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**RECORDS
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Vol. 87(1)

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Pages 1-94

C O N T E N T S

	PAGE
TILAK, R. & JUNEJA, D.P. —On a collection of fishes from Hindon River, District – Saharanpur, (Uttar Pradesh) ...	1
KULSHRESTHA, ANIL, K. & KULSHRESTHA, AJAY, K. —On a collection of Damselflies (Coenagrionidae : Odonata) from District Bharatpur (Rajasthan) ...	11
SRIVASTAVA, G.K. —Studies on Oriental Dermaptera Preserved in the California Academy of Science, Sanfrancisco, U.S.A. ...	15
TILAK, R. —Studies on the Fish fauna of Uttar Pradesh Tehri 2. On the extension of range of distribution of <i>Pangio pangia</i> (Hamilton) with Zoogeographical remarks ...	55
GHOSH, S.K. —A new genus and a new species of the family Hemerobidae (Neuroptera) from India ...	61
SHISHODIA, M.S. & MANDAL, S.K. —New records of Orthoptera (Insecta) from the Nagarjuna Sagar Tiger Reserve Forest, Andhra Pradesh, India ...	65
BAQRI, Q.H. & DEY, S. —Nematodes from West Bengal (India) XXIII. Qualitative and quantitative studies of plant and soil inhabiting nematodes associated with paddy crop in district Darjeeling ...	77
RAJPUT, K.B. & KULKARNI, S.M. —Records of culicinae mosquitoes from Bastar district (Madhya Pradesh) India (Diptera : Culicidae), Part I – Genus <i>Toxorhynchites</i> , <i>Tripteroides</i> , <i>Uranotaenia</i> and <i>Orthopodomyia</i> ...	83
BHOWMIK, H.K. —Indian species of genus <i>Leva</i> Bolivar, 1909, and subgenus <i>chorthippus</i> Jago, 1971, (Orthoptera : Acrididae : Gomphocerinae) ...	89

RECORDS OF THE ZOOLOGICAL SURVEY OF INDIA

Vol. 87(2)

1990

Pages 95-186

CONTENTS

	PAGE
TILAK, R.—Studies on the Fish fauna of Uttar Pradesh Terai 3. Notes on the distribution and ecology of <i>Balitora brucei</i> Gray (Homalopteridae) ...	95
SHISHODIA, M.S. & TANDON, S.K.—The Grylloidea (Orthoptera) of Tripura, India ...	99
ALFRED, J.R.B. & AGARWAL, N.—Aphid (<i>Micromyzus kalimpongensis</i>) – Ant (<i>Pheidole smyltriese</i>) interrelationship – A preliminary study ...	109
RAVICHANDRAN, M.S. & PILLAI, R.S.—On a collection of frogs and toads from Periyar Wildlife Sanctuary ...	121
KALIAMURTHY, M.— <i>Lepeoptheirus krishnai</i> , a new Piscicolous Copepod from the Pulicat Lake ...	127
TILAK, R.—On the fish fauna of Ladakh with notes on Zoogeography ...	131
NANDI, B.C.—Sarcophagid flies (Diptera : Sarcophagidae) from Tamil Nadu and Kerala, India ...	151
PATEL, B.H. & REDDY, T.S.—An addition to the Araneid Fauna (Araneae : Arachnida) of India ...	157
TIKADER, B.K. & SETHI, VEENA, D.—Studies of some Giant Crab spiders of the family Heteropodidae from India, Part II ...	165

RECORDS OF THE ZOOLOGICAL SURVEY OF INDIA

Vol. 87(3)

1990

Pages 187-261

CONTENTS

	PAGE
ADHIKARY, C.C. & GHOSH, A.K.—New record of <i>Ancistroplax crociduræ</i> Waterston (Anoplura : Hoplopleuridae) from India with redescription of the taxa ...	187
JAGO, N.D. & BHOWMIK, H.K.—A new species of Oedipodinae Grasshopper, <i>Sphingonotus orissaensis</i> , from Eastern India (Orthoptera : Acrididae) ...	193
RAJPUT, K.B. & SINGH, T.K.—Records of Anopheline mosquitoes collected from Manipur with ecological notes ...	197
DASGUPTA, M.—Biometry of the Mahseer <i>Tor tor</i> (Hamilton) ...	207
CHERIAN, P.T.—Impact of Idukki Hydro-Electric Project on the population of <i>Villorita cyprinoides</i> Var. <i>cochinensis</i> (Hanley) inhabiting the estuarine waters of Nuvattu-puzha river in Kerala ...	215
VARSHNEY, R.K.—Abnormal segmentation in the antenna of an apterous male Lac insect, <i>Kerria lacca</i> (Kerr.) (Homoptera : Tachardidae) ...	223
DATTA, S.C., GHOSH, S. & HALDAR, D.P.—Studies in Septate Gregarines (Apicomplexa : Sporozoa) from Orthopteran insect of West Bengal. Seven new species of <i>Didymophyes</i> , <i>Hirmocystis</i> and <i>Quadru-spinospora</i> ...	227
KRISHNAN, S. & RAMACHANDRAN, V.—Development of asymmetry and Handedness in the Fiddler Crab <i>Uca (Celuca) triangularis bengali</i> inhabiting the Adyar Estuary and backwater ...	249
GHOSH, S.K.—Description of an unknown female along with two new locality records of the family Myrmeleontidae (Neuroptera) from Lakshadweep Island, India ...	259

RECORDS OF THE ZOOLOGICAL SURVEY OF INDIA

Vol. 87(4)

1990

Pages 263-337

CONTENTS

	PAGE
SATI, J.P. & ALFRED, J.R.B.—On the Western limit of Pigtailed Macaque distribution in N.E. India ...	263
MISRA, A. & CHAKRABORTY, R.K.— <i>Terebellodibranchia agattiensis</i> , a new genus and species of Terebellidae (Polychaeta) from Lakshadweep, India ...	265
CHOUBISA, S.L.— <i>Cercaria gurayai</i> , a new species (Furcocercaria) from the freshwater snail, <i>Faunus ater</i> (Linnaeus) ...	267
TILAK, R., SINHA, N.K. & RAY, P.—On the new record of distribution and association of a north Indian Roofed Turtle, <i>Kachuga tecta</i> (Gray) (Reptilia : Testudines : Emydidae) and freshwater Leech, <i>Ozoleranchus shipleyi</i> Harding (Hirudinea : Ichtiyobdellidae) in Uttar Pradesh Terai...	273
YAZDANI, G.M. & PRAKASH, OM—The importance of Urohyal in Fish Systematics ...	277
TILAK, R.—Zoogeographical remarks on distribution of Fish in India, based on Fish fauna of Uttar Pradesh Terai ...	293
PRASAD, N.L.N.S.—Abundance and diversity of bird species in Idukki Hydroelectric Project Area, Kerala ...	299
MALHOTRA, SANDEEP, K. & CAPOOR, V.N.—Avian Cestodes in the Himalayan Ecosyokm 1. A new species of Cestode <i>Cotugnia chauhani</i> n.sp. (Cestoda : Davaineidea) from <i>Columba livia domestica</i> and <i>Columba livia intermedia</i> ...	317

SHORT COMMUNICATIONS	PAGE
DASGUPTA, J.M. & BASUROY, SIPRA—Extension of the range of <i>Pellorneum ruficeps olivaceum</i> Jerdon to Eastern Tamil Nadu ...	321
MUKHERJEE, RATHIN—New records of two Freshwater Ciliates (Protozoa) from India ...	323
KURUP, G.U.—Rediscovery of the small Travancore Flying Squirrel, <i>Petinomys fuscocapillus fuscocapillus</i> (Jerdon) from Kerala, India ...	325
MUKHERJEE, R.N.—On a new record of <i>Pseudochlamus patella</i> Claparede and Lachmann (Protozoa : Rhizopoda) from India ...	327
GHOSE, R.K.—Deterioration of habitat of the Moupin Pika, <i>Ochotona</i> <i>thibetana sikimaria</i> Thomas, in Sikkim, India ...	329
GHOSE, R.K. & SAHU, U.—Occurance of Rufoustailed Hare at Mahenjodaro ...	331
MUKHERJEE, A.K.—Languriid Beetle (Coleoptera) of Silent Valley, Kerala, India ...	333
SANYAL, A.K., DE, S.K. & BANERJEE, SOMNATH—Record of ticks (Acarina : Metastigmata) associated with reptiles in Zoological Garden, Calcutta ...	335
GHOSAL, D.K. & GHOSE, R.K.—Partial albinism in a specimen of the Crow-Pheasant <i>Centropus sinensis sinensis</i> (Stephens) ...	337

ON A COLLECTION OF FISHES FROM HINDON RIVER, DISTRICT SAHARANPUR (UTTAR PRADESH)

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INTRODUCTION

The fish fauna of district Saharanpur has been found to be taxonomically interesting by Tilak and Husain (1975, 1977, 1980, 1981) who described new taxa, discovered the distribution of eastern Indian forms in the streams of this area and confirmed the taxonomic validity of some specimens based on the collection from this district. The fish fauna of this district has earlier been studied by Day (1875-78), Falconer (1868), Myers (1960) etc. The above mentioned workers studied the fish fauna of this district with great enthusiasm because of the interesting topographical features of the region comprising montane, submontane and plain areas which depict ecologically different terrains harbouring specialised fish fauna. It should, therefore, be taxonomically and zoogeographically interesting to study the various ichthyo-faunal elements of different ecological niches available in the district. In order to achieve this end, a systematic study of the fish fauna of various waterways traversing through montane, submontane and plain areas have been envisaged so that a thorough ecological inter-relationships between the main faunal elements of fish from different ecologically specialised areas can be attempted. In this context, therefore, the results of the study of fish collected from Hindon river from montane, submontane and plain areas and presented in this paper. A study of the fish fauna of Hindon river in the extreme southern part which is completely plain has been done by Sinha and Shiromani (1953) and Mahajan (1966).

THE HINDON RIVER

The Hindon river begins as a small stream from Siwalik in the north of Muzaffarabad pargana in Saharanpur district. Kaluwal Rau and Chahchani streams also merge with Hindon river in pargana Haraurā. Then it flows across that pargana to the western border, enters Nagal and passes south through pargana Deoband into district Muzaffarnagar. In the montane region, the river flows through large and medium sized boulders with a swift current. The river flows through the fields in the submontane region. In this region, the river has muddy bottom. In the plains, the river flows on a stretch of light sandy soil. Several seasonal rivers such as Nagdeo, Paondhoe and Dhamola also merge with Hindon in this district.

SYSTEMATIC ACCOUNT

The fishes from river Hindon have been collected from the montane and submontane

regions falling in Siwaliks and the plain areas in district Saharanpur for three years during all the seasons. As far as possible, the collection was made from all different ecological niches in the river i.e. understones, pools, by the side of the running streams, areas overgrown with vegetation, muddy and sandy bed etc. The specimens have been thoroughly examined and identified. The list of the fish fauna collected and studied is given below in a systematic order.

Super-order OSTARIOPHYSI
Order CYPRINIFORMES
Family CYPRINIDAE
Sub-family RASBORINAE

1. *Amblypharyngodon mola* (Hamilton); 2. *Aspidoparia morar* (Hamilton); 3. *Barilius barila* Hamilton; 4. *Barilius bendelisis* Hamilton; 5. *Barilius vagra* Hamilton; 6. *Brachydanio rerio* (Hamilton); 7. *Danio devario* (Hamilton); 8. *Esomus danricus* (Hamilton); 9. *Parluciosoma daniconius daniconius* (Hamilton).

Sub-family CULTRINAE

10. *Chela (Chela) cachi* Hamilton

Sub-family CYPRININAE

11. *Puntius sarana* Hamilton; 12. *Puntius conchonus* Hamilton; 13. *Puntius chola* Hamilton; 14. *Puntius sophore* Hamilton; 15. *Puntius ticto* Hamilton; 16. *Catla catla* (Hamilton); 17. *Cirrhinus mrigala* (Hamilton); 18. *Cirrhinus reba* (Hamilton); 19. *Labeo calbasu* (Hamilton); 20. *Labeo rohita* (Hamilton).

Sub-family GARRINAE

21. *Crossocheilus latius* (Hamilton); 22. *Garra gotyla gotyla* (Gray).

Family COBITIDAE

Sub-family NOEMACHEILINAE

23. *Noemacheilus botia* (Hamilton)

Sub-family COBITINAE

24. *Lepidocephalus (Lepidocephalichthys) guntea* (Hamilton)

Order SILURIFORMES

Family BAGRIDAE

25. *Mystus bleekeri* (Day); 26. *Mystus vittatus* (Bloch); 27. *Rita rita* (Hamilton)

Family SILURIDAE

28. *Ompok bimaculatus* (Bloch); 29. *Wallago attu* (Schneider)

Family SISORIDAE

30. *Glyptothorax pectinopterus* (McClelland)

Family AMBLYCIPITIDAE

31. *Amblyceps mangois* (Hamilton)

Family HETEROPNEUSTIDAE

32. *Heteropneustes fossilis* (Bloch)

Super-order ATHERINOMORPHA

Order ANTHERINIFORMES

Family BELONIDAE

33. *Xenentodon cancila* Hamilton

Order CHANNIFORMES

Family CHANNIDAE

34. *Ophiocephalus gachua* Hamilton; 35. *Ophiocephalus marulius* Hamilton; 36. *Ophiocephalus punctatus* (Bloch); 37. *Ophiocephalus striatus* (Bloch).

Order PERCIFORMES

Family GOBIIDAE

38. *Glossogobius gutum* (Hamilton)

Family NANDIDAE

39. *Nandus nandus* Hamilton

Family CHANDIDAE

40. *Chanda ranga* (Hamilton); 41. *Chanda nama* (Hamilton)

Family BELONIIDAE

42. *Colisa fasciatus* (Schneider); 43. *Colisa lalius* (Hamilton)

Order MASTACEMBELIFORMES

Family MASTACEMBELIDAE

44. *Mastacembelus armatus* (Lacepede); 45. *Mastacembelus pancalus* (Hamilton).

REMARKS

Among the species recorded from this river, there is only one species i.e. *Glyptothorax pectinopterus* (McClelland) which is restricted to the montanus part of the

river because it needs strong flow of water and rocky bottom to adhere to and feed on the algae and insects entangled in them. This species is rarely recorded in submontane region unless it gets incidentally washed down due to floods. This represents 2.22% of the fish fauna of this river recorded here. In the submontane region, there are quite a number of species such as *Barilius barila* Hamilton, *Barilius bendelisis* Hamilton, *Barilius vagra* Hamilton, *Garra gotyla* (Gray) etc. which live both in the lower reaches of the hilly tract on the one side and on higher side of the plain region; they however mostly inhabit the submontane terrain where the flow of water is comparatively fast and the bed is stony or pebbly. They do not normally extend to the region with a muddy or clayey water. The species of the submontane region enumerated above represent 8.89% of the fish fauna of the river recorded here. The rest of the species mostly live in the plain area where the flow of water is slow, the stream is infested with aquatic vegetation and the bed is muddy. These species sometimes extend into the lower reaches of the submontane part of the stream. These species represent 88.91% of the total fauna recorded from the stream. Normally the species of the three ecological regions viz. montane, submontane and plain areas remain restricted to their respective habitats, but under exceptional circumstances particularly during floods or during breeding season, some of them do enter into the adjoining ecological areas. This ecological distribution of the species in a stream showing all the three types of ecological niches is normally of a fixed nature and changes only under exceptional circumstances. This affords an ecological distinction to the fauna of the respective ecological niches in the stream.

KEY TO IDENTIFICATION

1. The anterior vertebrae modified to form Weberian apparatus..... (2)
 The anterior vertebrae not modified to form Weberian apparatus(33)
2. Body with scales; scales usually cycloid (3)
 Body without scales.....(26)
3. Barbel one or two pairs or none; no sub-ocular spines present. Scales generally large; eyes never covered with skin..... (4)
 Barbels three or four pairs; sometimes a sub-ocular spine present below the eye; scales generally small, embedded in skin or absent; eyes sometimes covered with skin.....(25)
4. Abdomen or a part of it keeled but not serrated; dorsal fin always in the posterior half of body.....
 Sub-family Cultrinae : *Chela* (*Chela*) *cachius* Hamilton
 Abdomen round or flat; dorsal fin not in posterior half of body (5)
5. Origin of dorsal fin opposite the ventral fin or little before..... (6)

- Origin of dorsal fin clearly behind the ventral fin.....(17)
6. Upper lip continuous with the skin of the snout; lower lip with or without a suctorial disc Sub-family Garrinae (7)
- Upper lip separated from the skin of the snout by a deep groove; lower lip without a suctorial disc..... (8)
7. Upper and lower lip continuous at the angles of the jaws; lower lip with a suctorial disc.....*Garra gotyla gotyla* (Gray)
- Upper and lower lips not continuous; lower lip without a suctorial disc *Crossocheilus latius* (Hamilton)
8. Upper lip absent *Catla catla* (Hamilton)
- Upper lip present (9)
9. A symphysial knob present in lower jaw(10)
- No symphysial knob in lower jaw.....(11)
10. Lateral line scales 35-38; dorsal fin rays 10-12.....
- *Cirrhinus reba* (Hamilton)
- Lateral line scales 40-45; dorsal fin rays 15-16.....
-*Cirrhinus mrigala* (Hamilton)
11. Lower lip with an inner transverse fold; mouth inferior(16)
- Lower lip without an inner transverse fold; mouth terminal.....(12)
12. Barbels present(13)
- Barbels absent(14)
13. Four barbels; last undivided ray of dorsal fin serrated; dorsal without colour markings.....*Puntius sarana* Hamilton
- Two maxillary barbels; last undivided ray of dorsal fin bony and smooth; dorsal with colour spot.....*Puntius chola* Hamilton
14. Last undivided ray of the dorsal fin bony and smooth; middle dorsal rays with the dark spot at the base*Puntius sophore* Hamilton
- Last undivided ray of dorsal fin bony and serrated.....(15)
15. Depth of body 2.7 to 2.9 times in length of body.....
-*Puntius conchonius* Hamilton
- Depth of body three or more times in total length
-*Puntius ticto* Hamilton

16. Branched dorsal rays 13-15; colour uniformly dark.....
.....*Labeo calbasu* (Hamilton)
Branched dorsal rays 12-13; colour brownish on back and silvery on
sides.....*Labeo rohita* (Hamilton)
17. Lateral line incomplete.....*Amblypharyngodon mola* (Hamilton)
Lateral line complete(18)
18. Dorsal fin does not extend to above the anal fin; anal fin with 5 to 11
branched rays.....(19)
Dorsal fin generally extending over the anal; anal fin with 7 to 33
branched rays.....(21)
19. A symphysial knob present in the lower jaw fitting into an
emargination in the upper jaw; mouth oblique; both lips present.....(20)
No symphysial knob in the lower jaw present; mouth inferior; lower
jaw with a sharp crescentic edge but with no lip.....
.....*Aspidoparia morar* (Hamilton)
20. Barbels absent*Parluciosoma-daniconius daniconius* (Hamilton)
Maxillary barbels very long*Esomus danricus* (Hamilton)
21. Sub-orbital ring of bones distinctly broad and prominent; cleft of mouth
often extending beyond anterior margin of eye(22)
Sub-orbital ring of bones not broad; cleft of mouth extending beyond
anterior margin of eye.....(23)
22. Dorsal fin with 7 branched rays; anal fin with 11 to 13 rays.....
.....*Brachydanio rerio* (Hamilton)
Dorsal fin with 18 and 19 branched rays; anal fin with 15 to 16 rays.....
.....*Danio devario* (Hamilton)
23. Cleft of mouth extending upto below the middle of orbit; body with 10
and 14 dark verticle bands*Barilius vagra* Hamilton
Cleft of mouth extending to below anterior third of the orbit.....(24)
24. Anal fin with 7 to 8 branched rays.....*Barilius bendelisis* Hamilton
Anal fin with 10 to 13 branched rays*Barilius braila* Hamilton
25. An erectile spine present near the orbit.....
.....*Lepidocephalus (Lepidocephalichthys) guntea* (Hamilton)

- An erectile spine absent near the orbit...*Noemacheilus botia* (Hamilton)
26. Anal fin long*Heteropneustes fossilis* (Bloch)
- Anal fin short or of moderate length(27)
27. Nostrils widely separated(28)
- Nostrils close together(30)
28. Barbels six; eyes sub-cutaneous *Rita rita* (Hamilton)
- Barbels eight eyes with free orbital margins(29)
29. Occipital process 1.5 to 2.0 times as long as wide at the base; body without longitudinal stripes*Mystus bleekeri* (Day)
- Occipital process 3 to 5 times as long as wide at the base; body with longitudinal stripes..... *Mystus vittatus* (Bloch)
30. Lower surface of the head and body flat; paired fins horizontal.....
- *Glyptothorax pectinopterus* (McClelland)
- Lower surface of head and body not greatly flattened.....(31)
31. Dorsal fin spineless.....(32)
- Dorsal fin with a short spine embeded in the skin of the dorsal fin.....
-*Amblyceps mangois* (Hamilton)
32. Eyes with a free orbital margin and lie above the level of corner of mouth and not visible from underside of head; gape of mouth oblique, wide and very long reaching to or beyond anterior border of eye; pectoral not reaching beyond origin of anal..... *Wallago attu* (Schneider)
- Eyes sub-cutaneous; lie posterior to corner mouth and visible from underside of head; pectoral usually surpassing the origin of anal.....
- *Ompok bimaculatus* (Bloch)
33. Size small; branchiostegal rays 4 to 15; opercular bones unarmed; pelvic fins abdominal.....*Xenentodon cancila* (Hamilton)
- Size normal to large; branchiostegal rays 4; opercular bones sometimes armed.....(34)
34. Head snake like; suprabranchial organ present; only elongated dorsal fin present.....(35)
- Head not snake like; suprabranchial organ absent; dorsal fin normally short and 2nd dorsal fin usually present(38)

35. 15-20 scales between snout and origin of dorsal fin; 9-10 scales between the orbit and angle of pre-operculum; dorsal rays 37-55(36)
 12-13 scales between snout and origin of dorsal fin; 4-5 scales between orbit and angle of pre-operculum; dorsal rays 29-37(37)
36. 18-20 scales between the snout and the origin of dorsal fin; 9 scales between the orbit and the angle of pre-operculum; 37-45 rays in the dorsal fin.....*Ophiocephalus striatus* (Bloch)
 15-16 scales between the snout and the origin of dorsal fin; 10 scales between the orbit and the angle of pre-operculum; 45-55 rays in the dorsal fin.....*Ophiocephalus marulius* Hamilton
37. Ventral fin 2/5th of the length of pectoral; dorsal with 32-37 rays; pectoral fin with alternating orange and blue transverse bands and no band on body.....*Ophiocephalus gachua* Hamilton
 Ventral fin 2/3rd - 3/4th of the length of pectoral; dorsal fin with 29-32 rays; pectoral fin without transverse bands; bands or patches from back passes down the abdomen*Ophiocephalus punctatus* (Bloch)
38. Body cylindrical and elongated(39)
 Body neither cylindrical nor elongated(40)
39. Anal and dorsal fins confluent with the caudal.....
*Mastacembelus armatus* (Lacépède)
 Anal and dorsal fins distinct from the caudal fin
*Mastacembelus pancalus* (Hamilton)
40. Pelvics united to form a sucking disc .. *Glossogobius gutum* (Hamilton)
 Pelvics not united to form a sucking disc.....(41)
41. Accessory respiratory organ absent(42)
 Accessory respiratory organ present(44)
42. Spinous and soft dorsals connected at base; procumbent spine before dorsal fin present.....(43)
 Spinous and soft dorsals continuous; no procumbent spine before dorsal fin present*Nandus nandus* Hamilton
43. Lower jaw with two pairs of large crooked caniniform teeth.....
*Chanda nama* (Hamilton)
 No caniniform teeth in lower jaw; all teeth small and normal.....
*Chanda ranga* (Hamilton)

44. Soft rays of dorsal 9 to 13; body banded and sexual dimorphism not much pronounced..... *Colisa fasciatus* (Schneider)

Soft rays of dorsal 7 to 8; a marked sexual dimorphism present and the male is intensely banded with scarlet and azure blue bands.....

..... *Colisa lalius* (Hamilton)

SUMMARY

Hindon river at montane, submontane and the plain areas of Saharanpur district has been surveyed for three years covering all seasons. Altogether 45 species have been collected from the river and have been studied, identified and listed in the paper. The analysis of species occurring in different zones has also been given. A key to the identification of the species is provided.

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ON A COLLECTION OF DAMSELFLIES
(COENAGRIONIDAE : ODONATA)
FROM DISTRICT BHARATPUR (RAJASTHAN)

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INTRODUCTION

Adams (1899) has recorded for the first time these insects from Rajasthan under the general heading Neuroptera. He did not record a single species by name but mentioned only the family Libellulidae. Fraser (1933) and Kumar and Prasad (1981) have reported some species from North-West India. Agrawal (1957), Bose and Mitra (1976), Prasad and Thakur (1981) and Thakur (1985) have recorded a large number of Odonata from the different parts of Rajasthan.

Topographically Bharatpur is located in the eastern region of Rajasthan. Gurgaon, Morena, Agra and Alwar are situated in north, south, east and west directions of Bharatpur, respectively. Mathura and Sawai-Madhopur are also adjoining places to Bharatpur.

The present paper is based on a small collection of damselflies collected from different parts of Bharatpur district (Rajasthan). Following is the list of species recorded for the first time from Bharatpur.

Family COENAGRIONIDAE

Subfamily ISCHNURINAE

Ischnura senegalensis Rambur

1842. *Agrion senegalensis* Ramb., *Ins. Neurop.* : 276.

1933. *Ischnura seneglensis* Fraser, *Fauna Brit. India*, Odonata, 1 : 348-418.

1981. *Ischnura senegalensis* Kumar & Prasad, *Rec. zool. Surv. India, Occ. Pap.*, No. 20 : 39.

Specimens Collected : 2 ♂♂, Bharatpur, 27.8.83; 1 ♂, Deeg, 29.8.83; 1 ♂, 1 ♀, Ghana, 21.9.83; 1 ♂, 1 ♀, Bari, 16.9.84; 3 ♂♂, Kama, 26.9.84.

Measurements : Male - Abdomen, 22 mm; fore wing, 17 mm; hind wing, 16 mm
Female - Abdomen, 24 mm; fore wing, 18 mm, hind wing, 16 mm.

Known distribution : Throughout India, Burma, Ceylon and extending to most of African countries.

Remarks : The specimens differ from the description of the species as given in the Fauna of British India, as follows :

In male : Post ocular spots greenish yellow in colour and Superior anal appendages about two-third the length of 10th segment. In female Labrum black in colour.

***Ischnura elegans* Vander Linden**

1823. *Agrion elegans* Vander Lind., *Opusc. Sci*, 4 : 104.

1933. *Ischnura elegans* Fraser *Fauna Brit. India*, Odonata, 1 : 351-354.

Specimens collected : 1 ♂, Deeg, 29.8.83; 2 ♂♂, Dholpur, 7.9.83; 1 ♂, Ghana, 21.9.83.

Measurements : Male - Abdomen, 23 mm, fore wing, 17 mm; hind wing 15 mm.

Known distribution : North west India and Baluchistan.

Remarks : In male Post ocular spots green in colour.

***Ischnura annandalei* Laidlaw**

1919. *Ischnura annandalei* Laid., *Rec. Indian Mus.*, 16 : 175-177.

1933. *Ischnura annandalei* Fraser, *Fauna Brit. India*, Odonata, 1 : 351-354.

Specimens collected : 2 ♂♂, 2 ♀♀, Bharatpur, 27.8.83; 3 ♂♂, 2 ♀♀, Dholpur, 7.9.83; 1 ♂, 1 ♀, Bari, 16.9.84; 2 ♂♂, Kama, 26.9.84.

Measurements : Male - Abdomen, 17 mm; fore wing, 12 mm; hind wing, 10 mm. Female - Abdomen, 19 mm; fore wing, 12 mm; hind wing, 12 mm.

Known distribution : India (Rajasthan), North Shan States and Burma.

