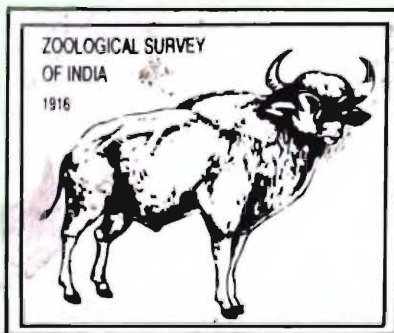


STATE FAUNA SERIES 4

FAUNA OF MEGHALAYA

PART 3
INSECTA



ZOOLOGICAL SURVEY OF INDIA
1995

FAUNA OF MEGHALAYA

Part-3

INSECTA

Edited by :
The Director, Zoological Survey of India
Calcutta.



सत्यमेव जयते

ZOOLOGICAL SURVEY OF INDIA
1995

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FAUNA OF MEGHALAYA

Part-3

INSECTA

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INSECTA : EPHEMEROPTERA

V. D. SRIVASTAVA

Zoological Survey of India, Calcutta

INTRODUCTION

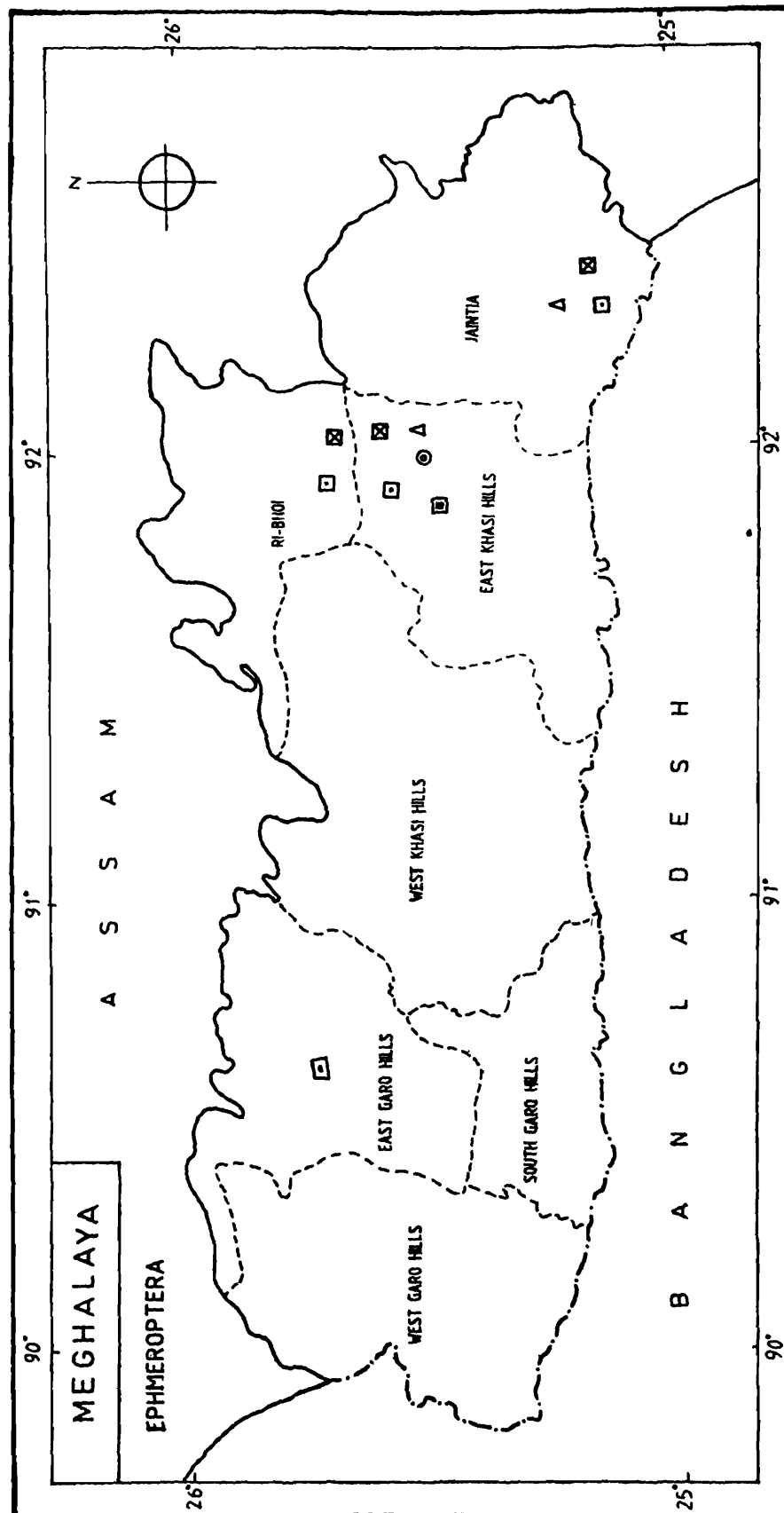
Ephemeroptera are popularly known as mayflies. These insects are amphibiotic in their life cycle. Immature stages from oviposition to different stages of developing larvae are aquatic, while adults are winged form and are of conspicuously short duration. These insects play significant role in food-chain, fish-food, model for fish bait and also as bioindicator of water quality.

These are soft bodied, minute to medium sized (2-25 mm) insects, with minute setaceous antennae, atrophied mouth parts, two pairs of wings, a long filamentous cerci and usually with a median caudal filament. Larvae are aquatic, spindle shaped or broad bodied and with number of tracheal gills. These insects are relatively less conspicuous, specially in their adult stage because of short span of life.

The order is known to be represented in India by 105 species spread over 40 genera and 13 families vis-a-vis a little over 2000 species world over under 155 genera and 22 families. Major component of Indian Ephemeroptera are represented under families : Baetidae (40 species), Heptageniidae (15 species), Ephemeridae (15 species), Leptophlebiidae (13 species). Thus these 4 families together constitute a little more than 4/5 (or 83 : 22) of whole Indian Ephemeroptera. Ephemeroptera fauna of Meghalaya is represented by 5 species under 4 genera and 2 families; leaving there by further scope of additional species for the state.

HISTORICAL BACKGROUND

Perusal of literature reveals that relatively lesser contributions are made on these insects from Meghalaya. Same is true on wider Indian scenario as well, which can be attributed mainly due to very short adult life span and less developed taxonomy of larvae of these insects. Chopra (1937) described a new species of Ephemeridae viz., *Ephemerella (Ephemerella) annadalei*. Same year a new genus was established by Kimmins namely *Cinygmina* (Heptageniidae) to accommodate a new species as its genotype viz., *C. assamensis* Kimmins. 3 other new species were also established by Kimmins (1937) of Heptageniidae. One of these was under genus *Heptagenia* Walsch, namely *H. nubilia* Kimmins; while other 2 new species were under genus *Ecdyonurus* Eaton viz., *E. eatoni* Kimmins and *E. subfuscus* Kimmins. Subsequently Hubbard (1974) changed the last named species to *indicus*; as *subfuscus* was preoccupied thus was established *E. subfuscus* (= *E. indicus* Hubbard).



Distribution Map No. 1 :- Showing distribution of 5 species of Ephemeroptera known from Meghalaya namely Ephemeridae [*Ephemera annandeli* Chopra] Heptageniidae [*Cinygmina assamensis* *Ecdyonurus eatoni* Kimmins, *E. indicus* Kimmins and *Heptagenia nublia* Kimmins].

SYSTEMATIC ACCOUNT

Ephemeroptera fauna of Meghalaya is known only by 5 species, 4 genera and 2 family viz., Ephemeridae and Heptageniidae. A brief mention is made of salient morphological features; with special reference to taxonomic importance. A note on collection preservation and study techniques are also provided, along-with comprehensive list of technical terms used, key and synonymy, diagnostic feature, discussion and distribution. Same was felt necessary before dealing systematic account.

GENERAL MORPHOLOGY

Imago (adult) and subimagos are small to medium size (Meghalaya component are in range of 7-15 mm body length). These are air breathing, soft bodied insects with small setaceous antennae. Mesothorax much larger than Pro- and Metathorax. Wings paired, membranous fragile with network of longitudinal, and cross veins in between. Legs are long Prothoracic leg in some instance longer than body. Abdomen 11 segmented, last reduced and fused with X. Epiproct is tergal part of XI, truncate at posterior margin, which is called supra anal plate of pygidium. On it is based the stump of median caudal filament the tail or 'telofilum' Paraprocts are lateral portions of vestigial 11 segment and support two lateral tails or cerci. Male genitalia is comprised of forceps and penis; former is 4 segmented. Penis are bilobed, lobes separated of joint. Tip of each lobe may have titillators which are prolonged sclerites and may be pointed or hooked.

COLLECTION PRESERVATION AND STUDY TECHNIQUE

Mayflies adult (imago) and subimago are very short lived. These are though winged form but are not good fliers, hence remain normally very much in the vicinity of water bodies to which they are associated in their immature stages. Imago/subimago normally remain sitting/resting amongsts vegetation; mostly on the underside of leaves. These can be collected by hand picking using forcep, soft brush or even with delicate hold of thumb and forefinger. Imagos are also collected on their flight in the evening (dusk) and also can be picked up when occasionally get attracted to light source.

Imago and adult are best preserved in 70% alcohol; which enables their study easier even after long duration of preservation. Wings tend to crumple or folded. A set of dry preserved specimens are also useful for studying wing venation. In both cases mentioned above wing venation (specially smaller sized) antennae, cerci and genitalia are best studied on slide mounts. Pigmentation can be examined in reflected light; hypodermally lodged pigments in wet and cuticular pigments in dry preserved specimens are best observed.

TERMS AND EXPLANATION USED IN KEY AND TEXT

A list of technical terms used in key and or text are indicated below, alongwith their explanations. Same are arranged alphabetically :

<i>Name of term</i>	<i>Explanation</i>
Annulated	With annules (ring) like external markings without corresponding internal septa/wall.
Bistre	Pigment of warm brown colour
Bulf	Light yellow colour
Bulla	A weak spot on principal vein midway their length, increases flexibility of wing tip.
Chesnut pigment	Light brown
Costal space	Space between cost and subcoata.
Cross vein	Veins running across longitudinal veins.
Cubitoanal area	Lower basal portion of wing where anal and cubital veins are present.
Emarginate	Inward cleft or dent in the margin.
Endemic	Confined to particular area.
Epiproct	Plate covering anus from above primarily tergite XI, but often regarded as part of tergite X.
Fuscous	Brown
Paraprocts	A pair of ventral plates of abdomen XI on the sides and below abdomen.
Pygidium	It is a term equivalent to epiproct; and is met with in Ephemeroptera and Isoptera.
Sagittate marking	Markings shaped as arrow head.
Stigmatic area	Very slightly chitinized in apical side of costal space
Subcostal space	Space between subcostal and radius first vein.
Subimago	A stage of life cycle in mayflies (prior to adult-imago stage) immediately after emergence from last stage aquatic larva.

SYSTEMATIC LIST OF EPHEMEROPTERA KNOWN FROM MEGHALAYA

I. Family : EPHEMERIDAE

Genus- 1. : *Ephemera* Linnaeus

Species (i) : *Ephemera (E.) annadelei* Chopra

II. Family : HEPTAGENIIDAE

Genus-2 : *Heptagenia* WalschSpecies (ii) : *Heptagenia nubilia* KimminsGenus-3 : *Ecdyonurus* EatonSpecies (iii) : *Ecdyonurus eatoni* KimminsSpecies (iv) : *Ecdyonurus indicus* HubbardGenus-4 : *Cinygmina* KimminsSpecies (v) : *Cinygmina assamensis* Kimmins*Key to the families represented*

1. Veins M and Cu 1 strongly divergent at base, with M 2 strongly bent toward Cu basally; outerfork of hindwing wanting, hind tarsi-4 jointed..... EPHEMERIDAE.
- Veins M and Cu 1 little divergent at base and fork of M more nearly symmetrical; outer fork of Rs in hindwing present or absent, hind tarsus 5 segmented..... HEPTAGENIIDAE.

SYSTEMATIC ACCOUNT

Family : EPHEMERIDAE

Family Ephemeridae is represented in India by 3 genera viz., *Ephemera* Linnaeus, *Eatonigenia* Ulmer, and *Ichtyobotus* Eaton. Of these only former is represented in Meghalaya; hence no key is provided for genera.

Genus *Ephemera* Linnaeus1758. *Ephemera* Linnaeus. Syst. Nat., 546.1973. *Ephemera* : Mc Cafferty and Edmunds, *Pna-Pac. Ent.*, 49 : 300.1978. *Ephemera* : Hubbard and Peters, *Orient. Ins.*, Suppl., 9 : 15.

Remarks : This genus is represented in India by 12 species and is second maximum represented; after genus *Baetis* Leach (Baetidae) with 22 species. This genus was recognized with 2 subgenera viz., *Ephemera* Linnaeus and *Aethephemera* McCafferty and Edmunds; only former of these is represented in Meghalaya hence no key to the subgenera is provided. The subgenus *Ephemera* is represented in India by 9 species but in Meghalaya only represented by single species hence no key to the species for the genus is provided.

Members of the genus are characterized by moderate size (10-15 mm), wings dark spotted, eyes of male relatively small separated by distance of at least the diameter of one eye. Cross veins at and below bulla distinctly more; in hind wing M2 often detached from M1 at base and directed downwards toward Cu2 paired cerci, and median cercus all of equal length.

***Ephemera (Ephemera) annandalei* Chopra**

1937. *Ephemera (E.) annandalei* Chopra, in Hafiz, *Rec. Indian Mus.*, 39 : 360.

1971. *Ephemera annadalei* : Dubey, *Oriental Ins.*, 5 : 529.

1978. *Ephemera (E.) annandalei* : Hubbard and Peters, *Oriental Ins.*, Suppl, 9 : 15.

Material : Type 2, 1 M, sub-imago (No. 967/H8) and 1 F, imago (968/H8), Shillong Assan (=Meghalaya), 4500 ft., April 1918 and November 1924, Coll. N. Annandale and T. B. Fletcher, 3 M M, Williamnager East Garo hills; 27. 5. 90 (57/90), Coll. M. S. Shishodia and party, 1 F Williamnagar East Garo hills, at light, 8. 3. 91 Coll. B. C. Das & party.

Diagonastic features : Moderate sized (Body length, Forewing 15 : 13.5 mm) for male subimago and 15 : 15 mm. for female imago. Wings dirty white, pale yellow subcostal zone, a very prominent spot at bifurcating point of M; Sc and R are opaque white. Abd. 3-9 with 3 clear streaks on each side, submedian oblique and meets with other side at the anterior end of tergite; black square spot on abd. 10.

Remarks : This species was described on male subimago, female imago but larva (nymph) are not known. It has resemblance with *Ephemera (E.) exspectans* (Walker) known in India from Bihar, Uttar Pradesh, Karnataka; Burma. It is distinguished from same by more dark and dense pigmentation on dorsum, wing membrane also brighter as compared to dull white, lesser subsidiary veins at the wings inner margin from A 1 and more pointed, finger like structure at the sides of penes lobe.

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

Family : HEPTAGENIIDAE

Family Heptageniidae is represented in India 15 species and 8 genera. Of these 8 genera only 3 are represented in Meghalaya by 4 species. These genera are *Cinygmina* Kimmins, *Ecdyonurus* Eaton and *Heptagenia* Walsch.

Key to the genera of Heptageniidae

1. Basal joint of the fore tarsus of male 1/6 to 1/3 as long as second..... ***Heptagenia* Walsch.**
- Basal joint in the fore tarsus of male more than 1/2 as long as second2.
2. Penese lobe dilated laterally, genital stimuli developed, distinct, in shape of small spine.....
.....***Ecdyonurus* Eaton.**
- Penese lobe dilated apically, genital stimuli reduced to a pair of small, thin chitinous plates..... ***Cinygmina* Kimmins.**

Genus *Heptagenia* Walsch

1863. *Heptagenia* Walsch, *Proc. Ent. Soc. Philadelphia*, 2 : 197.

1978. *Heptagenia* : Hubbard and Peters, *Orient. Ins.*, Suppl., 9 : 20.

Remarks : This genus is represented in India 2 species viz., *H. nubilia* Kimmins and *H. solangensis* Dubey. Former of these was described from Meghalaya and is endemic there. Since only single species is described and known from Meghalaya no key is provided.

Members of this genus are of moderate sized [of the two Indian species mentioned *nubilia* (from Meghalaya) has body and fore wing 8 : 8.5-10 mm.]. Foreleg of male slightly longer than body while in female its only 3/4; claws dissimilar in all tarsi. Penes usually united basally (basal half to basal two third), free divergent apically, each division of penes apical and lateral lobe.

Heptagenia nubilia Kimmins

1937. *Heptagenia nubilia* Kimmins, *Ann. Mag. nat. Hist.* (10); 19 : 437.

1978. *Heptagenia nubilia* : Hubbard and Peters, *Orient. Ins.*, Suppl. 9 : 20.

Material : 3 M M, Jaintia Hills, Luchook, Garampani Meghalaya St. 2, 2. 10. 1988, Coll. V. D. Srivastava and party.

Diagnostic features : Moderate size (Body : wing length 8 : 8.5-9 mm). Posterior margin of head in female not immarginate; eyes simple not turbinate. Body and fore leg in male and female in ratio of 4 : 5 and 4 : 3 respectively. All femora yellowish brown, all tarsi 5 segmented; Fore tarsus and tibia are 1.5 : 1 while tarsal segments are in ratio 3 : 19 : 18 : 13 : 6. Wings hyaline. Fore and hind wing in ratio of 3 : 1 or even 4 : 1.

Remarks : This species was described on male and female imago; larvae not known. So for this species is only known from Meghalaya; first it was described from Shilong, present author recorded it from Jaintia hills (Garampani). This species, when compared to only other species described from India viz., *H. solangensis* is smaller (8 : 11), 13-16 stigmatic crossveins in male instead of 19; only basal 2/3 of penes lobe apposed as compared to all along its length.

Distribution : India : Meghalaya, Khasi hills (Shillong), Jaintia hills (Garampani).

Genus *Ecdyonurus* Eaton

1868. *Ecdyonurus* Eaton, *Trans. Ent. Soc.*, 142.

1871. *Ecdyonurus* Eaton, *Trans. Ent. Soc.*, 25.

1885. *Ecdyonurus* : Eaton, *Trans. Linn. Soc. London*, (ser. 2) Zool., 3 : 276.

1978. *Ecdyonurus* : Hubbard and Peters, *Orient. Ins.*, Suppl. 9 : 19.

Remarks : The genus is represented in India by 4 species of which in Meghalaya 2 species are known; namely *E. eatoni* Kimmins and *E. indicus* Hubbard. Both these are endemic to the state, as per known records.

Genital stimuli in members of this genus is in form of small spine and penes lobe dilated laterally. These two characters, in allied genus *Cinygmina* are in contrast reduced thin chitinous plate and dilated apically. Larvae body is dorso-ventrally depressed and broad, ventrally arched so as to enable them attach like "limpet" on to boulders in running water.

Key to the species of Ecdyonurus

1. Thorax dorsally light brown; Femora yellowish brown on basal, apical margin and a median ring; genital hamule strong, downwardly curved and penes lobes separate.....
.....*indicus* Hubbard.
- Thorax dorsally shining brown; Femora dark brown in middle, only at apical end., genital hamule spine like and in curved, penes lobes joint..... *eatoni* Kimmins.

Ecdyonurus indicus Hubbard

1937. *Ecdyonurus subfuscus* Kimmins, *Ann. Mag. nat. Hist.* (10) 19 : 439.

1974. *Ecdyonurus indicus* Hubbard, *J. Kansas Ent. Soc.*, 47. : 358.

Material : 1 M, 1 F, Shillong, Khasi hills (D. E. Kimmins Type in B. M. (N. H.) : *Ecdyonurus subfuscus* = *indicus*).

Diagnostic features : Body small sized (body length M : F = 7 : 8 mm.; body length : fore wing length 7 : 8 in male, 8 : 11 in female). Fore tarsus : tibia 1.6 : 1.5 tarsal segments in ratio of 13 : 19 : 16 : 12 : 5. All femora with basal, apical and medial dark brown rings. Simple cross vein in stigmatic area. Abd. 2-8 deep purple-brown on dorsum; each segment marked similarly as follows: a narrow mid-dorsal stripe; on apical 2/3 additional lateral stripes. Basal segment of genital forcep broader than long; second six times basal incurved.

Remarks : This species was described by Kimmins (alongwith another coinhabiting species *E. eatoni*) as *E. fuscus* but since the name was preoccupied by Stephens, Hubbard (1974) named it *E. indicus*. This can be distinguished from *eatoni* in having genital hamule small, strongly downwardly curved instead of short in curved spine. Penes lobes are distinctly separate as against both lobes joint all along their length.

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

Ecdyonurus eatoni Kimmins

1937. *Ecdyonurus eatoni* Kimmins, *Ann. Mag. nat. Hist.*, (10) 19 : 43 p.

1978. *Ecdyonurus eatoni* : Hubbard and Peters, *Orient. Ins.*, Suppl., 9 : 19.

Material : 1 M, 1 F, Shillong, Khasi Hills (D. E. Kimmins; Type B. M. (N. H.) = *E. eatoni*).

Diagnostic features : Body small sized (Body length male : female 9 : 9-11 mm., wings male : female – 10-11 : 12-16 mm or approx 2 : 3-4; while cerci are equal 25 : 25 mm.). All femora with brown ring in middle and apical extreemity; fore tibiae with additional brown apical

pigments not found in other tibiae. Fore tarsus and tibiae 1 : 1-4; Fore tarsal segments 6 ; 15 : 14 : 9 : 5.5. Pale brown spot at the base and apex of stigmatic area. Abd. tergite 1 and 7 to 9 more broadly marked, while 2-6. has following pattern both apical and distal margins of each segment, a narrow median triangle from base to 3/4 segment an oblique lateral stripe linking apical and distal pigment band and two lateral at angles at apical end. Forcep base has strong tooth on each side.

Remarks : This species is distinguishable from conspecific *E. indicus* (= *fuscus*) by points mentioned under latter, species, key and distinct pattern of abdominal markings. Presence of strong tooth at forcep base also distinguished it with *eatoni*.

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

Genus *Cinygmina* Kimmins

1937. *Cinygmina* Kimmins, *Ann. Mag. nat. Hist.*, (10) : 19 : 435.

1978. *Cinygmina* : Hubbard and Peters, *Orient. Ins.*, Suppl. 9 : 18.

Remarks : This genus is represented in India by single species viz., *C. assamensis* Easton from Khasi Hills (Meghalaya) and is endemic to it. No key to the species of genus is required as it is the sole representative. This species is also the genotype.

Members of this genus are of moderate size (Body : Wing 8-9 : 10-13; Caudal cerci and body 20-30 : 8-9). Numerous, well spread cross veins; 2 parallel pair of intercalaries which are basally free; no cross-veins in stigmatic area in fore wing. Fore tarsus 1.5 times tibia; fore tarsus : Tibia 4 : 7, hind-tarsus: tibia, 10 : 9. Genital forcep 4 segmented, penes joint at base, diverges apically and widens; apical lobes rounded, devoid of spine, genital stimuli reduced, paired chitinousplate.

Cinygmina assamensis Kimmins

1937. *Cinygmina assamensis* Kimmins, *Ann. Mag. nat. Hist.*, (10) 19 : 435.

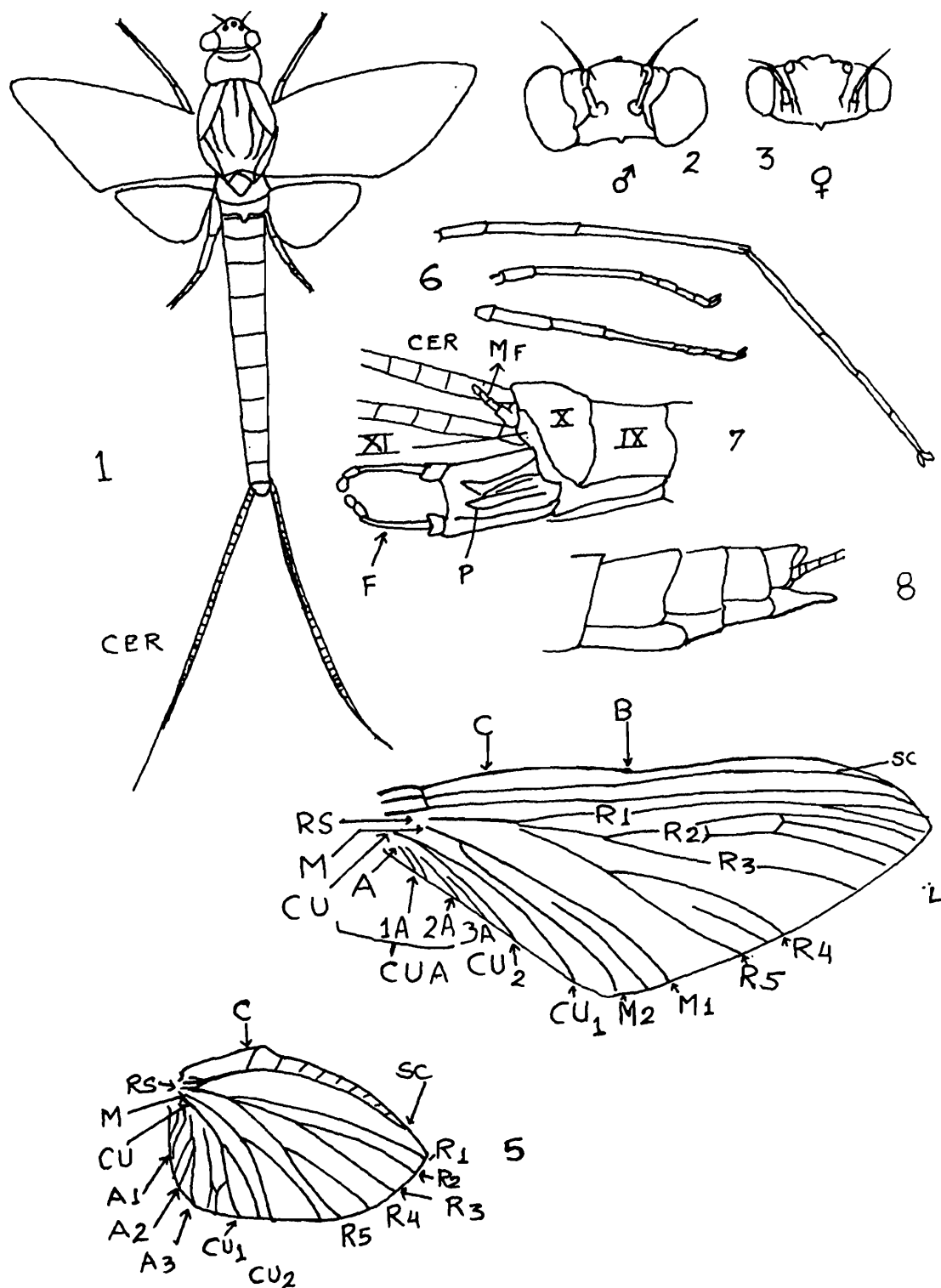
1978. *Cinygmina assamensis* : Hubbard and Peters, *Orient. Inst.*, Suppl., 9 : 18.

Material : 1 M, 1 F, imago and sub-imago, Khasi Hills, Shillong and Jaintia hills (Jowai), 2-x-88, Coll. V. D. Srivastava (Type of the species is in B. M. (N. H.). London).

Diagnostic features : Body length M : F-8:9 mm; wing 10:13-14 mm. Cerci 23-25 : 20 mm. Ground colour brown-reddish brown on head, yellowish brown on thorax and abdomen. Fore tarsal segments in ratio of 8 : 14 : 10 : 5 : 5 and hind tarsal segments 10 : 9 : 7 : 5 : 12. Wings hyaline, venation pale; costa, subcosta and radius grey, a black spot at junction of subcosta and great. Cross-vein. Abd. 1-9 with broad reddish brown stripe; additional paired triangular spot on abd. 2. paired reniform spot or abd. 3-8.

Remarks : This species was described by Kimmins based on imago of both sexes; larva is yet to be described.

Distribution : India : Meghalaya (Shillong, Khasi hills; Jowai, Jaintia Hills.)



Diagrams : Plate -I : Generalized diagram

1. Body, dorsal view; 2. Head of male; 3. Head of female; 4. Wing venation—forewing; with names of veins; 5. Wing venation—Hind wing, with names of veins; 6. Fore, middle and hind of male—Ephemera; 7. End of abdomen of male imago; 8. End of abdomen of female imago.

Abbreviation used : A= anal area (1A, 2A, 3A respectively first, second, third anal veins); B= Bulla; C= Costa; Cer= Cerci; Cu= Cubital; Cu₁ and Cu₂ = cubital one and cubital two; CUA= Cubital anal area; f= forcep; M= Media; Mf= Vestigial middle tail (telofilum); p= penes R= Radius; Sc= Subcosta.

