FAUNA OF MEGHALAYA

PART-4

Zoological Survey of India
Calcutta
1999
FAUNA OF MEGHALAYA

PART-4

INSECTA : HEMIPTERA : HOMOPTERA

Edited by
The Director
Zoological Survey of India, Calcutta

Zoological Survey of India
Calcutta
1999
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(iii)
INSECTA : HOMOPTERA : CICADELLIDAE

M. GHOSH AND L.K. GHOSH

Zoological Survey of India, Calcutta

The Cicadellids or Leafhoppers are the auchenorrhynchaous homopteran insects constituting the largest family in the order Hemiptera.

They have been considered insects of economic importance. These insects usually cause damage to the plants by sucking plant's sap, injecting toxins while sucking, by laying eggs covering the leaf circle. Some are vectors transmitting viruses and microplasmalike organism. Nielson (1979) listed 128 species of Cicadellidae as vectors of plant pathogens in the world. Despite their damage caused to the crops plant, very little attention has been paid to explore their fauna, abundance and distribution in the country. Though the leaf hopper fauna of the Western parts of the world are well-known, studies on oriental leaf-hoppers with special reference to India including Meghalaya are very much limited.


Hamilon (1984) estimated that 15000 species of Leafhoppers were described so far from the world. In India about 680 species are so far known (Basu et. al 1991)


The present contribution is an attempt to provide a comprehensive account of the family Cicadellidae of Meghalaya comprising 38 species belonging to 27 genera distributed over 12 subfamilies. It is based on the recent as well as the old collections made by different survey party members of Zoological Survey of India.

The account deals with a brief note on earlier investigations, diagnosis of each species, keys to taxa, geographical distribution of each species, new locality records of 11 species (marked *), literature and references. Genitallic structures of 26 species (Male studied) have been provided in this paper as an aid to identification of these species. Maps showing the distribution of 38 species examined from various districts of Meghalaya have also been included in the paper.

The classification of the family has been adopted after Distant (1908-1918); Young (1952), Ghauri (1963, 1967, 1971, 1974); Borror et. al (1976); Knight and Neilson (1986).
### SYSTEMATIC ACCOUNT

Classified List of Cicadellidae of Meghalaya

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*New record from Meghalaya State

Key to subfamilies

1(2) Male valve and Pygofer fused; genital plates narrow basally ................................................. 3
2(1) Male valve usually more or less triangular, genital plates triangular ........................................... 9
3(4) Lateral margin of pronotum rather long, carinate; ................................................................. 5
4(3) Lateral margin of pronotum short and not carinate; Forewing without or with very narrow appendix; lateral facial sutures terminating at antennal pits ........................................ 7
5(6) Hind wing with submarginal vein extending to jugum .................................................. Krishninae
6(5) Hind wing with submarginal vein not extending to jugum .................................................. Iassinae
7(8) Hind wings always present, with three closed apical cells ........................................... Macropsinae
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Subfamily I. Cicadellinae

1. Genus Bothrogonia Melichar


Type, by subsequent designation

Bothrogonia ferruginae Fabricius

1787. Cicada ferruginea Fabricius, Mantissa Insectorum 2 : 269

Key to the species of Bothrogonia

1(2) Pronotum with 5 spots ................................................................................ leopardina
2(1) Pronotum with 3 spots ................................................................................ 3
3(4) Abdomen light brown; aedeagus massive and with complex structure (Fig. 2a); Style with rod-shaped preapical lobe, mesal apical extension almost hook-shaped (Fig. 2b). indistincta
4(3) Abdomen black; aedeagus not massive, \( \frac{3}{4} \) apically oarshaped, deeply cleft lengthwise; style with short apical knob, rest cylindrate ................................................................. ferrugiana

1. Bothrogonia ferruginea (Fabricius)

1794. Tettigoniella ferruginea Fabricius, Entomologia Syst. 4 : 32.


1862 ZSI/99-2A

Diagnosis: Vertex with black spots, one at apex and other between ocelli; pronotum with three black spots one at anterior margin and other two at base; scutellum centrally with a black spot; Tegmina piceous, claval suture with black patches its apical cell blackish; Abdomen blackish.

Aedeagal shaft (Fig. 1a) terminating in oar-shaped processes; style (Fig. 1b) with short apical knob, rest cylindrate; Male plate (Fig. 1c) massive, gradually tapered; Pygofer (fig. 1d) hook infolded, base serrate on outer margin, apex acuminate.

Length: male 14 mm, female 15 mm.

Distribution: India: Meghalaya (Garo Hills, Khasi Hill); Maharashtra, Tamil Nadu, West Bengal, Uttarakhand, Elsewhere: Borneo; Burma; Ceylon; Coorg; Dutch East Indies; Japan; Java; Liangs; Korea; Malay Peninsula; Malacca; Nepal; Philippine; Perak; Pahang; Singapore; Sumatra.

Remarks: It is reported to be injurious to apple (in Hida Province, Nozawa 1916: 325), agricultural crops in Philippine (Woodworth 1921: 31) Silkworm mulberry (Yoneyama 1925: 192), citrus plants in Japan (Miyoshi, 1926: 338). It is suspected in spreading spike disease of Sandal forest (Dover 1934: 36), reported on cotton from Formosa (Shiraki 1937: 43), often it is parasitised by Halictophagus serratus Boh (Strepsiptera) (Bohart 1943: 352-359).

2. Bothrogonia indistincta (Walker)


Diagnosis: Vertex, pronotum and scutellum brownish yellow; vertex with two black spots, one at base and other at apex; pronotum trinotate. Scutellum with a black spot; subapically, tegmina testaceous; abdomen brown.

Aedeagal structure (Fig. 2a) complex, massive; connective Y-shaped; style (Fig. 2b) straight stout, male plate (Fig. 2c) massive, convergent apicad with row of microsetae; pygofer (Fig. 2d) triangulate apicad; posterolateral margin infolded, hook massive arising from laterobasal margin, stout, elongate.

Length: 13.5 mm (male), 14.5 mm (female)

Distribution: India: Meghalaya (Elephant Falls, Shillong); Assam; Uttar Pradesh, Elsewhere: Borneo; Burma; Ceylon; China (Western and Northern); Fukien; Java; Philippine; Sumatra; Szechwan.

3. Bothrogonia leopardina (Distant)

Material examined: 1 ex., Meghalaya: Garo Hills, 12.3.91, coll. B.C. Das and party.

Diagnosis: Vertex brownish yellow, with five black spots two each on anterior, basal margin and one central; pronotum with five black spots; scutellum with three spots; tegmina castaneous with a black spot on its claval suture.

Aedeagal structure (Fig. 3a) complex, massive; connective V-shaped; style (Fig. 3b) about half as long as male plate, preapical lobe not prominent, mesal apical extention gradually tapered to pointed apex. Male plate (Fig. 3c) robust, discal, surface spined densely, lateral margin setose; pygofer (Fig. 3d) subrectangle, pygofer hook stout twisted.

Length: 11.5 mm (male)

Distribution: India: Meghalaya (Garo Hills), Assam. Elsewhere: Java, Myitta; Tenasserim.

2. Genus Cicadella Latreille


Type, by subsequent designation, Cicadella viridis Van-Duzee.


4. Cicadella spectra (Distant)


1908. Telligoniella spectra Distant, Fauna Brit. India 4: 211.

1910. Cicadella spectra (Distant), Insect Trans, 10: 234.


Diagnosis: Vertex with 4 black spots, pronotum with transverse striation. Male plate (Fig. 4c) triangulate, lateral margin convex; mesal margin almost linear gradually tapered from base to apex; discal setae stout; much longer than those on apical and densely spinule, pygofer densely spinule, with micro-setae on posterior part, style (Fig. 4b) beak-like, gradually tapering to pointed apex, Aedeagus subapically curvate, shaft slender, connective T-shaped.

Length: female 10 mm. and male 8 mm.

Distribution: India: Assam, Meghalaya (Garo Hills, Elephant Falls, Shillong), Assam, Bihar, Karnataka, Maharashtra, Madhya Pradesh, Orissa; Elsewhere: Australia; Bangladesh; Nepal; Sri Lanka.

Remarks: The species is commonly found on paddy during winter period. It also feeds on wild grasses.
3. Genus *Cofana* Melichar


5. *Cofana mimica* (Distant)


*Diagnosis:* Vertex with one central black spot and two identical spots close to ocelli. Pronotum with fine transverse impression, tegmina greenish white. Aedeagus (Fig. 5a) with well developed basal strut, strongly geniculate at base, directed caudad; connective 'Y' shaped, style dorsoventrally compressed, male plate (Fig. 5c) robust, lateral margin uniseriate; pygofer simple rectangulate.

*Length:* female 6.5 mm, male 5 mm.

*Distribution:* India : Meghalaya (Garo Hill and Tura); Bihar, Uttar Pradesh and West Bengal.

*Remarks:* The species is common on paddy crop during winter season.

4. Genus *Kolla* Distant


*Key to the species of Kolla*

1(2) Aedeagus distinctly bulbous at base; vertex with a single spot.................................................... *ganesha*

2(1) Aedeagus variably shaped but not bulbous; vertex with three spots ............................................. 3

3(4) Style robust, much swollen basally; Male plate blunt at posterior extremity; aedeagus spoon-shaped; body smaller in size (5 mm)................................................................. *unimaculata*

4(3) Style rather slender, not swollen as above; male plate robust, narrowed beyond middle, apex rounded; aedeagus foot-shaped (Fig. 7a); body larger in size (8-9 mm).......... *Opponens*

6. *Kolla ganesha* Distant


*Material examined:* 1 ex., Meghalaya : Jaintia Hill, 29.9.88, coll. V.D. Srivastava & party.

*Diagnosis:* Vertex with a black small spot at its tip; a dark transverse band of its sub-anterior margin extending to antennal base. Pronotum ochraceous centrally with a dark triangular fascia each basal angle of scutellum with a black spot. Tegmina blackish, its vein greyish and costal margin darker.
Aedeagus (Fig. 6a) bulbous at base with a filamentous process, style (Fig. 6b) shot, apex conical, preapical lobe well differentiated; male plate (Fig. 6c) convergent at distal end; pygofer (Fig. 6d) densely spinulate, pygofer hook geniculate with sharp apex.

Length: female 6.5 mm and male 5.5 mm.

Distribution: India : Meghalaya (Jaintia Hill), West Bengal. Elsewhere : Southern Peninsula.

7. Kolla insignis Distant


Material examined: 3 exs., Meghalaya : Jaintia Hills; Jowai, Reithsesim, 29.9.88; coll. V.D. Srivastava; 2 exs., Garampani, Luchook, 2.10.88, coll. V.D. Srivastava; 1 ex., Garo Hill, Tambo William nagar; 11.3.91, col. B.C. Das; 2 exs., Shillong; East Khasi Hill, 16.3.91, coll. B.C. Das.

Diagnosis: Vertex with two spots and with three spots centrally, anterior spots united by a short thick line; pronotum bronzy black with a wavy transverse fascia close to anterior margin; scutellum with black spot at each basal angle; tegmina shiny black, apical cell pigmented.

Length: female 5 mm.

Distribution: India : Meghalaya (Jaintia Hills, Shillong, Garo Hills), Uttar Pradesh, West Bengal; Elsewhere : Nepal.

8. Kolla opponens (Walker)


Diagnosis: Vertex with two anterior black spots and at base a transverse black spot; anterior margin of pronotum black; scutellum with a black spot at its basal angle; abdomen with a black fascia.

Aedeagus (Fig. 7a) red-shaped apical portion foot-shaped; style (Fig. 7b) with apex beak-shaped: male plate (Fig. 7c) narrowed beyond middle and apex rounded; pygofer (Fig. 7b) also robust, dagger-shaped.

Length: female 9 mm and male 8 mm.

Distribution: India : Meghalaya (Jaintia Hills, Shillong and Tura), Assam Uttar Pradesh, West Bengal; Elsewhere : Burma; Netherlands.

9. Kolla unimaculata Signoret


Diagnosis: Vertex with 3 dark spots at its anterior margin, pronotum beyond middle with a transverse band, scutellum with a dark spot; tegmina with a pale brownish longitudinal band at its claval area.

Aedeagal shaft spoon-shaped basally (Fig. 8a); shaft of style (Fig. 8b) with broader base, somewhat conical with acuminate apex, preapical lobe well differentiated; male plate (Fig. 8c) gradually converging; anal hook prominent.

Length: female 6 mm. male 5 mm.

Distribution: India: Meghalaya (Jaintia Hill, Shillong); Karnataka, Tamil Nadu, West Bengal; Elsewhere: Burma; Java; Malacca; Philippines; Sri Lanka.

5. Genus Tettigella China & Fennah

Type by original designation, Cicada viridis China and Fennah.

10. Tettigella bellona Distant


Diagnosis: Vertex yellowish, with a prominent black spot at central and at lateral margin, longitudinal ridge present; pronotum yellowish, tegmina golden yellow.

Length: 8 mm. (female)

Distribution: India: Meghalaya (Shillong), Nilgiri Hills; Elsewhere: Burma.

Subfamily II. Penthiminae

6. Genus Penthimia Germar

1821. Penthimia Germar, Mag. Ent. 4 : 46.
Type by monotypy, Cercopis atra Fabricius

Key to the species of Penthimia

1(2) Body blackish; apex of each claval area with a small dull ochraceous spot; posterior tibiae black .............................................................. noctua

2(1) Body castaneous; claval area without such spot; posterior tibiae strongly spinose and somewhat castaneous.............................................................. melanocephala

11. Penthimia melanocephala Motsch


Diagnosis: Vertex black, punctate; pronotum bright reddish brown with fine transverse wrinkle; scutellum punctate; tegmina at apex whitish black shade.

Length: female 4.5 mm.

Distribution: India: Meghalaya (East Khasi Hills and Jaintia Hills), South India; Burma; Coorg; Newera Elia; Elsewhere: Sri Lanka; Tanasserin.

12. Penthimia noctua Distant

1918. Penthimia noctua Distant, Fauna Brit. India, 4 : 22


Diagnosis: Vertex black, present a strongly sloping line, pronotum rounded; tegmina rugose; ochraceous at apex.

Length: female 4.5 mm.

Distribution: India: Meghalaya (East Garo Hills); West Bengal.

Subfamily III. Ledrinae

7. Genus Ledra Fabricius


Type by subsequent designation Ledra aurita Linnaeus


13. Ledra dilatata Walker


Diagnosis: Vertex brownish, thickly granulated and with central longitudinal ridge, pronotum tuberculate, finely punctate; scutellum distinctly bilineate: tegmina coriaceous, strongly reticulate beyond middle.

Length: 22 mm (female).

Distribution: India: Meghalaya (Tura); ‘Bengal’, Madras, Nilgiri Hills, Elsewhere: Burma; East Indies; Sri Lanka.

8. Genua Petalocephala Stal


Type by subsequent designation of Atkinson, Petalocephala bohemani Stal

Key to the species of *Petalocephala*

1(2) Scutellum finely punctate; face narrow, centrally sulcate near antennae, tegmina hyaline

[1(2) Scutellum finely punctate; face narrow, centrally sulcate near antennae, tegmina hyaline]

2(1) Scutellum rather deeply punctate, with transverse striation; face obscurely sulcate; tegmina rusty brown, clavus area purplish brown

[2(1) Scutellum rather deeply punctate, with transverse striation; face obscurely sulcate; tegmina rusty brown, clavus area purplish brown]

14. **Petalocephala confusa** Distant


*Diagnosis*: Vertex greenish yellow, pronotum punctate, with a longitudinal compressed line; scutellum finely punctate; tegmina hyaline, strongly punctate; face narrow, broadening posteriorly, centrally sulcate near antennae.

*Length*: female 12.5 mm.

*Distribution*: India: Meghalaya (West Khaasi Hills); Elsewhere: Sri Lanka.

15. **Petalocephala latifrons** Walker


*Diagnosis*: Vertex greenish yellow with centrally distinct longitudinal carina; pronotum strongly punctate; scutellum with transverse striation apically; tegmina rusty brown, clavus area purplish brown; face obscurely, not prominently sulcate.

*Length*: 13.5 mm (female).

*Distribution*: India: Meghalaya (Shillong), Assam, Maharashtra, Sikkim, West Bengal; Elsewhere: Sri Lanka.

9. Genus **Tituria** Stal


Type by subsequent designation *Tituria planata* Fabricius


Key to the species of *Tituria*

1(2) Pronotum thickly punctate and with fine transverse striation; scutellum dark virescence at base

[1(2) Pronotum thickly punctate and with fine transverse striation; scutellum dark virescence at base]

2(1) Pronotum punctate and finely rugulose, scutellum tastaceous at basal angle

[2(1) Pronotum punctate and finely rugulose, scutellum tastaceous at basal angle]

16. **Tituria assamensis** Distant

**Material examined:** 1 ex., Meghalaya; Tura, dist. West Garo Hills; 3.10.1991, coll. R.K. Varshney and party.

**Diagnosis:** Vertex greenish with thickly and finely punctate; pronotum finely thickly punctate and finely transversely striate; scutellum dark green; tegmina thickly coarsely punctate at claval area.

Length: 10.5 mm (female).

**Distribution:** India: Meghalaya (West Garo Hills), Assam.

17. *Tituria planata* Fabricius

1794. *Tituria planata* Fabricius, Ent. Syst. 4: 11.

**Material examined:** 1 ex., Meghalaya; Shangpung, dist. Jaintia Hills, 21.9.75, coll. N. Muraleedharan.

**Diagnosis:** Vertex greenish yellow, thickly punctate, longitudinally central carinate; pronotum punctate and finely rugulose; tegmina coarsely punctate at claval area and rest thickly punctate.

Length: female 16 mm.

**Distribution:** India: Meghalaya (Jaintia Hills); Eastern India, Madras, West Bengal; Elsewhere: Cambodia; East Indies; Formosa; Indochina; Japan; Malacca; Siam; Tenasserim.

**Subfamily IV. Ulopinae**

10. Genus *Moonia* Distant


**Type by original designation,** *Moonia sandta* Distant 4: 197.

**Material examined:** 1 ex., Meghalaya: Tura, on way to Tura peak, dist. West Garo Hill, 2.5.1979, coll. J.K. Jonathan and party.

**Diagnosis:** Vertex light brownish; pronotum with a series of spots; scutellum with a spot at each basal angle; tegiminal vein brownish. Aedeagal shaft (Fig. 9a) medially notched; Stylar shaft (Fig. 9b) twisted abruptly subapically, apex truncate; male plate (Fig. 9c) club-shaped. Pygofer as figured (Fig. 9d).
State Fauna Series 4: Fauna of Meghalaya

Length male 4.5 mm female 5 mm.

Distribution: India: Meghalaya (Tura, West Garo Hill); South India.


Material examined: 1 ex., Meghalaya: Jaintia Hills, Jowai Kalbhrnei Ghat; 18.9.88, coll. V.D. Srivastava and party.

Diagnosis: Vertex with linear spots; pronotum black with small spots; scutellum with a small spot at each basal angle; tegminal vein lightly spotted, with piceous transverse fascia at base.

Length: female 4.5 mm.

Distribution: India: Meghalaya (Jaintia Hills), Kodaikanal, Nilgiri Hills.

Subfamily V. Nirvaninae

11. Genus Nirvana Kirkaldy

1900. Nirvana Kirkaldy, Entomologist, 33: 293.

Type, by original designation Nirvana pseudommatos Kirkaldy

1900. Nirvana pseudommatos Kirkaldy, Entomologist, 33: 293.

20. Nirvana pallida Melichar

1903. Nirvana pallida Melichar, Fauna Vol Ceylon, Hom.,: 166


Material examined: 1 ex., Meghalaya (Rongra, West Garo Hills), 12.1.91, coll. B. Nandi and party.

Diagnosis: Vertex eliplical, with pale white line; pronotum with an ore shaped impressed line; scutellum with a transversely impressed line in middle; tegmina transparent, apical cell with brownish dots.

Aedeagal shaft (Fig. 10a) elongated, narrowed to apex; Style simple; Male Plate (Fig. 10b) finger-shaped, lateral margin with a row of hair-like setae. Pygofer with a tuft of long setae; pygofer hook (Fig. 10c) projected beyond pygofer tip.

Length: female 5.5 mm, male 5 mm.

Distribution: India: Meghalaya (West Garo Hill), Madras, Karnataka, Uttar Pradesh; Elsewhere Burma; China; Formosa; Hong Kong; Japan; Kyushu Limbok; Malay States; Oshima Island; Ryukyu; singapore; Sri Lanka.

Subfamily VI. Aphrodinae

12. Genus Gurawa Distant


Type by original designation Gurawa vexillum Distant
21. *Gurawa vexillum* Distant


**Material examined**: 1 ex., Meghalaya, Jaintia Hills, Jowri Thadlaskein lake; 17.9.‘88, coll. V.D. Srivastava and party.

**Diagnosis**: Vertex subtriangular, with a central black band; pronotum with a pair of black spots on each side; scutellum with 3 spots one at tip rest at centre; tegmina semitransparent.

Aedeagus (Fig. 11a) funnel-shaped, gradually attenuating; stylar shaft (Fig. 11b) prominent; male plate (Fig. 11c) short, triangular, setose; pygofer densely spined.

Length: female 4.5 mm and male 4 mm.

**Distribution**: India: Meghalaya (Jaintia Hill); Eastern Himalaya; South India.

Subfamily VII *Hecalinae*

13. Genus *Parabolocratus* Fieber


Type by monotype, *Parabolocratus sulcatus* (Fieber)


22. *Parabolocratus albomaculatus* (Distant)


**Material examined**: 1 ex., Meghalaya : Dist. Jaintia Hills; Jowai 8 miles village; 24.9.88, coll. V.D. Srivastava and party.

**Diagnosis**: Vertex dark brown; pronotum fasciate: scutellum with a dark spot on each basal angle; apical cell of tegmina brownish with white spots.

Aedeagal shaft tube-like except basal third broadened (Fig. 12a) otherwise tube like; a pair of elongate slender acute apical processes directed cephaled; styler shaft with preapical lobe differentiated (Fig. 12b) mesal apical extension sharply pointed, directed laterocaudad; Male plate (Fig. 12c) gradually connivent, disc spinulate; pygofer simple (Fig. 12d).

Length: female 5 mm, male 4.5 mm.

**Distribution**: India: Meghalaya (Jaintia Hill); Orissa, Tamil Nadu, West Bengal; Elsewhere: Bengian Congo; Luzon; Philippine islands; Sri Lanka; Sumbawa.

**Remarks**: The species has affinity with paddy pests like *Nephotettix virescens* (Fabr.), *N. apicalis* de Mots. *Kolla mimica* Dist. and *Cicadella spectra* (Dist.) but can be separated by the structure of aedeagal shaft with terminal processes.
Subfamily VIII. Deltocephalinae

14. Genus *Arya* Distant


Type, by original designation *Arya rubrolineata* Distant.


23. *Arya rotunda* Pruthi


*Material examined* : 1 ex., Meghalaya : Jaintia Hills, Jowai Dawki; 25.9.88; coll. V.D. Srivastava.

*Diagnosis* : Vertex reddish brown; two linear impressions at base; pronotum transversely striated, with a paired dark impression (female) and a black stripe (male) close to anterior margin; tegmina sub-hyaline.

Aedeagal shaft tubular (Fig. 13a) apex spoon-shaped style (Fig. 13b) with mesal apical extension slender, apex pointed; Male plate (Fig. 13c) egg-shaped at posterior half; pygofer (Fig. 13d) flattened, massive; hook extending 3/4 part of male plate.

Length : female 5 mm and male 4 mm.

*Distribution* : India : Meghalaya (Jaintia Hill), Madhya Pradesh.

15. Genus *Balclutha* Kirkaldy


Type, by subsequent designation, *Cicada punctata* Fabricius


24. *Balclutha viridis* Pruthi


*Diagnosis* : Vertex binotate; pronotum with greenish tinge; scutellum binotate; tegmina hyaline.

Length : female 3 mm, male 2.5 mm.

*Distribution* : India : Meghalaya (Shillong) : Maharashtra, Orissa, South India, West Bengal.

16. Genus *Cicaduls* Zetterstedt


Type, by subsequent designation *Cicada quadrinotata* Fabricius


25. *Cicadula maculata* Pruthi


**Diagnosis**: Vertex with large subapical spots; pronotum with black patches; scutellum with a black spot at each basal angle; tegmina pale brown.

Aedeagal shaft (Fig. 14a) gradually connivent to acute apex; style (Fig. 14b) with apex pointed; Male plate (Fig. 14c) gradually connivent, apex having a row of fine hair-like setae; Pygofer (Fig. 14d) ovoid, spined.

Length: female 3.5 mm, male 3 mm.

**Distribution**: India: Meghalaya (Jaintia Hills and Shillong); Elsewhere: Sikkim.

17. Genus *Dio* Distant

Type, by original designation, *Dio Facialis* Distant

26. *Dio facialis* Distant


**Material examined**: 1 ex., Meghalaya; Shillong, Botanical Garden; East Khasi Hills; 25.5.1979, coll. G.K. Srivastava and party.

**Diagnosis**: Vertex brownish yellow; anterior half of pronotum and tegmina marked with spots.

Aedeagal shaft elongated (Fig. 15a) slender, arcuate, subapically with a minute projection and a pair of apical processes; style (Fig. 15b) narrowed in the middle, serrate, apex hood-shaped; Male plate (Fig. 15c) massive. oar-shaped, pygofer (Fig. 15d) ovoid, pygofer hook sharp, short, directed cauded.

Length: male 2.5 mm.

**Distribution**: India: Meghalaya (Shillong); so far known from Eastern Himalaya.

18. Genus *Eutettix* van Duzee

Type, by original designation, *Thamnotettix luridus* van Duzee.

27. *Eutettix phycitis* Distant


**Material examined**: 1 ex., Meghalaya, Umtyngar, Cherrapunji; Dist. East Khasi Hill, 8.11.1991, coll. R.C. Basu and party.
Diagnosis: Vertex anteriorly rounded, pronotum broader, rugulose, tegminal surfaces finely ornamented with reddish brown patches.

Aedeagus (Fig. 16a) with a pair of tube-like shafts, outer margin sinuate, apex sharp, hook-shaped, triangulate; connective Y-shaped, style (Fig. 16b) attenuate, inner margin of apical half serrate; Male plate (Fig. 16c) setose.

Length: female 4 mm; male 3.5 mm.

Distribution: India: Meghalaya (Umtyngar, Cherrapunji); Assam, Bihar, Tamil Nadu, West Bengal; Elsewhere: Australia.

Remarks: According to Pruthi (1934) the species is a suspect vector of spike disease of Sandal (Salanum album). In India.

19. Genus *Exitianus* Ball


Type by original designation *Exitianus obscurinervis* (Stal).


Key to the species of *Exitianus*

1(2) Scutellum with a rounded black spot on each side of basal margin; pygofer posterior third with four microsetae at apex, almost of same size and shape................................. *nanus*

2(1) Scutellum without such spots on each side of basal margin; pygofer with two microsetae at apex........................................................................................................ *indicus*

28. *Exitianus indicus* (Distant)

1908. *Athysanus indicus* Distant, Fauna Brit. India, 4: 344


Diagnosis: Vertex ochraceous with a black fascia across eyes, scutellum granulate on basal area; tegmina subhyaline; veins pale brown; abdomen fuscous.

Aedeagus (Fig. 17a) laterally compressed, beak shaped, apex sharp; Style (Fig. 17b) with apex sharply pointed. Male plate (Fig. 17c) posteriorly converging to angulate apex; pygofer (Fig. 17d) densely spinulate, with a pair of distinct apical spur.

Length: female 5.5 mm, male 4.5 mm.

Distribution: India, Meghalaya (Shillong, Jaintia Hill); Bihar, Uttar Pradesh; Elsewhere: Nepal.

Remarks: In the paddy field the species is usually found in association with Nephotettix spp. In India Cheo (1935) reported the species to be injurious to economic plant, in China (Helgon 1951). The species transmits "witches' broom virus" of lucerne and Sugarcane.
29. **Exitianus nanus** (Distant)


**Diagnosis**: Vertex rounded with an arcuate fascia between eyes, pronotum greenish yellow, scutellum brown, a dark spot at basal angle; tegmina hyaline, its vein brown; abdomen pale brown.

Aedeagal (Fig. 18a) shaft robust, curvate inwards; styler shaft with beak-shaped mesal apical extension (Fig. 18b); male plate (Fig. 18c) thick somewhat conical than others; Pygofer as figure (Fig. 18d).

Length: female 5 mm, male 4 mm.

**Distribution**: India : Meghalaya (Shillong, Jaintia Hills); Bihar, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu; Elsewhere: Iraq.

20. Genus **Goniagnathus** Fieber

Type, by monotypy, *Jassus brevis* Herrick Sch.

30. **Goniagnathus punctifer** Walker


**Material examined**: 1 ex., Meghalaya; West Garo Hills 12.5.59, coll. S.B. Ray and party.

**Diagnosis**: Vertex with dark spots, face punctate with distinct transverse stripes; pronotum finely striate, anterior margin smooth; tegmina smoky with thick veins, spots fuscoous.

Aedeagus (Fig. 19a) with an apodeme, lateral part of shaft concave with a pair of sharp terminal processes; style (Fig. 19b) with mesal apical extension, margin at apex bifurcate; male plate (Fig. 19c) simple; pygofer 1/3 densely spined apically; pygofer hook dagger-shaped.

Length: female 7 mm, male 6 mm.

**Distribution**: India : Meghalaya (Garo Hills); Bihar; Maharashtra, Uttar Pradesh; Elsewhere: Burma, Maldive, Malagasy, Sri Lanka.

21. Genus **Nephotettix** Matsumura

Type, by subsequent designation, *Selenocephalus cinticeps* Uhler
Key to the species of *Nephotettix*

1(2) Vertex with a transverse submarginal black band; anterior margin of pronotum marked by a transverse black band; aedeagus with 8 pairs of spines; pygofer without any long spur (Fig. 20d)

2(1) Vertex usually without sub-marginal black band; anterior margin of pronotum without black band; aedeagus with five pairs of spines; pygofer with a long, sharp, spur besides three spurs (Fig. 21d)

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### 31. *Nephotettix nigropicta* (Stal)


*Diagnosis*: Vertex with a transverse line between eyes; tegmina with an oblique broad stripe extending medially to claval suture; apical 1/3 of tegmina and abdomen blackish.

Aedeagus (Fig. 20a) with well developed apodeme with 3 pairs of lateral processes; styler shaft with mesal apical extension gently notched posterolaterally (Fig. 20b); male plate (Fig. 20c) beyond middle spinulate on both margin; pygofer (Fig. 20d) subrectangular.

*Length*: female 5.5 mm and male 4.5 mm.

*Distribution*: India: Meghalaya (East Garo Hills and Jaintia); Bihar, Orissa, Punjab and West Bengal; Elsewhere: East Africa; Philippines and Sri Lanka.

*Remark*: The species enjoys wide distribution in all rice growing areas of the world. This is a common seasonal insect of rice fields in West Bengal. It is abundantly found during Kharif season particularly during August - November. The species is a vector of viruses on paddy crops. It occurs along with *N. virescens* (Fabr.) during winter in the Eastern and Western India. The species is reported to transmit dwarf disease in Japan and Tungro disease in India.

### 32. *Nephotettix virescens* (Fabricius)


**Diagnosis**: Face black, clypeus in male with a black spot on each side absent in female; tegmina deep black.

Aedeagal shaft linguiform, short, flat, apex with 3 pairs of spur-like processes (Fig. 21a); style (Fig. 21b) with apical extension, saw-like; male plate (Fig. 21c) gradually converging, apex obtuse, mesal margin spined; pygofer (Fig. 21d) posteriorly with a long sharp spur besides three smaller spurs.

Length: female 5 mm and male 4 mm.

**Distribution**: India: Meghalaya (Shillong, Jaintia Hills); Bihar, West Bengal; Elsewhere: Ethiopian region Indonesia; Japan; Korea; Malaysia; Micronesia; Netal; Palestine; Philippines; Singapore; Sumbawa; Taiwan; Thailand.

**Remarks**: The species transmits viruses consisting of Transitory yellowing (Taiwan), Rice Tungro virus (Philippines and India) and rice dwarf virus (Japan), Ponyakit morah (Tungro) (Malaysia. Rice tungro virus (RTV) occasionally occurs as epidemics in several states of the country including West Bengal.

22. **Genus Recilia** Edwards


Type, by original designation, *Deltocephalus dorsalis* Motschulsky


33. **Recilia dorsalis** (de Mot.)


**Material examined**: 1 ex., Meghalaya: Jaintia Hills Jowai Dawki, 25.9.88, coll. V.D. Srivastava and party.

**Diagnosis**: Vertex with two spots; scutellum with spots at each basal angle; tegmina with an irregular fuscous fascia from near to apex and a row of brown spots extend from apex of clavus to apical cell.

Aedeagal shaft (Fig. 22a) elongate, stout, stylar shaft beyond middle tapered to a point (Fig. 22b); male plate (Fig. 22c) simple; pygofer also simple.

Length: female 4 mm, male 3.5 mm.

**Distribution**: India: Meghalaya (Jaintia Hills); Tamil Nadu, West Bengal; Elsewhere: Burma; Sri Lanka; South-East and Far East Asian countries.

23. **Genus Thomsoniella** Signoret


Type, by monotype, *Thomsoniella kirschbaumi* Signoret


1862 ZSI/99—3A
34. *Thomsoniella porrecta* Walker


*Diagnosis*: Anterior margin of vertex usually blackish pronotum transverse; scutellum usually trifasciate; tegmina transparent.

Aedeagus (Fig. 23a) slender, basally broad and with hook-shaped spines apically; style (Fig. 23b) robustly dagger-shaped, apically pointed; Male plate (Fig. 23c) long, slender, broadened at bases gradually tapered with apical half transversely rugulose, lateral margin of basal half with spines; pygofer (Fig. 23d) broad basally, posterior half subtriangulate and spinulose.

*Length*: female 5.5 mm, male 4.5 mm.

*Distribution*: India: Meghalaya (Shillong; Tura, Khasi Hills); Bihar, Orissa, Punjab; Elsewhere: Burma; Formosa; Maldive; Philippine Islands; Queensland.

Subfamily IX. *Macropsinae*

24. Genus *Magnentius* Pruthi


*Type*, by original designation, *Magnentius clavates* Pruthi


35. *Magnentius clavatus* Pruthi


*Diagnosis*: Vertex stout; blackish; pronotum and scutellum somewhat punctate; tegmina with white pubescence.

Apex of aedeagal shaft spatulate but distinctly bifid (Fig. 24a); style (Fig. 24b) with pre-apical lobe not differentiated; mesal apical extension obliquely extended; Male plate (Fig. 24c) stout, gradually tapered, a few fine setae at tip; pygofer (Fig. 24d) appearing rectangular, with a row of macrosetae subapically.

*Length*: (female) 6 mm, male 5 mm.

*Distribution*: India: Meghalaya (Shillong); South India.

Subfamily X. *Agalinae*

25. Genus *Nehela* White


*Type*, by subsequent designation, *Nehela vulturina* White

36. *Nehela violacea* Distant


*Diagnosis:* Vertex dark purplish red; with a large spot in the middle; pronotum rounded convexly; scutellum dark brown; tegmina dark purplish red.

*Length:* (female) 5 mm.

*Distribution:* India: Meghalaya (Shillong), South India.

Subfamily XI. lassinae

26. Genus *lassus* Fabricius


37. *lassus indicus* (Lethierry)


*Diagnosis:* Vertex blunt at apex rounded, frons raised above cheeks; pronotum finely striate; scutellum depressed at base.

Aedeagal shaft (Fig. 25a) semi transparent, dorsoventrally flattened, deeply notched at base, a stout lateral process arising medially, inner margin at apex serrate; stylar shaft (Fig. 25b) tip beak-shaped; pygofer (Fig. 25d) with a sharply geniculate hook; male plate (Fig. 25c) ligulate with minute setae.

*Length:* female 7.5 mm, male 7 mm.

*Distribution:* India: Meghalaya (Shillong, Khasi Hills); Andaman Is.; Karnataka and Mysore; Elsewhere: Africa; Buru; Philippine Island; Samoa; Sri Lanka; Sumbawa; Upolu.

*Remarks:* Pruthi (1934) and Mathew (1953) recorded the species as a suspect vector of spike disease of Sandal wood.

Subfamily XII. Krishninae

27. Genus *Krisna* Kirakaldy


38. *Krisna strigicollis* (Spinola)


*Diagnosis* : Vertex binotate, pronotum with transverse lines; scutellum transversely striate; tegmina brownish yellow.

*Edeagal shaft simple* (Fig. 26a) *style* (Fig. 26b) slender, elongate, extreme apical part appearing spatulate; *Male plate* (Fig. 26c) broadened basally, gradually connivent, mesal margin with rugal projection; pygofer hook dagger-shaped (Fig. 26d).

Length : male 9.5 mm, female 10.5 mm.

*Distribution* : India : Meghalaya (Shillong); Bihar, Maharashtra, Tamil Nadu, Utta Pradesh; Elsewhere : Africa; Belgium; Billiran Is.; and Borneo; Burma; Compuchia; China; Dutch; East Indies; Indochina; Japan; Java; Luzon; Malay Peninsula; Malaysia; Philippine Islands; Singapore; Sri Lanka.

**SUMMARY**

The paper presents an account of 38 species belonging to 27 genera distributed over 12 subfamilies of Cicadellidae from Meghalaya. Of these, 12 species constitute new locality record from the state. Running key to various taxa, wherever applicable, is provided for easy identification. Besides, reference to original literature, notes on economic importance wherever possible, general diagnosis, geographical distribution of each species are incorporated. Necessary illustrations on genitalic armature of 26 species (male) are also provided. Also, a list of Cicadellid species so far known from the state of Meghalaya is appended. The paper is based on the collections made by various survey parties of Zoological Survey of India.

**ACKNOWLEDGEMENTS**

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**REFERENCES**


Fig. 1. Bothrogonia ferruginea (Fabricius). a - Aedeagus; b Style; c Male plate; d Pygofer.
Fig. 2. *Bothrogonia indistincta* (Walker). a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 3. *Bothrogonia leopardina* (Distant). a - Aedeagus; b  Style; c  Male plate; d  Pygofer.
Fig. 4. *Cicadella spectra* (Distant). a - Aedeagus; b - Style; c - Male plate.

Fig. 5. *Cofana mimica* (Distant). a - Aedeagus; b - Style; c - Male plate.
Fig. 6. *Kolla ganesha* Distant. a - Aedeagus; b Style; c Male plate; d Pygofer.

Fig. 7. *Kolla opponens* Walker. a - Aedeagus; b Style; c Male plate; d Pygofer.
Fig. 8. *Kolla unimaculata* Signoret. a - Aedeagus; b - Style; c - Male plate.

Fig. 9. *Moonia albivitta* Distant. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 10. *Nirvana pallida* Melichar. a - Aedeagus; b - Style; c - Male plate.

Fig. 11. *Gurawa vextillum* Distant. a - Aedeagus; b - Style; c - Male plate.
Fig. 12. *Parabolocratus albomaculatus* (Distant). a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 13. *Arya rotunda* Pruthi. a - Aedeagus; b Style; c Male plate; d Pygofer.

Fig. 14. *Cicadula maculata* Pruthi. a - Aedeagus; b Style; c Male plate; d Pygofer.
Fig. 15. *Dio facialis* Distant. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 16. *Eutettix phycitis* Distant. a - Aedeagus; b  Style; c  Male plate.
Fig. 17. *Exitianus indicus* (Distant). a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 18. *Exitianus nanus* (Distant). a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 19. *Goniagnathus punctifer* Walker. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 20. *Nephotettix nigropicta* Stal. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 21. *Nephotettix virescens* Fabricius. a - Aedeagus; b - Style; c Male plate; d - Pygofer.
Fig. 22. *Recilia dorsalis* de Mots. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.

Fig. 23. *Thomsoniella porrecta* Walker. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 24. Magnentius clavatus Pruthi. a - Aedeagus; b - Style; c - Male plate; d - Pygofer.
Fig. 25. Iassus indicus (Walker). a - Aedeagus; b Style; c Male plate; d Pygofer.
Fig. 26. *Krisna strigicollis* (Spinola). a - Aedeagus; b - Style; c - Male plate; d - Pygofer.


Table - 1. Distribution of Cicadellid species in different districts of Meghalaya

<table>
<thead>
<tr>
<th>Name of species</th>
<th>WEST GARO HILLS</th>
<th>EAST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>WEST KHASI HILLS</th>
<th>EAST KHASI HILLS</th>
<th>JANTIA HILLS</th>
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<td>1. <em>Bothrogonia ferruginea</em> Fabricius</td>
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<td>3. <em>Bothrogonia leopardina</em> (Distant)</td>
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<td>4. <em>Cicadella spectra</em> (Distant)</td>
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<td>6. <em>Kolla qanesha</em> Distant</td>
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<td>7. <em>Kolla insignis</em> Distant</td>
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<td>8. <em>Kolla opponens</em> (Walker)</td>
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<td>9. <em>Kolla unimaculata</em> Signoret</td>
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<td>10. <em>Tettigella bellona</em> China &amp; Fannah</td>
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<td>11. <em>Penthimia melancephala</em> Motsch.</td>
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<td>12. <em>Penthimia noctua</em> Distant</td>
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<td>13. <em>Ledra dilatata</em> Walker</td>
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<td>14. <em>Petalocephala confusa</em> Distant</td>
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<td>15. <em>Petalocephala latifrons</em> Walker</td>
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<td>16. <em>Tituria assamensis</em> Distant</td>
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<td>17. <em>Tituria planata</em> Fabricius</td>
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<td>18. <em>Moonia albivitta</em> Distant</td>
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<td>19. <em>Moonia variabilis</em> Distant</td>
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<td>20. <em>Nirvana pallida</em> Melichar</td>
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<td>21. <em>Gurawa vexillum</em> Distant</td>
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</tr>
<tr>
<td>22. <em>Parabolocratus albomaculatus</em> (Distant)</td>
<td>-</td>
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<td>+</td>
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</tr>
<tr>
<td>23. <em>Arya rotunda</em> Pruthi</td>
<td>-</td>
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</tr>
</tbody>
</table>
Table - 1. Distribution of Cicadellid species in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>WEST GARO HILLS</th>
<th>EAST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>WEST KHASI HILLS</th>
<th>EAST KHASI HILLS</th>
<th>JAINIA HILLS</th>
<th>RI-BHOI</th>
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<tbody>
<tr>
<td>24. Balclutha viridis Pruthi</td>
<td></td>
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<tr>
<td>25. Cicadula maculata Pruthi</td>
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<td>+ +</td>
</tr>
<tr>
<td>26. Dio facialis Distant</td>
<td></td>
<td></td>
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<td>+</td>
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<tr>
<td>27. Eutettix phycitis Distant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>+</td>
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<tr>
<td>28. Exitianus nanus (Distant)</td>
<td></td>
<td></td>
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<td>+ +</td>
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<tr>
<td>29. Exitianus indicus (Distant)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>+ +</td>
</tr>
<tr>
<td>30. Goniagnathus punctifer Walker</td>
<td></td>
<td></td>
<td></td>
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<td>+</td>
</tr>
<tr>
<td>31. Nephotettix nigropicta (Stal)</td>
<td>-</td>
<td></td>
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<td>+</td>
</tr>
<tr>
<td>32. Nephotettix virescens (Fabricius)</td>
<td></td>
<td></td>
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<td>+</td>
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<tr>
<td>33. Recilia dorsalis (de Motschulsky)</td>
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<td>+</td>
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<tr>
<td>34. Thomsonilla porrecta Walker</td>
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<td>+</td>
</tr>
<tr>
<td>35. Magnentius claavetus Pruthi</td>
<td></td>
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<td>+</td>
</tr>
<tr>
<td>36. Nehela violacea Distant</td>
<td>-</td>
<td></td>
<td></td>
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<td>+</td>
</tr>
<tr>
<td>37. Jassus indicus (Lethierry)</td>
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</tr>
<tr>
<td>38. Krishna strigicollis (Spinola)</td>
<td></td>
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<td>+</td>
</tr>
</tbody>
</table>
MAP-1: DISTRIBUTION OF CICADELLID SPECIES (NO. 1-9): HEMIPTERA

- Bothrogonia rerruginea Fabricius
- Bothrogonia indistincta (Walker)
- Bothrogonia leopardina (Distant)
- Cicadella spectrs (Distant)
- Cofana mimica (Distant)
- Kolla ganeshia Distant
- Kolla insignis Distant
- Kolla opposita (Walker)
- Kolla unimaculata Signoret
MAP-2: DISTRIBUTION OF CICADELLID SPECIES (NO. 10-19): HEMIPTERA

MEGHALAYA

10. *Tettigella bellona* China & Fennah
11. *Pentthimla melanoccephala* Matsch
12. *Pentthimla noctua* Distant
13. *Ledra dilatata* Walker
14. *Pentalocephala confusa* Distant
15. *P. latifrons* Walker
16. *Tituria assamensis* Distant
17. *T. planata* Fabricius
18. *Moonia albivitta* Distant
19. *Moonia variabilis* Distant

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MAP - 3. DISTRIBUTION OF CICADELLID SPECIES (NO. 20 - 29) HEMIPTERA

MEGHALAYA

ASSAM

BANGLADESH

20. Nirvana pallida Melichar
21. Gurawa exilum Distant
22. Parabolocaras albonasculatus (Distant)
23. Arya rotunca Pruthi
24. Belclitha viridis Pruthi
25. Cicadula maculata Pruthi
26. Dio fascialis Distant
27. Eutettix phycitis Distant
28. Exitianus nanus (Distant)
29. Exitianus indicus (Distant)
INTRODUCTION

The tree hoppers are members of the family Membracidae (Auchenorhyncha : Homoptera) and constitute one of the largest families in the order Hemiptera. The group is economically important. They are considered close to Leaf hoppers (Cicadellidae) from which they differ in having great development of the pronotum, particularly its pronotal process. These insects can be diagnosed by ocelli placed between the eyes, antennae inserted in front of head and between eyes, pronotum prolonged backward into a hood or process of variable length and structure. They suck the plant sap with the help of their piercing and sucking type of mouth parts.

In the recent years treehoppers have been gaining importance as pests of economically important plants, often causing direct damage by desapping them.

The information available on Membracid fauna of Meghalaya is fragmentary. No attempt was made earlier to explore the group from the state which is endowed with lush vegetation, diverse climatic conditions, heterogenous physiological nature and rich fauna.

Zoological Survey of India has undertaken a series of faunistic surveys in the state of Meghalaya. During this project, quite a large number of hemipterous specimens including the family Membracidae have been brought by different survey parties of Zoological Survey of India.

The present work is an attempt to provide a comprehensive account of the family Membracidae from Meghalaya. It is based on the recent collections made by different party members and also the old collections represented in Zoological Survey of India.

A perusal of literature reveals that altogether 8 species in 6 genera of Membracidae are so far known from Meghalaya (Atkinson 1885; Distant 1908, 1916; Funkhouser 1927, 1951; Wu 1935; Goding 1950; Mathur 1953).

In India a little over 200 species belonging to about 45 genera are known through the works of Buckton 1903; Paiva 1919; Funkhouser 1922; Dover 1932; Goding 1934, 1939; Evans 1948; Menon and Das 1958; Metcalf and Wade 1965; Ananthasubramanian and Ananthakrishnan 1975; Datta et al. 1978; Ghosh et al. 1986.

The present contribution is the first consolidated account of 19 species belonging to 11 genera from Meghalaya. Of these, 11 species marked (*) are hitherto reported for the first time from the State. The account deals with a brief note on earlier investigations, diagnosis of each species, keys to
taxa, new locality record and literature references. Maps showing distribution of the above species examined from various districts of Meghalaya have been incorporated in the paper.

The classification of the family has been mainly adopted after Distant (1908, 1916), Metcalf and Wade (1965) and Ananthasubramanian and Ananthakrishnan (1975).

All the material examined is in the National collection at Zoological Survey of India, Calcutta.

Classified list of Species from Meghalaya State

<table>
<thead>
<tr>
<th>Family</th>
<th>MEMBRACIDAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subfamily</td>
<td>CENTROTINAE Spinola, 1850</td>
</tr>
<tr>
<td>Tribe</td>
<td>Hypsaucheniiini Distant</td>
</tr>
<tr>
<td>Genus I</td>
<td>Hypsauchenia Germ, 1835</td>
</tr>
<tr>
<td>1.</td>
<td>Hypsauchenia hardwickii (Kirby)</td>
</tr>
<tr>
<td>2.</td>
<td>H. subfusca Buckton</td>
</tr>
<tr>
<td>Genus II</td>
<td>Hypsolyrium Schmidt, 1926</td>
</tr>
<tr>
<td>3.</td>
<td>Hypsolyrium kempi (Distant)</td>
</tr>
<tr>
<td>4.</td>
<td>H. uncinata (Stal)</td>
</tr>
<tr>
<td>Tribe</td>
<td>Micreunini Distant</td>
</tr>
<tr>
<td>Genus III</td>
<td>Leptobelus Stal, 1866</td>
</tr>
<tr>
<td>5.</td>
<td>Leptobelus dama (Germ.)</td>
</tr>
<tr>
<td>6.</td>
<td>L. gazella (Fairm.)</td>
</tr>
<tr>
<td>Tribe</td>
<td>Leptocentrini Distant</td>
</tr>
<tr>
<td>Genus IV</td>
<td>Indicopleustes Distant, 1908</td>
</tr>
<tr>
<td>7.</td>
<td>Indicopleustes obortus Distant</td>
</tr>
<tr>
<td>Genus V</td>
<td>Leptocentrus Stal, 1866</td>
</tr>
<tr>
<td>8.</td>
<td>Leptocentrus bajulans Distant</td>
</tr>
<tr>
<td>9.</td>
<td>L. leucaspis (Walker)</td>
</tr>
<tr>
<td>10.</td>
<td>L. mephistopheles Buckton</td>
</tr>
<tr>
<td>Genus VI</td>
<td>Nilautama Distant, 1908</td>
</tr>
<tr>
<td>11.</td>
<td>Nilautama typica Distant</td>
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<tr>
<td>Tribe</td>
<td>Centrotypini Haupt</td>
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<tr>
<td>Genus VII</td>
<td>Centrotypus Stal, 1866</td>
</tr>
<tr>
<td>12.</td>
<td>Centrotypus assamensis (Fairm.)</td>
</tr>
<tr>
<td>Tribe</td>
<td>Centrotini Goding</td>
</tr>
</tbody>
</table>
Genus VIII  
13. Anchon brevis Distant

Genus IX  
14. Tricentrus gibbosulus (Walker)
15. T. selenus (Buckton)

Tribe  
Gargarini Distant

Genus X  
16. Gargara affinis Distant
17. G. mixta (Buckton)
18. G. robusta Distant

Subfamily  
DARTHULINAE Metcalf, 1929

Genus XI  
19. Darthula Krik, 1900

Key to the subfamilies of the family Membracidae

1(2) Abdomen never possesses apical process; tegmina membranous with its veins never raised; scutellum with its apex generally excuate or broadly sinuate, the apical angles acute

.............................................................................................................................. .. Centrotinae

2(1) Abdomen provided with a long apical process about as long as the whole body, covered with long bristly hairs, with a strong triangular tubercle at base; tegmina coriaceous, densely and reticulately veined, which are raised & prominent; scutellum triangular apically subacute

.............................................................................................................................. .. Darthulinae

Subfamily  
CENTROTINA

Key to the tribes of the subfamily Centrotinae

1(2) Pronotum without any lateral process ................................................................. 3

2(1) Pronotum containing both the lateral processes ............................................... 5

3(4) Posterior pronotal process produced upward in a compressed process generally curved backward with its apex bilobed ......................................................... Hypsaucheniiini

4(3) Posterior pronotal process never produced upward & not apically bilobed ....... Gargarini

5(6) Wings with 4 apical areas ..................................................................................... 7

6(5) Wings not with 4 apical areas .............................................................................. 9

7(8) Scutellum longer than broad, apically acuminate .............................................. Micreunini

8(7) Scutellum nearly as long as broad, apically broad and sinuate or truncate ..... Leptocentrini
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9(10) Wings with 5 apical areas.............................................................. Centrotypini
10(9) Wings with 3 apical areas.............................................................. Centrotini

Tribe Hypsaucheniini
Genus I Hypsauchenia Germar


Key to the species of the genus Hypsauchenia

1(2) The posterior process of the pronotum more elevated from the scutellum; the apical lobes of the dorsal pronotal process broader covering a circular space at the base........ hardwickii
2(1) The posterior process of the pronotum is more nearer to the scutellum, the apical lobes of the dorsal process narrower and more elongate, while the space separating them at base is ovate................................................................. subfusca.

1. Hypsauchenia hardwickii (Kirby)


Material examined : 1 ex., above Tura, West Garo hills, 15.vii.-30.vii. 1917, S. Kemp coll.

Diagnostic characters : Piceous, pronotum granulose; its discal process bilobed and their apices with a slight slender projections, nearly reaching the tegminal apices; tegmina for about two thirds broadly & laterally punctate.

Length : 7-8 mm

Distribution : India : Meghalaya (West Garo hills), Assam, Nagaland, Sikkim, West Bengal; Elsewhere : Burma; Colombia; Georgia; Nepal; Pegu.

Remarks : This is a common East Himalayan species.

2. Hypsauchenia subfusca Buckton

1903. Hypsauchenia subfusca Buckton, Mon. Membrac. : 211.

Material examined : 1 ex., Cherrapunjee, East Khasi hills, 10.xi.1965, B. K. Tikadar, coll.

Diagnostic characters : The subapical angular elevation to the posterior process is narrower and more acute than H. subfusca.

Length : 7-8 mm.

Distribution : India : Meghalaya (East Khasi hills), Assam; Elsewhere : Sikkim; Nepal.

Genus II Hypsolyrium Schmidt

BISWAS & GHOSH: Hemiptera: Membracidae

Key to the species of the genus Hypsolyrium

1(2) Anterior pronotal process more perpendicularly elevated, the concave elevation of the posterior process shorter and more abruptly raised ......................................................... *kempi*

2(1) Anterior pronotal process bending a little forward and then elevated, the concave elevation of the posterior process longer and less raised .......................................................... *uncinata*

3. **Hypsolyrium kempi** (Distant)


*Material examined*: 1 ex., Cherapunjee, East Khasi hills, 28.x.1914, S. W. Kemp coll.

*Diagnostic characters*: Pronotum longly produced upwards, its apex subacute and directed backward, behind this it is inwardly lobately produced, it's central ridge finely serrated; a small white spot on tegminal margin near apex of the posterior pronotal process.

*Length*: 8 mm.

*Distribution*: India: Meghalaya (East Khasi hills), Assam; Elsewhere: Burma.

4. **Hypsolyrium uncinata** (Stal)


*Diagnostic characters*: The dorsal process of the pronotum posteriorly sublobate, acuminate and recurved at the apex; tegmina moderately, densely reticulate behind middle.

*Length*: 8 mm.

*Distribution*: India: Meghalaya (East Khasi hills), West Bengal; Elsewhere: Nepal.

Tribe Micreunini

Genus III: **Leptobelus** Stal


Key to the species of the genus *Leptobelus*

1(2) Lateral pronotal processes seen from behind more prominently recurved than when viewed in front, their apices acute, the posterior process curved and a little undulated ............... *dama*

2(1) Lateral pronotal processes wide, recurved, tricarinate, posterior process almost straight........

................................................................................................................. *gazella*

5. **Leptobelus dama** (Germar)

Material examined: 1 ex., Jakrom, West Garo hills, 25.iii.81, K. P. Singh coll; 1 ex., Shillong, East Garo hills, 11.iv.72, S. Biswas coll.

Diagnostically characters: Head, scutellum and pronotum black; tegmina pale bronzy, the base black, thickly and coarsely punctate followed by a large transverse dull ochraceous spot; scutellum beyond the cretaceous base finely and thickly punctate.

Length: 9.5 mm; width: Lateral pronotal process 5 mm.

Distribution: India: Meghalaya (West Garo hills, East Garo hills); Elsewhere: Borneo; Java; Palawan; Philippine islands; Sumatra; Taraislands.

6. Leptobelus gazella (Fairm)


Diagnostically characters: Head, pronotum, scutellum indigo black; tegmina brownish ochraceous dark castaneous at base; apical area distinctly wrinkled; scutellum elongate, more or less white at base pronotum finely and palely pilose.

Length: 8-10 mm; width lateral pronotal process 6 mm.

Distribution: Meghalaya (East Khasi hills); Assam, Nagaland; Elsewhere: Burma; China; Java; Ruby mines; Sumatra.

Tribe Leptocentrini

Key to the genera of the tribe Leptocentrini

1(2) Posterior pronotal process impinging on scutellum near its apex.........................Indicopleustes
2(1) Posterior pronotal process remote from scutellum ................................................................. 3
3(4) Posterior pronotal process curved at base and then obliquely directed downward, its apex touching or nearly touching or sometimes passing the posterior angle of inner tegminal margin ................................................................. Leptocentrus
4(3) Posterior pronotal process straight, not curved at base, not directed downward, its apex remote from tegmina and scarcely reaching posterior angle of inner tegminal margin ...........

................................................................. Nilautana

Genus IV Indicopleustes Distant


7. Indicopleustes obortus (Distant)


Material examined: 7 exs., Tura, West Garo hills, 7.x.1917, M. S. Kemp coll.
BISWAS & GHOSH: *Hemiptera: Membracidae*

**Diagnostic characters**: Pronotum black, coarsely punctate, longly and palely pilose, the lateral angles strongly produced, sub-horizontally but a little upwardly extended, the apical area carinate, the apices obliquely narrowed and terminally acute; the posterior process moderately slender, raised at base, horizontally and straightly produced, its apex subacute and passing the posterior angle of the inner tegminal margin.

**Length**: 7 mm. Width lateral Pronotal process 5 mm.

**Distribution**: India: Meghalaya (West Garo hills); Elsewhere: Burma; Borneo; Malaya; Moulmein; Singapore; Sumatra.

**Genus V**  
*Leptocentrus* Stal


Key to the species of the genus *Leptocentrus*

1(2) Posterior pronotal process remote from the tegmina, legs brownish ochraceous, tegmina pale bronzy, pronotum thickly and coarsely punctate, longly pale pilose.......................... *bajulans*

2(1) Posterior pronotal process touching the apex of the inner margin of tegmina, pronotum not pilose....................................................................................................................................... 3

3(4) Pronotum black, the lateral pronotal process long and slender, tegmina shining ochraceous, legs piceous, dorsum with white tomentose patches.................................................. *leucaspis*

4(3) Pronotum brown, the lateral pronotal process not much slender, tegmina hyaline, legs very pale ochraceous, dorsum without tomentose patches............................... *mephistopheles*


**Material examined**: 1 ex., Tura, West Garo hills, 15.vi.1917, S. W. Kemp coll.

**Diagnostic characters**: Head pronotum black, palely pilose legs brownish ochraceous, femora a little darker, tegmina pale bronzy, lateral pronotal processes strongly carinate, their apices strongly recurved and acute; posterior pronotal process remote from tegmina, strongly tricarinate, its apex subacute and passing the posterior angle of the tegmina.

**Length**: 6-6.5 mm. width: lateral pronotal process, 4-4.5 mm.

**Distribution**: India: Meghalaya (West Garo hills), Kerala, Maharashtra, West Bengal; Elsewhere: Bangladesh; Burma; Malaya; Siam.

9. *Leptocentrus leucaspis* (Walk)


Diagnostic characters: The lateral transverse process slender centrally carinate above, somewhat strongly recurved; the posterior process tricarinate above recurved from near base and touching the apex of the interior margin of tegmina which are punctate at base.

Length: 7-9 mm. width lateral pronotal process 4.5 to 7 mm.

Distribution: India; Meghalaya (Jaintia hills); Elsewhere: Burma; Java; Philippine; Sri Lanka; Singapore.

10. Leptocentrus mephistopheles Buckton


Material examined: 1 ex., Tura, West Garo hills, 15. vii.-30. vii.1917, S. W. Kemp coll.

Diagnostic characters: The dorsum is lacking any white tomentose patch; the abdomen of the male is stout and ringed and the posterior pronotal process is shorter and rather more curved.

Length: 8 mm. width lateral pronotal process 4.5 to 7 mm.

Distribution: India: Meghalaya (West Garo hills), Karnataka, Sikkim, Uttar Pradesh.

Genus VI Nilautama Distant

11. Nilautama typica Distant


Diagnostic characters: Posterior pronotal process tricarinate, apex acutely narrowed and directed upward, transverse process as seen from above broad, carinate behind middle, apex roundly truncate and a little recurved, as seen infront narrow and obliquely upwardly divergent, tegmina bronzy brown with costal area broadly black.

Length: 7 mm.; width lateral pronotal process 4.5 mm.

Distribution: India: Meghalaya (East Garo hills, West Garo hills), Elsewhere: Tenasserim, Myitta.

Tribe Centrotypini

Genus VII Centrotypus Stal 1866

12. Centrotypus assamensis (Fairm)

Material examined: 1 ex., Tura (1,200-1,500 ft), West Garo hills, 15.vi.-15.viii. 1917 coll. ?

Diagnostic characters: Pronotum dark, indigo blue, coarsely punctate; legs, body beneath, thickly shortly palely pilose; tegmina pale ochraceous; lateral transverse processes broad but less dialated them C. flexuous and with a distinct anterior as well as a posterior carination more convexly oblique and subacute apically than C. flexuous.

Length: 10 to 11 mm width; lateral. Pronotal processes 8-9.5 mm.

Distribution: India: Meghalaya (West Garo hills); Assam, Sikkim, Tamil Nadu; Elsewhere: Burma; Cambodia; Malacca; Malay Penninsula; Siam; Tenasserim; Mitra.

Tribe Centrotini

Key to the genera of the tribe Centrotini

1(2) Posterior pronotal process rising obliquely direct near base of pronotum and then rectangularly direct to near posterior angle of inner margin of tegmina ....................... Anchon

2(1) Posterior pronotal process moderately short and impinging on scutellum and tegmina...........

......................................................................................................................................... Tricentrus

Genus VIII Anchon Buckt.


13. Anchon brevis Distant


Diagnostic characters: Pronotal lateral processes as seen from above broad, somewhat flat, as viewed from the front much narrowed, more recurred, their apices appearing biangulate; posterior process very short, curved not extending beyond apex of clavus.

Length: 5 mm width lateral pronotal process 3.5 mm.

Distribution: India: Meghalaya (East Garo hills); Elsewhere: Sri Lanka.

Genus IX Tricentrus Stal, 1866


Key to the species of the genus Tricentrus

1(2) Head and pronotum black; posterior process short, robust, raised, lateral pronotal process short, broad, slightly upturned, the anterior margin rounded, posterior margin obliquely straight, apex obtusely acute and slightly recurved, tegmina pale, bronzy brown ..............
................................................................................................................................................. gibbosulus

2(1) Head and pronotum ochraceous or bronzy brown pilose; extreme apex of the anterior lateral pronotal process, anteriorly a little ampliate and rounded, apices subacute, tegmina pale ochraceous.................................................................................. selenus
14. *Tricentrus gibbosulus* (Walker)


*Diagnostic characters*: Legs piceous, tibae, tarsi apices of femora testaceous; tegmina bronzy brown base piceous black, posterior process short robust raised, centrally and laterally carinate, the apex not quite reaching posterior angle of inner tegminal margin.

*Length*: 5 mm; width of lateral pronotal process 3.5 mm.

*Distribution*: India: Meghalaya (East Khasi hills), Assam, Tamil Nadu, Uttar Pradesh, West Bengal; Elsewhere: Borneo; China; Malay Peninsula; Singapore; Sumatra.

15. *Tricentrus selenus* (Buckton)


*Materal examined*: 1 ex., Keghabya, Shillong, East Khasi hills 21.iii.91, B. C. Das and party coll.

*Diagnostic characters*: Head pronotum dark ochraceous, pilose; the lateral pronotal processes as seen from above moderately broad, anteriorly little ampliate and rounded, apice subacute, broadly carinate near middle; posterior process robust, tricarinate, sides oblique apex about reaching the posterior angle of inner margin.

*Length*: 5 mm. width lateral pronotal process 3.5 mm.

*Distribution*: India : Meghalaya (East Khasi hills), Elsewhere: Tenasserim, Myitta.

Tribe Gargarini

Genus X *Gargara* Amy. and Serv.


Key to the species of the genus *Gargara*

1(2) Pronotum thickly, palely pilose, tegmina greyish semiopaque; legs ochraceous, coxae and bases of femora piceous................................................................. *mixta*

2(1) Pronotum thickly and somewhat coarsely punctate tegmina subhyaline, femore black, their apices and the tibae and tarsi castaneous................................................................. 3

3(4) Pronotum black; tegmina black at base, a pale brownish transverse spot on apical margin near end of clavus and also the extreme apical margin, in some specimens ............... *robusta*

4(3) Pronotum purplish-brown, tegmina without the apical marginal spots, the base purplish brown not black; posterior process a little longer and more laterally compressed......... *affinis*

16. *Gargara affinis* Distant


Diagnostic characters: The pronotum palely pilose and central carination to pronotum is very fine and obscure; other characters are like G. robusta.

Length: 4 mm., Lateral pronotal angle 2 mm.

Distribution: India: Meghalaya (East Khasi hills), Karnataka, Maharashtra, Tamil Nadu; Elsewhere: Borneo; Burma; Myitta; Philippines; Tenasserim.

17. Gargara mixta (Buckton)


Material examined: 1 ex., Umtihar, East Khasi hills, 6.iv.91, S. K. Saba and party coll.

Diagnostic characters: Body beneath and face piceous; legs ochraceous; coxae and bases of femora piceous; tegmina greyish semiopaque; pronotum with lateral angles angularly prominent but not produced, posterior process robust gradually narrowing to apex, inpinging on scutellum and tegmina and about reaching the posterior angle of inner margin of tegmina.

Length: 5 mm. Width of lateral pronotal angle 2.5 to 3 mm.

Distribution: India: Meghalaya (East Khasi hills), Bihar, Maharashtra, Tamil Nadu; Elsewhere: Borneo; Burma; China; Sri Lanka.

18. Gargara robusta Dist.


Diagnostic characters: Pronotum thickly and coarsely punctate, head, pronotum, femora, body beneath black; tegmina sybhyaline black at base, in some specimens beyond the middle there are some transverse fuscous markings; the posterior process short, robust, only just passing the apex of the claval area.

Length: 3.5 mm with pronotal angle 2 mm.

Distribution: India: Meghalaya (East Khasi hills, West Khasi hills, Ri-Bhoi), Uttar Pradesh, West Bengal, Elsewhere: Ganguel; Borneo.

Subfamily DARTHULINAE
Genus XI Darthula Krikaldy


19. Darthula hardwicki (Gray)


Diagnostic characters: Tegmina piceous brown; with its venation testaceous; pronotum piceous brown, finely punctate, the central carination laminately raised, posterior process of the abdomen, piceous or piceous brown with long bristly hairs; the tegmina reticulately veined, the veins raised and prominent.

Length: Excluding posterior process 12 to 17 mm.

Distribution: India: Meghalaya (East Khasi hills), Assam, Nagaland, Sikkim, West Bengal; Elsewhere: Africa; Burma; China; Nepal; Yunnam.

Remarks: Tail raised to perpendicular position when irritated. The specimens recorded from Tura were found sitting on clutch of eggs.

* A list of Membracid species so far recorded from the State of Meghalaya

* 1. Anchon brevis Distant
* 2. Centrotypus assamensis (Fairm)
** 3. C. flexuosus Fabr.
  4. Darthula hardwicki (Gray)
* 5. Gargara affinis Distant
* 6. G. mixta (Buckton)
* 7. G. robusta Distant
* 8. Hypsauchenia hardwicki Kirby
* 9. H. subfuscra Buckton
* 10. Hypsolyrium kempfi (Distant)
* 11. H. uncinata (Stal)
12. Indicopleustes obtortus Distant
13. Leptobelus dama (Germ.)
14. L. gazella (Fairm.)
15. Leptocentrus bajulans Distant
* 16. L. leucaspis (Walker)
17. L. mephistopheles buckton
* 18. Nilautama typica Distant
19. Tricentrus gibbosulus (Walker)
* 20. T. selenus (Buckton)
** This species has not been included in the present study due to the nonavailability of the material

* First record from Meghalaya.

SUMMARY

The paper deals with 20 species belonging to 11 genera under two subfamilies. 11 species are hitherto reported for the first time from Meghalaya. Diagnosis of each species, keys to various taxa have been provided. Necessary literature references have been cited. Distribution of each species is given. Maps showing distribution of the species within the State have been incorporated.

ACKNOWLEDGEMENT

The authors are grateful to the Director, Zoological Survey of India, Calcutta for laboratory facilities. Sincere thanks are due to Dr. S. K. Bhattacharya, Scientist 'SG' and Dr. S. K. Tandon, Scientist 'SF' for numerous courtesies.

REFERENCES


Dover, C. 1932. Entomological investigation on the spike disease of sandal (Santalum album Linn.), Indian Forest Rec. 17(1) : 1-53.


Table - 1. Distribution of Membracid species in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>EAST GARO HILLS</th>
<th>WEST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>EAST KHASI HILLS</th>
<th>WEST KHASI HILLS</th>
<th>RI-BHOI</th>
<th>JAINIA HILLS</th>
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<tbody>
<tr>
<td>1. Hypsauchenia hardwickii (Kirby)</td>
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<td>2. Hypsauchenia subfuscata Buckton</td>
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<td>3. Hypsolyrium kempii (Distant)</td>
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<td>4. Hypsolyrium uncinata (Stal)</td>
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<tr>
<td>5. Leptobelus dama (Germar)</td>
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<td>6. Leptobelus gazella (Fairm)</td>
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<td>7. Indicopleuistes obortus (Distant)</td>
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<td>8. Leptocentrus bajulans Dist.</td>
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<td>9. Leptocentrus leucaspis (Walk.)</td>
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<td>11. Nilautama typica Distant</td>
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<td>12. Centrotypus assamensis (Fairm)</td>
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<td>13. Anchon brevis Distant</td>
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<td>14. Tricentrus gibbosulus (Walker)</td>
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<td>15. Tricentrus selenus (Buckton)</td>
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<td>16. Gargara affinis Distant</td>
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<td>17. Gargara mixta (Buckton)</td>
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<tr>
<td>18. Gargara robusta Dist.</td>
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<tr>
<td>19. Darhula hardwicki (Gray)</td>
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</table>
BISWAS & GHOSH: *Hemiptera : Membracidae*


Map 1

DISTRIBUTION OF MEMBRACID SPECIES (1-10) (HEMIPTERA)

MEGHALAYA

ASSAM

BANGLADESH

1. Hypsuchenia hardwickii (Kirby)
2. Hypsuchenia subfuscus Buckton
3. Hypsolyrium kempi (Distant)
4. Hypsolyrium uncinate (Stal)
5. Leptobelus dema (Germar)
6. Leptobelus gazella (Fairm.)
7. Indicopleutes obtortus (Distant)
8. Leptocentrus bajulans Distant
9. Leptocentrus leucaspis (Walker)
10. Leptocentrus mephistoheles (Buckton)
Map-II DISTRIBUTION OF MEMBRACID SPECIES (11-19) (HEMIPTERA)

1. Nileotoma typica Distant
2. Centrotypus assamensis (Fairm)
3. Anchon brevis Distant
4. Tricentrus gibbosulus (Walker)
5. Tricentrus selenus (Buckton)
6. Gorgoro affinis Distant
7. Gorgoro mixta (Buckton)
8. Gorgoro robusta Distant
9. Dortheulo hardwicki (Gray)
INTRODUCTION

The Psyllids usually called as Jumping lice are small homopteran insects which suck plant sap. As a result, various damage symptoms are seen in plant. These insects are Phytophagous in both larval and matured stages. They also act as vectors of bacterial and plant viral diseases. Secretion of honey dew through specialised wax gland pores is characteristic of this insect. Usually five nymphal stages are seen in the life cycle of Psyllids.

Psyllids are more common in forests and over 100 species are on record on about 95 species of trees and other vegetations growing in the forest.

Our knowledge of Indian Psyllidae dates back to Lithierry (1890), Kieffer (1905), Lefroy (1909), Crawford (1912), Ramakrishna Ayyar (1924). However, outstanding contributions have been made in the recent years by Mathur (1975) who dealt with 101 species from the Indian subcontinent. Besides, Kandasamy (1986) added 23 species to the earlier list while studying South Indian psyllids. Bhanotar et al. (1971) and Lahiri and Biswas (1979) described one new genus and species each from Calcutta and Shillong respectively. Later, Lahiri and Biswas (1990) described two new species and recorded one species for the first time from Meghalaya. Thus, a total of 126 species of Psyllids are so far known from India.

Very little is known about the psyllid fauna of Meghalaya. Out of 14 species of Psyllids so far known from Meghalaya two species, Phacopteron lentigenosum Buckton and Pauropsylla beesoni Laing are hitherto reported for the first time from Meghalaya. The present work is an attempt to provide an account of these 14 species belonging to 9 genera of the family Psyllidae from Meghalaya. The paper is based on the material collected by Survey parties of Zoological Survey of India. It is also supplemented by the material deposited in the National Zoological Collections at Zoological Survey of India, Calcutta.

The account deals with a brief note on earlier investigations, keys to taxa, diagnosis, geographical distribution of each species, new locality record (marked*) and literature references.

The classification of the family has been mainly adopted after Crawford (1914) and Mathur (1975).

Morphological characters

The family Psyllidae is characterised by two pairs of membranous wings (Fig. 1, 2C) normally held in stegopterous manner, ten- segmented antennae (Fig. 2B), 3 ocelli widely placed on the
vertex (Fig. 2A), thickened hind femora, (Fig. 2E) and uniformly dimerous tarsi terminating in two equal claws, the venation is simple and exhibits relatively few marked deviations among various genera. The most striking feature in the forewing is the presence of a principal basal vein formed by the fusion of the stems of R, M and Cu (Fig. i). The venation in the hind wing is extremely simple.

**Method of Collection and slide preparation**

For collections, a sweeping net and a sucking tube (aspirator) are used for capturing the adults. The collected psyllids are killed by placing them in a cyanide bottle and preserved in specimen tubes (15 cm x 5 cm) containing alcohol. The natural colour of the adults is noted before changing them into permanent preservation tubes with 70% ethyl alcohol. A part of each collection is mounted on card points or pinned with micropins on pith, and the rest is preserved in alcohol in small vials. The field data are maintained. For study of finer details of each part of both sexes and nymphal stages of each species, the following method is adopted: - Soak the material in KOH for 8-10 hours, boil in water bath for sometime till the specimen is clear, wash in distilled water, transfer in glacial acetic acid to dissolve organic matter, if any. Wash again in distilled water, dehydrate in alcohol and stain in eosin. Clear in clove oil and the specimen is dissected. The dissected parts are mounted in balsam and examined under the microscope.

**SYSTEMATIC ACCOUNT**

<table>
<thead>
<tr>
<th>Subfamily</th>
<th>Genus</th>
<th>Species</th>
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<tbody>
<tr>
<td>Subfamily 1</td>
<td>Genus 1</td>
<td>Pauropsyllinae</td>
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<tr>
<td>Pauropsyllinae</td>
<td>Pauropsylla Rubsaamen</td>
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<td>Genus 1</td>
<td><em>Pauropsylla beesoni</em> Laing</td>
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<td>Genus 2</td>
<td>Paurocephala Crawford</td>
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<td>Genus 3</td>
<td>Phacopteron Buckton</td>
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<td>Cecidopsylla Kieffer</td>
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<td><em>Phacopteron lentiginosum</em> Buckton</td>
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<td>Subfamily 2</td>
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<td>Genus 6</td>
<td>Cryptotrioza Lahiri and Biswas</td>
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<td>Genus 7</td>
<td>Euphyllura Schwarz</td>
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<td>Subfamily 3</td>
<td>Genus 3</td>
<td>Psyllinae</td>
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<td>Genus 5</td>
<td>Arytaina fasciata Laing</td>
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<tr>
<td>Genus 6</td>
<td>Cryptotrioza Lahiri and Biswas</td>
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<tr>
<td>Genus 7</td>
<td>Euphyllura eastopi Mathur</td>
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</tbody>
</table>
Genus 8. *Psylla* Geoffroy

8. *Psylla murrayi* Mathur
9. *P. quadrimaculata* Mathur
10. *P. shillongensis* Lahiri and Biswas
11. *P. simlae* Complex
12. *P. viburni* Loew

Subfamily 4. Triozinae

Genus 9. *Trioza* Foerster

13. *Trioza gigantea curta* Mathur
14. *T. heptaphleura* Lahiri and Biswas

Key to the subfamilies of Psyllidae

1. Genae not covering frons; genal cones not produced into conical processes ...... Pauropsyllinae
   Genae covering frons and usually produced into conical processes ........................................... 2

2. Forewings with more than two marginal cells, the additional cells being formed by branching or radial sector and cross veins; head deeply cleft .............................................. Ciracreminae
   - Forewings with only usual two marginal cells; radial sector not branched and without any cross vein; head not cleft ........................................................................................................ 3

3. Basal tarsal segment of hind legs with two black claw-like apical spines at apex; radius, media and cubitus from basal vein not diverging at same point; wings usually not angulate at apex ................................................................. Psyllinae
   Basal tarsal segment of hind legs without clawlike spines; radius, media and cubitus usually diverging at same point from basal vein but media and cubitus with a common cubital petiole; wings usually angulate at apex ........................................................................................................... Triozinae

   1. Subfamily Pauropsyllinae

   Key to genera

   1. Head not as wide as thorax, frons large, prominently visible; genae absent; eyes globose; wings narrowly or broadly rounded at apex; first marginal cell narrow and long, often maculated .......................................................... *Paurocephala*

   Head as wide as or narrower than thorax; frons visible as a small sclerite; genae conical; eyes hemispherical; wings broadly rounded; first marginal cell wide, rarely maculate ................. 2

   2. Head as wide as thorax; forewings broadly rounded, cross veins absent; pterostigma often present, non maculate .......................................................... *Pauropsylla*

   Head narrower than thorax; forewings rhomboidal, cross vein present; pterostigma absent, maculate ........................................................................ *Phacopteron*
Genus 1. *Paurocephala* Crawford


1. *Paurocephala reticulata* Mathur


*Diagnosis*: The species is chiefly characterised by head being slightly broader than thorax, moderately depliced, finely rugulose-reticulate. Also, forwings broad and subsquare at apex.

