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
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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 yeilds 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.

**DIAGONOSTIC 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, Rhyacophiloida, 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. Arctopsychoidea has not been considered as a family and the genus Arctopsyche has been placed in the family Hydropsychidae instead of Arctopsychoidea.

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 ............................................. STENOPTYCHIDAE

3. Mesoscutum with a pair of rounded setal warts ....................... POLYCENTROPIDAE
   Mesoscutum without setal warts ......................................... HYDROPSYCHIDAE

Key to families of the superfamily RHYACOPHILIOIDEA

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

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)

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 R3 + 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 *Dolophilie/a* Ulmer

*6. Dolophilie/a relic/a* Martynov


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

*Remarks*: Martynov (1935) described the species from Kurscong. 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* MacLachlan

**Key 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.


*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


*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)


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.

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.

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

Genus *Plectrocnemia* Stephens

*12. Plectrocnemia aurea* Ulmer


*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


*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


*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 tricalcarata Martynov

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)  


*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  
2. 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 ..................  
2. Forewing with a dark brown band at middle and at apex ....................... *fastosum fastosum* Walker  

18. *Macronema fastosum fastosum* Walker  


*Materiae 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  


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

*Length of forewing*: 8 mm.
GHOSH & CHAUDHURY: *Insecta: Trichoptera*

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

*Remarks*: The authors agree 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 pubescence; legs yellow but femora brown.

20. *Macronema pseudoneura* Brauer


*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


*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


*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* MacLachlan

23. *Arctopsyche Lobata* Martynov


*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 *Dipleclrona* Westwood.

24. *Dipleclrona marqinala* (Betten)


*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 *Dipleclrona* 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* Pictet

Key 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


*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)


Length of forewing: 8-11 mm.


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. Ilydropsyche 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


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


*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


*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

... *R. 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

... *R. digitata* Martynov

31. *Rhyacophila rhombica* Martynov


*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


**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


**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, membrance 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 LIMNEPHILOIDEA
Family PHRYGAENIDAE
Genus *Eubasilissa* Martynov

35. *Eubasilissa machlachlani* (White)


*Length of forewing*: 33 mm.

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

Genus *Neurocyta* Navas

36. *Neurocyta arenata* Navas


*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 there fore not possible to comment on the species.

Family LIMNEPHILIDAE
Genus *Phylostenax* Mosely

*37. Phylostenax himalus* Mosely


*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 A2 and apical forks 1, 3 and 5 ....................... *Paraphlegopteryx* Ulmer
   Forewing with Cu A2 lacking and with apical fork no. 1, 2 and 3... *Indocrunoecia* Martynov
Genus **Dinarthrum** MacLachlan

38. **Dinarthrum (Indodinarthrum) latum** Martynov


**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** Martynov

39. **Indocrunoceia heterolepida** Martynov


**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 summerised 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


**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

**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


*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 genitalie features between the two were not stated by Martynov (1936).

Family CALAMOCERTIDAE

Genus *Ganonema* MacLachlan

*43. Ganonema salsum* Betten


*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* Kolenati

*44. Triplectides magnus* (Walker)


*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. 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. 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


*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.

**REFERENCES**


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


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 ornatisimus Schmutz is recorded for the first time from India. Altogether 8 new genera - Ajothrips Bhatti; Biltlothrips Bhatti; Zaniothrips Bhatti; Lefroyothrips Prisener; Projectothrips Moulton; Monilothrips Moulton; Ablemothrips Ananthakrishnan and Ocythrips Ananthakrishnan have been described from the State of which 3 genera - Ajothrips, Biltlothrips 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 recored 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 twings, aerial roots, grass, within plant galls and a few are preaceous 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 tress 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:


**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-terebrantian 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 venis and setae. .................................................. (Suborder Tubulifera) Family PHLAEOOTHIRIPIDAE Maxillary styles uniformly thin, never broadended; narrower than labial palps.............................. Subfamily PHLAEOOTHERIPINAE Maxillary styles thickened; band like; broadened at apex, broader than labial palps ................................. Subfamily IDOLOTHIRIPINAE 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 distinctly widened towards apex, racket shaped. Antennae stout with rigid setae on intermediate segments ........................................ Subfamily MYMAROTHIRIPINAE 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 AEOLOTIRIPINAE 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 MEROTHIRIPIDAE 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, atmost with transverse striae ........................................ Subfamily THRIPINAE Terminal antennal segments not long and thin needle-like. Dorsum of body deeply reticulate with polygonal areas ................................................................. Subfamily PANCHAETOTHIRIPINAE

Key to the genera of the Family Aeolothuripidae

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 Haliday

1836. Aeolothrips Haliday, Ent. Mag., 3 : 451

Key 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..........................................................

collaris Preisner

1. Aeolothrips collaris Preisner


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 Bagnall


**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. Bhatti (1964) recorded this common European species from India and since then the species was not reported anywhere from India.

**Genus 2. Mymarothrips** Bagnall


3. *Mymarothrips garuda* Ramakrishna & Margabandhu

(Text-figure 3)


**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.

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**Text-Fig. 3. Mymarothrips garuda** R&M. A. Head and pronotum. B. Antenna. C. Forewing
Family MEROTHRIPIDAE
Genus 3. Merothrips Hood


4. Merothrips indicus Bhatti & Ananthakrishnan


General body colour pale brown; head dark brown; antennal segments 1 & 3-8 concolourus 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.


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

2. Dorsum of body deeply reticulate with polygonal areas. Terminal antennal segments long and thin, needle like (Subfamily Panchaetothripinae) ........................................................... 31

3. Abdomen with dense rows of microtrichia (Tribe Sericothripini) ............................................. 4

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 setae 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 posterior marginal 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 at 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 mediadorsal 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 metasternum with spinula ..........................................................14

Meso - and metasternum without spinula. Antennals segments 3 & 4 with simple sense cones. Foretibiae at inner apex with long trifid spur. Femra divided. ³Wings 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


15. Spinula present on mesosternum, absent on metasternum. Head partly with polygonal reticulations. Anteroangualrs 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. Femra 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..............................Bilothrips 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 area. 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 postangulars; anteromarginals shorter than postangulars.............. 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. Abdominal segments II-VIII with an incomplete comb. Antennal segment 6 enlarged; segment 2 of style very long.................................................................................. Projectothrips Moulton
Atmost 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 anteroangulars.............. 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, usualy 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........................................................................................................ Myletherothrips 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 Priesner
Postoculars in a single row. Head parallel sided, males with checks 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
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-VIII with teeth or scallops. Head small..............................
..............................................................................................................*Microcephalothrips* Crawford
Atmost 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.................................
..................................................................................................................*Monithlothrips* 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..........................................................*Helionothrips* 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  


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. Posteroangulares 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. Posteroangulares longer, outer 55-58 and inner 70-73 long respectively. Forefemora 74 wide .......................................................... *gara* Bhatti  

5. *Ajothrips gara* Bhatti  


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

6. *Ajothrips karma* Bhatti  


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

Genus 5. *Anaphothrips* Uzel  


7. *Anaphothrips sudanensis* Trybom  


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; Puerto Rico; Trinidad; Cuba.

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

Genus 6. Aptinothrips Haliday


8. *Aptinothrips rufus* (Gmelin)


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

Genus 7. Aroidothrips Ananthakrishnan


9. *Aroidothrips longistylus* Ananthakrishnan


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

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

Genus 8. Ayyaria Karny


10. *Ayyaria chaetophora* Karny


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


11. Bathrips melanicornis (Shumsher)


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. Bilothrips Bhatti


12. Bilothrips minutus (Bhatti)


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

Genus 11. Bolacidothrips Preisner


13. Bolacidothrips graminis indicus Ananthakrishnan


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 posteroangulars 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.

Slale Fauna Series 3 : Fauna of West Bengal


**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**


14. *Craspedothrips minor* (Bagnall)


**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


15. *Ctenothrips niger* Kudo


**Female (Macropterus & Brachypterus)** 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. Postocularrays 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 pairsl 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.


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

Genus 14. *Dichromothrips* Preisner

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


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

1. Pronotum with 2 pairs of long and subequal posteroangular setae. Postero-lateral 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. Postero-lateral 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


**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


*Macropterus 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 median 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 postero marginal 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 glandulars areas.

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

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

Genus 15. *Dorcadothrips* Priesner


**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 submedian 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


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

19. *Dorcadothrips indicus* Bhatti


*Distribution*: India: West Bengal (Haora); M. P.; Maharashtra; Karnataka & Andhra Pradesh.
Genus 16. *Exothrips* Priesner


20. *Exothrips hemavarna* (Ramakrishna & Margabandhu)


*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


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 concolorous 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)


**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


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

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

Genus 18. *Lefroyothrips* Priesner


23. *Lefroyothrips lefroyi* (Bagnall)


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

Genus 19. *Megalurothrips* bagnall

24. *Megalurothrips distalis* (Karny)


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


25. *Megaphysothrips subramanii* Ramkrishna & Margabandhu


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

Genus 21. Microcephalothrips Bagnall


26. Microcephalothrips abdominals (Crawford)


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

Genus 22. Mycerothrips Trybolon


27. Mycerothrips setiventris (Bagnall)


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

Genus 23. Organothrips Hood


28. Organothrips indicus Bhatti

(Text Figure 5)


**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


29. *Priesneriola o'niellae* Ananthakrishnan


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


Genus 25. *Proctothrips* Moulton


30. *Proctothrips pruthi* Moulton


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

Genus 26. *Pseudodendrothrips* Schmutz


31. *Pseudodendrothrips ornatissimus* Schmutz


*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


Key to the Species of *Rhamphothrips*

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


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.

Intercellular 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


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

Genus 28. *Scirtothrips* Shull


34. *Scirtothrips dorsalis* Hood


*Distribution*: India: West Bengal [Calcutta, Coochbehar, Purulia, 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 Chillies. Sen et al (1988) recorded this species from West Bengal.
Genus 29. *Scolothrips* Hinds


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


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


36. *Scolothrips rhagebianus* Priesner


*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

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)


*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)


**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


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

40. *Stenchaetothrips indicus* (Ramakrishna & Margabandhu)


**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)


**Key to the Species of Thrips**

1. Mouthcone very long and narrow, surpassing base of prosternum; maxilacy 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

.................................................................................................. hawaiensis (Morgan)

Antennal segment 5 dark and segment 6 shorter than 4. Posterior ssela 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 sensille. 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 sternites 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................................................................. lalis 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. Intercellular 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)
1969. Thrips andrewsi Bhatti, Oriental Ins., 3 (4) : 380

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 color 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


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


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

44. *Thrips beharensis* Ramakrishnan & Margabandhu


*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


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

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

46. *Thrips flavus* Schrank


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

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

47. Thrips hawaiiensis (Morgan)
(Text-figure 7)

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


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

Remarks: This species is recorded for the first time from West Bengal.
48. *Thrips latis* Bhatti


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

49. *Thrips orientalis* (Bagnall)


*Distribution*: West Bengal [Calcutta, 24 Parganas (South)]; Tamil Nadu; Maharashtra; Punjab; Delhi, Elsewhere: Malaysia; 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


*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


51. *Trichromothrips arorai* Bhatti

(Text-figure 8)


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.


Distribution: India: West Bengal (Haora).

Genus 33. Tusothrips Bhatti


52. Tusothrips setipravis (Karny)


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

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

Subfamily PANCHAETOTORIPINAE

Genus 34. Astrothrips Karny


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)


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


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.


*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


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)


**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)


**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


57. *Helionothrips kadaliphilus* (Ramakrishna & Margabandhu)


**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


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


**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 remora and mid & hind tibiae (legs golden yellow); wings yellowish along margin and whitish at middle. All setae dark.

Head broader than long, distinctly produced in front between bases of antennae, anterior margin of projection concave; cheeks slightly arched; 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; tergites 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.


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

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

Genus 38. Panchaetothrips Bagnall


59. Panchaetothrips indicus Bagnall


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 kempi* Moulton. A. Head and Pronotum. B. Abdominal sternum V. C. Terminal abdominal segments of male.

Genus 39. *Phibalothrips* Hood


60. *Phibalothrips peringueyi* (Faure)


*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

61. *Retithrips syriacus* Mayet


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

Genus 41. *Rhipiphorothrips* Morgan


62. *Rhipiphorothrips cruentalus* Hood


**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

63. Selenothrips rubrocinctus (Giard)


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


Genus 43. Zaniothrips Bhatti


64. Zaniothrips ricini Bhatti


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

Remarks: Bhatti (1967) described Zaniothrips ricini from Jabalpore (M.P.) and Sibpore Botanical Garden, Howrah (West Bengal) and since then the species was not reported from anywhere. This species was collected from Castor leaf 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 Phylaeothripinae) ..................3

Maxillary styles broad, band-like (Subfamily Idolothripinae) ......................................28
3. Fore wings banded, narrow, more widened at base. Males with a well developed spur or tooth on inner side of forefemora; major females also with weak spur.....*Aleurothrips* 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 setae 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

Maxillae styles long, retracted into head capsule ................................................5

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.................................................................*E cacanthothrips* Bagnall

Sensecones on antennal segment 3 almost 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 bulged. 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 without notch 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, almost 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...........................................*Hoplantrothrips* 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 .......................................................................................... \textit{Liothrips} Uzel
    Head shorter, Pronotum heavy and much longer than head. Forefemora of oedymcrous 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 .............. \textit{Hoplothrips} Serville
    Oedymcrous males when present without forefemoral or foretibial teeth .......... 15
15. Pronotum with twisted striae. Postoculcurs usually one pair, occasionally two pairs. Mouthcone
    very broadly rounded ........................................................................ \textit{Gynaikothrips} Karny
    Pronotum without twisted striae, almost with transverse striae ..................... 16
16. Tube very much longer than head. Head very little produced and with a clear notch behind eyes;
    cheeks wide behind eyes. Tube pilose. Integument strongly sculptured .... \textit{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 .................................................................. \textit{Euoploothrips} 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 ocular, closely approximate. Foretarsi unarmed in both
    sexes ....................................................................................................... \textit{Ablemothrips} Ananthakrishnan
    Head not elongate, almost as longer than pronotum. Cheeks constricted at base and slightly
    spinose. Forefemora usually enlarged. Wings narrow ................ \textit{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 .......... \textit{Podothrips} Hood
    Foretibiae unarmed .................................................................................. 22
22. Maxillary styles short, retracted just above mouthcone. Checks convex, serrate. Foretarsi with
    tooth only in males ................................................................................ \textit{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 gynaccoid
    males and more enlarged in oedymcrous males. Foretarsal tooth when present directed forward
.......................................................................................................................... 24
Antennal segment 3 not very symmetrical. Forefemora of females usually simple, almost
enlarged in males. Forewings with or without double fringes .......... \textit{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..........................................................*Dolicholepta* Priesner

27. Forefemora enlarged Antennal segment 3 stout and with 2-3 sense cones. Metanotal sculpture 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 ..................................................*Nesoethrips* Kirkaldy
Maxillary styles not 'V' like, somewhat close at midle. Antennal segment 4 with 4 sense cones. Fore tarsal 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 oedemerous males, weak in gynaecoid. Oedemerous 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 varied 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 oedemerous males with strongly developed setae general setae well developed. 