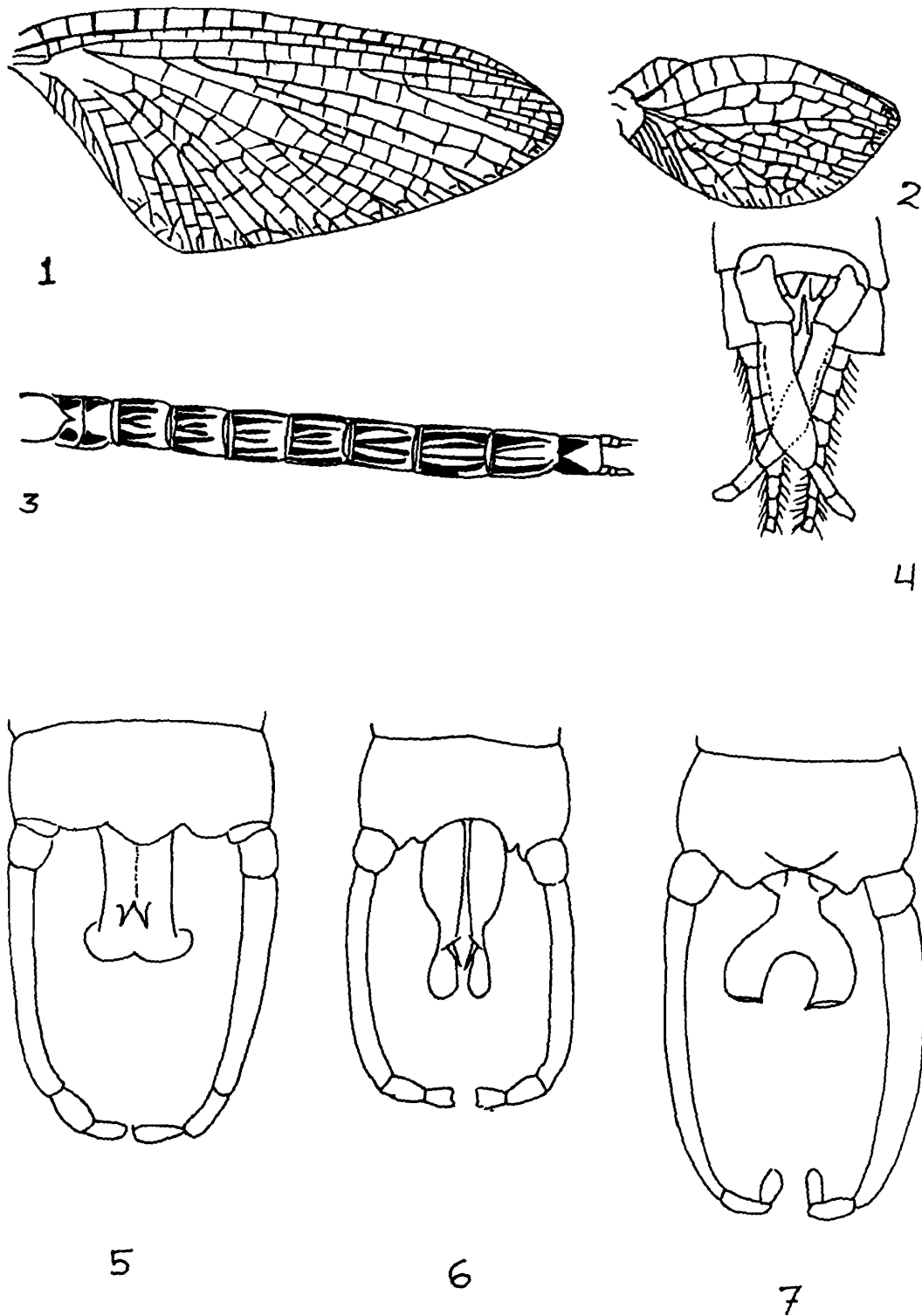


Plate -II : *Ephemera annadaeli*

Fig. 1. Fore wing, showing venations 2. Hind wing, showing venations 3. Abdomen showing marking pattern of tergites 4. External genitalia of male, ventral view.

Figs. 5. External genitalia of *Ecdyonurus eatoni* 6. External genitalia of *E. indicus* 7. External genitalia of *Cinygmima assamensis*.

SUMMARY

Present paper deals with known Ephemeroptera fauna of Meghalaya and study of type/ other material : faunal composition is very meagre and is known to comprise of 5 species under 4 genera and 2 families viz., Ephemeridae and Heptageniidae. A systematic list, key to various taxa is also provided; besides diagnostic characters, affinity with allied taxa distribution.

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INSECTA : COLLEMBOLA

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INTRODUCTION

Collembola— popularly known as springtails are small and permanently wingless insects. The English entomologist Sir John Lubbock in the year 1870 gave the name collembola to this group of insects. The small to minute insects with a range from 0.25 mm to 10 mm in length. Antennae with 4 to 6 segments. These are minor pests in agriculture but its importance as biological agent in the soil forming process are immense. Many species of collembolan are now established as bio-indicator of soil pollution as well as soil fertility. The collembola have a very wide distribution, occurring in all parts of the world and in any atmospheric habitat. They occur to the vicinity of both south and north poles (upto 83° south latitude in Antarctica). Few species are living permanently on glaciers or snow fields. The diversity as well as the greatest number are found in rich organic matter content soil. Some species live freely on the surface of the water (viz. *Podura aquatica*). They are less abundant in the dry habitat. The collembola are divided into two suborders, each characterised by a distinct body form. The collembolans which have elongated body come under suborder Arthropleona. In the symphyleona the body is compacted and globular.

The notable researchers in the field of collembolan taxonomy from different parts of the world are Imms (1906, 1912), Womersley (1939), Gisin (1944, 1960), Stach (1947, 1963), Strenzke (1940), Scott (1961), Salmon (1949-1964), Chaudhuri (1961) Richards (1968), Christiansen (1961-1982), Massoud (1971), Ellis and Bellinger (1973), Dallai (1971), Mitra (1991).

The study of the Indian collembola were initiated perhaps by Ritter (1910). But the significant contribution was of Imms (1912). He erected four new genera of collembola and new subfamily. Subsequently Carpenter (1913, 1924), Handschin (1929) and Denis (1936) have contributed on the Indian Collembola. Salmon (1951-1969), Baijal (1955, 1968), Choudhuri (1963-1966), Yosii (1966a,b), Mitra (1966-1990), Prabhoo (1971) have also contributed significantly to our knowledge on Indian collembola in the recent years. The study of Meghalaya collembola was first attempted by Carpenter (1924) and described 4 species of collembola from Siju caves, mitra (1975) reported two species of the genus *Dicranocentroides* from Shillong. Kemp was first collector of the group of collembola from the state. He has collected several examples of collembola from Siju cave area during January-February 1922.

Over 5500 species under 452 genera, 4 families and 2 sub-orders are known throughout the world. From India about 210 species under 86 genera, 8 families and 2 sub-orders are known, and from Meghalaya 10 species under 6 genera and 3 families have been recorded.

The Zoological Survey of India have conducted a number faunistic exploration in Meghalaya since 1990 till 1992 under departmental scheme of state fauna study. The present study is based on a part of this collection. Some species have described on the basis of previous collections on literature as we could not collect during the present study. Majority of the figures given in the present paper have been adopted from Mitra & Yosi.

This study provides key to families, subfamilies, genera and species.

SYSTEMATIC ACCOUNT

General morphology of Collembola

(Figs 1 and 2)

The Head : It is more or less oval shaped in dorsal view, which varies considerably in different species, depending upon whether the Jaws are directed, anteriorly or ventrally said to prognathous or hypognathous. In sminthuridae the long axis of the head is typically vertical and the antennae arise dorsally.

The Antennae : These are normally consist of four basic segments. In many sminthuridae the last segment or last two segments are divided into a few or many sub-segments.

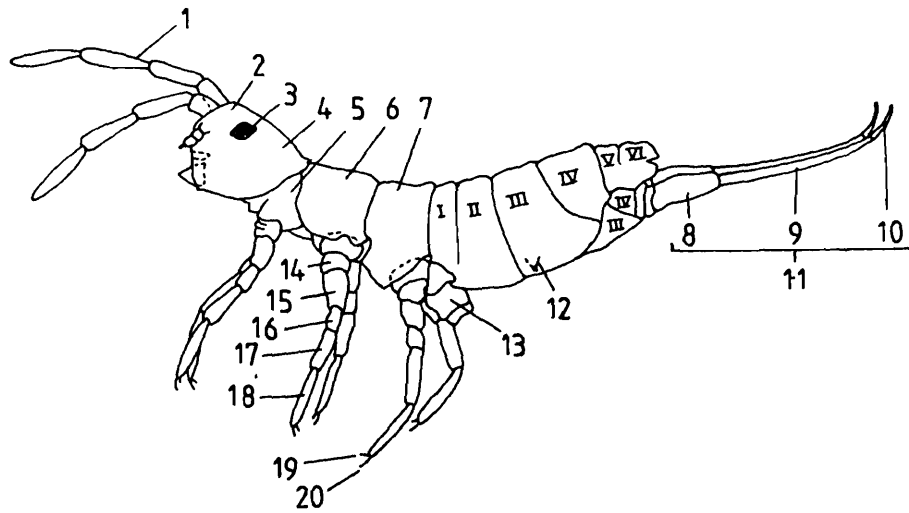
The post antennal organ (PAO) : This organ is found in some families between the antennal base and the eye region. This organ has got immense taxonomic value.

The eyes : The eye patch behind each antenna which consists of from 1 to 8 in more or rectangular arrangement, usually located on a heavily pigmented area.

The Thorax and the legs : In each segments of the thorax there is a pair of six segmented legs. Some times there are one or more subapical hairs on the tibiotarsus, these are called tenent hairs and have considerable taxonomic importance. The leg terminates in one or two claws, the larger is known as unguis, the smaller one is known as unguiculus.

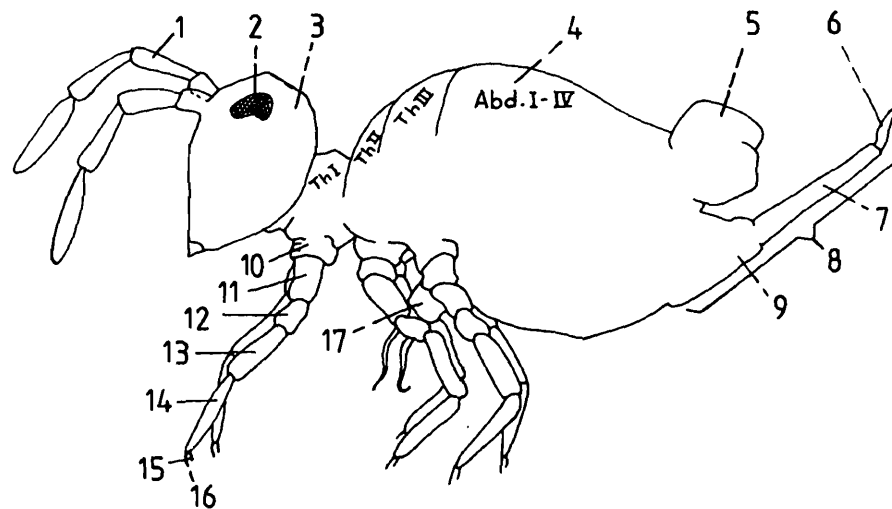
The abdomen : Unlike other insects the abdomen of collembola is six segmented. In most of the species of Arthropleona the abdominal segments are distinct where as in symphypleona the first four segments of the abdomen are fused with thorax to form a globular-mass. In majority species of symphypleona the females bear chitinous structures on each side of the annus. The anal. appendages are important in the separation of species.

The ventral tube (Collophore) : In the abdominal segment a circular or cylindrical bilobed appendages is present which is known as the ventral tube. Because of the presence of this peculiar structure by all the known species the name of this order was give as collembola. It secretes a glue like substances which helps in adhesion process.



1. Antennae ; 2. Postantennal organ; 3. Eye patch; 4. Head; 5. Prothorax ;
6. Mesothorax; 7. Metathorax ; 8. Manubrium; 9. Dentes; 10. Mucrone ;
11. Furcula; 12. Tenaculum; 13. Collophore; 14. Precoxa; 15. Coxa ;
16. Trochanter; 17. Femur; 18. Tibiotarsus; 19. Unguiculus; 20. Unguis .

Fig. 1. General morphology of a typical arthropleonid collembola.



1. Antennae ; 2. Eye; 3. Head; 4. Abdomen I - IV; 5. Anal papilla (Abd. v-vi)
6. Mucrone; 7. Dens; 8. Furcula; 9. Manubrium; 10. Precoxae; 11. Coxa ;
12. Trochanter; 13. Femur; 14. Tibiotarsus; 15. Unguiculus; 16. Unguis ;
17. Collophore

Fig. 2. General morphology of a typical symphypleonid collembola.

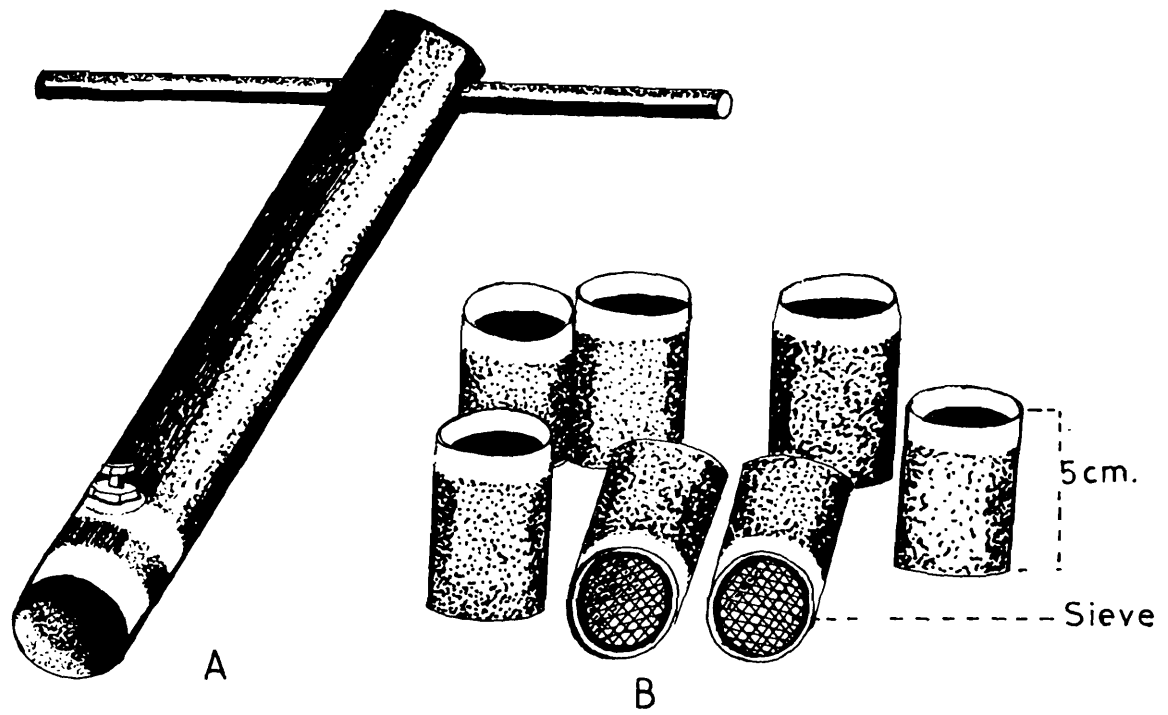


Fig. 3. Stainless steel soil sampler: A. Sampler holder B. Stainless steel corer.

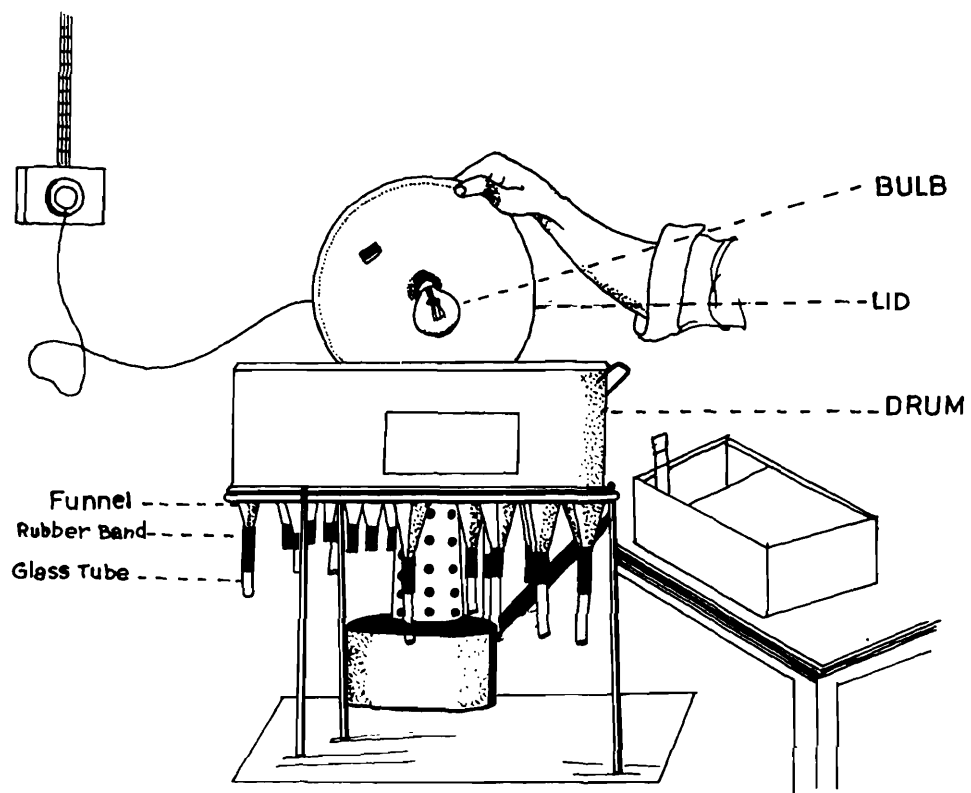


Fig. 4. Soil sample extraction apparatus (modified).

The furcula : The common name of this group is "spring tail insect" has been originated for the presence of this organ. It is appended to the ventral surface of the fourth segment of the abdomen. It is present in the majority of species, in some it is lacking or poorly developed. The structure is composed of a pair of appendages fused in their basal portion to form the manubrium. From this basal segment a pair of separate elongate structures known as dentes, which attached distally with small hook like structure which is called mucrones (Fig. 1).

Body clothing : The body of the collembolans are clothed with different types of hairs arranged in patterns, which gives the identity of different species. There are some sensory hairs arising from cup like pits in the integument is called *Bothriotricha*.

Collection and preservation of collembola : These small tiny insects may be collected from most of the habitat. But the collection techniques are different for taxonomical study and for the ecological study.

A white enamel tray and aspirator are most useful tools for the collection of collembola to be used for taxonomic studies. Sometimes alcohol may be given in the tray or on a large petri-dish and then by beating the bushes, or mosses or forest litters the collembolans may be collected by inducing them to jump on these objects. They are then picked up in the end of a fine brush and transferred to fixative. But large numbers and greater varieties of collembola can be obtained by employing stainless steel copers for collecting known quantity of soil samples (Fig. 3). The cores are then placed on Tullgren funnel or Highgradient extraction apparatus (Macfadyen, 1953). The Tullgren funnel is simply a funnel or a rows of funnels with a wire net on which soil, litter, mosses etc. are placed. An electric bulb above the funnel is hanging to provided temperature. A tube with alcohol below the funnel is kept for the collection of soil insects (Fig. 4). But the tullgren funnel technique is unsatisfactory for finegrained materials and mineral soil as these materials are passed through the wire-net easily. Therefore, for such things the soil sample is immersed in water or salt solution and stirred, and collembolans float to the surface of solution and collected by picking up with brush. This method is known as flotation technique.

Preservatives : The collembolans can be preserve in Von-Torne's medium. It consists of 1000 cc. isopropyl alcohol, 30 cc glacial acetic acid, 3 cc. 40% formaldehyde.

Mounting media : For studying the collembolans the media which permit mounting directly from alcohol or clearing agents are useful. Hoyer's mounting medium perhaps would be best. It consists of 50 cc. distilled water, 200 g. chloral hydrate, 40 cc. glycerine, 20 gm. gum arabic, these mixture should be filtered through glass wool.

LIST OF TAXA

Family ENTOMOBRYIDAE

Subfamily PARONELLINAE

Salina striata (Handschin)

Salina choudurii Mitra

Dicranocentroides salmoni Mitra

Dicranocentroides indica (Handschin)

Callyntrura vestita (Handschin)

Callyntrura japonica (Kinoshita)

Subfamily CYPHODERINAE

Cyphoderopsis gracilis Carpenter

Subfamily ENTOMOBRYINAE

Lepidocyrtus magnificus Carpenter

Lepidocyrtus exploratorius Carpenter

Order COLLEMBOLA

Suborder ARTHROPLEONA Börner

Super Family ENTOMOBRYOIDEA Womersely

Key to families of Entomobryoidea

1. Hind coxae usually with trochanteral organ. Abdomen IV appreciably longer than abdomen III. Scales present or absent; often ciliated. Furcula well-developed... ENTOMOBRYIDAE.
2. Hind coxae without trochanteral organ. Abdomen III and IV usually subequal; the one never more than one and one half times as long as the other posterior abdominal segments often fused. Scales usually not present..... ISOTOMIDAE.

Key to the subfamilies of Entomobryidae

1. PAO present or absent and setae at most unilaterally ciliate..... ISOTOMINAE
- PAO absent, some setae multilaterally ciliate2.
2. Dens dorsally crenulated and curving upward; basally in line with manubrium ENTOMOBRYINAE
- Dens not crenulated, straight and usually forming a basal angle with manubrium.....3.
3. Eyes and pigment absent; dens with large dorsal scales and without apical lobe..... CYPHODERINAE
- Eyes and pigment; dens without dorsal scales and with apical lobe..... PARONELLINAE

Subfamily PARONELLINAE Börner, 1913

The members of this subfamily can be distinguished from other entomobryids the straight

dentes not ringed, no spines but with the presence of dental scale appendages in the terminal part of dentes. The mucro in majority cases are blunt, they may be bidentate or tridentate and different in shape from the subfamily entomobryinae. The fourth abdominal segment is much elongated.

*Key to genera of subfamily Paronellinae
from Meghalaya*

1. Body covered with scales.....2.
- Body not covered with scales.....*Salina* Macgillivray
2. Basal seta of the outer maxillary ramus is blunt*Callyntrura* Börner
- Basal seta of the outer maxillary ramus is pointed.....*Dicranocentroides* Imms
- Rami short and stout, each with four small teeth.....*Paronella* Schott

I. Genus *Salina* MacGillivray, 1894

This genus is represented by only 2 species from Meghalaya

Key to species of the genus Salina

1. Body pigment usually form longitudinal bands.....2
- Body pigment usually form transverse band.....3
2. One lateral and one sub-median longitudinal bands in dark brown pigment present on Thorax I, III and Abdomen I-VI.....*Salina striata* (Handschin).
3. Body surrounded through lateral margins of the head with deep blue black pigmented band. Two thin transverse bands on Abdomen II.....*Salina choudhuria* Mitra.

1. *Salina striata* (Handschin, 1928)

(Fig. 5 and map 1)

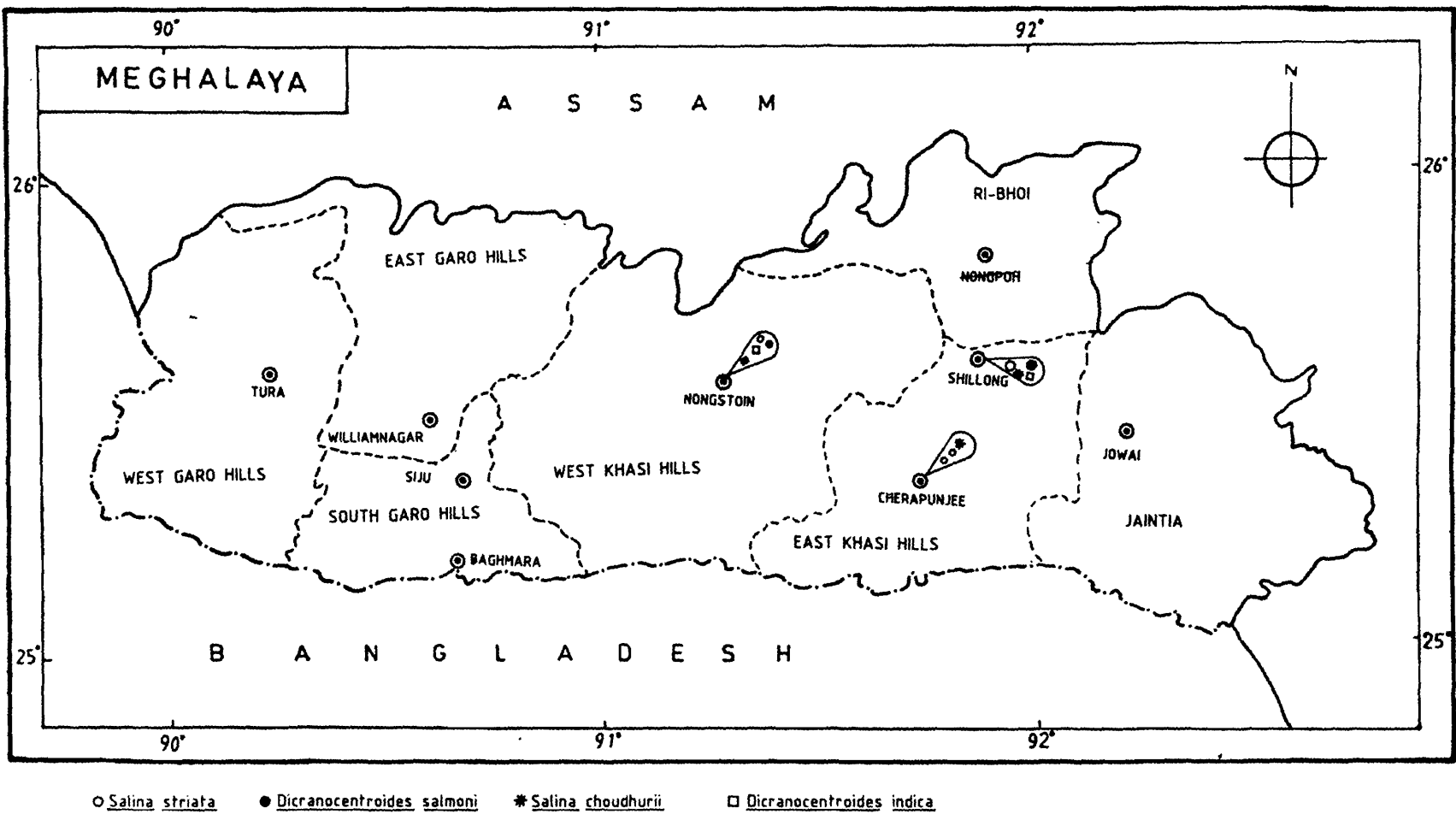
1928. *Cremastocephalus striatus* Handschin, *Treubia*, **10** : 245-270.

1961. *Salina striatella* : Yosii, *Nature and life in South East Asia*, **1** : 171-200.

Material examined : *West Khasi hill district* : 4 km. West of Nongstoin near Govt. Poultry and pigfarm by the side of a hill stream, 21. iii. 1991, coll. A. K. Hazra; 25 exs., by the side of Nongfa river bed under decomposed leaf litter, 22. iii. 1991, coll. A. K. Hazra 10 exs.

East Khasi hills district : Botanical gardens, Shillong, 28. iii. 1991, coll. A. K. Hazra, 42 exs.; Botanical gardens, Shillong, 20. vi. 1965, coll. B. K. Tikader, 5 exs.; Near Mousomai caves, Cherapunjee under growth of forest, 27. iii. 1992, coll. A. K. Hazra, 5 exs.

Diagnostic characters : Body length is 3.2 mm. Ground colour of head and body is creamish or pale yellow. Thorax II and III laterally with dark pigment. Abdomen I and II each having three



Map. 1. Showing distribution of *Salina striata*, *Salina choudhurii*, *Diceranocentroides salmoni* and *Diceranocentroides indica* in Meghalaya.

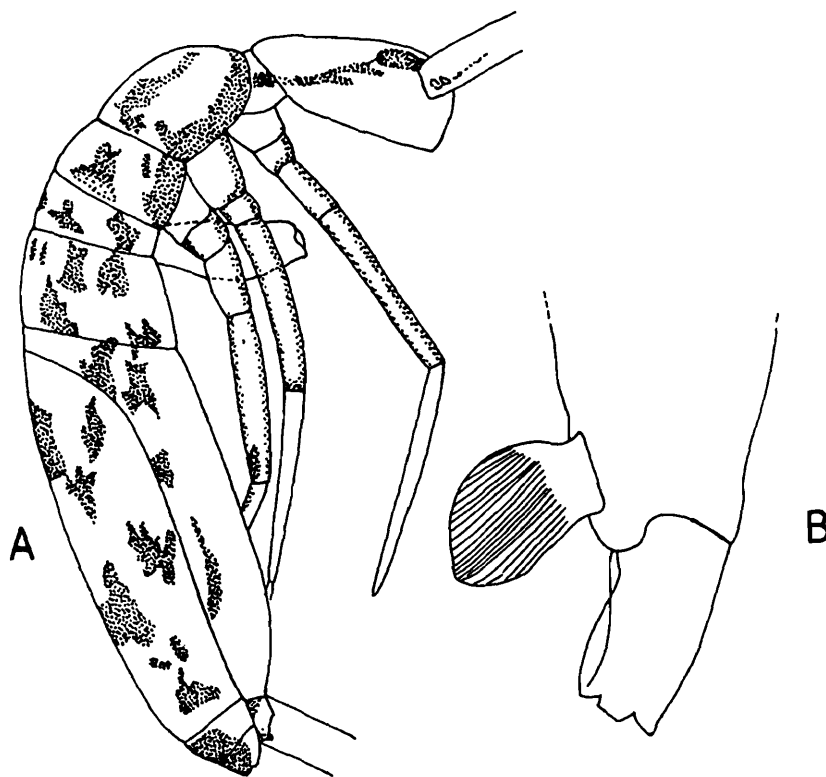


Fig. 5. Lateral view of *Salina striata* (A); Mucrodens complex (B).