Remarks : Specimens differs from the description of the species as follows : In Male Basal segment of antennae yellowish green. Broad quadrate basal spot absent on 10th segment. Inferior anal appendages shorter than superior anal appendages. In female Humeral region dull red in colour.

***Ischnura aurora* (Brauer)**

1858. *Agrion delicatum* Hagen, *Verh. zool. bot. Ges. Wien.*, 8 : 479.

1933. *Ischnura delicata* Fraser, *Fauna Brit. India*, Odonata, 1 : 360-362.

1981. *Ischnura delicata* Kumar & Prasad, *Rec. zool. Surv. India Occ. Pap.*, No. 20 : 38-39.

Specimens collected : 2 ♂♂, Bharatpur, 27.8.83; 1 ♂, 1 ♀, Deeg, 29.8.83; 1 ♂, Dholpur, 7.9.83; 2 ♂♂, 1 ♀, Bari, 16.9.84.

Measurements : Male - Abdomen, 19 mm; fore wing, 12 mm; hind wing, 12 mm.

Known distribution : Throughout India, Sri Lanka, Burma, Malaysia, The Sondaic Archipelago, Borneo, New Guinea, Australasia, Phillipines, Samosa.

Remarks : In Male - Basal segment of antennae yellowish green. Inferior anal appendages shorter than superior anal appendages.

Subfamily PSEUDAGRIONINAE

***Ceriagrion coromandelianum* Fabr.**

1798. *Agrion coromandelianum* Fabricius, *Ent. Syst. Suppl.*, : 287.

1933. *Ceriagrion coromandelianum* Fraser, *Fauna Brit. India*. Odonata, 1 : 315.

1971. *Ceriagrion coromandelianum* Prasad & Singh, *Rec. zool. Surv. India* 70 : 121-123.

1981. *Ceriagrion conomandelianum* Kumar & Prasad, *Rec. zool. Surv. India Occ. Pap.*, No. 20 : 36-37.

Specimens collected : 5 ♂♂, 1 ♀, Bharatpur, 27.8.83; 2 ♂♂, 2 ♀♀, Deeg, 29.8.83; 4 ♂♂, 1 ♀, Dholpur, 7.9.83; 3 ♂♂, 2 ♀♀, Ghana, 21.9.83; 2 ♂♂, 1 ♀, Bari, 16.9.84; 3 ♂♂, Kama, 26.9.84.

Measurements : Male - Abdomen, 29 mm; fore wing, 20 mm; hind wing, 19 mm; Female - Abdomen, 28 mm; fore wing, 21 mm; hind wing, 19 mm.

Known distribution : Throughout India, Nepal, Sri Lanka, South China, Malaysia, Indo-china and Burma.

Remarks : In Male : Eyes gray in colour.

Ceriagrion erubescens Selys

1891. *Ceriagrion coromendalium* race *erubescens* Selys, *Ann. Mus. civ Genova* (2) 10 : 516.

1933. *Ceriagrion erubescens* Fraser, *Fauna Brit. India*, Odonata, 1 : 315.

Specimens collected : 1 ♂, Bharatpur, 17.8.83; 2 ♂♂, Ghana, 21.9.83.

Measurements : Male - Abdomen, 29 mm; fore wing, 21 mm; hind wing, 19 mm.

Known distribution : Burma, Indo-China and Malaysia.

Remarks : 11 Post nodal nervures in fore wing and Abdomen yellowish orange in colour. It is recorded for the first time for India.

Pseudagrion malabaricum Fraser

1931. *Pseudagrion malabaricum* Fraser, *Rec. Indian Mus.*, 26 : 428, 494-495.

1933. *Pseudagrion malabaricum* Fraser, *Fauna Brit. India*. Odonata, 1 : 284-286.

Specimens collected : 3 ♂♂, 1 ♀, Deeg, 29.8.83; 2 ♂♂, 2 ♀♀, Ghana, 21.9.83; 1 ♂, Kama, 26.9.84.

Measurements : Male - Abdomen, 34 mm; fore wing, 22 mm; hind wing, 20 mm; Female - Abdomen, 23 mm; fore wing, 19 mm; hind wing, 17 mm.

Known distribution : South Kanara to Sri Lanka.

Remarks : In Male 10th segment black on dorsum. In female Ground colour of 2nd segment orange. It is recorded for the first time from Rajasthan.

Subfamily AGRIOCNEMIDINAE

Agriocnemis pygmaea Rambur

1842. *Agriocnemis pygmaea* Ramb. *Ins. Neurop.*, : 278

1933. *Agriocnemis pygmaea* Fraser, *Fauna Brit. India*, Odonata, 1 : 398-401.

1971. *Agriocnemis pygmaea* Sahn, *Bull. Ent.*, 12(2) : 69-84.

1976. *Agriocnemis pygmaea* Prasad & Singh, *Rec. zool. surv. India*, 72 : 121-123.

1981. *Agriocnemis pygmaea* Kumar & Prasad, *Rec. zool. Surv. India, Occ. Pap.*, No. 20 : 40.

Specimens collected : 1 ♂, 7 ♀♀, Bharatpur, 27.8.83; 3 ♀♀, Deeg, 29.8.83; 2 ♂♂, 6 ♀♀, Ghana, 21.9.83; 2 ♀♀, Bari, 16.9.84; 1 ♂, 3 ♀♀, Kama, 26.9.84.

Measurements Male - Abdomen, 17 mm; fore wing, 12 mm; hind wing, 10 mm; Female - Abdomen, 19 mm; fore wing, 13 mm; hind wing, 12 mm.

Known distribution : Throughout India and oriental region, Australia and Pacific Islands.

Remarks : The specimens differs from the description as given in the Fauna of British India, as follows :

In Male a broad dorsal thistle shaped marking on segment two species.

In Female Post ocular spots and stripe between eye spots yellowish red in colour.

SUMMARY

8 species of damselflies have been recorded for the first time from district Bharatpur (Rajasthan). Out of these *Ceriagrion erubescens* Selys is recorded for the first time from India. Differences from Fraser's (1933) description have been noted.

ACKNOWLEDGEMENTS

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**STUDIES ON ORIENTAL DERMAPTERA PRESERVED IN THE
CALIFORNIA ACADEMY OF SCIENCE, SANFRANCISCO, U.S.A.**

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INTRODUCTION

The present study is based on a collection of Dermaptera from various countries of the Oriental Region. Altogether 57 species (excluding 5 species determined up to generic level) belonging of 29 genera which include seven new species viz., *Diplaty daviesi*; *Epilandex wagneri*; *Gonolabis emarginata*; *Paralabis rossi*; *Isolabis rossi*; *Chaetospania acuminata* and *Proreus ledyardi*. Besides two new combinations, namely *Leptisolabis fletcheri* (Burr) and *Liparura debrepaniensis* (Kapoor, Bharadwaj & Banerjee) are proposed. In addition, the female sex of *Labia emarginata* Srivastava is recorded for the first time.

Chaetospania bihastata (Borg) which was hitherto known from Africa is reported for the first time from India (Darjeeling) on a male and female. *Spongovostox hakeni* Ramamurthi is treated as synonym of *Spongovostox semiflavus* (Bormans).

Most of the collections were made by E. S. Ross and D. Q. Cavagnaro except as otherwise stated and are deposited in the California Academy of Sciences, Sanfrancisco, U.S.A.

The accompanying table provides at a glance the details of distribution of various species dealtwith. The highest number of species i.e., 27 are from India, followed in descending order, by 19 from Philippine Islands; 7 from Thailand; 4 each from Bangladesh, Malaya and Moluccas; 3 each from Sri Lanka and localities, not known; 2 each from Pakistan and Borneo and 1 each from South Vietnam, China, Java.

PYGIDICRANOIDEA

PYGIDICRANIDAE

DIPLATYINAE

***Schizodiplatys daviesi* sp.n.**

Figs. 1-5

♂ : General colour yellowish brown with shades of black on certain body parts; head elytra and wings dark blackish brown; legs with joints and basal half of hind femora yellowish, abdominal tergites laterally and ultimate tergite blackish with a triangular yellowish brown area in middle posteriorly; forceps blackish, at extreme base lighter in colour. Build slender, pubescent.

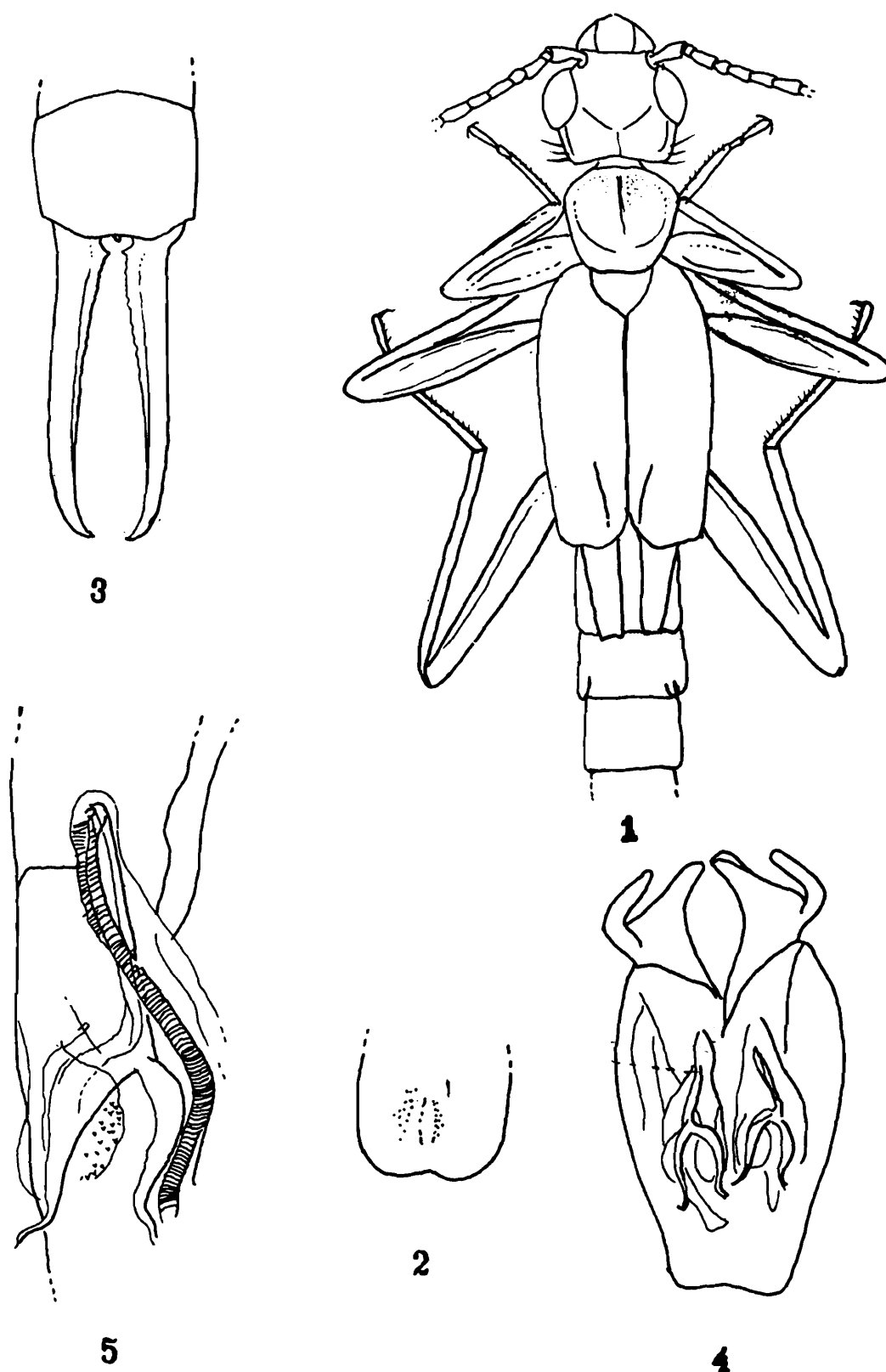
Table : Distribution of various species represented in the collection. Distributional areas are denoted by numbsrs as : 1. Pakistan, 2. India, 3. Nepal, 4. Bangladesh, 5. Sri Lanka, 6. Thailand, 7. South Vietnam, 8. China, 9. Malaya, 10. Sumatra, 11. Java, 12. Borneo, 13. Philippine islands, 14. Moluccas and 15. Locality Unknown.

[illegible]

Name of Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
15. Euborellia femoralis (Dohrn)					+										
16. Euborellia philippinensis Srivastava													+		
17. Epilandex wagneri sp.n.														+	
18. Gonolabis emarginata sp.n.									+						
19. Epilabis punctata Srivastava		+													
20. Epilabis penicillata (Borelli)		+													
21. Epilabis sp.		+													
22. Paralabis lefroyi (Burr)		+													
23. Paralabis rossi sp.n.													+		
24. Aborolabis nepalensis (Brindle)			+												
ISOLABIDINAE															
25. Leptisolabis fletcheri (Burr) comb.n.		+													
26. Isolabis rossi sp.n.									+						
27. Isolabis ocellata Srivastava						+									
LABIDURIDAE															
ALLOSTETHINAE															
28. Gonolabidura astruci Burr		+													
NALINAE															
29. Nala lividipes (Dufour)	+	+		+		+							+		
LABIDURINAE															
30. Labidura riparia (Pallas)		+					+						+		

[illegible]

Name of Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CHELISOCHIDAE															
CHELISOCHINAE															
50. <i>Proreus simulans</i> (Stal)													+		
51. <i>Proreus ledyardi</i> sp. n.													+		
52. <i>Proreus laetior</i> (Dohrn)														+	
53. <i>Chelisoches semirufus</i> Borelli															+
54. <i>Chelisoches rubriceps</i> (Burr)															+
55. <i>Hamaxas crassus</i> Borelli													+		
56. <i>Adiathetus tenebrator</i> (Kirby)		+													
FORFICULIDAE															
FORFICULINAE															
57. <i>Hypurgus</i> sp.															+
58. <i>Hypurgus fulvus</i> Borelli													+		
OPISTHOCOSMIINAE															
59. <i>Liparura debrepaniensis</i> (Kapoor Bharadwaj & Banerjee) comb.n.		+													
60. <i>Eparchus insignis</i> (Haan)				+											
61. <i>Opisthocosmia longipes</i> (Haan)													+		
62. <i>Cordax armatus</i> (Haan)								+							



Figs. 1-5. *Diplatys daviesi* sp.n., Holotype ♂; 1. Anterior portion of body, 2. Posterior margin of penultimate sternite, 3. Ultimate tergite and forceps, 4. Genitalia, 5. A portion of distal lobe, enlarged.

Head triangular, longer than broad, frons raised, occiput depressed, post-ocular carina distinct, extending from eye to hind margin, transverse suture obsolete, median suture short and distinct, hind margin emarginate. Eyes prominent, distinctly longer than the post-ocular length. Antennae (partly broken since only 21 segments on the right side and 7 on the left remaining) with segments long and slender, basal segment stout, expanded apically, about as long as the distance between antennal bases; 2nd transverse; 3rd long and cylindrical; 4th stouter, only slightly longer than broad, shorter than the preceding; 5th slightly longer than the 4th; 6th about as long as the 3rd, afterwards segments gradually increasing in length and thinner. Pronotum about as long as broad, smooth; strongly narrowed posteriorly, anteriorly convex, sides straight, hind margin briefly rounded, median sulcus distinct, prozona strongly convex and well demarcated from flat metazona. Elytra and wings well developed, former with axillary angles rounded off to show a triangular scutellum. Legs typical for the genus. Abdomen convex, smooth, long and slender, lateral tubercles on 3rd and 4th tergites well marked, gently expanded from 8th tergite onwards. Penultimate sternite oblong, hind margin rounded with slight emargination in middle. Ultimate tergite weakly transverse, disc convex, sloping backwards, posteriorly in middle with a triangular pilose area, hind margin trisinate, oblique above the base of forceps, posterolateral angles a little projecting. Pygidium vertical with a small point in middle posteriorly. Forceps long, slender, tapering apically, depressed above, almost straight, gently incurved near apex, internal margin at base with a small tubercle, afterwards finely serrated, at base above with an oblique triangular crest. Genitalia as seen in fig. 4 and 5.

♀ : Unknown.	
Measurements : (in mm)	Holotype
	♂
Length of body	13.4
Length of forceps	2.7
Material examined : Borneo: Sabah State, Poring, 9 mi. N. of Ranau, alt. 1600 ft., Holotype ♂ (genitalia mounted between two coverslips and pinned with the specimen), 26-29.IV.1970 (coll. T.W. & M.C. Davies).	
Remarks : This species comes close to <i>Schizodiplatys hoogstraali</i> (Srivastava) from Philippines in having somewhat similar pronotum and penultimate sternite but differs by shape of parameres and details of virga and associated structures of distal lobes and forceps comparatively more elongated and slender.	

Diplatys sp.

Material examined : India : Assam, Near Ledo, Barkflakes, 1♀,... X.61.
Remarks : In the absence of a ♂ it is not possible to determine it up to specific level.

Diplatys sp.

Material examined : India : Maharashtra, 3 mi W. Sakoli, 220 m, 1 ♀, 20.I.1962.

ECHINOSOMATINAE

Echinosoma parvulum Dohrn

1863. *Echinosoma parvulum* Dohrn, *Stettin ent. Ztg.*, 24 : 66 (♀; Ceylon).

Material examined : India : Andhra Pradesh : 5 mi SE Ashwaraopet, 100 m, 3♂♂ (genitalia of 1 ex. placed in the same vial as the specimen), 2 ♀♀, 9 nymphs, 6.II.62; Mysore : 12 mi E. Virajpet, 850 m, 3 ♂♂, 5 ♀♀, 8 nymphs, 24.II.63; Madhya Pradesh : 14 mi S Kanker, 450 m, 1♂, 7 nymphs, 31.I.1962.

Distribution : India and Sri Lanka.

Echinosoma trilineatum Borelli

1921. *Echinosoma trilineatum* Borelli, *Bull.Mus.Hist.nat.Paris*, 27 : 77 (♂, India, Shembaganur).

Material examined : India : Mysore : 8 mi NE Mercara, 1000 m, 1♂ (genitalia projecting beyond penultimate sternite), 1♀, 22.II.62; 4 mi SW Sidapur, 900 m, 2♂♂, 2♀♀, 3 nymphs (partly damaged); 12 mi E Virajpet, 850 m, 3 ♂♂, 1♀, 24.II.62.

Distribution : Distributed in the mountains of S. India only.

Echinosoma convolutum Hincks

1959. *Echinosoma convolutum* Hincks, *Syst. mono.Dermaptera*, 2 : 152 (♀; Ceylon).

Material examined : Thailand : E. Slope Doi Suthep, 1100-1275 m, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 15.VII.62; 20 mi NW Lee, 380 m, 1♀, 14.VII.1962. Nepal : 9 mi W Hitaura, 400 m, 1♂, 1 nymph, 23.X.1961.

Distribution : India, Nepal, Burma, Vietnam and Sumatra.

PARAPSALINAE

Paraspsalis infernalis (Burr)

1913. *Chaetospania infernalis* Burr, *Ent. Mitt.*, 2 : 6 (♂, ♀ ; Kosempo Formosa).

Material examined : India : Assam : 10 mi SW Kochugaon, 50 m, 1♂, 19.X.1961. Philippine Islands : Mindoro, San Jose, 1♂, ... IX.45 (*Ross and Skinner*); 1 ♂, ... X-45 (*E.S.Ross*).

Distribution : Widely distributed throughout the Oriental Region.

ANISOLABIOIDEA

ANISOLABIDIDAE

PLATYLABININAE

Platylabia sp.

Material examined : India : Mysore : 8 mi NE Mercara, 1000 m, 1 nymph, 22.II.62.

***Platylabia major* Dohrn**

1867. *Platylabia major* Dohrn, *Stettin ent. Ztg.*, 28 : 347 (♀; Celebes).

Material examined : Thailand : Khao-Yi Nat. Pk., 750 m, 5 ♀♀, 26.VIII.62; E. Slope, Doi Suthep, 875-950 m, 1♀, 15.VII.1962; 1♀ (without locality data) (Dr. E. Mejoberg leg).

Distribution : Widely distributed throughout the Oriental Region.

Remarks : Out of the above material, 2 examples are macropterous.

TITANOLABIDINAE

***Titanolabis maindroni* (Borelli)**

1911. *Homoeolabis maindroni* Borelli, *Boll. Musei Zool. Anant. comp. R. Univ. Torino*, 24(640) : 2 (♂; Pondicherry).

1982 *Titanolabis maindroni* : Srivastava, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 84 : 99.

Material examined : India : Mysore : 15 mi NE, Somwarpet, 960 m, 1♂ (genitalia slightly pulled out but attached with the specimen), 1♀, 21.II.62; 12 mi E. Virajpet, 850 m, 1 nymph, 24.II.62; Tamil Nadu : 7 mi SW Avinashi, 390 m, 1♀, 7.III.62; Coimbatore, 430 m, 1♂ (genitalia slightly pulled out for examination but attached with the specimen), 8.III.62; 16 mi NE Coimbatore, 640 m, 1♂, 1♀, 1 nymph, 8.III.62; Rajapalayam, 150 m, 1♀, 28.III.1962; Andhra Pradesh : Tirumala grade, 780 m, 1♀, 19.IV.62.

Distribution : In India this species occurs in Deccan plateau. Besides it is reported from Sri Lanka as well.

CARCINOPHORINAE

***Euborellia rajasthanensis* Srivastava**

1977. *Euborellia rajasthanensis* Srivastava, *Oriental Insect*, 11(2) : 184 (♂, ♀; India : Rajasthan, Phalodi).

Material examined : Pakistan : Taxilla, 550 m, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 22.XII.1961; Margala Pass nr. Taxilla, 62 m, 1♀, 17.XII.61; 10 mi SW Kohat, 650 m, 1♀, 19.XII.61.

Distribution : This species was hitherto known from the type locality. It is reported for the first time from Pakistan.

***Euborellia stali* (Dohrn)**

1864. *Forcinella stali* Dohrn, *Stettin ent. Ztg* : 25 : 286 (♀; Java).

Material examined : India : Mysore : 2 mi NW Punjur, 850 m, 16 ♂♂, 22 ♀♀, 16 nymphs, 13.III.1962; Mysore, Sirsi, 600 m, 1♀, 7 nymph, 16.II.62; Tamil Nadu : Coimbatore, 16 mi NW, 640 m, 4 ♂♂ (genitalia of one specimen pulled out for examination but attached with the body), 8.III.62; Coimbatore, 430 m, 4♂♂, 4♀♀, 4 nymphs, 8.III.62; 7 m SE Avanashi, 390 m, 3♀♀, 7.III.62; Topslip, Anamalai Hills, 760 m, 1♂, 2♀♀, 18.III.62; Orissa : 3mi SE Pottangi, 3345 ft. 1♂, 1♀, 3.II.1962.

***Euborellia annulipes* (Lucas)**

1847. *Forficesila annulipes* Lucas, *Ann.Soc.ent.Fr.*, (2) 5 : 84 (sex ? "Jardin des Plantes" Paris (Introduced).

Material examined : India : Tamil Nadu : Sethumadai, nr Pollachi, 375 m, 2 ♂♂, 1 ♂, 1 nymph, 18.III.1962; M.P. : 9 mi N Paharasgaon, 850 m, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 1.III.62; Gujarat : 5 mi S Palanpur, 250 m, 3♀♀, 1.I.62.

Distribution : World wide.

Remarks : The identification of ♀♀ from Gujarat should be treated with reserve.

***Euborellia plebeja* (Dohrn)**

1863. *Labidura plebeja* Dohrn, *Stettin ent. Ztg.*, 24 : 322 (♀ ; Java).

Material examined : Bangladesh : Chicknagul, 10 mi N Sylhet, 10 m, 1♂ (genitalia pulled out for examination but attached with the body), 1 nymph, 30.IX.61.

Distribution : Widely distributed throughout the Oriental Region.

***Euborellia femoralis* (Dohrn)**

1863. *Labidura femoralis* Dohrn, *Stettin ent. Ztg.*, 24 : 321 (♀; Ceylon).

Material examined : Sri Lanka : Province of Uva Egodapitiya Nilgala, 1♀, 1-3.VII.1968 (P. B. Karunaratne and T F. Halstead coll).

Distribution : Widely distributed throughout the Oriental Region.

Remarks : In the absence of a ♂ the identification of above ♀ should be treated with some reserve.

***Euborellia philippinensis* Srivastava**

1979. *Euborellia philippinensis* Srivastava, *Bull.zool.Surv.India*, 2(1) : 49 (♂, ♀; Philippines, Laguna).

Material examined : Philippine Island : Mindoro, 2 ♂♂, 1♀, 1 nymph, ,... IX.44, (Ross & Skinner), 2 ♂♂ (genitalia of 1♂ pulled out for examination but attached with the body), ... X.45, (E. S. Ross).

Distribution : Philippine Islands.

Epilandex wagneri sp.n.

Figs. 6-11

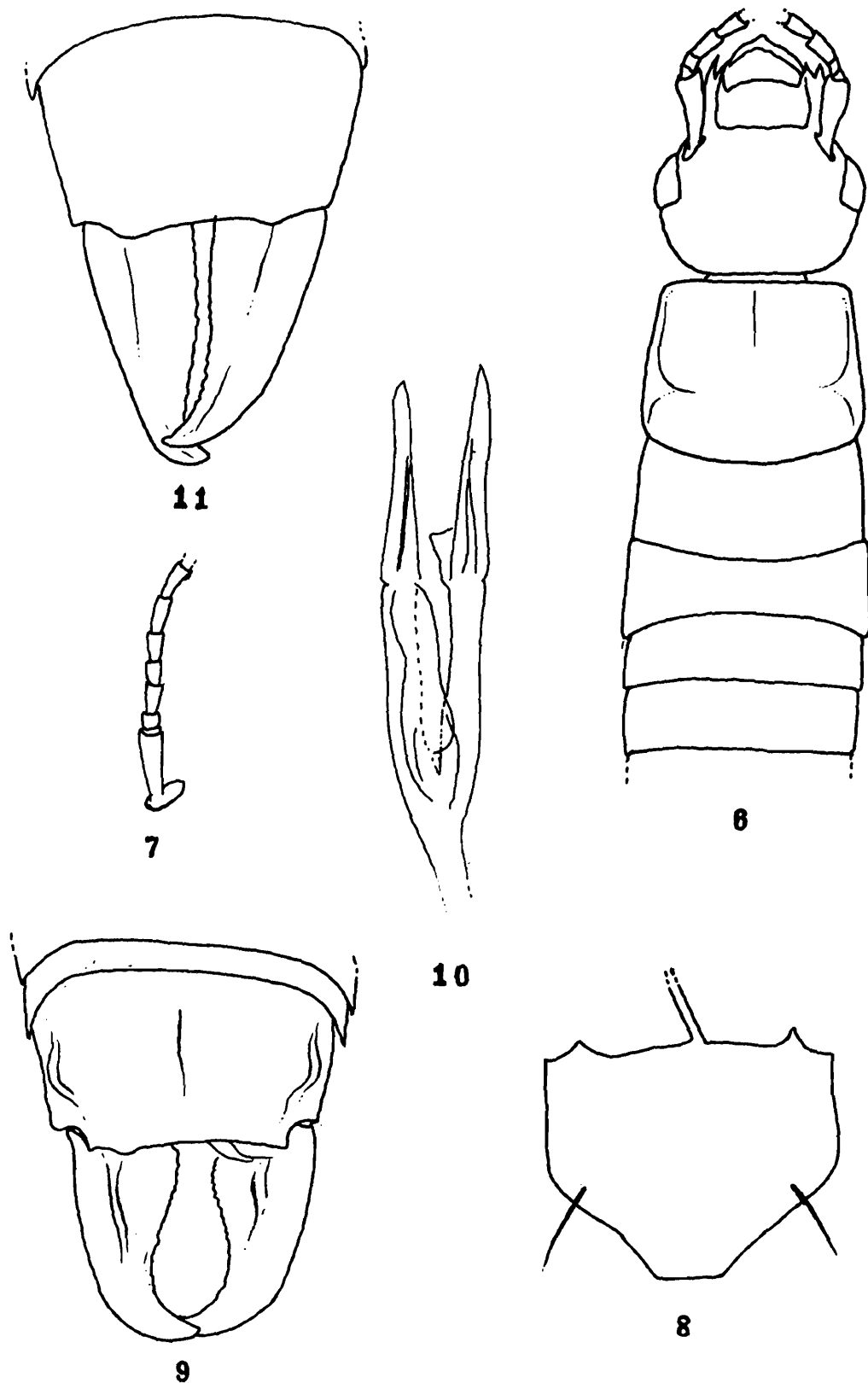
♂ : General colour blackish brown; antennae light brown; mouth parts and sides of pronotum pale; legs yellow, femora with a broad fuscus band and forceps reddish with margins blackish.