**Elaphrothrips** Buffa

Suborder TUBULIFERA
Family PHLAEOOTHRIPIDAE
Subfamily UROTHRIPINAE

Genus 44. **Stephanothrips** Trybom


65. **Stephanothrips occidentalis** Hood & Williams


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

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

Subfamily PHLAEOOTHRIPINAE
Genus 45. **Ablemothrips** Ananthakrishnan


66. **Ablemothrips maxillatus** Ananthakrishnan


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 oculad, entire length closely approximate.

Pronotum short with twisted striae. Prothoracic setae short; anteroangulars, anteromarginals, midlateral and posteroangulars almost subcqucl, epimerals a little longer. Fore femora not much enlarged; foretarsi unarmcd. Fore wings mesothripinae, without double fringes.

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

**Genus 46. Aleurodorthips** Franklin


67. *Aleurodorthips fasciapennis* (Franklin)


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

**Genus 47. Antillothrips** Stannard


**Key to the Species of Antillothrips**


................................................................................................................................................. *nayari* (Ananthakrishnan & Jagadish)

Body bicolourous. Prothoracic anteromarginals well developed and expanded at tip..............

................................................................................................................................................. *nayari* (Ananthakrishnan)

68. *Antillothrips nayari* (Ananthakrishnan)


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

**Remarks**: This species is recorded for the first time from West Bengal.
69. *Antillothrips varius* (Ananthakrishnan & Jagadish)


**Distribution**: India: West Bengal (Calcutta); Kerala; U. P.

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

Genus 48. *Arrhenothrips* Hood


70. *Arrhenothrips longisetis* Sen


**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. Postoculares blunt, about half as long as eyes. Antennal segments 3-7 pedicellate. Mouthcone pointed; maxillary styles retracted medially, ‘V’ shaped.

All the prothoracic setae very well developed, slightly knobbled except posteroangulars blunt; mid laterals, posteroangulars and epimera incurved. Fore wings narrow with 18-26 double fringes; basal wing setae very well developed, slightly knobbled. Mesaprosternum incomplete restricted to two lateral sclerites. Pelta apparently pyramidal shaped.


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

Genus 49. *Azaleothrips* Ananthakrishnan


71. *Azaleothrips amabilis* Ananthakrishnan

(Text-figure-11)


**Head** about as long as wide across cheeks; checks convex, widest at checks, narrowed across eyes and base; checks weak warty and with few small spines. Eyes directed forward. Postoculares 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.


Distribution: India: West Bengal (Calcutta, Darjiling); Tamil Nadu; Kerala; Goa; Maharashtra; M. P.; U. P.; Manipur.

Remarks: Ananthakrishnan (1973) recorded this species from West Bengal.

Genus 50. Dolichothrips Karny

Key to the species of Dolichothrips
1. Body with red hypodermal pigmentation. All tibiae yellow. Foretarsal tooth small. Forewings with 8 double fringes ................................................................................... malhavii Ananthakrishnan
   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)


*Specimen studied*: Calcutta : 5 Female (Z. S. I. Reg. Nos. 8592/8, 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)


*Distribution*: West Bengal (Kurseong, Darjiling Dt.)

74. *Dolichothrips malhavii* Ananthakrishnan


*Distribution*: India : West Bengal (Coochbehar Dt.); Uttar Pradesh.


Genus 51. *Ecacanthothrips* Bagnall


75. *Ecacanthothrips tibialis* (Ashmead)


**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


76. **Euoplothrips malabarica** Ramakrishna & Margabandhu


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

**Remarks**: This species is recorded for the first time from West Bengal. *Euoplothrips malabarica* is a 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 anywhere 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


**Key to the Species of Gynaikothrips**

1. Head much longer than wide; tube very long, 1.5 times longer than head. Postoculaters 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. Postoculaters two pairs subequal, shorter than eyes. Maxillary stylets retraced upto the level of postoculaters, close at middle. Forewings faint yellow..........................................................*flavitibia* Moulton
   All tibiae not yellow, mid- and hind tibiae yellow. Head shorter, tube very little than head. Postoculaters 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

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.


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

78. *Gynaikothrips flavitibia* Moulton

(Text fig. 12)


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

Remarks: Ananthakrishnan & Muraledharan (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


*Distribution*: India West Bengal (Birbhum, Calcutta, Nadia); North Malabar.

Remarks: This species is recorded for the first time from West Bengal.
SEN et al.: Insecta: Thysanoptera


Genus 54. Haplothrips Amyot & Serville
(Map 3)


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 bicoulorous. Antennal segments 3 & 4 with 0 + 1 & 2 + 2 + 1 sensccones 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 Priesner.
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)


  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


  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


**Distribution**: India: West Bengal [Bankura, Murshidabad, Puruliya, 24 Parganas (South)]; Tamil Nadu. Elsewhere: Sri Lanka; Java; Sumatra.

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

83. *Haplothrips clarisetis* Priesner


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

84. *Haplothrips ganglbaueri* Schmutz


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.


85. Haplothrips gowdeyi (Franklin)


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


**Distribution**: India: West Bengal (Bankura, Birbhum, Calcutta, Murshidabad, Puruliya); Maharashtra; Rajasthan, Andaman Is. Elsewhere: Bangladesh; Java.

**Genus 55. Hoplandrothrips** Hood


87. *Hoplandrothrips graminis* Ananthakrishnan


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

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

**Genus 56. Karnyothrips** Waston


**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 ...........................................*melaeucus* (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


**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)


**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** (Annthakrishnan & Jagadish)


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

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

Genus 57. **Leeuwenia** Karny

91. *Leeuwenia karnyiana* Prisner


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

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

**Genus 58. *Liothrips* Uzel**


**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 Muralledharan & 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 epimirs & postangulars. Postoculars shorter than eyes.
   Mesopraesternum narrowed. Forewings with 11-20 double fringes. Setae on abdominal segment IX shorter than tube.......................................................morulus Ananthakrishnan & Jagadish

92. *Liothrips aberrans* Muralledharan & Sen


**Female (Male)** : General body colour brown; all femora, mid and hindtibiae brown, forctibiae 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 streak. All setae dark brown, mostly pointed.

Female: 40-48 (56-60)
Male: 40 (48056);

V
Female: 128 (44);
Male: 100-112 (40);

VI
Female: 100 (44);
Male: 80-100 (36);

Mouthcone pointed; maxillary styles occlud, 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 chaetotaqy: 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.


Total body length : 3.52-3.57 (3.11-3.33) mm.


Distribution : India : West Bengal (Darjiling); Sikkim.

93. Liolhrips himalayanus Ananthakrishnan & Jagadish


General body colour brown, antenal segments, 1, 2, 7 & 8 brown, 3 yellow, 4-6 proximal half yellow and distal half brown; all femora mid and hind tibiae brown, forctibiae 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. Postoculurs exceedingly long. Much longer than eyes. Maxillary styles retracted up to the level of postoculurs, close at middle.

Prothoracic anteroangulars longer than anteromarginals; posteroangulars and epimerals subequal. Mesopraesternum constricted at middle. Forewings, with 8-15 double fringes. Tube as long as head.


Distribution : India : West Bengal (Darjiling).
94. Liothrips morulus Ananthakrishnan & Jagadish


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 oculad, 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.


Distribution : India : West Bengal (Darjiling).

59. Membrothrips Bhatti


95. Membrothrips indicus (Hood)


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


Genus 60. Mesothrips Zimmerman


96. Mesothrips jordani Zimmerman


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

Remarks: Ananthakrishnan (1973) recorded this species from West Bengal.

Genus 61. Neoheegeria Schmutz


97. Neoheegeria montana Ananthakrishnan & Jagadish


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; anteroangulura 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.


Distribution: India: West Bengal (Darjiling).

Genus 62. Ocythrips Ananthakrishnan


98. Ocythrips rarus Ananthakrishnan


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 up to 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 D1).
Genus 63. Pegothrips Sen & Muraleedharan


99. Pegothrips meghalaya Sen & Muraleedharan
(Text - figure 13)


Female (Male) : General body colour dark brown; antennal segment 1 dark brown, 2 dark brown at proximal half and margin, 3-8 yellow; all scora, 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. Postcubars 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.


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


Genus 64. Podothrips Hood


Key to the Species of Podothrips

1. Body bicoloured .................................................................................................................................2

   Body unicolours, brown. Antennal segment 3 with one sensecone. Forefemora ocassionally 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 & Ananthakrishnan
100. *Podothrips bicolor* Seshadri & Ananthakrishnan


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

101. *Podothrips lucasseni* (Kruger)


*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)


*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

103. *Rhyncothrips champakae* Ramkrishna & Margabandhu

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

Genus 66. Sophiothrips Hood

104. *Sophiothrips nigrus* Ananthakrishnan

*Apterous Female (Male)* : General body colour almost uniformly brown except apices of all femora, antennal segments 1-3 and proximal halves of segmental 4-6 brownish yellow.


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<th>III</th>
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<th>V</th>
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<tr>
<td><strong>Female</strong></td>
<td>45-55 (28-30);</td>
<td>42-50 (28-30);</td>
<td>45-50 (28-30)</td>
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<tr>
<td><strong>Male</strong></td>
<td>50-55 (25-26);</td>
<td>43-55 (25-27);</td>
<td>45-53 (25-26)</td>
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<tbody>
<tr>
<td><strong>Female</strong></td>
<td>58-63 (28-30);</td>
<td>28-33 (18-20);</td>
<td>25 (8-10)</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>52-63 (25-26);</td>
<td>25-38 (15-17);</td>
<td>25 (8-10)</td>
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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.


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 Ananthakrishnan
105. *Stigmothrips infirmus* Ananthakrishnan


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. Postoculans very short. Mouthcone broadly rounded; maxillary styles retracted upto the level of postoculans. 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


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 sense cones respectively............... ................................................................. inquiline (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.............................................. *puellus* Ananthakrishnan & 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* Ananthakrishnan & Jagadish

106. *Xylaplothrips debilis* Ananthakrishnan & Jagadish


Distribution: India: West Bengal (Coochbehar); Kerala; Andhra Pradesh.

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

107. Xylaplothrips inquilinus (Priesner)


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)


Distribution: India: West Bengal (Coochbehar); Kerala; Karnataka.

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

109. Xylaplothrips pusillus Ananthakrishnan & Jagadish


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

110. Allothrips pillichellus bicolor Ananthakrishnan


*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


111. Dinothrips juglandis Moulton


*Distribution*: India: West Bengal (Lopchu, Darjeeling Dt.). Elsewhere: Burma.

Genus 71. Elaphrothrips Buffa

(Map 6)


*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 wide

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, midlateralrs, epimerais 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


113. *Elaphrothrips denticollis* (Bagnall)


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 (Cardothrips) insignis* Ananthakrishnan

(Text fig. 14)


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.

115. *Elaphrothrips procer* (Schmutz).


*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


Key to the Species of Ethiothrips


Forewings transparent and with 10-15 double fringes. Body setae moderate, not exceptionally long................................................................. obscurus (Schmutz)

116. Ethiothrips longisetis (Ananthakrishnan & Jagadish)


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, postcroangulars 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)


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 postcroangulars subequal. Foretarsal tooth moderate. Forewings with 10-15 double fringes.

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


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........................................................................... quadrirsetis 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)


Remarks: Okajima (1987) recorded this species from West Bengal.

119. Holothrips quadrirsetis Okajima


Female (Macropterous): General body colour dark brown; antennal segements 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)


Remarks: Okajima (1987) recorded this species from DarjilingDt. and forms the first record from West Bengal as well as from India hitherto known only from Nepal.

Genus 74. Loyola indica Ananthakrishnan


121. Loyola indica Ananthakrishnan


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


122. Neosmerinthothrips fructuum Schmutz


Distribution: India: West Bengal (Birbhum, Calcutta, Hughli, Nadia); Andhra Pradesh; Kerala; Karnataka, Tamil Nadu, Madhya Pradesh.

Remarks: Ananthakrishnan (1973) recorded this species from Alipore and Chandannagar (West Bengal).
SEN et al. : Insecta : Thysanoptera

Genus 76. Nesothrips Kirkaldy


123. Nesothrips lativentris (Karny)


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. Postoculares very long about 1.5 times longer than eyes. Prothorax of females and gynaecoid males half as long as head and in oedymous males two third as long as head. All prothoracic setae except anteromarginals well developed. Forefemora of oedymous males strongly bent inwards; foretarsi of female unarmed and armed in males, tooth longer in oedymous males. forewings with 13-21 double fringes. Pelta hat-shaped.


Distribution : India : West Bengal [Birbhum; Coochbehar; Hugli; 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 (Hugli Dt.) and Calcutta.

Genus 77. Oidanothrips Moulton

124. *Oidanothrips megacephalus* (Ananthakrishnan)


*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 oculad, almost meeting at middle. Prothoracic anteroangulars short and curved, antromarginals vestigial. Forestarsal 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 *Haplothrips* 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.
REFERENCE


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 herbagas, 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 herbagas.
(b) **Beating** : Beating is usually employed to dislodge insects from foliages 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.

Neuroptera 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 (vide supra) or running separately (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 (R1) : long, parallel and close to Sc; united with Sc at apex of wing (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 Cu1 and Cu2 (Myrmeleontidae), branches of Cu1 sometimes forming posterior banksian line in Cubital field (Myrmeleontidae), Cu2 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 Cu1 (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 (Hemeroobiidae, 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.

Female genitalia (Figs. 12-13) : 8th segment discleritous and usually separated from 9th which either synscleritus or discleritus; 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, meduncus; each arch of gonarcus may have a lateral process, entoprocessus; in many genera, additional vertically movable structure, accexus, 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 gonducts 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; be., 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; mtsc1., metascutellum of metathorax. 10. Fore wing (C., costa; R., radius; Sc., subcosta; Rs., radial sector; M., media; M₁., anterior media; M₂., posterior media; Cu., cubitus; Cu₁., anterior cubitus; Cu₂., posterior cubitus; Cup., basal fork of cubitus; 1A₁., first anal; 2A₁., second anal; 3A₁., 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).
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


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)


Distribution: India: West Bengal (Darjeeling); Meghlaya. Bangladesh (Sylhet).

Remark: Ghosh (1981) recorded the species for the first time from India in Meghlaya State. It is now being recorded from West Bengal.

Genus II. Corydalus Latreille


Type species: Corydalus cornulus (Linnaeus)

Distribution: America; China and India.

Remark: Only a single species is reported from West Bengal under the genus.

2. Corydalus territans Needham


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 exserted .......................................................... HEMEROBIIDAE

Antennae in males pectinate, in females otherwise; vertex with three prominent ocellus-like tubercles; with numerous crossveins in wings; ovipositor exserted and long ..................... DILARIDAE

7. Ocelli present; discal area of wings with many crossveins ........................................... OSMYIDAE

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 hindwing 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

   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

   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

   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

   Distribution : World-wide excepting for the Australian Region.
   Remark : A single species of this genus is known from West Bengal.

5. Semidalis aleyrodiformis (Stephens)

**Distribution**: India: West Bengal (24-Parganas, Burdwan & Nadia), Jammu & Kashmir; Bihar. Palaeartic Region: Norway, Sweden, Finland, Denmark, England, Scotland, Netherlands, Luxemburg, France, Germany, Switzerland, Australia, Poland, Czechoslovakia, Jugoslovakia, 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


*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)


**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**


*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)


**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


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


*Distribution*: India: West Bengal (24-Parganas & Darjeeling); Assam; Karnataka and Western Himalayas, Nepal.