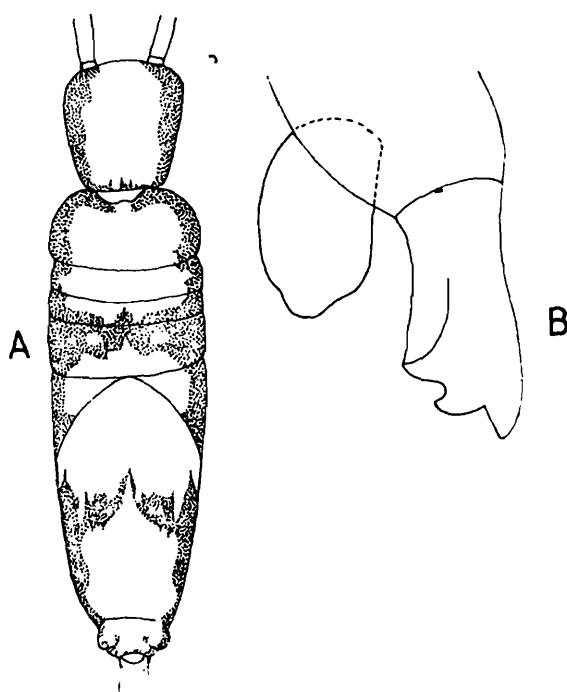


Fig. 6. Dorsal view of *Salina choudhurii* (A); Mucrodens complex

colour pigmented patches each side. Body surface sparsely covered with short ciliated microchaetae. Head pearshaped ocelli 8 + 8. Relative length of Thorax II : III = 15 : 9 relative length index of abdomen I : II : III : IV : V : VI = 8 : 14 : 3 : 41 : 7 : 3, ventral tube well developed. The species has been nicely described by Mitra (1973) therefore, detail description in the present paper is not needed.

Distribution : INDIA : Meghalaya (East Khasi hills), Uttar Pradesh, Nilgiri hills (Tamil Nadu).

2. *Salina choudhuria* Mitra, 1973

(Fig. 6, map 1)

1973. *Salina choudhuria* Mitra, *Oriental Ins.* : 7 (2) : 159-202.

Material examined : East Khasi hills district : Botanical garden, Shillong, 28. iii. 1991, coll. A. K. Hazra 4 exs.; Forest near Mousomai cave, 27. iii. 1991, coll. A. K. Hazra 7 exs.; Holotype collected from "Cave Mousmai, Khasi and Jaintia hills, 18. xi. 1967, coll. G. Topal"

West Khasi hills : Nongstoin by the side of Nongfa river bed, 22. iii. 1991, coll. A. K. Hazra, 5 exs.

Diagnostic characters : Total length of the body is 1.7 mm. Body colour light yellow. Two deep blue-black band present longitudinally along the margin of the head thorax and the abdomen. Two transverse bands are present respectively on II and IV abdomen. The IV abdominal segment with 2 + 2 macrochaetae. Head pear-shaped dorsally with 8 + 8 ocelli. The relative length index of thorax II : III = 36 : 9, the IVth abdominal segment is more than nine times the length of abdomen III. The relative length index of abdomen I : II : III : IV : V : VI = 7 : 11 : 10 : 98 : 7. The detail descriptions of the species with chaetotaxic formulae have been nicely described by Mitra (1973).

Distribution : INDIA : Meghalaya (East Khasi, and West Khasi hills).

II. Genus *Dicranocentroides* Imms (1912)

The genus is represented by only 2 species from Meghalaya

Key to the species of genus Dicranocentroides

1. Presence of dark pigment on the body.....2
- Absence of dark pigment on the body.....3
2. Thorax III, Abds. I, II. with dark pigmented patches III abdominal segment and its lateral extensions pigmented.....*Dicranocentroides salmoni*.
3. Antennae I, II, III. each with a pigmented distal ring and IV antennal segment totally pigmented. Abdomen IV with light longitudinal bands.....*Dicranocentroides indica*

3. *Dicranocentroides salmoni* Mitra, 1973

(Fig. 7, Map 1)

1957. *Dicranocentroides fasciculatus* Salmon, *Acta. Zool. Cracao.*, **12** (14) : 313-362.

1975. *Dicranocentroides salmoni* Mitra, *Rce. zool. Surv. India*, **71** : 57 : 95.

Material examined : East Khasi hills Dist. : Botanical gardens, Shillong, 28. iii. 1991, coll. A. K. Hazra, 10 exs., Forest near Cherrapunjee, 27. iii. 1991, coll. A. K. Hazra, 5 exs; Shillong, 20. v. 1965, coll. B. K. Tikader 2 exs.

West Khasi hills Dist. : Nongfa river bed side at Nongstoin 21. iii. 1991, coll. A. K. Hazra, 5 exs.

Diagnostic character : Total body length 2.8 mm. Thorax III and abdomen I, II with dark pigment. Body covered with scales and ciliated, obliquely truncated macrochaetae (brush setae). Head pear-shaped with 1 + 1 dark ocellar field, each having 8 ocelli. The II thoracic segment is relatively larger than III (ratio 14 : 10). Abdominal segments length index of I : II : III : IV : V : VI = 7 : 7 : 4 : 37 : 4 : 2 and relative length index of manubrium mucrodens = 28 : 40. a detailed description of the species was given by Mitra (1975).

Distribution : INDIA : Meghalaya (East Khasi hills, West Khasi hills); Sikkim, Manipur, BHUTAN.

4. *Dicranocentroides indica* (Handschin, 1929)

(Fig. 8, Map 1)

1929. *Aphysa indica* Handschin, *Rev. Suisse Zool.*, **36** : 221-262.

1975. *Dicranocentroides indica* (Handschin) *Rec. zool. Surv. India*, **71** : 57-59.

Material examined : East Khasi hills dist. : Botanical garden, Shillong, 28. iii. 1991, coll. A. K. Hazra, 10 exs; Forest near Shillong peak, 28. iii. 1991, coll. A. K. Hazra, 5 exs.; Shillong, 3. v. 1965, coll. B. K. Tikader, 1 ex.

West Khasi hills dist. : Forest hill stream near Govt. Poultry farm, Nongstoin, 20. iii. 1991, coll. A. K. Hazra, 5 exs.; Nongfa river bed side, Nongstoin, 20. iii. 1991, coll. A. K. Hazra, 5 exs.

Diagnostic characters : Light longitudinal bands come down from the anterior margin of Abd. IV and joins posteriorly, pigments are darker at bases of antennae; Antennae I, II and II distally possess clear bluish ring. Ground colour of the body with light purple blue pigment all over the head and body, body is covered with scales, cervix and anterior margin of Thorax II with a row of acuminate setae; head with two dark ocellar fields, each with 8 + 8 ocelli arranged in two longitudinal parallel rows. Fourth antenna superficially annulated. The relative length of thorax II : III = 12 : 9 and that of abdomens I : II : III : IV : V : VI = 6 : 6 : 3 : 29 : 3 : 1, mucro short with 6 teeth.

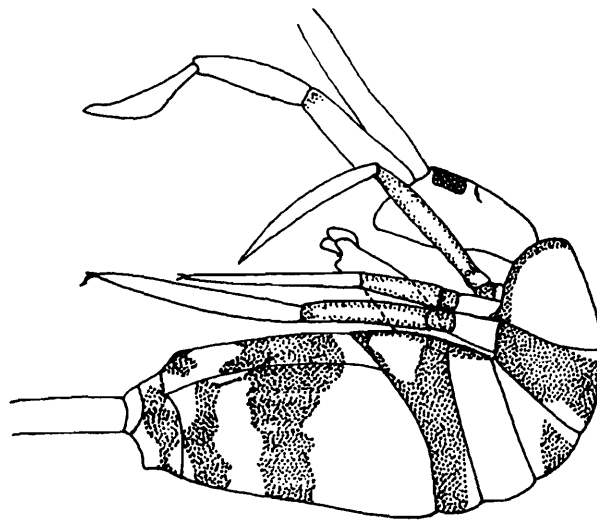


Fig. 7. Lateral view of *Dicranocentroides salmoni*

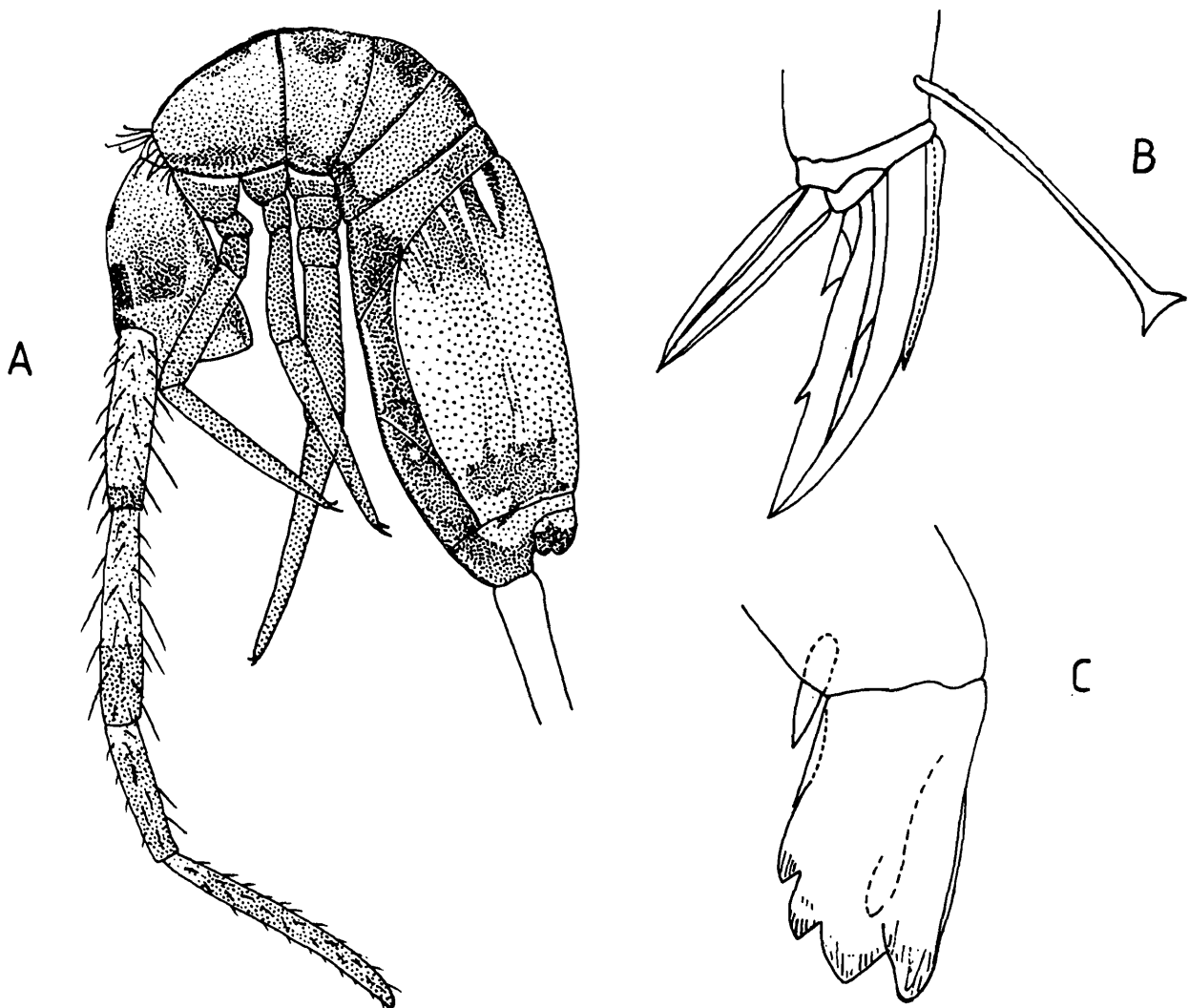


Fig. 8. Lateral view of *Dicranocentroides indica* (A); root complex (C).

Distribution : INDIA : Meghalaya (East Khasi hills dist., Wst Khasi hills dist); Tamil Nadu.

III. Genus *Callyntrura* Börner, 1906

The genus is also represented by three species from the state.

Key to the species of the genus Callyntrura

1. Median three of the first row of labral setae modified; furca with distinct dental spines.....
.....*Callyntrura vestita*
- Without modified labral setae, dental spines absent.....*Callyntrura japonica*

5. *Callyntrura vestita* (Handschin, 1925)

(Fig. 9, Map 2)

1925. *Microphysa vestita* Handschin, *Treubia*, 6 : 225-270.

Material examined : East Khasi hills dist. : West side of the Botanical garden, Shillong, 28. iii. 1991, coll. A. K. Hazra, 4 exs.; Umdienpur, Shillong, 4. iii. 1965, coll. B. K. Tikader.

West Khasi hills dist. : By the side of a hill stream under rotten leaves, Nongstoin, 20. iii. 1991, coll. A. K. Hazra, 6 exs.

Diagnostic character : The length of the body is 3.8 mm.; ground colour pale whitish. Head, thorax and upto III abdominal segments are completely covered with black pigment. Ventral tube covered with black pigment. Legs are deeply pigmented on basal two segments and with median patch on each tibiotarsus. Ratio of antennae segment as 40 : 35 : 20 : 60. Scales are present on three basal segments of antenna. Fourth antennal segment is annulated and with sub-apical cone. Furca ventrally scaled. Dens bears more than 20 spiny smooth setae arranged irregularly along the inner side near the base. Distal bulging on the dens is medium large. Muero comparatively shorter and with 6 teeth.

Distribution : INDIA : Meghalaya (East khasi hills, West Khasi hills). JAVA.

6. *Callyntrura japonica* (Kinoshita, 1917)

(Fig. 10, Map 2)

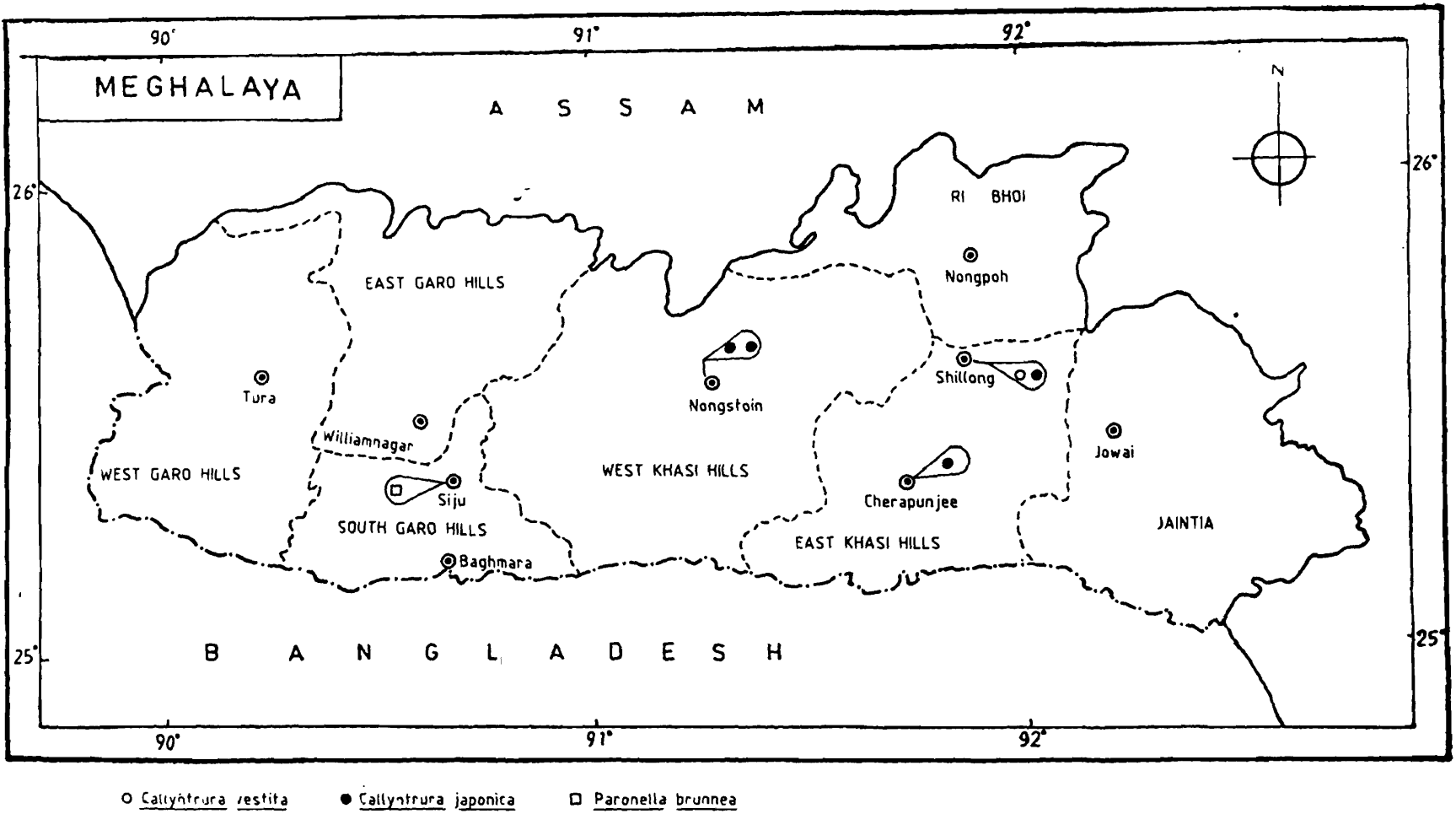
1917. *Paronella japonica* Kinoshita

1977. *Callyntrura japonica* Yosii

Material examined : East Khasi hills dist. : Near Mausomai cave Cherapunji, 27. iii. 1991, coll. A. K. Hazra, 5 exs.; Botanical garden Shillong, 28. iii. 1991, coll. A. K. Hazra 4 exs.

West Khasi hill dist. : Nongstoin, 20. iii. 1991, coll. A. K. Hazra, 10 exs. By the side of a hill stream, near Govt. polutry farm, Nongstoin, 21. iii. 1991, coll. A. K. Hazra, 5 exs.

Diagnostic character : Body length is 3 mm. Ground colour of body is creamish white.



Map. 2. Showing distribution of *Callyntrura vestita*, *Callyntrura japonica* and *Paronella brunnea*, in Meghalaya.

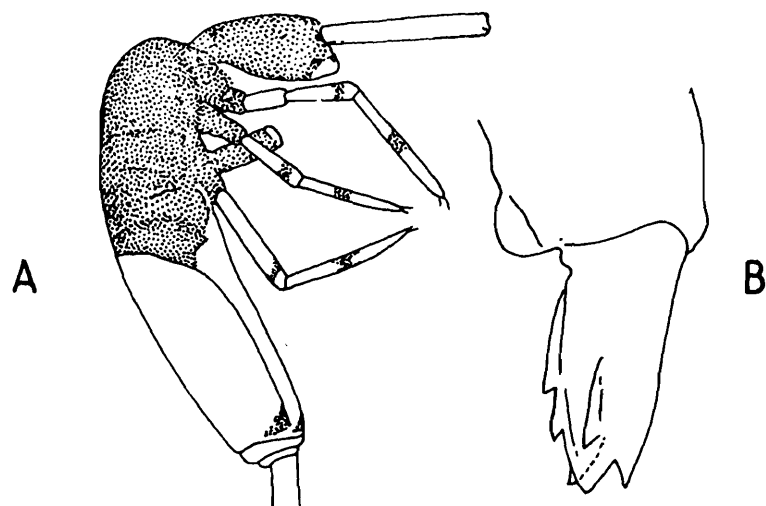


Fig. 9. Lateral view of *Callyntrura vestita* (A); mucrodens complex (B).

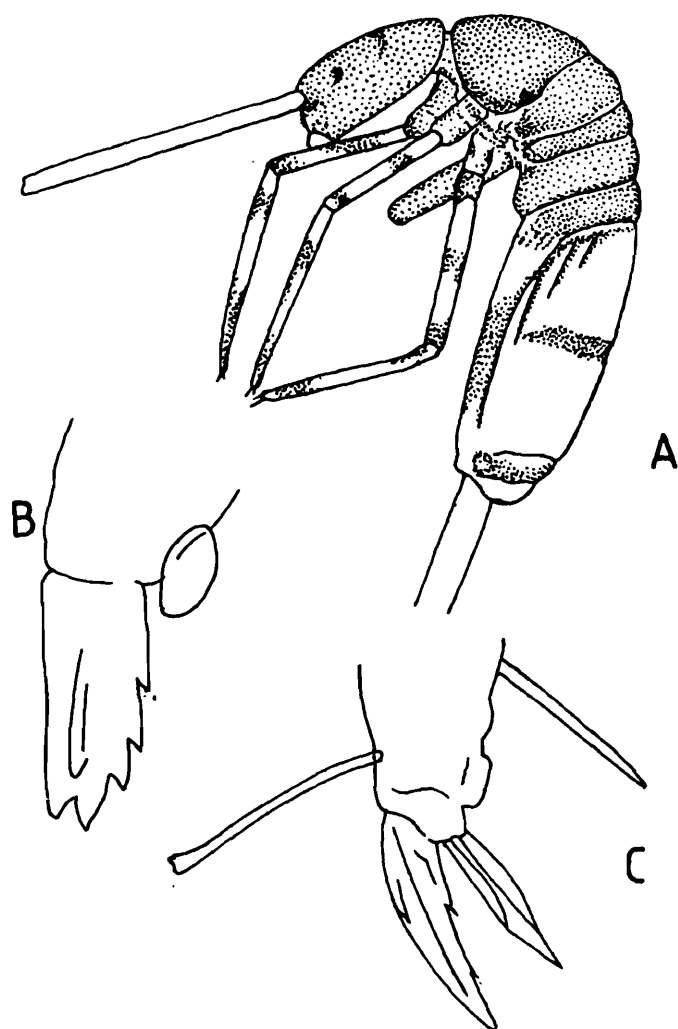


Fig. 10. Lateral view of *Callyntrura japonica* (A); mucrodens complex (B); hind leg claw (C).

Head is dark all over, the base of the antennae are more deeper in colour. Thorax is obscurely dusky all over deeper along the marginal area of each segments. Fourth abdominal segment bears a narrow transverse patch. Antennae scaled. Ventral tube deeply dark. Furca long, scaled dens without spines but with prominent dorsal vesicle. Mucro elongated with teeth.

Distribution : INDIA : Meghalaya (East Khasi hills dist., West Khasi hills dists.) ; JAPAN.

IV. Genus *Paronella* Schott, 1893

7. *Paronella brunnea* Carpenter, 1924

(Map 2)

1924. *Paronella brunnea* Carpenter, *Rec. Ind. Mus.*, Calcutta, 26 : 287.

The genus is represented by only species from the state.

Material examined : South Garo hill district. At the entrance of Siju Caves, 7. 02. 1922, coll. S. Kemp. 5 exs.

Diagnostic character : Total body length 2.5 mm. The relative length of antennal segment 10 : 8 : 4 : 11. The IV abdominal segment is more than eight times as long as III. The body colour is brownish with dark transverse pigments on the hind margin of the tergum and alternate dark and faint longitudinal pigment on the fourth abdominal segment. Furca 4/5 as long as body, dens half as long as manubrium, dental scale absent. More detail description is available in Carpenter (1924).

Distribution : INDIA : Meghalaya (West Khasi hill district).

Remarks : No specimen of this species has been collected during the present survey. This is purely based on the literature of Carpenter (1924).

Subfamily CYPHODERINAE

Unlike other entomobryids the members of this subfamily do not have ocelli, dental crenulations and dental spines,

V. Genus *Cyphoderopsis* Carpenter 1924

Only one species is recorded from Meghalaya.

8. *Cyphoderopsis gracilis* Carpenter 1924

(Map 3)

1924. *Cyphoderopsis gracilis* Carpenter *Rec. Ind. Mus.*, Calcutta 26 : 288.

Material : South Garo hills dists. : From entrance and interior of Siju cave, ii. 1922, coll. S. Kemp, 15 exs.

Diagnostic Character : Body length 1.5 mm, body colour white with feeble yellowish on brownish mottlings. Antennae double the length of head, relative length of antennae I : II : III : as long IV = 3 : 6 : 6 : 10. fourth abdominal segment six times as long as third. Furcula about 3 quarters as body, dens 3 quarters as long as manubrium, dentes are thickly scaled. More a detail descriptions and figures are given by Carpenter (1924).

Distribution : INDIA : Meghalaya (South Garo hills dist.)

Remarks : No specimens of this species have been collected during present survey. This is based on the material collected by S. Kemp and described by Carpenter (1924). Salmon (1964) synonymized this genus with *Troglopedetes*.

Subfamily ENTOMOBRYINAE Schaeffer, 1896

Dentes crenulated dorsally. Mucrones falcate or with basal spines, it is short and hook like. Body with hairs or scales or both. The chaetotaxy of the head, trunk and eye number are useful in identifying members of this subfamily.

VI. Genus *Lepidocyrtus* Bourlet, 1839

Two species under this genus have been recorded from Meghalaya.

Key to the species of the genus Lepidocyrtus from Meghalaya

1. Mesonotum 4 times as long as metanotum, large size, antennae twice as long as head.....
.....*Lepidocyrtus magnificus* Carpenter
2. Mesonotum about double the length of metanotum, small size antennae half as long as head
.....*Lepidocyrtus exploratorius* Carpenter

9. *Lepidocyrtus magnificus* Carpenter 1924

(Map 3)

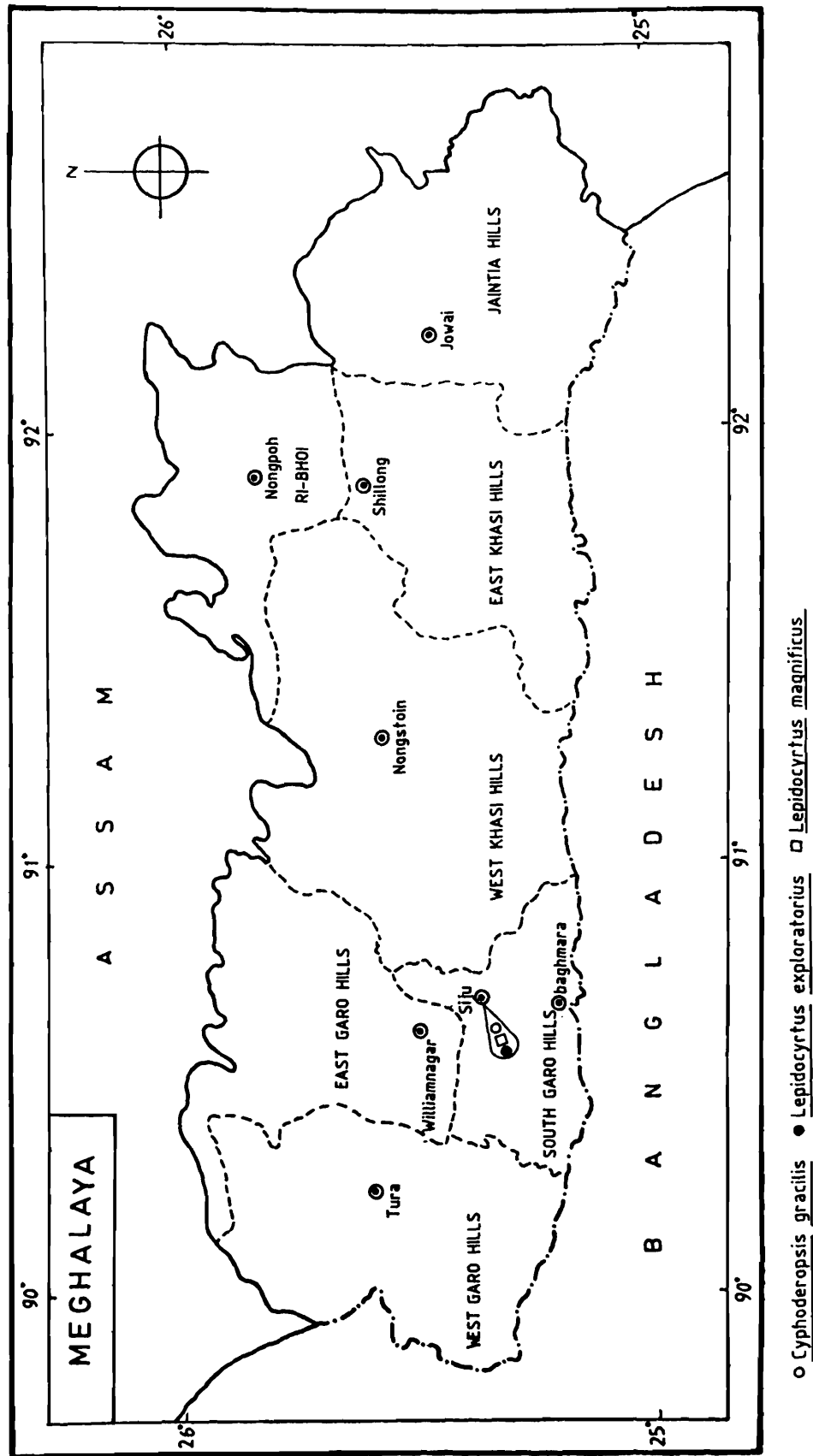
1924. *Lepidocyrtus magnificus* Carpenter, *Rec. Ind. Mus.*, Calcutta 26 : 285.

Material : South Garo hills dist. : Siju Cave, at entrance, ii. 1922, coll. S. Kemp 1 ex.

Diagnostic character : Body length 2.75 mm. Ground colour pale yellow, 4th abdominal segment seven times as long as third. Relative length of I : II : III : IV antennae, 6 : 14 : 10 : 17. Furcula half as long as body. More detailed description and figures are given by Carpenter in his original paper (1924).

