m.; Mukteshwar, 2300 m.; Ranikhet, 2000 m.; Herbertpur; Mohakampur; Roorkee. Bihar : Ranchi Dist. : Namkum, Ambera-Bero. West Bengal : Darjiling, 1980 m. Meghalaya : Khasi Hills : Shillong Botanical Garden, 1980 m. Jaintia Hills, Jowai. Sikkim. Gangtok, 1700 m. Nepal.
1987. *Delopia simlaensis* : Gupta. *Mem. Amer. Ent. Soc.*, 41 (Part I) : 416. n. comb.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 4 Females, 5 Males, 4-8.v.1966, Colls. M.K. Kamath, J.K. Jonathan, D.T. Tikar, G.K. Agarwal.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Himachal Pradesh, Meghalaya, Sikkim. Elsewhere : Nepal.

*Remarks* : This is a distinct species having the temple strongly indented medially; tegula black; apical segments of abdomen black and interocellar distance 1.25x the ocello-ocular distance.

#### 94. *Delopia townesi* (Gupta & Gupta)

1978. *Dusona townesi* Gupta & Gupta. *Oriental Ins. Monogr.*, 8 : 52. M, F. key, des., fig. Type : F, India : Sikkim : Gangtok, 1700 m. (Gupta). India : West Bengal : Darjiling Botanical Garden, 1980 m.; Rangiroon, 1910 m. Burma.

*Material examined* : India : West Bengal : Darjiling District : Darjiling Botanical Garden, 1 Female, 6.v.1966, D.T. Tikar. Rangiroon, 1910m, 1 Male, 25.v.1962, V.K. Gupta, S. Gupta (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Burma.

*Remarks* : This species is characterized by having the apical segments of abdomen only dorsally black; median carina of frons present; interocellar distance 0.3x the ocello-ocular distance, transverse carina on prepectus ridge-like.

### 32. Genus *Kartika* Gupta & Gupta

1976. *Kartika* Gupta & Gupta, *Oriental Ins.*, 10 : 459.

Type-species : *Kartika aspera* Gupta & Gupta.

#### 95. *Kartika longifemorata* Gupta & Gupta

1976. *Kartika longifemorata* Gupta & Gupta. *Oriental Ins.*, 10 : 483. F. key, des., fig. Type : F, India : Himachal Pradesh : Dalhousie Hills : Ahla, 2286 m. (Gupta). India : Himachal Pradesh : Dalhousie Hills : Kalatop, 2438 m.; Khajjiar, 1828 m. West Bengal : Darjiling Botanical Garden, 1930 m.; Rangiroon, 1910 m.

*Diagnostic characters* : Face densely punctate; clypeus mat, sparsely punctate; malar space 0.35x the basal width of mandible; interocellar distance 1.6x the ocello-ocular distance; flagellum 50-segmented; pronotum in lower half trans-striate; mesoscutum with moderately dense punctures;

mesopleurum punctate, area below subtegular ridge strongly rugose, in front of speculum trans-striate. Propodeum with shallow median longitudinal depression; nervulus distad of basal vein by 0.35x its length; areolet sessile, receiving second recurrent vein basad of the middle. First tergite long, 7.0x as long as wide; all abdominal tergites subpolished. Ovipositor little longer, about 2.0x as long as apical depth of abdomen, its sheath 0.7x as long as hind femur.

Abdomen with last three tergites largely red. Body 12-15 mm.

*Material examined* : India : West Bengal : Darjiling District : Darjiling Botanical Garden, 2 Females, 5.21.1966, J.K. Jonathan and V.K. Gupta. Rangiroon, 1 Female, 26.v.1966, J.K. Jonathan.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh.

### Tribe MACRINI

#### Key to the Genera of Tribe MACRINI

1. Apical margin of clypeus with a weak median tooth; areolet present and receiving the second recurrent vein basad of the middle ..... *Campoletis* Foerster
- Apical margin of clypeus without a median tooth; areolet present or absent, if present receiving second recurrent vein apicad of the middle..... 2
2. Areolet present..... 3
- Areolet absent..... 4
3. Clypeus very broad, its apical margin broadly truncate; temple about as long as eye, strongly swollen; ovipositor not longer than apical depth of abdomen; lower tooth of mandible usually longer than upper tooth ..... *Olesicampe* Foerster
- Clypeus narrow, its apical margin convex; temple shorter than eye, longer and swollen; ovipositor extending well beyond the apex of abdomen; lower tooth of mandible shorter than upper tooth ..... *Diadegma* Foerster (in part)
4. Areola confluent with petiolar area and separated from first lateral area, not separated from petiolar area by either a carina or a strong constriction ..... *Diadegma* Foerster
- Areola distinctly separated from petiolar area, either by a carina or by a strong constriction; areola usually longer than wide. (Ovipositor distinctly surpassing tip of abdomen; scutellum moderately convex)..... *Eriborus* Foerster

#### 33. Genus *Campoletis* Foerster

1869. *Campoletis* Foerster, *Verh. Naturh. Ver. Rheinlande*, **25** : 157.

Type-species : *Msoleptus tibiator* Cresson.

#### 96. *Campoletis chlorideae* Uchida

1957. *Campoletis chlorideae* Uchida. *Mushi*, **30** : 29. M, F. des. Type : F, Japan : Okayama (Sapporo). China : Manchuria : Kaiyuan. Japan : Chiba; Hiroshima; Kagoshima.

1974. *Campoletis chlorideae* Gupta. *oriental Ins.*, 8 : 112. M, F. syn., des. India : Widely distributed in Himachal Pradesh; Uttar Pradesh; Haryana; Delhi; Bihar; Madhya Pradesh; Andhra Pradesh; West Bengal; Sikkim; Assam; Meghalaya; Maharashtra; Rajasthan; Gujarat; Tamil Nadu; Karnataka; Nepal.

**Diagnostic characters** : Face 0.8x as long as wide; face and clypeus granulose; malar space equal to the basal width of mandible; frons and vertex granulose; interocellar distance 2.0x the ocello-ocular distance; mesopleurum finely granulose with a few minute punctures; prepectal carina arcuate in profile; metapleurum and propodeum granulose, propodeal carinae strong, areola elongate, pentagonal, petiolar area shallow. Nervulus distad; nervellus intercepted at its lower 0.2; postpetiole and second abdominal tergite granulose; thyridium distinct separated from base of second tergite by 1.25 to 1.33x its diameters. Ovipositor long, upcurved.

Body black, variously marked, its hind leg with coxa black, trochanter dark brown, femur yellowish-brown, tibia with a band, tarsus largely blackish.

**Material examined** : India : West Bengal (Haora District), Bandel, 1 Female, 9.iii.1964 (Gupta).

**Distribution** : India : West Bengal : Haora District. Assam, Bihar, Delhi, Haryana, Maharashtra, Meghalaya, Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Uttar Pradesh. Elsewhere : Nepal, China, Taiwan, Japan.

**Remarks** : This species is widely distributed in India.

**Host** : *Heliothis armigera*, *H. assulta*, *Phthorimaea operculella*.

#### 34. Genus *Diadegma* Foerster

1869. *Diadegma* Foerster, *Verh. Naturh. Ver. Rheinlande*, 25 : 153.

Type species : *Campoplex crassicornis* Gravenhorst.

#### 97. *Diadegma varuna* Gupta

1974. *Diadegma varuna* Gupta. *Oriental Ins.*, 8 : 105. M, F. des. Type : F, India : West Bengal : Kalimpong (Gupta). India : Himachal Pradesh : Dalhousie Hills : Ahla, 2268 m. Phalak (1970) published an account of the biology of this species.

**Diagnostic characters** : Face granulose; clypeus apically smooth, malar space 0.5x the basal width of mandible; propodeal carinae strong and areola pentagonal; petiolar area wide, trans-rugose; metapleurum shiny, sparsely punctate. Areolet petiolate, second recurrent vein partly unpigmented. Hind tibia spinose, tarsal claws pectinate. Petiole with a small depression in the centre, second tergite rugulose, following tergites mat. Ovipositor long, upcurved, longer than the abdomen.

Mandible, palpi, tegula, yellow; fore and middle coxae and trochanters yellowish-white; hind coxa black, trochanters yellow; all femora reddish-brown; all tibiae yellowish except hind one blackish; hind tarsus black with 0.75 of basal segment and 0.5 of second segment yellow; abdomen black, at sides reddish-yellow.

**Material examined** : Nil.

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh.

**Host** : *Plutella xylostella*.

35. Genus *Olesicampe* Foerster1869. *Olesicampe* Foerster, *Ver. Naturh. Ver. Rheinlande*, 25 : 153.Type-species : *Ichneumon longipes* Mueller.98. *Olesicampe flavicornis* (Thomson)1887. *Olesicampe flavicornis* Thomson. *Opuscula Entomologica*, 11 : 1143. M, F. des. Types : M, F, Sweden : Palsjo in Skane (Lund ?).1961. *Olesicampe flavicornis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 243. n. comb. Europe. India.

**Diagnostic characters** : The following description is based on a account given by Morley (1913) : a black species with silvery pubescence, and the legs and abdomen mainly red. Thorax with a whitish callosity before the tegulae; pronotum not striolate; areola hexagonal and twice as long as broad; basal area elongate; spiracle circular; glymmal sulci distinct and rising from the base of the petiole; hind coxa and femur black, tibia and tarsal segments apically blackish. Wings hyaline, stigma yellowish. Body 6-7 mm.

**Material examined** : Nil. (Morely reported one female from Darjiling. x.1908, coll. E. Brunetti, in Z.S.I. Calcutta).

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh. Elsewhere : Europe.

36. Genus *Eriborus* Foerster1869. *Eriborus* Foerster, *Ver. Naturh. Ver. Rheinlande*, 25 : 153.Type-species : *Campoplex perfidus* Gravenhorst.Key to the Species of *Eriborus*

1. Legs mainly deep yellow; hind coxa, trochanters, femora at base broadly, apices of tibiae and tarsi wholly, black.....*mandibularis* (Cameron)
- Fore and middle legs mainly reddish; hind leg black, its femur at apex, tibia broadly in the middle, dull red .....*perfidus* Gravenhorst

99. *Eriborus ? mandibularis* (Cameron)1903. *Bosmina mandibularis* Cameron. *Ztschr. System. Hymen. Dipt.*, 3 : 338. M. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : M, India : West Bengal : Darjiling (London). (The lectotype is labeled "Simla".)1961. *Eriborus ? mandibularis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 245. n. comb. India.

**Material examined** : Nil.

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh.

**Remarks** : Morley (1913) reported this species from Simla in Himachal Pradesh and Darjiling in West Bengal. The species can be recognised by the characters given in the key.

100. *Erioborus perfidus* (Gravenhorst)

1829. *Campoplex perfidus* Gravenhorst. *Ichneumonologia Europaea*, 3 : 595. F. des. Type : F. Europe : Barterodae (Lost).

1913. *Erioborus (!) perfidus* : Morley. *Fauna of British India*, Hymenoptera, 3 : 469. F. des. India : West Bengal : Darjiling.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Darjiling District), Elsewhere : Europe, Taiwan.

*Remarks* : Morely (1913) reported one female of this species from Darjiling in West Bengal.

## 5. Subfamily CREMASTINAE

## Key to the Genera of CREMASTINAE

1. Second tergite with a distinct pair of thyridia near the base; hind femur usually with a tooth beneath; tip of ovipositor sinuate ..... *Pristomerus* Curtis
- Second tergite without a pair of thyridia; hind femur without a tooth beneath; tip of ovipositor straight, or sometimes sinuate. (ventral margins of first tergite bowed inward near the middle, where they touch or almost touch, the margin of the tergite fused with the sternite) .....  
..... *Temelucha* Foerster

37. Genus *Pristomerus* Curtis

1836. *Pristomerus* Curtis, *British Entomology*, 13 : 624.

Type-species : *Ichneumon vulnerator* Panzer.

101. *Pristomerus marginicollis* (Cameron)

1907. *Pristomeridia marginicollis* Cameron. *Tijdschr. v. Ent.*, 50 : 110. F. des. Type : F, India : Sikkim (London).

1970. *Pristomerus marginicollis* : Rao. *Marathwada Univ. J. Sci.*, 9 : 94. F. India : Maharashtra : Aurangabad.

*Diagnostic characters* : This black species has various yellow spots on the body. Head with inner orbits narrowly, clypeus, scape and two basal antennal segments, pronotum with a line, yellow. Abdomen reddish, with the two basal segments apically and ventrally and the basal half of the first, yellowish. Legs yellowish, with hind coxae, except apically, black; hind femur reddish, tibia and tarsus darker in shade. Body largely punctate, 6-9mm.

*Material examined* : Nil.

*Distribution* : India : West Bengal (Calcutta), Assam, Maharashtra, Meghalaya, Sikkim, Uttar Pradesh. Elsewhere : Burma, Sri Lanka.

*Remarks* : Morley (1913) reported this species from West Bengal.

38. Genus *Temelucha* Foerster

1869. *Temelucha* Foerster. *Verh. Naturh. Ver. Rheinlande*, 25 : 148.

Type-species : (*Porizon macer* Cresson) = *facilis* Cresson.

102. *Temelucha stangli* (Ashmead)

1904. *Leptopygus stangli* Ashmead. *J. N. Y. Ent. Soc.*, 12 : 18. F. des. Type : F, Phillippines : Luzon : Bacoor (Washington).

1984. *Temelucha stangli* : He. *Acta Agri. Univ. Zhejiangensis*, 10 : 96. M, F. biol. China : Hubei : Jingmen; Guangdong : Ding'an; Yaxian; Yunnan : Kunming.

*Material examined* : Nil.

*Distribution* : India : West Bengal. Elsewhere : Thailand, China, Malaysia, Philippines.

*Remarks* : Very little is known about this species. Momoi (1968) reported this species from West Bengal.

*Host* : *Scirpophaga incertulas*.

## 6. Subfamily OPHIONINAE

## Key to the Genera of OPHIONINAE

1. Posterior transverse carina of mesosternum complete or very rarely slightly obliterated on mid-ventral line. (Gaster with second tergite slender to moderately slender, compressed and with thyridia separated from anterior margin by at least 1.4x their own length; female usually with ovipositor very short, rarely with 0.5 as long as gaster; mandible tapered, slightly to conspicuously twisted) ..... *Enicospilus* Stephens
- Posterior transverse carina of mesosternum broadly incomplete, represented laterally by vestiges ..... 2
2. Fore tibial spur with a membranous flange behind the macrotrachial comb, the flange extending at least 0.7 the length of the comb. (fore wing with  $Rs = 2r$  proximally almost straight, usually either narrow or only weakly broadened before joining pterostigma)... *Ophion* Fabricius
- Fore tibial spur either without a membranous flange, or with a minute flange extending, at most, 0.3 the length of macrotrachial comb. (antennae short and stout, not longer than fore wing; gaster stout, second tergite less than 2.5x as long as deep posteriorly).....  
..... *Euryophion* Cameron

39. Genus *Ophion* Fabricius

1798. *Ophion* Fabricius. *Entomologia Systematica ... descriptionibus*, (Suppl.) : 152.

Type-species : *Ichneumon luteus* Linnaeus.

Key to the Species of *Ophion*

1. Forewing with  $Rs+2r$  emitted distad to the middle of pterostigma; anterior corner of discosubmarginal cell extensively glabrous;  $Rs+2r$  weakly arcuate. (Hing wing with marginal cell narrowly glabrous, close to  $Rs$ ; mesoscutum uniformly orange-brown).....  
..... *nepus* Gauld & Mitchell
- Forewing with  $Rs+2r$  emitted proximal to middle of pterostigma; anterior corner of discosubmarginal cell usually narrowly glabrous;  $Rs+2r$  often more or less straight..... 2

2. Occipital carina absent on upper part of head, or represented by discontinuous vestigial ridge or mid-dorsally incomplete. (Ovipositor sheath of female usually broad; lower face subquadrate, 0.9-1.0x as broad as long; anterior transverse carina of propodeum incomplete) .....  
 .....*fuscumaculatus* (Cameron)
- Occipital carina complete on upper part of head..... 3
3. Hind wing with *R1* bearing 10-14 hamuli, the distal 6 of which are usually very slender. (Segment 2 of labial palp stouter, less than 1.5x as long as broad; pterostigma orange to reddish-brown; head in dorsal view with genae of moderate length, often slightly inflated .....  
 .....*bicarinatus* Cameron
- Hind wing with *R1* bearing 6-9 hamuli, the distal ones of which are not exceptionally slender. (Middle and hind legs of female with fifth tarsal segment submedially not broadened, 3.0x as long as broad, ventrally flat and with out specialized hairs).....*mastrus* Gauld & Mitchell

### 103. *Ophion bicarinatus* Cameron

1905. *Ophion bicarinatus* Cameron. *Spolia Zeylanica*, y 3 : 120. F. des. Lectotype (designated by Gauld & Mitchell, 1981) : F, Sri Lanka : Maskeliya (London).
1928. *Ophion castaneus* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, 21 : 208. F. key, des. Lectotype : F (designated by Gauld & Mitchell, 1981), Taiwan : Meiyuan (= Baibara) (Sapporo). Taiwan : Puli (= Horisha); Kiuhabon. Syn. by Gauld & Mitchell, 1981.
1981. *Ophion bicarinatus* Gauld & Mitchell. *Taxonomy, distribution Ophioninae*, p. 37. M, F. lectotype design., key, syn., des., fig. Burma : Mt. Victoria. China : Tibet, Gautsa, Yatung. India : Several localities in Arunachal Pradesh; Bihar; Himachal Pradesh; Kashmir; Sikkim; Tamil Nadu; Uttar Pradesh; West Bengal. Malaysia, Nepal, Phillipines, Sri Lanka, Taiwan.

*Material examined* : India : West Bengal : Darjiling District : Ghoombhanjang, 1 Female, v.1975, J.K. Jonathan. Lepchajagat, 2 Female, 1 Male, vii.1975, J.K. Jonathan.

*Distribution* : India : West Bengal (Darjiling District), Arunachal Pradesh, Bihar, Himachal Pradesh, Kashmir, Sikkim, Tamil Nadu, Uttar Pradesh. Elsewhere : Sri Lanka, Nepal, Burma, china, Malaysia, Taiwan, Phillipines.

*Remarks* : This species can be recognised by the characters given in the key. Gauld & Mitchell (1981) gave a detailed description of this species.

### 104. *Ophion fuscumaculatus* Cameron

1899. *Ophion fuscumaculatus* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 43 (3) : 99. (F). key, des. Type : F, India : Meghalaya : Khasi Hills (Oxford).
1928. *Ophion orientalis* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, 21 : 208. M, F. key, des., fig. Lectotype : F (designated by Townes, Momoi & Townes, 1965 : 320), Japan; Sakhalin : Ichinosawa (Sapporo). Japan : Hokkaido. Korea : Mt. Keum-kang, Suk-wang-sa. Sakhalin : Furumaki. Syn. by Gauld, 1979.
1981. *Ophion fuscumaculatus* : Gauld & Mitchell. *Taxonomy Distribution ... Ophioninae*, p. 33. M. F. key, syn., des., fig. India : Meghalaya : Khasi Hills. Himachal Pradesh : Dalhousie Hills : Khajjiar, 1828 m.; Upper Bakrota. Sikkim : Lachen, 2700 m. West Bengal : Darjiling Dist. : Sukhia Pokhri. Uttar Pradesh. Nepal, Taiwan.

**Material examined** : India : West Bengal : Darjiling District : Sukhia Pokhri, 1 Female, v.1971, J.K. Jonathan.

**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Uttar Pradesh. Elsewhere : Japan, Korea, Nepal, Taiwan.

**Remarks** : This species is mainly recognised by the absence of occipital carinal on head; ovipositor sheath broad; anterior transverse carina of propodeum incomplete. Gauld and Mitchell (1981) gave a detailed description of this species.

#### 105. *Ophion mastrus* Gauld

1981. *Ophion mastrus* Gauld & Mitchell. *Taxonomy, distribution Ophioninae*, p. 40. M, F. key, des., fig. Type : F, Burma : Adung Valley, 4000 m. (London). China : Tibet : Gyantse, 4200 m.; Tsangpo Valley : Nyimala, 4600 m.; Yatung, 3300 m.; Zayul, 1935 m.: Yunnan : Pei-ma-shan. India : Himachal Pradesh : Simla Hills : Koti, 2400 m.; Nichar, 2500 m. Sikkim : Chumroma Phokri, 2950 m.; Lachen, 2700 m.; Yunathang, 3500 m. Uttar Pradesh : Garhwal Dist. : Bampa; Malari. West Bengal : Naya Bazar. Nepal.

**Material examined** : India : West Bengal : Naya Bazar, 1 Female, 1x.1959, B.K. Tikader

**Distribution** : India : West Bengal, Himachal Pradesh, Uttar Pradesh. Elsewhere : Burma, China, Nepal, Tibet.

**Remarks** : Gauld & Mitchell (1981) described this species in detail. This species is recognised by having occipital carina complete, middle and hind legs of female with fifth tarsal segment not broadened and without specialized hairs.

#### 106. *Ophion nepus* Gauld & Mitchell

1981. *Ophion nepus* Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 30. M, F. key, des., fig. Type : F, India : "Himalaya" (London). India : Uttar Pradesh : Garhwal Dist. : Kholara. West Bengal : Darjiling Dist. : Ghoombhanjang, 2300 m. Nepal.

**Material examined** : India : West Bengal : Darjiling District : Ghoombhanjang, 2300m, 1 Female, v.1975, J.K. Jonathan.

**Distribution** : India : West Bengal (Darjiling District), Uttar Pradesh. Elsewhere : Nepal.

**Remarks** : The main distinguishing characters of this is that *Rs-2r* vein in forewing emitted distad to the middle of pterostigma; mesoscutum orange-brown (Gauld and Mitchell, 1981).

### 40. Genus *Euryophion* Cameron

1906. *Euryophion* Cameron. *Ann. S. African Mus.*, 5 : 83.

Type-species : *Euryophion nigripennis* Cameron.

#### 107. *Euryophion vexatious* Gauld & Mitchell

1981. *Euryophion vexatious* Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 61. F. des., fig. Type : F, India : Assam : Doom Dooma (Washington). India : West Bengal : Jalpaiguri.

**Diagnostic characters** : This species is distinguished by having maxillary palps 5-segmented, labial palp 4-segmented, labrum triangular, clypeus 2x as broad as long; occipital carina complete; scutellum convex, punctate.

Fore wing 14-17 mm, AI = 0.5 to 0.55; CI = 0.25-0.3; ICI = 0.9-0.95; DI = 0.52-0.63; *Cu-a* subopposite *Rs + M*; 1m-cu evenly curved; *Rs + 2r* sinuous; 5-6 hamuli on R1.

Fore tibia with numerous long slender spines; gaster stout, second tergite in profile about 1.5x as long as deep; colour in general orange-brown.

*Material examined* : No material was available for study.

*Distribution* : India : West Bengal (Jalpaiguri), Assam.

41. Genus *Enicospilus* Stephens

1835. *Enicospilus* Stephens. *Illustrations of British Entomology*, 7 : 126.

Type-species : (*Ophion merdarius* Gravehorst sensu Stephens) = *Ichneumon ramidulus* Linnaeus.

Key to the Species of *Enicospilus*

1. Fenestra without sclerites. (Lateral longitudinal carina of scutellum present only on anterior 0.8 or more) ..... 2
- Fenestra with one or more distinct sclerites, or in a few species with a rather poorly defined sclerite on the periphery of fenestra..... 3
2. Fore wing with AI = 0.82 or less; *Rs=2r* straight to rather weakly sinuate. (Metapleurum less swollen; lower face broad, more than 0.6x as broad as long; fore wing with CI = 0.4-0.5; 2nd discal cell 2.5-3.0x as long as deep) .....*biharensis* Townes et al.
- Fore wing with AI = 0.85 or more; *Rs=2r* straight to strongly sinuate. (Lower face elongate; fore wing with CI less than 0.77).....*erythrocerus* (Cameron)
3. Fore wing with SDI = 0.07 or less; CI = 0.5 or less; hind tarsal claws simple with the distal pectina not projecting; central sclerites present, sometimes weak. (Gaster exceptionally long and slender with tergite 4 in profile more than 2.5x as long as deep).....*gasteralis* Nikam
- Fore wing with SDI = 1.08 or more..... 4
4. *Rs + 2r* with a weak, central, anteriorly directed angulation so that anterior margin of vein has a small promontary centrally; proximal and distal sclerites weak, confluent; central sclerites weakly pigmented, linear, sub-parallel with *Rs + 2r*.....*grammospilus* (Enderlein)
- *Rs + 2r* without a central anteriorly directed angulation; alar sclerites various..... 5
5. Central sclerite entirely absent. (Fore wing with *Cu-a* proximal to *Rs + M* by 0.2 to 0.3x its own length; *Rs + 2r* straight) .....*dasychirae* Cameron
- Central sclerite present, usually strongly pigmented, D-shaped, separated from proximal sclerite by less than 2.0x its maximum diameter and separated from *Rs + 2r* by equal to or less than its own minimum diameter.....*laqueatus* (Enderlein)

108. *Enicospilus biharensis* Townes, Townes & Gupta

1913. *Henicospilus horsfieldi* var. *glabratus* Morley. *Fauna of British India*, Hymenoptera, 3 : 395. (F). Name preocc. in *Enicospilus* by Say, 1836. des. Type : F, India : Bihar : Chapra (London).
1961. *Enicospilus biharensis* Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 271. new name for *horsfieldi* var. *glabratus* India.
1971. *Enicospilus (Bicorniata) bicornis* Rao & Nikam. *Marathwada Univ. J. Sci.*, 10 (3) : 177. F. des., fig. Type : F, India : Maharashtra : Parbhani (Nikam). Syn. by Nikam, 1980.
1981. *Enicospilus biharensis* : Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 289. M, F. key, syn., des., fig. India : Maharashtra : Aurangabad; Parbhani. Burma : Mt. Popa. China : Sichuan; Kuanshien; Suifu, 500 m. India : Andhra Pradesh : Patancheru. Kashmir : Sopore. Karnataka : Dharwar. Tamil Nadu : Anamalai Hills : Cinchona, 1100 m.; Coimbatore; Nilgiri Hills. Uttar Pradesh : Agra : Forest Nursery; Muradnagar. Garhwal Hills : Srinagar, West Bengal : Darjiling, Rangpo. Indonesia, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand.