*Length*: Male 2.02 mm and Female 32.30 mm.


*Distribution*: India: Meghalaya, (Khasi Hills, Shillong).

Genus 2. *Pauropsylla* Rubaamen


2. *Pauropsylla beesoni* Laing


*Diagnosis*: Head with median suture; forewings large and narrowly rounded at apex; cubital petiole almost obsolete; radial sector flexed towards costal margin.

*Length*: 2.3 mm (male) and 2.52 mm. (female).


*Distribution*: India: Meghalaya (Khasi Hills, Mawphlong), Uttar Pradesh.

*Remarks*: This is the first record of this species from the state of Meghalaya.

Genus 3. *Phacopteron* Buckton


3. *Phacopteron lentiginosum* Buckton

GHOSH & GHOSH: Insecta: Hemiptera: Psyllidae

**Diagnosis**: Head small strongly deflexed, about as broad as prothorax, finely rugulose, the arch m+2 coalesces radial sector, cubital petiole more than half as long as radius, cells unequal, first marginal cell very small, 2nd cell quadrangular.

**Length**: Male 3.5 mm., Female 4.3 mm.

**Material examined**: Alate females, India: Meghalaya, Mawphlong; (ZSI lot No. 143).

**Distribution**: India: Meghalaya (Mawphlong), Bihar, Karnataka, Kerala, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

**Remarks**: The species forms galls on leaves (Kandasamy, 1986).

2. Subfamily Ciriacreminae

   Key to genera

1. Radial sector large and much deflexed, terminating below apex of wing............. *Cecidopsylla*

   Radial sector small and terminating up to costa; fore wings without pterostigma; Head bistero in appearance................................................................. *Mesohomatoma*

   Genus 4. *Cecidopsylla* Kieffer


4. *Cecidopsylla schimae* Kieffer


**Diagnosis**: Head nearly as broad as thorax, somewhat deflexed, about twice as broad as long, finely rugulose, with two foveal impression near posterior margin which is strongly arcuate, anterior margin deeply emarginate in centre; front ocellus not visible from above, rostrum long, protruding between legs, thorax, strongly arched, finely rugulose; scutellum subquadrate, slightly broader than long; hind tibiae with a prominent basal spur and two tooth-like spines at apex; fore wings long, hyaline with narrow brown band, hind wings also quite long; costal margin armed with a few simple and hooked setae.

**Length**: Male 2.19 mm. and Female 2.52 mm.


**Distribution**: India: Meghalaya (Shillong), West Bengal.

3. Subfamily *Psyllinae*

   Key to genera of *Psyllinae*

1. Radius and Media fused at base forming a long petiole................................. *Cryptotrioza*

   Radius and Media not as above ................................................................. 2
2. Fore wing distinctly rhomboidal, usually thickend and opaque; Genae produced into two transverse contiguous lobes .................................................. \textit{Euphyllura}

Forewing elongate opaque, not strongly rhomboidal; Genal cones not as above, usually hyaline or subhyaline, rarely opaque .................................................. 3

3. Pleural suture of prothorax extend upto middle of lateral extremity of pronotum; antennae usually very short, seldom long; male proctiger simple ................. \textit{Arytaina}

Pleural suture of prothorax extend obliquely to posterior part of lateral extremity of pronotum; antennae rather longer .................................................. \textit{Psylla}

\textbf{Genus 5. \textit{Arytaina} Foerster}


5. \textit{Arytaina fasciata} Laing

1930. \textit{Arytaina fasciata} Laing, \textit{Indian Forest Rec.}, 4(7) : 43 - 44.


\textit{Diagnosis}: Body small but robust. Head nearly as broad as or broader than thorax, vertex somewhat flat; antennae much longer and more slender; scutellum pale yellowish brown, tegmen semihyaline with two well defined transverse brown bands and another brown sub-apical area occupying from costa to radial cell; veins more or less spotted with black, wings hyaline.

\textit{Length}: Male 1.75 mm.


\textit{Distribution}: India: Meghalaya (Shillong), Sind Valley.

\textbf{Genus 6. \textit{Cryptotrioza} Lahiri and Biswas}


6. \textit{Cryptotrioza mathuri} Lahiri & Biswas


\textit{Diagnosis}: Body robust. Head smaller than thorax and covered with finely pubescent, subquadrate, medially depressed, its posterior margin arcuate; genal cones large with long setae. Antennae long pubescent. Hind tibiae with thick black tooth at apex and basal tooth usually present. Fore wings hyaline.

\textit{Material examined}: 1 ex., India: Meghalaya: East Khasi Hills, Shillong, Risha colony. coll. S. Biswas.

\textit{Distribution}: India: Meghalaya (Shillong).

\textbf{Genus 7. \textit{Euphyllura} Foerster}

7. *Euphyllura eastopi* Mathur


**Diagnosis**: Head strongly deflexed, as broad as thorax, vertex large; pronotum extending far down laterad; hind tibiae without basal spur, with small, black, spines at apex; 2nd marginal cell long and elongate.

**Length**: Male 1.74 mm., Female 1.76 mm.

**Material examined**: 1 Male, 1 Female, on unidentified host plant, India : Meghalaya : East Khasi Hills, Okland Road, Shillong; 24.vi.1976, coll. A.R. Lahiri.

**Distribution**: India: Meghalaya (Shillong), Himachal Pradesh.

**Remarks**: According to Lahiri and Biswas (1979) the nymphs cause heavy infestation on young foliage and yield produce sticky whitish, wooly secretion on the back surface of leaf.

**Genus 8. *Psylla* Geoffroy**


**Key to species of *Psylla***

1. Forewings maculated..............................................................................................*quadrimaculata*
   - Forewings hyaline or with flavus tinge, transparent..............................................2

2. Hind tibiae without basal spur, genal cones thick and notched; pterostigma long ..........*murayi*
   - Hind tibiae with a basal spur .....................................................................................3

3. 4 apical spines on hind tibiae; hind femora almost as long as hind tibiae..............*shillongensis*
   - 5 apical spines on hind tibiae; hind femora usually shorter than hind tibiae...............4

4. Vertex strongly rounded; genal cones thick and approximate ...........................................*simlae*
   - Vertex not rounded; genal cones rather divergent; marginal cell longer than 2nd ........ *viburni*

8. *Psylla murrayi* Mathur


**Diagnosis**: Head broader than thorax, finely rugulose, vertex about two and a half times as broad as long, genal cone small and thick, slightly smaller than vertex, notched and weakly impressed near about middle; antennae long and slender; hind tibiae without basal spur, with five black tooth-like spines at apex; tarsal joint robust, proximal joint of metatarsus with two claw-like spines; pterostigma long, radius longer than cubital petiole, fore wings hyaline, transparent.


**Distribution**: India : Meghalaya (Shillong), Uttar Pradesh.
Remarks: Lahiri and Biswas (1980) studied the nature of infection of the species on citrus plants caused by *P. murrayi* at Shillong "in relation to host difference, seasonal change and outburst of other biological agents, either competitor or even actual enemy of the psyllid fly.”

9. *Psylla quadrimaculata* Mathur


*Diagnosis*: Body slender. Head nearly as broad as thorax, strongly deflected, scatterly pubescent, finely rugulose; vertex broader than long; disc shallowly depressed near middle; general cone large and robust; antennae long and slender; hind tibiae with a strong basal spur, with five black tooth-like spines at apex; basal tarsal segments with two claw-like black spines at apex; Pterostigma long and prominent; radius about twice as long as cubital petiole; forewings transparent.

*Material examined*: 1 Male and 1 Female, Meghalaya, Mawphlong, February March, 1969, coll. B. Datta.

*Distribution*: India: Meghalaya (Mawphlong), Assam, West Bengal.

10. *Psylla shillongensis* Lahiri & Biswas


*Diagnosis*: Body robust. Head large, moderately deflected, genal cones covered with pubescence; vertex twice as broad as long; antennae long and more slender; scutellum small, postscutellum of matathorax moderately large; hind femur almost as long as hind tibia; hind tibiae with a moderately large basal spur and four black tooth-like spines at apex; Forewings hyaline transparent, thickly beset with minutes points.


*Distribution*: India : Meghalaya (East Khasi Hills).

11. *Psylla simlae* Complex Mathur


*Diagnosis*: Body long. Head large and almost as broad as thorax, deflexed and with fine pubescence and rugulose; vertex much broader than long, genal cones large with black stripe at edges of genae; antennae long and slender; scutellum narrowly transverse, its anterior margin somewhat straight, with prominent antero-lateral angle; hind femur with three to six setae at apex; hind tibiae with small basal spur and four black apical spines on one side and one on other side; fore wing hyaline, membrane beset with minute points; hind wings large, costal margin with a few simple hooked setae.


*Distribution*: India : Meghalaya (East Khasi Hills); Assam, Uttar Pradesh.

12. *Psylla viburni* Loew


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*Diagnosis*: Body robust. Head as broad as thorax; finely pubescent and strongly rugulose; vertex broader than long; genal cones large, almost as long as vertex, pubescent, broad at base and at apex, subacute; 1st basal segment of antenna robust; hind tibiae with a small basal spur and with five long, stout black spines at apex; hind tarsi with two stout black spines at apex; pterostigma long and narrow; cubital petiole smaller than radius; forewings transparent.


*Distribution*: India: Meghalaya: (East Khasi Hills); Himachal Pradesh. Elsewhere: Central Europe, Honshu, Kyushu; Austrial France; Rumania; and Manolache.

4. Subfamily *Triozinae*

Genus 9. *Trioza* Foerster


Key to species of *Trioza*

1. Genal cones short, about 0.33 times as long as vertex; Radial sector short, curved to costa and extends atmost upto the base of 2nd marginal cell................................. *heptaphleura*

   Genal cones large, about 0.75 times as long as vertex; Radial sector long, appreciably deflexed and extends almost upto the end of 2nd marginal cell ............................................ *gigantea*

13. *Trioza gigantea curta* Mathur


*Diagnosis*: Body large, covered with long brown pubescence; head broad and much broader than thorax, bearing sparse pubescence; vertex large and broad; its posterior margin strongly arcute, a foreal impression present on its disc; antennae long; hind tibiae with large basal spur; apical region robust with three stout spines; pterostigma long; forewing large, hyaline.


*Distribution*: India: Meghalaya (East Khasi Hills), Sikkim, West Bengal.


*Diagnosis*: Head large with pubescence and long setae; vertex twice as long as broad, finely rugulose; antennae long and slender; thorax large sparsely pubescent with long hairs; scutellum small, broadened anteriorly with prominent anterolateral angles; femora shorter than tibiae, hind tibiae with three weak basal spur; forewing long, transparent, hyaline; hind wing much smaller than forewings, membrane uniformly beset with minute points.


*Distribution*: India : Meghalaya (East Khasi Hills).
Fig. 1: Generalised wing venation of psyllid: A - Anal Vein; Cu - Cubitus; M - Media; R - Radius; Rs - Radial Sector

Fig. 2: Structural features of a generalised adult Psyllid: A - Head; B - Antennae; C - Fore Wing; D - Male abdomen; E - Hind leg; F - Female genitalia; G - Aedeagus; H - Male genitalia (Entire).
Map - I DISTRIBUTION OF PSYLLID SPECIES (1 - 5) [HEMIPTERA]

1. Paurocephala reticulata Crawford
2. Pauropsylla beesoni Laing
3. Phacopteron lentiginosum Buckton
4. Cecidopsylla schimae Kieffer
5. Atytaina fasciata Laing
Map - II. DISTRIBUTION OF PSYLLID SPECIES (6 - 10) [HEMIPTERA]

6. *Cryptotrioza mathuri* Lahiri and Biswas

7. *Euphyllura eastopi* Mathur

8. *Psylla murrayi* Mathur

9. *Psylla quadrimaculata* Mathur

10. *Psylla shillongensis* Lahiri and Biswas
Map -III. DISTRIBUTION OF PSYLLID SPECIES (11 - 14) [HEMIPTERA]

11. Psylla similae Complex Mathur
12. Psylla viburni Loew
13. Trioza gigantea curta Mathur
14. Trioza heptaphleumah Lahiri & Biswas
Table -1. Distribution of Psyllid species in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>WEST GARO HILLS</th>
<th>EAST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>WEST KHASI HILLS</th>
<th>EAST KHASI HILLS</th>
<th>JAITIA HILLS</th>
<th>RI-BHOI</th>
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<tbody>
<tr>
<td>1. <em>Paurocephala reticulata</em> Crawford</td>
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<td>2. <em>Pauropsylla beesoni</em> Laing</td>
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<td>3. <em>Phacopteron lentiginosum</em> Buckton</td>
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<td>4. <em>Cecidopsylla schimae</em> Kieffer</td>
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<td>5. <em>Arytaina fasciata</em> Laing</td>
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<td>6. <em>Cryptotrioza mathuri</em> Lahiri and Biswas</td>
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<td>7. <em>Euphyllura eastopi</em> Mathur</td>
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<td>8. <em>Psylla murrayi</em> Mathur</td>
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<td>9. <em>Psylla quadrimaculata</em> Mathur</td>
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<td>10. <em>Psylla shillongensis</em> Lahiri and Biswas</td>
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<td>11. <em>Psylla simiae</em> Complex Mathur</td>
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<td>12. <em>Psylla viburni</em> Loew</td>
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<td>13. <em>Trioza gigantea curta</em> Mathur</td>
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<tr>
<td>14. <em>Trioza hetaphleurnma</em> Lahiri and Biswas</td>
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SUMMARY

The paper deals with the Psyllidae fauna of Meghalaya, India. Altogether 14 species/Subspecies under 9 genera belonging to 5 subfamilies are treated in the text. Two species viz., Phacopteron lentigenosum Buckton and P. beesoni Laing have been recorded for the first time from the state of Meghalaya. The keys for identification of subfamilies, tribes, genera, species and subspecies are provided.

ACKNOWLEDGEMENT

The authors are grateful to Dr. A.K. Ghosh, Director, Zoological Survey of India, Calcutta for providing laboratory facilities and encouragement. They also express gratitude to Dr. J.R.B. Alfred, Addl. Director and Chief Co-ordinator, State Fauna Series, State of Meghalaya; Dr. S.K. Tandon and Dr. R.K. Varshney, Joint Directors for numerous courtesies. Grateful thanks are also due to Dr. J.K. Jonathan, Scientist -SF for his constructive suggestions.

REFERENCES


INSECTA : HEMIPTERA : HOMOPTERA : APHIDIDAE

L. K. GHOSH AND R. C. BASU
Zoological Survey of India, Calcutta

INTRODUCTION

Aphids or plant lice are soft bodied phytophagous homopteran insects. They are remarkable for their complicated life cycle and ability for transmitting many plant viral diseases. The aphids enjoy more or less cosmopolitan distribution and are found in abundance in places having temperate climate.

Out of estimated world fauna of over 4,000 species of aphids, about 787 species belonging to 211 genera are known from Indian region (Ghosh, A. K. 1989). Thus, the Indian aphids constitute 20% of the global fauna. Compilation of available data also reveals that over 1200 species of plants belonging to nearly 700 genera and 175 families are infested by these aphids in India. As a result of thorough investigation on this group, quite an appreciable number of publications are made on Indian aphids but for limitation of space only some important contributions are given below:


A perusal of literature reveals that altogether 232 species/subspecies of aphids belonging to 105 genera in seven subfamilies are so far known from the State of Meghalaya. The present contribution is an attempt to provide a comprehensive account of the above aphid fauna from Meghalaya. It deals with a brief note on earlier investigations; keys to subfamilies, tribes, subtribes, genera species/subspecies; literature reference, geographical distribution of each species both within India and in abroad and also endemism. The taxonomic keys, however, presented here are essentially for identification of Aphididae of Meghalaya and it may not work for aphids not represented in this region. The taxonomic nomenclature of the listed genera and species has mostly been adopted from Eastop and Hille Ris Lambers (1976), Raychaudhuri, D. N. (ed. 1980), Ghosh, A. K. (1980, 1982, 1984, 1988, 1993), Ghosh, A. K. and Quednau (1990).

A critical analysis of the aphid fauna of Meghalaya reveals that it constitutes about 30% of the total species known from India, 23% of the species from the Oriental and 5.8% of the species from the
world aphid fauna. Of the 233 species so far known from the State, 7% are endemic in origin. The find of sexual forms in the area hints at the possibility of completion of holocyclyc for some of these species, although anholocyclic type of life cycle is shown by majority of the aphid species found in Meghalaya. The material were examined chiefly from the collections in Entomology Laboratory (C. U. Colls : R. C. Basu, H. Banerjee etc.), Department of Zoology, University of Calcutta and also from the collections represented in the Zoological Survey of India (ZSI Coll., NZC).

ABBREVIATION USED

The following abbreviations have been used in the text:

Alata(e) : Alate viviparous female(s); Aptera(e) : Apterous viviparous female(s); a.s. : Antennal segment; b.d. : Basal diameter of antennal segment III; C.U. : Department of Zoology, University of Calcutta; F.T.C. : First tarsal chaetotaxy; h.t2 : Second joint of hind tarsus; N.Z.C. : National Zoological Collection, Zoological Survey of India; p.t. : Processus terminalis; u.r.s. : Ultimate rostral segment; X : Times as long as; Z.S.I. : Zoological Survey of India.

SYSTEMATIC CONTENTS

Subfamily I. Anoeiinae

Tribe Aiceonini

Genus 1. Aiceona Takahashi

   1. A. robustiseta Ghosh and Raychaudhuri

Subfamily II. Aphidinae

Tribe Aphidini

Subtribe Aphidina

Genus 2. Aphis Linnaeus

   2. Aphis citricola Patch
   3. A. craccivora Koch
   4. A. fabae solanella Theobald
   5. A. gossypii Glover
   6. A. kurosawai Takahashi
   7. A. longisetosa Basu
   8. A. nasturtii Kaltenbach
   9. A. nerii Boyer de Fonscolombe
  10. A. polygonaceae Matsumura
  11. A. punicae Passerini

Genus 3. Toxoptera Koch
12. *Toxoptera anrantii* Boyer de Fonscolombe
13. *T. citricidus* (Kirkaldy)
14. *T. odinae* (van der Goot)

Subtribe Rhopalosiphina

Genus 4. *Hyalopterus* Koch
15. *Hyalopterus atriplicis* (Linnaeus)
16. *Hyalopterus pruni* (Geoffroy)

Genus 5. *Hysteroneura* Davis
17. *Hysteroneura setariae* (Thomas)

Genus 6. *Melanaphis* van der Goot
18. *Melanaphis arundinariae* (Takahashi)
19. *M. donacis* (Passerini)
20. *M. meghalayensis meghalayensis* Raychaudhuri & Banerjee
21. *Melanaphis sacchari* (Zehntner)

Genus 7. *Rhopalosiphum* (Koch)
22. *Rhopalosiphum maidis* (Fitch)
23. *R. nymphaeae* (Linnaeus)
24. *R. padi* (Linnaeus)
25. *R. rufiabdominalis* (Sasaki)
26. *R. yoksumi* Ghosh, Banerjee and Raychaudhuri

Genus 8. *Schizaphis* Borner
27. *Schizaphis graminum* (Rondani)
28. *S. punjabipyri* (Das)
29. *S. rotundiventris* (Signoret)

Tribe MACROSIPHINI

Genus 9. *Acutosiphon* Basu, Ghosh and Raychaudhuri
30. *Acutosiphon obliquorius* Basu, Ghosh and Raychaudhuri

Genus 10. *Acyrthosiphon* Mordvilko
31. *Acyrthosiphon pisum* (Harris)

Genus 11. *Akkaia* Takahashi
32. *Akkaia bengalensis* Basu

Genus 12. *Amphorophora* Buckton
33. *Amphorophora ampullata bengalensis* Hille Ris Lambers and Basu

Genus 13. *Anthracusiphoniella* Basu

34. *Anthracusiphoniella maculatum* Basu

Genus 14. *Aulacorthum* Mordvilko

35. *Aulacorthum cornaceae* Ghosh

36. *A. dasi* Ghosh, Basu and Raychaudhuri

37. *A. magnoliae* (Essig and Kuwana)

38. *A. nipponicum* (Essig and Kuwana)

39. *A. rhamni* Ghosh, Ghosh and Raychaudhuri

40. *A. scirpi* van der Goot

41. *A. solani* (Kaltenbach)

Genus 15. *Brachycaudus* van der Goot

42. *Brachycaudus hilichrysi* (Kaltenbach)

43. *Brachycaudus persicaecola* (Boisduval)

Genus 16. *Brevicorne* Linnaeus

44. *Brevicoronye brassicae* (Linnaeus)

Genus 17. *Capitophorus* van der Goot

45. *Capitophorus archangelskii* Nevsky

46. *Capitophorus carduinus* (Walker)

47. *C. elaeagni* (del Guercio)

48. *C. formosartemisiae* (Takahashi)

49. *C. hippophaes javanicus* Hille Ris Lambers

50. *C. h. mitegoni* Eastop

51. *C. indicus* Ghosh and Raychaudhuri

52. *C. meghalayensis* Basu and Raychaudhuri

53. *C. vernoniae* Ghosh and Raychaudhuri

Genus 18. *Cavariella* del Guercio

54. *Carariella araliae* Takahashi

55. *C. aegopodii* (Scopoli)

56. *C. biswasi* Ghosh, Basu and Raychaudhuri

57. *C. salicicola* (Matsumura)
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Genus 19. Chaetomyzus Ghosh and Raychaudhuri
   58. Chaetomyzus rhododendri Ghosh and Raychaudhuri

Genus 20. Coloradoa Wilson
   59. Coloradoa rufomaculata (Wilson)

Genus 21. Cryptomyzus Ocklund
   60. Cryptomyzus taoi Hille Ris Lambers

Genus 22. Cryptosiphum Buckton
   61. Cryptosiphum artemisiae Buckton

Genus 23. Dactynotus Rafinesque
   62. D. sonchi (Linnaeus)
   63. D. tanaceti indica Ghosh
   64. D. (Uromelan) compositae Theobald

Genus 24. Diphorodon Borner
   65. Diphorodon cannabis (Passerini)

Genus 25. Dysaphis Börner
   66. Dysaphis pyri (Boyer de Fonscolombe)

Genus 26. Hayhurstia del Guercio
   67. Hayhurstia atriplicis (Linnaeus)

Genus 27. Hyadaphis Kirkaldy
   68. Hyadaphis coriandri (Das)

Genus 28. Hyperomyzus Borner
   69. Hyperomyzus carduellinus (Theobald)

Genus 29. Indumasonaphis Raychaudhuri, Ghosh and Basu
   70. Indumasonaphis inulae (Ghosh & Raychaudhuri)

Genus 30. Liosomaphis Walker
   71. Liosomaphis himalayensis Basu

Genus 31. Lipaphis Mordvilko
   72. Lipaphis erysimi Kaltenbach

Genus 32. Macromyzus Takahashi
   73. Macromyzus woodwardi Takahashi

Genus 33. Macrosiphoniella del Guercio
   74. Macrosiphoniella formosartemisiae Takahashi
75. *M. matsumurana* Ghosh, Basu and Raychaudhuri
76. *M. pseudoartemisiae* Shinji
77. *M. sanborni* (Gillette)
78. *M. spinipes* Basu
79. *M. yomogifoliae* (Shinji)

Genus 34. *Macrosiphum* Passerini
80. *Macrosiphum* (*Macrosiphum*) *aulacorrhoides* David, Narayanan and Rajasingh
81. *M. (M.) pachysiphon* Hille Ris Lambers
82. *M. (M.) rosae* Linnaeus
83. *M. (M.) spinipes* (Basu)
84. *M. (M.) spinipes rhododendri* (Ghosh, Basu and Raychaudhuri)
85. *M. (M.) spinotibium* Ghosh, Ghosh and Raychaudhuri
86. *M. (Sitobion) africanum* Hille Ris Lambers
87. *M. (S.) avenae* (Fabricius)
88. *M. (S.) fagopyri* Ghosh & Raychaudhuri
89. *M. (S.) ibarae* Matsumura
90. *M. (S.) indicum* (Basu)
91. *M. (S.) luteum* (Buckton)
92. *M. (S.) mimosae* Ghosh, Basu and Raychaudhuri
93. *M. (S.) miscanthis* (Takahashi)
94. *M. (S.) plectranthi* Ghosh, Ghosh & Raychaudhuri
95. *M. (S.) rosaeiformis* (Das)
96. *M. (S.) sikkimensis* Ghosh & Raychaudhuri
97. *M. (S.) smilacifoliae* (Takahashi)
98. *M. (S.) takahashii* Eastop

Genus 35. *Matsumuraja* Schumacher
99. *Matsumuraja capitophoroides* Hille Ris Lambers

Genus 36. *Metaphorodon* Takahashi
100. *Metaphorodon polygoni* (van der Goot)

Genus 37. *Metopolophium* Mordvilko
101. *Metopolophium* (*Metopolophium*) *euryae* (Takahashi)
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Genus 38. *Micromyzodium* David
102. *Micromyzodium filicium* David

Genus 39. *Micromyzus* van der Goot
103. *Micromyzus kalimpongensis* Basu
104. *M. mawphlangensis* Ghosh
105. *Micromyzus* sp.

Genus 40. *Myzus* Passerini
106. *Myzus ascalonicus* Doncaster
107. *M. brevisiphon* Basu
108. *M. cerasi* (Fabricius)
109. *M. cymballariellus* Stroyan
110. *M. dycei* Carver
111. *M. indicus* Basu & Raychaudhuri
112. *M. meghalayensis* Basu & Raychaudhuri
113. *M. monoji* Basu & Raychaudhuri
114. *M. obtusirostris* David, Narayanan & Rajasingh
115. *M. ornatus* Laing
116. *M. persicae* (Sulzer)
117. *M. siegesbeckicola* Strand

Genus 41. *Neohyalomyzus* Basu, Ghosh & Raychaudhuri
118. *Neohyalomyzus raoi* (Hille Ris Lambers)

Genus 42. *Neomegouropsis* Ghosh, Basu & Raychaudhuri
119. *Neomegouropsis cajanae* Ghosh & Raychaudhuri

Genus 43. *Neomyzus* van der Goot
120. *Neomyzus* (*Neomyzus*) *circumflexus* Buckton
121. *N. (N.) primulum* Ghosh, Banerjee & Raychaudhuri

Genus 44. *Ovatus* van der Goot
122. *Ovatus minutus* van der Goot

Genus 45. *Paczoskia* Mordvilko
123. *Paczoskia budhium* Banerjee, Ghosh & Raychaudhuri

Genus 46. *Pentalonia* Caquerel
124. *Pentalonia nigronervosa* Coquerel
Genus 47. *Perillaphis* Takahashi
   125. *Perillaphis perillae* (Shinji)

Genus 48. *Pleotrichophorus* Borner
   126. *Pleotrichophorus chrysanthemi* (Theobald)

Genus 49. *Pseudoacryrthosiphon* Ghosh and Raychaudhuri
   127. *Pseudoacryrthosiphon (P.) holsti* Takahashi

Genus 50. *Rhodobium* Hille Ris Lambers
   128. *Rhodobium porosum* (Sanderson)

Genus 51. *Rhopalosiphoninus* Baker
   129. *Rhopalosiphoninus latysiphon* (Davidson)

Genus 52. *Scleromyzus* Basu, Ghosh & Raychaudhuri
   130. *Scleromyzus corylophi* (Basu, Ghosh & Raychaudhuri)

Genus 53. *Semiaphis* van der Goot
   131. *Semiaphis heraclei* (Takahashi)

Genus 54. *Shinjia* Takahashi
   132. *Shinjia pteridifoliae* (Shinji)

Genus 55. *Sinomegoura* Takahashi
   133. *Sinomegoura citricola* (van der Goot)
   134. *S. photinia* (Takahashi)
   135. *S. pyri* Ghosh and Raychaudhuri
   136. *S. rhododendri* (Takahashi)

Genus 56. *Subovatomyzus* Basu
   137. *Subovatomyzus leucosceptri* Basu

Genus 57. *Tricaudatus* Tao
   138. *Tricaudatus polygoni* (Narzikulov)

Genus 58. *Trichosiphonaphis* Takahashi
   139. *Trichosiphonaphis gerbarae* Ghosh & Raychaudhuri
   140. *T. lonicerae* (Uye)

Genus 59. *Tuberocephalus* Shinji
   141. *Tuberocephalus sasaki* (Matsumura)

Genus 60. *Vesiculaphis* del Guercio
   142. *Vesiculaphis kuwanis* Ghosh, Basu & Raychaudhuri
143. *V. pieridis* Basu

144. *V. verbasci* Chowdhuri, Basu, Chakrabarti & Raychaudhuri

**Genus** 61. *Xenomyzus* Aizenberg

145. *X. scabripes* Basu, Ghosh & Raychaudhuri

**Subfamily** III. Drepanosiphinae

**Genus** 62. *Betacallis* Matsumura

146. *Betacallis prunicola* Basu, Ghosh & Raychaudhuri

147. *B. querciphaga* Basu, Ghosh & Raychaudhuri

**Genus** 63. *Clethrobius* Mordvilko

148. *Clethrobius dryobius* Chakrabarti & Raychaudhuri

**Genus** 64. *Machailaphis* Takahashi

149. *Machailaphis machili* (Takahashi)

**Genus** 65. *Mesocallis* Matsumura

150. *Mesocallis alnicola* Ghosh

**Genus** 66. *Neobetulaphis* Basu

151. *Neobetulaphis immaculata* Ghosh

**Genus** 67. *Shivaphis* Das

152. *Shivaphis celti* Das

**Genus** 68. *Subtakacallis* Raychaudhuri and Pal

153. *Subtakacallis pilosus* (David, Rajasingh & Narayanan)

**Genus** 69. *Takacallis* Matsumura

154. *Takecallis arundinariae* (Essig)

**Genus** 70. *Taoia* Quednau

155. *Taoia indica* (Ghosh & Raychaudhuri)

**Genus** 71. *Tinocallis* Matsumura

156. *Tinocallis magnoliae* Ghosh and Raychaudhuri

**Genus** 72. *Tinocalloides* Basu

157. *Tinocalloides montanus* Basu

**Genus** 73. *Tuberculatus* Mordvilko

158. *Tuberculatus indicus* Ghosh

159. *T. nervatus* Chakrabarti & Raychaudhuri

160. *T. paiki* Hille Ris Lambers
Subfamily IV Greenideinae

Tribe Cervaphidini

Genus 74. *Cervaphis* van der Goot
  161. *Cervaphis quercus* Takahashi
  162. *C. schouteniae* van der Goot

Genus 75. *Schoutedenia* Rubsaamen
  163. *Schoutedenia emblica* (Patel and Kulkarni)
  164. *S. ralumensis* Rubsaamen

Genus 76. *Sumatraphis* Takahashi
  165. *Sumatraphis celti* Takahashi

Tribe Greenideini

Genus 77. *Allotrichosiphum* Takahashi
  166. *Allotrichosiphum assamense* Raychaudhuri, Ghosh, Banerjee and Ghosh

Genus 78. *Brevitrichosiphon* Raychaudhuri et al.
  167. *Brevitrichosiphon mukerjii* Raychaudhuri, Ghosh, Banerjee and Ghosh

Genus 79. *Eutrichosiphum* Essig & Kuwana
  168. *Eutrichosiphum alnicola* Basu
  169. *E. assamense* Ghosh, Basu & Raychaudhuri
  170. *E. blackmanum* Agarwala and Ghosh
  171. *E. dubium* (van der Goot)
  172. *E. flavum* Takahashi
  173. *Eutrichosiphum khasyanum* (Ghosh & Raychaudhuri)
  174. *E. makii* Raychaudhuri and Chatterjee
  175. *E. neotattakanum* Agarwala and Ghosh
  176. *E. pseudopasaniae* Szelegiewicz
  177. *E. pyri* Chakrabarti, Ghosh and Raychaudhuri
  178. *E. rameshi* (Raychaudhuri, Chatterjee and Raychaudhuri)
  179. *E. raychaudhurii* Ghosh
  180. *E. russellae* (Ghosh, Ghosh and Raychaudhuri)
  181. *E. sankari* Raychaudhuri, Ghosh, Banerjee and Ghosh
182. *E. sensoriatum* (Ghosh)
183. *E. subinoyi* Raychaudhuri, Ghosh, Banerjee and Ghosh
184. *E. tattakanum* (Takahashi)

Genus 80. **Greenidea** Schouteden

185. *Greenidea (Greenidea) artocarpi* (Westwood)
186. *G. (G.) decaspermi* Takahashi
188. *G. (G.) longicornis* (Ghosh and Raychaudhuri)
189. *G. (G.) lonirostris* Basu
190. *G. (Paragreenidea) symplocosis* Ghosh, Basu and Raychaudhuri
191. *G. (Trichosiphum) bucktonis* Ghosh, Basu and Raychaudhuri
192. *Greenidea (Trichosiphum) camelliae* Agarwala and Ghosh
193. *G. (T.) formosana formosana* (Maki)
194. *G. (T.) prunicola* Ghosh, Banerjee & Raychaudhuri
195. *G. (T.) quercicola* Basu, Ghosh & Raychaudhuri
196. *G. (T.) sikkimensis* Raychaudhuri, Ghosh, Banerjee and Ghosh

Genus 81. **Greenideoida** van der Goot

197. *Greenideoida (Neogreenidea) bengalensis* Raychaudhuri and Chatterjee
198. *Greenideoida (Paragreenideoida) ceyloniae* van der Goot
199. *G. (Pentatrichosiphon) luteum* (Basu)

Genus 82. **Mollitrichosiphum** Suenaga

200. *Mollitrichosiphum (Mollitrichosiphon) tenuicorpus* Okajima
201. *M. (M) montanum* (van der Goot)
202. *M. (M.) rhusae* Ghosh

Subfamily V. Hormaphidinae

Tribe Cerataphidini

Genus 83. **Aleurodaphis** van der Goot

203. *Aleurodaphis blumeae* van der Goot

Genus 84. **Astegopteryx** Karsch

204. *Astegopteryx bambusae* (Buckton)
Genus 85. *Ceratovacuna* Zehntner

205. *Ceratovacuna perglandulosa* Basu, Ghosh & Raychaudhuri
206. *C. silvestri* (Takahashi)
207. *C. spinulosa* Ghosh and Raychaudhuri

Genus 86. *Glyphinaphis* van der Goot

208. *Glyphinaphis bambusae* van der Goot

Genus 87. *Pseudoregma* Doncaster

209. *Pseudoregma alexanderi* (Takahashi)
210. *P. bucktoni* Ghosh, Pal and Raychaudhuri
211. *P. panicola* (Takahashi)

Genus 88. *Tuberaphis* Takahashi

212. *Tuberaphis loranthis* (van der Goot)

Tribe *Nipponaphidni*

Genus 89. *Neothoracaphis* Takahashi

213. *Neothoracaphis sutepensis* (Takahashi)

Genus 90. *Nipponaphis* Pergande

214. *Nipponaphis* (*Pseudonipponaphis*) *himalayensis* Ghosh & Raychaudhuri
215. *N. (P.) machiliphaga* Takahashi

Genus 91. *Indonipponaphis* Ghosh and Raychaudhuri

216. *Indonipponaphis tuberculata* Ghosh & Raychaudhuri

Genus 92. *Metanipponaphis* Takahashi

217. *Metanipponaphis assamensis* Ghosh & Raychaudhuri
218. *M. echinata* Ghosh

Genus 93. *Sinonipponaphis* Tao

219. *Sinonipponaphis monzeni* (Takahashi)

Genus 94. *Thoracaphis* van der Goot

220. *Thoracaphis quercifoliae* Ghosh

Subfamily VI. Lachninae

Tribe Cinarini

Subtribe Cinarina

Genus 95. *Cinara* Curtis
221. Cinara atrotibialis David & Rajasingh

Subtribe Eulachnina

Genus 96. Eulachnus del Guercio

222. Eulachnus thunbergii Wilson

Tribe Lachnini

Genus 97. Lachnus Burmeister

223. Lachnus tropicalis (van der Goot)

Genus 98. Longistigma

224. Longistigma liquidambarus (Takahashi)

Genus 99. Maculolachnus Gaumont

225. Maculolachnus rubi Ghosh and Raychaudhuri

Genus 100. Nippolachnus Matsumura

226. Nippolachnus bengalensis Basu & Hille Ris Lambers

227. N. piri (Matsumura)

Genus 101. Pyrolachnus Basu and Hille Ris Lambers

228. Pyrolachnus piri (Buckton)

Genus 102. Tuberolachnus Mordvilko

229. Tuberolachnus salignus (Gmelin)

Subfamily VII. Pemphiginae

Tribe Eriosomatini

Genus 103. Eriosoma Leach

230. Eriosoma lanigerum (Hausmann)

Tribe Pemphigini

Genus 104. Prociphilus Koch

231. Prociphilus osmanthae Essig & Kuwana

Tribe Fordini

Genus 105. Geoica Hartig

232. Geoica lucifuga (Zehntner)

MORPHOLOGY AND TERMINOLOGY

Body of an aphid is normally of three regions viz. head, thorax and abdomen but fusion may take place between head and prothorax or may be various types of fusion of abdominal segments. The head
bears a flat or convex frons, with or without lateral frontal tubercles which when present may be smooth, rugose, spinulose and parallel, covering. Eyes are normally of large and compound but in apterae of some group of aphids eyes may be represented by triommatidia. Paired lateral and dorsal tubercles may be present on head, thoracic and abdominal segments and ocular tubercles present on eyes of alatae. Antennae usually consists of two short basal segments and a flagellum of 1-4 segments; the penultimate segment bears a primary rhinaria at the distal end and in the last antennal segment consist of 'base' and slender apical part, called 'processus terminalis'; secondary rhinaria may vary in shape, size and number and may be variably present on segment III, IV and sometimes on base of segment VI in alatae, and on antennal segment III of Apterae in some Aphididae. Rostrum consists of 5 segments, last segment being usually small and fused with 4th segment, combined structure is known as 'Ultimate rostral segment' which bears variable number of accessory hairs besides a tuft of 6 primary hairs at apex. Thorax is composed of pro-. meso-. and meta-thorax, the first may fuse with the head, the others may variably fuse among themselves and abdomen. Mesothorax in apterae possesses mid-thoracic furca. Legs consists of usually 5 joints, sometimes coxae and trochanters may be fused. Tarsi and usually 2-segmented and the small first tarsal joint bears 2-7 ventral hairs, in some groups dorsal hairs may also be present. Second tarsal joint usually bears dorso and lateroapical hairs and a pair of terminal claws; empodial hairs present between the claws (Fig. 1). Forewing possesses stigma, a straight or curved radial sector, simple, once or twice forked media besides anal and cubital veins; hind wings usually smaller than forewing, bears 2 oblique veins which may be reduced to 1 or may even be absent. Abdomen consists of 9 segments, each of the segments 1-7 usually bears a pair of spiracle. Lateral abdominal tubercles usually present on 1st and 7th tergite, those on 2nd - 6th may be variably present; abdominal segment 5 or 6 usually bears a pair of siphunculi, of various shapes and characters, however in some Aphididae, siphunculi are absent. Subanl plate situated ventral to cauda, modification of terminal abdominal segment. Cauda may be of various shapes and bears 2 to many hairs.

The males are usually alate but smaller in size than alate viviparous females, exhibit sclerotic claspers and bears many secondary rhinaria on antennal segment III, IV, V and sometimes also on VI. The oviparous females are usually apterous and possess numerous pseudosensoria on hind tibiae which are distinctly swollen than those of apterous viviparous females. Female genitalia with rudimentary gonapophyses, vulva etc.

MATERIAL AND METHODS

HABITAT: Aphids usually feed in colony on the succulent leaves, stems, foliages, fruits and occasionally form galls inside which they multiply. Sometimes the aphids are found in underground stems and roots. The association of ants and presence of predators like coccinellid beetles are commonly met with.

COLLECTION: The following are the various methods of collecting aphids:

i) Aphids are generally removed from their host plants with a soft brush soaked in alcohol and fixed either in 96% alcohol or in fluid consisting of 2 vols. of 96% alcohol and 1 vol. of lactic acid.
Fig. 1. Typical apterous viviparous female

Fig. 2. Typical Alate viviparous female
Fig. 3. Posterior segments of abdomen of apterous viviparous female
Fig. 4. Typical male genitalia

Fig. 5. Typical female genitalia

Fig. 6. Hind tibia showing pseudosensoria in apterous oviparous female
ii) A sheet of strong paper on a thin board is put under the host plant which is shaken gently, the aphids will then fall upon the substratum. Then the insects are collected and preserved in a suitable fluid. A part of an infested plant sample is also collected into tubes and the aphids are transferred into 96% alcohol.

iii) Another technique is to collect the aphids alive in a rather wide glass tube with a portion of the host plant. In this method, it is often possible to get more material in better condition because nymphs can be reared to adulthood and more alatae can be obtained than by picking directly.

iv) More sophisticated method may be adopted by using tubes of standard width that can be fitted to an exhauster, and thereby the aphids are sucked in from the threshing broad. This acts very quickly and the aphids are not damaged by handling. But the sample should not be large. (In fact, the procedure is followed by every European worker.)

v) However, the best method of collecting aphids in the field is to collect them alive along with their respective host plants. The portion of each infested plant along with the aphids in then placed in an expanded plastic bag or in tubes or in tins plugged with cotton. The advantage lies here in the fact that it may be possible to have winged specimens that come out within a day or two from the original sample containing both the immature forms and wingless adults. As a result, desirable number of apterous and winged adults along with different stages of nymphs may be collected for study.

Apart from this, appropriate colour notes, nature of damage to plant, site of infestation, attendant ants or predators, parasites, if any, may be accurately recorded in the laboratory. Data for each sample may be kept separately in the field note book and each container should bear a label.

vi) Regarding the collection of root aphids digging method is adopted. This is generally done by following the external symptoms of the host plants, the roots of which are liable to be infested by the plant lice, or by observing the association of ants that act as an index in helping the collector to locate the site of infestation in a plant. The rest of the procedure is to be followed as mentioned in the preceding technique.

**YELLOW PAN TRAP METHOD**: This is a device meant for collecting winged aphids specially of migratory habit. This method consists of a yellow coloured tray containing only water. The tray is kept at suitable place of varied altitudes where there is a passage of free air current. While flying at certain heights, winged aphids are attracted perhaps by yellow colour and fall on water. These aphids are then collected and preserved in 70% alcohol. This process is maintained at every 24 hours. The water is preferably changed after each catch.

**LIGHT TRAP**: This method of aphid collection is not so effective as in aforesaid methods.

**PRESERVATION**: The best way of preserving aphids is to put them in the fluid consisting of 2 vols. of 95% alcohol and 1 vol. of 75% lactic acid. Lactophenol also plays an important role in preservation. In this process the live aphids are placed directly into vials containing the clearing fluid made of saturated solution the lactic acid with clear phenol crystals. In this solution, the aphids the
aphids are generally cleared within a few hours or days. In lactophenol the aphid material may be kept for up to 3 years without ill effects.

**LABELLING**: A specimen carries no meaning at all, if it is not properly labelled so far as systematic studies are concerned. While labelling the following points should be noted.

**Name of the host plant and location on host**:

- **Locality**: (Name, District, State and if necessary, latitudes, longitude and altitude).
- **Date of collection**:
- **Collector**:

It is also desirable to maintain a field note book to record all the necessary details in regard to host plant, colouration, nature of damage to plants, site of infestation, presence of ant/predator etc. and other peculiarities, if any. A herbarium should also be made so as to record the correct plant sample.

**TRANSPORTATION**: The aphid specimens which are collected in the field, should be put into a tube containing fluid of 95% alcohol and 75% lactic acid. While sending the material from the field to the laboratory, if it takes much time to reach, from field to the laboratory there is every possibility of damage of specimens owing to the frequent agitation. Due to obvious reasons, lactic acid is mixed with alcohol because it not only keeps the specimens soft but also checks damage of the appendages and maintains the orientation of chaetotaxy which are of paramount importance in aphid taxonomy.

The labels should be inserted in each tube which is closed with wet cotton plug. Similar label should also be provided outside each tube. Care should be taken that no trace of air remain inside the tube. The tubes, thus labelled, are placed in another container of 90% alcohol. Now, it is ready for postal transit after necessary packing.

**MOUNTING**: The aphids preserved in alcohol are to be cleared for mounting and permanent storage on slides. For this purpose aphids are washed in alcohol and boiled in a water bath for 5-7 minutes; after carefully decanting off the alcohol, 10% KOH is added to the tube and specimens are boiled for 3-5 minutes for clearing. After removing the KOH, the specimens are boiled in Chloral phenol solution (saturated) for about 10 minutes. After clearing, the specimens may be mounted in Berlese medium which is composed of Chloral hydrate 20 gm., Gum accacia (powdered) 12 gm., Glycerine 12 C.C. and distilled water 40 C.C. Eastop and van Emden (1972) may be consulted as to collection, preservation and mounting techniques.

**SYSTEMATIC ACCOUNT**

**Key to the subfamilies**

1(2) First tarsal segments always with more than 7 ventral hairs and sometimes with a pair of dorsal hairs; head usually with a median longitudinal suture .......................... Lachninae

2(1) First tarsal segments with at most 7 ventral hairs; head may or may not have a median suture .......................................................... 3
3(4) Siphunculus usually elongated and densely hairy, if short and truncate then without any hair but with a pair of dorsal processi arising from abdominal tergite 7....................... Grenideinae

4(3) Siphunculus of various shapes, if elongate then usually without hairs............................... 5

5(6) Empodial hair always fine; subanal plate never indented or bilobed; head and pronotum usually separate .................................................................................................................. 7

6(5) Empodial hair flattened or fine; subanal plate usually indented or bilobed, if entire then body usually with wax gland plates; head and pronotum usually entire................................. 9

7(8) Siphunculus usually elongate; cauda longer than broad; p.t. usually longer than base of last antennal segment....................................................................................................... Aphidinae

8(7) Siphunculus cone-shaped; cauda broader than long; p.t. always shorter than base of last antennal segment........................................................................................................ Anoecciinae

9(10) Eyes in all morphs large or sometimes 3 faceted (then head fused with prothorax and processus terminalis very short); siphunculus truncate, elongate or clavate or ring-like, never absent, variably imbricated or reticulated; wax gland plate may be present but usually absent, body and appendages without dorsal hairs .................................................... Drepanosiphinae

10(9) Eyes in apterae always 3-faceted, siphunculi truncate, cone shaped, ring-like or absent; wax gland plate usually present........................................................................................................ 11

11(12) Head in apterae free from pronotum, separate; frontal processi absent; antennae 5-6 segmented; dorsoapical hairs of second tarsal segments fine; cauda rounded..... Pemphiginae

12(11) Head in apterae fused with pronotum; apterae usually with a pair of frontal horns; antennae 2-5 segmented; dorsoapical hairs of second tarsal segments capitate; cauda weakly or distinctly knobbed or rounded................................................................. Hormaphidinae

Subfamily  I. ANOECIINAE

Tribe    AICEONINI

Genus  1. Aiceona Takahashi


Type species : Aiceona actinodaphnis Takahashi

Genus  1. Aiceona Takahashi

Body pale to pale brown. Antennae usually 6-segmented, with fine spinular imbrication on flagellum; processus terminalis 0.25 – 0.75 x as long as base of last antennal segment; primary and secondary rhinaria round to oral, protuberant, non ciliated; hairs on flagellum numerous, fine. Eyes of 3 facets in apterae, Rostrum hardly exceeding hind coxae, ultimate rostral segment of hind tarsus, with 2-8 accessory hairs. Mesothoracic furca with separated arms. Abdominal dorsum pale; alatae sometimes with dorsal segment sclerotic bands; dorsal hairs numerous, fine, marginal hairs usually in cluster; 7th and 8th tergites each with 12-16 hairs. Siphunculi on hair-bearing cone. Cauda broad, rounded with many fine hairs. Subanal plate entire. Subgenital plate not defined.
Legs pale, trochanters indistinctly fused with femora, dorsoapical hairs on second tarsal segments short, never exceeding length of claws, with acute apices; first tarsal segments with 5-8 hairs. Wings pale to fuscous, fore wings with pterostigma short, media twice-branched; hind wings with both obliques.

Sexuales alate. oviparous female without pseudosensoria on hind tibiae. Alate males may be without sclerites in abdomen, but with longer antennae fewer secondary rhinaria on III antennal segment, while 0-1 on other segments and with or without siphunculi, claspers with numerous hairs.

1. **Aiceona robustiseta** Ghosh and Raychaudhuri


*Material examined:* 10 apterae

*Host plant and locality:* Shangpung, Jaintia Hills, 6.xii.1975, C.U. Coll.

*Distribution:* India : Meghalaya (Jaintia Hills), West Bengal.

**Subfamily** II **APHIDINAE**

*Key to the Tribes of the subfamily Aphidinae*

1(2) Spiracles of abdominal segments 1 and 2 placed close together; lateral abdominal tubercles usually absent from segments 1 and 7 but variably present on abdominal segments 2-3 or completely absent; antennal tubercles often well developed ....................... Macrosiphini

2(1) Spiracles of abdominal segments 1 and 2 placed far apart; lateral abdominal tubercles present on segments 1 and 7, antennal tubercles usually not well-developed; antennae and body with normal hairs ................................................................................................. Aphidini

**Tribe** APHIDINI

*Key to the Subtribes of the Tribe Aphidini*

1(2) Lateral tubercles on abdominal segments 1 and 7 posterodorsal to the spiracles of those segments; frons with "rhopalosiphine" type of small projection just inner to the antennal sockets .................................................................................................................. Rhopalosiphina

2(1) Lateral tubercles on abdominal segments 1 and 7 posteroventral to the spiracles of those segments; frons normal and without any projections as above......................... Aphidina

**Subtribe** APHIDINA

*Key to the genera of the Subtribe Aphidina*

1(2) Hind tibiae with row of peg-like structures; lateroventral areas of abdominal segments 6 and 7 with rows of spinules forming inter connecting striae................................. Toxoptera

2(1) Hind tibiae without such structures and rows of spinules absent.......................... Aphis
Genus 2. *Aphis* Linnaeus

Type species: *Aphis sambuci* Linnaeus, 1758.

Key to the species of *Aphis* Linnaeus

**Apterae:**

1(2) u.r.s. stiletto-shaped................................................................. *kurosawari*
   — u.r.s. may be of various shapes but never stiletto-shaped................................. 3
2(3) First segment of hind tarsus usually with 3 hairs.............................................. *nerii*
3(4) First segment of hind tarsus always with 2 hairs............................................... 5
4(3) First segment of hind tarsus always with 2 hairs............................................... 5
5(6) 8th abdominal tergite with 3-8 hairs ................................................................. *fabaesolanella*
6(5) 8th abdominal tergite with only 2 hairs.............................................................. 7
7(8) Abdominal dorsum usually completely sclerotic.................................................. *craccivora*
8(7) Abdominal dorsum pale and smooth....................................................................... 9
9(10) Hairs on posterior abdominal tergites longer, never less than 3 x b.d. III............ *longisetosa*
10(9) Hairs on posterior abdominal tergites shorter; about 0.5 1.8 x b.d. III................ 11
11(12) Siphunculi pale, smooth, dusky near apices; p.t. about 2.5 3.1 x base IV........... *punicae*
12(11) Siphunculi brown to blackish, imbricated......................................................... 13
13(14) Longest hair on hind femora as long as or longer than its maximum width......... *citricola*
14(13) Longest hair on hind femora appreciably shorter than its maximum width.......... 15
15(16) Second tarsal segment with only primary hairs............................................... *nasturtii*
16(15) Second tarsal segment with primary and secondary hairs................................. 17
17(18) Hairs on 8th tergite much longer (at least 2 x b.d. III)................................. *polygonaceae*
18(17) Hairs on 8th tergite shorter, hardly as long as b.d III................................. *gossypii*

**Alatae:**

1(4) Post-siphuncular sclerite absent though scattered scleratic areas may be found around
the stigmal pori and on other portions of the abdomen. p.t. shorter than antennal segment III
and hardly twice as long as the base of segment VI, segment III with 4-5 secondary rhinaria
distributed in a row along its entire length excepting the basal 0.3 portion, flagellum pale;
cauda dark, elongate and bears 7-9 hairs............................................................... *Aphis kurosawai* Takahashi

4(1) Post-siphuncular sclerites present either singly or in combination with other sclerites
distributed on different portions of the abdomen...................................................... 5
5(6) u.r.s. shorter than h.t.2; p.t. about 2.2-2.5 times as long as the base of the segment, III antennal segment pale and with 4-5 circular secondary rhinaria in a row distributed on its entire length excepting basal 0.3 portion; dorsum of abdomen with irregularly arranged brownish sclerites; siphunculi and cauda black and the latter with about 6-8 hairs..............

.................................................................................................................. Aphis craccivora Koch

6(5) u.r.s. longer than h.t.2.............................................................................................................. 7

7(10) p.t. either subequal to or distinctly shorter than III antennal segment................................. 8

8(9) p.t. subequal to III antennal segment and 2.1 - 2.3 times as long as the base of segment VI, segment III with 5-7 secondary rhinaria in a row distributed almost over its entire length; siphunculi brownish, about 4 - 4.5 times as long as its width at apex and nearly 1.5 times as long as pale cauda which bears 4-6 hairs. ...................................................... Aphis gossypii Glover

9(8) p.t. distinctly shorter than III antennal segment VI, segment III with 6-14 secondary rhinaria distributed on almost its entire length; siphunculi dark brownish, about 5-6 times as long as its width at apex and 1.8 to 1.9 times as long as cauda which bears 11-14 hairs ..............

.................................................................................................................. Aphis nerii Boyer de Fonscolombe

10(7) p.t. longer than antennal segment III...................................................................................... 11

11(12) Cauda with 15-18 hairs; antennal segment III with 8-20 secondary rhinaria distributed ever its entire length, IV with 1-8 secondary rhinaria, p.t. 2.5 - 3.5 times as long as the base of the segment ............................................................... Aphis fabae solanella Theobald

12(11) Cauda with 4-12 hairs; antennal segment III with 4-8 secondary rhinaria, IV without any rhinaria, p.t. 2-2.8 times as long as base of segment VI .................................................................................. 13

13(14) Femeral hairs of different lengths, shorter ones nearly equal to and longer ones about twice the basal diameter of antennal segment III which is with 6-8 secondary rhinaria; cauda with 9-11 hairs.................................................................................................................. Aphis citricola v.d. Goot

2. Aphis citricola van der Goot


Material examined : Numerous apterous, alatae and nymphs.

Host plant and locality : The insects were collected throughout the year from more than 70 plants under 31 natural orders from all the localities of survey. They were also collected in Y.P.T. during the months of January to May and again from August to December.

Biology : Greenish brown to brownish insects severely infest almost all the aerial parts of a plant body.

Distribution : India : Meghalaya (throughout) and almost all States in India. Elsewhere : Australia, Bhutan, Bermuda Island, China, Nepal, New Zealand, North America, Pakistan, Sri Lanka, Taiwan, Thailand and Vietnam.

3. **Aphis craccivora** Koch


**Material examined**: Numerous apterae, alatae and nymphs.

**Host plant and locality**: Plants of natural orders Cucurbitaceae, Papilionaceae, Solanaceae and Umbilliferae are infested almost throughout year and in all localities of survey. They were also caught in Y.P.T. during the months of March, September and October.

**Biology**: Blackish brown insects severely infest all the arial parts of the plant.

**Distribution**: India: Meghalaya (Throughout) and virtually cosmopolitan.

**Remarks**: *Aphis craccivora* Koch, commonly known as black aphid, attacks many plants and most often leguminous crops. It is a major pest of bean and cowpea. Leaves, stems and fruits of peas, beans are often severely infested and suffer heavy injury. It also infests a large number of ornamental plants, attacking leaves, flowers and other young growth and sometimes causing severe damage.

4. **Aphis fabae solanella** Theobald


**Material examined**: Numerous apterae, alatae and nymphs.

**Host plant and locality**: Host plants of the natural orders Amaranthaceae, Compositae, Nyctaginaceae, Papilionaceae, Polygonaceae and Solanaceae are infested in almost all localities throughout the year. They were also collected in Y.P.T. on 23.12.1968, 2.2.1969, 8.2.1969 and 10.2.1969.

**Biology**: Blackish brown insects infest the growing shoots and both the surfaces of the leaves.

**Distribution**: India: Meghalaya (Shillong), Arunachal Pradesh, Assam, Himachal Pradesh, Sikkim, South India, Tripura, Uttar Pradesh. Elsewhere: Africa, Europe, Middle East.

5. **Aphis gossypii** Glover


**Material examined**: Many apterous, alate viviparous females and nymphs.

**Host plant and locality**: Collected from more than 70 plant species under 32 natural orders throughout the areas of survey, infestation occurring throughout the year, numerous alatae were also collected in Y.P.T. during the period from January to May and again from October to December.

**Biology**: Brownish to greenish brown insects infest all most all the arial parts of the plant body.

**Distribution**: India: Meghalaya and all over India Elsewhere: Virtually cosmopolitan.

6. **Aphis kurosawai** Takahashi

Material examined: Many apterous and alate viviparous females and nymphs.

Host plant and locality: Artemisia sp. (Compositae), Long round Road, 20.5. 1969; Artemisia vulgaris (Compositae), Umpling, 11.7.1969 and 26.7.1969.

Distribution: India: Meghalaya (Umling), Assam, Manipur, Kashmir, Nagaland, Sikkim, Uttar Pradesh, West Bengal. Elsewhere: Japan, Nepal, Taiwan and Thailand.

Remarks: The species is one of the typical inhabitants of Artemisia spp. and characterised by stiletto-shaped ultimate rostral segment.

7. Aphis longisetosa Basu


Material examined: Many apterous viviparous females and nymphs.

Host plants: Rubus ellipticus and Rubus rosaeolica (Rossaceae).

Distribution: India: Meghalaya: (Shillong), Arunachal Pradesh, Himachal Pradesh, Manipur, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Remarks: The species is characterised by its longer dorsal body hairs about 2.0 - 2.5 times as long as b.d. III.

8. Aphis nasturtii Kaltenbach [Fig. 18]

1843. Aphis nasturtii Kaltenbach, Mongr. Fam. pflanz., 76.

Material examined: Many apterous, viviparous females and nymphs.

Host plant and locality: Infested 17 host plants under 15 natural orders, during all the seasons and all the localities of survey. They were also collected in Y.P.T. during the period from January to February and again from September to October; viviparous females were collected from an unidentified host of Natural Order Rhamnaceae, Patharmukrah on 18.12.1968 and males were collected in Y.P.T. on 26.1.1969 and 2.2.1969.

Biology: Greenish brown insects infest almost all the aerial parts of a plant body.

Distribution: India: Meghalaya (Patharmukrah), Arunachal Pradesh, Haryana, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh, West Bengal. Elsewhere: America, Europe, Great Britain, Middle East, Nepal, Pakistan, Taiwan.

Remarks: So far only one alate male of this species has been known from India. Gleiss (1966) has given a detailed description of oviparac and sexales from Germany.

9. Aphis nerii Boyer de Fonscolombe


Material examined: Many apterae, and alatae and nymphs.
Host plant and locality: *Asclepias currasavica* (Asclepiadaceae), Umpling, 29.12.1968; *Nerium odorum* (Apocynaceae), Dhankheti, 30.7.1969; and vagrant alate on *Lycopersicum esculentum* (Solanaceae), Polo ground, 19.5.1969.

**Biology**: Brownish insects infest growing shoots and both the surfaces of the leaves.

**Distribution**: India: Meghalaya (Umling, Dhankheti), West Bengal and all over India. Elsewhere: Cosmopolitan.

10. *Aphis polygonaceae* Matsumura


**Material examined**: 4 apterae and nymphs, on *Rumex* sp. Shillong, 5.1.1969, A.K. Ghosh.

**Biology**: The aphids were seen infesting the undersurface of the leaf.

**Distribution**: India: Meghalaya (Shillong), Himachal Pradesh. Elsewhere: Japan.

11. *Aphis punicae* Passerini


**Material examined**: 2 apterae.

Host plant and locality: *Punica granatum* (Punicaceae), Umpling, 5.1.1969.

**Biology**: Greenish brown insects infest the undersurface of the leaves.

**Distribution**: India: Meghalaya (Umling), and other parts of India. Elsewhere: East Africa, Southern Europe, France, Italy, Morocco, Pakistan, Spain, Switzerland and U.S.S.R.

Genus 3. *Toxoptera* Koch


Type species: *Aphis aurantii* Boyer de Fonscolombe, 1841

**Key to the species of genus Toxoptera Koch**

1(2) Siphunculi much shorter, maximally about half as long as cauda; F.T.C. 3,3,2.................

.............................................................................................................................................*odinae* van der Goot

2(1) Siphunculi as long as or longer than cauda; F.T.C. 3,3,3 ............................................. 3

3(4) Longest hair on antennal segment III shorter than b.d. III, siphunculi sparsely imbricated; cauda with 9-17 hairs..........................................................*aurantii* (B.d.f)

4(3) Longest hair on antennal segment III as long as to 1.5 times as long as b.d. III: siphunculi heavily imbricated, cauda with 25-36 hairs................................. *citricidus* (Kirk.)
Alate viviparous female:

1(4) Body 5-10 times as long as siphunculi which are about 1.2-1.6 times as long as cauda; eighth abdominal tergite usually bears only 2 hairs; p.t. 3.5-5.2 times as long as the base of the segment, longest hair on III antennal segment less than twice as long as the basal diameter of the segment ................................................................. 2

2(3) Small insects, about 1.5 - 1.8 mm long; cauda with 8-16 hairs; III antennal segment except the very base, almost pale and bears 4-8 secondary rhinaria, IV antennal segment without any secondary rhinaria, IV antennal segment without any secondary rhinaria, longest hair on antennal segment III usually not longer than the basal diameter of the segment................................................................. Toxoptera aurantii (Boyer de Fonsolombe)

3(2) Large insects, about 2.2 - 2.5 mm long; cauda with 20-35 hairs; III antennal segment except the very base, black and bears 8-20 secondary rhinaria, IV antennal segment with 0-5 secondary rhinaria, longest hair on III antennal segment always longer than the basal diameter of the segment................................................................. Toxoptera Citricidus (Kirkaldy)

4(1) Body 13-20 times as long as siphunculi which are about 0.5-0.7 times as long as cauda; eighth abdominal tergite bears 3-8 hairs; p.t. 2.5-3.2 times as long as the base of the segment, longest hair on III antennal segment never less than twice as long as basal diameter of the segment................................................................. Toxoptera odinae (van der Goot)

12. Toxoptera aurantii (Boyer de Fonsolombe) [Fig. 19]

1976. Toxoptera aurantii (Boyer de Fonsolombe); Mandal, Basu, R. C. and Raychaudhuri, D.N., Orient. Insects, 10(4) : 536.

Material examined: Numerous alatae and nymphs.

Host plant and locality: Infest a wide range of host plants under different natural orders. Infestation can be noticed throughout the year in all localities of survey; they were also collected in Y.P.T. on 21.12.1968.

Biology: Blackish brown insects infest almost all the aerial parts of a plant body.

Distribution: All over India. Elsewhere: Virtually cosmopolitan.

13. Toxoptera citricidus (Kirkaldy)


Material examined: Numerous apterae, alatae and nymphs.

Host plant and locality: Infest mostly the plants of Natural order Rutaceae and Urticacea but these insects have also been noticed on other Natural orders like Fagaceae, Passifloraceae and Tornstroemiaseae. Infestations occur almost all the year round and in all the localities of survey. They have also been collected in Y.P.T. during the months of January and February.
**Biology**: Dark brownish insects infest the growing shoots and both the surfaces of the leaves.

**Distribution**: India: Meghalaya (throughout), Orissa, South India. Elsewhere: Ethiopian region, Fiji, Howaii, Japan, Java, Korea, Malaysia, Nepal, New Guinea, New South Wales, New Zealand, Philippines, Queensland, South Africa, South Australia, Sri Lanka, Sumatra, Taiwan, Thailand, Victoria and West Australia.

14. *Toxoptera odinae* (van der Goot)


**Material examined**: Many apterous, alate viviparous females and nymphs.

**Host plant and locality**: Plants of Natural order Rutaceae are generally infested. Infestation can be noticed all round the year in different corners of Shillong. They were also collected in Y.P.T. during December to January.

**Biology**: Blackish brown insects infest all the aerial parts of the plant.

**Distribution**: India: Meghalaya (Shillong), and all other parts of India. Elsewhere: China, Java, Malaysia, Nepal, Philippines, South America, Sri Lanka, Sumatra and Taiwan.

Subtribe Rhopalosiphina

**Key to the genera of the Subtribe Rhopalosiphina**

1(2) Siphunculus short, about 0.06 times as long as body ............................................. *Hyalopterus*

2(1) Siphunculus long, more than 0.07 times as long as body .............................................. 3

3(4) Dorsum of abdomen with spinules arranged in polygons, each polygon enclosing a few spinules ............................................................................................................. *Rhopalosiphum*

4(3) Dorsum of abdomen without such spinules ........................................................................ 5

5(6) Siphunculus short and thick; secondary rhinaria in alatae protuberant ............................ *Melanaphis*

6(5) Siphunculus rather long; Secondary rhinaria in alatae normal ........................................ 7

7(8) Cauda pale, medially constricted, usually with 4 medial hairs; alatae with Media of forewing twice-branched; hind wing with 1 oblique vein ............................................. *Hysteroneura*

8(7) Cauda not as above; alatae with Media of fore wings once-branched; hind wing with 2 oblique veins .............................................................................................................. *Schizaphis*

Genus 4. *Hyalopterus* Koch


Type species: *Aphis pruni* Geoffroy, 1762.

**Key to the species of Hyalopterus Koch**
**Alate viviparous female:**

1(2) U.r.s. narrow, 0.12 mm long; secondary rhinaria distributed on III antennal segment only; p.t. 2.2 - 3 times as long as the base of the segment; siphunculi 0.6 - 0.7 times as long as cauda ......................................................... *atriplicis*

2(1) U.r.s. broad, 0.09 mm long; secondary rhinaria distributed on a.s. III, IV and V, p.t. about 4 times as long as base of VI; siphunculi about 0.3 times as long as cauda ...................... *pruni*

15. *Hyalopterus atriplicis* (Linnaeus) [Fig. 20]


*Material examined*: 1 aptera, 4 alatae and 1 nymph.

*Host plant and locality*: *Chenopodium* sp. (*Chenopodiaceae*), Happy Valley, 1.12.1969.

*Biology*: Brown specimens were collected from both the surfaces of the leaves.

*Distribution*: India: Meghalaya (Happy Valley); Assam, West Bengal, Uttar Pradesh. Elsewhere: Middle East, Europe, North America, Far East.

16. *Hyalopterus pruni* (Geoffroy)


*Material examined*: Many apterous and alate viviparous females and nymphs, Shillong, 1.9.1969.

*Host plant*: *Phragmites* sp, *Poa* sp. (*Gramineae*) and *Prunus* sp. (*Rosaceae*).

*Distribution*: India: Meghalaya (Shillong), Arunachal Pradesh, Manipur, Mysore, Nagaland, Tamil Nadu, Uttar Pradesh, West Bengal. Elsewhere: Africa, Afghanistan, Cyprus, Iraq, Italy, Pakistan, Spain, United Kingdom and Yugoslavia.

**Genus 5. Hysteroneura** Davis


*Type species*: *Siphonophora setariae* Thomas, 1878

17. *Hysteroneura setariae* (Thomas) [Fig. 21]


*Material examined*: 16 apterous and 8 alate viviparous females and 10 nymphs.

Biology: Greenish to dark brownish forms infest the very growing shoots, under and upper surfaces of the leaves and the young growing curled leaves. Plants of N.O. Gramineae and Rosaceae are generally infested.

Distribution: India: Meghalaya (Borapani, Cerrapunji, Dhanketi, Nongrim Hills), and all over country. Elsewhere: Africa, America, China, Eastern Islands, Fiji, Hawai, Japan, Korea, Malayaasia, Nepal, New Guinea, Philippines, Solomon Islands, Taiwan, Thailand and Vietnam.

Remarks: This species has been recorded from South India (David et al., 1968) and has also been found in the north eastern states of India but so far the sexuales had not been reported from India, Palmer (1952) has given illustrations and short descriptions of the sexuales from U.S.A. under the name Aphis setariae Thomas.

Genus 6. Melanaphis van der Goot


Type species: Aphis bambusae Fullaway, 1910.

Key to the species and subspecies of Melanaphis

1(2) Longest hair on midfemora longer than its middle width ....................................................... 3
2(1) Longest hair on mid femora shorter than its middle width ..................................................... 5
3(4) Marginal hair on anterior abdominal segments always less than 3, caudal hairs 8-10..............
............................................................................................................................ meghalayensis meghalayensis
4(3) Marginal hair on anterior abdominal segments 3-5; cauda usually with 5-7 hairs ............. a
........................................................................................................................................ arundinariae
5(6) Longest hair on anterior abdominal tergites always longer than b.d. III, cauda with 15-21 hairs ........................................................................................................................................ donacis
6(5) Longest hair on anterior abdominal tergites shorter than or atmost as long as b.d. III; cauda usually with 9-17 hairs ................................................................. sacchari

18. Melanaphis arundinariae (Takahashi) [Fig. 22]


Material examined: Numerous apterae and 3 alatae.


Biology: Blackish brown insects were seen to infest the leaves, growing shoots and sometimes also the subarial region of host.

Distribution: India: Meghalaya (Shillong, Cherrapunji, Mulki, Dhankheti), West Bengal. Elsewhere: Far East.

Remarks: Specimens from Shillong have short siphunculi and cauda with more hair.
19. *Melanaphis donacis* (Passerini)


*Host plant:* *Arundo donax* (Graminae)

*Distribution:* India: Meghalaya (Shillong), Tamil Nadu. Elsewhere: Mediterranean region excepting Africa.

20. *Melanaphis meghalayensis meghalayensis* Raychaudhuri and Banerjee


*Host plant:* Unidentified Bamboo (Gramineae).

*Distribution:* India: Meghalaya (Kench's trace) and West Bengal.

21. *Melanaphis sacchari* (Zehntner)


*Material examined:* Numerous apterae, alatae and nymphs.


*Biology:* Greenish Yellow insects infest growing shoots and lower portion of the stem besides both the surfaces of the leaves.

*Distribution:* India: Meghalaya (Nongrim Hill, Kench's trace), widely distributed throughout the country. Elsewhere: Cosmopolitan.

**Genus 7 Rhopalosiphum Koch**


*Type species:* *Aphis nymphaeae* Linnaeus, 1761.

*Key to the species of genus Rhopalosiphum Koch*

Apterous viviparous females:

1(2) Antennae 5-segmented; abdominal dorsum densely covered with long and fine hairs............

.................................................................................................................................................. *rufiabdominalis*

2(1) Antennae 6-segmented; abdominal dorsum not with such hairs........................................3
3(4) Processus terminalis about 2.5 times as long as base VI; body about 10-15 times as long as siphunculi.......................... maidis

4(3) Processus terminalis never less than 3.9 times as long as base VI; body at the best 8.5 times than the siphunculi.......................... 5

5(6) Siphunculi distinctly swollen distally, dorsal abdominal hairs fine.................. nymphaeae

6(5) Siphunculi rather cylindrical; dorsal abdominal hairs with blunt apices.................. padi

Alate viviparous females:

1(2) Antennae 5-segmented; p.t. never less than 3.0 times as long as and may be upto about 7.0 times as long as base of segment V and 1.03-1.49 times as long as segment III..........................

........................................... ................................................................................ rufiabdominalis

2(1) Antennae 6-segmented.................................................................................................. 3

3(4) Processus terminalis about 1.70-2.38 times as long as base of segment VI and always shorter than segment III.......................... maidis

4(3) Processus terminalis never less than 3.0 times as long as and at most upto 5.23 times as long as base of segment VI and always longer than segment III.......................... 5

5(6) Siphunculi cylindrical, body about 8.53-8.91 times as long as siphunculi; processus terminalis about 4.62-5.23 times as long as base of segment VI, segment III with 14-19, IV with 1-9 and V with 1-6 secondary rhinaria; cauda 0.52-0.63 times as long as siphunculi......

........................................................................................................................... : ................

nymphaeae

6(5) Siphunculi with a basal cylindrical stem and a distal swollen portion; body about 5.59-7.95 times as long as siphunculi; processus terminalis about 3.45-3.88 times as long as base of segment VI; segment III with 14-27, IV with 0-6 and V with 2-8 secondary rhinaria..

.................................................................................................................................

nymphaeae

22. *Rhopalosiphum maidis* (Fitch)


*Material examined*: 17 apterae, 6 alatae and 4 nymphs.

*Host plant and locality*: *Cardamine hirsuta* (Cruciferae), Laban, 29.1.1969; Grass (Gramineae), Kench's trace, 29.12.1968; *Hordeum vulgare* (Gramineae), Umpling, 29.12.1968; *Poa sp.* (Gramineae), Jowai, 29.7.1969; and *Zea mays* (Gramineae), Kench's trace, 8.12.1968.

*Biology*: Yellow to green specimens were collected from the upper and undersurfaces of the leaves surrounding the growing shoots and also from roots of the hosts. Sometimes ants were seen in association.

*Distribution*: Cosmopolitan.
23. *Rhopalosiphum nymphaeae* (Linnaeus) [Figs. 23, 24]


*Materal examined*: 4 alate viviparae, 5 apterous oviparous females and 5 alate males.

*Host plant and locality*: *Prunus persica* (Rosaceae), Kench’s trace, 12.12.1968; males from *Prunus persica* (Rosaceae) and *Curcuna longa* (Zingiberaceae), Shillong, 29.12.1968; oviparae and males from *Prunus* sp. (Rosaceae), Shillong, 12.12.1968.

*Biology*: Deep brown to blackish brown specimens were collected from the upper and undersurfaces of the leaves.

*Distribution*: Cosmopolitan.

*Remarks*: Theobald (1927) has given descriptions of males and oviparae from Europe and Richards (1960) also described the oviparae in detail from Canada.

24. *Rhopalosiphum padi* (Linnaeus)


*Materal examined*: Many apterous and 3 alate viviparous females and nymphs.

*Host plant and locality*: Insects were seen to infest quite a few host plants of different natural orders. Infestation could be noticed all round the year and in all localities of survey. A few vagrant alatae were collected from some unusual hosts like *Adonostoma viscosum* (Compositae), *Lycopersicum esculantum* (Solanaceae), *Thunbergiana coccinea* (Acanthaceae).

*Biology*: Green to black specimens were collected from upper and under surfaces of the leaves.

*Distribution*: Cosmopolitan.

25. *Rhopalosiphum rufiabdominalis* (Sasaki)


*Materal examined*: Many alatae viviparous females.

*Host plant and locality*: Quite a few hosts were noticed to be infested by alate forms only in the different localities of Shillong but during the year 2 alatae were collected in Y.P.T. in the months of December and February.

*Biology*: Blackish brown insects were collected from under and upper surfaces of the leaves.

*Distribution*: Cosmopolitan.


*Material examined*: 5 apterae and 2 alatae.


*Distribution*: India : Meghalaya and Sikkim.

**Genus 8. Schizaphis Börner**


*Type species*: *Aphis graminus* Rondani, 1847.

*Key to species of Schizaphis Börner*

1(2) Cauda somewhat pale, elongate; siphunculi never more than twice cauda.......................... *graminum*
2(1) Cauda dark, constricted at about its middle and with a bulbous apex; siphunculi never less than twice cauda.................................................................................................................. 3
3(4) All dorsal abdominal hairs either long or on anterior tergite there may be some short and blunt hairs mixed with longer hairs.............................................................. *punjabipyri*
4(3) Anterior tergal hairs on abdominal dorsum minute and blunt but hairs on 7th and 8th tergites much longer and conspicuous.......................................................... *rotundiventris*

27. *Schizaphis graminum* (Rondani)


*Material examined*: 1 aptera only.

*Host plant and locality*: Poa sp. (Gramineae), Nongrim Hill, 25.1.1969.

*Biology*: Greenish brown insect was seen on the underface of the leaf.

*Distribution*: India : Meghalaya (Shillong); Assam, West Bengal, Uttar Pradesh. Elsewhere : Australia, Ceylon, Canada, Egypt, South Africa.

28. *Schizaphis punjabipyri* (Das)


*Host plant*: Cynodon sp. (Gramineae).

*Distribution*: India : Meghalaya (Shillong), Himachal Pradesh, West Bengal. Elsewhere : Pakistan.
29. **Schizaphis rotundiventris** (Signoret)

1860. *Schizaphis rotundiventris* Signoret (complete reference could not be traced).


*Material examined*: Many apterae and nymphs.

*Host plant*: *Cyperus* spp. (*Cyperaceae*).

*Distribution*: India: Meghalaya (Shillong), Assam. Elsewhere: Far East, Africa, Australia.

*Remarks*: Eastop (1966) suggested that there is a complex of races of *cypéri* and the oldest name for this complex is probably *Schizaphis rotundiventris* (Signoret).

**Tribe** MACROSIPHINI

*Key to the genera of the Tribe Macrosiphini*

1(2) Siphunculi with pore placed obliquely at the apical 1/3; antennae 5-segmented; cauda typically thumb-shaped, constricted at very base ....................................................... *Acutosiphon*

2(1) Siphunculi variously shaped but never as above ................................................................. 3

3(4) Tarsi atrophied and without claws; F.T.C. 1,0,0; apterae without secondary rhinaria ...........