Head slightly longer than broad, smooth, frons convex, sutures obsolete, hind margin hardly emarginate in middle. Eyes moderately prominent, slightly shorter than the post-ocular area. Antennae partly broken (right side with 7 and left side with 4 segments remaining), 1st stout, gently expanded apically, about as long as the distance between antennal bases; 2nd short, about as long as broad; 3rd long and cylindrical, 4th slightly shorter than the 3rd, gently expanded apically; 5th about as long as 3rd but expanded apically, remaining gradually increasing in length and each gently expanded apically. Pronotum slightly broader than long, anteriorly and sides straight, gently expanded posteriorly, hind margin rounded, median sulcus faint; prozona feebly raised and metazona weakly depressed. Mesonotum transverse, hind margin truncate. Metanotum transverse, hind margin broadly emarginate. Elytra and wings absent. Legs typical for the genus, hind tarsi with 1st segment distinctly longer than the combined length of 2nd and 3rd segments. Sternal plates typical for the genus. Abdomen convex, obscurely punctulate, gradually enlarging posteriorly, sides of segments 5th to 9th acute angled posteriorly with a sharp longitudinal carina except 5th. Penultimate sternite narrowed posteriorly with hind margin truncate, manubrium a little over three times longer than the sternite, dilated apically. Ultimate tergite transverse, smooth in anterior half and obscurely striate in posterior half, convex above, sloping backwards, median sulcus short, discernible only in the middle, sublaterally with a sharp ridge, posterior margin trisinate, oblique laterally. Forceps with branches subcontiguous, trigonal in basal 1/3, afterwards depressed, tapering apically, incurved in apical 1/3 with tip gently hooked, inner margin finely serrated. Genitalia with parameters six times longer than broad, narrowed apically with tip pointed, a fine tubular virga discernible, distal lobes otherwise lacking any teeth or chitinous plates.

♂ : Agrees with males in most characters except that penultimate sternite obtuse posteriorly; ultimate tergite contracted posteriorly and forceps simple and straight, internal margin with serrations more prominent.

Measurements : (in mm)

	Holotype	Paratypes
	♂	2♀♀
Length of body	7.7	7.9 - 8.2
Length of forceps	1.3	1.4 - 1.5



Figs. 6-11. *Epilandex wagneri* sp.n., Holotype ♂; 6. Anterior portion of body, 7. A few basal antennal segments, 8. Penultimate sternite, 9. Hind portion of body showing a few abdominal tergites and forceps, 10. Genitalia; Paratype ♀; 11. Ultimate tergite and forceps.

Material examined : Indonesia : Moluccas : Ambon Island, 30 m, Holotype ♂ (genitalia mounted between two coverslips and pinned with the specimen), Paratype 1♀ and 1 nymph, 12.VI.1962, coll. on fungi; Paratype 1♀, 27.V.1962 (A. M. Wagner).

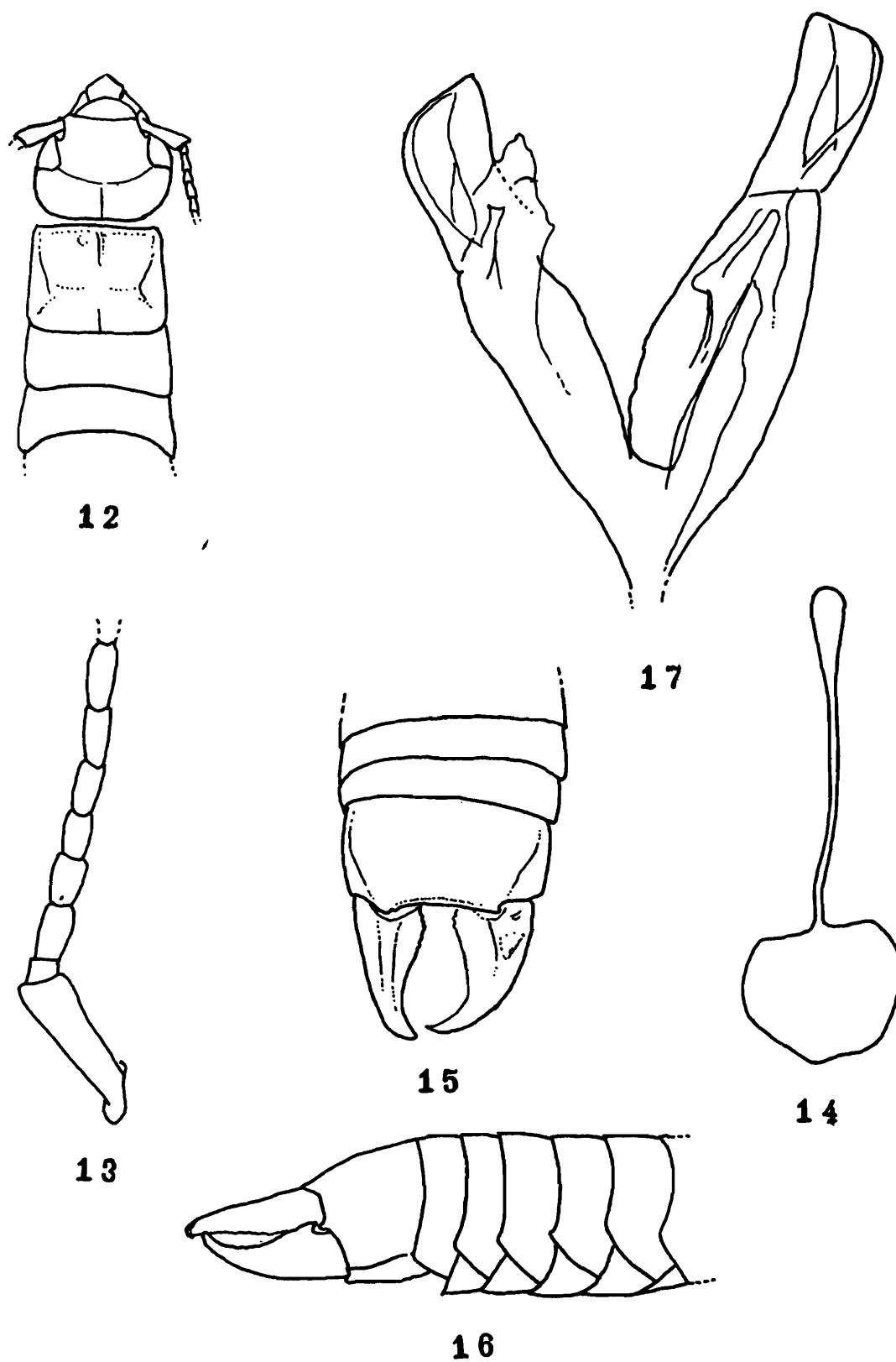
Remarks : The described species differs from all the known species of the genus by the shape of penultimate sternite in being narrowed posteriorly, produced into a sort of lobe with its hind margin truncate and ultimate tergite provided with a sharp crest or ridge sublaterally above.

***Gonolabis emarginata* sp.n.**

Figs. 12-17

♂ : General colour reddish black, antennae lighter, legs yellowish brown, femora with a broad fuscous band. Antennae with fine yellow pubescence and a few long hairs especially on the sides of abdominal segments present.

Head smooth, slightly longer than broad, frons raised, occiput feebly depressed, sutures marked by faint depression. Eyes prominent, slightly shorter than post-ocular area. Antennae partly broken (16 segments on the right and 19 on the left remaining), 1st stout, narrowed at base, expanded apically, about as long as the distance between the antennal bases; 2nd short, about as long as broad; 3rd long and cylindrical, gently expanded at extreme apex; 4th stouter and shorter than preceding; 5th longer than 4th but a trace shorter than 3rd; 6th almost equal to 3rd and afterwards gradually thinning and increasing in length except a few apical ones shorter. Pronotum slightly longer than broad, gently widened posteriorly with margin briefly convex, sides straight gently reflexed, median sulcus distinct, complete, prozona feebly convex and metazona depressed. Mesonotum twice as broad as long, feebly depressed in anterior half, obscurely punctate, hind margin truncate. Metanotum transverse, hind margin broadly emarginate, punctate. Elytra and wings absent. Legs typical for the genus. Abdomen convex, gradually enlarging from 9th tergite (not as in *G. electa* Burr, attaining maximum width on ultimate tergite), punctate, laterally above on each tergite with a pair of small smooth patches, side of segments 6th to 9th acute angled posteriorly (but not as acute as in *G. electa*). Penultimate sternite narrowed posteriorly with slight emargination in middle posteriorly, punctate, manubrium about three times longer than the sternite and dilated apically. Ultimate tergite smooth, transverse, sloping backwards and laterally, hind margin trisinate, laterally oblique. Forceps remote at base, trigonal above in basal one third, afterwards depressed, tapering apically, branches straight in basal half afterwards incurved with apices gently hooked, internal margin finely serrated. Genitalia with parameres distinctly longer than broad, inner tip obtuse, external angle rounded and margin straight, inner margin concave, distal lobes with a small chitinous pad and fine virga discernible.



Figs. 12-17. *Gonolabis emarginata* sp.n., Holotype ♂, 12. Anterior portion of body, 13. A few basal antennal segments, enlarged, 14. Penultimate sternite and manubrium, 15. Hind portion of body, 16. Hind portion of body, in profile, 17. Genitalia.

♀ : Unknown

Measurements : (in mm)

	Holotype
	♂
Length of body	17.0
Length of forceps	2.2

Material examined : Malaya : Singapore, Bukit Timah, Alt. 100 ft., Holotype ♂ (genitalia mounted between two coverslips and penultimate sternite mounted on a card and both pinned with the specimen), 4.VI.1962.

Remarks : The described species comes close to *G. sumatrana* Bormans and *G. oblita* Burr but differs from both by its larger size. It can be further distinguished from *G. sumatrana* in having the posterior margin of penultimate sternite slightly emarginate (vs broadly rounded in *G. sumatrana*) and parameres with internal margin concave with external angle rounded (vs straight and obtuse). From *G. oblita* it can be separated in having the sides of abdominal segments 6th to 9th acute angled posteriorly (vs convex posteriorly in *G. oblita*) and paramers comparatively longer with apical margin and external angle convex (vs parameters shorter, apical margin straight and external angle obtuse).

The genus *Gonolabis* Burr, is mainly characterised by the shape of parameres longer than broad with external angle broadly rounded. The posterior dilation of body may not be taken very seriously when the distinction of various genera of Carcinophorinae is primarily based on parameres.

In the genus *Gelotolabis* Zacher, the parameres are slightly longer than broad but comparatively shorter than in *Gonolabis* and the tip is narrowed to form a sort of snout and external angle is distinctly projecting or obtuse. As regards the length of parameres in relation to its width the genus *Gelotolabis* comes in between *Euborellia* Burr and *Gonolabis* Burr.

Epilabis punctata Srivastava

1978. *Epilabis punctata* Srivastava, *Bull.zool.Surv.India*, 1(1) : 74, figs. 2, A-F (♂, ♀; India : Tamil Nadu, Yercaud, Shevroy Hills, 4500 ft.).

Material examined : India : Yercaud, 4000 ft., 1 ♂ (genitalia pulled out for examination but attached with the specimen), 4 ♀♀, 3 nymphs, 6.III.62.

Distribution : Known from the type locality only. The above specimens represent the Topotypes.

Epilabis penicillata (Borelli)

1911. *Euborellia penicillata* Borelli, *Boll. Musei Zool. Anat Comp. R. Univ., Torino*, 24(624) : 3 (♂, ♀; Coonoor).

Material examined : India : Ootacmund, 2330 m, 1♂ (genitalia pulled out for examination but attached with the specimen), 2♀♀, 10.II.62; NE slope Dodabetta Peak, 2475 m, 1♂ (genitalia pulled out for examination but attached with the specimen), 1♀, 11.III.62.

Distribution : India (Deccan Plateau).

***Epilabis* sp.**

Material examined : India : Munnar, 6200 ft., 4♀♀, 20.II.62.

Remarks : The elytra in the above material are identical to *Epilabis penicillata* (Borelli). Since there are several species in Western Ghats (South India) having similar elytra, it is not possible to assign above specimens to any species on females alone.

***Paralabis lefroyi* (Burr)**

Figs. 18 - 22

1910. *Psalis lefroyi* Burr, *Fauna Brit. India, Dermaptera* : 77, pl. 3, fig. 20 (♀♀ nec ♂), Bombay Mahim).

Material examined : India : Mysore, 12 mi E. Virajpet, 850 m, 2♀♀, 24.II.62.

Distribution : This species is known from various localities in South India only.

***Paralabis rossi* sp. n.**

Figs. 18 - 22

♂ : General colour dark brownish black; legs, antennae and mouth parts yellowish brown.

Head slightly longer than broad, smooth, frons convex, sutures fine, hind margin feebly emarginate in middle. Eyes whitish, slightly shorter than the post-ocular length. Antennae yellowish brown with one or two segments yellowish, 20-segmented, 1st segment shorter than the distance between antennal bases, expanded apically; 2nd short, about as long as broad; 3rd long and cylindrical; 4th stout, shorter than 3rd; 5th slightly longer than 4th; 6th slightly longer than preceding but slightly shorter than 3rd, comparatively less stout; 7th onwards segments gradually increasing in length and becoming thinner, a few apical ones rod shaped. Pronotum slightly broader than long, posteriorly gently expanded, anterior margin straight, hind margin subtruncate, median sulcus distinct, prozona feebly raised and differentiated from weakly depressed metazona. Mesonotum transverse, hind margin truncate and metazona transverse with hind margin broadly emarginate. Legs typical for the genus. Abdomen convex, finely punctulate, gradually expanding posteriorly, sides of segments 6th to 9th convex posteriorly, 8th and 9th rugosely punctate. Penultimate sternite with posterior margin almost straight with a very slight emargination in middle, covered with a few long hairs. Ultimate tergite smooth, transverse, sloping backwards, on sides with an oblique fold, hind margin trisinate, oblique laterally. Forceps with branches subcontiguous, broader at

base, tapering apically, right branch incurved in apical half and left one almost straight, gently incurved near apex, trigonal in basal one third, apices gently hooked and pointed, inner margin finely serrated. Genitalia with parameres broader at base, narrowed apically with tip obtuse, internal margin straight except for a slight emargination before apex, external margin oblique and straight, near base broadly convex, distal lobes without teeth.

♀ : Unknown.

Measurements : (in mm)

	Holotype ♂
Length of body	13.5
Length of forceps	2.7

Material examined : Philippine Islands : Mindoro, San Jose, Holotype ♂ (genitalia mounted between two coverslips and pinned with the specimen...), X.45 (E. S. Ross).

Remarks : This species comes close to *P. henriki* Srivastava, from Thailand in having weakly transverse pronotum and ecarinate abdominal segments but differs in having the sides of abdominal segments 6th to 9th convex and parameres with external margin less oblique, broadest about the middle and internal margin slightly emarginate a little before apex and distal lobes unarmed.

Aborolabis nepalensis (Brindle)

1974. *Anisolabis nepalensis* Brindle, *Senckenbergiana biol*, 55(1/3) : 148 (♂, ♀ ; Nepal).

Material examined : Nepal : Aghore, 1050 m, 3 ♂♂, (2 ♂♂ with genitalia mounted between two coverslips and pinned with the respective specimens), 18.XI.61.

Distribution : Nepal.

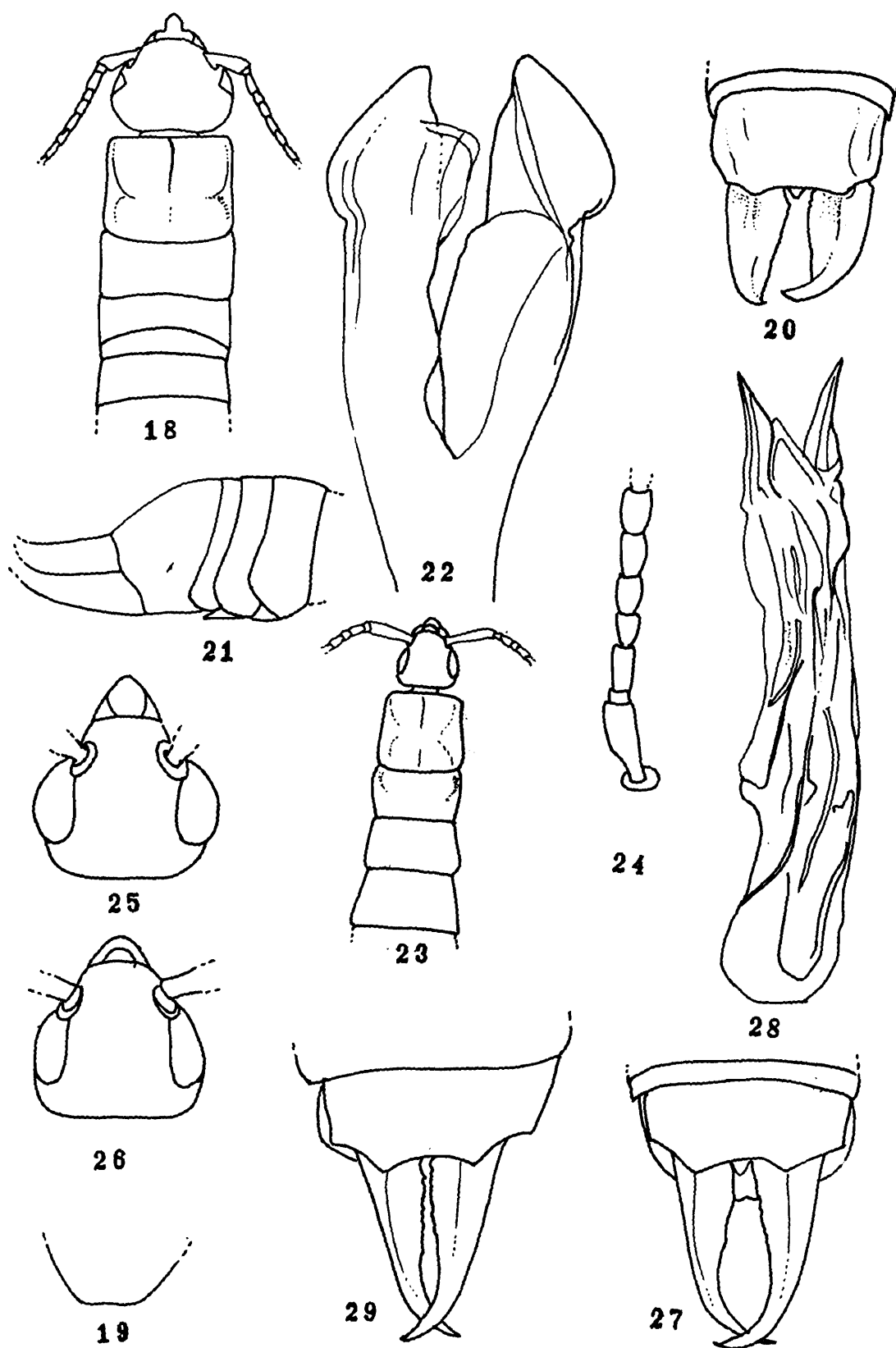
ISOLABIDINAE

Leptisolabis fletcheri (Burr) comb. n.

Figs. 23-29

1910. *Ctenisolabis fletcheri* Burr, *Fauna Brit. India, Dermaptera* : 110, fig. 79 9(♀; Ceylon, Madulsima).

Material examined : India : Mysore, 6 mi NE Ramnagaram, 750 m, 1 ♂ (genitalia mounted between two coverslips and pinned with the specimen), 25.II.62; Yercaud, 4000 ft., 1 ♂ (genitalia mounted between two coverslips and pinned with the specimen), 1♀, 6.II.63; Kodaikanal grade, 1150 m, 1 ♂ (genitalia mounted between two coverslips and pinned with the specimen), 29.II.62.



Figs. 18-29. *Paralabis rossi* sp.n., Holotype ♂, 18. Anterior portion of body, 19. Posterior margin of penultimate sternite, 20. Hind portion of body, 21. Hind portion of body, in profile, 22. Genitalia; *Leptisolabis fletcheri* (Burr) comb. n., ♂, 23. Anterior portion of body, 24. A few basal antennal segments; 25 and 26. Head, 27. Ultimate tergite and forceps, 28. Genitalia; ♀, 29. Ultimate tergite and forceps.

Remarks : The above material agrees with original description of the species (Burr, 1910).

Since the mesonotum is having a distinct curved fold laterally, dying out posteriorly, it is referred to *Leptisolabis* Burr.

Hitherto this species was known by ♀ from Sri Lanka. The male sex is reported here for the first time and a brief description of the same is provided. Some variations in the size of eyes are noted in the present material. Eyes are distinctly longer than the post-ocular area but in the ♂ from Mysore, Ramanagaram possesses eyes somewhat more prominent.

Following is the description of ♂ not so far reported in the species : ♂ : General colour blackish brown; legs yellow with femord apically blackish brown. Covered with fine yellow pubescence and punctate all over the body.

Head longer than broad, frons strongly convex, hind margin almost straight. Eyes prominent, about twice as long as the post-ocular area. Antennae 13-segmented, 1st long, stout, expanded apically, longer than the distance between antennal bases; 2nd short, about as long as broad; 3rd long, slender, about twice as long as broad; 4th subclavate, stout, about as long as broad, remaining gradually increasing in length and thickness, except a few apical ones. Pronotum longer than broad, expanded posteriorly, median sulcus represented by a smooth line extending up to the middle, all margins straight, lateral margin gently reflexed. Meso – and metanotum transverse, former with a distinct curved fold laterally, dying out posteriorly. Legs long and slender, typical for the genus. Abdomen spindle shaped, laterally with long pubescence, lateral tubercle on 3rd and 4th tergites feebly marked. Penultimate sternite triangular, hind margin with a emargination in middle, manubrium slightly longer than the sternite, almost of uniform width. Ultimate tergite transverse, sloping backwards, hind margin trisinate, laterally oblique, above the bases of forceps produced into minute lobes. Forceps long and cylindrical, remote at base, tapering apially, almost straight in a little beyond basal half, afterwards incurved, apices pointed, branches crossing a little before apex.

<i>Measurements</i> : (in mm)		
	♂♂	♀
Length of body	9.0–10.5	11.0
Length of forceps	1.0–1.5	1.5

Isolabis rossi sp. n.
Figs. 30-33

♂ : General colour shining dark brown, shaded with black on some posterior abdominal tergites and forceps.

Head impunctate, longer than broad, convex and hind margin almost straight, sutures

faint. Eyes not prominent, slightly shorter than the post-ocular length. Antennae partly broken (eight segments on the right side and thirteen on the left remaining), 1st stout, strongly narrowed basally, longer than the distance between antennal bases; 2nd short, about as long as broad; 3rd three times longer than broad, cylindrical; 4th shorter than preceding, stouter; 5th stout, about as long as 3rd, remaining gradually increasing in length and each one gently expanded apically, a few apical ones short. Pronotum smooth, obscurely punctate in posterior half, about as long as broad, greatly enlarged posteriorly, sides reflexed, straight, hind margin briefly rounded, postero-lateral angle rounded, prozona raised and poorly differentiated from weakly depressed metazona, median sulcus distinct and complete. Mesonotum punctate, transverse, depressed in anterior half, weak lateral fold near shoulder, dying out posteriorly, hind margin truncate. Metanotum punctate, posterior margin broadly emarginate. Legs long and slender, typical for the genus.

Abdomen convex, punctate, punctations separated from each other by the space slightly more than their diameter, lateral tubercle on 3rd and 4th tergites weakly developed, sublaterally above with a pair of oblong smooth patches but 5th tergite with a broad somewhat dull patch of smooth area, spindle shaped. Penultimate sternite obscurely punctate, transverse, narrowed posteriorly with slight emargination in middle. Ultimate tergite with punctation faint, transverse, sloping backwards, hind margin trisinate, laterally oblique. Forceps cylindrical, remote and broad at base, tapering apically, almost straight in basal half, afterwards incurved, apices hooked and pointed, crossing near tip. Genitalia as seen in fig. 32.

♀ : Agrees with males in most characters except that penultimate sternite obtuse in middle posteriorly; ultimate tergite narrowed posteriorly with hind margin almost straight in middle and laterally and forceps almost straight, only slightly incurved near apex.

Measurements : (in mm)

	Holotype ♂	Paratypes ♀♀
Length of body	9.8	8.4–10.7
Length of body	1.2	1.8–1.9

Material examined : Malaya : G. Batu, Brinchang, Holotype ♂ (genitalia mounted between two coverslips and pinned with the specimen), Paratypes 2 ♀♀, 6500 ft., 19.IV.1962.

Remarks : This species comes close to *Isolabis punctata* (Dubrony) from Java and Sumatra but differs in having eyes smaller i.e., about as long as the post-ocular area and antennal segments elongate, especially 4th one which is about two and half times longer than broad.

***Isolabis ocellata* Srivastava**

Fig. 34

1978. *Isolabis ocellata* Srivastava, *Annali Mus.civ.Stor.nat.Giacomo Doria*, **82** : 325 (♂, Burma - Genova Museum); Srivastava, 1984, *Bull. zool.Surv. India*, **5**(2 & 3) : 11 (♂; Java).

Material examined : Thailand : 10 mi N. Saramburi, 1 ♀, 100 m, 11.VII.1962.

Distribution : Burma, Thailand and Java.

Remarks : The above female agrees with the male in most characters except that the penultimate sternite is obtusely rounded posteriorly and ultimate tergite comparatively narrowed posteriorly.

Measurements : Length : body - 9.5 mm; forceps - 1.5 mm.

LABIDURIDAE

ALLOSTETHINAE

***Gonolabidura astruci* Burr**

1911. *Gonolabidura astruci* Burr, *J. Asiat.Soc.Beng.* (N.S.), **7** : 776 (♂, ♀ ; South India, Madura Dist., Shembaganur).

Material examined : India : 8 mi NE, Munnar, 6200 ft., 2 ♂♂ (genitalia pulled out for examination but attached with the body), 1 ♀, 5 nymphs, 20.III.62.

Distribution : South India.

Remarks : This is the second subsequent record of the species after a lapse of about seven decades since its original description.

The ♀ is dark blackish whereas other two ♂♂ are reddish brown.

NALINAE

***Nala lividipes* (Dufour)**

1828. *Forficula lividipes* Dufour, *Ann.Sci.Nat.*, **13** : 340.

Material examined : Pakistan : 8 mi E Peshwar, 350 m, 1♀, 1 nymph, 18.XII.1961; Margala Pass, nr Taxilla, 1 nymph, 17.XII.61. India : U.P. : Kitham Lake nr. Agra, 200 m, 2 nymphs, 3.XII.1961; West Bengal : 12 mi NE Dumka, 200 m, 2 ♂♂ (1♂, with genitalia pulled out for examination but attached with the specimen), 2 ♀♀, 2 nymphs, 31.X.1961; Calcutta, 1♀, 5m, 12.V.62. Bangladesh Comilla, 50 ft, 1♂, 1♀, 23.IX.61. Thailand : 8 mi S. E. Saramburi, 100 m, 1♀, 28.VII.62. Philippine Islands : Tacloban, Leyte, 1♂, 1♀, ...XI.44; San Jose, Mindoro, 1♂, ...X.45 (E. S. Ross).

Distribution : World wide.

LABIDURINAE

Labidura riparia (Pallas)

1773. *Forficula riparia* Pallas, *Reise Russ. Reichs*, 2 : 727 (Sex ? Shores of Irtysh River, Western Siberia).