*Material examined* : India : West Bengal : Darjiling District, Rangpo, 1 Female, v.1974, J.K. Jonathan.

*Distribution* : India : West Bengal (Darjiling District), Andhra Pradesh, Karnataka, Kashmir, Maharashtra, Tamil Nadu, Uttar Pradesh. Elsewhere : Pakistan, Nepal, Thailand, Sri Lanka, Malaysia, Indonesia, Singapore, Philippines, Rhykyus.

*Remarks* : Gould & Mitchell (1981) gave a detailed description of this species.

*Host* : *Laelia subrosea*, *Psalis* sp.

109. *Enicospilus dasychirae* Cameron.

1905. *Enicospilus (!) dasychirae* Cameron. *Spolia Zeylanica*, 3 : 123. F. key, des. Type : F, Sri Lanka : Pundaluoya (London).
1905. *Enicospilus (!) horsfieldi* Cameron. *Spolia Zeylanica*, 3 : 124. F. key, des. Type : F, Sri Lanka : (Peradeniya) (London). Syn. by Townes, Townes & Gupta.
1906. *Henicospilus borneensis* Szepliget. *Ann. Mus. Natl. Hungarici*, 4 : 138. F. des. Type : F, Borneo (Budapest). Syn. by Townes, Townes & Gupta, 1961
1937. *Enicospilus nigrimarginalis* Cushman. *Arb. uber Morph. u. Taxonom. Ent.*, 4 : 311. M. des., fig. Type : m, Taiwan : Talin (= Taihorin) (Eberswalde). Taiwan : Taipei. Syn. by Townes, Townes & Gupta, 1961.
1981. *Enicospilus dasychirae* Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 340. M, F. key, des., fig. Sri Lanka : Pundaluoya; Peradeniya. "Borneo" Taiwan : Talin (= Taihorin). Brunei : Ulu Temburong, 350' China : Fujian; Chyuanchow; Kwangtung; Canton. India : Bihar : Namkum. Karnataka : Bangalore; Kalamassery; Kanara; Mandya. Sikkim. Tamil Nadu; Anamalai Hills : Cinchona. West Bengal; Darjiling *Distribution*. : Bijanbari. Indonesia, Malaysia, Sarawak, Malaya, Papua New Guinea, Philippines, Ryukyus, Sri Lanka, Taiwan.

*Material examined* : India : West Bengal : Darjiling District : Bijanbari, 1 Female, J.K. Jonathan.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Karnataka, Himachal Pradesh, Sikkim, Uttar Pradesh. Elsewhere : Sri Lanka, Taiwan, Rhykyus, China, Indonesia, Philippines.

*Remarks* : Gauld and Michell (1981) gave a detailed description of this species.

*Host* : *Callitaera horsfielde*, *Dasychira mendosa*, *Pralis pennatule*.

110. *Enicospilus erythrocerus* (Cameron)

1905. *Pleuroneurophion erythrocerus* Cameron. *Spolia Zeylanica*, 3 : 121. F. des. Type : F, Sri Lanka : Peradeniya (London).
1928. *Allocamptus orientalis* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, 21 : 230. M, F. Name preocc. in *Enicospilus* by Morley, 1913. des., fig. Lectotype (designated by Gauld & Mitchell, 1981) : F, Taiwan : Meiyuan (= Baibara) (Sapporo). Taiwan : Pingtung. Ryukyus : Okinawa. Syn. by Townes, Townes & Gupta, 1961.
1955. *Enicospilus hirayamai* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, 50 : 120. new name for *orientalis* Uchida.
1981. *Enicospilus erythrocerus* : Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 175. M, F. key, syn., des., fig. Widely distributed in the Orient. Recorded from Burma, China. India : Karnataka : Mangalore. Tamil Nadu : Cinchona; Anamalai Hills. Singapore, Indonesia, Malaysia, Philippines, Sri Lanka, Taiwan.

*Material examined* : India : West Bengal : Darjiling District : Reeyond, 1 Male, 20.iii.1973, H.S. Sharma & party.

*Distribution* : India : West Bengal (Darjiling District), Delhi, Gujarat, Karnataka, Uttar Pradesh. Elsewhere : Sri Lanka, Indonesia, Malaysia, Philippines, Taiwan, China, Burma.

*Remarks* : This species differs from all other species of *Enicospilus* in having distal sclerite fusiform, *Im-cu* medially thickened and strongly convex.

111. *Enicospilus gasteralis* Nikam

1980. *Enicospilus gasteralis* Nikam. *Oriental Ins.*, 14 : 188. F. key, des. Type : F, India : West Bengal : Darjiling district : Bijanbari (Calcutta).
- 1981 *Enicospilus gasteralis* : Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 205. F. key, des., fig. India : West Bengal.

*Material examined* : India : West Bengal : Darjiling Dist. : Bijanbari, 1 Female, v.1974, J.K. Jonathan.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This is a very unusual species characterized by the exceptionally long gaster and very large mandibles.

112. *Enicospilus grammospilus* Enderlein

1921. *Dicamptus grammospilus* Enderlein. *Stettiner Ent. Ztg.*, 82 : 17. M. des. Type : M, Indonesia : Sumatra : Sukaranda (Warsaw).
1954. *Enicospilus zeugos* Chiu. *Bull. Taiwan Agri. Res. Inst.*, 13 : 64. F. key, des., fig. Type : F, Taiwan; Wulai (= Urai) (Wufeng). Syn. by Gauld & Mitchell, 1981.
1981. *Enicospilus grammospilus* : Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 316. M, F. key, syn., des., fig. Taiwan : Urai. Brunei : Ulu Temburong : Bk. Retak, 1600 m. India : Uttar Pradesh : West Bengal : Darjiling. Indonesia, Malaysia, Philippines, Vietnam, Taiwan.

*Material examined* : India : West Bengal : Darjiling, 1 Male, iv.1971, Braumin.

*Distribution* : India : West Bengal (Darjiling District), Uttar Pradesh. Elsewhere : Indonesia, Malaysia, Philippines, Vietnam, Taiwan.

*Remarks* : The shape of the alar sclerites and form of *Rs* + *2r* characterize this species.

113. *Enicospilus laqueatus* (Enderlein)

1921. *Henicospilus laqueatus* : Enderlein. *Stettiner Ent. Ztg.*, **82** : 26. M. des. Type : M, Taiwan : Pienan (= Pilam) (Warsaw). (Type M, not F., cf. Gauld & Mitchell, 1981).
1954. *Enicospilus leetoni* Chiu. *Bull. Taiwan Agri. Res. Inst.*, **13** : 38. M, F. key, des., fig. Type : F, Taiwan : Taipei (= Taihoku) (Wufeng). Taiwan : Henchun. Syn. by Gauld & Mitchell, 1981.
1981. *Enicospilus laqueatus* Gauld & Mitchell. *Taxonomy, distribution ... Ophioninae*, p. 396. M, F. key, syn., des., fig. India. Localities in Bihar; Sikkim; Himachal Pradesh; Kerala; Orissa; Karnataka; Tamil Nadu; Uttar Pradesh; West Bengal. Maldiv Is., Nepal, Philippines, Sri Lanka, Taiwan.

*Material examined* : India : West Bengal : Shanpur, 1 Male, ii.1976, Biswas.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Delhi, Himachal Pradesh, Kerala, Karnataka, Orissa, Tamil Nadu, Uttar Pradesh. Elsewhere : Sri Lanka, Philippines, Taiwan, Nepal, Maldiv Is.

*Remarks* : This species is particularly distinct on account of its very strong, large central sclerite.

## 7. Subfamily MESOCHORINAE

42. Genus *Mesochorus* Gravenhorst

1829. *Mesochorus* Gravenhorst. *Ichneumonologia Europea*, **3** : 960.  
Type-species : *Mesochorus splendidulus* Gravenhorst.

114. *Mesochorus ? claristigmaticus* Morley

1913. *Mesochorus claristigmaticus* Morley. *Fauna of British India*, Hymenoptera, **3** : 519. F. key, des. Type : F, India : West Bengal : Darjiling (Calcutta). India : Uttar Pradesh : Deoban. Host : oak-feeding Lasiocampid moth.

*Diagnostic characters* : Body black with various yellow markings. Head reddish-brown, ocellar area black; mesoscutum deep yellow in the middle, at side infuscate; propleurum and mesopleurum blackish; metapleurum blackish; propodeum red; scutellum deep yellow; abdomen reddish-brown, at sides draker; legs in general deep yellow.

Mesoscutum finely punctate, sternaulus distinct; areola hexagonal, 2x as long as broad, propodeal spiracle circular. Abdomen nitidulous, its first tergite aciculated at apex; abdomen from 3rd tergite onwards compressed. Areolet in fore wing broader than high, subpetiolate, nervellus not intercepted. Body length about 4.0 mm.

*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling, ix.1908, E. Brunetti.

*Distribution* : India : West Bengal (Darjiling District), Uttar Pradesh.

*Remarks* : This is the only species of subfamily Mesochorinae known from West Bengal.

## 8. Subfamily METOPINAE

## Key to the Genera of METOPINAE

1. Face occupied by a flat or concave escutcheon-shaped area bounded by a carina; middle tibia with one spur ..... *Metopius* Panzer

- Face entirely convex; middle tibia with two spurs..... 2
- 2. Antennal sockets separated by a high lamella, the lamella with a deep median groove dorsally, just below median ocellus. (First abdominal segment broad basally, its spiracle near basal 0.25) ..... *Triclistus* Foerster
- Antennal sockets not separated by a lamella, or when a lamella is present, it does not have a median groove ..... 3
- 3. Back of head sloping from posterior ocelli to occipital carina, thence approximately vertical to the foramen magnum; spurs of middle tibia very much unequal in length, the front spur short ... ..... *Exochus* Gravenhorst
- Back of head not sloping, evenly arched; spurs of middle tibia subequal in length ..... *Macromalon* Townes

43. Genus *Metopius* Panzer

Subgenus *Metopius (Ceratopius)* Clement

1927. *Ceratopius* Clement. In Schmiedeknecht : *Opuscula Ichneumonologia*, 5 : 3461, 3466.

Type-species : *Metopius dissectorius* Panzer

Key to the Species of *Metopius (Ceratopius)*

- 1. Wing only apically infumate ..... *purpureotinctus* (Cameron)
- Wing entirely or at least in front all along its length infumate ..... 2
- 2. Wings wholly infumate ..... *flavobalteatus* (Cameron)
- Wings only along the anterior (costal) margin infumate ..... *dissessorius lar* Morley

115. *Metopius (Ceratopius) dissectorius lar* Morley

1912. *Metopius lar* Morley. *Revision of the Ichneumonidae in the British Museum*, 1 : 81. M, F. key, des., Type : F, India : Sikkim : Gangtok (London).

1961. *Metopius (Ceratopius) dissectorius* Kusigemati. *Kontyu*, 53 : 398. M. des. Nepal : Kuinibisona. (= *dissessorius lar* Morley).

*Material examined* : No material was available for study.

*Distribution* : India : West Bengal. Elsewhere : Nepal.

*Remarks* : This is moderately a large species, 17 mm in length. Body in general black with legs and apices of abdominal segments red. Wing along the costa infumate. Mandible bidentate.

116. *Metopius (Ceratopius) flavobalteatus* (Cameron)

1903. *Cultrarius flavo-balteatus* Cameron. *Ztschr. system. Hymen. Dipt.*, 3 : 342. "M" = F. des. Type : F, India : West Bengal : Darjiling (London).

1961. *Metopius (Ceratopius) flavobalteatus* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 301. n. comb. India.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : Morely (1913) redescribed this species based on a male from Darjiling. No material of this species was available for study from West Bengal. This is a black species; abdomen having violaceous and yellow bands. Wings infusate.

117. *Metopius (Ceratopius) purpureotinctus* (Cameron)

1907. *Cultrarius purpureotinctus* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **19** : 176. M. key, des. Type : M, India : West Bengal : Darjiling : Takvar, 4000 ft. (London).

1961. *Metopius (Ceratopius) purpureotinctus* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 302. n. comb. India.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : The male of this species was redescribed by Morley (1913) in his "Fauna of British India" This is a black species, its head with yellow markings and wings apically infumate. Lateral margin of first and fourth abdominal segments, apices of second and third segments reddish. Apical segments with short black hairs.

44. Genus *Triclistus* Foerster

1969. *Triclistus* Foerster, *Verh. Naturh. Ver. Rheinlande*, **25** : 161.

Type-species : *Exochus podagricus* Gravenhorst.

118. *Triclistus aikini* (Cameron)

1897. *Exochus aikini* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **41** (4) : 31. M. des. Type : M, India : Bengal (Oxford).

1902. *Exochus curvicarinatus* Cameron. *J. Bombay Nat. Hist. Soc.*, **14** : 431. F. des. Type : F, India : Maharashtra : Deesa (London). Syn. by Townes, Townes & Gupta, 1961.

1913. *Triclistus aitkeni* (!) : Morley. *Fauna of British India*, Hymenoptera, **3** : 302. M. key, des., fig. India : Bengal.

*Diagnostic characters* : This is a black species, its legs, except the hind coxae and tarsi, yellowish. Head covered with short black hairs. Propodeal areola slightly longer than broad. First abdominal segment basally depressed, the depression margined, and the margin continue as short keels. Areolet minute elongately petiolate. Body 7 mm.

*Material examined* : No material of this species was available for study from West Bengal.

*Distribution* : India : West Bengal, Maharashtra. Elsewhere : China, Japan, Micronesia, Philippines, Rhykyus, Taiwan.

45. Genus *Macromalon* Townes

1959. *Macromalon* Townes, *Bull. U.S. Natl. Mus.*, **216** (1) : 158.

Type-species : *Macromalon montanum* Townes.

119. *Macromalon orientale* Kerrich

1968. *Macromalon orientale* Kerrich. *oriental Ins.*, **1** (1957) : 194. M, F. des., fig. Type : F, India : Meghalaya : Upper Shillong (London). India : West Bengal : Kalimpong, Darjiling Botanical Garden. Sikkim : Gangtok.

**Diagnostic characters** : Palpi more or less pale testaceous. Tegulae dull ivory, with dark markings. Fore and middle legs largely yellowish; the coxae, trochanters and femora pale near apices, tibia dark brown with white band at base, tarsi largely infusate. Abdominal tergites 2-5 brownish at apex.

**Distribution** : India : West Bengal (Darjiling District), Meghalaya, Sikkim.

**Host** : *Plutella xylostella*.

#### 46. Genus *Exochus* Gravenhorst

1829. *Exochus* Gravenhorst. *Ichneumonologia Europaea*, 3 : 328.

Type-species : *Ichneumon gravipes* Gravenhorst.

#### 120. *Exochus flavicaput* Morley

1913. *Exochus flavicaput* Morley. *Fauna of British India*, Hymenoptera, 3 : 297. M. key, des. Type : M, India : West Bengal : Darjiling, 6000 ft. (Calcutta).

**Diagnostic characters** : This is a black species with head in front, mesoscutum broadly, scutellum and legs bright yellow, except hind coxa black. Thorax without reddish markings. Propodeum with its baso-lateral area punctate, all the area entire with the areola apically strong, both the lateral carinae present and the petiolar area discrete.

**Material examined** : India : West Bengal : Darjiling District, Darjiling, 1 Male (type), ix.1908, E. Brunetti.

**Distribution** : India : West Bengal (Darjiling District).

### 9. Subfamily ANOMALONINAE

#### 47. Genus *Anomalon* Panzer

1804. *Anomalon* Panzer. *Fauna Insectorum Germaniae*, Heft 94 : pl 15.

Type-species : (*Anomalon cruentatus* Panzer) = *foliator* Fabricius.

#### 121. *Anomalon foliator* (Fabricius)

1798. *Ophion foliator* Fabricius. *Supplementum Entomologiae Systematicae*, p. 239. F. des. Type : F, Germany, : Halle, Saxony (Kiel on deposit in Copenhagen).

1872. *Nototrachys foliator* : Marshall. *A Catalogue of British Hymenoptera*; Chrysididae, Ichneumonidae, Braconidae, p. 50. n. comb.

1906. *Nototrachys rufo-orbitalis* Cameron. *J. Bombay Nat. Hist. Soc.*, 17 : 276. F. des. Type : M, India : Maharashtra : Deesa (London). Syn. by Morley, 1912.

1907. *Nototrachys flavo-orbitalis* Cameron. *J. Bombay Nat. Hist. Soc.*, 17 : 590. M. des. Type : M, India : Maharashtra : Deesa (London). syn. by Morley, 1912.

1913. *Nototrachys foliator* : Morley. *Fauna of British India*, Hymenoptera, 3 : 397. M, F. key, syn., des., fig. India : Himachal Pradesh, Bihar, West Bengal : Calcutta. Madhya Pradesh, Maharashtra, Burma, Sri Lanka.

1955. *Anomalon foliator* : Mani, Singh & Baijal. *Agra Univ. J. Res. (Sci.)*, 4 : 501. n. comb.

**Diagnostic characters** : This is a reddish-black species. Frons and vertex minutely punctate, former with trans-aciculi and distinctly carinate medially; face and clypeus punctate; mesoscutum strongly rugulose; propodeum and mesopleurum entirely reticulate, basal carina strong, areola hexagonal. Abdomen mat; wings hyaline. Legs largely reddish-brown, hind tibia black. Body 10-14 mm.

**Distribution** : India : West Bengal (Calcutta), Bihar, Himachal Pradesh, Madhya Pradesh, Maharashtra. Elsewhere : Burma, Eurasia, Pakistan, Sri Lanka.

**Remarks** : Morely (1913) reported this species from Calcutta in West Bengal. No material of this species was available from West Bengal.

#### 10. Subfamily GRAVENHORSTINAE

##### 48. Genus *Perisphincter* Townes

1961. *Perisphincter* Townes. *Mem. Amer. Ent. Inst.*, 1 : 471.

Type-species : *Agrypon tisiphone* Morley.

##### 122. *Perisphincter tisiphone* (Morley)

1913. *Agrypon tisiphone* Morley. *Revision of the Ichneumonidae in the British Museum*, 2 : 92. F. key, des. Type : F, Sri Lanka : Kandy (London). India : West Bengal : Calcutta.

1961 *Perisphincter tisiphone* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 319. n. comb. Sri Lanka.

**Diagnostic characters** : Body in general black; inner orbits above and apex of clypeus transversely, yellow. Thorax with red or yellow markings. Abdominal third to fifth tergites yellow. Fore and middle legs pale; hind leg black with only the femoral apices darker. Frons with a weak carina in the middle, without horn. Propodeum rugulose with white hairs. Wings with first recurrent emitted before the centre of the first cubital cell; second recurrent emitted beyond the submarginal vein; nervellus strong, straight and not intercepted. Body about 12 mm.

**Distribution** : India : West Bengal (Calcutta). Elsewhere : Sri Lanka.

**Remarks** : Morely (1913) reported one female from Calcutta in West Bengal, in Z.S.I. collection. No material, however, was available for study. This is the only species of subfamily Gravenhorstinae known from West Bengal.

#### 11. Subfamily DIPLAZONTINAE

##### Key to the Genera of DIPLAZONTINAE

1. Second and third tergites with a post-median transverse groove; notaulus present; areolet absent; propodeum with strong carinae.....*Diplazon* Nees
- Second and third tergites without a transverse groove..... 2
2. Face polished; spiracle of third abdominal segment (and often also the second abdominal segment) in the epipleurum; areolet absent..... *Promethes* Foerster
- Face mat; spiracle of third abdominal segment (and of second) in the tergite..... 3
3. Apical about 0.75 of clypeus impressed, only a narrow basal semicircular area not impressed; apical edge of upper tooth of mandible concave; propodeum with strong carinae; areolet absent ..  
.....*Tymmophorus* Schmiedeknecht
- Apical about 0.4 of clypeus impressed; apical edge of upper tooth of mandible obliquely truncate or weakly concave; propodeum smooth; areolet present.....*Syrphoctonus* Foerster

49. Genus *Diplazon* Viereck

1914. *Diplazon* Viereck. *Bull. U.S. Natl. Mus.*, **83** : 46.

Type-spécies : *Ichneumon laetatorius* Fabricius.

123. *Diplazon guptai* Diller

1977. *Diplazon guptai* Diller. *Mitt. Munchen Ent. Gesell.*, **66** : 25. M, F. key, des., fig. Type : F, India : Himachal Pradesh : Dalhousie (Gupta). India : Himachal Pradesh : Dalhousie Hills : Dhenkund, 9000 ft.; Kalatop, 8000 ft.; Simla Hills : Simla, 7000 ft. West Bengal : Darjiling, Rangiroon, 6250 ft. Sikkim : Gangtok.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Sikkim.

*Remarks* : This species is only known by its type in Gupta collection.

50. Genus *Promethes* Foerster

1869. *Promethes* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 162.

Type-species : *Bassus sulcator* Gravenhorst.

124. *Promethes sulcator* (Gravenhorst)

1829. *Bassus sulcator* Gravenhorst. *Ichneumonologia Europaea*, **3** : 320. M, F. des. Types : M, F, From several localities in Central Europe (Lost).

1913. *Promethes sulcator* : Morley. *Fauna of British India*, Hymenoptera, **3** : 287. M, F. key, des., fig., biol. India : West Bengal : Darjiling.

*Diagnostic characters* : Head as broad as thorax and triangular; frons smooth; thorax largely smooth; notauli present. Basal segment of abdomen aciculate, twice as long as broad. Legs slender.

Face and clypeus yellow. Thorax black. Abdominal segments third, fourth, and apex of second red. Legs yellowish with all the trochanters and the anterior coxae dark brown or (in male) yellow. Body 4-6 mm.

*Distribution* : India : West Bengal (Darjiling District), Kashmir. Elsewhere : Holarctic Region.

*Remarks* : Morley (1913) reported this species from Darjiling in West Bengal.

51. Genus *Tymmophorus* Schmiedeknecht

1913. *Tymmophorus* Schmiedeknecht. *Opuscula Ichneumonologia*, **34** : 2714.

Type-species : (*Tymmophorus lacustris* Schmiedeknecht) = *Bassus rufiventris* Gravenhorst.

125. *Tymmophorus cinctus* (Gravenhorst)

1829. *Bassus cinctus* Gravenhorst. *Ichneumonologia Europaea*, **3** : 327. M. des. Type : M, Germany : near Reinerz & Warmbrunn (lost).

1913. *Homocidus cinctus* : Morley. *Fauna of British India*, Hymenoptera, **3** : 283. M, f. key, des., biol. India : West Bengal : Darjiling, 6000 ft.

1961. *Tymmophorus cinctus* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 330. n. comb. Europe. India.

*Diagnostic characters* : This is a black species with punctate body. Head as broad as thorax; frons impressed; areola distinctly delineated, subquadrate; metascutum rugulose; basal segment of abdomen

subquadrate. Body black with face, clypeus, scape, scutellum and post-scutellum yellow to deep yellow. Legs in general red, with hind tarsus and apex of tibia blackish. Body 3.5-6 mm.

*Material examined* : Nil (Morely, 1913, reported a female from West Bengal : Darjiling, ix.1908, E. Brunetti in Z.S.I. collection).

*Distribution* : India : West Bengal (Darjiling District), Elsewhere : Europe.

## 52. Genus *Syrphoctonus* Foerster

1869. *Syrphoctonus* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 162.

Type-species : *Bassus biguttatus* Gravenhorst.

### 126. *Syrphoctonus dimidiatus* (Schrank)

1802. *Ichneumon dimidiatus* Schrank. *Fauna Boica*, **2** : 293. F. des. Type : F, Germany : Ingolstadt. Upper Bavaria (Lost).

1958. *Syrphoctonus dimidiatus* : Narayanan & Lal. *Proc. Indian Acad. Sci. (Sec. B)*, **48** : 280. n. comb.

*Diagnostic characters* : Head broader than the thorax; malar space wider than the basal width of mandible; thorax subpolished, finely punctate. Abdomen sparsely punctate, first segment short, propodeum between the transverse carinae striolate. Legs stout; areolet sessile; nervellus intercepted far below its middle.

Body black, marked with white; face white; antennae, thorax and abdomen largely black. Legs red with anterior pair with black markings. Hind tibia with a median white band. Wings hyaline.

*Distribution* : India : West Bengal (Darjiling District), Elsewhere : Europe.

*Remarks* : Morley (1913) reported one female from Darjiling, ix.1909, E. Brunetti, in National Z.S.I. collection.

## 12. Subfamily PHYGADEUONTINAE

### Key to the Genera of PHYGADEUONTINAE

1. Propodeum very short, its areola about 3.0x as wide as long.....*Dichrogaster* Doumère
- Propodeum long, its areola 1.0x to 1.5x as wide as long.....*Charitopes* Foerster

## 53. Genus *Dichrogaster* Doumère

1855. *Dichrogaster* Doumère. *Ann. Soc. Ent. France* (3) **3** : (Bull.) p. LXXXVIII.