Distribution : INDIA : Meghalaya (South Garo hills dist.).

Remarks : No materials of this species have been collected during present survey. Therefore, it is based on the original description of Carpenter (1924).



Map. 3. Showing distribution of *Cyphoderopsis gracilis*, *Lepidocyrtus exploratorius* and *Lepidocyrtus magnificus* in Meghalaya.

Table Showing districtwise distribution of Collembola in Meghalaya

Name of Species	Name of districts						
	Jaintia Hills	Ri-Bhoi	East Khasi Hills	West Khasi Hills	East Garo Hills	South Garo Hills	West Garo Hills
<i>Subfamily Paronellinae</i>							
<i>Salina striata</i> (Handschin)	-	-	+	+	-	-	-
<i>Salina choudhurii</i> Mitra	-	-	+	+	-	-	-
<i>Dicranocentroides salmoni</i> Mitra	-	-	+	+	-	-	-
<i>Dicranocentroides indica</i> (Handschin)	-	-	+	+	-	-	-
<i>Callyntrura vestita</i> (Handschin)	-	-	+	+	-	-	-
<i>Callyntrura japonica</i> (Kinoshita)	-	-	+	+	-	-	-
<i>Paronella brunnea</i> Carpenter	-	-	-	-	-	+	-
<i>Subfamily Cyphoderinae</i>							
<i>Cyphoderopsis gracilis</i> Carpenter	-	-	-	-	-	+	-
<i>Subfamily Entomoryinae</i>							
<i>Lepidocyrtus magnificus</i> Carpenter	-	-	-	-	-	+	-
<i>Lepidocyrtus exploratorius</i> Carpenter	-	-	-	-	-	+	-

10. *Lepidocyrtus exploratorius* Carpenter 1924

(Map 3)

1924. *Lepidocyrtus exploratorius* Carpenter, *Rec. Ind. Mus.*, Calcutta, **26** : 286.

Material : South Garo hill dist. : Siju cave, 100-300 feet from entrance, ii. 1922, coll. S. Kemp., 15 exs.

Diagnostic character : Body length 1.7 mm, body colour pale yellow, antennae deep violet and faint violet string on coxae. Relative length of antennae I : II : III : IV = 5 : 7 : 7 : 11. Furcula as long as body manubrium slightly longer than dentes. Detail description and figures are lacking in the original description, therefore fresh collection is needed.

Distribution : INDIA : Meghalaya (South Garo hills).

Remarks : The collection of this species are lacking in the present survey. It is based on the original description of Carpenter (1924).

REFERENCES

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INSECTA : ODONATA

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INTRODUCTION

Odonates, which are commonly known as dragonflies (Anisoptera) and damselflies (Zygoptera), are amphibiotic insects. Adults are winged, while larvae are aquatic. Adults are also closely associated with both lotic and lentic water bodies; where these are seen flying or perching on vegetation in its vicinity. Some times, though they fly away from waterbody into deep woods or farm lands and return for copulation and aquatic oviposition. Ecologically and economically these insects are quite significant, being predator of noxious insects and bioindicator of water quality.

The order is represented by 37 families world over; clubbed under 3 suborders viz., Zygoptera, Anisozygoptera and Anisoptera. A little over 5500 species representing 630 genera are recorded world over. Of these 494 species are represented in India under 136 genera 19 families.

Odonata fauna of the state of Meghalaya, with this contribution, is known to comprise of 151 species under 79 genera and 14 families i.e. approximately 1/3 (151:494) of whole Indian faunal component. Of these Zygoptera and Anisoptera are represented by 69 and 90 species respectively.

HISTORICAL BACKGROUND

Perusal of literature reveals that first definite Odonata record from Meghalaya is of Hagen and Selys (1853) who described a new species viz., *Echo margarita*. There after contribution to the Odonate fauna of Meghalaya goes to the credit of several workers. A brief mention is, though, made hereunder; but for detail reference may be made to the works of Fraser (1933, 34, 36) and Lahiri (1987). Ed. de Selys Long Champs (1859-1891) described several species from Meghalaya. Ris (1909-1912) described a new species and recorded 5 Libellulid odonates. Laidlaw (1914-1932) contribution is of 10 species, of which 7 were new and 3 new records for the state. Fraser (1919-1935) contributed 26 Odonates; 17 of which were new species, 1 subspecies and 8 new records. In Fauna of British India : Odonata Fraser (1933-36) described 7 new species and 1 subspecies. Lahiri (1976) and Lieftinek (1977) described a new species each. Lahiri (1987) contributed further towards knowledge of odonata of Meghalaya by contributing on 147 species and 28 genera ; which includes 6 new species, 1 new subspecies and 49 new records.

CONTENTS OF PRESENT PAPER

Material on which present work is based were mainly collected by various Zoological Survey of India parties; including collection by senior author. These surveys were made in systematic way covering various districts and physiographic zones encompassing Khasi Jayantia and Garo Hills of east while Assam province. Present work has also incorporated study of 'Type material' (Holotype, Allotype and paratypes) of 7 species present in the National Zoological collection of this survey. Senior author, has also examined certain material at E.R. Station of this Survey. Care has also been taken to include odonate species mentioned in earlier important work so as to provide more comprehensive faunal picture of this group of insect in Meghalaya.

In this contribution new records of 12 species under 12 genera and 7 families are included. Thus a comprehensive list of Odonates so far known from Meghalaya has been provided; which comprises of 151 species. Key to various level of taxa, such as key to families, subfamilies, genera and species has been provided. Against each species interesting features, variations, distribution pattern within state and elsewhere and extent of endemism is also indicated. Number of diagrams, distribution maps and tables are provided to enhance its utility.

SYSTEMATIC ACCOUNT

A brief mention is made of salient morphological features, with special reference to taxonomic importance and supported by diagrams (Plates I-V). Collection and study techniques are also provided, alongwith a comprehensive list of technical terms used. This is followed by analysis of the faunal component of odonates from the state vis-a-vis rest of India; key to various level of taxa involved, and species wise account, supplemented by classified faunal list of odonate insects for Meghalaya.

GENERAL MORPHOLOGY

Morphology of Odonata, commonly known as dragonfly are adapted to suit their environment. These insect pass their adult life as swift flyers in vicinity of aquatic ecosystem and larval stages within water bodies.

A brief morphological features are, though, indicated here for convinence and ready reference. For detailed morphological features of both adult and larvae work of Fraser (1933,34,36,57) and Tillyard (1917) need be referred, which have been also basis of present work, specially in respect of wing venation and nomenclature thereof.

Adult are air breathing, head large, linked with thorax by delicate connection, antennae minute, filiform. Eyes large almost covering major part of dorsal surface of head in all Libellulids and other families of Anisoptera; while these are not so large in most of Zygopterans and are separated by wide gap. Prothorax mesothorax and metathorax are fused, angled forwardly, so are their respective legs. Wings are paired, reticulated, almost of same shape and size in practically

all the Zygopterans; while most of the Anisopterans have the posterior pair of wing wider, specially in their anal area. Abdomen is long, slender, ten segmented terminating in paired anal appendages. Most characteristic feature of male accessory genitalia is that these are shifted to the underneath of 2,3 abdomen, while gonopore are in their usual position. This necessitates their peculiar bending and coupling, in male-female forming some short of loop called 'tandem' Ovipositors are simple for exophytic forms (most of Anisopterans) or strong, serrated for endophytic forms (most of Zygopterans).

Larvae are long, elongated cylindrical in littoral and stout, broad bodied in benthic forms. These have extensible, prehensile labium, Zygopterans have abdominal gills and caudal filament, which are lacking in Anisopterans and these breathe by cloacal chamber suited for necessary exchange of dissolved oxygen.

List of technical terms : A list of technical terms used in key and or text are indicated, hereunder, along with their explanation. Same are arranged alphabetically :—

<i>Name of Term</i>	<i>Explanation</i>
Anal appendage	Male of Zygopterans with 2 pairs, male of anisoptera with 1 pair & single inferior and one pair in female uniformly at the end of abdomen.
Anal loop	An area of cells at the base of hindwing just adjacent to discoidal cell.
Anal triangle	Triangle at extreme base of hind wing in male of Anisoptera.
Antenodal nervures	Short transverse nervures running from the costal to radius proximal to node.
Caudal gill	Accessory respiratory organs at the distal end of Zygopteran larvae.
Cubital space	Space posterior to basal space, extending to base of discoidal cell.
Discoidal cell	Triangular or quadrilateral space near the wing base, distal to cubital space. It is four sided in Zygoptera, three sided in Anisoptera.
Discoidal field	Space distal to discoidal cell, bounded by MA and Cu ₁ and border of wings.
Enfumed	Smoky or brownish in tint.

<i>Name of Term</i>	<i>Explanation</i>
Hypertrigone	Narrow triangular cell above discoidal cell of Anisopterans.
Imago	Adult
Nodal index	Count of ante-and post-nodal nervure in fore and hind-wings.
Node	Thickening at costal margin nearer base of Zygoptera but in middle of Anisopterans.
Ocellus	Simple eye, three uniformly in all dragonfly and damselflies, disposed in a line in front of vesicle or in a triangle around vesicle on vertex of head.
Postnodal nervures	Short transverse nervures running from the costal to radius, distal to node.
Pterostigma	Small, thickened spot on the apical side on costal border.
Teneral	Freshly emerged adult prior to hardening and acquiring full adult pigmentation.
Tornus	Part of basal and posterior part of wing either angular or rounded, of Anisopterous wings.
Vertex	Dorsal surface of head, bearing vesicle and ocelli.
Vesicle	Small protuberance/eminece on vertex of head overhanging ocelli or located between them.
Vulvar scales	Sheath covering ovipositor formed of two plates attached to ventral segments of 8,9 abdomen.

Diagram : Generalized diagram of a dragonfly and a damselfly imago showing head, thorax, abdomen, wings. Another generalized diagram of a dragonfly and damselfly larvae showing head, thorax, abdomen extended prehensile labium, abdominal and caudal gills.

MATERIAL AND METHOD

Collection techniques : Collection technique which have been adopted were totally different

for imago (adult : male & female) then their larval counterparts, as their ecological niche and habitat are totally different. Former inhabit aquatic vegetation in vicinity of water body. Zygopterans (Damselfly) were best collected by sweeping with insect net. Anisopterans (dragonfly) were collected amongst vegetation near water body or even quite away, flying fast. In these cases insect net was effectively used by stroking head-backwardly action. Larvae were collected by using water net by side of water body amongst aquatic vegetation, under localized shelter of pebbles, stones or by scooping and washing bottom mud/sub-stratum for benthic forms. Some specimens of emerging imagos teneral forms are attracted to light and were collected by gentle swing of net as these were observed not to be good fliers as compared to the imagos during day time.

Study technique : Material of imagoes (adult male and female are best studied by usual process of relaxing, properly spreading, setting and pinning. Set specimens are examined under binocular microscope by fixing at desirable angle, level over plastacine cone/mounds fixed on slide or over convenient size of pith/thermocoll plate. External genitalia are examined sometimes directly by adjusting specimens under desirable angle or by dissecting out and mounting onto the slides. Wings, their venation were examined in transmitted light while pigmentation pattern were best observed under reflected light. Observation of wing's nodal index was invariably made to ascertain nodal variations. Irridescence and metallic pigmentation pattern, in most of Zygopterans and some Anisopterans, were also best observed under reflected light.

SYSTEMATIC ACCOUNT

Odonata fauna of Meghalaya comprises of 151 species under 79 genera and 14 families. These constitute approximately 1 : 3 (151 : 494) of whole Indian Odonate species. Among these, Zygopterans (damselflies) are represented by 66 species under 28 genera and 9 families viz., Coenagrionidae, Protonuridae, Platycnemididae, Chlorolestidae, Lestidae, Amphipterygidae, Chlorocyphidae, Euphaeidae and Calopterygidae. These families together represent approximately 1/1.26 (66 : 85) of Meghalaya Odonates or a little less than 1/3 of Anisopteran component. Among Zygopterans single subfamily : Ischnurinae vis-a-vis rest of Zygoptera are 1 : 3.77 or a little less than 1/3. This is closely followed by Calicneminae (10). Familywise predominance is of Coenagrionidae (18) followed by Chlorocyphidae (11).

Anisoptera component of Meghalaya Odonates comprises of 85 species under 51 genera and 5 families. Among these the single subfamily Libellulinae dominates as it is almost 1 : 1.12 or a little less than 50% of Anisoptera. Next maximum represented Anisopteran subfamily is Gomphinae (20). Familywise predominance is of Libellulidae (40) followed by Gomphidae (22) and Aeshnidae (15).

Analysis of the faunal component of Odonates from Meghalaya reveals that four families; one under Zygoptera (Coenagrionidae) and three under Anisoptera (Aeshnidae, Gomphidae and Libellulidae) constitute major proportion of Meghalaya Odonates (92 : 59). Faunal element as such shows definite affinity with those of Indochinese and much lesser to the Neotropical elements.

Among the faunal element of Meghalaya Odonata only a very small proportion at generic level (one genus) and slightly more at species level (Thirty three) have endemism. 12 species are new record for the state. Key to all level of taxa involved for Odonatas of Meghalaya i.e. sub-order superfamilies, families, genera, species have been provided. These are formulated partly basing on Fraser (1933,34,36,57) and partly modified on basis of authors own observations/interpretations. A consolidated list of systematically arranged species of Meghalaya component of the Odonate insects is provided at the end of Taxonomic Account followed by Summary and list of relevent literature. Distribution maps (Maps 1-12) for certain Odonates species (abundant, endamic or rare) are also provided for Meghalaya districts so as to provide an idea of their distribution pattern within states and districts at a glance.

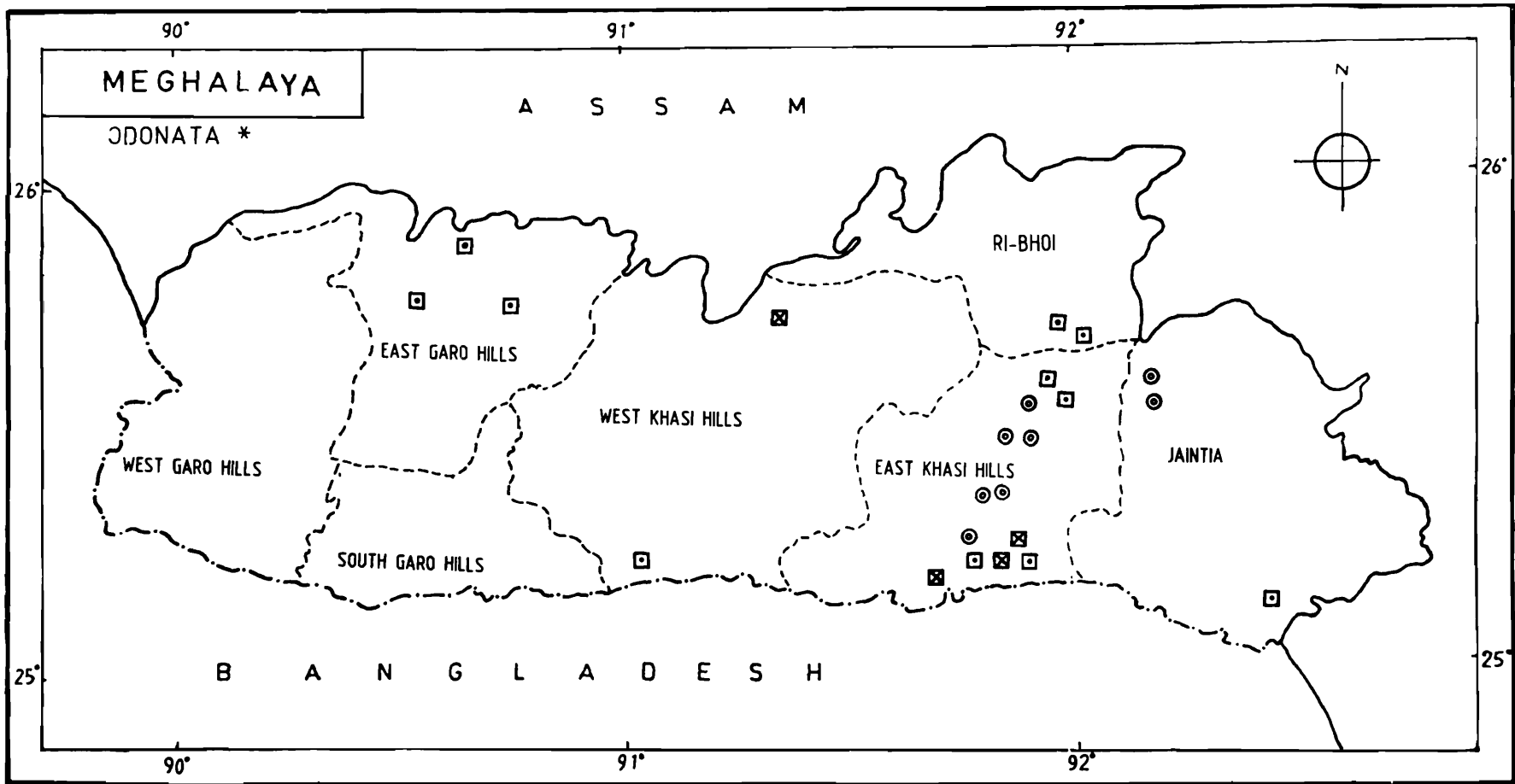
TAXONOMIC ACCOUNT

Order ODONATA

Key to the Suborders, Superfamilies and Families

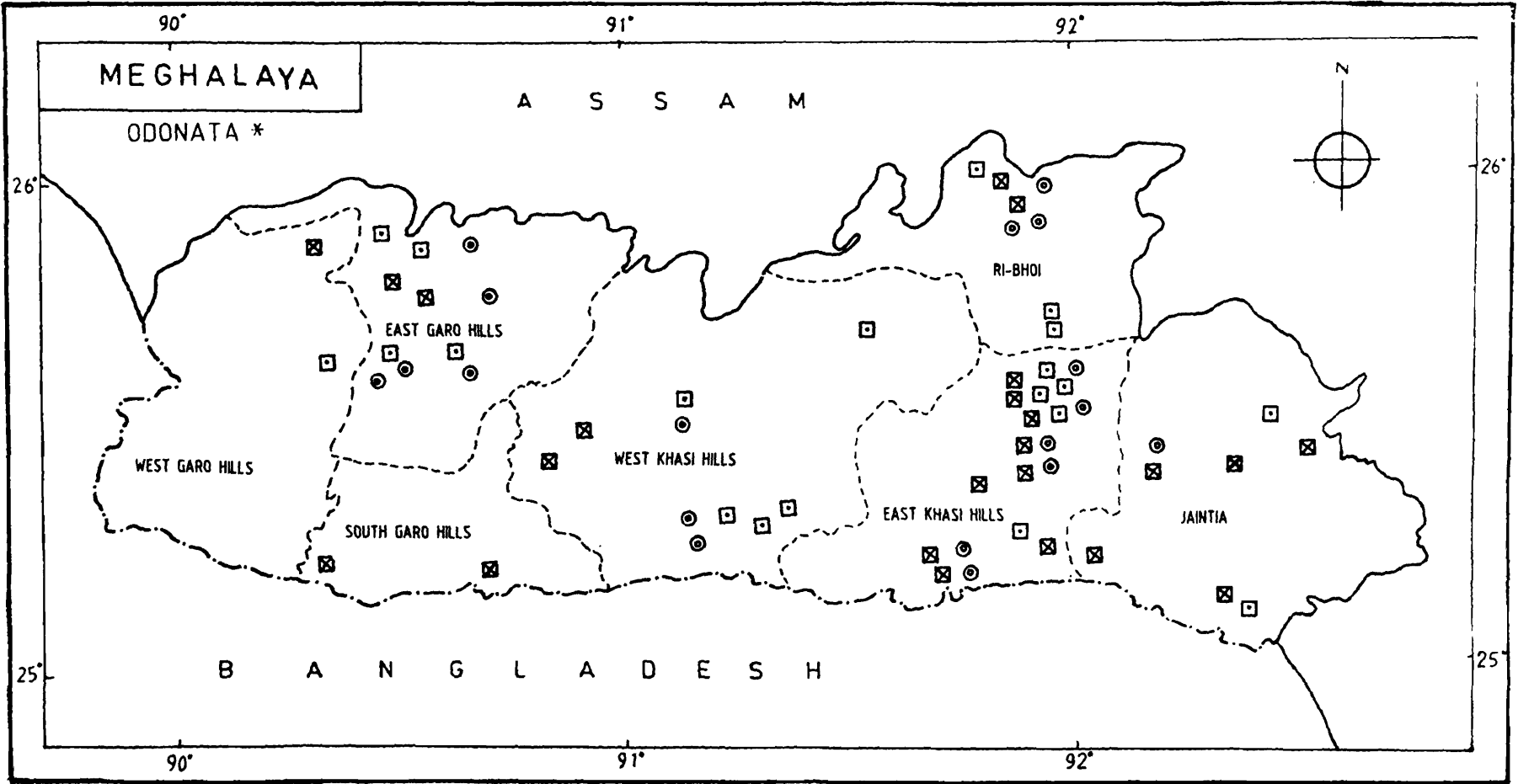
1. Fore and hind-wings more or less of same shape and venation, head transversely elongated, both superior and inferior anal appendage in male paired.....2.
- Fore and hind-wings are distinctly diffeerent in shape and venation-hingwings broader specially in anal area, head not transversely elongated rather globular ; paired superior and single inferior anal appendage in male.....ANISOPTERA.....5.
2. Eyes widely separated, frons not rigid nor markedly raised, larvae with abdominal and caudal gill.....ZYGOPTERA.....3.
3. Antenodals more than 2, postnodals not coinciding with veins belowCALOPTERYGOIDEA.....7.
- Only 2 antenodals, postnodals coinciding with veins below.....4.
4. IRiii and R IV+V more near node than arc, Males anterior hamules subquadrateCOENAGRIONOIDEA.....10.
- IRiii and R IV+V more near arc than node, Males anterior hamules elongateLESTOIDIDEA.....12.
5. Labial mask of larvae flattened without setae, lateral lobes narrow with long robust movable hook.....AESHNOIDEA.....13.
- Labial mask of larvae broad, concave with numerous setae, lateral lobes broad with tuft of setae.....6.
6. Costal and subcostal veins not coinciding, eyes are slightly separated or meeting only at a point; anterior and posterior hamules of genitalia well developed, ovipositor lacking or only pseudovipositor.....CORDULEGASTEROIDEA*

(* contains only a single family-Cordulegastridae)



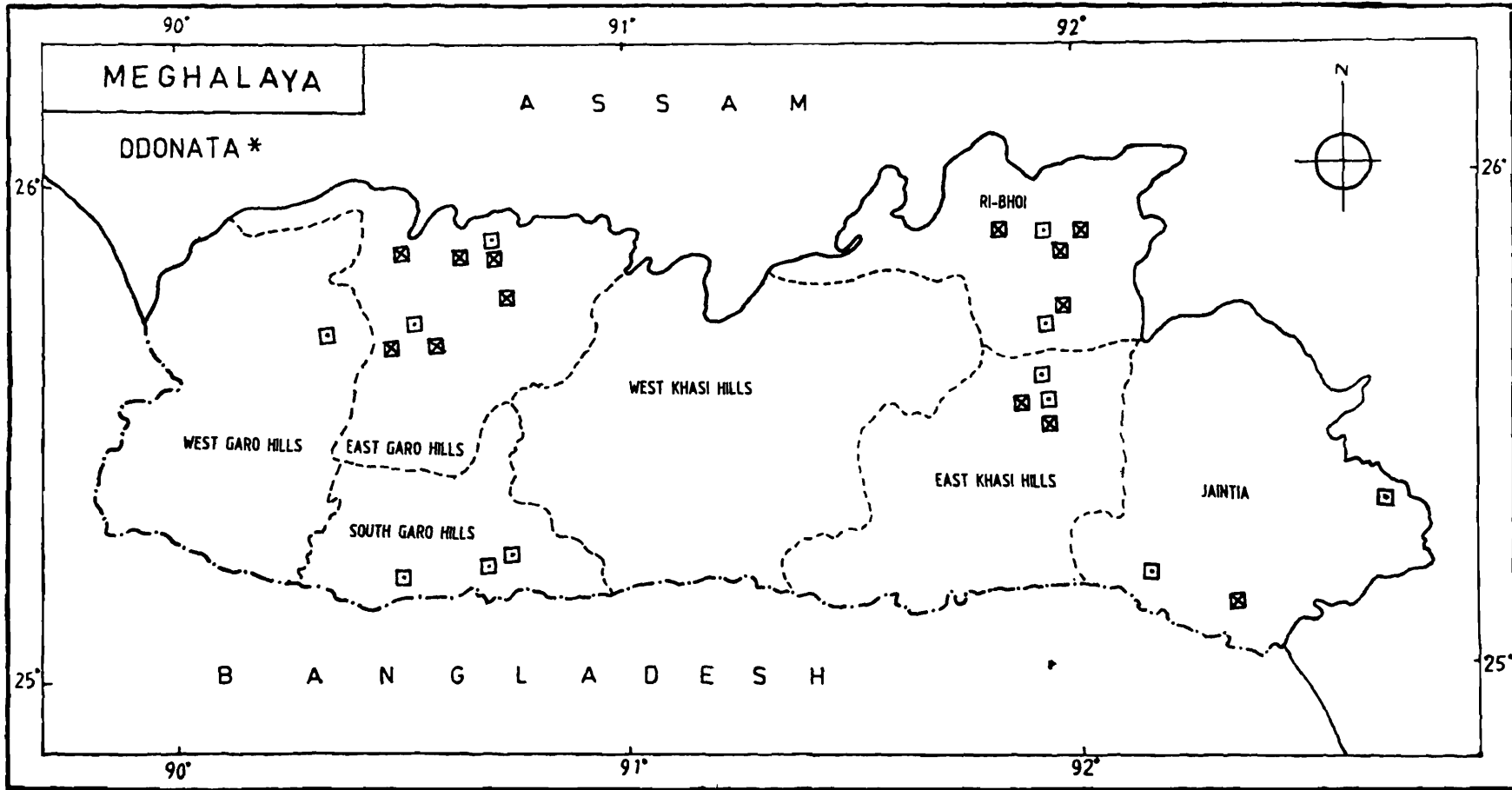
* MAP 1 □ RHYNOCYPHA QUADRIMACULATA, ⊠ R SPURIA ⊙ R. IGNIPENNIS
(ABUNDENT)

Map 1. *Zygoptera*, *Chlorocyphidae* : *Rhynocypha quadrimaculata* ; *R. spuria* ; *R. ignipennis*



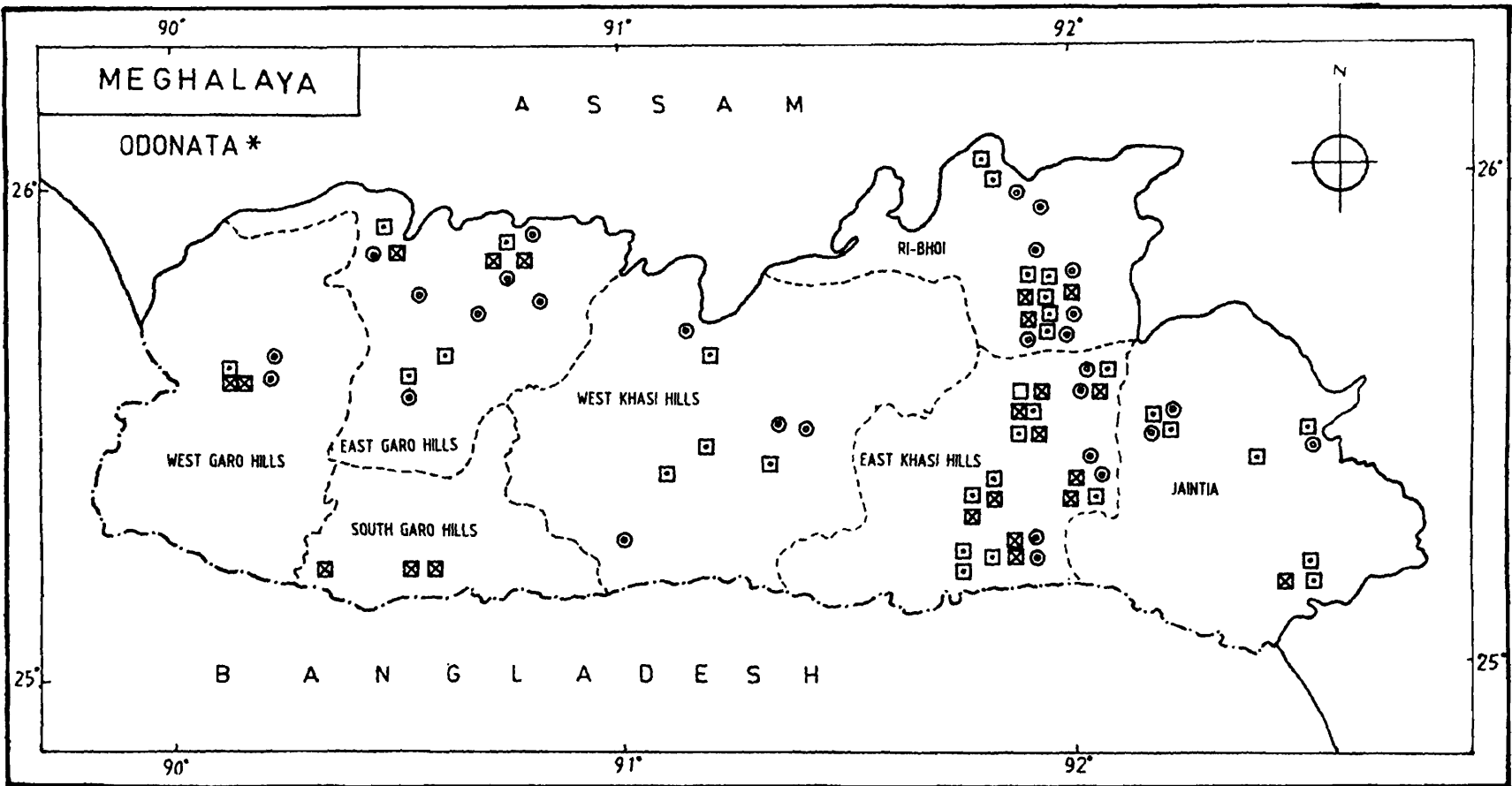
* MAP - 2: □ ORTHETRUM GLAUCUM, ☒ O. SABINA; ● O. NEGLFCTUM
(ABUNDENT)

Map 2. ANISOPTERA LIBELLULIDAE : *Orthetrum glaucum*; *O. sabina* *O. neglectum*.