.......................................................... *Shinjia*

4(3) Tarsi normal and with claws; F.T.C. variable but never 1,0,0 ................................................ 5

5(6) Postsiphuncular abdominal segments with prominent supracaudal process ...................... 7

6(5) Supracaudal process absent .................................................................................................. 9

7(8) Only 8th abdominal tergite bears a hair bearing process .................................................. *Cavariella*

8(7) Each of tergites 7 & 8 with distinct process ........................................................................... *Tricaudatus*

9(10) Cauda not or hardly longer than wide at base ....................................................................... 11

10(9) Cauda distinctly longer than wide at base ............................................................................. 15

11(12) Siphunculi very short; cauda rather oval ........................................................................... *Cryptosiphum*

12(11) Siphunculi subcylindrical, longer than wide ....................................................................... 13

13(14) Head with spinal tubercles; venter of head sparsely spinulose ........................................... *Dysaphis*

14(13) Head without such spinal tubercles; venter of head rather smooth siphunculi stout, somewhat conical, dorsal abdominal hairs at most twice as long as b.d. III...... *Brachycaudus*

15(16) Spinules in transverse rows present on second tarsal segment ....................................... 17

16(15) Spinules in transverse rows absent on second tarsal segment .......................................... 19

17(18) Ultimate rostral segment with spinules in transverse rows; head with a median frontal prominence; hind tibiae of nymphs spinulose .................................. *Pseudoacyrthosiphon*
18(17) Ultimate rostral segment without such spinules; siphunculi distinctly swollen; u.r.s. hairy; apterae with secondary rhinaria on antennal segment III, midthoracic furca stalked ................................................................. Amphorophora

19(20) Some of the secondary hairs on u.s.r. as long as or longer than primary hairs ............... 21

20(19) Secondary hairs on u.r.s. usually much shorter than primary hairs .................................. 25

21(22) Ultimate rostral segment extends beyond 2nd abdominal segment, about twice as long as h.t. 2 and with many secondary hairs .................................................................................... Paczoskia

22(21) Ultimate rostral segment rather shorter, almost up to 1.5 times as long as h.t. 2, with less secondary hairs ................................................................................................................. 23

23(24) Siphunculi reticulated with isodiametrical cells; secondary rhinaria protuberant; dorsal abdominal hairs normal in shape .......................................................................................... Macrosiphoniella

24(23) Siphunculi not reticulated; secondary rhinaria not protuberant; dorsal abdominal hairs fan-shaped ............................................................................................................ Pleotrichophorus

25(26) Siphunculi reticulated ........................................................................................................... 27

26(25) Siphunculi not reticulated but sometimes a few interconnecting striae present near the apical flange .......................................................................................................................... 33

27(28) Apterae usually without secondary rhinaria; if however, such rhinaria present, dorsum of abdomen reticulated and F.T.C. 4,4,4; abdominal dorsum with hair-bearing tubercles on spinopleural area ................................................................. Macromyzus

28(27) Apterae without secondary rhinaria ...................................................................................... 29

29(30) Siphunculi not reticulated with somewhat transversely elongate cells; head in apterae with spinules on dorsum ........................................................................................................ Perillaphis

30(29) Siphunculi reticulated with isodiametrical cells .................................................................. 31

31(32) Secondary rhinaria on antennal segment III nonprotuberant; F.T.C. usually 3,3,3 rarely 4,4,4; abdominal dorsum without hair bearing sclerites .................................................... Macrosiphum

32(31) Secondary rhinaria on antennal segment III protuberant; F.T.C. usually 5,5,5; abdominal dorsum usually with hair-bearing sclerites ................................................................. Uroleucon

33(34) Siphunculi warty .................................................................................................................. 35

34(33) Siphunculi not warty ........................................................................................................... 39

35(36) Siphunculi tapering to a point at apex and with an oblique pore situated much basad to apex ........................................................................................................................ Acutosiphon ........................................................................................................................ [see also 1(2)]

36(35) Siphunculi never as above .................................................................................................... 37

37(38) Primary rhinaria in apterae star-shaped, in alatae with finger-like processes; antennal tubercles high with a long finger-like projection; spiracular pores on 6th and 7th tergites longer than those on 1-5 tergites ............................................. Akkaia
38(37) Primary rhinaria not as above; spiracular pores normal, spiracles on 6th and 7th segments not different from those on other abdominal segments; siphunculus slightly narrow at apex with apical pore. ........................................................................................................ Vesiculaphis

39(40) Dorsal abdominal hairs with apices like an opened fan; u.r.s. stiletto-shaped; apterae without secondary rhinaria, alatae with such rhinaria on antennal segment III, IV and sometimes also on V; siphunculi slightly clavate near apex. ........................................... Coloradoa

40(39) Dorsal abdominal hairs not as above. .......................................................................................... 41

41(42) Dorsum of abdomen in apterae with a reticulate pattern .......................................................... 43

42(41) Dorsum of abdomen in apterae without such pattern .................................................................. 47

43(44) Siphunculi with a preapical circumcission; apterae with secondary rhinaria on antennal segment III........................................................................................................... Sinomegoura

44(43) Siphunculi without preapical circumcission; apterae usually without secondary rhinaria ... 45

45(46) Dorsal abdominal hairs in apterae with widely expanded apices; siphunculi puffed near apex and densely spinulose ........................................................................................................ Pentalonia

46(45) Dorsal abdominal hairs in apterae short and blunt, not as above; siphunculi not with spinular imbrications ................................................................................................................ Micromyzus

47(48) Head in apterae with processi either at middle or on lateral frontal tubercles ......................... 49

48(47) Head in apterae without such process ........................................................................................ 51

49(50) Head in apterae rugose; primary rhinaria nonciliated .................................................. Tuberocephalus

50(49) Head in apterae densely warty dorsally and ventrally .......................................................... Diphorodon

51(52) Segment I usually with finger-like projection from the inner apex; apterae without secondary rhinaria ................................................................. 53

52(51) Segment I never with such projection ....................................................................................... 55

53(54) Primary rhinaria nonciliated; ocular tubercles indistinct; abdominal dorsum in apterae areolated with spinules .......................................................... Tuberocephalus

....................................................................................................................................... Matsumuraja [see also 65(66)]

54(53) Primary rhinaria ciliated; ocular tubercles distinct; abdominal dorsum in apterae pale and smooth ........................................................................................................ Matsumuraja

55(56) Apterae mostly with secondary rhinaria; sometimes antennal segment III in apterae incrassate near base and then secondary rhinaria may be absent ........................................ 57

56(55) Apterae without secondary rhinaria ......................................................................................... 71

57(58) Dorsum of head in apterae covered with warts or spinules .................................................... 59

58(57) Dorsum of head in apterae usually not as above but may be slightly wrinkled ..................... 63

59(60) Antennae shorter than body; siphunculi nearly cylindrical; postsiphuncular sclerites absent; dorsum of head in apterae with rounded ................................................... Indomyzus
60(59) Antennae as long as or longer than body .............................................................................. 61
61(62) Apterae with a horseshoe-shaped patch on abdominal dorsum; median frontal prominence in apterae absent .......................................................... Neomyzus
62(61) Apterae without such patch on abdominal dorsum; median frontal prominence low but distinct .......... Neomegouropsis
63(64) Apterae without any median frontal prominence ......................................................... 65
64(63) Apterae with median frontal prominence .............................................................................. 67
65(66) Frontal sinus usually 'V', shaped in apterae possessing secondary rhinaria restricted only near base of antennal segment III .......................................................... Acyrthosiphon
66(65) Frontal sinus not as above; secondary rhinaria in apterae distributed over basal 0.7 portion of antennal segment III; abdominal dorsum in apterae smooth, variably pigmented but always with a pale area in front of siphunculi ........................................... Impatientinum
67(68) Dorsal body hairs thick with spatulate to capitate apices arising from strong tuberculate sockets .................................................................................................................. Cryptomyzus
68(67) Dorsal body hairs never as above; siphunculi cylindrical or sub-cylindrical ....................... 69
69(70) Cauda bears 2-4 very short hairs near apex; wing veins slightly bordered or blackish ............ ................................................................. Rhodobium
70(69) Caudal hairs more or less of equal length; wing veins rather normal ................................ Metopolophium
71(72) Dorsum of head in apterae usually smooth or may be slightly wrinkled .............................. 73
72(71) Dorsum of head in apterae spinulose or warty ................................................................. 85
73(74) Dorsal abdominal hairs in apterae with distinct capitate apices ........................................... Capitophorus
74(73) Dorsal abdominal hairs in apterae not with capitate apices ................................................. 75
75(76) Siphunculi shorter than cauda .............................................................................................. 77
76(75) Siphunculi longer than cauda .............................................................................................. 81
77(78) Siphunculi barrel-shaped, dorsum of abdomen in apterae with pigmented transverse segmental bands; cauda triangular ................................................................. Brevicoryne
78(77) Siphunculi usually not barrel-shaped; if so, cauda not triangular ........................................ 79
79(80) Mid-thoracic furca in apterae with separate arms; wing veins thick and bordered brown ...... ................................................................. Semiaphis
80(79) Mid-horacic furca in apterae with a broad base ............................................................... Hayhurstia
81(82) Siphunculi with a distinct preapical circumssision; alatae with tuberculate secondary rhinaria; abdominal dorsum pale ............................................................... Subovatomyzus
82(81) Siphunculi without pre-apical circumssion ......................................................................... 83
83(84) Mid-thoracic furca in apterae sessile; alatae with secondary rhinaria on antennal segment III, IV and some times also on V ................................................................. *Lipaphis*

84(83) Mid-thoracic furca in apterae with separate arms; Siphunculi distinctly clavate on about distal half............................................................................................ *Loisomaphis*

85(86) Pore in siphunculi obliquely placed and siphunculi often with hairs.................................................. 87

86(85) Pore in siphunculi not obliquely placed and Siphunculi without hairs ................................................. 89

87(86) Siphunculi devoid of apical flange; dorsum of head in apterae spinulose and with median frontal prominence............................................................................................... *Xenomyzus*

88(87) Siphunculi with distinct apical flange, hind wing with one oblique vein................................................... ................................. *Tricosiphonaphis*

89(90) Median frontal prominence distinct in apterae......................................................................................... 91

90(89) Median frontal prominence absent in apterae ....................................................................................... 93

91(92) Siphunculi without preapical circumcision; alatae with secondary rhinaria only on antennal segment III; primary rhinaria non-ciliated ......................................................... *Aulacorthum*

92(91) Siphunculi with preapical circumcision; alatae with secondary rhinaria on antennal segment III-V; primary rhinaria ciliated ..................................................................... *Neohyalomyzus*

93(94) Antennal segment I in apterae with inner apices scabrous and strongly angulated inward; abdominal dorsum wrinkled; siphunculi swollen on the inner margin at about its middle..... ................................. *Hyalomyzus*

94(93) Antennal segment III in apterae with inner apices neither scabrous nor angulated as above; abdominal dorsum usually smooth, without post-siphuncular sclerite........................................... 95

95(96) Alatae with secondary rhinaria somewhat protuberant; dorsum of abdomen in apterae completely pale or completely dark ................................................................. *Myzus*

96(95) Alatae with secondary rhinaria not protuberant; dorsum of abdomen in apterae with a broad horseshoe-shaped patch ....................................................................................... *Neomyzus*

**Genus 9. Acutosiphon** Basu, Ghosh and Raychaudhuri


30. *Acutosiphon obliquoris* Basu R.C., Ghosh, A.K. and Raychaudhuri D.N. [Fig. 26]


**Material examined**: Many apterous and alate viviparous females, many alate males and nymphs.

**Host plant and locality**: *Cotula* sp. (Compositae), Cherrapunji, 3.6.1.69.
Biology: Dark brown secimens were collected from undersurface of the leaves.


Remarks: The genus was originally characterised by the presence of 5-segmented antennae but one apterous, all the alate viviparous females and alate males show 6-segmented antennae. The antennae of alate viviparous females are longer than those of the apterae little over 0.5 times as long as the body; III antennal segment of alatae with 27-30, IV with 12-17 and V with 1-4 secondary rhinaria, p.t. 0.8 times to as long as the base of the segment; the shape of the siphunculi is somewhat different in alate viviparous female and in males too where it is heavily warty broadest at base, narrowest at apex and with the pale oblique pore on the outer margin near apex, in alate 0.12 times or little less than 0.12 times as long as body. Wing venation normal. In males, segment III with 35-40, IV with 17-18, V with 8-9 protruding secondary rhinaria, p.t. equal in length to base of the segment, abdominal dorsum-pale, with similar sclorotic pattern as in viviparous, venter spinulose; siphunculi dark brown to almost black, warty, 0.1 times as long as the body. Male genitalia with opercula and penis dark brown.

Genus 10. Acyrthosiphon Mordvilko

1914. Acyrthosiphon Mordvilko, Fauna Russie, 1 : 75.

Type species: Aphis pisi Kaltenbach, 1843 (=Aphis pisum Harris, 1776).

31. Acyrthosiphon pisum (Harris)


Material examined: 12 apterous, viviparous females and 2 nymphs.


Biology: Light green to greenish brown aphids were seen to infest mostly the growing shoots under and upper surfaces of the leaves.

Diagnosis: Apterous viviparous females: Antennae nearly as long as to longer than body, antennal segment 1 bearing 13-22 hairs, segment III bearing 1-4 secondary rhinaria distributed only on basal 0.2 portion; dorsal cephalic hairs 12-25 μ long; u.r.s. 0.6 - 0.7 times as long as h.t. 2; cauda bearing 7-12 hairs.

Distribution: India: Meghalaya (Nongrim Hill, Laban), Arunachal Pradesh, Assam, North West India, Rajasthan, Uttar Pradesh, West Bengal, Tamil Nadu and virtually cosmopolitan.

Genus 11. Akkaia Takahashi


Type species: Akkaia polygoni Takahashi, 1919
GHOSH & BASU: Hemiptera: Aphididae

32. Akkaia bengalensis A.N. Basu


Material examined: Many apterous, alate viviparous females and nymphs.

Host plant: Polygonum spp. (Polygonaceae)

Distribution: India: Meghalaya (Shillong), Assam, Sikkim, Timil Nadu and West Bengal.

Genus 12. Amphorophora Buckton


Type species: Amphorophora ampullata Buckton, 1876.

33. Amphorophora ampullata bengalensis Hille Ris Lambers & Basu [Fig. 27]


Material examined: Many apterae and nymphs.


Biology: Greenish apterae and ash coloured nymphs were collected from the under surface of the leaf.


Genus 13. Anthracesiphoniella A.N. Basu


Type species: Anthracesiphoniella maculatum Basu, 1969.

34. Anthracesiphoniella maculatum A.N. Basu [Fig. 28]


Material examined: Many apperae and nymphs.

Host plant and locality: Asplenium esculentum, Kench's trace, 18.4.76, A.K. Ghosh

Biology: Dark brown apterae infested the under surface of the leaves.

Distribution: India: Meghalaya (Kench's trace), West Bengal.

Remarks: A.N. Basu (1969) erected the genus Anthracesiphoniella which differs from its allied genus Anthracosiphon Hille Ris Lambers in the arrangement of secondary rhinaria on antennal segment III in apterae and their presence also on segment IV in apterae, almost flangeless siphunculi, pale cauda and first trasal chaetotaxy. The present material nearly fits with Basu's description, except spinulosity on the head which is sparse on dorsum but prominent on venter, presence of flange in the siphunculi though not described but evident in his figure and the dusky cauda. Moreover, this genus shows its close relation with the another fern aphid genus Macromyzus Takahashi but differs from it in having secondary rhinaria on III and IV antennal segments.
Genus 14. *Aulacorthum* Mordvilko


Type species: *Aphis solani* Kaltenbach, 1843.

Key to the species of *Aulacorthum*

**Apterae:**

1(2) Dorsum of head without spinules ................................................................. 3
2(1) Dorsum of head usually with spinules ............................................................. 5

3(4) A.s. *III* shorter than p.t. and with one secondary rhinarium near base; siphunculi pale with dusky apices ........................................................................................................... *rhamni*
4(3) A.s. *III* longer than p.t. and with 2-3 secondary rhinaria on basal 0.50 portion; siphunculi brown with dark apices ............................................................................................................... *cornaceae*

5(6) A.s. *III* longer than p.t. .................................................................................... 7
6(5) A.s. *III* usually shorter than or at most as long as p.t. ....................................... 9

7(8) U.r.s. nearly as long as or slightly longer than h.t. 2; antennae and femora more or less uniformly dark ............................................................................................................... *magnoliae*
8(7) U.r.s. much longer than h.t. 2; a.s. *III, IV, V* dark at apex and femora dark on distal 0.5 portion ......................................................................................................................... *dasi*

9(10) Head black; a.s. *III* dark only at apex ............................................................ *nipponicum*
10(9) Head paler; cauda and siphunculi dark ............................................................ 11

11(12) Dorsal abdominal hairs minute at least up to segment 7; u.r.s. about 1.20 x h.t.2; cauda at most upto 0.40 x siphunculi ........................................................................................................... *scirpi*
12(11) Dorsal abdominal hairs long; u.r.s. about 1.12 - 1.19 x h.t.2; cauda about 0.45 - 0.5 x siphunculi ......................................................................................................................... *solani*

**Alatae:**

1(2) Marginal pigmented areas on abdomen with 4-5 quite long hairs at least on segments 1-3, the hairs being about as long as b.d. *III* ............................................................................................................... *dasi*
2(1) Marginal pigmented areas on abdomen with never more than 3 hairs at least on segments 1-3, the hairs are shorter (less than 0.5 x b.d. *III*) ........................................................................................................... 3

3(4) U.r.s. as long as to atmost 1.20 x h.t.2 ................................................................ *solani*
4(3) U.r.s. 1.25 - 1.35 x h.t.2 ..................................................................................... 5

5(6) Longest hair on tergite 8 never less than 0.75 x b.d. *III*; cauda about 0.4 - 0.5 x siphunculi .......................................................... *rhamni*
6(5) Longest hair on tergite 8 about 0.60 x b.d. II; cauda about 0.35 x siphunculi; a.s. *III* with 9-22 secondary rhinaria ................................................................. *nipponicum*
35. *Aulacorthum cornaceae* A.K. Ghosh


*Material examined:* Many apterae and nymphs.

*Host plant and locality:* Unidentified (Cornaceae), Shillong, 7.4.1976.

*Distribution:* India: Meghalaya (Shillong).

36. *Aulacorthum dasi* Ghosh, Basu and Raychaudhuri [Fig. 29, 30]


*Material examined:* 4 apterae, 4 alatae and one nymph.

*Host plant and locality:* Artemisia sp. (Compositae), Cherrapunji, 21.12.1968 and from an unidentified host of Natural order Compositae, Nongrim Hill, 30.12.1968.

*Biology:* Chocolate brown insects infest the undersurface of the leaves.

*Distribution:* India: Meghalaya (Cherrapunji, Nongrim Hill), Assam.

37. *Aulacorthum magnoliae* (Essig and Kuwana)


*Material examined:* 6 apterae, 2 nymphs.


*Biology:* Brownish insects were seen to infest the undersurface of the leaves.

*Distribution:* India: Meghalaya (Nongrim Hill), Assam, West Bengal. Elsewhere: Korea, Japan.

38. *Aulacorthum nipponicum* (Essing and Kuwana)


*Distribution:* India: Meghalaya (Shillong), Sikkim, West Bengal. Elsewhere: China, Japan, Korea, and Taiwan.

39. *Aulacorthum rhamni* Ghosh, Ghosh and Raychaudhuri [Fig. 31]


*Host plant:* An Unidentified plant (Euphorbiaceae)

*Distribution:* India: Meghalaya (Shillong), Sikkim and West Bengal.

40. *Aulacorthum scirpi* van der Goot

Material examined: 5 apterae and 2 nymphs, Shillong 7.4.1976, A.K. Ghosh

Host plant: Scleria cochinensis (Cyperaceae).

Distribution: India: Meghalaya (Shillong), Assam. Elsewhere: Java.

41. Aulacorthum solani (Kaltenbach)

1843. Aphis solani Kaltenbach, Monogr. pflan-lause pfl lduse, 15.


Host plant: Gnaphalium luteoalbum (Compositae).

Distribution: Cosmopolitan.

Genus 15. Brachycaudus van der Goot


Type species: Aphis myosotidis Koch, 1954

Key to the species of Brachycaudus van der Goot

Apterous viviparous female:

1(2) Posterior margin of prosternum without any tubercle; Siphunculi 1.3 to 1.6 times as long as their basal width and 0.05 to 0.06 times as long as the length of body; antennae 0.3 to 0.5 times as long as the body, p.t.2 to 2.75 times as long as the base of segment VI. F.T.C. 3,3,2 ........................................................................................................................... helichrysi

2(1) Posterior margin of prosternum bearing a pair of tubercle; Siphunculi twice as long as their basal width and 0.09 to 0.12 times as long as the length of body; antennae 0.5 to 0.8 times as long as the body, p.t.3 to 4 times as long as the base of segment VI. F.T.C. 3,3,3 ............. persicaecola

Alate viviparous female:

1(2) Siphunculi 0.06 0.08 times as long as body and 1.5 - 1.8 times the basal width; p.t. 2.5 to 3.5 times as long as the base of the segment VI, secondary rhinaria distributed on antennal segment III 12-23 and IV 1-5, cauda broad, thumbshaped and nearly equal to its basal width.................................................................................................................................................. helichrysi

2(1) Siphunculi 0.09 0.12 times as long as body 2 to 2.5 times the basal width; p.t. 3.75 to 5 times as long as the base of segment VI, secondary rhinaria distributed on antennal segment III 22-35, IV 3-12, V 0-1; cauda conical, longer than its basal width.................. persicaecola

42. Brachycaudus helichrysi (Kaltenbach)


Material examined: Numerous apterous and alate viviparous females together with nymphs, single oviparous female and 13 alate males.
Host plant and locality: Insects were collected from 10 different plants distributed over 10 Natural orders during the whole year. Oviparous female from the Prunus sp. (Rosaceae), Shillong, 12.12.1968. Numerous alate viviparous females were collected in Y.P.T. during the period December to February and again in May. Alate males were collected in Y.P.T. during the period from January to February.

Biology: Light green to blackish brown insects were collected from the young growing sheets, inflorescences, under and upper surfaces of the leaves. Sometimes ants were seen in association with the aphid.

Distribution: Cosmopolitan.

Remarks: Earlier only a single alate male was noted at Simla, India (Chowdhuri et al., 1970). Palmer (1952) from U.S.A. has provided illustrations and short descriptions of sexuoles of this species under the name Aphis helichrysi Kaltenbach.


Material examined: 3 apterae, 5 alatae and 1 nymph.

Host plant and locality: Ageratum conyzoides (Compositae), Dhankheti, 30.7.1969.

Biology: Dark brown to black insects infested under surface of the leaves.

Distribution: Cosmopolitan.

Genus 16. Brevicoryne (Linnaeus)


Type species: Aphis brassicae Linnaeus, 1758.


Material examined: Many apterae, alatae and nymphs.

Host plant: Brassica sp. (Cruciferae), Shillong, 7.4.1976, A.K. Ghosh.

Distribution: India: Meghalaya (Shillong), and virtually cosmopolitan.

Remarks: Ghosh, L.K. et al. (1980) have given an account of the species of Brevicoryne van der Goot.

Genus 17. Capitophorus van der Goot


Type species: Aphis carduina Walker, 1850.

Key to the species of Capitophorus van der Goot
Apterous viviparous female:

1(2) Siphunculi distinctly elavate, somewhat imbricated; antenna about equal to the length of body; u.r.s. as long as or slightly longer than the h.t.2............................... \textit{hpppophaes}

a(d) Long hairs on abdominal tergites 6-8 but on other tergites hairs are much smaller.

b(c) Hairs on antennal segment 1 long and capitate......................................................... \textit{Capitophorus hippophaes hippophaes}

c(b) Hairs on antennal segment 1 inconspicuous and inverted bottle-shaped .................... \textit{Capitophorus hippophaes javanicus}

d(a) Hairs on all abdominal tergites nearly of equal lengths ........................................... \textit{Capitophorus hippophaes indicus}

2(1) Siphunculi cylindrical .............................................................................................................. 3

3(4) Hairs on dorsum of abdomen never duplicated, 6 per segment on anterior tergites; siphunculi 2 to 2.8 times the length of cauda......................................................... \textit{Capitophorus carduinus}

4(3) Hairs on dorsum of abdomen duplicated, 14-16 per segment on anterior tergites; siphunculi 3 to 5 times the length of cauda .............................................................................................. 5

5(6) U.r.s. 2.5 to 3 times as long as h.t. 2; siphunculi about 3 times as long as cauda ................ \textit{Capitophorus archangelskii}

6(5) U.r.s. 1.7 to 2 times as long as h.t.2; siphunculi about 5 times as long as cauda .......... \textit{Capitophorus formosartemisiae}

Alate viviparous female:

1(2) Siphunculi distinctly clavate; u.r.s. equal to the length of h.t.2................................. \textit{Capitophorus hippophaes}

a(b) Secondary rhinaria distributed on antennal segment III 10-11 and IV 0-2; siphunculi 1.7 times as long as cauda................................................................. \textit{Capitophorus hippophaes javanicus}

b(a) Secondary rhinaria distributed on antennal segments much more than mentioned above; siphunculi 2.5 to 2.75 times as long as cauda ......................................................... C

c(d) Secondary rhinaria distributed on antennal segment III 26-30, IV 16-20 and V 1-9, antenna about as long as body ................................................................. \textit{Capitophorus hippophaes hippophaes}

d(c) Secondary rhinaria distributed on antennal segment III 46-48, IV 18-25 and V 8-11, antenna always longer than the body ......................................................... \textit{Capitophorus hippophaes indicus}
2(1) Siphunculi cylindrical, u.r.s. 1.7 to 3.1 times as long as h.t. 2

3(4) Siphunculi 4 to 4.5 times the length of cauda; u.r.s. 1.7-2 times as long as h.t. 2

........................................................................................................... *Capitophorus formosartemisiae*

4(3) Siphunculi at most up to 3.5 times the length of cauda; u.r.s. 2.5 to little over 3 times as long as h.t. 2

........................................................................................................... *Capitophorus archangelskii*

45. *Capitophorus archangelskii* Nevsky


*Material examined:* 2 alate, 6 apterous females, along with 2 apterae oviparae.

*Host plant and locality:* Elaeagnus sp. (Elaeagnaceae), Nongrim Hill, 16.1.1969.

*Biology:* Greenish apterae, alatae and nymphs were collected from the under surface of the leaves.

*Distribution:* India: Meghalaya (Nongrim Hill), Assam and West Bengal. Elsewhere: Middle East.

*Remarks:* This is the first report of sexual form for this species from India. Sexual forms were earlier described by Nevsky (1928) from Central Asia.

46. *Capitophorus carduinus* (Walker)


*Material examined:* 19 apterae, 5 nymphs.


*Biology:* Greenish apterae and nymphs were collected from the under surface of the leaves.

*Distribution:* India: Meghalaya (Nongrim Hill), Assam, West Bengal; Elsewhere: Europe.

47. *Capitophorus elaeagni* (del Guercio)


*Host plant:* Cnicus sp. (Compositae).

*Distribution:* India: Meghalaya (Shillong), Sikkim and virtually cosmopolitan.

48. *Capitophorus formosartemisiae* (Takahashi)


*Material examined:* Many apterous, alate viviparous females and nymphs.

*Host plant and locality:* Artemesia sp. and *Artemesia vulgaris* (Compositae) from the different localities of Shillong in the month of January and again during the period May to December.
Biology: Yellowish green apterae, alatae and nymphs were collected from the undersurface of the leaves, surrounding the growing shoot and also from the inflorescence.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Sikkim, Uttar Pradesh and West Bengal. Elsewhere: Bhutan, South East Asian countries.

49. *Capitophorus hippophaes javanicus* Hille Ris Lambers


Host plant: *Polygonum alatum, Polygonum barbatum, Polygonum hydropiper, Polygonum paniculatum, Polygonum spp.* (Polygonaceae).

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Himachal Pradesh, Manipur, Sikkim, Uttar Pradesh, West Bengal; Elsewhere; Australia, China, Europe, Japan, Java, Korea, New Zealand, Pakistan and Taiwan.

* 50. *Capitophorus hippophaes mitegoni* Eastop


Material examined: Nil.

Distribution: India: Meghalaya, Sikkim, West Bengal; Elsewhere Africa and Australia.

51. *Capitophorus indicus* Ghosh and Raychaudhuri


Material examined: 33 apterae, 2 alatae and 6 nymphs.

Host plant and locality: *Polygonum sp.*, *Polygonum chinensis* and *Rumex* sp. of Polygonaceae and a single alate from an improbable host like *Impomoea* sp. (Convolvulaceae) were collected from the different localities of Shillong during the months of January to March and again during August to September.

Biology: Light green apterae, alatae and nymphs were noticed on under surface of the leaves.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Sikkim, Uttar Pradesh, West Bengal.

52. *Capitophorus meghalayensis* Basu and Raychaudhuri


Material examined: 3 apterae, 2 alatae, 3 nymphs and 2 aperous oviparae. 7.4.1976, A.K. Ghosh.

Host plant: *Elaegns* sp. (Elaeagnaceae).

Distribution: India: Meghalaya (Shillong).

* Not included in Key because of nonavailability of material
53. *Capitophorus vernoniae* Ghosh and Raychaudhuri


*Material examined:* 16 apterae and 3 nymphs.


*Biology:* Pale green apterae and nymphs were collected from the under surface of the leaves of host.

*Distribution:* India: Meghalaya (Patharmukhrah, Borapani), West Bengal and Sikkim.

**Genus 18. Cavariella del Guercio**


*Type species:* *Aphis pastinaceae* Linnaeus, 1758

**Key to the species of Cavariella del Guercio**

_Apterous viviparous female:

1(2) Antenna 5-segmented; supracaudal process long, narrow, 1.35 to 1.75 times as long as cauda; siphunculi 7 to 8 times as long as the maximum width on distal half.................. *araliiae*

2(1) Antenna 6-segmented; supracaudal process shorter, not so narrow, never more than 1.3 times as long as cauda; siphunculi 4.2 to 6.5 times as long as the maximum width on distal half.......................................................................................................................... 3

3(4) U.r.s. long, about 1.35 1.55 x h.t.2; p.t. about 1.5 x base of ultimate segment......... *biswasi*

4(3) U.r.s. short, shorter than to at most 1.2 x h.t.2................................................................. 5

5(6) Siphunculi not narrow at base, almost barrel-shaped, p.t. about as long as width of siphunculi at base........................................................................................................... *salicicola*

6(5) Siphunculi narrow at base, distinctly swollen on apical half; p.t. 1.6-2.0 x width of siphunculi at least, cauda with 5 hairs......................................................... *aegopodii*

54. *Cavariella araliiae* Takahashi


*Material examined:* 8 apterae, 4 nymphs.

*Host plant and locality:* *Aralia thomsoni* (Araliaceae), Shillong, 4.8.1969.

*Biology:* Yellowish apterae and pale nymphs were collected from the upper and under surfaces of the leaves.

*Distribution:* India: Meghalaya (Shillong), Assam; Elsewhere: Formosa, Japan.

*Remarks:* Number of caudal hair may be 5 instead of 4 as in Formosan specimens.
55. *Cavariella aegopodii* (Scopoli)


*Host plant*: *Salix babylonica* (Salicaceae)

*Distribution*: India: Meghalaya (Shillong), Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir, Manipur, Uttar Pradesh and West Bengal; Elsewhere: America, Australia, Europe, Japan, Korea, Middle East, New Zealand and Rhodesia.

56. *Cavariella biswasi* Ghosh, Basu and Raychaudhuri [Figs. 33, 34]


*Material examined*: Many apterous and 2 alate viviparous females and nymphs. Laban, 5.7.1966, Kenche's trace, 12.5.1968.

*Host plant*: *Salix babylonica, Salix elegans* (Salicaceae)

*Biology*: Brown apterae, alatae and nymphs were collected from both surfaces of the leaves.

*Distribution*: India: Meghalaya (Laban, Kenche's trace), Assam, West Bengal.

57. *Cavariella salicicola* (Matsumura)


*Host plant*: *Salix* sp. (salicaceae)

*Biology*: Greenish apterae collected from undersurface of the weeds.

*Distribution*: India: Meghalaya (Umpling), Assam, Himachal Pradesh, Manipur, West Bengal; Elsewhere: China, Japan, Korea and Taiwan.

Genus 19. *Chaetomyzus* Ghosh and Raychaudhuri


Type species: *Chaetomyzus rhododendri* Ghosh and Raychaudhuri, 1962

58. *Chaetomyzus rhododendri* Ghosh and Rahchaudhuri [Fig. 35]


Diagnosis: Apterous viviparous female: Body pale, 1.8 to 2.2 mm long with the minimum width 0.9 to 1.1 mm. Head smooth with low median and prominent diverging lateral tubercles, antennae 6 segmented, 0.5 to 0.6 times as long as bdy, apterae without secondary rhinaria, hairs on antennae short, with acute to acuminate apices, about 0.5 times as long as the basal diameter of antennal segment III, p.t. about twice as long as the base of the segment; rostrum long, reaching far beyond hind coxae, u.r.s. 1.4 to 1.6 times as long as h.t.2 and bears 18 to 20 hairs including preapicals. All thoracic tergites and abdominal tergites 1-6 with paired papillate processi arranged spinally and marginally, similar pleural processi also occur on all the above segments except on tergites 5 and 6; spinal processi gradually increase in length; siphunculi pale, about 0.2 times as long as body and 1.6 to 1.7 times as long as cauda, cylindrical upto basal 0.3 portion and then distinctly elevate, smooth excepting apical 0.1 portion where 3-4 spinulose striae present; cauda elongate, constricted at the basal 0.3 portion then appears bulbous at the middle and bears 5 hairs, legs pale, spinulose at apices of tibiae and whole of tarsi.

Measurements of one specimen in mm: Length of body 2.21; width of body 1.04; length of antenna 1.29; length of antennal segments III : IV : V : VI 0.44 : 0.19 : 0.17 (0.12 + 0.25); length of u.r.s. 0.13; length of h.t.2 0.09, length of siphunculus 0.42; length of cauda 0.25.

Material examined: 3 apterae and 2 Nymphs.

Host plant and locality: Rhododendron sp. (Ericaceae), Umpling, 26.7.1969.

Biology: Pale yellowish-green insects infest the under surface of the leave.

Distribution: India: Meghalaya (Umpling) Assam, Uttar Pradesh, Himachal Pradesh, West Bengal.

Genus 20. Coloradoa Wilson


Type species: Aphis rufomaculata Wilson, 1908

59. Coloradoa rufomaculata (Wilson) [Fig. 36]


Diagnosis: Apterous viviparous female: Body about 1-1.5 mm long with the maximum width 0.7-0.8 mm. Head with lateral frontal tubercles; frons convex; antenna 6 segmented, little over half to 0.62 times as long as body, without any secondary rhinaria, hairs inconspicuous. only 4 μ long, p.t. 1.6-1.8 times as long as the base of the segment; rostrum reaches beyond mid coxae, u.r.s. stiletto shaped, 1.2 to 1.25 times as long as h.t.2 Dorsum of abdomen pale, without any selorotic pigmentation and with fan-shaped hairs, these being 15 μ - 20 μ long; siphunculi cylindrical, elevate distally, with a flange where it is little dusky, about 0.12 - 0.14 times as long as body, 1.5 - 1.7 times as long as short tongue -shaped cauda which bears 4-5 hairs.

Measurements of one specimen in mm: Length of body 1.45; width of body 0.77; length of antenna 0.87; length of antennal segment III : IV : V : VI 0.09 : 0.11 : 0.10 : (0.12 + 0.21); length of
u.r.s. 0.10, length of h.t.2 0.08; length of siphunculus 0.88; length of cauda 0.16.

**Material examined**: Many apterous viviparous females and nymphs. Kench's trace, 12 iii.1969.

**Host plant**: Artemisia vulgaris, Artemisia sp. Chrysanthenum sp. (Compositae).

**Distribution**: India: Meghalaya (Shillong), Arunachal Pradesh, Assam, Himachal Pradesh, Maharashtra, Nagaland, Uttar Pradesh and West Bengal; Elsewhere: Virtually cosmopolitan.

**Genus 21. Cryptomyzus** Oestlund


Type species: *Aphis relic* Linnaeus, 1758

60. **Cryptomyzus taoi** Hille Ris Lambers


1986 Cryptomyzus taoi Hille Ris Lambers; Ghosh L.K., Tech. Monogr. 16, Zoological Survey of India: 76.

**Material examined**: Many apterae and nymphs, Shillong, 7.4.1976.

**Host plants**: Leoneurus sibiricus and Leucus aspara (Labiatae)

**Distribution**: India: Meghalaya (Shillong), China, Japan.

**Genus 22. Cryptosiphon** Buckton


Type species: *Cryptosiphon artemisiae* Buckton, 1979

61. **Cryptosiphon artemisiae** Buckton [Fig. 37]


**Diagnosis**: Apterous viviparous female: Body pale, 1.1 to 1.2 mm long with the maximum width 0.58 to 0.60 mm. Head smooth without developed lateral frontal tubercles; antennae 6 segmented, strongly imbricad, very short about 0.6 times as long as body, III antennal segment with 10-12 large round secondary rhinaria distributed irregularly on its entire length, p.t. short, slightly longer than its base; rostrum narrow, reaching beyond forecoxae, u.r.s. nearly equal in length to h.r.2. Dorsum of abdomen pale, with faint scattered sclerites, hairs with acuminate apices 30 μ, 50 μ long; siphunculi minute shorter than its basal width; cauda semioval with 4 hairs. Wing veins dusky, forewing with media once or twice branched, hind wing with both media and cubitus. F.T.C. 3,3,3.

**Measurements of one specimen in mm**: Length of body 1.10; width of body 0.58; length of antenna 0.69; length of antennal segments III : IV : V : VI 0.22 : 0.08 : 0.08 : (0.08 + 0.11); length of u.r.s. 0.08; length of h.t.2 0.08.

**Material examined**: 2 alatae in Y.P.T.

**Host plant and locality**: Artemisia vulgaris (Compositae), Kench's trace, Shillong, 9.6.1970, C.U. coll.

**Distribution**: India: Meghalaya (Shillong), Arunachal Pradesh, Sikkim and West Bengal; Elsewhere: China, Europe, Japan, Korea and Taiwan.
GHOSH & BASU: *Hemiptera: Aphididae*

Genus 23. *Dactynotus* Rafinesque


Type species: *Aphis hieraciurn paniculatum* Rafinesque

Key to the subgenera of *Dactynotus* Rafinesque

1(2) Cauda pale ................................................................. *Dactynotus*

2(1) Cauda dark ........................................................................ *Uromelan*

Key to the species subspecies of *Dactynotus* Rafinesque

Apterous viviparous female:

1(2) U.r.s. about 0.8 times as long as h.t.2; siphunculi not less than 0.3 times as long as body, about 1.8 to at most twice as long as cauda which bears 20-24 hairs ..............................................

.................................................................................................................. *Dactynotus sonchi* (Linnaeus)

2(1) U.r.s. 1.4 to 1.5 times as long as h.t.2; siphunculi less than 0.25 to 3 times as long as cauda which bears 5-6 hairs .............................................. *Dactynotus tanaceti indica* (Linnaeus)

62. *Dactynotus sonchi* (Linnaeus)


*Material examined:* 2 apterae.

*Host plant and locality:* Gynura sp. (Compositae), Round Road, 30.6.1969.

*Biology:* Chocolate brown insects infested the undersurface of the leaves.

*Distribution:* India: Meghalaya (Shillong), widely distributed in India; Africa, Australia, Egypt, Europe and South America.

63. *Dactynotus tanaceti indica* L.K. Ghosh


*Material examined:* 4 apterae, 5 alatae and 1 nymph.

*Host plant and locality:* Artemisia sp. (Compositae), Umpling, 23.6.1969; vagrant alate on Cynoglossum sp. (Boraginaceae), Umpling, 13.6.1969.

*Biology:* Greenish brown insects infest both the surfaces of the leaves and growing sheet.

*Distribution:* India: Meghalaya (Umpling), Assam; Elsewhere: Africa, Europe.

64. *Dactynotus (Uromelan) compositae* (Theobald)


Material examined: Many apterous and alate viviparous females and nymphs, Shillong, 7.4.1976, A.K. Ghosh.

Host plant: *Veronia roxburgii* (Compositae)

Distribution: India: Meghalaya (Shillong), South India, West Bengal; Elsewhere: Africa, Moritius and Taiwan.

Genus 24. *Diphorodon* Börner


Type species: *Phorodon cannabis* Passerini, 1860.

65. *Diphorodon cannabis* (Börner)


Host plant: *Cannabis sativa* (Moraceae)

Distribution: India: Meghalaya (Shillong), Himachal Pradesh, Kashmir, Manipur, Nagaland, South India, West Bengal; Elsewhere: Europe, Japan, Pakistan.

Genus 25. *Dysaphis* Börner


Type species: *Aphis angelicae* Koch, 1854

66. *Dysaphis pyri* (Boyer de Fonscolombe)


Distribution: India: Meghalaya (Khasi Hills); Elsewhere: Asia, Europe.

Genus 26. *Hayhurstia* del Guercio


Type species: *Hayhurstia deformans* del Guercio, 1917 (=*Aphis atriplicis* Linnaeus, 1761)

67. *Hayhurstia atriplicis* (Linnaeus)


Material examined: Many apterous and alate viviparous females and nymphs, Shillong, 7.4.1976, A.K. Ghosh.

Host plant: *Chenopodium album* (Chenopodiaceae)
**Distribution**: India: Meghalaya (Shillong) Arunachal Pradesh, Himachal Pradesh, South India, Uttar Pradesh and West Bengal; Elsewhere: China, Europe, Japan, Korea, Middle East, North America and Taiwan.

Genus 27. *Hyadaphis* Kirkaldy


Type species: *Aphis xylostie* Schrank, 1801 (= *Siphocoryne foeniculi* Passerini, 1960)

68. *Hyadaphis coriandri* (Das)


**Material examined**: 22 alatae


**Biology**: Brown alatae could be collected from the inflorescence of the host.

**Distribution**: India: Meghalaya (Shillong), Bihar, Himachal Pradesh, Manipur, Sikkim, South India, Uttar Pradesh, West Bengal; Elsewhere: Egypt, Nigeria, Pakistan and South Africa.

Genus 28. *Hyperomyzus* Börner


Type species: *Aphis lactucae* Linnaeus, 1758.

69. *Hyperomyzus carduellinus* (Theobald)


**Material examined**: Many apterous and alate viviparous females and nymphs.

**Host plant and locality**: *Gynura* sp. (Compositae), Laban, 4.7.1969. *Hypochoeris radieata* (Compositae), Laitumkhrah, 27.3.1969; *Sonchus* sp. (Compositae), Borapani, 30.4.1969 and Jowai 28.7.1969.

**Biology**: Light green to brown forms were seen to infest both the surfaces of the leaves, growing shoots and inflorescence.

**Distribution**: India: Meghalaya (Laban, Barapani, Laitumkhrah), Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, Nagaland, Sikkim, South India, Uttar Pradesh and West Bengal; Elsewhere: Africa, Australia, Fiji, Indonesia, Java, Nepal, New Zealand, Taiwan and Uganda.

Genus 29. *Indumasonaphis*, Ghosh, Basu and Raychaudhuri

1980. *Indumasonaphis* Ghosh et al., In Taxonomy of the Aphids of the North-East India and Bhutan: 152.

Type species: *Masonaphis (Neomasonaphis) inulae* Ghosh and Raychaudhuri, 1972.
70. *Indumasonaphis inulae* Ghosh and Raychaudhuri


*Material examined* : 8 apterae, 1 alate and 1 Nymph, Shillong.

*Host plant* : *Inula cappa* (Compositae) and *Rhododendron* sp. (Ericaceae).

*Distribution* : India : Meghalaya (Shillong).

Genus 30. *Liosomaphis* Walker


*Type species* : *Aphis berberidis* Kaltenbach, 1843

71. *Liosomaphis himalayensis* Basu


*Material examined* : Many apterous and alate viviparous females and nymphs, Shillong, 17.4.1076, A.K. Ghosh.

*Host plant* : *Berberis* spp. (Berberidaceae).

*Distribution* : India : Meghalaya (Shillong), Himachal Pradesh, Uttar Pradesh and West Bengal; Elsewhere : Nepal.

Genus 31. *Liphphis* Mordvilko


*Type species* : *Lipa Aphis erysimi* Kaltenbach

72. *Liphphis erysimi* (Kaltenbach)


*Material examined* : Numerous apterous and alate viviparous females and nymphs and one apterous oviparous female.

*Host plant and locality* : Different species of *Brassica* (Cruciferae); *Rhapanus sativus* (Cruciferae) in different localities of survey mainly during winter; one vagrant alate from *Goodyere procere* (Orchidaceae), Botanical Survey of India, 3.12.1969, and in Y.P.T. during the months of January to March; and ovipara from a plant of Cruciferae, Cherrapunji, 20.12.1968.

*Biology* : Blackish brown insects infest both surfaces of the leaves, growing shoots and inflorescences.
**GHOSH & BASU : Hemiptera : Aphididae**

**Distribution** : India : Meghalaya (Cherrapunji, Botanical garden, Shillong), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Nagaland, Rajasthan, Sikkim, South India, Tripura, Uttar Pradesh and West Bengal; Elsewhere : Bhutan, Nepal and virtually cosmopolitan.

**Remarks** : Although this species is very common on Cruciferae in Shillong, no sexual form was so far known from there, Oviparae (Phalak, 1968) and alate males (Verma and Mathur, 1966) have been reported from Kalimpong (Darjeeling district of West Bengal) and Kashmir respectively.

**Genus 32. Macromyzus Takahashi**


Type species : *Myzus woodwardiae Takahashi, 1921*

**73. Macromyzus (Macromyzus) woodwardiae Takahashi**


**Material examined** : Many apterous and alate viviparous females and nymphs, Shillong, 17.4.1976. A.K. Ghosh.

**Host plants** : Asplenium odientum, Asplenium auriculatum, Asplenium esculentum (Aspleniaceae); Cheileanthus variegans, Dicheria alata, Nephrodium moli and Polypodium sp. (Polypodiaceae).

**Distribution** : India : Meghalaya (Shillong), Arunachal Pradesh, Sikkim and West Bengal; Elsewhere : Japan, Nepal, Taiwan.

**Genus 33. Macrosiphoniella del Guercio**


Type species : *Siphonophora aíra Ferrari, 1872.*

**Key to species of the genus Macrosiphoniella**

1(2) Hind tibiae with a row of thick spines besides normal hairs on anterior margin...........................

.................................................................................................................. *spinepes*

2(1) Hind tibiae without such spines ................................................................................................. 3

3(4) Both ante- and post siphuncular sclerites developed ............................................................ *matsumurana*

4(3) Post siphuncular sclerites absent ............................................................................................. 5

5(6) Siphunculi as long as or longer than cauda and reticulated at almost on apical half ..............

.................................................................................................................. *formosartemisiae*

6(5) Siphunculi always shorter than cauda and reticulated area extends beyond apical half ........ 7

7(8) Antesiphuncular sclerite well developed; dorsal abdominal hairs usually on sclerotic bases..

.................................................................................................................. *sanborni*
8(7) Antesiphuncular sclerite not developed as above; dorsal abdominal hairs usually not on sclerotic bases ........................................................................................................ 9

9(10) Flagellum entirely black, femora pale at the very base, rest dark brown; tibiae also entirely black .................................................................................................................................. yomogifoliae

10(9) Flagellum not black as above; tibiae brown at base and apex but pale at middle ................................................................. pseudoartemisiae

74. Macrosiphoniella formosartemisiae Takahashi

1921. Macrosiphoniella formosartemisiae Takahashi, Aphididae of Formosa, 1:15.

*Material examined:* 4 apterae, 1 nymph.

*Host plant and locality:* Artemisia sp. (Compositae), Kench’s trace, 17.8.1969, Fragaria sp. (Rosaceae), Sweet falls, 23.3.1969.

*Biology:* Dark brownish insects were collected from the under surface of the leaves and the growing shoots.

*Distribution:* India: Meghalaya (Kench’s trace), Assam, West Bengal; Elsewhere: Formosa.

75. Macrosiphoniella matsumurana Ghosh, Basu and Raychaudhuri [Fig. 38]


*Material examined:* 9 apterae.

*Host plant and locality:* Artemisia vulgaris (Compositae), Kench’s trace, 11.1.1969.

*Biology:* Brownish specimens infest both the surfaces of the leaves and the growing shoots.

*Distribution:* India: Meghalaya (Kench’s trace)

76. Macrosiphoniella pseudoartemisiae Shinji


*Material examined:* Many apterous viviparous females and nymphs.

*Host plant and locality:* Artemisia spp. (Compositae), Kench’s trace, 7.4.1976.

*Distribution:* India: Meghalaya (Kench's trace), Sikkim, South India, Uttar Pradesh and West Bengal; Elsewhere: Bhutan, China, Japan, Korea.

77. Macrosiphoniella sanborni (Gillette)

1976. Macrosiphoniella sanborni (Gillette); Basu, R.C. and Raychaudhuri, D.N., Orient. Insects, 10(2): 305.

*Material examined:* Numerous apterae, alatae and nymphs.

Biology: Brownish specimens infest most of the aerial parts of a host plant.

Distribution: India: Meghalaya (all other districts) and all over India; Cosmopolitan.

78. *Macrosiphoniella spinipes* Basu


Material examined: Four apterae and nymphs.

Host plant and locality: *Artemesia* spp. (Compositae), Shillong, 7.4.1972, A.K. Ghosh.

Distribution: India: Meghalaya (Shillong), Sikkim and West Bengal.


79. *Macrosiphoniella yomogifoliae* (Shinji)


Material examined: 4 apterae and 1 nymph.


Biology: Brownish green insects infest the tender shoots and under surface of the leaves.

Distribution: India: Meghalaya (S.E. Falls), Arunachal Pradesh, Himachal Pradesh, Sikkim, South India, Uttar Pradesh, West Bengal; Elsewhere: China, Japan, Korea, Malaysia and Taiwan.

Genus 34. *Macrosiphum* Passerini


Type species: *Aphis rosae* Linnaeus, 1758.

Key to the subgenera of the genus *Macrosiphum* Passerini

1(2) First tarsal segment with 4,4,4 hairs ................................................................. *Neomacrosiphum*

2(1) First tarsal segment with 3,3,3 hairs ....................................................................................... 3

3(4) Longest hair on segment III never less than 0.50 times as long as diameter of the segment....

................................................................. *Sitobion*

4(3) Longest hair on segment III never less than 0.75 times as long as but may be longer than basal diameter of the segment................................................................. *Macrosiphum* s.s.

Key to the species of *Macrosiphum* Passerini
Apterous viviparous female:

1(10) Longest hair on antennal segment III about 0.6 times as long as the basal diameter of the segment; 1st instar nymphs with four caudal hairs........................................... Macrosiphum S. S.

2(3) Hind tibiae with spines besides normal hairs................................................................. 4

3(2) Hind tibiae with normal hairs......................................................................................... 8

4(5) Antennae, siphunculi and cauda dark; 7th and 8th abdominal sternites with spinulose striations. Infest Compositae................................................................. Macrosiphum spinepes spinepes

5(4) Antennae, siphunculi, cauda paler; venter of abdomen evenly and distinctly spinulose...........

6(7) Cauda with more hairs (20-23) ................................................................. Macrosiphum spinipes rhododendri

7(6) Cauda with less hairs ............................................................................................. Sipnotif!pium

8(9) III antennal segment with 1-3 secondary rhinaria; siphunculi dark in comparison to the pale body; cauda pale; u.r.s. about 0.6 - at most 0.8 times as long as h.t.2................................. Macrosiphum pachysiphon

9(8) III antennal segment with 9-13 secondary rhinaria distributed on basal half; siphunculi brownish on basal half and at the very apex, rest paler; cauda dusky; u.r.s. never less than 0.9 times as long as to longer than h.t.2........................................... Macrosiphum rosae

10(1) Longest hair on antennal segment III at most 0.6 times as long as the basal diameter of the segment; 1st instar nymphs with 2 caudal hairs.......................................... Subgenus Sitobion

11(14) U.r.s. distinctly longer than h.t.2................................................................................. 12

12(13) Venter of the head spinulose; flagellum; (excepting the apices of segments III,IV,V and p.t. which are dusky) pale, segment III with 4-8 secondary rhinaria; dorsum of abdomen pale..... Macrosiphum (Sitobion) ploctranthi

13(12) Venter of head smooth; flagellum nearly black with the very base of segment III dusky; segment III with 1-2 secondary rhinaria near base; dorsum of abdomen with an irregular brownish patch medially extending from abdominal segment 1-5........................................ Macrosiphum (Sitobion) luteum

14(11) U.r.s. distinctly shorter than or at most equal to h.t.2......................................................... 15

15(16) Head smooth; III antennal segment with 2-4 secondary rhinaria near base; p.t. 5.5 - 6 times as long as base of the segment; u.r.s. bears shaped; dorsum of abdomen dusky; antesi-siphuncular sclerite present................................................................. Macrosiphum (Sitobion) smilacifoliae

16(15) Head with granules on the dorsum.............................................................................. 17
17(18) U.r.s. never less than 1.5 and may be up to 1.8 times as long as its basal width; p.t. slightly longer than the width of head including the outer margin of the eyes; antennal segment III with 1-3 secondary rhinaria near base, p.t. about 4-5 times as long as the base of segment VI. ........................................................... *Macrosiphum* (Sitobion) africanum

18(17) U.r.s. at most up to 1.3 times as long as its basal width.......................................................... 19

19(20) Head and body pale with scattered brownish muskel pattern like structure on the abdomen; flagellum pale with apices of segments III, IV, V and whole of VI brownish, segment III with 3-6 secondary rhinaria near base, p.t. 5 to 6 times as long as the of segment VI; siphunculi dark, little less than to little over twice as long as pale cauda. Infest Rosaceae.....

......................................................

.................................. *Macrosiphum* (Sitobion) rosaeformis

20(19) Head darker with apices of femora and tibiae blackish brown or black; abdomen with broken brownish to blackish brown sclerites on dorsum, or these may sometimes fuse to form a solid patch........................................................................................................................................ 21

21(22) Antennae much longer than the body, p.t. 6 to 7.5 times as long as the base of segment VI; dorsum of abdomen with a dark almost continuous patch extending from segments 2-6; cauda dark ....................................................

...................... *Macrosiphum* (Sitobion) miscanthis

22(21) Antennae shorter than to at most equal to the length of body; p.t. 4-5.2 times as long as the base of segment VI; dorsum of abdomen with brownish patch medially and scattered patches marginally, cauda rather pale..............................................................................................

......................................................

.......................................... *Macrosiphum* (Sitobion) avanae

*Alate viviparous female :*

1(6) Antennal hairs always more than 0.6 times as long as to as long as the basal diameter of III antennal segment; 1st instar nymphs with 4 caudal hairs.................................................................

............................................................................................................ *Macrosiphum* S.S.

2(5) Hind tibiae only with normal hairs ......................................................................................... 3

3(4) III antennal segment with 47-35 secondary rhinaria on about basal 0.8 portion; flagellum (excepting the segment III which is partly darker) pale brownish; u.r.s. as long as to slightly longer than h.t.2............................................................ *Macrosiphum* rosae

4(3) III antennal segment with 16-22 secondary rhinaria distributed on its entire length, flagellum dark brown; u.r.s. 0.6-0.7 times as long as h.t.2; body rather pale with scattered sclerites; siphunculi dark................................................................. *Macrosiphum* pachysiphon

5(2) Hind tibiae with spines distributed all throughout its length besides normal hairs; antennae blackish brown on III and IV segments, rest brownish; III antennal segment with 46-64 secondary rhinaria distributed irregularly over its entire length; u.r.s. stout and rather long, about 1.5-1.6 times as long as h.t.2........................................................................

.................................................................................................

*Macrosiphum* spinipes spinipes
6(1) Antennal hairs short, less than 0.5 to at most 0.6 times the basal diameter of III antennal segment; 1st instar nymphs with 2 caudal hairs. Subgenus *Sitobion*

7(10) U.r.s. as long as or longer than h.t.2. ................................................................. 8

8(9) Antennal segment III longer than p.t. and with 15-25 secondary rhinaria distributed over the entire length; 8th abdominal tergites with 6 hairs. ................................................................. Macrosiphum (Sitobion) roaeformis

9(8) Antennal segment III shorter than p.t. and with 14-15 secondary rhinaria; 8th abdominal tergites with 4 hairs. ................................................................. Macrosiphum (Sitobion) luteum

10(7) U.r.s. distinctly shorter than h.t.2 ................................................................. 11

11(12) Post-siphuncular sclerite absent; antennal segment 1 with 8 hairs, III antennal segment much shorter than p.t. and with 8-11 secondary rhinaria. ................................................................. Macrosiphum (Sitobion) avenae

12(11) Post-siphuncular sclerite present; antennal segment 1 with 5-6 hairs ................................................................. 13

13(14) Siphunculi about 11-12 times as long as its minimum width, about 5 times as long as h.t.2 and about 6.5 times as long as u.r.s.; cauda with 8-9 hairs; antennal segment 1 with 5 and II with 3 hairs; III antennal segment with 10-13 secondary rhinaria. ................................................................. Macrosiphum (Sitobion) smilacifoliae

14(13) Siphunculi about 9 times as long as its minimum width, about 4 times as long as h.t.2 and about 4-5 times as long as u.r.s.; cauda with 7-8 hairs; antennal segment I with 6 and II with 4 hairs, III antennal segment with 8-9 secondary rhinaria. ................................................................. Macrosiphum (Sitobion) miscanthi

80. *Macrosiphum (Macrosiphum) aulacorthoides* David, Narayanan and Rajasingh


*Host plant*: Rubus sp. (Rosaceae).

*Distribution*: India : Meghalaya (Kench's trace), Arunachal Pradesh, Himachal Pradesh, Sikkim and West Bengal.

81. *Macrosiphum (Macrosiphum) pachysiphon* Hille Ris Lambers


Material examined: Several apterae, alate and nymphs.


Biology: Pinkish to brownish specimens with black siphunculi infest both the surfaces of the leaves, growing shoots, buds and flowers.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Sikkim, Uttar Pradesh, West Bengal. Elsewhere: Pakistan.

82. Macrosiphum (Macrosiphum) rosae (Linnaeus)


Material examined: 8 apterae, 4 alatae.

Host plant and locality: Rosa sp. (Rosaceae), Laitumkhrah, 10.3.1969.

Biology: Light brownish insects were seen to infest the leaves, the young shoots and the buds.

Distribution: India: Meghalaya (Laitumkhrah), Manipur, Sikkim, South India, Uttar Pradesh and West Bengal. Elsewhere: Virtually cosmopolitan.

83. Macrosiphum spinipes spinipes (Basu [Fig. 41]


Material examined: 10 apterae, 2 alatae and 2 nymphs.


Biology: Brownish green insects with black siphunculi and dusky cauda infest the growing shoots, under the upper surfaces of the leaves.

Distribution: India: Meghalaya (Charrapunji, Happy Valley), Assam, West Bengal.

Remarks: The species was described by Basu A.N. (1967) as Macrosiphoniella spinipes. However, the species differs from typical Macrosiphoniella in the absence of hair bearing sclerites and in the shape of ultimate rostral segment which is not stiletto-shaped. Further, the cauda of new born nymphs of the species shows 4 hairs and all these characters prompt transference of this species to Macrosiphum S.S. from Macrosiphoniella.

84. Macrosiphum spinipes rhododendri (Ghosh, Basu and Raychaudhuri)


Material examined: 2 apterae and 4 nymphs.

Host plant and locality: Rhododendron arboreum (Ericaceae), Kench's trace, 11.7.1966.
**Biology**: Light brown specimens were collected from the under surface of the leaves.

**Distribution**: India: Meghalaya (Kench's trace), Assam, West Bengal.

**85. Macrosiphum (Macrosiphum) spinotibium** Ghosh, Ghosh and Raychaudhuri.


**Material examined**: Many apterous and alate viviparous females and nymphs, Shillong, 7.4.1976, A.K. Ghosh.

**Host plants**: *Artemesia* spp. and other identified plants (Compositae).

**Distribution**: India: Meghalaya (Shillong), Arunachal Pradesh, Manipur, Sikkim and West Bengal.

**Remarks**: Ghosh A.K., Banerjee and Raychaudhuri D.N. (1971) reported the oviparae from Arunachal Pradesh.

**86. Macrosiphum (Sitobion) africanum** Hille Ris Lambers


**Material examined**: 3 apterae and 5 nymphs.

**Host plant and locality**: *Poa* sp. (Gramineae), Motinagar, 26.2.1969, Pathonnukhrah, 25.9.1969.

**Biology**: Brownish forms infest the under and upper surfaces of the leaves, growing shoots and the basal portion of the stem of the host plants.

**Distribution**: India: Meghalaya (Motinagar), Assam, South India, West Bengal. Elsewhere: East Africa.

**87. Macrosiphum (Sitobion) avenae** (Fabricius)


**Material examined**: 8 apterae, 7 alatae and 2 nymphs.

**Host plant and locality**: *Allium ascalonicum* (Liliaceae), Patharmukhrah, 3.3.1969; *Brassica oleracea* (Cruciferae), Patharmukhrah, 25.3.1969; *Paspalum dilatum* (Gramineae), Patharmukhrah, 25.9.1969; *Poa* sp. (Gramineae), Nongrim Hill, 5.3.1969, 28.5.1969; *Solanum tuberosum* (Solanaceae), Patharmukhrah, 3.3.1969; *Spinacea eleracea* (Chenopodiaceae), Nongrim Hill, 17.12.1968; *Stellaria media* (Caryophyllaceae), Laitumkhrah, 11.3.1968 and Y.P.T. 3.3.1969.

All alatae excepting these on the host plants like *Poa* sp., *Paspalum dilatum* and *Stellaria media* may be vagrant ones.

**Biology**: Brownish insects were seen not only on the under and upper surfaces of the leaves but also surrounding the apical and basal portions of the shoot.
Distribution: India: Meghalaya (Widely distributed); Elsewhere: Formosa, Japan, Java, Africa, Australia, Europe, America.

88. Macrosiphum (Sitobion) fagopyri Ghosh and Raychaudhuri


Material examined: Many apterous viviparous females and nymphs.

Host plant and locality: *Fagopyrum* sp., *Fagopyrum cymosum* (Polygonaceae), Shillong, 7.4.1976, A.K. Ghosh

Distribution: India: Meghalaya (Shillong), West Bengal.

89. Macrosiphum (Sitobion) ibarae Matsumura


Material examined: Nil

Host plant: *Cymbidium* sp.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Sikkim and West Bengal.

90. Macrosiphum (Sitobion) indicum (Basu)


Host plant: *Cymbidium* sp.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Sikkim and West Bengal.

91. Macrosiphum (Sitobion) luteum (Buckton)


Material examined: Numerous apterae and alatae.

Host plant and locality: *Calantho masuca*, *Cymbidium monronianum*, *Dendrobium longicorum*, *Eria lambusifolia*, *Otochilus porrecta* of the Natural order Orchidaceae, Botanical Survey of India, 23.12.1968.

Biology: Yellowish green insects infest the upper and under surfaces of the leaves, growing shoot and also the inflorescence.

Distribution: India: Meghalaya (Shillong), Assam, West Bengal. Elsewhere: America, Australia, Europe.
92. Macrocephalum (Sitobion) mimosae Ghosh, Basu and Raychaudhuri


Material examined: 1 apterous viviparous female and one nymph.

Host plant and locality: Mimosa pudica (Mimosae), Shillong. 17.4.1976, A.K. Ghosh.

Distribution: India: Meghalaya (Shillong), West Bengal.

93. Macrocephalum (Sitobion) miscanthi (Takahashi)


Material examined: 4 apterae, 2 alatae and 2 nymphs.

Host plant and locality: Cyperus rotundus (Cyperaceae), Beadon Falls, 7.8.1979; Poa sp. (Gramineae), Beadon Falls, 7.8.1969; Saroanthus pallidus (Orchidaceae), New colony, 17.7.1965.

Biology: Brown to blackish brown insects infest the leaves, both growing and basal portions of the shoots.


94. Macrocephalum (Sitobion) plectranthi Ghosh, Ghosh and Raychaudhuri [Fig. 39]


Material examined: 3 apterae and 1 nymph.

Host plant and locality: Perilla sp. (Labiatae), Motinagar, 6.6.1969.

Biology: Light brown apterae were seen on the under surface of the leaves and surrounding the inflorescence.

Distribution: India: Meghalaya (Motinagar) Assam, West Bengal.

95. Macrocephalum (Sitobion) resaeformis (Das) [Fig. 40]


Material examined: Many apterous and alate viviparous females and nymphs.

Host plant and locality: Rosa cania, Rosa macrophylla, Rosa moschata, and Spiraea corymbosa (Rosaceae), Shillong, 17.4.1976, A.K. Ghosh.
Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Assam, Bihar, Manipur, Nagaland, Sikkim, South India, Uttar Pradesh, West Bengal. Elsewhere: Nepal; Pakistan.

96. *Macrosiphum (Sitobion) sikkimensis* Ghosh and Raychaudhuri


Material examined: Nil

Host plant: *Smilax* sp. (Liliaceae).

Distribution: India: Meghalaya (Shillong), Sikkim and West Bengal.

97. *Macrosiphum (Sitobion) smilacifoliae* (Takahashi)


Material examined: 3 apterae, 4 alatae and 1 nymph.


Biology: Brown to chocolate brown specimens were seen to infest the under surface of the leaves of the host plant.

Distribution: India: Meghalaya (Shillong), Assam, West Bengal. Elsewhere: Formosa, Japan.

Remarks: This species is very closely related to *Macrosiphum (Sitobion) avenae* (Shinji) which is in the opinion of Takahashi (1964) is perhaps *miscanthi* Takahashi.

98. *Macrosiphum (Sitobion) Takahashii* Eastop


Host plant: Unidentified.

Distribution: India: Meghalaya (Mawphlang), Sikkim, South India, West Bengal. Elsewhere: Africa, Japan and Taiwan.

Genus 35. *Matsumuraja* Schumacher


99. *Matsumuraja capitophoroides* Hille Ris Lambers [Fig. 42]


Material examined: Numerous apterae and nymphs.

**Biology**: Pale Yellowish insects were collected from under and upper surfaces of the leaves, growing shoots and inflorescence.

**Distribution**: India: Meghalaya (Shillong), Assam, Uttar Pradesh, Himachal Pradesh, West Bengal. Elsewhere: West Pakistan.

Genus 36. **Metaphorodon** Takahashi


100. *Metaphorodon polygoni* (van der Goot) [Fig. 43]


**Material examined**: 6 apterae, 3 alatae and 2 nymphs.


**Biology**: Brownish insects infest both the surfaces of the leaves and soft growing shoots.

**Distribution**: India: Meghalaya (Umling, Cherrapunji, Dhankheti, Laban, Shillong), Sikkim, West Bengal. Elsewhere: Japan; Java.

Genus 37. **Metopolophium** Mordvilko


**Type species**: *Aphis dihorda* Walker, 1848.

101. *Metopolophium (Metopolophium) euryae* (Takahashi)


**Material examined**: 2 apterae.

**Host plant and locality**: *Eurya japonica* (Ternstroemiaceae), Mawphlang, 4.ix.1972, A.K. Ghosh

**Distribution**: India: Meghalaya (Mawphlang). Elsewhere: Taiwan.

**Remarks**: This species was recorded for the first time from India by Ghosh, A.K. (1974). He discussed about its affinity with Japanese material.

Genus 38. **Micromyzodium** David


**Type species**: *Micromyzodium filiciwm* David, 1958.
102. *Micromyzodium filicium* David


*Material examined*: 4 apterae


*Biology*: Brownish to black aphids were collected from the undersurface of leaves of the host plants.

*Distribution*: India: Meghalaya (Shillong), Himachal Pradesh, Uttar Pradesh and South India.

Genus 39. *Micromyzus* van der Goot


*Type species*: *Micromyzus nigrum* van der Goot, 1917.

103. *Micromyzus kalimpongensis* Basu [Fig. 44]


*Material examined*: 4 apterae and 2 nymphs

*Host plant and locality*: *Curcuma longa* (Zingiberaceae), Silvicultural Garden, 3.1.1969.

*Biology*: Brownish insects infest the undersurface of the leaves.

*Distribution*: India: Meghalaya (Shillong), West Bengal.

104. *Micromyzus mawphlangensis* Ghosh


*Material examined*: 2 alatae and nymphs.


*Biological notes*: The species was collected in a colony from young shoot of host plant in Mawphlang forest.

*Distribution*: India: Meghalaya (Mawphlang, Khasi Hills).


*Morphological Characters*: *Apterous oviparous female*: Body about 1.5 1.65 mm long, with about 0.8 0.92 mm as maximum width, pale but head, antennae, legs, siphunculi and cauda are brown. Head spinulose with somewhat parallel lateral frontal tubercles; flagellum distinctly imbricated, segment III nearly equal to the length of segments IV and V taken together, rest broken; rostrum reaching hind coxae, u.r.s. about 1.5 times as long as h.t.2., dorsum of abdomen pale, with very short hairs which are about 15 μ 18 μ long; siphunculi cylindrical, weakly clavate, about 0.17 times as long as body; cauda about 0.6 times as long as siphunculi, with somewhat bulbous base and narrowed apex, bears 6-8 hairs. Hind tibiae swollen and bears 40-45 psudesensoria, F.T.C. 3.3.2.
Measurements of one specimen in mm: Length of body 1.65; width of body 0.92; length of antennal segments III : IV : V 0.30 : 0.17 : 0.14; length of u.r.s. 0.11; length of h.t.2 0.07; length of siphunculus 0.27; length of cauda 0.17.

Material examined: 2 apterous oviparous females.


Biology: Greenish brown insects were seen on undersurface of the leaf.

Remarks: Scanty material and lack of viviparae made specific identification difficult and only a short description of the oviparous morph is given.

Genus 40. *Myzus* Passerini


Type species: *Aphis cerasi* Fabricius, 1775.

Key to the species of *Myzus* Passerini

1(2) U.r.s. short with obtuse apex, shorter than ht$_2$ .................................................. *obtusirostris*

2(1) U.r.s. long, about as long as to 1.5 times as long as ht$_2$ ........................................... 3

3(4) Tergite 7 slightly and subgenital plate strongly produced posteriorly, the letter nearly triangular ................................................................. *siegesbeckicola*

4(3) Tergite 7 and subgenital plate normal hairs on abdominal dorsum short with myzine type of apices ................................................................. 5

5(6) Siphunculi very short, never exceeding 0.06-0.08 times as long as body and slightly shorter to just longer than cauda ..................................................... *brevisiphon*

6(5) Siphunculi never less than 0.10 times as long as body and at least 1.5 times as long as cauda ................................................................. 7

7(8) Siphunculi strongly clavate ................................................................. 9

8(7) Siphunculi usually cylindrical or very weakly swollen on inner margin just before apical flange ................................................................. 13

9(10) Distance between 6th and 7th spiracles distinctly longer than that between 5th and 6th... ................................................................. *persicae*

10(9) Distance between 6th and 7th spiracles distinctly shorter than that between 5th and 6th... ................................................................. 11

11(12) 8th abdominal tergite with 2 hairs; antennae shorter than to about as long as body... ................................................................. *cymballariellus*

12(11) 8th abdominal tergite with 4 hairs; antennae always longer than body................................................................. *ascalonicus*

13(14) Siphunculi as long as or longer than width of head across outer margin of eyes; siphunculi bent outward at apex ................................................................. *dycei*
14(13) Siphunculi distinctly shorter than width of head across outer margin of eyes...................... 15
15(16) Dorsum of head uniformly spinulose or warty .................................................................. 17
16(15) Dorsum of head not uniformly spinulose or warty ............................................................... 19
17(18) P.t. longer than a.s. III and siphunculi; siphunculi with normal imbrications.............. manoji
18(17) P.t. shorter than a.s. III and siphunculi; siphunculi with strong imbrications............... cerasi
19(20) Dorsum of abdomen pale but usually with segmentally arranged dark patches; u.r.s. usually as long as ht$_2$................................................................. ornatus
20(19) Dorsum of abdomen not as above; u.r.s. never less than 1.20 times as long as ht$_2$.............. 21
21(22) F.T.C. 3 : 3 : 3; cauda with 4 hairs.................................................................................. indicus
22(21) F.T.C. 3 : 3 : 2; cauda with 6 hairs.................................................................................. meghalayensis

106. *Myzus ascalonicus* Doncaster


*Material examined*: Many apterae, 3 alatae and nymphs.

*Host plant and locality*: Calamintha sp. (Labiatae), Jowai, 19.3.1969; Ceresteum glomoratum (Carryophyllaceae), Upper Shillong, 31.12.1969, 30.1.1969, 5.3.1969; Chrysanthemum sp. (Compositae), Laban, 13.2.1969, 25.2.1969; Hypochoeris radiata (Compositae), Jail Road, 7.3.1969; Papaver somnifera (Papavaraeceae), Laban, 17.2.1969; Richardsonia pilosa (Eubiaceae), Laitumkhrah, 31.12.1968; Sonobierapinnotifida (Cruciferae), Kench’s trac, 7.3.1969 (C.U. Coll.)

*Biology*: Greenish brown to dark brown apterae and alatae infest under and upper surfaces of the leaves, growing shoots and inflorescences.

*Distribution*: India: Meghalaya (Shillong), Assam, West Bengal, Uttar Pradesh Elsewhere: Australia; New Zealand; Europe; North America.

107. *Myzus brevisiphon* A.N. Basu


*Material examined*: 3 apterae and 2 nymphs.

*Host plant and locality*: Polygonum capitatum, Polygonum sp. (Polygonaceae), Shillong. (C.U. Coll.)

*Distribution*: India: Meghalaya (Shillong), Uttar Pradesh, West Bengal.

108. *Myzus cerasi* (Fabricius)


*Material examined*: 2 apterae
Host plant and locality: *Sambucus javanica* (Caprifoliaceae), Cherrapunji, 21.12.1968.

**Biology**: Dark brown insects were collected from the under surface of the leaves.

**Distribution**: India: Meghalaya (Cherrapunji), Assam, West Bengal, Himachal Pradesh, Sikkim, Uttar Pradesh. Elsewhere: Japan; Australia; New Zealand, Europe; North America and virtually cosmopolitan.

109. *Myzus cymballariellus* Stroyan


**Material examined**: 3 apterae

**Host plant and locality**: *Amaranthus viridis* (Amaranthaceae), Laban, 4.7.1969; *Oxalis corniculate* (Oxalidaceae), S.E. Falls, 27.1.1969 and *Spiraea* sp. (Rosaceae), Nongrim Hill, 12.12.1968.

**Biology**: Brown to reddish apterae were seen on the stem and under surface of the leaves.

**Distribution**: India: Meghalaya (Nongrim Hill, Laban), Himachal Pradesh, West Bengal. Elsewhere: Australia; England; New Zealand; South Africa.

110. *Myzus dycei* Carver


**Material examined**: 16 apterae, 3 alatae and 2 nymphs.

**Host plant and locality**: *Cucurbita* sp. (Cucurbitaceae), Laitumkhrah, 27.12.1968, and *Digitalis* sp. (Scrophulariaceae), Laban, 16.12.1968; *Urtica* sp. (Urticaceae), Nongrim Hill, 12.12.1968 and Dhankhetti, 26.6.1968; also in Y.P.T. 15.12.1968.

**Distribution**: India: Meghalaya (Laitumukhrah, Laban, Nongrim Hill, Dhankhetti).

**Biology**: Black insects were collected from the stem and under surface of the leaves. Sometimes ants were seen in association.

111. *Myzus indicus* Basu & Raychaudhuri


**Material examined**: 10 apterae and nymphs

**Host plant and locality**: *Boehmeria* sp. (Urticaceae), Shillong, 28.xii.1968, C.U. coll.

**Distribution**: India: Meghalaya (Shillong).

112. *Myzus meghalayensis* Basu and Raychaudhuri


*Material examined:* 4 apterae

*Host plant and locality:* Host unidentified, Shillong, 18.xii.1968, R. C. Basu coll.

*Distribution:* India: Meghalaya (Shillong).

*Remarks:* The species is endemic and originally described from Meghalaya. It is characterised by its completely pale body, dorsum of head not uniformly spinulose, smooth dorsum of femora.

113. *Myzus manoji* Basu and Raychaudhuri


*Material examined:* 2 apterae and nymphs.

*Host plant and locality:* Host undetermined, Shillong, A.K. Ghosh (ZSI. Coll.)

*Distribution:* India: Meghalaya (Shillong), West Bengal.

114. *Myzus obtusirostris* David, Narayanan and Rajasingh


*Material examined:* 1 aptera


*Distribution:* India: Meghalaya (Shillong).

*Remarks:* This species was originally described from material collected on grass from Meghalaya.

115. *Myzus ornatus* Laing


*Material examined:* Many apterae, alatae and nymphs.

*Host plant and locality:* Numerous plants belonging to varied Natural orders were seen to be infested throughout the year in many localities. A few alatae were collected in Y.P.T.

*Biology:* Light green to dark brown insects were seen to infest almost all the parts of a plant body excepting the roots. Sometimes ants were seen in association.

*Distribution:* India: Meghalaya (almost all the districts of the state) and all over India; Virtually cosmopolitan.
116. *Muzus persicae* (Sulzer)


*Material examined* : Many apterae, alatae and nymphs.

*Distribution* : India : Meghalaya (almost all districts) and throughout India; Virtually cosmopolitan.

117. *Myzus siegesbeckicola* Strand


*Material examined* : Many apterae and alatae.

*Host plant and locality* : A number of plants distributed over a number of Natural orders were infested throughout the year in Shillong and its adjacent areas. Some alatae were also collected in Y P.T. alate males were collected from *Prunus persica* (Rosaceae), Nongrim Hill, 16.12.1968 and in Y.P.T. 27.12.1968.

*Biology* : Light green to black forms were seen to infest the growing shoots, under and upper surfaces of the leaves, inflorescences, flowers and even fruits. In a few seasons ants were seen in association.

*Distribution* : India : Meghalaya (almost all districts), West Bengal. Elsewhere : Japan; Korea; Sumatra and Taiwan.

*Remarks* : Cottier (1953) has given detailed description of sexuales of this species from New Zealand.

**Genus 41. Neohyalomyzus** Basu, Ghosh and Raychaudhuri


*Type species* : *Hyalomyzus raoi* Hille Ris Lambers, 1973

118. *Neohyalomyzus raoi* (Hille Ris Lambers)


*Material examined* : Many apterae, alatae and nymphs.