9. *Mantispa femoralis* Banks


*Distribution*: India: West Bengal (24-Parganas); Karnataka.

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

* 10. *Mantispa alicante* Banks


*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 ........ *Pspectra* 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

\[ \text{Mixomicromus} \text{ Ghosh} \]

Ninth sternite in male short and not produced beyond apex of anal plate; \( M_{3+4} \) and \( Cu_1 \) in hindwing fused

\[ \text{Micromus} \text{ Rambur} \]

Genus IX. **Psectra** Hagen


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)


*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


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


*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


Type species: *Hemerobius variegatus* Fabricius.

*Distribution*: World-wide.

*Remark*: A single species of the genus is recorded from West Bengal.

13. *Micromus timidus* Hagen


*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


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)


*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


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


*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


   Type species: *Osmylus punctipennis* Walker.

   Distribution: India and Japan.

   Remark: Only a single species is recorded from West Bengal.

16. **Hyposmylus punctipennis** (Walker)


   Distribution: India: West Bengal (Darjeeling); Meghalaya.

   Remark: The species, so far reported, is endemic in India.

Genus XV. **Spilosmylus** Kolbe


   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* Krüger


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* Krüger**

Venation of forewing almost entirely dark brown .................................*perspicillaris* (Gerstaecker)

Venation of forewing pale, marked with piceous dots of the hair bases .......... *langii* MacLachlan

18. *Thyridosmylus perspicillaris* Gerstaecker


*Distribution*: India: West Bengal (Darjeeling), Sikkim, Tamil Nadu; Kerala.

*Remark*: The following subspecies is recorded from West Bengal.

19. *Thyridosmylus perspicillaris minor* Kimmins


*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* MacLachlan


*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 **BEROTHIDAE**

Genus XVII. *Berotha* Walker


Type species: *Berotha insolita* Walker.

*Distribution*: Oriental region.

*Remark*: A single species of this genus is known from West Bengal.
21. *Berotha insolita* Walker


*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* Burmeister


*Type species*: *Hemerobius fuscatus* Fabricius.

*Distribution*: Africa; Australia; China; Cuba; Europe; Honduras; India; Japan; Lower Amazones; North America and the Philippines.

*Remark*: A single species of this genus is so far recorded from West Bengal.

22. *Sisyra indica* Needham


*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
    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
    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
    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)
    Distribution: India: West Bengal (Calcutta, 24-Parganas, Nadia, Burdwan); South India; Western
    Himalayas; Andamans, Lakshadweep Island. China; Insulinde.

Genus XXI. Tumeochrysa Needham
    Type species: Tumeochrysa indica Needham
    Distribution: India and China.
    Remark: A single species was described by Navas (1930) from West Bengal as Chrysoplecta
    cirera. Banks (1940) synonymised Chrysoplecta Navas with Tumeochrysa Needham. Hence the
    species, Tumeochrysa cirera is dealt with here.
* 25. **Tumeochrysa cirerai** (Navas)


*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** Leach


*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 cross veins in forewing nearer to outer row than to radial sector..................

   ................................................................................................................................. *virgestes* Banks

   Inner row of gradate cross veins in forewing equidistant to both outer row and radial sector........

   ................................................................................................................................. *ignobilis* Walker

26. **Chrysopa septempunctata** Wesmael


*Distribution*: India: West Bengal (Darjeeling); Europe; Iran; Mauritius; Turkestan.

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

27. **Chrysopa virgestes** Banks


*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** Walker

**GHOSH : Insecta : Neuroptera**

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

*Remark*: The species was recorded from West Bengal. Walker (1858) reported the species from “Hindostan” without specifying the exact locality.

*29. Chrysopa notata* Navas


*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)


*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


*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)


*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


*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.............

32. Anisochrysa alecestes (Banks)
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)

Distribution: Japan; Ryuku Is., Bonin 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

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)

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

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)

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* Principi


*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* Navas


*Type species*: *Chrysopidia nigrata* Navas

*Distribution*: India and Nepal.

*Remark*: Two species of this genus are hitherto reported from West Bengal.

* 37. *Chrysopidia nigrata* Navas


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

*Remark*: No comment is possible due to the dearth of material for study.

* 38. *Chrysopidia numerosa* Navas


*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
    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)

Distribution : India: West Bengal (Bankura, Birbhum, Jalpaiguri; North-Western Himalayas);
Madhya Pradesh; Maharashtra; Southern Peninsula; Orissa; Bihar; Sikkim; “North India”

* 40. Palpares patiens Walker

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

Type species: Acanthaciisis 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)

Distribution: India: West Bengal (Calcutta, Midnapur), Tamil Nadu; Orissa; Bihar; Assam.

42. Centroclisis eustalacta (Gerstaecker)

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

Type species: Nesoleon braunsi Banks

Distribution: India; North Africa; Taiwan.

Remark: A single species is hitherto reported from West Bengal.

43. Nesoleon perpunctatus Banks

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

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)


*Distribution*:  India:  West Bengal (Darjeeling);  Himachal Pradesh;  Uttar Pradesh;  Assam;  Taiwan.

*45.  Hagenomyia monticolla*  (Navas)


*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

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  
*Distribution*: India: West Bengal (Darjeeling); Assam.  
*Remark*: The species (Fig. 15) is for the first time recorded from West Bengal.

47. **Myrmeleon clothilde** Banks  
*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  
*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  
*Distribution*: India: West Bengal.  

*51. **Myrmeleon punctulatus** Rambur  
*Distribution*: India: West Bengal); Orissa.  

Genus XXXIV. **Creoleon** Tillyard  
*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)


*Distribution*: India: West Bengal (Bankura); Maharashtra; Tamil Nadu; Madhya Pradesh; Orissa; Bihar; “North India” Egypt; Sudan; Israel; Iran.

**Genus XXXV. Gatzara Navas**


*Type species*: *Gatzara jubilaea* Navas

*Distribution*: India.

*Remark*: Only a single species is so far reported from West Bengal.

53. *Gatzara jubilaea* Navas


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

**Genus XXXVI. Neuroleon Navas**


*Type species*: *Myrmeleon arenarius* Navas

*Distribution*: Spain; Rumania; Greece; North Africa; Malagasy; Saudi Arabia; Iran; Afghanistan; Pakistan; India; Indonesia; Malaysia and Micronesia.

*Remark*: Only a single species is reported from West Bengal.

54. *Neuroleon guernii* Navas


*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**


*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 other 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)


   **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** Ghosh


   **Distribution**: India: West Bengal (Darjeeling); Orissa.

   **Remark**: The species (Fig. 16) is for the first time recorded from West Bengal.

   **57. Distoleon audax** (Walker)


   **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)


   **Distribution**: India: West Bengal.


   **Genus XXXVIII. Negrokus** Navas


   **Type species**: *Negrokus lebasi* Navas

   **Distribution**: India.

   **Remark**: Only a single species is so far known from West Bengal.
*59. *Negrokus lebasi* Navas  
*Distribution*: India: West Bengal (Darjeeling).  

Genus XXXIX. *Allogama* Banks  
*Type species*: *Gama irene* Banks.  
*Distribution*: India.  
*Remark*: A single species is so far known from West Bengal.

*60. *Allogama irene* (Banks)  
*Distribution*: India: West Bengal and Karnataka.  

Genus XXX. *Layahima* Navas  
*Type species*: *Layahima nebulosa* Navas  
*Distribution*: India.  
*Remark*: Only a single species is known from West Bengal.

*61. *Layahima nebulosa* Navas  
*Distribution*: India: West Bengal (Darjeeling).  

Genus XXXXI. *Talosus* Navas  
*Type species*: *Talosus oberthuri* Navas  
*Distribution*: India.  
*Remark*: A single species is known from West Bengal.

*62. *Talosus oberthuri* Navas  
*Distribution*: India: West Bengal (Darjeeling).  
Genus XXXXI. *Dolicholeon* Navas.


Type species: *Formicaleo substigmalis* Navas.

*Distribution*: India.

**63. *Dolicholeon substigmalis* Navas**


*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 .........................*Suhpalacsa* Hagen

4. Abdomen of male as long as or longer than hindwing; antenna straight; legs slender ................

   ..........................................................................................................................*Suhpalomitus* 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 XXXII. **Agrionosoma** Weele


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** Weele


*Distribution*: India: West Bengal (Darjeeling); Sikkim.

*Remark*: Ghosh (1988) recorded this species from West Bengal.

Genus XXXIII. **Suhpalacsa** Lefebvre


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. **Suhpalacsa orsedice** Banks


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

*Remark*: Ghosh (1988) recorded the species from West Bengal.

Genus XXXIV. **Suphalomitus** Weele


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* Weele

Second abdominal segment with tuft of black bristles; labrum and clypeus brownish; dense blackish-brown hairs between the antennal bases.............................................. *brevis* Kimmins

Second abdominal segment without tuft of black bristles; labrum and clypeus yellowish; greyish hairs between the antennal bases............................................................. *verbosus* (Walker)

66. **Suphalomitus brevis** Kimmins


**GHOSH : Insecta : Neuroptera**

**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)


**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


**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)


**Distribution**: India: West Bengal (Darjeeling); Sikkim; Assam; Meghalaya.

Genus XXXXVI. *Hybris* Lefebvre


**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)


**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


**Type species**: *Ascalaphus dentifera* Westwood.

**Distribution**: India, Burma and Sri Lanka.

**Remark**: A single species is hitherto reported from West Bengal.
70. *Glyptobasis dentifera* (Westwood)


**Distribution**: India: West Bengal (Calcutta); Punjab; Uttar Pradesh; Maharashtra; Madhya Pradesh; Kerala; Karnataka.

**Genus XXXVIII. Ascalaphus** Fabricius


**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)


**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)


**Distribution**: India: West Bengal (Malda); Karnataka; Orissa.

**Remark**: Ghosh (1988) recorded the species for the first time from West Bengal.
73. *Ascalaphus dicax* Walker


*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 Philippines, 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


*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.

**REFERENCES**


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.


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, bident 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 envelops. 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 transfered 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.

<table>
<thead>
<tr>
<th>Fore wing veins</th>
<th>Hind wing veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB = costa</td>
<td>ab = costella</td>
</tr>
<tr>
<td>CD = subcosta</td>
<td>cde = subcostella</td>
</tr>
<tr>
<td>EFG = metacarpus</td>
<td>ef = metacarpella</td>
</tr>
<tr>
<td>WKHYXZ = cubitus</td>
<td>dgh = radiella</td>
</tr>
<tr>
<td>MNTF = radius</td>
<td>jkl = cubitella</td>
</tr>
<tr>
<td>PQRW = discoideus</td>
<td>mn = discoidella</td>
</tr>
<tr>
<td>RLO = subdiscoideus</td>
<td>pq = brachiella</td>
</tr>
<tr>
<td>CS = medius</td>
<td>ij = mediella</td>
</tr>
<tr>
<td>UV = submedius</td>
<td>op = submediella</td>
</tr>
<tr>
<td>VW = brachius</td>
<td>kg = intercubitella</td>
</tr>
<tr>
<td>BME = stigma</td>
<td>jmp = nervellus</td>
</tr>
<tr>
<td>SWD = basal vein</td>
<td>KN = first intercubitus</td>
</tr>
<tr>
<td>XT = second intercubitus</td>
<td>ZT = third intercubitus</td>
</tr>
<tr>
<td>QH = first recurrent vein</td>
<td>YL = second recurrent vein</td>
</tr>
<tr>
<td>PV = nervulus</td>
<td>QRW = postnervulus</td>
</tr>
<tr>
<td>MN = first abscissa of radius</td>
<td>Nt = second abscissa of radius</td>
</tr>
</tbody>
</table>

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).
A key is provided in the publication to identify the species.

The synonymy or taxonomic position of the species.

The species is described or there is a descriptive note.

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** (*Nygmopolistes*) 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** (Lepeletier, 1836)

12. **brevita** Das and Gupta, 1989

13. **santoshae** Das and Gupta, 1989

14. **artifex artifex** (Saussure, 1853)
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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. *analis 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 leefmansii* 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 bollworm. 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 ........................................................................ Ropalidiini

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 ...

.......................................................................................... PoIistiini

— 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. Intercellular 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. Intercellular distance more than the diameter of posterior ocellus. First
gastral sternite usually bounded by well developed margin at base.............Polistella Ashmead

Subgenus 1. Polistes (Nygmopolistes) Richards
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 (Nygmopolistes) tenebricosus sulcatus Smith
Ning-po-foo (London).

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
stermites (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.

1107/H, 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 (Megopolistes) van der Vecht
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 (Megopolistes)
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* (*Megaplistis*) *olivaceus* (De Geer)


*Remarks*: This species is very close to *P. wattii*. It can be distinguished by the characters given in the key.

3. *Polistes* (*Megaplistis*) *wattii* Cameron


*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* (*Megaplistis*) *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 (Megapolyistes) rothneyi rothneyi Cameron


*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 (Megapolyistes) rothneyi sikkimensis van der Vecht


*Distribution*: India : West Bengal (Darjiling District), Assam, Bihar, Meghalaya, Sikkim. Elsewhere : Nepal.

Subgenus 3. Polistes (Stenopolyistes) van der Vecht


*Type-species*: Polistes lateritius Smith, 1857.

Das and Gupta (1989) reported three species, viz., khasianus Cameron, nigritarsis Cameron and delhiensis Das and Gupta from India. Of these, nigritarsis Cameron has been reported from West Bengal.

6. Polistes (Stenopolyistes) nigritarsis Cameron


*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**


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 .............................................................................................................. stigama 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


**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)


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


Distribution: India: West Bengal (Darjiling District), Assam, Bihar, Manipur, Sikkim, Tripura, Uttar Pradesh.

10. *Polistes (Polistella) sagittarius* Saussure


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. (Anthereneida)* 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)........... 2

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) .......................................................... *stigna stigna* (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) ............... \textit{variegata variegata} (Smith)

Subgenus 5. \textit{Ropalidia} (\textit{Anthreneida}) White


Type-species: \textit{Vespa sumatrae} Weber, 1801 (=\textit{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. \textit{Ropalidia} (\textit{Anthreneida}) \textit{marginata marginata} (Lepeletier)

1793. \textit{Vespa ferruginea} Fabricius. \textit{Ent. Syst.}, 2 : 280, des. Type: F (Copenhagen); preocc. by \textit{Vespa ferruginea} Gmelin, 1770 and Oliver, 1791.


\textit{Remarks} : This subspecies is different from another subspecies, viz., \textit{marginata rufigerata} 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. \textit{Ropalidia} (\textit{Anthreneida}) \textit{brevita} Das and Gupta


\textit{Distribution} : India : West Bengal (Haora and Darjiling Districts), Assam, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Orissa, Sikkim, Uttar Pradesh.

\textit{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. \textit{Ropalidia} (\textit{Anthreneida}) \textit{santoshae} Das and Gupta


\textit{Distribution} : India : West Bengal (Darjiling District), Arunachal Pradesh, Meghalaya, Sikkim.
14. *Ropalidia (Anthreneida) artifex artifex* (Saussure)


**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)


**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)


**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 recognized 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)


18. *Ropalidia (Anthreneida) variegata variegata* (Smith)


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


Type-species: *Icaria flavopicta* Smith, 1857.