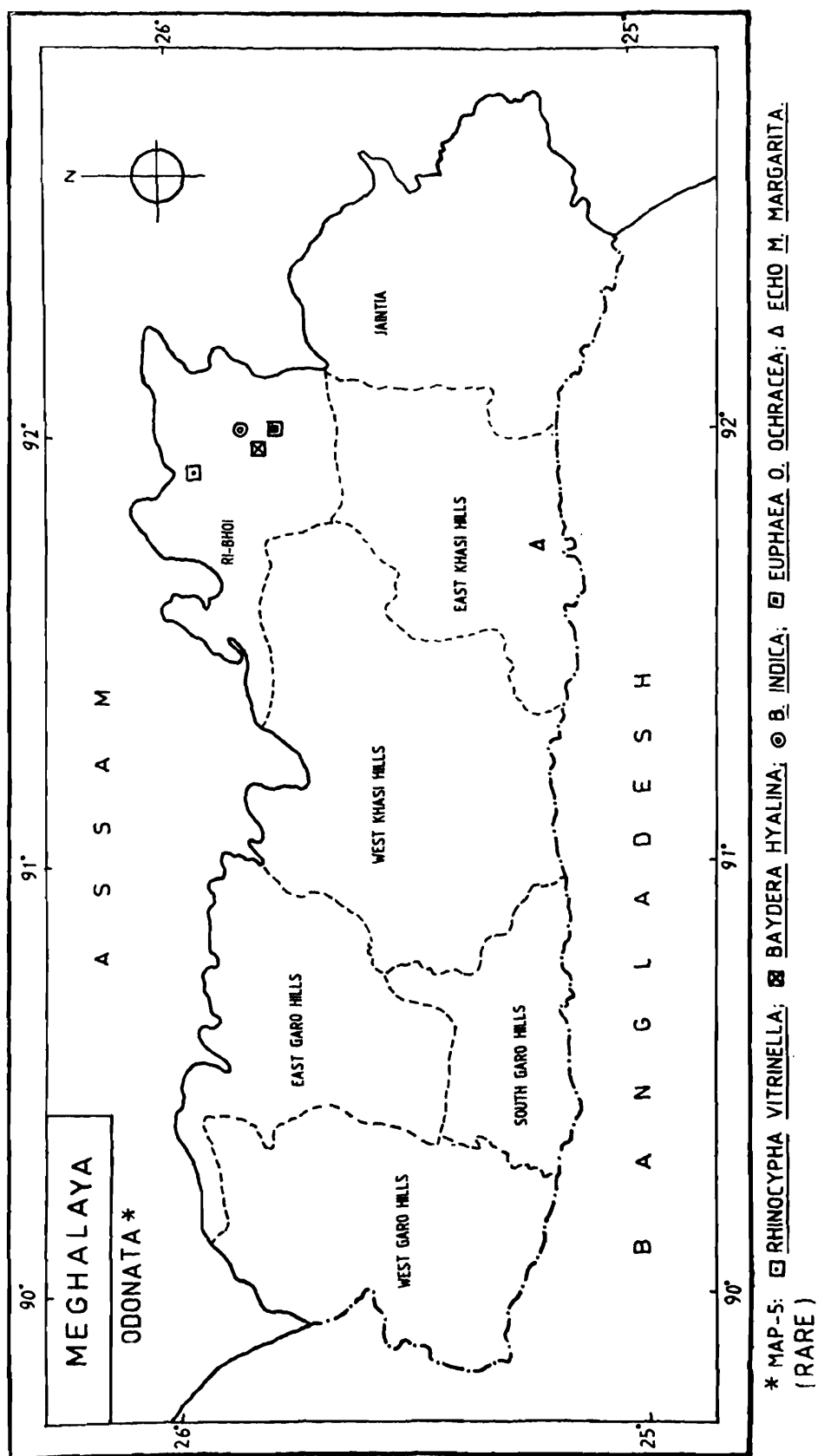
*MAP - 3. □• NEUROTHEMIS FULVIA; □X NEUROTHEMIS INTERMEDIA;
(ABUNDENT)

Map 3. ANISOPTERA LIBELLULIDAE: *Neurothemis fulvia*; *N. intermedia*

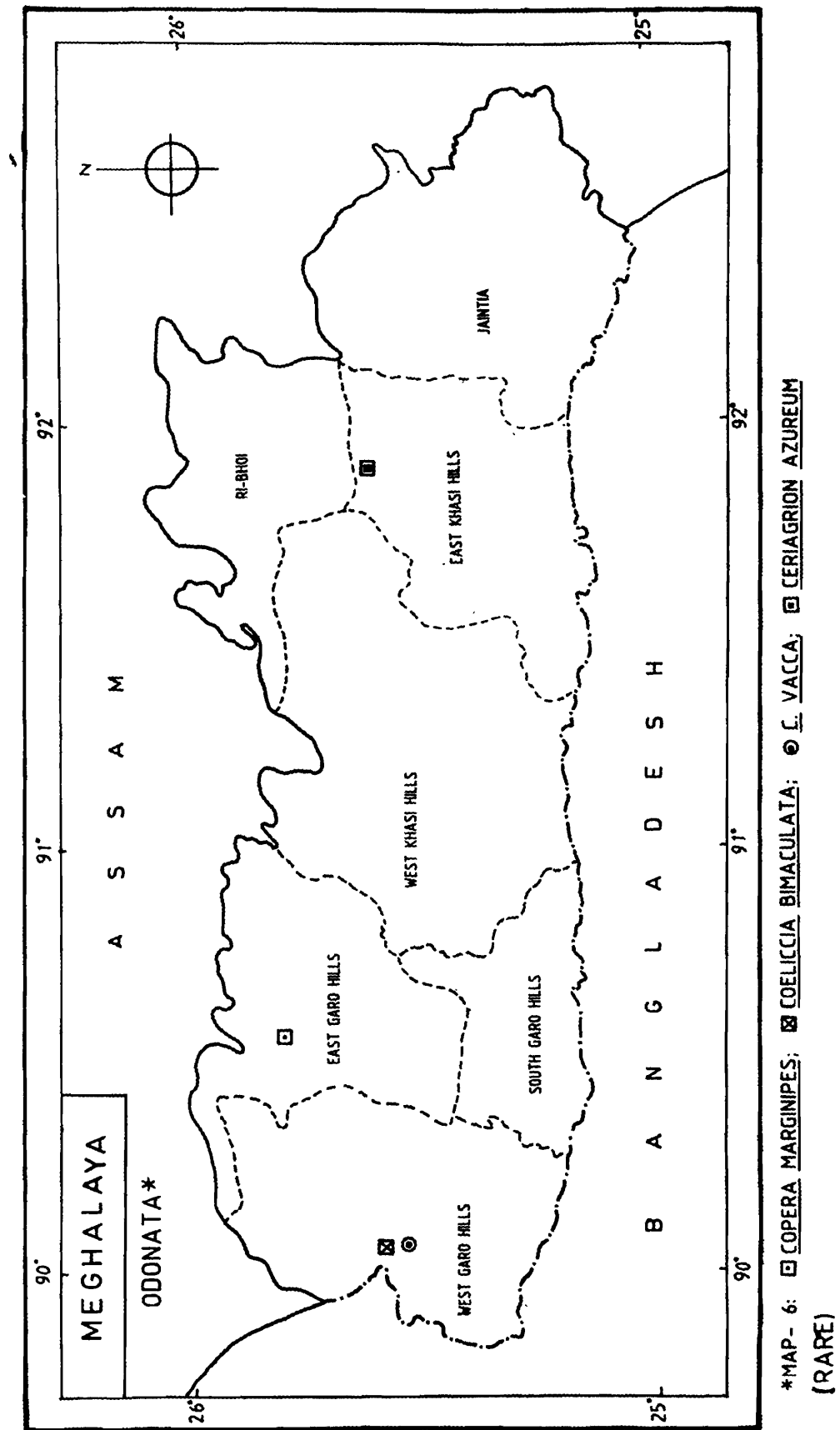


* MAP-4: □ COROCOTHEMIS S. SERVILLIA; ☒ PANTALA FLAVESCENS; ● PALPOPLEURA SEXMACULATA;
(ABIUNDENT)

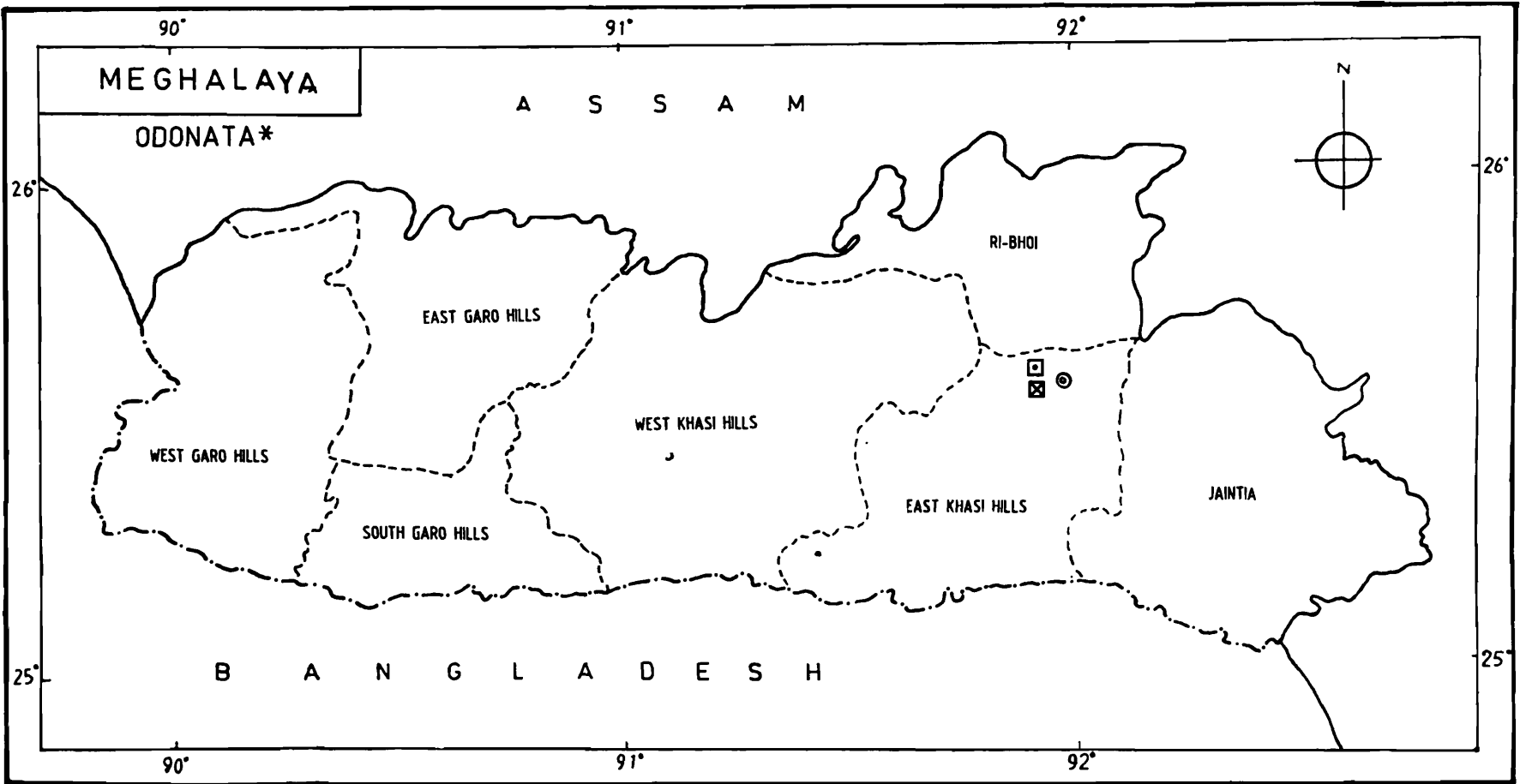
Map 4. ANISOPTERA LIBELLULIDAE : *Corocothemis s. servilla*; *Pantala flavescens* ; *Palpopleura sexmaculata*



Map 5. ZYGOPTERA, CHLOROCYPHIDAE : *Rhinocypha vitrinella*;
EUPHAEIDAE *Baydera hyalina*; *B. indica*; *Euphaea O. ochracea*; CALOPTERYGIDAE : *Echo m. margarita*

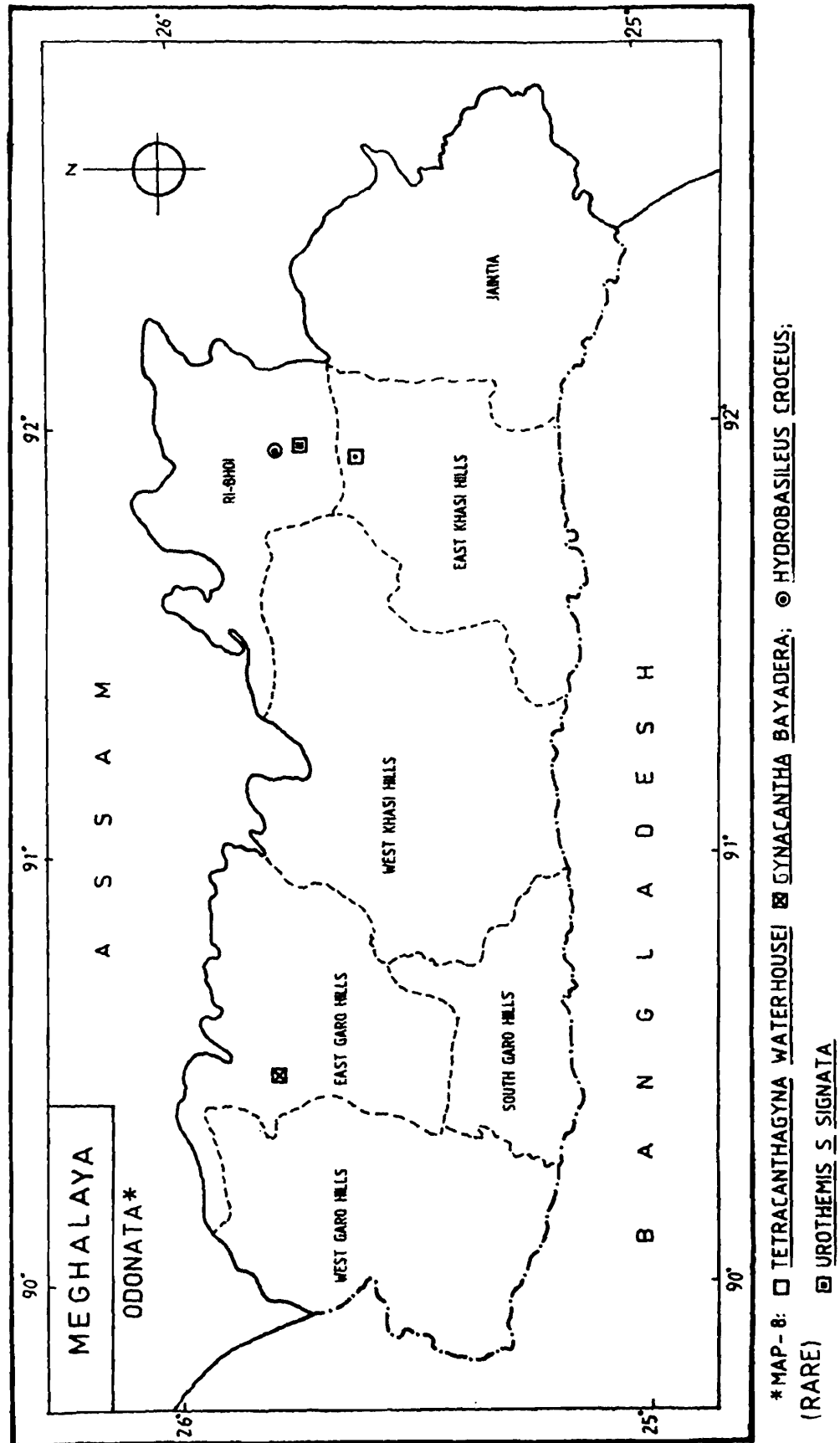


Map 6. ZYGOPTERA, COENAGRIONIDAE: *Copera marginipes*; *Coeliccia bimaculata*; *C. vacca*; *Cerigriion azureum*.

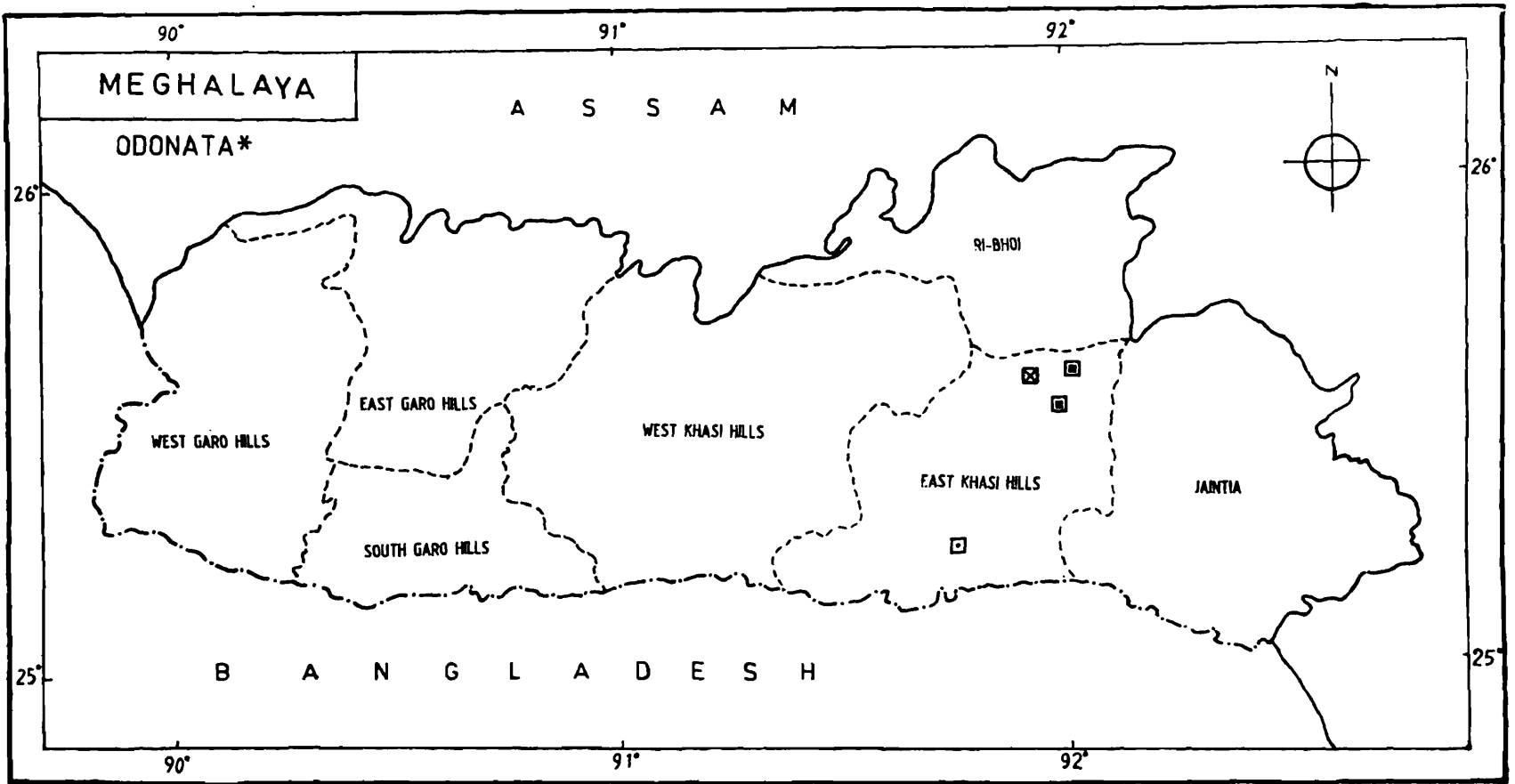


*MAP-7: □ OLIGOAESCHNA DECORATA ☒ O. MARTINI ⊙ PETALIAESCHNA FLETCHERI
(RARE)

Map 7. ZYGOPTERA, AESCHNIDAE : *Oligoaeschna decorata*; *O. martini*; *Petaliaeschna fletcheri*.

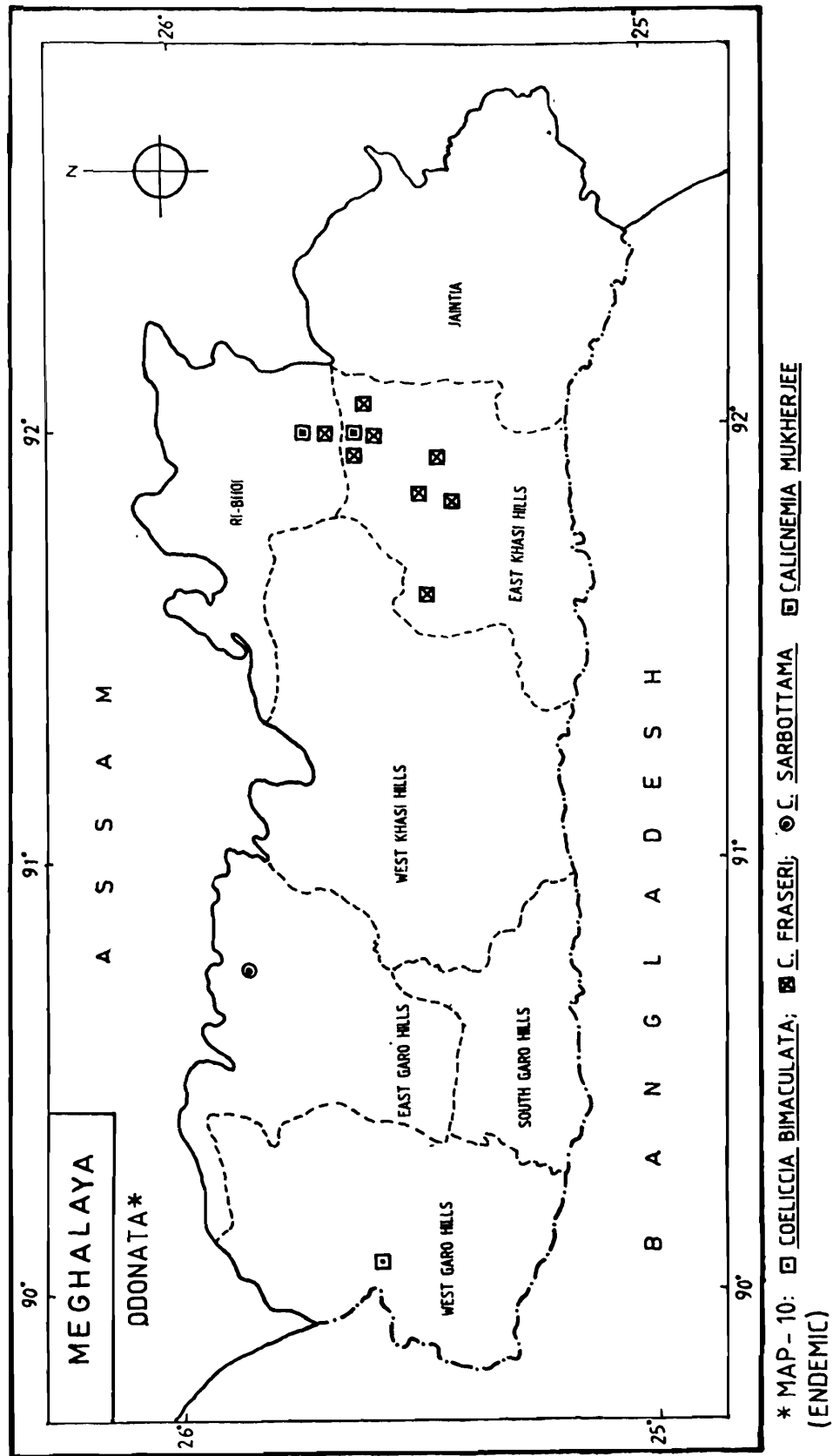


Map 8. ZYGOPTERA, AESHNIDAE : *Tetracanthagyna waterhousei*; *Gynacantha bayadera*; *Hydrobasilleus croceus* ; *Urothemis s. signata*.

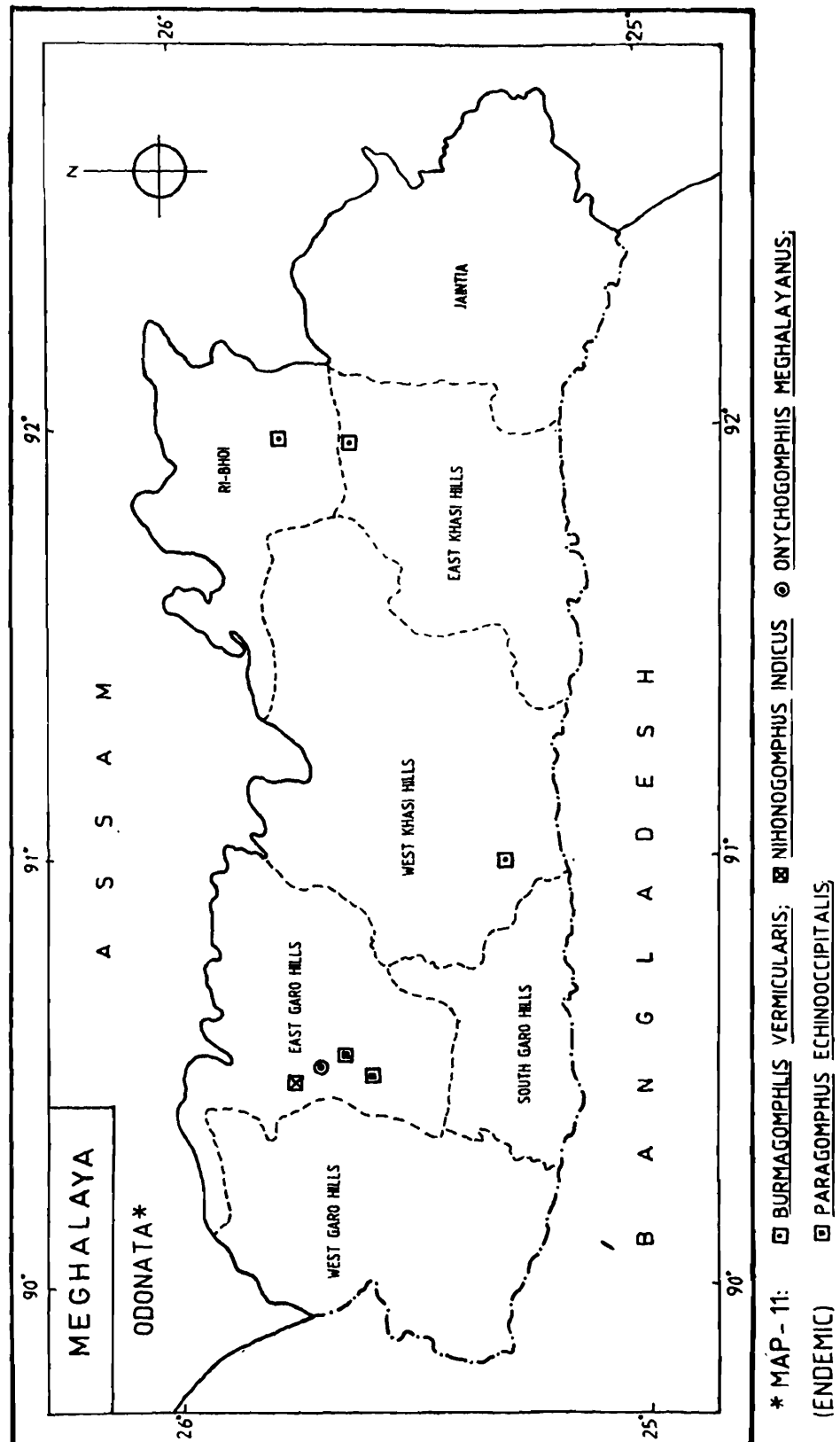


* MAP -9: □ ECHO M. MARGARITA; ⊠ INDOLESTES INDICA □ MEGALESTES RAI CHOUDHURI
(ENDEMIC)

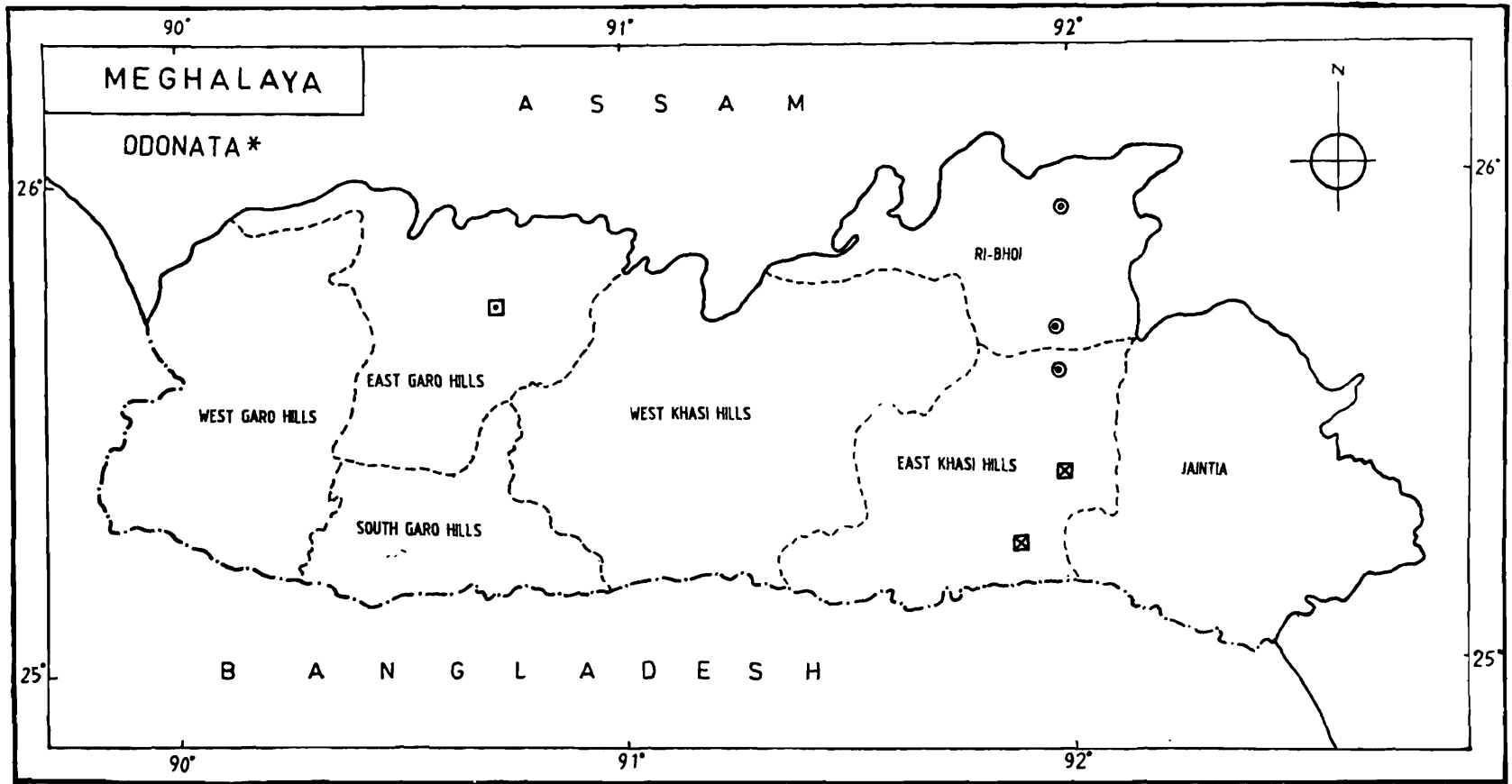
Map 9. ZYGOPTERA, CALOPTERYGIDAE : *Echo m. margarita*;
LESTIDAE : *Indolestes indica*; *Megalestes raychoudhuri*



Map 10. ZYGOPTERA, COENAGRIONIDAE: *Coeliccia bimaculata*; *C. fraseri*; *C. arbottama*; PLATYCNEMIDIDAE: *Calicnemia mukherjee*



Map 11. ANISOPTERA, GOMPHIDAE : *Burmagomphus vermicularis*, *Nihonogomphus indicus*; *Onychogomphus meghalayanus*; *Paragomphus echinooccipitalis*.