*Host plant and locality* : *Chenopodium* sp. (Chenopodiaceae); *Artemesia* sp. (Compositae); *Rubus ellipticus*, *Rubus reticulata* (Rosaceae); Shillong, (ZSI Coll.)

*Distribution* : India : Meghalaya (Shillong), Sikkim, Uttar Pradesh, West Bengal.

**Genus 42. Neomegouropsis** Ghosh, Basu and Raychaudhuri


*Type species* : *Megouroparsus dooarsis* Ghosh and and Raychaudhuri, 1967.
119. **Neomegouropsis cajanae** (Ghosh and Raychaudhuri)


*Material examined:* Many apterae, alatae and nymphs.

*Host plant and locality:* *Cajanus cajan*, (Papilionaceae), Shillong, (ZSI Coll.)

*Distribution:* India: Meghalaya (Shillong), Arunachal Pradesh, Manipur, West Bengal.

Genus 43. **Neomyzus** van der Goot


Type species: *Siphonophora circumflexus* Buckton, 1876.

**Key to the species of Neomyzus**

*Apterous viviparous females:*

1(2) Fore femora and at least basal 0.50 portion of segment III smooth; siphunculi slightly swollen on distal 0.50 portion on inner margin............................... *primulum*

2(1) Fore femora with a few scaly imbrications at distal end; siphunculi usually cylindrical ........

.................................................................................................................. *circumflexus*

120. **Neomyzus (Neomyzus) circumflexus** Buckton


*Material examined:* Many apterae, alatae and nymphs.

*Host plant and locality:* Extremely polyphagous. Found throughout the year in Meghalaya State, Shillong (C. U. coll.)

*Biology:* Greenish brown insects feed on both the surfaces of the leaves, growing shoots and inflorescences.

*Distribution:* India: Meghalaya (widely distributed), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Nagaland, Sikkim, South India, Uttar Pradesh, West Bengal; Virtually cosmopolitan.

121. **Neomyzus (Neomyzus) primulum** (Ghosh, Banerjee and Raychaudhuri)


*Material examined:* Many apterae and nymphs.

*Host plant and locality:* *Primula* sp. (Primulaceae), Shillong (C. U. Coll.)
Distribution: India: Meghalaya (Shillong) and Sikkim.

Genus 44. Ovatus van der Goot

Type species: Myzus mespili van der Goot, 1912 (= Aphis crataegaria Walker, 1850)

122. Ovatus minutus (van der Goot)


Material examined: Many apterae and nymphs.

Host plant and locality: Leonurus sibiricus (Labiatae), Shillong, (C. U. Coll.)

Distribution: India: Meghalaya (Shillong). Elsewhere: Java.

Genus 45. Paczoskia Mordvilko

Type species: Paczoskia paczoskii Mordvilko, 1919

123. Paczoskia budhium Banerjee, Ghosh and Raychaudhuri [Fig. 45]


Material examined: 12 apterae, 3 alatae and 2 nymphs.


Biology: Brownish to dark greenish brown insects infest mostly the undersurface of the leaves and also the young shoots of the plant.

Distribution: India: Meghalaya (Borapani, Sweet Falls, Laitumkhrah), Uttar Pradesh, West Bengal.

Genus 46. Penttllonia Coquerel

Type species: Penttllonia nigronervosa Coquerel, 1859

124. Penttllonia nigronervosa Coquerel


Material examined: Many apterae and alatae

Host plant and locality: Musa spp. (Musaceae), Shillong, 12.8.1969, (ZSI Coll.)

Distribution: India: Meghalaya (Shillong), widely distributed in India and virtually cosmopolitan.
Genus 47. *Perillaphis* Takahashi


Type species: *Macrosiphum perillae* Shinji, 1924

125. *Perillaphis perillae* (Shinji)


*Material examined*: Many apterous and alate viviparous females and nymphs.

*Host plant and locality*: *Perilla* sp. (Labiatae), Shillong, C. U. Coll.

*Distribution*: India: Meghalaya, Arunachal Pradesh, West Bengal. Elsewhere: Japan, Taiwan.

Genus 48. *Pleotrichophorus* Börner


Type species: *Aphis glandulosa* Kaltenbach, 1846

126. *Pleotrichophorus chrysanthemi* (Theobald)


*Material examined*: Nil.

*Distribution*: India: Meghalaya. Elsewhere: Australia; Egypt; England; Ireland, Rhodesia and South Africa.

*Remarks*: Ghosh A. K. (1974) reported this species for the first time from Meghalaya. So far, this species is apparently not recorded from anywhere in India except in the State of Meghalaya.

Genus 49. *Pseudoacyrthosiphon* Ghosh and Raychaudhuri


Type species: *Macrosiphum holsti* Takahashi, 1935

127. *Pseudoacyrthosiphon* (*Pseudoacyrthosphon*) *holsti* Takahashi


*Material examined*: 2 apterous viviparous females.

*Host plant and locality*: *Rhododendron arboreum* (Ericaceae), Shillong, C.U. coll.

*Distribution*: India: Meghalaya (Shillong), Sikkim, West Bengal. Elsewhere: Japan and Taiwan.
Genus 50. *Rhodobium* Hille Ris Lambers


Type species: *Macrosiphum rosaeolium* Theobald, 1915.

128. *Rhodobium porosum* (Sanderson)


*Material examined*: Many apterous viviparous females and nymphs.

*Host plant and locality*: *Rosa cania, Rosa macrophylla, Rosa* sp. (Rosaceae), Shillong, C. U. coll.

*Distribution*: India: Meghalaya (Shillong); South India, West Bengal; virtually cosmopolitan.

Genus 51. *Rhopalosiphoninus* Baker


Type species: *Amphorophora latysiphon* Davidson, 1912

129. *Rhopalosiphoninus latysiphon* (Davidson)


1980. *Rhopalosiphoninus latysiphon* (Davidson); Raychaudhuri, Ghosh and Basu., *In Taxonomy of the Aphids of North East India and Bhutan*: 245.

*Material examined*: Nil

*Host plant and locality*: *Poa* sp. (Gramineae), Shillong, C. U. coll.

*Distribution*: India: Meghalaya (Shillong), South India. Elsewhere: America; England; Germany, Holland and Switzerland.

Genus 52. *Scelromyzus* Basu, Ghosh and Raychaudhuri


130. *Scelromyzus corylopsis* (Basu, Ghosh and Raychaudhuri)


*Material examined*: Many apterae and nymphs.

*Host plant and locality*: *Corylopsis* sp. (Hamamelidaceae); Shillong, C. U. coll.

*Distribution*: India: Meghalaya (Shillong), Assam.

Genus 53. *Semiaphis* van der Goot


Type species: *Aphis carotae* Koch, 1854 (=*Aphis dauci* Fabricius, 1775).
131. **Semiaphis heraclei** (Takahashi) [Fig. 46, 47]


**Material examined**: Many alate viviparous females and nymphs.

**Host plant and locality**: Unidentified plant of Rosaceae, Kenche's trace, 19.ix.1969.

**Distribution**: India: Meghalaya (Shillong), West Bengal. Elsewhere: China; Hawaii; Japan; Korea; Sumatra and Taiwan.

Genus 54. **Shinjia** Takahashi


Type species: *Microtarsus pteridifoliae* Shinji, 1929.

132. **Shinjia pteridifoliae** (Shinji) [Fig. 48, 49]


**Material examined**: Many apterous and alate viviparous females and nymphs, 15 oviparae and 1 alate male.


**Biology**: Pale greenish to very light brownish insects with brownish antennae infest mostly the different species of fern. Mostly the under surface of the leaves and also the growing shoots are affected.

**Distribution**: India: Meghalaya (Umpling, Shillong, Borapani, Laitumkhrah), Arunachal Pradesh, Assam, Sikkim, Uttar pradesh, West Bengal. Elsewhere: Australia; China; Japan; Korea and Nepal.

**Remarks**: This species is fairly common in higher altitudes of eastern India where ferns are very common but so far no sexual form had been known from India. Sorin (1962) gives a detailed biological account of this species from Japan.

**Apterous oviparous female**: Body pale, about 1.3-1.4 mm long with the maximum width 0.7–0.8 mm. Head smooth, with very low diverging lateral frontal tubercles; antennae 6 segmented pale on basal two segments, root brownish, about 1.2–1.3 times as long as body, without any secondary rhinaria, p.t. 6.5–7.5 times as long as the base of segment VI; rostrum reaching beyond mid coxae, u.r.s. obtuse, about 0.12 mm long. Hairs on head, dorsum of abdomen and antennae with acute to acuminate apices and about 4 μ-7 μ long; siphunculi rather short, very weakly clavate, about 0.2 times as long as body and about 3 times as long as cauda which bears only 4 hairs; tarsi atrophied like the viviparous forms, hind tibiae enlarged and bear numerous pseudosensoria.
Measurements of one specimen in mm: Length of body 1.39; width of body 0.73; length of antenna 1.75; length of antennal segments III : IV : V : VI 0.34 : 0.23 : 0.23 : (0.11 + 0.72); length of u.r.s. 0.12; length of siphunculus 0.28; length of cauda 0.09.

Alate male: Body 1.5 mm long with the maximum width 0.66 mm. Head light brownish, smooth almost flat; antennae concolourous with the body, about 1.25 times as long as body; antennal segment III with 30-35, IV with 18-20 and V with 9-12 secondary rhinaria, p.t. 6.5 times as long as the base of the segment, hairs on the antennae inconspicuous; rostrum reaching about hind coxae, u.r.s. rather long, about 0.14 mm long. Dorsum of abdomen almost pale with pale brownish patches marginally on each segment and centrally on tergites 3-4, those on 8th tergite forming a band; siphunculi brownish, cylindrical to weakly clavate, about 0.16 times as long as body and about 3 times as long as cauda which bears 5 hairs. Tarsi atrophied. Distinct penis and claspers-like structure present. Media of fore wing twice branched, hind wing with 2 obliques, all wing veins are bordered brownish.

Measurements of one specimen in mm: Length of body 1.50; width of body 0.66; length of antenna 1.98; length of antennal segment III : IV : V : VI 0.44 : 0.27 : 0.27 : (0.11 + 0.72); length of u.r.s. 0.14; length of siphunculus 0.24; length of cauda 0.08.

Genus 55. Sinomegoura Takahashi


Type species: Acyrhosiphon photiniae Takahashi, 1936

Key to the species of Sinomegoura Takahashi

1(2) Cauda dark............................................................................................................................... 3
2(1) Cauda pale................................................................................................................................ 5
3(4) Cauda with many hairs (12-24); polygonal reticulation on body very distinct......................
.....................................................................................................................................................citricola
4(3) Cauda with fewer hairs (about 7); polygonal reticulation on body very indistinct............
.....................................................................................................................................................rhododendri
5(6) Antennae pale, cauda with 10-18 hairs; u.r.s. about 1.5 x h.t.2...............................photiniae
6(8) Antennae dark brown; cauda with 11-12 hairs; u.r.s. 1.0-1.2 x h.t.2..............................pyri

133. Sinomegoura citricola (van der Goot)

1927. Macrosiphoniella citricola van der Goot, Contr. Fauna Indes neerl., 1(3) : 34:

Material examined: Many apterous and alate viviparous females and nymphs.

Host Plant and locality: Polyphagous. In and around Shillong.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Sikkim, West Bengal. Elsewhere: Australia; China; Japan; Java; Nepal; New Guinea; Philippines; Singapore; Sumatra and Taiwan.
134. *Sinomegoura photinae* (Takahashi)


*Material examined:* Many apterous viviparous females and nymphs.

*Host plant and locality:* *Photinia integrifolia* and *Photinia* sp. (Rosaceae). C. U. coll.

*Distribution:* India: Meghalaya (Kench's trace), Sikkim, West Bengal. Elsewhere: China and Japan.

135. *Sinomegoura pyri* Ghosh and Raychaudhuri


*Material examined:* 6 apterae and 2 nymphs

*Host plant and locality:* *Ardisia* sp. (Myrsinaceae) and *Pyrus* sp. (Rosaceae), Shillong, C. U. coll.

*Distribution:* India: Meghalaya (Shillong)

*Remarks:* The species is originally described from Meghalaya and so far known only from the state.

136. *Sinomegoura rhododendri* (Takahashi)


*Material examined:* Many apterous viviparous females and nymphs.


*Distribution:* India: Meghalaya (Shillong), West Bengal. Elsewhere: Japan.

Genus 56. *Subovatomyzus* Basu


*Type species:* *Subovatomyzus leucosceptri* Basu, 1964

137. *Subovatomyzus leucosceptri* Basu


*Material examined:* Many apterae, alatae and nymphs

*Host plant and locality:* *Vernonia* sp. (Compositae), Shillong, 19.9.1969, C. U. coll.

*Distribution:* India: Meghalaya (Shillong), Sikkim, West Bengal.
Genus 57. *Tricaudatus* Narzikulov


Type species: *Rhopalosiphoninus polygoni* Narzikulov, 1953

138. *Tricaudatus polygoni* (Narzikulov)


**Material examined**: Many apterous and alate viviparous females and nymphs.

*Host plant and locality*: *Polygonum* sp. (Polygonaceae), *Spiraea* sp. (Rosaceae), Shillong, 2.8.1969, C. U. col.

*Distribution*: India: Meghalaya (Shillong), Arunachal Pradesh, Himachal Pradesh, Sikkim, Uttar Pradesh, West Bengal. Elsewhere: Japan; Korea; Taiwan and U. S. S. R.

Genus 58. *Trichosiphonaphis* Takahashi


Type species: *Myzus polygoniformosanus* Takahashi, 1921.

Key to the species of *Trichosiphonaphis* Takahashi

Apterous viviparous females:

1(2) Cauda with 7-8 hairs; siphunculi constricted near apical flange; body pale, without any sclerite .................................................................................................................................................................................. *gerbarae*

2(1) Cauda with 12-14 hairs, siphunculi not constricted near apical flange; body blackish brown, more sclerotised on dorsum................................................................................................................................. *lonicerae*

139. *Trichosiphonaphis gerbarae* Ghosh and Raychaudhuri


**Material examined**: Many apterous and alate viviparous females and nymphs.

*Host plant and locality*: *Gerbera macrophylla*, *Gerbera* sp. (Compositae); *Polygonum serrulatum*, *Polygonum* sp. (Polygonaceae), Shillong, 19.9.1969, C. U. coll.

*Distribution*: India: Meghalaya (Shillong), West Bengal.

140. *Trichosiphonaphis lonicerae* (Uye)


**Material examined**: Several apterae and nymphs.

Biology: Brown to blackish brown insects mostly infest the undersurface of the leaves and the growing shoots.

Distribution: India: Meghalaya (Nongrim Hill, Kench’s trace, Borapani), Assam. Elsewhere: Japan.

Genus 59. **Tuberocephalus** Shinji


Type species: *Tuberocephalus artemissiae* Shinji, 1929

141. **Tuberocephalus sasaki** (Matsumura)


Material examined: Many apterous viviparous females and nymphs.


Distribution: India: Meghalaya (Shillong), Sikkim, West Bengal.

Genus 60. **Vesicula phis** del Guercio


Type species: *Toxoptera caricis* Fullaway, 1910

Key to the species of *Vesicula phis* del Guercio

Apterous viviparous female:

1(2) Processus terminalis shorter than the base of the segment and 0.2-0.28 times as long as antennal segment III, antennae 5 or 6 segmented, 0.3-0.35 times as long as body..............

.......................................................................................................................................

2(1) Processus terminalis 2-3 times as long as the base of the segment and slightly shorter to longer than antennal segment III, antennae 6-segmented, 0.45 to 0.66 times as long as body

3(4) Large, plumpy body, 2.2 to 2.4 mm long; antenna short, never more than 0.5 times as long as body, p.t. 2.0 to 2.5 times as long as the base of the segment and shorter than antennal segment III; abdominal dorsum dark brown excepting lateral margin which is pale; F.T.C. 3, 3, 2............................................................................................................................ *pieridis*

4(3) Spindle-shaped body, 1.70 to 1.90 mm long; moderately long antenna which is 0.5 to 0.66 times as long as body, p.t. 2.5 to 3 times as long as the base of the segment and equal to slightly longer than the antennal segment III; dorsum of abdomen brown to blackish brown; F. T. C. 3, 3, 3.................................................................................................................. *verbasci*

142. **Vesicula phis kuwanis** Ghosh, Basu and Raychaudhuri [Fig. 50]


Material examined: Many apterae

Host plant and locality: Host unidentified, Myllieum, 5.4.1965.

Biology: Dark brown insects were collected from the tender shoots and under surface of the leaves.

Distribution: India: Meghalaya (Myllieum), Sikkim, West Bengal.

143. Vesiculaphis pieridis Basu [Fig. 51]


Material examined: 6 apterae, 11 nymphs.

Host plant and locality: Pieris evalifolia (Ericaceae), Nongrim Hill, 14.i.1969 and Jowai, 11.2.1969.

Biology: Deep brown apterae and light brown nymphs were collected from the under surface of the leaves.

Distribution: India: Meghalaya (Nongrim Hill, Jowai), Assam, West Bengal.

Remarks: Basu (1964) described the species with 5 segmented antennae but collections from Shillong show that antenna may be 5 or 6 segmented and body much longer than reported in the original description.

144. Vesiculaphis verbasci Chowdhuri, Basu, Chakrabarti and Raychaudhuri


Material examined: Many apterous viviparous females and nymphs.

Host plant and locality: Collections were made from quite a few number of host plants of different Natural orders (Polygonaceae, Rosaceae) during the months of March and again during May to December.

Biology: Light to dark brown apterae and nymphs were collected from the young shoots, inflorescences, under and upper surfaces of the leaves.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Himachal Pradesh, Manipur, Nagaland, Sikkim, Uttar Pradesh, West Bengal.

Genus 61. Xenomyzus Aizenberg


Type species: Xenomyzus corticis Aizenberg, 1935.

145. Xenomyzus scabripes Basu, Ghosh and Raychaudhuri

Material examined: Many apterae, alatae and nymphs.


Distribution: India: Meghalaya (Shillong), Arunachal, Pradesh, Sikkim, Uttar Pradesh and West Bengal.

Remarks: This species is characterised in having longer dorsal cephalic hairs, shorter body, shorter p.t. and scabrous femora and tibiae and also dark siphunculi.

Subfamily III. DREPANSIPHINAE

Key to the Genera:

1(2) Apical tibial hairs not differentiated; Rudimentary gonapophyses 2 or 4, never 3; a.s. II longer than a.s. I ............................................................. Machilaphis

2(1) Apical tibial hairs well differentiated as spines; Rudimentary gonapophyses 2, 3 or 4 ...........

3(4) Embryo and 1st instar with dorsal body hairs in 6 or more longitudinal rows; a.s. II with more than 1 hair, fore coxae normal; alatae without spinal finger-like processes .......... 5

4(3) Embryos and 1st instar with dorsal body hairs in 4 longitudinal rows; a.s. II with only 1 hair; fore coxae often enlarged, alatae often with spinal finger-like processes ............. 11

5(6) Dorsal body hairs sparse, not in clusters; anal plate bilobed .................................................. 7

6(5) Dorsal body hairs always in clusters; anal plate rounded or shallowly indented .....................

7(8) p.t. subequal to base of a.s. VI; apterae without secondary rhinaria; cauda elongate with a constriction near the middle ............................................................. Neobetulaphis

8(7) P.t. shorter or longer than the base VI; apterae with secondary rhinaria ......................... 9

9(10) Viviparous females alatae; p.t. 2-3 x base VI; siphunculi straight, without hair attached; cauda with a short rounded knob ...................................................... Betacallis

10(9) Viviparous females alatae and apterae; p.t. subequal or shorter than base VI; cauda elongate with a slender knob .............................................................. Taoia

11(12) Fore coxae of alatae normal; alate viviparae with finger-like spinal processes .............

12(11) Fore coxae of alatae elongate or more or less enlarged .................................................. 13

13(14) Dorsal body hairs of apterae and alaloid nymphs stout, capitate, with spinulose surface ...

14(13) Dorsal body hairs of apterae and alaloid nymphs if stout and capitate, with smooth surface...

15(16) Rostrum elongate, reaching far beyond fore coxae, apical segment longer than its greatest basal width ................................................................. 17
16(15) Rostrum reaching a little beyond fore coxae, apical segment about as long as its greatest basal width................................................................. 21

17(18) Dorsal integument without extended fields of wax gland pores................................. 19

18(17) Dorsal integument provided with extended fields of specialised wax gland pores; secondary rhinaria narrow oval, alatae without spinal processes.............................. *Shivaphis*

19(20) Fore coxae somewhat enlarged, elongated; siphunculi with hair appended...........................

................................................................................................................................. *Tinoealloides*

20(19) Fore coxae greatly enlarged; siphunculi mostly without hair appended; wings often with veins bordered or with dark spots ................................................................. *Tinoeallis*

21(22) P.t. subequal to the base of a.s. VI; siphunculi cylindrical, sometimes with a hair appended.

................................................................................................................................. *Takeeallis*

22(21) P.t. shorter than the base of a.s. VI; siphunculi short, cylindrical without a hair appended....

................................................................................................................................. *Subtakeeallis*

Genus 62. *Betacallis* Matsumura


Type species: *Betacallis alnicolens* Matsumura, 1919.

*Key to the species of Betacallis :*

1(2) Dorsal cephalic hairs subequal to h.d. III; a.s. III with 18-22 secondary rhinaria............... ................................. *prunico/a*

2(1) Dorsal cephalic hairs much longer (1.25-1.60 x b.d. III), a.s. III with 26-40 secondary rhinaria................................................................................................................. *querchiphaga*

146. *Betacallis prunico/a* Basu et al.


*Material examined :* 3 alatae


*Distribution :* India : Meghalaya (Shillong), Arunachal Pradesh, West Bengal. Elsewhere : China.

147. *Betacallis querchiphaga* Basu et al.


*Material examined :* 1 alata

*Host plant and locality :* Quercus sp., Old Barapani, Meghalaya, 3.2.1974, A. K. Ghosh (NZC).
GHOSH & BASU: Hemiptera: Aphididae

Distribution: India: Meghalaya (Barapani), Sikkim, West Bengal.

Genus 63. Clethrobius Mordvilko

Type species: Callipterus giganteus Cholodkovsky, 1899.

148. Clethrobius dryobius Chakrabarti and Raychaudhuri [Fig. 52]


Material examined: 2 alatae.

Host plant and locality: Undet, Rosaceae, old Barapani, Meghalaya, 2.2.1974, K. Deb.

Distribution: India: Meghalaya (Barapani), Sikkim, West Bengal, Arunachal Pradesh.

Genus 64. Machilaphis Takahashi

Type species: Phyllaphis machili Takahashi, 1928

149. Machilaphis machili (Takahashi)


Material examined: 4 alatae.


Distribution: India: Meghalaya (Shillong), Assam. Elsewhere: China, Taiwan, Japan.

Genus 65. Mesocallis Matsumura


150. Mesocallis alnicola A. K. Ghosh


Material examined: 6 apterae and 3 alatae.


Distribution: India: Meghalaya (Shillong).

Remarks: This is an endemic species.

Genus 66. Neobetulaphis A. N. Basu

Type species: Neobetulaphis pussila Basu, 1964
151. *Neobetulaphis immaculata* A. K. Ghosh


*Material examined:* 7 apterae and 2 nymphs.

*Host plant and locality:* Undet Rosaceae, Shillong, Meghalaya, 8.7.1974, A. C. Sukla (NZC).

*Distribution:* India: Meghalaya (Shillong).

*Remarks:* This endemic species is characterised in the presence of long rostrum, pale smooth tergum, pale antennae and legs.

Genus 67. *Shivaphis* Das


*Type species:* *Shivaphis celti* Das, 1918

152. *Shivaphis celti* Das


*Material examined:* Not available.


Genus 68. *Subtakecallis* Raychaudhuri and Pal


*Type species:* *Cranaphis pilosa* David, Rajasingh and Narayanan, 1970.

153. *Subtakecallis pilosus* (David, Rajasingh and Narayanan)


*Material examined:* Not available.


*Remarks:* According to Ghosh and Quednau (op. cit.) the species is characterised in having longer spinal hairs on anterior tergites and in the ratio of base VI. to p.t.

Genus 69. *Takecallis* Matsumura


*Type species:* *Takecallis bambusae* Matsumura, 1917.
154. Takecallis arundinariae (Essig)

1990. Takecallis arundinariae; Ghosh and Quednau, Fauna India (Homoptera : Aphidoidea), Subfamily Drepanosiphinae; ZSI, pt. 5 : 232.

Material examined: Many alatae


Remarks: The species has often been recorded on Bambusa spp. in North East India and North West Hill area.

Genus 70. Taoia Quednau


Type species: Euceraphis chuansiensis Tao

155. Taoia indica (Ghosh and Raychaudhuri)

1990. Taoia indica (Ghosh and Raychaudhuri): Ghosh and Quednau, Fauna India (Homoptera : Aphidoidea), Subfamily Drepanosiphinae, Z. S. I., pt. 5 : 244.

Material examined: 2 apterae


Distribution: India: Meghalaya (Shillong), Manipur, Sikkim, West Bengal.

Elsewhere: Nepal.

Remarks: The species appears to have a monoecious holocyclic mode of reproduction on Alnus and Betula in North East Himalaya.

Genus 71. Tinocallis Matsumura


Type species: Tinocallis ulmiparvifoliae Matsumura

156. Tinocallis magnoliae Ghosh and Raychaudhuri


Material examined: 1 alata and 1 nymph.


Distribution: India: Meghalaya (Shillong).

Remarks: This is an endemic species.
Genus 72. *Tinocalloides* Basu

Type species: *Tinocalloides montanus* Basu, 1969.

157. *Tinocalloides montanus* Basu [Fig. 53]


*Material examined:* 6 alatae


*Distribution:* India: Meghalaya (Shillong), Arunachal Pradesh, Himachal Pradesh, Manipur, Sikkim, West Bengal.

*Remarks:* The species is endemic to India.

Genus 73. *Tuberculatus* Mordvilko

Type species: *Aphis quercea* Kaltenbach

Key to the species of *Tuberculatus* Mordvilko

1(2) Mesonotum with one pair of finger-like spinal processes; abdominal tergites 1-3 with a few hairs near the bases of spinal processes ................................................................. *indicus*

2(1) Mesonotum without such spinal processes ................................................................. 3

3(4) Pronotum with two pairs of finger-like spinal processes; Media of forewing with narrow diffuse brown bordering ................................................................. *nervatus*

4(3) Pronotum with one pair of finger-like spinal process; Media of forewing not bordered as above; u.r.s. 1.1-1.2 x as long as h.t.2 ............................................................................. *paiki*

158. *Tuberculatus indicus* L. K. Ghosh


*Material examined:* 4 alatae and 4 nymphs.


*Distribution:* India: Meghalaya (Shillong), Arunachal Pradesh, Manipur. Elsewhere: Japan, Korea.

*Remarks:* Ghosh, A. K. and Quednau (1990) have made valuable comments on the species.

159. *Tuberculatus nervatus* Chakrabarti & Raychaudhuri [Fig. 54]

Material examined: 2 alatae and 3 nymphs


Distribution: India: Meghalaya (Shillong).

Remarks: The species is restricted to Khasi Hills of Meghalaya so far as distribution is concerned. It is characterised by brown patches on abdomen, dark patch on the postscutum as dusky wing venation.

160. **Tuberculatus paiki** Hille Ris Lambers


Material examined: 1 alate and 1 nymph.


Remarks: In India, the species is so far known only from Meghalaya.

Subfamily IV. **GREENIDEINAE**

Key to tribes of the subfamily Greenideinae:

1(2) Body in apterae and alatae never with any fingure-like processii; siphunculi with many long hairs ......................................................................................................................... Greenideini

2(1) Body in apterae always with fingure-like processii; in alatae this processii reduced or absent; Siphunculi with a few short hairs ................................................................. Cervaphidini

Tribe Cervaphidini

Key to the genera:

1(2) Cauda rounded or with a median stylus; 7th tergite with only one pair of distinct tubercle; antennae 5-segmented ...................................................................................... Schoutedenia

2(1) Cauda never with a median stylus .................................................................................................................................................................................. 3

3(4) Body processi mostly branched in apterae; siphunculi long ........................................... Cervaphis

4(3) Body processi never branched in apterae; siphunculi short ........................................ Sumatraphis

Genus 74. **Cervaphis** van der Goot

1917. *Cervaphis* van der Goot, *Contr. Faune. Indes. neerl.*, 1(3) : 1

Type species: *Cervaphis schouteniae* van der Goot, 1917

161. **Cervaphis quercus** Takahashi


Material examined: 7 apterae and nymphs.

Host plant and locality: Quercus griffithi (Fagaceae), Shillong, 6.4.1975, M. S. Jyrwa.

Distribution: India: Meghalaya (Shillong), Manipur. Elsewhere: Japan; Korea; Taiwan.

162. Cervaphis schouteniae Hille Ris Lambers


Material examined: 3 apterae and 2 nymphs.

Host plant and locality: Mixocos peniculata (Tiliaceae), Shillong, 3.5.1970, H. Banerjee.

Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Tripura. Elsewhere: Indonesia, Malayashia; Philippines and Vietnam.

Genus 75. Schoutedenia Rubsaamen


Type species: Schoutedenia ralumensis Rubsaamen, 1905.

Key to the species of Schoutedenia:

1(2) P.t. 0.38-0.60 X base of last segment and 0.5-1.0 X as long as u.r.s. Schoutedenia emblica
2(1) P.t. 0.53-0.85 X base of last segment as 1.1-1.6 X as long as u.r.s. Schoutedenia ralumensis

163. Schoutedenia emblica (Patel and Kulkarni)


Material examined: 2 apterae

Host plant and locality: Phyllanthus emblica, Shillong, 18.3.1969, R. C. Basu.

Distribution: India: Meghalaya (Shillong), Andhra Pradesh, Maharashtra, Tamil Nadu, Tripura, West Bengal. Elsewhere: Nepal.

164. Schoutedenia ralumensis Rubsaamen


Material examined: 6 apterae and 5 alatae


Distribution: India: Meghalaya (Barnihat), Sikkim, Tripura, West Bengal. Elsewhere: Africa; Australia; Indonesia; Malaysia; Pakistan; Taiwan.
Genus 76. **Sumatraphis** Takahashi


Type species: *Sumatraphis celti* Takahashi, 1935

165. **Sumatraphis celti** Takahashi [Fig. 56]


**Material examined**: 1 alata

**Host plant and locality**: Yellow Pan Trap, Shillong, 12.5.1977; (C. U. Coll.).

**Distribution**: India: Meghalaya (Shillong), Manipur, Tamil Nadu, West Bengal. Elsewhere: Indonesia (Sumatra); Nepal; Taiwan.

Tribe Greenideini

**Key to genera**:

1(2) Body hairs on raised sockets, with capitate or expanded apices in both apterae and alatae.....

2(1) Body hairs usually on normal sockets, never with capitate or expanded apices................. 3

3(4) Siphunculi in apterae barrel-shaped................................................................. *Brevitrichosiphon*

4(3) Siphunculi in apterae never as above ........................................................................ 5

5(6) Cauda transversely oval with a median stylus; Siphunculi reticulated...................... *Greenidea*

6(5) Cauda never with a median stylus............................................................................. 7

7(8) U.r.s. blunt; segments IV & V distinctly divided.................................................... *Greenidioida*

8(7) U.r.s. usually pointed, segments 4 and 5 distinctly separated................................. 9

9(10) Hind tibiae with stridulatory ridges in thr form of transverse cuts; siphunculi long, cylindrical.................................................................................................................. *Mollitrichosiphum*

10(9) Hind tibiae without any stridulatory ridge; siphunculi usually curved outwards ........

.................................................................................................................. *Eutrichosiphum*

Genus 77. **Allotrichosiphum** Takahashi, 1962


Type species: *Trichosiphum kashicola* Kurisaki, 1920.

166. **Allotrichosiphum assamense** Raychudhuri, Ghosh, Banerjee and Ghosh


Material examined: 1 aptera

Host plant and locality: Quercus dealbata, Cherrapunji, 27.xii.1969, H. Banerjee.

Distribution: India: Meghalaya (Cherrapunji).

Genus 78. **Brevitrichosiphon** Raychaudhuri et al.


Type species: **Brevitrichosiphon mukerjii** Raychaudhuri et al., 1973

167. **Brevitrichosiphon mukerjii** Raychaudhuri et al.


Material examined: 1 aptera

Host plant and locality: Host unidentified, Cherrapunji. C.U. coll.

Distribution: India Meghalaya (Cherrapunji), Manipur, West Bengal.

Genus 79. **Eutrichosiphum** Essig and Kuwana


Type species: **Trichosiphum pasaniae** Okajima, 1908

Key to the species of **Eutrichosiphum** :

1(2) None of the dorsal hairs on abdomen with furcated apices ..................................................... 3

2(1) At least some of the dorsal hairs on abdomen with furcated apices ........................................ 5

3(4) Dorsal hairs of abdomen thick and stiff, mostly thorny, antennae 5 or 6-segmented .................

.................................................................................................................................................... dubium

4(3) Dorsal hairs of abdomen with acute, blunt apices or a few thorny; u.r.s. 0.19-0.23 mm long and 1.90-2.40 X 2 ................................................................................................................ pyri

5(6) Most of the dorsal hairs on abdomen with branched apices, a few shorter ones with acute or blunt apices .......................................................................................................... 7

6(5) Some or a few of the dorsal hairs on abdomen with branched apices, others with acute, acuminate or blunt apices ................................................................. 11

7(8) Abdominal dorsum smooth; antennae 5 or 6-segmented; u.r.s. obtuse at apex; p.t. 1.6-1.7 X base of last antennal segment ................................................................. raychaudhurii

8(7) Abdominal dorsum spinulose entirely; antennae 5-segmented ................................................. 9

9(10) Dorsum of head spinulose; siphunculi with a few hairs with furcated apices near the base...

.................................................................................................................................................... subinoyi

10(9) Dorsum of head smooth; none of the siphuncular hairs with furcated apices.........................

.................................................................................................................................................... pseudopasaniae
11(12) Dorsum of head spinulose ........................................................................... \textit{khasyanum}
12(11) Dorsum of head smooth ........................................................................... 13
13(14) U.r.s. long and acute ........................................................................... \textit{tattakanum}
14(13) U.r.s. obtuse or long and tapering or acute ........................................................................... 15
15(16) Most of the dorsal hairs of abdomen with blunt apices ........................................................................... 17
16(15) Most of the dorsal hairs of abdomen with acute, acuminate or some with blunt or furcated apices ........................................................................... 19
17(18) Dorsum of abdomen with a brown central patch extending on 3-5 tergites; antennae 6-segmented and 2-2.4 \(X\) h.t.2 ........................................................................... \textit{querciphaga}
18(17) Dorsum of abdomen variably sclerotised, never with a brown central patch ........................................................................... \textit{neotattakanum}
19(20) Dorsum of abdomen locally spinulose ........................................................................... 21
20(19) Dorsum of abdomen smooth ........................................................................... 27
21(22) Antennae 5-segmented; u.r.s. 1.8-2.1 \(X\) h.t.2 ........................................................................... \textit{sankari}
22(21) Antennae 6-segmented ........................................................................... 23
23(24) Siphunculi densely spinulose throughout ........................................................................... \textit{rameshi}
24(23) Siphunculi sparsely spinulose except near apical region which is densely spinulose ........................................................................... 25
25(26) Siphunculi 0.20-0.36 mm long and 0.15-0.19 \(X\) body ........................................................................... \textit{flavum}
26(25) Siphunculi 0.60-0.85 mm long and about 0.30 \(X\) body ........................................................................... \textit{blackmanum}
27(28) Antennae 5-segmented; u.r.s. obtuse ........................................................................... 29
28(27) Antennae 6-segmented; siphunculi densely spinulose throughout, 0.24-0.28 \(X\) body; u.r.s. 2.7-3.6 \(X\) h.t.2 ........................................................................... \textit{russellae}
29(30) Siphunculi sparsely spinulose on most of the portion, densely spinulose near the apex ........................................................................... \textit{maki}
30(29) Siphunculi densely spinulose throughout; u.r.s. 0.20-0.30 mm long ........................................................................... \textit{assamense}

Note: The key does not include \textit{E. alnicola} A. N. Basu and \textit{E. sensoriata} A. K. Ghosh due to lack of sufficient material.

168. \textit{Eutrichosiphum alnicola} (Basu)


Material examined: Nil.

**Distribution**: India: Meghalaya (upper Shillong), Himachal Pradesh, Sikkim, Uttar Pradesh, West Bengal. Elsewhere: Nepal.

**Remarks**: Due to nonavailability of material the species could not be included in the key.

169. *Eutrichosiphum assamense* Ghosh et al. [Figs. 58, 60]


**Material examined**: 5 apterae and 1 alata


**Distribution**: India: Meghalaya (Shillong), Himachal Pradesh, Manipur, Uttar Pradesh.

170. *Eutrichosiphum blackmanum* Agarwala and Ghosh


**Material examined**: 6 aptera and 4 nymphs.


**Distribution**: India: Meghalaya (Shillong).

**Remarks**: The species is originally described from Meghalaya.

171. *Eutrichosiphum dubium* (van der Goot)


**Material examined**: 2 apterae

**Host plant and locality**: Host indet. Malki Reserve Forest, Shillong, 28.x.1975, R. S. Giri.

**Distribution**: India: Meghalaya (Shillong), Manipur, West Bengal. Elsewhere: China; Taiwan.

172. *Eutrichosiphum flavum* Takahashi


**Material examined**: 4 apterae and 3 nymphs.

**Host plant and locality**: Quercus sp., Motinagar, Shillong, 30.v.1974, M. S. Jyrwa.

**Distribution**: India: Meghalaya (Shillong), Manipur. Elsewhere: Indonesia, Taiwan.
173. *Eutrichosiphum khasyanum* (Ghosh and Raychaudhuri)


*Material examined*: 5 apterae and 1 alata


174. *Eutrichosiphum makii* Raychaudhuri and Chatterjee


*Material examined*: 4 apterae


*Distribution*: India: Meghalaya (Shillong), West Bengal.

175. *Eutrichosiphum neotattakanum* Agarwala and Ghosh


*Material examined*: 1 aptera and 5 nymphs.


*Distribution*: India: Meghalaya (Shillong).

*Remarks*: The species is characterised by its long and narrow ultimate rostral segment.

176. *Eutrichosiphum pseudopasaniae* Szelegiewicz [Fig. 59]


*Material examined*: 6 apterae


177. *Eutrichosiphum pyri* Chakrabarti, Ghosh and Raychaudhuri


Material examined: 1 aptera


Distribution: India: Meghalaya (Shillong), Uttar Pradesh.

178. Eutrichosiphum rameshi (Raychaudhuri, Chatterjee and Raychaudhuri)


Material examined: 1 aptera and 2 nymphs


Distribution: India: Meghalaya (Shillong).

Remarks: The species is originally described from Meghalaya.

179. Eutrichosiphum raychaudhurii Ghosh


Material examined: 6 apterae


Distribution: India: Meghalaya (Shillong), Sikkim, Tamil Nadu, West Bengal.

Remarks: This is an endemic species.

180. Eutrichosiphum russellae Ghosh, Ghosh and Raychaudhuri [Fig. 64]


Material examined: 1 aptera and 2 nymphs.


Distribution: India: Meghalaya (Mawphlong). So far known only from the State.

181. Eutrichosiphum sankari Raychaudhuri, Ghosh, Banerjee and Ghosh


Material examined: 2 alatae and 3 nymphs
Host plant and locality: Litsea cubeba, Shillong, 8.viii.1974, A. C.-Sukla.

Distribution: India: Meghalaya (Shillong), West Bengal.

182. *Eutrichosiphum sensoriatum* (Ghosh, A. K.)


Material examined: Nil.


Distribution: India: Meghalaya (Mawphlang).

Remarks: This is an endemic species originally described from Meghalaya.

183. *Eutrichosiphum subinoyi* Raychaudhuri, Ghosh, Banerjee and Ghosh


Material examined: 1 aptera and 1 alata


Distribution: India: Meghalaya (Shillong).

Remarks: Also an endemic species known from Meghalaya so far.

184. *Eutrichosiphum tattakanum* (Takahashi)

1925. *Greeidea tattakanum* Takahashi, R., Aph. of Formosa, pt. 4: 30


Material examined: 2 apterae and 1 nymph


Distribution: India: Meghalaya (Khasi Hills), Himachal Pradesh, Manipur, Uttar Pradesh. Elsewhere: Bhutan, Nepal, Japan, Pakistan, Taiwan.

Genus 80. *Greenidea* Schouteden, 1905


Type genera: *Siphonophora artocarpi* Westwood., 1890)

Key to the subgenera of genus *Greenidea*:

1(2) Hind tibiae of both apterae and alatae viviparae with a variable number of transverse cuts...

...........................................................................................................................

Paragreenidea
2(1) Hind tibiae of apterae and alatae viviparae without any transverse cut................................. 3
3(4) Siphunculi in apterae viviparae distinctly reticulated near the base on one surface
................................................................................................................................. Trichosiphum

4(3) Siphunculi in apterae viviparae distinctly reticulated on both surfaces throughout the length
................................................................................................................................. Greenidea S. S.

Key to the species of subgenus Greenidea:

Apterous viviparous Females:

1(2) None of the hairs on siphunculi with furcated apices; antennae shorter than the body
................................................................................................................................. decaspermi

2(1) Atleast some of the hairs on siphunculi with furcated apices; antennae shorter to longer or longer than body................................. 3

3(4) Siphunculi long, 0.71-0.87 X as long as body, segment 4 of u.r.s. with less than 10 accessory hairs
................................................................................................................................. longicornis

4(3) Siphunculi 0.42-0.57 X as long as body; segment 4 of u.r.s. with more than 10 accessory hairs; dorsum of abdomen yellowish brown; u.r.s. upto about 2.7 X ht2
................................................................................................................................. longirostris

Alate viviparous Females:

1(2) Siphunculi 2.90 mm long, longer than body ................................................................. longicornis

2(1) Siphunculi shorter than body; venter of abdomen medially smooth, rest variably spinulose...
................................................................................................................................. himansui

3(4) 7th tergite with 6 spino-pleural hairs besides marginal ones................................. 5

3(3) 7th tergite with 2 spinal hairs......................................................................................... 3

5(6) Siphunculi short, about 0.76 mm long and 0.31 X as long as body; antennal segment III with at least 35 secondary rhinaria
................................................................................................................................. artocarpi

6(5) Siphunculi short to long, usually long (1.01-1.96 mm), seldom short, 0.33-0.81 X as long as body; antennal segment III with less than 35 secondary rhinaria. U.r.s. 0.29-0.41 mm long; longest hair on anterior tergites 1.10-1.30 X as long as b.d. III................................................................. longirostris

185. Greenidea (Greenidea) artocarpi (Westwood)


Material examined : Nil.

Distribution : India : Meghalaya, South India. Elsewhere : China; Sri Lanka.

Remarks : Due to nonavailability of material, the species is included in the key on the basis of literature.
186. **Greenidea (Greenidea) decaspermi** Takahashi


*Material examined*: 2 apterae and 8 nymphs.


*Distribution*: India: Meghalaya (Jowai), Karnataka, Sikkim. Elsewhere: Nepal; Taiwan.

187. **Greenidea (Greenidea) himansui** Raychaudhuri, Ghosh, Banerjee and Ghosh


*Material examined*: 1 alata.


*Distribution*: India: Meghalaya (Dawki).

188. **Greenidea (Greenidea) longicornis** (Ghosh, Ghosh and Raychaudhuri)


*Material examined*: 1 aptera and 3 nymphs.

*Host plant and locality*: Cassia sp., Cherapunji, 14.iii.1971, S. Sarkar.

*Distribution*: India: Meghalaya (Cherapunji), Sikkim.

189. **Greenidea (Greenidea) longirostris** Basu, A. N.


*Material examined*: 3 apterae, and 3 nymphs.


*Biology*: Greenish brown insects infest mostly the under surface of the leaves.


190. **Greenidea (Paragreenidea) symplocosis** Ghosh, Basu and Raychaudhuri


**Material examined**: Nil

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

**Remarks**: Due to nonavailability of material, the species could not be included in the key.

**Key to the species of subgenus *Trichosiphum***

**Apterous viviparous females**:

1(2) Mid ventral area spinulose; caudal hairs 4........................... *sikkimensis*

2(1) Mid ventral area smooth, rest variably spinulose; caudal hairs 6-8........................... 3

3(4) U.r.s. upto 3.0 x as long as h.t.......................... *quercicola*

4(3) U.r.s. less than 2.40 x as long as h.t.......................... 5

5(6) Abdominal venter with a dark spino-pleural sclerotic patch, evenly spinulose........................... *prunicola*

6(5) Abdominal venter with median region smooth, laterally variably spinulose........................... 7

7(8) P. t. longer than antennal segment III .................................. *camelliae*

8(7) P. t. shorter to subequal of antennal segment III ........................................... 9

9(10) U.r.s. 0.21-0.25 mm long and 1.91-2.27 x as long as h.t............................... *formosana formosana*

10(9) U.r.s. 0.15-0.19 mm long and 1.20-1.72 x as long as h.t............................... *formosana heeri*

13. Siphunculi black or dark brown, 0.20-0.29 x as long as body; dorsum of abdomen brown sclerotic and wrinkled ........................................... *bucktonis*

191. *Greenidea (Greenidea) bucktonis* Ghosh, Basu and Raychaudhuri [Fig. 61]


**Material examined**: 3 apterae and 2 nymphs.

**Host plant and locality**: *Syzygium* sp., Mawphlang, 17.v.1977, H. Khajuria.

**Distribution**: India: Meghalaya (Shillong), Sikkim, Uttar Pradesh and West Bengal.

192. *Greenidea (Trichosiphum) camelliae* Agarwala and Ghosh

Material examined: 1 aptera


Distribution: India: Meghalaya (Shillong).

Remarks: The species is originally described from Meghalaya.

193. Greenidea (Trichosiphum) formosana formosana (Maki)

1916. Trichosiphum formosana Maki, M., Coll. Essays for Nawa, Gifu, 13 (Partim)


Material examined: 7 apterae and 1 alata.


Distribution: India: Meghalaya (Morch), Manipur, West Bengal. Elsewhere: Bangladesh; China; Indonesia; Japan; Nepal; Taiwan.

194. Greenidea (Trichosiphum) prunicola Ghosh, Banerjee and Raychaudhuri


Material examined: 1 aptera


Distribution: India: Meghalaya (Shillong), Sikkim.

195. Greenidea (Trichosiphum) quercicola Basu, Ghosh and Raychaudhuri [Fig. 63]


Material examined: 1 aptera.


Distribution: India: Meghalaya (Shillong), Manipur.

196. Greenidea (Trichosiphum) sikkimensis Raychaudhuri, Ghosh, Banerjee and Ghosh


Material examined: 6 apterae and 1 nymph.

Distribution: India: Meghalaya (Pynursha), Sikkim.

Genus 81. *Greenideoida* van der Goot


Key to the subgenera of genus *Greenideoida*

1(2) First tarsal segments with 5 ventral hairs; antennae 5-segmented; media of forewings twice-branched, hind wings with 1 oblique vein................................................. *Pentatrichosiphum*

2(1) First tarsal segments with 7 ventral hairs; antennae 6-segmented ............................................. 3

3(4) Hind tibiae with transverse cuts; media of forewings once branched......................................................... *Paragreenideoida*

4(3) Hind tibiae without transverse cuts; media of forewings twice branched............................................. *Neogreenideoida*

197. *Greenideoida* (*Neogreenideoida*) *bengalensis* Raychaudhuri and Chatterjee


Material examined: Nil

Distribution: India: Meghalaya, West Bengal.

198. *Greenideoida* (*Paragreenideoida*) *ceyloniae* van der Goot

1905. *Greenidea* *artocarpi* Schouteden, H. *Spolia Zeylan.*, 2 : 181 (Partim).


Material examined: Nil

Distribution: India: Meghalaya, Assam, Tripura, South India. Elsewhere: Malaysia; The Philippines; Sri Lanka.

199. *Greenideoida* (*Pentatrichosiphum*) *luteum* (Basu, A. N.)


Material examined: 1 aptera and 2 nymphs


Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Sikkim, West Bengal. Elsewhere: Bhutan.
Genus 82. Mollitrichosiphum Suenaga


Type Species: *Trichosiphum tenuicorpus* Okajima, 1908

Key to the subgenera of genus *Mollitrichosiphum*

1(2) Flagellum with long and short hairs, radial sector curved.......................... *Metatrichosiphon*

2(1) Flagellum with hairs of nearly similar lengths, radial sector, nearly straight..............................

...................................................................................................................... *Mollitrichosiphum*

Key to the species of subgenus *Metatrichosiphon*

1(2) Longest hair on a.s.III 5.5-6.5 x b.d.III ................................................ *montanum*

2(1) Longest hair on a.s.III 2.3-4.7 x b.d.III ................................................... 3

3(4) Abdominal dorsum locally spinulose; 7th tergite with 2 hairs ......................... *kazirangi*

4(3) Abdominal dorsum never spinulose; u.r.s. 2.3-2.75 x h.t.2............................ *rhusae*

200. *Mollitrichosiphum* (*Mollitrichosiphum*) *tenuicorpus* Okajima


*Material examined*: 2 apterae and 2 alatae


*Distribution*: India: Meghalaya (Shillong), Sikkim, West Bengal. Elsewhere: Indonesia; Japan.

201. *Mollitrichosiphum* (*Metatrichosiphon*) *montanum* (van der Goot)


*Material examined*: 1 aptera


*Distribution*: India: Meghalaya (Shillong), Sikkim, Uttar Pradesh, West Bengal. Elsewhere: Nepal.


*Material examined*: 3 apterae


*Distribution*: India: Meghalaya (Barapani).
Remarks: This is an endemic species originally described from Meghalaya.

Subfamily V. HORMAPHIDINAE

Key to tribes:

1(2) Frons with a pair of horn-like processii; Siphunculi present usually pore-like.................................
.................................................................................................................................Cerataphidini

2(1) Frons without horn-like processii. Siphunculi pore-like or absent; apterae aleyrodiform...........
.................................................................................................................................Nipponaphidini

Tribe Cerataphidini

Key to genera of Cerataphidini:

1(2) Frons without any process or tubercle.....................................................................................3

2(1) Frons often with distinct frontal process or lowly elevated tubercles.................................5

3(4) Body aleyrodiform in apterae, with row of wax glands arranged along entire margin...........
.................................................................................................................................Aleurodaphis

4(3) Body without wax glands as above.................................................................Glyphinaphis

5(6) Frons with a median and low lateral blunt tubercles, each with a short spine; median tubercle deeply notched..........................................................Tuberaphis

6(5) Frons with a pair of horn-like processii; Dorsum with variable wax glands..................7

7(8) Pronotum in apterae with two pleural grooves, separated by a median ridge; 8th tergite in apterae with small wax pores or distinct wax gland cells in oval plates..................
.................................................................................................................................Pseudoregma

8(7) Pronotum without deep pleural grooves; wax gland groups variable.........................9

9(10) Wax gland groups composed of rounded cells or some irregularly-shaped one; first instar larvae with long, slender pointed frontal horns.................................................Ceratovacuna

10(9) At least marginal wax gland groups on abdomen with transversely oval cells arranged in a row. First instar larvae with thick and strongly conical, frontal horns.................................Astegopteryx

Genus 83. Aleurodaphis van der Goot

1917. Aleurodaphis van der Goot, P., Contr. Faune Indes., 1(3) : 239

Type species: Aleurodaphis blumeae v.d. Goot, 1917.

203. Aleurodaphis blumeae van der Goot [Fig. 67]


Material examined: 5 apterae


Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, West Bengal. Elsewhere: Indonesia, Japan, Korea, Taiwan.

Genus 84. Astegopteryx Karsch, 1890


204. Astegopteryx bambusae (Buckton)


Material examined: 10 apterae

Host plant and locality: Bamboo, Shillong, 16.5.1974, A. C. Sukla.

Distribution: India: Meghalaya (Shillong), North West and North East India.

Genus 85. Ceratovacuna Zehntner


Key to the species of the genus Ceratovacuna:

1(2) Dorsum of abdomen without spinal and pleural wax gland cell groups ......................... spinulosa
2(1) Dorsum of abdomen usually with spinal wax gland cell groups............................................... 3
3(4) Dorsal abdominal hairs with normal or swollen apices. Longest hair on antennal segment III at most equal to the basal diameter of the segment...................................................... silvestrii
4(3) Dorsal abdominal hairs with acute apices. Longest hair on antennal segment III upto 2.20 X as long as the basal diameter of the segment...................................................... perglandulosa

205. Ceratovacuna perglandulosa Basu, Ghosh & Raychaudhuri [Figs. 69, 70]


Material examined: Many apterae and nymphs.


Distribution: India: Meghalaya (Shillong), Arunachal Pradesh, Assam, Sikkim, West Bengal.

Remarks: This species is originally described from Meghalaya.

206. Ceratovacuna silvestrii (Takahashi)


*Material examined*: Four apterae


*Distribution*: India: Meghalaya (Mawphlang), Arunachal Pradesh, Assam, Manipur, Nagaland, Meghalaya, Sikkim, Tripura, West Bengal. Elsewhere: China.

207. *Ceratovacuna spinulosa* Ghosh and Raychaudhuri


*Material examined*: Two apterae and Five nymphs.


*Distribution*: India: Meghalaya (Shillong), Manipur, West Bengal.

Genus 86. *Glyphinaphis* van der Goot


208. *Glyphinaphis bambusae* van der Goot [Fig. 68]


*Material examined*: Four apterae and nymphs.

*Host plant and locality*: Bamboo, Shillong, 30.6.1977, (K. Deb coll.)


Genus 87. *Pseudoregma* Doncaster


Type species: *Pseudoregma bucktonii* Doncaster, 1966

Key to the species of the genus *Pseudoregma* :

1(2) Dorsoapical hairs on second tarsal segments with funnel-shaped apices; frontal horns small blunt..........................................................................................................................................................*panicola*

2(1) Dorsoapical hairs of two types, one with expanded, apex, other with normal apex ............... 3
3(4) Fore wings with a distinct pale area along the inner margin, extending all along the length of subcosta; eighth tergite with 6 hairs; cauda with 10 to 12 hairs ...................... *alexanderi*

4(3) Fore wings without pale area along the inner margin of subcosta................................. *bucktoni*
209. *Pseudoregma alexanderi* (Takahashi)


**Material examined**: Many apterae and alatae.

**Host plant and locality**: Plant and locality: Bamboo, Cherrapunji, 28.5.1968.

**Distribution**: India: Meghalaya (Cherrapunji), Manipur, Nagaland, Sikkim, West Bengal. Elsewhere: Nepal, Taiwan.

**Remarks**: Originally described under *Oregma* the species was transferred to *Pseudoregma* by A. N. Basu (1968).


**Material examined**: Nil.


211. *Pseudoregma panicola* (Takahashi)


**Material examined**: 5 apterae


**Distribution**: India: Meghalaya (Borapani, Shillong), Arunachal Pradesh, Manipur, Sikkim, Tamil Nadu, West Bengal. Elsewhere: Mauritius, Formosa, Japan, Australia, New Zealand, Africa, Puerto Rico, Cuba.

**Genus 88. Tuberaphis** Takahashi


**Type species**: *Tuberaphis coreanus* Takahashi, 1933.

212. *Tuberaphis loranthi* (van der Goot)

Material examined: 2 apterae, 1 alata and 10 nymphs.


Biology: The dirty green to brownish insects form small or large colonies, covered with white waxy secretion and often cause marginal folds on leaves insides which the insects live [Ghosh, A. K. (1988)].

Distribution: India: Meghalaya (Shillong), West Bengal. Elsewhere: Indonesia, Java.

Key to the genera of Nipponaphidini

1(2) Sipunculi present. Prosoma never completely fused with abdominal segments (II to VII); rhinaria either closely placed or wide apart................................................................. 3

2(1) Sipunculi absent; antennae placed ventrally, unsegmented, abdomen with round plate-like structures, without submarginal hairs ................................................................. Neothoracaphis

3(4) Eighth tergite always with hairs; antennae reduced; rhinaria closely placed................................................................. Metanipponaphis

4(3) Eighth tergite usually with 4 to 8 hairs; cauda broader than long and appears semioval ...... 5

5(6) Dorsum of prosoma with distinct spinal and lateral finge-like tubercles; eighth tergite with four hairs .................................................................................. Indonipponaphis

6(5) Dorsum of prosoma variably puslulate, without any finge-like tubercles......................... 7

7(8) Tergum smooth but bearing pointed Triangular spine-like pustules................................. Sinonipponaphis

8(7) Tergum never with triangular spine-like pustules.............................................................. 9

9(10) Abdominal segments (II to VII) with six pairs of submarginal hairs, but without any posteromesial hairs at hind end; eighth tergite with 2 to 4 hairs.............................. Thoracaphis

10(9) Abdominal segments (II to VII) always with a pair of posteromesial hairs at hind end; eighth tergite with 4 to 8 hairs................................................................. Nipponaphis

Genus 89. Neothoracaphis Takahashi


Type species: Nipponaphis yononis Matsumura.

213. Neothoracaphis sutepensis (Takahashi)


Material examined: Many apterous aliicolae.

**Distribution**: India: Meghalaya (Khasi Hills), Manipur. Elsewhere: China, Thailand.

**Remarks**: The aphids are dark and form small colonies on undersurface of leaves of the host plant at temperate climatic condition.

Genus 90. *Nipponaphis* Pergande


Type species: *Nipponaphis distychii* Pergande

Key to the species of *Nipponaphis*:

1(2) Prosoma incompletely separated from fused abdominal segments (2-7); submarginal hairs of variable lengths ................................................................. *himalayensis*

2(1) Prosoma completely separated from fused abdominal segments (2-7); only 4th and 5th pair of submarginal hairs much shorter than others .............................................. *machiliphaga*

214. *Nipponaphis* (*Pseudonipponaphis*) *himalayensis* Ghosh and Raychaudhuri


**Material examined**: 7 apterous alicolae.

**Host plant and locality**: *Litsea* sp., Garampani, Meghalaya, 26.1.1975, (Z.S.I., coll.).

**Distribution**: India: Meghalaya (Garampani), Assam, West Bengal. Elsewhere: Japan.

215. *Nipponaphis* (*Pseudonipponaphis*) *machiliphaga* Takahashi


**Material examined**: 7 apterous alicolae.

**Host plant and locality**: *Litsea* sp., Garampani, Meghalaya, 26.1.1975 (Z.S.I. coll.).

**Distribution**: India: Meghalaya (Garampani), Assam, West Bengal. Elsewhere: Japan.

Genus 91. *Indonipponaphis* Ghosh and Raychaudhuri


216. *Indonipponaphis tuberculata* Ghosh and Raychaudhuri


**Material examined**: 5 apterae.
Host plant and locality: Quercus dealbata, Shillong, H. Banerjee.

Distribution: India: Meghalaya (Shillong).

Remarks: This is an endemic species.

Genus 92. *Metanipponaphis* Takahashi


Key to the species of *Metanipponaphis*:

1(2) Prosoma with numerous round to irregular pustules being spiny and hook-like on marginal area........................................................................................................... *echinata*

2(1) Prosoma with round oval, polygonal pustules but these never appear spiny; body large (1.7-1.8 mm) ........................................................................................................... *assamensis*

217. *Metanipponaphis assamensis* Ghosh and Raychaudhuri


Material examined: 4 apteræ.

Host plant and locality: Castanopsis tribuloides, Shillong, 12.3.1969, C. U. coll.

Distribution: India: Meghalaya (Shillong).

Remarks: This is also an endemic species to India.

218. *Metanipponaphis echinata* A. K. Ghosh


Material examined: 6 apteræ.


Distribution: India: Meghalaya (Old Barapani).

Remarks: This is again an endemic species to India.

Genus 93. *Sinonipponaphis* Tao


219. *Sinonipponaphis monzeni* (Takahashi)


Material examined: 2 apteræ, 2 alatae, 2 nymphs.

**Distribution:** India: Meghalaya (Shillong). Elsewhere: Japan.

Genus 94. *Thoracaphis* v.d. Goot


Type species: *Thoracaphis arboris* van der Got, 1917.

220. *Thoracaphis quercifoliae* A. K. Ghosh


**Material examined:** 9 apterae.

**Host plant and locality:** *Quercus dealbata*, Shillong, 26.3.1972, Z.S.I. coll.

**Distribution:** India: Meghalaya (Shillong).

Subfamily VI. LACHNINAE

**Key to the tribes:**

1(2) U.r.s. always blunt, rostral segment 5 reduced; fore wing often with pigmentation................

.................................................................................................................................................. Lachnini

2(1) U.r.s. usually acuminate, distinctly divided into segment 4 and 5; fore wing usually hyaline.

.................................................................................................................................................. Cinarini

**Tribe** CINARINI

**Key to the subtribes:**

1(2) Body elongate or elongate oval. Epicranial suture obscure or invisible or distinct. Ultimate rostral segment short and blunt, segment 5 indistinctly separated from segment 4. Siphunculi hardly elevated, with or without any surrounding hairs. First tarsal segment sometimes with a pair of dorsal hairs.............................. *Eulachnina*

2(1) Body rounded. Epicranial suture usually distinct. Ultimate rostral segment pointed, distinctly divided into segment 4 and 5. Siphunculi on small to large, sclerotic cones, bearing many hairs. First tarsal segments never with dorsal hairs.............................. *Cinarina*

**Subtribe** CINARINA

Genus 95. *Cinara* Curtis


Type species: *Aphis pini* Linnaeus, 1758

221. *Cinara atrotibialis* David and Rajasingh [Fig. 66]


Material examined: Many apterae and nymphs.


Distribution: India: Meghalaya (Shillong), Himachal Pradesh, Manipur. Elsewhere: Thailand, Philippine Is.

Remarks: The species is characterised by its abdominal dorsum with many scattered dark brown hair bearing slerites.

Subtribe Eulachnina

Genus 96. Eulachnus del Guercio

Type species: Lachnus agilis Kaltenbach

222. Eulachnus thunbergii Wilson


Material examined: 5 apterae


Distribution: India: Meghalaya (Shillong, Mawphlang), Arunachal Pradesh, Assam, Manipur, Nagaland. Elsewhere: Japan, Korea, Formosa and Australia.

Remarks: The species is recognisable by its dirty green to brown coloured colonies on pine needles.

Tribe LACHNINI

Key to the genera of Lachnini

1(8) Forewings with pterostigma elongate, radial sector little curved or straight. Wings immaculate. Apterae may be with or without a single tubercle on 4th abdominal tergite...... 2

2(3) Eyes without ocular tubercles. Dorsal cephalic hairs long and fine, may be up to 6.5 X as long as the basal diameter of antennal segment III. Forewings with median much paler and thinner than other veins, may be simple, once or twice-branched...................................................

.............................................................................................................................................. Nippolachnus

3(2) Eyes with distinct ocular tubercles. Dorsal cephalic hairs up to 3.5X as long as the basal diameter of antennal segment III. Forewings with media as dark as or paler than other veins, usually twice branched ................................................................. 4

4(5) Abdominal dorsum with a large spinal tubercle on 4th tergite. Flagellum with secondary rhinaria on segment IV in apterae and on segments III and IV in alatae. Hairs on the hind tibiae up to 0.70 X as long as the diameter at the middle of hind tibiae............................... Tuberolachnus
5(4) Abdominal dorsum without tubercle on 4th tergite. Flagellum with secondary rhinaria on segments III-IV in apterae and in alatae. Hairs on hind tibiae shorter or longer than the diameter at the middle of hind tibiae........................................................................................................ 6

6(7) Hairs on flagellum and dorsum of abdomen fine, always longer than the basal diameter of antennal segment III. Abdominal dorsum with large marginal sclerites........................................................................................................ Longistigma

7(6) Hairs on flagellum and dorsum of abdomen fine or thick, those on flagellum shorter or longer than the basal diameter of antennal segment III. Abdominal dorsum without large marginal sclerites, as above ........................................................................ Pyrolachnus

8(1) Forewings with pterostigma blunt; radial sector usually curved. Wings often variably pigmented or with a dark or pale. Apterae with ocular tubercles and never with a single dorsal tubercle on 4th tergite .................................................................................. 9

9(10) Abdominal dorsum with hair-bearing scleroites, which may sometimes become confluent. Ultimate rostral segment much shorter than or nearly equal to second segment of hind tarsus and bearing 10-15 accessory hairs. Hind legs usually similar to fore and mid legs. Forewings with a pigmented blotch at base of media. On Rosa and Rubus ........................................................................................................ Maculolachnus

10(9) Abdominal dorsum usually without scleroites as above. Ultimate rostral segment shorter or longer than second segment of hind tarsus and bears 6 to more than 20 accessory hairs. Hind legs much elongated. Forewings usually strongly variegated. On various dicotyledons ........................................................................................................ Lachnus

Genus 97. Lachnus Burmeister


Type species: Lachnus fasciatus Burmeister (= Aphis roboris Linnaeus).

223. Lachnus tropicalis (van der Goot) [Fig. 65]


Material examined: 4 apterae and 1 alata.


Biology: This species usually forms small to medium-sized colony on the stems of the host plants.

Genus 98. *Longistigma* Wilson


Type species: *Aphis caryae* Harris

224. *Longistigma liquidambarus* (Takahashi)


*Material examined*: 5 alatae and nymphs.


Genus 99. *Maculolachnus* Gaumont


Type species: *Aphis submacula* Walker (= *Lachnus rosae* Cholod.)

225. *Maculolachnus rubi* Ghosh and Raychaudhuri


*Material examined*: 3 apterae and nymphs.


*Distribution*: India: Meghalaya (Shillong).

*Remarks*: This species is so far known from Meghalaya only.

Genus 100. *Nipplachnus* Matsumura


Type species: *Nippolachnus piri* Matsumura, 1917

Key to the species of *Nippolachnus*

Apterous viviparous females:

1(2) U.r.s. with 9 to 14 accessory hairs, p.t. with only a few terminal setae, without any hairs......

2(1) U.r.s. with 18-20 accessory hairs; p.t. with a few fine hairs besides terminal setae............*pyri*

226. *Nippolachnus bengalensis* Basu and Hille Ris Lambers


*Material examined*: One apterous viviparous female and two nymphs.

Distribution: India: Meghalaya (Shillong), West Bengal.

227. Nippolachnus pyri (Matsumura)


Material examined: 6 apterae and 2 alatae.

Host plant and locality: Pyrus communis, Shillong, 8.10.1972.

Distribution: India: Meghalaya (Shillong), West Bengal. Elsewhere: Korea, Japan, Taiwan and Malaya.

Genus 101. Pyrolachnus Basu and H.R.L.


Type species: Lachnus pyri Buckton, 1899

228. Pyrolachnus Pyri (Buckton)


Material examined: 3 apterae and nymphs.


Distribution: India: Meghalaya (Shillong), Tamil Nadu, West Bengal.

Genus 102. Tuberolachnus Mordvilko


Type species: Aphis viminalis B. d. Fonscolombe

229. Tuberolachnus salignus (Gmelin)


Material examined: 5 apterae, 3 alatae and nymphs.


Distribution: India: Meghalaya (Shillong), widely distributed throughout the country and virtually cosmopolitan except in Australia.

Subfamily VII. PEMPHIGINAE

Key to the tribes of Pemphiginae

1(2) Siphunculi present as cones or as rings, surrounded by a few hairs; wax glands present........

............................ Eriosomatini

..........................................................
2(1) Siphunculi absent or very feebly developed, without any hair; wax glands may be present or absent....................................................................................................................................... 3

3(4) U.r.s. with a few or without accessory hairs; wax gland groups in apterae each bearing a hair, long or inconspicuous .......................................................................................................................Pemphigini

4(3) U.r.s. with 2-many accessory hairs (up to 20); wax glands absent or inconspicuous, in apterae never with hair................................................................................................................................. Fordini

Tribe Eriosomatini
Genus 103. Eriosoma Leach

   Type species: Eriosoma mali Leach = Aphis lanigera Hausmann

230. Eriosoma lanigerum (Hausmann)

1802. Aphis lanigerum Hausmann, Illigers Mag. Insek.t., 1(3-4) : 440.


Material examined: Many apterae and nymphs.

Distribution: India: Meghalaya (Shillong), widely distributed Cosmopolitan.

Remarks: Fotedar and Kapur (1943) described about the life cycle of the species in Kashmir.

Tribe Pemphigini
Genus 104. Prociphilus Koch

   Type species: Aphis bunelieae Schrank, 1801.

231. Prociphilus osmanthaE Essig & Kuwana


Material examined: 2 alatae and 1 nymph.

Distribution: India: Meghalaya (Shillong); Elsewhere: Japan.

Tribe Fordini
Genus 105. Geoica Hartig

   Type species: Geoica quamosa Hart 1894 = Pemphigus urticarius Passerini, 1856.

232. Geoica lucifuga (Sehntner)

Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

<table>
<thead>
<tr>
<th>Name of Species/Subspecies</th>
<th>East Garo hills</th>
<th>West Garo hills</th>
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Subfamily  I. Anoeciinae
Tribe       Aiceonini
Genus 1. *Aiceona* Takahashi
   1. *A. robustiseta* Ghosh and Raychaudhuri

Subfamily II. Aphidinae
Tribe *Aphidini*
Subtribe *Aphidina*
Genus 2. *Aphis* Linnaeus
   2. *Aphis citricola* Patch
   3. *A. craccivora* Koch
   4. *A. fabae solanella* Theobald
   5. *A gossypii* Glover
   6. *A. kuroswai* Takahashi
   7. *A. longisetosa* Basu
   8. *A. nasturtii* Kaltenbach
   9. *A. nerii* Boyer de Fonscolombe
   10. *A. polygonaceae* Matsumura
   11. *A. punicae* Passerini
Genus 3. *Toxoptera* Koch
   12. *Toxoptera anrantii* B.d.F.
   13. *T. citricidus* (Kirkaldy)
   14. *T. odinae* (van der Goot)
   15. *Hyalopterus atriplicis* (Linn.)
   16. *Hyalopterus pruni* (Geoffroy)
Genus 5. *Hysteroneura* Davis
   17. *Hysteroneura setariae* (Thomas)
Genus 6. *Melanaphis* van der Goot
   18. *Melanaphis arundinariae* (Takahashi)
   19. *M. donacis* (Passerini)
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<tr>
<td>20. <em>M. meghalayensis meghalayensis</em> Raychaudhuri &amp; Banerjee</td>
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<td>21. <em>Melanaphis sacchari</em> (Zehntner)</td>
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<td><strong>Genus 7. Rhopalosiphum</strong> (Koch)</td>
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<td>22. <em>Rhopalosiphum maidis</em> (Fitch)</td>
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<td>23. <em>R. nymphaeae</em> (Linnaeus)</td>
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<td>24. <em>R. padi</em> (Linnaeus)</td>
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<td>25. <em>R. rufiabdominalis</em> (Sasaki)</td>
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<td>27. <em>Schizaphis graminum</em> (Rondani)</td>
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<td>28. <em>S. punjabipyri</em> (Das)</td>
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<td>29. <em>S. rotundiventris</em> (Signoret)</td>
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<td><strong>Tribe MACROSIPHINI</strong></td>
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<td><strong>Genus 9. Acutosiphon</strong> Basu, Ghosh and Raychaudhuri</td>
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<td>30. <em>Acutosiphon obliquoris</em> Masu et al.</td>
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<td><strong>Genus 10. Acyrthosiphon</strong> Bordvilko</td>
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<td>31. <em>Acyrthosiphon pisum</em> (Harris)</td>
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<td><strong>Genus 11. Akkaia</strong> Takahashi</td>
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<td>32. <em>Akkaia bengalensis</em> Basu</td>
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<td><strong>Genus 12. Amorphophora</strong> Buckton</td>
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<td>33. <em>Amorphophora ampullata bangalensis H.R.L.</em></td>
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<td><strong>Genus 13. Anthracosiphoniella</strong> Basu</td>
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<td>34. <em>Anthracosiphoniella macula</em> Basu</td>
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<td><strong>Genus 14. Aulacorthum</strong> Mordvilko</td>
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<td>35. <em>Aulacorthum cornaceae</em> Ghosh</td>
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<td>36. <em>A. dasi</em> Ghosh, Basu and Raychaudhuri</td>
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<td>37. <em>A. magnolieae</em> (Essig &amp; Kuwana)</td>
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<td>38. <em>A. nipponicum</em> (Essig &amp; Kuwana)</td>
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Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

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39. *A. rhamni* Ghosh *et al.*
40. *A. scirpi* van der Goot
41. *A. solani* (Kaltenbach)

Genus 15. *Brachycaudus* van der Goot
42. *Brachycaudus hilichrysi* (Kaltenbach)
43. *Brachycaudus persicaecola* (Boisduval)

Genus 16. *Brevicoryne* Linnaeus
44. *Brevicoryne brassicae* (Linnaeus)

Genus 17. *Capitophorus* van der Goot
45. *Capitophorus archangelskii* Nevsky
46. *Capitophorus carduinus* (Walker)
47. *C. elaeagni* (del Guercio)
48. *C. formosartemisiae* (Takahashi)
49. *C. hippophaes javanicus* H.R.L.
50. *C. h. mitegoni* Eastop
51. *C. indicus* Ghosh & Raychaudhuri
52. *C. meghalayensis* Basu and Raychaudhuri
53. *C. vernoniae* Ghosh & Raychaudhuri

Genus 18. *Cavariella* del Guercio
54. *Cavariella araliae* Takahashi
55. *C. aegopodi* (Scopoli)
56. *C. biswasi* Ghosh *et al.*
57. *C. salicicola* (Matsumura)

Genus 19. *Chaetomyzus* Ghosh and Raychaudhuri
58. *Chaetomyzus rhododendri* Ghosh & Raychaudhuri

Genus 20. *Coloradoa* Wilson
59. *Coloradoa rufomaculata* (Wilson)

Genus 21. *Cryptomyzus* Oestlund
60. *Cryptomyzus taoi* H.R.L.
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<td>Genus 22. Cryptosiphum Buckton</td>
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<td>61. Cryptosiphum artemisiae Buckton</td>
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<td>62. D. sonchi (Linnaeus)</td>
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<td>63. D. pseudotanaceti Verma</td>
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<td>64. D. (Uromelan) compositae Theob.</td>
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<td>65. Diphorodon cannabis (Passerini)</td>
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<td>66. Dysaphis pyri (Boyer de Fonscolombe)</td>
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<td>67. Hayhurstia atriplicis (Linnaeus)</td>
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<td>68. Hyadaphis corianári (Das)</td>
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<td>69. Hyperomyzus carduellinus (Theobald)</td>
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<td>Genus 29. Indumasonaphis. Raychaudhuri et al.</td>
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<td>70. Indumasonaphis inulæ (Ghosh &amp; Raychaudhuri)</td>
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<td>Genus 30. Liosomaphis Walker</td>
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<td>71. Liosomaphis himalayensis Basu</td>
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<td>72. Lipaphis erysìmi Kaltenbach</td>
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<td>Genus 32. Macromyzus Takahashi</td>
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<td>73. Macromyzus woodwardi Takahashi</td>
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<td>Genus 33. Macrosiphoniella del Guercio</td>
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<td>74. Macrosiphoniella formosartemisiae Takahashi</td>
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<td>75. M. matsumurana Ghosh et al.</td>
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<td>76. M. pseudoartemisiae Shinji</td>
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<th>East Khasi hills</th>
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<th>Ribhoi</th>
<th>Jayantia hills</th>
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<td>77. M. sanborni (Gillette)</td>
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<td>78. M. spinipes Basu</td>
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<td>79. M. yomogifoliae (Shinji)</td>
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<td>David, Narayanan &amp; Rajasingh</td>
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<td>88. M. (S.) fagopyri Ghosh and Raychaudhuri</td>
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<td>92. M. (S.) mimosae Ghosh et al.</td>
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<td>94. M. (S.) plectranthi Ghosh et al.</td>
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<td>98. M. (S.) takahashii Eastop</td>
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<th>Jayanta hills</th>
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<td>102. <em>Micromyzodium filicium</em> David</td>
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<td>104. <em>M. mawphlangensis</em> Ghosh</td>
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<td>107. <em>M. brevisiphon</em> Basu</td>
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<td>108. <em>M. cerasi</em> (Fabricius)</td>
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<td>109. <em>M. cymballarietus</em> Stroyan</td>
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<td>110. <em>M. dycei</em> Carver</td>
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<td>111. <em>M. indicus</em> Basu &amp; Raychaudhuri</td>
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<td>113. <em>M. monoji</em> Basu &amp; Raychaudhuri</td>
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<td>114. <em>M. obtusirostris</em> David et al.</td>
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<td>115. <em>M. ornatus</em> Laing</td>
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<td>117. <em>M. siegesbeckicola</em> Strand</td>
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<td>Genus 41. <em>Neohyalomyzus</em> Basu et al.</td>
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<td>Genus 42. <em>Neomegouropsis</em> Ghosh et al.</td>
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<td>119. <em>Neomegouropsis cajanae</em> Ghosh &amp; Raychaudhuri</td>
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<td>120. <em>Neomyzus</em> (<em>Neomyzus</em>) <em>circumflexus</em> Buckton</td>
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<td>121. <em>N. (N.) primulum</em> Ghosh et al</td>
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<td>Genus 44. <em>Ovatus</em> van der Goot</td>
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<td>122. <em>Ovatus minutus</em> van der Goot</td>
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Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

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<td>124. Pentalonia nigronervosa Coquerel</td>
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<td>133. Sinoemegoura citricola (van der Goot)</td>
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<td>138. <em>Tricaudatus polygoni</em> (Narzikulov)</td>
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<td>144. <em>V. verbasci</em> Chawdhuri et al.</td>
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Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

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<td>166. Allotrichosiphum assamense Raychaudhuri et al.</td>
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<td>Genus 78. Brevitrichosiphon Raychaudhuri et al.</td>
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<td>167. Brevitrichosiphon mukerjii Raychaudhuri et al.</td>
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Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

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Genus 79. *Eutrichosiphum* Essig & Kuwana

168. *Eutrichosiphum alnicola* Basu
169. *E. assamense* Ghosh *et al.*
170. *E. blackmanum* Agarwala and Ghosh
171. *E. dubium* (van der Goot)
172. *E. flavum* Takahashi
173. *E. khasyanum* Ghosh & Raychaudhuri
174. *E. makii* Raychaudhuri & Chatterjee
175. *E. neotattakanum* Agarwala and Ghosh
176. *E. pseudopasaniae* Szelegiewicz
177. *E. pyri* Chakrabarti, Ghosh & Raychaudhuri
178. *E. rameshi* (Raychaudhuri *et al.*)
179. *E. raychaudhuri* Ghosh
180. *E. russellae* (Ghosh *et al.*)
181. *E. sankari* Raychaudhuri *et al.*
182. *E. sensoriatum* (Ghosh)
183. *E. subinoyi* Raychaudhuri *et al.*
184. *E. tattakanum* (Takahashi)

Genus 80. *Greenidea* Schouteden

185. *Greenidea (Greenidea) artocarpi* (Westwood)
186. *G. (G.) decaspermi* Takahashi
188. *G. (G.) longicornis* (Ghosh & Raychaudhuri)
189. *G. (G.) lonirostris* Basu
190. *G. (Paragrennidea) symplocosis* Ghosh *et al.*
191. *G. (Trichosiphum) bucktonis* Ghosh *et al.*
192. *Greenidea (Trichosiphum) camelliae* Agarwala and Ghosh
193. *G. (T.) formosana formosana* (Maki)
### Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

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<td>**193A. **G. (T.) manii Ghosh et al.</td>
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### Systematic List of Aphididae of Meghalaya

#### Name of Species/Subspecies | East Garo hills | West Garo hills | South Garo hills | East Khasi hills | West Khasi hills | Ribhoi | Jayanta hills
--- | --- | --- | --- | --- | --- | --- | ---

| 210. | *P. bucktoni* Ghosh, Pal and Raychaudhuri | +(?)
| 211. | *P. panicola* (Takahashi) | + | +

**Genus 88. Tuberaphis** Takahashi

| 212. | *Tuberaphis loranthi* (van der Goot) | +

**Tribe Nipponaphidini**

**Genus 89. Neothoracaphis** Takahashi

| 213. | *Neothoracaphis sutepe* (Takahashi) | +

**Genus 90. Nipponaphis** Perga.

| 214. | *Nipponaphis (P.) himalayensis* Ghosh & Raychaudhuri | +
| 215. | *N. (P.) machiliphaga* Takahashi | +

**Genus 91. Indonipponaphis** Ghosh and Raychaudhuri

| 216. | *Indonipponaphis tuberculata* Ghosh and Raychaudhuri | +

**Genus 92. Metanipponaphis** Takahashi

| 217. | *Metanipponaphis assamensis* Ghosh & Raychaudhuri | +
| 218. | *M. echinata* Ghosh | +

**Genus 93. Sinonipponaphis** Tao

| 219. | *Sinonipponaphis monzeni* (Takahashi) | +

**Genus 94. Thoracaphis** van der Goot

| 220. | *Thoracaphis quercifoliae* Ghosh | +

**Subfamily VI. Lachninae**

**Tribe Cinarini**

**Subtribe Cinarina**

**Genus 95. Cinara** Curtis

| 221. | *Cinara atrotibialis* David & Rajasingh | +

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**Table : Distribution of Aphid species/subspecies in different districts of Meghalaya**
Table: Distribution of Aphid species/subspecies in different districts of Meghalaya

<table>
<thead>
<tr>
<th>Name of Species/Subspecies</th>
<th>Systematic List of Aphididae of Meghalaya</th>
<th>East Garo hills</th>
<th>West Garo hills</th>
<th>South Garo hills</th>
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<th>West Khasi hills</th>
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<td>225. Maculolachnus rubi Ghosh &amp; Raychaudhuri</td>
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D. Nippolachnus pyri Matsumura  
E. Aleurodaphis blumae v.d. Goot  
F. Tuberculatus nervatus Chakrabarti and Raychaudhuri  
G. Micromyzus kalimpongensis Basu  
H. Brachycaudus helichrysi (Kalt.)  
I. Semiaphis heraclei Tak.  
J. Aphis gossypii Glover  
K. Myzus (Nectarosiphon) persicae (Sulzer)  
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Fig. 70. Ceratovacuna silvestri (Takahashi) : Alate viviparous female X 26

**Material examined**: 1 alata.

**Host plant and locality**: From yellow Pan trap, Shillong, 2.4.1969 (C.V. Coli.).

**Distribution**: India: Meghalaya (Shillong), Manipur, Sikkim, West Bengal. Elsewhere: Pakistan, Sri Lanka, Malaya, Central Asia, China, Java, Philippines, Australia, Middle East (Egypt, Israel).