This subgenus is represented by a single species in West Bengal.

19. *Ropalidia (Icarielia) scitula* Bingham


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 that 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* Saussure


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).


*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)


*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
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*, *Dolicthovespula* 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 binghani*); 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


Type-species: *Vespa binghami* Buysson, 1905.

22. *Vespa* (Nyctovespa) binghami Buysson


**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).


**Distribution:** India: West Bengal (Darjiling District). Elsewhere: Burma, China.
Subgenus 8. *Vespa* (*Vespa*) Linnaeus

   Type-species: *Vespa crabro* Linnaeus, 1758.

   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..

   — 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

--- 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

--- 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

(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..........

--- 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)


Remarks : This subspecies is usually confused with Vespa cincta (= Vespa tropica tropica).

24. Vespa (Vespa) analis nigrans Buysson


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


26. Vespa (Vespa) bicolor Fabricius


**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


**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


**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 ........................................
   - 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 leefmansii* van der Vecht

29. **Vespa (Vespa) tropica tropica** (Linnaeus)


**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 Palaeartic regions.

30. *Vespa* (*Vespa*) *tropica leefmansi* van der Vecht


**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


**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


**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


**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


Type-species : *Vespa australica* Panzer, 1799.


Type-species : *Vespa australica* Panzer, 1799.


Type-species : *Vespa vulgaris* Linnaeus, 1758.


Type-species : *Vespa rufa* Linnaeus, 1758.


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)


**Diagnostic characters**: Intercellular 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.

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**Genus 6. Provespa Ashmead**


Type-species: *Vespa anomalala* Saussure, 1853 (= *V. dorylloides* Saussure, 1853).

This genus is known by a single species, viz., *P. anomalala* (Saussure), which is described as below.

### 35. Provespa anomalala (Saussure)


**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.


**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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Systematic List</th>
<th>Darjiling</th>
<th>Jalpaiguri</th>
<th>Koch Bihar</th>
<th>West Dinajpur</th>
<th>Malda</th>
<th>Murshidabad</th>
<th>Birbhum</th>
<th>Bardhaman</th>
<th>Nadia</th>
<th>Purulia</th>
<th>Bankura</th>
<th>Hugli</th>
<th>North 24-Parganas</th>
<th>South 24-Parganas</th>
<th>Haora</th>
<th>Calcutta</th>
<th>Medinipur</th>
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Subfamily 1. Polistinae
Tribe 1. Polistini
Genus 1. Polistes Latreille, 1802
Subgenus 1. Polistes (Nygmopolistes) Richards, 1973

Table 1

Subgenus 2. Polistes (Megapolistes) van der Vecht, 1968

2. *olivaceus* (De Geer, 1773) 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
7. *adustus* Bingham, 1897 x
8. *stigma tamula* (Fabricius, 1798) x
9. *strigosus atratus* Das and Gupta, 1989 x
10. *sagittarius* Saussure, 1853 x

Subfamily 2. Ropalidiinae
Tribe 2. Ropalidiini
Genus 2. Ropalidia Guérin, 1838
Subgenus 5. Ropalidia (Anthreneida) White, 1841

11. *marginata marginata* (Lepeletier, 1836) x
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<td>Genus 5.</td>
<td><em>Vespula</em> Thomson, 1869</td>
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<td><em>orbata orbata</em> (Buysson, 1902)</td>
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<td>Genus 6.</td>
<td><em>Provespa</em> Ashmead, 1903</td>
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<td>35.</td>
<td><em>anomala</em> (Saussure, 1853)</td>
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Map 1. Number Indicates Name of Species/Subspecies of Subfamily Polistinae, as Treated in the Text.
JONATHAN et al.: Insecta: Hymenoptera: Vespidae

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 at least 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: SCOLIIIDAE

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INTRODUCTION

The family Scoliidae belongs to superfamily Scolioidea, which includes one of the most attractive groups of wasps. The superfamily Scolioidea is one of the seven recently recognised superfamilies of aculeate Hymenoptera. This superfamily is recognised by having 4 families, viz., Scoliidae, Tippiidae, 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. Diagramatic view of fore wing: a, various veins; b, various cells.

The list of the museums who loaned their material for this study is given below:

- Honolulu Bernice P. Bishop Museum Honolulu 17, Hawaii, U.S.A.

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 **Scola** 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. SCOLIIDAE

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 at least above; longer spur of hind tibia black or
testaceous, usually blunt at the apex. Fore wing usually dark brown ........................................ 3. Seriocampsomeris 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


Type-species: *Elis (Campsomeris) phalerata* Saussure, 1858.


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)


1897. *Elis iris* (Lepeletier) : Bingham. *Fauna of British India, Hym.*, 1 : 94. Male, Female ( Specimens from North India, Burma and Java only).


**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 posterior-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 posterior-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.

Distribution: India: West Bengal (Darjiling and Jalpaiguri districts), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Meghalaya, Sikkim, Tripura, Uttar Pradesh. Elsewhere: Burma, China, Nepal, 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


Type-species: *Scolia marginella* Klug, 1805.


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)


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.


**Distribution**: India: West Bengal (Darjiling district), Bihar, Gujrat, Karnataka, Maharashter, 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

Type-species: *Scolia quadriguttulata* Burmeister, 1854.

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)


**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.


**Distribution**: 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

   Type-species: *Scolia thoracica* Fabricius, 1787.

   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............................subgeneres *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)


Distribution: 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 (Annullifer) annulata (Fabricius)


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 *Annullifer* Betrem. This species is widely distributed in North India and also distributed from Bangladesh to Japan.

5. Genus *Megacampsomeris* Betrem


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)


**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)


**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**

   Type-species: *Scolia* (*Liacos*) *dimidiata* Guerin, 1938.

   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* Michä. Of these, *L. erythrosoma erythrosoma* has been recorded from West Bengal.

8. **Liacos erythrosoma erythrosoma** (Burmeister)


**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


Type-species : *Scolia ruficeps* Smith.


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)


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.


8. Genus Megascolia Betrem

Type-species: Scolia flavifrons Fabricius, 1775.

1928. Scolia subgenus Triscolia section Megascolia Betrem. Treubia, 9 (suppl.): 239.
Type-species: Scolia procer Illiger, 1802.

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.

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)


**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) azurea christiana* (Guiglia and Betrem)


**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**


**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*).


**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


**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


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) fasciopunctata dunensis* Betrem, comb. nov.


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.


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)


1928. *Scolia (Scolia) decorata desidiosa* : Betrem : Treubia, 9 (suppl.): 321. Male, female (specimens from North India and Burma only).


Distribution: India: West Bengal (Darjiling district), Assam, Arunachal Pradesh, Uttar Pradesh.

Remarks: This subspecies is known from North India and Burma only.


**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


**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 spatum, 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


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


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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Systematic List</th>
<th>Darjiling</th>
<th>Jalpaiguri</th>
<th>Koch Bihar</th>
<th>West Dinajpur</th>
<th>Malda</th>
<th>Murshidabad</th>
<th>Birbhum</th>
<th>Bardhaman</th>
<th>Nadia</th>
<th>Purulia</th>
<th>Bankura</th>
<th>Hugli</th>
<th>North 24 Parganas</th>
<th>South 24 Parganas</th>
<th>Haora</th>
<th>Calcutta</th>
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</table>

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
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<td>8.</td>
<td><em>erythrosoma erythrosoma</em> (Burmeister)</td>
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<td>7.</td>
<td>Genus <em>Austroscolia</em> Betrem</td>
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<td>9.</td>
<td><em>ruficeps ruficeps</em> (Smith)</td>
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<td>8.</td>
<td>Genus <em>Megascolia</em> Betrem</td>
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<td>3.</td>
<td>Subgenus <em>Regiscolia</em> Betrem &amp; Bradely</td>
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<td>10.</td>
<td><em>fulvifrons</em> (Sanssure)</td>
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<td>11.</td>
<td><em>azuria christiana</em> (Guiglia &amp; Betrem)</td>
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<td>9.</td>
<td>Genus <em>Scolia</em> Fabricius</td>
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<td>4.</td>
<td>Subgenus <em>Discolia</em> Betrem &amp; Bradely</td>
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<td><em>cyanipennis</em> Fabricius</td>
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<td>13.</td>
<td><em>nobilis nobilis</em> Sanssure</td>
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<td>14.</td>
<td><em>cruenta</em> Klug</td>
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<td>15.</td>
<td><em>fasciatopunctata dunensis</em> Betrem</td>
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<td>16.</td>
<td><em>formosicola lebongensis</em> Betrem</td>
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<td><em>histrionica desidiosa</em> (Bingham)</td>
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<td>18.</td>
<td><em>affinis</em> Guerin</td>
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<td>19.</td>
<td><em>elizabethae</em> Binham</td>
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<td>20.</td>
<td><em>quadripustulata</em> Fabricius</td>
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<td>21.</td>
<td><em>carmichaeli</em> Betrem</td>
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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 Scoiinae in West Bengal. Number indicates the name of the taxa as treated in the text.
REFERENCES


INTRODUCTION


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 – \( \varphi \) min.
b) Worker major – \( \varphi \) maj.
c) Soldier – 24

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 coated 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-ster nal lobes” - Keml].

*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, mesopleurae; p, meta-pleurae; f, trochanters; g, femora; h, tibiae; i, tibial calcaria; k, tarsi.
Fig. 4. A – Abdomen of doryline worker; B – Abdomen of Ponerinae worker; C – Abdomen of Dolichoderinae worker; D (i) & (ii) – Abdomen of Myrmicinae; (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 valvet 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 up to 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 tayloiri* 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 dohmi 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 quadriscopilosus* 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 aseta* (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 ........................................ FORMICINAE

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


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

1. Dorylus (Typhlopone) labiatus Shuckard


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

2. Dorylus (Alaopone) orientalis Westwood


Remarks : Wilson (1964) also reported this species alongwith the synonyms from Shibpur (Haora), Orissa, Madras and Poona.

2. Genus Aenictus Shuckard

Key to the Species
♂ ♂
1. Posterior border of hypopygium broadly emarginate ........................................... A. shuckardi
   Posterior border 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

1903. Aenictus clavitibia, Bingham, Fauna Brit. India, Hym., 2 : 14, ♂

Material examined : Nil.


Remarks : Bingham (1903) reported this species from “Bengal, Barrackpore”

4. Aenictus shuckardi Forel

1903. Aenictus shuckardi, Bingham, Fauna Brit. India, Hym., 2 : 12, ♂


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)


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 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* Mayr

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* Mayr
1903. *Lioponera longitarsus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 27, ♂♀♂


*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* Forel
1903. *Lioponera parva*, Bingham, *Fauna Brit. India, Hym.*, 2 : 27, ♂♀♂

*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 ........................................ **Platythyrea**
   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


Key to the Species

1. Basal abdominal segment smooth or only very lightly punctured, shining, not opaque at base ......
   .................................................................................................................................................. **A. madaraszi**
   Basal abdominal segment closely punctured, opaque .................................................. **A. punctiventris**
8. Anochetus madaraszi Mayr

1903. Anochetus madaraszi, Bingham, Fauna Brit. India, Hym., 2 : 43, ♂ ♂


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


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


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)*


11. Bothroponera rufipes (Jerdon)

1911. Pachycondyla (Bothroponera) rufipes, Emery, Genera Insect., 118 : 76-77.


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 (Frauenfeldi)

1903. Bothroponera sulcata, Bingham, Fauna Brit. India, Hym., 2 : 98, ♂♂
1911. Bothroponera (Bothroponera) sulcata, Emery, Genera Insect., 118 : 78.


Distribution: India: West Bengal (Calcutta, Nadia, South 24-Parganas), North-West Provinces and Central-Western India.

13. Bothroponera tesserinoda (Emery) *

1903. Bothroponera tesserinoda, Bingham, Fauna Brit. India, Hym., 2 : 97, ♂♂
1911. Pachycondyla (Bothroponera) tesserinoda, Emery, Genera Insect., 118 : 78.


6. Genus Diacamma Mayr


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)


Material examined : Nil.


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. ♂.

Distribution: India: West Bengal (Barddhaman, Darjiling), Assam, Sikkim. Elsewhere: Burma.

16. Diacamma vagans (Smith)


**7. Genus *Ectomyrmex* Mayr**


17. *Ectomyrmex javana* Mayr *


*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.


*Distribution*: India: West Bengal (Darjiling), Assam. Elsewhere: Burma, China, Java, Malayan subregion, Sumatra.

18. *Ectomyrmex javana materna* Forel *


*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.


*Distribution*: India: West Bengal (Darjiling), Assam. Elsewhere: Burma, China, Hongkong.
8. Genus *Brachyponera* Emery


**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)


**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) *


**Distribution**: India: West Bengal (Barddhaman, Darjiling), Nicobar Island, throughout India. Elsewhere: Burma; Java, Malay Peninsula, Milu, Philippines, Sri Lanka, Sumatra.

9. Genus *Leptogenys* Roger


Subgenus *Lobopelta* Mayr

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.) kittlei

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 *

1911 Leptogenys (Lobopelta) birmana, Emery, Genera Insect., 118 : 102.


22. Leptogenys (Lobopelta) chinensis Mayr *

1903. Lobopelta chinensis, Bingham, Fauna Brit. India, Hym., 2 : 69, ♂ ♀
1911 Leptogenys (Lobopelta) chinensis, Emery, Genera Insect., 118 : 103.

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) *


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 *


25. *Leptogenys (Lobopelta) diminuta striatula* Emery *


26. *Leptogenys (Lobopelta) kitteli* Mayr *


27. *Leptogenys (Lobopelta) minchini* Forel


*Material examined*: Nil.


28. *Leptogenys (Lobopelta) ocellifera* (Roger) *


29. Leptogenys (Lobopelta) punctiventris Mayr

1903. Lobopelta punctiventris, Bingham, Fauna Brit. India, Hym., 2: 64, ♀.

Material examined: Nil.


Remarks: Bingham (1903) reported this species from “Calcutta”

30. Leptogenys (Lobopelta) roberti coonoorensis Forel *


Distribution: India: West Bengal (Darjiling), Nilgiri Hills. Western India.

** 10. Genus Odontomachus Latreille


31. Odontomachus monticola Emery *


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,

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 Platthyrea Roger

32. Platthyrea wroughtoni var. victoriae Forel

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 carinæ 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

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
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 *


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.


Distribution: India: West Bengal (Puruliya).

13. Genus Sphinctomyrmex Mayr


36. Sphinctomyrmex taylori Forel


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

37. *Stictoponera menadensis bicolor* Emery *


*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.


*Distribution*: India: West Bengal (Darjiling), Assam. Elsewhere: Burma, China, Malay Peninsula, Philippines.

15. Genus *Amblyopone* Erichson


38. *Amblyopone rothneyi* Forel


*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.


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

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

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

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

41. Dolichoderus bituberculatus (Mayr) *


**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.


**Distribution**: India: West Bengal (Darjiling), Sikkim, Western India. Elsewhere: Burma, Celebes, Java.

**18. Genus *Iridomyrmex* Mayr**


42. *Iridomyrmex anceps* (Roger) *


**Diagnostic characters**: ♀. TL 3.5-4.5 mm. Head, thorax and abdomen dark castaneous brown, with a beautiful metallic refugence 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.