* MAP-12: □ PERIAESCHNA BIGUTTA; ☒ IDIONYX OPTATA; ⊙ ZYGONYX IRIS INTERMEDIA
{ ENDEMIC }

3

Map 12. ANISOPTERA, AESCHNIDAE : *Periaeschna bigutta*;
LIBELLULIDAE : *Idionyx optata*; *Zygonyx iris intermedia*.

- Costal and subcostal veins coinciding, eyes are broadly meeting on its dorsum, males with obsolete anterior hamules of genitalia, ovipositor inconspicuous.....LIBELLULOIDEA.....14.
- 7. 2 primary antenodal, distinct from secondaries.....8.
- 2 primary antenodal, not distinct from secondaries.....9.
- 8. Petiolation at the level of arc or slightly proximal to it.....AMPHIPTERYGIDAE.
- Petiolation for proximal from the level of arc.....CHLOROCYPHIDAE.
- 9. First lateral suture of synthorax incomplete, not distinctly seen upto the spiracle.....EUPHAEIDAE.
- First lateral suture of synthorax complete, distinctly seen beyond spiracle.....CALOPTERYGIDAE.
- 10. IA, Cu ii reduced, former even absent.....PROTONEURIDAE.
- IA, Cu ii neither reduced nor absent.....11.
- 11. Discoidal cell with costal and hinder side subequal, inner distal angle obtusePLATYCNEMIDIDAE.
- Discoidal cell with costal side much shorter than hinder side, inner distal angle acute or sub-acute.....COENAGRIONIDAE.
- 12. IRiii and R IV+V arises nearer node than arc, Cuii arched costal-ward distal to discoidal cell, anal vein arising proximal to arc.....CHLOROLESTIDAE.
- IRiii and R IV+V arises nearer arc than node, Cuii not arched costal-wards distal to discoidal cell, anal vein arising at the level of arc.....LESTIDAE.
- 13. Eyes are well separated on dorsum-vertex, occipital plate large, trapezoidalGOMPHIDAE.
- Eyes are meeting all along inner side on dorsum-vertex, occipital plate small, triangular.....AESHNIDAE.
- 14. Eyes with a projection at posterior border, thorax metallic blue/green, long membranous keel on flexor surface of tibiae in male.....CORDULIIDAE.
- Eyes without a projection at posterior borders, thoracic non-metallic (rarely metallic), no membranous keel to tibiae.....LIBELLULIDAE.

Suborder ZYGOPTERA

Superfamily COENAGRIONOIDEA

This superfamily is represented in Meghalaya, by 3 families viz., Coenagrionidae,

Protonuridae and Platycnemididae. Key to these families are already given earlier in general “Keys to Suborders, Superfamilies and families”

Family COENAGRIONIDAE

This family is represented in Meghalaya by 18 species 7 genera. It has not been dealt here under subfamilies, due to the inconsistency of characters formulated by previous workers or same applicable only to one sex. Earlier, though, Tillyard & Fraser (1938-1940) had divided the family into 2 subfamilies, while Fraser (1957) divided it into 6 subfamilies.

Key to the genera of Coenagrionidae

Characters distinguishing male and female are different, hence a separate key is indicated hereunder for male and female.

Male Key :

1. Arc situated distinctly distal to distal to antenodal nervure.....2.
- Arc situated at the level or only slightly distal to distal antenodal nervure.....3.
2. Abdomen longer (25 mm or more).....*Argiocnemis* Selys.
- Abdomen shorter (20 mm or less).....*Argiocnemis* Selys.
3. Ab arises at level of Ac or only slightly proximal to it.....4.
- Ab arises distinctly distal to level of Ac.....6.
4. Pterostigma in forewing distinctly longer than that of hind wing.....*Aciagrion* Selys.
- Pterostigma in forewing and hindwing of same length or nearly so.....5.
5. Prominent ridge on frontal side of frons present.....*Ceriagrion* Selys.
- Ridge on frontal side of frons absent.....*Pseudagrion* Selys.
6. Pterostigma of similar and uniform colour in both wings.....*Enallagma* Charpentier.
- Pterostigma of dissimilar colour in fore and hind wing, that of hindwing not uniform.....*Ischnura* Charpentier.

Female Key :

1. Arc distinctly distal to distal antenodal nervure, vulver spine absent.....2.
- Arc at the level of distal antenodal nervure or only very slightly distal, vulver spine present or absent.....3.
2. Abdomen longer (28 mm or more).....*Argiocnemis* Selys.
- Abdomen shorter (25 mm or less).....*Argiocnemis* Selys.

3. Ab arises at the level of Ac or only slightly proximal to it, vulver spine present or absent4.
- Ab arises distinctly distal to the level of Ac, vulver spine present.....6.
4. Pterostigma in forewing distinctly longer than that of hindwing, vulver spine present*Aciagrion* Selys.
- Pterostigma in forewing and hindwing equal in length or nearly so, vulver spine absent5.
5. Prominent ridge on frontal side of frons present.....*Ceriagrion* Selys.
- Ridge on frontal side of frons absent.....*Pseudagrion* Selys.
6. Labrum narrowly black at base.....*Ischnura* Charpentier.
- Labrum entirely yellow or greenish yellow.....*Enallagma* Charpentier.

Genus *Ceriagrion* Selys

1876. *Ceriagrion* Selys *Bull. Acad. Belg. Sci.*, **42** : 525.

1933. *Ceriagrion* : Fraser, *Fauna Brit. India, Odon* I, 1–313.

1967. *Ceriagrion* : Asahina, *Jap. J. Zool.* **15** : 255.

Key to the species of the genus *Ceriagrion* Selys

1. Ab arising distinctly proximal to the point where Ac meets, abdomen yellow changing to black on Segment 7–10.....*fallax* Ris.
- Ab arising at the point where Ac meets, abdomen marking absent or variable.....2.
2. Abdomen uniformly dull olivaceous in both sexes.....*olivaceum* Laidlaw.
- Abdomen not uniformly dull olivaceous but of variable colour.....3.
3. Abdomen bright citron yellow.....*coromandelianum* Fabricius.
- Abdomen not bright citron yellow, but pale azure blue.....*azureum* (Selys).

Genus *Ceriagrion* Selys

1876. *Ceriagrion* Selys, *Bull. Acad. Belg. Sci.*, **42** : 525.

1933. *Ceriagrion* Fraser, *Fauna Brit. India, Odon.* **I** : 313.

1967. *Ceriagrion* Asahina, *Jap. J. Zool.* **15** : 255.

Ceriagrion azureum (Selys)

1891. *Pseudagrion azureum* Selys, *Ann. Mus. Civ. Genova* (2) **10** (30) : 513.

1933. *Ceriagrion azureum* Fraser, *Fauna Brit. India, Odon.* (1) : 328.

Distribution : INDIA : Meghalaya, Assam, West Bengal, BURMA.

Remarks : This species is included on the basis of the literature review. It differs from other species of the genus in having uniform glossy turquoise-blue abdomen, with dorsal shield-like black spot on abd. 9 and abd. 10.

***Ceriagrion coromandelianum* (Fabr.)**

1798. *Agrion coromandelianum* Fabricius *Ent. Syst. suppl.*, 287.

1842. *Agrion cerinum* : Rambur *Hist. Nat. Ins. Nevrov.*, : 279.

1876. *Ceriagrion coromandelianum* : Selys, *Bull. Acad. Belg. Sci.*, (2) 13 : 528.

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

1967. *Ceriagrion coromandelianum* : Asahina, *Jap. J. Zool.* 15 : 279.

Material : 1 F. W. Garo Hills dist., Bagmara, South of Karapara, Stn. No. 3, 16.x. 1988, K.K. Ray and Party coll.

Diagnosis : This species is easily distinguished from all others by its abdomen being entirely pale citron to lemon yellow and without markings.

Distribution : INDIA : Meghalaya (West Garo Hills Dist.); Assam, Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Mezoram, Orissa, Punjab, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. NEPAL, SRI LANKA, BURMA, INDOCHINA, THAILAND.

Remarks : This species is rare in Meghalaya. These are found in weedy ponds, tanks, on the banks or borders of which it may be found for the greater part of the year. The female is commonly found in scrub-jungle some distance away from water.

***Ceriagrion fallax* Ris**

1914. *Ceriagrion fallax* Ris, *Ent. Metteil.*, 3 (2) : 47.

1933. *Ceriagrion fallax* Fraser, *Fauna Brit. India. Odon.*, 1 : 321.

1967. *Ceriagrion fallax pendleburvi* Laidlaw : Asahina, *Jap. J. Zool.* 15 (3) : 286.

Material : 1 M, Khasai Hills, Nongstain Stn. No. 3, ca. 2 kms. east of P.W.D. Banglaw, 21.ix. 88, A.R. Lahiri coll.; 1 M, Shillong, B. Garden, Stn. No. 2, Alt. 1900 m., 29.iii. 91, S.K. Ghosh and party coll.

Diagnosis : Prothorax and thorax olivaceous green on dorsum, yellow on sides. Thorax with a small black point on the upper part of humeral suture another similar spot on the upper part of postero-lateral suture. Beneath thorax citron yellow. Abdomen pale lemon yellow with black markings on the end segments. Superior anal appendages more than half the length of segment 10.

Distribution : India : Meghalaya (Shillong, Khasai hills Dist.) Assam, Himachal Pradesh, Sikkim, Bengal. NEPAL, CHINA, BURMA, THAILAND, MALAYSIA, INDONESIA, TAIWAN.

Remarks : In Meghalaya this species is restricted in Khasi hills. These are commonly found only in the few months following the monsoon, around temporary water bodies. Distinguished from other species by the shape of its anal appendages, while from nigroflavum by the much longer superior anal appendages.

***Ceriagrion olivaceum* Laidlaw**

1914. *Ceriagrion olivaceum* Laidlaw, *Rec. Indian Mus.*, **8** : 345.

1933. *Ceriagrion olivaceum* : Fraser, *Fauna Brit. India. Odon.*, **1** : 324.

1967. *Ceriagrion olivaceum olivaceum* Laidlaw, *Jap. J. Zool.*, **15** (3) : 305.

1967. *Ceriagrion olivaceum auranticum* : Fraser : Asahina, *Jap. J. Zool.* **15** (3) : 307.

Material : 1 M, Shillong, forest colony, 17.v. 90, M.S. Shishodia coll.

Diagnosis : This species is distinguishable from all other species of the genus in having uniform olivaceous colouring.

Distribution : INDIA : Meghalaya (Shillong, Khasai hills dist.) Assam, Kerala, Manipur, Maharashtra, Uttar Pradesh, west Bengal. BURMA, THAILAND, VIETNAM, LAOS, CAMBODIA, MALAYSIA.

Remarks : This species frequently inhabits weeds and grasses in vicinity of water body. Fraser (1933) remarked that quite contrary to habits of genus this species "appear to breed in streams"

Genus *Pseudagrion* Selys

1876. *Pseudagrion* Selys, *Bull. Acad. Belg. Sci.* (2) **42** : 490.

1938. *Pseudagrion* : Fraser, *Fauna Brit. India. Odon.*, **1** : 274

***Key to the species of the Genus Pseudagrion* Selys**

1. Face and frons and vertex bright reddish orange or dark ochreous
..... *rubriceps rubriceps* Selys.
- Face frons and vertex blue or green and marked with black.....2.
2. Superior anal appendage smaller only about half the length of segment 10.
.....*australasiae* Selys.
- Superior anal appendage bigger as long as or nearly so, to segment 10.....
.....*spencei* Fraser.

***Pseudagrion australasiae* Selys**

1876. *Pseudagrion nicrocephalum* race ? *Bull. Acad. Belg. Sc.* (2) **42** : 506 (pars).

1916. *Pseudagrion australasiae* : Laidlaw, *Rec. Ind. Mus.*, **12** : 21.

1919. *Pseudagrion bengalense* : Laidlaw, *Rec. Indian Mus.*, **16** : 192.

1933. *Pseudagrion bengalense* : Fraser, *Fauna Brit. India, Odon.*, **1** : 282.

Distribution : INDIA : Meghalaya (Garo hills) Assam, Manipur, West Bengal. BURMA, INDONESIA, THAILAND, MALAYSIA, AUSTRALIA.

Remarks : This species is included on the basis of the literature review. It is comparatively rare in Meghalaya. It has similarity with *P. microcephalum* but is distinguishable from same by elongate vase-shaped spot instead of goblet-shaped on abd. 2 and in absence of basal spines.

***Pseudagrion rubriceps rubriceps* Selys**

1876. *Pseudagrion rubriceps* Selys, *Bull. Acad. Belg. Sci.* (2) **42** : 510.

1933. *Pseudagrion rubriceps* : Fraser, *Fauna Brit. India. Odon.*, **1** : 296.

1953. *Pseudagrion rubriceps rubriceps* Selys : Lieftinck, *Verh. naturf. Ges. Basel*, **64** : 156.

Material : 1M, Khasai Hills, Nongthymmai, 7.vii. 73, M.S. Jyrwa coll.

Diagnosis : Thorax golden green on dorsum, azure blue on sides, sparingly marked with black on dorsum. Pale lilaceous line on each side of mid-dorsal carina. A narrow black humeral stripe present. Abdomen 10 with narrow X-shaped black marking on dorsum.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills Dist.), Assam, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, punjab, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, BURMA, INDO-CHINA, MALAYSIA, INDONESIA, TAIWAN, PHILIPPINES.

Remarks : Breeds in and frequents the grassy banks of small streams. The male is easily distinguished from all others by the brilliant reddish orange face. The female presents more difficulty; as the bifid mark on segment 9 is shared by at least one other species. Female have similarity with *P. hypermelas* (but it is distinguishable by absence of head markings); and *P. spencei* from which it is distinguishable by broader abdominal markings.

***Pseudagrion spencei* Fraser**

1922. *Pseudagrion spencei* Fraser, *Mem. Dep. Agric. India (Ent.)* **7** : 47.

1933. *Pseudagrion spencei* : Fraser, *Fauna Brit. India, Odon.*, (1) : 292.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hill and Jaintia hills) Assam, Bihar, Madhya Pradesh, Uttar pradesh, West Bengal. NEPAL.

Remarks : This species is included on the basis of the literature review. These are found at various altitudes. Usually they are found near water bodies and occassionally on grassy ground.

It has, in males, unexpanded superior anal appendages inwardly but beset with a long robust basal spines.

Genus *Aciagrion* Selys

1876. *Pseudagrion* Selys, *Bull. Acad. Belg. Sci.* (2) 42 : 509 (pars).

1891. *Aciagrion* : Selys, *Ann. Mus. Civ. Genova* (2) : 10 (32) : 509.

1933. *Aciagrion* : Fraser, *Fauna Brit. India Odon.*, 1 : 333.

*Key to the species of the genus **Aciagrion** Selys*

2. Ground colour pale yellow, without black markings on head and thorax***Pallidum*** Selys.
- Ground colour blue with black markings on head, thorax and abdomen.....2.
2. Larger species, abdomen more than 30 mm., Prothorax not trilobite behind, anal appendage yellowish or pale blue tipped with black.....***Olympicum*** Laidlaw.
- Smaller species, abdomen less than 25mm., Posterior lobe of prothorax trilobite behind, anal appendage in male black.....***Tillyardi*** Laidlaw.

***Aciagrion pallidum* Selys**

1891. *Aciagrion pallidum* Selys, *Ann. Mus. Civ. Genova* (2)-10 (30): 512.

1933. *Aciagrion pallidum* : Fraser, *Fauna Brit. India Odon.*, 1 : 344.

Material : 1 M, E. Khasai Hills, Umshing 2.x. 88, A.R. Lahiri coll.; 2 MM, Khasai Hills, Umshing, 5.iii. 71, G.M. Yazdani coll.

Diagnosis : Moderate size species (29-31 mm. hind wing 18-20mm.). Head, prothorax and thorax pale brown. No black making on head and thorax.

Distribution : INDIA : Meghalaya (Garo hills, Khasi Hills); Assam, Arunachal Pradesh, Bihar, Goa, Karnataka, Madhya pradesh, Maharashtra, Manipur, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, BURMA.

Remarks : It normally inhabits dry areas amongst grass, other vegetation where it easily mingles. Since it has cryptic colouration it remains inconspicuous unless flies.

***Aciagrion tillyardi* Laidlaw**

1919. *Aciagrion tillyardi* Laidlaw, *Rec. Indian Mus.*, 16 : 187.

“ 1933. *Aciagrion approximans*; Fraser, *Faunt Brit, India, Odon.*, 1 : 342.

Distribution : INDIA : Meghalaya (Khasi Hills, Jaintia Hills), Assam, Arunachal Pradesh, Mainpur. MALAYSIA.

Remarks : This species is included on the basis of literature review. It differs from *A. olympicum* and *A. azureum* by shorter and most robust abdomen and by having segment 10 black above. From *A. Hisopa*, to which it is very closely related, the broader markings on segment 2 and 10 and the shape of the hinder border of the posterior lobe of the prothorax which is trilobate in *A. approximans* and simple and rounded in *A. hisopa*. They are commonly found along grassy edges of small streams or even stagnant water bodies.

***Aciagrion olympicum* Laidlaw**

1919. *Aciagrion olympicum* Laidlaw, *Rec. Indian Mus.*, 16 : 171.

1933. *Aciagrion olympicum* : Fraser, *Fauna Brit, India, Odon.*, 1 : 337.

Material : 1 M, 1 F, Dispur, 6.vi. 90, M. S. Shishodia and party coll. ; 1 M, 2 FF, Muktapur, Jaintia hills, 21.v. 90, M. S. Shishodia and party coll., 2 MM, 3 FF, Garampani, Jaintia hills, 22.v. 90, M. S. Shishodia coll.

Diagnosis : Black markings on head, thorax and abdomen post occuler sports connected across the middle line of occiput. Thorax black on dorsum, marked with rather broad pale blue antehumeral stripes. Abdominal segment 2 with a broad stripe slightly expanded subapically and then slightly constricted to join a narrow apical ring. Segment 8 with a narrow dorsal triangle of black. Superior anal appendages bifid at apex.

Distribution : INDIA : Meghalaya (Khasi Hills, Jaintia Hills), Sikkim, West Bengal.

Remarks : It differs from other species of the genus by its great length and by the characteristic markings on segment 2 of the male and segments 8 and 9 of the female. It is closely related to *A. azureum* which has large isolated post-ocular spots and a lower nodal index. It is a marsh-breeder species like *A. occidentalis*.

Genus ***Enallagma*** Charpentier

1840. *Enallagma* Charpentier, *Lib. Europ.*, : 21.

1933. *Enallagma* : Fraser, *Fauna Brit. India. Odon.*, 1 : 371.

No key to the species of genus *Enallagma* Charp. is provided as it has only one species represented in Meghalaya. This is smallest species of genus in India, with abdomen 17 mm. and fore wing with only 6 or 7 postnodal nervure.

***Enallagma parvum* Selys**

1876. *Enallagma parvum* Selys, *Bull. Aead. Belg.*, (2) 41 : 537.

1933. *Enallagma parvum* : Fraser, *Fauna Brit. India. Odon.*, 1 : 376.

Distribution : INDIA : Meghalaya (Garo Hills, Khasi Hills), Karnataka, Kerala, Maharashtra, Manipur, Punjab, Uttar Pradesh, West Bengal. NEPAL, SRILANKA, BURMA.

Remarks : This species is included on the basis of the literature review. It is one of the smallest Indian dragonflies. Shape of its anal appendages is characteristic and small post-ocular colour sport confluent by a narrow stripe.

Genus *Ischnura* Charpentier

1940. *Ischnura* Charpentier *Lib. Europ.*, : 20.

1933. *Ischnura* : Fraser, *Fauna Brit. India. Odon.*, 1: 346.

Key to the species of genus Ischnura

1. Species with ground colour of both sexes bright orange red abdominal segments 8 to 10 black.....*rufostigma rufostigma* Selys.
- Species with ground colour of male and isochrome female blue or pale grass green, abdominal segment 3 to 6 citron yellow.....*aurora aurora* (Brauer).

Ischnura a. aurora (Hagen)

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

1915. *Ischnura aurora* (Brauer) : *Ris Nova Caledonia Zool.* 2 (4) : 67.

1933. *Ischnura delicata* : Fraser, *Fauna Brit. India. Odon.*, 1 : 360.

1949. *Ischnura aurora aurora* (Brauer) : Lieftinck, *Nova Guinea* (New ser.), 5 : 220.

Material : 1 M, Khasai Hills, Nongstain, stn. No. 3, cu. 2 kms east of P.W.D. I. B., 21. ix. 88, A.R. Lahiri coll.; 1 M, 1 F, Khasai Hills, Adibasti, ca 24 kms. south of Shillong, 10. ix. 88, A.R. Lahiri coll.; 1 M, 1 F, Pynursla, Khasai Hills, 29. viii. 73, S.K. Chanda coll.; 1 M, W. Garo Hills, Adogiri, 15 km of E. Tura, 6.x. 88, K.K. Ray and party coll.; 1 M, W. Khasai Hills, Nongstain, Mourinia, 14.iii. 91, A.K. Sanyal and party coll.

Diagnosis : Smallest species (abd. 16-20 mm., hindwing 10-15mm.) Pterostigma kite shaped, rose red for its proximal half but hyaline in distal half, abdomen 8-10 entirely azure blue, 10 with broad quadrate black dorsal spot.

Distribution : INDIA : Meghalaya (Khasi hills, Jaintia hills, West Garo hills) Assam, Andhra Pradesh, Arunachal Pradesh, Himachal Pradesh, Kerala, Maharashtra, Manipur, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, SRI LANKA, CHINA, MALAYSIA, INDONESIA, AUSTRALIA, NEW ZEALAND, PACIFIC ISLANDS.

Remarks : The only other species of the genus at all resembling it in colour is *I. Inarmata* Calvert but can be distinguished by larger size and shape of anal appendages. This species is known to commonly inhabit marshy areas flying through grasses and weeds. In rainy seasons these are also recorded over grassy fields in the neighbourhood of stagnant water bodies or slow running streams.

Ischnura rufostigma rufostigma Selys

1876. *Ischnura rufostigma* Selys, *Bull. Acad. Belg. Sci.* (2) 41 : 283.

1933. *Ischnura rufostigma* : Fraser, *Fauna Brit. India. Odon.*, 1 : 362.

1977. *Ischnura rufostigma rufostigma* Selys : Lahiri, *Rec. zool. Surv. India*, 72 : 413.

Distribution : INDIA : Meghalaya (Garo hills, Jaintia hills) Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, West Bengal. BURMA.

Remarks : This species is included on the basis of the literature review. It inhabits lower altitude in Meghalaya. It is usually known to found swarming on and around weedy, stagnant and often ephemeral water bodies, like the paddy fields.

Genus *Agriocnemis* Selys

1869. *Agriocnemis* Selys, *Pollen and van Dam. Fauna Mad. Ins.*, 24.

1933. *Agriocnemis* : Fraser, *Fauna Brit. India. Odon.*, 1 : 379.

Key to the species of the Genus Agriocnemis Selys

1. Labrum metallic blue, superior anal appendage longer than inferior, pterostigma pale-yellow in fore wing, black in hind.....*pygmaea* (Rambur).
- Labrum non metallic, superior anal appendage shorter than inferior.....2.
2. Abdomen palest blue, much restricted black dorsal markings, abd. 4 to 10 unmarked with black.....*lacteola* Selys.
- Abdomen darker blue, black dorsal marking much expanded, abdominal segment 8 entirely black.....*clauseni* Fraser.

Agriocnemis pygmaea (Ramb.)

1842. *Agrion pygmaeum* Rambur, *Hist. nat. Ins. Nevrop.*, 278.

1877. *Agriocnemis pygmaea* Selys, *Syn. Agr. Sme. Legion : Agrion (Suite etfin)* : 52.

1933. *Agriocnemis pygmaea* : Fraser, *Fauna Brit. India. Odon.*, 1 : 398.

Material : 1 M, 1 F, W. Khasai Hills district, Nongstoin stn. No. 1, P.W.D., I. B. Compound, 24.ix. 88, A. R. Lahiri coll.; 2 M, M Khasi Hills, stn. No. 3, umling, ca. 13–16 km South of Nongpoh circuit house, 29.ix. 88, A. R. Lahiri coll.; 2 M, M, 3 F, F, Khasi Hills, stn. No. 3, Umling, ca. 13–16 kms South of Nongpoh circuit house, 1.x. 88, A.R. Lahiri coll.; 3 MM, 2 FF, Khasi Hills, stn. No. 3, Umling, ca 13–16 kms south of Nongpoh circuit house, 25.ix. 88, A.R. Lahiri coll.; 1 F, Khasi Hills, Nongstoin, Stn. No. 1, P.W.D. I.B. compound, 22.ix. 88, A.R. Lahiri coll.; 1 M, Khlichriat, Jaintia Hills, 20.v. 90, M.S. Shishodia coll.; 1 M, 1 F, Pynursla, Khasai Hills, 29.viii. 73, S.K. Chanda coll.; 2 MM, Khasai Hills, Nongpoh, 11.iv. 78, K.P. Singh coll.;

1 F, W. Garo Hills dist., Barengapara, S. of Karapara, Stn. No. 4, 17.x. 88, K.K. Ray and party coll.

Diagnosis : Labrum brilliant metallic blue. Pterostigma pale yellow in the forewing, black in hind Abd. 1–6 pale greenish yellow (with black marking-broadly on abd. 1, thistle shaped on abd. 2, 3 to 6 broad stripe expanded subapically) abd. 7–10 and anal appendages brick-red in male, yellow in female, valvar scale robust.

Distribution : INDIA : Meghalaya (Garo Hills, Khasi Hills, Jaintia hills), Assam, Himachal Pradesh, Uttar Pradesh, Madras, Malabar, Manipur, Nicobar, Punjab, Rajasthan, West Bengal. CHINA, SRI LANKA, BURMA, MALAYSIA, INDONESIA, NEW GUINEA, TAIWAN, PHILIPPINES, AUSTRALIA, PACIFIC ISLANDS, SEYCHELLES.