Material examined : India : W. Bengal, 12 mi NE Dumka, 200 m, 1 nymph, 31.X.1961. South Vietnam : Bien Hoa Prov., Long Binh Post nr Bien Hoa City, 1♂, 7.V.69 (Marshal F. Kirby). Philippine Islands : San Jose, Mindoro, 1♂, 1♀, ...X.45 (E. S. Ross).

Distribution : World wide.

FORFICULOIDEA

SPONGIPHORIDAE (= LIBIIDAE)

NESOGASTRINAE

Nesogaster apoensis Rehn

Figs. 35-36

1946. *Nesogaster apoensis* Rehn, *Proc. Acad.nat.Sci.Philad.*, 98 : 235 (♂, ♀; Philippine Islands, Mindanao).

1971. *Nesogaster apoensis* : Brindle, *Entomologist's mon. Mag.*, 107 : 121.

Material examined : Philippine Islands : San Jose, Mindoro, 4 ♂♂, 4 ♀♀, 1 nymph, ...X.45 (E. Ross); 1♂, ...IX.45, (Ross & Skinner).

Distribution : Philippine Islands; New Britain and New Ireland.

Nesogaster reditus Rehn

Figs. 37-38

1948. *Nesogaster reditus* Rehn, *Proc.Acad.nat.Sci.Philad.*, 98 : 226 (♂, ♀ ; Piti, Guam).

Material : Indonesia : Moluccas, Ambon Island, 70 m, 1♂, 16.II.1961, at light (A. M. R. Wegner).

Distribution : Hitherto known from Guam and the present record from Moluccas is of interest.

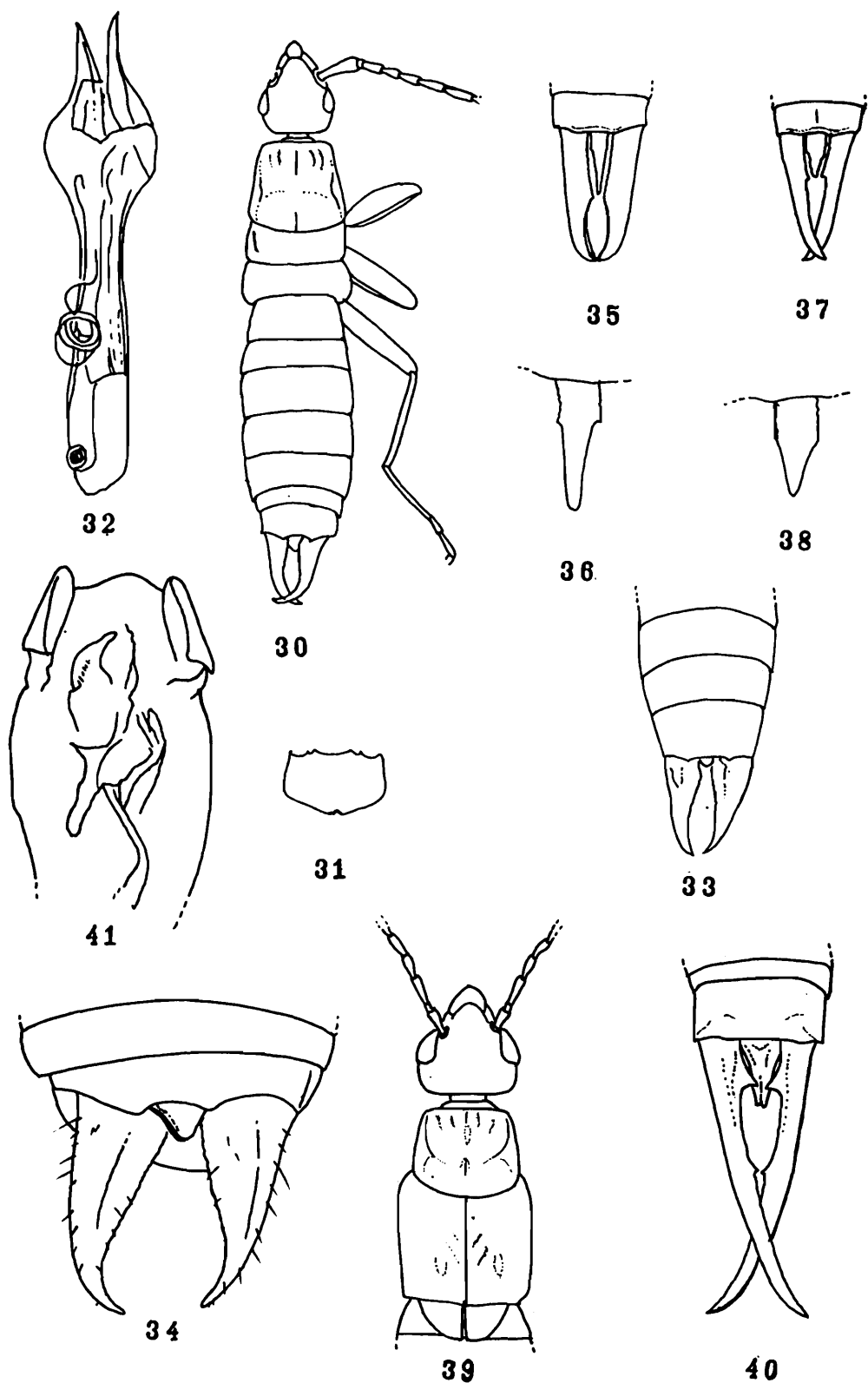
Remarks : Following are the measurements of the above specimen: Length : body - 4.5 mm; forceps - 2.3 mm and pygidium - 0.7 mm.

IRDEXINAE

Irdex nitidipennis (Bormans)

1894. *Spongophora nitidipennis* Bormans, *Annali Mus.civ.Stor.nat. Giacomo Doria*, (2) 14 : 382 (♂; Burma).

1985. *Irdex nitidipennis* : Srivastava, *Annali Mus.civ.Stor.nat. Giacomo Doria*, 85 : 203 (species redefined).



Figs. 30-41. *Isolabis rossi* sp.n., Holotype ♂, 30. Dorsal view without antennae and legs of left side, 31. Penultimate sternite, 32. Genitalia; Paratype ♀, 33. Hind portion of body; *Isolabis ocellata* Srivastava, ♀, 34. Hind portion of body; *Nesogaster apoensis* Rehn, ♂, 35. Ultimate tergite and forceps, 36. Pygidium, enlarged; *Nesogaster redivus* Rehn, ♂, 37. Ultimate tergite and forceps, 38. Pygidium, enlarged; *Spongovostox gracilis* Borelli, ♂, 39. Anterior portion of body, 40. Ultimate tergite and forceps, 41. Genitalia.

Material examined : Thailand : Khao - Yai Nat. PK, 750 m, 2 ♂♂, 2 ♀♀ (macropterous), 1 ♂, 1 ♀ (brachypterous), 26.VII.62.

Distribution : Widely distributed throughout the Oriental Region.

SPONGIPHORINAE

Spongovostox gracilis Borelli

Figs. 39-41

1916. *Spongovostox (Sci) gracilis* Borelli, *Boll. Musei zool.Anat.comp.R. Univ., Torino*, 31(715) : 2 (♂; ♀; Philippine Islands : Luzon & Mindanao).

Material examined : Philippine Islands : San Jose, Mindoro, 1 ♂ (genitalia mounted between two coverslips and attached with the specimen), 10 ♀♀, ...X-45 (E. Ross), 7 ♂♂, 3 ♀♀, ...IX-45 (E. S. Ross & Skinner).

Distribution : Philippine Islands.

Remarks : The pygidium in males is strongly projecting, triangular, narrowed posteriorly or broader with apex feebly bifid.

There appears to be some variation in the shape of ♂ pygicium since Brindle's (1971, fig. 27) figure shows it being comparatively broader.

Spongovostox anamalaiensis Srivastava

Figs. 42-46

1969. *Spongovostox anamalaiensis* Srivastava, *EOS, Madr.*, 44 : 425, figs. 1-4 (♂; Tamil Nadu, Anamalai Hills, Cinchona, 3500 ft.).

Material examined : India : Mysore, 4 km SW Sidapur, 900 m, 3 ♂♂ (1 ♂, without left branch of forceps and genitalia mounted between two coverslips and pinned with the specimen); 1 ♀, 3 nymphs, 22.II.62; 3 mi N. Yellapur, 550 m, 1 ♀, 16.II.62.

Distribution : India (Deccan Plateau).

Remarks : The species slightly less stout in build than *Spongovostox semiflavus* (Bormans).

The two males, out of the present material, possess two small distantly placed tubercles along the posterior margin of pygidium, which is, in the third specimen, distinctly emarginate between the tubercles. Besides the internal tooth situated at the middle of forceps in some specimens in weakly developed or obsolete.

Spongovostox mucronatus (Stål)

Figs. 47-49

1860. *Forficula mucronata* Stål, *Eug.Resa Ins.* : 300 (♂ nec. ♀; Java).

Material examined : Philippine Islands : Mindoro, San Jose, 1 ♂ (genitalia mounted between two coverslips and pinned with the specimen), 3 ♀♀, ...IV.45 (E. S. Ross).

Distribution : Widely distributed in the Oriental Region. Also recorded from Mauritius and New Guinea.

***Spongovostox semiflavus* (Bormans)**

Figs. 50-52

1894. *Spongophora semiflava* Bormans, *Annali Mus.civ.Stor.nat. Giacomo Doria*, (2) 14 : 385 (♂, ♀ ; Burma).

1967. *Spongovostox hakeni* Ramamurthi, *Ent. Medd.*, 35 : 242, figs. 19-20 (Holotype ♂; Philippines, Tawi Tawi in Zoologisk Museum, Copenhagen) Syn. n.

Material examined : India : Assam, 10 mi SW of Kochugaon, 50 m, 1♀; 19.X.1961; Mysore, 12 mi E. Virajpet, 850 m, 2♂♂, 2♀♀, 1 nymph, 24.II.62. Thailand : 20 mi NW Lee, 830 m, 1♂, 1♀ 14.VII.1962. Philippine Islands : San Jose, Mindoro, 2♂♂ (1♂ with genitalia mounted between two coverslips and pinned with the specimen), 4♀♀, ...IX.45 (*Ross and Skinner*).

Distribution : Widely distributed throughout the Oriental Region. Also known from Mauritius and New Guinea.

Remarks : The material from India, Thailand and Philippines are identical in most of the details. Some variations noted in the shape of pygidium are figured here.

Spongovostox hakeni Ramamurthi, is treated here as a synonym since it agrees with this species in most characters except those which show intraspecific variations.

***Marava arachidis* (Yersin)**

Fig. 53

1860. *Marava arachidis* Yersin, *Ann.Soc.ent.Fr.*, 8 : 509 (♂, ♀ ; Marseille, France).

Material examined : Indonesia : Moluccas, Ambon Islands, 6 m, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 28.II.1961, coll. at Light (*A.M.R. Wagner*).

Distribution : World wide.

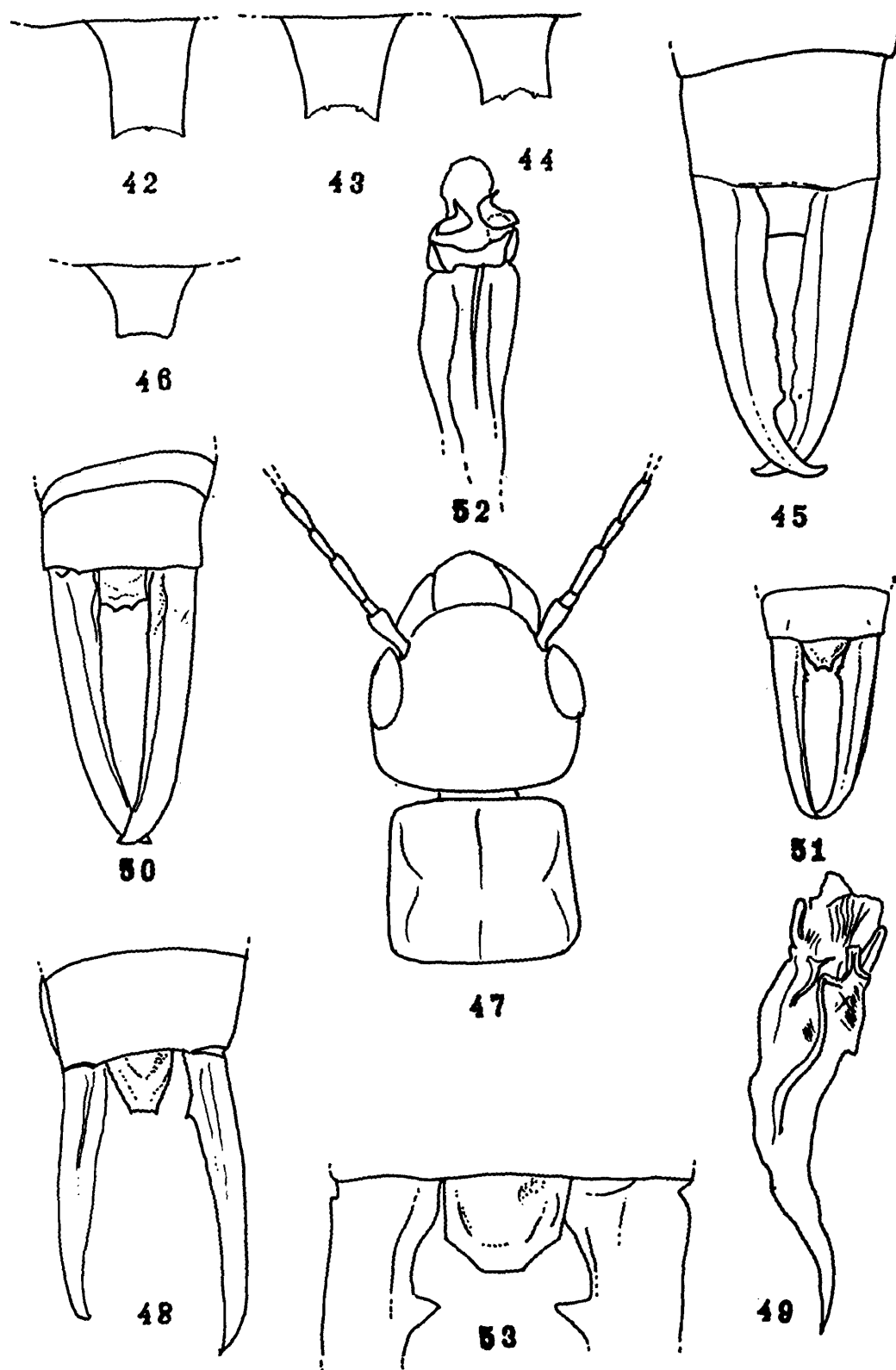
LABIINAE

***Apovostox serratus* (Kapoor)**

1967. *Labia serrata* Kapoor, *Bull.Ent.*, 8(2) : 1, 6 figs. (♂, ♀; Tamil Nadu, Madurai Dist., Perumalmalai).

Material examined : India Mysore, 8 mi NE, Mercara, 1000 m, 1♂ (genitalia in the vial with the specimen), 22.II.62.

Distribution : India (Tamil Nadu and Karnataka).



Figs. 42-53. *Spongovostox anamalaiensis* Srivastava, ♂ 42-44. Pygidium, enlarged, ♀, 45. Ultimate tergite and forceps, 46. Pygidium, enlarged; *Spongovostox mucronatus* (Stål), ♂, 47. Anterior portion of body, 48. Ultimate tergite and forceps, 49. Genitalia; *Spongovostox semiflavus* (Bormans), ♂, 50-51. Ultimate tergite and forceps, 52. Genitalia; *Marava arachidis* (Yersin), ♂, 53. A portion of forceps and pygidium (figs. 50 and 52 from the same specimen).

Apovostox jupiter (Burr)

Figs. 54-55

1900. *Chaetospania jupiter* Burr, *Ann.Mag.nat.Hist.*, (7) 6 : 95 (♂, ♀; Borneo).

1985. *Apovostox jupiter* : Srivastava, *Annali Mus.civ.Stor.nat.Giacomo Doria*, 85 : 208.

Material examined : Borneo : Sabah, Kinabalu National Park H.Q., 1♂, 25.III.1970 (T W. Bavies).

Distribution : Borneo.

Remarks : This species was treated as synonym of *Irdex nitidipennis* (Bormans) by Burr (1910). Srivastava (1985) reinstated it.

The present material was compared with the coloured transparencies of Syntypes ♂ of this species and were found to be identical.

Labia curvicauda (Motschulsky)

1863. *Forficesila curvicauda* Motschulsky, *Bull.Soc.Imp.Moscou*, 36 : 2, pl. 2, fig. 1 (♂, ♀; Nura Eliya Mountains, Ceylon).

Material examined : India : Mysore, 4 mi SW Sidapur, 900 m, 11♂♂, 5♀♀, 1 broken nymph, 22.II.1962; Yercaud, 4000 ft., 1♂, 1♀, 1 nymph, 6.II.62. Sri Lanka : Colombo Dist., Ratmalana, 1♀, 12.III.1986 (T F. Halstead). Bangladesh : Chiknagul, 10 m, 10 mi N Sylhet, 2♂♂, 3♀♀, 2 nymphs, 30.IX.61. Thailand : Khao - Yai Nat. Park, 750 m, 2♂♂, 2♀♀, 26.VII.62; 20 mi ES Chantaburi, 75 m, 2♀♀, I.VII.1962. Philippine Islands : Tacloban, Leyte, 1♂, 2♀♀, ...XI.44; San Jose, Mindoro, 23♂♂, 30♀♀ (Ross & Skinner).

Distribution : World wide.

Labia emarginata Srivastava

Fig. 56

1978. *Labia emarginata* Srivastava, *EOS, Madr.*, 52 : 278 (♂, Philippine Isls, Culion).

Material examined : Philippine Isls : San Jose, Mindoro, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 5♀♀, ...IV.45 (E. S. Ross).

Remarks : This species was hitherto known by its Holotype ♂ and the ♀ is described below for the first time.

♀ : Agrees with ♂ in most characters except that penultimate sternite obtusely rounded posteriorly; ultimate tergite slightly narrowed posteriorly with hind margin thickened, slightly raised and provided with a pair of small tubercles in middle; pygidium subvertical, transverse, slightly emarginate in middle and forceps, almost straight, tapering apically, gently incurved near apex, trigonal in basal 2/3, internal margin below dentate in basal half. Measurements : Length body - 4.5 - 5.0 mm; forceps 0.9 - 1.0 mm.

The ♂ measures : Length : body - 5.2 mm; forceps - 1.2 mm.

***Labia minor* (L.)**

1758. *Forficula minor* Linnaeus, *Syst. Nat.*, (10th ed.) : 423 (Europe).

Material examined : Java : Garoet, 1♂ (*G. Linsley* collector). Sri Lanka : Colombo Dist., Ratmalana, 3 ♀♀, 26.III.1968 (*T F. Halstead*).

Distribution : Almost World wide. Amongst the South Asian countries it is recorded from India, Sri Lanka, Burma and Philippine Islands.

Remarks : The ♂ from Java lacks ultimate tergite but the penultimate sternite with ♂ genitalia are sufficient for determining the species.

***Chaetospania lanceolata* Borelli**

Figs. 57-59

1926. *Chaetospania lanceolata* Borelli, *Res. Biologicae*, 1 : 72 (♂, ♀; Philippine Isls : Mindanao, Luzon and Palawan).

Material examined : Malaya : 16 mi NE Kuala Lumpur, 1000 ft., 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 8.VI.1962. Philippine Islands : Mindoro, San Jose, 1♀, ...IX.45 (*Ross & Skinner*); 2 ♂♂ (genitalia mounted between two coverslips and pinned with respective specimens), 2 ♀♀, ...X.45 (*E. S. Ross*).

Distribution : Philippine Islands and Malaya (new record).

Remarks : In the present material wings are either well developed or present as narrow, lateral lobes.

Male pygidium is lanceolated and provided with two minute tubercles at the apex.

***Chaetospania nigriceps* (Kirby)**

Figs. 60-65

1891. *Platylabia nigriceps* Kirby, *J. Linn.Soc.(Zool.)*, 23 : 518 (♀; Dorey).

1982. *Chaetospania nigriceps* : Srivastava, *Rec.zool.Surv.India*, 79 : 477, 478.

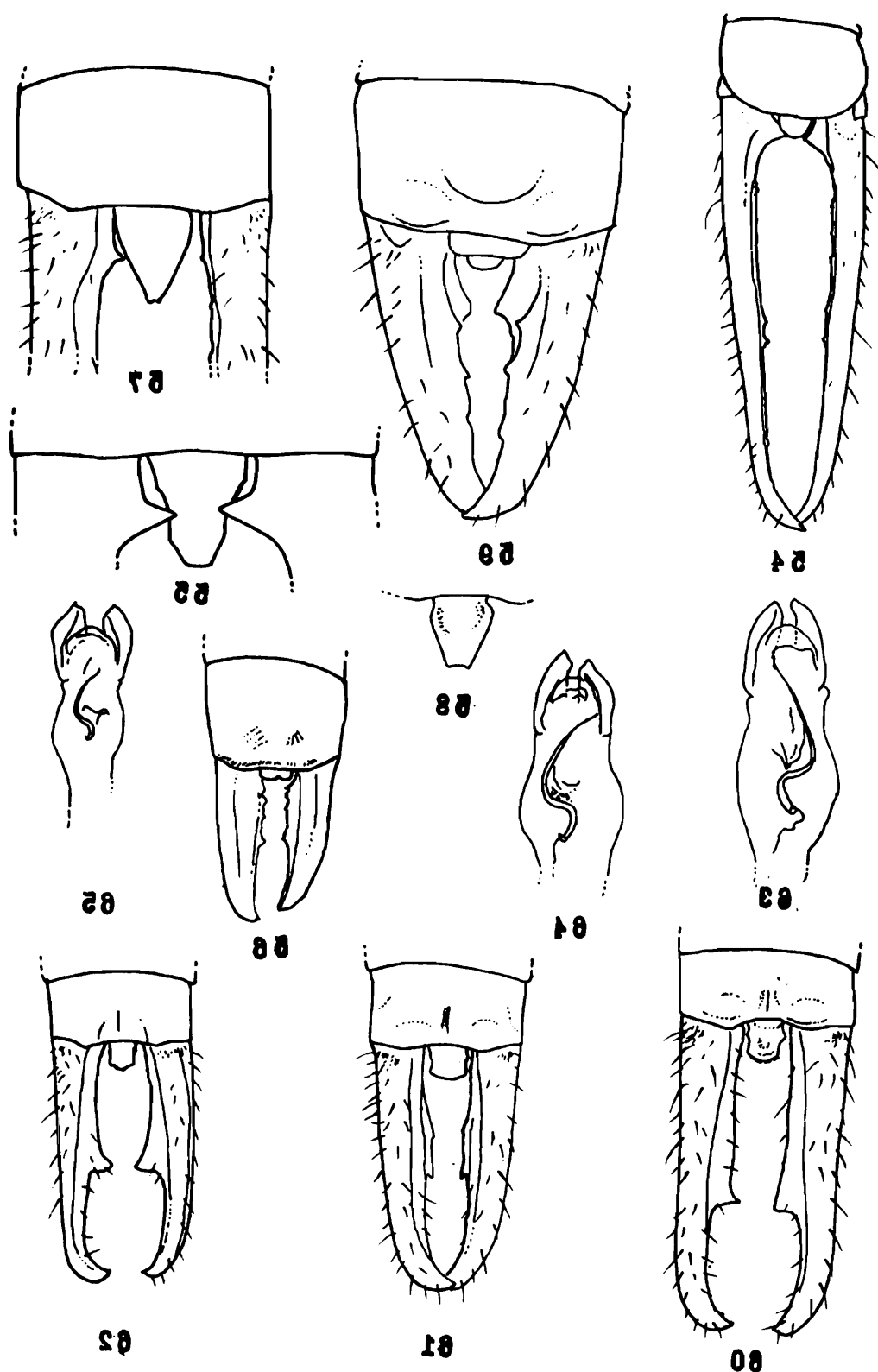
Material examined : India : Mysore, 3 mi N. Yallapur, 550 m, 4♂♂, 2 ♀♀, 16.II.62; 12 mi W of Munnar, 840 m, 1♂, 1♀, 21.III.62; Coimbatore, 430 m, 5 ♂♂, 8.III.62. Philippine Islands : Mindoro, San Jose, 38 ♂♂ (3♂♂ with genitalia mounted between two coverslips and pinned with respective specimens), 54 ♀♀, ...X.45 (*E. S. Ross*).

Distribution : Widely distributed in the Oriental Region.

***Chaetospania thoracica* (Dohrn)**

1867 *Platylabia thoracica* Dohrn, *Stettin ent. Ztg.*, 28 : 348 (♂, ♀; Penang [Island, Straits Settlement] Ceylon).

1911 *Chetospania thoracica* : Burr, *Gen.Insect.*, 122 : 54.



Figs. 54-65. *Apovostox jupiter* (Burr), Syntype ♂, 54. Penultimate sternite and forceps; 55. A portion of forceps and pygidium; *Labia emarginata* Srivastava, ♀, 56. Ultimate tergite and forceps; *Chaetospania lanceolata* Borelli, ♂, 57. Ultimate tergite and a portion of forceps, 58. Pygidium; ♀, 59. Ultimate tergite and forceps; *Chaetospania nigriceps* (Kirby), ♂, 60-62. Ultimate tergite and forceps, 63-65. Genitalia (figs. 60, 63; 61, 64 and 62, 65 from the same specimens).

Material examined : India : Kerala, Thekkady Dist., Periyar Lake, 900 m, 1♂, 23.III.1962.

Distribution : Widely distributed throughout the Oriental Region. Also known from Bismark Isl. and Seychelles.

***Chaetospania acuminata* sp.n.**

Figs. 66-70

♂ : General colour brownish black; antennae with a few preapical segments yellow; legs brownish with fore femora black; abdominal tergites somewhat brownish with shades of black; ultimate tergite blackish posteriorly and forceps blackish brown. Form weakly depressed. Long and short pubescence present all over the body.

Head cordiform, depressed, sutures obsolete, obscurely punctured, about as long as broad, hind margin emarginate. Eyes not prominent, shorter than post-ocular length. Antennae 12-segmented, stout, 1st gently expanded apically, almost equal to distance between antennal bases, stout; 2nd short about as long as broad; 3rd long and slender; 4th about as long as preceding but a shade stouter; 5th slightly longer than 3rd, gently narrowed at base, remaining gently increasing in length distally excepting a few preapical ones shorter. Pronotum slightly longer than broad, smooth, gently narrowed posteriorly, anteriorly convex, sides depressed and straight, hind margin subtruncate, prozona weakly raised and metazona depressed, median sulcus obsolete, except for a short faint groove anteriorly. Legs typical for the genus, hind tarsi with 1st segment about as long as the 3rd; 2nd short, broader than long. Elytra and wings well developed, sparsely and shallowly punctured. Abdomen depressed, parallel sided obscurely punctulate. Penultimate sternite broadly rounded posteriorly with slight emargination in middle. Ultimate tergite transverse, depressed above, sides straight, hind margin faintly emarginate in middle, on sides oblique and emarginate, feebly raised above the bases of forceps and depressed in middle with a pair of distantly placed tubercles. Pygidium roughly triangular, at base declivious, apically produced into a sharp point. Forceps long and slender, gently curved apically, trigonal in basal 1/3, close to external margin with a faint convexity, internally forming a sharp flange with a triangular teeth at apical 1/3, clad with long pubescence. Genitalia with parameres elongated, tapering apically, virga tubular, broadly curved at base with reniform vesicle.

♀ : Agrees with males in most characters except that ultimate tergite lacks tubercles on the posterior median depression; pygidium longer than broad, at base broader, declivious, apically narrower, parallel sided, hind margin faintly concave in middle and forceps comparatively more depressed, internal flange more prominent, wavy and gradually merging with the inner margin a little before apex.