**Distribution**: India: West Bengal (Medinipur), Assam, throughout India except in the North-West Provinces and the Punjab. Elsewhere: Burma, Java, Malaysia, Sri Lanka.
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V. Subfamily PSEUDOMYRMECINAE Emery
(Figures 6 a, b)

19. Genus Tetraponera Smith

Subgenus Tetraponera Smith

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)


Distribution: India: West Bengal (Nadia), Western India. Elsewhere: Burma, China, Java, Philippines, Singapore, Sri Lanka, Sumatra.

44. Tetraponera (Tetraponera) binghami (Forel) *


45. *Tetraponera (Tetraponera) nigra* (Jerdon)


*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) *


*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.................................. *Phidolegeton*
   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.............................................. *Myrmicas*
   Club of flagellum not well defined; antennae 7-jointed..................................... *Meranoplus*
9. Antennal furrow lateral and deep........................................................................ *Oligomyrmex*
   No antennal furrow......................................................................................... 10
10. Erect hairs on body trifid ............................................................................. *Triglyphothrix*
    Erect hairs on body not trifid, 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............................................................ 16
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

47. *Acidomyrmex rothneyi* (Forel)

*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.

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


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.


Distribution: India: West Bengal (Darjiling).

22. Genus Cataulacus Smith


49. Cataulacus (Cataulacus) latus Forel


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.


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


Key to the Species

1. Head square ........................................................................................................... 2
   Head rectangular ................................................................................................... 3
2. Scape of antennae up to 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-ferrugenous colour; pilosity abundant; first flattened joint of pedicel with sides rounded ....
   ........................................................................................................................................ C. rothneyi

50. Crematogaster contemta Mayr

Manila (Check List Ants Asia), 1 : 87.


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

1922. Crematogaster (Acrocoelia) brunnea subnuda, Emery, Genera Insect., 174 B : 149.
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


*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


*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 *


*Distribution*: India: West Bengal (Darjiling, Jalpaiguri), Karnataka, Sikkim, Western India. Elsewhere: Burma.

55. *Crematogaster flava* Forel *


*Distribution*: India: West Bengal (Darjiling), Assam, Orissa, Sikkim. Elsewhere: Nepal.
56. *Crematogaster rothneyi* Mayr


**Material examined**: Nil.

**Distribution**: India: West Bengal (Calcutta, Haora), Gujarat, Maharashtra, Sikhim.

**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 *


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

24. Genus *Paratopula* Wheeler


58. *Paratopula ceylonica* (Emery)


**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

59. *Lophomyrmex quadrispinosus* Jerdon


**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


**Key to the Species**

1. Clypeus convex in the middle, obscurely bicarinate; mesonotum armed posteriorly with 2 long acute spine; metanotum 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)


**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 *


**27. Genus *Messor* Forel


62. *Messor barbarus* (Linnaeus) *


*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.


*Distribution*: India: West Bengal (North 24-Parganas). Elsewhere: Central Europe.

28. Genus *Monomorium* Mayr

Key to the Species

1. Antennae 11-jointed, scape of antennae not reaching the top of the head; 2nd node of pedicel sub-globose, 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) *


64. *Monomorium latinode* Mayr *


65. *Monomorium orientale* Mayr


*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* Latreille


* 66. *Myrmica rugosa* Mayr *


**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.


**Distribution**: India: West Bengal (Darjiling), entire Himalayas along the length.

30. Genus *Myrmicaria* Saunders


67. *Myrmicaria brunnea* Saunders


**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* Mayr

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 up to 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


   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


   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

   (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


   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 acute 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 quitely 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


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

*Remarks*: Bingham (1903) also reported this species from “Calcutta”

72. *Pheidole (Pheidole) fervens* Smith *


*Distribution*: India: West Bengal (Darjiling). Elsewhere: Burma, Java, Sunda Islands.

73. *Pheidole (Pheidole) jucunda* Forel


*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


*Remarks*: The material of this species could not be available for our study. Imai et at. (1984) reported the species, *Pheidole latinoda* from Botanical Garden, Haora.

75. *Pheidole (Pheidole) mus* Forel

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 *


Distribution: India: West Bengal (Darjiling), Karnataka, Sikkim.

77. Pheidole (Pheidole) rogersi Forel


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


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


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, ♂ ♀ ♀♂ ♀♂


**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


**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


**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)


**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)


**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


Key to the Species

1. Length over 3 mm........................... S. geminata
Length under 3 mm........................... S. wroughtoni

84. Solenopsis geminata (Fabricius)


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


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


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.............. \textit{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 ..........

\textbf{86. \textit{Tetramorium christiei} Forel}


\textit{Material examined}: Nil.

\textit{Distribution}: India: West Bengal (Darjiling), Sikkim.

\textit{Remarks}: Bingham (1903) reported this species only from “Darjeeling” and “Sikhim”

\textbf{87. \textit{Tetramorium simillimum} (Smith)}


\textit{Material examined}: Nil.


\textit{Remarks}: Bingham (1903) recorded the species within the limits from “Calcutta”

\textbf{88. \textit{Tetramorium smithi} Mayr}


\textit{Distribution}: India: West Bengal, Southern and Western India.

\textit{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.

\textbf{36. Genus \textit{Triglyphothrix} Forel}


\textit{Key to the Species}

1. The metanotal spines long and slender; second node of pedicel closely punctured, opaque..............

\hdashline

\textit{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)

*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)

*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 HYRMOTERATINII
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 MYRMELACHISTINII
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 DYMORPHOMYRMYCINI

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 SANTICHIELLINI

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 Polyergus

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 FORMICINII

**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...........
   ....................................................................................................................*Hemiopticta*
   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


**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. rufoglanus 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)


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) *


Distribution : India : West Bengal (Darjiling), Assam, Central and Western India. Elsewhere : Burma.

93. Camponotus arrogans (Smith)


*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) *

1903. *Camponotus compressus*, Bingham, *Fauna Brit. India, Hym.*, 2 : 351, ♀ ♂


*Distribution*: India: West Bengal (Bankura, Calcutta, Darjiling, Murshidabad, South 24-Parganas). Elsewhere: Borneo, Philippines.

95. *Camponotus dichrous* Forel *


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

96. *Camponotus invidus* Forel *


Distribution: India: West Bengal (Barddhaman, Darjiling, Medinipur), Orissa.

97. Camponotus irritans (Smith) *


98. Camponotus oblongus (Smith) *


99. Camponotus rothneyi (Forel)


Material examined: Nil.


Remarks: Bingham (1903) reported this species and mentioned the habitat “Bengal, Orissa, Barrackpore”

100. Camponotus rufoglaucus dolenda Forel *


1925. Camponotus (Myrmosericus) dolenda, Emery, Genera Insect., 183: 106.


Distribution: India: West Bengal (Calcutta, North 24-Parganas, South 24-Parganas), Sikkim, North-West Himalayas.

101. *Camponotus sericeus* (Fabricius) *

1903. *Camponotus sericeus*, Bingham, *Fauna Brit. India, Hym.*, 2: 376, fig. ♀♀ (Syns.).


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.


Distribution: India: West Bengal (Darjiling).

38. Genus *Polyrhachis* Smith


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

   (Check List Ants Asia), 1 : 257.


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

1925. Polyrhachis (Cyrtomyrm) laevissima, Emery, Genera Insect., 183 : 207.
   (Check List Ants Asia), 1 : 264.


105. Polyrhachis mayri Roger

   Ants Asia), 1 : 272.

Material examined: India: West Bengal: 4 ♀♀, Darjiling, 3 km. South-East of Rangpo F.R.H.

106. Polyrhachis simplex Mayr
1903. Polyrhachis simplex, Bingham, Fauna Brit. India, Hym., 2: 394, ♀♂♂


107. Polyrhachis thrinax Roger
1903. Polyrhachis thrinax, Bingham, Fauna Brit. India, Hym., 2: 410, ♀♂♂


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


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

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


110. Lasius alienus (Forster) *

1850. Formica aliena Forster, Hym. Stud., 1: 36, 71, ♀ ♂
1861. Lasius alienus, Mayr, Europ. Formicid.: 49.
1951. Lasius (Lasius) niger alienus, Chapman and Capco, Monogr. Inst. Sci. Tech., Manila (Check List
       Ants Asia), 1: 202.
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.),

Distribution: India: West Bengal (Darjiling), North-West Himalayas. Elsewhere: America, Europe, Japan.

** 40. Genus Myrmecocystus Wesmael


111. Myrmecocystus setipes Forel *

1903. *Myrmecocystus setipes*, Bingham, *Fauna Brit. India, Hym.*, 2 : 312, ♂


**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 boarder 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.


**Distribution**: India: West Bengal (Calcutta, Haora, Murshidabad), Punjab, Central India. Elsewhere: Persia.

41. Genus *Paratrechina* Motschoulsky


**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 up to 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. longicorns*
   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)


**Material examined**: Nil.
Distribution: India: West Bengal (Darjiling), Sikkim.

Remarks: Bingham (1903) reported this species under the genus *Prenolepis* from "Sikhim" and "Darjeeling".

113. *Paratrechina bourbonica* (Forel)


Material examined: Nil.


Remarks: Bingham (1903) reported the species, *Prenolepis bengalensis* and mentioned only "Bengal" as its locality.

114. *Paratrechina indica* (Forel)


115. *Paratrechina taylori* (Forel)


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)


**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


117. *Oecophylla smaragdina* (Fabricius)


**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.


**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 bispinulate; 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

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


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)

Material examined: Nil.


Remarks: Bingham (1903) reported this species from “Barrackpore”, collected by Rothneyi.

** 44. Genus Anoplolepis Santschi
120. *Anoplolepis longipes* (Jerdon) *


**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.


**Distribution:** India: West Bengal (Darjiling), throughout India except the North-West areas. Elsewhere: Burma, Dutch New Guinea, Maffin Bay, Sri Lanka.

45. Genus *Plagiolepis* Mayr


**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* Forel


**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* Forel

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)
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

Distribution: India: West Bengal (Haora). Elsewhere: Fuji, Java.

125. Centromyrmex feae (Emery)


126. Cerapachys biroi Forel


127. Camponotus paria Emery

Distribution: India: West Bengal (Haora), throughout India. Elsewhere: Burma, China, Malacca, Sri Lanka.
128. *Camponotus taylori* Forel


*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)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Species</th>
<th>Bankura</th>
<th>Barddhaman</th>
<th>Birbhum</th>
<th>Calcutta</th>
<th>Darjiling</th>
<th>Haora</th>
<th>Hugli</th>
<th>Jalpaiguri</th>
<th>Koch Bihar</th>
<th>Maldah</th>
<th>Medinipur</th>
<th>Murshidabad</th>
<th>Nadia</th>
<th>North 24-Parganas</th>
<th>Purulia</th>
<th>South 24-Parganas</th>
<th>West Dinajpur</th>
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</thead>
<tbody>
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<td>1</td>
<td><em>Dorylus</em> (Typhlopon) <em>labiatus</em> Shuckard</td>
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<td><em>D. (Alaopone) orientalis</em> Westwood</td>
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<td><em>Aenictus clavitiibia</em> Forel</td>
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<td><em>A. shuckardi</em> Forel®</td>
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<td><em>A. brevicornis</em> (Mayr)</td>
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<td>6</td>
<td><em>Lioponera longitarsus</em> Mayr®</td>
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<td>7</td>
<td><em>L. parva</em> Forel®</td>
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<td><em>Anochetus madaraszi</em> Mayr</td>
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<td><em>A. punctiventris</em> Mayr®</td>
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<td>10</td>
<td><em>Bothroponera bispinosa</em> (Smith)</td>
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<td><em>B. rufipes</em> (Jerdon)</td>
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<td>12</td>
<td><em>B. sulcata</em> (Frauenfeldi)</td>
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<td><em>B. tesserinoda</em> (Emery)</td>
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<td>14</td>
<td><em>Diacamma rugosum</em> var. <em>sculptum</em> (Jerdon)</td>
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<td>15</td>
<td><em>D. scalpratum</em> (Smith)</td>
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<td>16</td>
<td><em>D. vagans</em> (Smith)</td>
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<td>17</td>
<td><em>Ectomyrmex javana</em> Mayr</td>
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<td>18</td>
<td><em>E. javana materna</em> Forel</td>
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<td>19. Brachyponera jerdoni (Forel)</td>
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<td>20. B. luteipes (Mayr)</td>
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<td>21. Leptogenys (Lobopelta) birmana Forel</td>
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<td>22. L. (L.) chinensis Mayr</td>
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<td>23. L. (L.) diminuta (Smith)</td>
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<td>24. L. (L.) diminuta hodgsoni forel</td>
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<td>25. L. (L.) diminuta striatula Emery</td>
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<td>26. L. (L.) kitteli Mayr</td>
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<td>27. L. (L.) minchini Forel</td>
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<td>28. L. (L.) ocellifera (Roger)</td>
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<td>29. L. (L.) punctiventris Mayr</td>
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<td>30. L. (L.) roberti coonoorensis Forel</td>
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<td>128. <em>C. taylori</em> Forel</td>
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**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 Myrmicinae 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.
REFERENCES


TIWARI et al.: *Insecta: Hymenoptera: Formicidae*


N.B. Tewary, R.N. and Tiwari, R.N. are the same person.
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.


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.
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:

- **Amsterdam**: Afdeling Entomologie, Zoologisch Museum, Universiteit van Amsterdam, Plantage Middenlaan 64, Amsterdam 1004, The Netherlands.
- **Bangalore**: Commonwealth Institute of Biological Control, Indian Station, P.O. Box 603, Bangalore 560 006, India.
- **Berlin**: Museum fur Naturkunde der Humboldt-Universitat zu Berlin, DDR-104 Berlin, Invalidenstrasse 43, DDR Germany.
- **Betrem**: Collections of Dr. J.G. Betrem – now at Leiden.
- **Brussels**: Institut Royal des Sciences Naturelles de Belgique, Entomologie, Rue Vautier 31, B-1040 Bruxelles, Belgium.
- **Budapest**: Termeszettudomanyi Muzeum Allattara (Zoological Department of the Hungarian Natural History Museum), 1088 Budapest, Baross-Utca 13, Hungary.
- **Calcutta**: Zoological Survey of India, M-Block, New Alipore, Calcutta-700 053, India.
- **Copenhagen**: Zoologisk Museum, Universitetsparken 15, DK 2100 Kobenhavn, Denmark.
- **Dehra Dun**: Forest Entomology Branch, Forest Research Institute & Colleges, P.O. New Forest, Dehra Dun, U.P., India.
- **Eberswalde**: Institut f. Pflanzenschutzforschung Kleinmachnow, Abt. Taxonomie der Insekten, DDR-13 Eberswalde-Finow 1, Schicklerstrasse 5, DDR Germany.
- **Gainesville**: 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).
- **Gupta**: Collections of Virendra Gupta, Located at the American Entomological Institute, 3005 S.W. 56th Avenue, Gainesville, Florida 32608, U.S.A.
- **Heinrich**: 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.
- **Honolulu**: Bernice P. Bishop Museum, Department of Entomology, Honolulu, Hawaii 96819, U.S.A. Also contains the types previously at Hawaiian Sugar Planters Association, Honolulu.
- **Leiden**: Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300 RA Leiden, The Netherlands.
- **London**: Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7, 5 BD, England.
State Fauna Series 3 : Fauna of West Bengal

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  

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.