Type-species : *Microgaster perlae* Doumère.

### 127. *Dichrogaster pallens* Townes

1983. *Dichrogaster pallens* Townes. *Mem. Amer. Ent. Inst.*, **35** : 103. M, F. key, des. Type : F, India : West Bengal : Darjiling Hills : Rangiroon, 6250 ft. (Gupta). India : West Bengal : Darjiling.

*Diagnostic characters* : Second flagellar segment 2.3x as long as wide in male, 4.2x as long as wide in female. Mesoscutum and scutellum strongly mat, its lateral carina extending 0.6 at its base.

Propodeum polished, punctures small and shallow, areola separated from basal area by a weak carina. Postpetiole with weak longitudinal wrinkles and shallow sparse punctures.

Head of female light brown, ocellar area and occiput blackish; flagellum blackish, at base brownish. Thorax largely black, except scutellum light yellow. Legs light brown. Wings hyaline. First tergite black, second to seventh light brown, a postmedian brown band on second tergite in female.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : Townes (1983) described this species based on a male and female. The types are in Gupta collection. No material was available for study.

#### 54. Genus *Charitopes* Foerster

1869. *Charitopes* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 181.

Type-species : (*Hemitalis chrysopae* Brischke) = *gastricus* Holmgren.

#### Key to the Species of *Charitopes*

1. Postpetiole mat, sometimes also with fine weak longitudinal striae, but the dominant sculpture mat. Mesopleurum mostly polished.....*densus* Townes
- Postpetiole longitudinally striate or wrinkled, sometimes also more or less mat but striae or longitudinal wrinkles dominating the sculpture. Mesopleurum transversely wrinkled.....*rugatus* Townes

#### 128. *Charitopes densus* Townes

1983. *Charitopes densus* Townes. *Mem. Amer. Ent. Inst.*, **35** : 65. M, F. key, des. Type; M, India : Himachal Pradesh : Kalpa Valley : Nichar. (Gupta). India : Himachal Pradesh : Ahla, Dalhousie, Manali, Narkanda; Kashmir : Batalik; Uttar Pradesh : Harsil; Mussoorie; West Bengal : Jore Bungalow, Ghoom; Meghalaya : Shillong.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Kashmir, Meghalaya, Uttar Pradesh.

*Remarks* : Townes (1983) described this species in detail on a collection mainly from northern India. No material of this species was available for study.

#### 129. *Charitopes rugatus* Townes

1983. *Charitopes rugatus* Townes. *Mem. Amer. Ent. Inst.*, **35** : 67. M, F. key, des. Type : M, Himachal Pradesh : Kulu Valley : Manali, 1828 m. (Gupta). India : Himachal Pradesh : Dalhousie Hills : Ahla, Dalhousie, Simla Hills : Narkanda, Kulu Valley, Uttar Pradesh, Bhyundar, Bharon Ghati, Dehra Dun, West Bengal : Rangiroon; Darjiling. Nepal.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh. Elsewhere : Nepal.

*Remarks* : Townes (1983) provided a detailed description of this species. Species is widely distributed in Northern India and Nepal.

## 13. Subfamily HEMIGASTERINAE

## Key to the Genera of HEMIGASTERINAE

- 1 Upper value of ovipositor tip with strong oblique or transverse teeth. Propodeum very short, its median apical area 0.65 to 0.75 as long as the areola plus median basal area. Propodeal spiracle elongate..... 2
- Upper value of ovipositor tip smooth, or rarely with minute or faint ripple-like teeth along its dorsal edge. Propodeum usually longer, with its median apical area usually less than 0.65 as long as areola plus median basal area. Propodeal spiracle circular to elongate ..... 3
2. Tergites 2 and 3 fused together to form a carapace-like structure. Second intercubitus lacking.....  
.....*Hemigaster* Brulle
- Tergites 2 and 3 not fused. Second intercubital vein present.....*Mansa* Tosquinet
3. Lower tooth of mandible distinctly longer than upper tooth. (Intercubiti subparallel).....  
.....*Aconias* Cameron
- Lower tooth of mandible of the same length as upper tooth or a little shorter. (Propodeal spiracle about 3x as long as wide).....*Polytribax* Foerster

55. Genus *Mansa* Tosquinet

1896. *Mansa* Tosquinet. *Mem. Soc. Ent. Belgique*, 5 : 209.

Type-species : *Mansa sigularis* Tosquinet.

130. *Mansa fulvipennis* (Cameron)

1902. *Colganta fulvipennis* Cameron. *Entomologist*, 35 : 22. F. des. in key. Type : F, India : Meghalaya : Khasi Hills (London).

1961. *Mansa fulvipennis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 134. India.

*Diagnostic characters* : This species is chiefly recognized by its yellow-orange colour of the body. Hind tarsus slightly annulated with black. Wings hyaline with yellowish tinge. Antenna deep yellow at base. scutellum narrowed at apex with gradual slope. Areolet narrowed below, intercubiti oblique. Body 12 mm; Ovipositor 4 mm long.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 1 Male, 1 Female, v.1912, Mus. Collection (mis. det. as *Mansa veda* (Cameron)).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh.

56. Genus *Hemigaster* Brulle

1846. *Hemigaster* Brulle. In Lepeletier : *Hist. Naturelle des. Insectes. Hymenopteres*, 4 : 266.

Type-species : *Hemigaster fasciata* Brulle.

131. *Hemigaster fulvipes* (Cameron)

1899. *Chreusa fulvipes* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, **43** (3) : 210. f. des. Type : F, India : Meghalaya : Khasi Hills (Oxford).
1903. *Charmis limbatus* Tosquinet. *Mem. Soc. Ent. Belgique*, **10** : 274. F. des. Type : F, Indonesia : Java : Mt. Gede (Brussels). Syn. by Townes, Townes & Gupta, 1961.
1913. *Cryptodema anormis* Morley. *Fauna of British India, Hymenoptera*, **3** : 313. M. des. fig. Type : M, India : West Bengal : Buxar Duar (London). Syn. in Townes, Townes & Gupta, 1961.
1961. *Hemigaster fulvipes* : Townes, & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 133. India, Java.

*Diagnostic characters* : A black species with reddish-brown markings and white pilosity. Head very broad and transverse. densely punctate; frons with a median carina; mandibles stout; antennae pilose, 30-segmented. Thorax : mesoscutum with distinct notauli; propodial areola confluent with both basal and petiolar areae, apophysis long; spiracle small, linear; scutellum coarsely punctate and dull. Abdomen evenly punctate; its sides and base of first segment, and apices of first three tergites reddish-brown. Legs slender, reddish-brown in general.

*Distribution* : India : West Bengal (Buxar Duar), Meghalaya. Elsewhere : Indonesia.

*Remarks* : No specimen of this species was available for study. Above account is as given by Morley (1913).

57. Genus *Polytribax* Foerster

1868. *Polytribax* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 183.  
Type-species : *Phyadeuon (Polytribax) pallescens* Viereck.

132. *Polytribax luteus* (Cameron)

1903. *Steriphocryptus luteus* Cameron. *Entomologist*, **36** : 234. F. des. Type : F, India : West Bengal : Darjiling (London).
1961. *Polytribax luteus* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 37. n. comb. India.

*Diagnostic characters* : Face, frons and clypeus closely punctate. Frons with a furrow in the middle. Notauli on mesoscutum distinct. Propodeum strongly punctate, basal carina interrupted in the middle. Abdomen smooth and shiny.

Body luteous. Mesoscutum at sides, propodeum at base and apex, base of mesopleurum and metapleurum, all the abdominal segments, black.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species was described by Cameron (1903), but no specimen was collected from West Bengal during the mopping surveys.

58. Genus *Aconias* Cameron

1904. *Aconias* Cameron, *Ztschr. System. Hymen. Dipt.*, **4** : 345.  
Type-species : *Aconias spinitarsis* Cameron.

133. *Aconias spinitarsis* Cameron

1904. *Aconias spinitarsis* Cameron. *Ztschr. System. Hymen. Dipt.*, **4** : 346. F. des. Type : F, India : West Bengal : Darjiling (London).
1961. *Plectocryptus spinitarsis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 37. n. comb. India.

*Diagnostic characters* : Face and basal half of clypeus closely punctate, apex of clypeus weakly trans-striate. Thorax in general sparsely punctate; propodeum shiny, irregularly striated in the middle; metapleurum irregularly striate in the middle, juxta coxal carina present. Abdomen smooth and shiny. Legs covered with pale pubescence, tibia and tarsi spinose.

Body in general black. Antennae with a broad band; apical 0.66 of the second and the following segments red. Legs reddish, the coxae and trochanters and greater part of four front femora black.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : No material of this species was available for study.

#### 14. Subfamily MESOSTENINAE

##### Key to the Tribes of MESOSTENINAE

1. Spiracle of first tergite at or close to the midlength, not behind apical 0.4 of the tergite. Tip of the lower valve of ovipositor with a dorsal lobe that partly encloses tip of upper valve. Fourth segment of female front tarsus not, or weakly, bilobed. First tergite without median dorsal carinae; lower tooth of mandible usually longer than upper tooth.....**Gabuniini**
- Spiracle of first tergite at, or behind apical 0.47 of the tergite, or the other characters not entirely as above ..... 2
2. Apical 0.7 of mediella weakly to strongly arched. (Areolet rectangular or somewhat trapezoidal, usually much wider than high, sometimes its outer side open; or rarely the areolet represented only by the very short first intercubitus which is approximately interstitial with second recurrent vein).....**Ceratocryptinini**
- Apical 0.6 of the mediella approximately straight..... 3
3. Areolet usually about 1.5x as wide as high, or areolet sometimes lacking and first intercubitus almost opposite second recurrent vein and almost obliterated by approximation of radius and cubitus. First tergite without median dorsal carinae or with traces of them. Notaulus reaching to behind center of mesoscutum. Thyridium nearly always wider than long .....**Mesostenini**
- Areolet less than 1.4x as wide as high. First tergite usually with at least a trace of the median dorsal carinae. Thyridium usually longer than wide ..... 4
4. Front side of hind coxa with a basal short horizontal groove. Mesopleural impression that is just below speculum in the form of a short horizontal groove.....**Ischnini**
- Front side of hind coxa without a basal short horizontal groove. Mesopleural impression that is just below speculum in the form of a pit, that may or may not be connected with mesopleural suture by a short horizontal groove..... **Goryphini**

##### Tribe GABUNIINI

##### Key to the Genera of Tribe GABUNIINI

1. Base of first tergite without a lateral triangular tooth, but in some females with a small rounded lateral flange. Nervulus opposite basal vein, or basad of basal vein by less than 0.3 its length.

(Areolet large; first tergite with a complete dorsolateral carina; juxta coxal carina complete).....  
 .....*Apocryptus* Uchida

— Base of first tergite with a lateral triangular tooth, the tooth pointed and acute or subacute in females, blunt and often indistinct in males. Nervulus basad of basal vein by at least 0.3 its length. (Arolet not higher than wide; propodeum moderately long. Teeth on ovipositor tip not unusually close).....*Xoridesopus* Cameron

59. Genus *Apocryptus* Uchida

1932. *Apocryptus* Uchida, *J. Fac. Agri. Hokkaido Imp. Univ.*, **33** : 170.

Type-species : *Apocryptus issiki* Uchida.

Key to the Species of *Apocryptus*

1. Propodeum wholly smooth and shiny. Thorax smooth or finely mat. Face and clypeus always yellow..... 2
- Propodeum with punctures basally or striate centrally, never wholly smooth or shiny. Thorax granulate to mat ..... 4
2. Fourth to sixth abdominal tergites completely black. Malar space, lower half of temple, mandible and clypeus at apex, black. Teeth on ovipositor tip in two distinct groups.....  
 .....*biserratus* Gupta & Gupta
- Fourth to sixth abdominal tergites either with usual yellow bands, or faintly narrowly banded (bands distinct laterally). Malar space yellow. Teeth on ovipositor tip in one group (except in *erugatus*)..... 3
3. Teeth on ovipositor tip in one group. Brachiella and discoidella of hind wing blackish pigmented. Nervellus intercepted at its lower 0.4.....*pilosus* Gupta & Gupta
- Teeth on ovipositor tip in two groups. Brachiella and discoidella of hind wing not pigmented, light yellow. Nervellus intercepted at its lower 0.2 ..... *erugatus* Gupta & Gupta
4. Propodeum laterally between apical and basal transverse carinae strongly rugose. Metapleurum finely striate. Mesopleurum strongly striate next to speculum. Dorso-lateral carina of first tergite distinct and complete. Hind leg largely black .....*flavofacies* Gupta & Gupta
- Propodeum laterally between the two transverse carinae punctate or smooth. Basal area of propodeum with punctures ..... 5
5. Frons smooth and shiny. Antennal scrobes shallow and shiny, with fine striations. Mesopleurum next to speculum without striations. Speculum flat, with scattered punctures. Middle groove of pronotum not striate, coarsely punctate. Dorsolateral carina of first tergite weak and incomplete. Mesosternum brown.....*terebratus* Gupta & Gupta
- Frons punctate, punctures minute or tending to be granulate. Antennal scrobes a little shallow, dull, without striations. Speculum moderately convex and smooth, middle groove of propodeum

distinctly striate. Dorso-lateral carina of first tergite complete and distinct. Mesosternum black. Teeth on ovipositor tip in one group. Upper margin of pronotum broadly yellow.....  
 .....*flavorbitalis flavorbitalis* Gupta & Gupta

134. *Apocryptus biserratus* Gupta & Gupta

1983. *Apocryptus biserratus* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 27. M, F. key, des., fig. Type : F, India : Meghalaya : Khasi Hills : Shillong, Botanical Garden, 1465 m. (Gupta). India : West Bengal : Darjiling. Sikkim : Gangtok, 1675 m.

*Material examined* : India : West Bengal : Darjiling District : Darjiling Botanical Garden, 1980m, 1 Female, 5.v.1966, D. R. No. T231 (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim.

*Remarks* : This species is distinguished by having the fourth to sixth abdominal tergites wholly black. The malar space 0.9 the basal width of mandible, prepectal carina extended up to the base of subtegular ridge; the teeth on ovipositor in two groups.

135. *Apocryptus erugatus* Gupta & Gupta

1983. *Apocryptus erugatus* Gupta & Gupta. *Oriental Ins. Mongor.*, **10** : 31. M, F, key, des., fig. Type : F, India : West Bengal : Darjiling Hills : Rangiroon, 1910 m (Gupta).

*Material examined* : Indian : West Bengal : Darjiling District : Rangiroon, 1910m, 1 Female, 26.v.1966, V.K. Gupta, No. 188. Darjiling Botanical Gardens, 4 Females 5-8.v.1966, J.K. Jonathan, M.K. Kamath, D. Ram (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Uttar Pradesh.

*Remarks* : This species is recognised by having two set of teeth on ovipositor; nervellus intercepted near its lower 0.2 and abdominal tergites 3 to 6 with faint brownish bands. The epomia is complete.

136. *Apocryptus flavofacies* Gupta & Gupta

1983. *Apocryptus flavofacies* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 40. F. key, des. Type : F, India : West Bengal : Darjiling Hills : Rangiroon, 1910 m. (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1910m, 1 Female (type), 25.v.1966. V.K. Gupta, No. 105 (Gupta).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species can be recognised by having its propodeum trans-rugose laterally between the basal and apical transverse carinae, metapleurum finely striate, and hind leg largely dark brown to blackish.

137. *Apocryptus flavorbitalis flavorbitalis* Gupta & Gupta

1983. *Apocryptus flavorbitalis flavorbitalis* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 48. M, F. key, des., fig. Type : F, India : West Bengal : Darjiling Hills : Rangiroon, 1910 m (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1910m, 4 Females, 25-27.v.1966, J.K. Jonathan, No. J157 (Gupta).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This subspecies is recognised by having malar space brownish-yellow, more or less of some colour as the face. Mesopleurum with broad yellow mark. Propodeum with a W-shaped yellow mark.

### 138. *Apocryptus pilosus* Gupta & Gupta

1983. *Apocryptus pilosus* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 30. M, F. key, des., fig. Type : F. India : West Bengal : Darjiling Hills : Rangiroon, 1910 m. (Gupta). India : West Bengal : Darjiling, Botanical Garden, 1900 m.

*Material examined* : India : West Bengal : Darjiling District : Darjiling Botanical Garden, 1900 m, 3 Females, 4-5.v.1966, M.K. Kamath, J.K. Jonathan, Nos. K 101, J 146 (Gupta).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species is close to *A. erugatus* in having black upper margin of pronotum; and malar space, temple, mandible, clypeus and apices of all the abdominal tergites yellow. It is distinguished by having face closely punctate, teeth in ovipositor in one group.

### 139. *Apocryptus terebratus* Gupta & Gupta

1983 *Apocryptus terebratus* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 44. F. key, des. Type : F. India : West Bengal : Darjiling Hills : Rangiroon, 1910 m. (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1910m, 1 Female, 26.v.1966, M.K. Kamath, No. K 117 (Gupta).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species is distinct in having the frons and antennal scrobes shallow and shiny, with fine striations, speculum flat, coarsely punctate, apical carina of propodeum complete.

## 60. Genus *Xoridesopus* Cameron

1907. *Xoridesopus* Cameron, *J. Straits Branch Roy. Asiatic Soc.* **48** : 18.

Type-species : *Xoridesopus annulicornis* Cameron.

### Key to the species of *Xoridesopus*

- 1 Lateral carina of scutellum marked yellow. Scutellum triangular, densely punctate, punctures running into striations, clypeus with a post-median transverse ridge. Face in the middle and along the eye margin yellow; Pronotum along the upper margin and speculum wholly, yellow..  
.....*flavispeculum* Gupta & Gupta
- Lateral carina of scutellum black. Scutellum roundish and arched, shallowly punctate, punctures not running into striations. Clypeus without a post-median transverse ridge. Face wholly yellow; upper margin of pronotum and speculum, black .....*orientalis* Gupta & Gupta

### 140. *Xoridesopus flavispeculum* Gupta & Gupta

1983. *Xoridesopus flavispeculum* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 94. F. key, des., fig. Type : F. India : West Bengal : Darjiling, 1980 m. (Gupta). India : West Bengal : Darjiling

Botanical Gardens, 1980 m.; Rangiroon, 1910 m. Meghalaya : Cherrapunji. Sikkim : Gangtok. Uttar Pradesh : Garhwal Hills : Phata, 1500 m.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 1980 m, 1 Female, 4.v.1966, J.K. Jonathan, No. J 145. Rangiroon, 1910m, 1 Female, 26.v.1966, J.K. Jonathan, No. J 158.

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim, Uttar Pradesh.

*Remarks* : This species can be distinguished by the characters given in the key.

#### 141. *Xoridesopus orientalis* Gupta & Gupta

1983. *Xoridesopus orientalis* Gupta & Gupta. *Oriental Ins. Monogr.*, **10** : 114. M, F. key, des., fig. Type : F, India : Uttar Pradesh : Garjia (Gupta). India : West Bengal : Tista-Kalimpong route. Assam : Rangapara, Charduar Forest. Meghalaya : Khasi Hills : Burnihat; Shillong Botanical Garden, 4800 ft. Kerala : Walayar Forest : Watapara. Karnataka : Mysore : Santaverry; Ammathiam, 945 m. Tamil Nadu : Shevaroy Hills : Yercaud, 1370 m. Burma, Philippines.

*Distribution* : India : West Bengal (Darjiling District), Assam, Karnataka, Kerala, Meghalaya, Tamil Nadu, Uttar Pradesh. Elsewhere : Burma, Philippines.

*Remarks* : This species can easily be recognised by the characters given in the key. Gupta & Gupta (1983) described this species in detail. No material of this species was available for study.

### Tribe ISCHNINI

#### 61. Genus *Buathra* Cameron

1903. *Buathra* Cameron. *Trans. Ent. Soc. London.* 1903 : 233.

Type-species : *Buathra rufiventris* Cameron.

#### Key to the Species of *Buathra*

- 1 Fore and middle femora with a black line along its lower margin; fore tarsus with its 3-5 segments blackish; hind tarsal segments 2-4 yellowish-white. Face with small dense punctures; apical carina of propodeum evenly arched in the middle.....*excavata* (Cameron)
- Fore and middle femora without a black line along its lower margin; fore and hind tarsus entirely reddish. Face with coarse dense punctures. Apical carina of propodeum straight in the middle.....*luculenta* (Cameron)

#### 142. *Buathra excavata* (Cameron)

1905. *Cryptus excavatus* Cameron. *Entomologist*, **38** : 84. F. des. Type : F, India : Himachal Pradesh Simla (London).

1970. *Buathra excavatus* : Townes. *Mem. Amer. Ent. Inst.*, **12** : 193. n. comb.

*Material examined* : India : West Bengal : Darjiling District : Darjiling, 8 Males, 27-29.iv.1974, 1 Male, 21.v.1966, Colls. M.L. Gupta, S. Biswas. Darjiling Botanical Garden, 5 Females, 1 Male, 4-8.v.1966, Colls. J.K. Jonathan, V.K. Gupta, T. Chand. Rangiroon, 1 Female, 25.v.1966. M.K.

Kamath. Darjiling 2 Females, 6.v.1966, D. Ram. Sanchal, 4 Females, 6.v.1966, V.K. Gupta. Leborg Cant., 2 Males, 24-28.v.1976, S. Biswas & L.K. Sharma.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh. Elsewhere : Sri Lanka.

*Remarks* : This species is close to *B. luculenta* (Cameron) but can be distinguished by the characters given in the key.

143. *Buathra luculenta* (Cameron)

1905. *Cryptus luculentus* Cameron. *Entomologist*, **38** : 85. F. des. Type : F, India : Himachal Pradesh (London).

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Kashmir, Uttar Pradesh.

*Remarks* : No material of this species was available from the state of West Bengal, though the specimens were collected from Himachal Pradesh, Uttar Pradesh and Kashmir. The placement of this species under *Buathra* is doubtful as its axillus vein is slanted away from the wing margin. It may belong to genus *Meringopus* Foerster.

Tribe MESOSTENINI

Key to the Genera of Tribe MESOSTENINI

1. Apical margin of clypeus without median tooth or tubercle; areolet about 3x as wide as high.....*Gotra* Cameron  
 .....*Gotra* Cameron  
 — Apical margin of clypeus with a median tooth-like extension; areolet very small.....  
 .....*Anupama* Jonathan

62. Genus *Gotra* Cameron

1902. *Gotra* Cameron. *Ann. & mag. Nat. Hist.*, (7) **9** : 206.

Type-species : *Gotra longicornis* Cameron.

144. *Gotra marginata* (Brulle)

1846. *Mesostenus marginatus* Brulle. In Lepeletier : *Histoire Naturelle des Insectes*. Hymenopteres, **4** : 224. F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : Bengal (Paris). Philippines.

1897. *Mesostenus himalayensis* Cameron. *Mem. & Proc. Manchester Lit. Phil Soc.*, **41** (4) : 18. M. des. Type : M, India : "Himalayas" (London). syn. by Townes, Townes & Gupta, 1961.

1904. *Mesostenoides octozonatus* Ashmead. *Proc. U. S. Natl. Mus.*, **28** : 143. F. des. Type : F, Philippines : Luzon : Manila (Washington). Syn. by Townes, Townes & Gupta, 1961.

1904. *Mesostenus clarinervis* Cameron. *Trans. Ent. Soc. London*, 1904 : 115. F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : Meghalaya : Khasi Hills (Oxford). Syn. by Townes, Townes & Gupta, 1961.

1916. *Stenaraeus rufipes* Szepliget. *Ann. Mus. Natl. Hungarici*, **14** : 325. (F). key, des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Taiwan : Puli (= Horisha) (Budapest). Taiwan : Sunmoon Lake (= Jihyueh Lake). Syn. by Townes, Townes & Gupta, 1961.

1936. *Gotra marginata* : Cheesman. *Nova Guinea*, **17** : 365. n. comb.

*Diagnostic characters* : Head subpolished; face closely punctate; frons weakly striolated; mesoscutum closely punctate; scutellum impunctate. Propodeum coarsely striated; metapleurum above closely reticulate, lower area strongly obliquely striated. Abdomen largely subpolished, 2-3 tergites closely punctate.

Body black with various markings. Face, mandible at base, inner and outer orbits, white. A broad line on the basal half of the pronotum, base of tegula, a mark on middle lobe of mesoscutum, scutellar carinae, apical half of scutellum, postscutellum, an oblique mark on the base of mesopleurum, a crescent-shaped mark on mesosternum, a small mark on metapleurum above and a large mark in the middle; propodeum with 3 characteristic spots in a triangle, apices of all the abdominal tergites, yellow. Legs reddish, four front coxae white, tips of tarsi black; hind tarsi with 2-5 segments infuscate. Wings clear hyaline.

*Material examined* : India : West Bengal : Calcutta, Zoo-garden, 1 Female, 31.iv.1960, S. Ali. Darjiling Dist. : Goke, F.R.H., 2 Females, 16, 17.iv.1973, H.S. Sharma; Singla, 19 Females, 10.17.iv.1973, H.S. Sharma and 2 Females, iv.191, Lord Charmichael; Takdah, 2 Females, 26.ii.1973, H.S. Sharma, Reyong, 1 Female, 26.ii.1973, H.S. Sharma; Rangpo, 4 Females, 26.ii. to 19.iv.1973, H.S. Sharma; Andharikhola, 1 Female, 6.iv.1973, H.S. Sharma; Pashok, 1 Female, 3.vi.1930. S.L. Hora.