Measurements : (in mm)

	Holotype	Paratype
	♂	♀
Length of body	7.5	6.5
Length of forceps	2.0	1.75

Material examined : India : Mysore (now Karnataka) 4 mi SW of Sidapur, 900 m, Holotype ♂ (genitalia mounted between two coverslips and pinned with the specimen), Paratype 1♀, 22.II.1962.

Remarks : With Srivastava's (1982) key to Indian species of *Chaetospania* Karsch, the described species comes close to *C. stiletta* Burr, from South India but differs in ♂, in having the pronotum slightly longer than broad, gently narrowed posteriorly (vs clearly longer than broad, parallel sided in *C. stiletta*); pygidium drawn out posteriorly into an acuminate point (vs pygidium lanceolate); and inner flange of forceps with its free margin entire, terminating into a short, acute tooth at apical 1/3 (vs wavy with a small teeth near base and another larger one at apical 1/3 triangular and sharp); and in ♀ ultimate tergite lacking compressed tubercles in the posterior median depression of ultimate tergite (vs present); pygidium longer than broad (vs broader than long) and inner flange of forceps with a shallow emargination near base, gradually dying out at apical 1/3 (vs with broad and more pronounced emargination in basal 1/3).

The above comparisons are made with the Syntypes 1♂, 1♀ of *Chaetospania stilleta* Burr, which was placed at my disposal through the courtesy of Shri B. N. Ramamurthi who received it from the British Museum (Natural History), London, probably in exchange.

Chaetospania minuta Borelli
Fig. 71

1921. *Chaetospania minuta* Borelli, *Boll. Musei Zool. Anat. comp. R. Univ. Torino*, 35 (736) : 4 (♂, ♀ ; Sandakan, Borneo); Srivastava, 1983, *Boll. Mus. Reg. Sci. Nat. Torino*, 1(2) : 233 (Type reexamined and figured).

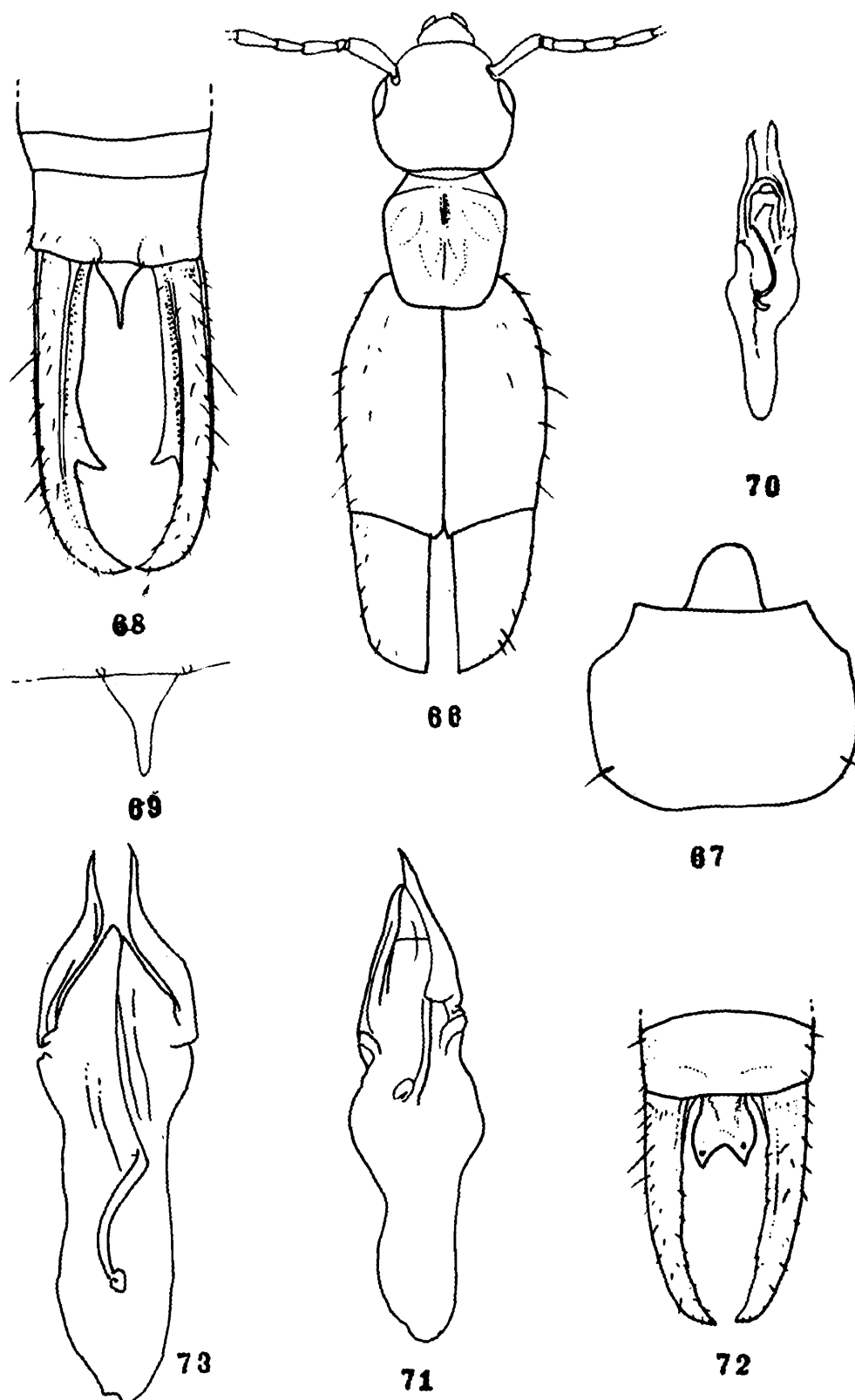
Material examined : Malaya : Cameron Highlands, 4 mi NE Jor camp, 800 m, 4 ♂♂ (1♂ with genitalia mounted between two coverslips and pinned with the specimen), 4 ♀♀, 3 exs. (hind portion of body missing), 20.VI.62.

Distribution : Borneo and Malaya.

Remarks : The ♂ genitalia is figured here for the first time.

Chaetolabia bihastata (Börg)
Figs. 72-73

1904. *Platylabia bihastata* Börg, *Ark. Zool.*, 1 : 572 (♂ ; Cameroon).
1948. *Labia bihastata* : Hincks, *Entomologist's mon. mag.*, 84 : 95 (Redescription of the type).



Figs. 66-73. *Chaetospania acuminata* sp.n., Holotype ♂, 66. Anterior portion of body, 67. Penultimate sternite, 68. Hind portion of body, 69. Pygidium, enlarged, 70. Genitalia; *Chaetospania minuta* Borelli, ♂, 71. Genitalia; *Chaetolabia bihastata* (Borg), ♂, 72. Ultimate tergite and forceps, 73. Genitalia.

1973. *Chaetolabia bihastata*: Brindle, *The Dermaptera of Africa*, Pt.I : 160, figs.201, 228.

Material examined : India : West Bengal, Darjeeling Dist., Tista Bridge, Tista River Valley, 350 m, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 1♀, 28.X.61.

Distribution : Africa; the present record from India is of interest.

Remarks : The above material agrees well with the redescription of the species by Hincks (1948).

CHELISOCHIDAE

CHELISOCHINAE

Proreus simulans (Stål)

1860. *Forficula simulans* Stål, *Eug. Resa .Ins.*, : 302 (♂, Java).

Material examined : Philippine Islands : Tacloban, Leyte, 1♀, ...XI.44 (*E. S. Ross*); Los Baños, 2♀♀, 1914 (*Ledyard*); Laguna, 3 ♂♂, 1♀, 1.V.32, ex Sugar cane (without and any further data).

Distribution : Oriental Region.

Proreus ledyardi sp. n.

Figs. 74-77

♂ : Head and pronotum orange, latter yellow on sides; antennae and legs yellow; elytra and wings yellow, shaded with black; abdomen, ultimate tergite and pygidium black and forceps reddish black.

Head longer than broad, weakly convex, smooth, sutures faint, hind margin emarginate. Eyes about half as long as the post-ocular length. Antennae partly broken, right side with basal segment and on the left 8 segments present, basal stout, gently narrowed basally, slightly longer than the antennal bases; 2nd short, about as long as broad; 3rd cylindrical, about as long as 5th; 4th slightly shorter than 3rd, 5th onwards segments gradually increasing in length and thinning. Pronotum smooth, slightly longer than broad, anteriorly as broad as head, convex, sides straight, gently reflexed, slightly widened posteriorly with hind margin rounded, prozona weakly raised and metazona feebly depressed, median sulcus faint, but complete. Legs typical for the genus. Elytra and wings well developed. Abdomen gently narrowed at base, weakly depressed, obscurely punctulate, lateral tubercles on 3rd weakly and on 4th strongly developed, hind margin of some posterior tergites with a row of distantly placed faint compressed tubercles. Penultimate sternite transverse, obscurely punctulate, hind margin broadly rounded in middle, scarcely emarginate. Ultimate tergite smooth, transverse, depressed, posteriorly in middle with a depression, two pairs of compressed tubercles, inner pair closely placed, on either side of middle line, posterior margin trisinate,

oblique laterally and feebly raised above bases of forceps. Pygidium subvertical, about as broad as long, narrowed posteriorly, hind margin subtruncate. Forceps subcontiguous, stout, depressed tapering apically, almost straight in basal half, afterwards gently incurved with apices hooked and pointed, internal margin at base with a bifid tooth, followed by another minute triangular tooth, afterwards margin unarmed. Genitalia as seen in fig. 77.

♀ : Unknown.

Measurements : (in mm)

	Holotype ♂
Length of body	10.5
Length of forceps	4.0

Material examined : Philippine Islands : Los Banos, Holotype ♂ (genitalia mounted between two coverslips and pinned with the specimen), 1913 (*Ledyard*) - no further data.

Remarks : This species comes close to *Proreus ludekingi* (Dohrn), widely distributed in the Oriental Region, but differs by the shape of penultimate sternite broadly rounded and hardly emarginate in middle (vs comparatively narrowed posteriorly with median emargination of hind margin more pronounced in *P. ludekingi*) and forceps with inner margin armed at base with a bifid tooth followed by another tooth, a little distance apart, afterwards unarmed (vs internally armed with several teeth spread throughout the length).

Proreus laetior (Dohrn)

1865. *Lobophora laetior* Dohrn, *Stettin ent.Ztg.*, 27 : 73 (♀; Batchian).

Material examined : Indonesia : Moluccas, Ambon Island, at light, 70 m, 1♀, 3.V.1960; 60 m, 1♀, 6.II.1961; 1♀, 8.II.1961; 70 m, 1 nymph, 24.III.1961, All coll. at ligh (*A.M.R. Wagner*).

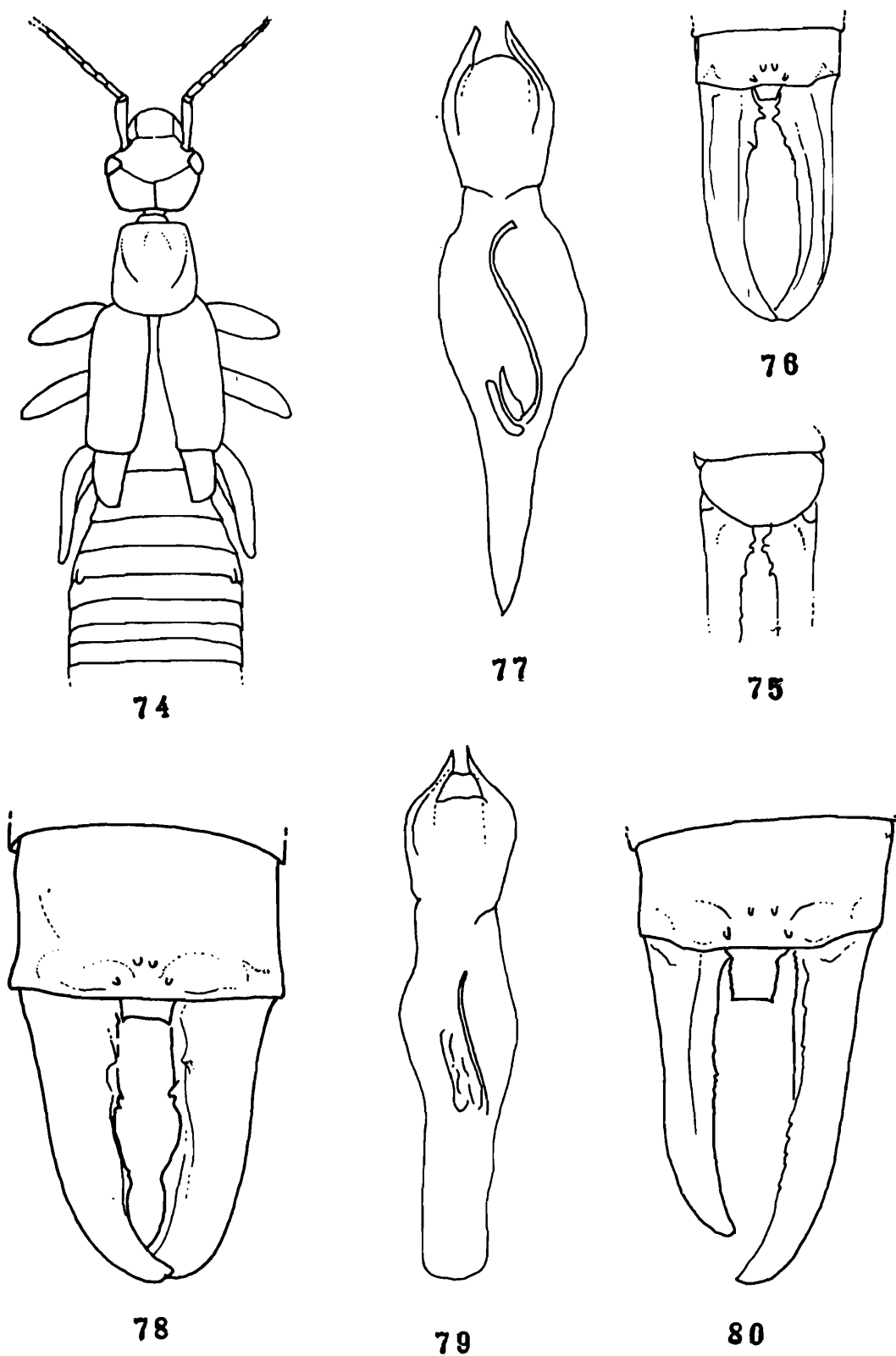
Distribution : Known from Indonesia (Moluccas) and Solomon Islands.

Chelisoche semirufus Borelli

Figs. 78-80

1926. *Chelisoche semirufus* Borelli, *Res.Biologicae*, 1(1) : 7, figs. 7, 7a and 8 (♂, ♀; Sipora et Siberoet (Isole Mentawai).

Material examined : 1♂ (genitalia mounted between two coverslips and pinned the specimen), 1♀ labelled as i) W. W. Funge Bequest; ii) Mjoberg collection - No further data.



Figs. 74-80. *Proreus ledyardi* sp.n., Holotype ♂, 74. Anterior portion of body, 75. Penultimate sternite and a portion of forceps, 76. Ultimate tergite and forceps, 77. Genitalia; *Chelisoches semirufus* Borelli, ♂, 78. Ultimate tergite and forceps, 79. Genitalia, ♀, 80. Ultimate tergite and forceps.

Remarks : The present material agrees well the original description of the species except for some minor variation in the inner armature of male forceps. Following are the measurements of the present material : Length : ♂; body- 10.3 mm; forceps- 2.2; ♀; body-9.7, forceps-3.0 and Pygidium- 0.4 mm.

***Chelisothes rubriceps* (Burr)**

Figs. 81-82

1900. *Spongiphora rubriceps* Burr, *Ann. Mag. nat. Hist.*, (7) 6 : 89 (♂, ♀; Sarawak, Kuching).

1926. *Chelisothes rubriceps*: Borelli, *Res. Biologicae*, 1(1): 3, figs. 2,2a, 3,3a, 4 and 5, 5a.

Material examined : 1♂ labelled as : i) W.W. Funge Bequest; ii) Mjoberg collection - no further data; ♂ genitalia mounted between two coverslips and pinned with the specimen.

Remarks : The above specimen agrees well with the detailed information provided by Borelli (1926) except that size is slightly shorter (length : body - 8.0 mm and forceps - 1.6 mm).

***Hamaxas crassus* Borelli**

Figs. 83-85

1926. *Hamaxas crassus* Borelli, *Res. Biologicae*, 1(5) : 77 (♂, ♀; Mindoro).

Material examined : Philippine Islands : San Jose, 1♂ (genitalia mounted between two coverslips and pinned with the specimen), 1♀, ...IX.45 (*Ross & Skinner*).

Distribution : Philippine Islands.

***Adiathetus tenebrator* (Kirby)**

1891. *Chelisothes tenebrator* Kirby, *J. Linn. Soc. (Zool.)*, 23 : 521, pl.12, fig. 5 (♀, India).

Material examined : India : Karnataka, 12 mi W Munnar, 840 m, 1♂, 21.III.62; Mysore, 4 mi SW Sidapur, 900 m, 1♀, 22.III.62.

Distribution : India (Deccan Plateau).

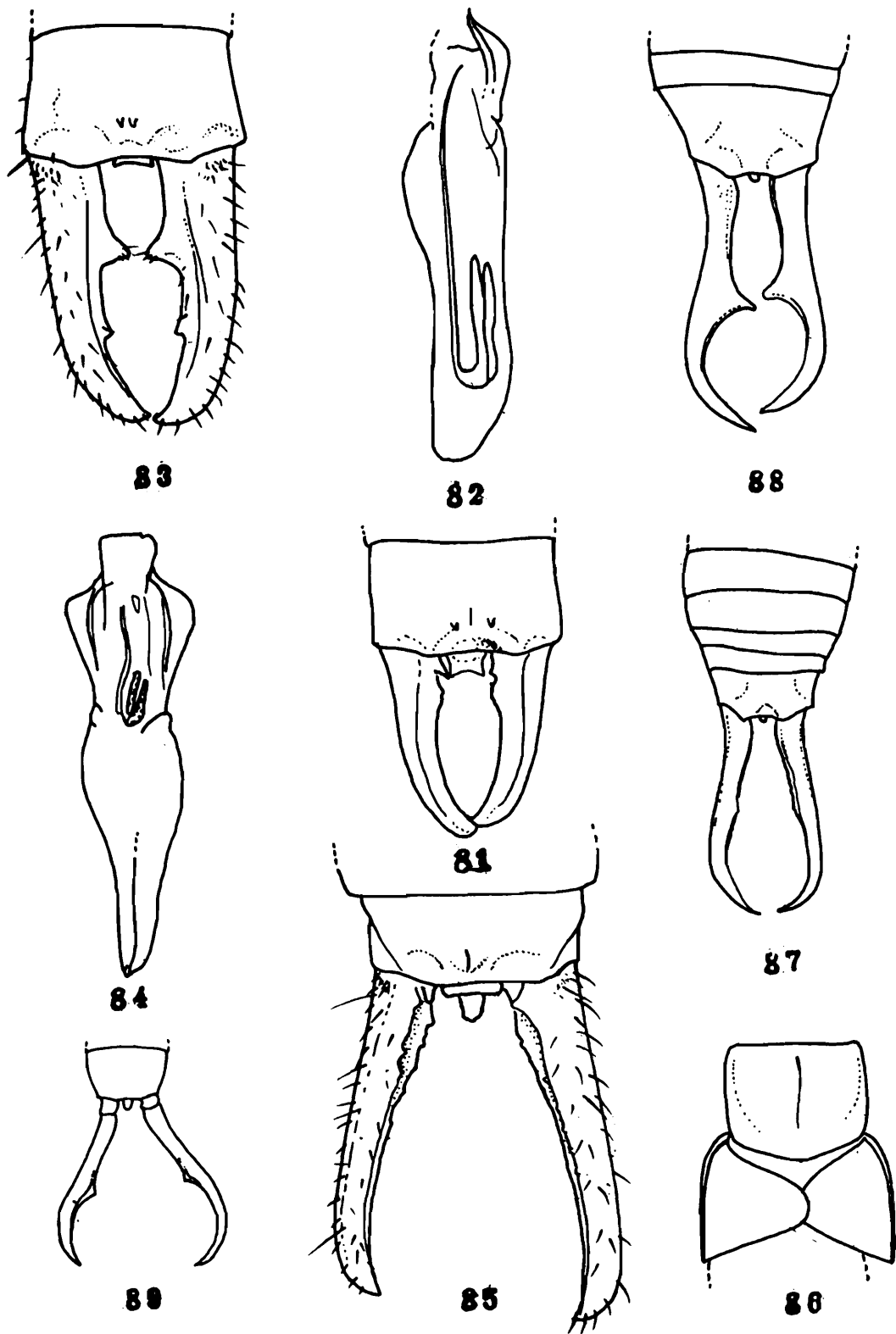
FORFICULIDAE

FORFICULINAE

***Hypurgus* sp.**

Material examined : 1♂ labelled as : *E. S. Ross* collection - no further data; genitalia mounted between two coverslips and pinned with the specimen.

Remarks : An undescribed species is represented but it is left unnamed in the absence of any locality data.



Figs. 81-89. *Chelisoches rubriceps* (Burr), ♂, 81. Ultimate tergite, 82. Genitalia; *Hamaxas crassus* Borelli, ♂, 83. Ultimate tergite and forceps, 84. Genitalia, ♀, 85. Ultimate tergite and forceps; *Liparura debrepaniensis* (Kapoor, Bharadwaj & Banerjee), Comb. n., ♂, 86. Pronotum and elytra, 87-89. Hind portion of body (fig. 89 from the Holotype ♂).

***Hypurgus fulvus* Burr**

1911. *Hypurgus fulvus* Burr, *Stettin ent.Ztg.*, : 341 (1 ♂, 2♀♀; Sumatra).

Material examined : Philippine Islands : San Jose, 1♂, ...IX.45 (Ross & Skinner), 1♂, ...X.45 (Ross).

Distribution : Burma, Sumatra and Philippines Islands.

Remarks : A yellow stripe along the internal margin of wings present.

OPISTHOCOSMIINAE***Liparura debrepaniensis* (Kapoor, Bharadwaj & Banerjee) comb.n.**

Figs. 86-89

1971. *Eparchus debrepaniensis* Kapoor, Bharadwaj & Banerjee. *Bull.Ent.*, 12(1) : 38, figs. 13-15 (Holotype ♂, Paratype 1♀; India : W. B. : Darjeeling. Debrepani, 6000 ft.; Paratype 1♀, Rangirun, 6000 ft).

Material examined : India : W. B., Darjeeling Dist., Debrepani, 10 mi, W Ghum, 2010 m, 9♂♂, 7♀♀, '22.X.1961.

Remarks : The type material of the species preserved in the Entomology Division, Forest Research Institute, Dehra Dun was examined. Since the elytra possesses a sharp ridge on the costal margin it can be referred to *Liparura* Burr.

In the present material some minor variations are noted in the internal tooth of forceps; it may be either well developed or weakly represented. The figure (89) from the Holotype ♂ shows intermediate stage.

This species comes very close to *L. punctata* (Burr) but can be easily separated by the shape of forceps in being remote at base lacking the vertical ridge close to inner margin.

***Eparchus insignis* (Haan)**

1842. *Forficula insignis* Haan, *Verh.nat.Ges.nederl. Overz.Bezitt.* : 243, pl. 23, fig 15 (not fig. 14 as mentioned in the text) (♂, ♀; Java).

Material examined : Bangladesh : Baraiyadhala, Forest Res., 150 m, 1♂ (genitalia taken out kept in a vial alongwith the specimen), 21.IX.61; Lawa Chera For. Srimangal, 110 m, 2♂♂, 2♀♀, 27.IX.61.

Distribution : Widely distributed in the Oriental Region.

***Opisthocosmia longipes* (Haan)**

1842. *Forficula longipes* Haan, *Verh.nat.Ges.Nederl.Overz.Bezitt.* : 242, pl.23, fig. 14 (not fig. 13 as mentioned in the text) (♂, Sumatra).

Material examined : Philippine Islands : Mt. Makiling, Laguna, 1♀, 11.V.1931 (F. C. Hadden collection).

Remarks : In the absence of a male this identification should be treated with some reserve.

Cordax armatus (Haan)

1842. *Forficula armatus* Haan, *Verh.nat.Ges.Nederl.Overz.Bezitt.*, : 243, pl. 23, fig. 13 (not Fig. 12 as mentioned in the text) (♂; Sumatra, Batang Singlang).

Material examined : China : Lung - Tan-Shan, N. Kwangtung, 1000-2000 ft., 1♂, 11.VI.47 (L. Gressitt).

Remarks : Hitherto this species was known from Burma and Vietnam and the present record is new to China.

Srivastava 1987 has redescribed this species.

ACKNOWLEDGEMENTS

I am thankful to the Director, Zoological Survey of India, Calcutta for providing necessary facilities during the course of present study and to Dr. Paul H. Arnaud Jr., Chairman, Department of Entomology, California Academy of Sciences, San Francisco, U.S.A. for placing the interesting collection at my disposal for study. My thanks are due to Mrs. J. Marshall, British Museum (Natural History), London for supplying some useful information and coloured transparencies from the syntypes of *Apovostox jupiter* (Burr).

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**STUDIES ON THE FISH FAUNA OF UTTAR PRADESH TERAİ
2. ON THE EXTENSION OF RANGE OF DISTRIBUTION
OF PANGIO PANGIA (HAMILTON) WITH
ZOOGEOGRAPHICAL REMARKS.**

RAJ TILAK

Zoological Survey of India, Dehra Dun

INTRODUCTION

The cobitid genus, *Pangio* Blyth is represented in India by only two species, *Pangio pangia* (Hamilton), so far recorded from North-east Bengal, Assam and Manipur in India and *Pangio goaensis* Tilak, known only from Goa. During recent surveys of fish fauna of Sarda river in Pilibhit district and Suheli river in Dudhwa National Park, Lakhimpur Kheri, district Uttar Pradesh Terai, twenty two examples of *Pangio pangia* have been collected. Since the fish is of rare occurrence and shows discontinuous distribution, notes on this material have been given in this paper.

OBSERVATIONS

***Pangio pangia* (Hamilton)
(Fig. 1)**

1822. *Cobitis pangia* Hamilton, *Fishes of Ganges* : 355, 394 (Type-locality : North-eastern parts of Bengal).
1889. *Acanthohthalmus pangia* : Day, *Fauna Brit. India, Fish*, 1 : 222.
1889. *Acanthophthalmus pangia* : Vinciguerra, *Ann.Mus.Stor.Nat. Genova*, (2)IX : 347.
1916. *Acanthophthalmus pangia* : Weber and Beaufort, *Fish. Indo-Austral. Archipel.*, III : 31.
1921. *Acanthophthalmus pangia* : Hora, *Rec. Indian Mus.*, 22 : 197.
1987. *Pangio pangia* : Kottelat, *Jap. J. Ichth.*, 33, p. 371.
B.III, D.III/6, P.I/8, V.I/6, A.II/5, C.17.

It is an elongated fish with both the profiles of the body almost parallel to each other. The length of head is contained 7.06-7.6 times and the length of caudal fin 9.5-13.2 times in the total length of body. The snout lies 3.0-3.75 times and the eye diameter 7.5 times in the length of head. The height of caudal peduncle lies 1.2-1.4 times in its length. The height of dorsal fin is contained 1.66-1.87 times, the length of pelvic fin 2.14 times and the length of caudal fin 1.25-1.87 times in the length of head. The length of base of dorsal fin is contained 1.14-1.5 times in the height of dorsal fin. The body is covered with scales.

In life, the fish is pinkish in colour and slimy to touch. It lives at the bottom of the stream inbetween stones and algae.



Fig 1. Photograph of *Pangio pangia* (Hamilton) from Sarda river, U. P. Terai.