Remarks : This is one of the smallest damselfly (abdomen 15–18 mm.) found in India. This inhabits wide ranging aquatic ecosystems. Males are distinguishable by different colour in Pterostigma of fore and hind wings and female with an unenclosed antehumeral stripes.

Agriocnemis clauseni Fraser

1922. *Agriocnemis clauseni* Fraser, *Mem. Dept. Agric. India (Ent.)* 7 : 53.

1933. *Agriocnemis clauseni* : Fraser, *Fauna Brit. India. Odon.*, 1 : 390.

Distribution : INDIA : Meghalaya (Garo Hills, Khasi Hills, Jaintia Hills), Assam, Punjab, Uttar Pradesh, West Bengal. BURMA, THAILAND.

Remarks : This species is included on the basis of the literature review. It has characteristic markings on abd. 7 and longer superior anal appendages; which differentiates it from two closely allied species *A. nana* and *A. naia*. Its recorded habitat in Meghalaya is generally in vicinity of water bodies.

Agriocnemis lacteola Selys

1877. *Agriocnemis lacteola* Selys, *Bull. Acad. Belg. Sci.* (2) 43 : 144.

1933. *Agriocnemis clauseni* : Fraser, *Fauna Brit. India. Odon.*, 1 : 381.

Distribution : INDIA : Meghalaya (Khasi Hills, Jaintia Hills), Assam, Bihar, Sikkim, Tripura, West Bengal.

Remarks : This species is included on the basis of the literature review. In Meghalaya the species is restricted only at lower altitude, It is known to inhabit grassy lands or paddy fields.

Genus *Argiocnemis* Selys

1877. *Argiocnemis* Selys., *Bull. Acad. Belg. Sci.*, (2) 43 : 135.

1933. *Argiocnemis* : Fraser, *Fauna Brit. India. Odon.*, 1 : 405.

No key to the species of the genus *Argiocnemis* is provided as there is single representative

viz., *A. obscura* Laidlaw (= *A. rubescens* Laidlaw).

***Argiocnemis obscura* Laidlaw**

1914. *Argiocnemis obscura* Laidlaw, *Rec. Indian Mus.*, 8 : 345.

1877. *Argiocnemis rubescens* Selys, *Bull. Acad. Belg.*, (2) 43 : 136.

1953. *Argiocnemis rubescens* : Fraser, *Fauna Brit. India. Odon.*, 1 : 406.

Material : 1 M, Khasai Hills, Nongpoh, 19.ix. 73, S. Biswas and party coll.

Diagnosis : Thorax black on dorsum marked with pale greenish blue antehumeral stripes. Abdomen pale blue laterally marked with black on dorsum. Segment 1 with a quadrate spot on mid dorsum. Segment 2 with a broad dorsal spot on mid dorsum. Anal appendages black; inferiors; less than half the length of superiors. Its outer angles produced as two minute spines.

Distribution : INDIA : Meghalaya (Garo Hills, Khasi Hills), Assam, West Bengal. BURMA.

Remarks : This species is known to inhabit bushes near small stagnant water bodies.

Family PROTONEURIDAE

This family is represented in Meghalaya by 3 species under 2 genera viz. *Elatoneura* and *Prodasineura*.

Key to the genera of the family Protoneuridae

1. Ab. straight; parallel to inner margin of discodal cell.....*Elatoneura* Cowley.
- Ab curved, forms a marginal cell with inner wing margin.....*Prodasineura* Cowley.

Genus *Elatoneura* Cowley

1886. *Disparoneura* Selys, *Mem. Cour. Acad. R. Belg.*, 38 : 160.

1933. *Disparoneura* : Fraser, *Fauna Brit. India. Odon.*, 1 : 228 (Partim).

1935. *Elatoneura* : Cowley, *Ent. mon. mag.*, 71 : 14.

Key to the species of the genus Elatoneura Cowley

1. Imago black, teneral marked with reddish or bluish in teneral; an ankle shaped spot underneath upper end of antehumeral stripe.....*atkinsoni* Selys.
- Imago and teneral both black marked with bluish markings; No ankle shaped spot at the upper end of antehumeral stripe.....*campioni* Fraser.

***Elatoneura atkinsoni* (Selys)**

1885. *Disparoneura atkinsoni* Selys, *Mem. Cour. Acad. R. Belg.*, 38 : 168.

1933. *Disparoneura atkinsoni* : Fraser, *Fauna Brit. India. Odon.*, 1 : 230.

1984. *Elattoneura atkinsoni* : Allen et al., *Societes Interna-nationalis Odontologico Rapid communication* (suppl.) No. 3 : 110.

Distribution : INDIA : Meghalaya (Khasi hills, Jaintia hills). BURMA.

Remarks : This species is included on the basis of the literature review.

***Elattoneura campioni* (Fraser)**

1922. *Disparoneura campioni* Fraser, *Mem. Dep. Agric. India (Ent.)* 7 : 44.

1933. *Disparoneura campioni* : Fraser, *Fauna Brit. India. Odon.*, 1 : 242.

1984. *Elattoneura campioni* : Allen et al., *Societies Internationalis Odontologico Rapid communication* (suppl.) No. 3 : 110.

Distribution : INDIA : Meghalaya (Khasi hills), Assam, Uttar Pradesh. BURMA.

Remarks : This species is included on the basis of the literature review. In blue markings this has superficial resemblance with members of the genus *Caconeura* though Complete anal bridge easily distinguishes it from other species of the genus.

Genus *Prodasinera* Cowley

1860. *Alloneura* Selys, *Mem. Cour. Acad. R. Belg. (B)* 38 : 160, 176 (nom. praecoc).

1890. *Caconeura* Kirby, *Syn. Cat. Neur. Odon.* : 134. (nom. nov.).

1933. *Caconeura* : Fraser, *Fauna Brit. India. Odon.*, 1 : 210. (partim).

1934. *Prodasinera* Cowley, *Entomologist*, 67 : 202.

No key to the species of genus is provided as it is represented by a single species in Meghalaya namely *P. autumnalis* (Fraser).

***Prodasinera autumnalis* Fraser**

1922. *Coconeura autumnalis* Fraser, *Mem. Dep. Agric. India (Ent.)* 7 : 43.

1933. *Coconeura autumnalis* : Fraser, *Fauna Brit. India. Odon.*, 1 : 223.

Distribution : INDIA : Meghalaya (Garo hills, Khasi hills), Uttar Pradesh. BURMA, VIETNAM, INDONESIA.

Remarks : This species is included on the basis of the literature review. It is known to inhabit bushy banks of slow running streams or lakes.

Family PLATYCNEMIDIDAE

The family is represented by 2 sub-families in Meghalaya and 4 genera. First key to sub-families is provided followed by genera.

Key to the subfamilies of Platycnemididae

1. Male tibiae dilated, often greatly so.....PLATYCNEMININAE Fraser.

— Male tibiae never dilated.....CALICNEMINAE Fraser.

Subfamily PLATYCNEMININAE

No key to the genera of subfamily is provided as it is represented by single genus *Copera*; characterized by dilated tibiae in male and costal margin of discoidal cell subequal to the inner one.

Genus *Copera* Kirby

1863. *Psilocnemis* Selys., *Bull. Acad. Belg. Sci.*, (2) 16 : 168 (nom. pracoc).

1890. *Copera* Kirby, *Syn. Cat. Neur. Odon.*, : 129.

1933. *Copera* : Fraser, *Fauna Brit. India. Odon.*, 1 : 191.

Key to the species of the genus *Copera* Kirby

1. Two hind pairs of tibiae white and widely dilated.....2.
- Two hind pairs of tibiae yellow; reddish or brownish; not dilated or only moderately so3.
2. Legs very long hind femora extending almost to abd. 2, abd 2 black on dorsum with no spots; inferiors arched, black at apices.....*annulata* Sclys.
- Legs very short, hind femora only extending upto end of thorax, abd. 2 with 2 dorsal blue spots; inferiors straight, white at apices.....*super platypes* Fraser.
3. Superiors only 1/4 length of inferiors, prothorax of female without spines.....*marginipes* Rambur.
- Superiors at least 1/2 of inferiors; prothorax of female with a pair of divergent, slender, forwardly directed spines.....*vittata* Selys.

Copera annulata (Selys)

1863. *Psilocnemis annulata* Selys, *Bull. Acad. Belg. Sci.* (2) 16 : 172.

1890. *Copera annulata* Selys : Kirby, *Syn. Cat. Neur. Odon.*, : 129.

1933. *Copera annulata* : Fraser, *Fauna Brit. India. Odon.*, : 203.

Material : 1 M, 1 F, Khasai Hills, Nongpoh, Stn. No. 1 Circuit house compound, 29.ix.88, A.R. Lahiri coll.

Diagnosis : Broad bronzed black triangular marking on frons and vertex. Two hind pairs of tibiae white and widely dilated. Hind femora extending nearly to end of abd. 2. Abdomen 2 wholly black on dorsum. Superiors conical, triangular, apex acute; inferiors broad at base, tapered to acute apex, curved strongly downwards and very slightly inwards.

Distribution : INDIA : Meghalaya (Nongpoh, Khasi hills, Garo hills), Assam, Himachal Pradesh, Manipur, West Bengal. CHINA, INDOCHINA, MALAYSIA, INDONESIA, JAPAN, TWIWAN.

***Copera marginipes* (Rambur)**

1842. *Platycnemis marginipes* Rambur, *Hist. nat. Ins. Nevrop.*, : 240.

1933. *Copera marginipes* : Fraser, *Fauna Brit. India. Odon.*, 1 : 192.

Distribution : INDIA : Meghalaya (Garo hills), Assam, Bihar, Goa, Himachal Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, CHINA, SRI LANKA, BURMA, THAILAND, MALAYSIA, INDONESIA, TAIWAN.

Remarks : This species is included on the basis of the literature review. It is known to have number of varieties. Fraser (1933) had recognised and described "Ceylon form" "West Coast form", "Deccan form", "Assam form" and "Bengal form"

***Copera vittata* (Selys)**

1863. *Psilocnemis vittata* Selys, *Bull. Acad. Belg. Sci.* (2) 16 : 170.

1890. *Copera vitta* (Selys) : Kirby, *Syn. Cat. Neur. Odon.*, : 129.

1933. *Copera vittata* : Fraser, *Fauna Brit. India. Odon.*, 1 : 198.

Material : 1 M, Khasai Hills, Nongpoh, Stn. No. 1, circuit house compound, 29.ix. 88, A.R. Lahiri coll.; 1 M, Khasai Hills, Nongpoh, Stn. No. 4, R. forest ca 36 kms. south of circuit house, 30.ix. 88, A.R. Lahiri coll.; 1 F, Khasai Hills, Nr. Umwai, ca 22 kms from Cherrapunji, 15.ix. 88, A. R. Lahiri coll.; 1 F, Khasi Hills, Umtham, 25.vi. 67, R.K. Varshney coll.

Diagnosis : Postclypeus, frons and vertex jet black, broad bluish green stripe extending from eye to eye on vertex. Posterior lobe of prothorax rounded in male. In females deeply notched, widely divergent spines underneath of thorax pale with 3 large black spots. Inferior anal appendage almost double in length of superior.

Distribution : INDIA : Meghalaya (Nongpoh, Cherrapunji, Garo hills, Khasi hills), Assam, West Bengal. LOWER BURMA, SIAM.

Remarks : This species is distinguishable from its closely alike species *C. assamensis* in having shorter legs, tibiae dilated, citron-yellow or black-red (instead of tibiae not dilated, brownish) and female with divergent spines to the posterior lobe of prothorax (instead of less divergent spines).

***Copera superplatypes* Fraser**

1927. *Copera superplatypes* Fraser, *Rec. Indian Mus.*, 29 : 88.

1933. *Copera superplatypes* : Fraser, *Fauna Brit. India. Odon.*, (1) : 206.

Material : 1 M, Khasai Hills, Nongpoh, Stn. No. 4, R. forest, ca 36 kms. south of circuit house, 30.ix 88, A.R. Lahiri coll.

Diagnosis : Prothorax black, with a pale bluish–white stripe and a spot of the same colour below it on each side. Thorax bronzed black, a black spot on the mesepimeron confluent with the black in the humeral region and another large black spot on the centre of metepimeron. Legs very short.

Distribution : INDIA : Meghalaya (Cherrapunji, Nongpoh, Khasi hills), West Bengal.

Remarks : This species is distinguishable from *C. annulata* by having broad pale blue stripes traversing the vertex from eye to eye (instead of broad black triangular markings). Short legs, tibiae of the hind legs enormously dilated (instead of long legs and not so enormously dilated tibiae) and inferior anal appendage straight (instead of incurved).

Subfamily CALICNEMINAE

This sub-family is represented by 3 genera in Meghalaya.

Key to the genera of Calicneminae

1. Ab arising at the level of Ac, 2–3 postquadrangular antenodal cells.....*Coeliccia* Kirby.
- Ab arising at the point where Ac meets it, 3–4 postquadrangular antenodal cells.....2.
2. Four postquadrangular cells; abdomen 45 mm or more in length.....*Indocnemis* Laidlaw.
- Three postquadrangular cells; abdomen 40 mm or lesser in length.....*Calicnemia* Strand.

Genus *Calicnemia* Strand

1863. *Calicnemis* Selys, *Bull. Acad. Belg. Sci.*, (2) 16 : 159.

1933. *Calicnemis* : Fraser, *Fauna Brit. India. Odon.*, 1 : 171.

1926. *Calicnemia* Strand, *Arch. Natur. gesch.*, 92A : 46.

Key to the species of the Genus Calicnemia

1. Head entirely black ventrally; abdomen mainly black.....*imitans* Lieftinck.
- Head though coloured as above, but marked with yellow; abdomen mainly red.....2.
2. Abdomen entirely red.....*eximia* Selys.
- Abdomen not entirely red, end segments black.....3.
3. Abd. 1–7 red, 8–10 black.....*miniata* Selys.
- Abd. 1–6 red, 7–10 black.....*mukherjeei* Lahiri.

Calicnemia eximia (Selys)

1863. *Calicnemis eximia* Selys, *Bull. Acad. Belg. Sci.* (2) 16 : 160.

1933. *Calicnemis eximia* : Fraser, *Fauna Brit. India. Odon.*, 1 : 174.

Distribution : INDIA : Meghalaya (Khasi hills), Himachal Pradesh, Uttar Pradesh, West Bengal. NEPAL, BURMA, VIETNAM.

Remarks : This species is included on the basis of the literature review. The generalized and vivid red colour serves to determine it at once from all other species of the genus. The female bears a close resemblance to those of *C. miniata* and *C. pulverulans* and is distinguished from the former by being broadly yellow beneath the head instead of almost wholly black. The presence of the upper humeral yellow spot will serve to separate it from latter.

***Calicnemia imitans* Lieftinck**

1948. *Calicnemia imitans* Lieftinck, *Arkiv For. Zoologi.*, 41A : 12.

Distribution : INDIA : Meghalaya (Khasi hills, Jaintia hills), BURMA.

Remarks : This species is recorded only from southern part of Meghalaya. It has black underneath head in both male and female. This differentiate it from 3 other species recorded from Meghalaya.

***Calicnemia mukherjeei* Lahiri**

1876. *Calicnemia mukherjee* Lahiri, *Odontologica* 5 : 273.

1987. *Calicnemia mukherjee* : Lahiri, *Rec. zool. Surv. India, Occ. paper* No. 99 : 80.

Material : Holotype M, Shillong, 12.viii. 74, coll. A.R. Lahiri, Z.S.I. Reg. No. 751H/13; Allotype F, Shillong, 22.viii. 74, coll. K.D.; Paratypes, 2 MM, Old Barapani road side, 6.iv. 73, coll. A.R. Lahiri, Z.S.I. Reg. No. 752/H13.

Distribution : INDIA : Meghalaya (Shillong, Khasi hills).

Remarks : They are found only at a higher altitude of Khasi hills and in Shillong. Type material present in National collection were examined.

***Calicnemia miniata* Selys**

1886. *Calicnemis miniata* Selys, *Mem. Cour.*, 38 : 132.

1933. *Calicnemis* (= *Calicnemia*) *miniata* : Fraser, *Fauna Brit. India. Odon.*, 1 : 177.

Material : 2 FF, Khasai Hills, Nr. Umwai, ca. 22 kms from Cherrapunjee, 15.ix. 88, A.R. Lahiri coll.

Diagnosis : Prothorax, thorax black. Former with a large reddish spot on each side of middle lobe, latter with narrow bright red antehumeral stripes. Pterostigma distinctly diamond-shaped. Abdomen blood red as far as the basal third of segment 7, remaining segment black.

Distribution : INDIA : Meghalaya (Cherapunje, Khasi hills), Sikkim, West Bengal.

Remarks : This species has anal appendages similar to *C. eximia* and *C. milies* but can be differentiated from former by inferiors much longer, sinuous, apices sloping inwards and meeting.

Higher postnodal nervures (18–21 : 14–15) and Pterostigma longer, rhomboidal instead of being diamond shaped shorter, helps to distinguish it from latter.

Genus *Coelliccia* Kirby

1857. *Trichocnemis* Selys, in Sagra, *Hist. Cube. Ins.*, : 454 (nom. preoc).

1890. *Coelliccia* Kirby : *Syn. Cat. Neur. Odon.*, : 128.

1933. *Coelliccia* : Fraser, *Fauna, Brit. India. Odon.* 1 : 152.

Key to the species of the genus Coelliccia Kirby

1. Dorsum of synthorax marked with one or two pairs of spots.....2.
- Dorsum of synthorax marked with a pair of stripes.....3.
2. Two pairs of pale blue spots on dorsum of thorax, lower pair simple, pyriform.....
.....*didyma* (Selys).
- One pair of oval, pale blue spots.....*bimaculata* Laidlaw.
3. Antehumeral stripes lying closely apposed to the mid-dorsal carina.....*fraseri* Laidlaw.
- Antehumeral stripes lying nearer the humeral suture than mid-dorsal carina.....4.
4. Antenumeral stripe broad, superior anal appendage with a small spine or projection on inner border (only known by male).....*sarbottoma* Lahiri.
- Antehumeral stripe narrow; posterior lobe of female prolonged, deeply and broadly notched (only known by female).....*vacca* Laidlaw.

Coelliccia bimaculata Laidlaw

1914. *Coelliccia bimaculata* Laidlaw, *Rec. Indian Mus.*, 8 : 341.

1932. *Coelliccia bimacalata* : Laidlaw, *Rec. Indian Mus.*, 34 : 11.

1933. *Coelliccia bimaculata* : Fraser, *Fauna Brit. India. Odon.*, 1 : 154.

Distribution : INDIA : Meghalaya (Tura, Garo hills).

Remarks : This species is included on the basis of the literature review. It is distinguished from other species of the genus by the two oval spots on dorsum of thorax.

Coelliccia didyma (Selys)

1863. *Trichocnemis didyma* Selys, *Bull. Acad. Belg. Sci.* (2) 16 : 158.

1890. *Coelliccia didyma* (Slys) : Kirby, *Syn. Cat. Neur. Odon.*, : 128.

1933. *Coelliccia didyma* : Fraser, *Fauna Brit. India. Odon.*, 1 : 159.

Distribution : INDIA : Meghalaya (Garo hills, Khasia hills) Assam, Himachal Pradesh, Nagaland, West Bengal. TIBET, BURMA, MALAYSIA.

Remarks : This species is included on the basis of the literature review. It is rare and known to occur at a lower altitude.

***Coeliccia fraseri* Laidlaw**

1932. *Coeliccia fraseri* Laidlaw, *Rec. Indian Mus.*, 34 : 14.

1933. *Coeliccia fraseri* : Fraser, *Fauna Brit. India. Odon.*, 1 : 169.

Distribution : INDIA : Meghalaya (Khasai Hills).

Remarks : This species is included on the basis of the literature review. It has restricted distribution in high altitude areas of Meghalaya and is common in bushes along the banks of stream.

***Coeliccia sarbottama* (Lahiri)**

1987. *Coeliccia sarbottama* Lahiri, *Rec. zool. Surv. India*, Occ. Paper No. 99 : 86.

Material : Holotype M, Wageasi, 6.v. 1973, coll. A.R.I. (Z.S.I. Reg. No. 3908/H13).

Distribution : INDIA : Meghalaya (Wagesi, Khasi hills).

Remarks : Lahiri (1987) described it from Wageasi. It is closely allied to *C. fraseri* Laidlaw, from which it differs in the shape of posterior lobe of prothorax and shape of dorsal thoracic markings. The two species also differ in their altitudinal distribution. *C. fraseri* Laidlaw is known to occur at high altitude, while *C. sarbottama* is known at a much lower altitude. Type material of this species has also been examined.

***Coeliccia vacca* Laidlaw**

1932. *Coeliccia vacca* Laidlaw, *Rec. Indian Mus.*, 34 : 15.

1933. *Coeliccia vacca* : Fraser, *Fauna Brit. India. Odon.*, 1 : 155.

Material : 1 M, "Type, above Tura, Garo hills, 3,500–3,900" Assam, S. Kemp, 13.vii–31.viii. 1917, Registration No. 7665/H1.

Distribution : INDIA : Meghalaya (Tura, Garo hills); Assam.

Remarks : This species is included on the basis of the literature review. It is differentiated at once from all other species of the genus by the unique shape of the posterior lobe of prothorax.

Genus *Indocnemis* Laidlaw

1917. *Indocnemis* Laidlaw, *Rec. Indian Mus.*, 13 : 325.

1933. *Indocnemis* : Fraser, *Fauna Brit. India. Odon.*, 1 : 185.

No key to the species of the Genus *Indocnemis* is provided as it is represented in Meghalaya by a single species viz., *I. Kempfi* Laidlaw.

***Indocnemis kempfi* Laidlaw**

1917. *Indocnemis kempfi* Laidlaw, *Rec. Indian Mus*, 13 : 325.

1933. *Indocnemis kempfi* : Fraser, *Fauna Brit. India. Odon.*, 1 : 186.

Distribution : INDIA : Meghalaya (Khasai hills).

Remarks : This species is included on the basis of the literature review. It had been known only from the southern slopes of Khasi hills but Lahiri (1987) discovered it from also the northern part of the same hills at a comparatively lower altitude.

Superfamily LESTIDOIDEA

No key to the families of Superfamily Lestidoidea is provided as key to distinguish two families of this superfamily viz., Chlorolestidae and Lestidae is provided in general key to super families and families.

Superfamily LESTIDOIDEA

Family CHLOROLESTIDAE

No key to subfamilies of Family Chlorolestidae is provided as this is represented in Meghalaya by single subfamily viz., Megalestinae, single genus *Megalestes* Selys and two species under it.

Subfamily MEGALESTINAE

No key to genera of subfamily Megalestinae is provided, as it is represented by a single genus *Megalestes* Selys.

Genus *Megalestes* Selys

1862. *Megalestes* Selys, *Bull. Acad. Belg. Sci.* (2) 13 : 293.

1933. *Megalestes* : Fraser, *Fauna Brit. India. Odon.*, 1 : 20.

Key to species of Genus Megalestes Selys

1. Hindwings larger (M 33-36; F 35-36 mm); Prothorax dull metallic emerald green, no median spot on hind margin of occiput; superiors with apical spine.....*major* Selys.
- Hind wings smaller (M 19-21; F 14-16 mm); Prothorax marked with yellow and a median spot of the same colour on hind margin of occiput; superiors without spine.....
.....Raychoudhuri Lahiri.

***Megalestes major* Selys**

1862. *Megalestes major* Selys, *Bull. Acad. Belg.* (2) 13 : 293.

1933. *Megalestes major* : Fraser, *Fauna Brit. India. Odon.*, (1) : 21.

Distribution : INDIA : Meghalaya (Shillong, Khasai hills) Assam, West Bengal, Uttar Pradesh, Sikkim. NEPAL, BHUTAN, CHINA, BURMA, VIETNAM, TAIWAN.

Remarks : This species is included on the basis of the literature review. It is montane and submontane and known to occur upto an approximate altitude of 3000 meters.

***Megalestes raychoudhuria* Lahiri**

1987. *Megalestes raychoudhuria* Lahiri. *Rec. zool. Surv. India Occ. papers* 99 : 54.

Material : Holotype M and Allotype F, Shillong (Nonghtymmai). 10.vii. 74, coll. A.R.L. (Z.S.I. Reg. No. 3909/H13 and 3910/H13 respectively): Paratypes : 2 MM. Shillong, Tripura Castle road, 7.vi. 74, coll. K.D. (Z.S.I. Reg. No. 3911/H13 and 3912/H13 respectively).

Distribution : INDIA : Meghalaya (Mawphlong, Khasi hills).

Remarks : This species is included on the basis of the literature review Lahiri. This species is very close to *M. major* Selys but differs from the same in size, marking of prothorax and shape of anal appendages.

Family LESTIDAE

This family is represented by 2 subfamilies, 3 genera and 5 species in Meghalaya.

Key to the subfamilies of the family Lestidae

1. Discoidal cell of hind wing one and half times as long as that of forewing; Rs in hind wing half distance from arc from origin of R 4+5SYMPECMATINAE.
- Discoidal cell of forewing and hindwing of same size; Rs in hind wing half or never more than one third distance from arc from origin of R 4+5LESTINAE.

Subfamily SYMPECMATINAE

No key to the genus of subfamily Sympecmatinae is provided as same is represented in Meghalaya by single genus viz., *Indolestes* Fraser.

Genus *Indolestes* Fraser

1922. *Indolestes* Fraser, *Mem. Dept. Agric. India (Ent.)*, 7 : 57.

1933. *Indolestes* : Fraser, *Fauna Brit. India. Odon.*, 1 : 77.

No key to the species of genus *Indolestes* Fraser is provided, as same is represented in Meghalaya by a single species viz., *I. indica* Fraser.

Indolestes indica Fraser

1922. *Indolestes indica* Fraser, *Mem. Dept. Agric. India (Ent.)*, 7 : 58.

1933. *Indolestes indica* : Fraser, *Fauna Brit. India. Odon.*, 1 : 78.

Distribution : INDIA : Meghalaya (Shillong, Khasi hills).

Remarks : This species is included on the basis of the literature. It is more common in dry areas.

Key to the genera of the subfamily Lestinae

1. R₂ arising after 7 or more cells beyond nodus wings partly opaque
.....*Orolestes* McLachlan.
- R₂ arising at most 4 cells beyond nodus; wings wholly hyaline.....*Lestes* Leach.

Genus *Orolestes* Malachlan

1895. *Orolestes* McLachlan, *Ann. Mag. nat. Hist.* (6), 16 : 21.

1933. *Orolestes* : Fraser, *Fauna Brit. India, Odon.*, 1 : 25.

No key to the species of the genus *Orolestes* is provided, as it is represented in Meghalaya by single species *O. durga* Lahiri.

Orolestes durga Lahiri

1987. *Orolestes durga* Lahiri, *Rec. zool. Surv. Occ. paper* No. : 99.

Material : Holotype M, Rongrengiri, 19.iv. 1973, coll. A.R.L. (Z.S.I. Reg. No. 3913/H13).

Distribution : INDIA : Meghalaya (Rongrengiri, Khasi Hills); Arunachal Pradesh.

Remarks : This species is included on the basis of literature review. This species differs from the only known species of the genus *O. selysi* McLachlan from Indian subregion in its smaller size, in having uncoloured wings and in the shape of anal appendages, specially that of the superiors.

Genus *Lestes* Leach

1815. *Lestes* Leach (in Burmeister) *Edinb. Encycl.*, 9 : 137.

1933. *Lestes* Fraser : *Fauna Brit. India. Odon.*, 1 : 29.

Key to the species of Genus Lestes Leach

1. Superior anal appendages without a sub-basal spine on inner border and acutely pointed at apex*garoensis* Lahiri.
- Superior anal appendages prolonged into a sub-basal spine on inner border and rounded at apex2.

2. Larger species (abd. neverless than 37 mm., may be upto 40 mm; Hindwings 26 mm) ; ground colour black*dorothea* Fraser.
- Smaller species (abd. 33 mm; hindwing 21 mm); ground colour reddish brown
.....*concinus* Selys.

***Lestes concinns* Selys**

1862. *Lestes concinna* Hagen : Selys, *Bull. Acad. Belg. Sci.* (2). 13 : 321 (Partim)

1890. *Lestes concinns* Selys : Kirby, *Syn. Cat. Neur. Odon.*, : 162 (Partim).

1933. *Lestes umbrina* : Fraser, *Fauna Brit. India. Odon.*, 1: 53.

Distribution : INDIA : Meghalaya (Rongram, Khasi Hills); Andhara Pradesh, Gujrat, Maharashtra, Uttar Pradesh, West Bengal. CHINA, BURMA, INDONESIA, PHILIPPINES, AUSTRALIA.

Remarks : This species is included on the basis of the literature review.

***Lestes dorothea* Fraser**

1923. *Lestes premorsa dorothea* Fraser, *J. Bombay. nat. Hist. Sec.* 29 : 480.

1924. *Lestes dorothea* : Fraser, *Rec. Indian Mus.*, 26 : 484.

1933. *Lestes dorothea* : Fraser, *Fauna Brit. India. Odon.*, 1 : 35.

Distribution : INDIA : Meghalaya (Nongpoh, Khasi Hills); Assam, Maharashtra. NEPAL.

Remarks : This species is included on the basis of the literature review. These are recorded in stagnant water bodies, mosses or very slow running water.

***Lestes garoensis* Lahiri**

1987. *Lestes garoensis* Lahiri, *Rec. zool. Surv. India. Occ. paper* No. 99 : 66.