**Remarks**: In Meghalaya apterae appear to be common throughout the year on the roots of graminaceous plants. The aphids are always associated with ants.

**ENDEMISM**

Analysis of data on the aphids of Meghalaya reveals that out of 232 species belonging to 105 genera so far known from the state, altogether 50 species (21.5% of total species) and 35 genera (33.3% of total genera) are found to be endemic. On the other hand, aphids of Meghalaya represent endemism of about 7% species and 16.5% genera of total known Indian fauna. Similarly, aphid fauna of Meghalaya represents 5% endemism in species level and 13.8% in generic level so far as Oriental fauna is concerned.

Again, out of 8 subfamilies represented in Meghalaya the subfamily Aphidinae represents maximum number of endemic species as 25 out of 144 and 18 out of 60 genera so far known from the state. This is followed by 10 species and 4 genera out of 42 and 9 respectively in the subfamily Greenideinae, equal number (4) of species and genera out of 18 species and 12 genera in the subfamily Hormaphidinae. The subfamily Lachninae shows rather poor aphid fauna with 2 endemic genera and species. The subfamilies Anoeciinae and Pemphiginae represents apparently no such endemism. However, extensive and intensive surveys in all the districts in the state of Meghalaya may reveal many more species and genera including endemic ones.

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<td>V. Hormaphidinae</td>
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<td>VII. Pemphiginae</td>
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**Total**: 105 (35) 232 (50)
SUMMARY AND CONCLUSION

A retrospect of the work reveals that a total of 232 species / subspecies of aphids belonging to 105 genera distributed over 7 subfamilies of the family Aphididae occur in the State of Meghalaya. The family Aphididae, as understood here, includes Anoeciinae, Aphidinae, Drepanosiphinae, Greenideinae, Hormaphidinae, Lachninae and and Pemphiginae. A consolidated account of the aphid fauna of Meghalaya is provided in this contribution.

A look into host plant association clearly depicts polyphagism for some of these species and host restriction for the quite a few.

A critical analysis of the data reveals that aphids of Meghalaya constitute about 6% of the total species known from the world, 23% of the species from the oriental (1015 species in 253 genera : Agarwala and Ghosh, 1985) and 30% of the species from the Indian fauna.

In conclusion, it may be said that Meghalaya presents a rather rich aphid fauna and these insects resemble more closely the oriental fauna. Further, endemism of the state can well be judged from the aphids so far reported from there. Moreover, the present work has helped in extending the knowledge of distribution of already known species.

Consideration of the available data, reveals that maximum intrusion has taken place from eastern palaearctic region and from countries of South East Asia. The diverse climatological conditions together with rich floral assemblage prevailing in Meghalaya and Eastern Himalaya helped these insects to represent 6% of world fauna and 30% of Indian fauna.

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INSECTA : HEMIPTERA : COCCOIDEA

R. K. VARSHNEY
Zoological Survey of India
M-Block, New Alipore, Calcutta 700 053

INTRODUCTION

Located in the tropical rain forest of the North-eastern India, Meghalaya state is very rich in vegetation. One can see all around pine, *Pinus khasiensis*, on higher altitudes, even *Rhododendron* in highlands like Upper Shillong, and variety of ferns and other flora in lower reaches. Plantations of pineapple, apple, orange, pear, peach are plum are aplenty. Some reserve forests, like Mawphlang, are still dense and home to many beautiful orchids and butterflies. Although the increased human population and consequent urbanization has taken huge toll of populations of birds, fishes and other groups, it is a point to make that Meghalaya, like Sikkim, is still one of the best habitat in India for diversity of animal and plant species.

The coccids of Meghalaya have not been listed at one place so far. Therefore, the present paper is first report on these insects of Meghalaya. Altogether 21 species are reported here, which are undoubtedly only a small fraction of the total species that may be occurring there. For lack of adequate exploration (see Map) and neglect of these insects by insect collectors, one has to wait for more records.

Identification of genus and species of the coccids continues to be a tough task in our country. There are almost negligible identified collections in India to compare material with. Secondly, there is lack of training in the methodology of preparation of material for study, and particularly for the study of characters for identification. Till such expertise is built up and number of students take up the taxonomic study of these interesting insects, one has to depend on the available published records, which are also much scattered and sometimes not easily accessible. A literature survey has shown that there are 624 species of coccids reported from the Indian region (Varshney, 1985).

The first report of a coccid from Shillong has been probably that of the San Jose Scale, *Quadraspidiotus perniciosus*, which occurs on the twigs, leaves and even on fruits, causing formation of pink colouration at the place of attachment, on the trees of apple, plum, peach and pear. It was reported by Rao & Chatterjee (1950) from Meghalaya, who also reported some other scale insects usually mistaken for the San Jose Scale. Borchsenius (1964, 1967) reported a few new species from Shillong. Varshney (1968) reported a new lac insect, *Paratachardina mithila*, from the Ward's Lake Gardens in Shillong.

The author conducted a short field survey in August-September 1991, in the then 5 districts namely East Khasi Hills, Ri-Bhoi, Jaintia Hills, East Garo Hills and West Garo Hills. With the addition of two new districts Meghalaya has now seven districts (see Map). A few lots of collections brought by
other survey parties were also made available to author. However, the majority of reports in the present paper are from earlier published accounts.

The figures given in this paper have been reoriented after some earlier publications of the author and some other coccidologists. Only the female specimen, as visible on slide, has been figured, with indicated portions enlarged. Data on the host plants is of Meghalaya only and the detailed distribution has been confined to the Indian material only. Although no report of Family Pseudococcidae is available at present, but this family must be occurring in Meghalaya.

The coccids (scale insects and mealybugs) of Oriental region have been catalogued by Ali (1969-1974). Later on Varshney (1992) has prepared a check-list for 15 families, excluding diaspidoids. In the North-eastern India, Das & Ganguli (1962) listed coccids on tea plant; Ganguli & Ghosh (1964) and Agarwala & Varshney (1988) listed coccids of Tripura. On Meghalaya, however, this paper seems to be the first consolidated report.

A key to separate the families of Indian coccids has been published earlier in Varshney (1985) and also as relevant in the 'Fauna of West Bengal' (Varshney, 1994). It is therefore not repeated here.

**SYSTEMATIC ACCOUNT**

I. Family MONOPHLEBIDAE

Genus *Icerya* Signoret


Type species: *Dorthesia seychellarum* Westwood.

1. *Icerya zimmermani* Green


*Diagnosis*: Adult female ca. 3 mm in length and 2 mm in breadth; brown in colour; dorsum covered with white wax powder and waxy tassel of uniform length all around margin. Antenna 11 segmented. Legs well built. No prominent ovisac. Body covered with setae of various sizes. Abdominal spiracles 3 pairs. On the dorsal margin and the rest of dorsum prominent large pores with bilocular centre and with two rim loculi on each side present. Other pore details as given in Rao (1951).

*Host plants*: *Melostoma* sp., and *Citrus* sp.

*Distribution*: India : Meghalaya : Dawki and Tangla (Rao, 1951); and Bihar : Bhagalpur. Originally described from Indonesia : Java.

*Remark*: This species is not included in catalogue by Ali (1970).

Genus *Crypticera* Cockerell


Type species: *Icerya rosae* Riley & Howard.
Fig. 1. *Misracoccus assamensis* Rao
2. *Crypticerya* sp.

*Material examined:* (i) One lot, Sl. No. 5 (dry + wet); Shillong, Polo, Indira Gandhi Inst. ground; 19.9.1991; on ‘Tagar’; coll. R. K. Varshney. (ii) One lot, Sl. No. 15 (dry + wet); mild infection; Shillong, Ward’s Lake ground (1500 m); 20.9.1991; on a garden bush; coll. R.K. Varshney.

*Diagnosis:* Adult female ca. 5 mm in length and 4 mm in breadth. Body cuticle covered by setae of various sizes, those in margin being long and those in posterior region small. Antenna 11 segmented. Abdominal spiracles two pairs. At maturity not producing an ovisac. Ventrum without ovisac band of pores. Pores on dorsum and margin, with various type of margin and centre, as detailed by Rao (1951). Test of material yellow sculptured.

*Host plants:* Ervatamia coronaria and another garden bush.

*Distribution:* India: Meghalaya: Shillong; Assam; Orissa; Kerala; Karnataka and Tamil Nadu. Varshney (1992) reported 3 species of this genus in the Indian region.

**Genus Drosicha** Walker


Type species: *Drosicha contrahens* Walker.


*Material examined:* (i) One lot, Sl. No. 17 (dry + wet); E. Khasi Hills, Cherrapunjee, Mawsmai (1150 m); 21.9.1991; on an evergreen wild bush growing by roadside; coll. R.K. Varshney. (ii) One lot, Sl. No. 20 (dry + wet); Same locality as in (i); 22.9.1991; on a wild tree; coll. R.K. Varshney.

*Diagnosis:* Female body large; length upto approx. 25.0 mm. Key characters include as follows: Female: Atrium or outer chamber of the abdominal spiracles is without multilocular pores; Dorsal setae may be minute or long and slender to moderately stout in different species. Male: Expanse of wings 10 - 16 mm. Four pairs of abdominal tussels, occasionally with a fifth very short tussel on the preceding segment (cf. Green, 1924).

*Host plants:* On undetermined wild bush and tree.

*Distribution:* India: Meghalaya: Mawsmai; and widely in North India. Also in Pakistan, Bangladesh and Sri Lanka. Varshney (1992) reported 10 species of this genus in the Indian region.

**Genus Steatococcus** Ferris


Type species: *Palaeococcus morrilli* Ckll.

4. *Steatococcus assamensis* Rao


*Diagnosis:* Adult female ca. 3 mm long and 2 mm broad. Antenna 11 segmented. Legs well developed. Body cuticle with large number of setae, those in the posterior region margin longer. Body developing an internal marsupium at maturity. Band of pores present on ventrum of abdomen.
Fig. 2. *Kerria chinensis chinensis* (Mahdihassan)
forming a small circle around opening of marsupium. Body cuticle with a large number of pores of variety as detailed by Rao (1951).

**Host plant**: Citrus sp.

**Distribution**: India: Meghalaya: Dawki (Rao, 1951). Genus reported from Nearctic, Australasian and Ethiopian regions. Species known from original record only.

**Genus** *Misracoccus* Rao


Type species: *Lophococcus convexus* Morrison.

5. *Misracoccus assamensis* Rao (Fig. 1)


**Diagnosis**: Female: Body large, about 10 - 12 mm in length and 5 - 7 mm in width and 4 - 5 mm in height. Antenna 9 segmented, basal segment widest and apical segment longest. Legs well developed with a few setae on all segments. Two pairs of thoracic spiracles and 7 pairs of abdominal spiracles. Anal tube short with a double row of pores at the opening.

This species is close to *M. xyliae* but differentiates in number of antennal segments; in the shape of marginal setae; and in different pores on ventrum (Rao, 1950).

**Host plant**: Undetermined wild tree; females attached to twigs.

**Distribution**: India: Meghalaya: Shillong. Genus and species known from original record only.

II. **Family** TACHARDIIDAE

(Syn. Kerriidae: Gill, 1993)

**Genus** *Kerria* Targioni Tozzetti


Type species: *Coccus lacca* Kerr.

6. *Kerria chinensis chinensis* (Mahd.) (Fig. 2)


**Material examined**: "From old lac samples; India: Assam; coll. R.K. Varshney"; slides and wet colln.

**Diagnosis**: Female body length 6.6 - 7.1 mm, width 3.85 - 4.2 mm of mounted specimen. Female body comparatively very long. Anal tubercle with supra anal plate longer than broad. Branchia moderately elevated with minute dimples. Anterior spiracles far away from branchial plate, with a long sclerotized trail. Dorsal spine and its pedicel long. Antennae small with 2 - 3 segments. Other details as in Varshney (1977).
Fig. 3. *Paratachardina mithilae* Varshney
Host plants: Many including Samanea saman, Cajanus cajan, Schleichera sp. etc.

Distribution: India: North-Eastern India including Meghalaya: Garo Hills; Assam and West Bengal Hills. Also in Myanmar, Thailand, Nepal, Bhutan, China and South-East Asian countries.

Genus Paratachardina Balachw.


Type species: Carteria decorella Maskell.

7. Paratachardina mithilae Varshney, n. emend. (Fig. 3)


Holotype - one ex. on a slide; Regd. No. 33/H15, in the Zoological Survey of India, Calcutta. Paratypes in the Smithsonian Institution, Washington.

Diagnosis: Female body length 2.5 - 3.0 mm, width 2.8 - 3.0 mm. Lac cell or test of female almost circular, brownish-black, with 16 conspicuous longitudinal ridges.


Host plant: Photinia notoniana var. macrophylla.

Distribution: India: Meghalaya: Shillong. This species is known from original record only.

Remark: Specific epithet mithila is emended here to mithilae in accordance with the nomenclature rules.

III. Family KERMESIDAE

Genus Pseudopulvinaria Atkinson


Type species: Pseudopulvinaria sikkimensis Atkinson.

8. Pseudopulvinaria sikkimensis Atkinson


Diagnosis: Female with 6 - 7 segmented antennae, in which third segment may have two partial divisions. Species described in detail by Ferris (1950) from China. Rao & Kumar (1952) collected it at Shillong.
Fig. 4. *Coccus hesperidum* Linnaeus
**Host plants**: Quercus incana, Castanea indica and C. tribuloides.

**Distribution**: India: Meghalaya (earlier Assam): Shillong. Also in China.

**Remark**: Genus Lefroyia and its type-species *L. castaneae* proposed by Green (1908) are synonymous with this.

IV. Family COCCIDAE

**Genus Ceroplastes** Gray


Type species: *Coccus (Ceroplastes) chilensis* Gray.

9. *Ceroplastes* sp.

**Material examined**: (i) One mixed lot, Sl. No. 16 (dry + wet); Shillong, Ward’s Lake, opposite A. G. Office (1500 m); 20.9.1991; on a bush; coll. R. K. Varshney. (ii) One ex. (dry), Sl. No. 19; E. Khasi Hills, Tyrna (850 m); 22.9.1991; ex wild tree; coll. R. K. Varshney.

**Diagnosis**: Adult female roughly oval; length of body between 1.0 - 20.0 mm. Derm membraneous in young and sclerotized in old females. Two well developed anal plates borne at apex of heavily sclerotized anal tubercle. Antennae well developed with 6 - 7 segments. Legs well developed. Stigmatic setae confined to marginal area. Only one long pair of setae in the inter-antennal space. Bristle shaped setae present along body margin. Dorsal setae variable in shape and size. A systematic revision of the genus has been published by Gimpel et al. (1974).

**Host plants**: Undetermined tree and bush.


**Genus Coccus** Linnaeus


Type species: *Coccus hesperidum* Linn.

10. *Coccus hesperidum* Linnaeus (Fig. 4)


**Material examined**: (i) One lot, Sl. No. 4; mild infection; Shillong, Polo, Indira Gandhi Inst. ground; 19.9.1991; on ‘tagar’; coll. R. K. Varshney. (ii) One lot, Sl. No. 11, mild infection on leaves and shoots; Shillong, Barapani (Umiam), Lum Nehru Park (1000 m); 19.9.1991; coll. R. K. Varshney. (iii) One mixed lot, Sl. No. 21; mild infection; Shillong, Polo, Indira Gandhi Inst. ground; 24.9.1991; on ‘tagar’; coll. R. K. Varshney. (iv) One mixed lot, Sl. No. 39; moderate infection; Tura, Orchid Lodge ground: 5.10.1991; on garden bush; coll. R. K. Varshney. All material dry + wet preserved.

1862 ZSI/99—20A
Fig. 5. Coccus wattii (Green)
Diagnosis: Adult female ca. 2.45 mm long and 1-3 mm broad, elliptical, moderately convex body. Colour pale brown to brown. Derm membraneous or slightly sclerotic; dorsal setae short, rod like; marginal setae long, pointed or furcate; fringe setae of anal fold. Antennae 7-8 segmented, seta on all segments; Legs developed with tibio-tarsal articulatory sclerosis; tarsal digitules 2; claw digitules 2; inner side of legs with few tubular ducts; multilocular pores distributed on vaginal area.

Species described and illustrated in many publications, e.g. Gill (1988).

Host plants: Polyphagous. On Ervatamia coronaria and other garden bushes.


11. Coccus watti (Green) (Fig. 5)


Diagnosis: Adult female ca. 7-8 mm long and 4-5 mm broad, brown to dark brown in colour. Very thin film-like wax plates cover the dorsum. Body broadly elliptical, with prominent spiracular clefts. Margin with a few scattered simple setae. Spiracles prominent, with setae, and large number of circular pores at inner end. Antennae and legs comparatively very small. Antenna 7 segmented. Tarsus and tibia more or less equal in length. Anal valves with a small seta at posterior end. Anal ring with 8 setae. Other details of setae and pores as in Rao & Kumar (1952). They have also illustrated the species.

Host plants: Tea and Citrus species.

Distribution: India: Meghalaya: Dawki; Assam: Sibsagar; and West Bengal: Krishnanagar (Rao & Kumar, 1952).

Remark: Avasthi (1993) has proposed in this family three new genera, namely Varshneococcus, Prococcus and Sharanococcus recently and placed the above species in the last genus.

Genus Saissetia Deplanche

Type species: Saissetia coffeae Deplanche.

12. Saissetia sp.

Material examined: One lot, Sl. No. 34, heavy infestation (dry + wet); W. Garo Hills, Khera Para (210 m); 4.10.1991; On a garden bush with milky sticking secretion, probably Tabernaemontana; coll. R. K. Varshney.

Diagnosis: Adult female body length 1-6 mm, circular, moderate to strongly convex. Old females' test dark brown to black, young females' and nymphs' yellow or yellowish grey. Convex hemispherical shape of fully mature adults and a distinctive "H" pattern of nymphs and adults conspicuous. Body has the large discal (central) setae on each operculum; cell-like areas dorsally; conical or spine-like dorsal setae; and ventral submarginal tubular duct bands.
Fig. 6. *Leucaspis manii* (Borchesenius)
Host plant: ? Tabernaemontana sp. (= Ervatamia sp.).

Distribution: India: Meghalaya: West Garo hills: Khera Para (on road to Dalu) (see Map). Genus widely distributed. Varshney (1985) reported 8 species from the Indian region.

Remark: Curiously, while some bushes were heavily infected, some others present nearby were not infected at all.

V. Family DIASPIDIDAE
Subfamily PARLATORIINAE
Genus Leucaspis Signoret

1964. Maniaspis Borchsenius, Revue d'Entomologie de l'URSS, 43 (4) : 869. (Syn.)
Type species: Aspidiotus pini Hartig.

13. Leucaspis manii (Borchsenius) (Fig. 6)


Diagnosis: Female body without gland spines apically, dentate between pygidial lobes; with two pairs of strongly sclerotized pygidial lobes, without strong hairs between median lobes; without a row of conical gland spines along the body; with perivulvar pores on 3rd and 4th abdominal segments.

Host plant: Twigs of undetermined tree.

Distribution: India: Meghalaya: Shillong: Upper Shillong. Species known from original record only.

Remark: Species described in russian and illustrated by Borchsenius (1964).

Subfamily ASPIDIOTINAE
Genus Chrysomphalus Ashmead

Type species: Chrysomphalus ficus Ashmead.

14. Chrysomphalus dictyospermi (Morgan) (Fig. 7)


Diagnosis: Test of female circular, flat, reddish to brown, with exuviae subcentrally placed. Female body with prosomatic region membraneous. Circumgenital pores present in 4 groups of 2 or 4 in each. Four pairs of pygidial lobes present, first 3 well developed, 4th represented by a
Fig. 7. *Chrysomphalus dictyospermi* (Morgan). On upper left, antenna of immature stage.
sclerotised point; beyond 4th lobe the margin is heavily sclerotised and with two notches. Dorsal ducts on pygidium few. Fimbriate spur on thoracic region. Other details as in Rao & Chatterjee (1950). Illustrated by Ferris.

**Host plant**: Apple.

**Distribution**: India: Meghalaya: Shillong and Assam, Karnataka and Tamil Nadu. Also in Sri Lanka, Thailand, Indonesia and British Guiana.

**Genus Hemiberlesia** Cockerell


Type species: *Aspidiotus rapax* Comstock.

15. **Hemiberlesia rapax** (Comstock) (Fig. 8)


**Diagnosis**: Test of female grey in colour, circular, convex, with exuviae on one side. Female body resembles *Q. perniciosus* but differentiated by presence of a sclerotised knob on the margin of thoracic region on each side; different shape of pygidial lobes and conspicuously coarse & serrated or divided plates between the lobes. Circumgenital pores absent. Median (first pair) lobes large with a single notch on outer margin. Second and third pairs of lobes merely triangular projections. Dorsal ducts few. Ventral microducts numerous towards margin. Anal opening large. Illustrated by Ferris and described in detail by Rao & Chatterjee (1950).

**Host plants**: Apple, peach, plum and pear.

**Distribution**: India: Meghalaya: Shillong, Assam, West Bengal, Orissa and Tamil Nadu.

**Genus Quadraspidiottus** MacGillivray


Type species: *Aspidiotus ostreaformis* Curtis.

16. **Quadraspidiottus perniciosus** (Comstock) (Fig. 9)


**Diagnosis**: Yellow to grey, circular, slightly convex test, with exuviae subcentral. Female body having derm membraneous except pygidium. Circumgenital pores absent. First and second pairs of lobes well developed, third pair indicated as a slight triangular projection. Dorsal ducts few and slender and present upto third abdominal segment. Other details as in Rao & Chatterjee (1950). Illustrated by Ferris.
Fig. 8. *Hemiberlesia rapax* (Comstock). On upper left, antenna of immature stage.
Host plants: Apple, peach, plum and pear.

Distribution: India: Meghalaya: Shillong; Upper Shillong and Sonapani; Orissa, West Bengal, Karnataka, Tamil Nadu and Maharashtra.

Subfamily DIASPIDINAE

Genus *Andaspis* MacGillivray


Type species: *Mytilaspis flava var. hawaiensis* Maskell.

17. *Andaspis betulae* (Borchsenius), comb. nov. (Fig. 10)


Borchsenius (1967) described this species in Russian and illustrated. Figure is reproduced here, but the brief description and a key to differentiate this species from four other species: *dasi* (Williams), *indica* (Borchs.), *leucophleae* (Rao) and *raoi* Borchs., could not be translated for me as yet.

Host plant: Betula sp.

Distribution: India: Meghalaya: Shillong. Species known from original record only.

Remark: *Raoaspis* has been merged with the *Andaspis* by Takagi (1970). However, this species is reported under *Andaspis* for the first time here.

Genus *Lepidosaphes* Shimer


Type species: *Coccus conchiformis* Gmelin (= *C. ulmi* Linn.).

18. *Lepidosaphes* sp.

Material examined: One mixed lot, Sl. No. 21 (dry + wet); mild infection; Shillong, Polo, Indira Gandhi Instt. ground; 24.9.1991; on “Tagar”; coll. R.K. Varshney.

Diagnosis: Adult female body elongate and fusiform. Median lobes normally parallel, each with inner and outer edges of same length; Paraphyses on lobes vertical and normal. Other important characters are the presence of a rounded pygidium, bosses, abdominal tubercles with or without spines and small dorsal ducts, but the absence of ventral paraphyses on the lobes. Other characters as detailed in Williams & Watson (1988 : 143).

Host plant: Ervatamia coronaria.

Fig. 9. *Quadraspidoitus perniciosus* (Comstock). On upper left, antenna of immature stage.
Genus *Fiorinia* Targioni Tozzetti


Type species: *Fiorinia pellucida* Targioni Tozzetti (= *Diaspis fioriniae* Targ.)

19. *Fiorinia multipora* Lindinger


Diagnosis: Note: Unfortunately the description of *multipora* is not traceable. Lindinger’s paper is not available to the author and above cited other papers have not provided even one line of description.

*Host plant*: *Taxus wallichiana*.

*Distribution*: India: Meghalaya (“Khasia, India”). Distribution in other places not known.

20. *Fiorinia proboscidaria* Green (Fig. 11)


Diagnosis: Adult female length: 1.5 mm. Membraneous long narrow body with almost parallel sides. Angled head narrowing almost to a point. Antennae prominent, each with a single long seta and a minute seta. Anterior spiracles each with one or no disc pores. Pygidium not membraneous, with medium lobes slightly divergent. Marginal ducts numbering 5 pairs. Other details as in Takagi (1970) and Williams & Watson (1988).

*Host plants*: *Gelonium lanceolatum*, *Piper* sp., *Citrus* sp., *Eugenia* sp., *Rosa* sp.

*Distribution*: India: Meghalaya. Widespread in whole southern Asia. Originally described from Sri Lanka. Later also recorded from Taiwan, Fiji and some south Pacific islands.

Genus *Pseudaulacaspis* MacGillivray


Type species: *Aulacaspis pellagona* Targ.

21. *Pseudaulacaspis pentagona* (Targioni Tozzetti) (Fig. 12)


Fig. 10. *Andaspis betulae* (Borchsenius) Varshney


**Diagnosis**: Test of female subcircular, white, exuviae near the margin at one end, even sometimes projecting outside margin. Female body broadly oval; margin strongly lobed; dorsal ducts present from 3rd to 5th abdominal segment. Median (first pair) pygidial lobes large, conspicuous and strongly zygotic; second pair well developed, bilobed and sclerotised; third pair also bilobed but vestigial; and 4th and 5th lobes represented by four sclerotised points. Circumgenital pores present in 5 large groups. Other details as in Rao & Chatterjee (1950). Species illustrated by Ferris.

**Host plants**: Apple, plum, peach and cherry. Polyphagous.

**Distribution**: India: Meghalaya: Shillong (Upper Shillong, Sonapani and Maungep); Assam, West Bengal and Uttar Pradesh. Occurs widely in North & South Americas, Africa, Europe, Asia and Australia.
Fig. 11. *Fiorinia proboscidaria* Green. On upper left, pygidium of second instar female.
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<th>FAMILY TACHARDIIDAE</th>
<th>FAMILY KERMESIDAE</th>
<th>FAMILY COCCIDAE</th>
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<td>1. Teiya zimmermani</td>
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<td>2. Cryptica sp.</td>
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<td>3. Drosicha sp.</td>
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<td>8. Kerria c. chinensis</td>
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<td>9. Ceroplastes sp.</td>
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<td>14. Chrysomphalus dictyospermii</td>
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<td>15. Hemiberlesia rapax</td>
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<td>16. Cinnamomum sp.</td>
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<td>21. Pseudaulacaspis pentagona</td>
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Table showing the district-wise distribution of coccids in Meghalaya.

- West Garo hills
- East Garo hills
- South Garo hills
- West Khasi hills
- East Khasi hills
- Ribhooi
- Jayantia hills
Fig. 12. *Pseudaulacaspis pentagona* (Targioni - Tozzetti).
SUMMARY

The scale insects and mealybugs of the Meghalaya State, North-east India, are reported, based on author's collection and literature records. A total of 21 species in 19 genera under five families are dealt with. One new combination (Andaspis betulae) and one new emendation in a species name (Paratachardilla mitthiae) have been proposed. Host-Plants and distribution range within the State have been mentioned and 12 species have been illustrated. The paper is a first consolidated report on the coccids of Meghalaya.

ACKNOWLEDGEMENTS

The author is thankful to the Director, Zoological Survey of India, for assignment. He is particularly thankful to Dr. J.R.B. Alfred, Co-ordinator, for encouragement. The assistance of Dr. L.K. Ghosh, Officer-in-Charge, Hemiptera Section, in the slide mounting work is acknowledged.

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INSECTA : HOMOPTERA : CICADIDAE

G. C. SEN, M. GHOSH AND L. K. GHOSH

Zoological Survey of India
Calcutta

INTRODUCTION

The Cicadids are forest insects and are well known for the shrill monotonous sound which is confined to the male. The Cicada’s “song” (Buzzing sound), usually heard in forest is clearly of a sexual nature. The song is suspended when insect is alarmed. About 1162 species belonging to 131 genera are so far known from the world (Metcalf 1963). Of this, about 206 species are known to occur in oriental region. A perusal of literature reveals that altogether 22 species under 12 genera are so far known from Meghalaya as against a total Indian record of 145 species (Distant 1889, 1890, 1891, 1892, Kato 1932, Mathur 1953, Paiva 1917). The present work is an attempt to provide a comprehensive account of 19 species belonging to 12 genera, in 4 subfamilies of the family Cicadidae from the State of Meghalaya. Of these, 4 species marked ‘*’ are reported for the first time from this State. The account deals with diagnosis of the Family, Subfamilies, keys to various taxa, diagnosis and geographical distribution of each species and literature references. The distribution of these species are indicated in map (1-3). The classification of the family has been mainly adopted after (Distant, 1889, 1890, 1891, 1892, 1906, 1916, Metcalf, 1963, Mathur, 1953).

The work is based on collections represented in Hemiptera Section, Z.S.I., Calcutta.

SYSTEMATIC ACCOUNT

Subfamily I. Cicadinae
Genus 1. *Pomponia* Stål
1. *Pomponia fusca* (Oliver)

Subfamily II. Gaeaninae
Genus 2. *Gaeania* Amyot and Serville
2. *Gaeania maculata* (Drury)

Genus 3. *Platylomia* Stål
3. *Platylomia radha* (Distant)
4. *Platylomia similis* (Distant)
5. *Platylomia umbrata* (Distant)

Subfamily III. Tibiceinae

* New record from Meghalaya
Ocelli three in number and placed on the disk of the vertex of head; antennae short, inserted close to the eyes and composed of seven joints. The head is short, broad and transverse, terminating beneath in an elongated rostrum composed of discal furrows on each side; the mesonotum is very large and terminates behind in a small basal cruciform elevation. The abdomen consists of six segments and an anal segmental appendage. The anterior femora are incrassated and more or less spinose beneath. The tegmina are generally hyaline, sometimes opaque; the venation usually distinct and furcate in ramification, but sometimes reticulate.
Key to Subfamilies

1. Tympana entirely or in greater part uncovered in male specimen .......... Tibiceninae
   Tympana entirely or in great part covered in male specimen .................. 2

2. Tympanal covering imperfect, more or less exposing orifices ............... Geaninae
   Tympanal covering concealing orifices ........................................... Cicadinae

Subfamily 1. Cicadinae

Genus 1. Pomponia Stål


Body variable, either long or very short and convex. Head, including eyes about equal in width to anterior margin of mesonotum, ocelli much further apart from eyes than from each other. Face convex, slightly prominent above. Pronotum with lateral margin moderately ampliated and sinuated. Posterior angle dilated, a little shorter than mesonotum; mesonotum with the disk moderately convex, abdomen in male longer than space between apex of head and base of cruciform elevation. Tympana covered; opercula short and transverse; tegmina and wings hyaline. Basal cell of tegmina longer than broad, more or less maculate, apical areas eight; anterior femora distinctly spined.

1. Pomponia fusca (Oliver)

1790. Cicada fusca Oliver, Enc. meth., v : 749.


Diagnosis: Head about as wide as base of mesonotum, greenish in colour, an irregular central alivaceous fascia present on the anterior margin of the front. Spot at inner margin of eyes, pronotum with a broad greenish longitudinal fascia and two large oblique spots on each lateral area, a central fascia present on mesonotum; tegmina and wings hyaline, costal membrane of tegmina greenish in colour and apical area infuscated; marginal series small spot; femora and tibiae brackish red. Femora with a spot near apices; abdomen brownish red, pilose.

Length: 42 mm (Female)


Key to genera of Subfamily Gaeninae

1. Tegmina with venation dense and fuscated, apical area numerous. Head equal in width as pronotum, front not porrectly produced. Tympana completely covered ............... Platylomia
   Tegmina with the venation normal, the apical areas eight. Head longer than pronotum, front somewhat porrectly produced. Tympana considerably exposed ......................... Gaeana
Subfamily II. Gaeaninae

Genus 2. *Gaeana* Amyot and Serville

1843. *Gaeana* Amyot and Serville, *Hemp* : 463

Body long and moderately slender in male, much shorter in the female; head broad including eyes, about equal in width to that of mesonotum at base, longer than pronotum, ocelli about twice the distance from eyes as from each other; face somewhat globosely convex, slightly prominent above; lateral margin of pronotum neither distinctly ampliated nor toothed, abdomen in male long moderately slender, in the female only as long as space between apex of head and base of cruciform elevation; tympana considerably exposed, the tympanal covering incomplete and rudimentary anterior femora distinctly spined; tegmina and wings opaque, their outer margin convexly rounded; apical area eight, interior ulnar area a little wider at apex than at base.

2. *Gaeana maculata* (Drury)


*Diagnosis* : Body black, a brownish spot between eyes and ocelli of head; four discal spots on mesonotum and a spot on each lateral margin of mesonotum and an ochraceous spot on each side of cruciform elevation; tegmina wings black, apex of tegmina greyish brown, five ochraceous spots in two transverse series, two near base and three about in the centre, wings with a broad transverse sub basal patch, near costal margin two contiguous spots, abdominal segment ochraceous. Legs black.

-Length* : 34 mm (Male), 34 mm (Female)


Genus 3. *Platylomia* Stål


Head including eyes about as wide or little wider than the base of mesonotum, pronotum centrally about or almost as long as mesonotum excluding basal cruciform elevation, its lateral margins always distinctly, sometime strongly and generally acutely toothed; abdomen considerably longer than space between apex of head and base of cruciform elevation; tympana completely covered; rostrum reaching the posterior coxae; opercula long, concavely sinuate on each side of basal area, their apices subacute reaching centre and sometime the apex of the abdomen; tegmina and wings hyaline, the venation sometimes fuscosely spotted.

3. *Platylomia radha* (Distant)


**Diagnosis**: Body light brownish; basal area of the head black; pronotum brownish yellow; two black transverse spots near inner margin of pronotum; mesonotum present, two black margined obconical spots, a black small spot present on each side of the anterior margin of mesonotum, five distinct spots present at basal area; tegmina and wings hyaline; its venation fuscous; costal membrane; basal cell, and claval area pale brownish yellow extreme base and claval area of wings dark brownish yellow; leg brownish yellow, abdomen dark castaneous, its segment blackish red.

**Length**: 52 mm (Female)


4. *Platylomia similis* (Distant)


**Material examined**: 1 ex., India: Meghalaya, Tura, West Garo Hills, x.1917, coll. *Mrs. Kemp*.

**Diagnosis**: Head green in colour, ocelli area pitchy black; thorax olive green, posterior margin and inner edge of anterior margin black, a central longitudinal black linear fascia on mesonotum, a short oblique black fascia on each side of mesonotum, a small anterior black spot and with two black spots in front of cruciform elevation; tegmina and wings hyaline, the venation greenish brown, in some places black, costal membrane of tegmina greenish; abdomen broad oblique chalky white tomentose fascia on each side of basal area; leg greenish in colour.

**Length**: 50 mm (Male).

**Distribution**: India: Meghalaya (West Garo Hills), Assam, Sikkim. Elsewhere: Malay Peninsula, Siam.

5. *Platylomia umbrata* (Distant)


**Diagnosis**: Body robust, olive green in colour, the lateral area of the vertex with some irregular black spots; a central fascia present between face and eyes, two black central fascia on pronotum,
two obconical black spots on mesonotum, and a central lanceolate fascia, tegmina and wings hyaline; venation fuscous, extreme base and costal membrane fuscous, femora and tibiae black, abdomen above suffused with black shading, beneath olive green in colour.

Length : 45 mm (Female)

Distribution : India : Meghalaya (East Khasi hills), Assam, Northern Bengal, Sikkim, Uttar Pradesh. Elsewhere : Burma, Bhamo.

Genus 4. Cryptotympana Stål


Body long and robust. Head broad, more or less transversely truncate between the eyes, and including the eyes a little broader than the base of the mesonotum; ocelli about twice distance from eyes each other; face slightly prominent, pronotum about as long as mesonotum, lateral margin of pronotum slightly ampliated, but not angulated or toothed. Anterior femora distinctly and strongly spined. Abdomen in male about as long as space between apex of head and base of cruciform elevation. Tympana covered. Opercula varying in length and pattern, sometime short. Metasternum moderately elevated at middle, and furnished with the posterior process turning backward. Tegmina and wings hyaline or semi opaque, basal cell longer than broad; apical areas eight.

6. Cryptotympana corva (Walker)


Diagnosis : Body robust; head black, thickly greyish, pilose; basal margin of face with a spot; lateral margin of pronotum covered with ochraceously pilose; obconical spot present at mesonotum; tegmina and wings hyaline, venation fuscous; wings with less than basal third black, femora and posterior tibiae reddish; abdomen covered with thickly darkly pilose, with a broad central black fascia.

Length : 46 mm (Female).

Distribution : India : Meghalaya (North Khasi Hills); Assam, Bengal, Eastern Himalayas, Sikkim, Tamil Nadu, Uttar Pradesh.

7. Cryptotympana varicolor Distant


**Diagnosis**: Body brownish; head short; pronotum pilose; with curved black spot and two black oblique spots on each lateral area; mesonotum with a pale greenish discal spot; tegmina and wings hyaline; base of tegmina and wings moderately infuscate; costal membrane, apical area brownish; anterior femora with two long spines.

**Length**: 30 mm (Female).


**Genus 5. Dundubia** Amyot and Serville


Body long and robust; head somewhat-triangularly elongate including eyes, rather narrower than the base of pronotum at lateral angle; ocelli a little further apart from eyes than from each other. Pronotum almost as long as mesonotum, the lateral margins not prominently ampliated but distinctly toothed; abdomen a little longer than space between apex of head and base of cruciform elevation; tympana completely covered; anterior femora spined; tegmina and wings hyaline, the first with venation normal, the apical area eight in-number and the basal cell twice as long as broad.

8. *Dundubia intemerata* Walker


**Material examined**: 1 ex, India : Meghalaya : Darugiri; East Garo Hills, 10.iv.74, coll. S. Biswas.

**Diagnosis**: Body long and robust, greenish in colour, head as long as width between eyes, eyes blackish red in colour; rostrum, claws black in colour; tegmina and wings pale hyaline, the base of tegmina and wings and its venation and costal membrane brownish green in colour; coxae, tarsi and tibiae brownish.

**Length**: 27 mm (Female).

**Distribution**: India : Meghalaya (Garo Hills); Assam. Elsewhere : Borneo, Burma, Laos, Malay Peninsula, Penang, Perak, Siam, Singapore, Sumatra, Tenasserim.

9. *Dundubia manni/era* (Linnaeus)


State Fauna Series 4: Fauna of Meghalaya


**Diagnosis:** Body long and robust, greenish in colour; head elongate, as long as pronotum; pronotum as long as mesonotum, its lateral margin distinctly toothed; abdomen above with some small black distinct spots; tegmina and wings hyaline the venation and costal membrane of tegmina brownish; anterior femora spined.

**Length:** 38 mm (Male), 31 mm (Female).

**Distribution:** India: Meghalaya (North Khasi Hill, West Garo Hills, East Khasi Hills); Assam. Elsewhere: Burma, Bamo, Borneo, China, Java, Sumatra.

Genus 6. **Haphsa** Distant


Body robust; head including eyes about as broad as mesonotum, considerably shorter than breadth between eyes, lateral margin obliquely sinuate from eyes to apex; pronotum distinctly shorter than mesonotum, subacutely toothed before middle of lateral margin; abdomen short, not longer than space between head and base of cruciform elevation; tympana covered, tympanal flaps about as long as broad; opercula in male broad, their inner margins contiguous, nearly broad throughout, their apices convex, their outer margins very obsolescently sinuate; tegmina and wings hyaline.

10. **Haphsa nicomache** (Walker)


**Material examined:** 3 exs., India: Meghalaya: Songsok, East Garo Hills, 26.ix.75, coll. N. Muraleedharan.

**Diagnosis:** Body brownish yellow, head with lateral black striae, lateral margin of vertex with two transverse black spots; pronotum with two black central longitudinal lines united posteriorly, pronotum with a transverse black spot; mesonotum with three central discal black lines united posteriorly, each side of mesonotum with a small black spot, a broad lateral fascia containing a small brownish yellow spot; tegmina and wings hyaline, its venation dark brown in colour, costal membrane browish yellow, post costal area and transverse vein smoky in colour; abdomen black, lateral spots and margin brownish yellow.

**Length:** 26 mm (Female).

**Distribution:** India: Meghalaya (East Garo Hills), Assam, Nagaland, Sikkim, Uttar Pradesh.

Genus 7. **Huechys** Amyot & Serville

Body moderate size, somewhat slender; head, including eyes, about equal in width to base of mesonotum. Ocelli about equally wide apart from eyes as from each other; front convexly somewhat flatly produced, shorter than vertex, their lateral margin discontinuous; pronotum with the lateral margin more or less convex, narrower in front than behind, the posterior lateral angles in some species distinctly posteriorly produced. Antero femora prominently spinous. Tympana completely exposed and uncovered, opercula small; face more or less longitudinally sulcate. Tegmina more or less opaquely coloured, apical areas more or less eight, sometimes ten; basal cell much longer than broad; wings either transparent or infuscated and partly opaque.

11. *Huechys sanguinea* (De Geer)


*Material examined:* 2 exs., India: Meghalaya; 1 ex., Wageaasi and 1 ex., Nongal, South Garo Hills, 5.iv.73, coll. S. Biswas.

*Diagnosis:* Body black in colour, face to head and front blood-red in colour; two large blood-red spots on mesonotum; tegmina black, opaque, wings shining blackish red, some specimens blackish interior or anal area almost pale in colour; legs black; abdomen narrowly black.

*Length:* 21 mm (Female), 18 mm (Male).

*Distribution:* India: Meghalaya (East Garo Hills), Assam, Orissa, West Bengal. Elsewhere: Borneo, Burma, China, Malay Peninsula, Rangoon, Sumatra, Tennasserim.

Genus 8. *Platypleura* Amyot and Serville


Body robust, somewhat short, head broad anteriorly truncate, head including eyes a little or scarcely broader than the base of the mesonotum; ocelli about twice and sometimes thrice the distance from eyes as from each other; face moderately convex not prominently above; pronotum with the lateral margins amplified or laminately medially angulate, anterior femora not prominently spined; tympana practically concealed by the tympanal flap or covering, abdomen in male about as long as space between apex of head and base of cruciform elevation; opercula in male short, broad, their apices more or less convexly rounded; tegmina either hyaline, more or less opaquely coloured, tegmina with the base cell a little longer than broad; the costal membrane only moderately dilated or arched at base, apical area eight in number.

12. *Platypleura badia* Distant


Diagnosis: Body brownish yellow. Head with black inner margins, a black fascia between eyes, pronotum with a black longitudinal central line, mesonotum with four black obconical spots, and two black small spots in front of cruciform elevation, tegmina palce hyaline; tegmina with opaque dark brownish yellow, wings with brownish yellow opaque coloration, abdomen fulvous brown.

Length: 16 mm (Female)


13. **Platyleura nobilis** (Germar)


Diagnosis: Body greenish yellow. Head with blackish inner margin, a black fascia between eyes; pronotum with a central longitudinal black line; mesonotum with four obconical spots, and a central black oblong spot, and two small black spots in front of cruciform elevation; tegmina with basal half creamy yellowish, two spots on costal membrane, three spots in radial area, and a large spot on claval area, apical half pale hyaline with subapical oblique fascia and a series of small spots, wings dark smoky brown; abdomen greenish brown, the segmental margin black.

Length: 16 mm (Female).


Genus 9. **Purana** Distant


Head including eyes as wide as base of mesonotum and as long as space between eyes, face prominent and convex, its base almost at right angles to the anterior lateral angles of the vertex; pronotum narrowed anteriorly, its lateral margins angulated or toothed; mesonotum much longer than pronotum, abdomen moderately conical above, gradually attenuated posteriorly, in male consilonger than the space between the apex of head and base of cruciform elevation, tubercles on the second and third ventral segments large and prominent; opercula small; tympanal covering in male broader at base than long; tegmina and wings hyaline.
14. *Purana pryeri* (Distant)


*Material examined*: 1 ex., India: Meghalaya: Mawphlong, Shillong; East Khasi Hills, 6.ix.75, Coll. N. Muraleedharan.

*Diagnosis*: Body brownish yellow; head with the frontal margin, area of ocelli and the posterior margin blackish; pronotum with a central longitudinal sulcation, its posterior and lateral margin brownish yellow; mesonotum with two obscure obconical spots on anterior margin, its edges blackish; tegmina and wings hyaline with pale brownish tinge, its venation, costal membrane brownish yellow, with a small dark spot at base, and a submarginal series of small blackish red colour spots near apices, legs brownish yellow, abdomen brownish yellow, its tubercles dark brown.

*Length*: 28 mm (Male).

*Distribution*: India: Meghalaya (Shillong). Elsewhere: Borneo.

Genus 10. *Rustia* Stål


Body moderately long and slender. Head broad, including eyes about as wide as the anterior margin of the mesonotum; the vertical angles globosely produced in front of the anterior margin of the eyes which are somewhat pedunculate; ocelli sinuate much further apart from eyes than from each other. Pronotum as long as mesonotum, lateral margins moderately convexly sinuate, the posterior angles somewhat lobately recurved. Anterior femora distinctly and prominently spined. Abdomen longer than space between apex of the head and base of cruciform elevation; Tympana almost totally uncovered and exposed. Opercula very small, not covering the cavities. Tegmina and wings hyaline; tegmina with the basal cell much longer than broad, apical area eight in number, interior ulnar area of irregular shape and much wider at apex than at base. Wings with five apical areas.

15. *Rustia dentivitta* (Walker)


*Diagnosis*: Body brownish yellow in colour, a fascia on each side of front of head, on vertex two black longitudinal central spots; anterior angle of vertex black; inner margin of eyes black; on
each side of pronotum with an oblique black fascia and two black central longitudinal, two obconical black spots, united centrally on mesonotum and a curved fascia on each lateral area of mesonotum; tegmina and wings hyaline, venation and costal membrane, with a series of marginal spots dark brown; abdomen black.

Length: 13 mm (Female).

Distribution: India: Meghalaya (West Garo Hills); Assam, Uttar Pradesh. Elsewhere: Burma, Cambodia, Rangoon, Siam.

Genus 11. Scieroptera Stål


Body robust. Head including eyes a little broader than base of mesonotum; front subconically flatly produced, shorter than vertex, the lateral margin both discontinuous; pronotum longer than head, its lateral margins slightly convexly oblique, the posterior lateral angles distinctly produced, mesonotum (including cruciform elevation) not longer than pronotum; abdomen longer than pronotum; abdomen longer than space between apex of head and base of cruciform elevation; tympana entirely exposed, tympanal covering altogether absent; opercula in male small and transverse; anterior femora strongly spined beneath; face not longitudinally sulcate; tegmina more or less opaque, apical areas eight, basal cell longer than broad; wings hyaline, apical areas six.

16. Scieroptera splendidula (Fabricius)


Material examined: 1 ex., India: Meghalaya; Motinagar; East Khasi Hills, 7. vii. 72, coll. S. Biswas.

Diagnosis: Body black, front of head marked with purplish in colour, vertex brownish yellow, pronotum with brownish yellow central fascia, mesonotum brownish yellow, central area of cruciform elevation black, tegmina dark brown and wings hyaline, costal membrane of tegmina ochraceous femora reddish brown, tibiae and tarsi black, abdomen frequently with a central, dorsal longitudinal black macular fascia.

Length: 15 mm (Female)

Distribution: India: Meghalaya (East Khasi Hills); Assam, Bengal, Bihar, Sikkim, Uttar Pradesh. Elsewhere: Burma, Borneo, China, Indo-China, Java, Philippine, Sumatra.

Genus 12. Tosena Amyot and Serville


Body robust and long. Head broad, including eyes, about equal in width to that of mesonotum at base; ocelli twice the distance from eyes as from each other; face convex, slightly prominent above, pronotum as long as mesonotum; its lateral margins more or less amplified or laminately expanded, and more or less distinctly toothed; Anterior femora distinctly spined. Abdomen in male long very
much longer than space between apex of the head and base of cruciform elevation, somewhat convex above; tympana covered, opercula short and broad; tegmina and wings opaque; apical areas eight; interior ulnar area somewhat widened at apex.

17. *Tosena dives* (Westwood)


*Diagnosis*: Body black in colour, apex of face reddish brown, and very globose; tegmina black, its venation, costal membrane, transverse fascia, apical area, reddish brown, wings red, its apex black; legs black, abdomen black.

*Length*: 25 mm (Male).

*Distribution*: India: Meghalaya (Shillong, East Khasi Hills); Assam, “Bengal” Sikkim.

18. *Tosena melonopteryx* (Kirkaldy)


*Diagnosis*: Body black in colour; head, pronotum black, posterior margin and lateral margin of pronotum brownish yellow; posterior margin of mesonotum and lateral margin of metanotum ochraceous; tegmina more or less black; legs black, abdomen black, a double segmental series of spots in abdomen beneath.

*Length*: 60 mm (Male), 43 mm (Female).

*Distribution*: India: Meghalaya (Shillong, Tura); Assam, “Bengal” Sikkim. Elsewhere: Burma, Bhamo, Indochina, Tinkin.

19. *Tosena splendida* Distant


Diagnosis: Body black in colour, head black, front of head with reddish spots at each basal angle, on vertex two small spots, pronotum with two large brownish yellow spots on disk and two brown spots, one each in posterior angle of pronotum, and two brownish yellow spots on the disk of mesonotum; tegmina and wings hyaline, tegmina exhibiting a changeable opaline lustre which in some lights is found to be ornamented with close and regular series of transverse darker striae; base of tegmina narrow, its costal membrane shining black and venation blackish red, a series of shining black marginal spots on apices, claval area pale greenish. Legs black, a wide central blood red annulation to femora; abdomen black.

Length: 46 mm (Male), 44 mm (Female).

1. Front of head.  
2. Vertex of head.  
3. Pronotum.  
5. Cruciform elevation.  
5a. Tympanal coverings.  
6. Abdomen.  
7. Face on head beneath.  
8. Rostrum.  
11. Costal area.  
12. Costal vein.  
13. Radial vein.  
15. Radial area.  
16. Ulnar areas.  
17. Apical areas.  
18. Postcostal area.  
19. Claval area.  
20. Clavus.
MAP 2. SHOWING DISTRIBUTION OF THE SPECIES OF Cicadidae OF Meghalaya

1. Cryptotympana varicolor Distant
2. Haplocheta nicomache Walker
3. Huechys sanguinea De-Geer
4. Platyleura laevigata Distant
5. Cryptotympana varicolor Distant
6. Haplocheta nicomache Walker
7. Huechys sanguinea De-Geer
8. Platyleura laevigata Distant
9. Dundubia intemerata Walker
10. Dundubia mannifera Linn.
11. Dundubia mannifera Linn.
12. Dundubia intemerata Walker
13. Dundubia mannifera Linn.
MAP - 3. SHOWING DISTRIBUTION OF THE SPECIES OF CICADIDAE OF MEGLALAYA

13. Platycleura mobilis Germain
14. Purana preyeri Distant
15. Rustia dentivitta Walker
16. Scieroptera splendidula Fabricius
17. Tosena dives Westwood
18. Tosena melanopteryx Kirkaldy
19. Tosena splendidula Distant
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REFERENCES

INSECTA : HEMIPTERA : HETEROPTERA : REDUVIIDAE

B. BISWAS AND L. K. GHOSH

Zoological Survey of India
Calcutta

The Reduviid fauna of Meghalaya in North-east India is meagre. A perusal of literature reveals that altogether 71 species belonging to 43 genera are so far known (Paiva 1919; Ambrose and Vennison 1989, Distant 1919; Kemp 1924; China 1924) from the state of Meghalaya as against a total Indian record of a little over 450 species in 129 genera distributed over 14 subfamilies (Miller 1959; Samuel and Joseph 1953; Wygdzinsky; Lent 1967, 1980; Muraleedharan 1976; Cook 1977; Ambrose and Livingstone 1986; Livingstone and Murugan 1987; Livingstone and Ravichandran 1988, 1990; Biswas et al. 1993).

The present work is an attempt to provide a comprehensive account of 48 species belonging to 37 genera of the family Reduviidae from Meghalaya. Of these, 20 species (marked *) in 18 genera are hitherto reported for the first time from the state. Thus, the total species of Reduviidae from Meghalaya stands at 91. The account deals with brief note on earlier investigation, keys to various taxa, diagnosis, geographical distribution of each species and literature references. The distribution of the species is indicated in Maps (1 - 8).

The classification of the family has been mainly adopted after Distant (1906, 1910) and for some of the subfamilies, Miller (1959) and Cook (1977) have been followed.

The work is based on the collections represented in Hemiptera Section, Zoological Survey of India, Calcutta.

GENERAL DIAGNOSIS

The characteristic features of the family Reduviidae is as follows :- Head narrow, longer than broad; jointed anteriorly; antennae filiform, apical segments often very fine, 4 or 5 segmented; eyes well developed; ocelli when present placed behind the eyes; rostrum short, curved, stout, usually 3 segmented, pointed and with the tip resting in a furrow between the fore coxae; prothorax prominent, smooth, ridged, spined or sharply angular; hemelytra with corium and clavus; membrane distinct, with areoles, wings well developed, rudimentary or absent; legs hairy or spiny, fore legs somewhat raptorial. tarsi 1-2 or 3-segmented with claws.

Subfamily I. EMESINAE
Division Stenololaemaria
Genus 1. Myiophanes Reut.
   1. Myiophanes greeni Distant
Division Leistarcharia
2. *Bagauda cavernicola* Paiva

Subfamily II. TRIBELOCEPHALINAE

Genus 3. *Apocauscus* Distant
3. *Apocauscus laneus* Distant

Subfamily III. STENOPODINAE

Genus 4. *Aulacogenia* Stål
4. *Aulacogenia corniculata* Stål

Genus 5. *Canthesancus* Amy. & Serv.
5. *Canthesancus gulo* Stål

Subfamily IV. SALYAVATINAE

Genus 6. *Lisarda annulosa* Stål
6. *Lisarda annulosa* Stål

Genus 7. *Valentia* Stål
7. *Valentia apetala* (de Vuill)

Subfamily V. ACANTHASPIDINAE

Division Psoparia

Genus 8. *Psophis* Stål
8. *Psophis erythraea* Stål

Division Epiroderaria

9. *Centrocnemis stali* Reuter

Genus 10. *Epirodera* Westwood
10. *Epirodera bengalensis* Distant
11. *E. impexa* Distant

Division Acanthaapisaria

Genus 11. *Acanthaapis* Amy. & Serv.
12. *Acanthaapis helluo* Stål
13. *A. quinquespinosa* (Fabr.)

Division Lenaearia

Genus 12. *Velitra* Stål
14. Velitra rubropicta (Amy. & Serv.)

Genus 13. Sminthocoris Distant

15. Sminthocoris fuscipennis (Stål)

Subfamily VI. PIRATINAE

Genus 14. Pirates Stål

16. Pirates arcuatus (Stål)

Subfamily VII. ECTRICHODIINAE

Genus 15. Scadra Stål

17. Scadra castanea Paiva

18. S. fuscicrus Stål


19. Ectrychotes relatus Paiva

Genus 17. Haemorrhopus Stål

20. Haemorrhopus marginatus (Reuter)

Genus 18. Paralivavious Paiva

21. Paralivavious singularis Paiva

Genus 19. Vilius Stål

22. Vilius melanopterus (Stål)

Subfamily VIII. APIOMERINAE


23. Velocipeza aliena (Distant)

Subfamily IX. HARPACTORINAE

Division Harpactoraria


24. Lopocephala guerini Lap.

Genus 22. Rhynocoris Hahn

25. Rhynocoris costalis (Stål)

26. R. fuscipes (Fabricius)

27. R. marginellus (Fabricius)

28. R. nigricolli (Dallas)

Genus 23. Sphedanolestes Stål

29. Sphedanolestes bowringi Distant
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Division: Vesbiaria

Genus 24. *Vesbius* Stål

34. *Vesbius purpurells* (Thunb.)

Division: Velinaria

Genus 25. *Cosmoslestes* Stål

35. *Cosmoslestes annulipes* Distant

Genus 26. *Velinus* Stål

36. *Velinus annulatus* Distant

Division: Sycanaria

Genus 27. *Sycanus* Amy. & Serv.

37. *Sycanus croceovittatus* Dohrn

Genus 28. *Villanovanus* Distant

38. *Villanovanus dichrous* Distant

Division: Yolinaria

Genus 29. *Agriosphodrus* Stål

39. *Agriosphodrus dohrni* Distant

Division: Euagorasaria

Genus 30. *Epidaustrinus* Stål

40. *Epidaus atrispinus* Distant

Genus 31. *Rihirbus* Stål

41. *Rihirbus trochantericus* Stål

Division: Panthousaria

Genus 32. *Panthous* Stål

42. *Panthous excellens* Stål

Division: Coranusaria

Genus 33. *Coranus* Curtis

43. *Coranus fuscipennis* Reuter
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Key to the Subfamilies of the family Reduviidae

1(2) Rostrum three jointed .............................................................................................................. 3

2(1) Rostrum four jointed ................................................................................................................... Nabidinae

3(4) Anterior coxae not more than twice or three times longer than broad ..................................... 5

4(3) Anterior coxae much elongated, reaching or passing apex of head ..................................... Emesinae

5(6) Ocelli absent, pronotum transverse, body tomentose; antenniferous tubercles laterally obliquely prominent, first joint of antennae increasate .................................. Tribelocephalinae

6(5) Ocelli present .......................................................................................................................... 7

7(8) Hemelytra without a quadrangular areolet or cell at interior area of corium, near base of membrane ........................................................................................................... 9

8(7) Hemelytra with a quadrangular cell at interior area of corium near base of membrane...... 17

9(10) Hemelytra with a discoidal cell somewhat sex angular and touching base of membrane or largely triangular ................................................................. Stenopodinae

10(9) Hemelytra without a discoidal cell .......................................................................................... 11

11(12) Scutellum with its apex triangular or subtriangular .............................................................. 13

12(11) Scutellum with its apex broad and two or three spined .......................................................... Ectrichodinae

13(14) Pronotum constricted before or near middle ........................................................................ 15

14(13) Pronotum constricted behind middle .................................................................................. Piratinae

15(16) Anterior tarsi two jointed ................................................................................................. Salyavatinae

16(15) Anterior tarsi three jointed ............................................................................................. Acanthaspidinae
17(18) First joint of rostrum short, second joint long; space between eyes rarely transverse, generally as long as broad................................................................. Apiomerinae
18(17) First joint of rostrum rarely very short, generally elongate; space between eyes transverse ...
.................................................................................................................. Harpactorinae

Key to the Division of the Subfamily Emesinae

1(2) Anterior tarsi short, not longer or little longer than the posterior tarsi; hemelytra absent or present, when present marked with fuscous ...................................................... Stenolaemaria
2(1) Anterior tarsi long, not or a very little shorter than the tibiae; hemelytra present, sometimes strongly marked with fuscous .............................................................................. Leistarcharia

Subfamily 1. EMESINAЕ
Division Stenolaemaria
Genus 1. Myiophanes Reut.


1. Myiophanes greeni Distant


Material examined: 1 ex., Tura, West Garo hills (1400), x.1917, Mrs. Kemp Coll.

Diagnostic characters: A creamy white species; a central oblique spot on each side of anterior pronotal lobe; three broad annulations to anterior femora; five broad transverse annulations to abdomen, dark fuscous; antennae slender, pilose, first and second joints subequal in length.

Length: 16.5 mm.


Division Leistarcharia
Genus 2. Bagauda Bergr. 1903


2. Bagauda cavernicola Paiva


Material examined: 6 exs., Siju cave, West Garo hills. 2.xi.1917, R. Friel Coll.

Diagnostic characters: Castaneous brown; membrane fuliginous, a large rounded spot on coreium; apical halves of anterior femora, prosternum, a spot on the disk of meso and metasterna and posterior tibia creamy white; constricted area of pronotum extending to the anterior half of the posterior lobe.

Length: 16 mm (excluding membrane)
Distribution: India: Meghalaya (West Garo Hills).

Subfamily II. TRIBELOCEPHALINAE

Genus 3. Apocaus Dist., 1909


3. Apocaus laneus Distant


Material examined: 1 ex., Above Tura, West Garo hills, 15.vii.30.vii.17, S. Kemp Coll.

Diagnostic characters: Head castaneous brown covered with pale brownish fleecy clothing; elytra fuscous brown with the marginal area paler; abdomen beneath smooth and shining; legs finely pilose, pale castaneous brown.

Length: 5.5 mm.

Distribution: India: Meghalaya (West Garo Hills), West Bengal.

Subfamily III. STENOPODINAE

Key to the genera of Stenopodinae

1(2) Apical spine to scutellum laterally produced, neither erect nor suberect; rostrum with first joint about as long as two apical joints together .................................................. Aulacogenia

2(1) Apical spines to scutellum erect or suberect rostrum with first joint not or very little longer than second ........................................................................................................... Canthesancus

Genus 4. Aulacogenia Stål, 1870


4. Aulacogenia corniculata Stål


Diagnostic characters: A gray species streaked with fuscous; head with a central piceous line on the postocular area; eyes black; corium with longitudinal fuscous streak, two small fuscous discal spots connected by a same coloured line; head tuberculously spinous, the apex of head is bispinously produced between antenniferous tubercles.

Length: 10 mm.


Genus 5. Canthesancus Amy & Serv. 1843


5. Canthesancus gulo Stål

Material examined: 2 exs., Above Tura, West Garo hills, (3500-3900), 15.vii.30, S. Kemp Coll.

Diagnostic characters: Head, pronotum and scutellum ochraceous; a central black line to head continued through pronotum, pronotal spine fuscous; hemelytra finely mottled with brown excepting at basal angle of corium and with three irregular spots; antennae black, first joint about as long as pronotum and scutellum together.

Length: 27-29 mm.

Distribution: India: Meghalaya (West Garo hills), Assam, Sikkim. Elsewhere: Burma; Malay Peninsula.

Subfamily IV. SALYAVATINAE
Key to the Genera of the Subfamily Salyavatinae

1(2) Head porrectly produced between antenniferous tubercles; anterior tibiae simple

2(1) Head not porrectly produced between antenniferous tubercles; anterior tibiae apically compressed and amplified

Valentia

Genus 6. Lisarda Stål, 1859


6. Lisarda annulosa Stål

1874. Lisarda annulosa Stål, En. Hens. 4 : 83.


Diagnostic characters: Apical spine to scutellum short, obtuse, robust; head with apical porrect prolongation; mottlings to hemelytra and abdomen, a broad macular fascia on each side of abdominal disk joining a spot on apical segment; tibiae and femora annulated with fuscous, femora with an obscure spine near apex, the anterior femora also medially spined beneath.

Length: 11 mm.

Distribution: India: Meghalaya (Jaintia hills); Elsewhere: Burma; Sri Lanka.

Genus 7. Valentia Stål, 1865


7. Valentia apetala (de Vuill)


Material examined: 1 ex., Tura, West Garo hills (1200-1500 ft), 15.vi.17, S. Kemp Coll.
Diagnostic characters: Anterior area of head and the pronotum centrally finely sulcate; lateral pronotal spines a little obliquely upwardly directed, a small rounded spot on inner margin of coreium; spots to connexium, basal area of femora and subbasal annulations to tibiae ochraceous or luteous.

Length: 17 to 18 mm.

Distribution: India: Meghalaya (West Garo hills); Elsewhere: Java Malay Peninsula; Siam.

Subfamily V. ACANTHASPIDINAE
Division Psopharia
Genus 8. Psophis Stål, 1863


8. Psophis erythraea Stål


Diagnostic characters: Palely sanguineous; first antennal joint about as long as anteocular portion of head and fuscous; apex of the scutellum forming a recurved spinous tubercle, claval and subclaval area fused along the whole membranal area.

Length: 9 mm.

Distribution: India: Meghalaya (Jaintia hills), North India.

Division Epiroderaria

Key to the genera of the division Epiroderaria

1(2) Head with the postocular area long, cylindrical, longer than anteocular portion; eyes and anteocular portion of head strongly spined......................................................... Centrocnemis

2(1) Head with the postocular area tumid, shorter than anteocular portion which is not spinous; first joint of antennae not passing apex of head ............................................................... Epirodera

Genus 9. Centrocnemis Sign., 1852


9. Centrocnemis stali Reut


Material examined: 2 exs., Above Tura, West Garo hills (3500-3900) 15.vii. 3.viii.17, S. Kemp. Coll.

1862 ZSI/99—23A
Diagnostic characters: Brownish ochraceous species mottled with fuscous; spines in front of eyes; posterior pronotal angles broad, with three short broad dentations, lateral abdominal margins spined at segmental angles; first joint of antennae a little thickened and granulate and about as long as anteocular portion of head.

Length: 22.5 mm.

Distribution: India: Meghalaya (West Garo hills), Assam, Sikkim, West Bengal.

Genus Epirodera Westw.


Key to the species of the genus Epirodera

1(2) Black, apex of the scutellum narrowly spatulate, connexivum ochraceous, spotted with piceous

bengalensis

2(1) Chocolate brown, apex of the scutellum elongately lobate and sulcate, connexivum piceous, spotted with ochraceous

impexa

Genus 10. Epirodera Westw. 1847


10. Epirodera bengalensis Distant


Diagnostic characters: Black species with anteocular portion of head ochraceous and longer than postocular which is globose behind eye; pronotum with the anterior lobe very strongly defined, the anterior angles conspicuous, two central longitudinal ridges curved inwardly near middle; abdomen beneath with a sublateral segmental series of black spots on each side.

Length: 9 mm.

Distribution: India: Meghalaya (West Garo hills), "Bengal", Bihar.

11. Expirodera impexa Distant


Material examined: 1 ex., Tura, West Garo hills, (1200-1500), 15.vi. 15.vii.1917, S. Kemp Coll.

Diagnostic characters: Generally an obscure chocolate brown species with the coreium except basal angle, membrane and connexivum piceous; antennae longly pilose with its apical joint luteous; pronotum with lateral margins of anterior lobe serrate, pronotum transversely constricted and trifoveate, anterior femora robust, prominently spined beneath.

Length: 9 mm.


Division Acanthaspisaria

Genus 11. Acanthaspis Amy. & Serv. 1843

Key to the species of the genus *Acanthaspis*

1(2) Posterior lobe of pronotum with four discal spines; basal joint of antennae about as long as head; anterior lobe of pronotum strongly sculptured, posterior lobe rugose... *quinquespinosa*

2(1) Posterior lobe of pronotum with two short but prominent discal tubercles; basal joint of antennae a little longer than head, anterior lobe of pronotum moderately sculptured, posterior lobe almost smooth............................................................................................................ *helluo*

12. *Acanthaspis helluo* Stål


*Material examined* : 1 ex., Damanged, Above Tura, West Garo hills, (3500-3900), Sept., 17, Coll?

*Diagnostic characters* : A black species; first joint of antennae a little longer than head; pronotum with the anterior lobe moderately sculptured, posterior lobe almost smooth, the lateral angles ochraceous and subspinously produced, their apices slightly recurved, posterior disk with two short, distinct tubercles.

*Length* : 20-22 mm.

*Distribution* : India : Meghalaya (West Garo hills), Assam, Nagaland.

13. *Acanthaspis quinquespinosa* (Fabricius)


*Diagnostic characters* : Generally black species with the four posterior spines of pronotum, a basal and a transverse discal spots to corium and spots to connexivum above and beneath luteous; basal joint of antennae about as long as head; scutellar spine long obliquely ascending.

*Length* : 15.5 to 19 mm.

*Distribution* : India : Meghalaya (Ri Bhoi, East Khasi hills, West Garo hills); Assam, “Bengal” Bihar, Maharashtra; Elsewhere : Burma; Sri Lanka.

*Division Lenaearia*

Key to the genera of the Division Lenaearia

1(2) Prosternal process acute, sulcate, posteriorly recurved; posterior tibiae and femora almost subequal in length............................................................................................................ *Velitra*

2(1) Prosternal process straight, not recurved; second joint of antennae four or five times as long as the first............................................................................................................ *Sminthocoris*
Genus 12. *Velitra* Stål 1865


14. *Velitra rubropicta* (Amy. & Serv.)


*Diagnostic characters:* Piceous, pronotum with the anterior lobe sculptured, posterior lobe with three longitudinal series of punctures one central and others lateral, coreium testaceous with an elongate piceous spot on each side of claval apex and a large irregular piceous spot not reaching apical angle; antennae except first joint finely pilose.

*Length:* 18 to 20 mm.

*Distribution:* India: Meghalaya (West Garo hills); Elsewhere: Burma; Java; Malay Peninsula.

Genus 13. *Sminthocoris* Distant


15. *Sminthocoris fuscipennis* (Stål)


*Diagnostic characters:* A sanguineous species; posterior lobe of pronotum with three longitudinal series of punctures; apex of the scutellum long, conical, straightly produced, first joint of antennae, base of the corium sanguineous.

*Length:* 15 to 17 mm.

*Distribution:* India: Meghalaya (West Garo hills, Ri Bhoi), Assam; Elsewhere: Burma.

Subfamily VI. PIRATINAES

Genus 14. *Pirates* Serv., 1831


16. *Pirates arcuatus* (Stål)


Diagnostic characters: Generally a black species; pronotum longitudinally striate; pronotum, scutellum, clavus, basal half of corium dark brown; an arcute transverse fascia near base of membrane, and an apical spot greyishly flavacent.

Length: 9.5 to 11 mm.

Distribution: India: Meghalaya (East Khasi hills East Garo hills), Assam; Elsewhere: Burma; Philippines.

Key to the genera of the Subfamily Ectrichodiinae
1 (2) Anterolateral angle of scutellum on each side with a prominent posteriorly curving tooth

.......................................................................................................................................Vilius

2 (1) Anterolateral angles of the scutellum rounded

.................................................................................................................................3

3 (4) Apical margin of scutellum with distinct posteriorly projecting median tubercles

.................................................................................................................................5

4 (3) Apical margin of scutellum without a distinct median tubercles, transverse sutures at or beyond the middle of the pronotum, interrupted by four short thickened longitudinal ridges; major ventral tubercles of fore femur at middle of segment usually accompanied by smaller tubercles..........................................................Haematorrohophus

5 (6) Abdomen with a strong acute spine at the posterior angle of each segment of the connexivum; median tubercles on apical margin of the secutellum two third as long as the lateral prongs

.................................................................................................................................Paralivavious

6 (5) Abdomen without the spines at the posterior angle of each segment of the connexivum

.........................................................................................................................................7

7 (8) Scutellum with three apical spinous angulations, the middle one minute

Ectrychotes

8 (7) Scutellum with two apical spinous angulations; rostrum with first joint about as long as remaining joints together

..........................................................Scadra

Genus 15. Scadra Stål 1859


Key to the species of the genus Scadra
1 (2) Rufous testaceous, a large spot on the inner area of corium, three segmental spots to the ventral segment black

.................................................................................................................................Juscicrus

2 (1) Castaneous, a small triangular patch on the apical margin of corium ochraceous, a greenish yellow patch on the basal lateral angles of the 2nd, 3rd, 4th & 5th segments

..........................................................Scadra castanea Paiva


Material examined: 1 ex., Above Tura, West Garo hills, (3500-3900), 15.viii.1917, S. Kemp Coll.
Diagnostic characters: Head pale brown, Pronotum constricted a little before middle, a deep central longitudinal furrow extending from the anterior margin to a little beyond the middle of the posterior lobe; scutellum strongly depressed on disk, the apical spines curved inwards; connexivum dilated, obliquely reflexed, marked alternately with orange yellow and black.

Length: 13.5 mm.

Distribution: India: Meghalaya (West Garo hills).

18. Scadra fuscicrus Stål


Material examined: 1 ex., Above Tura, West Garo hills, (3500-3900), 15.vii.1917, Coll. ?

Diagnostic characters: Posterior lobe of pronotum with two piceous spots; a large spot on interior area of corium, antennae; and three spots to the ventral segments black or piceous.

Length: 10.5 13.5 mm.

Distribution: India: Meghalaya (West Garo hills); Elsewhere: Burma; Sri Lanka.

Genus 16. Ectrychotes Burm., 1835


19. Ectrychotes relatus Paiva


Material examined: 5 exs., Above Tura, West Garo hills (3500 - 3900) 15.vii.30.viii.1917, S. Kemp Coll.

Diagnostic characters: Reddish testaceous, pronotum excluding the posterior lateral margins, and base of scutellum cupreous, hemelytra black and a black patch on clavus and disk of the corium; connexivum with black patch on the third, fourth, fifth and sixth abdominal segments, posterior femora distinctly anaulated.

Length: 13 mm.

Distribution: India: Meghalaya (West Garo hills).

Genus 17. Haemorrhopus Stål 1874


20. Haemorrhopus marginatus (Reut.)


**Diagnostic characters**: Apterous, abdomen dorsally violaceous black irregularly rugose whereas lateral margin of connexivum sanguineous; pronotum with the anterior lobe longer than the posterior lobe which is broader than the anterior lobe.

*Length*: ♀ 30 to 40 mm.

*Distribution*: India: Meghalaya (Ri Bhoi, North Khasi Hills), Assam; Elsewhere: Burma.

**Genus 18. *Paralivavious* Paiva, 1919**


21. *Paralivavious singularis* Paiva


*Diagnostic characters*: Pale reddish ochraceous; antennae black, extreme base of first joint ochraceous; disk of the posterior lobe of pronotum, scutellum, legs castaneous; membrane dull black.

*Length*: 8 mm.

*Distribution*: India: Meghalaya (West Garo hills)

**Genus 19. *Vilius* Stål, 1863**


22. *Vilius melanopterus* Stål


*Diagnostic characters*: Generally a coral red species, with base and lateral margin of corium testaceous; posterior lobe of pronotum with three longitudinal impressions; antennae with first and second joints longly ochraceously pilose in male but in female not pilose.

*Length*: 17-22 mm.