*Distribution* : India : West Bengal (Calcutta and Darjiling Districts), Assam, Bihar, Delhi, Kerala, Maharashtra, Tamil Nadu, Rajasthan, Sikkim, Uttar Pradesh. Elsewhere : China, Hong Kong, Taiwan, Philippines.

*Remarks* : This species has three characteristic yellow spots in a triangle on propodeum; species is widespread in India.

### 63. Genus *Anupama* Jonathan

1981 *Anupama* Jonathan. *oriental Ins.* **15** (3) 281.

Type-species : *Anupama himalayensis* Jonathan.

#### 145. *Anupama himalayensis* Jonathan

1982. *Anupama himalayensis* Jonathan. *oriental Ins.*, **15** : 283 (1981). M, F. des., fig. Type : F, India : Sikkim : Gangtok, 1650 m. (Gupta). India : West Bengal : Darjiling Hills : Rangiroon, 2000 m. Nepal : Kathmandu Valley : Godavari, 1500 m. Burma.

*Diagnostic characters* : Face weakly rugoso-punctate in the middle, rugulose at sides; clypeus with scattered shallow punctures; malar space 0.75x the basal width of mandible; frons with a few oblique wrinkles; pronotum along its posterior margin finely and in its scrobes coarsely striated; mesoscutum closely punctate; mesopleurum rugoso-punctate; propodeum in the middle reticulo-wrinkled, at base punctate; abdomen largely mat and subpolished.

Body black. Flagellar segments 6-11 yellowish-white above; face in the middle and eye along the margin, pronotal collar, upper margin of pronotum, oval spot on mesoscutum, tegula at base, subtegular ridge, broad mark on mesopleurum, scutellum and its lateral carinae, metascutellum, metapleurum with an oval spot, horse-shoe-shaped mark on propodeum, hind coxa above, apices of all the abdominal tergites, yellow.

*Material examined* : India : West Bengal : Darjiling Dist. : Rangiroon, 11 Females, 25-27.v.1966, J.K. Jonathan, M.K. Kamath, V.K. Gupta, T. Chand, D. Ram, Nos. 185, 189, 192, J 157, J 159, K 116, K 119.

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Burma, Nepal.

Tribe GORYPHINI

Key to the Genera of Tribe GORYPHINI

1. First abdominal segment without longitudinal carinae or ridges, its spiracle near the apical 0.47. Propodeum about 1.2 as long as wide, the portion behind basal carina polished or subpolished and usually covered with regular transverse wrinkles. Apical carina of propodeum absent or blunt and very close to apex. Areolet of moderate size, and about 1.4 as wide as high,..... *Friona* Cameron
- First abdominal segment either with longitudinal carinae or ridges and/or its spiracle behind the apical 0.45. Propodeum usually less than 1.0 as long as wide, the portion behind basal carina usually mat and/or punctate, if wrinkled the wrinkling irregular. Areolet usually less than 1.4 as wide as high ..... 2
2. Epomia absent, weak, or moderately strong, when present divergent abruptly from swollen front margin of pronotal collar, this swelling continued dorsad of juncture with epomia in essentially undiminished strength, the hind margin of the swelling carinate or with a distinct ridge. Scutellum often with lateral carina on its basal 0.4 or more. (Nervellus intercepted near its 0.37, strongly reclivous).....*Menaforia* Seyrig
- Epomia weak to strong, divergent gradually from swollen front margin of pronotal collar, the submarginal swelling absent or abruptly weaker dorsad of its juncture with epomia. Scutellum without lateral carina, or with lateral carina on its basal 0.35 or less ..... 3
3. 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 horns. Brachiella present or absent.. ..... 4
- Frons without a semicircular carina above each antennal socket..... 7
4. Epomia and sternaulus absent or almost indistinct; prepectal carina short, extending as much as 0.5 the height of mesopleurum; first abdominal tergite short and stout, about 2x as long as wide at apex, postpetiole as long 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 3x as long as wide at apex, postpetiole longer than wide or wider than long; nervulus and nervellus positions various; brachiella present or absent; ovipositor moderately short to long, tip straight or sometimes curved ..... 5

5. First abdominal segment short and thick in shape, about 2 to 2.5x as long as wide at apex, petiole short, quadrate, its spiracle close to the apex than to each other; thorax short, stout 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 3x as long as wide at apex, petiole long, usually tubular, its spiracle 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
6. First abdominal tergite less than 2x as long as wide 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..... *Goryphus* Holmgren
- First abdominal tergite 2x 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..... *Skeatia* Cameron

#### 64. Genus *Menaforia* Seyrig

1952. *Menaforia* Seyrig. *Mem. Acad. Malgache*, **39** : 205.

Type-species : *Menaforia rufa* Seyrig.

#### 146. *Menaforia indica* Gupta & Saxena

1979. *Menaforia indica* Gupta & Saxena. *oriental Ins.*, **13** : 240. M, F. key, des., fig. Type : F, India Bihar : Ranchi Dist. : Namkum (Gupta). India : Andhra Pradesh : Nagaram; Pakhal. Assam : Rangapara : Baragarh; Bilaspur; Raigarh; Ratanpur. Maharashtra : Deolali; Ghoti. Orissa : Puri Dist. : Gop; Nimpara; Pipli; Sakhi Gopal; Delang. Uttar Pradesh : Agra; Dehra Dun : New Forest. West Bengal : Bankura; Bishnupur; Murshidabad; Nadia : Shyampur; Sibpur, Howrah; Sundarban; Suryaderia. Tamil Nadu : Karikal.

1979. *Menaforia nigrominiata* Gupta & Saxena. *Oriental Ins.*, **13** : 237. F. key, des. Type : F, India : Bihar : Ranchi Dist. : Namkum. (Gupta).

*Diagnostic characters* : Face as long as wide, granulose to rugulose; malar space 0.75x the basal width of mandible; interocellar distance 0.5x the ocello-ocular distance; temple ruguloso-punctate; antenna 36-segmented; scutellum finely punctate; pronotum striate in the middle; meso- and metapleurum ruguloso-punctate; propodeum rugulose with a few striations apically. Wings cloudy at tip, areolet pentagonal, receiving second recurrent vein a little below the middle. first tergite narrow and long, second and third tergites closely punctate apically; hind basitarsus 0.5x of hind tibia.

*Material examined* : India : West Bengal : Bankura, 13 Females, 25, 28.ii.1976, S. Biswas. Bishnupur, 3 Females, 27.ii.1976, S. Biswas. Murshidabad, 1 Female, 21.ii.1976, S. Biswas. Nadia, 1 Female, 20.ii.1976, S. Biswas. Haora : Sibpur, 9 Females, 1.iii.1976, S. Biswas. Sunderban, 2 Males, 36 Females, 13.ii.1976, S. Biswas (Gupta).

*Distribution* : India : West Bengal (Bankura, Murshidabad, Nadia, Haora, South 24-Parganas), Andhra Pradesh, Assam, Bihar, Delhi, Madhya Pradesh, Maharashtra, Orissa, S. India, Uttar Pradesh.

65. Genus *Friona* Cameron1902. *Friona* Cameron. *J. Straits Branch Roy. Asiatic. Soc.*, **37** : 61.Type-species : *Friona striolata* Cameron.Key to the species of *Friona*

- 1 Face in the middle and clypeus wholly, black, all abdominal tergites with complete apical bands; hind coxa reddish with a yellow spot. Mesopleurum trans-striate .....*didymata* Morley
- Face and clypeus completely yellow; all tergites with apical bands, except bands on 5-6 tergites interrupted in the middle; hind coxa blackish-brown with a yellow spot. Mesopleurum trans-wrinkled. .... *lineatipes* Cameron

147. *Friona didymata* Morley1914. *Friona didymata* Morley. *Rec. Indian Mus.*, **8** : 328. M, F. des. Types : M, F. India : Uttar Pradesh : Dehra Dun (London). India : Uttar Pradesh : Kumaon Hills : Bhowali. Assam, Bihar, West Bengal, Calcutta, Kerala, Burma.*Distribution* : India : West Bengal (Calcutta).*Remarks* : No specimen of this species was available for study from West Bengal. This species can be recognised by having face in the middle and clypeus wholly black; all tergites with yellow apical bands; hind coxa reddish with yellow apical spot and mesopleurum finely trans-striate.148. *Friona lineatipes* Cameron1907. *Friona lineatipes* Cameron. *Ann. & Mag. Nat. Hist.*, (97) **20** : 23. F. des. Type F. India West Bengal : Darjiling, 7000 ft. (London).*Material examined* : India : West Bengal : Darjiling District, Tista-Kalimpong route, 1 Female, 22.v.1966. D. Ram.*Distribution* : India : West Bengal (Darjiling District).*Remarks* : This species is recognised by having mesopleurum trans-wrinkled; face and clypeus entirely yellow; apical band on fifth and sixth tergites interrupted in the middle. This species is close to *F. frontella* Cameron in most characters, except hind femora more darker.66. Genus *Goryphus* Holmgren1868. *Goryphus* Holmgren. *Konglia Svenska Fregatten Engenies Resa.*, **2** : 398.Type-species : *Goryphus basilaris* Holmgren.Key to the species of *Goryphus*

1. First tergite shorter or as long as the second tergite (0.8 to 1.0x)...The *Mesoxanthus* Group 2
- First Tergite longer than the second tergite (1.2 to 1.5x).....The *albomaculatus* Group 3
2. Propodeum black, with apophysis, yellow. (Mesopleurum strongly rugose; metapleurum reticulate). Hind femur reddish, tibia brownish-yellow .....*sikkimensis* Jonathan & Gupta

- Propodeum entirely red. (Mesopleurum granulose; metapleurum wrinkled. Hind femur reddish; tibia largely black, its subbasal area yellow).....*hyalinoides* (Uchida)
3. Propodeum with horse-shoe-shaped mark; lateral carina of scutellum black.....*brahminus* (Cameron)
- Propodeum with a broad shield-shaped mark; lateral carina of scutellum marked yellow.....*saluator* (Cameron)

149. *Goryphus saluator* (Cameron)

1904. *Mesostenus saluator* Cameron. *Trans. Ent. Soc. London*, 1904 : 117. F. des. Type : F, India : Meghalaya : Khasi Hills (Oxford).

1973. *Goryphus saluator* : Jonathan & Gupta. *Oriental Ins. Monogr.*, 3 : 69. M, F. Key, des. India : Meghalaya : Khasi Hills : Cherrapunji, 1235 m. West Bengal : Rangiroon near Darjiling, 1897 m. Sikkim : Gangtok, 1676 m.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1897m, 3 Females, 5-27.v.1966, Colls. J.K. Jonathan, No. J 159; Tek Chand, Nos. 186 & 193. Darjiling, 1981 m, 1 Female, 5.v.1966, J.K. Jonathan, No. J 146.

*Distribution* : India : West Bengal (Darjiling District), Assam, Sikkim.

*Remarks* : Jonathan & Gupta (1973) gave a detailed description of this species.

150. *Goryphus sikkimensis* Jonathan & Gupta

1973. *Goryphus sikkimensis* Jonathan & Gupta. *Oriental Ins. Monogr.*, 3 : 42. F. key, des. fig. Types : F, India : Sikkim : Gangtok, 1670 m. (Gupta). India : Uttar Pradesh : Kumaon Hills : Dunia, Jeolikote, 1219 m.; Dehra Dun : New Forest. West Bengal : Valley at Tista Bridge, 200 m. Burma.

*Material examined* : India : West Bengal : Tista Bridge, 200 m., 3 Females, 8-15.xii.1934, R. Malaise (Gupta).

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Uttar Pradesh. Elsewhere : Burma.

*Remarks* : This species is distinguished by having the face and frons along the eye margins pronotal collar and a small median mark anterior to epomia, yellow; hind femur largely reddish (Jonathan & Gupta, 1973).

151. *Goryphus hyalinoides* (Uchida)

1916. *Mesostenus opacus* Szepligeti, *Ann. Mus. Natl. Hungarici*, 14 : 335. F. Name preocc. in *Goryphus* by Smith. Key. des. (Budapest).

1961 *Goryphus hyalinoides* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 150.

*Material examined* : India : West Bengal : Darjiling District, Singla, 1 Female, 19.iv.1973, H.S. Sharma & party. Nilgung, 1 Female, 5.12.1967 to 13.1.1968, no other data.

*Distribution* : India : West Bengal (Darjiling District), Elsewhere : Burma, Indonesia.

*Remarks* : This is the first record of this species from India.

152. *Goryphus brahminus* (Cameron)

1904. *Mesostenus brahminus* Cameron, *Trans. Ent. Soc. London*, 1904 : 113. F. des. Type F. (Oxford).

1973. *Goryphus brahimnus* : Jonathan & Gupta, *Oriental Ins. Mongr.* 3 : 76.

*Material examined* : India : West Bengal : Darjiling District : Rangpo, 1 Female, 10.v.1973, H.S. Sharma & party.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Maharashtra, Meghalaya, Uttar Pradesh. Elsewhere : Burma.

*Remarks* : This is the first record of this species from West Bengal.

67. Genus *Skeatia* Cameron

1901 *Skeatia* Cameron, *Proc. Zool. Soc. London*. 1901 : 39.

Type-species : *Skeatia nigrispina* Cameron.

Key to the species of *Skeatia*

1. All the abdominal tergites with broad apical yellow bands.....*versatilis* (Cameron)
- All the abdominal tergites not with apical yellow bands, variously banded..... 2
2. Third abdominal tergite entirely black.....*fuscinervis* (Cameron)
- Third abdominal tergite with narrow incomplete to complete band. .... 3
3. Base of hind wing yellow; pronotal collar black and mesoscutum without an oval mark on its median lobe.....*mysorensis* Jonathan & Gupta
- Base of hind wing black; pronotal collar yellow and middle lobe of mesoscutum with an oval yellow mark.....*maculifrons* Jonathan & Gupta.

153. *Skeatia maculifrons* Jonathan & Gupta

1973. *Skeatia maculifrons* Jonathan & Gupta. *Oriental Ins. Monogr.*, 3 : 119. F. key, des., fig. Type : F, India : Himachal Pradesh : Dalhousie Hills : Benikhet, 1534 m. (GUPTA). India : Himachal Pradesh : Dalhousie Hills : Khajjiar, 1920 m. Uttar Pradesh : Kumaon Hills : Jeolikote, 1210 m.; Garjia, 610 m.; Garhwal Hills : Govind Ghat, 1828 m.; Phata, 1524 m.; West Bengal : Darjiling Hills : Rangiroon, 1897 m. Meghalaya. Cherrapunji, 1235 m. Indonesia.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1897 m, 1 Female, 25.v.1966, V.K. Gupta, No. 185.

*Distribution* : India : West Bengal (Darjiling District), Assam, Himachal Pradesh and Uttar Pradesh. Elsewhere : Indonesia.

*Remarks* : Jonathan & Gupta (1973) gave a detailed description of this species. It is distinguished by having the face rugulose; metapleurum finely wrinkled; propodeum basad rugose to wrinkled and apical carina absent. Face, clypeus and frons yellow.

154. *Skeatia versatilis* (Cameron)

1904. *Mesostenus versatilis* Cameron. *Trans Ent. Soc. London*, 1904 : 118. F. des. Type : F, India : Meghalaya : Khasi Hills (Oxford).  
 1973. *Skeatia versatilis* : Jonathan & Gupta. *oriental Ins. Monogr.*, 3 : 133. F. n. comb., key, des., fig. India : West Bengal Tista-Kalimpong Route. Meghalaya : Khasi Hills.

*Material examined* : India; West Bengal; Tista-Kalimpong route, 1 Female, 22.v.1968. J.K. Jonathan, No. J 156 (Gupta).

*Distribution* : India : West Bengal (Darjiling), Assam.

*Remarks* : This species is having apices of all the abdominal tergites yellow; face also yellowish. Face punctate; mesopleurum strongly rugose; metapleurum wrinkled to reticulate. Head and thorax with long fine hairs.

155. *Skeatia mysorensis* Jonathan & Gupta

1973. *Skeatia mysorensis* Jonathan & Gupta. *Oriental Ins. Monogr.*, 3 : 117. Key, des, fig. (Gupta).

*Material examined* : India : West Bengal : Darjiling District : Singla, 2 Females, 19.iii.1973, 18.iv.1973, Coll. H.S. Sharma & party. Rangpo, 1 Female, 16.iv.1973, H.S. Sharma & party.

*Distribution* : India : West Bengal (Darjiling District), Assam, Bihar, Maharashtra, Meghalaya, Karnataka, Tamil Nadu.

*Remarks* : Jonathan & Gupta (1973) gave a detailed description of this species. This is the first record of this species from West Bengal.

156. *Skeatia fuscinervis* (Cameron)

1902. *Ancaria fuscinervis* Cameron, *Ann. Mag. Nat. Hist.*, (7) 9 : 205. F. des. (Oxford).  
 1973. *Skeatia fuscinervis* : Jonathan & Gupta, *Oriental Ins. Monogr.*, 3 : 109.

*Material examined* : India; West Bengal; Darjiling District : Rangpo, 1 Female, 9.iv.1973, H.S. Sharma & party.

*Distribution* : India : West Bengal (Darjiling District), Assam, Bihar, Tamil Nadu. Elsewhere : Indonesia, Taiwan.

*Remarks* : Jonathan & Gupta (1973) gave a detailed description of this species. This is the first record of this species from West Bengal.

68. Genus *Gambroides* Betrem

- 1941 *Gambroides* Betrem. *Treubia*, 18 67.

Type-species : *Eripterimorpha javensis* Rohwer.

157. *Gambroides javensis* (Rohwer)

1918. *Eripterimorpha javensis* Rohwer. *Proc. U. S. Natl. Mus.*, 54 564. F. key, des. Type : F, Indonesia : Java : Pasurocan (Washington).  
 1980. *Gambroides javensis* : Jonathan. *Rec. Zool. Surv. India, Occ. Paper*, 17 : 30. M, F. key, des., fig. India : Assam : Gauhati. Meghalaya : Jauharabad. Uttar Pradesh : Lucknow; Hardoi. Orissa : Bhubaneshwar. Karnataka : Madhya. Tamil Nadu : Pugalur.

**Diagnostic characters** : Body about 10 mm. Body in general punctate. Malar space 0.6x the basal width of mandible; antennal scrobes with fine striations; distance between median and lateral ocellus 0.6 as compared to the distance between the ocelli; lower margin of pronotum smooth, epomia indistinct. Lateral carina of scutellum extending to its basal 0.3; mesopleurum rugose in the middle, sternaulus not well defined; juxta coxal carina also indistinct; propodeum finely wrinkled in the middle; apical carina absent. First tergite short, 2x as long as broad at apex; areolet pentagonal, nervulus interstitial, nervellus intercepted above the middle, brachiella absent.

Antennae with 6-9 flagellar segments white above. Thorax with its more or less posterior half and first abdominal segment, red; fore leg largely blackish to dark brown; middle coxa red; hind coxa, femur reddish.

**Material examined** : India : West Bengal : Calcutta (Tollygunge), 1 Female (no other data).

**Distribution** : India : West Bengal (Calcutta), Bihar, Delhi, Haryana, Assam, Punjab, Uttar Pradesh, Maharashtra, Meghalaya, Tamil Nadu. Elsewhere : Bangladesh, China, Indonesia.

**Remarks** : Jonathan (1980) described this species in detail.

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

#### 69. Genus *Isotima* Foerster

1869. *Isotina* Foerster. *Verh. Naturh. Ver. Rheinlande*, **25** : 182.

Type-species : *Isotima albicineta* Ashmead.

#### 158. *Isotima difficilis* Jonathan

1980. *Isotima difficilis* Jonathan *Rec. Zool. Surv. India, Occ. Paper*, **17** : 58. M, F. key, des., fig. Type : F, India : West Bengal : Tista-Kalimpong route (Gupta). India : Assam : Rangapara : Sonajuli Tea Estate; Tarajuli Tea Estate.

**Diagnostic characters** : Face largely punctate, rugoso-punctate in the middle; clypeus sparsely to closely punctate; malar space 0.7x the basal width of mandible; lower tooth of mandible slightly shorter than upper; frons rugose in the middle; punctate at sides; temple somewhat rugoso-punctate. Pronotum with a few trans-striations in the middle, epomia strong but short; mesoscutum minutely and sparsely punctate; lateral carina of scutellum extending to its basal 0.7; mesopleurum rugoso-wrinkled, speculum with sparse punctures, prepectal carina 0.85 high; metapleurum coarsely wrinkled, juxta coxal carina present. Propodeum between transverse carinae finely wrinkled, apical carina strongly arched. First tergite in middle with a few puncture, second densely punctate, following tergites mat. Nervulus interstitial, nervellus intercepted slightly below the middle. Ovipositor long, sheath 0.75x as long as hind tibia.

Body black. 4-9 flagellar segments white. Thorax largely red, except anterior 0.33. Pronotum above, second, seventh and eighth abdominal tergites broadly yellow. Apical half of first tergite red. Legs in general reddish to reddish-brown, hind tibia and tarsus black. Wings hyaline, fore wing at apex with a distinct cloud near areolet.

**Material examined** : India : West Bengal : Darjiling District : Tista-Kalimpong route, 1 Male, 1 Female, 22.v.1966, M.K. Kamath, V.K. Gupta.

*Distribution* : India : West Bengal (Darjiling District), Assam.

*Remarks* : Jonathan (1980) gave a detailed description of this species.

70. Genus *Formostenus* Uchida

Subgenus *Formostenus (Formostenus)* Uchida

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

Type-species : *Mesostenus (Formostenus) angularis* Uchida.

159. *Formostenus (Formostenus) flavofasciatus* Jonathan

1980. *Formostenus (Formostenus) flavofasciatus* Jonathan. *Rec. Zool. Surv. India, Occ. Paper*, **17** : 83. F. key, des., fig. Type : F, India : Sikkim : Gangtok, 1676 m. (Gupta). India : West Bengal : Darjiling Hills : Rangiroon, 1905 m. Uttar Pradesh : Kumaon Hills : Chaubatia, 1943 m., Burma.

*Diagnostic characters* : Face weakly rugose; clypeus sparsely punctate; malar space 1.0x the basal width of mandible; frons shallowly punctate; pronotum trans-striate in the middle; rest punctate; lateral carina of scutellum extending to its basal 0.5; metapleurum largely trans-rugoso-striate; propodeum in the middle coarsely rugose. Abdomen spindle-shape. Fore wing with areolet pentagonal. Ovipositor tip long, curved.

The distinguishing colour characters are : Face with a trilobate mark, frons with two lateral strips which extend from the level of median ocellus and joins with facial mark, yellow. Pronotal collar, metapleurum and propodeum, black. Hind coxa, trochanter and femur, brown; tibia blackish, tarsus pale, its fourth segment at apex, fifth wholly, brown.

*Material examined* : India : West Bengal : Darjiling District : Rangiroon, 1905m, 1 Female, 26.v.166, J.K. Jonathan, Colln. No. J 158.

*Distribution* : India : West Bengal (Darjiling District), Sikkim, Uttar Pradesh. Elsewhere : Burma.

Tribe CERATOCRYPTINI

71. Genus *Lipoprion* Townes

1961 *Amphiprion* Townes. *Mem. Amer. Ent. Inst.*, **1** : 472. Name preocc. by Schneider, 1801.

Type-species : *Buodias rufo-ornatus* Cameron.

1970. *Lipoprion* Townes. *Mem. Amer. Ent. Inst.*, **12** : 303. New Name.

160. *Lipoprion rufo-ornatus* (Cameron)

1907. *Buodias rufo-ornatus* Cameron. *Tijdschr. v. Ent.*, **50** : 89. M. des. Type : F, India : Sikkim (London).

1970. *Lipoprion rufo-ornatus* : Townes. *Mem. Amer. Ent. Inst.*, **12** : 303. n. comb.

*Diagnostic characters* : Pronotum above sparsely punctate, lower half strongly longitudinally striated. Mesopleurum above obliquely, irregularly striated, below closely and finely reticulated; metapleurum strongly reticulate. Propodeum at base smooth, rest coarsely reticulate, densely covered with long hairs, areola wider than long. Abdominal tergites subpolished, 2-3 tergites closely punctate. Areolet small, wider than long.

Body in general black. Face, clypeus, orbits, upper margin of pronotum, base of pronotum, scutellum at sides and apex, apical slope of propodeum, yellow. Lower half of mesopleurum, mesosternum and metapleurum, reddish-yellow. First abdominal segment basally and apically, four anterior legs, yellow. Wings clear hyaline.

*Distribution* : India : West Bengal (Jalpaiguri District), Sikkim.

*Remarks* This species is known by its types only. No material was available for study.

### 15. Subfamily ICHENEUMONINAE

The genera and species of this subfamily are unusually difficult to classify. A large portion of them are only weakly differentiated and often there is convergence, parallelism and annectant forms (Townes, 1961).

The characters in the key are subject to exceptions, which at times will make identification difficult.