Pleural 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.

Postpectal 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 Geliniae, Ichneumoninae, and Diplazontinae, often in males of Microleptinae, and rarely in males of *Coccygominus*. 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 *cuspis*, 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).


Figure 1, c. Abdominal segments 1 and 2, side view (after Townes, 1969).

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)

<table>
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<td>ab = Costella</td>
<td>1 = Radial cell</td>
<td>12 = Costell cell</td>
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<tr>
<td>CD = Subcosta</td>
<td>cde = Subcistekka</td>
<td>2 = Median cell</td>
<td>13 = Radiellan cell</td>
</tr>
<tr>
<td>EFG = Metacarpus</td>
<td>ef = Metacarpella</td>
<td>3 = Discocubital cell</td>
<td>14 = Mediellan cell</td>
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<tr>
<td>HIF = Radius</td>
<td>dgh = Radiella</td>
<td>4 = Areolet (2nd cubital cell)</td>
<td>15 = Cubitell cell</td>
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<tr>
<td>KLMNO = Cubitus</td>
<td>jkl = Cubitella</td>
<td>5 = Third cubital cell</td>
<td>16 = Discoideell cell</td>
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<td>mn = Discoidella</td>
<td>6 = Second discoidal cell</td>
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<td>20 = Postellan cell</td>
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<td>pq = Brachiella</td>
<td>10 = Second brachial cell</td>
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<td>BEH = Stigma</td>
<td>bh = Basal hamulus</td>
<td>11 = Anal cell</td>
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<td>DP = Basal vein</td>
<td>dh = Distal hamulus</td>
<td>12 = Anal cell</td>
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<tr>
<td>IL = First intercubitus</td>
<td>rs = Axillus</td>
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<td>IN = Second intercubitus</td>
<td>jmp = Nervellus</td>
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<td>QL = Discocubitus</td>
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<td>K = Ramulus</td>
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<td>QK = First recurrent vein</td>
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<tr>
<td>MS = Second recurrent vein</td>
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<td>Y = A Bulla</td>
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<tr>
<td>PV = Nervulus</td>
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<tr>
<td>QRW = Postnervulus</td>
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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 spiracle
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
1. Median lobe of mesoscutum
2. Lateral lobe of mesoscutum
1 & 2. Mesoscutum
3. Scutellum
4. Postscutellum
5. Hind margin of metanotum
6. Tegula
7. Subtegular ridge
8. Collar
8, 9 & 10. Pronotum
10. Hind corner of pronotum
11, 12, & 18. Mesopleurum (Mesepisternum)
12. Speculum
13. Mesepimeron
14. Upper division of metapleurum
15. Metapleurum (lower division of metapleurum)
16. Juxtacoxal area
17. Prepectus
19. Meso sternum
20. Front coxa
21. Middle coxa
22. Hind coxa
23-28. 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 spiracle

CARINAE and GROOVES
A. Notaulus
B. Epomia
C. Prepectal carina
D. Mesopleural fovea
E. Mesopleural suture
F. Sternaulus
G. Postpectal carina
H. Juxtacoxal carina
I. Submetapleural carina
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
JONATHAN: *Hymenoptera: Ichneumonidae*

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. 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. 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. 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. 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. 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 0.85 x as long as its tergite; abdomen long) ................................................................. Leptopimpla Townes

1. Genus Leptopimpla Townes


Type-species : Ephialtes longiventris Cameron

1. Leptopimpla longiventris (Cameron)


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.


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* Foerster

Subgenus *Iseropus* (*Gregopimpla*) Momoi


Type-species: *Pimpla (Epiurus) kuwanae* Veireck.

2. *Iseropus* (*Gregopimpla*) *himalayensis* (Cameron)


*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; mesopleuron 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* Hartig

Subgenus *Scambus* (*Scambus*) Hartig


Type-species: *Pimpla (Scambus) sagax* Hartig.

3. *Scambus* (*Scambus*) *lucidus* Gupta & Tikar


*Diagnostic characters*: Vertex parallel sided and sloping behind; face as long as wide, smooth; pronotum, mesopleuron, metapleuron 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), metapleuron, propodeum, first tergite and apical margins of 2-5 tergites, black. Mesoscutum, scutellum, mesopleuron, red; tegula and all legs including coxae, yellow with their femora marked with light testaceous; ovipositor brown.


Distribution: India: West Bengal (Darjiling District), Sikkim.

Remarks: This species is easily disinguished 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


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)


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)


Distribution : India : West Bengal (Darjiling District), Sikkim, Meghalaya. Elsewhere : Nepal, Burma, Taiwan.

Remarks : This species is distinguished by a white mark an dorsal part of prepectus and a white line along mesopleural suture, and also by the characters given in the key.

5. Genus Camptotypus Kriechbaumer

Type-species : Camptotypus sellus Kriechbaumer.

6. Camptotypus arianus arianus (Cameron)


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 talar 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


Type-species : *(Ichneumon scanicus* Villers) :: *maculator* Fabricius.

7. *Itopectis tibetensis* Perkins


*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 rugosopunctate. 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.


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*


.......................................................................................................................... *bilineatus* (Cameron)

— Ovipositor tip subcylindrical, 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)


*Material examined* : India : West Bengal : Darjiling Dist. : Darjiling, 1 Female, (no other data) (Gupta).


*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)


*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)


Material examined: Nil.


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)


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)


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)


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)

Material examined: Several females and males were seen in Gupta collection from Rangiron, 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)

Distribution: India : West Bengal (Darjiling District), Kashmir, Uttar Pradesh. Elsewhere : Burma, China, Japan, Korea, Ryukyus, Eurasia, Afghanistan.

Remarks: Moorely (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

Type-species: (*Echthromorpha maculipennis* Holmgren) = *Ichneumon agrestoria fuscator* Fabricius.

16. *Echthromorpha agrestoria notulatoria* (Fabricius)


**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.


**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


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)

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State Fauna Series 3 : Fauna of West Bengal
— 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 ................... stemmator (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 obsolete, 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)


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)


**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


**Distribution**: India West Bengal : Bihar, Orissa, Assam, Tamil Nadu, Kerala, Karnataka. Elsewhere : Indonesia, Malaya, New Caledonia, New Guinea, New Solomans, 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)


**Material examined** : Nil.


21. *Xanthopimpla nana nana* Schulz


**Remarks** : This is a small species having hind femora entirely yellow.

22. *Xanthopimpla nigritarsis reciprocata* Townes & Chiu


**Material examined** : Nil.

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

23. *Xanthopimpla ochracea valga* Krieger


Material examined: No material or description of this species was available for study, therefore, this species could not be included in the key.


24. Xanthopimpla pedator (Fabricius)


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)


**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


**Distribution**: India: West Bengal (Darjiling District), Bihar. Elsewhere: Nepal, Bangladesh, Burma, Thailand, Laos, N. Vietnam, 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


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)


1970. Xanthopimpla stemmator Cameron. 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. (Sublaterallongitudinal 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 ......................................................... Nomosphecia Gupta

10. Genus Theronia Holmgren

Type-species: (Pimpla flavicans Fabricius) = atalantae Poda.

29. Theronia zebra iridipennis Cameron


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.


11. Genus Parema Gupta

Type-Species: Theronia (Parema) nigrobalteata nigrobalteata Cameron.
30. *Parema nigrobalteata nigrobalteata* (Cameron)


*Diagnostic characters*: Face punctate; pro- and mesopleuræ 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 *Nomosphecia* Gupta


Type-species: *Nomosphecia zebroides zebroides* (Krieger).

31. *Nomosphecia zebroides indicus* (Gupta)


*Diagnostic characters*: Face narrow in the front, strongly punctate, hairy; clypeus smooth, truncate apically; mandible stout and punctate; malar space obsolete; eyes strongly emarginate; antennæ 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. Antennæ 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 infuscate.
**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


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


**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)


*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


Type-species: *Achorocephalus cinctipes* Kreichbaumer.

34. *Achorocephalus spinosus* (Cameron)


*f.* des., fig. Type: F, Meghalaya: Khasi hills (Oxford).


*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


Type-species: *Rhyssa mesopyrrha* Mocsary = *Cyrtorhyssa mesopyrrha* (Mocsary).

35. *Cyrtorhyssa mollerii* (Bingham)


*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; nineth 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; nineth sternum with a spindle-shaped desclerotized area at speculum base........................................................................**Phytodietus** Gravenhorst

**Subgenus Phytodietus (Neuchorus) Uchida**


Type-species: **Neuchorus longicauda** Uchida.
36. *Phytodietus (Neochorus) longicauda* (Uchida)


**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, mesopleuron 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.


**Subgenus Phytodietus (Phytodietus) Gravenhorst**


Type-species : *Phytodietus astutatus* Gravenhorst.

37. *Phytodietus (Phytodietus) silvicola* Kaur & Jonathan


**Diagnostic characters**: Face finely and closely punctate; clypeus sparsely punctate; malar space 0.66x the basal width of mandible; pronotum puncticulate, 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.


*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

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

3. Occipital carina present; areolet absent; notafulus 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)
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 disted of basal vein, at least slightly so; brace and pad well-defined

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

Netelia Gray

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

— 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


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 2.0 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).


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)


**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.


Type-species: *Parabatus deceptor* Morley.

40. *Netelia (Bessobates) virgata* (Fourcroy)


**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.


Host: Drepana cultaria L., Erannis defoliaria Cl., Eupithecia absinthiata Curt., Gonodontis bidentata Cl., Oporinia diluta Schiff.

Subgenus Netelia (Parabates) Foersterz
Type-species: Parabates nigricarpus Thomson.

41. Netelia (Parabates) foersteri Kaur & Jonathan
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
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. Dicocubitus 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).............................................. \textit{turgida} Kaur & Jonathan

42. \textit{Netelia (Longiterebates) grandis} Kaur & Jonathan


\textbf{Distribution} : India : West Bengal (Darjiling District), Sikkim.

\textbf{Remarks} : Kaur & Jonathan (1979) gave a detailed description of this species in their revision of the tribe Phytodietini.

43. \textit{Netelia (Longiterebates) himalayensis} Kaur & Jonathan


\textbf{Distribution} : India : West Bengal (Darjiling District), Himachal Pradesh, Sikkim, Uttar Pradesh.

\textbf{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. \textit{Netelia (Longiterebates) turgida} Kaur & Jonathan


\textbf{Material examined} : India : West Bengal : Darjiling District : Takdali, 1500 m, 1 Female, 26.iii.1973, H. S. Sharma & party.

\textbf{Distribution} : India : West Bengal (Darjiling District), Himachal Pradesh.

\textbf{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

Type-species: *Paniscus antefurcalis* Szepligeti.

45. *Netelia (Prosthodocis) japonica* (Uchida)


*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; areol 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. Gonoforesp spatulate at its dorso-apical corner.


*Distribution*: India : West Bengal (Darjiling District), Sikkim. Elsewhere : Italy, Japan, Switzerland, Taiwan.

Subgenus *Netelia (Toxochiloides)* Tolkanitz

Type-species: *Netelia krishtali* Tokanitz, 1971.

46. *Netelia (Toxochiloides) latro latro* (Holmgren)


*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.


**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**


*Type-species*: *Paniscus inquinatus* Gravenhorst.

**Key to the species of Netelia (Netelia)**

1. Scutellar carina 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 incisuous; 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; areola 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 ............................................................. *kashmiriensis* (Cameron)

1. 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

2. 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)

3. 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

7. 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

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)

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.

— Mesopleurum finely to coarsely punctate; propodeum usually moderately regularly, closely striated. Subgenital plate rounded in the middle of its free posterior end.

10. Eyes rather broad, about 2.5x as long as broad; 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 2.6-2.7x 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 ............................................................... rimosap (Enderlein) 12

12. Small and delicate species; mesopleurum finely weakly punctate, polished; metapleuran smooth. ................................................................................ rukmaniae Kaur & Jonathan

— Small to large species; mesopleurum moderately coarsely and closely punctate, subpolished; metapleuran 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

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

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)

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
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


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.966, 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. Netelia (Netelia) intermedia (Cameron)


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)


**Distribution** : India : West Bengal (Darjiling District), Arunachal Pradesh, Bihar, Delhi, Himachal Pradesh, Karnataka, Sikkim, Uttar Pradesh.

**Host** : *Adsiura* sp.

53. *Netelia* (*Netelia*) *laevis* (Cameron)


**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)


**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

Type : M, India : West Bengal : Darjiling Dist. : Rangiroon, 1910 m. (Gupta).

**Material examined** : India : West Bengal : Darjiling District : Rangiroon, 1 Male (hototype) 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)


**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)


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: Devbetta, 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.; Dhinia; 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.; Gehra Dun, 600 m.; Srinagar, 610 m.; Mohakampur; Herbertpur; Roorkkee; Sikandrabad. Orissa: Mayurbhanj Dist: Jenabji. Manipur: Ukhrul, 1945 m. Meghalaya: Khasi Hills: Shiitong, 1484 m. Happy Valley; Cherrapunji, 1360 m. Assam: Rangapara: Charduar Forest, Sonajuli Tea Estate; Mangaldai, Mazbat. West Bengal: Calcutta; Darjiling, Botanical Garden; Rangiroon, 1910 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.


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) rimosos (Enderlein)


JONATHAN: *Hymenoptera: Ichneumonidae*


**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


**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


**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)


**Distribution**: India: West Bengal (Darjiling District), Uttar Pradesh. Elsewhere: France, Hungary, Italy, Russia, Switzerland.
Host: Apcheima hispidaria, Lycia hirtaria, L. pomonaria, Phigalia pilosaria, Tephrina arnaceaia.

Subgenus *Netelia (Paropheltes)* Cameron


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


*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


*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
   ① Tergites 2-4 without deep grooves ........................................................................ 2

2. Nervellus intercepted at or below the middle, abdomen subcylindric .................. Lissonotini
   ② 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
   ① Areolet absent. (Tergites 2-4 without a median longitudinal carina) ........... Glypta Gravenhorst

17. Genus Teleutaea Foerster

Type-species: Lissonota striata Gravenhorst.

64. Teleutaea prima (Morley)


Diagnostic characters: This is a slender, yellow and black species. Head without frontal horn or tubercle. Notauli distinct. Propodeum punctate, medially bicornate, apophysis absent. Petiolar area very short, spiracle small and circular. First abdominal tergites bicornate 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 Glytopimpla prima Morley.

Distribution: India: West Bengal (Darjiling District).

18. Genus Glypta Gravenhorst

Type-species: Glypta sculpturata Gravenhorst.
65. *Glypta nursei* Cameron


**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


Type-species : *Lissonota sulphurifera* Gravehorst.
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


*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


*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


68. *Cryptopimpla taiwanensis* (Momoi)


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.


Distribution: India: West Bengal (Darjiling District), Himachal Pradesh, Uttar Pradesh. Elsewhere: Burma, Taiwan.

21. Genus Syzeuctus Foerster
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) leplopunctatus 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 leplopunctatus Chandra & Gupta

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)

*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


Type-species: (*Leptobatopsis australiensis* Ashmead) = *indica* Cameron.

71. *Leptobatopsis indica* (Cameron)


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 .......................................................... *Banchopsis* 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 *Banchopsis* Rudow


Type-species: *Banchopsis crassicornis* Rudow.