Remarks : *P. pangia* (Ham.) was first described by Hamilton (1822) as *Cobitis pangia* from North-east Bengal and subsequently many authors (Day, 1878; Weber and Beaufort, 1916; Hora, 1920, 1921 b, 1930, 1935, 1941 a, 1941 b, 1944, 1952; Smith, 1945) recorded it from North-east Bengal, Assam, Manipur, Burma, Java and Sumatra. Weber and Beaufort (1916) recorded it from Java and Sumatra and considered *A. javanicus* Bleeker as its synonym but Smith (1943) did not agree with this treatment on the basis of his comparison of the material at his hand with the figure of *P. pangia* (*A. pangia*) given by Day (1878). Tilak (1972), while describing *A. goaensis* from Goa, clarified that Day's figure of *A. pangia* was incorrect in as far as the length of base of dorsal fin and its distance in relation to the tip of snout or the caudal base are concerned. Therefore, the resurrection of *A. javanicus* from the synonymy of *A. pangia* by Smith (1945) was not held valid. The present material agrees well with the description of *P. pangia* (*A. pangia*) which is, therefore, distributed very widely extending from U. P. Terai (district Pilibhit) to Manipur in India, Burma, Thailand, Java and Sumatra. Taxonomic status of *Acanthophthalmus* van Hasselt and *Pangio* Blyth.

Kottelat (1987) has pointed out that *Acanthophthalmus* Bleeker, 1859 is a subsequent erroneous spelling of *Acantophthalmus* van Hasselt, 1853 and hence not available according to International Rules of Zoological Nomenclature. *Acantophthalmus* is a junior synonym of *Cobitis* according to Kottelat (1987) and, therefore, the fishes usually described under the generic name *Acantophthalmus* or *Acanthophthalmus* in fact are to be considered under *Pangio* Blyth, 1860 (type-species : *Cobitis cinnamomeum* McClelland, 1839, an unnecessary replacement name for *Cobitis pangia* Hamilton, 1822). Blyth (1860) also described *Apua* with *A. fusca* Blyth as its type-species but this species is a junior synonym of *Cobitis pangia* based on specimens lacking pelvic fins (Hora, 1921). *Apua* Blyth is, therefore, a synonym of *Pangio* Blyth. Kottelat (1987) has retained *Pangio* Blyth for these fishes and hence, this generic name is used here.

ZOOGEOGRAPHICAL REMARKS

The present record of *P. pangia* from Sarda river in Pilibhit district and Suheli river in Dudhwa National Park, Lakhimpur Kheri district of Uttar Pradesh Terai extends the range of distribution of this species westwards and establishes a zoogeographic relationship of the eastern part of India with Western part of U. P. This is still another instance to strengthen the belief that the fish fauna travelled from the East to the West along Himalaya (Tilak and Hussain, 1975, 1978, 1980 and Tilak, in press). *P. pangia* is the third species identified from Sarda river to show its extended distribution from the eastern part of India towards the west; the other two species have been siluroids, *Conta conta* (Ham.) of the family Sisoridae and *Chandramara chandramara* (Ham.) of the family Bagridae (Tilak, in press). The evidence of the distribution of fish species common to eastern part of India and western part of Uttar Pradesh indicate that the distribution of

fish fauna from eastern part of India but also along the base of Himalaya with the similar intensity.

SUMMARY

Two examples of *Pangio pangia* (Hamilton) have been collected from Sarda river in Pilibhit district and twenty two examples of this species from Suheli river in Dudhwa National Park, district Lakhimpur Kheri of Uttar Pradesh. This fish has so far been recorded from North Bengal and further east and the present record of this species in the west along the base of Himalaya as far west as Pilibhit and Lakhimpur Kheri districts in zoogeographically important and provides further support to the opinion that fish fauna got distributed from east to the west along Himalaya. Important morphological characters of this species, as studied in the present material have been mentioned. A photograph of the material is also presented.

ACKNOWLEDGEMENT

The author feels grateful to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta for grant of facilities to work and encouragement.

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A NEW GENUS AND A NEW SPECIES OF THE FAMILY HEMEROBIIDAE (NEUROPTERA) FROM INDIA

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INTRODUCTION

The material has been received for identification from Post Graduate Centre, Tripura, India. On careful examination of the material the author has come across some unique morphological features including genitalia. Therefore the erection of a new genus viz., *Neomicromus* along with a new species viz., *Neomicromus agarwalai* is felt necessary. The description of the new taxa along with suitable illustrations is dealt with in this paper.

Neomicromus, gen. nov.

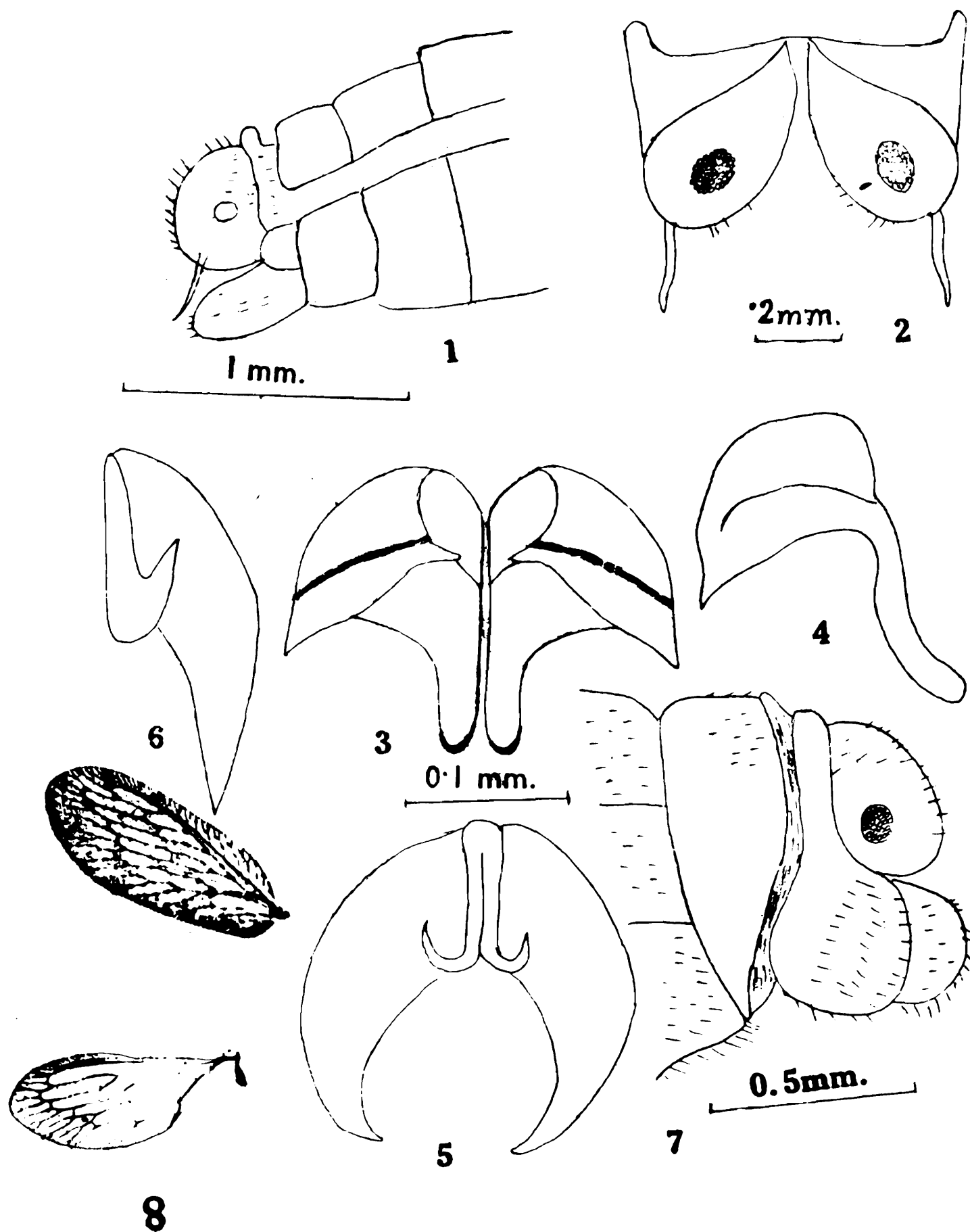
Forewing : With elliptical apex; humeral vein unforked and not recurrent; Rs with 4 - branches; M 3 + 4 and Cu not coalescent; outer and inner gradate series of crossveins not regularly arranged. Hindwing: Rs with 3 - branches; M 3+4 and Cu though close but separated. Male genitalia : ectoproct with short and spiny catoprocessus; parameres proximally separated but distally united and with a pair of large processes; gonarcus arch-shaped, without arcessus but with a process at middle which bends on either side to form a hook. Female genitalia: tergite 9 greatly expanded below the ectoproct.

Type species : *Neomicromus agarwalai*, sp. nov.

Remarks : The new genus comes close to the genus *Micromus* Rambur by the narrow costal area particularly at base, unforked humeral vein, number of branches of Rs and presence of catoprocessus in male ectoproct but differs from it by M 3+4 and Cu in both wings non-coalescent and also by the structure of male genitalia.

Neomicromus agarwalai, sp. nov.

Palpi, frons, antenna and vertex : brown. Pronotum : broader than long and with dark shadings towards the margins. Meso and metanotum : dark brown. Forewing (Fig. 8) : narrow with elliptical apex; pterostigma inconspicuous; membrane tawny; costals partially yellow or brown; longitudinal veins pale yellow interrupted with brown streaks; crossveins brown; distinct brownish spot present between M & Cu, over apical portion of Cu₂, and 1A & 2A, and also on a single apical gradate in inner row; all the gradates in outer row clouded with brown; Rs with 4 branches. Hindwing (Fig. 8) : shape same as forewing; membrane hyaline; longitudinal veins pale at base but brown apicad; Rs with 3 branches; crossveins of inner gradates pale; outer gradates brown; M 3



Figs. 1-8. *Neomicromus agarwalai*, sp. nov., 1. tip of abdomen in male, lateral 2. tip of abdomen showing catoprocessus 3. parameres, dorsal 4. paramere, lateral 5. gonarcus, dorsal 6. gonarcus, lateral 7. tip of abdomen in female, lateral 8. fore and hind wings.

+ 4 & Cu not coalescent. Abdomen : yellowish brown; *male* genitalia : ectoproct (Fig. 1) rather short, narrow and with curved hindmargin; catoproceßus (Fig. 2) short, acute and spine-like, almost straight; sternite with rounded hindmargin; parameters (Figs. 3 & 4) large with a pair of large processes at apex, proximally separate but distally united; gonarcus (Figs. 5 & 6) arch-shaped with a process at middle which is bent on either side at apex to form a hook; *female* genitalia (Fig. 7) : tergite 9 greatly expanded backwards below the ectoproct; gonapophysis lateralis prominent.

Measurements : ♂, ♀ : Length of forewing, 7 mm, hindwing, 5 mm.

Material examined : (Holotype ♂, Z.S.I. Reg. no. 1169/H₁₂ & Allotype , Z.S.I. Reg. no. 1170/H₁₂ : India, Tripura, Agartala, date - nil, coll. B. K. Agarwala.

Remarks : The species closely resembles *Micromus timidus* Hagen but differs from it by the number of branches of Rs and spotting over cubital and anal veins of forewing, M 3 + 4 & Cu not coalescent in hindwing and also by the structure of genitalia.

SUMMARY

A new genus along with a new species of the family *Hemerobiidae* is described from India.

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**NEW RECORDS OF ORTHOPTERA (INSECTA) FROM THE
NAGARJUNA SAGAR TIGER RESERVE FOREST, ANDHRA
PRADESH, INDIA**

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INTRODUCTION

Tandon and Shishodia (1969) have reported seventeen species of Acridoidea from Nagarjuna Sagar Dam Area. The area has been again explored after about sixteen years specially the Mahbubnagar district of Andhra Pradesh, by one of the authors (SKM) for the collection of Orthoptera. The collections were made from meadows, fallow lands, field crops and outskirts of forest and other vegetation. The present study is based on this material, containing 34 species of Tetrigoidea, Acridoidea and Grylloidea, of which 13 species are recorded here for the first time from Andhra Pradesh. We hope that there may be still some species in the area which have not been obtained. The material studied is deposited in the National Collection of the Zoological Survey of India, Calcutta. Species marked with asterisk are new records from Andhra Pradesh.

SYSTEMATIC	ACCOUNT
Order	ORTHOPTERA
Superfamily	TETRIGOIDEA
Family	TETRIGIDAE

1. **Euscelimena harpago* (Serville)

1839. *Tetrix harpago* Serville, *Ins. Orth.*, : 763.

1887. *Scelimena harpago*, Bolivar, *Annls Soc. ent. Belg.*, 31 : 216-17.

1938. *Euscelimena harpago*, Günther, *Stettin. ent. Ztg.*, 99 : 364.

Material : 1 ♂, Gundam Falls, Mahbubnagar Dist., 14. iv. 1985.

Distribution : India (Maharashtra, Karnataka, Tamilnadu, Madhya Pradesh, Bihar, Uttar Pradesh); Sri Lanka.

Remarks : This species is generally found near water or on stones lying on the banks of river or ponds. It may swim for a short distance.

2. **Criotettix latifrons* Hebard

1929. *Criotettix latifrons* Hebard, *Revue suisse Zool.*, 36 : 578.

Material : 2 ♀♀, 1 ♂, Gundam Falls, Mahbubnagar, 14. iv. 1985.

Distribution : India (Tamilnadu). It is also studied from Maharashtra.

Remarks : The specimens more or less agree well with the original characters given by Hebard (1929).

3. **Euparatettix histricus* (Stål)

1860. *Tetrix histricus* Stål, *Kong. Svens Fregatten Eugenics Resa Omkring Jorden*, Stockholm, 3 : 347.

1887. *Paratettix histricus*, Bolivar, *Annls Soc. ent. Belg.* 31 : 279.

1937. *Euparatettix histricus*, Gunther, *Revue suisse Zool.* 44 : 133.

Material : 1 ♀, 1 ♂, Gundam Falls, Mahbubnagar Dist., 14. iv. 1985; 3 ♀♀, Mannanur, 2059 m., Mahbubnagar Dist., 11, 15, 19. iv. 1985.

Distribution : India (Tamilnadu, Orissa, West Bengal, Bihar, Assam); Sri Lanka; Java; Borneo; Sumatra; Malaya Islands; N. Caledonia; Philippines; N. Australia. It is also studied from Maharashtra and Rajasthan (in press).

Remarks : It is a very common species found in India.

Family ACRIDIDAE

4. *Acrida exaltata* (Walker)

1859. *Truxalis exaltata* Walker, *Ann. Nat. Hist.*, 4 : 222.

1914. *Acrida exaltata*, Kirby, *Fauna Brit. India, Orthopt.* (Acridiidae) : 99.

Material : 3 ♀♀, 2 ♂♂, Mannanur, 2059m, Mahbubnagar District, 11, 19. iv. 1985.

Distribution : India (Mostly throughout); Bangladesh; Pakistan; S. E. Tibet; Afghanistan; S. E. Persia; Arabia; Yemen; W. Aden Protectorate; Sri Lanka.

Remarks : This species is very common in India. It feeds mostly on grasses and other vegetations of economic importance causing damage.

5. **Leva cruciata* Bolivar

1914. *Leva cruciata* Bolivar, *Trab. Mus. nac. Cienc. nat., Madr.* (Ser. Zool.) No. 20 : 66.

Material : 2 ♀♀, Gudam Falls, Mahbubnagar District, 14.iv.1985; 10, Mannanur, 2095m, 19. iv. 1985.

Distribution : India (Karnataka, Tamilnadu, Bihar, West Bengal); Sri Lanka.

Remarks : This species is differentiated from the other species of the genus by the cruciform mark of the pronotum.

6. *Aiolopus thalassinus tamulus* (Fabricius)

1798. *Gryllus tamulus* Fabricius, *Entomologia Systematica Suppl.*, : 195.

1968. *Aiolopus thalassinus tamulus*, Hollis, *Bull. Br. Mus. nat. Hist.* (Ent.), 22 No.7 : 347.

Material : 5 ♀♀, 6 ♂♂, Mannanur, 2059m, Mahbubnagar District, 11, 19. iv. 1985.

Distribution : India (Tamilnadu, Andaman Nicobar & Andaman Islands, West Bengal, Bihar, Madhya Pradesh, Rajasthan, Himachal Pradesh); Sri Lanka; Bangladesh; Pakistan; Burma; Thailand; China; Hainan; Hong Kong; Taiwan; Malaya; Singapore; Sumatra; Java; Lombok; Timor; Japan; Philippines; Borneo; Celebes; New Guinea; Papua; Australia.

It is also studied from Haryana, Punjab, Uttar Pradesh, Orissa and Karnataka States of India.

Remarks : It is a pest species and reported to damage a large number of plants such as cabbage, cotton, maize, millet, rice, sugarcane, tea, tobacco, wheat, oat, pea etc.

7. *Zygophlaeoba* sp.

Material : 1 ♂, Vot-var-la pally, Mahbubnagar District, 17. iv. 1985.

Remarks : It resembles *Zygophlaeoba bolivari* Henry, but differs from it in absence of hind wings.

8. **Gelastorrhinus semipictus* (Walker)

1870. *Opomala semipicta* Walker, *Cat. Derm. Salt. Br. Mus.*, 3 : 512.

1914. *Gelastorrhinus semipictus*, Kirby, *Fauna Brit. India, Orthopt.* (Acrididae) : 217.

Material : 1 ♂, Mannanur, 2095 m., Mahbubnagar District, 11.iv.1985; 5 ♀♀, Gudam Falls, Mahbubnagar District, 14. iv. 1985.

Distribution : India (Tamilnadu); Sri Lanka.

Remarks : This species is distinguished from the other Indian species by the fastigium which is separated from vertex by an arched sulcus; by the antennae which is thickened and flattened at base, and as long as head and pronotum; and by the tegmina which is not uniformly yellowish green.

9. **Dnopherula (Aulacobothrus) collinus* uvarov (Fig. 1, A)

1929. *Aulacobothrus collinus* Uvarov, *Revue suisse Zool.*, 36 : 543.

1985. *Dnopherula (Aulacobothrus) collinus*, Bhowmik, *Rec. zool. Surv. India, Occ. Paper* No. 78 : 21.

Material : 1 ♀, Gundam Falls, Mahbubnagar District, 14. iv. 1985.

Distribution : India (Karnataka & Tamilnadu).

Remarks : The species fully resembles the description given by Uvarov (1929).

10. **Dnopherula (Aulacobothrus) decius* (Walker) (Fig. 1, B-C)

1871. *Stenobothrus decius* Walker, *Cat. Derm. Salt. Br. Mus.*, 5 Suppl. : 80.

1921. *Aulacobothrus decius*, Uvarov, *Ann. Mag. nat. Hist.*, (9) 7 : 482.

1971. *Dnopherula (Aulacobothrus) decius*, Jago, *Proc. Acad. Sci. nat. Philad.*, 123 (8) : 24.

Material : 2 ♀♀, 1 ♂, Gundam Falls, Mahbubnagar district, 14. iv. 1985.

Distribution : India (Maharashtra, West Bengal).

Remarks : Bhowmik (1985) in his Catalogue mentioned Tamilnadu under distribution, but we could not trace its report from Tamilnadu so far. We presume that it is error.

11. **Dnopherula (Aulacobothrus) socius* Bolivar
(Fig. 1, D)

1902. *Aulacobothrus socius* Bolivar, *Annls Soc. ent. Fr.*, 70 : 599.

1971. *Dnopherula (Aulacobothrus) socius*, Jago, *Proc. Acad. Sci. nat. Philad.*, 123 (8) : 243.

Material : 1 ♂, Gundam Falls, Mahbubnagar District, 14. iv. 1985.

Distribution : India (Tamilnadu & Maharashtra). It is also studied from Himachal Pradesh and Haryana States of India.

Remarks : Lateral carinnae of pronotum curved, and the lateral lobe of pronotum with scarf-like mark.

12. **Dnopherula (Aulacobothrus) luteipes* (Walker)
(Fig. 1, E)

1871. *Stenobothrus luteipes* Walker, *Cat. Derm. Salt. Br. Mus.*, 5 Suppl. : 82.

1921. *Aulacobothrus luteipes*, Uvarov, *Ann. Mag. nat. Hist.*, (9) 7 : 482.

1971. *Dnopherula (Aulacobothrus) luteipes*, Jago, *Proc. Acad. Sci. nat. Philad.*, 123 (8) : 243.

Material : 3 ♀♀, 1 ♂, Gundam Falls, Mahbubnagar District, 14. iv. 1985.

Distribution : India (Jammu & Kashmir, Himachal Pradesh, Maharashtra, Karnataka, Tamilnadu, Madhya Pradesh, Bihar, Orissa, West Bengal, Assam); Sri Lanka; Pakistan; Bangladesh; Nepal; Burma; China; Taiwan; Thailand.

Remarks : It is reported as a minor pest on the foliage of teak.

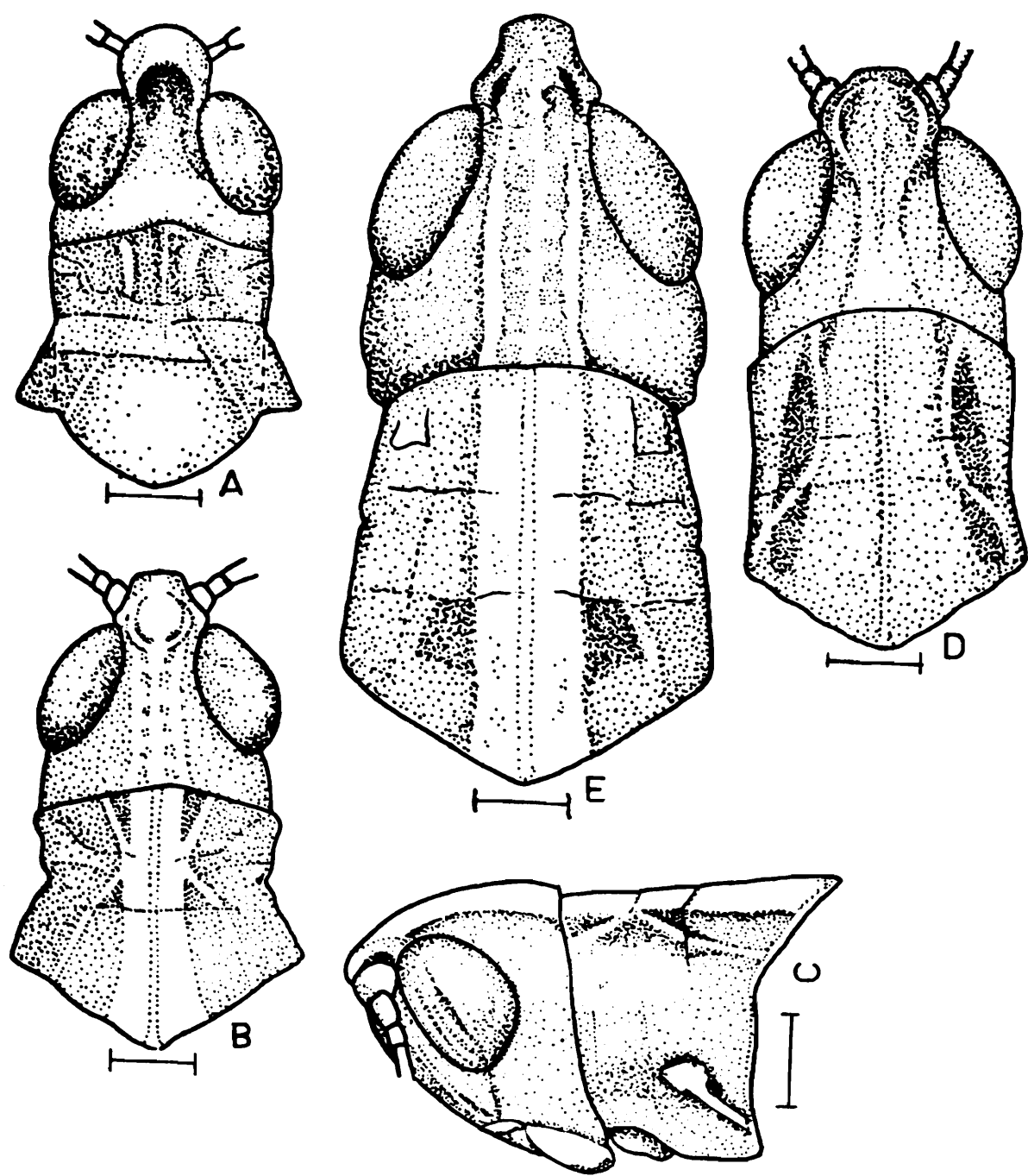
13. *Acrotylus humbertianus* Saussure

1884. *Acrotylus humbertianus* Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, 28(9) : 189.

1914. *Acrotylus humbertianus*, Kirby, *Fauna Brit. India. Orthopt.* (Acridiidae) : 153.

Material : 2 ♀♀, 1 ♂, Mannanur, 2059, Mahbubnagar District, 11, 19.iv.1985; 1 ♀, Gundam Falls, Mahbubnagar District, 14. iv. 1985.

Distribution : India (Andhra Pradesh, Tamilnadu, Madhya Pradesh, Bihar, Rajasthan, Maharashtra and Goa); Sri Lanka; Nepal; Bangladesh; Pakistan and Afghanistan. It is also studied from Haryana, Uttar Pradesh, Delhi and West Bengal States of India.



Text- fig.1

Scale-1 mm.

Fig. 1. (A) *Aulacobothrus collinus* Uvarov - dorsal view of head and pronotum (male); (B) *A. decisus* (Walker) - dorsal view of head and pronotum (male); (C) *A. decisus* (Walker) - lateral view of head and pronotum (male); (D) *A. socius* Bolivar - dorsal view of head and pronotum (female); (E) *A. luteipes* (Walker) - dorsal view of head and pronotum (female).

Remarks : It is terricolous species and found in sandy places where grass is available. It is a pest and damage various plants like rice, millet, coffee, wheat, sorghum, maize etc.

14. *Trilophidia annulata* (Thunberg)

1815. *Gryllus annulatus* Thunberg, *Mem. Acad. Sci. St. - Petersb.*, 5 : 234.

1873. *Trilophidia annulata*, Stål, *Recens. Orth.*, 1 : 132.

1914. *Trilophidia annulata*, Kirby, *Fauna Brit. India, Orthopt.* (Acridiidae) : 149.

Material : 3 ♀♀, Mannanur, 2059m, Mahbubnagar District, 11, 19. iv. 1985; 3 ♀♀, 1 ♂, Gundam Falls, Mahbubnagar District, 14. iv. 1985.

Distribution : India (almost throughout); Bangladesh; Nepal; Pakistan; Afghanistan; Sri Lanka; Burma; Malaya; Thailand; Japan; Singapore; Philippines; Vietnam; China; Korea; Hainan; Hong Kong; Taiwan; Sumatra; Borneo; Java; Sarawak; etc.

Remarks : It is geophilous and occurs in places overgrown with grass associated with crops of economic importance. It is reported as a major pest of pastures throughout the year.

15. *Oedaleus abruptus* (Thunberg)

1815. *Gryllus abruptus* Thunberg, *Mem. Acad. Sci. St. - Petersb.*, 5 : 233.

1884. *Oedaleus abruptus*, Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, : 110, 117.

1914. *Oedaleus abruptus*, Kirby, *Fauna Brit. India, Orthopt.* (Acridiidae) : 144.

Material : 2 ♂♂, Gundam Falls, 14. iv. 1985.

Distribution : India (Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Tamilnadu, Karnataka, Goa); Nepal; Bangladesh; Pakistan; Sri Lanka; Burma; Thailand; China; Hawaiian Is. (introduced). It is also studied from Haryana, Punjab, West Bengal and Kerala States of India.

Remarks : Size small; pronotum pointed at posterior margin; tegmina brown, with three pale bands before the middle; wings pale greenish towards the base, with a brownish central fascia. It is a very common species found in India. It damages a large number of plants such as maize, rice, sorghum, tomato, sugarcane, gram, groundnut, sandal, pinus etc.

16. *Morphacris fasciata* (Thunberg)

1815. *Gryllus fasciatus* Thunberg, *Mem. Acad. Sci. St. Petersb.*, 5 : 230.

1910. *Morphacris citrina*, Kirby, *Syn. Cat. Orth.*, 3 : 219.