#### Key to the Tribes of ICHENUMONINAE

1. Basal half of first abdominal segment wider than deep, flat above; ovipositor short, subtended by a large, broadly triangular subgenital plate; clypeus moderately small, moderately to strongly convex ..... **Platylabini**
- Basal half of first abdominal segment about as wide as deep or deeper than wide, often rounded or with carinae above ..... 2
2. Mandible wide, not or very little tapered apically, both of its teeth rather long and sharp, occipital carina not joining hypostomal carina before reaching base of mandible; temple swollen; face and clypeus often forming an evenly convex surface..... 3
- Not as above, either the mandible narrow or tapered apically or the occipital carina joining hypostomal carina above base of mandible ..... 4
3. Apico-ventral corners of tergites 2-4 produced, forming acute angles; malar space about 0.9x as long as basal width of mandible ..... **Ichneumonini** (some genera)
- Apico-ventral corners of tergites 2-4 rounded, forming obtuse angles; malar space 2.0x as long as basal width of mandible ..... **Ischnojoppini**
4. Propodeum in profile with an evenly arcuate dorsal line from base of areola to attachment of abdomen, the curve sometimes with a faint interruption at apex of second lateral area; second lateral area long and reaching far down so that its apex is closer to abdominal attachment than to costula, sometimes the second lateral area fused with third lateral area and the combined area thus reaching apex of propodeum; nervellus distad of basal vein; gastrocoelus rather deep; mandible of normal shape, its lower tooth of moderate size; occipital carina joining hypostomal carina above base of mandible. Areola closed behind, small and raised ..... **Ichneumonini**
- Not as above, either the propodeum with distinguishable dorsal and postero-dorsal faces which

meet at a more or less distinct angle or tooth at apex of second lateral area, *or* apex of second lateral area closer to costula than to attachment of abdomen, *or* nervulus basad of or opposite basal vein, *or* lower tooth of mandible small or absent, *or* occipital carina not as above.....  
 .....**Joppini**

### Tribe JOPPINI

#### Key to the Genera of Tribe JOPPINI

- 1 Occipital carina reaching base of mandible..... 2
- Occipital carina joining hypostomal carina above base of mandible..... 3
2. Nervulus a little distad of basal vein. (Mandible narrow; its lower tooth rather small; scutellum very high apically, with a lateral carina; ovipositor straight).....**Eccoptosage** Kriechbaumer
- Nervulus opposite or a little basad of basal vein; apical margin of clypeus moderately thick; apex of scutellum not unusually high. (Second tergite without median impressions) .....  
 .....**Coelojoppa** Cameron
3. Scutellum with a lateral carina that extends beyond the middle. (Second tergite with a large weak impression on each side of the middle, similar to the tergal impressions; clypeus rather narrow).  
 .....**Darymna** Cameron
- Scutellum without a lateral carina, or with a lateral carina not reaching the middle..... 4
4. Thyridium not distinctly impressed; propodeum without a median tubercle on its base; median part of postpetiole smooth, mat. or sometimes with punctures. (2-4 segments of female fore and middle tarsi unusually wide) .....**Mesophadnus** Cameron
- Thyridium usually more or less impressed; propodeum with or without a median tubercle on its base; median part of postpetiole nearly always longitudinally striate or coarsely punctate ..... 5
5. Apical margin of clypeus broadly, weakly concave, with a weak, broad, median tooth; apical part of female flagellum blunt, not distinctly tapered before the last segment .....  
 .....**Thascia** Cameron
- Apical margin of clypeus truncate or weakly convex, without a median tooth; apical part of female flagellum usually tapered to a rather slender tip..... 6
6. Males..... 7
- Females.....10
7. Subgenital plate with a rather long median apical lobe; genital clasper unusually large.....  
 .....**Spilichneumon** Thomson
- Subgenital plate medially rounded or somewhat pointed, without a long lobe; genital clasper usually not enlarged..... 8

- 8. Carina closing apical side of second lateral area of propodeum approximately straight, not distinctly angled at its juncture with the apical section of the medium longitudinal carina, receiving the longitudinal carina at or close to the lower lateral corner of areola, this resulting in the combined median apical area and lateral apical areas together forming an elongate hexagon ...  
.....*Pterocormus* Foerster
- Carina closing apical side of second lateral area of propodeum angled downward at its juncture with the apical section of the median longitudinal carina receiving the longitudinal carina a little distance below lower lateral corner of areola..... 9
- 9. Propodium with an acute tooth at apex of second lateral area. (Apex of first tergite marked with white; propodium usually with a median white spot).....*Achais* Cameron
- Propodium with a obtuse tooth or without a tooth at apex of second lateral area.....  
.....*Setanta* Cameron
- 10. Tip of abdomen acutely pointed; ovipositor not unusually short; subgenital plate inconspicuous  
.....*Pterocormus* Foerster
- Tip of abdomen rounded; ovipositor unusually short; subgenital plate conspicuous..... 11
- 11. Flagellum rather short, its apex with a short taper; mandible broad, usually constricted basally ..  
.....*Spilichneumon* Thomson
- Flagellum long, its apex with a long taper; mandible not unusually broad..... 12
- 12. Propodeal tooth short; apex of first tergite marked with white, propodeum usually with a median white spot .....*Achais* Cameron
- Propodeal tooth moderately long; apex of first tergite black; propodeum entirely black. (Apical truncation of clypeus very broad and straight, the clypeus about 2.7x as wide as long .....  
.....*Setanta* Cameron

72. Genus *Eccoptosage* Kriechbaumer

1989. *Eccoptosage* Kriechbaumer *Ent. Nachr.*, **24** : 4, 31.  
Type-species : *Eccoptosage Waageni* Kriechbaumer.

160. *Eccoptosage waagenii* Kriechbaumer

- 1898. *Eccoptosage waagenii* Kriechbaumer. *Ent. Nachr.*, **24** : 31. "F" = M. des. in key. Type : M, India : Sikkim (Munich).
- 1903. *Acanthojoppa indica* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **11** : 180. M. des. Type : M, India : Meghalaya : Khasi Hills (Oxford). Syn. by Townes, Townes & Gupta, 1961.
- 1903. *Acanthojoppa tinctipennis* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **12** : 370. M. des. Type : M, India : Meghalaya : Khasi Hills (Oxford). Syn. by Townes, Townes & Gupta, 1961.
- 1903. *Acanthojoppa apicilineata* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **12** : 565. F. des. Type : F, India : Meghalaya : Khasi Hills (Oxford). Syn. with *tinctipennis* by Heinrich, 1937.
- 1903. *Acanthojoppa curtispina* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **12** : 567. M. des. Type : M, India : Meghalaya : Khasi Hills (Oxford). Syn. by with *tinctipennis* by Heinrich, 1937.

1961. *Eccoptosage waagenii* Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 354. syn. India.

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim. Elsewhere : China.

*Remarks* : This is the only species known under the genus from West Bengal and can be distinguished by characters given in the generic key.

### 73. Genus *Pterocormus* Foerster

1850. *Pterocormus* Foerster. *Arch. f. Naturgesch.*, **16** : 71.

Type-species : (*Brachypterus means* Gravenhorst) = *latrator* Fabr.

#### 161. *Pterocormus annaelisae himalayanus* (Heinrich)

1965. *Ichneumon annaelisae himalayanus* Heinrich. *Ent. Tidskr.*, **86** : 87. F. key, des. Type : F, India : West Bengal : Darjiling (Berlin).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This is the only subspecies known under the genus from West Bengal. No material was available for study. The subspecies can be differentiated by its generic characters as given in the key.

### 74. Genus *Thascia* Cameron

1904. *Thascia* Cameron. *Ztschr. System. Hymen. Dipt.*, **4** : 339.

Type-species : *Thascia pilosa* Cameron.

#### 162. *Thascia pilosa* Cameron

1904. *Thascia pilosa* Cameron. *Ztschr. System. Hymen. Dipt.*, **4** : 339. M. des. Type : M, India : West Bengal : Darjiling (London).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species is known by a single male specimen, deposited in British Museum. No material of this species was available for study.

### 75. Genus *Spilichneumon* Thomson

1894. *Spilichneumon* Thomson. *Opuscula Entomologia*, **19** : 2087.

Type-species : (*Amblyteles Occisorius* Gravenhorst) = *occisor* Fabr.

#### 163. *Spilichneumon darjeelingensis* Cameron

1905. *Spilichneumon darjeelingensis* Cameron. *Ztschr. System. Hymen. Dipt.*, **5** : 87. F. des. Type : F, India : West Bengal : Darjiling (London).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This species is only known by its type female in British Museum.

### 76. Genus *Achais* Cameron

1903. *Achais* Cameron. *Ann. & Mag. Nat Hist.*, (7) **12** : 266.

Type-species : *Achais flavobalteatus* Cameron.

164. *Achaius flavobalteatus* Cameron

1903. *Achaius flavo-balteatus* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **12** : 267. M. des. Type : M, India : Meghalaya : Khasi Hills (Oxford).
1903. *Haliphera maculipes* Cameron. *Entomologist*, **36** : 238. F. des. Type : F, India : West Bengal : Darjeeling (London). Syn. by Townes, Townes & Gupta, 1961.
1907. *Haliphera latibalteata* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **20** : 81. M. des. Type : M, India : Sikkim : Runjit Valley, 1000 ft. (London). Syn. by Townes, Townes & Gupta, 1961.
1965. *Achaius flavobalteatus* : Heinrich. *Ent. Tidskr.*, **86** : 112. M, F. key, syn., des. Burma : Mt. Victoria, 2400-2800 m.; Kambaiti, 7000 ft.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Sikkim. Elsewhere : Burma.

77. Genus *Setanta* Cameron

1901. *Setanta* Cameron. *Ann. & Mag. Nat. Hist.*, (7) : 483.  
Type-species : *Setanta rufipes* Cameron.

165. *Setanta himalayensis* (Cameron)

1905. *Myermo himalayensis* Cameron. *Ztschr. System. Hymen. Dipt.*, **5** : 248. M. des. Type : M, India : West Bengal : Darjiling (London).
1905. *Myermo iridipennis* Cameron. *Ztschr. System. Hymen. Dipt.*, **5** : 278. M, des. Type : M, India : West Bengal : Darjiling (London) Syn. by Heinrich, 1974.
1905. *Myermo femorata* Cameron. *Ztschr. System. Hymen. Dipt.*, **5** : 279. M. des. Type : M, India : West Bengal : Darjiling (London). Syn. by Heinrich, 1974.
1905. *Myermo robusta* Cameron. *Ztschr. System. Hymen. Dipt.*, **5** : 280. M. des. Type : M, India : West Bengal : Darjiling (London). Syn. with *femorata* by Townes, Townes & Gupta, 1961.
1974. *Setanta himalayensis* : Heinrich. *Ann. Zool. Warszawa* **31** : 445. M, F. key, syn., des. India : West Bengal : Darjiling. Sikkim. Burma : Kambaiti, 2000 m.

*Distribution* : India : West Bengal (Darjiling District), Sikkim. Elsewhere : Burma.

*Remarks* : This is the only species known under this genus from West Bengal and can be recognised by the characters mentioned in the key.

78. Genus *Coelojoppa* Cameron

1904. *Coelojoppa* Cameron. *Entomologist*, **37** : 162.  
Type-species : *Coelojoppa cariniscutis* Cameron.

166. *Coelojoppa cariniscutis* Cameron

1904. *Coelojoppa cariniscutis* Cameron. *Entomologist*, **37** : 208. F. des. Type : F, India : West Bengal : Darjiling (London).

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : No material of this species was available for study. This species is only known by its type female from Darjiling.

79. Genus *Mesophadnus* Cameron

1907. *Mesophadnus* Cameron. *Tijdschar. v. Ent.*, **50** : 75.  
Type-species : *Mesophadnus spilopterus* Cameron.

167. *Mesophadnus violaceipennis* (Cameron)

1905. *Lagenestra(!) violaceipennis* Cameron. *Ztschr. System. Hymen. Dipt.*, 5 : 86. F. des. Type : F, India : West Bengal : Darjiling. (London).
1961. *Eupalamus fumipennis* Townes, Townes & Gupta, *Mem. Amer. Ent. Inst.*, 1 : 376. New name for *L. violaceipennis* which was preocc. under *Eupalamus*.
1980. *Mesophadnus violaceipennis* : Heinrich. *Ann. Zool. Warszawa*, 35 : 139. F. n. comb., key, syn., des. India : West Bengal : Darjiling. Sikkim. Meghalaya : Khasi Hills.

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim.

*Remarks* : No material of this species was available for study. This is the only species known from West Bengal under this genus and can be identified by the generic characters mentioned in the key.

80. Genus *Darymna* Cameron

1904. *Darymna* Cameron. *Ztschr. System. Hymen. Dipt.* 4 : 224, 337.  
Type-species : *Darymna pleuralis* Cameron.

168. *Darymna pleuralis* Cameron

1904. *Darymna pleuralis* Cameron. *Ztschr. System. Hymen. Dipt.*, 4 : 337. "F" = M. des. Type : M, India : West Bengal : Darjiling (London).
- 1961 *Darymna pleuralis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 358. India.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This is the only species known under this genus from India and can be recognised by the characters given in generic key.

## Tribe ICHNEUMONINI

## Key to the Genera of Tribe ICHNEUMONINI

- 1 Occipital carina reaching base of mandible without joining hypostomal carina; mandible very wide; post-petiole evenly convex, without a distinct middle field; scutellum with lateral carina on its basal half or more. (Areola or its remnant 1.5 to 2.3x as long as wide; hind basitarsus of female simple).....*Cratojoppa* Cameron
- Occipital carina joining hypostomal carina above base of mandible; mandible moderately narrow to rather wide; postpetiole nearly always with a distinct middle field; scutellum with or without lateral carina..... 2
2. Areola raised above general surface of propodeum, the propodeum sloped away from areola on all sides. (Scutellum strongly convex; ovipositor rather short, the abdomen of female amblypygons; post median segments of female flagellum not widened).*Amblyjoppa* Cameron
- Areola within the general convex surface of propodeum, not distinctly raised ..... 3
3. Abdomen slightly spindle-shaped from second through fifth segment, a little narrower than thorax; ovipositor rather long .....*Ichneumon* Linnaeus

- Abdomen approximately parallel sided from the second through fifth segments, much narrower than thorax. (Ovipositor about as long as apical depth of abdomen; areola and basal area black)..  
 .....*Naenaria* Cameron

81. Genus *Ichneumon* LinnaeusSubgenus *Ichneumon (Ichneumon)* Linnaeus

1758. *Ichneumon (Ichneumon)* Linnaeus. *Systema naturae* edition 10, 1 : 560.

Type-species : *Ichneumon comitator* Linnaeus.

There are six subspecies under this genus known from the state of West Bengal. They are known by their types and with inadequate descriptions. No material of these species was available for study. No key to the species was possible, therefore, the species are listed below with their distribution records.

169. *Ichneumon (Ichneumon) annulipes* (Cameron)

1905. *Myermo annulipes* Cameron. *Ztschr. System. Hymen. Dipt.*, 5 : 281. M. des. Type : M, India : West Bengal : Darjiling (London).

1961 *Ichneumon annulipes* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.* 1 : 403. n. comb. India.

*Distribution* : India : West Bengal (Darjiling District).

170. *Ichneumon (Ichneumon) fulvipes* (Cameron)

1904. *Shalisha fulvipes* Cameron. *Ztschr. System. Hymen. Dipt.*, 4 : 222. M. des. Type : M, India : West Bengal : Darjiling (London).

1961. *Ichneumon fulvipes* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 406. n. comb. India.

*Distribution* : India : West Bengal (Darjiling District), Sikkim.

171. *Ichneumon (Ichneumon) iridipennis* (Cameron)

1905. *Aglaojoppa iridipennis* Cameron. *Ztschr. System. Hymen. Dipt.*, 5 : 85. F. des. Type : F, India : West Bengal : Darjiling. (London).

1961. *Ichneumon iridipennis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 407. Australia. n. comb. India.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Sikkim, Uttar Pradesh. Elsewhere : Australia.

172. *Ichneumon (Ichneumon) lineaticeps* (Cameron)

1904. *Lodryca lineaticeps* Cameron *Ztschr. System. Hymen. Dipt.*, 4 : 223. F. des. Type : F, India : West Bengal : Darjiling (London).

1961. *Ichneumon lineaticeps* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, 1 : 407. n. comb. India.

*Distribution* : India : West Bengal (Darjiling District), Sikkim.

173. *Ichneumon (Ichneumon) rufofemoratus* Cameron

1903. *Cyanojoppa rufofemorata* Cameron. *Ztschr. System. Hymen. Dipt.*, 3 : 9. F. des. Type : F, India : Himachal Pradesh : Simla (London).

1903. *Cyanojoppa caeruleicaudis* Cameron. *Ztschr. System. Hymen. Dipt.*, **3** : 9. f. des. Type : F, India : Meghalaya : Khasi Hills (Oxford). Syn. by Heinrich, 1937.
1903. *Cyanojoppa nigro-coerulea* Cameron. *Ztschr. System. Hymen. Dipt.*, **3** 12. M, F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : West Bengal : Darjiling (London). Syn. by Heinrich, 1937.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh. Elsewhere : Burma.

174. *Ichneumon (Ichneumon) taihorinus* (Uchida)

1904. *Spilojoppa fulvipes* Cameron. *Entomologist*, **37** : 209. Name preocc. in *Ichneumon* by Cameron, July 1904. F. des. Type : F, India : West Bengal : Darjiling (London). Syn. by Heinrich, 1966.
1932. *Coelichneumon taihorinus* Uchida. *J. Fac. Agri. Hokkaido Imp. Univ.*, **33** : 148. M, F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, Taiwan : Talin (= Taihorin) (Eberswalde).
1961. *Ichneumon fulvimanus* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 406. n. comb. India. n. name for *Spilojoppa fulvipes* Cameron. Syn. by Heinrich, 1966.
- 1961 *Ichneumon taihorinus* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1** : 408. lectotype design., n. comb. China. Taiwan.

*Distribution* : India : West Bengal (Darjiling District), Himachal Pradesh, Sikkim, Uttar Pradesh. Elsewhere : Burma, China, Indonesia, Taiwan.

*Remarks* : This is a widely distributed species recorded from India through Burma to Taiwan.

82. Genus *Amblyjoppa* Cameron

1902. *Amblyjoppa* Cameron *Entomologist*, **35** : 108.  
Type-species : *Amblyjoppa rufobaleata* Cameron.

175. *Amblyjoppa forticornis forticornis* (Cameron)

1903. *Hadrojoppa forticornis* Cameron. *Ann. & Mag. Nat. Hist.*, (7) **12** : 272. F. des. Lectotype (designated by Townes, Townes & Gupta, 1961): F, India: Meghalaya: Khasi Hills (Oxford). India: West Bengal: Darjiling.
- 1961 *Amblyjoppa forticornis forticornis* : Townes, Townes & Gupta. *Mem. Amer. Ent. Inst.*, **1**: 415. Lectotype design. India.

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim.

*Remarks* : Cameron (1903) described this species from Khasi Hills in Meghalaya and Darjiling in West Bengal. Since then this species was not reported by any worker.

83. Genus *Naenaria* Cameron

1903. *Naenaria* Cameron *Ann. & Mag. Nat. Hist.*, (7) **11** : 313.  
Type-species : *Naenaria grandiceps* Cameron.

176. *Naenaria nigrocoerulea* (Cameron)

1905. *Aglaojoppa nigro-coerulea* Cameron. *Ztschr. System. Hymen. Dipt.*, **5** : 85. F. des. Type : F, India: West Bengal: Darjiling (London).

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim.

*Remarks* : This species is known by its type female only.

#### 84. Genus *Cratojoppa* Cameron

1901 *Cratojoppa* Cameron *Ann. & Mag. Nat. Hist.* (7) 7 : 281.

Type-species : *Cratojoppa robusta* Cameron.

#### 177. *Cratojoppa robusta* Cameron

1901 *Cratojoppa robusta* Cameron. *Ann. & Mag. Nat. Hist.*, (7) 7 : 282. F. des. Lectotype (designated by Townes, Townes & Gupta, 1961) : F, India : Meghalaya : Khasi Hills (Oxford).

1907. *Cratojoppa cingulata* Cameron. *Entomologist*, 40 : 6. M. key, des. Type : M, India : West Bengal : Buxa Duar (London). Syn. by Townes, Townes & Gupta, 1961.

1969. *Cratojoppa robusta* : Heinrich. *Ent. Tidskr.*, 90 : 102. M, F. key, des. India : Khasi Hills. Sikkim. Bhutan. Burma : Tenasserim; Maymyo; Mt. Victoria, 1400 m.; Mt. Popa, 600 m.

*Distribution* : India : West Bengal (Darjiling District), Meghalaya, Sikkim. Elsewhere : Bhutan, Burma.

### Tribe ISCHNOJOPPINI

#### 85. Genus *Ischnojoppa* Kriechbaumer

1898. *Ischnojoppa* Kriechbaumer. *Ent. Nachr.* 24 : 32.

Type-species : (*Joppa lutea* Fabricius) = *luteator* Fabricius.

#### 178. *Ischnojoppa luteator* (Fabricius)

1798. *Ichneumon luteator* Fabricius. *Supplementum Entomologiae Systematicae*, p. 222. (M, F). des. Lectotype : F, "Germany : Halle in Saxony" (Kiel, on deposit in Copenhagen). (Type locality incorrect).

1804. *Joppa lutea* Fabricius. *Systema Piezatorum*, p. 123. n. name for *I. luteator*. "Germany : Halle"

1822. *Ichneumon adspersor* Thunberg. *Mem. Acad. Imp. Sci., St. Petersbourg*, 8 : 258. new name for *I. luteator*. key.

1846. *Joppa rufa* Brulle. In Lepeletier. *Histoire Naturelle des. Insectes*, Hymenopteres, 4 : 294. M, F. Name preocc. by Brulle, 1846. des. Lectotype : sex ?, India : Bengal (Lost).

1897. *Ichneumon agraensis* Cameron. *Mem. & Proc. Manchester Lit. Phil. Soc.*, 41 (4) : 13. M. des. Type : M, India : Uttar Pradesh : Agra (Oxford).

1902. *Bodargus rufus* Cameron. *J. Striats Branch Roy. Asiatic Soc.*, 37 : 53. M. Name preocc. in *Ischnojoppa* by Brulle, 1846. des. Type : M, Malaysia : Sarawak (London). Syn. by Heinrich, 1937.

1912. *Exephanes akonis* Matsumura. *Thousand Insects of Japan*, Suppl., 4 : 240. F. des., fig., Type : F, Taiwan : Pingtung (Sapporo ?)

1915. *Ischnojoppa luteator* : Morley. *Revision of the Ichneumonidae in the British Museum.*, 4 : 97. M, F. syn., des. India : Uttar Pradesh : Lucknow. Bihar : Chapra; Pusa. West Bengal : Calcutta. Sikkim. Meghalaya : North Khasi Hills. Maharashtra : Bombay. Karnataka : Bangalore. Tamil Nadu : Coimbatore. Bangladesh, Nepal, Bhutan, Sri Lanka, Burma, Malaysia, Singapore. Northern China, Australia.

*Distribution* : India : West Bengal (Darjiling District), Bihar, Meghalaya, Karnataka, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh. Elsewhere : Australia, Bangla Desh, Bhutan, Burma, N. China, Malaysia, Nepal, Philippines, Sri Lanka.

*Remarks* : This is a widely distributed species recorded from Indo-Australian Region and is the only species known under the genus from West Bengal.

*Host* : *Scirpophaga incertulas*.

#### Tribe PLATYLABINI

#### 86. Genus *Platylabus* Wesmael

1844. *Platylabus* Wesmael. *Nouv. Mem. Acad. Sci. Bruxelles*; **18** : 150, 153.

Type-species : *Platylabus rufus* Wesmael.

#### 179. *Platylabus uranius viridis* (Cameron)

1907. *Chlorojoppa viridis* Cameron. *Ztschr. System. Hymen. Dipt.*, **7** : 467. M. des. Type : M, India : West Bengal : Darjiling, 7000 ft. (London).

1974. *Platylabus uranius viridis* Heinrich. *Ann. Zool. Warszawa* **32** : 117. F. n. comb. India : West Bengal : Darjiling, 7000 ft.

*Distribution* : India : West Bengal (Darjiling District).

*Remarks* : This subspecies is known by its type male. This is the only subspecies known under this genus from West Bengal.

### SUMMARY

This paper deals with the Ichneumonidae fauna of West Bengal. Altogether 179 species and subspecies under 86 genera and 15 subfamilies are treated in the text. The keys for identification of subfamilies, tribes, genera and species are provided. Distributional maps and illustrations of morphological characters are included for ready reference.

The Ichneumonidae contain many parasites of pests associated with cultivated crop, orchards and forests. With proper knowledge of their speciation, hosts, distribution etc., it is hoped that many of these may be economically exploited for the biological control of these pests.