72. *Banchopsis ruficornis* (Cameron)


*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.

24. Genus Exetastes Gravenhorst


Type-species: *Ichneumon fornicator* Fabricius.

73. *Exetastes illusor* Gravenhorst


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 Bombaycidae, 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

2. Spiracle of the first abdominal tergite basad or much basad of the apex of first sternite; petiole long, slender, cylindric to subcylindric 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
— Spirocle 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 cylindric. (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 is 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


Type-species: [Limneria (Sinophorus) canarsiae Ashmead] = validus Cresson.

74. Sinophorus nitidus (Brischke)


**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


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 *Homoneae* 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 discernible and areola generally well formed, narrow and parallel sided; if side of areola incomplete, then stubs distinct; propodeum always distinctly granulose ................................................................. The *Phthoinacae* 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; metapleuran and propodeum coarsely granulose; propodeum and metapleuran 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, metapleuran 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


*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


*Distribution*: India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Uttar Pradesh, Sikkim. Elsewhere : Nepal, Taiwan.

77. *Campoplex orien*s Gupta & Maheshwary

JONATHAN: *Hymenoptera: Ichneumonidae*

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: Khari Hills: Shillong, 1463 m. Burma, Sri Lanka, Taiwan, China, Malaysia.


78. *Campoplex pseudocollinus* Gupta & Maheshwary


*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


*Distribution*: India: West Bengal (Darjiling District), Himachal Pradesh, Sikkim, Meghalaya. Elsewhere: Pakistan, Taiwan.

*Host*: Larva feeding on *O. dilatata*.

27. Genus *Casinaria* Holmgren


Type-species: *Campoplex tenuiventris* Gravenhorst.

*Key to the species of Casinaria*

1. Hind leg largely yellowish-brown. (Upper half of mesopleuron 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.......................*atratsa* (Morley)

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80. *Casinaria ashimae* Maheshwary & Gupta

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. huttone*.

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81. *Casinaria atrata* Morley


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.

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82. *Casinaria indubia* (Morley)


**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 euploeae*.

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83. *Casinaria minima* (Morley)


**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.

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28. Genus *Charops* Holmgren


**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)


**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., *Trichomalopsis apanteloctenus*, *Eupteromalus* sp.

85. *Charops obtusus obtusus* Morley


**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*, *Euprostis scintillans*, *Terias silhetana*, *Orgyia postiea*.

**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, cylindric to subcylindric 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 distal 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 distal of the basal vein by 0.15-0.4x its length ....................................... Kartika Gupta & Gupta

29. Genus Cymodusa Holmgren


Type-species: Cymodusa leucocera Holmgren.

86. Cymodusa josephi josephi Gupta & Gupta


Diagnostic characters : Intercellular 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.


Distribution : India: West Bengal (Darjiling District), Himachal Pradesh.
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30. Genus Menaka Gupta & Gupta


Type-species: Menaka nigrita Gupta & Gupta.

87. Menaka nigrita Gupta & 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, mesoplurum 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 metanotum of hind leg, black.


Distribution: India: West Bengal (Darjiling District).

31. Genus Delopia Cameron


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)


*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


*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)


*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)


*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)


*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)


**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 intercellular distance 1.25x the ocello-ocular distance.

94. *Delopia townseni* (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; intercellular distance 0.3x the ocello-ocular distance, transverse carina on prepectus ridge-like.

32. Genus *Kartika* Gupta & Gupta


**Type-species** : *Kartika aspera* Gupta & Gupta.

95. *Kartika longifemorata* Gupta & Gupta


**Diagnostic characters** : Face densely punctate; clypeus mat, sparsely punctate; malar space 0.35x the basal width of mandible; intercellular 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, infront 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.


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

   Type-species: Msoleptus tibiator Cresson.

96. Campoletis chlorideae Uchida

1974. *Campopleis 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


Type species: *Campoplex crassicornis* Gravenhorst.

97. *Diadegma varuna* Gupta


**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 regulose, 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* Foerster


Type-species: *Ichneumon longipes* Mueller.

98. *Olesicampe flavicornis* (Thomson)


*Europe. India.*

**Diagnostic characters**: The following description is based on an 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* Foerster


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)


**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. *Eriborus* perfidus* (Gravenhorst)


**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


Type-species : *Ichneumon vulnerator* Panzer.

101. *Pristomerus marginicollis* (Cameron)


**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.


**Remarks**: Morley (1913) reported this species from West Bengal.

38. Genus *Temelucha* Foerster


Type-species : *(Porizon macer Cresson) = facilis* Cresson.
102. Temelucha stangli (Ashmead)


*Material examined*: Nil.


*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


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; $Rs + 2r$ weekly 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) .................. *fuscomaculatus* (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


*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 fuscomaculatus* Cameron


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


Material examined: India: West Bengal: Naya Bazar, 1 Female, 1x.1959, B.K. Tikadn.


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


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

Type-species: Euryophion nigripennis Cameron.

107. Euryophion vexatious Gauld & Mitchell


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


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.

   — Face 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


*Host*: *Laelia subrosea, Psalis* sp.


*Distribution*: India: West Bengal (Darjiling District), Bihar, Karnataka, Himachal Pradesh, Sikkim, Uttar Pradesh. Elsewhere: Sri Lanka. Taiwan, Rhykyus, China, Indonesia, Philippines.


*Host*: *Callitaera horsfielda, Dasychira mendosea, Pralis pennatule*. 
110. **Enicospilus erythrocerus** (Cameron)  


**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, lm-cu medially thickened and strongly convex.

111. **Enicospilus gasteralis** Nikam


**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


**Material examined**: India : West Bengal : Darjiling, 1 Male, iv.1971, Braumin.


**Remarks**: The shape of the alar sclerites and form of Rs + 2r characterize this species.
113. Enicospilus laqueatus (Enderlein)


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


Type-species : Mesocherus splendidulus Gravenhorst.

114. Mesochorus ? claristigmaticus Morley


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.


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 oceli 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


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 ........................................... dissectorius lar Morley

115. Metopius (Ceratopius) dissectorius lar Morley


Material examined: No material was available for study.


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)


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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 infuscate.

117. Metopius (Ceratopius) purpureotinctus (Cameron)


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


Type-species: Exochus podagricus Gravenhorst.

118. Triclistus aikini (Cameron)


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


Type-species: Macromalon montanum Townes.

119. Macromalon orientale Kerrich

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 infuscate. Abdominal tergites 2-5 brownish at apex.

Distribution: India: West Bengal (Darjiling District), Meghalaya, Sikkim.

Host: Plutella xylostella.

46. Genus Exochus Gravenhorst


Type-species: Ichneumon gravipes Gravenhorst.

120. Exochus flavicaput Morley


Diagnostic characters: This is a black species with head infront, 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


Type-species: (Anomalon cruentatus Panzer) = foliator Fabricius.

121. Anomalon foliator (Fabricius)

1798. Ophion foliator Fabricius. Supplementum Entomologiae Systematica, p. 239. F. des. Type: F, Germany.: Halle, Saxony (Kiel on deposit in Copenhagen).


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.

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


Type-species: *Agrypon tisiphone* Morley.

122. *Perisphincter tisiphone* (Morley)


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.


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 DILAZONTINAE

Key to the Genera of DILAZONTINAE

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* Scmiedeknecht

   — 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


Type-spécies: *Ichneumon laetatorius* Fabricius.

123. *Diplazon guptai* Diller


**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


Type-species: *Bassus sulcator* Gravenhorst.

124. *Promethes sulcator* (Gravenhorst)


**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


Type-species: (*Tymmophorus lacustris* Schmiedeknecht) = *Bassus rufiventris* Gravenhorst.

125. *Tymmophorus cinctus* (Gravenhorst)


**Diagnostic characters**: This is a black species with punctate body. Head as broad as thorax; frons impressed; areola distinctly delineated, subquadrate; metascurtum rugulose; basal segment of abdomen
subquadrate. Body black with face, clypeus, scape, scutellum and post-scuteellum 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


Type-species: *Bassus biguttatus* Gravenhorst.

126. *Syrphoctonus dimidiatus* (Schrank)


**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 subsessile; 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* Doumere
   — Propodeum long, its areola 1.0x to 1.5x as wide as long.................... *Charitopes* Foerster

53. Genus *Dichrogaster* Doumere


Type-species: *Microgaster perlae* Doumere.

127. *Dichrogaster pallens* Townes


**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


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


**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


**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. ...................................................... , ............................................ Lossa Tosquinet

   — 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

Type-species: Mansa sigularis Tosquinet.

130. Mansa fulvipennis (Cameron)


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

Type-species: Hemigaster fasciata Brulle.
131. **Hemigaster fulvipes** (Cameron)


**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; propodal 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


Type-species : *Phyadeuon (Polytribax) pallescens* Viereck.

132. **Polytribax luteus** (Cameron)


**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 mesopleuron and metapleuron, 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


Type-species : *Aconias spinatus* Cameron.

133. **Aconias spinitis** Cameron


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 value. 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. (Areal rectangular or somewhat trapezoidal, usually much wider than high, sometimes its outer side open; or rarely the areol represented only by the very short first intercubitus which is approximately interstitial with second recurrent vein)..............................Ceratocryptininii

— Apical 0.6 of the mediella approximately straight......................................................... 3

3. Areol usually about 1.5x as wide as high, or areol 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

— Areol 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. (Areolet not higher than wide; propodeum moderately long. Teeth on ovipositor tip not unusually close)……………………………Xoridesopus Cameron

59. Genus Apocryptus Uchida


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 granulose 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. Metapleuron finely striate. Mesopleuron 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. Mesopleuron 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 granulose. 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. ......................

134. *Apocryptus biserratus* Gupta & Gupta


*Distribution*: India: West Bengal (Darjiling District), Sikkim. Gupta & Gupta

*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


*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


*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


**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. Mesopleuron with broad yellow mark. Propodeum with a W-shaped yellow mark.

138. *Apocryptus pilosus* Gupta & 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


**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


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


**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


**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.

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**Tribe ISCHNINI**

61. Genus *Buathra* Cameron


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)


Remarks : This species is close to B. luculenta (Cameron) but can be distinguished by the characters given in the key.

143. Buathra luculenta (Cameron)


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

— Apical margin of clypeus with a median tooth-like extension; areolet very small.................. Anupama Jonathan

62. Genus Gotra Cameron


Type-species : Gotra longicornis Cameron.

144. Gotra marginata (Brulle)


Diagnostic characters: Head subpolished; face closely punctate; frons weakly striolated; mesoscutum closely punctate; scutellum impunctate. Propodeum coarsely striated; metapleural 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 mesopleuron, a crescent-shaped mark on mesosternum, a small mark on metapleural 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.


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

Type-species: Anupama himalayensis Jonathan.

145. Anupama himalayensis Jonathan


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; mesopleuron 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 mesopleuron, scutellum and its lateral carinae, metascutellum, metapleural with an oval spot, horse-shoe-shaped mark on propodeum, hind coxa above, apices of all the abdominal tergites, yellow.
JONATHAN: Hymenoptera: Ichneumonidae


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 mesopleuron; first abdominal tergite short and stout, about 2x as long as wide at apex, postpetiole as longs 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

\[ \text{Isotima Foerster} \]

— 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

\[ \text{Formostenus Uchida} \]

6. First abdominal tergite less than 2x as long as wide at apex, and postpetiole much wider at base (width=distance between spiracles) than long (length=distance between spiracle and apex); ovipositor tip usually short and blunt, and not so pointed. propodeal apophysis generally crest-like

\[ \text{Goryphus Holmgren} \]

— 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

\[ \text{Skeatia Cameron} \]

64. Genus *Menaforia* Seyrig


Type-species : *Menaforia rufa* Seyrig.

146. *Menaforia indica* Gupta & Saxena


*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.


*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* Cameron


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* Morley


*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* Cameron


*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* Holmgren


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) ................................................. \textit{hyalinoides} (Uchida)

3. Propodeum with horse-shoe-shaped mark; lateral carina of scutellum black .................................

— Propodeum with a broad shield-shaped mark; lateral-carina of scutellum marked yellow ............

149. \textit{Goryphus salutator} (Cameron)


\textit{Distribution} : India : West Bengal (Darjiling District), Assam, Sikkim.

\textit{Remarks} : Jonathan & Gupta (1973) gave a detailed description of this species.

150. \textit{Goryphus sikkimensis} Jonathan & Gupta


\textit{Material examined} : India : West Bengal : Tista Bridge, 200 m., 3 Females, 8-15.xii.1934, R. Malaise (Gupta).

\textit{Distribution} : India : West Bengal (Darjiling District), Sikkim, Uttar Pradesh. Elsewhere : Burma.

\textit{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. \textit{Goryphus hyalinoides} (Uchida)


\textit{Remarks} : This is the first record of this species from India.
152. *Goryphus brahminus* (Cameron)


*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


*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 it median lobe............................................................ *mysorense* Jonathan & Gupta
   — Base of hind wing black; pronotal collar yellow and meddle lobe of mesoscutum with an oval yellow mark.............................................................. *maculifrons* Jonathan & Gupta.

153. *Skeatia maculifrons* Jonathan & Gupta


*Remarks* : Jonathan & Gupta (1973) gave a detailed description of this species. It is distinguished by having the face rugulose; metapleurum finely wrinkled; propodeum basad regose to wrinkled and apical carina absent. Face, clypeus and frons yellow.
154. **Skeatia versatilis** (Cameron)


*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 mysorense** Jonathan & Gupta


*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)


*Material examined* : India; West Bengal; Darjiling District : Rangpo, 1 Female, 9.iv.1973, H.S. Shanna & 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


Type-species : *Eripternimorpha javensis* Rohwer.

157. **Gambroides javensis** (Rohwer)


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; mesopleuron rugose in the middle, sterna 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
Type-species: Isotima albicineta Ashmead.

158. Isotima difficilis Jonathan

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; mesopleuron 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.

Distribution: India: West Bengal (Darjiling District), Assam.


70. Genus *Formostenus* Uchida

Subgenus *Formostenus (Formostenus)* Uchida

Type-species: *Mesostenus (Formostenus) angularis* Uchida.

159. *Formostenus (Formostenus) flavofasciatus* Jonathan


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.


Distribution: India: West Bengal (Darjiling District), Sikkim, Uttar Pradesh. Elsewhere: Burma.

71. Genus *Lipoprion* Townes


Type-species: *Buodias rufo-ornatus* Cameron.


160. *Lipoprion rufo-ornatus* (Cameron)


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 mesopleuron, 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 Ichneumoninae

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 annexant forms (Townes, 1961).

The characters in the key are subject to exceptions, which at times will make identification difficult.

**Key to the Tribes of Ichneumoninae**

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.

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 labe; 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) ................................................. Achaius 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 ..................................................................................... Achaius 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

Type-species : Eccoptosage Waageni Kriechbaumer.

160. Eccoptosage waagenii Kriechbaumer


**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


Type-species: (*Brachypterus means* Gravenhorst) = *latrator* Fabr.

161. *Pterocormus annaelisae himalayanus* (Heinrich)


**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


Type-species: *Thascia pilosa* Cameron.

162. *Thascia pilosa* Cameron


**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


Type-species: (*Amblyteles Occisorius* Gravenhorst) = *occisor* Fabr.