*Distribution*: India: Meghalaya (East Garo hills, Jaintia hills), Assam; Elsewhere: Bangladesh; Burma; Malay Peninsula.

**Subfamily VIII. PIOMERINAE**

**Genus 20. *Velocipeda* Bergr. 1891**


23. *Velocipeda aliena* (Dist.)


Diagnostic characters: Generally a piceous species, with three transverse ochaceous spots on lateral areas of hemelytra; pronotum with the anterior lobe glabrous and shining, the posterior lobe granulous and speckled with greyish; abdomen beneath castaneous and piceous on lateral area.

Length: 9-10 mm.

Distribution: India: Meghalaya (West Garo hills).

Subfamily IX. HARPACTORINAE
Division Harpactoraria

Key to the genera of the Division Harpactoraria

1(2) First joint of antennae as long as head........................................... Lophocephala
2(1) First joint of antennae much longer than head........................................... 3
3(4) Posterior lobe of pronotum neither longitudinally impressed nor elevated .......... Rhynocoris
4(3) Posterior lobe of pronotum longitudinally impressed............................... Sphedanolestes
Genus 21.  

**Lopocephala** Lap. 1832


*Material examined* : 1 ex., Tura, West Garo hills (1400), x.1917, *Mrs. Kemp Coll.*

*Diagnostic characters* : Generally a sanguineous species, with, antennae, scutellum, membrane, inner area of corium, body beneath, posterior and intermediate femora violaceous black; head thickly pilose and transversely impressed behind eyes; posterior pronotal angle rounded; antennae finely pilose with the basal joint a little longer than the second.

*Length* : 16 - 17 mm.

*Distribution* : India : Meghalaya (West Garo hills), West Bengal; Elsewhere : Sri Lanka.

Genus 22.  

**Rhynocoris** Hahn. 1834


Key to the species of the genus Rhynocoris

1(2) First joint of rostrum not or scarcely longer than anteocular area of head ........................................... 3

2(1) First joint of rostrum distinctly longer than anteocular area of head ........................................... 5

3(4) Coral red, pronotum with anterior lobe distinctly sculptured .................................................. *fusipes*

4(3) Black, pronotum with anterior lobe very obscurely sculptured .................................................. *costalis*

5(6) Pronotal lobe concolorous; first joint of antennae about equal in length to anterior femora, anterior lobe of pronotum posteriorly centrally impressed .................................................. *marginellus*

6(5) Pronotal lobe not concolorous; posterior lobe luteous; first joint of rostrum reaching posterior margin of eyes ................................................................................................. *nigrlicollis*

25.  *Rhynocoris costalis* (Stål)


*Diagnostic characters* : Generally black species with lateral margins and basal area of posterior pronotal lobe, apex of scutellum, lateral areas of corium, coxae, trochanters and abdomen beneath, a spot between and a lateral spot behind eyes, and anterior lobe of pronotum coral red, basal joint of rostrum not passing eyes; first joint of antennae a little shorter than anterior femora.

*Length* : 12 to 14 mm.

*Distribution* : India : Meghalaya (East Khasi hills, East Garo hills), Assam, Bengal; Elsewhere : Malay Peninsula.
26. **Rhynocoris fuscipes** (Fabricius)  


**Diagnostic characters**: Generally coral red in colour, upper surface of the postocular area, and a lateral fascia behind eyes, disk of scutellum, anterior area of the posterior lobe of pronotum, segmental fasciae of abdomen beneath and legs black; clavus, interior area of corium and membrane fuscoolly violaceous; first joint of antennae a little shorter than anterior femora; pronotum with the anterior lobe distinctly sculptured.  

**Length**: 14 to 16 mm.  

**Distribution**: India: Meghalaya (East Garo hills, Jaintia hills) Maharashtra; Elsewhere: Sri Lanka.

27. **Rhynocoris marginellus** (Fabr.)  


**Diagnostic characters**: Black, pronotum with the anterior lobe obscurely sculptured, posteriorly centrally impressed, posterior lobe sericeous; lateral margins of abdomen ochraceous or reddish ochraceous first joint of antennae about equal in length to anterior femora; head as long as pronotum; basal joint of rostrum just passing eyes.  

**Length**: 12 to 15 mm.  

**Distribution**: India: Meghalaya (East Garo hills, East Khasi hills), Assam, Sikkim; Elsewhere: Burma.

28. **Rhynocoris nigricollis** (Dall.)  

**Material examined**: 1 ex., Above Tura, West Garo hills, (3500 3900), 15.vii.30.viii.1917, *S. Kemp* Coll.  

**Diagnostic characters**: Black, head beneath, corium, posterior lobe of pronotum, and posterior area of prosternum luteous; membrane pale brownish, connexivum and abdomen beneath sanguineous; first joint of antennae shorter than anterior femora, anterior lobe of femora not sculptured; first joint of rostrum reaching posterior margins of eyes.  

**Length**: 13-14 mm
**Distribution**: India: Meghalaya (West Garo hills), Sikkim, West Bengal; Elsewhere: Bhutan; Burma; Sumatra.

Genus 23. *Sphedanolestes* Stål, 1866


**Key to the species of the Genus Sphedanolostes**

1(2) Pronotum unicolorous, or palely pubescent................................................................. 3

2(1) Pronotum black, anterior lobe and posterior margin sanguineous, head with a large spot behind eyes black............................................................... *mendicus*

3(4) Pronotum black .............................................................................................................. 7

4(3) Pronotum sanguineous....................................................................................................... 5

5(6) Rostrum black, a small lateral spot to head near eyes coral red, membrane fuscous violaceous ......................................................................................... *trichrous*

6(5) Rostrum with its first joint, a large spot on each side of head infront of eyes and a small spot on each side of head behind eyes, pale luteous; black tessellate markings on each lateral area of abdomen beneath ................................................................. *bowringi*

7(8) Coreium greyishly pubescent, abdomen sanguineous............................................... *pubinotum*

8(7) Coreium piceous, connexivum spotted and a large spot before apex of abdomen beneath sanguineous......................................................................................... *indicus*

29. *Sphedanolestes bowringi* Distant


**Material examined**: 1 ex., Sangsak, East Garo hills, 22.ix.1975, N. Muraleedharan Coll.

**Diagnostic characters**: Black species with pronotum, scutellum and sternum coral red; two spots on posterior area of connexivum; anterior femora about as long as the first joint of antennae; pronotum with anterior lobe centrally longitudinally sulcate, posterior lobe centrally broadly impressed; membrane considerably passing the abdominal apex with its apical area brownish ochraceous.

**Length**: 9 mm.

**Distribution**: India: Meghalaya (East Garo hills).

30. *Sphedanolestes indicus* Reuter


Diagnostic characters: Black species with bases of femore and corium piceous, antennae with the first joint about as long as anterior femora; lateral pronotal angle rounded; anterior pronotal lobe centrally sulcated, posterior lobe discally broadly impressed.

Length: 12.5 mm.

Distribution: India: Meghalaya (East Khasi hills).

31. Sphedanolestes mendicus (Stål)


Material examined: 1 ex., Tura, West Garo hills (1200-1500), 15.vi.15.vii.1917, S. Kemp. Coll.

Diagnostic characters: Black species with head anterior lobe and posterior margin of pronotum sanguineous, head about as long as pronotum, first joint of rostrum slightly longer than anteocular portion of head; membrane longly passing abdominal apex.

Length: 11-14 mm.

Distribution: India: Meghalaya (West Garo hills), Assam; Elsewhere: Burma; Malay Peninsula.

32. Sphedanolestes pubinotum Reut.


Diagnostic characters: Shiningly black species with abdomen sanguineous beneath, head with postocular area a little longer than anteocular area; pronotum with its central impression continued to about middle of the posterior lobe, first joint of rostrum a little longer than anteocular portion of head and much shorter than second joint, membrane longly passing the abdominal apex.

Length: 15 to 16.5 mm.


33. Sphedanolestes trichorus (Stål)

1874. Haemactus trichorus Stål, En. Hem. 4 : 34.


Diagnostic characters: Coral red species with antennae rostrum, head and legs black but base of the head and base of femora coral red, small lateral spot to head near eyes, membrane fuscous violaceous.

Length: 11 mm.
**Distribution**: India: Meghalaya (West Khasi hills).

**Division** Vesbiaria

**Genus 24.** *Vesbius* Stål, 1865


34. *Vesbius purpureus* (Thunb.)


**Material examined**: 1 ex., Darugiri, West Khasi hills, 11.iv.1971, R. S. Pillai Coll.

Diagnostic characters: Generally a sanguineous species with antennae, head, rostrum, legs and membrane black; first joint of antennae subequal in length to anterior femoral femora nodulose; apical third of membrane hyaline, legs largely pilose.

**Length**: 7-8 mm.

**Distribution**: India: Meghalaya (West Khasi hills), Assam. Elsewhere: Burma; Java; Phillipines, Sri Lanka.

**Division** Velinaria

**Key to the genera of the Division Velinaria**

1(2) First joint of antennae about as long as anterior femora; scutellum with the apex spatulately dilated.................................................................Cosmoslestes

2(1) First joint of antennae very much longer than anterior femora.........................Velinus

**Genus 25.** *Cosmoslestes* Stål 1866


35. *Cosmoslestes annulipes* Distant


**Material examined**: 2 exs., Garampani, Jaintia hills, 19.ix.1979, P. T. Cherian & C. Radhakrishnan Coll.

Diagnostic characters: General colouration of the species luteous; annulations to femora and basal annulations to tibiae black; head with an oblique fascia in front of eyes; scutellum with a central discal line and spatulate apex luteous.

**Length**: 10 mm.

**Distribution**: India: Meghalaya (Jaintia hills), Assam. Elsewhere: Burma.

**Genus 26.** *Velinus* Stål 1865


36. *Velinus annulatus* Distant


Diagnostic characters: Generally a luteous species; corium purplish red, membrane brownly black, its apical area pale fuliginous; anterior lobe of pronotum medially impressed; first joint of antennae about twice the length of the head; annulations to the femora black and annulations to the basal joint of antennae and apex of scutellum luteous.

Length: 15 to 16 mm.


Divison Sycanaria
Genus 27. Sycanus Amy. & Serv., 1843

1843. Sycanus Amy. & Serv., Hem.; 360.

37. Sycanus croceovittatus Dohrn


Diagnostic characters: General coloration of the species black, apical half of corium and basal margin of membrane golden yellow; antennae unicolourous first joint subequal in length to anterior femora; scutellar spine long a little obliquely curved backward its apex bifid, abdominal margins amplified and upwardly reflexed.

Length: 22 to 25 mm.

Distribution: India: Meghalaya (East Khasi hills).

Genus 28. Villanovanus Dist., 1902


38. Villanovanus dichrous Distant


Material examined: 2 exs., above Tura, West Garo hills, 15.vi.vii.1917, C. A. Paiva Coll.

Diagnostic characters: Generally a sanguineous species with eyes, antennae, rostrum black; abdomen, lateral margins of sternum, sanguineous; pronotum longer than head and its posterior lateral spines short.

Length: 25 mm.

Distribution: India: Meghalaya (West Garo hills), Assam, Nagaland.
Division Yolinaria

Genus 29. *Agriosphodrus* Stål 1868


39. *Agriosphodrus dohrni* (Sing.)


*Material examined*: 1 ex., Khasi hills, Date? Coll. ? material badly damaged.

*Diagnostic character*: A shinningly black species, lateral margin of the abdomen dialated, dull ivory white with large black segmental spots, apex of last abdominal segment more prominent in female than male, pronotum medially longitudinally impressed.

*Length*: 19 - 22 mm.

*Distribution*: India: Meghalaya (Khasi hills), Deccan. Elsewhere: China.

Key to the genera of the Division Evagorasaria

1(2) Anterior tibiae simple, not inwardly spined before apex................................. *Epidaus*

2(1) Anterior tibiae incurved and spined before apex.............................................. *Rihirbus*


40. *Epidaus atrispinus* Distant


*Diagnostic characters*: A tawny brown species with legs and abdomen beneath pale luteous, discal and lateral spines to the posterior lobe of pronotum, scutellum black; head with a short erect tubercles behind base of each antenna, first joint of which as long as anterior femora and trochanters together, membrane shinningly brown.

*Length*: 21 mm.

*Distribution*: Meghalaya (East Khasi hills), Sikkim.
Genus 31. **Rihirbus** Stål 1861


41. **Rihirbus trochantericus** Stål


*Material examined*: 1 ex., Tura, West Garo hills, ?, Coll. ?

*Diagnostic characters*: A black greyishly sericeous species, sternum and abdomen pale reddish testaceous.

*Length*: 18 – 24 mm.

*Distribution*: India: Meghalaya (West Garo hills). Elsewhere: Burma; Philippine islands; Sri Lanka.

Division Panthousaria

Genus 32. **Panthous** Stål, 1863


42. **Panthous excellens** Stål


*Material examined*: 5 exs., Above Tura, West Garo hills (3500-3900), 15.vii.30.viii.1917, Coll. ?

*Diagnostic characters*: Generally an ochraceous species, anterior lobe of pronotum, transeverse spots to lateral areas of abdomen beneath and legs black, membrane olivaceously black, femora and tibiae nodulose; rostrum, coxae, trochanters, and bases of femora reddish ochraceous.

*Length*: 24-29 mm.

*Distribution*: India: Meghalaya (West Garo hills); Assam, Nagaland.

Division Coranusaria

Genus 33. **Coranus** Curtis, 1833


Key to the species of the genera *Coranus*

1(2) Membrane bronzy fuscous; corium fuscous; antennae brownish ochraceous, abdomen beneath ochraceous; first joint of antennae distinctly shorter than head............... **spiniscutis**

2(1) Membrane brassy black, corium very pale ochraceous; abdomen beneath black; first joint of antennae almost as long as head.......................................................... **fuscipennis**
43. **Coranus fuscipennis** Reut.


*Diagnostic character*: Black, postocular area with a central pale longitudinal line; corium pale ochraceous, clavus and membrane brassy black; connexivum above and beneath pale testaceous with transverse piceous spots; femora black, nodulose, scutellum with an erect conical spine, posterior lobe of pronotum densely granulate, first joint of rostrum shorter than second.

*Length*: 9 to 10 mm.

*Distribution*: India: Meghalaya (East Khasi hills); Elsewhere: Sumatra.

44. **Coranus spiniscutis** Reuter


*Diagnostic character*: A testaceous fuscous species, head black, antennae brownish ochraceous with first joint and base of second joint luteous; abdomen beneath ochraceous; legs ochraceous with annulations to femora; first joint of antennae distinctly shorter than head; scutellum with an erect conical tuberculous spine.

*Length*: 9 - 10 mm.


**Division** Polididusaria

**Genus** 34. **Forestus** Dist., 1903


45. **Forestus typica** (Distant)


*Diagnostic characters*: Ochraceous species; membrane, basal and apical joints of antennae, a large spot on fourth and fifth segments on connexivum brownish ochraceous.

*Length*: 12.5 - 14 mm.

*Distribution*: India: Meghalaya (East Khasi hills), Assam, Sikkim.
Genus 35. *Scipinia* Stål


46. *Scipinia horrida* (Stål)


*Diagnostic characters*: An ochraceous species, membrane bronzy; black spots to the connexivum, largest being on fourth and fifth segment; posterior lobe of pronotum granulate, its lateral angle acute; posterior and intermediate femora subnodulose near apex.

*Length*: 10 mm.

*Distribution*: India: Meghalaya (East Garo hills), Sikkim; Elsewhere: Burma; Philippines; Sri Lanka.

Genus 36. *Gropis* Stål 1859


47. *Gropis annulatus* Paiva.


*Diagnostic characters*: Head, pronotum, scutellum and legs pale luteous; scutellum with a black spot at centre of basal margin, some light brown linear markings on vertex of head; hemelytra fuscous brown; disk of the anterior lobe of pronotum variegated with brown, legs with two large black patches on the outer side of the anterior femora.

*Length*: 10 mm.

*Distribution*: India: Meghalaya (West Garo hills).

Genus 37. *Nabis* Latr. 1807


48. *Nabis assamensis* Paiva


*Material examined*: 1 ex., above Tura, West Garo hills, 15.vi.15.vii.1917, *C. A. Paiva* Coll.

*Diagnostic characters*: Head fuscous brown, a black 'V' shaped mark on disk extending from anterior margin of eyes to base of head, pronotum with a greyish sericeous patch on disk of the anterior lobe and black elongated spot on the central area of the anterior lobe, connexivum black with transverse ochraceous spots, a small black spot on the disk of corium and another small ochraceous spot on apical margin of membrane.

*Length*: 9-25 mm.

*Distribution*: India: Meghalaya (West Garo hills).
SCHEMATIC DIAGRAM OF A REDUVIID BUG SHOWING MORPHOLOGICAL TERMINOLOGY USED IN THE TEXT
SCHEMATIC DIAGRAM OF A REDUVIID BUG SHOWING
MORPHOLOGICAL TERMINOLOGY USED IN THE TEXT
MAP OF MEGHALAYA SHOWING DISTRIBUTION OF REDUVIID SPECIES (MAP 1)

1. Mylophantes greeni Distant
2. Bassequa cavernicola Paiva
3. Adenus Dineus Distant
4. Aulacogena corniculata Stål
5. Canthesancus gulo Stål
6. Lisarda annulosa Stål
IMP OF ME6HAlAYA SHOWl", DISTRIBUTION OF REDUVIID SPECIES (IMP 2)

MEGHALAYA

ASSAM

BANGLADESH

1. Valentia apetala (de Yuill)
2. Psophis erythraea Stal
3. Centrocnemis Stal Reuter
4. Epirodera bengalensis Distant
5. Epirodera impexa Distant
6. Acanthaspis heiluo Stal

State Fauna Series 4: Fauna of Meghalaya
MAP OF MEGHALAYA SHOWING DISTRIBUTION OF REDUVIID SPECIES (MAP 3)

13. Acanthaspis guingumspinosa (Fabricius)
14. Velitra rubropicta (Amy. & Serv.)
15. Smithocoris fuscipennis (Stal)
16. Pirates arcuatus Stal
17. Scadra castanea Palva
18. Scadra fuscicrus Stal
19. Ectrichotes relatus Paiva
20. Haemorrhophus marginatus (Reuter)
21. Paralivivius singularis Paiva
22. Vilius melamopterus Stal
23. Velocipeda aliena (Distant)
24. Lopocephala guerini Lap.
MAP OF MEGHALAYA SHOWING DISTRIBUTION OF REDUVIID SPECIES (MAP 5)

25. *Rhynocoris costalis* (Stal)
26. *Rhynocoris fuscipes* (Fabricius)
27. *Rhynocoris marginellus* (Fabricius)
28. *Rhynocoris nigricollis* (Dallas)
29. *Sphedanolestes bowringi* Distant
30. *Sphedanolestes indicus* Reuter
31. *Schedanolates mendicus* (Stal)
32. *Schedanolates pubinotum* Reuter
33. *Schedanolates trichorus* (Stal)
34. *Veslius purpureus* (Thumb.)
35. *Cosmostes annulipes* Distant
36. *Velinus annulatus* Distant
MAP OF MEGHALAYA SHOWING DISTRIBUTION OF REDUVIID SPECIES (MAP 7)

37. Sycanus croceovittatus Dohrn
38. Villanovanus dichrous Distant
39. Agriosphorbus dohrni (Signoret)
40. Epidaus atrispinus Distant
41. Rhirbus trochantericus Stal
42. Panthous excellens Stal
Map of Meghalaya showing distribution of reduviid species (Map 8):

43. Coranus fuscipennis Reuter
44. Coranus spiniscutis Reuter
45. Forestus typica (Distant)
46. Scipinia horrida (Stal)
47. Gropis annulatus Paiva
48. Habis assamensis Paiva
Table 1. Distribution of the Reduviid species in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>EAST GARO HILLS</th>
<th>WEST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>EAST KHASI HILLS</th>
<th>WEST KHASI HILLS</th>
<th>RI-BHOI</th>
<th>JAINIA HILLS</th>
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<td>1. Myiophanes greeni Distant</td>
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<td>2. Bagauda cavernicola Paiva</td>
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<td>3. Apocaus cus laneus Distant</td>
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<td>4. Aulacogenia corniculata Stal</td>
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<td>5. Canthesancus gulo Stal</td>
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<td>6. Lisarda annulosa Stal</td>
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<td>7. Valenta apetala (deVeill)</td>
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<td>8. Psophis erythraea Stal</td>
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<td>9. Centrocemis stali Reuter</td>
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<td>10. Epirodera bengalensis Distant</td>
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<td>11. Epirodera impexa Distant</td>
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<td>12. Acanthaspis helluo Stal</td>
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<td>13. Acanthaspis quinquespinosa (Fabr.)</td>
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<td>14. Velitra rubropicta (Amy. &amp; Serv.)</td>
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<td>15. Sminthocoris fuscipennis (Stal)</td>
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<td>16. Pirates arcatus (Stal)</td>
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<td>17. Scadra castanea Paiva</td>
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<td>18. Scadrafuscicrus Stal</td>
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<td>19. Ectrychotes relatus Paiva</td>
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<td>20. Haematorrhopus marginatus (Reuter)</td>
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<td>21. Paralivavious singularis Paiva</td>
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<td>22. Vilius melanopterus (Stal)</td>
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<td>23. Velocipeda aliena (Distant)</td>
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<td>24. Lopocephala guerini Lap.</td>
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<td>25. Rhynocoris costalis (Stal)</td>
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<td>26. Rhynocoris fuscipes (Fabr.)</td>
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<td>27. Rhynocoris marginellus (Fabr.)</td>
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<td>29. Sphedanolestes bowringi Distant</td>
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<td>30. Sphedanolestes indicus Reuter</td>
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<td>34. Vesbius purpureus (Thumb.)</td>
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<td>35. Cosmoslestes annulipes Distant</td>
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<td>36. Velinus annulatus Distant</td>
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<td>37. Sycanus croceovittatus Dohrn.</td>
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<td>38. Villanovanus dichrous Distant</td>
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<td>39. Agriosphodrus dohrni (Sign.)</td>
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<td>40. Epidaus atrispinus Distant</td>
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<td>41. Rihirbus trochantericus Stal</td>
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<td>42. Panthous excellens Stal</td>
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<td>43. Coranus fuscipennis Reuter</td>
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<td>44. Coranus spiniscutis Reuter</td>
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<td>45. Forestus typica (Distant)</td>
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<td>46. Scipinia horrida (Stal)</td>
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<td>47. Gropis annulatus Paiva</td>
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<td>48. Nabis assamensis Paiva</td>
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SUMMARY

The paper deals with a consolidated account of 48 species belonging to 37 genera under 10 subfamilies of the family Reduviidae from Meghalaya. Of these, 20 species (marked*) belonging to 18 genera were hitherto unknown from the state. Running keys to the various taxa are incorporated for easy recognition of the group. In addition, general diagnostic characters of each species is provided. The original and recent references and distributional record of each species from India and abroad are also furnished. The study is based on the existing collections as well as mopping survey materials of different survey parties in recent years. The distribution of all 48 species is shown in maps.

ACKNOWLEDGEMENT

The authors are grateful to the Director, Zoological Survey of India for Laboratory facilities. Sincere thanks are due to Dr. J. R. B. Alfred, Joint Director and Coordinator of the Meghalaya Fauna for constant encouragement and offering constructive suggestions. Helpful cooperation rendered by Dr. S. K. Tandon, Scientist ‘SF’, ZSI. is thankfully acknowledged. Thanks are also due to all the colleagues of Hemiptera Section for necessary help as and when necessary.

REFERENCES


INSECTA : HEMIPTERA : HETEROPTERA : PYRRHOCORIDAE

G.C. SEN., M. GHOSH AND L.K. GHOSH
Zoological Survey of India
Calcutta 700 053

INTRODUCTION

Pyrrhocorid bugs are commonly known as 'Cotton Stainers' which is derived from their habit of piercing the bolls and staining the fibre. They are mostly phytophagous in nature and usually inhabit the agricultural fields, bushes, vegetable gardens, crop fields etc.

The species belonging to the genus Dysdercus Amyot and Serville are serious pest of cotton and mostly occur in cotton fields.

The family Pyrrhocoridae is primarily tropical and sub-tropical in distribution. The world record of Pyrrhocoridae represents about 360 species belonging to 43 genera. In India, the family is represented by 45 species under 15 genera (Distant 1902, 1910; Mitra et al. 1977; Sen et al. 1993).

The Pyrrhocorid fauna of Meghalaya is poorly explored. So far, only 14 species belonging to 8 genera are known from the State.

The paper provides a consolidated account of these 14 species under 8 genera. Of these, two species (marked *) constitute new distributional record from the State.

The classification of the family has been mainly adopted after Distant (1904, 1910).

The work is chiefly based on the collections represented in Hemiptera Section, Zoological Survey of India, Calcutta.

SYSTEMATIC ACCOUNT

Family PYRRHOCORIDAE

1. Subfamily Euryopthalminae
   1. Genus Iphita Stal
      1. Iphita limbata Stål
   2. Genus Macrocerea Spinola
      *2. Macrocerea grandis (Gray)
   3. Genus Physopelta Amyot & Serville
      3. Physopelta gutta Burm.
   4. Physopelta schlanbuschi Fabricius
2. Subfamily Pyrrhocorinae

4. Genus *Antilochus* Stål

5. *Antilochus coqueberti* Fabricius

*6. *Antilochus russus* Stål

5. Genus *Dindymus* Stål

7. *Dindymus lanius* Stål

8. *Dindymus rubigenosus* Fabricius

6. Genus *Dysdercus* Amyot & Serville

9. *Dysdercus evanescens* Distant

10. *Dysdercus koenigii* (Fabricius)

7. Genus *Euscophus* Stål

11. *Euscophus indecorus* (Walker)

12. *Euscophus rufipes* Stål

8. Genus *Melamphaus* Stål

13. *Melamphaus feber* Fabricius

14. *Melamphaus rubrocinctus* Stål

Family PHRRHOCORIDAE

*Diagnosis*: Large and robust insects; usually bright in colour, red and black with predominant tints. Ocelli absent; antennae inserted below a line drawn from the centre of the eye to the apex of the face; corium broader, without appendix; membrane generally with four but not with more than five veins; in a few genera hemelytra incomplete, membrane fully developed; This family shows much affinity with Lygaeidae but can be distinguished in the absence of ocelli which is present in Lygaeidae.

Key to the Subfamilies

Sixth ventral segment of female divided on the median line..... *Euryophalminae* (=*Larginae*)

Sixth ventral segment of female entire ............................................................... *Pyrrhocorinae*

1. Subfamily Euryophalminae

Key to Genera of the Subfamily Euryophalminae

1. Antennae in male long; first joint about twice as long as head and pronotum together

.......................................................... *Macroceroea*

Antennae normal in male, first joint longer than head but shorter than head and pronotum together.................................................................2

2. Anterior area of the pronotal disk convex, this convexity not reaching at the anterior margin; lateral margin reflexed......................................................... *Iphita*
Anterior area of the pronotal disk convex, this convexity reaching at the anterior margin; lateral margin not reflexed ................................................................. Physopelta

1. Genus Iphita Stål

1870. *Iphita* Stål, Enum. Hem. 1 : 91 and 99. Type by subsequent designation *Iphita limbata* Stål

1. *Iphita limbata* Stål


*Diagnosis*: Body blackish red, lateral margin of pronotum, corium and base of antennae brownish yellow; pronotum at centre transversely impressed, not well defined; legs reddish.

*Length*: 18 mm. (Female)

*Distribution*: India: Meghalaya (North Khasi Hills); West Bengal. Elsewhere: Sri Lanka.

2. Genus Macrocerea


2. *Macrocerea grandis* (Gray)


*Diagnostic character*: Body red. Pronotum and scutellum reddish in colour. Central to clavus area with elongate spots and large rounded spots different in size at inner angle of corium. Leg black.

*Length*: 30 mm. (Female)

*Distribution*: India: Meghalaya (Khasi Hills); Assam; West Bengal. Elsewhere: Philippines.

3. Genus Physopelta Amyot and Serville


*Key to the species of the genus Physopelta*

Body reddish ochraceous, a discal rounded black spot at the middle of the corium, paramere weakly bifid with inner arm narrower than outer ......................................................... ......*gutta*

Body sanguineous, a dot like black spot at the middle of the corium, paramere deeply bifid, with dissimilar arms .................................................................................. *schlanbuschi*
3. Physopelta gutta (Burmeister)


Diagnostic characters : Body pale reddish brown in colour; head with a spot at base; pronotum, scutellum and base of corium reddish in colour and with a discal round black spot; antennae reddish in colour; body pilose.

Length : 16 mm. (Female)

Distribution : India : Meghalaya (Jaintia Hills, Cherrapunji, Shillong); Assam; West Bengal. Elsewhere : Australia, Burma, China, Ceylon, Java, Japan, Philippines, Sumatra.

4. Physopelta schlanbuschi (Fabricius)

1789. Cimex schlanbuschi Fabricius, Mant. Ins., 11; 299.


Diagnostic characters : Body blood red in colour, at posterior lobe of pronotum with two large transverse spots and at posterior a rounded area punctate; spot on scutellum to corium sternal with a lateral series of transverse linear spots; antennae pilose.

Length : 15 mm. (Female)

Distribution : India : Meghalaya (Garo Hills); Assam; West Bengal. Elsewhere : Burma, China, Hong Kong, Formosä, Penang, Tenasserim.

Remarks : This species damages rice crops.

2. Subfamily Pyrrhocorinae

Keys to genera of Pyrrhocorinae

1. Apical angle of corium elongately acute ............................................................... Dysdercus
- Apical angle of corium more or less rounded, not elongately acute ....................... 2

2. Head transversely constricted or impressed beneath near base .......................... Antiloclus
- Head not transversely constricted or impressed beneath ........................................ 3

3. Anterior area of pronotum completely circumscribed by continuous impression or punctures ................................................................. Euscoclus
- Anterior area of pronotum not or incompletely circumscribed by continuous impression or punctures ............................................................... 4

4. Lateral margins of pronotum acute, strongly reflexed ........................................ Dindymus
- Lateral margins of pronotum rarely reflexed ......................................................... Melamphaus
4. Genus *Antilochus* Stål


**Key to species**

Pronotum with two transverse series of punctures and at base of scutellum with transverse series of punctures ................................................................. *russus*

Pronotum without transverse series of puncture; at base scutellum without transverse series puncture ................................................................................................... *coqueberti*

5. *Antilochus coqueberti* (Fabricius)


**Material examined**: 2 exs., Meghalaya, Rongrogis, Phedbon, Garo Hills, 12.ii.71, Coll K.P. Singh.

**Diagnostic characters**: Head blood red in colour; antennae, membrane black; apical margin of membrane pale brownish; pronotum at anterior margin black, obscurely punctate; corium thickly punctate; anterior femoral spine present.

**Length**: 15 mm. (Female)

**Distribution**: India : Meghalaya (Garo Hills), Andaman Islands, Assam, Jammu & Kashmir, Nagaland, West Bengal. Elsewhere : Burma, Sri Lanka.

6. *Antilochus russus* Stål


**Material examined**: 1 ex., Meghalaya, Khasi Hills. Date and Coll. ?

**Diagnostic characters**: Body reddish brown, membrane yellowish brown, pronotum transversely punctate and strongly angulated; scutellum at base of membrane, corium thickly punctured, apices of anterior femora spined.

**Length**: 18 mm. (Female)


5. Genus *Dindymus* Stål


**Key to species**

*Hamelytra* broadly subovate; pronotum at anterior area defined by coarse black punctures ................................................................. *lanius*
Hemelytra elongated; pronotum at anterior area without punctures ....................rubigenosus

7. *Dindymus lanius* Stål


*Material examined*: 1 ex., Meghalaya, North Khasi Hills, Date and Coll. ?

*Diagnostic characters*: Body blackish red; a large discal black spot at membrane, basal margin of scutellum, base of abdomen and legs black; lateral margin of pronotum reddish, anterior area of pronotum coarse black puncture and posterior part of pronotum sparingly punctate, corium finely and thickly punctate, abdomen blackish red.

*Length*: 17 mm. (Female)


8. *Dindymus rubiginosus* Fabricius


*Material examined*: 1 ex., Meghalaya : Khasi Hills (North).

*Diagnostic characters*: Body reddish with brownish tinge, membrane with a large black spot; abdomen, legs black; Posterior parts of three sternal segments creamy white; basal margin of pronotum and membrane pale blackish red; basal area of abdomen black.

*Length*: 14 mm. (Female)


*Key to species*

Present a transverse line which connect the area of each eye. Pronotum and corium punctate .................................................................koenigii

Absent a transverse line which connect area of each eyes. Pronotum and corium thickly punctate ............................................................... evanescens

9. *Dysdercus evanescens* Distant


*Diagnostic characters*: Body pale brownish; head, pronotum and scutellum reddish brown; a transverse line present between eyes; pronotum thickly punctate; abdominal segment reddish brown and abdominal margin black; membrane pale brownish.
**Length**: 19 mm. (Female)


10. *Dysdercus koenigii* (Fabricius)


**Diagnostic characters**: Body ochraceous; anterior pronotal callosity and lateral margin of pronotum reddish; scutellum, membrane and legs black in colour; abdominal segments, spot of coxae creamy white.

**Length**: 14 mm. (Female)

**Distribution**: India: Meghalaya (Garo Hills, Shillong); Assam, Karnataka, Nicobar Islands, West Bengal. Elsewhere: Bhamo, Burma, Ceylon, Hounghdaran, Kamorta, Minhla, Metaja.

7. Genus *Euscopus* Stål


**Key to species**

- Anterior femora with two distinct spines beneath near apex ........................................... *indecorus*
- Anterior femora without distinct spines beneath near apex ........................................... *rufipes*

11. *Euscopus indecorus* (Walker)


**Material examined**: 1 ex., Meghalaya: North Khasi Hills. Date and Coll. ?

**Diagnostic characters**: Body reddish black; lateral and posterior margin of pronotum brownish yellow; a small spot present at apical margin of corium; membrane dark reddish paler at its apical margin; a round black spot present at lateral margin of abdomen; coarse of series punctures present transversely at pronotum; two distinct spines present at apex of femora.

**Length**: 8.5 mm. (Female)

**Distribution**: India: Meghalaya (North Khasi Hills), Assam. Elsewhere: Bhamo, Ceylon, Teinzo.

12. *Euscopus rufipes* Stål

**Material examined**: 1 ex., Meghalaya: North Khasi Hills.

**Diagnosis characters**: Body black; apex of scutellum blackish red, valvus area with a black round spot; apical margin of membrane with reddish disk of pronotum; scutellum and corium thickly punctate; posterior part of pronotum more coarsely punctate; legs blackish red.

**Length**: 10 mm. (Female)

**Distribution**: India: Meghalaya (North Khasi Hills), Assam. Elsewhere: Burma, Java, Karennee, Pulo Laut, Yunnan.

8. Genus *Melamphaus* Stål


**Key to species**

- Lateral margin of pronotum acute. Rostrum extending to near middle of abdomen ........... *feber*
- Lateral margin of pronotum reflexed. Rostrum not extending to near middle of abdomen

............................................................................................................................ *rubrocinctus*

13. *Melamphaus feber* (Fabricius)


**Diagnostic characters**: Head blood reddish in colour; posterior area of pronotum, scutellum and membrane black; two black spots at base of sternal sutures and four black spots present at lateral segment of abdomen; apical margin of corium with brownish spot; antennae black.

**Length**: 26 mm. (Female)

**Distribution**: India: Meghalaya (East Garo Hills), Assam, West Bengal. Elsewhere: Burma, Borneo, Ligo, Malacca, Palawan, Pulo Candor, Philippines.

14. *Melamphaus rubrocinctus* Stål


**Material examined**: 1 ex., Meghalaya: Garampani, Jaintia Hills, 22.v.90, Coll. M.S. Shisodia.

**Diagnostic characters**: Head brownish red, with small spot at base; pronotum, scutellum, corium, membrane pitchy black; two oblique reddish fasciae present at lateral and posterior margin of pronotum; apical margin of membrane smoky brown.

**Length**: 22 mm. (Female)

**Distribution**: India: Meghalaya (Khasi Hills, Jaintia Hills), Assam. Elsewhere: Burma, Karennee, Margherita.
Table - 1. Distribution of Pyrrhocoridae in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>West Garo hills</th>
<th>East Garo hills</th>
<th>South Garo hills</th>
<th>West Khasi hills</th>
<th>East Khasi hills</th>
<th>Jayantia hills</th>
<th>Rivoi</th>
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<tr>
<td>1. <em>Iphita limbata</em> Stal</td>
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<td>2. <em>Macrocerea grandis</em> (Gray)</td>
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<td>3. <em>Physopelta gutta</em> Burm.</td>
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<td>4. <em>Physopeila gutta</em> Burm.</td>
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<td>5. <em>Antilochus cogueberti</em> Fabricius</td>
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<td>6. <em>Antilochus russus</em> Stal</td>
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<td>7. <em>Dindymus lanius</em> Stal</td>
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<td>8. <em>Dindymus rubigenosus</em> Fabricius</td>
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<td>9. <em>Dysdercus evanescens</em> Distant</td>
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<td>10. <em>Dysdercus koenigii</em> (Fabricius)</td>
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<td>11. <em>Euscophus indecorus</em> (Walker)</td>
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<td>12. <em>Euscophus rufipes</em> Stal</td>
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<td>13. <em>Melamphaus feber</em> Fabricius</td>
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<td>14. <em>Melamphaus rubrocinctus</em> Stal</td>
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</tbody>
</table>
1. *Iphita limbata* Stal
2. *Macrocerea grandis* (Gray)
4. *Physopelta schlumbergeri* Fabricius
5. *Antilochus coqueberti* Fabricius
6. *Antilochus rufus* Stål
7. *Dindymus lanius* Stål
MAP-2. SHOWING DISTRIBUTION OF THE SPECIES OF PYRRHOCORIDAE

8. *Dindymus rubigenosus* Fabricius
9. *Dysdercus evanescens* Distant
10. *Dysdercus koenigi* (Fabricius)
11. *Euscophus indecorus* (Walker)
12. *Euscophus rufipes* Stal
13. *Melamphaus feber* Fabricius
14. *Melamphaus rubrocinctus* Stal
SUMMARY

The paper presents an accounts of 14 species belonging to 8 genera under 2 subfamilies of the family Pyrrhocoridae from Meghalaya. Of these, 2 species (marked *) constitute new locality records from the state. Running keys to various taxa are incorporated for easy identification of the group. General diagnosis of the species (not included in the key) is given. Also, distribution of each species in India and elsewhere is provided. The study is based on the existing collections as well as mopping survey material of Zoological Survey of India parties in the recent years.

ACKNOWLEDGEMENTS

Thanks are due to the Director, Zoological Survey of India, Calcutta for necessary Laboratory facilities. Gratitude is expressed to Dr. J.R.B. Alfred, Dr. R.K. Varshney, Dr. S.K. Tandon, Additional Directors for numerous courtesies. Grateful thanks are also due to Dr. J.K. Jonathan, Deputy Director, Zoological Survey of India for critically going through the manuscript and offering valuable suggestions.

REFERENCE


Fuigorids, usually known as 'Lantern flies', are principally characterised by reticulated anal area of the wing. The group is abundant in tropical regions and also found in temperate zones.

A perusal of literature reveals that about 430 species of Fulgoroidea are known from India as against world fauna of nearly 6521 species. In India, earlier contributions are made by Distant (1908, 1916), Paiva (1918), Menon and Prasad (1962), Chopra (1976), Dutta and Pramanick (1977), Dutta and Ghosh (1979).

Our knowledge of Fulgorid fauna of Meghalaya is at present inadequate. So far, only 20 species belonging to 16 genera under 5 subfamilies are known from the State.

In this paper, an attempt has been made to provide a consolidated account of the superfamily Fulgoroidea from Meghalaya.

It deals with all the 20 species mentioned above. Of these, 5 species (marked *) belonging to 5 genera constitute new distributional record from Meghalaya.

The paper provides keys to various taxa where more than one taxon is involved. General diagnosis has been given only in case of single species which is not included in the key. Distributional record for each species in India and elsewhere has been included.

The paper is based on the material collected during Mopping Surveys of Meghalaya. It is also supplemented by the materials deposited in the National Zoological Collections made by the earlier survey parties of Zoological Survey of India. A classified list of species so far known from Meghalaya is given.

The classification is basically followed by Distant (1908, 1916) and Metcalf (1936, 1945).

The material is in the Zoological Survey of India, Calcutta.

CLASSIFIED LIST OF FULGOROIDEA

1. Family CIXIIDAE
2. Genus Andes Stål
   1. Andes plagosa Distant
2. Genus Oliarus Stål
   * 2. Oliarus caudatus Walker
2. Family FULGORIDAE
| Page 344 |
| State Fauna Series 4 : Fauna of Meghalaya |

3. Genus *Laternaria* Linne
   - *Laternaria candelaria* (Linne)  
   - *Laternaria viridirostris* Westwood

4. Genus *Lycorma* Stål
   - *Lycorma jole* Stål

5. Genus *Penthicodes* Blanchard
   - *Penthicodes (Atomaria) nigropunctata* Guerin-Meneville

6. Genus *Zanna* Kirkaldy
   - *Zanna chennelli* Distant  
   - *Zanna chinensis* Distant
   - *Zanna dohrni* Stål

   - *Indogaetulia nigrovenosa* Melichar

8. Genus *Pochazia*
   - *Pochazia atkinsoni* Distant

9. Genus *Ricania* Germar
   - *Ricania speculum* Walker
   - *Ricania pulverosa* Stål

10. Genus *Sogana* Matsumura
    - *Sogana extrema* Melichar

11. Subfamily *Dictyopharinae*
    - Genus *Centromerla* Stål
    - *Centromerla simulata* Distant

12. Genus *Chanithus* Kolenati
    - *Chanithus pallidus* Donovan

13. Genus *Faventia* Stål
    - *Faventia pustulata* Walker

14. Genus *Kinnara* Distant
    - *Kinnara spectra* Distant
Insecta: Hemiptera: Fulgoroidea

3. Subfamily Eurybrachinae

15. Genus *Messena* Stål

19. *Messena radiata* Distant

4. Subfamily Flatinae

16. Genus *Farona* Melichar

20. *Farona fuscipennis* Melichar

* New record from Meghalaya

**SYSTEMATIC ACCOUNT**

Superfamily FULGOROIDEA

*Diagnostic Characters:* Genae very often separated from frons by a ridge; tegmina at base with a tegula which is concealed, wings reticulated at anal area; anterior coxae inserted near the sides of the body, very often elongate, posterior pair transverse, contiguous, extending to the lateral margin of the body.

**Key to the families**

1. The anal and jugal areas of hind wings strongly reticulate............................................ Fulgoridae
   - The anal and jugal areas of hind wings not as above .......................................................... 2

2. Head usually with distinct cephalic process ................................................................. Dictyophoridae
   - Head without such process .................................................................................................. 3

3. Hind tibiae long, either without or with only a few lateral spines............................... Cixiidae
   - Hind tibiae always with many lateral spines........................................................................ 4

4. Second segment of antennae usually subglobular pronotum short with a median carina
   - Second segment of antennae usually distinctly longer than broad; pronotum without median carina................................................................. Nogodinidae

1. Family Cixiidae

The head not elaborately developed, relatively simple; antennae two-jointed, each with a terminal flagellum; tegulae present; wings are usually macropterous, sub-costa, radius and media usually united, radius and media have a few branches forming a small number of antiapical cell; claval suture distinct, the claval vein united; Legs usually simple; the hind tibiae long, either without or with only a few lateral spines; apex of hind tibia with a circle of apical spines.

**Key to genera of Cixiidae**

1. Mesonotum with three longitudinal ridges................................................................. *Andes*
   - Mesonotum with five longitudinal ridges ........................................................................ *Oliarus*
1. Genus *Andes* Stål

Type by original designation. *Andes undulatus* Stål.


1. *Andes plagosa* Distant


*Diagnosis*: Body above pitchy black and beneath brownish; tegmina pale brownish; three transverse pale silvery spots at margin with castaneous; the first short and strongly oblique at base, the second long and slightly oblique at middle, the third one short and discal before apical area; greyish fascia present and a large spots beyond stigma; wings pale smoky brown

*Length*: 4 mm (♀)

*Distribution*: India: Meghalaya (Garo Hill), Sikkim.

2. Genus *Oliarus* Stål

Type by original designation *Oliarus walkeri* Stål.


2. *Oliarus caudatus* Walker


*Diagnosis*: Body reddish brown; two ridges on the head; pronotum and mesonotum have five carinae; abdomen brownish; a central ridge present on frontal area of face; tegmina hyaline; venation dark brown and at apical areas two or three dark brown spots.

*Length*: 5-5 mm (♀)

*Distribution*: India: Meghalaya (Jaintia Hill), North India.

2. Family Fulgoridae

Head large and usually with a large cephalic process; frons large, usually quadrangular, with strongly elevated lateral margin; compound eyes large, projecting, semiglobose with ventral sinus ill-developed paired ocelli conspicuous. Antennae usually relatively indistinct. Thorax typically large, pronotum about as large as mesonotum. Median carina strongly elevated Mesonotum typically triangular. Tegulae large, the anal and jugal areas of hind wings are strongly reticulate. Abdomen large and broadly depressed.
Key to genera of Fulgoridae

1. Head with strong porect cephalic process ................................................................................ 2
   Head without such process ..................................................................................................... 3

2. Cephalic process straight; Genae before eyes rounded; apex of face profoundly sinuate; mesonotum not centrally carinate ................................................................. Zanna
   Cephalic process more or less curved; genae before eyes truncate; apex of face slightly sinuate; mesonotum centrally carinate ................................................................. Laternaria

3. Face with two parallel discal carination sometimes obliterated behind middle ........ Lycorna
   Face having disc with two anteriorly divergent carination and with a central, sometimes obsolete longitudinal sulcation ................................................................. Penthicodes

3. Genus Laternaria Linne

1964. Laternaria Linne, Museum Uricae : 152
   Type by original designation Fulgora candelaria Linne.

1767. Fulgora candelaria Linne, Systema Nature Editor Duodecima 1(2) : 703.

Key to species of Laternaria

Head and cephalic process ochraceous; measured from apex to eyes as long as from anterior margin of mesonotum to abdominal apex; Length of cephalic process 16 to 20 mm ........................................................................................................................... candelaria

Head and cephalic process green; measured from apex to eyes as long as from posterior angle of mesonotum to abdominal apex; Length of cephalic process 12 to 15 mm ............... viridirostris

3. Laternaria candelaria (Linne)

1746. Cicada candelaria Linne, Actattolm : 63


Diagnosis : Cephalic process of the head brownish; with minute white spots; pronotum and mesonotum brownish, with two discal four obconical and two oblique black spots, abdomen brownish, tegmina pitchy black; with deeply reticulate, pale olicaceus venation; a transverse fascia present at base of tegmina and medially two same fascia centrally fused; a series of black spots present.

Length : 23 mm. (♀)

Distribution : India : Meghalaya (Ri-bhoi); Sikkim. Elsewhere : Asia, Cambodia, China. East Indies, Fukien, Hainan Island, Hong Kong, Indochina, Kwangtung, Siam, South China, Thailand, Tonkin.
4. *Laternaria viridirostris* (Westwood)


*Material examined*: 1 ex., Meghalaya; above Tura, Garo Hills; 19.ix.75, Coll. S.W. Kemp.

*Diagnosis*: Head green; with minute white spots cephalic process also green and spotted; two discal dark spots on pronotum and four spots on mesonotum; tegmina pitchy-black with pale olivaculum venation, with brown fascia at base and two same fasciae often medially fused at centre; and present a series of spots; wings yellowish brown, its apical area broadly black.

*Length*: 20 mm. (♀)

*Distribution*: India: Meghalaya (Garo Hills); Assam: Sikkim. Elsewhere: Burma, Indo-China, Penang Island, Tonkin.

4. Genus *Lycorma* Stal


Type by original designation *Lycorma imperialis* White


5. *Lycorma jole* Stål


*Diagnosis*: Head and thorax green-olivaceous, mesonotum and tegmina also green-olivaceous; with large black spots and its apical area blackish; and green veined; wings with black spots and with short green fascia.

*Length*: 17.5 mm.


5. Genus *Penthicodes* Blanchard


Type by original designation *Aphaena farinosa* Fabricius.

6. *Penthicodes nigropunctata* (Guerin-Meneville)


Diagnosis: Head and pronotum brownish, mesonotum pitchy black; abdomen reddish; tegmina brownish yellow; its basal area purplish; on costal area two black spots; at base an elongated spot and a few minute pale spots on apical area; wings purplish red; black spot on its basal area; posterior area dark brown.

Length: 17 mm. (♀)

Distribution: India: Meghalaya (Khasi Hills); Punjab. Elsewhere: China, Java, Malay Peninsula, Sumatra.

6. Genus Zanna Kirkaldy

Type by original designation Fulgora tenebrosa Fabricius

Key to species of Zanna

1. Abdomen above fulvous or ochraceous.............................................................. dohrni
   Abdomen above black.......................................................................................... 2

2. Tegmina thickly spotted with black, the spots slightly more prominent on anterior portion, body larger in size................................................................. chinensis
   Tegmina finely spotted with black, the spots a little longer on upper half, smaller and denser on the posterior half; body smaller in size................................................... chennelli

7. Zanna chennelli (Distant)


Material examined: 1 ex., Meghalaya: Williamnagar; East Garo Hills, 21.i.91, Coll. B. Nandy & party.

Diagnosis: Head and pronotum brownish with yellowish tinge; head with thickly black punctures; cephalic process of head with a central carina; tegmina brownish with finely black spots; wing milky white with brownish venation; abdomen black.

Length: 24.5 mm. (♀)

Distribution: India: Meghalaya (East Garo Hills); Assam; Naga Hills.

8. Zanna chinensis (Distant)


Diagnosis: Head dull greyish; cephalic process with a few black spots; thorax dull greyish with ochreous tinge have thickly black spots; tegmina with thick black spots; more prominent on apical area; venation brownish; wings milky white; abdomen black.
Length: 34.5 mm. (♀)

Distribution: India: Meghalaya (Jaintia Hill); Assam. Elsewhere: China, Indo-China, Japan.

9. Zanna dohrni Stal


Diagnosis: Head pale brownish spotted black, pronotum black spotted, tegmina pale brownish, spotted black its venation ochraceous; wing light creamy-white; vein darker in colour, abdomen chalky-white, pilose.

Length: 33 mm. (♀)

Distribution: India: Meghalaya (Garo Hills); Tamil Nadu. Elsewhere: Ceylon. Indo-China, Java.

3. Family Nogodinidae

Head about as wide as pronotum; crown short and broad; frons longer than wide; lateral carinae strongly elevated, clypeus less than half as long as the frons; antennae small, the 1st segment short, collar-like, 2nd segment usually distinctly longer than broad. Pronotum short and broad, posterior margin of pronotum deeply in size. Laterally the pronotum narrows behind the compound eyes. Mesonotum large, tri-carinate, usually longer than its maximum diametre. Tegmina large; coriaceous, sub-hyaline or hyaline, usually broader towards the apex, and with numerous veins and cross veins, basal cell usually large; clavus not punctualate, with claval vein united at middle or beyond. Hind tibia with lateral spines, 2nd segment of hind tarsus small, with a pair of spine at apex.

7. Genus *Indogaetulia* Schmidt

Type by original designation *Indogaetulia nigrovenosa* Melichar.

10. *Indogaetulia nigrovenosa* Melichar


Length: 5 mm. (♀)

Diagnosis: Body ochraceous; vertex with two piceous lines; pronotum and mesonotum with pale brownish yellow central carinate fascia, later three longitudinal fasciae brownish; tegmina and wings transparent, the venation fuscous; and present a subtriangular costal fuscous spot.

Distribution: India: Meghalaya (Khasi Hill); Assam, Eastern India. Elsewhere: Burma, Java, Sumatra, Tenasserim.
4. Family Ricaniidae

Head about as wide as pronotum; vertex short and broad, nearly rectangular, usually carinate. Frons rather large with lateral carinae strongly elevated. Clypeus much narrower than frons, triangular, usually with a median carina. Antennae short, basal segment short, collar-like, 2nd segment usually sub-globular, flagellum elongated, shorter than body. Pronotum short with a median carina. Mesonotum large, tricarinate, convex; tegulae usually large. Tegmina large nearly triangular, costal margin rather straight, apical margin long, nearly straight; costal membrane broad with numerous cross veins; corium with many cross veins; claval veins usually united beyond. Tegmina vary greatly in texture; venations of tegmina also vary greatly; typically radius, media and cubitus with supernumerary veins. Costa arises from the base of basal cell. The wings smaller than the tegmina, cross veins relatively few. Legs simple with the front and middle legs small; hind femora large; hind tibiae elongate with one or more spines on the lateral margin; 1st segment of hind tarsi usually shorter than 2nd and 3rd together, without spine at the apex.

Key to genera of family Ricaniidae

Apical Margin of tegmina longer than inner margin.................................................. Pochazia
Apical margin of tegmina about as long as inner margin............................................ Ricania

8. Genus Pochazia Amyot and Serville

Type by original designation Pochazia fasciata Fabricius.
1803. Flata fasciata Fabricus. Systema Rhyn., 47.

11. Pochazia atkinsoni Distant


Material examined : 1 ex., Meghalaya; above Tura, Garo hills, 7.vii.1916, Coll. F.H. Gravely.

Length : 10.5 mm. (♀)

Diagnosis : Body pitchy black; face centrally with a strong carina; tegmina pale reddish brown with two large yellowish spots, one elongated at costal margin, other on rounded disk; wings pale reddish brown.

Distribution : India : Meghalaya (Garo Hills); Sikkim.

9. Genus Ricania Germar

Type by original designation Ricania fenestrata Fabricius.

12. Ricania speculum Walker

Material examined: 1 ex., Meghalaya; Sangsak; East Garo Hills; 27.ix.1975, Coll. N. Muraleedharan.

Diagnosis: Head, pronotum, mesonotum, pitchy black in colour. Face with fine central carina; tegmina pitchy black, beyond middle three greyish white spots two upper and one costal margin and two elongate spots on costal margin, wing smoky brown in colour, abdomen pitchy brown in colour.

Length: 6.5 mm. (♀)

Distribution: India: Meghalaya (East Garo Hills); Assam; 'Bengal'; Madras; Sikkim. Elsewhere: Borneo, British Malaya, Burma, China, Ceylon, Dutch, East Indies, Fukein, Java, Japan, Luzon, Malay, Mindanao, Singapore, Sumatra, Sunda, Tenasserim, Tonkin.

13. Ricania pulverosa (Stål)


Diagnosis: Head, face, pronotum, mesonotum carina with pitchy black in colour; face with central and lateral tegmina dark brown with yellowish tinge in colour; the costal with two transverse black spots; and two greyish white large spots divided by a central black line, and two small black spots and minute black spots present at costal margin; wings reddish brown.

Length: 6 mm (♀)

Distribution: India: Meghalaya (East Garo Hills); Assam; 'Bengal'. Elsewhere: Burma, Formosa, France, Japan, Java, Lower Burma, Sumatra, Siam, Tonkin.

5. Family Tropiduchidae
10. Genus Sogana Matsumura

Type by original designation Sogana hopponis Matsumura

14. Sogana extrema Melichar

1942. Logana (Sic.) extrema Lallemand, Notes Ent. Chinoise, 9: 70.

Material examined: 1 ex., Meghalaya; Tura, Garo Hills, x.1917, Coll. Mrs. S.W. Kemp.


Note: Diagnosis and measurement could not be given due to damage condition of the specimen.

Key to Subfamilies

1. Face broad, transverse or almost equally broad as long; anterior legs compressed, more or less dilated; anal area of wings sometime reticulated.......................... Eurybrachidina
   Face not laterally angulate; legs very often simple; anal area of wings never reticulated .... 2
2. Claval vein not reaching apex; face without apical ocellus; lateral margin of clypeus always carinate or acute.................................................... Dictyopharinae

   Claval vein reaching apex or united with the claval suture near apex........................................ 3

3. Head narrower than thorax; sides of clypeus carinate; last joint of rostrum elongate; thorax notched at base........................................................................................................... Achilinae

   - Sides of clypeus without a ridge or with an obtuse ridge; clavus granulate, apex sometime subacute and closed; costa dilated, costal membrane with transverse veins, claval suture prominent.................................................................................................................. Flatinae

1. Subfamily  Dictyopharinae

Key to genera of Dictyopharinae

Anterior femora without a spine; head with a well developed porrect or curved caphalic process......................................................................................................................... Chanithus

Anterior femora with a minute acute spine near apex; head with a short anterior recurved process....................................................................................................................... Centromeria

11. Genus  Centromeria Stål

Type by original designation Dictyophora longipennis, Walker.


15. Centromeria simulata Distant


Diagnosis: Head brownish with yellow tinge; central place of vertex with two small spots and a longitudinal ridge pronotum reddish-brown with a broad central fascia, tegmina transparent, its claval area dark brown; wings transparent with elongate dark brown spots; abdomen ochraceous.

Length: 10 mm. (♀)

Distribution: India: Meghalaya (Jaintia Hills); Assam;


Type by original designation Chanithus pannonicus Kolenati


16. Chanithus pallidus (Donovan)

1800. Fulgora pallida Donovan, Insects of India 8.
Material examined: 1 ex., Meghalaya: West Garo Hills, 15.i.91; Coll. B. Nandi and party.

Diagnosis: Head yellowish brown, pronotum and mesonotum with three yellowish carinae; mesonotum with pitchy black spots at its basal angle; tegmina and wings transparent, the venation dark brown abdomen pitchy black.

Length: 22.5 mm. (♀)

Distribution: India: Meghalaya (West Garo Hills); Maharashtra, Sikkim; Tamil Nadu; West Bengal. Elsewhere: Borneo, Burma, Sri Lanka.

2. Subfamily Achilinae

Key to genera of the Subfamily Achilinae

1. Face not or very slightly projecting before eyes; clypeus about or nearly as long as face; face anteriorly emarginate .......................................................... Kinnara

   face prominently produced before eyes, clypeus small, less than half length of face not
   emarginate as above ........................................................................................................ Faventia

13. Genus Faventia Metcalf


Type Cixius pustulatus Walker.


17. Faventia pustulatus (Walker)


Diagnosis: Body dark brown with yellowish tinge; vertex black and two black spots on mesonotum, tegmina greyish; apical area darker; its vein brownish-yellow and small reddish spots on apical marginal area; on its claval area one large prominent spot and one spot on disk and one at base. Wing smoky-brown and venation brownish, face with central and lateral ridge.

Length: 8 mm. (♀)

Distribution: India: Meghalaya (Jaintia Hills); Assam; Sikkim. Elsewhere: Borneo, Palawan Island, Singapore, Tenasserim.

14. Genus Kinnara Distant


Type by original designation Pleroma ceylonica Melichar.

18. **Kinnara spectra** Distant


*Diagnosis*: Body brownish; head short and broad and much narrower than pronotum, at its margin present strong carinae; tegmina and wings pale transparent with greyish white tinge.

*Length*: 3 mm. (♀)

*Distribution*: India: Meghalaya, (Garo Hills); West Bengal. Elsewhere: Malay.

3. Subfamily **Eurybrachinae**

15. Genus **Massena** Stål


*Type by original designation* *Messena pulverosa* [nec Hope] Distant.

19. **Messena radiata** Distant


*Material examined*: 1 ex., Meghalaya; above Tura, West Garo Hills; 15.ix.17, Coll. *S. Kemp*.

*Diagnosis*: Body brownish yellow with dark marking; tegmina brownish with purplish shade; at margin purplish spots, at base greyish brown spots, at central subapical spots, wing pale greyish; abdomen organe yellow.

*Length*: 12.5 mm. (♀)

*Distribution*: India: Meghalaya (West Garo Hills); Tamil Nadu.

4. Subfamily **Flatinae**

16. Genus **Farona** Melichar


*Type by original designation* *Farona fuscipennis* Melichar.


20. **Farona fuscipennis** Melichar


*Diagnosis*: Body pale brown; pronotum and mesenotum with dark brown speckled; tegmina pale brown with white spots at costal margin, apical marginal area and apex of disk; wings creamy white.

*Length*: 9 mm. (♀)

*Distribution*: Meghalaya (West Garo Hills); Assam. Elsewhere: Burma.
MAP-I. SHOWING DISTRIBUTION OF THE SPECIES OF FULGORIDAE

1. *Anes plagosa* Stal
2. *Ollarus caudatus* Walker
3. *Laternaria camellaria* (Linn.)
4. *Laternaria viridirostris* Westwood
5. *Lycorna jole* Stal
7. *Zanna chemilli* Distant
MAP-2. SHOWING DISTRIBUTION OF THE SPECIES OF FULGORIDAE

MEGHALAYA

ASSAM

BANGLADESH

1. Zanna chinensis Distant
2. Zanna albovittata Distant
3. Zanna albovittata Stal
4. Zanna albovittata Stal
5. Zanna albovittata Stal
6. Zanna albovittata Stal
7. Zanna albovittata Stal
8. Zanna albovittata Stal
9. Zanna albovittata Stal
10. Zanna albovittata Stal
11. Pochazia atkinsoni Distant
12. Riciania speculum Walker
13. Riciania pulvosa Stal
14. Sogana extima Melichar
MAP-3. SHOWING DISTRIBUTION OF THE SPECIES OF FULGORIDÆ

15. Centromeria simulata Distant
16. Chanithus pallidus Donovan
17. Faventia pustulata Walker
18. Kinnara spectra Distant
19. Messena radiata Distant
20. Farona fuscipennis Melichar
Table 1. Distribution of Fulgoridae in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>WEST GARO HILLS</th>
<th>EAST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>WEST KHASI HILLS</th>
<th>EAST KHASI HILLS</th>
<th>JANTIA HILLS</th>
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<td>1. <em>Andes plagosa</em> Stal</td>
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<td>2. <em>Oliarius caudatus</em> Walker</td>
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<td>3. <em>Laternaria candelaria</em> (Linn.)</td>
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<td>4. <em>Laternaria viridirostris</em> Westwood</td>
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<td>5. <em>Lycorma jole</em> Stal</td>
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<td>6. <em>Penthicodes (Atomaria) nigropunctata</em> Guerin-Menevillo</td>
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<td>7. <em>Zanna chennlli</em> Distant</td>
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<td>8. <em>Zanna chinensis</em> Distant</td>
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<td>9. <em>Zanna dohrni</em> Stal</td>
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<td>10. <em>Indogaetulia nigrovenosa</em> Melichar</td>
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<td>11. <em>Pochazia atkinsoni</em> Distant</td>
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<td>12. <em>Ricania speculum</em> Walker</td>
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<td>13. <em>Ricaniapulverosa</em> Stal</td>
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<td>14. <em>Sogana extrema</em> Melichar</td>
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<td>15. <em>Centromeria simulata</em> Distant</td>
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<td>16. <em>Chanithus pallidus</em> Donovan</td>
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<td>17. <em>Faventia pustulata</em> Walker</td>
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<td>18. <em>Kinnara spectra</em> Distant</td>
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<td>19. <em>Messena radiata</em> Distant</td>
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<td>20. <em>Farona fuscipennis</em> Melichar</td>
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SUMMARY

The paper deals with a consolidated account of Superfamily Fulgoroidea from Meghalaya State in Eastern India. Out of 20 species belonging to 17 genera, 5 species (marked*) are of new distributional record from the State. Keys to various taxa are given. General diagnosis of the species (not included in key) is also provided. Besides, distribution of each species in India and elsewhere is given.

ACKNOWLEDGEMENTS

The authors are grateful to the Director, Zoological Survey of India, Calcutta for Laboratory facilities. They are also grateful to Dr. J.R.B. Alfred, Additional Director and Chief Coordinator, State Fauna Series, Meghalaya for encouragement. Grateful thanks are due to Dr. R.K. Varshney, Additional Director; Dr. S.K. Tandon, Joint Director, Z.S.I. for numerous courtesies. Sincere gratitude is expressed to Dr. J.K. Jonathan, Deputy Director, S.Z.I. for kindly suggesting improvement of the manuscript. Necessary help rendered by Sri Pradip Saha, Insect Setter, Hemiptera section is thankfully acknowledged.

REFERENCE


INSECTA : HEMIPTERA : COREOIDEA

R. C. BASU, ANIMESH BAL AND S. C. MITRA

Zoological S-urvey of India
Calcutta

INTRODUCTION

The superfamily Coreoidea is represented by four families from India, and comprises medium to large sized hemipteran insects. They are commonly known as leaf-footed bugs which generally exhibit their phytophagous food habit, though a few are known to be predaceous. They are known to be occurred in hills and plains in abundance while a few are predominant in agricultural fields and cultivated gardens.

Economically some of them are reported as important pest particularly on cereals, pulses, vegetables and fruits. These bugs often secrete obnoxious odours to avoid their predators. Distant (1904, 1908, 1918) contributed to the general studies on the coreid fauna as a pioneer worker from Indian sub-continent. Since then stray works have been done by some authors like Paiva (1919), Kumar (1965), Dolling (1978), O'Shea and Schaefer (1980). The Coreid bugs of India are distributed among four families, i.e. Coreidae, Alydidae, Rhopalidae and Stenocephalidae. Classification is based upon Richards and Davies, 1977.

This present study is based on the collections of Coreoid from Meghalaya region by different survey parties from Zoological Survey of India as well as the named collections housed in the National Zoological Collection.

Nearly 190 species of Coreoids have, so far, been recorded from India. The present study has recorded 50 species under 22 genera belonging to two families from the state of Meghalaya, six of which are being recorded for the first time from the state and these are cited in the text with asteric marks.

MATERIAL AND METHOD

Coreids like most of the hemipteran insects are phytophagus in nature and are found in agricultural fields, vegetable gardens and other herbs and shrubs.

As these insects are well fliers like other hemipteran insects they are being collected by sweeping the habitat with insect net or by hand picking with foreceps and light-traping during night time.

The collected materials are killed in a killing jar using Benzene or Chloroform vapour and preserved dry with paradichlorobenzene and naphthalene. In the field the insects are kept in the insect-envelopes and labelled properly mentioning locality, altitude, date of collection and name of the collector with ecological notes. In the laboratory the specimens are set, pinned and mounted to display
properly for easy handling and observation under binocular microscope during the process of identification. For detailed specific identification the genitalia are also dissected out properly and mounted on slide for further study.

SYSTEMATIC ACCOUNT

List of the Meghalaya coreoid species studied in this paper. Species with asteric marks indicate new record from the State.

Super family COREOIDEA

Family Alydidae

Subfamily Leptocorisinae

Genus 1. Leptocorisa Latreille 1825

Genus 1. Leptocorisa acuta (Thunberg)

Subfamily Alydinae

Genus 2. Riptortus Stål 1859

2. Riptortus linearis (Fabricius)

3. Riptortus strenuus Horvath

Genus 3. Babaranus Distant 1908

4. Babaranus ornatus Distant*

Family Coreidae

Subfamily Coreinae

Tribe Mictini

Genus 4. Derepteryx White 1839

5. Derepteryx grayi White*

6. Derepteryx hardwicki White

Genus 5. Helcomeria Stål 1873

7. Helcomeria spinosa Signoret

Genus 6. Prionolomia Stal 1873

8. Prionolomia gigas Distant

9. Prionolomia fulvicornis (Fabricius)

Genus 7. Ochrochira Stål 1873

10. Ochrochira biplagiata (Walker)

11. Ochrochira nigrorufa (Walker)

12. Ochrochira albiditarsis (Westwood)*
13. *Ochrochira grannipes* (Westwood)

Genus 8. *Mictis* Leach 1814

14. *Mictis pictor* (Fabricius)

15. *Mictis tenebrosa* (Fabricius)

16. *Mictis gallina* Dallas

Genus 9. *Anoplocnemis* Stål 1873

17. *Anoplocnemis phasiana* (Fabricius)

Tribe Cloresmini

Genus 10. *Notobitus* Stål 1859

18. *Notobitus excellens* Distant

19. *Notobitus abdominalis* Distant

20. *Notobitus meleagris* (Fabricius)

Genus 11. *Cloresmus* Stål 1859

21. *Cloresmus khasianus* Distant

22. *Cloresmus antennatus* Distant*

23. *Cloresmus nepalensis* (Westwood)

Tribe Gonocerini

Genus 12. *Cletus* Stål 1859

24. *Cletus punctiger* (Dallas)

25. *Cletus bipunctatus* (Westwood)

26. *Cletus punctulatus* (Westwood)

Genus 13. *Cletomorpha* Mayr 1866

27. *Cletomorpha raja* Distant*

28. *Cletomorpha hastata* (Fabricius)

Tribe Dasynini

Genus 14. *Dasynus* Burmeister 1834

29. *Dasynus orientalis* (Distant)

30. *Dasynus relatus* Paiva

Tribe Anisoscelidini

Genus 15. *Leptoglossus* Guerin 1830

31. *Leptoglossus membranaceus* (Fabricius)
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<th>Tribe</th>
<th>Genus</th>
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<td>Homoecerini</td>
<td>Homoecerus Burmeister 1835</td>
<td>Pseudophoelinae</td>
<td>Physomerus Burmeister 1835</td>
<td>Hydarella</td>
<td>Colpurinae</td>
<td>Hygia Uhler 1861</td>
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<td>Homoecerus consisus var. A. Walker</td>
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<td>Physomerus grossipes (Fabricius)</td>
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<td>Homoecerus albiguttulus Stal</td>
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<td>Acanthocornis Amyot &amp; Serville</td>
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<td>Hydarella orientalis (Distant)</td>
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<td>Homoecerus simiolus Distant</td>
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<td>Homoecerus biguttatus Westwood*</td>
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<td>Homoecerus inornatus Stål</td>
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Superfamily  COREOIDEA

Coreid bugs are generally medium to large insects, head much narrower than pronotum; antennae four segmented, inserted on the upper side of the head; ocelli present; rostrum four segmented; scent glands opening on thorax conspicuous. Mostly dull coloured and capable of producing pungent scent, in some genera they exhibit extra ordinary dialation of the antennae, many species have flattened and leaf like legs, therefore they are called leaf-footed bugs. A few species are known to be predacious in nature.

The superfamily Coreoidea is represented in Meghalaya by two families, namely Coreidae and Alydidae.

Key to the families of superfamily Coreoidea found in Meghalaya

1. Bucculae short, not extending to the insertion of antennae; pronotum posteriorly slightly longer than the head along the mid-longitudinal axis; scutellum not reaching the base of metanotum and generally narrower than the interocular space .................. **ALYDIDAE**
   
   Bucculae long, extending to near insertion of antennae; pronotum posteriorly three times or more longer than head along the mid-longitudinal axis; scutellum reaching or surpassing the base of metanotum and generally broader than the interocular space .................. **COREIDAE**

Family  I. ALYDIDAE

In Meghalaya the family Alydidae is represented by two subfamilies.

Key to the subfamilies of the family Alydidae found in Meghalaya.

1. Pronotum at widest point usually at least half as wide as and distinctly longer than head; aedeagus always with a ventral pair of thecal appendages; ocelli minute to large, usually centrally placed and moderately separated from each other behind the compound eyes........

.......................................................................................................................... subfamily Leptocorisinae

Pronotum at widest point only slightly wider and longer than head; aedeagus usually without ventral pair of thecal appendages; ocelli usually large, generally centrally placed and narrowly separated from each other .......................................................... subfamily Alydinae

Subfamily  Leptocorisinae

Genus  1. *Leptocorisa* Latreille 1825


1. *Leptocorisa acuta* (Thunberg)


Diagnosis: Body length of adult insect may vary from 13-16 mm; body cylindrical, pale brown in colour; head elongated; antennae uniformly pale, first and fourth joints longest and subequal in length while second and third shortest and subequal; rostrum short, hardly reaching apices of second coxae; a small distinct tubercle near each lateral pronotal angle; pronotum with a distinct mid-longitudinal carina.

Distribution: India: Meghalaya (East Khasi Hills); Assam; Bihar; Karnataka; Kerala; Maharashtra; Sikkim; Tamil Nadu; West Bengal. Elsewhere: Australia, Bhutan, Burma, Formosa, Hong Kong, Malaya, New Guinea, Pakistan, Sri Lanka, Sumatra, Solomon, Islands, Thailand, Vietnam.

Subfamily Alydinae

Key to the genera of the subfamily Alydinae found in Meghalaya

1. Posterior femora well developed and armed with spines beneath; rostrum with second joint not or slightly longer than the fourth joint..............................................Riptortus

   Posterior femora not modified and not armed with spines but finely spinulose; rostrum with second joint about as long as third and fourth joints together................................Babaranus

Genus 2. Riptortus Stal 1859


Key to the species of the genus Riptortus

1. Body dark cinemon brown; lateral pronotal spines less acute and small; pronotal disc with no distinct rugocities; posterior femora with a ventro-lateral row of thin spines.................linearis

   Body cinemon brown; lateral pronotal spines more acute and long; pronotal disc with distinct scattered rugocities; posterior femora with ventro-lateral row of thick spines ..............strenuus

2. Riptortus linearis (Fabricius) 1775


Diagnosis: Adult insect may reach upto 15 mm in length, linear in appearance. Other diagnostic characters as in species key.

Distribution: India: Meghalaya (East Garo Hills); Karnataka; Sikkim; West Bengal. Elsewhere: Burma, Malayan Archipelago, Sri Lanka.

3. Riptortus strenuus Horvath

1889. Riptortus strenuus Horvath, Term. Fuzetek, : 35.

Diagnosis: Adult insect may reach up to 16 mm in length; stout and wider in appearance in comparison to R. linearis. Other diagnostic characters as in species key.

Distribution: India: Meghalaya (West Garo Hills): NEFA; Uttar Pradesh.

Genus 3. Babaranus Distant


4. Babaranus ornatus Distant *


Diagnosis: Body length of adult insect may reach up to 16 mm., head with two longitudinal lines on anterior area and a small spot on disc; antennae with first, second and third joints subequal in length; fourth longest; pronotum very thickly darkly punctate and anterior area with two short erect spines while lateral angles produced into few long horizontal spines; legs long slender finely spinose; femora not modified; posterior tibiae a little curved and as long as femora; posterior tarsi with basal joint a little longer than the remaining two joints together.

Distribution: India: Meghalaya (East Garo Hills); Assam. Elsewhere: Burma.

Family II. COREIDAE

Key to the subfamilies of the family Coreidae found in Meghalaya

1. Tibiae sulcate or non-sulcate above ......................................................................................... 2
   Tibiae otherwise .......................................................................................................................... 3

2. Tibiae sulcate above ................................................................................................................. Subfamily Corinae
   Tibiae non-sulcate and rounded above .................................................................................. Subfamily Pseudophoelinae

3. Antenal first joint with clavate apices; lateral angles of pronotum with long spines...........
   .................................................................................................................................................... Subfamily Hydarinae
   Antenal first joint without clavate apices; lateral angles of pronotum without long spines.......
   .................................................................................................................................................... Subfamily Colpurinae

Subfamily Corinae

Tribe Mictini

Key to the genera of the tribe Mictini

1. Pronotum produced anteriorly remarkably beyond the tip of the head ............... Derepteryx
   Pronotum not produced anteriorly beyond the tip of the head ............................................... 2

2. Pronotum expanded remarkably laterally ................................................................. 3
   Pronotum not expanded laterally ............................................................................................ 5
3. Scutellum tuberculate at the apex; posterior femora in both the sexes strongly tuberculate; posterior tibiae dilated remarkably on both sides while anterior and middle tibiae dilated dorsally.......................................................... Helcomeria

Scutellum not tuberculate at the apex; posterior femora of male only tuberculate; posterior tibiae moderately dilated on both sides but no dilatation on anterior and middle tibiae............. 4

4. Posterior femora in male longitudinally tuberculate above; on each posterior tibial dilatation in male an acute process at the middle ventrally................................. Prionolomia

Posterior femora in male not tuberculate above; on each posterior tibial dilatation in male the acute process near the base ventrally..................................................... Ochrochira

5. Abdomen beneath in male distinctly tuberculate; posterior tibiae dentate on inner margin in male .......................................................... Mictis

Abdomen beneath in male very strongly gibbously tuberculate; posterior tibiae not dentate in either sex................................................................. Anoplocnemis

Genus 4. Derepteryx White 1839


Key to the species of the genus Derepteryx

1. Pronotum above with small scattered tubercles; lateral process of pronotum strongly toothed on inner margin while outer margin finely serrated; posterior femora of male incrassated and armed with two well developed spines on the ventral side on each; posterior tibiae of male dilated on both inner and outer sides.................................................. grayi

Pronotum above rugose, not tuberculate; lateral process of pronotum strongly spined on both inner and outer margins; posterior femora of male incrassated and armed with a single well developed spine on the ventral side on each; posterior tibiae of male dilated only on inner side................................................................. hardwicki

5. Derepteryx grayi White *


Diagnosis: Body length 33 mm, breadth between the pronotal angles 19 mm. Other characters as in key.

Distribution: India: Meghalaya (East Khasi Hills); Sikkim; West Bengal. Elsewhere: Burma, Nepal.

6. Derepteryx hardwicki White


Diagnosis: Body length 26-28 mm., breadth between the pronotal angles 15-16 mm. Other diagnostic characters as in key.


Genus  5. Helcomeria Stål 1873


7. Helcomeria spinosa Signoret


Diagnosis: Body length 34-38 mm, breadth between the pronotal angles 19-20 mm.; anterior margins of pronotum strongly spined, lateral margins of the dialated processes more irregularly spinous, upper side finely tuberculated and rugose; posterior femora strongly tuberculate in both sexes, in male strongly spined before apex; posterior tibiae dialated on both sides, inwardly spined in male only, middle and anterior tibiae outwardly dialated.

Distribution: India: Meghalaya (West Garo Hills, Jaintia Hills); Assam; Nagaland; Sikkim.

Genus  6. Prionolomia Stål 1873


Key to the species of the genus Prionolomia

1. Pronotum rugose and obscurely granulated; lateral processes of pronotum produced somewhat upward and forward, gradually narrowed to the apex; posterior femora in male tuberculated above and prominently spined beneath near apex; posterior tibiae in male prominently dialated on both sides with strongly angulate beyond middle on the inner side.....