1921. *Morphacris fasciata*, Uvarov, *Ann. Mag. nat. Hist.*, (9) 7 : 488.

Material : 1 ♂, Mannanur, 2059m, 19. iv. 1985.

Distribution : Whole of Africa and S.W. & S. Asia; Spain; Madagascar. In India it is distributed in Goa, Maharashtra, Madhya Pradesh, Tamilnadu, Andhra Pradesh, Kerala and Bihar.

Remarks : Wings yellow at the base, separated by a dark brown band from the outer hyaline area. It is an occasional minor pest and found to damage leaves of maize, millet, sorghum, tobacco, cotton, vegetables etc. Commonly found in open grassy places of forest.

17. *Dittopternis venusta* (Walker)

1870. *Oedipoda venusta* Walker, *Cat. Derm. Salt. Br. Mus.*, 4 : 740.

1888. *Dittopternis venusta*, Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, 30(1) : 40.

1914. *Dittopternis venusta*, Kirby, *Fauna Brit. India. Orthopt.* (Acridiidae) : 140.

Material : 2 ♂♂, Mannanur, 2059m, 11, 19. iv.1985; 1m., Gundam Falls, 14. iv. 1985.

Distribution : India (Tamilnadu, Madhya Pradesh, West Bengal, Andhra Pradesh); Sri Lanka. It is also studied from Karnataka State of India.

Remarks : Head and pronotum much granular; lateral lobes of pronotum rectangular behind; hind wings yellow at base with a blackish band beyond; hind femora with black transverse band; hind tibiae black at base, followed by light yellow band, then blue at apex; internal calcaria of posterior tibiae nearly equal in length.

18. *Teratodes* sp.

Material : 1 ♀ (nymph), Mannanur, 2059m. 19. iv. 1985.

Distribution : India (Uttar Pradesh, Madhya Pradesh, Maharashtra, Tamilnadu, Andhra Pradesh, West Bengal); Pakistan; Sri Lanka.

Remarks : Usually found on trees or large woody shrubs in forest areas. It is reported an occasional pest of forest plants specially teak, sandal, vines etc., and recently found feeding on potato, sugarcane plants.

19. *Spathosternum prasiniferum prasiniferum* (Walker)

1871. *Heteracris* (?) *prasinifera* Walker, *Cat. Derm. Salt. Brit. Mus.*, 5 : 69, 82.

1914. *Spathosternum prasiniferum*, Kirby, *Fauna Brit. India, Orth.* (Acridiidae) : 208.

1936. *Spathosternum prasiniferum prasiniferum*, Tinkham, *Lingnan Sci. Journ.*, 15 : 51.

Material : 4 ♀♀, 4 ♂♂, Mannanur, 2059, 11 & 19. iv. 1985.

Distribution : India (distributed throughout India); Bangladesh; Pakistan; Sri Lanka; Nepal; Burma; Thailand; China; Vietnam; Indo-China; Hainan; W. Malaysia.

Remarks : Very common Indian species found along the bunds of cultivated fields, road side, pastures etc. and is a major pest of various plants such as barley, millet, maize, rice, sorghum, sugarcane, wheat etc.

20. **Oxya hyla hyla* Serville

1831. *Oxya hyla* Serville, *Annls Sci. nat. (Zool.)*, 22 : 287.

1971. *Oxya hyla hyla*, Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)*, 26(7) : 282.

Material : 2 ♀♀, 2 ♂♂, Mannanur, 2059m, 11. iv. 1985.

Distribution : India (Arunachal Pradesh, West Bengal, Bihar, Orissa, Tamilnadu, Goa, Uttar Pradesh, Rajasthan, Himachal Pradesh); Pakistan; Afghanistan; Persia; Bangladesh; Nepal; Sri Lanka; Africa; Madagascar. It is also studied from Haryana, Punjab, Assam, Tripura, Manipur, Maghalaya, Karnataka.

Remarks : Very common species of *Oxya* Serville, which generally prefer rice fields and low-lying grasslands but rarely recorded from forest. It is reported as a pest of rice, barley, canna, citrus, cotton, maize, millet, sugarcane, wheat, sweet potato, etc.

21. *Oxya nitidula* (Walker)

1870. *Acridium nitidulum* Walker, *Cat. Derm. Salt Br. Mus.*, 4 : 64.

1971. *Oxya nitidula*, Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)*, 26 (7) : 315.

Material : 10 ♀♀, 13 ♂♂, Mannanur, 2059m, 11, 13 & 19. iv. 1985.

Distribution : India (West Bengal, Andhra Pradesh, Tamilnadu, Karnataka, Kerala, Goa, Rajasthan); Sri Lanka.

Remarks : It is generally found in Southern India, but sometimes also recorded from West Bengal in east and Goa and Rajasthan in West. This species occurs along with *Oxya hyla hyla* Serville in paddy fields.

22. * *Coptacra punctaria* (Walker)

1870. *Acridium punctarium* Walker, *Cat. Derm. Salt Br. Mus.*, 4 : 630.

1914. *Bibractoides punctoria*, Kirby, *Fauna Brit. India, Orthop. (Acridiidae)* : 236.

1929. *Coptacra punctaria*, Uvarov, *Revue suisse Zool.*, 36 : 561.

Material : 2 ♂♂, Vet-vor-la pally, 17. i. 1985.

Distribution : India (S. India - Tamilnadu).

Remarks : It is differentiated from the other known Indian species of the genus by the rugosities and black granules of the pronotum and sometimes the head also furnished with fine punctuation; front considerably produced between the antennae; antennae filiform; tegmina shorter than the abdomen.

23. * *Eucoptacra saturata* Walker,

1870. *Acridium saturatum* Walker, *Cat. Derm. Salt Br. Mus.*, 4 : 628.

1921. *Eucoptacra saturata*, Uvarov, *Ann. Mag. nat. Hist.*, (9) 7 : 503.

Material : 1 ♂, Vet-vor-la pally, 17. iv. 1985.

Distribution : India (Assam, Orissa, Madhya Pradesh and Uttar Pradesh).

Remarks : It differs from the other known Indian species of the genus by the moderate size of the body; in absence of black spot on the superior - externa area of hind femur near the middle part; sub-genital plate of female at the hind margin not broadly

rounded or triangularly expanded; cercus extended upto the apex of supra-anal plate; hind tibiae reddish beyond the middle.

24. *Tristria pulvinata* (Uvarov)

1921. *Tapinophyma pulvinata* Uvarov, *Ann. Mag. nat. Hist.*, (9) 7 : 497.

1929. *Tristria pulvinata*, Uvarov, *Revue suisse Zool.*, 36 : 559.

Material : 11 ♀♀, 3 ♂♂, Vet-vor-la pally, 17. iv. 1985.

Distribution : India (Delhi, Bihar, West Bengal, Tamilnadu, Kerala and Maharashtra); Sri Lanka.

Remarks : Sub-genital plate of male is almost linear, compressed, knife-like; anterior half of ventral margin of lateral lobe of pronotum in female strongly upcurved.

25. *Tylotropidius varicornis* (Walker)

1870. *Heteracris varicornis* Walker, *Cat. Derm. Salt. Br. Mus.*, 4 : 667.

1914. *Tylotropidius varicornis*, Kirby, *Fauna. Brit. India, Orthop. (Acridiidae)* : 265.

Material : 3 ♀♀, 1 ♂, Gundam Falls, 14. iv. 1985.

Distribution : India (Himachal Pradesh, Rajasthan, Maharashtra, Goa, West Bengal); Nepal; Sri Lanka; Burma; Thailand; China.

Remarks : Lateral carinae of pronotum pale and curving towards behind; hind margin of pronotum roundly angulate; prosternal tubercle truncate, compressed and slightly bituberculate at apex; tegmina with a row of triangular whitish spots; hind femora thickened at base and slender towards the apex; hind tibiae light blue towards apex; tarsi also light blue; supra-anal plate of male elongate-triangular; cerci straight, a little compressed and acuminate. It is reported as a minor crop pest.

26. *Xenocatantops karnyi* Kirby

1910. *Catantops karnyi*, *Syn. Cat. Orthopt.*, 3 : 483.

1982. *Xenocatantops karnyi*, Jago, *Trans. Ame. ent. Soc.*, 108 no. 1 : 454.

Material : 2 ♀♀, Mannanur, 2059 m, 19. iv. 1985.

Distribution : India (Orissa, Andhra pradesh, Tamilnadu, Uttar Pradesh and Himachal Pradesh); Nepal.

Remarks : Inner side of hind femur orange-red, with brown or black markings; male cercus bifurcated at apex, subequal in length and bluntly pointed at their apex.

27. *Catantops pinguis innotabilis* (Walker)

1870. *Acridium innotabile* Walker, *Cat. Derm. Salt. Brit. Mus.*, 4 : 629.

1925. *Catantops innotabilis*, Uvarov, *In Mission Guy babault dans les Provinces centrales de l' Inde et dans l' region occidentale de l' Himalaya*, 1914 Insectes, : 30.

1953. *Catantops pinguis innotabilis*, Dirsh and Uvarov, *Tijdschr. Ent.*, 96(3) : 233.

Material : 1 ♂, Gundam Falls, 14. iv. 1985.

Distribution : India (Orissa, Andhra Pradesh, Tamilnadu, Goa, Lacadive Islands, Sikkim, West Bengal, Bihar, Madhya Pradesh, Uttar Pradesh, Rajasthan, Himachal Pradesh, Jammu & Kashmir); Sri Lanka; It is also studied from Haryana, Punjab, Assam, Tripura, Maharashtra, Karnataka States of India.

Remarks : Generally found at the outskirts of forest. It is a minor pest and reported to cause damage to cotton, millet, rice, tea, teak, pinus sp. etc.

28. *Cyrtacanthacris tatarica* (Linnaeus)

1758. *Gryllus Locusta tataricus* Linnaeus, *Systema naturae per Regna Trium naturae*. (10 ed.) : 432.

1923. *Cyrtacanthacris tatarica*, Uvarov, *Bull. ent. Res.*, 14 : 39.

Material : 1 ♂, Mannanur, 2059 m., 15. iv. 1985.

Distribution : India (Widely distributed); Pakistan; Nepal; Bangladesh; Burma; Sri Lanka; Thailand; Indonesia; Africa; Red Sea; Madagascar; Seychelle and Comore Islands : Saudi Arabia; Sokotra.

Remarks : It is found feeding on wild and cultivated plants. It is a savannah species and reported to cause damage to various species of grass, coffee, cotton, ficus sp., millet, maize, sugarcane, sunflower, teak, tobacco, vegetables etc.

29. *Epistaurus sinetyi* Bolivar

1902. *Epistaurus sinetyi* Bolivar, *Annals Soc. ent. Fr.*, 70 : 623.

1914. *Epistaurus sinetyi*, Kirby, *Fauna Brit. India, Orthopt.* (Acridiidae) : 242.

Material : 1 ♀, Mannanur, 2059 m., 11. iv. 1985; 1 fem., Gundam, Falls, 14. iv. 1985.

Distribution : India (Tamilnadu, West Bengal). It is also studied from Orissa State in India.

Remarks : It is smaller in size; abdomen red or pale-red, spotted on the back; hind femur obliquely trifasciate with brown; cerci short, compressed, incurved towards the apex; subgenital plate obtuse, a little produced.

Family PYRGOMORPHIDAE

30. *Atractomorpha crenulata* (Fabricius)

1793. *Truxalis crenulatus* Fabricius, *Ent. Sys.*, 2 : 28.

1861. *Atractomorpha crenulata*, Saussure, *Annls Soc. ent. Fr.*, (4) 1 : 475.

1914. *Atractomorpha crenulata*, Kirby, *Fauna Brit. India, Orthopt.* (Acridiidae) : 181.

Material : 17 ♀♀, 6 ♂♂, Mannanur, 2059 m., 11, 13, 19. iv. 1985; 5 ♀♀, 2 ♂♂, Gundam Falls, 14. iv. 1985.

Distribution : India (Widely distributed throughout India); Nepal; Pakistan;

Bangladesh; Sri Lanka; Burma; Thailand; Malaya; N. W. Sumatra.

Remarks : This species is available throughout the year. Both adults and hoppers are serious pest of young plants especially tobacco and maize but may also damage other crop and vegetable plants.

31. *Chrotogonus (Chrotogonus) oxypterus* (Blanchard)

1836. *O. mmexecha oxypterus* Blanchard, *Annls Soc. ent. Fr.*, 5 : 622.

1914. *Chrotogonus oxypterus*, Kirby, *Fauna Brit. India, Orthop.* (Acridiidae) : 166.

1959. *Chrotogonus (Chrotogonus) oxypterus*, Keven, *Publicões cult. Co. Diam. Angola*, no. 43 : 48.

Material : 1 ♀, 2 ♂♂, Mannanur, 2059m, 15 & 19. iv. 1985.

Distribution : India (Goa, Maharashtra, Madhya Pradesh, Uttar Pradesh Bihar, Orissa, West Bengal, Andhra Pradesh, Kerala, Tamilnadu, Karnataka); Bangladesh; Sri Lanka.

Remarks : Commonly known as surface grasshopper because it lacks the climbing habits. It is a regular minor pest and feeds almost all green vegetation.

Family GRYLLIDAE

32. *Gryllus bimaculatus* De Geer

1773. *Gryllus bimaculatus* De Geer, *Mem. Ins.*, 3 : 521.

1969. *Gryllus bimaculatus*, Chopard, *Fauna of India, Orthopt.* 2 Grylloidea : 35.

Material : 1 ♀, Mannanur, 2059m, 19. iv. 1985.

Distribution : India (Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, Madhya Pradesh, Bihar, Rajasthan, Maharashtra, Goa, Karnataka, Tamilnadu, Andhra Pradesh, West Bengal, Andaman Islands, Arunachal Pradesh, Sikkim, Meghalaya); Pakistan; Sri Lanka; Burma; Malaya; Singapore; Africa; Mediterranean region.

It is also studied from Haryana and Assam States of India.

Remarks : Body colour entirely black, the legs rufous; tegmina with characteristic yellow spots at the base.

33. *Gryllodes sigillatus* (Walker)

1869. *Gryllus sigillatus* Walker, *Cat. Derm. Salt. Brit. Mus.*, 1 : 46.

1877. *Gryllodes sigillatus*, Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, 25 : 210.

1969. *Gryllodes sigillatus*, Chopard, *Fauna of India, Orthopt.* 2 Grylloidea : 85.

Material : 1 ♂, Mannanur, 11. iv. 1985.

Distribution : India (Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal, Assam, Orissa, Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Andaman Islands); Pakistan; Sri Lanka; Malaya and Malacca. It is also studied from Haryana State of India.

Remarks : Tegmina of male hardly extend upto the middle of abdomen, and it is

truncated at apex. Wings absent.

34. * *Paranemobius pictus* (Saussure)

1877 *Pseudonemobius pictus* Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, 25 : 67.

1969. *Paranemobius pictus*, Chopard, *Fauna of India, Orthopt. 2 Grylloidea* : 174.

Material : 1 ♂, Gundam Falls, 14. iv. 1985.

Distribution : India (Jammu & Kashmir, Maharashtra, Madhya Pradesh, Bihar, Karnataka, Kerala, Tamilnadu); Sri Lanka.

Remarks : General colouration strongly variegated with blackish and yellowish; tegmina extended upto the anterior margin of 2nd abdominal tergite; veins of dorsal field straight; subgenital plate notched at apex.

SUMMARY

Thirty-four species of Orthoptera from Nagarjuna Sagar, Tiger Reserve Forest (Andhra Pradesh) belonging to 30 genera and 6 families are dealt with in this paper. Out of these, 13 species are recorded for the first time from the area. Distributional records of all the species are given.

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NEMATODES FROM WEST BENGAL (INDIA) XXIII. QUALITATIVE AND QUANTITATIVE STUDIES OF PLANT AND SOIL INHABITING NEMATODES ASSOCIATED WITH PADDY CROP IN DISTRICT DARJEELING

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INTRODUCTION

During October 1983, a random survey was conducted at seven localities of Darjeeling district (W. Bengal) to make the qualitative and quantitative studies of plant and soil inhabiting nematodes associated with paddy crop. Twenty soil samples were collected.

MATERIAL AND METHODS

The sampling was made at random. For the quantitative estimation, the methodology described by Baqri et al. (1983) was followed. The nematode population per 200 ml soil was counted from each sample. The paddy roots of each sample were processed through blender and the nematode population per 10 gm roots was also estimated.

QUALITATIVE STUDY

In all, 15 stylet bearing nematode species belonging to 12 genera of the Orders Tylenchida and Aphelenchida have been identified. Besides, 21 species of ectoparasite, soil inhabiting or predaceous nematodes have also been identified under the Orders Doruylaimida and Mononchida. The identified species are being listed below:

Order TYLENCHIDA Thorne, 1949

1. *Tylenchus* sp.
2. *Filenchus* sp.
3. *Tylenchorhynchus mashhoodi* Siddiqi & Basir, 1959
4. *Hoplolaimus indicus* Sher, 1963
5. *Helicotylenchus dihystra* (Cobb, 1893) Sher, 1961
6. *H. digitatus* Siddiqi & Husain, 1964
7. *H. pseudorobustus* (Steiner, 1914) Golden, 1956
8. *Pratylenchus scribneri* Steiner, 1943
9. *Hirschmanniella oryzae* (Van Breda de Haan, 1902) Luc & Goodey, 1963
10. *H. gracilis* (de Man 1880) Luc & Goodey, 1963
11. *Meloidogyne graminicola* Golden & Birchfield, 1965

12. *Macroposthonia ornata* (Raski, 1958) De Grisse & Loof, 1965
13. *Hemicriconemoides cocophillus* (Loos, 1949) Chitwood & Birchfield, 1957

Order APHELENCHIDA Siddiqi, 1980

1. *Aphelenchus avenae* Bastain, 1865
2. *Aphelenchoides pusillus* (Thorne, 1929) Filipjev, 1934

Order DORYLAIMIDA Deman, 1976

1. *Laimydorus finalis* Thorne, 1892
2. *L. baldus* Baqri & Jana, 19823
3. *Laimydorus oryzae* Dey & Baqri, 1986
4. *Eudorylaimus* spp.
5. *labronemella andrassyi* (Baqri & Khera, 1976) Andrassy, 1985
6. *Opishodorylaimus cavalcantii* (Lordello, 1955) Corbvonnell & Coomans, 1986
7. *Thornenema novum* Dey & Baqri, 1986
8. *Thornenema nodicaudatum* Dey & Baqri, 1986
9. *Aporcelaimellus heynsi* Baqri & Jairajpuri, 1968
10. *Belondira nepalensis* Siddiqi, 1964
11. *Paraoxydirus gigas* (Jairajpuri, 1964) Jairajpuri & Ahmad, 1979
12. *Tylencholaimus pakistanensis* Timm, 1964
13. *T. paradaxus* Loof & Jairajpuri, 1968
14. *Discomyctus cephalatus* Thorne, 1939
15. *Proleptonchus clarus* Timm, 1964
16. *Neoactinolaimus elaboratus* (Cobb, 1906) Heyns & Agro, 1969
17. *Neoactinolaimus* sp.
18. *Xiphinema insigne* Loos, 1949

Order MONOCHIDA Jairajpuri, 1969

1. *Mylonchulus branchyuris* (Butschili, 1873) Altherr, 1954
2. *Paramylonchulus mulveyi* (Jairajpuri, 1970) Jairajpuri & Khan, 1982
3. *Miconchus dalhousiensis* Jairajpuri, 1969

QUANTITATIVE STUDY

The details of quantitative estimation of different parasitic nematode genera and other nematodes from each locality have been furnished in Table I. The number of soil samples collected from each locality has also been provided in the same Table. Table II provides the information regarding the average percent of frequency of occurrence and dominance of potential nematode pests in soil as well as paddy roots at Darjeeling district.

The results reveal that *meloidogyne* (*M. graminicola*) is the most important pest of rice in the area surveyed because it is present in 100% samples while it dominates in 63% soil samples. This may further be noted that *Hirschmanniella* spp. (mainly *H. gracilis*) and *Tylenchorhynchus mashhoodi* are the other potential nematode pests because the frequency of their occurrence has been noted in 70% and 90% soil samples respectively. The former species dominated in 26% sample while the latter in 10.5% samples.

TABLE 1

Results of the survey of Paddy crop in DARJEELING district West Bengal Range of nematode number with its average per 200ml of soil.

Figures in parenthesis indicate percent frequency of occurrence

	LOCALITY / VILLAGE			
	Doodhiya Basti	Poorbum	Tashiding	Tashiding (Upper)
No. of samples collected	4	2	2	1
Nematodes				
1. <i>Meloidogyne</i> (larvae)	50-400:200 (100)	150-610:380 (100)	30-120:75 (100)	120:120 (100)
2. <i>Tylenchorhynchus</i>	10-160:67.5 (100)	50:50 (50)	120-370:245 (100)	100:100 (100)
3. <i>Helicotylenchus</i>	240:240 (25)	— —	320:320 (50)	— —
4. <i>Pratylenchus</i>	—	—	—	—
5. <i>Hirschmanniella</i>	60:60 (25)	10:10 (50)	50:50 (50)	20:20 (100)
6. <i>Hemicriconemoides</i>	20:20 (25)	— —	— —	— —
7. <i>Criconemoides</i>	— —	— —	20:20 (50)	— —
8. <i>Other tylenchs</i>	10:10 (25)	— —	— —	— —
9. <i>Other dorylaims</i>	150:600:295 (100)	190—690:449 (100)	200—420:260 (100)	110:110 (100)
10. <i>Saprophagous</i>	70-320:180 (100)	270—430:350 (100)	160—390:275 (100)	450:450 (100)

Result of the survey of Paddy crop in DARJEELING district, West Bengal

	LOCALITY / VILLAGE		
	Tashiding (Lower)	Sukna	Salbani
No. of samples collected	2	5	4
Nematodes			
1. <i>Meloidogyne</i> (Larvae)	150:150 (100)	40-340:152 (100)	160-290:210 (100)
2. <i>Tylenchorhynchus</i>	30-60:45 (100)	40-250:152 (100)	10-300:123 (100)
3. <i>Helicotylenchus</i>	—	80:80 (20)	30:30 (25)
4. <i>Pratylenchus</i>	30:30 (50)	— —	— —
5. <i>Hirschmanniella</i>	20:20 (50)	260—390:280 (100)	50—200:113 (100)
6. <i>Hemicriconemoides</i>	—	—	—
7. <i>Criconemoides</i>	—	—	—
8. <i>Other tylenches</i>	10:10 (50)	—	—
9. <i>Other dorylaims</i>	240-280:260 (100)	270-670:432 (100)	120-460:297 (100)
10. <i>Saprohagous</i>	300-490:440 (100)	140-300:193 (100)	60-300:143 (100)

TABLE 2

The results of the survey of paddy crop in Darjeeling district, West Bengal
Range of nematode number potential pests with its average per 200 ml soil and
10 gm roots.

(Figures in parenthesis indicate percent frequency of occurrence with dominance in
soil/occurrence in roots)

	Soil population	Root population
1. <i>Meloidogyne</i>	30-610:189 (100:63)	2-980:209 (50)
2. <i>Tylenchorhynchus</i>	10-370:125 (90:10.5)	2-12:9.5 (20)
3. <i>Hirschmanniella</i>	10-390:146 (70:26)	6-106:23 (60)

The high degree of dominance of *Meloidogyne* and *Hirschmanniella* species per 10 gm roots (Table II) further confirms that these are the key pest of paddy in the area surveyed.

The *Pratylenchus*, *Helicotylenchus*, *Criconeoides*, and *Hemicriconeoides* species were also encountered during estimation but their presence was not significant.

SUMMARY

The present study concludes that *Meloidogyne graminicola* Golden & Birchfield, 1965; *Hirschmanniella* spp. (mainly *H. gracilis*); and *Tylenchorhynchus mashoodi* Siddiqi & basir, 1959 are the important pests of paddy crop in Darjeeling district (West Bengal). The paper also reports 36 species of the orders Tylenchida, Aphelenchida, Dorylaimida and Mononchida from Darjeeling district.

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**RECORDS OF CULICINE MOSQUITOES FROM BASTAR
DISTRICT (MADHYA PRADESH) INDIA (DIPTERA : CULICIDAE),
PART-I GENUS *TOXORHYNCHITES*, *TRIPTEROIDES*,
URANOTAENIA AND *ORTHOPODOMYIA*.**

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INTRODUCTION

After the publication of monograph on Indian Anophelines (Christophers, 1933) and Culicines (Barraud, 1934), Prakash and Hussainy (1974) and Hussainy (1981) reported the distribution records of 18 species of Anophelines and 13 species of Culicines from Bastar District. The present communication deals with additional records of 7 species and 3 varieties belonging to 4 genera, collected during the period from 1980 to 1982.

1. *Toxorhynchites splendens* (Wiedemann)

1819. *Toxorhynchites splendens* (Wiedemann) *Zool. Mag.* 1 (3) : 2, Barraud, 1934 : 24; Stone *et al.*, 1959 : 64 and Knight and Stone, 1977 : 362.

This species is recorded from Oriental region including Burma, Sikkim and India, New Guinea, Fiji and Rotuma Islands.

Specimens examined : 21 ♀♀, 25 ♂♂ reared from larvae.

Present records : Bringpal - 1 ♂ (20 Jul. '81), 1 ♀, 6 ♂♂ (14 Sept. '81), 2 ♂♂ (24 Sept. '81). Chapar-Bhanpuri - 1 ♀, 1 ♂ (28 Aug. '81). Chindwada - 1 ♂ (15 Jul. '81), 2 ♀♀, 3 ♂♂ (29 Jul. '81), 5 ♀♀, 1 ♂ (10 Sept. '81). Darbha - 1 ♀ (5 Aug. '81). Dhaniyalur - 1 ♂ (30 Jul. '81), Jagdalpur - 1 ♂ (12 Nov. '81), Kakalgur - 10 ♀♀, 6 ♂♂ (29 Aug. '81), Takaraguda - 1 ♂, 1 larva (7 Jul. '81), Telengarapur - 2 ♂♂ (31 Aug. '81).

Notes : Most of the specimens were reared from larvae collected from pitcher-plant around tribal hutments in villages and a few from discarded motor tyres.

2. *Tripteroides aranoides* var. *serrata* (Barraud)

1901. *Tripteroides aranoides* (Theobald) *Mon. Cul.* 2 : 274; var. *serrata* (Barraud) 1929. *Indian J. Med. Res.* 16 : 1059; Barraud, 1934 : 42; Stone *et al.*, 1959 : 66 and Knight and Stone, 1977 : 317.

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This species has a wide distribution in the South-east Pacific region including Malaya, Singapore, Thailand, Java, Sumatra, Borneo, Indo-China, Hainan Island, Formosa, Burma, India, Ceylon, Andaman Islands. The var. *serrata* is known from India and Thailand.

Specimens examined : 37 ♀♀, 21 ♂♂ and larvae.

Present records : Adawal - 1 ♀ (2 Oct.'80), 1 ♀ (30 Sept.'81), 1 ♀ (20 Nov.'81), Bastar - 1 ♀ (27 Jan.'82), Darbha - 1 ♂ (23 Mar. '81), Dhaniyalur - 1 ♂ (23 Nov.'81), Kangoli - 1 ♀ (21 Nov. '81), Karanji - 1 ♂ (30 Mar.'81), Keslur - 1 ♂ (14 Dec. '81), Pandripani - 14 ♀♀, 11 ♂♂ and many larvae (17 Aug. '81), 10 ♀♀, 5 ♂♂ (14 Sept. '81), Rajur - 3 ♀♀ (7 Oct. '80), 1 ♀ (11 Jan. '82), Takaraguda - 1 ♀, 2 ♂♂ (17 Nov. '81), 1 ♀ (15 Dec. '81), Tokapal 1 ♀ (25 Jan. '82).

Notes : Adults were collected from outdoor habitats, but some were reared from larvae collected from Bamboo cuttings.

3. *Uranotaenia campestris* Leicester

1908. *Uranotaenia campestris* Leicester, *Cul. Malaya* : 213; Barraud, 1934 : 68; Stone *et al.*, 1959 : 111 and Knight and Stone, 1977 : 347.