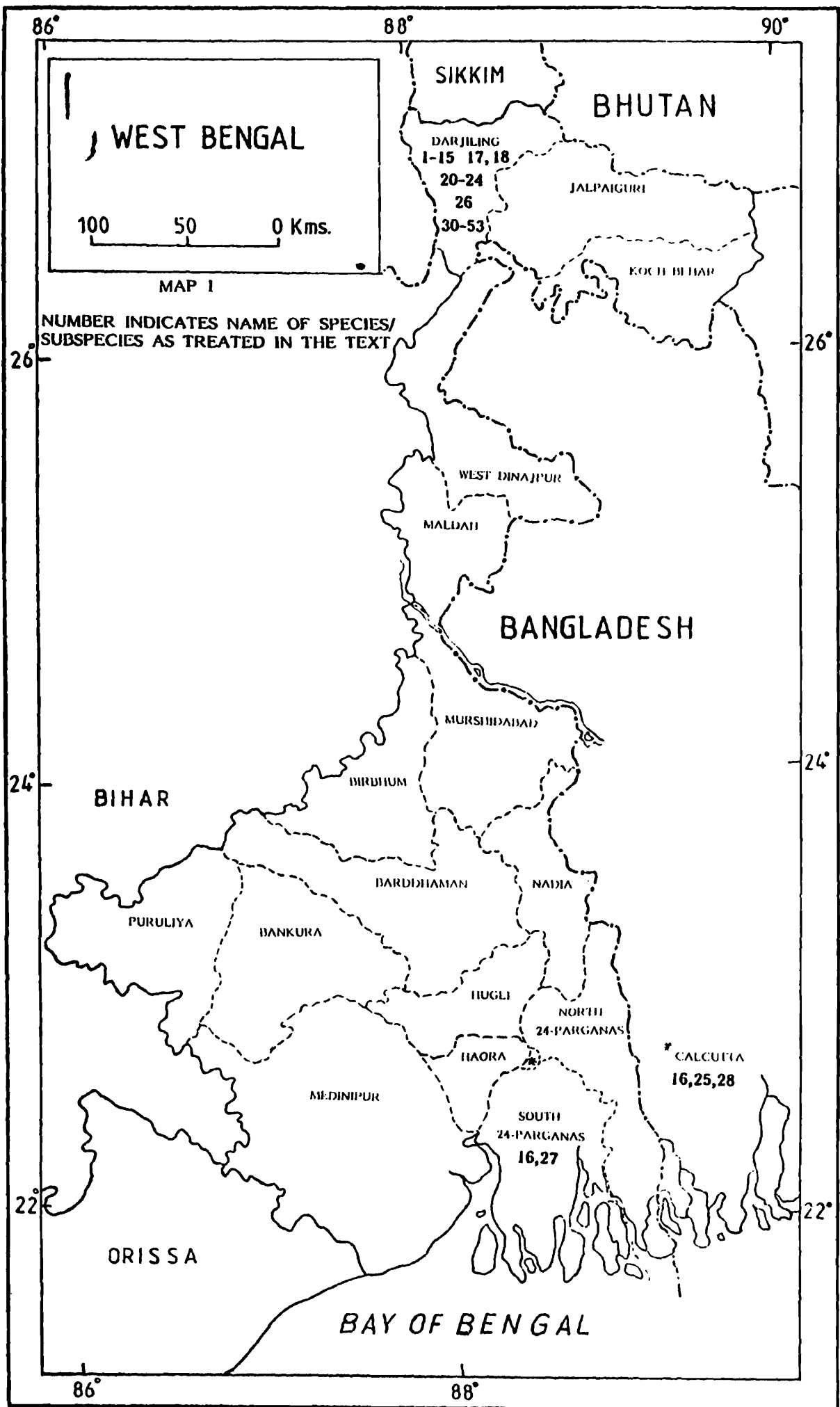
### ACKNOWLEDGEMENTS

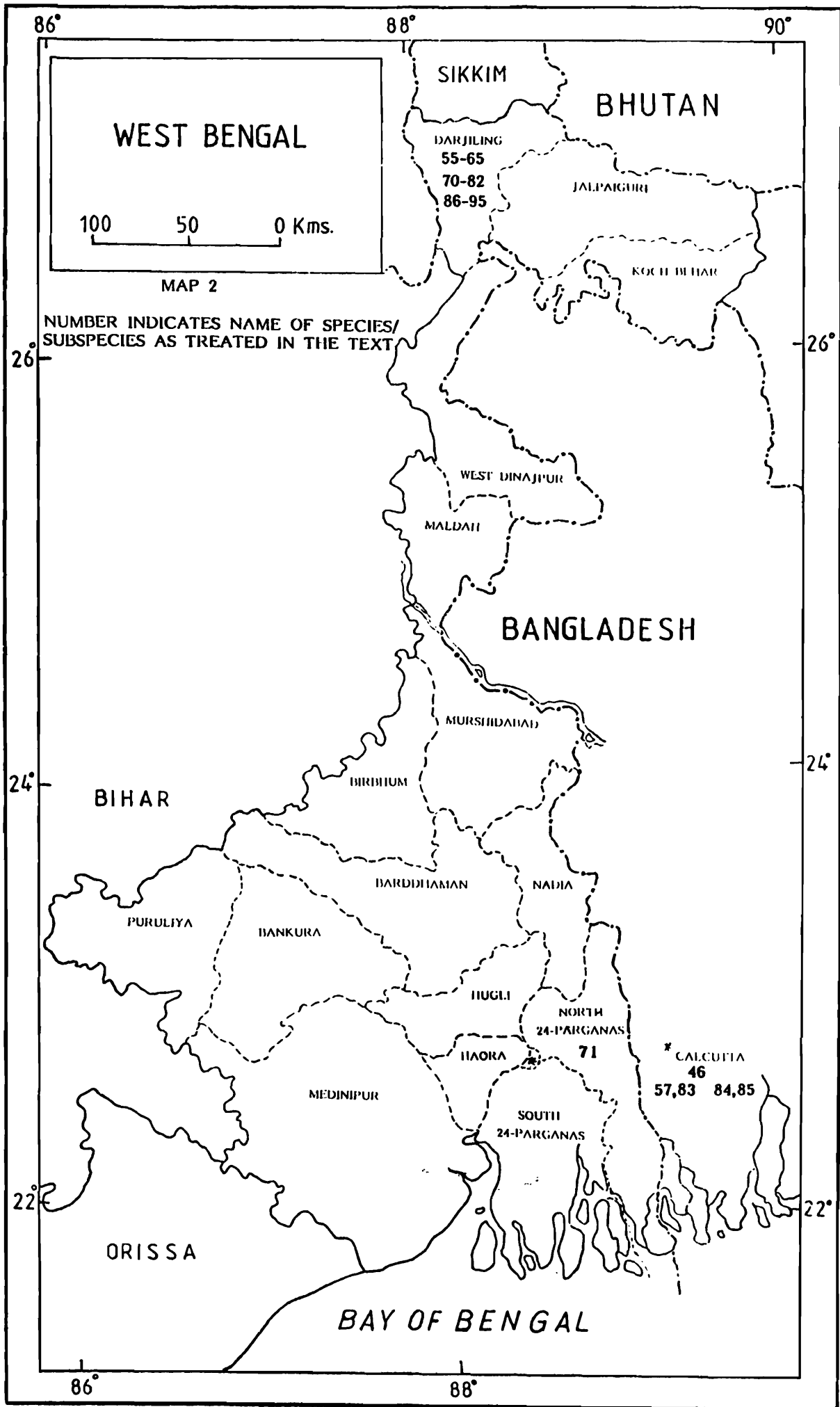
I express my deep sense of gratitude to Prof. (Dr.) Virendra Gupta, Florida, U.S.A., for the generous supply of literature and notes for writing this paper.

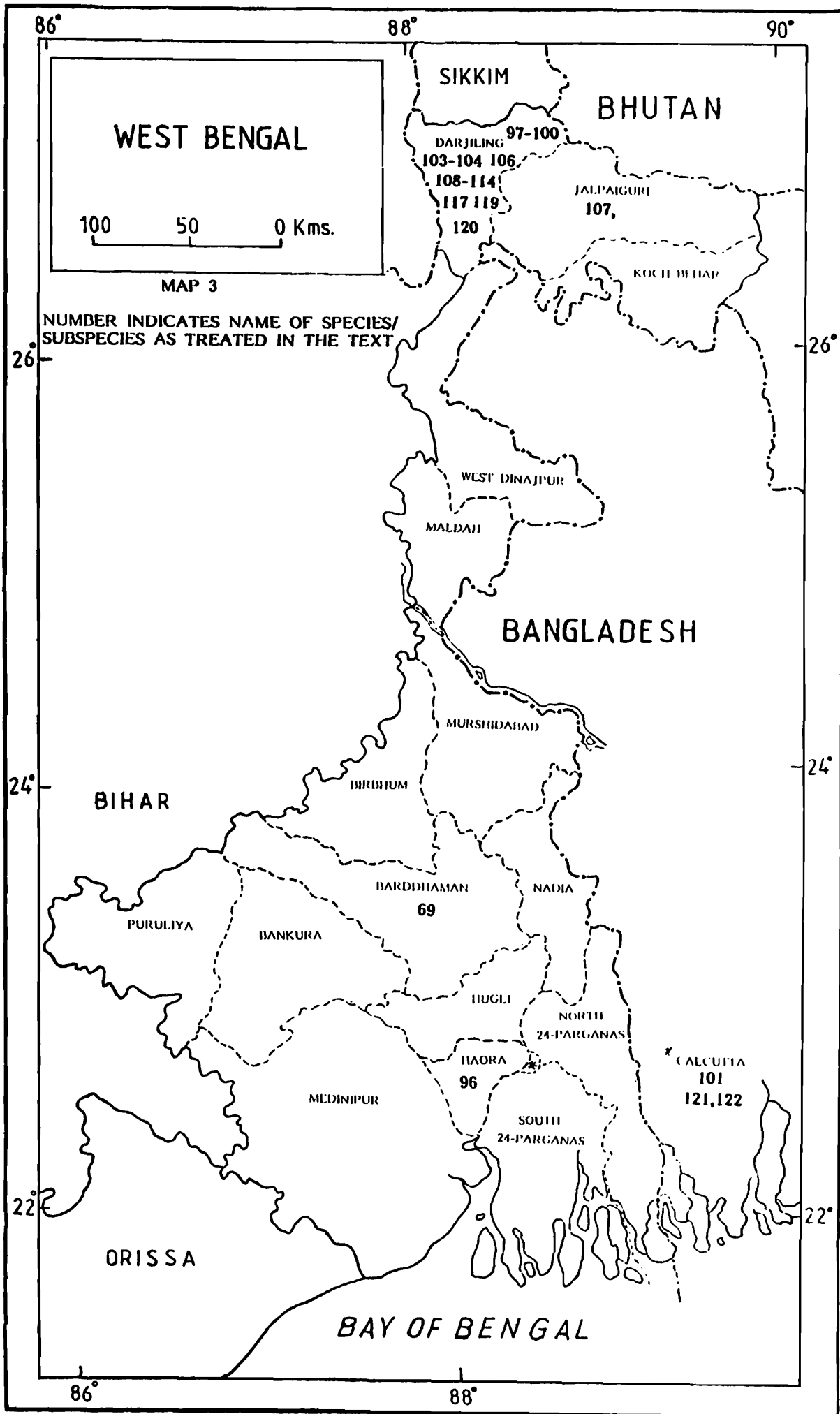
I am grateful to Dr. A. K. Ghosh, Director, Zoological Survey of India for providing all the facilities to carry out this research work. I am thankful to Dr. S.K. Bhattacharya, Scientist SG for guidance and encouragement. I am also grateful to Dr. J.R.B. Alfred, Scientist SF, Shri S. Gurunathan, P.P.O. and Shri I.J. Gupta for helping me in various ways.

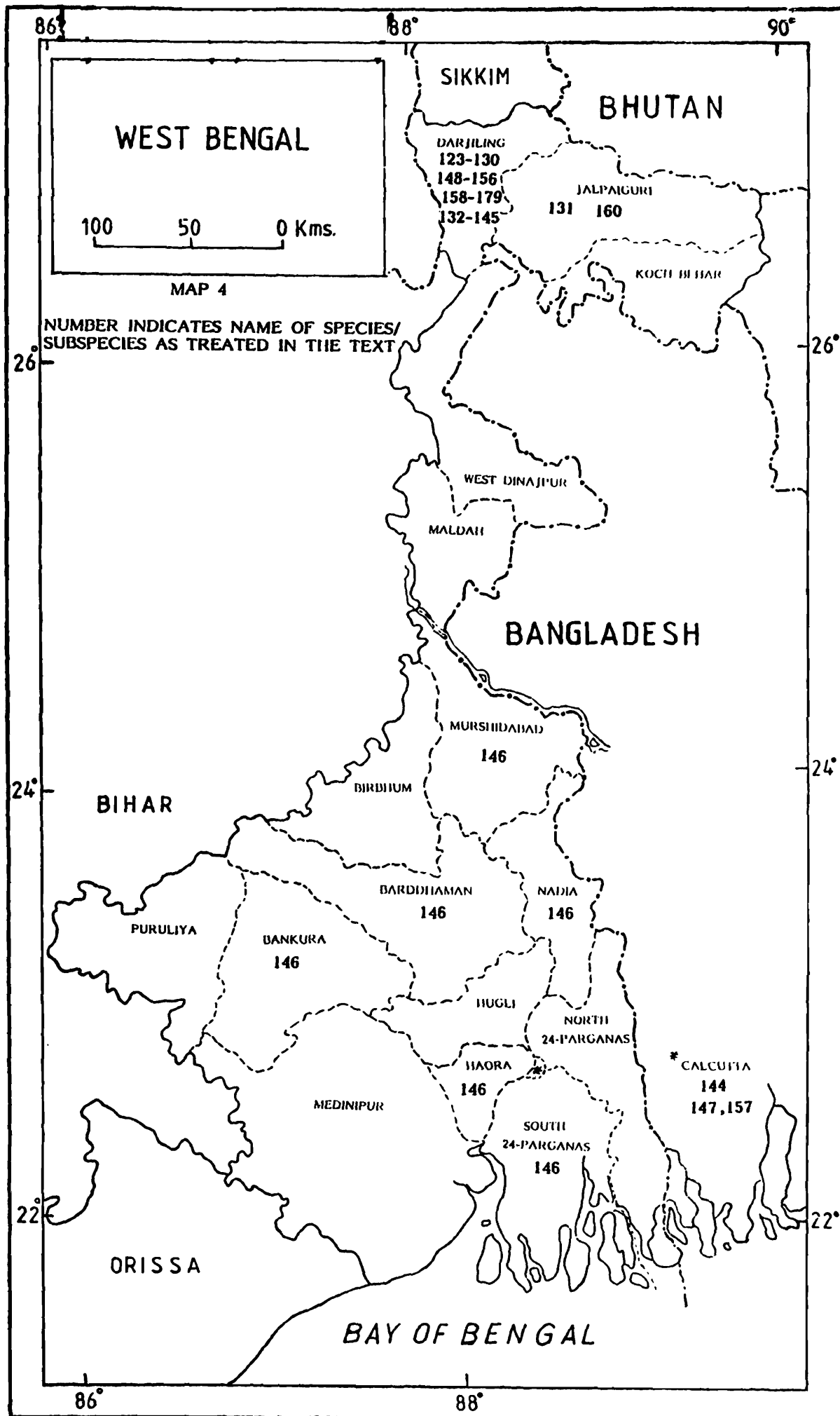
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## **INSECTA : HYMENOPTERA : BRACONIDAE**

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### **INTRODUCTION**

Taxonomic study of family Braconidae (Hymenoptera) of West Bengal is known only from scattered literature by Bingham (1901,1910), Ashmead (1903, 1957), Keiffer (1905), Cameron (1910), Enderlein (1923), Rao (1967) and Sharma & Chatterjee (1970). About 7,000 species from the world, 250 species from India and only 22 species of Braconids are known till date, from West Bengal.

### **MATERIAL AND METHOD**

All the Braconids are parasites and can be collected in the field by sweeping with an insect net from the leaves, flowers and bushes or can be reared from Lepidopterous larvae, in the laboratory. The collected insects then, can be transferred into a killing tube (made with Chloroform or Benzene or Ethyl acetate); on top of the chemicals, a white round, blotting paper can be placed, so that the specimens might not get damaged. The dead Braconids can then be placed into a relaxing or damp box, for relaxation of the body-parts and then can be dried, set and pinned and can be studied by putting the pinned insects, under binocular.

The measurements of the specimens were taken, all in mm.

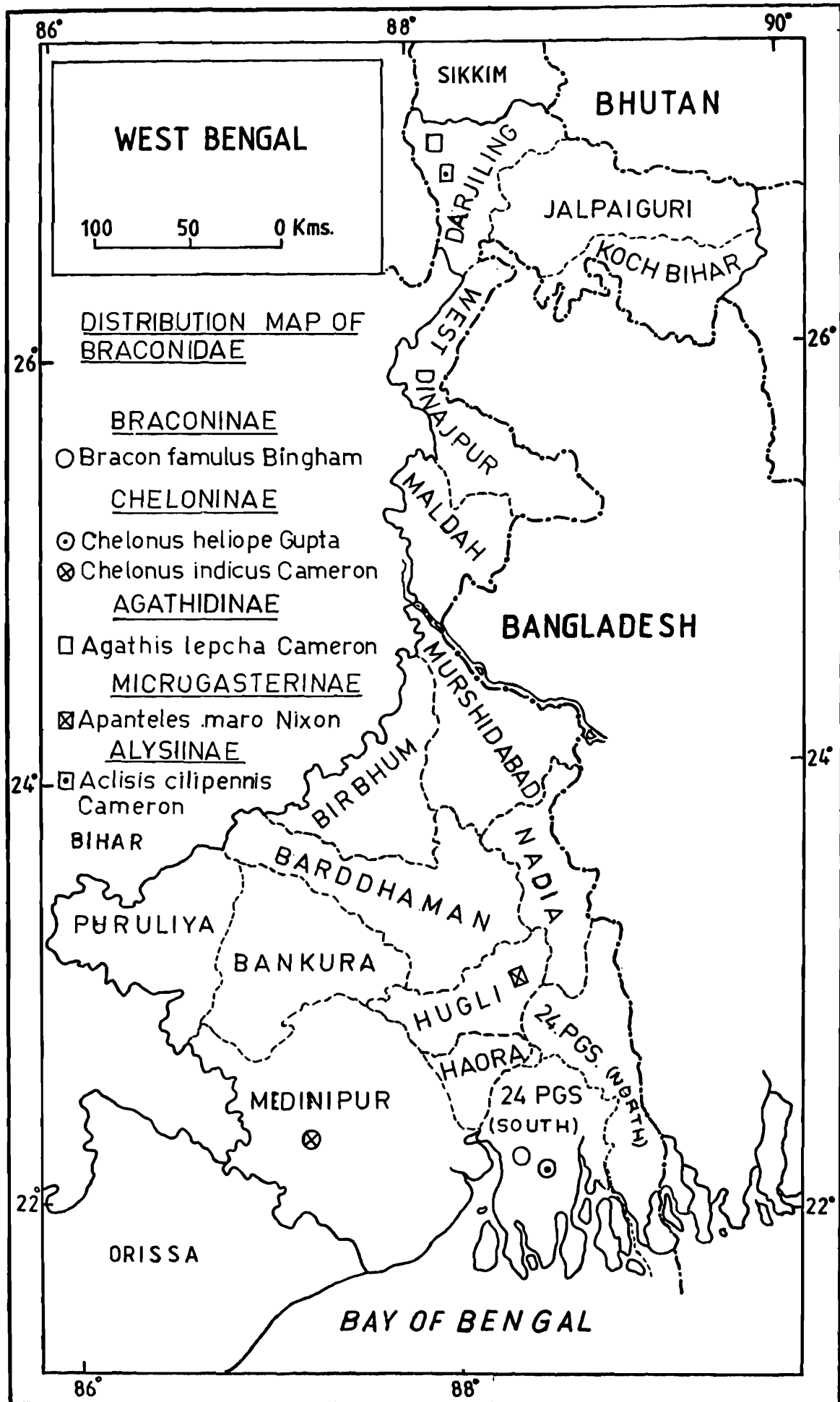
### **MORPHOLOGY AND TERMINOLOGY**

#### **General morphology**

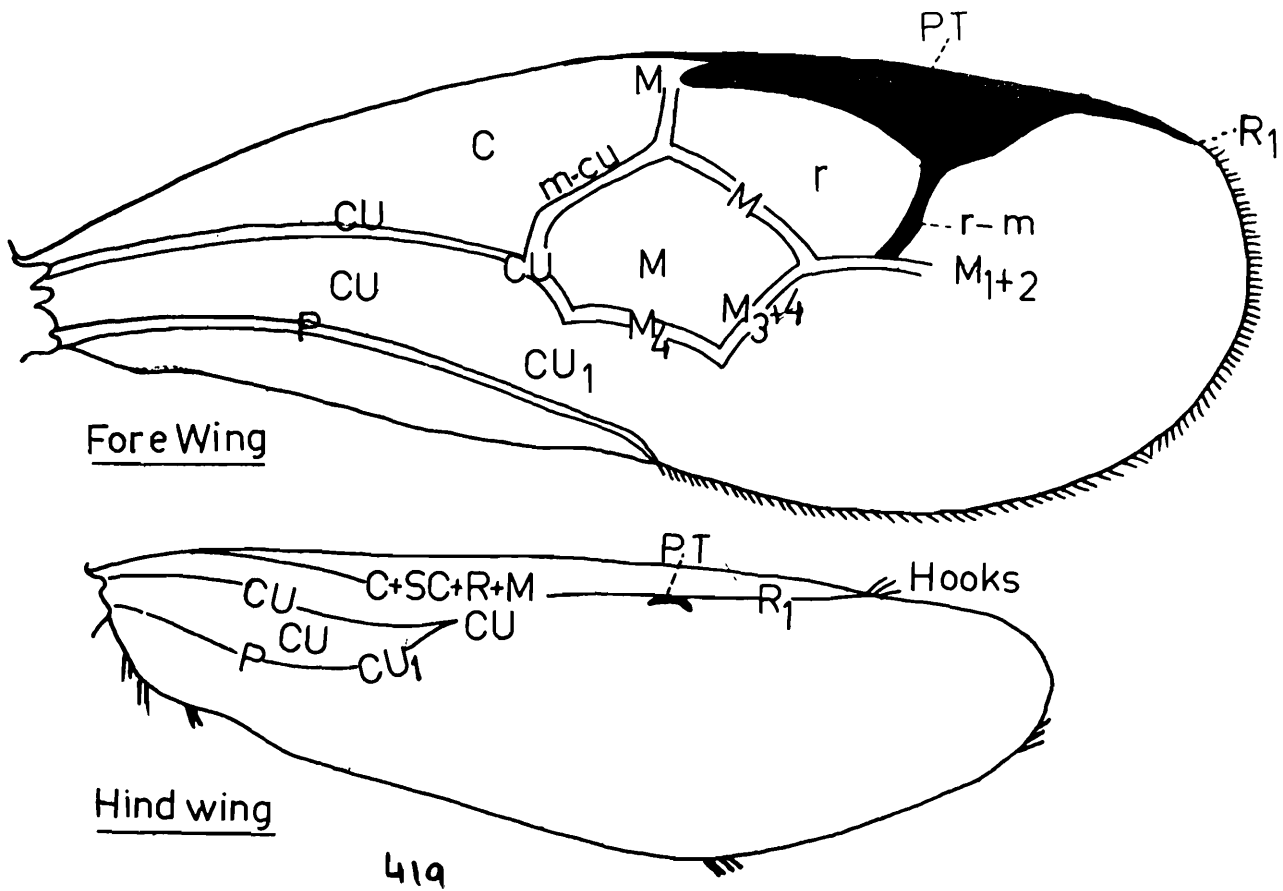
Braconid specimens are small (2.00 mm – 15.00 mm. in size) and have two pairs of membranous wings, the bigger forewings and the smaller hindwings. The cells and venation of the wings may be more or less as the subfamilies may be. The antennae of the head may be longer and many-jointed, in general. Three pairs of walking legs are generally present, of which hind legs are comparatively long. Thorax generally is proportionate to the body. Abdomen is subglobular or subelongated.

#### **List of terms used in key and text**

- Ovipositer – (Or egg-laying organ) is composed of 3 pairs of gonapophyses/valvulae. in fem. Braconid.
- Pterostigma – The black / opaque spot present in subcostal region of forewing.
- Cubital Cells – The cells which articulate median axillary sclerites (or plates) and has 2 median branches
- Discoidal Cells – The central (or disc) cells which limit the cubital cells.



APANTELES Forst. (Braconidae)



4. SYSTEMATIC ACCOUNT

Class INSECTA  
 Order HYMENOPTERA  
 Family BRACONIDAE

Serial no.	Name of the species	Subfamily
1.	<i>Bracon ceceidobius</i> Kieffer	Braconinae
2.	<i>Bracon daphnephibae</i> Kieffer	Braconinae
3.	<i>Bracon famulus</i> Bingham	Braconinae
4.	<i>Bracon niceivilli</i> Bingham	Braconinae
5.	<i>Agathis lepccha</i> Cameron	Agathidinae
6.	<i>Euagathis sikkimensis</i> Enderlein	Agathidinae
7.	<i>Euagathis tricarinata</i> Enderlein	Agathidinae
8.	<i>Doryctes cheops</i> Nixon	Dcryctinae
9.	<i>Chelonus indicus</i> Cameron	Cheloninae
10.	<i>Chelonus heliope</i> Gupta	Cheloninae

11.	<i>Cyclophatnus flavus</i> Cameron	Macrocentrinae
12.	<i>Aclisis cilipennis</i> Cameron	Alysiinae
13.	<i>Rhacalsia rufobalteata</i> Cameron	Alysiinae
14.	<i>Colastes nigropectus</i> Cameron	Exothecinae
15.	<i>Apanteles derjeelingensis</i> Sharma & Chatterjee	Microgasterinae
16.	<i>Apanteles stantoni</i> (Ashmead)	Microgasterinae
17.	<i>Apanteles flaviceps</i> (Cameron)	Microgasterinae
18.	<i>Apanteles maro</i> Rao	Microgasterinae
19.	<i>Apanteles priscus</i> Rao	Microgasterinae
20.	<i>Apanteles ruficrus</i> (Haliday)	Microgasterinae
21.	<i>Apanteles bifida</i> Sharma	Microgasterinae
22.	<i>Microgaster himalayensis</i> Cameron	Microgasterinae

#### Key to the Subfamilies of Braconidae of West Bengal

1. Demarcation of internal cubital cells and discoidal cells, not clear .....2  
Demarcation of internal cubital cells and discoidal cells, clear ..... 3
2. Specimens 10-12 mm., in length ..... Agathidinae  
Specimens less than 10-12 mm., in length ..... 4
3. Antennae markedly thick and long ..... Braconinae  
Antennae moderately thick and short ..... 5
4. Terebra 90 mm., in length ..... Exothecinae  
Terebra less than 90 mm., in length ..... Alysiinae
5. Thorax and abdomen markedly thick ..... Cheloniinae  
Thorax and abdomen moderately thick ..... 6
6. Wing-venation, much reduced ..... Microgasterinae  
Wing-vention, not much reduced ..... 7
7. Legs distinctly long ..... Doryctinae  
Legs moderately long ..... Macrocentrinae

#### I. Subfamily BRACONINAE

##### 1. Genus *Bracon* Fabricius

1805. *Bracon* Fabricius, *Syst. Piezat*, p.102.