163. *Spilichneumon darjeelingensis* Cameron


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

**Remarks**: This species is only known by its type female is British Museum.

76. Genus *Achaius* Cameron


Type-species: *Achaius flavobilteatus* Cameron.
164. Achaius flavobalteatus Cameron


**Distribution** : India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Sikkim. Elsewhere : Burma.

77. Genus Setanta Cameron


Type-species : Setanta rufipes Cameron.

165. Setanta himalayensis (Cameron)


**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


Type-species : Coelojoppa cariniscutis Cameron.

166. Coelojoppa cariniscutis Cameron


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

**Remarks** : No material of this species was available for study. This species in only known by its type female from Darjiling.

79. Genus Mesophadnus Cameron


Type-species : Mesophadnus spilopterus Cameron.
167. *Mesophadnus violaceipennis* (Cameron)


**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


Type-species: *Darymna pleuralis* Cameron.

168. *Darymna pleuralis* Cameron


**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

— Aerola 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).

81. Genus Ichneumon Linnaeus

Subgenus Ichneumon (Ichneumon) Linnaeus


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)


170. Ichneumon (Ichneumon) fulvipes (Cameron)


171. Ichneumon (Ichneumon) iridipennis (Cameron)


172. Ichneumon (Ichneumon) lineaticeps (Cameron)


173. Ichneumon (Ichneumon) rufosomoratus Cameron


**Distribution**: India : West Bengal (Darjiling District), Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh. Elsewhere : Burma.

174. *Ichneumon (Ichneumon) taihorinus* (Uchida)


**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


Type-species : *Amblyjoppa rufobaleata* Cameron.

175. *Amblyjoppa forticornis forticornis* (Cameron)


**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


Type-species : *Naenaria grandiceps* Cameron.

176. *Naenaria nigrocoerulea* (Cameron)

**Distribution**: India: West Bengal (Darjiling District), Meghalaya, Sikkim.

**Remarks**: This species is known by its type female only.

84. **Genus Cratojoppa** Cameron


Type-species: *Cratojoppa robusta* Cameron.

177. **Cratojoppa robusta** Cameron


**Distribution**: India : West Bengal (Darjiling District), Meghalaya, Sikkim. Elsewhere : Bhutan, Burma.

Tribe ISCHNOJOOPPINI

85. **Genus Ischnojoppa** Kriechbaumer


Type-species : (*Joppa lutea* Fabricius) = *luteator* Fabricius.

178. **Ischnojoppa luteator** (Fabricius)


**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

**Genus**: Platylabus Wesmael


Type-species: *Platylabus rufus* Wesmael.

179. *Platylabus uranius viridis* (Cameron)


**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 many 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.
REFERENCES


WEST BENGAL

MAP 3

NUMBER INDICATES NAME OF SPECIES/SUBSPECIES AS TREATED IN THE TEXT

BAY OF BENGAL
NUMBER INDICATES NAME OF SPECIES/SUBSPECIES AS TREATED IN THE TEXT
INSECTA : HYMENOPTERA : BRACONIDAE

K. K. RAY

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 vention 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.
WEST BENGAL

DISTRIBUTION MAP OF BRACONIDAE

BRACONINAE
○ Bracon famulus Bingham

CHELONINAE
○ Chelonus heliope Gupta
○ Chelonus indicus Cameron

AGATHIDINAE
□ Agathis lepcha Cameron

MICRUGASTERINAE
○ Apanteles maro Nixon

ALYSINAE
○ Aclisis cilipennis Cameron

BIHAR
○ Purulia

BARDHAMAN
○ Bankura

HUGLI
○ Medinipur

HAORA
○ 24 PGS (SOUTH)

MURSHIDABAD

BIRBHUM

BARODHAMAN

BAY OF BENGAL

SIKKIM

BHUTAN

JALPAIGURI

KOH CH BHIAR

DARULING

BANGLADESH

ORISSA

BAY OF BENGAL
4. SYSTEMATIC ACCOUNT

Class  INSECTA
Order  HYMENOPTERA
Family  BRACONIDAE

<table>
<thead>
<tr>
<th>Serial no.</th>
<th>Name of the species</th>
<th>Subfamily</th>
</tr>
</thead>
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<td>1.</td>
<td><em>Bracon ceceidobius</em> Kieffer</td>
<td>Braconinae</td>
</tr>
<tr>
<td>2.</td>
<td><em>Bracon daphnephilae</em> Kieffer</td>
<td>Braconinae</td>
</tr>
<tr>
<td>3.</td>
<td><em>Bracon famulus</em> Bingham</td>
<td>Braconinae</td>
</tr>
<tr>
<td>4.</td>
<td><em>Bracon niceivilli</em> Bingham</td>
<td>Braconinae</td>
</tr>
<tr>
<td>5.</td>
<td><em>Agathis lepcha</em> Cameron</td>
<td>Agathidinae</td>
</tr>
<tr>
<td>6.</td>
<td><em>Euagathis sikkimensis</em> Enderlein</td>
<td>Agathidinae</td>
</tr>
<tr>
<td>7.</td>
<td><em>Euagathis tricarinata</em> Enderlein</td>
<td>Agathidinae</td>
</tr>
<tr>
<td>8.</td>
<td><em>Doryctes cheops</em> Nixon</td>
<td>Doryctinae</td>
</tr>
<tr>
<td>9.</td>
<td><em>Chelonus indicus</em> Cameron</td>
<td>Cheloniinae</td>
</tr>
<tr>
<td>10.</td>
<td><em>Chelonus heliope</em> Gupta</td>
<td>Cheloniinae</td>
</tr>
</tbody>
</table>
11. *Cyclophatnus flavus* Cameron
12. *Aclisis cilipennis* Cameron
13. *Rhacalsia rufobalteata* Cameron
14. *Colastes nigropectus* Cameron
15. *Apanteles derjeelingensis* Sharma & Chatterjee
16. *Apanteles stantoni* (Ashmead)
17. *Apanteles flaviceps* (Cameron)
18. *Apanteles maro* Rao
19. *Apanteles priscus* Rao
20. *Apanteles ruficrus* (Haliday)
21. *Apanteles bifida* Sharma
22. *Microgaster himalayensis* Cameron

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 ........................................................................................................ 4
   Specimens less than 10-12 mm., in length .......................................................................................... 5
3. Antennae markedly thick and long ......................................................................................................... 6
   Antennae moderately thick and short ....................................................................................................... 7
4. Terebra 90 mm., in length ....................................................................................................................... 8
   Terebra less than 90 mm., in length ........................................................................................................ 9
5. Thorax and abdomen markedly thick .................................................................................................... 10
   Thorax and abdomen moderately thick .................................................................................................. 11
6. Wing-venation, much reduced ........................................................................................................... 12
   Wing-venation, not much reduced ........................................................................................................ 13
7. Legs distinctly long ................................................................................................................................. 14
   Legs moderately long .............................................................................................................................. 15

I. Subfamily **BRACONINAE**

1. Genus *Bracon* Fabricius


Key to the species of *Bracon* Fabricius

1. Specimens, brownish-red ...................................................................................................................... 2
   Specimens, dull-testaceous .................................................................................................................... 3

   B. ceceidobius Kieffer
2. Abdomen, elongate ................................................................. *B. niceivelli* Bingham
Abdomen, subglobular ........................................................................................................ 3
3. Antenna, elongate ................................................................. *B. daphnephibae* Kieffer
Antenna, short ..................................................................................................................... *B. famulus* Bingham

1. *Bracon ceceidobius* Kieffer


*Distribution*: India: West Bengal.

2. *Bracon daphnephibae* Kieffer


*Distribution*: India: West Bengal.

3. *Bracon famulus* Bingham


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

4. *Bracon niceivelli* Bingham


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

II. Subfamily AGATHIDINAE

2. Genus *Agathis* Latreille


5. *Agathis lepcha* Cameron


*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* Szepiketi


Key to the species of *Euagathis* Szepiketi

Thorax and abdomen covered with dense pubescence ......................... *sikkimensis* Enderlein
Thorax and abdomen covered with sparse pubescence ......................... *tricarinata* Enderlein
6. **Euagathis sikkimensis** Enderlein


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

7. **Euagathis tricarinata** Enderlein


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

III. Subfamily **DORYCTINAE**

4. Genus **Doryctes** Haliday


8. **Doryctes cheops** Nixon


*Material*: 1 (fem), Darjiling, Coll. J.K. Jonathan & party, May, 1974; body length, 4.2 mm.

*Diagnosis*: Head strongly transverse, ovipositor less than half the length of abdomen.

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

IV. Subfamily **CHELONINAE**

5. Genus **Chelonus** Jurine


Key to the Species of **Chelonus**

Yellow band of abdomen markedly broad .................................................... *C. heliope* Gupta

Yellow band of abdomen moderately narrow ................................................... *C. indicus* Cameron

9. **Chelonus heliope** Gupta


*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** Cameron

RAY: Insecta: Hymenoptera: Braconidae

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


11. Cyclophatnus flavus Cameron


Distribution: India: West Bengal (Darjiling).

VI. Subfamily ALYSINAE

7. Genus Aclisis Forster


12. Aclisis cilipennis Cameron


Distribution: India: West Bengal (Darjiling).

8. Genus Rhacalsia Cameron


13. Rhacalsia rufobalteata Cameron


Distribution: India: West Bengal (Darjiling).

VII. Subfamily EXOTHECINAE

9. Genus Colastes Haliday


14. Colastes nigropectus (Cameron)


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* Forster


**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 balck ...........................................................................................................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. ruficus* (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* Sharma


*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 & Chatterjee


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

17. *Apanteles flavipes* (Cameron)


*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* Nixon

*Diagnosis*: Parasitic on *Diacrisia obliqua* Walker.

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

19. *Apanteles priscus* Rao

*Diagnosis*: Parasitic on *Achaea janata* Linnaeus.

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

20. *Apanteles ruficrus* (Haliday)

*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)

*Diagnosis*: Parasitic on Pyralid moths.

*Distribution*: India: West Bengal.

11. Genus *Microgaster* Latreille

22. *Microgaster himalayensis* Cameron

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

**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.

REFERENCES


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, Hybophthiriidae, 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* Jhonson
   6. *H. maniculata* (Neumann)
   7. *H. malabarica* Werneck
   8. *H. pacifica* Ewing
  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 Dhand
   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 mammalologists.

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°C ± 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, DMsS - Dorsal mesothoracic setae, DMtS - Dorsal metathoracic setae, MDTS - Median dorsal thoracic setae, DAAS - Dorsal accessory abdominal setae, DCAS - Dorsal central abdominal setae, DPrS - Dorsal paratergal 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 pre-antennal head setae (VPaHS); 13 - Dorsal pre-antennal head setae (DPaHS); 14 - Supra antennal head setae (SPSdHS); 15 - Supra antennal central head setae (SPatdHS); 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 (DAndHS); 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 parategites 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 occular lobes .......................................................... 2
   — Head without distinct eyes ........................................................................................................ 4

2. Head with prominent occular 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


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 anterolateral 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


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

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


*Material examined*: 20 ♀♀, 20 ♂♂, from Boos bubalis in Barddhaman dist., West Bengal, 10.10.83, 12.5.85; Coll. C.C. Adhikary.


*Remarks*: This species is close to *H. eurysternus* Denny, but it can be separated by the number of setae on paratergites.

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2. Family HOPLOPLEURIDAE Ewing
1. Subfamily HOPLOPLEURINAE Ewing
2. Genus Hoplopleura Enderlein 1904


*Key to the species of the genus Hoplopleura recorded in West Bengal*

1. Parategite VIII with dorsal process well developed, ventral posterior process lacking ............... 2
   — Parategite 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 lobed, with serrated margins; VII dorsal process wide, ventral narrow ................................................................................................................................. 3
   — 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


4. *Hoplopleura blanfordi* Mishra and Dhanda


*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


**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)

1921 *Hoplopleura maniculata*, Ferris, Contributions towards a monograph of the sucking lice, Pt. II 112-113.

**Material examined**: 15 ♀♀ 10 ♂♂ from *Funambulus pennanti* Puruliya, West Bengal: 18.1.85; Coll. C.C. Adhikary.


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

7. **Hoplopleura malabarica** Werneck


**Material examined**: 10 ♀♀, 10 ♂♂ from *Bandicota bengalensis*, Midnapore, West Bengal; 10.9.1984; Coll. C.C. Adhikary.


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

8. **Hoplopleura pacifica** Ewing


**Material examined**: 3 ♀♀, 3 ♂♂ from *Rattus rattus arboreus*; West Bengal; 18.9.84; Coll. C.C. Adhikary.
**Distribution**: India: West Bengal (Barddhaman); 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.


**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


**Material examined**: 12 ♀♀, 10 ♂♂ from *Rattus niviventer* in Shillong, Meghalaya; 4.7.85; coll. C.C. Adhikary.


**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


**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


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


*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
   reperiundis commentarius*, P. 80.

1932. *Linognathus setosus* Ferris, *Contributions towards a monograph of the sucking lice*, Pt. V. P.
   340-344.


*Material examined*: 4 ♀♀, 5 ♂♂ from Dog in Uttar Pradesh; 9.10.86. Coll. C.C. Adhikary.


*Remarks*: This species is close to *L. pedalis* (Osborn) but it can be separated by large spiracles.

14. *Linognathus vituli* (Linnaeus)


*Material examined*: 20 ♀♀, 20 ♂♂ from domesticated cattle in Barddhaman, West Bengal, 10.12.84. Coll. C.C. Adhikary.

*Distribution*: India: West Bengal (Barddhaman) 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 1758


15. *Pediculus humanus* Linnaeus


*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 sickel shaped, genital plate variable in form.


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 1904


*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


*Material examined*: 2 ♀ ♂ 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


*Distribution*: India: West Bengal (Puruliya); Maharashtra and Karnataka.

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

18. *Polyplax reclinata* (Nitzsch)


*Material examined*: 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)


*Material examined*: 8 ♀ ♂ 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 1910


20. *Neohaematopinus echinatus* (Neumann)


*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 1815


21. *Pthirus pubis* (Linnaeus)


*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**

**Host**  
*Bandicota bengalensis*  
*Bos bubalis*  
*Fumambulus pennanti*  
*Mus booduga*  
*Mus sexicauda*  

**Parasite**  
*Hoplopleura malabarica*  
*Polyplax asiatica*  
*Haematopinus tuberculatus*  
*Hoplopleura maniculata*  
*Neohaematopinus echinatus*  
*Hoplopleura captiosa*  
*Hoplopleura ramgarh*
\textit{Hoplopleura blanfordi}  \hspace{1cm} \textit{Polyplax blanfordi} \\
\textit{Hoplopleura pacifica}  \hspace{1cm} \textit{Polyplax reclinata} \\
\textit{Hoplopleura sicata}  \hspace{1cm} \textit{Polyplax stephensii} \\
\textit{Hoplopleura silvula}  \\

**Host** \\
Cattle \\
Dog \\
Goat \\
Swine \\

**Parasite** \\
\textit{Haematopinus eurysternus} \\
\textit{Linognathus vituli} \\
\textit{Linognathus setosus} \\
\textit{Linognathus africanus} \\
\textit{Haematopinus suis} \\

Besides the above \textit{Pediculus humanus Pthirus pubis} have been recorded from Man.

**REFERENCES**