..........................gigas

Pronotum distinctly granulated anteriorly; lateral processes of pronotum produced horizontally with the apices narrowed and obtusely pointed; posterior femora in male tuberculated on both above and beneath; posterior tibiae in male dialated on the inner side with prominently angulated..........................fulvicornis

8. Prionolomia gigas Distant


Material examined: 3 exs., Tura, West Garo Hills., 15.iii.1991, R. S. Burman coll.

Diagnosis: Body length 43 mm, breadth between the pronotal angles 19 mm. Other characters as in key.

9. **Prionolomia fulvicornis** (Fabricius)


1904. **Prionolomia fulvicornis**: Distant, *Fauna Brit. India, Rhynchota*, 1: 338


*Diagnosis*: Body length 26-29 mm, breadth between the pronotal angles 12-13.5 mm. Other characters as in key.

*Distribution*: India: Meghalaya (Khasi Hills, West Garo Hills).

**Genus 7. Ochrochira** Stal 1873


**Key to the species of the genus Ochrochira**

1. Pronotum with distinct mid-longitudinal depression ......................................................... 2
   Pronotum with inconspicuous or no mid-longitudinal depression ...................................... 3

2. Prononal angles more produced and dentation on the posterior margin of lateral angles; first and fourth antennal joints subequal in length, while second and third joints almost equal; male with posterior femoral spine on each more stronger and longer in structure .... *biplagiata*
   Prononal angles less produced and no dentation on the posterior margin of lateral angles; first antennal joint longest, while third joint longer than second; male with posterior femoral spine on each thin and smaller ............................................................................................ *nigrorufa*

3. Pronotum with lateral margins prominently produced, strongly and coarsely dentated; posterior femur of male with prominent spine placed a little beyond the middle .... *albiditarsis*
   Pronotum with lateral margins moderately reflexed and horizontally produced, also minutely serrated; posterior femur of male with prominent spine placed a little anterior to the middle .. ............................................................................................................................... *granulipes*

10. **Ochrochira biplagiata** (Walker)


*Diagnosis*: Body length 26-27 mm, breadth between pronotal angles 11-12.5 mm. Other characters as in key.

*Distribution*: India: Meghalaya (Khasi Hills, West Garo Hills); Sikkim. Elsewhere: Burma, Nepal.
11. **Ochrochira nigrorufa** (Walker)


*Diagnosis*: Body length 25-28 mm, breadth between the pronotal angles 9-10 mm. Other characters as in key.


12. **Ochrochira albiditarsis** (Westwood) *


*Diagnosis*: Body length 23 mm, breadth between pronotal angles 8 mm. Other characters as in key.

*Distribution*: India: Meghalaya (West Garo Hills); Himachal Pradesh. Elsewhere: Bangladesh.

13. **Ochrochira granulipes** (Westwood)


*Material examined*: 1 ex., Tura, West Gora Hills, 15.vii.1917, S. Kemp coll.

*Diagnosis*: Body length 21-25 mm, breadth between pronotal angles 8-10 mm. Other characters as in key.

*Distribution*: India: Meghalaya (West Garo Hills); Sikkim.

Genus 8. **Mictis** Leach 1814


Key to the species of the genus *Mictis*

1. Length of the adult about 30-32 mm; pronotum densely punctate and slightly rugulose *pictor*
   Length of the adult generally does not exceed 26 mm; pronotum otherwise......................... 2

2. Pronotum with lateral angles moderately prominent and subacutely rounded; fourth antennal segment longest, and slightly longer than the first segment......................... *tenebrosa*
   Pronotum with lateral angles moderately prominent and apices not rounded but subacute to pointed processess; fourth antennal segment longest and much longer than the first segment.. .......................................................... *gallina*
14. **Mictis pictor** (Fabricius)


*Diagnosis* : Body length 30-32 mm, breadth between pronotal angles 12-14 mm., pronotal lateral angles moderately prominent and margins serrated. Other characters as in key.

*Distribution* : India : Meghalaya (West Garo Hills); Assam.

15. **Mictis tenebrosa** (Fabricius)


*Diagnosis* : Body length 23-26 mm, breadth between the pronotal angles 8-9 mm, posterior femora in male strongly curved and incrassated but in female less curved and moderately thickened. Other characters as in key.

*Distribution* : India : Meghalaya (East Khasi Hills, West Garo Hills); Assam; Sikkim. Elsewhere : Burma, China, Malay Peninsula.

16. **Mictis gallina** Dallas


*Diagnosis* : Body length 25-26 mm, breadth between pronotal angles 9-10 mm, pronotal lateral margins finely serrated; posterior femora of male very much incrassated and distally thickened, in female apically incrassated but less prominently so than in male. Other characters as in key.


**Genus 9. Anoplocnemis** Stal 1873


17. **Anoplocnemis phasiana** (Fabricius)


**Diagnosis**: Body length 22-28 mm, breadth between pronotal angles 7-10 mm, posterior femora of male distinctly curved at the base and incrassated, inwardly broadly dentate near apex and outer margin serrated.

**Distribution**: India: Meghalaya (East Khasi Hills); Assam; Karnataka; Kerala; Maharashtra; Nagaland; Tamil Nadu. Elsewhere: Burma, Malay Peninsula, Sri Lanka.

**Tribe Cloresmini**

**Key to the genera of the tribe Cloresmini**

1. Rostrum about reaching the base of mesosternum; antennae with first, second and third joints of nearly equal length .................................................................................................................. *Notobitus*
   Rostrum not reaching the base of mesosternum; antennae with the first joint shorter than the second .......................................................................................................................... *Cloresmus*

**Genus 10. Notobitus Stål 1859**


**Key to the species of the genus Notobitus**

1. Adult insect may reach upto 28-30 mm in body length; male with posterior femora not extending beyond the tip of the abdomen and each armed with a strong and curved spine at the middle .................................................................................................................. *excellens*
   Adult insect scarcely reaches upto 25 mm in body length; posterior femora of male otherwise .................................................................................................................. 2

2. Posterior femur of male on the inner side with a strong and most prominent spine placed at about one-third from the distal end, and the femur not reaching beyond the tip of the abdomen .................................................................................................................. *abdominalis*
   Posterior femur of male on the inner side with strong and prominent spine placed a little beyond the middle, and the femur reaching considerably beyond the apex of the abdomen...... .................................................................................................................. *meleagris*

18. *Notobitus excellens* Distant


**Diagnosis**: Body length 28-30 mm, breadth between pronotal angles 8-9 mm; antennae with first, second and third joints subequal in length; rostrum extending upto the base of mesonotum. Other characters as in key.

**Distribution**: India: Meghalaya (West Garo Hills); Nagaland; Sikkim; West Bengal.

19. *Notobitus abdominalis* Distant


Diagnosis: Body length 21-23 mm, breadth between pronotal angles 5-6 mm; lateral margins of abdomen beneath and posterior margins of 3rd, 4th and 5th abdominal segments yellowish. Other characters as in key.

Distribution: India: Meghalaya (West Garo Hills); Nagaland; Sikkim; West Bengal.

20. Notobitus meleagris (Fabricius)


Diagnosis: Body length 22-25 mm, breadth between pronotal angles 6-7 mm; posterior tibiae of male with inner margins strongly serrate. Other characters as in key.

Distribution: India: Meghalaya (East Khasi Hills); Maharashtra; Tamil Nadu. Elsewhere: Burma, China, Malaya Archipelago.

Genus 11. Cloresmus Stål 1859


Key to the species of the genus Cloresmus

1. Body length 18-22 mm; posterior tibiae with inner side conspicuously serrated......................

................................................................................................................................................khasianus

Body length does not exceed 17 mm; posterior tibiae with inner side less serrated...............2

2. Antennae distinctly longer than half of the body length and slender; antennal first and third joints subequal in length while fourth longest of all ..............................................antennatus

Antennae considerably shorter than half of the body length and comparatively thick; antennal first and third joints subequal in length but shorter than second and fourth joints each ..........

...............................................................................................................................................nepalensis

21. Cloresmus khasianus Distant


Diagnosis: Body length 18-22 mm; rostrum scarcely exceeding beyond the anterior coxae; posterior femora in male moderately incrassated with an elongate spine a little beyond the middle of underside on each. Other characters as in key.

Distribution: India: Meghalaya (Khasi Hills); Sikkim; West Bengal. Elsewhere: Burma.

Remarks: Collection was not available for present studies. Distant (1901, 1904) recorded it from Khasi Hills.
22. *Cloresmus antennatus* Distant


*Diagnosis*: Body length 12-13 mm; antennal basal joints clothed with long hairs; rostrum reaching the anterior coxae; posterior femora conspicuously spined underside on the apical half. Other characters as in key.

*Distribution*: India: Meghalaya (East Khas Hills), Sikkim.

23. *Cloresmus nepalensis* (Westwood)


*Diagnosis*: Body length 14-17 mm, posterior femora of male moderately incrassated armed with a strong spine on the middle of underside on each; rostrum just passing the anterior coxae. Other characters as in key.

*Distribution*: India: Meghalaya (Khasi Hills); Sikkim; Tamil Nadu; West Bengal. Elsewhere: Burma.

*Remarks*: No collection was available for present studies. Distant (1904) recorded the species from Khasi Hills in his Fauna of British India, Rhynchota, Volume.

Tribe Gonocerini

Key to the genera of the tribe Gonocerini

1. Lateral angles of pronotum acutely upwardly produced; abdominal segmental angles not exteriorly acutely produced ................................................................. *Cletus*

   Lateral angles of pronotum horizontally produced; abdominal segmental angles exteriorly acutely produced ................................................................. *Cletomorpha*

Genus 12. *Cletus* Stål 1859


Key to the species of the genus *Cletus*

1. Adult insect may reach upto 12 mm in length; pronotum with lateral angles prominently acutely produced and apices with black spines, one on each ....................... *punctiger*

   Adult insect may reach upto 10 mm in length; pronotum with lateral angles otherwise ........ 2

2. Breadth between the pronotal angles 3.5-4 mm; pronotum angles shortly but acutely produced, apices ending with sharp pointed fuscous spines; femora without castaneous spots *bipunctatus*

   Breadth between the pronotal angles 4.5-5 mm; pronotum angles widely and acutely produced, apices ending with short thick castaneous spines; all femora covered with numerous castaneous spots ................................................................. *punctulatus*
24. **Cletus punctiger** (Dallas)


*Diagnosis*: Body length 11-12 mm, breadth between pronotal angles 5-5.5 mm; sternum coarsely punctate with a small black spot on the lateral area on each side. Other characters as in key.

*Distribution*: India: Meghalaya (West Khasi Hills); West Bengal. Elsewhere: Burma, China.

25. **Cletus bipunctatus** (Westwood)


*Diagnosis*: Body length scarcely 10 mm; breadth between pronotal angles 3.5-4 mm. Other characters as in key.

*Distribution*: India: Meghalaya (West Khasi Hills); Karnataka; Maharashtra; West Bengal. Elsewhere: Burma.

26. **Cletus punctulatus** (Westwood)


*Diagnosis*: Body length scarcely 10 mm; breadth between pronotal angles 4.5-5 mm. Other characters as in key.

*Distribution*: India: Meghalaya (Khasi Hills); Assam, Nagaland; Sikkim, West Bengal.

*Remarks*: No collection was available for present studies. According to Distant (1904) the species has been included in the Fauna of Meghalaya.

Genus 13. **Cletomorpha** Mayr 1866


*Key to the species of the genus Cletomorpha*

1. Antennae dark brown in colour; antennal first and second joints subequal in length; pronotum with lateral angles acutely produced and distinctly recurved on each:................................. raja

Antennae yellowish in colour; antennal first and third joints subequal in length; pronotum with lateral angles produced into a short spine on each:.................................................. hastata

27. **Cletomorpha raja** Distant *


Diagnosis: Body length 9 mm, breadth between pronotal angles 4 mm. Other characters as in key.

Distribution: India: Meghalaya (West Garo Hills); Assam; Sikkim; West Bengal. Elsewhere: Burma.

28. Cletomorpha hastata (Fabricius)


Diagnosis: Body length 8-8.5 mm, breadth between the pronotal angles 4-4.5 mm. Other characters as in key.

Distribution: India: Meghalaya (West Garo Hills); Maharashtra; West Bengal. Elsewhere: Pakistan.

Tribe Dasynini

Genus 14. Dasynus Burmeister 1834


Key to the species of the genus Dasynus of Meghalaya

1. Antennal first, second and fourth joints subequal in length while third much shorter than others; scutellum tinged with red; posterior pronotal angles moderately prominent...orientalis

Antennal first and second joints subequal in length and those are longer than third and fourth which are subequal in length; scutellum brownish yellow; posterior pronotal angles very prominent.................................................................relatus

29. Dasynus orientalis (Distant)


Material examined: 3 exs., Tura, West Garo Hills, 13.vii.1917, S. Kemp coll.

Diagnosis: Body Length 16-18 mm, breadth between pronotal angles 5-5.25 mm; rostrum reddish, apex black and reaching the intermediate coxae. Other diagnostic characters as in key.

Distribution: India: Meghalaya (West Garo Hills); Assam; Sikkim.

30. Dasynus relatus Paiva


Diagnosis: Body length 17-21 mm, breadth between pronotal angles 6-8. Other diagnostic characters as in key.

Distribution: India: Meghalaya (West Garo Hills).

Remarks: No collection was available for present studies but Paiva (1919) recorded this species from Tura.
Tribe  Anisoscedidini

Genus  15. *Leptoglossus* Guerin 1830


*Diagnosis*: Body length 19-22 mm, breadth between pronotal angles 7 mm; an arcuated yellowish fascia crossing anterior area of pronotum; first antennal joint as long as head, second and fourth joints subequal in length and longer than third; inner margin of posterior femur prominently spined but outer margin less spined; posterior tibia strongly dialated for more than basal half of the length.

*Distribution*: India: Meghalaya (Khasi Hills); Andaman and Nicobar Islands. Elsewhere: Australia, Burma, Africa, Malayan Archipelago, Sri Lanka.

*Remarks*: Distant (1904) recorded the species from Khasi Hills.

Tribe  Homoecerini

Key to the genera of the tribe Homoecerini

1. Posterior femora and tibiae not modified; pronotal angles moderately prominent ................................................................. *

Posterior femora and tibiae modified; pronotal angles either not prominent or moderately prominent ................................................................. 2

2. Claval suture about as long as apical margin of corium; 4th antenal joint slightly shorter than the 3rd joint; posterior femora strongly incrassate ................................................................. *

Claval suture a little longer than the apical margin of corium; 4th antennal joint distinctly shorter than the 3rd joint; portum femora moderately incrassate ................................................................. *

Genus  16. *Homoecerus* Burmeister, 1835


Key to the species of the genus *Homoecerus*

1. Pronotal angles not prominent to form any acute spine like structures ................................................................. 2

Pronotal angles may be moderately prominent or conspicuously prominent ................................................................. 4

2. Antennal first joint longest, third and fourth joints subequal; rostral third and fourth segments almost subequal in length; corium with a large whitish spot placed on lateral border but not to reach the inner margin ................................................................. *

Antennal second joint longest; rostral segment otherwise; corium different ................................................................. 3

3. Antennal first joint longer than third, fourth joint distinctly thickened than third; rostral third segment slightly longer than fourth; corium with a thin transverse pale spot placed near the inner angle .................................................................
Antennal first and third joints subequal in length, fourth joint cylindrical and slightly thickend than third; rostral third segment considerably longer than fourth; corium without any spot...............................................................................................................................simiolus

4. Pronotal angles moderately prominent to form small process on each...............................5
Pronotal angles conspicuously prominent and each terminating with an acute spine like structure .................................................................................................................................................6

5. Antennal first and second joints subequal in length but third a little longer than fourth; rostral third and fourth segments subequal in length; corium with a pale small obscure discal spot placed near to the inner angle..........................................................bigitatus
Antennal first and second joints subequal in length but third shorter than fourth; rostral third segment slightly shorter than fourth; corium with a rounded pale spot placed at the inner angle...................................................................................subjectus

6. Antennal third joint shortest and considerably shorter than fourth; corium with no pale spot but a subcostal black line..................................................................................................................striicornis
Antennal fourth joint shortest and longer than third; corium with pale spot but no subcostal black line ..............................................................................................................................................7

7. Antennal first joint considerably shorter than second; corium with two small transverse spots placed at the inner angle..............................................................................................walkeri
Antennal first joint a little shorter than second; corium with spot otherwise.................8

8. Antennal third joint a little shorter than first; rostral third and fourth segment almost subequal in length; corium with a large transverse pale spot placed only near the inner angle.....signatus
Antennal first and third joints subequal in length; rostral third segment longer than fourth; corium with a large transverse pale spot which laterally touches both inner and other margin..................................................................................................................................................inornatus

32. Homoeocerus consisus var. A Walker


Material examined: 2 exs., Tura, West Garo Hills, 15.vii.1917, S. Kemp coll.

Diagnosis: Body length 14-16 mm, breadth between pronotal angles 3-4 mm; pronotum about as long as broad at base; rostrum with third and fourth joints almost subequal in length. Other characters as in key.

33. **Homoecerus albiguttulus** Stål


_Diagnosis_: Body length 16-20 mm, breadth between pronotal angles 4.5-5 mm. Other characters as in key.

_Distribution_: India: Meghalaya (Khasi Hills); Assam, Sikkim. Elsewhere: Burma, Cochin, China, Malay Peninsula, Sumatra.

_Remarks_: Collection was not available for present studies. Distant (1904) recorded the species from Khasi Hills.

34. **Homoecerus simiolus** Distant


_Material examined_: 2 exs., Tura, West Garo Hills, 15.vii.1917, S. Kemp coll.

_Diagnosis_: Body length 15.5-17 mm, breadth between pronotal angles 4 mm. Other diagnostic characters as in key.

_Distribution_: India: Meghalaya (Khasi Hills, West Garo Hills); Assam; Sikkim. Elsewhere: Burma.

35. **Homoecerus biguttatus** Westwood *


_Diagnosis_: Body length 21 mm, breadth between pronotal angles 6 mm. Other characters as in key.

_Distribution_: India: Meghalaya (East Khasi Hills); Sikkim.

36. **Homoecerus subjectus** Walker


_Material examined_: 3 exs., Tura, West Garo Hills, 12.vii.1917, S. Kemp coll.

_Diagnosis_: Body length 17-18 mm, breadth between pronotal angles 5 mm. Other diagnostic characters as in key.


37. **Homoecerus striicornis** Scott


**Diagnosis**: Body length 17-20 mm, breadth between pronotal angles 4.5-5.5 mm. Other characters as in key.

**Distribution**: India: Meghalaya (East Khasi Hills); Assam; Maharashtra; Sikkim. Elsewhere: Japan, Sri Lanka.

38. **Homoeocerus walkeri** Kirby


*Diagnosis*: Body length 18-19 mm, breadth between pronotal angles 5.5-6 mm. Other characters as in key.

**Distribution**: India: Meghalaya (Khasi Hills, East Garo Hills); Assam; Nagaland; Sikkim. Elsewhere: Burma, Sri Lanka.

39. **Homoeocerus signatus** Walker


*Diagnosis*: Body length 19-21 mm, breadth between pronotal angles 6 mm. Other characters as in key.

**Distribution**: India: Meghalaya (West Garo Hills); Maharashtra; Sikkim. Elsewhere: Sri Lanka.

40. **Homoeocerus inornatus** Stål


*Diagnosis*: Body length 13-16 mm, breadth between pronotal angles 4.4.5 mm. Other characters as in key.

**Distribution**: India: Meghalaya (East Garo Hills); Pondicherry; Sikkim. Elsewhere: Burma, China.

Genus 17. **Physomerus** Burmeister 1835


41. **Physomerus grossipes** (Fabricius)


*Diagnosis*: Body length 20-24 mm, breadth between pronotal angles 5.5-6.5 mm; posterior tibiae strongly incrassated, finely longitudinally tuberculate on upper and outer areas and obtusely spinous
beneath, each with a long spine at the middle of inner margin and finely serrated upto apex; rostrum reaching the intermediate coxae.

**Distribution**: India: Meghalaya (East Khasi Hills); Assam; Andaman and Nicobar Islands; Maharashtra; Sikkim; West Bengal. Elsewhere: Burma, Malay Archipelago, Sri Lanka.

Genus 18. *Acanthocoris* Amyot & Serville 1843


42. *Acanthocoris scabrator* (Fabricius)


*Material examined*

**Diagnosis**: Body length 13-14.5 mm, breadth between pronotal angles 5-5.5 mm; pronotum with lateral angles acutely produced with serrated anterior margin; posterior femora moderately incrassated with serrated inner margin; rostrum reaching the intermediate coxae.

**Distribution**: India: Meghalaya (West Khasi Hills); Assam; Karnataka; Maharashtra; Sikkim. Elsewhere: Burma, Malay Archipelago.

Subfamily Pseudophoelinae

Genus 19. *Trallianum* Distant 1904


43. *Trallianum chennelli* Distant


**Diagnosis**: Body length 13 mm; head elongate and moderately produced in front of antenniferous tubercles; antennae with first joint incrassate and subequal to fourth joint, second joint logest longer than third; rostrum reaching the intermediate coxae; pronotum with a distinct foviate impression, lateral angles sub-prominent and rounded; legs moderately short and stout, posterior femora not extending much beyond the middle of abdomen.

**Distribution**: India: Meghalaya (Khasi Hills).

**Remarks**: Collection was not available for present studies. Distant (1904) recorded this species from Khasi Hills.

Subfamily Hydarinae

Genus 20. *Hydarella*

44. *Hydarella orientalis* (Distant)


Diagnosis: Body length 7 mm; thickly punctate, punctures very coarse on the corium, arranged in longitudinal series on clavus, very profound in a single longitudinal submarginal series to corium, pronotum with lateral angles spinous; abdomen more coarsely punctate laterally.

Distribution: India: Meghalaya (Jaintia Hills).

Subfamily Colpurinae

Key to the genus of the subfamily Colpurinae

1. Head long and longer than broad between eyes; first joint of rostrum extending considerably beyond the base of head; pronotum with anterior lateral angles not produced...........Colpura
   Head subquadrate and not or scarcely longer than broad between eyes; first joint of rostrum reaching basal margin of head, pronotum with anterior lateral angles prominently produced ...

..................................................Hygia

Genus 21. Colpura Bergroth 1894


Key to the species of the genus Colpura

1. Rostrum extending considerably beyond the posterior coxae.............................2
   Rostrum extending upto the posterior coxae, not surpassing the first abdominal segment......

..................................................Colpura nodulosa

2. Rostrum extending to the fourth abdominal segment...........................................3
   Rostrum does not reach upto the fourth abdominal segment but to the third segment .....4

3. Rostrum reaching upto the basal margin of fourth abdominal segment; a small yellowish spot near the middle of apical margin of corium.................................obscura
   Rostrum reaching upto the apical margin of fourth abdominal segment; corium with no yellowish spot but costal margin yellowish red in colour ...........................................sulcata

4. Rostrum reaching the middle of the third abdominal segment; a small dark spot near the posterior margin of corium.................................................................erebus
   Rostrum reaching upto the posterior margin of the third abdominal segment; a large black spot near the claval apex of corium.................................................funebris

45. Colpura nodulosa (Distant)


Diagnosis: Body 8-10 mm in length; pronotum with the lateral angles distinctly subnodulose; abdomen with marginal incisural spots and lateral series of black segmental spots of which last three most distinct. Other characters as in key.

Distribution: India: Meghalaya (Khasi Hills); Sikkim; West Bengal.*Elsewhere : Burma.

Remarks: Collection was not available for present studies. Distant (1904) recorded this species from Khasi Hills.
46. *Colpura obscura* Dallas


*Diagnosis*: Body length 16-17mm; a small yellowish spot near middle of apical margin of corium. Other characters as in the key.

*Distribution*: India: Meghalaya (East Khasi Hills). Elsewhere: Java, Korea, Malay, Sumatra.

47. *Colpura sulcata* Paiva


*Diagnosis*: Body length 16-17 mm; pronotum with lateral margins slightly reflexed. Other characters as in key.

*Distribution*: India: Meghalaya (West Garo Hills).

48. *Colpura erebus* Distant


*Diagnosis*: Body length 11-15 mm; breadth between pronotal angles 3.5-4.5 mm; antennae with first joint thickened and slightly curved, second longest, fourth cylindrical and shorter than third; pronotum with the anterior angles moderately and distinctly prominent, anterior margin concavely sinuate; elytra with membrane not reaching apex of abdomen. Other characters as in the key.

*Distribution*: India: Meghalaya (West Garo Hills); Nagaland; Sikkim; West Bengal.

49. *Colpura funebris* Distant


*Material examined*: 2 exs., Tura, West Garo Hills, 15.vi.1917, S. Kemp coll.

*Diagnosis*: Body length 15 mm, breadth between pronotal angles 4.5 mm; antennae with the basal joints stoutest and curved, second joint much longer than third, fourth cylindrical and shortest, pronotum with the anterior angles rounded. Other characters as in key.

*Distribution*: India: Meghalaya (West Garo Hills); Assam; Sikkim.

Genus 22. *Hygia* Uhler 1861


50. *Hygia touchi* (Distant)

Material examined: 3 exs., Tura, West Garo Hills., 15.vii.1917, S. Kemp coll.

Diagnosis: Body length 9-11 mm, breadth between the pronotal anyles 3-3.5 mm, rostrum just passing the posterior coxae; abdomen beneath with four central basal spots, and a black spot on the lateral area of each of the last three segments.

Distribution: India: Meghalaya (West Garo Hills); Assam; Sikkim. Elsewhere: China.
MAP I. DISTRIBUTION OF COREOID BUGS (ORDER HEMIPTERA)

1. Leptocorisa acuta
2. Riptortus linearis
3. Riptortus strenuus
4. Babaranus ornatus
5. Derepteryx grayi
6. Derepteryx hardwicki
7. Helcomeria spinosa
8. Prionolomia gigas
9. Prionolomia fulvicornis
10. Ochrochira bispinosa
11. Ochrochira nigrorufa
12. Ochrochira albida
13. Ochrochira granulipes
14. Mictis pector
MAP II. DISTRIBUTION OF CORBOID BUGS (ORDER HEMIPTERA)

15. Nictis tenebrosa
16. Nictis gallina
17. Anoplocnemis phasiana
18. Notobitus excellens
19. Notobitus abdominalis
20. Notobitus meleagris
22. Cloresmus antennatus
23. Cletus punctiger
24. Cletus bipunctatus
25. Cletus hastata
26. Cletomorpha raja
27. Cletomorpha hastata
28. Dasynus orientalis
29. Dasynus relatus
30. Homoecerus consisus var. A
MAP III. DISTRIBUTION OF COREOID BUGS (ORDER HEMIPTERA)

34. Homoecerus simiolus
35. Homoecerus biguttatus
36. Homoecerus subjectus
37. Homoecerus striicornis
38. Homoecerus walkeri
39. Homoecerus signatus
40. Homoecerus inornatus
41. Physamerus grossipes
42. Acanthocoris scabrator
44. Hyderella orientalis
46. Colpura obscura
47. Colpura sulcata
48. Colpura erebus
49. Colpura funebris
50. Nygia touchi
SUMMARY

The paper presents an account of 50 species belonging to 22 genera of the superfamily Coreoidea. Out of four families of Coreoidea only two families viz., Alydidae and Coreidae are represented in Meghalaya. Most of the species belong to the family Coreidae which is the largest family of the superfamily Coreoidea. A considerable number of species infest on cereals, pulses, vegetables and other economically important plants causing serious damage to the yield. In the present paper 6 species under 6 genera are added as new record of the coreoid fauna from the State of Meghalaya. Diagnostic characteristics of each of the species studied along with the distributional pattern in various districts of Meghalaya and other States of India as well as abroad has been mentioned. Distribution of almost all the studied Coreoid species has been also cited in the Map of Meghalaya.

ACKNOWLEDGEMENT

Authors are grateful to the Director, Zoological Survey of India for the Laboratory facilities. Hearty thanks are due to Drs. J. R. B. Alfred and R. K Varshney, Scientists-SG, Drs. S. K. Tandon, J. K. Jonathan and P. K. Maiti, Scientists SF for numerous courtesies. Help rendered by the Staff members of the Hemiptera Section is also thankfully acknowledged.

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INSECTA : HEMIPTERA : HETEROPTERA ; PENTATOMOIDEA

S. P. CHAKRABORTY AND L. K. GHOSH

Zoological Survey of India
Calcutta

INTRODUCTION

The Pentatomids, commonly known as "Shield Bugs", are heteropteran insects. They are mostly phytophagous, some are carnivorous in habit. Some are pests on vegetable crops. Some families like Asopidae are predaceous on lepidopterous larvae. These insects are remarkable for their beautiful colouration and also for a nauseous odour emitted by them. The group is abundant in tropical regions and also spread over temperate zones.

A perusal of literature reveals that about 550 species of Pentatomoidea are known from India (Distant 1902, 1908, 1918; Paiva 1919; Datta et al. 1985; Chakraborty et al. 1993).

Pentatomid fauna of Meghalaya is rather meagre. So far, 65 species belonging to 51 genera are known from the State. (Distant 1902, 1908; Paiva 1919).

The present work is an attempt to provide a consolidated account of the superfamily Pentatomoidea from Meghalaya. The paper deals with 46 species in 37 genera belonging to 9 families. Of these, 15 species (marked *) belonging to 12 genera are being reported for the first time from Meghalaya. The paper is based on the material collected during mopping surveys of Meghalaya. It is also supplemented by the materials deposited in the National Zoological Collections made by the earlier survey parties of Zoological Survey of India. A list of species so far known from Meghalaya is appended.

Material and Methods, general diagnosis have been dealt in Fauna of West Bengal (State Fauna Series, 3 : 1993). So, these are not included here. Keys to various taxa are provided. Also, diagnosis of the species (not included in key) is also given.

The classification is basically followed by Distant (1902, 1908, 1918) and Ahmad and Kamaluddin (1982). The material is in the Zoological Survey of India, Calcutta.

CLASSIFIED LIST OF PENTATOMOIDEA OF MEGHALAYA

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<th>Order</th>
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Genus 2. Plautia Stal
2. Plautia fimbriata (Fabricius)

Division II. Carpocoraria
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3. *Dolycoris baccarum* (Linnaeus)
4. *Dolycoris indicus* Stal

Genus 4. Halyomorpha Mayr
5. Halyomorpha picus (Fabricius)

Genus 5. Tolumnia Stal
6. Tolumnia latipes (Dallas)

Division III. Eurydemaria
Genus 6. Agonoscelis Spinola
7. Agonoscelis nubila (Fabricius)

Genus 7. BAGRADA Stal
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Genus 8. Eurydema Laporte
9. Eurydema pulchrum (Westwood)

10. Strachia crucigera Hahn.

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Genus 11. Eysarcoris Hahn.
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15. Dalpada oculata (Fabricius)
16. Dalpada sp.

* New record from Meghalaya
Genus 13. *Erthesina* Spinola
17. *Erthesina fullo* (Thunberg)

Genus 14. *Halys* Fabricius
18. *Halys dentatus* Fabricius

Division VI. Hoplistoderaria
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19. *Hoplistodera virescens* Dallas
20. *Hoplistodera* sp.

Division VII. Nezaria
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21. *Nezaraviridula* (Linnaeus)

Genus 17. *Piezodorus* Fieber
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25. *Cantao ocellatus* (Thunberg)

26. *Chrysocoris stollii* (Wolff)

Genus 22. *Hotea* Amyot & Serville
27. *Hotea curculionoides* (Herr.-Sch.)

Genus 23. *Poecilocoris* Dallas
28. *Poecilocoris druraei* (Linnaeus)
29. *Poecilocoris hardwickii* (Westwood)

Family III. GRAPHOSOMATIDAE
Genus 24. *Scotinophara* Stal
30. *Scotinophara* sp.

Genus 25. *Storthecoris* Horvath
31. *Storthecoris* sp.
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<td>46.</td>
<td>Stibaropus callidus (Schiodte)</td>
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</table>

* New record from Meghalaya
SYSTEMATIC ACCOUNT

Key to families of Pentatomoidea

1. Head always clypeated; hemelytra longer than the body, folded in at the base of membrane.  
   ......................................................................................................................................... . Plataspidae
   - Head normal; hemelytra straight, not folded in at the base of membrane .......................... 2

2. Hamus present; scutellum covering the whole of the hemelytra, excepting extreme base of 
   outer margin. ...................................................................................................................... . Scutelleridae
   - Hamus absent .................................................................................................................. 3

3. Scutellum large, whole of outer margin of corium exposed ........................... Graphosomatidae
   - Scutellum variable in size and shape .............................................................................. 4

4. Scutellum large, nearly covering the whole of abdomen ................................. Cydnidae
   - Scutellum Extending to rarely beyond middle of abdomen; tarsi 3-segmented .............. 5

5. Spiracles of basal ventral segment not hidden by metasternum .......................... Tessaratomidae
   Spiracles at basal ventral segment hidden by metasternum .............................................. 6

6. Rostrum short not usually passing anterior coxae ........................................ Urostylidae
   - Rostrum long, always passing anterior coxae .................................................................. 7

7. Membrane very large .............................................................................................. Dinidoridae
   - Membrane small ............................................................................................................. 8

8. Basal segment of rostrum inserted at labrum ................................................ Asopidae
   - Basal segment of rostrum not inserted at labrum ...................................................... Pentatomidae

Family I. PENTATOMIDAE

Key to Division :

1. Scutellum broad .............................................................................................................. 2
   - Scutellum triangular .................................................................................................... 3

2. Body short and broad ........................................................................................ Hoplistoderaria
   - Body obovate; scutellum always broad and short; lateral lobes of head never meet infront 
     of central lobe .............................................................................................................. Eusarcoecoriaria

3. Abdomen armed at base ......................................................................................... 4
   - Abdomen unarmed at base .......................................................................................... 5

4. Lateral pronotal angles strongly produced ............................................ Tropicoraria
   - Lateral pronotal angles usually rounded ................................................................. Nezaria

5. Lateral margins of pronotum serrate or dentate ........................................ Halyaria
   - Lateral margins of pronotum normal .......................................................................... 6

6. Head clypeated, foliaceously dilated ................................................................. Sciocoraria
Head not clypeated ........................................................................................................ 7
7. Body oval, abdomen with a short basal furrow ................................................. Carpocoraria
   - Abdomen without basal furrow ............................................................................. 8
8. Body obovate, head subtriangular ................................................................. Antestiaria
   - Body elongate, head obovate ............................................................................... Eurydemaria

Division I. Antestiaria

Key to genera:
Head emarginate infront of eyes; anterior lateral margins of pronotum normal .......... Plautia
   - Head deflected, anterior lateral margins of pronotum elevated and callous .......... Antestia

Genus 1. Antestia Stål, 1864

1864 Antestia Stål, Hem. Afr. 1 : 200
Type species: Antestia maculata (Dallas)

1. Antestia anchora (Thunberg)


Diagnostic characters: Orange-yellow; a lineate spot before each eye and two discal lines black; pronotum with two lateral discal suffusions luteous, a transverse black spot on each side of anterior margin and 4 discal spot black; scutellum with 4 spots, 2 on anterior margin and two angulated ones on apical half black; membrane fuliginous with the apical margin greyish; body beneath luteous with discal transverse, and marginal lineate spots black; antennae black but 1st and 2nd segments and base of third rufous.

Length: 10 to 12 mm.

Distribution: India, Meghalaya (East Khasi hills); Nagaland, Sikkim, West Bengal. Elsewhere: Burma; Java; Malay Peninsula, Sumatra.

Genus 2. Plautia Stål, 1867

1867. Plautia Stål, Qfv. Vet. AK. Forh. : 514
Type-species: Plautia fimbriata (Fabricius)

2. Plautia fimbriata (Fabricius)

Diagnostic characters: Head, pronotum and scutellum bright pale olivaceous-green; corium purplish-red with greenish lateral margins and usually with posterior discal spots; membrane fuliginous with two brown spots on base; abdomen above red; the central disk of abdomen beneath greenish ochraceous.

Length: 10 to 11 mm.

Distribution: India: Meghalaya (Jaintia hills, Garo hills, Khasi hills); Assam, Maharashtra, Nagaland, Orissa, Sikkim, Tamil Nadu, West Bengal. Elsewhere: Burma, China, Japan, Malay Archipelago, Malay Peninsula, Sri Lanka.

Division II. Carpocoraria

Key to genera:

1. Lateral lobes of head longer than central lobe; odoriferous orifices on metasternum abruptly abbreviated.............................................................. Dolycoris
- Head not as above, odoriferous orifices on metasternum long and acuminate.............. 2

2. Lobes of head equal in length; margins of pronotum normal............................. Halyomorpha
- Central lobe of head longer than lateral lobes; margins of pronotum elevated or callous

........................................................................................................................................ Tolumnia

Genus 3. Dolycoris Mulsant & Rey, 1866

1866. Dolycoris Mulsant & Rey, Pin. France Pent., 238
Type-species: Dolycoris baccarum (Linnaeus)

Key to the species of Dolycoris

1. Anterior lateral margin of pronotum narrowly luteus; larger in size (12-14 mm.)....baccarum
   Anterior lateral margin of pronotum not as above but broadly pallid; smaller in size (9-10 mm)............................................................................................................................. indicus

3. *Dolycoris baccarum (Linnaeus)

1866. Dolycoris baccarum Muls. & Rey, Pin. France Pent., 238.


Distribution: India: Meghalaya (Garo hills, Khasi hills); Kashmir, Maharashtra, West Bengal. Elsewhere: West Pakistan, Common in Palaeartic region.

Remarks: The species is a new distributional record for the State of Meghalaya.
4. *Dolycoris indicus* Stål

1876. *Dolycoris indicus* Stål, Ent. Hem., 5: 76.


*Distribution:* India: Meghalaya (Garo hills, Khasi hills); Maharashtra, Nagaland, South India, West Bengal.

*Remarks:* This is a new record from the state.

**Genus 4. Halyomorpha** Mayr, 1864


*Type-species:* *Halyomorpha picus* (Fabricius)

5. *Halyomorpha picus* (Fabr.)


*Diagnostic characters:* Very variable in colour and size; head, anterior and lateral areas of pronotum marked with dark fuscus or brownish; a small dark spot margined with levigate ochraceous at basal angles of scutellum; body beneath and legs pale luteous. Rostrum reaching 2nd abdominal segment; 2nd antennal segment smaller than third; 4th and 5th segments subequal in length.

*Length:* 12 to 17 mm.

*Distribution:* India: Meghalaya (Khasi hills, Garo hills); Kerala, Maharashtra, Tamil Nadu, West Bengal. Elsewhere: Burma, China, Japan, Malaysia and Sri Lanka.

6. *Tolumnia* Stål, 1867


*Type-species:* *Tolumnia trinotata* Westwood

6. *Tolumnia latipes* (Dall.)


*Diagnostic characters:* Body above dark-brown, thickly punctate and faintly irrorated with ochraceous; scutellum with apex and two large spots on basal angles luteous; body beneath and legs luteous; three small spots on each lateral area of the sternum, apices of femora, tibiae and tarsi and apex of rostrum black. Antennae ochraceous with 1st segment black.
CHAKRA BORTY & GHOSH: Insecta: Hemiptera: Pentatomoidae

Length: 9 - 11 mm.

Distribution: India: Meghalaya (Khasi hills); Kerala, Nagaland, Sikkim. Elsewhere: Burma, Hong knong, Indonesia and Malay Peninsula.

Division III. Eurydemaria

Key to genera:

1. Body elongately ovate, remotely pilose................................................................. Agonoscelis
   - Body not as above, not pilose.................................................................................. 2

2. Body ovate, eyes sessile .......................................................................................... Eurydema
   - Body elongately oval.............................................................................................. 3

3. Body oval, eyes stylate, basal joint of antennae not reaching apex of head .......... Bagrada
   - Body elongately subovate; basal joint of antennae extending beyond apex of head. Strachia

Genus 6. Agonoscelis Spinola, 1837

1837. Agonoscelis Spinola, Ess. : 327

Type-species: Agonoscelis nubila Fabricius

7. Agonoscelis nubila (Fabricius)


Diagnostic characters: Body yellow-brown, covered with black puncture excepting the lateral margins and central fascia to head, an irregular central fascia to pronotum, apex of scutellum which are levigate; luteous rugosities on the anterior lateral areas of the scutellum; body beneath and legs luteous; antennae, apex of rostrum, tibiae, tarsi and apices of femora black; membrane fuliginous with viens piceous.

Length: 10 - 11 mm.

Distribution: India, Meghalaya (Garo hills, Khasi hills); Bihar, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, West Bengal. Elsewhere: Burma, China, Japan, Malayan Archipelago, Malay Peninsula and Sri Lanka.

Genus 7. Bagrada Stål, 1862

1862. Bagrada Stål, Stett. ent. Zeit. 23 : 105

Type-species: Bagrada picta (Fabricius)

8. *Bagrada picta (Fabricius)

1775. Cimex picta Fabricius, Syst. Ent. : 715

Diagnostic characters: Body black excepting lateral lobes of head before eyes and lateral margins and a central fascia to pronotum, a central fascia, a spot near each basal angle and a spot on each margin before apex of scutellum, a little beyond base and terminating in a rounded discal spot before apex ochraceous; membrane fuliginous; body beneath ochraceous, legs ochraceous spotted and streaked with black: antennae black.

Length: 5 - 7 mm.

Distribution: India: Meghalaya (Khasi hills); Bihar, Maharashtra, Manipur, Uttar Pradesh, West Bengal. Elsewhere: Sri Lanka.

Remarks: This is a new record from the State.

Genus 8. Eurydema Laporte

1832. Eurydema Laporte, Ess. Hem. 61
Type-species: Eurydema oleraceum (Linnaeus)

9. Eurydema pulchrum (Westwood)

1837. Pentatoma pulchrum Westwood, Hope Cat. 1; 34.


Diagnostic characters: Reddish-ochraceous, spotted with black; head black with margins ochraceous; pronotum with 6 black spots 2 anterior and transverse, four discal; scutellum with a large spot at base and two marginal subapical spots black; body beneath and legs luteous; lateral margins of sternum and abdomen orange-yellow and both with lateral and central series of transverse balck spots.

Distribution: India: Meghalaya (Jaintia hills, Khasi hills), Assam, Nagaland. Elsewhere: Burma, China, Sumatra and Queensland.

Genus 9. Strachia Hahn, 1831

1831. Strachia Hahn., Wanz. 1: 180
Type-species: Strachia crucigera Hahn

10. Strachia crucigera Hahn.


Diagnostic characters: Body above black but head with one central small linear and two apical ochraceous spots; anterior and anterior-lateral margins of pronotum narrowly ochraceous also a broad central fascia ochraceous; a transverse fascia on anterior area of pronotum brownish-ochraceous. Scutellum with a spot near centre of each lateral margin and a subapical spot black; corium with the basal area and lateral margins and a transverse fascia before apex pale luteous; sternum blackish with a carmine spot on the lateral area of each segment; abdomen beneath luteous with disk piceous, lateral margins carmine; legs, antennae and rostrum black.

Length: 8 to 10 mm.

Distribution: India: Meghalaya (Khasi hills). Elsewhere: Burma, Indonesia, (Borneo, Java), Malay Peninsula; (Sumatra).

Division IV. Eusarcocoriaria

Key to genera:

1. Head deflected; scutellum but little narrowed on posterior half, almost as long as corium.....
   ................................................................................................................................. Eysarcoris

2. Head normal; scutellum prominently narrowed and distinctly shorter than corium... Carbula

Genus 10. Carbula Stål, 1864

   Type-species: Carbula decorata Signori

11. *Carbula indica* (Westwood)

1837. Pentatoma indica Westwood, Hope Cat., 1: 42.


Diagnostic characters: Brownish-ochraceous but antennae, rostrum, body beneath and legs ochraceous; excepting apex of rostrum, a central spot on each of the two terminal abdominal segments, the stigmata and small marginal spots which are black; anterior lateral margins of the pronotum levigate; pronotal angles moderately produced and conave beneath; their apices broadly subacute.

Distribution: India: Meghalaya (Garo hills), Sikkim, West Bengal. Elsewhere: Nepal.

Remarks: This species is reocrded for the first time from the state of Meghalaya.

Genus 11. Eysarcoris Hahn, 1834

1834. Eysarcoris Hahn, Wanz., 11: 66
   Type-species: Eysarcoris aeneus (Scopoli)

Key to the species of Eysarcoris

1. Whole of abdominal ventral disc black................................................................. 2

2. Whole abdominal ventral disc not black but with a central angulate fascia being black; apical joint of antennae brownish yellow; lateral angles of pronotum acutely prominent......
   ................................................................................................................................. montivagus
2. Anterior area of pronotum normal, without any spot; apical joint of antennae shining black; lateral angles of pronotum obtusely prominent....................................................guttiger
Anterior area of pronotum with two large brassy-black spots, pronotal angles simple ...........

..........................................................ventralis.

12. *Eysarcoris guttiger* (Thunberg)


*Distribution*: India: Meghalaya (Garo hill), Maharashtra, Nagaland, Orissa, Sikkim, South India, West Bengal. Elsewhere: Sri Lanka.

*Remarks*: Recorded for the first time from Meghalaya.

13. *Eysarcoris montivagus* (Distant)


*Distribution*: India: Meghalaya (Jaintia hills, Garo hills); Assam, Nagaland, Orissa, West Bengal.

14. *Eysarcoris ventralis* (Westwood)


*Distribution*: India: Meghalaya (Garo hills); Arunachal Pradesh, Bihar, Karnataka, Maharashtra. West Bengal. Elsewhere: Burma, Malay Peninsula.

*Remarks*: This is a new record from the State.

Division V. Halyaria

Key to genera:

1. Both anterior and posterior tibiae dilated .......................................................... *Erthesina*
   - Anterior tibiae rarely dilated, posterior tibiae always normal.......................... 2
2. Head elongated, tapering at the apex, longer than pronotum .................................. *Halyx*
   - Head normal, rounded or truncated at the apex, not longer than pronotum ............ *Dalpada*
Genus 12. *Dalpada* Amyot & Serville, 1843


- Type-species: *Dalpada aspera* Amyot & Serville

15. *Dalpada oculata* (Fabricius)


*Diagnostic characters*: Ochreous mottled with dark olivaceous-green; antennae brownish with bases of 4th and 5th segments ochreous; body beneath and legs ochreous, lateral margins of head, sternum and abdomen, apices of femora and subapical and anal appendage to abdomen very dark greenish or black. Lateral pronotal angles inwardly distinctly furrowed. Rostrum just passing the posterior coxae.

*Length*: 15 - 18 mm.

*Distribution*: India: Meghalaya (Garo hills, Khasi Hills); Sikkim, West Bengal. Elsewhere: Burma, Malay Peninsula.

16. *Dalpada* sp.


*Remarks*: The material could not be identified upto species level due to poor condition of the insects and non availability of literature.

Genus 13. *Erthesina* Spinola, 1837


- Type-species: *Erthesina fullo* (Thunberg)

17. *Erthesina fullo* (Thunb.)


*Diagnostic characters*: Head black, a central longitudinal line, lateral and inner margins of eyes, ocelli ochreous; antennae piceous with base of apical joint ochreous; a central line and anterior and lateral margins of pronotum ochreous; body beneath pale ochreous; 4 longitudinal lines to head beneath, sternal and abdominal incisures, marginal and subapical spot to abdomen black; second joint of antennae prominently longer than third; rostrum reaching the 3rd abdominal segment.
Length : 20 - 25 mm.

Distribution : India : Meghalaya (Garo hills); Andhra Pradesh, Assam, Kerala, West Bengal. Elsewhere : Bangladesh, China, Japan and Sri Lanka.

Remarks : The species is hitherto known for the first time from the state of Meghalaya.

Genus 14. *Halys* Fabricius 1803

Type-species : *Halys dentatus* Fabricius

18. *Halys dentatus* Fabricius


Diagnostic characters : Dull ochraceous, head long tapering in front, abdomen sulcated; pronotum with indistinct oblique fasciae, scutellum with two marginal spots before apex black; apex of scutellum pale; body beneath and legs ochraceous; 2nd and 3rd also 4th and 5th segments of antennae subequal in length; rostrum normally extends beyond 5th abdominal segment.

Length : 17-23 mm.

Distribution : India : Meghalaya (Khasi hill); Karnataka, Maharashtra, Orissa, Sikkim, Tamil Nadu, West Bengal. Elsewhere : Pakistan, Sri Lanka.

Division VI. *Hoplistoderaria*

Genus 15. *Hoplistodera* Westwood, 1837

1837. *Hoplistodera* Westwood, *Hope Cat.*, 1 : 18
Type-species : *Hoplistodera testacea* Westwood

19. *Hoplistodera virescens* Dallas


Diagnostic characters : Head orange-yellow, brownish towards the vertex; pronotum with two ochraceous spots near anterior margin; lateral spines nearly horizontal, acute; basal area of scutellum with 4 brown spots; membrane pale hyaline; abdomen beneath concolourous.

Length : 8 mm.

Distribution : India : Meghalaya (Garo hills, Khasi hills); Nagaland, Sikkim. Elsewhere : Burma, West Yunnan.
**Remarks**: This species is a new distributional record from the State of Meghalaya.

20. *Hoplistodera* sp.


**Remarks**: Species identification was not possible due to lack of proper literature.

Division VII. Nezaria

**Key to genera:**

1. Abdomen tuberculously spinous at base; clavus without any spot..................*Nezara*

2. Abdomen acutely spinous at base; clavus with a small black apical spot.............*Piezodorus*

Genus 16. *Nezara* Amyot & Serville, 1843

1843. *Nezara* Amyot & Serville, Hem.: 143
Type-species: *Nezara viridula* (Linnaeus)

21. *Nezara viridula* (Linn.)


**Diagnostic characters**: Above dark green or greenish ochraceous; antennae green with apices of 3rd, 4th and 5th segments purplish-brown; extremity of segmental angles to abdomen black. In some variety head (excluding base) and anterior area and lateral margins of pronotum pale luteous. In other there are two spots at base of head, 3 spots on anterior area of pronotum, 3 basal and apical spot to scutellum and a discal spot on corium.

**Length**: 12 - 16 mm.

**Distribution**: It is a widely distributed species and common to all regions in India.

Genus 17. *Piezodorus* Fieber, 1861

Type-species: *Piezodorus incarnatus* Germar

22. *Piezodorus rubrofasciatus* (Fabricius)


Diagnostic characters: Above pale greenish or luteous; pronotum with the lateral margins ochraceous with a transverse pale or purplish fascia between the pronotal angles; clavus with a small black apical spot; membrane hyaline; body beneath with legs pale luteous; 4th and 5th antennal segment purplish.

Length: 8 – 10 mm.

Distribution: India: Meghalaya (Khasi hills, Garo hills); Assam, Maharashtra, Orissa, West Bengal. Elsewhere: Australia, Burma, Japan, Malay Archipelago, Malay Peninsula, Sri Lanka.

Remarks: This is a new record from the state of Meghalaya.

Division VIII. Sciocoraria

Genus 18. Sciocoris Fallen, 1829

1829. Sciocoris Fallen, Hem. Suec. : 20
Type-species: Sciocoris terreus Schrank

23. Sciocoris sp.


Remarks: Due to nonavailability of recent literature the material could not be identified up to species level.

Division IX. Tropicoraria

Genus 19. Placosternum Amyot & Serville, 1843

1843. Placosternum Amyot & Serville, Hem. 174
Type-species: Placosternum taurus (Fabricius)

24. Placosternum taurus (Fabricius)


Diagnostic characters: Ochraceous, coarsely and blackly punctate, the punctures frequently confluent forming irregular black spots or patches. There are two such prominent transverse and linear on anterior area and two irregularly rounded on disk of pronotum and two on anterior area of scutellum; antennae piceous with bases ochraceous; the apices of the pronotal angles are truncate and bisinuate.

CHAKRABORTY & GHOSH: Insecta: Hemiptera: Pentatomoidea

Key to genera:

1. Body elongate, obovate; head elongate gradually narrowed to apex; lateral angles of pronotum prominent or spined

- Body ovate, convex; head large broad or slightly elongate, lateral angles of pronotum not as above

  Cantao

2. Lateral pronotal angles acuminate; median lobes of head longer than lateral lobes

- Lateral angles of pronotum normal

  Hotea

3. Abdomen distinctly sulcate beneath

- Abdomen not sulcated beneath

  Poecilocoris

  Chrysocoris

Genus 20. Cantao Amyot & Serville, 1843

1843. Cantao Amyot & Serville, Hem.: 29
Type-species: Cantao ocellatus (Thunberg)

25. Cantao ocellatus (Thunberg)


Diagnostic characters: Ochraceous or reddish-ochraceous; base and central fascia to head and antennae bluish-black, pronotum with some times two black spots near anterior margin, sometimes containing 8 spots.

Length: 16 - 28 mm.

Distribution: India: Meghalaya (Khasi hills); Bor Ghat, Maharashtra, Sikkim, Uttar Pradesh. Elsewhere: Bangladesh, Borneo, Burma, China, Java, Malabar, Malay Peninsula, Sumatra, Sri Lanka.

Remarks: The species prefers 'Moon' tree (Macaranga roxburghii) as its host plant and the pollination of the plant depends on this insect.

Genus 21. Chrysocoris Hahn, 1834

1834. Chrysocoris Hahn., Wanz. Ins., 11: 38
Type-species: Chrysocoris dilaticollis (Guerin)

26. Chrysocoris stollii (Wolff.)


Diagnostic characters: Above bluish or purplish green; pronotum with eight spots, three near anterior margins, three larger on posterior base and on each lateral angles; scutellum with 7 spots of which arranged in pairs with central one large, subovate.

Length: 13 – 14 mm.

Distribution: India: Meghalaya (East Khasi hills).

Remarks: The species is found throughout the country.

Genus 22. Hotea Amyot & Serville, 1843

Type-species: *Hotea gambiae* Westwood

27. Hotea curculionoides (Herrich-Schaffer)


Diagnostic characters: Ochraceous, central lobe to head, lateral margins and three obscure longitudinal fasciae to pronotum, a central longitudinal line to scutellum terminating in an apical spot and a curved anterior discal area levigate; head and lateral pronotal angles beneath piceous: 4th segment (excluding base) and 5th antennal segment piceous.

Length: 8 to 9.5 mm.

Distribution: India: Meghalaya (Garo hills, Khasi hills); Nagaland. Elsewhere: Burma, China; Malayan Archipelago; Malay Peninsula.

Genus 23. Poecilocoris Dallas, 1848

Type-species: *Poecilocoris druraei* (Linnaeus)

Key to the species of Poecilocoris

1. Anterior margin of pronotum reddish yellow; scutellum bears usually with eleven spots; anterior and anterolateral margins of pronotum sparsely punctate.......................... *druraei*

   Anterior margin of pronotum black; scutellum usually with 14 spots; anterior and antero lateral margins of pronotum thickly and coarsely punctate.......................... *hardwickii*

28. Poecilocoris druraei (Linn.)


Distribution: India: Meghalaya (Khasi Hills); Assam, Bhutan, Nagaland, Sikkim. Elsewhere: Burma, Formosa, Hong Kong.

29. Poecilocoris hardwickii (Westwood)


Distribution: India: Meghalaya (Khasi & Jaintia hills); Assam, Bhutan, Nagaland. Elsewhere: Burma; Hong Kong; West China.

Remarks: The species is a minor pest to Tea plants.

Family III. Graphosomatidae
Genus 24. Scotinophara Stål, 1867

Type-species: Scotinophara inuncta (Fabricius)

30. Scotinophara sp.

Remarks: Species identification could not be done due to poor condition of the specimen.

Genus 25. Storthecoris Horvath, 1883

Type-species: Storthecoris nigriceps Horvath

31. Storthecoris sp.

Remarks: Due to nonavailability of literature the material could not be identified upto species.

Family IV. Dinidoridae

Key to genera:

1. Antennae 4 segmented; rostrum reaching the intermediate coxae; membrane with reticulated veins ........................................................................................................ Cyclopelta
   - Antennae 5 segmented; rostrum reaching beyond the anterior coxae; membrane with anastomosed veins .............................................................. Coridius


Type-species: *Coridius janus* (Fabricius)

32. *Coridius brunneus* (Thunb.)


*Diagnostic characters*: Above brownish ochraceous, body beneath and legs more or less infuscated; antennae fuscous with apical segment luteous, sometimes with its apex narrowly black; abdomen above red; third segment of the antennae a little longer than the second, shorter than 4th or 5th segments.

*Length*: 17-20 mm.

*Distribution*: India: Meghalaya (Garo hills, Khasi hills); Assam, Bihar, Maharashtra, West Bengal. Elsewhere: Burma, Indonesia, Malaysia and Malayan Archipelago.

33. *Coridius* sp.


Genus 27. *Cyclopelta* Amyot & Serville


Type-species: *Cyclopelta obscura* (Lepeletier & Serville)

34. *Cyclopelta siccifolia* (Westwood)


*Diagnostic characters*: Entirely black or subcupreous black; variable in size, the abdomen much suffused with red; pronotum and scutellum obsolete transversely wrinkled; scutellum usually with a minute sanguineous spot at base; conexitivum concolourous; membrane more or less brownish-ochraceous.

*Length*: 11-16 mm.

*Distribution*: India: Meghalaya (Khasi hills); Maharashtra, Sikkim, West Bengal. Elsewhere: Burma, Sri Lanka.
**Remarks**: This species is said to infest plants belonging to Leguminosae.

**Family**: V. Asopidae

**Key to genera**:

1. Anterior femora with a prominent spine; pronotum elongate and narrowed anteriorly .......... ................................................................. **Picromerus**
   Anterior femora unarmed; pronotum not as above ................................................................. 2

2. Body elongate; pronotum deflected anteriorly ................................................................. **Andrallus**
   Body short, obovate; pronotum normal ........................................................................... **Zicrona**

**Genus 28. Andrallus** Bergroth, 1906

   Type-species: **Andrallus spinidens** (Fabricius)

35. **Andrallus spinidens** (Fabricius)


**Material examined**: 1 ex., East Garo hills, Sangsak, 2.v.1991, Coll. B.N. Das & party.

**Diagnostic characters**: Pale brownish ochraceous; 4th and 5th antennal segments and apex of the 3rd segment black; head with a blackish punctate fascia on each side of central lobe; pronotum with a pale central broken levigate line extending between the pronotal angles which are black and emarginate, the posterior spine being very small; scutellum with the apex and a central apical line luteous; lateral margins of corium broadly luteous.

**Length**: 13-16 mm.

**Distribution**: India: Meghalaya (Garo hills, Khasi hills), Assam, Bihar, Maharashtra, Elsewhere: Abissinia, Africa, Bangladesh, Fiji, Malayan Archipelago, Mexico, Tahiti and virtually widely distributed.

**Genus 29. Picromerus** Amyot & Serville, 1843

1843. **Picromerus** Amyot & Serville, Hem.: 84
   Type-species: **Picromerus bidens** (Linnaeus)

36. ***Picromerus obtusus** Walker

1867. **Picromerus obtusus** Walker, Cat. Het., 1: 133.

**Material examined**: 1 ex., West Garo hills, Balphakram National Park, 12.v.1988, Coll. C. Radhakrishnan.

1862 ZSI/99—30A
**Diagnostic characters:** Fuscous brown with legs a little paler; antennae ochraceous with apex of 3rd segment and 4th and 5th segments excluding base black; lateral pronotal margin crenulated and pronotal angles black produced very slightly backwardly at apices which are emarginate, the anterior spine much the longest; abdomen beneath with a more or less welldefined central black fascia.

**Length:** 11-13 mm.

**Distribution:** Meghalaya (Garo hills), Nagaland, Sikkim. Elsewhere: Burma.

**Remarks:** This species is hitherto known for the first time from Meghalaya.

**Genus 30. Zicrona Amyot & Serville, 1843**

1843. *Zicrona Amyot & Serville, Hem. : 86*

Type-species: *Zicrona caerulea* (Linnaeus)

37. *Zicrona caerulea* (Linnaeus)


**Material examined:** 1 ex., East Garo hills, Sangshok, 2.v.1991, Coll. B.N. Das & party.

**Diagnostic characters:** Body entirely blue or violaceous; antennae and membrane black; scutellum a little gibbous at base.

**Length:** 9-10 mm.

**Distribution:** India: Meghalaya (Garo hills); Nagaland, Kashmir, West Bengal. Elsewhere: Burma, China, Japan, Malayan Archipelago, Pakistan, Palearctic Region.

**Remarks:** This is a new record from the State of Meghalaya.

**Family VI. (Urostylidae)**

**Genus 31. Anaxandra Stal, 1876**

1876. *Anaxandra Stal, En. Hem. V : 110*

Type-species: *Anaxandra rufescens* (Dallas).

38. *Anaxandra* sp.

**Material examined:** 1 ex., East Khasi hills, Malki Forest, 28.viii.1978, Coll. M.S. Jyrwa.

**Remarks:** Due to damaged condition, the material could not be identified upto species.

**Family VII. (Plataspidae)**

**Genus 32. Coptosoma Dallas, 1851**

1851. *Coptosoma Dallas, List. Hem. 1 : 61*

Type-species: *Coptosoma globus* (Fabricius)

**Key to the species of Coptosoma**

1. Apical area of scutellum simple; abdomen beneath with a series of large bifid ray-like brownish yellow spots; larger in size (4 mm).......................... *jeanum*

Apical area of scutellum with a large "W" shaped spot; abdomen beneath with ochraceous spots at apex of each abdominal segment; smaller in size (3 mm)..................... *W* nigram
39. *Coptosoma feanum* Montandon


*Distribution:* India: Meghalaya (Khasi hills), Nagaland, Sikkim, Tamil Nadu. Elsewhere: Burma.

*Remarks:* This species is hitherto known for the first time from Meghalaya.

40. *Coptosoma W. nigram* Varshney


*Distribution:* India: Meghalaya (Garo hills), Madhya Pradesh. Elsewhere: Burma.

*Remarks:* Recorded for the first time from Meghalaya.

**Family VIII (TESSARATOMIDAE)**

**Key to genera:**

1. Posterior femora in male strongly incrassated and with long spine near base ........... *Eusthenes*
   - Posterior femora in male normal, without any long spine......................................................... 2

2. 2nd abdominal segment centrally elevated and reaching the base of the metasternum ............
   ......................................................................................................................................................... *Mattiphus*
   - 2nd abdominal segment normal........................................................................................................ *Pycanum*

**Genus 33. Eusthenes* Laporte, 1832


Type-species: *Eusthenes robustus* (Lepeletier & Serville)

41. *Eusthenes cupreus* (Westwood)


*Distribution:* India: Meghalaya (Garo hills, Khasi hills); Assam, Himachal Pradesh, Uttar Pradesh.

42. *Eusthenes scutellaris* (Herrick-Schaffer)


**Distribution**: India: Meghalaya (Khasi hills, Garo hills). Elsewhere: Nepal.

Genus 34. *Mattiphus* Amyot & Serville, 1843

1843. **Mattiphus** Amyot & Serville, *Hem.*: 168  
Type-species: *Mattiphus laticollis* (Westwood)

43. *Mattiphus oblongus* Dallas


**Diagnostic characters**: Above brilliant brassys-green, pronotum transversely quadrate with the anterior angles rather less than right angle; anterior margins nearly straight with the posterior margin gently rounded; margins of the abdomen projecting beyond the corium on each side, the posterior angles of the apical segment prominent, acute, making the apex of the abdomen nearly truncated and giving an oblong form to the whole body; body beneath golden yellow with legs fulvous brown; antennae darker with the apex of the 3rd and base of the 4th segments yellow.

**Length**: 25-27 mm.

**Distribution**: India: Meghalaya (Khasi hills), Uttar Pradesh.

**Remarks**: This species is hitherto known for the first time from Meghalaya.

Genus 35. *Pycanum* Amyot & Serville, 1843

1843. **Pycanum** Amyot & Serville, *Hem.*: 171  
Type-species: *Pycanum rubens* (Fabricius)

44. *Pycanum ochraceum* Distant


**Material examined**: 1 ex., Garo hills, Rongli, 5.xi.1977, Coll. S. Biswas.

**Diagnostic characters**: Ochraceous; antennae black with the basal segments and extreme apex of 4th segment ochraceous. Pronotum with the lateral margins moderately amplifated and rounded; scutellum with apical margin stramineous; membrane very pale brassy-brown; body beneath violaceous or greenish; legs ochraceous with femoral spines blackish; abdomen above bluish-black with two broken, narrow, central, longitudinal ochraceous fasciae.

**Length**: 24 to 28 mm.

**Distribution**: India: Meghalaya (Garo hills, Khasi hills), Assam, Nagaland, Sikkim, West Bengal. Elsewhere: Burma.
Genus 36. *Tessaratoma* Le Peletier & Serville, 1825

Type-species: *Tessaratoma papillosa* (Drury)

45. *Tessaratoma papillosa* (Drury)


*Diagnostic characters*: Ochraceous or pale olivaceous brown; antennae black and margins of head and pronotum narrowly piceous; pronotum with the lateral margins moderately amplified and reflexed and oblique from the lateral angles to head; body beneath usually covered with white powdery substance; legs and tarsi dark castaneous. In the male the anal appendage is sinuate at the apex; the apical angles acute.

*Distribution*: India: Meghalaya (Garo hills), Assam, Nagaland, West Bengal. Elsewhere: Chiha.

*Remarks*: This is a new record from the state of Meghalaya.

Family IX. CYDNIDAE

Genus 37. *Stibaropus* Dallas, 1851

1851. *Stibaropus* Dallas, *List Hem.*, 1: 111; 125
Type-species: *Stibaropus molginus* (Schiodte)

46. *Stibaropus callidus* (Schiodte)


*Diagnostic characters*: Suboval; head, pronotum and scutellum dark castaneous; body beneath pale castaneous, finely pilose; rostrum just passing the prosternum; 3rd antennal segment is subequal in length to 4th segment; scutellum transversely rugosely punctate; punctures more confluent at base; corium finely punctate.

*Length*: 5-5.5 mm.

*Distribution*: India: Meghalaya (Garo hills, Jaintia hills); South India, West Bengal. Elsewhere: Burma.
MAP - I showing the distribution of species No. 1 - 6 of Pentatomoidea (Hemiptera)

1. Antestia anchora (Thunberg)
2. Plautia fimbriata (Fabricius)
3. Dolycoris baccarum (Linnaeus)
4. Dolycoris indicus Stal
5. Halyomorpha picus (Fabricius)
6. Tolumnia latipes (Dallas)
MAP - II showing the distribution of species 7-12

7. Agonoscelis nubila (Fabricius)
8. Bagrada picta (Fabricius)
9. Eurydema pulchrum (Westwood)
10. Strachia crucigera Hahn
11. Carbula indica (Westwood)
12. Eysarcoris guttiger (Thunberg)
MAP - III showing the distribution of species 13 - 15 and 17 - 19

13. Eysarcoris montivagus (Distant)  
14. Eysarcoris ventralis (Westwood)  
15. Dalpada oculata (Fabricius)  
17. Erthesina fullo (Thunberg)  
18. Halys dentatus Fabricius  
19. Hoplistodera virescens Dallas
MAP - IV showing the distribution of species No. 21, 22 and 24 - 27

21. Nezara viridula (Linnaeus)
22. Piezodorus rubrofasciatus (Fabricius)
24. Placosternum taurus (Fabricius)
25. Cantao ocellatus (Thunberg)
26. Chrysocoris stollii (Wolff)
27. Hotea curculionoides (Herrich-Schaffer)
MAP - V showing the distribution of species 28 - 29, 32 and 34 - 36

28. Poecilocoris druraei (Linnaeus)
29. Poecilocoris hardwickii (Westwood)
32. Coridius brunneus (Thunberg)
34. Cyclopelta siccifolia (Westwood)
35. Andralius spinidens (Fabricius)
36. Picromerus obtusus Walker
MAP - VI showing the distribution of species No. 37 and 39 - 46

37. Zicrona caerulea (Linnaeus)  
39. Coptosoma feanum Montandon  
40. Coptosoma w. Montandon  
41. Eusthenes cupreus (Westwood)  
42. Eusthenes scutellaris (Herrich-Schaffer)  
43. Mattiphus oblongus Dallas  
44. Pycanum ochraceum Distant  
45. Tessaratoma papillosa (Drury)  
46. Stibaropus callidus (Schiodte)
Table - 1. Distribution of Pentatomid species in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>EAST KHASI HILLS</th>
<th>WEST KHASI HILLS</th>
<th>RI-BHOL</th>
<th>EAST GARO HILLS</th>
<th>WEST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>JANTIA HILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agonoscelis nubila (Fabricius)</td>
<td>-</td>
<td>-</td>
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<td>+</td>
<td>+</td>
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<td>2. Antestia anchora (Thunberg)</td>
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<td>3. Bagrada picta (Fabricius)</td>
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<td>4. Carbula indica (Westwood)</td>
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<td>+</td>
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<tr>
<td>5. Dalpada oculata (Fabricius)</td>
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<td>6. Dolycoris baccarum (Linnaeus)</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
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</tr>
<tr>
<td>7. Dolycoris indicus Stal</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
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</tr>
<tr>
<td>8. Erthesina fullo (Thunberg)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>9. Eurydema pulchrum (Westwood)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
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</tr>
<tr>
<td>10. Eysarcoris guttiger (Thunberg)</td>
<td>-</td>
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<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
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</tr>
<tr>
<td>11. Eysarcoris ventralis (Distant)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>12. Halys dentatus Fabricius</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>13. Halyomorpha picus (Fabricius)</td>
<td>-</td>
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<td>-</td>
<td>+</td>
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</tr>
<tr>
<td>14. Hoplistodera virescens Dallas</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15. Nezara viridula (Linnaeus)</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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<td>+</td>
</tr>
<tr>
<td>16. Piezodorus rubrofasciatus (Fabricius)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
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</tr>
<tr>
<td>17. Placosternum taurus (Fabricius)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>18. Plautia fimbriata (Fabricius)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
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<tr>
<td>19. Strachia crucigera Hahn.</td>
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</table>
### Table - 1. Distribution of Pentatomid species in different districts of Meghalaya.

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>EAST KHASI HILLS</th>
<th>WEST KHASI HILLS</th>
<th>RI-BHOI</th>
<th>EAST GARO HILLS</th>
<th>WEST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>JANTIA HILLS</th>
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<tbody>
<tr>
<td>21. <em>Tolumnia latipes</em> (Dallas)</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>22. <em>Chrysocoris stollii</em> (Wolff)</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>23. <em>Cantao ocellatus</em> (Thunberg)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>24. <em>Poecilocoris druraei</em> (Linnaeus)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25. <em>Poecilocoris hardwickii</em> (Westwood)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>26. <em>Hotea curculionoides</em> (Herrich-Schaf.)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>27. <em>Coridius brunneus</em> (Thunberg)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>28. <em>Cyclopelta siccifolia</em> (Westwood)</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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<tr>
<td>29. <em>Stibaropus callidus</em> (Schiodte)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>30. <em>Andrallus spinidens</em> (Fabricius)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>31. <em>Picromerus obtussus</em> Walker</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>32. <em>Zicrona caerulea</em> (Linnaeus)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
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<tr>
<td>33. <em>Coptosoma feanum</em> Montandon</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>34. <em>Coptosoma w-nigrum</em> Varshney</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>35. <em>Eusthenes cupreus</em> (Wastwood)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
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<tr>
<td>36. <em>Eusthenes scutellaris</em> (Herrich-Schaf)</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
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<tr>
<td>37. <em>Mattiphus oblongus</em> Dallas</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>38. <em>Pycanum ochraceum</em> Distant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>39. <em>Tessaratoma papillosa</em> (Drury)</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>
SUMMARY

The paper incorporates the account of 46 species belonging to 37 genera distributed over 9 families of Pentatomids from Meghalaya. Of these, 15 species (marked *) in 12 genera constitute new records from the State of Meghalaya. For each species is given the original reference, subsequent reference(s), distributional records within the State and elsewhere; keys to various taxa are provided. The species which is not included in the key is provided with diagnostic characters. The classification is chiefly after followed Distant (1902 - 1918). A list of Pentatomids so far known from Meghalaya State is appended. The study is based on the existing collection as well as mopping survey material of different survey parties in recent years.

ACKNOWLEDGEMENT

The authors are grateful to Dr. A.K. Ghosh, Director, Zoological Survey of India, Calcutta for Laboratory facilities. Grateful thanks are also due to Dr. J.R.B. Alfred, Additional Director and Chief Co-ordinator, Meghalaya Fauna for encouragement; to Dr. R.K. Varshney, Joint Director, to Dr. S.K. Tandon, Jt. Director, Z.S.I. for numerous courtesies. The authors are also thankful to Dr. J.K. Jonathan, Deputy Director for constructive suggestions to improve of the paper.

List of Species so far recorded from Meghalaya

<table>
<thead>
<tr>
<th>Order</th>
<th>HEMIPTERA</th>
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<tbody>
<tr>
<td>Sub Order</td>
<td>HETEROPTERA</td>
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<tr>
<td>Super Family</td>
<td>PENTATOMOIDEA</td>
</tr>
<tr>
<td>Family</td>
<td>PENTATOMIDAE</td>
</tr>
<tr>
<td>Genus</td>
<td>Dalpada Amyot &amp; Serville</td>
</tr>
<tr>
<td>Genus</td>
<td>Erthesina spinola</td>
</tr>
<tr>
<td>Genus</td>
<td>Halys Westwood</td>
</tr>
<tr>
<td>Genus</td>
<td>Nevisanus Distant</td>
</tr>
<tr>
<td>Genus</td>
<td>Sciocoris Fallen</td>
</tr>
<tr>
<td>Genus</td>
<td>Laprius Stal</td>
</tr>
<tr>
<td>Genus</td>
<td>Laprius varicornis (Dall)</td>
</tr>
</tbody>
</table>
Genus 7. Belopis Distant
Genus 8. Amyntor Stal
10. Amyntor obscurus (Dall)
Genus 9. Cappaea Ellenr
11. Cappaea taprobanesis (Dall)
Genus 10. Niphe Stal
12. Niphe subferruginea (Westw.)
Genus 11. Halyomorpha Mayr
13. Halyomorpha picus (Fabr.)
14. Halyomorpha scutellata (Dist.)
Genus 12. Tolumnia Stal
15. Tolumnia tatipes (Dall.)
Genus 13. Cratonotus Distant
Genus 14. Axiagastus Dallas
17. Axiagastus rosmarus Dall.
Genus 15. Plautia Stal
18. Plautia fimbriata (Fabr.)
Genus 16. Agonoscelis Spinola
19. Agonoscelis nubila (Fabr.)
20. Agonoscelis femoralis Walker
Genus 17. Eurydema Laporte
21. Eurydema pulchrum (Westw.)
Genus 18. Strachia Hahn
22. Strachia crucigera Hahn
Genus 19. Lelia (Walker)
23. Lelia octopunctata (Dall.)
Genus 20. Prionaca Dallas
24. Prionaca lata Dall
Genus 21. Placosternum (Amyot & Serville)
25. Placosternum taurus (Fabr.)
26. Plaeosternum urus Stal
Genus 22. *Rhynchocoris* Westwood
27. *Rhynchocoris humeralis* (Thunb.)

Genus 23. *Catacanthus* Spinola
28. *Catacanthus incarnatus* (Dru.)

Genus 24. *Menida* (Motschulski)
29. *Menida varipennis* (Westw.)

Genus 25. *Diplostira* Dallas
30. *Diplostira valida* Dall.

Family DINIDORIDAE
Genus 26. *Cyclopelta* Amyot & Serville
31. *Cyclopelta siccifolia* Westwood

Genus 27. *Coridius* Illiger
32. *Coridius janus* (Fabr.)
33. *Coridius ochreus* (Westwood)
34. *Coridius brunneus* (Thunb.)
35. *Coridius nepalensis* (Westwood)
36. *Coridius chinensis* (Dallas)

Genus 28. *Megymenum* Laporte
37. *Megymenum brevicorne* (Fabr.)

Family ASOPIDAE
Genus 29. *Cazira* Amyot & Serville
38. *Cazira verrucosa* (Westwood)

Genus 30. *Canthecona* Amyot & Serville
39. *Canthecona tibialis* Distant

Genus 31. *Andrallus* Bergroth
40. *Andrallus spinidens* (Fabr.)

Family TESSARATOMIDAE
41. *Tessaratoma quadrata* Distant

Genus 33. *Eusthenes* Laporte
42. *Eusthenes robustus* (Lepell & Serv.)
43. *Eusthenes saevus* Stal
44. *Eusthenes polyphemus* Stal
45. *Eusthenes scutellaris* (Herr. Schaff)
Genus  34. *Asiarcha* Stal
46. *Asiarcha nigridorsis* (Stal)
Genus  35. *Pycanum* Amyot & Serville
47. *Pycanum ochraceum* Distant

**Family PHYLLOCEPHALIDAE**
Genus  36. *Dalsira* Amyot & Serville
48. *Dalsira glandulosa* (Wolff)
Genus  37. *Salvianus* Distant
49. *Salvianus dilatatus* (Distant)
Genus  38. *Gonopsis* Amyot & Serville
50. *Gonopsis coccinea* (Walker)
51. *Megarhynchus truncatus* Westwood

**Family UROSTYLIDAE**
Genus  40. *Urochela* Dallas
52. *Urochela pilosa* Stal

**Family ACANTHOSOMATIDAE**
Genus  41. *Sastragala* Amyot & Serville
53. *Sastragala uniguttata* (Don.)
Genus  42. *Anaxandra* Stal
54. *Anaxandra tauriformis* Distant

**Family PLATASPIDAE**
Genus  43. *Brachyplatys* Boised
55. *Brachyplatys vahlii* (Fabricius)
Genus  44. *Coptosoma* Laporte
56. *coptosoma duodecimpunctatum* (Germ.)

**Family SCUTELLERIDAE**
Genus  45. *Solenostethium* Spinola
57. *Solenostethium rubropunctatum* (Guer.)
Genus  46. *Cantao* Amyot & Serville
58. *Cantao ocellatus* (Thunb.)
Genus 47. *Poecilocoris* Dallas

59. *Poecilocoris hardwickii* (Westwood)

60. *Poecilocoris druraei* (Linnaeus)

Genus 48. *Brachyaulax* Stal

61. *Brachyaulax oblonga* (Westwood)

Genus 49. *Chrysocoris* Hahn.