#### Key to the species of *Bracon* Fabricius

1. Specimens, brownish-red .....2  
Specimens, dull-testaceous ..... *B. ceceidobius* Kieffer

2. Abodomen, elongate..... *B. nicevelli* Bingham  
 Abodomen, subglobular..... 3
3. Antenna, elongate..... *B. daphnephibe* Kieffer  
 Antenna, short..... *B. famulus* Bingham

1. *Bracon ceceidobius* Kieffer

1905. *Bracon ceceidobius* Kieffer, *Ann.Soc. Brussels*, **29** : 185.

*Distribution* : India : West Bengal.

2. *Bracon daphnephibiae* Kieffer

1905. *Bracon daphnephibiae* Kieffer, *Ann.Soc.Brussels*, **29** : 185.

*Distribution* : India : West Bengal.

3. *Bracon famulus* Bingham

1901. *Bracon famulus* Bingham, *Ann.Mag.nat.Hist.Soc.*, (7) **8** : 556.

*Distribution* : India : West Bengal (Calcutta).

4. *Bracon niceivelli* Bingham

1901. *Bracon niceivelli* Bingham, *Ann.Mag.nat.Hist.Soc.* (7) **8** : 555.

*Distribution* : India : West Bengal (Calcutta).

II. Subfamily AGATHIDINAE

2. Genus *Agathis* Latreille

1804. *Agathis* Latreille, *Noun.Dict.Hist.Nat.*, **24** : 173.

1973. *Agathis* Latreille, Shenefelt, *Hym.Cat.*, (10) : 311.

5. *Agathis lepcha* Cameron

1907. *Agathis lepcha* Cameron, *Tidj.Ent.*, **50** : 113.

*Material* : 2 (m), 2 (F), Darjiling, Coll. J.K.Jonathan & party, May, 1974, body length, mal.-6.00 mm., fem.-7.00 mm.

*Diagnosis* : Face and clypeus densely covered with fuscous pubescence while the abdomen is smooth.

*Distribution* : India : West Bengal (Darjiling), Sikkim.

3. Genus *Euagathis* Szepligeti

1900. *Euagathis* Szepligeti, *Term.Fuz.*, **23** : 62.

1970. *Euagathis* Szepligeti : Shenefelt, *Hym.Cat.*, (6) : 408.

Key to the species of *Euagathis* Szepligeti

Thorax and abdomen covered with dense pubescence..... *sikkimensis* Enderlein

Thorax and abdomen covered with sparse pubescence..... *tricarinata* Enderlein

6. *Euagathis sikkimensis* Enderlein1918. *Euagathis sikkimensis* Enderlein, *Arch.Nat.*, **84A** (11) : 177.1970. *Euagathis sikkimensis* Ferrier & Vecht, *Hym.Cat.*, Part **6** : 415.*Distribution* : India : West Bengal (Darjiling).7. *Euagathis tricarinata* Enderlein1918. *Euagathis tricarinata* Enderlein, *Arch.Nat.*, **84(A)** (11) : 178.1970. *Euagathis tricarinata* Ferrier & Vecht, *Hym.Cat.* Part **6** : 415.*Distribution* : India : West Bengal (Darjiling).

## III. Subfamily DORYCTINAE

4. Genus *Doryctes* Haliday1836. *Doryctes* Haliday, *Ent.Mag.*, **4** : 40, 43.1976. *Doryctes* Haliday : Vecht & Shenefelt, *Hym.Cat.* Part **13** : 1277.8. *Doryctes cheops* Nixon1939. *Doryctes cheops* Nixon, *Ann.Mag.nat.Hist.Soc.*, (11) **3**(17) : 485.*Material* : 1 (fem), Darjiling, Coll. J.K. Jonathan & party, May, 1974; body length, 4.2 mm.*Diagnosis* : Head strongly transverse, ovipositer less than half the length of abdomen.*Distribution* : India : West Bengal (Darjiling).

## IV. Subfamily CHELONINAE

5. Genus *Chelonus* Jurine1801. *Chelonus* Jurine, *Int.Lit.Ztg.*, **1** : 164.1973. *Chelonus* Jurine : Vecht & Shenefelt, *Hym.Cat.*, part **10** : 838.Key to the Species of *Chelonus*Yellow band of abdomen markedly broad ..... *C. heliope* GuptaYellow band of abdomen moderately narrow ..... *C. indicus* Cameron9. *Chelonus heliope* Gupta1955. *Chelonus heliope* Gupta, *Agra Univ.J.Res. (Sci.)*, **4** : 209-211.1973. *Chelonus heliope* Vecht & Shenefelt, *Hym.Cat.* Part **10** : 888.*Material* : 2 (m), 2 (fem), Junput, South-24-Parganas, Coll. A.K.Hazra, 2.viii.1986; body length, fem-4.5 mm., m-4.6 mm.*Diagnosis* : The mid-region of abdominal tergum bears a markedly broad yellow band.*Distribution* : India : West Bengal (South 24-Parganas-new record); Gujarat (Anand).10. *Chelonus indicus* Cameron1907. *Chelonus indicus* Cameron, *J.Bombay nat.Hist.Soc.*, **17** : 584.1973. *Chelonus indicus* Vecht & Shenefelt, *Hym.Cat.*, Part **10** : 584.

**Material** : 1 (m), 1 (fem), Digha, Medinipur, Coll. A.K. Hazra & party, 3.ix.1986; body length, fem-4.3 mm, m-4.5 mm.

**Diagnosis** : Presence of a moderately broad yellow band in midregion of abdominal tergum.

**Distribution** : India : West Bengal (Medinipur-New record); Punjab (Ferozpur).

V Subfamily MACROCENTRINAE

6. Genus *Cyclophatnus* Cameron

1910. *Cyclophatnus* Cameron, *Tijd.Ent.*, **53** : 54.

11. *Cyclophatnus flavus* Cameron

1910. *Cyclophatnus flavus* Cameron, *Tidj.Ent.*, **53** : 54.

**Distribution** : India : West Bengal (Darjiling).

VI. Subfamily ALYSIINAE

7. Genus *Aclisis* Forster

1862. *Aclisis* Forster, *Verh.Nat.Ver.Rheinl.*, **19** : 267.

12. *Aclisis cilipennis* Cameron

1910. *Aclisis cilipennis* Cameron, *Wien.ent.Ztg.*, **29** : 10.

**Distribution** : India : West Bengal (Darjiling).

8. Genus *Rhacalsia* Cameron

1910. *Rhacalsia* Cameron, *Wien.ent.Ztg.* **29** : 9.

13. *Rhacalsia rufobalteata* Cameron

1910. *Rhacalsia rufobalteata* Cameron, *Wien.ent.Ztg.*, **29** : 10.

**Distribution** : India : West Bengal (Darjiling).

VII. Subfamily EXOTHECINAE

9. Genus *Colastes* Haliday

1833. *Exothecus* Thomson, *opusc.Ent.*, **16** : 1697.

1975. *Colastes* Haliday : Vecht & Shenefelt, *Hym.Cat.*, (12) : 1115.

14. *Colastes nigropectus* (Cameron)

1910. *Exothecus nigropectus* Cameron, *Tidj.Ent.*, **53** : 41.

1975. *Colastes nigropectus* (Cameron) : Vecht & Shenefelt, *Hym.Cat.*, (12) : 1122.

**Distribution** : India : West Bengal (Darjiling).

VIII. Subfamily MICROGASTERINAE

Key to the genera of MICROGASTERINAE

Absence of weak external cubital cells in forewing ..... *Apanteles* Forster

Presence of weak external cubital cells in forewing ..... *Microgaster* Latreille

10. Genus *Apanteles* Forster1862. *Apanteles* Forster *Verh.nat.ver Rheintl*, 19 : 245.Key to the species of *Apanteles* Forster

1. Head black .....2  
Head dark-brown .....3
2. Thorax testaceous, legs brownish yellow .....4  
Thorax black, legs brownish red.....5
3. Stigma pale, foretarsus with a small spine..... *A. maro* Nixon  
Stigma not pale, foretarsus with a conspicuous spine.....*A. priscus* Rao
4. Abdomen black.....6  
Abdomen dark-brown.....7
5. Vein 2-r, distinctly long than width of pterostigma.....*A. bifida* Sharma  
Vein 2-r, moderately long than width of pterostigma.....*A. stantoni* (Ashmead)
6. Abdominal tergites with scanty hairs ..... *A. ruficrus* (Haliday)  
Abdominal tergites with more hairs .....7
7. Forewing normal; hind coxa testaceous .....*A. flavipes* (Cameron)  
Forewing large; hind coxa brownish .....*A. darjeelingensis* Sharma & Chatterjee

15. *Apanteles bifida* Sharma1973. *Apanteles bifida* Sharma, *Or.Ins.*, 7(1) : 119.

*Material* : 1 (m), 1 (fem), Darjiling, Coll. J.K. Jonathan & party May, 1974; body length: m. 2.00 mm. fem. 2.2 mm.

*Diagnosis* : Scape of antenna yellowish-brown in female, reddish-brown to black in Male.

*Distribution* : India : West Bengal (Darjiling).

16. *Apanteles darjeelingensis* Sharma & Chatterjee1970. *Apanteles darjeelingensis* Sharma & Chatterjee, *Or.Ins.* 4(2) : 165-168.

*Distribution* : India : West Bengal (Darjiling).

17. *Apanteles flavipes* (Cameron)1891. *Cotesia flavipes* Cameron, *Mem.Proc.Manch.Phil.Soc.* 4(4) : 185.1904. *Apanteles flavipes* Szepliget, *Gen.Ins.*, 22 : 104.

*Material* : 3 (m), 3 (fem), Darjiling, Coll. J.K. Jonathan & party. May, 1974; body length m-2.2 mm. fem-2.3 mm.

*Diagnosis* : Head dark brown, scape of antenna red testaceous; parasitic on *chilo simplex* Butl.

*Distribution* : India : West Bengal (Darjiling); Bihar (Pusa); Delhi.

18. *Apanteles maro* Nixon1967-68. *Apanteles maro* Nixon, *Bull. British Mus. nat. Hist. (Ent.)* **21** : 25.*Diagnosis* : Parasitic on *Diacrisia obliqua* Walker.*Distribution* : India : West Bengal (Hugli).19. *Apanteles priscus* Rao1967-68. *Apanteles priscus* Nixon, *Bull. British Mus. nat. Hist. (Ent.)*, **21** : 24.*Diagnosis* : Parasitic on *Achaea janata* Linnaeus.*Distribution* : India : West Bengal (Hugli).20. *Apanteles ruficrus* (Haliday)1835. *Microgaster ruficrus* Haliday, *Etn. Mag.*, **2**: 253.1929. *Apanteles ruficrus* Wilkinson, *Bull. ent. Res.*, **20** : 108.*Material* : 2 (m), 2 (fem), Darjiling, Coll. J. K. Jonathan & party, May, 1974; body length m. 1.5 mm., fem. 2.00 mm.*Diagnosis* : Antennal scape dark red above, pale brown below; abdomen dark brown; parasitic on *Agrotis* sp.*Distribution* : India . West Bengal (Darjiling), Bihar (Pusa). Delhi.21. *Apanteles stantoni* (Ashmead)1904. *Urogaster stantoni* Ashmead, *J. Newyork ent. Soc.*, **12** : 20.1926. *Apanteles stantoni* Wilkinson, *Bull. ent. Res.*, **19** : 131.*Diagnosis* : Parasitic on Pyralid moths.*Distribution* : India : West Bengal.11. Genus *Microgaster* Latreille1804. *Microgaster* Latreille, *Nouv. Dict. H. N.*, **24** : 175.22. *Microgaster himalayensis* Cameron1910. *Microgaster himalayensis* Cameron, *Wien ent. Ztg.*, **29** : 5.*Distribution* : India : West Bengal (Darjling).

## SUMMARY

Braconids belonging to 22 species, 11 genera and 8 subfamilies have so far been recorded, till date, from different districts of West Bengal, along with synonymy, keys, diagnostic characters, distribution and a map of distribution; 2 species of *chelonus* have been noted, here, as new records from West Bengal.

Studies were made either from the specimens collected by ZSI collectors or from the specimens deposited in the Zoological Survey of India, Calcutta, or from the available literature on the group.

## ACKNOWLEDGEMENT

The author acknowledges his grateful thanks to the Director, Zoological Survey of India, Calcutta, for facilities and senior scientists of the department, for guidelines and encouragement, during the course of work.

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## INSECTA : ANOPLURA

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### INTRODUCTION

The Sucking lice belonging to the order Anoplura are obligatory, permanent ectoparasites adapted to the microenvironment of all the major groups of eutherian mammals except Chiroptera, Edentata, Pholidota, Cetacea, Proboscidea and Sirania (Kim and Ludwig 1978). They appear to have been associated with mammals ever since their appearance in the evolutionary history. Approximately 65% species of mammals are believed to harbour sucking lice. The morphological adaptation of the lice are much pronounced so as to suit best to the ectoparasitic way of life. These lice have attracted attention due to their suspected involvement in some zoonotic diseases and association with diverse group of hosts. They have now been proved to the arthropod vector of relapsing fever, epidemic typhus and trench fever. In addition to their role in transmission of diseases, their bites can cause irritation of skin and interfere with the sleep especially during night; usually bites are associated with local pigmentation of skin which was at one time known as vagabond's disease. Besides, the parasites are recorded to cause certain viral diseases, such as myxoma of rabbits, lymphocytic choriomeningitis of laboratory animals and tularemia (Horsfall, 1962).

According to Kim and Ludwig (1978) the order Anoplura has been classified into 15 families Echinophthiriidae, Enderleinellidae, Haematopinidae, Hamophthiriidae, Hoplopleuridae, Hybophthiridae, Linognathidae, Microthoraciidae, Neolinognathidae, Pecaroceidae, Pedicinidae, Pediculidae, Polyplacidae, Pthiridae and Ratemiidae. Subsequently Chin (1980) added two more families viz. Haematopinoididae and Microphthiridae. Approximately 4060 species of mammals in 1004 genera under 122 families Anderson and Jones (1967) are known throughout the globe of which nearly 900 species are now known to harbour Anopluran parasites. It may be assumed that the numbers of all most all the families of lice have every possibility of occurrence on diverse mammalian fauna of India. Adhikary (1989) recorded/redescribed 58 species belonging to 14 genera and 8 families throughout the country.

In West Bengal 21 species have been recorded/redescribed belonging to the 6 families and 7 genera; these have been collected from 16 species of mammalian host and from seven out of 17 districts of West Bengal; further survey in other districts and host-spectrum is expected to reveal more species of anoplura from the state.

### SYSTEMATIC ACCOUNT : List of Taxa

1. Family Haematopinidae Enderlin  
Genus *Haematopinus* Leach  
1 *Haematopinus eurysternus* Denny

2. *Haematopinus suis* (Linnaeus)
3. *H. tuberculatus* (Burmeister)
2. Family Hoplopleuridae Ewing
1. Subfamily Hoplopleurinae Ewing
  2. Genus ***Hoplopleura*** Enderlin
    4. *Hoplopleura blanfordi* Mishra and Dhanda
    5. *H. captiosa* Johnson
    6. *H. maniculata* (Neumann)
    7. *H. malabarica* Werneck
    8. *H. pacifica* Ewing
    9. *H. ramgarh* Mishra, Bhat and Kulkarni
    10. *H. sicata* Johnson
    11. *H. silvula* Johnson
  3. Family Linognathidae Enderlin
    3. Genus ***Linognathus*** Enderlin
      12. *Linognathus africanus* Kellogg and Paine
      13. *L. setosus* (von-Olfers)
      14. *L. vituli* (Linnaeus)
  4. Family Pediculidae Leach
    4. Genus ***Pediculus*** Linnaeus
      15. *Pediculus humanus* Linnaeus
  5. Family Polyplacidae Fahrenholz
    5. Genus ***Polyplax*** Enderlin
      16. *Polyplax asiatica* Ferris
      17. *P. blanfordi* Mishra and Dhanda
      18. *P. reclinata* (Nitzsch)
      19. *P. stephensi* (Christophers and Newstead)
  6. Genus ***Neohaematopinus*** Mjoberg
    20. *Neohaematopinus echinatus* (Neumann)
6. Family Pthiridae Ewing
  7. Genus ***Pthirus*** Leach
    21. *Pthirus pubis* (Linnaeus)

## METHODOLOGY

The materials were collected both from domesticated and wild mammals. The specimens from individual host were taken out directly by means of a fine camel hair brush and were put in a vial containing 70% alcohol. To avoid contamination utmost care was taken during the search of ectoparasites. A representative specimens of each species of small mammal, from a particular area was preserved for the confirmation of their identity. The large mammals were identified by competent mammalogists.

### *Mounting of specimens :*

Permanent slides of lice were prepared in the following manner :

- i) The specimens were transferred from alcohol to water. A small puncture was made with the help of a fine needle in the abdominal region of each specimen, avoiding the setae. The specimens were then soaked in 10% KOH solution for about 20-24 hours at room temp. ( $28^{\circ}\text{C} \pm 2$ ).
- ii) Each specimens was then gently pressed with the help of a bent needle to remove the dissolved soft parts. They were then transferred into water and washed for 2-3 hours with frequent change of water.
- iii) The specimens were dehydrated by passing them through the ascending grades of alcohol (30%, 50%, 70%, 90%, and 100%). Duration of treatment in each grade varied from 5-30 minutes depending upon the type of specimens.
- iv) These were then transferred into clove oil and kept for 20-30 minutes or until they become clear.
- v) The specimens from clove oil directly mounted in Canada balsam on clear glass slides.

## GENERAL MORPHOLOGY

General Morphology of adult stages of sucking lice have been discussed at length by Ferris (1951). A brief explanation of the terms have been given by Kim and Ludwig (1978) and Mishra (1981). The important taxonomic characters are given below.

The head (Fig. b) generally conical and may be divided into two parts, fore head and hind head, by the presence of a transverse suture. The shape is generally characteristic of each taxon but the head length varies considerably, even within members of a genus. The size of dorsal principal head setae and dorsal posterior central head setae varies among different taxa. The antennae are primarily five segmented, with two distinct sensoria one each on the fourth and the fifth segment. The number of antennal segments varies within a family taxon and is constant within a genus taxon. The position of sensoria in each segment are considered as a valid taxonomic characters at the generic level; the size and shape of the basal segments are often used for determination of species.

The thorax consists largely of a pleural and sub coxal structures. The tergum is greatly reduced and often invaginated to form a notal apophysis. The thoracic segments are dorsally fused. Each segment can be identified by strong pleural apophyses or phragmata and coxal processes. The sternal plate is developed in many taxa and may be various shaped within a given genus. The sternal plate is an important character at generic and specific level but may be absent in some groups.

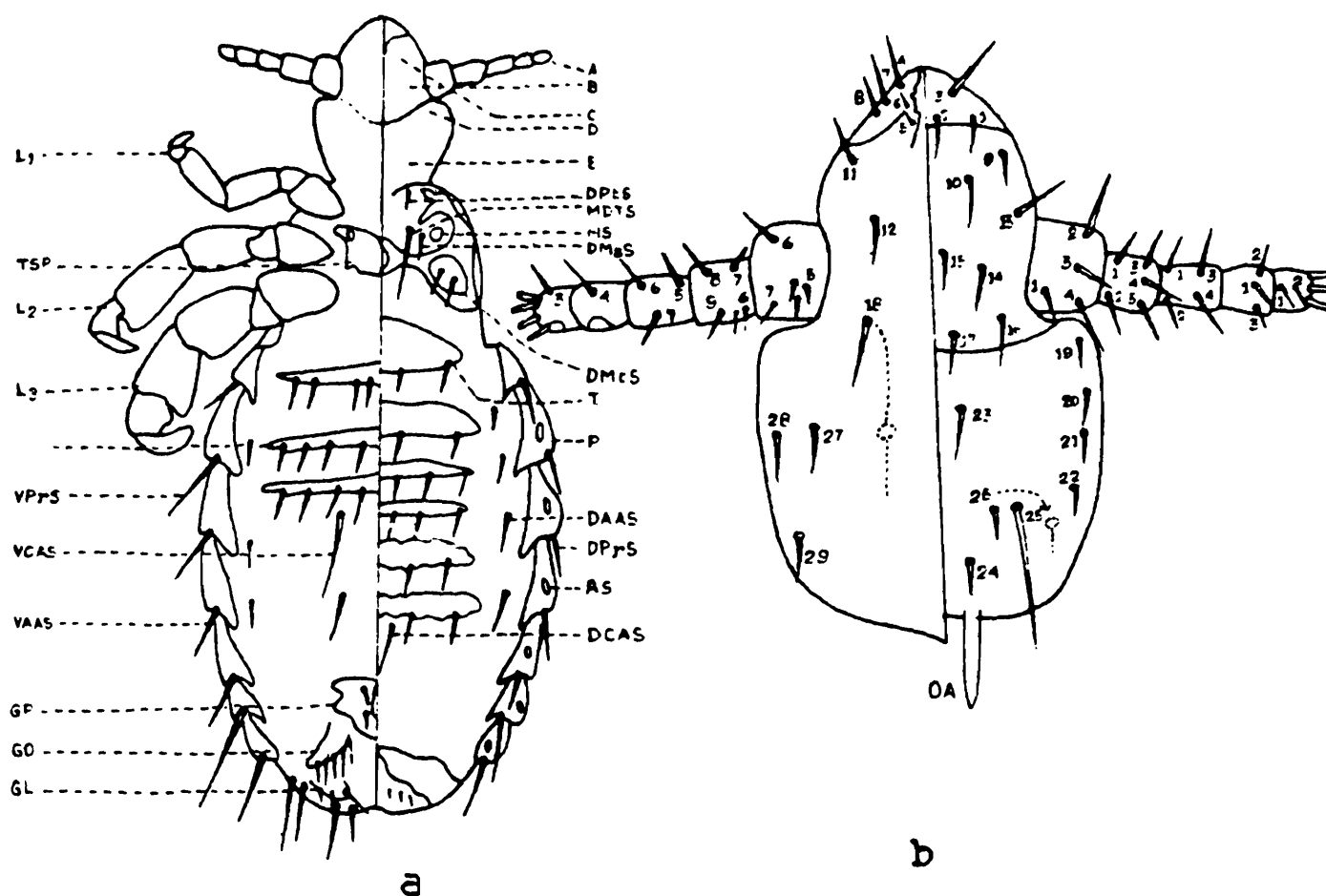


Fig. a. Anatomy and standardized chaetotaxy of typical Anoplura ♀ (generalized). Anatomy : A -Antenna, B Forehead, C Clypeus, D Clypeo-frontal suture, E Hind head, L1 Fore leg, L2 - Mid leg, L3 Hind leg, P Paratergite, S Sternite, T Tergite, AS Abdominal spiracle, G1 Genital lobe, Go Gonopod, Gp Genital plate, Ms Mesothoracic spiracle, TSP Thoracic sternal plate; Chaetotaxy, DPTs Dorsal prothoracic setae, DMtS Dorsal metathoracic setae, MDTS Median dorsal thoracic setae, DAAS Dorsal accessory abdominal setae, DCAS Dorsal central abdominal setae, DPrS Dorsal paratergal setae, VAAS Ventral accessory abdominal setae, VCAS Ventral central abdominal setae, VPrS Ventral paratergal setae.

Fig. B. Standardized chaetotaxy of typical Anoplura (generalized – Head : Left side shows the ventral half and right side is dorsal; setae on head are continuously numbered and setae on each antennal segment are separately numbered without specific positional designation; 1, 2 : Dorsal anterior head setae (DAnHS); 3, 4 : Apical head setae (AphS); 5, 6 : Oral setae (OS); 7, 8 : Anterior marginal head setae (AnMHS); 9, 10 : Dorsal pre antennal lateral head setae (DPaLHS); 11, 12 : Ventral preantennal head setae (VPaHS); 13 : Dorsal pre antennal head setae (DPaHS); 14 : Supra antennal head setae (SPStHS); 15 : Supra antennal central head setae (SPAChS); 16, 17 : Sutural head setae (SHS); 18 : Ventral principal head setae (VPHS); 19, 20, 21, 22 : Dorsal marginal head setae (DMHS); 23 : Dorsal anterior central head setae (DAnChS); 24 : Dorsal posterior central head setae (DPoChS); 25 : Dorsal principal head setae (DPHS); 26 : Dorsal accessory head setae (DAChS); 27 : Ventral lateral head setae (VLHS); 28 : Ventral anterior marginal head setae (VAnMHS); 29 : Ventral posterior marginal head setae (VPoMHS); OA : Occipital apophysis.

The abdomen provides the majority of taxonomic characters and shows striking sexual dimorphism within each species, especially in terminatea. The abdomen consists of nine rather distinct segments with the tenth segment and perhaps eleventh segment remaining obscure. The abdomen is primarily membranous and devoid of sclerites in most Anoplura, although tergites and sternites are highly developed in some groups and in these taxa the abdominal sclerites may be divided longitudinally or transversely. The genital plate in both male and female are usually synsternites.

The number, size and shape of the paratergites provide good taxonomic characters at generic and specific level, when present. Each paratergite usually bear a pair of setae, one on the dorsal side and other on the ventral side.