It is recorded from Malaya, India, Nepal, Ceylon, Thailand, Sumatra, Java and Borneo.

Specimens examined : 46 ♀♀, 13 ♂♂.

Present records : Adawal - 1 ♀ (18 Dec.'81), Aghanpur - 1 ♀ (19 Mar.'81), Bastar - 3 ♀♀ (22 Dec. '81), 1 ♀ (12 Jan. '82), 1 ♀ (27 Jan. '82), Bhond - 1 ♂ (15 Dec. '81), Bringpal - 1 ♀, 1 ♂ (14 Dec. '81), 1 ♀ (18 Jan. '82), Chindawada 1 ♀, 1 ♂ (10 Dec. '81), 1 ♀ (28 Jan. '81), Darbha - 1 ♀ (17 Feb. '81) 1 ♂ (18 Mar. '81), 11 ♀♀, 1 ♂ (23 Mar. '81), Daurgaon - 1 ♀ (13 Nov. '81), 1 ♀ (19 Jan. '82), Dhaniyalur - 1 ♀ (16 Jan. '82), Kotamsar - 2 ♀♀ (5 Feb.'81), 1 ♂ (6 Feb. '81), Pakhanjore - 7 ♀♀, 5 ♂♂ (27-29 Nov. '81), Pandripani - 1 ♂ (14 Dec. '81), 1 ♀, 1 ♂ (18 Jan. '82), Potanar - 1 ♀ (31 Dec. '81), 3 ♀♀ (21 Jan.'82), Rajur - 2 ♀♀ (15 Nov.'80), Takaraguda - 2 ♀♀ (15 Dec. '81), Telengarapur - 1 ♀ (19 Nov.'80), 1 ♀ (13 Jan. '82).

Notes : 43 ♀♀, 12 ♂♂ were collected from outdoor habitats, 1 ♂ from indoor cattle shed, 2 ♀♀ from human bait and 1 ♂ was reared from larvae collected from a rock-pool at the edge of a nala.

4. *Uranotaenia campetris* var. *zelena* Barraud

1908. *Uranotaeria campetris* Leicester *Cul. Malaya* : 213; var. *zelena* Barraud, 1934 : 69; Stone *et al.*, 1959: 111 and Knight and Stone, 1977 : 350.

This species is recorded from India, Thailand and Hainan Island. The var. *zelena* is known from Bombay, India.

Specimen examined : 1 ♂.

Present records : Pakhanjore - 1 ♂ (27 Nov. '81).

Notes : Collected from outdoor habitat from a hole at the edge of a stream.

5. *Uranotaenia tastacea* Theobald

1905. *Uranotaenia tastacea* Theobald, *Ann. Hist. Nat. Mus. Hung.* 3 : 113; Barraud, 1934 : 74; Stone *et al.*, 1959 : 119 and Knight and Stone, 1977 : 353.

This species is recorded from Singapore, Malaya, India, Burma, China and Philippines.

Specimens examined : 4 ♀♀.

Present records : Chindawada - 1 ♀ (28 Jan. '82), Darbha - 1 ♀ (18 Nov.'80), Orcha - 1 ♀ (30 Nov.'81) and Rajur - 1 ♀ (15 Nov.'80).

Notes : All the mosquitoes were collected from outdoor vegetation.

6. *Uranotaenia maxima* Leicester

1908. *Uranotaenia maxima* Leicester, *Cul. Malaya* : 221; Barraud, 1934 : 77; Stone *et al.*, 1959 : 115 Knight and Stone, 1977 : 342.

The species is recorded from Malaya, Thailand, Hainan Island. In India, it is known from Assam.

Specimens examined : 2 ♀♀.

Present records : Darbha - 1 ♀ (23 Mar.'81), Tekameta - 1 ♀ (10 Nov.'81).

Notes : The sepcimens were collected from forest vegetation.

7. *Uranotaenia maculipleura* Leicester

1908. *Uranotaenia maculipleura* Leicester, *Cul. Malaya* : 223; Barraud, 1934 : 82; Stone *et al.*, 1959 : 82 and Knight and Stone 1977 : 342.

This species is recorded from Malaya and Formosa. In India it is known from Darjeeling and Uttar Pradesh.

Specimens examined : 7 ♀♀, 7 ♂♂

Present records : Adawal - 1 ♂ (2 Oct.'80), Bringpal - 1 ♂ (14 Dec.'81), Darbha - 1 ♀ (5 Nov.'80), 1 ♀ (23 Mar.'81), Pakhanjore - 5 ♀♀, 5 ♂♂ (27-29 Nov.'81).

Notes : All the specimens were collected from outdoor vegetation.

8. *Uranotaenia bicolour* Leicester

1908. *Uranotaenia bicolor* Leicester, *Cul. Malaya* : 225; Barraud, 1934 : 83; Stone *et al.*, 1959 : 110 and Knight and Stone, 1977 : 339.

This species is recorded from Malaya and Hainan Island. In India it is known from Mysore.

Specimens examined : 2 ♀♀, 3 ♂♂.

Present records : *Darbha* - 1 ♂ (18 Mar.'81), 2 ♀♀, 2 ♂♂ (16 Sept.'81).

Notes : 1 ♂ was collected from outdoor habitat and 2 ♀♀, 2 ♂♂ were reared from larvae collected from sand-bottomed pit of a rocky stream edge in a dense forest.

9. *Uranotaenia recondita* Edwards

1922. *Uranotaenia recondita* Edwards, *Bull. Ent. Res.*, 13 : 91; Barraud, 1934 : 83; Stone *et al.*, 1959 : 118 and Knight and Stone, 1977 : 344.

This species is recorded from Ceylon, Thailand, Hainan Island and from many places in India.

Specimens examined : 28 ♀♀, 58 ♂♂

Present records : *Adawal* - 4 ♀♀, 4 ♂♂ (2 Oct.'80), *Aghanpur* - 1 ♂ (23 Jan.'82), *Bhod* - 1 ♂ (4 Aug.'81), 1 ♂ (15 Dec.'81), *Bringpal* 1 ♂ (29 Dec.'81), *Chindawada* - 1 ♂ (18 Nov.'81), 1 ♀ (10 Dec.'81), 1 ♀, 1 ♂ (24 Dec.'81), 9, 12 ♂♂ (15 Jan.'82), 3 ♀♀, 2 ♂♂ (28 Jan.'82), *Darbha* - 1 ♂ (23 Mar.'81), *Dhaniyalur* - 1 ♂ (16 Jul.'81), 2 ♂♂ (13 Aug.'81), *Orcha* - 2 ♂♂ (30 Nov.'81), *Pakhanjore* - 5 ♀♀, 14 ♂♂ (27-29 Nov.'81), *Potanar* - 4 ♀♀, 12 ♂♂ (5-7 Dec.'81), 1 ♂ (21 Jan.'82), *Takaraguda* - 1 ♂ (17 Nov.'81), 1 ♂ (15 Dec.'81).

Notes : All the specimens were collected from outdoor habitats.

10. *Orthopodomyia anopheloides* var. *maculata* Theobald

1903. *Orthopodomyia anopheloides* (Giles) *J.trop.Med.*, 6 : 315, var. *maculata*, Theobald, 1910, *Rec.Indian Mus*; 4 : 29; Barraud, 1934 : 98; Stone *et al.*, 1959: 122 and Knight and Stone, 1977 : 299.

This species is recorded from Ceylon, Thailand, Hainan Island and Java. In India, the var. *maculata* is known from Travancore.

Specimens examined : 10 ♀♀, 12 ♂♂

Present records : *Adawal* - 1 ♀ (9 Nov.'81), *Bastar* - 1 ♀, 1 ♂ (22 Dec.'81), 1 ♀ (12 Jan.'82), *Darbha* - 2 ♂♂ (18 Nov.'80), *Dhaniyalur* - 1 ♂ (11 Dec.'81), *Dongariguda* - 1 ♀ (31 Mar.'81), *Kakalgur* - 1 ♂ (24 Dec.'81), 1 ♂ (15 Jan.'82), *Keslur* - 1 ♂ (14 Dec.'81), *Kumarawand* - 1 ♀ (10 Sept.'81), 1 ♀ (21 Nov.'81), *Pandripani* - 1 ♀ (24 Sept.'81), *Rajur* - 1 ♀ (22 Jun.'81), *Sargipal* - 1 ♂ (23 Nov.'80), *Tekameta* - 1 ♀ (10 Nov.'81), *Tokapal* - 1 ♀, 4 ♂♂ (7 Sept.'81).

Notes : 9 ♀, 8 ♂ were collected from outdoor habitats and 1 ♀, 4 ♂♂ were reared from larvae collected from discarded log groove.

DISCUSSION

The genera *Toxorhynchites*, *Tripteroides*, *Uranotaenia* and *Orthopodomyia* are recorded for the first time from the Bastar district of Madhya Pradesh. All these genera

were not recorded by Hussainy (1981). Out of 42 villages surveyed in the course of the present study, *Toxorhynchites splendens* was recorded from only a single village, *Tripteroides anopheloides* var. *Serrata* - 11, *Uranotaenia campestris* type form - 16, *U. campestris* var. *zelena* - 1, *U. tastacea* - 4, *U. maxima* - 2, *U. maculipleura* - 4, *U. bicolor* - 1, *U. recondita* - 11 and *Orthopodomyia anopheloides* var. *maculata* from 13 villages. Most of the *Toxorhynchites* specimens were reared from larvae, while the remaining genera were generally collected as adults from outdoor habitats. However, pitcher-plants for *Toxorhynchites*, bamboo-cuttings for *Tripteroides*, rocky stream edge habitat for *Uranotaenia* and wide hole or groove on log with heavy decaying matter for *Orthopodomyia* serve as the favourite breeding places in Bastar district. The breeding habits of *Toxorhynchites* are of significance, because the larvae are highly predaceous and are being tried as biological control agents.

SUMMARY

Records and ecological notes for seven species and three varieties of Culicine mosquitoes viz., *Toxorhynchites splendens*, *Tripteroides aranoi* var. *serrata*, *Uranotaenia campestris*, *U. campestris* var. *zelena*, *U. tastacea*, *U. maxima*, *U. maculipleura*, *U. bicolor*, *U. recondita* and *Orthopodomyia anopheloides* var. *maculata* in 42 villages surveyed in Bastar district are presented in this communication.

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ВНОВМІК

PLATE I

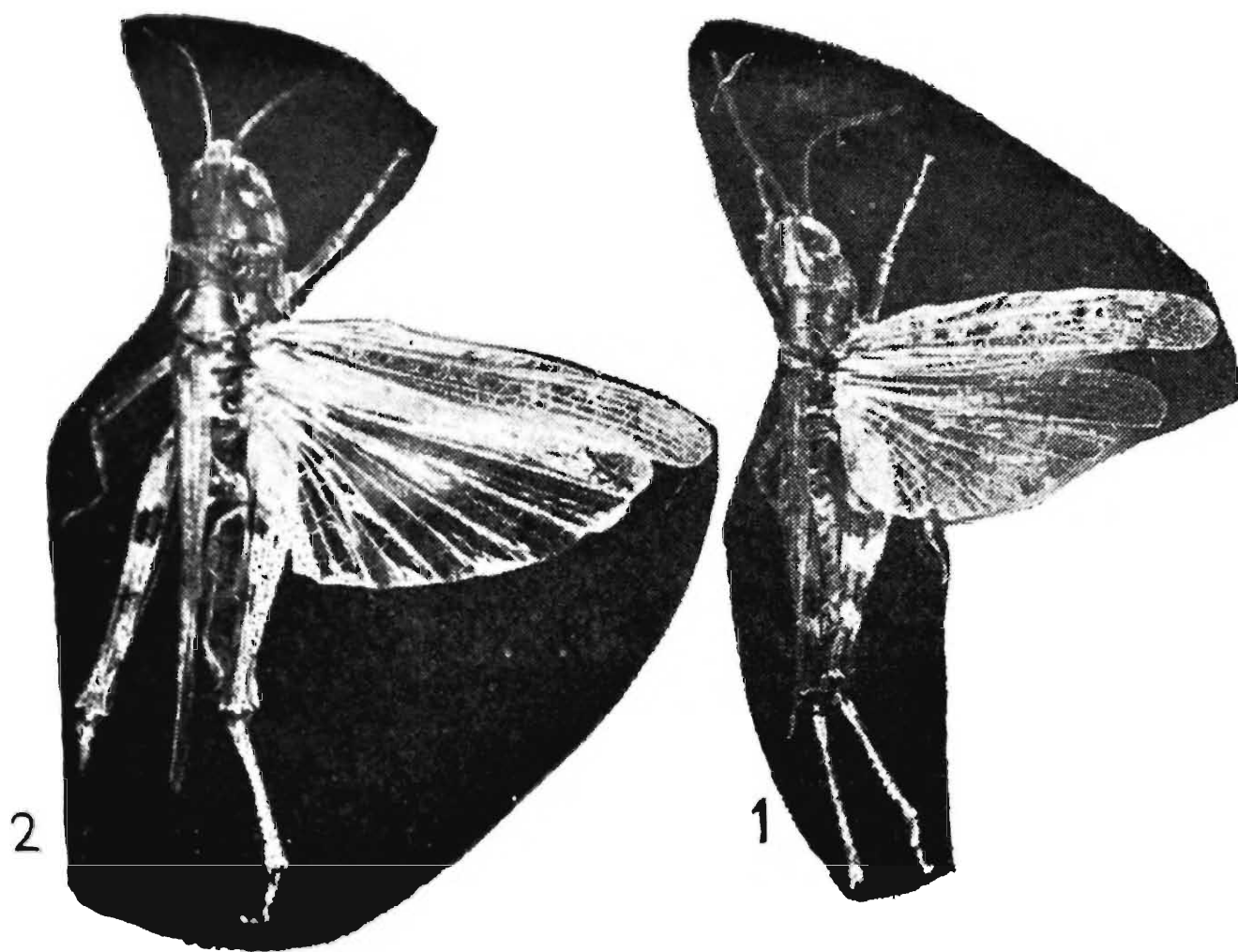


Fig. 1. *Leva indica* Male.

Fig. 2. *Leva cruciata* Female.

BHOWMIK

PLATE II

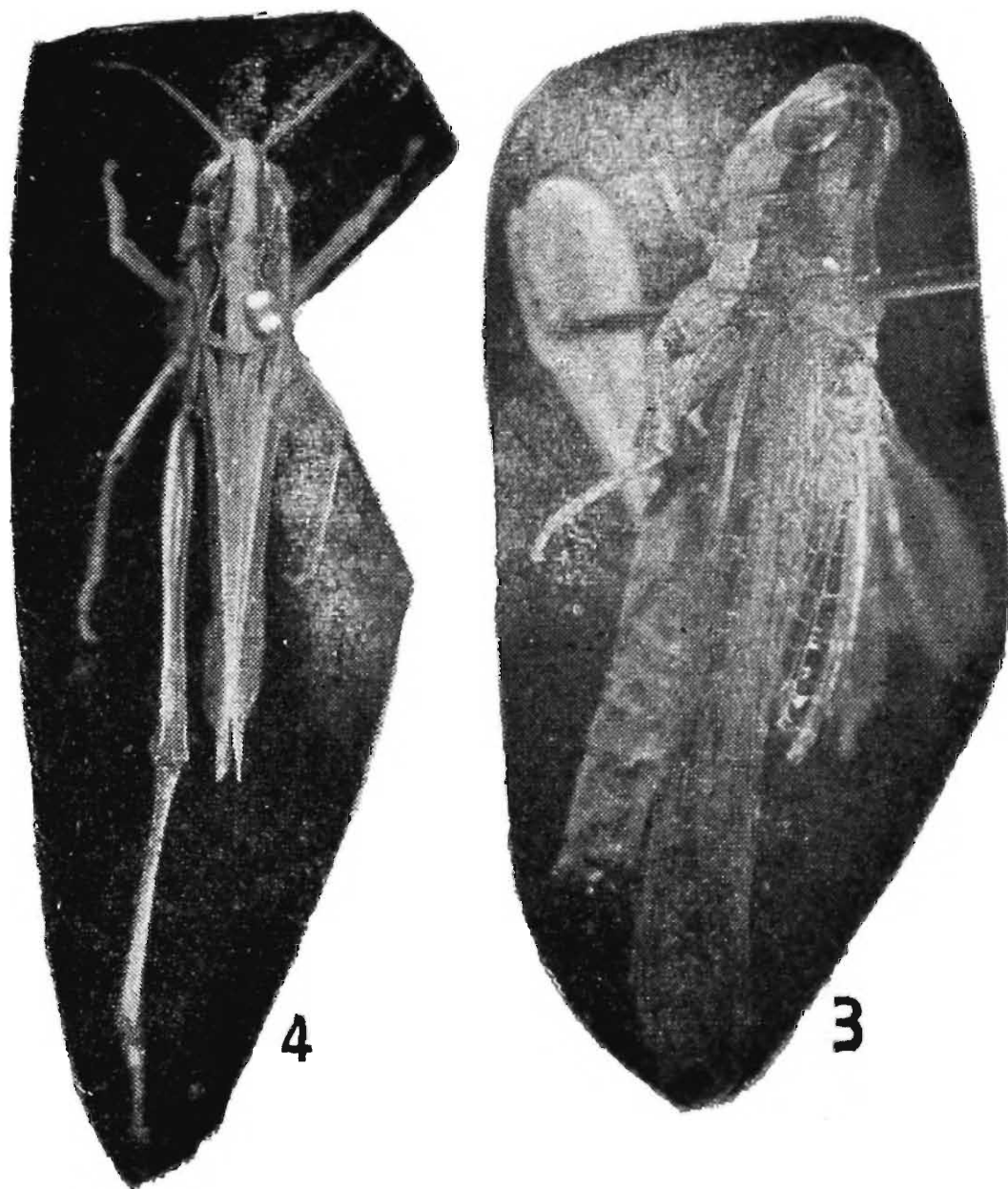


Fig. 3. *Lova mundus* Female.

Fig. 4. *Chorthippus (Chorthippus) indus* Female.

**INDIAN SPECIES OF GENUS *LEVA* BOLIVAR, 1909, AND
SUBGENUS *CHORTHIPPUS* JAGO, 1971, (ORTHOPTERA :
ACRIDIDAE : GOMPHOCERINAE)**

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INTRODUCTION

The genus *Leva* Bolivar, 1909, consists of five valid species in India, of which three species are indigenous. Of these five, four have a restricted distribution in Southern and Western India; only one species, *L. indica*, is found throughout the length and breadth of the country.

The species of this genus are little known and their taxonomy not yet clarified. In this communication, attempts have been made to reexamine the morphology of the available species. *L. cruciata* has been newly recorded from Andhra Pradesh, Orissa and Tripura, and *L. mundus* is reported from Northern India (Punjab) for the first time.

The genus *Chorthippus* Fieber, 1852, is represented in India by two indigenous species and a subspecies of a third species of Russian and Chinese affinity. According to Jago (1971) all of them belong to the largest subgenus - *Chorthippus* (*Chorthippus*), other five subgenera being yet without any representatives in the country. The members of this subgenus have the following combination of characters - antennae often flattened, which are unwidened to slightly and gradually widened apex (but never clubbed nor showing tendency of club - formation), and a distinctly to hardly expanded medial area of ♂ tegmen (medial area not greatly expanded forming a stridulatory speculum), and width of CU₁ area being at least half width of medial area and never occluded. Lastly, their temporal foveolus is at least 3 times longer than deep. Length to depth ratio of post-femur is at least 5.

Indian members of this sub-genus are restricted to the southern slopes of the western Himalayas, all of them being available in the same habitat. Of the two species, one of them, *C. (C.) almoranus*, is described here on the basis of a unique male, and the exotic subspecies, *C. (C.) hammarstroemi hammarstroemi*, is also represented by a few specimens from the same locality in the western Himalayas. Further, more specimens are urgently required and reliable specific identification will only be possible after recordings of their 'songs' have been obtained.

For latest bibliographical references to the members of both the genera, Bhowmik (1985) may be consulted.

SYSTEMATIC ACCOUNT

Order	ORTHOPTERA
Family	ACRIDIDAE
Subfamily	GOMPHOCERINAE
(a) Genus	<i>Leva</i> Bolivar, 1909

Key to Indian species of Leva

1. Lateral carinae in prozona almost parallel-sided up to 3rd sulcus, in metazona strongly divergent.....*indica* Bol., 1909.
Lateral carinae strongly constricted and inflexed in middle of compressed prozona, but divergent in metazona..... 2
2. Frontal ridge distinctly sulcate throughout, convergent near fastigial apex but divergent towards clypeo-frontal suture.....*cruciata* Bol., 1914.
Frontal ridge (between antennae) depressed, plain, subenlarged; impress-punctate, convergent before fastigial apex; hardly sulcate 3
3. Frontal ridge well marginated; reasonably divergent towards clypeo-frontal suture.....*trapezoidalis* Bol., 1914.
Frontal ridge subcarinate; its margins distinct before converging fastigial apex, but towards clypeus obsolete; foveolae narrowly separated from each other..... 4
4. Tegmen shorter than abdomen, having three to four somewhat black spots in medial area; wing a little infusate apically.....
.....*apicalis* Walk., 1871
Tegmen longer than abdomen having three to four light brown spots in medial area and some vague small spots on radial area; wing entirely hyaline.....*mundus* Walk., 1871

Leva indica (Bolivar, 1909)

1909. *Gymnbothrus indicus* Bolivar., *Bol. Soc. esp. Hist. nat.*, 9 : 295.

Material : 5 ♂♂; Babbili, Vizianagar, A.P.; 18.9.83. 2 ♂♂, 1 ♀; Near Seabeach, Vizak, A.P.; 2.9.83; 1 ♂, 2 ♀, Tikarpara, Dhenkanal, Orissa; 23.9.85. 3 ♂♂; Dhenkikote, Kheonjhar, Orissa; 29.9.83. 2 ♂♂, 1 ♀ Purnakote, Orissa; 17.9.83. 1 ♂; Joshipur, Orissa; 6.10.85. 1 ♂; Angul, Orissa; 13.9.85. All by H.K.Bhowmik.

Remarks : Bhowmik (1986) has given a description of the species. The species shows, however, variability as regards its colour pattern. Apex of post. femur with its knee lobes and base of post. tibia are usually brownish; post. tibia annulated with a pale

ring after brownish base. But the colour spots of tegmina, post-ocular colour bands and dark colour of post. femoral apices may be totally absent. In well preserved specimens, these colour patterns are distinct. Besides, on the basis of the current series the following observations can be made.

Frontal ridge which is convergent towards clypeal end distinctly sulcate in ♂, in ♀, it is, however, less grooved and less divergent (i.e., almost paralled sided). Fastigium of vertex deeply grooved in middle, presenting impression of a transverse furrow; a fine median carinula is detectable from behind fastigial base which extends up to border of pronotum. In posterior tibia, after the dark base, a yellowish ring is evident, remaining portion of it being light brownish. Small and slender habitus.

As a whole, the species is variable and always exhibits certain minor differences from population to population.

Leva cruciata Bolivar, 1914

1914. *Leva cruciata* Bolivar, *Trab. Mus. Cienc nat Madr.* 20 : 65.

Material : 4 ♀♀, Dhenkikote, Orissa; 1.10.85. 1 ♀, Balugaon, Puri, Orissa 30.9.83. 1 ♀, Sea beach, Vizak, A.P.; 2.9.83. 1♀; Araku Valley, A.P.; 7.9.83. 4 ♀♀; Tripurah state (different localities); 7 - 22.2.83.

Remarks : The species was described from India oriental (t.c.) and is known from Karnatak (Mysore), T.N. (Coimbatore) and Sri Lanka. The present localities are, therefore, new records for it.

The speciemens before me agree well with known descriptions. It is very close to *L. indica* in its colour pattern, this being particularly true of speciemens from Tripurah; Oriyan material is more testaceous in appearance. Morphologically the species differs from *L. indica* in the following main characters :

Lateral carinae of pronotum more incurved in middle, narrowest part being in between 1st and 2nd sulci; pale in appearance and cruciform in shape after 3rd sulcus, cruciform mark is of dumbel-shaped. Precostal srea of tegmen, beside a false vein, with a few transverse veinlets; costal area with 8 to 9 oblique veinlets; cubital area with a somewhat false intercalated vein in proximal quarter. Bigger in size than *L. indica*.

Measurement : (♀ only)

Body	13 - 17.5
Antenna	5.5 - 6
Pronotum	3.23 - 3.5
Tegmen	12 - 12.5
Post. femur	8.5 - 9.5
Post. tibia	8 - 9

Leva mundus (Walker, 1871)

1871. *Stenobothrus mundus* Walker, *Cat. Dern. Salt. Br. Mus.*, 5 (suppl) : 79.

Material : 1 ♂, 3 ♀♀; Hoshiarpur, Punjab; 8 - 11.10.82; H.K.B. coll.

Remarks : The species is generally known from Bombay (Maharashtra). The present locality is a new record from Northern India.

The specimens in hand completely tally with the known account, specially with the generic characters of *Stenohippus*. However, the species is unique in having the following salient features-frontal ridge convex at superior part; from below middle ocellus deplanate, with bounding carinulae somewhat recognizable, but not sulcate in true sense. Lateral carinae of pronotum may be missing in between 2nd and 3rd sulci or indistinct; on metazona it is very weak and fine.

Measurements : (♀ only)

Body	16 - 16.5
Antenna	6.5 - 7
Pronotum	3.25 - 3.5
Tegmen	16 - 16.5
Post. femur	14 - 14.5
Post. tibia	7.5

(b) Genus *Chorthippus* Fieber, 1852

Subgenus *Chorthippus* (*Chorthippus*) Jago, 1971

Key to Indian species of the subgenus

1. Length of separate middle segments of antenna in ♂ twice, in ♀ 1.25 - 1.5 times greater than greatest width. Medial field wide in both sexes, its greatest width in ♂ twice, in ♀ 1.5 times greater than greatest width of cubital area.....*hummarstroemi hammarstroemi* Miram, 1906
Separate middle segments in ♂ more than twice, in ♀, more than 1.5 times. Medial field not more than 1.25 to 1.5 times wider, in both sexes, than width of cubital field..... 2
2. Hairy species. Antenna short, thick, scarcely longer than head and pronotum, middle segments not more than twice as long as wide. Tegmen longer reaches apex of supra-anal plate; medial field scarcely wider than cubital area which is crossed by irregular veinlets. Lateral carinae strongly raised, angularly incurved in middle of prozona. Posterior margin of metazona obtuse angular.....
.....*almoranus* Uvarov, 1942

Not hairy. Antenna longer than head and pronotum, slender, segments elongate in middle. Tegmen extending a little beyond post. knees; medial field fairly wider, with regular cross-veinlets, cubital area slightly narrower than medial area and similar having regular cross-veinlets. Lateral carinae roundly inflexed (with a tendency to become angular) in prozona. Fastigium of vertex elongate-parabolic, with subacute apex. Posterior border of matazona rounded.....
.....*indus* Uvarov, 1942

***Chorthippus (Chorthippus) indus* Uvarov, 1942**

1942. *Chorthippus indus* Uvarov, *Eos.* 18 : 88-89. fig.2.

Material : 6 ♂♂, 7 ♀♀ (and 4 nymphs), Manali (different localities as Vsist, Dhungri, Rohtang Pass) H.P.; 25 - 27.9.80; H.K.B. coll. 3 ♂♂; Solan, H.P.; 20.4.77; J.M. Julka and P. Halder coll.

Remarks : The species was described from western parts of Pakistan and the western Himalayas, and seems to be abundant in its distributional ranges.

The present series from the upper H.P. completely agrees with the original description including figure and measurement given by Uvarov (op.cit).

***Chorthippus (Chorthippus) hammarstroemi hammarstroemi* (Miram 1906)**

This subspecies has already been reported earlier (Bhowmik & Halder, 1983).

SUMMARY

Three species of the genus *Lava* and two species of the subgenus *Chorthippus* have been studied, with discovery of new records of distribution for two species of the former genus. Practical keys to the species and subspecies of involved genera are given.

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