62. *Chrysocoris grandis* (Thunberg)

63. *Chrysocoris stollii* (Wolff)

Genus 50. *Lamprocoris* Stal

64. *Lamprocoris roylii* (Westwood)

65. *Lamprocoris spiniger* (Dallas)

Family GRAPHOSOMATIDAE

Genus 51. *Storthecoris* Horv.


REFERENCE


CHAKRABORTY & GHOSH: *Insecta*: *Hemiptera*: *Pentatomoidea*


The present paper is on the water-bugs of Meghalaya. It consists of a taxonomic treatment of nine families of water-bugs of the Order Hemiptera, of which seven families are aquatic, belonging to the Series Hydrocorisae, namely Ochteridae, Gelastocoridae (both are shore bugs), Corixidae, Nepidae, Notonectidae, Belostomatidae and Naucoridae while other two families are surface dwelling semiaquatic bugs belong to the Series Amphibicorisae, namely Gerridae and Veliidae (Classification is based upon Richards and Davies, 1977). The work is aimed to bring out a faunistic-cum-taxonomic study of water-bugs of Meghalaya, chiefly based on the collections made by various Survey parties of the Zoological Survey of India and other unnamed and a few named collections housed in the National Zoological Collection.

Distant (1902, 1906, 1910) had recorded only three species of water-bugs from the State of Meghalaya (the then Assam) in his valuable Fauna of British India, Rhynchota volumes. Since then so far, Paiva (1919) had presented the only systematic account of hemiptera fauna from Garo Hills, Meghalaya (the then Assam State), where he recorded 11 species of water-bugs belonging to two families. Hutchinson (1940) recorded two new species of Corixids from Khasi Hills.

The present study may be considered a comprehensive systematic work, first of its kind from the state, since it precisely includes the keys for different taxa, diagnostic characters for each species, distributional pattern of each species in the map of Meghalaya as well as their distribution in other states of India, and world.

Approximately 200 species of water-bugs have been recorded from India so far, belonging to the concerned nine families. The present paper has recorded 35 species under 24 genera from the State of Meghalaya, 17 of which are being recorded for the first time from the state and cited in the text with asteric marks. The studied materials are present in the National Zoological Collection, Calcutta.

COLLECTION AND PRESERVATION

The water-bugs of the Order Hemiptera have very wide range of habitat preferences. The habitat of nine families of water-bugs, those are included in the present paper, are being stated here in brief, along with their collection and preservation methods.
Both Ocherids and Gelatocorids are shore dwelling bugs found at the margin of ponds, lakes and other freshwater bodies, capable of running or short jumping rather than swimming. Corixids are the most abundant of all aquatic bugs in the world, with a wide range of habitat preferences. Nepids are awkward swimmers and live in trash and tangled aquatic plants. Notonectids are found in a variety of freshwater stagnant pools and in the quiet water of streams and lakes; adults can fly and disperse over considerable distances. Belostomatids are inhabiting in freshwater ponds, lakes, rivers, streams and also in salt water. They rest at the surface in the mats of aquatic vegetation by extending their body obliquely downwards and tip of the abdomen slightly above the surface film. Naucorids occur in ponds, lakes, rivers, hot springs and saline water. Gerrids are semiaquatic bugs, dwelling on the surface film of ponds, lakes and pools in streams. Veliids can walk over the surface water in protected and secluded places.

The water nets, the water screens and the light traps are useful methods of collecting water-bugs from different habitat. The water nets, made up of close meshed nylon thread supported by strong ring and long pole are used by the side of water bodies or from boats. The nets are also used to collect insects from streams by disturbing stones and aquatic vegetation which harbour the insects. The water screens, made up of metal sheets with numerous pores, fitted with wooden handle are used in the streams through dense vegetation to collect insects. All the adult water-bugs are quite capable of flight over considerable distances and can be trapped by using petromax gas light or other source of powerful light placed near the edge of water bodies during night.

The water-bugs can be preserved both dry and wet, as in case with other insects in general, depending upon purpose, nature of specimens, etc. Collected specimens in the field are generally kept dry in the insect-envelopes after killing them in killing bottle (Benzene, Ethyl acetate, Carbon tetrachloride or Chloroform-any one can be used as killing agent). Water-bugs in the field are also preserved in 70% or 80% Ethyl alcohol as wet collection, by direct pouring them from the net to the alcohol filled glass jar container. Each collection is provided with collection data.

In the Laboratory the collected specimens are sorted out according to different taxa for further studies. After setting and pinning in the Laboratory the studied materials are kept in dry Insect Cabinet with proper labels, or a number of specimens can be kept as wet collection in 70% Ethyl alcohol with proper labels after changing the alcohol in the Laboratory.

SYSTEMATIC ACCOUNT

Following is the systematic list of all the species contained in the present paper. Asteric mark with the species denotes the new record from the State of Meghalaya.

SERIES - HYDROCORISAE

Family I. Ochteridae
Genus 1. Ochterus Latreille 1807
   1. Ochterus marginatus (Latreille)

Family II Gelastocoridae
Genus 2. Nerthra Say 1932
2. *Nerthra indica* (Atkinson)
3. *Nerthra spissa* (Distant)*

Family III. Corixidae

Subfamily Micronectinae

Genus 3. *Micronecta* Kirkaldy 1897
4. *Micronecta (Dichaetonecta) haliploides* Horvath *
5. *Micronecta (Mesonecta) waltoniana* Hutchinson
6. *Micronecta (Mesonecta) khasiensis* Hutchinson

Subfamily Corixinae

Genus 4. *Cymatia* Flor 1860
7. *Cymatia apparens* (Distant)

Genus 5. *Corixa* Geoffroy 1762
8. *Corixa (Vermicorixa) kempi* Hutchinson *

Family IV. Nepidae

Genus 6. *Ranatra* Fabricius 1790
9. *Ranatra gracilis* Dallas *
10. *Ranatra sordidula* Dohra *
11. *Ranatra varipes* Stal *

Genus 7. *Laccotrephes* Stal 1865
12. *Laccotrephes robustus* Stal *
13. *Laccotrephes ruber* (Linnaeus)
14. *Laccotrephes griseus* (Guerin) *

15. *Montonepa erutus* (Montandon)

Family V. Notonectidae

Genus 9. *Anisops* Spinola 1837
16. *Anisops sardea* Herrich-Shaffer *

Genus 10. *Enithares* Spinola 1837
17. *Enithares fusca* Brooks *

Family VI. Belostomatidae

Genus 11. *Sphaerodema* Laporte 1832
18. *Sphaerodema annulatum* (Fabricius) *
Genus 12. *Lethocerus* Mayr 1853
19. *Lethocerus indicus* (Lepeletier & Serville)

Family VII. Naucoridae
Subfamily Cheirochelinae

Genus 13. *Cheirochela* Hope 1841
20. *Cheirochela assamensis* Hope *

Subfamily Laccocorinae

Genus 14. *Heleocoris* Stal 1876
21. *Heleocoris obliquatus* (Spinola) *

**SERIES - AMPHIBICORISAE**

Family VIII. Gerridae
Subfamily Ptilomerinae

Genus 15. *Ptilomera* Amyot & Serville 1843
22. *Ptilomera laticaudata* (Hardwicke)

Subfamily Halobatinae

Genus 16. *Metrocoris* Mayr 1865
23. *Metrocoris tenuicornis* Esaki *
24. *Metrocoris femoratus* (Paiva)
25. *Metrocoris nigrofasciatus* Distant

Subfamily Gerrinae

Genus 17. *Eotrechus* Kirkaldy 1902
26. *Eotrechus kalidasa* Kirkaldy

Genus 18. *Onychotrechus* Kirkaldy 1903
27. *Onychotrechus sakuntala* (Kirkaldy) *

Genus 19. *Chimarrhometra* Bianchi 1896
28. *Chimarrhometra orientalis* (Distant)

Genus 20. *Gerris* Fabricius 1794
29. *Gerris adelaidis* Dohrn *

Genus 21. *Limnogonus* Stal 1868
30. *Limnogonus nitidus* (Mayr) *
31. *Limnogonus parvulus* (Stal)
Family IX. Veliidae

Genus 22. *Ragovelia* Mayr 1865

32. *Ragovelia nigricans* (Burmeister)

Genus 23. *Microvelia* Westwood 1834

33. *Microvelia lineatipes* Paiva

34. *Microvelia atromaculata* Paiva

Genus 24. *Perittopus* Fieber 1861

35. *Perittopus maculatus* Paiva

Key to the families

1. Antennae shorter than head, usually hidden in cavities beneath eyes and not visible from above (except Ochteridae). [Aquatic and shore bugs] Series - Hydrocorisae. ........................................2

Antennae longer than head, inserted in front of eyes and clearly visible from above. [Semiaquatic bugs] Series Amphiboricisae. .........................................................................................8

2. Ocelli present; middle and hind legs without fringe of swimming hairs (Shore bugs)........3

Ocelli absent; middle and hind legs provided with more or less extensive fringe of long swimming hairs (Aquatic bugs)..................................................................................................................4

3. Antennae small and exposed, can be seen from above; front legs similar to middle legs.

..............................................................................................................................................*OCHTERIDAE*

Antennae concealed in grooves under the strongly protruded eyes; front legs raptorial with broad and grooved femora. ...........................................................................................................*GELASTOCORIDAE*

4. Rostrum very short and broad with no distinct segmentation; front tarsi spatulate and developed into comblike palae; base of head overlapping the anterior margin of pronotum

..............................................................................................................................................*CORIXIDAE*

Rostrum cylindrical or cone shaped with distinctly 3-4 segmented; front tarsi normal and not modified into palae; base of head inserted into pronotum. .................................................5

5. Abdomen with a pair of long, slender posterior appendages; hind coxae short, free and rotatory..........................................................*NEPIDAE*

Abdomen without paired long slender posterior appendages; hind coxae broadly jointed to the thoracic pleura..........................................................6

6. Body elongated; head spherical; hind legs long, slender and oarlike without distinct claws.

..............................................................................................................................................*NOTONECTIDAE*

Body dorso-ventrally flattened; head otherwise; hind legs otherwise; with distinct paired claws..........................................................7

7. Membrane of hemelytra with reticulate veins; abdomen with a pair of short, flat, retractile posterior appendages; head nearly triangular at the anterior margin...*BELOSTOMATIDAE*

Membrane of hemelytra without veins; abdomen without any straplike appendages; head strongly curved posteriorly at the anterior margin...........................................*NAUCORIDAE*
8. Rostrum 4-segmented; middle and hind legs elongated; hind femora long, greatly exceeding the apex of abdomen; adult with median metasternal scent gland opening...........GERRIDAE
Rostrum 3-segmented; middle and hind legs not elongated; hind femora scarcely, if at all, surpassing the tip of the abdomen; adult with lateral metathoracic scent gland openings.

.......................................................... VELIIDAE

SERIES - HYDROCORISAE

Family  I. OCHTERIDAE

Genus 1. Ochthus Latreille 1807


1. Ochthus marginatus (Latreille)

1804. Acanthia marginatus Latreille, Hist. Ins., 12 : 242

Material examined : 1 ex., Tura, on the way to Tura peak, West Garo Hills Dist., 1.V.1979, J. K. Jonathan and party coll.

Diagnosis : Adult insects may attain a length of 4-6 mm; body moderately depressed; antennae short and 4-jointed, inserted beneath the eyes; pronotum transverse and hexangular, lateral margin laminately amplified and moderately rounded; yellowish spots to the margins of the abdomen; hemelytra totally covering the abdomen.

Distribution : India : Meghalaya (West Garo Hills); West Bengal; Bihar; Orissa; Maharashtra; U.P. Elsewhere : Burma, Nepal, Sri Lanka.

Family  II. GELASTOCORIDAE

Genus 2. Nerthra Say 1832


Key to the species of the genus Nerthra

1. Head between eyes about three times wider than long and provided with two short district projecting spines at the middle of anterior margin; pronotum with lateral margins angularly dilated; pronotum provided with a prominent anteriorly directed spine at the anterior angle just behind each eye; scutellum irregularly gibbous with no distinct tubercle. ............................... indica

Head not provided with any spine at the anterior angle; scutellum with three distinct tubercles, one on each side near base and median one at the apex......................... spissa

2. Nerthra indica (Atkinson)

1906. Mononyx indicus : Distant, Fauna Brit. India, Rhynchota, 3 : 15
Material examined: 1 ex., Above Tura, West Garo Hills Dist., 3500-3900 ft., Reg. No. 8624/H1, 15.VII. 1930, S. Kemp coll.

Diagnosis: Adults attain a length of 9-10 mm.; breadth between the pronotal angles approx. 7 mm. Other diagnostic characters as in key.

Distribution: India: Meghalaya (West Garo Hills); Assam; Sikkim.

3. Nerthra spissa (Distant) *

1906. Mononyx spissus Distant, Fauna Brit. India, Rhynchota, 5 : 312


Diagnosis: Adults may attain a length of about 10 mm.; breadth of pronotum about 6.5 mm. Other diagnostic characters as in key.

Distribution: India: Meghalaya (Districts - East Garo Hills, West Garo Hills); Assam.

Family III. CORIXIDAE

Key to the subfamilies and genera of the family Corixidae

1. Antennae three-jointed; scutellum exposed; in male 9th segment and upper paramere not forming supports or sheaths for the aedeagus; small species, hardly over 4.5 mm in length. ... Subfamily Micronectinae and genus Micronecta

Antennae four-jointed; scutellum hidden under posteriorly produced pronotum; in male the posterior projection of 9th segment and the modified upper paramere forming supports or sheaths for the aedeagus; larger species, rarely under 4.5 mm. ... Subfamily Corixinae ---------------------------- 2

2. Rostrum without transverse sulcations; palea subcylindrical in cross section in both the sexes; pronotum with very obscure markings; elytra with transverse bands, more regular at the base of clavus. Cymatia

Rostrum provided with transverse sulcations; palae triangular in cross section in both the sexes; pronotum and elytra marked with transverse alternating yellow and dark vermiculations or bands. Corixa

Genus 3. Micronecta Kirkaldy 1897

1897. Micronecta Kirkaldy, Entomologist, 30 : 260

Key to the species of the genus Micronecta

1. Elytron pale with punctiform black spot. .................. M. (Dichaetonecta) haliploUks
Elytron without punctiform black spots but obscurely linear dark lines. 2

2. Larger, over 2.5 mm in length; head without any orange stripe on frons; in male anterior femur with a row of 12 long spines on the flexor margin; male pala with a row of about 20 hairs on the posterior flexor margin. M. (Mesonecta) waltoniana

Smaller, under 2.5 mm in length; head with a dull orange stripe on frons; in male anterior femur with two long spines on the flexor margin; male pala with a row of more than 30 hairs on the posterior flexor margin. M. (Mesonecta) khasiensis
4. *Micronecta* (Dichaeonecta) *haliploides* Horvath *


Diagnosis : Adult insects may attain a length of about 3 mm.; pronotum transverse and narrow, lateral margins very short, elytra with lateral margins moderately convexly rounded. Other diagnostic characters as in key.

Distribution : India : Meghalaya (East Khasi Hills); West Bengal. Elsewhere : Bangladesh, Java.

5. *Micronecta* (Mesonecta) *waltoniana* Hutchinson


Diagnosis : Adults may be 2.77 to 2.95 mm in length; head dull brownish yellow; legs greyish yellow; head just under four times as wide as long; in male sixth tergite not emerginate within strigil. Other diagnostic characters as in key.

Distribution : India : Meghalaya (District - Khasi Hills)

Remarks : This species is not available in the present collection. Diagnostic characters have been incorporated in the present paper from Hutchinson (1940).


Diagnosis : Adults may be 2.14 to 2.34 mm in length; head dull yellowish in colour; legs brownish yellow; in male sixth abdominal segment with tergite emerginate central to strigil. Other diagnostic characters as in key.

Distribution : India : Meghalaya (Khasi Hills).

Remarks : This species is not available in the present collection. Diagnostic characters have been incorporated in the present paper from Hutchinson (1940).

Genus 4. *Cymatia* Flor 1860


7. *Cymatia apparents* (Distant)


Diagnosis : Adult insects with body length from 4.7 to 5.8 mm; pronotum with very obscure markings, hardly visible in uncleared specimen; elytra with transverse bands more regularly developed at the base of the clavus; the clavus having relatively unbroken yellow bands narrower than the intermediate space; pronotum and elytra non-rastrate; a well defined longitudinal carina on the pronotum.


**Distribution**: India: Meghalaya (Khasi Hills); West Bengal; Jammu and Kashmir; Maharashtra. Elsewhere: China.

**Remarks**: This species is not available in the present collection. Distant (1906) reported it from Khasi Hills as *Corixa hieroglyphica*.

**Genus 5. Corixa Geoffroy 1762**

1762. *Corixa* Geoffroy, Hist. abreg. Ins., 1: 477

8. *Corixa (Vermicorixa) kempi* Hutchinson *

1940. *Corixa (Vermicorixa) kempi* Hutchinson, Conn. Acad. Arts Sci., 33: 432

**Material examined**: 5 exs. (3 F, 2 m); Near Elephant Falls, Shillong, East Khasi Hills Dist., 4.XI. 1991, R.C. Basu and party coll.

**Diagnosis**: Adult insects may attain a length of about 6.5 to 6.83 mm; head yellow in colour, gently rounded in front and hardly produced in front of eyes; vertex with a low obscure posterior longitudinal carina between a pair of rows of six punctures; pronotum dark blackish with ten transverse yellow lines, rastrate and two-third times as wide as long, central carina forming a small tubercle anteriorly; clavus with three basal yellow lines straight and unbroken, other lines vermiculate but almost unbroken; in male pala subparallel with eight long hairs on the extensor margin and a row of about 34 pegs which runs obliquely from the middle of the base, recurves to run subparallel to the extensor margin of the pala; right paramere evenly curved, narrow and uncrested; sixth abdominal segment with rather small, subquadrate strigil.

**Distribution**: India: Meghalaya (East Khasi Hills); West Bengal; Himachal Pradesh; U.P.

**Family IV. NEPIDAE**

**Key to the genera of the family Nepidae**

1. Body slender, subcylindrical; pronotum slender and much longer than broad; hind coxae very close; anterior femora a little incrassate without any groove beneath; anterior femora provided with one or two pairs of sharp teeth; anterior coxae very long.....................*Ranatra*

   Body elongately suboval and flattened; pronotum about as long as or little shorter than broad; hind coxae widely separated; anterior femora incrassate and longitudinally grooved beneath to hold the tibiae; anterior femora not provided with sharp teeth but a round tubercle at the base on each; anterior coxae very short..........................................................2

2. Posterior margin of pronotum strongly concavely sinuate; membrane well developed; abdominal appendages well developed and long..........................*Laccotrephes*

   Posterior margin of pronotum less sinuate; membrane rudimentary; abdominal appendages short..........................................................*Montonepa*

**Genus 6. Ranatra Fabricius 1790**

Key to the species of the genus *Ranatra*

1. Abdominal appendages very short, nearly 1/4th of the body length; head with an acute tubercle between the eyes; anterior femora with six minute teeth arranged linearly beneath the basal half and two large teeth at the middle. .......................................................... *gracilis*

Abdominal appendages much longer but a bit shorter than the body length; head with no tubercle between the eyes; anterior femora not provided with minute teeth on the basal half. .............................................................................................................. 2.

2. Abdominal appendages 3-4 mm shorter than the body length; pronotum provided with an indistinct ridge at the posterior angle on each side; metasternal process posteriorly projectile with lateral concavity on each side and mid-longitudinally slightly carinated; anterior tibia shorter, not touching the inner tooth on the anterior femur. ......................... *sordidula*

Abdominal appendages 7-8 mm shorter than the body; pronotum provided with a distinct ridge at the posterior angle on each side; metasternal process posteriorly blunt and slightly rounded with no lateral concavity, mid-longitudinal carination less distinct; anterior tibia longer and clearly touching the inner tooth on the anterior femur. ............................ *varipes*

9. *Ranatra gracilis* Dallas *


*Diagnosis*: Adult insect may attain a length about 34 mm. Other diagnostic characters as in key.


10. *Ranatra sordidula* Dohrn *


*Diagnosis*: Adult insect may be 23-24 mm long, abdominal appendages approximately 20 mm in length; head with no tubercle on the vertex. Other diagnostic characters as in key.

*Distribution*: India: Meghalaya (East Khasi Hills); West Bengal; Orissa. Elsewhere: Malay Peninsula, Sri Lanka, Thailand.

11. *Ranatra varipes* Stal *


Diagnosis: Adult insects may attain a length of about 19-20 mm and abdominal appendages reach up to 12 mm in length. Other characters as in key.

Distribution: India: Meghalaya (East Khasi Hills); West Bengal; Orissa; Tamil Nadu; U.P. Elsewhere: Burma, Malay Peninsula, Nepal, Sri Lanka, Thailand.

Genus 7. *Laccotrephes* Stal 1865


Key to the species of the genus *Laccotrephes*

1. Adults attain a length about 36-44 mm; anterior area of prosternum provided with an indistinct tubercle; abdominal appendages either or a little longer than the body length; abdomen above red blood in colour. .................................................................................. *robustus*

   Adults less than 35 mm in length; anterior area of prosternum provided either with an indistinct tubercle or a strong acute spine like structure; abdominal appendages otherwise; abdominal colouration different. .......................................................... 2

2. Adults attain a length about 30-35 mm; abdomen above yellowish red in colour; prosternum provided with a small indistinct tubercle; abdominal appendages a little longer than the body .......................................................................................... *ruber*

   Adults never attain a length more than 15-20 mm; abdomen above with light bluish tinge; prosternum provided with a strong acute spine like structure; abdominal appendages shorter than the body .................................................................................. *griseus*

12. *Laccotrephes robustus* Stal *


Diagnosis: As in key.


13. *Laccotrephes ruber* (Linnaeus)


Diagnosis: As in key.

Distribution: India: Meghalaya (East Khasi Hills, West Khasi Hills, West Garo Hills, East Garo Hills); West Bengal; Himachal Pradesh; Jammu & Kashmir; Maharashtra; Nagaland; Orissa. Elsewhere: China, Formosa, Japan, Sri Lanka.

14. Laccotrephes griseus (Guerin)*

1910. Laccotrephes griseus: Montandon, Annali Mus. zool. Napoli, 3(10) : 3


Diagnosis: As in key.

Distribution: India: Meghalaya (South Garo Hills); West Bengal; Pondicherry; Tamil Nadu. Elsewhere: Burma, Malacca, Seychelles, Sri Lanka, Thailand.

Genus 8. Montonepa Lansbury 1973


15. Montonepa erutus (Montandon)


Diagnosis: Adult insect may attain a length of about 15 mm.; head and pronotum darkbrown in colour; eyes small and protuberant; pronotum deeply crenulated and ridged, anterior lateral margins raised and posterior humeral angles divergent; scutellum large and triangular, apex raised with a pair of prominent ridges which almost reach the base of the scutellum; elytra with nodules, membrane clearly differentiated from the elytra with distinct venation; fore femur nodulate, fore tibia sulcate; abdominal appendages approximately 1 mm in length.

Distribution: India: Meghalaya (Khasi Hills).

Remarks: This species was not available in the present collection. Distant (1910) had no opportunity to have one for his studies but Lansbury (1973) had studied the male Holotype specimen collected from Khumis, Khasia Hills, which at present deposited in the United States national Museum, Washington, U.S.A.
Family V. NOTONECTIDAE

Key to the genera of the family Notonectidae

1. Hemelytra commissure with a definite hair-lined pit at the anterior end just behind the scutellum; pronotum more longer than wide without any foveately excavation; middle femur without any antepical protuberance; anterior leg of male with one tarsal segment but female with two segments................................................................................................. *Anisops*

Hemelytra commissure without any hair-lined pit at the anterior end; pronotum more wider than long with its anterior angles foveately excavate; middle femur with an antepical pointed protuberance; anterior leg of both male and female with three tarsal segments...................................................................................................................... *Enithares*

Genus 9. *Anisops* Spinola 1837


16. *Anisops sardea* Herrich-Shaffer *

1850. *Anisops sardeus* Herrich-Shaffer, Die Wanz. Ins., 9 : 41

**Material examined**: 3 exs. (2 M, 1 F), Shella, East Khasi Hills Dist. 3.IV. 1992, M. Ghosh coll.

**Diagnosis**: Adult males 7.5-8.4 mm and female 7.2-7.5 mm in length; greatest body width about mid way the length of body; general body colour pale yellow or brownish yellow; synthlipsis narrow, less than one-third the anterior width of vertex; male provided with much prominent caphalic horn with frons excavate of its entire length and bordered laterally by two carinae; anterior tibia of male provided with stridulatory comb which gradually narrow toward the apex, composed of about 18 teeth.

**Distribution**: India: Meghalaya (East Khasi Hills); West Bengal; Orissa; Punjab; U.P.; South India. Elsewhere: Africa, Albania, Burma, Canary Islands, Corfu, Pakistan, Syria, Turkey.

Genus 10. *Enithares* Spinola 1837


17. *Enithares fusca* Brooks *

1968. *Enithares fusca* : Lansbury, Pacif. Insects, 10(2) : 412


**Diagnosis**: Adults of both sexes 9.2-9.3 mm long and maximum width 3.5-3.6 mm.; head rounded anteriorly as seen from above; synthlipsis just over half the anterior width of vertex; male with large well developed angulate mesotrochanter; male midtibia with a large nodule on the inner surface distally.

**Distribution**: India: Meghalaya (East Khasi Hills); Kerala.
Family VI. **BELOSTOMATIDAE**

Key to the genera of the family Belostomatidae

1. Body moderate in size, generally attain a length from 12 to 27 mm, and more or less ovate or sub-ovate; head in front of eyes subtriangularly produced; hemelytra with distinct membrane, often very small, contains areas moderately convexly ampliate; anterior tarsal claws two of equal length on each .............................................. *Sphaerodema*

2. Body large in size, length may vary from 40 to 110 mm and narrowly elliptical; head in front of eyes not conically produced; hemelytra with distinct membrane provided with prominent longitudinal veins and not outwardly ampliate; tarsal claw one on each ............... ................................................................. *Lethocerus*

**Genus 11. Sphaerodema** Laporte 1833


**Remarks**: Authors have retained the much known and used name *Sphaerodema* in this paper. Lauck and Menke (1961) mentioned that the synonym of the genus *Diplonychus* Laporte has been confused in the literature and the genus needed a thorough revision, though they have adopted the name *Diplonychus*.

18. *Sphaerodema annulatum* (Fabricius) *


**Material examined**: 8 exs., (2 M with eggs on their elytra), Shella, East Khasi Hills Dist., 3.IV. 1992 M. Ghosh coll.

**Diagnosis**: Adults may attain a length of about 21-22 mm and breadth about 16-17 mm; body very broad and oval in shape; greatest expanse of hemelytra together almost equal to their length, head as long as the interocular space; pronotum, scutellum and corium thickly and finely punctate; membrane small; embolium convexly ampliate with its outer margin a little reflexed; hemelytra not provided with any shining spot beyond the middle of the inner margin.

**Distribution**: India: Meghalaya (East Khasi Hills); West Bengal; Assam; Bihar; Orissa. Elsewhere: Bangladesh, Formosa, Pakistan.

**Genus 12. Lethocerus** Mayr 1853


19. *Lethocerus indicus* (Lepeletier & Serville)


**Diagnosis**: This giant Indian water-bug may vary in length from 62-85 mm; head between eyes with parallel sides; pronotum with a transverse faciæ at the basal end and a fine mid-longitudinal carination; hemelytra with distinct membrane provided with longitudinal veins; posterior tibiae and tarsi amplyately compressed; intermediate and posterior legs provided with thick sets of swimming hairs on the ventral side.

**Distribution**: India: Meghalaya (West Garo Hills); West Bengal; Assam; Bihar; Kerala; Maharashtra; Mizoram; Orissa; U.P. Elsewhere: Burma, China, Java, Malay Peninsula, Pakistan, Philippines, Sri Lanka, Sumatra.

**Family VII. NAUCORIDAE**

Key to the subfamilies and genera of the family Naucoridae

1. Head more or less prominent and rounded, produced in front of eyes; pronotum anteriorly strongly and concavely excavate or wavy, posterior angles more or less acuminate; gula long and tectiform; eyes with no external process; eyes thick and placed laterally to the head......................................................... Subfamily Cheirochelinae and genus *Cheirochela*

Head broad but not prominently produced in front of eyes; pronotum anteriorly gradually concave, posterior angles not acuminate; gula short, neither tectiform nor tumid; eyes with an external process on each between their outer margin and the anterior angles of the pronotum; eyes flat and anteriorly convergent................................................................. Subfamily Laccocorinae and genus *Heleocoris*

Genus 13. *Cheirochela* Hope 1841


20. *Cheirochela assamensis* Hope *


**Diagnosis**: Adults attain a length of about 22-23 mm and breadth between the pronotal angles about 9-9.5 mm; body depressed and elongately ovate; head strongly and broadly produced in front of eyes, beneath with a deep excavation containing the base of rostrum; pronotum transverse with anterior margin concave and the anterior lateral angles elongately acuminate while the posterior angles transversely acuminate; hemelytra not covering the whole of the abdomen and corium completely rounded and hiding connexivum for about half its length; abdomen broad and depressed, lateral posterior segmental angles more or less spionously produced; anterior femora very strongly dilated, anterior tibiae and tarsi curved; middle and posterior tibiae clothed ventrally with long thick hairs.
Distribution: India: Meghalaya (East Khasi Hills); Assam. Elsewhere: Burma.

Genus 14. Heleocoris Stal 1876


21. Heleocoris obliquatus (Spinola) *

1837. Naucoris obliquatus Spinola, Ess. Ins. Hemipt., : 54
1906. Heleocoris obliquatus : Distant, Fauna Birt. India, Rhynchota, 3 : 31


Diagnosis: Adult insects attain a length about 10.5 mm; head and pronotum spotted with grey and black markings; scutellum black, apex pale; pronotum not distinctly bordered with a marginal furrow; posterior angles of pronotum terminating obliquely.

Distribution: India: Meghalaya (South Garo Hills); Bihar; Maharashtra. Elsewhere: Burma.

SERIES - AMPHIBICORISAE

Family VIII. GERRIDAE

Key to the subfamilies and genera of the family Gerridae

1. Metacetabular suture dorsally reaching to the anterior end of first abdominal tergite; intersegmental suture between mesonotum and metanotum always distinct laterally, thus metacetabular region always divided into two areas. Hind tarsus fused; middle femur of male well developed with a fringe of long hairs................................................................................................................................. subfamily Ptilomerinae and genus Ptilomera

Metacetabular suture dorsally not reaching to the anterior end of first abdominal tergite; intersegmental suture between mesonotum and metanotum either lost laterally or rarely present laterally this metacetabular region never divided into two areas. Hind tarsus not fused; middle femur of male otherwise........................................................................................ 2

2. Metasternum represented by a very short, transverse, subtriangular plate rarely reaching metacetabular region laterally. Male with anterior femur may be well built, often curved and may be provided with teeth; 7th abdominal segment of female with ventral apical margin excessively developed and modified into various shape............................................................. subfamily Halobatinae and genus Metrocoris

Metasternum distinctly present, at least about about one tenth as long as mesonotum in length. Male with anterior femur normal in shape, not curved and not provided with teeth; 7th abdominal segment of both male and female modified to form connexival spines..........
................................................................................................................................. subfamily Gerrinae.............................. 3
3. Hind legs longer than middle legs; claws arising apically ......................... \textit{Eotrechus} \\
Hind legs nearly as long as or shorter than middle legs; claws not arising apically. ........4

4. First tarsal segments of middle and hind legs shorter than the second tarsal segments; claws well developed and arising from near the middle of second tarsal segments \textit{Onychotrechus} \\
First tarsal segments of middle and hind legs longer than the second tarsal segments; claws not well developed and arising from near the apex of the second tarsal segment...............5

5. Mesonotum with paired oblique depressions near the anterior margin; paramere of male genitalia greatly developed................................................................. \textit{Chimarrhometra} \\
Mesonotum without paired oblique depressions near the anterior margin; paramere not greatly developed ........................................................................................................... 6

6. First tarsal segments little shorter than the second tarsal segments on the front legs; abdominal spiracles placed much closer to the anterior margin than to the posterior margin on each segment; 7th segment of male with a concave ventral apical margin and with a small median emergination; 8th segment of female always well exposed .................\textit{Gerris} \\
First tarsal segments much shorter than the second tarsal segments on the front legs; abdominal spiracles placed nearly at the middle between the anterior and posterior margins on each segment; 7th segment of male with concave ventral apical margin and without any median emergination; 8th segment of female always basally telescoped within tubular 7th segment. ................................................................................................. \textit{Limnogonus}

\textbf{Subfamily PTILOMERINAE

Genus \textit{Ptilomera} Amyot and Serville 1843

1843. \textit{Ptilomera} Amyot and Serville, \textit{Hemipteres}, : 413

\textit{22. Ptilomera laticaudata} (Hardwicke)


\textit{Diagnosis} : Both apterous and macropterous adults may attain a length between 13.0-15.0 mm; antennae nearly as long as the body, first antennal segment almost as long as the other three segments together; rear margin of metacoxa provided with thorn like projection in both the sexes; almost all over the middle femur provided with fringed like hairs in male, parameres very prominent, bent and laterally directed; female with 7th abdominal segment modified and provided with long prominent connexival spines.
Distribution: India: Meghalaya (West Garo Hills, South Garo Hills, East Khasi Hills); West Bengal; Sikkim; Tamil Nadu. Elsewhere: Burma, Malay Peninsula, Sri Lanka, Thailand.

Subfamily HALOBATINAE
Genus Metrocoris Mayr 1865


Key to the species of the genus *Metrocoris*

1. 2nd segment of antennae shorter than the 3rd segment; male front femur not much broader than that of female and not provided with prominent teeth along the inner margin at the middle and distal end................................................................. *tenuicornis* Esaki

2nd and 3rd segments of antennae subequal in length; male front femur much broader than that of female and provided with prominent teeth along the inner margin at the middle and distal end................................................................. 2

2. Male front femur provided with two prominent teeth, one a little beyond the middle and other one at the distal end................................................................. *femoratus*

Male front femur provided with a prominent tooth and several small teeth at the distal end only, no tooth at the middle................................................................. *nigrofasciatus*

23. *Metrocoris tenuicornis* Esaki *


*Diagnosis*: Adult insects may attain a length about 4.5-6.0 mm. Other diagnostic characters as in key.


*Remarks*: Lundblad (1934) recorded this species from India without mentioning the locality.

24. *Metrocoris femoratus* (Paiva)


**Diagnosis**: Body length approximately 8.5 mm. Other diagnostic characters as in key.

**Distribution**: India: Meghalaya (West Khasi Hills, West Garo Hills).

25. *Metrocoris nigrofasciatus* Distant


**Diagnosis**: Apterous and macropterous forms may be 5.5-6.0 mm. in length. Other diagnostic characters as in key.

**Distribution**: India: Meghalaya (East Khasi Hills, South Garo Hills); Assam; U.P. Elsewhere: Burma, Java, Malaya, Thailand.

Subfamily GERRINAE

Genus 17. *Eotrechus* Kirkaldy 1902

1902. *Eotrechus* Kirkaldy, Entomologist, 35 : 137

26. *Eotrechus kalidasa* Kirkaldy

1902. *Eotrechus kalidasa* Kirkaldy, Entomologist, 35 : 137

**Diagnosis**: Adult macropterons forms may attain a length of about 10.0-10.5 mm; head with emerginate prominent eyes; antennae with first and second segments longest and subequal in length while third and fourth segments a little shorter and subequal; anterior pronotal lobe provided with a mid-longitudinal and lateral yellow lines; pronotum with apical margin broadly rounded; each tarsus being terminated by two strong, curved, apical, aroliated claws.

**Distribution**: India: Meghalaya (West Garo Hills); West Bengal. Elsewhere: Burma.

**Remarks**: This species is not available in the present collection. Paiva (1919) recorded one apterous specimen from above Tura, Meghalaya.

Genus 18. *Onychotrechus* Kirkaldy 1903

1903. *Onychotrechus* Kirkaldy, Entomologist, 36 : 44

27. *Onychotrechus sakuntala* (Kirkaldy)*

1901. *Gerris sakuntala* Kirkaldy, Entomologist, 34 : 117
1982. *Onychotrechus sakuntala* : Andersen, Semiaquatic bugs, Entomonograph, 3 : 183

Diagnosis: Adult insect may attain a length of about 5.5 mm; head with lateral yellowish margins in front of eyes and mid-longitudinal yellowish fascia; pronotum with yellowish anterior margin, lateral margins and three longitudinal discal fasciae (central one straight, the lateral ones curved); antennae with first segment longest and curved, remaining segments shorter and subequal in length; rostrum considerably surpassing the anterior coxae; middle femora slightly longer than posterior femora; tarsal claws long.


Remarks: Lundlad (1934) mentioned in his voluminous work on water bugs that this species also found in India.

Genus 19. Chimarrhometra Bianchi 1896


28. Chimarrhometra orientalis (Distant)

1879. Halobates orientalis Distant, Trans. ent. Soc., 2: 176
1902. Chimarrhometra orientalis: Distant, Fauna Brit. India, Rhynchota, 2: 190


Diagnosis: Adult insects may attain a length of about 8.0 mm; head with semi-globular large eyes; antennae with first segment curved, robust and about the length of head and pronotum together, other segments slender, second and third segments sub-equal while fourth segment a little shorter than the third segments; pronotum truncated anteriorly with mid-longitudinal pale line and mesonotum with paired oblique depression near the anterior margin; basal joint of anterior tarsi nearly twice as long as the second joint; anterior femora much incrassate and thicker than the middle femora, parameres of male genitalia greatly developed.

Distribution: India: Meghalaya (East Khasi Hills, West Khasi Hills); West Bengal; Himachal Pradesh; Punjab; U.P.

Genus 20. Gerris Fabricius 1794

29. *Gerris adelaidis* Dohrn *


*Diagnosis*: Adults may attain a length of about 11.5 mm; head with a basal semi-lunar pale yellow spot; antennae with first joint longest and slightly shorter than the remaining three joints together; rostrum short, slightly surpassing base of head; posterior lobe of pronotum with a distinct brownish carina along the length; first tarsal segment of middle leg about four times as long as the second tarsal segment; hind leg with first tarsal segment about twice the length of the second tarsal segment.

*Distribution*: India: Meghalaya (East Khasi Hills); West Bengal. Elsewhere: Borneo, Burma, Cambodia, China, Malaya, Sri Lanka, Thailand.

Genus 21. *Limnogonus* Stal 1868


Key to the species of the genus *Limnogonus*

1. Pronotum with mid-longitudinal carination moderately prominent; posterior tip of pronotum remarkably angular; anterior lobe of pronotum with a pair of linear, small yellowish patches; 4th antennal segment slightly smaller than the 1st segment; 7th abdominal segment provided with convexival spines ................................................. *Limnogonus nitidus*  

Pronotum with mid-longitudinal carination indistinct; posterior tip of pronotum more or less convexly rounded; anterior lobe of pronotum with a single roundish yellow patch; 4th antennal segment nearly half in length than the 1st segment; 7th abdominal segment not provided with convexival spines ............................................. *Limnogonus parvulus*

30. *Limnogonus nitidus* (Mayr)*


Diagnosis: Body length of adult insects from 6.0-8.0 mm; antennae with 2nd and 3rd segments shortest and nearly subequal in length. Other diagnostic characters as in key.

Distribution: India: Meghalaya (East Khasi Hills); West Bengal; Assam; Bihar; Kerala; Orissa; U.P. Elsewhere: Bangladesh, Burma, Java, Malaya, Sri Lanka, Sumatra.

31. *Limnogonus parvulus* (Stal)


Diagnosis: Body length of adult insects may be 6.0-6.5 mm; antennal 1st segment longest and as long as or little longer than the 2nd and 3rd segments together. Other diagnostic characters as is key.

Distribution: India: Meghalaya (East Khasi Hills); West Bengal; Assam; Bihar; Kerala; Orissa; U.P. Elsewhere: Bangladesh, Burma, China, Java, Malay Peninsula, Pakistan, Singapore, Sri Lanka.

Family IX. VELIIDAE

Key to the genera of the family Veliidae

1. Body elongate; eyes relatively large; antennae long with 3rd and 4th segments moderately slender; middle tarsus three segmented with terminal segment deeply clefted containing a series of long plumose hairs and leaf like claws.................................................. *Rhagovelia*

   Body short and subovate; eyes small; antennae moderately short and stout; middle tarsus either two or three segmented but terminal segment not clefted and armed with paired normal claws .................................................................

2. Middle tarsus two segmented; pronotum subanguarly posteriorly produced; hemelytra not divided into distinct corium and membrane........................................... *Microvelia*

   Middle tarsus three segmented; pronotum convexly posteriorly produced; hemelytra divided by a straight vein to corium and membrane ........................................... *Perittopus*

Genus 22. *Rhagovelia* Mayr 1865

32. *Rhagovelia nigricans* (Burmeister)

Diagnosis: Body length of adult insects may be 3.0-4.0 mm; body colour piceous black; anterior margin of pronotum yellowish red with a narrow median interruption; antennae, legs and margins of pronotum longly pilose; antennae with 1st segment longest and outwardly curved, 2nd and 4th segments subqual and each slightly shorter than the 3rd segment.

Distribution: India: Meghalaya (West Garo Hills); Bihar; Himachal Pradesh; Maharashtra; Punjab; Tamil Nadu; U.P. Elsewhere: Egypt, Jordan, Palestine, Seychelles, Sri Lanka, Syria.

Genus 23. Microvelia Westwood 1834


Key to the species of the genus Microvelia

1. Antennae with 2nd segment shortest while remaining segments subequal in length; pronotum with a reddish yellow anterior margin interrupted medially by a black mid-longitudinal streak extending posteriorly; no black spot at the basal angle of pronotum

...............................................................lineatipes

Antennae with 2nd segment shortest while 4th longest, 1st and 3rd segments subequal in length; pronotum with anterior margin yellowish and a transverse dark patch produced narrowly and medially backward; two jet black spots at the basal angle of pronotum

...............................................................atromaculata

33. Microvelia lineatipes Paiva


Material examined: 3 exs. (Types, Reg. No. 8377/H1, NZC); Damalgiri, West Garo Hills Dist., IX. 1917., S. Kemp coll.

Diagnosis: Adults may attain a length from 2.3 to 2.5 mm; head with a mid-longitudinal fine sulcation extending from near base to the apex. Other diagnostic characters as in key.

Distribution: India: Meghalaya (West Garo Hills).

34. Microvelia atromaculata Paiva


Material examined: 3 exs. (Types, Reg. No. 8578/H1, NZC); Damalgiri, West Garo Hills Dist., IX. 1917, S. Kemp coll.
**Diagnosis**: Adults may attain a length about 1.75 mm; apex of head, anterior margin of pronotum and posterior portion of lateral angles of pronotum reddish yellow. Other diagnostic characters as in key.

**Distribution**: India: Meghalaya (West Garo Hills).

Genus 24. *Perittopus* Fieber 1861


35. *Perittopus maculatus* Paiva


**Material examined**: 4 exs. (Types, Reg. No. 8379/H1, NZC); Above Tura, West Garo Hills Dist., 15.VII-30.VIII. 1917, S. Kemp coll.; 9 exs., Tura, 1200-1500 ft., West Garo Hills Dist., October, 1917, Mrs. Kemp coll.

**Diagnosis**: Adults bright reddish yellow in colour and may attain a length about 2.0 mm; head globosely arched, a short longitudinal sulcation between the eyes; antennae with 1st joint stout, curved outwardly and longest, 2nd and 4th joints subequal and slightly longer than the 3rd joint; a large black patch on each antero-lateral margin of pronotum.

**Distribution**: India: Meghalaya (West Garo Hills).
MAP-1: SHOWING DISTRIBUTION OF WATER-BUGS (ORDER-HEMIPTERA)

1. Ochterus marginatus (Latreille)
2. Nerthra indica (Atkinson)
3. Nerthus spissa (Distant)
4. Micronecta (Dichaetoneceta) hallplodes Horvath
5. Corixa (Vermicorixa) kempi Hutchinson
6. Corixa (Vermicorixa) obscura (Distant)
7. Laccotrephes robustus Stal
8. Laccotrephes ruber (Linnaeus)
9. Ranatra gracilis Dallas
10. Ranatra sordida Dohner
11. Ranatra varipes Stal
12. Laccotrephes robustus Stal
13. Laccotrephes ruber (Linnaeus)
MAP-II: SHOWING DISTRIBUTION OF WATER-BUGS (ORDER-HEMIPTERA)

14. Laccotrephes griseus (Guerin)
15. Anlaops sardena Herrick-Shaffer
16. Swithares fusca Brooks
17. Spheroerema annulatum (Fabricius)
18. Lethocerus indicus (Lepeletier & Serville)
19. Cheirochela assamensis Hope
20. Heleocorba oblata (Spinola)
21. Psilomaera leptocaudata (Hardwicke)
22. Metrocoris tamuicorns Esaki
23. Metrocoris semoratus (Paiva)
MAP-III: SHOWING DISTRIBUTION OF WATER-BUGS (ORDER-HEMIPTERA)

25. Metrocoris nigrofasciatus Distant
27. Orycholcephas salutator (Kirkaldy)
28. Chimarrhometra orientalis (Distant)
29. Gerris adelaidia Dohrn
30. Limnogonus nitidus (Mayr)
31. Limnogorus parvulus (Stal)
32. Rhogovella nigricans (Burmeister)
33. Microvelia lineatipes Paiva
34. Microvelia atromaculata Paiva
35. Peritopus maculatus Paiva
SUMMARY

The present work consists of water-bugs belonging to nine families of the Order-Hemiptera from Meghalaya. They are Ochteridae, Gelastocoridae, Corixidae, Nepidae, Notonectidae, Belostomatidae, Neucoridae, Gerridae and Veliidae. A total number of 35 species under 24 genera belonging to the above mentioned nine families have been included in the study, out of which 17 species with asteric marks in the text, are being recorded for the first time from the State of Meghalaya. Necessary taxonomic keys for families, subfamilies, genera and species of water-bugs have been constructed in the present work. Distribution of each species is also shown in the present paper in the map.

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INSECTA : HEMIPTERA : HOMOPTERA : CERCPOIDEA

B. BISWAS, M. GHOSH AND L. K. GHOSH

Zoological Survey of India,
Calcutta-700 053

INTRODUCTION

The Cercopids or the frog hoppers or Cuckoospits are one of the economically important insects belonging to Auchenorhynchous Homoptera.

The group is characterised chiefly by ocelli two on vertex; hind tibiae with stout teeth and with short spines at the tip. The nymphs live on grasses of spittle-like froth on the aerial shoots of plants or underground at the roofs of plants in cavities filled with froth. Postclypeus greatly expanded, hind coxae mobile, short, conical, tegmina opaque.

The group is represented by about 2368 species belonging to 326 genera in the world (Animal Resources of India, State of the Art, 1991). In India, nearly 190 species belonging to 37 genera are known through the works of Gardiner, 1974; Atkinson, 1885; Distant, 1908; Lallemand, 1949, Metcalf, 1960, 1962; Datta and Ghosh, 1962, 1972, and Biswas, Ghosh and Basu (in press).

Our knowledge on Cercopid fauna from Meghalaya is scanty. The present work is an attempt to provide a comprehensive account of 29 species belonging to 15 genera from the state. Of these, 10 species (marked *) in 5 genera constitute new record from Meghalaya State. The account deals with general diagnosis of each species, keys to various taxa for easy recognition of the species, geographical distribution of each species and literature reference. Distribution maps of the species are also provided.

The work is based on the recent collections made by different party members and also the old collections represented in Zoological Survey of India.

The classification has been mainly adopted after Distant (1908) and Lallemand (1949).

MATERIAL AND METHOD

Cercopids, like most other hemipteran insects, are phytophagous in habit and feed on agricultural crops, vegetables etc. They are usually collected by sweeping with the help of insect net or by light trap at night.

The collected materials are killed in a killing jar using benzene or chloroform vapour and preserved dry with paradichlorobenzene and nephthelene. The specimens are kept in the insect envelope and labelled properly mentioning locality, altitude, date of collection and name of collector with ecological notes etc. In laboratory, the specimens are set, pinned and mounted to display properly for easy handling under the binocular microscope during the process of identification.
SYSTEMATIC ACCOUNT

Superfamily  
CERCOPIDEA

Family  
CERCOPIDAE Westwood, 1838

Subfamily  
Callitettnae Metcalf, 1939

Genus I  

callitetix Stal
1. Callitetix versicolor (Fabricius)

Genus II  
Abidama Distant
2. Abidama producta (Walker)

Genus III  
Caloscarta Breddin
3. Caloscarta (=Phymatostetha) signifera (Walker)

Subfamily  
Cercopinae Oshanin, 1916

Genus IV  
Eoscarta Breddin
4. Eoscarta borealis Distant
5. E. semirossea Walker

Genus V  
Phymatostetha Stal
6. Phymatostetha stalli Butler

Genus VI  
Cosmoscarta Stal
7. Cosmoscarta dimidiata var affinis (Atkinson)
8. C. dimidiata var. tripunctata (Atkinson)
9. C. dorsimaculata (Walker)
10. C. egens (Walker)
11. C. fuscipennis (St. Farg & Serv.)
12. C. metallica Distant
13. C nigrofasciata Atkinson
14. C. septapunctata (Walker)
15. C. trigona (Walker)

Genus VII  
Leptataspis Schmidt
16. Leptataspis fulviceps (Dallas)
17. L. specialis Lallemand

Genus VIII  
Simeliria Schmidt
18. Simeliria funeralis (Butler)

Subfamily  
Aphrophorinae Licent, 1912

Genus IX  
Poophilus Stal
19. Poophilus costalis (Walker)
Genus X  Clovia Stal
* 20. Clovia bipunctata Kirby
* 21. C. conifera (Walker)
* 22. C. lineaticollis (Motsch)
* 23. C. puncta (Walker)

Genus XI  Ptyelus St. Farg & Serv.
24. Ptyelus nebulosus (Fabr.)

Genus XII  Peucepyelus Sahlberg
* 25. Peucepyelus sigillifer (Walker)

Genus XIII  Jembrana Distant
* 26. Jembrana costalis Distant

Genus XIV  Philagra Stal
27. Philagra fusiformis (Walker)

* New record from Meghalaya

Family  CERCOPIDAE
Subfamily  CALLITETTIXNAE

Key to the genera of the subfamily Callitettixnae

1(2) Anterior femora distinctly longer than the intermediate femora................................. 3
2(1) anterior femora not or only slightly longer than the intermediate femora.............. Caloscarta

3(4) Head not elongately produced in front of eyes, face less than twice as long as broad; tegmina moderately ampliated towards apices.................................................. Callitettix

4(3) Head in male longly acutely produced in front of eyes........................................ Abidama

Genus I  Callitettix Stal, 1865


1. Callitettix varsicolor (Fabricius)


Diagnostic characters : Body shining black; tegmina with two white spots, one before the middle of the small clavus and other subtransverse spot between the middle of upper claval margin and the costal margin; two sanguineous spots beyond the middle of the tegmen, the external one large and transverse, the internal small.
**Length**: Excluding tegmina 9 mm; Expanse tegmina 20 to 22 mm.

**Distribution**: India: Meghalaya (East Garo hills, Jaintia hills), Assam, Bihar, Jammu & Kashmir, Maharashtra, Tamil Nadu, Uttar Pradesh, Sikkim. Elsewhere: Burma; China; Malay Peninsula; Siam.

Genus II **Abidama** Distant, 1908


2. **Abidama producta** (Walker)


*Diagnostic characters*: Head, pronotum, body beneath black, apex of scutellum and tegmina rufotestaceous, the apical margin of later broadly black, metasternum and legs dark sanguineous; face laterally longitudinally striate.

*Length*: Including tegmina, ♂ & ♀, 7 to 9 mm.

*Distribution*: India: Meghalaya (East Khasi hills, West Garo hills, Ribhoi), Assam, Bengal, Bihar, Uttar Pradesh. Elsewhere: Burma.

Genus III **Caloscara** Bredd, 1903


3. **Caloscara** (=*Phymatostetha*) *signifera* (Walker)


*Diagnostic characters*: Base of head and two broad angulated fasciae to finely wrinkled pronotum, black; tegmina with basal half stramineous containing three fuscous spots and a much waved and broken testaceous fascia, apical margin dark ochraceous; abdomen above violaceous black and lateral marginal spots ochraceous; tegmina nearly three times as long as broad.

*Length*: Excluding tegmina 14 to 15 mm; Expanse tegmina 38 to 40 mm.

*Distribution*: India: Meghalaya (East Khasi hills), Assam, Nagaland, West Bengal.

Subfamily Cercopinae

Key to the genus of the subfamily Cercopinae

1(2) Face with a longitudinal furrow, pronotum not laterally dialated..................*Eoscarta*

2(1) Face without a furrow ......................................................................................... 3
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3(4) Anterior margin of pronotum foliaceous, without protruberances ..................................Leptataspis
4(3) Anterior margin of pronotum not foliaceous ..............................................................................5
5(6) Mesosternum posteriorly with two conical tubercles ............................................................7
6(5) Tubercles of the mesosternum not conical; anterior margin of mesosternum prominent...........
..........................................................................................................................Simeliria
7(8) Pronotum with the posterior lateral margins straight and sinuate its greatest width a little more than half of its length ..........................................................................................................................Phymatostetha
8(7) Pronotum with the posterior lateral margins not sinuate, its greatest width about two-thirds of its length ..........................................................................................................................Cosmoscarta

Genus IV Eoscarta Bredd, 1902


Key to the species of the genus Eoscarta

1(2) Legs ochraceous, strongly pilose; tegmina pale, semihyaline, apical area of the tegmina rosaceous with a few small fuscous spots in the cellular area..................................semirosae
2(1) Legs pale luteous, tegmina roseate, shortly and finely greyishly pilose..................borealis

4. Eoscarta borealis (Distant)


Diagnostic characters: Head and pronotum pale luteous, eyes luteous more or less suffused with black, antennae and ocelli black, abdomen beneath and tegmina roseate, face compressed, before middle broadly longitudinally sulcate, finely transversely striate on the flattened lateral areas.

Length : Excluding tegmen 6 mm; Expanse tegmina 16 to 17 mm.

Distribution : India : Meghalaya (East Khasi hills, Jaintia hills); Assam, Tamil Nadu. Elsewhere : Burma; China; Philippines; Siam; Malay Peninsula.

5. Eoscarta semirosea (Walker)

Material examined: 1 ex., West Garo hills, above tura, Date - ?, coll. ?

Diagnostic characters: Body, legs, tegmina with base, claval area and sometimes costal area ochraceous, apical area of tegmina rosaceous with a few small fuscous spots in the cellular areas; face transversely striate on its compressed sides and finely pilose above; legs strongly pilose; tarsal claws black.

Length: Excluding tegmina 7; expanse tegmina 18 mm.

Distribution: India: Meghalaya (West Garo hills); Assam. Elsewhere: Borneo; Java; Malay Peninsula.

Remarks: The species is so far known from eastern Himalayas in India.

Genus V  Phymatostetha  Stal, 1870


6. Phymatostetha stalii  Butler

1953. Phymatostetha stalii : Mathur, Indian Forest leaflet (Ent.) 12 (3) : 151.

Material examined: 2 exs., East Khasi hills, Cherrapunji, 2-8.x.1914, S. W. Kemp coll.

Diagnostic characters: Scutellum, lateral margins and anterior area of pronotum, vertex of head before eyes and legs ochraceous; tegmina piceous, a basal costal claval streak, two transverse fasciae, the first before middle the second before apical area, the apical margin pale testaceous; scutellum foveate at base; posterior tibiae with a moderately strong spine near base and a very strong spine a little beyond middle; tegmina about two and half times as long as broad.

Length: Excluding tegmina 14 to 15; Expanse tegmina 29 to 37 mm.


Genus VI  Cosmoscarta  Stal, 1869


Key to the species of the genus Cosmoscarta

1(2) Tegmina with transverse pale fasciae .......................................................................................... 7
2(1) Tegmina not transversely fasciated, apical area ochraceous, basal area spotted .................. 3
3(4) Tegmina testaceous red ............................................................................................................ 5
4(3) Tegmina black or piceous; greater part of costal area luteous ........................................ fuscipennis
5(6) Pronotum usually with four spots, the smaller near anterior margin the larger discal; tegmina about twice as broad as long .......................................................... dorsimaculata
6(5) Pronotum with sometimes two small black spots near anterior margin, tegmina about two and a half times as long as broad ......................................................... septapunctata
7(8) Pronotum black, bluish black or castaneous ........................................................................... 9
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8(7) Pronotum red or luteous................................................................. nigrofasciata

9(10) Pronotum with a pale transverse fascia and with pale discal spots................................. 11

10(9) Pronotum unicolorus...............................................................................................................

11(12) Tegmina with the basal pale area and the first transverse pale fascia obliterated, and the second fascia broken into three spots ............................................. dimidiata var. tripunctata

12(11) Tegmina with Rufous testaceous bands at the base and in the middle reduced to narrow lines, and the apical band to three somewhat distant spots arranged in a triangle ................................................................. dimidiata var. affinis

13(14) Body dark indigo-blue, rostrum reaching the intermediate coxae; mesosternum with two moderate-sized tubercles; apex, lateral margin or abdomen, coxae and femora coral red ................................................................. metallica

14(13) Body black; rostrum not quite reaching the intermediate coxae........................................ 15

15(16) Tegmina piceous, about two and a half times as long as broad; crossed by two testaceous or sanguineous transverse fasciae, first near middle and second before apical area connected with base at claval and costal area; mesosternum with two broad compressed tubercles ................................................................. trigona

16(15) Tegmina black, not quite two and half times as long as broad with a basal slender longitudinal streak and a broader curved fascia at base of clavus, and a transverse fascia before apical area; mesosternum with two short acutely pointed tubercles .......................... egens

7. Cosmoscarta dimidiata var. affinis (Atkinson)


Diagnostic characters : Tegmina black with rufous testaceous bands at the base and in the apical band to three somewhat distant spots arranged in a triangle.

Length : Excluding tegmina 11 to 13 mm; Expanse tegmina 29 to 31 mm.

Distribution : India : Meghalaya (East Khasi hills), Assam. Elsewhere : China; Java; Siam; Singapore; Sumatra; West Indies.

8. Cosmoscarta dimidiata var. tripunctata Atkinson


1956. Cosmoscarta undata var. tripunctata : Wu, Catalogue insectorium sineusium, 2 : 46.


*Diagnostic characters:* Tegmina with the basal pale arch and the first transverse pale fascia obliterated and the second fascia broken into three spots.

*Length:* Excluding tegmina 11 to 13 mm; Expansion of tegmina 29 to 31 mm.

*Distribution:* India: Meghalaya (East Khasi hills, West Garo hills, Jaintia hills), Assam, Nagaland, Sikkim. Elsewhere: Bhutan; China; Malay Peninsula; Siam; Singapore; Sumatra.

9. *Cosmoscarta dorsimacula* (Walker)*


*Diagnostic characters:* Tegmina, body, legs testaceous red, four spots to pronotum, the smaller two near anterior and the larger two discal; tegmina with seven large spots, six in two irregular transverse series, the seventh subapical and subcostal; mesosternal tubercles transverse; compressed, a double longitudinal series of black spots on each side of abdomen beneath.

*Length:* Excluding tegmina 13 to 15 mm; Expansion tegmina 36 to 38 mm.

*Distribution:* India: Meghalaya (Ri-Bhoi, West Garo hills), Assam, Himachal Pradesh, Nagaland, Sikkim, Uttar Pradesh, West Bengal. Elsewhere: Borneo; China; Java; Japan; Malacca; Malay Peninsula; Tibet.

10. *Cosmoscarta egens* (Walker)


*Material examined:* 1 ex., East Garo hills, Rongrengiri, 29.v.1990, M.S. Shishodia and party coll.; 2 exs., West Garo hills, above Tura, Date? coll.?

*Diagnostic characters:* Tegmina, body black; legs, scutellum, abdominal segmental, and lateral margins testaceous of sanguineous; tegmina with a short slender basal longitudinal streak, a broader curved fascia at base of clavus, and transverse fascia before are testaceous or sanguineous; rostrum not reaching the intermediate coxae.

*Length:* Excluding tegmina 5 to 8 mm, Expansion tegmina : 27 to 33 mm.
Distribution: India: Meghalaya (East Garo hills, West Garo hills), Assam, Nagaland, Sikkim, West Bengal. Elsewhere: Burma; China.

11. *Cosmoscarta fuscipennis* (St. Farg. & Serv.)*


*Material examined*: 1 ex., West Garo hills, above tura, 15.vii - 30.viii.1917, S. Kemp coll.

*Diagnostic characters*: Legs, lateral margins of pronotum, head luteous; scutellum and abdomen above purplish black; body beneath and posterior femora piceous; tegmina black, basal two third of costal area luteous; rostrum reaching the intermediate coxae; posterior tibiae with a long spine beyond middle; tegmina less than two and a half times as long as broad.

*Length*: Excluding tegmen 12 to 14; Expansion tegmina: 31 to 40 mm.


12. *Cosmoscarta metallica* Distant


*Diagnostic characters*: Body indigo-blue; coxae, femora, apex and the lateral margins of abdomen coral red; tegmina black, with two irregularly shaped and angulate sanguineous transverse fasciae, the first at about one third from base, the other before apical area, connected with base by a sanguineous longitudinal fascia, mesosternum with two moderate-sized tubercles; rostrum reaching the intermediate coxae; posterior tibiae with a single moderate-sized spine beyond middle.

*Length*: Excluding tegmina 11 mm; Expansion tegmina: 26 mm.


13. *Cosmoscarta nigrofasciata* Atkinson*


*Diagnostic characters*: Body orange-yellow; two black bands one before the other on the middle of each tegmen; feet yellow ochraceous; mesosternal tubercules broad, compressed but prominently raised; apex of the tegmina blackish and finely reticulated.

*Length*: 15 mm. Expansion tegmina 39 mm.

Distribution: India: Meghalaya (East Garo hills), Sikkim.
14. *Cosmoscarta septapunctata* (Walker)


*Diagnostic characters*: Body, tegmina, legs, testaceous red, pronotum thickly finely punctate, sometimes with two small black spots on its anterior margin; mesosternal tubercles broad, a double series of broad, compressed, spot on each side of abdomen; tegmina with six spots arranged in two irregular transverse series and sometimes with a seventh subapical and subcostal black spots.

*Length*: Excluding tegmina 10 to 11 mm, Expansion tegmina: 23 to 31 mm.

*Distribution*: India: Meghalaya (Jaintia hill, West Garo hills), West Bengal. Elsewhere: Burma; Java; Siam.

15. *Cosmoscarta trigona* (Walker)


*Diagnostic characters*: Tegmina piceous, crossed by two testaceous or sanguineous transverse fasciae the first near middle, the second just before apical area, the first connected and nearly connected with base along claval area and also along the costal area by the same colour; abdomen beneath and above black; posterior tibiae with a single short spine beyond middle.

*Length*: Excluding tegmina 9 mm; Expansion tegmina 25 mm.

*Distribution*: India: Meghalaya (East Khasi hills); Assam, Sikkim, Tamil Nadu, West Bengal. Elsewhere: China; Hong Kong; Tibet.

Genus VII *Leptataspis* Schmidt, 1910


*Key to the species of the Genus Leptataspis*

1(2) Mesosternal tubercles compressed, moderately angularly prominent, pronotum luteous; scutellum piceous wings fuliginous, tegmina black with a sanguineous basal streak to clavus ................................................................. *fulviceps*

2(1) Mesosternal tubercles absent, pronotum, scutellum yellowish ochraceous, wings blackish with the base yellowish Ochraceous, tegmina with one black band another ochraceous yellow band ................................................................. *specialis*
16. *Leptataspis fulviceps* (Dallas)*


*Material examined* : 1 ex., West Garo hills, Rongram, 8.i.1978, K. P. Singh coll.; 2 exs., Ri-Bhoi, Nongpoh, 30.i.x.1988, A. R. Lahiri and Party coll; 2 exs., West Garo hills, Tura, 15.vi.-15.vii.17, coll ?

*Diagnostic characters* : Head, pronotum luteous; abdomen above and beneath bluish black; tegmina black, with a short sanguineous basal streak to clavus.

*Length* : Excluding tegmina 14 to 16 mm; Expansion tegmina : 38 to 40 mm.

*Distribution* : India : Meghalaya (Khasi hills, Garo hills), Assam, Sikkim, West Bengal. Elsewhere : Bhamo; Bhutan; Burma; Hong Kong; Malaya Peninsula; Siam.

17. *Leptataspis specialis* Lallemand


*Material examined* : 1 ex., West Garo hills, above Tura (3500-3900 ft.), 15.vii, 30.viii.1917, S. Kemp coll.

*Diagnostic characters* : Pronotum, scutellum, base of tegmina, legs ochraceous yellow, tegmina with one wide black band and a narrow ochraceous yellow band broadening towards the external broader and lastly reticulate at the apical portion with clear brown colour; pronotum without longitudinal carinae, mesosternum without protuberances.

*Length* : Length of tegmina 10 mm, width, 3.5 mm.

*Distribution* : India : Meghalaya (West Garo hills), Sikkim.

Genus VIII *Simeliria* Schmidt, 1909


18. *Simeliria funeralis* (Butler)


*Material examined* : 1 ex., West Garo hills, Tura, 15.vi. 15.vii.17, coll ?

*Diagnostic characters* : Pronotum with a faint longitudinal carination on anterior half, transversely foveate on each side before anterior margin; abdominal segments transversely banded and laterally spotted with black; tegmina uniformly black or piceous.

*Length* : Excluding tegmina 12 to 15; expansion tegmina 33 to 43 mm.

*Distribution* : India : Meghalaya (West Garo hills); Assam, Sikkim, West Bengal. Elsewhere : Burma; Malaya; Malacca.

Subfamily Aphrophorinae

Key to the genera of the subfamily Aphrophorinae

1(2) Vertex of head broader than long, convexly rounded anteriorly ........................................ 3
2(1) Vertex of head as long as or longer than broad strongly prolonged in front of eyes, head centrally and laterally carinate; ocelli a little nearer to eyes than to each other, face centrally carinate. \textit{Philagra}

3(4) Head and pronotum not centrally longitudinally carinate. \textit{5}

4(3) Head and pronotum distinctly centrally longitudinally carinate. \textit{9}

5(6) Face more or less convexly produced. \textit{7}

6(5) Face more or less flattened, not convexly produced. \textit{Clovia}

7(8) Clypeus slightly passing the apices of the anterior coxae. \textit{Poophilus}

8(7) Clypeus reaching but not extending beyond the apices of the anterior coxae. \textit{Ptyelus}

9(10) Pronotum with a single central carination. \textit{Peuceptyelus}

10(9) Pronotum tricarinate. \textit{Jembrana}  

Genus IX \textit{Poophilus} stal, 1866


19. \textit{Poophilus costalis} (Walker)


\textit{Diagnostic characters} : Tegmina with apical area and costal margin paler; central apical margin to vertex with five very small black spots; apices of the femora pale, disk of sternum and the anterior and intermediate legs fuscous or piceous.

\textit{Length} : 9 to 10 mm.

\textit{Distribution} : India : Meghalaya (East Khasi hills, East Garo hills, Jaintia hills), Bihar, Gujarat, Karnataka, Maharashtra, West Bengal. Elsewhere : Bangladesh; Pakistan; Singapore; Sri Lanka and South-West Africa.

Genus X \textit{Clovia} Stal, 1866


\textit{Key to the species of the Genus Clovia}

1(2) Head about as long as the medical length of the pronotum. \textit{3}

2(1) Head a little shorter than the medial length of pronotum; with some very indistinct darker longitudinal lines. \textit{puncta}
3(4) Longitudinal ochraceous fasciae between the eyes and an outer one on each side interrupted by the eyes and continued through pronotum, scutellum and basal area of tegmina ..............

................................................................................................................................. lineaticollis

4(3) Longitudinal ochraceous fasciae on head, pronotum and scutellum absent......................... 5

5(6) Tegmina with a large median and larger apical, costal, hyaline or subhyaline spot.... conifera

6(5) Tegmina with apical area subhyaline and crossed by two irregularly bent oblique tawny fasciae, a black spot at posterior angle of inner margin ................................................. bipunctata

20. Clovia bipunctata Kirby*


Material examined : 1 ex., Jaintia hills, Garampani, Luchook, 2.x.1988, V.D. Srivastava, coll.

Diagnostic character : The apical area of tegmina subhyaline and crossed by two oblique tawny fasciae, a black spot at posterior angle of inner margin of tegmina, head as long as the medial length of pronotum.

Length : 6 to 8 mm.

Distribution : India : Meghalaya (Jaintia hills); Bihar, Pondicherry, West Bengal. Elsewhere : Java; Japan; Sri Lanka.

21. Clovia conifera (Walker)*


Diagnostic characters : Tegmina with a large median and larger apical, costal, hyaline or subhyaline spot; head almost as long as centre of pronotum and subtriangularly rounded between the eyes; lateral area of sternum castaneous with a longitudinal ochraceous fascia.

Length : 6 to 8 mm.

Distribution : India : Meghalaya (East Khasi hills), Assam, Sikkim, Tamil Nadu. Elsewhere : Bangladesh; Burma; Java; Malay Peninsula; Philippines.

22. Clovia lineaticollis (Motsch)*


Diagnostic characters: Longitudinal ochraceous fasciae continued posteriorly through the pronotum, scutellum, and basal area of tegmina; tegmina with a large costal spot before middle and two longitudinal ochraceous fasciae on apical area, a large oblique subapical spot join the inner apical fascia with costal margin; a large spot occupying central base of face and disk of prosternum.

Length: 10 mm.

Distribution: India: Meghalaya (Jaintia hills), Karnataka, Tamil Nadu.

23. Clovia puncta (Walk) *


Diagnostic characters: Pale tawny brown tegmina with a small black spot at posterior angle of inner margin, head a little shorter than the medial length of pronotum, anterior central area with three pale longitudinal lines, a piceous spot behind each anterior coxae.

Length: 6 mm.

Distribution: India: Meghalaya (Jaintia hills), Bihar, Gujarat, Maharashtra, Sikkim.

Genus XI Ptyelus St. Farg. & Serv.


24. Ptyelus nebulosa (Fabr.)


Diagnostic characters: Body pale yellowish grey, two small black spots on anterior margin of head, tegmina with a very oblique anterior fascia, a somewhat large spot at the commissure, an obliquely transverse spot beyond the middle of the costal margin and a minute costal spot towards the apex.

Length: 9 to 10 mm.

Distribution: Meghalaya (East Garo hills); Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, West Bengal; Bangladesh; Java; Sri Lanka.

Genus XII Peuceptyelus Sahlberg, 1871

25. *Peucepyelus sigillifer* (Walker)*


*Diagnostic characters*: Testaceous but covered with brown pits; head brown with a central carina, some pale smooth spaces surrounded by brown infront of the pronotum and an indistinct pale spot surrounded by darker in the middle of the costa of tegmina; legs brown indistinctly banded with paler striations.

*Length*: 7 to 7.5 mm.

*Distribution*: Meghalaya (East Khasi hills, West Khasi hills), Karnataka, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh; Burma; Borneo; China; Philippine island; Sumatra.

Genus XIII *Orolditals* Distant, 1908


26. *Jembrana costalis* Distant*


*Material examined*: 1 ex., West Garo hills, above Tura, 15.vi.30. viii.1917, S. Kemp coll.; 1 ex., Jaintia hills, Jowai, date ?, coll. ?

*Diagnostic characters*: Tegmina with extreme costal margin from base to about middle narrowly pale ochraceous, spotted with black and the costal area beyond base pale dull ochraceous; scutellum blackish; legs with pale annulation.

*Length*: 7.5-8 mm.

*Distribution*: India: Meghalaya (West Garo hills, Jaintia hills); Kerala, Tamil Nadu, West Bengal. Elsewhere: Burma; Napal; Sri Lanka.

Genus XIV *Philagra* Stal


27. *Philagra fusiformis* (Walker)


*Diagnostic character*: Head above strongly tricarinate, about half as long as pronotum, its apex slightly upwardly recurved; body and legs ochraceous, tegmina ochraceous with pale irregular scattered fuscous markings.

*Length*: Excluding tegmina 10 to 14 mm. Expansion tegmina 18 to 27 mm.

*Distribution*: India: Meghalaya (Jaintia hills); Assam, Sikkim. Elsewhere: Burma; North China.
A list of Cercopid species so far recorded from the state of Meghalaya.

1) Abidama producta (Walker)
2) Callitettix versicolor (Fabricius)
3) Clovia bipunctata Kirby
4) C. conifera (Walker)
5) C. lineaticollis (Motsch.)
6) C. puncta Walker
7) Caloscarta (Phymatostetha) signifera (Walker)
8) Cosmoscarta dimidiata var. affinis (Atkinson)
9) C. dimidiata var. tripunctata (Atkinson)
10) C. dorsimaculata (Walker)
11) C. egens (Walker)
12) C. fuscipennis (St. Farg & Serv.)
13) C. metallica Distant
14) C. nigrofasciata Atkinson
15) C. septapunctata (Walker)
16) C. shillongana Distant
17) C. trigona (Walker)
18) Eosciarta borealis Distant
19) E. semirosa Walker
20) Jembrana costalis Distant
21) Leptataspis fulviceps (Dallas)
22) L. specialis Lall.
23) Peuceptylus sigillifer (Walker)
24) Philagra fusiformis (Walker)
25) Phymatostetha stalli Butler
26) Poophilus costalis (Walker)
27) Ptyelus nebulosa (Fabricius)
28) Simeliria funeralis (Butler)

* New record from Meghalaya, ** Not examined.
1. Callitetis versicolor (Fabricius)
2. Abidame producta (Walker)
3. Caloscars (=Phymatostetha) signifera (Walker)
4. Eoscarta barea (Distant)
5. Eoscarta semirosea Walker
6. Phymatostetha stalli Butler
7. Cosmocarta dimidiate var. affinis (Atkinson)
8. Cosmoscarta dimidiata var. tripunctata (Atkinson)
9. Cosmoscarta dorsimaculata (Walker)
10. Cosmoscarta egena (Walker)
11. Cosmoscarta fuscipennis (St. Farg. & Serv.)
12. Cosmoscarta metallica Distant
13. Cosmoscarta nigrofasciata Atkinson
14. Cosmoscarta septapunctata (Walker)
MAP-3: DISTRIBUTION OF CERCOPID SPECIES (NO: 15-20): HEMIPTERA

15. Cosmoscarta trigona (Walker)
16. Leptataspis fulvicornis (Dallas)
17. Leptataspis species Lallemand
18. Simeliria funerals (Butler)
19. Poophilus costalis (Walker)
20. Clovia bipunctata Kirby
MAP-4: DISTRIBUTION OF CERCOPID SPECIES (NO:21-27): HEMIPTERA

21. Clovia connegra (Walker)
22. Clovia lineaticollis (Motsch)
23. Clovia puncta (Walker)
24. Ptyelus nebulosus Distant
25. Peuceptylus sgiillifer (Walker)
26. Jembrana costalis Distant
27. Philagri fusiformis (Walker)
Table 1. Distribution of Cercopid species in different districts of Meghalaya

<table>
<thead>
<tr>
<th>Name of the species</th>
<th>EAST GARO HILLS</th>
<th>WEST GARO HILLS</th>
<th>SOUTH GARO HILLS</th>
<th>EAST KHASI HILLS</th>
<th>WEST KHASI HILLS</th>
<th>RI-BHOI</th>
<th>JAINIA HILLS</th>
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</thead>
<tbody>
<tr>
<td>1. Callitettix varsicolor (Fabr.)</td>
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<td>2. Abidama producta (Walk.)</td>
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<td>3. Caloscarta (Phymatostetha) signifera (Walk.)</td>
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<td>4. Eoscarta borealis (Distant)</td>
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<td>5. Eoscarta semirosea (Walker)</td>
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<td>6. Phymatostetha stalii Butler</td>
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<td>7. Cosmoscarta dimidiata var. affinis Atkinson</td>
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<td>8. Cosmoscarta dimidiata var. tripunctata Atkinson</td>
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<td>9. Cosmoscarta dorsimaculata (Walker)</td>
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<td>10. Cosmoscarta egens (Walker)</td>
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<td>11. Cosmoscarta fusciennis (St. Farg &amp; Serv.)</td>
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<td>12. Cosmoscarta metallic Distant</td>
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<td>13. Cosmoscarta nigrofasciata Atkinson</td>
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<td>14. Cosmoscarta septapunctata (Walker)</td>
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<td>15. Cosmoscarta trigona (Walker)</td>
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<td>16. Leptataspis fulviceps (Dallas)</td>
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<td>Name of the species</td>
<td>EAST GARO HILLS</td>
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<td>SOUTH GARO HILLS</td>
<td>EAST KHASI HILLS</td>
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<td>17. <em>Leptataspis specialis</em> Lammanand</td>
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<td>18. <em>Semiliria funeralis</em> (Butler)</td>
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<td>19. <em>Poophilus costalis</em> (Walker)</td>
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<td>20. <em>Clovia bipunctata</em> Kirby</td>
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<td>21. <em>Clovia conifera</em> (Walker)</td>
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<td>22. <em>Clovia lineaticollis</em> (Motsch)</td>
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<td>23. <em>Clovia puncta</em> (Walker)</td>
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<td>24. <em>Ptyelus nebulosa</em> (Fabricius)</td>
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<td>25. <em>Peuceptyelus sigillifer</em> (Walker)</td>
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<tr>
<td>26. <em>Jembrana costalis</em> Distant</td>
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<tr>
<td>27. <em>Philagra fusiformis</em> (Walker)</td>
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BISWAS et. al: Insecta: Homoptera: Cercopoidea

SUMMARY

The paper incorporates the account of 29 species of Cercopids belonging to 15 genera distributed over three subfamilies from the state of Meghalaya. Ten species (marked *) in five genera constitute new record from Meghalaya. Besides, necessary keys to various taxa, general diagnosis of each species, measurements, geographical distribution, reference to original literature have been provided. Distribution of each species is also shown in the maps.

ACKNOWLEDGEMENTS

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REFERENCE