The abdominal spiracles are usually associated with paratergites. The basic number usually six pairs, one pair each on abdominal segments III to VIII.

The male genitalia consist of four primary parts; basal apodeme, a pair of paramere, aedeagus with gonopore and pseudopenis. In addition there are endomere in some taxa. The basal apodeme is a long, rod like sclerite, the parameres are paired elongate sclerite, the aedeagus or penis is usually membranous or weakly sclerotized tube. The pseudopenis is a Y or V-shaped sclerite between the parameters.

The principal parts of the female genitalia are the sub genital plate, gonopod and spermatheca. The sub-genital plate is form of the sternal plate of the abdominal segment VIII and sometime involves the venter of segment VII. It is variously shaped and usually bears a definite number of setae. The gonopod are paired, sclerotized, flattened lobes or plates on the abdominal segments VIII and IX. The gonopods of segment IX often bear an enlarged seta which is generally referred to as genital seta (Kim 1965). A very delicate sclerotized or inconspicuous spermatheca is present in many genera. An unsclerotized or only partially sclerotized plate (valva) occurs between the gonopods of segment VIII in many cases Kim (1966b). The valva is variously shaped; it may be tapered, serrated, or even blunt at the apex.

#### Key to the families recorded in West Bengal

- 1 Head with distinct eyes or prominent ocular lobes..... 2
- Head without distinct eyes ..... 4
2. Head with prominent ocular lobes, thoracic sternal plate strongly sclerotized, abdominal paratergites present on segment II or III to VIII which are strongly sclerotized, cap like, their margins not free from the body wall; segmental setae arranged in simple transverse rows.....  
.....HAEMATOPINIDAE
- Head with distinct eyes..... 3
3. Thoracic phragmata well developed, head relatively short abruptly constricted posteriorly into the neck; thoracic sternal plate sclerotized or completely lacking; abdomen long' paratergites as a sclerotized cap or lobes on IV to VII not free from the body wall..... PEDICULIDAE

- Thoracic phragmata not developed, thorax very wide, fore legs very slender, mid and hind leg very large and stout, each with stout claw; abdomen membranous small; paratergites as sclerotized caps or lobes .....PTHIRIDAE
- 4. Abdominal paratergites usually highly developed and its apex free from the body wall; tergal and sternal plate usually highly developed on abdomen ..... 5
- Abdominal paratergites absent or atmost represented by small tubercles anterior to each spiracles; tergal and sternal plate in abdomen entirely absent..... LINOGNATHIDAE
- 3. Sternal plate on abdominal segment II extended laterally on each side to articulate with the corresponding paratergal plate.....HOPLOPLEURIDAE
- Sternal plate on abdominal segment II never extended laterally on each side to articulate with the corresponding paratergal plates.....POLYPLACIDAE

1. Family HAEMATOPINIDAE Enderlein

1. Genus *Haematopinus* Leach 1915

1915. *Haematopinus* Leach, *Encyclopedia Britannica* Supplement 1. p. 24.

1929. *Haematopinus* Ewing, *Manual of External parasites*, p. 137.

Key to species of the genus *Haematopinus* recorded from West Bengal

- 1. Forehead long, thoracic sternal plate with anterolateral process roughly triangular with a triangular protuberance posterolaterally; abdominal paratergite quadrate, appearing as a black marginal band, tergites strongly sclerotized with small, irregular, submarginal plate .....*suis*
- Forehead short..... 2
- 2. Abdominal paratergites with a tuft of 5-8 posterior setae; thoracic sternal plate nearly rectangular with 2 antero lateral process; head abruptly constricted at the posterior end.....*tuberculatus*
- Abdominal paratergites with 2 or 3 posterior setae; IX abdominal tergite with anteromedial process elongated and acute; female with gonopods short, compact, median sub genital plate subtrapezoid.....*eurysternus*

1. *Haematopinus eurysternus* Denny 1842

1842. *Haematopinus eurysternus* Denny, *Monographic Anoplurum Britinnae* London.

1974. *Haematopinus eurysternus*, Mishra, Bhat and Kulkarni, *Indian J. Med. Res.*, 62 : 1270.

*Material examined* : 3 ♀♀, 2 ♂♂, from Cattle Barddhaman dist. 18.10.88 Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Barddhaman) and through out India. Elsewhere : Worldwide.

*Remarks* : This species is recorded from West Bengal for the first time.

2. *Haematopinus suis* (Linnaeus) 1758

1758. *Pediculus suis* Linnaeus, *Systema Naturae*, (ed. 10) P. 611.

1810. *Haematopinus suis* Leach, *Encyclopedia Britannica* Supplement, 1, P. 24.

1933. *Haematopinus suis*, Ferris, *Contributions towards a monograph of sucking lice* Pt. VI, P. 425-431

*Material examined* : 10 ♀♀, 10 ♂♂ from domestic Swine in Sagar Island. S. 24-Parganas, West Bengal, 10.12.83. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (South 24-Parganas) and wide spread. Elsewhere : Worldwide.

*Remarks* : This species is close to *H. aperis* Ferris and it can be separated by large and strong legs; quadrate paratergite and strongly sclerotized tergites.

3. *Haematopinus tuberculatus* (Burmeister) 1839

1839. *Haematopinus tuberculatus* Burmeister, *Genera Insectorum, Rhynehota, species* 20.

1974. *Haematopinus tuberculatus*, Mishra *et al*; *India J. Med. Res.*, **62** : 1268-1287.

1977. *Haematopinus tuberculatus* Krishna Rao *et al*; *Mysore J. Agric.* **11** : 588-595.

*Material examined* : 20 ♀♀, 20 ♂♂, from *Bus bubalis* in Barddhaman dist., West Bengal, 10.10.83, 12.5.85; Coll. C.C. Adhikary.

*Distribution* India : West Bengal, Barddhaman; Meghalaya, Arunachal Pradesh, Uttar Pradesh, Tamil Nadu, Andaman Islands. Elsewhere : Worldwide.

*Remarks* : This species is close to *H. eurysternus* Denny, but it can be separated by the number of setae on paratergites.

## 2. Family HOPLOPLEURIDAE Ewing

## 1. Subfamily HOPLOPLEURINAE Ewing

2. Genus *Hoplopleura* Enderlein 1904

1904. *Hoplopleura* Enderlein, *Zoo. Anz.*, **28** : 221.

1981. *Hoplopleura* Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 21-22.

Key to the species of the genus *Hoplopleura* recorded in West Bengal

1. Paratergite VIII with dorsal process well developed, ventral posterior process lacking ..... 2
- Paratergite VIII devoid of both the process ..... 3
2. Setae on paratergite III small, almost half of the length of the process, thoracic sternal plate with posterior process long, rounded at tip, median dorsal thoracic setae minute; all paratergites are scaly, paratergites IV to VI each with both processes lobbed, with serrated margins; VII dorsal process wide, ventral narrow..... *ramgarh*
- Setae on paratergite III long; median dorsal thoracic setae long; paratergites IV to VI, each with posterior process lobed, VII with both processes acute, dorsal longer than ventral ..... *captiosa*

3. Paratergite VII with both dorsal and ventral posterior process present; thoracic sternal plate with rounded anterior and long posterior process; paratergites IV and V with both processes lobed and serrated, VI with dorsal process serrated and emerginate, ventral narrow, VII, with both processes well developed and acute.....*silvula*
- Paratergite VII devoid of one or both the processes ..... 4
4. Paratergite VII with dorsal posterior process well developed, ventral process lacking, paratergite VI with ventral process truncated, III and IV, each with posterior processes truncated and emerginate; median dorsal thoracic setae medium sized; abdominal setae sword shaped.....*sicata*
- Paratergite VII devoided of both the processes ..... 5
5. Dorsal and ventral setae on paratergite VI longer than processes, paratergite III to V, each with dorsal and ventral posterior processes small and acute; thoracic sternal plate devoid of anterior and posterior processes, median dorsal thoracic setae long.....*maniculata*
- Dorsal and ventral setae on paratergite VI shorter than process or only ventral seta on paratergite VI longer than process ..... 6
6. Ventral seta on paratergite VI longer than process; paratergites IV to VI, each with dorsal posterior processes notched, ventral posterior processes small and acute; thoracic sternal plate pear shaped with anterior process small, posterior process at apex.....*malabarica*
- Ventral and dorsal setae on paratergite VI, both shorter than processes..... 7
7. Dorsal setae on paratergite IV to VI smaller than processes, paratergites III to V, each with dorsal processes comparatively less wider than ventral process; median dorsal thoracic setae long .....*pacifica*
- Ventral and dorsal setae on paratergite IV to VI both are smaller than processes; thoracic sternal plate with anterior margin straight, posterior process narrow; median dorsal thoracic setae long...  
..... *blanfordi*

2. Family Hoplopleuridae Ewing

1. Subfamily Hoplopleurinae Ewing

2. Genus *Hoplopleura* Enderlein

1904 *Hoplopleura* Enderlein, *Zool. Anz.*, **28** : 221.

1981 *Hoplopleura*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 21-22.

4. *Hoplopleura blanfordi* Mishra and Dhanda

1972. *Hoplopleura blanfordi* Mishra and Dhanda, *J. Parasit.*, **58** : 393-396.

1981 *Hoplopleura blanfordi*, Mishra, *Rec Zool. Surv. India, Occ. Paper*, **21** : 28-30.

*Material examined* : 10 ♀♀, 10 ♂♂ from *Rattus blanfordi*; Ajadha hill, Puruliya, W. Bengal; 12.1.1985; Coll. C.C. Adhikary.

*Distribution* : India : West Bengal; (Puruliya), Maharashtra and Karnataka.

*Remarks* : *H. blanfordi* is recorded from West Bengal for the first time.

#### 5. *H. captiosa* Johnson

1960. *Hoplopleura captiosa* Johnson U.S.D.A. *Tech. Bull.*; **1211** : 23-28

1981 *Hoplopleura captiosa*, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 30-32.

*Material examined* : Paratype 1 ♀, 1 ♂ (V.R.C. Regd. No. 81327) from *Mus booduga*; Kargil, Ladakh; 31.8.67' Coll. A.C. Mishra; 2 ♀♀ 1 ♂ from *Mus booduga* Midnapore, West Bengal; 16.9.85, Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Midnapore); Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir. Elsewhere : Oriental and palearctic region.

*Remarks* *H. captiosa* is recorded from West Bengal for the first time.

#### 6. *Hoplopleura maniculata* (Neumann)

1909. *Haematopinus (Polyplax) maniculatus* Neumann, *Arch. Parasit.*, **13** : 521-523.

1921 *Hoplopleura maniculata*, Ferris, *Contributions towards a monograph of the sucking lice*, Pt. II 112-113.

1981 *Hoplopleura maniculata*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 48-51.

*Material examined* : 15 ♀♀ 10 ♂♂ from *Funambulus pennanti* Puruliya, West Bengal; 18.1.85; Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Puruliya, Bankura); Maharashtra, Gujarat, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh and Tamil Nadu. Elsewhere : Sri Lanka.

*Remarks* : This species recorded from West Bengal for the first time.

#### 7. *Hoplopleura malabarica* Werneck

1954. *Hoplopleura malabarica* Werneck, *Rec. Brazil, Biol.*, **14** : 113-116.

1981 *Hoplopleura malabarica*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 46-47.

1987. *Hoplopleura malabarica*, Adhikary, *Bull. Zool. Surv. India*, **8** : 127-130.

*Material examined* : 10 ♀♀, 10 ♂♂ from *Bandicota bengalensis*, Midnapore, West Bengal; 10.9.1984; Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Midnapore). Elsewhere : Sri Lanka and Thailand.

*Remarks* : This species is recorded from India for the first time.

#### 8. *Hoplopleura pacifica* Ewing

1924. *Hoplopleura pacifica* Ewing, *Bull. Bishop Mus. Honolulu*, **14** : 9.

1981 *Hoplopleura pacifica*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 52-54.

*Material examined* : 3 ♀♀, 3 ♂♂ from *Rattus rattus arboreus*; West Bengal; 18.9.84; Coll. C.C. Adhikary.

**Distribution** : India : West Bengal (Bardhaman); Arunachal Pradesh, Meghalaya, Orissa, Maharashtra, Rajasthan, Madhya Pradesh, Arunachal Pradesh. Elsewhere : Oriental and Australian regions.

**Remarks** : This species is recorded from West Bengal for the first time.

### 9. *Hoplopleura ramgarh* Mishra, Bhat and Kulkarni

1972. *Hoplopleura ramgarh* Mishra *et al.*, *Parasit*; **65** : 11-21.

1981. *Hoplopleura ramgarh*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 55-57.

**Material examined** : 5 ♀♀, 5 ♂♂ from *Mus sexicola* in Ajadha Hill, Puruliya, West Bengal. Coll. C.C. Adhikary.

**Distribution** : India : West Bengal(Puruliya); Orissa and Maharashtra.

**Remarks** : This species is recorded from West Bengal for the first time.

### 10. *Hoplopleura sicata* Johnson

1964. *Hoplopleura sicata* Johnson, *Misc. Publs. Ent. Soc. Am.*, **4** : 73.

1981. *Hoplopleura sicata*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 59-61.

**Material examined** : 12 ♀♀, 10 ♂♂, from *Rattus niviventer* in Shillong, Meghalaya; 4.7.85; coll. C.C. Adhikary.

**Distribution** : India : West Bengal, Meghalaya, Sikkim, and Jammu & Kashmir. Elsewhere : Laos and Indonesia.

**Remarks** : this species is close to *H. pacifica* Ewing but it can be separated by well developed dorsal process on paratergite VII.

### 11. *Hoplopleura silvula* Johnson

1972. *Hoplopleura silvula* Johnson, *Pacific Ins.*, **14** : 607-611.

1981. *Hoplopleura silvula*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 141.

**Material examined** : 1 ♀ 1 ♂ from *Vandeleuria oleracea* from Puruliya, West Bengal; 19.1.1985; Coll. C.C. Adhikary.

**Distribution** : India : West Bengal(Puruliya); Maharashtra, Karnataka and Himachal Pradesh. Elsewhere : Laos.

**Remarks** : This species is recorded from West Bengal for the first time.

## 3. Family Linognathidae Enderlein

### 3. Genus *Linognathus* Enderlein, 1905

1905. *Linognathus* Enderlein, *Zool. Anz.*, **29** : 194.

## Key to the species of the genus *Linognathus* recorded in India

1. Gonopods of the female with a sclerotized hook at inner angle of emerginate posterior margins; central abdominal setae in two rows both dorsal and ventral side.....*vituli*

- Gonopods of female not bearing such type of hooks ..... 2
2. Genital plate of the female large and elongate; gonopods slender, convergent, narrowly rounded at the apex ..... *africanus*
- Genital plate of the female relatively small; head small, slightly longer than wide; parameters of the male genitalia pointed at tip..... *setosus*

### 12. *Linognathus africanus* Kellogg and Paine

1911. *Linognathus africanus* Kellogg and Paine, *Bull. Ent. Res.*, **2** : 146.

1977. *Linognathus africanus*, Krishna Rao *et al*, *Mysore J. agric. Sci.*, **11** : 589.

*Material examined* : 10 ♀♀, 10 ♂♂ from goat in Sagar Island, West Bengal; 12.12.83. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (South 24-Parganas); Arunachal Pradesh, Meghalaya, Karnataka, Punjab. Elsewhere : Worldwide.

*Remarks* : This species is close to *L. stenopsis* (Burmeister) but it can be separated by slender, convergent gonopophyses.

### 13. *Linognathus setosus* (Von Olfers)

1816. *Pediculus setosus* Von Olfers, *De vegetativis et animatis corporibus in corporibus animatis reperiendis commentarius*, P. 80.

1932. *Linognathus setosus* Ferris, *Contributions towards a monograph of the sucking lice*, Pt. V. P. 340-344.

1974. *Linognathus setosus*, Mishra *et al*, *Indian J. Med. Res.*, **62** : 1281.

*Material examined* : 4 ♀♀, 5 ♂♂ from Dog in Uttar Pradesh; 9.10.86. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal, Uttar Pradesh, Himachal Pradesh and Jammu & Kashmir. Elsewhere : Worldwide.

*Remarks* : This species is close to *L. pedalis* (Osborn) but it can be separated by large spiracles.

### 14. *Linognathus vituli* (Linnaeus)

1758. *Pediculus vituli* Linnaeus, *Systema naturae*, Ed X, P. 611.

1904. *Linognathus vituli* Enderlein, *Zool. Anz.*, **29** : 194.

1977. *Linognathus vituli*, Krishna Rao *et al*, *Mysore J Agric. Sci.*, **11** : 589.

*Material examined* : 20 ♀♀, 20 ♂♂ from domesticated cattle in Bardhaman, West Bengal, 10.12.84. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Bardhaman) and throughout India. Elsewhere : Worldwide.

*Remarks* : The present specimens correspond with those described by Ferris (1932, 51) but with following differences; dorsal principal head setae long, median dorsal thoracic setae one pair, central abdominal setae in 2 rows.

## 4. Family Pediculidae Leach

4. Genus *Pediculus* Linnaeus 17581758. *Pediculus* Linnaeus, *Systema Naturae*, Ed. X, P. 610.1935. *Pediculus*, Ferris, *Contribution towards a monograph of sucking lice*, Pt. VIII P. 534-535.15. *Pediculus humanus* Linnaeus1758. *Pediculus humanus* Linnaeus, *Systema naturae*, Ed. X, P. 610.1974. *Pediculus humanus*, Mishra et al, *Indian J. Med. Res.*, 62 : 1283.

*Material examined* : 10 ♀♀, 10 ♂♂, from Human head in Calcutta; West Bengal; 10.9.83; Coll. C.C. Adhikary.

*Diagnosis* : Paratergites varying to some extent, but never with dorsal and ventral lobes; gonopophyses sickle shaped, genital plate variable in form.

*Distribution* : India : West Bengal and throughout India. Elsewhere : Worldwide.

## 5. Family Polyplacidae Fahrenholz

## Key to the genera of the family Polyplacidae recorded in West Bengal

Paratergite of abdominal segment II divided into two plates bearing one seta on each plate .....  
.....*Polyplax*

Paratergite of abdominal segment II not divided into two plates.....*Neohaematopinus*

5. Genus *Polyplax* Enderlein 19041904. *Polyplax* Enderlein, *Zool. Anz. Leipzig*, Vol. 28, P. 142, 223.1981 *Polyplax*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, 21 : 81-83.Key to the species of the genus *Polyplax* recorded from West Bengal

1. Thoracic sternal plate with distinct, well sclerotized, handle like prolongation, about one fourth of plate, extending anteriorly between the coxae of first pair of legs; Paratergite III to VI, each with posterior angle acute, both setae long.....*stephensi*
- Thoracic sternal plate devoid of such prolongation ..... 2
2. Setae on paratergite VI longer than plate, spiracles unusually large, Paratergites III to VIII each with roughly triangular, posterior angle rounded.....*reclinata*
- Setae on paratergite VI never longer than plates ..... 3
3. Ventral seta of Paratergite VI about 2 of dorsal seta; thoracic sternal plate with anterior margin concave medially.....*blanfordi*
- Ventral seta of Paratergite VI is equal to dorsal seta, but smaller than plates, thoracic sternal plate roughly triangular, tergites and sternites absent except few small tergites on anterior segments.....*asiatica*

16. *Polyplax asiatica* Ferris

1923. *Polyplax asiatica* Ferris, *Contribution towards a monograph of the sucking lice* Pt. IV, P. 233.

1981 *Polyplax asiatica*, Mishra, *Rec. Zool Surv. India, Occ. Paper*, **21** : 81-87.

*Material examined* : 2 ♀♀ 1 ♂ from *Bandicota bengalensis* in Midnapore, West Bengal; 15.9.85. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Medinipur); Maharashtra, Uttar Pradesh, Punjab, Himachal Pradesh. Elsewhere : Burma, Asia and Africa.

*Remarks* : This species is recorded from West Bengal for the first time.

17. *Polyplax blanfordi* Mishra and Dhanda

1972. *Polyplax blanfordi* Mishra and Dhanda, *J. Parasit*; **58** : 393-399.

1981 *Polyplax blanfordi*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*; **21** : 87-89.

*Material examined* : 2 ♀♀, 4 ♂♂ from *Rattus blanfordi* in Puruliya, West Bengal; 21.1.85. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal(Puruliya); Maharashtra and Karnataka.

*Remarks* : This species is recorded from West Bengal for the first time.

18. *Polyplax reclinata* (Nitzsch)

1864. *Pediculus reclinatur* Nitzsch, *Gesam Naturw*; **23** : 23.

1904. *Polyplax reclinata* Enderlein *Zool. Anz.*, **28** : 142.

1981 *Polyplax reclinata*, Mishra, *Rec. zool. Surv. India Occ. Paper*, **21** : 98-101.

*Material examined* : 5 ♀♀, 5 ♂♂ from *Suncus murinus* in Midnapur, West Bengal; 20.9.84. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal (Medinipur); Arunachal Pradesh, Meghalaya, Orissa, Maharashtra, Uttar Pradesh and Jammu & Kashmir. Elsewhere : Sri Lanka and cosmopolitan.

*Remarks* : This species is recorded from West Bengal for the first time.

19. *Polyplax stephensi* (Christophers and Newstead)

1906. *Haematopinus stephensi* Christophers and Newstead, *Thomp. Yates Lab. Rept.* (n.s.), **7** : 3.

1923. *Polyplax stephensi*, Ferris, *Contributions towards a monograph of the sucking lice*, Pt. IV : 206.

1981. *Polyplax stephensi*, Mishra, *Rec. zool. Surv. India. Occ. Paper*, **21** : 105-108.

*Material examined* : 8 ♀♀, 9 ♂♂ from *Tatera indica* in Puruliya, West Bengal; 15.1.85; Coll. C. C. Adhikary.

*Distribution* : India : West Bengal (Puruliya) and throughout India. Elsewhere : Iran.

*Remarks* : This species is recorded from West Bengal for the first time.

6. Genus *Neohaematopinus* Majoberg 19101910. *Neohaematopinus*, Mjoberg, *Arch. Zool.* **6** : 160.1981. *Neohaematopinus*, Mishra, *Rec. Zool. Surv. India, Occ. Paper*, **21** : 72.20. *Heohaematopinus echinatus* (Neumann)1910. *Haematopinus (Polyplax) echinatus* Neumann, *Arch. Parasit.*, **13** : 517.1912. *Neohaematopinus echinatus*, Cummings, *Bull. Ent. Res.*, **3** : 393.1981. *Neohaematopinus echinatus*, Mishra, *Rec. zool. Surv. India. Occ. Paper*, **21** : 73-77.

*Material examined* : 5 ♀♀, 5 ♂♂, from *Funambulus pennanti* in Puruliya, West Bengal; 19.1.85. Coll. C.C. Adhikary.

*Distribution* : India : West Bengal(Puruliya); Maharashtra, Madhya Pradesh, Gujarat, Himachal Pradesh, Tamil Nadu and Uttar Pradesh.

*Remarks* : This species is recorded from West Bengal for the first time.

## 6. Family Pthiridae Ewing

7. Genus *Pthirus* Leach 18151815. *Pthirus* Leach, *Edinburg Encyclopaedia*, **9** : 27.1935. *Pthirus*, Ferris, *Contributions towards a monograph of the sucking lice*, Pt. VIII, P. 602-603.21. *Pthirus pubis* (Linnaeus)1758. *Pediculus pubis* Linnaeus, *Systema Naturae* ed. X, P. 611.1904. *Pthirus pubis*, Enderlein, *Zool. Anz.*, **28** : 136.

*Material examined* : 10 ♀♀, 10 ♂♂, from Human body, Calcutta, West Bengal; 10.3.85. Coll. C.C. Adhikary.

*Diagnosis* : Abdomen much reduced, first three pairs of spiracles very close together; gonopophyses strongly sclerotic.

*Distribution* : India : West Bengal(Calcutta) and throughout India. Elsewhere : Worldwide.

## HOST PARASITE LIST

<i>Host</i>	<i>Parasite</i>
<i>Bandicota bengalensis</i>	<i>Hoplopleura malabarica</i>
	<i>Polyplax asiatica</i>
<i>Bos bubalis</i>	<i>Haematopinus tuberculatus</i>
<i>Fumambulus pannanti</i>	<i>Hoplopleura maniculata</i>
	<i>Neohaematopinus echinatus</i>
<i>Mus booduga</i>	<i>Hoplopleura captiosa</i>
<i>Mus sexicola</i>	<i>Hoplopleura ramgarh</i>

<i>Rattus blanfordi</i>	<i>Hoplopleura blanfordi</i>
	<i>Polyplax blanfordi</i>
<i>Rattus rattus arboreus</i>	<i>Hoplopleura pacifica</i>
<i>Rattus niviventer</i>	<i>Hoplopleura sicata</i>
<i>Suncus murinus</i>	<i>Polyplax reclinata</i>
<i>Tatera indica</i>	<i>Polyplax stephensi</i>
<i>Vandeleuria oleracea</i>	<i>Hoplopleura silvula</i>
<i>Domesticated Mammals</i>	
<b>Host</b>	<b>Parasite</b>
Cattle	<i>Haematopinus eurysternus</i>
	<i>Linognathus vituli</i>
Dog	<i>Linognathus setosus</i>
Goat	<i>Linognathus africanus</i>
Swine	<i>Haematopinus suis</i>

Besides the above *Pediculus humanus* *Pthirus pubis* have been recorded from Man.

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*State Fauna Series 3*

# FAUNA OF WEST BENGAL

PART-8

INSECTA

(Trichoptera, Thysanoptera, Neuroptera, Hymenoptera and Anoplura)

*Edited by*

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1999