Material : Holotype M, Rongrengiri, 20.iv. 1973. coll. A.R.L. (Z.S.I. Reg. No. 3918/H13); Paratype 1 M, Rongrengiri, 20.iv. 1973, coll. A.R.L. (Z.S.I. Reg No. 3916/H13).

Distribution : INDIA : Meghalaya (Rongrengiri, Khasi Hills); Manipur.

Remarks : This species is included on the basis of the literature review Lahiri, 1987. It is very close to *L. nodalis* Selys but differs from the same in the shape of superior anal appendages

Superfamily CALOPTERYGOIDEA

Key to the families of the superfamily Calopterygoidea

No Key to 3 families, under this family represented in Meghalaya namely Amphipterygidae, Chlorocyphidae and Euphaeidae, are provided here as the key distinguishing feature are included in general key to superfamilies and families.

Family AMPHIPTERYGIDAE

This family is represented by single subfamily Philoganginae, hence no key is provided.

Subfamily PHILOGANGINAE

No key to genera of the subfamily philoganginae is provided, as it represented by single genus *Philoganga* Kirby, not only in Meghalaya but also in India.

Genus *Philoganga* Kirby

1859. *Anisoneura* Selys, *Bull. Acad. Belg. Sci.*, (2) 7 : 444.

1890. *Philoganga* Kirby, *Syn. Cat. Neur. Odon.*, : 111.

1934. *Philoganga* : Fraser, *Fauna Brit. India. Odon.*, 2 : 114.

No key to the species of genus *Philoganga* is provided as it has sole species represented by *P. montana* (Selys), within our limits.

Philoganga montana (Selys)

1859. *Anisoneura montana* Selys, *Bull. Acad. Belg. Sci.*, (2) 7 : 445.

1890. *Philoganga montana* (Selys) : Kirby, *Syn. Cat. Neur. Odon.*, 111.

1934. *Philoganga montana* : Fraser, *Fauna Brit. India. Odon.*, 2 : 114.

Distribution : INDIA : Meghalaya (Shillong, Garo Khasi Hills), Assam, West Bengal.

Remarks : This species is included on the basis of the literature review. It inhabits vegetation in vicinity of the montane streams over hanging over it.

Family CHLOROCYPHIDAE

Key to the genera of the family Chlorocyphidae

1. Forewing of male without pterostigma; sectors of arc arising from a common point.....
.....*Libellago* Selys.
- Forewing of male with pterostigma; sectors of arc not arising from a common point but separated at their origin*Rhinocypha* Rambur.

Genus *Libellago* Selys

1840. *Libellago* Selys, *Mon. Lib. Eur.*, : 200 (Parts).

1934. *Libellago* : Fraser, *Fauna Brit. India, Odon.*, (2) : 53.

1842. *Micromerus* Rambur, *Hist. nat. Ins. Nevrop.*, : 238.

No key to the species of genus *Libellago* is provided it has got sole representative in Meghalaya namely *L. lineata lineata* (Burmeister).

Libellago 1. lineata (Burmeister)

1839. *Caloptergx lineata* Burmeister, *Handb. Ent.*, (2) : 826.

1840. *Libellago lineata* : Selys, *Mon. Lib. Eur.*, : 200.

1934. *Libellago 1. Lineata* : Fraser, *Fauna Brit. India. Odon.*, (2) : 60.

Distribution : INDIA : Meghalaya (Garo hills, Khasi Hills), Assam, Himachal Pradesh, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal. BURMA, THAILAND, VIETNAM, MALAYSIA, INDONESIA.

Remarks : This species is included on the basis of the literature review. It is commonly found in comparatively open habit in vicinity or along sides streams or small rivers which has sandy bottom and clear water.

Genus ***Rhinocypha*** Rambur

1831. *Agrion* Guerin, *Mag. Zool. Ins.*, 1 : 15.

1842. *Rhinocypha* Rambur, *Ins. Neyron*, 232.

1934. *Rhinocypha* : Fraser, *Fauna Brit. India. Odon.*, (2) : 5.

*Key to the species of genus **Rhinocypha** Rambur*

1. Wings coloured in both sexes.....*immaculata* Selys.
- Wings coloured, at least partly in males.....2.
2. Dorsal mesothoracic triangle extending as far as root of wings.....3.
- Dorsal mesothoracic triangle absent, uncoloured or extending not more than half-way upto root of wings.....6.
3. Apical vitreous spot large, separated from costal border by 1 or 2 row of cells.....*cuneata* Selys.
- Apical vitreous spot not so large, separated from costal border by 3 to 4 row of cells.....4.
4. Apical vitreous spot large, located almost entirely proximal to line of pterostigma; mid row of vitreous spots more or less confluent; large species (hind wing 27-28 mm).....*spuria* Selys.
- Apical vitreous spot not so large, lying partly proximal to line of pterostigma, mid-row of vitreous spots always well separated, costal spot extending much nearer node than middle spot small species (Hindwing 20-24 mm).....5.
5. Smaller species (abd. 19 mm hindwing 21 mm); opaque area of forewing 3/4 width apical vitreous spot 1 row posterior to IRiii.....*quadrifasciata quadrifasciata* Selys.

- Larger species (abd. 23 mm, hindwing 23 mm); costal area of forewing 1/2 of width apical vitreous spot 3 row posterior to IRiii.....*quadrimaculata hemihyalina* Fraser.
- 6. Mesothoracic triangle uncoloured or entirely obsolete, hindwing distinctly broader than fore wing; inner vitreous spot much shorter.....*ignipennis* Selys.
- Mesothoracic triangle coloured; hindwing almost as broad as forewing.....7.
- 7. Apical long, half of hindwing opaque, two rows of vitreous spots.....*beatifica* Fraser.
- Apical vitreous spot short.....8.
- 8. Apex of fore-wing tipped with black as far as inner end of pterostigma.....*biforata delimbata* selys.
- Apex of fore wing tipped with brown*vitrenella* Kirby.

***Rhinocypha beatifica* Fraser**

1927. *Rhinocypha perforata beatifica* Fraser, *Rec. Ind. Mus.*, (29) : 86.

1934. *Rhinocypha perforata beatifica* : Fraser, *Fauna Brit. India. Odon.*, (2) : 44.

1987. *Rhinocypha beatifica* : Lahiri, *Rec. Zool. Surv. India. Occ. paper No. 99* : 28.

Distribution : INDIA : Meghalaya (Garo hills, Khasi hills) Assam, Nagaland.

Remarks : This species is included on the basis of the literature review. It is known to inhabit vegetation in vicinity of water body in montane and sub-montane zone. It has tendency to move away and at higher points on being slightly disturbed.

***Rhinocypha biforata delimbata* Selys**

1879. *Rhinocypha biforata var delimbata* Selys, *Bull. Acad. Belg. Sci.*, (2) 47: 392.

1928. *Rhinocypha biforata delimbata* : Fraser, *J. Bombay Nat. Hist. Soc.*, (32) : 453.

1934. *Rhinocypha biforata delimbata* : Fraser, *Fauna Brit. India. Odon.*, (2) : 45.

Distribution : INDIA : Meghalaya (Garo hills) Assam, Manipur, BURMA, VIETNAM.

Remarks : This species is included on the basis of the literature review. It is commonly found along montane streams or rivers. The males are known to perch on exposed boulders in mid-streams.

***Rhinocypha ignipennis* Selys**

1879. *Rhinocypha ignipennis* Selys, *Bull. Acad. Belg.* (2) 47 : 389.

1934. *Rhinocypha ignipennis* : Fraser, *Fauna Brit. India. Odon.*, (2) : 23.

1987. *Rhinocypha ignipennis* : Lahiri, *Rec. Zool. Surv. India. Occ. paper No.. 99* : 28.

Distribution : INDIA : Meghalaya (Khasi hills, Jaintia hills); West Bengal. BURMA.

Remarks : This species is included on the basis of the literature review. It is known to inhabit montane streams in a relatively open habitat.

***Rhinocypha immaculata* Selys**

1879. *Rhinocypha immaculata* Selys, *Bull. Acad. Belg.* (2) 47 : 385.

1934. *Rhinocypha immaculata* : Fraser, *Fauna Brit. India. Odon.*, (2) : 35.

Material : 1 F, Khasai Hills, N. W. Umwai, ca 22 km. from Cherrapunjee, 15.ix. 8B, A.R. Lahiri, coll.; 1M, Khasai Hills Nongpoh, stn. No. 4, R. forest ca 3-6 km south of Circuit house, 30.ix. 8B, A.R. Lahiri coll.

Diagnosis : In female mesothoracic triangle black, bordered yellow.

Distribution : INDIA : Meghalaya (Cherapunji, Nongpoh, Khasi hills); Assam, West bengal, Uttar Pradesh.

Remarks : It is known to inhabit vegetation in vicinity of montane streams in comparatively open habitat; in which it shares conspecific *R. ignepennis*.

***Rhinocypha quadrimaculata hemihyalina* Fraser**

1921. *Rhinocypha quadrimaculata hemihyalina* Fraser, *Mem. Dept. Agr. India (Ent.)*, 7 : 64.

1934. *Rhinocypha quadrimaculata hemihyalina* : Fraser, *Fauna Brit. India. Odon.*, 2 : 17.

Distribution : INDIA: Meghalaya (Shillong, Khasi hills, Jaintia hills), Assam.

Remarks : This species is included on the basis of the literature review. This species in contrast differs from other members of genus from Meghalaya in zonation of opaque area of forewing which cover only costal half. Also it differs in extended Zonation of apical vitreous spot of hind-wing extending back to 3 rows of cells posterior to IRiii, instead of only one.

***Rhinocynha q. quadrimaculata* Selys**

1853. *Rhinocypha quadrimaculata* Selys, *Syn. Cal.* : 60.

1934. *Rhinocypha quadrimaculata* : Fraser, *Fauna Brit. India. Odon.*, (2) : 14.

1950. *Aristocypha quadrimaculata* (Selys): Laidlaw, *Trans. R. ent. Soc. London*, 101 : 273.

Material : 1 M, Khasai Hills, Umling, 2.x. 88, A.R. Lahiri and party coll.; 1 M, Garo Hills, Selbalgiri, 10.v. 88, V.T. Darling coll.; 1 F, K. Hills, Malkai, 9.vi. 75, M.S. Jyrwa coll.; 1 M, Rangri katham vill., 1 km east of forest Tilla, Tura, 9.iii. 91. A.K. Sanyal and Party coll.

Diagnosis : Wing's reticulation very close. Hindwing broader, dialated in the middle. Apical vitreous spot transversely elongate, extending one cell row posterior to IRiii. Middle row of spots 3 in number. Of those middle one shorter than the hinder spot. Vitreous stripes extending distalwards into opaque area for a distance of 7-8 cells.

Distribution : INDIA : Meghalaya (Khasi hills, Tura, Garo hills, Jaintia hills), Assam, Himachal Pradesh, Kashmir, Sikkim, Uttar Pradesh, West Bengal. NEPAL, BURMA.

Remarks : These species are commonly found near montane streams in comparatively open habitat. This habitat is shared by *R. ignipennis* and *R. immaculata*.

Rhinocypha spuria Selys

1879. *Rhinocypha spuria* Selys, *Bull. Acad. Belg.* (2) 47 : 388.

1934. *Rhinocypha spuria* : Fraser, *Fauna Brit. India. Odon.*, (2) : 12.

1950. *Aristocypha spuria* (Selys) Laidlaw, *Trans. R. ent. Soc. London.* 101 : 273.

Material : 1 M, Mawblong, Khasai Hills, 22.ix. 72, A.K. Ghosh coll.; 1 F, K. Hills, Malkoi, 9.vi. 75, M.S. Jyrwa coll.

Diagnosis : Vitreous stripes in hind-wing invading opaque black area for a distance of 3 to 5 cells. Apical vitreous spot limited posteriorly by nervure IRiii. Middle row of spots four in number.

Distribution : INDIA : Meghalaya (Mawblang, Malkai, Khasi hills) Nagaland, Uttar Pradesh, West Bengal. BURMA.

Remarks : This species is known to inhabit preferably in vicinity of montane streams in comparatively open habitat; as also certain other members of genus recorded from Meghalaya.

Rhinocypha cuneata Selys

1853. *Rhinocypha cuneata* Selys, *Syn. Cal.* : 60.

1934. *Rhinocypha cuneata* : Fraser, *Fauna Brit. India. Odon.*, (2) : 9.

Material : 1 F, Khasai Hills, Nr. Umwai, ca 22 kms from Cherrapunjee, 15.ix. 88, A.R. Lahiri coll.

Diagnosis : Dorsal mesothoracic triangle extending as far as root of hind wing.

Distribution : INDIA : Meghalaya (Cherapunji, Khasi hills); Assam, West Bengal.

Remarks : This species is having its apical vitreous spot of forewing extending upto one or two cells of costal margin.

Rhinocypha vitrenella Fraser

1900. *Rhinocypha whiteheadi* Kirby, *Ann. Mag. Nat. Hist.*, (7) 5: 536, pl. xii, fig. 4.

1934. *Rhinocypha whiteheadi* : Fraser, *Fauna Brit. India. Odon.*, (2) : 39.

1935. *Rhinocypha vitrenella* : Fraser, *Rec. Indian Mus.* 37 : 333.

Distribution : INDIA : Meghalaya (Khasi hills), Assam.

Remarks : Unlike most species of the genus, this species is found near stagnant and not so clear water bodies, deep inside jungles in shaded zones.

Family EUPHAEIDAE

This family in Meghalaya is represented by 3 genera and 6 species.

Key to genera of the family Euphaeidae

1. Discoidal cell traversed; abd. 10 with a prominent middorsal keel apically.....*Euphaea* Selys.
- Discoidal cell entire; abd. 10 without middorsal keel.....2.
2. R_{2+3} fused with R_1 near its origin*Baydera* Selys.
- R_{2+3} not fused with R_1 near its origin.....*Anisopleura* Selys.

Genus *Anisopleura* Selys

1853. *Anisopleura* Selys, *Syn. Cal.*, : 48.

1934. *Anisopleura* : Fraser, *Fauna Brit. India. Odon.*, 2 : 84.

Key to the species of the genus Anisopleura

1. One cubital nervure in all wings, no humeral stripe; a short spine at middle of superior anal appendage.....*lestoides* Selys.
- Several cubital nervure in all wings, humeral stripe present, a short spine near base of superior anal appendage.....*supplatystyla* Fraser

Anisopleura lestoides Selys

1853. *Anisopleura lestoides* Selys, *Syn. Cal.*, : 48.

1934. *Anisopleura lestoides* : Fraser, *Fauna Brit. India. Odon.*, (2) : 86.

Material : 1 ♂, Khasai hills, Nr. Umwai, ca 22 km. from Cherrapunjee, 15.ix. 88, A.R. Lahiri, and party coll.

Diagnosis : Moderately large size. One cubital nervure in all wings. Costal border of hindwing in male with an abrupt outward angulation at a point little before midway from wing-base to nodus, resulting in widening of costal space abruptly at the point, then decreasing gradually outwards. Superior anal appendages with short spine at middle.

Distribution : INDIA : Meghalaya (Cherapunjee, Khasi Hills), Assam, Sikkim, West bengal,

Remarks : The superior anal appendages of male has a robust spine at about middle on ventrolateral face, directed anal wards.

***Anisopleura subplatystyla* Fraser**

1927. *Anisopleura subplatystyla* Fraser, *Rec. Indian Mus.*, 29 : 81.

1934. *Anisopleura subplatystyla* : Fraser, *Fauna Brit. India. Odon.*, (2) : 89.

Material : 1 M, Khasai Hills, Malkai, 17.xiii. 74, M.S. Jyrwa coll.; 2 FF, Khasai Hills, Malki, 12.vii. 72, R. S. Giri coll.

Diagnosis : It has the combined ante-humeral and humeral stripes and numerous cubital nervures. Superior anal appendage with short spine near base.

Distribution : INDIA : Meghalaya (Cherapunjee, Khasi Hills), Assam.

Remarks : This species is found near streams as well as in comparatively drier habitats inside bushes and forest, far away from the streams.

Genus *Bayadera* Selys

1853. *Epallage*, group *Bayadera* Selys, *Syn. Cal.*, : 49.

1934. *Bayadera* : Fraser, *Fauna Brit. India. Odon.*, (2) : 78.

Key to the species of genus *Bayadera*

1. Wings apically blackish brown; posterior lobe of prothorax trapezoidal with its hind margin erect and straight in middle.....*indica* (Selys).
- Wings hyaline; posterior lobe of prothorax broadly suboval; with its hind margin arched backward and a little sinuous at middle.....*hyalina* Selys.

***Bayadera hyalina* Selys**

1879. *Bayadera hyalina* Selys, *Bull. Acad. Belg.*, (2) 47 : 373.

1934. *Bayadera hyalina* : Fraser, *Fauna Brit. India. Odon.*, (2) : 81.

1975. *Bayadera hyalina* : Lahiri, *Odontologica*, 4 : 255.

Distribution : INDIA : Meghalaya (Shillong, Khasi hills). Assam, West Bengal.

Remarks : This species is included on the basis of the literature review. It has characteristic entirely hyaline wing and a well-developed ventral spine to superior anal appendages. Imagos are known to frequent spots, even quite away from aquatic habitat.

***Bayadera indica* Selys**

1853. *Epallage indica* Selys, *Syn. Cal.*, (2) : 49.

1890. *Bayadera indica* : Kirby, *Syn. Cat. Neur. Odon.*, : 108.

1934. *Bayadera indica* : Fraser, *Fauna Brit. India. Odon.*, (2) : 79.

Distribution : INDIA : Meghalaya (Barapani, Khasi hills), Himachal Pradesh, Uttar Pradesh, West Bengal. NEPAL.

Remarks : This species is included on the basis of literature review. It is distinguished from its closely allied species *B. hyalina* by its much larger size and by the apices of all wings in the male being tipped with black, instead of being wholly hyaline.

Genus *Euphaea* Selys

1840. *Euphaea* Selys, *Mon. Lib. Fur.*, : 200.

1890. *Pseudophaea* : Kirby, *Syn. Cat. Neur. Odon.*, : 109.

1929. *Allophaea* : Fraser, *Fauna Brit. India.*, 2 : 95.

1929. *Indophaea* : Fraser, *J. Bombay nat. Hist. Soc.* 33 : 293.

Key to the species of genus Euphaea

1. Large species (Abd. 32–38) wings are darker brown.....*ochracea burnnea* Selys.
- Small species (Abd. 33–35) wings saffronated.....*ochracea ochracea* Selys.

Euphaea ochracea burnnea Selys

1879. *Euphaea burnnea* Selys, *Bull. Acad. Belg.* (2), 47 : 374.

1931. *Euphaea ochracea brunnea* Selys : Laidlaw, *J. Fed. Mal States Mus.*, 16 : 180.

Distribution : INDIA : Meghalaya (Garo hills, Khasi hills), Assam. BURMA.

Remarks : This species is included on the basis of the literature review. It is usually medium to large size insect. Wings saffronated and the saffronated parts of wings are clouded with dark brown along the costa in the fore wing and in the outer and posterior part in the hind wing. It is commonly found along montane streams and are often noticed perching on exposed boulders in mid-streams.

Euphaea ochracea Selys

1859. *Euphaea ochracea* Selys, *Bull. Acad. Belg.*, (2) 7 : 443.

1890. *Pseudophaea ochracea* : Kirby, *Cat. Odon.*, : 109.

1929. *Allophaea ochracea* : Fraser, *J. Bombay Nat. Hist. Soc.* 33 : 288.

1934. *Allophaea ochracea* : Fraser, *Fauna Brit. India.*, (2) : 96.

Distribution : INDIA : Meghalaya (Shillong, Khasi hills). BURMA.

Remarks : This species is included on the basis of the literature review. Its wings are hyaline, saffronated but without opaque areas.

Family CALOPTERYGIDAE

This family is represented in Meghalaya by 2 subfamilies 5 genera and 8 species.

Key to subfamilies of family Calopterygidae

1. Discoidal cell traversed once, half the length of median space; IA fused with the inner border of wing.....CALIPHAENIAE.
- Discoidal cell traversed 4 or more times, not half but subequal the length of median space; IA not fused but free from inner border of wing.....CALOPTERYGINAE.

Subfamily CALIPHAENIAE

No key to the genera of subfamily Caliphaeniae is provided as only single genus *Euphaea* Selys is represented in Meghalaya.

Genus *Caliphaea* Selys

1859. *Caliphaea* Selys, *Bull. Acad. Belg. Sci.*, (2) 7 : 440.

1934. *Caliphaea* : Fraser, *Fauna Brit. India. Odon.*, (2) : 149.

No key to the species of genus *Caliphaea* Selys is provided as only single species of this genus is represented in Meghalaya, namely *C. confusa* Selys.

Caliphaea confusa Selys

1859. *Caliphaea confusa* Selys, *Bull. Acad. Belg. Sci.*, (2) 7 : 440.

1934. *Caliphaea confusa* : Fraser, *Fauna Brit. India. Odon.*, (2) : 149.

Distribution : INDIA : Meghalaya (Mawphlang, Khasi hills); West Bengal, NEPAL. BURMA, BHUTAN TIBET, CHINA, LAOS.

Remarks : This species is included on the basis of the literature review. It is montane and sub-montane species known upto an altitude of 2000 meters. Prothorax, thorax and abdomen 1 to 7 metallic coppery green, 8 to 10 pruinose white on dorsum.

Subfamily CALOPTERYGINAE

Key to the genera of subfamily Calopteryginae

1. Arc oblique, not angulated; basal space entire.....*Vestalis* Selys.
- Arc angulated, not oblique; basal space traversed or reticulated.....2.
2. Pterostigma present, not traversed.....*Echo* Selys.
- Pterostigma absent; if present then traversed by nervures.....3.
3. All wings in both sexes opaque black; pterostigma in male absent, female white, traversed by nervures.....*Matrona* Selys.

- Forewing in both sexes hyaline; pterostigma absent in male; false or absent in female.....
.....*Neurobasis* Selys.

Genus *Echo* Selys

1853. *Echo* Selys, *Syn. Cal.*, : 19.

1934. *Echo* : Fraser, *Fauna Brit. India. Odon.*, (2) : 134.

Key to the genera of Genus Echo Selys

1. Wings basal 4/5th hyaline, only apical fifth dark blackish brown.....
.....*margarita margarita* Selys.
- Wings hyaline 2/3 hyaline, outer third blackish brown.....*margarita tripartita* Selys.

Echo m. margarita Selys

1853. *Echo margarita* Selys, *Syn. Cal.*, : 19.

1929. *Echo margarita* : Fraser, *J. Bombay Nat. Hist. Soc.*, 33 : 587.

1934. *Echo margarita margarita* : Fraser, *Fauna Brit. India. Odon.*, (2) : 136.

Material : 1 M, Khasai Hills, Nr. Umwai, ca 22 kms. from Cherrapunjee, 15.ix. 88, A.R. Lahiri coll.; 1 F, W. Khasai Hills district, Nongstoin, ca 7 kms. north of P.W.D./I.B., 28.ix. 88, A.R. Lahiri coll.; 1 M, Khasai Hills, Mawsynram, 10.x. 72, A.K. Ghosh coll.

Diagnosis : Prothorax and thorax dark metallic green. Dorsum of thorax and whole of sides with a coppery reflex. Wing hyaline, apical fifth dark blackish brown. Hyaline area with a bluish-purple iridescence.

Distribution : INDIA : Meghalaya (West Khasi Hills), Assam. CHINA, BURMA.

Remarks : Wings closely reticulated, hyaline, apical fifth dark blackish brown, slight clouding of brown at node in all wings. Pterostigma milky white.

Echo m. tripartita Selys

1879. *Echo margarita* race *tripartita* Selys, *Bull. Acad. Belg.*, (2) 47 : 356.

1934. *Echo margarita tripartita* : Fraser, *Fauna Brit. India. Odon.*, (2) : 137.

Material : 1 M, Khasai hills, Nongthymmai, 7.vii. 73, M.S. Jyrwa coll.; 1 M, Khasai Hills, Pynursla, 29.viii. 72, A.K. Ghosh coll.; 1M, 2 FF, Khasai Hills, Shillong, 23.vii. 75, M.S. Jyrwa coll.

Diagnosis : Differs from *E. m. margarita* in the greater extent of black on the wing which covers the outer third roughly but is subject to slight variations.

Distribution : INDIA : Meghalaya (Shillong, Nongthumai, Khasi Hills).

Remarks : The subspecies is known to have restricted distribution only in Central and

Southern parts of Khasi hills. They commonly occur along montane streams with clear water at the place where the banks are beset with thick bushes or weeds.

Genus *Matrona* Selys

1853. *Matrona* Selys, *Syn. Cal.*, : 17.

1934. *Matrona* : Fraser, *Fauna Brit. India. Odon.*, (2) : 144.

Key to species of genus Matrona Selys

1. Wings basal 4/5th dark brown to bluish steely blue, outer 1/5th hyaline; bluish white nervures on basal half of wing distinct.....*basilaris basilaris* Selys.
- Whole wing dark steely, bronze or bluish, bluish white nervures on basal half of wing not distinct.....*basilaris nigripectus* Selys.

Matrona b. basilaris Selys

1853. *Matrona basilaris* Selys, *Syn. Cal.*, : 17.

1929. *Matrona basilaris* : Fraser, *J. Bombay Nat. Hist. Soc.*, 33 : 593.

1934. *Matrona basilaris basilaris* : Fraser, *Fauna Brit. India. Odon.*, (2) : 145.

Material : 1 M, Khasai hills, Nongstoin, Stn. No. 3, ca 2kms coast of P.W.D.I.B., 21.ix. 88, A.R. Lahiri coll.; 1 M, 1 F, Khasai Hills, Nongstoin, Stn. No. 3, 2 kms. East of P.W.D.I.B., 21.ix. 88, A.R. Lahiri coll.

Diagnosis : Prothorax and thorax metallic emerald green with bluish reflections on dorsum, Wings long very broad, reticulation close, varying from dark brown to blackish steely blue, outer fifth of forewings comparatively hyaline but the nervures are framed in opaque brown. Abdomen brilliant glossy emerald metallic green on dorsum legs of great length, finely spined.

Distribution : INDIA : Meghalaya (Barapani, Cherapunji, Shillong, Khasi Hills), Assam. BURMA, TIBET.

Remarks : Bluish-white nervures in basal half of wings more pronounced than *nigripectus*. It also differs from latter in having posterolateral sutures and ventral border of metapimeron yellow instead of black with spots of black.

Matrona b. nigripectus Selys

1879. *Matrona basilaris* race *nigripectus* Selys, *Bull. Acad. Belg.* (2) 47 : 355.

1934. *Matrona basilaris nigripectus* : Fraser, *Fauna Brit. India. Odon.*, (2) : 147.

Material : 2 MM, 1 F, Khasai hills, Malkai, 17.viii. 74, M.S. Jyrwa coll.; 2 MM, Khasai Hills, Releground, 21.viii. 77, A.C. Sukla coll.; 1 M, Khasai Hills, Risa colony, 14.ix. 71. R. Giri coll.

Diagnosis : Wings all uniformly dark as far as apices. Base of wings bluish grey.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills), Assam, Himalayas. BURMA

Remarks : The species is known to occur usually over tiny swift streams, clear streams with pebbly substrata, but never over stagnant water.

Genus *Neurobasis* Selys

1853. *Neurobasis* Selys, *Syn. Cal.*, : 17.

1934. *Neurobasis* : Fraser, *Fauna Brit. India. Odon.*, (2) : 119.

No key to the species of genus *Neurobasis* Selys is provided as the genus has sole representation in Meghalaya by *N.C. chinensis* (Linnaeus).

Neurobasis chinensis chinensis (Linnaeus)

1758. *Libellula chinensis* Linnaeus, *Syst. Nat.*, 1 : 545.

1890. *Neurobasis chinensis* : Kirby, *Cat. Odon.*, : 102.

1934. *Neurobasis chinensis chinensis* : Fraser, *Fauna Brit. India. Odon.*, (2) : 121.

Distribution : INDIA : Meghalaya (Rongren giri, Garo hills, Barapani, Khasi Hills), Assam, Mezoram, Manipur, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu, West Bengal, Uttar Pradesh. NEPAL, SRILANKA, BURMA, THAILAND, MALAYSIA, INDONESIA.

Remarks : This species has characteristic lack of pterostigma in male and false or absent in female. These are commonly known to inhabit along montane streams and rivers with exposed surface of the boulders.

Genus *Vestalis* Selys

1853. *Vestalis* Selys, *Syn. Cal.*, : 24.

1934. *Vestalis* : Fraser, *Fauna Brit. India. Odon.*, (2) : 124.

Key to the species of Genus Vestalis Selys

1. Wings tinted uniformly with golden yellow.....*smaragdina* Selys.
- Wings untinted or only partly so.....*gracilis* (Rambur).

Vestalis smaragdina Selys

1879. *Vestalis smaragdina* Selys, *Bull. Acad. Belg.* (2) 47 : 362.

1934. *Vestalis smaragdina* : Fraser, *Fauna Brit. India. Odon.*, (2) : 133.

Material : 1 MM, Khasai Hills, Umshing, 27.iii. 68, R.K. Varshney coll.

Diagnosis : Prothorax and thorax metallic emerald green and blue reflection on dorsum of thorax. Wings hyaline tinted with yellow. Inferiors anal appendages about two-thirds the length of superiors, cylindrical and ending in an acute inwardly directed spine.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills), Assam, West Bengal. BURMA, TIBET.

Remarks : Wings are wholly hyaline but tinted with golden yellow instead of green, with irridescence of colour of mother of pearl or blue as in *V. gracilis gracilis*.

Vestalis g. gracilis (Rambur)

1842. *Calopteryx gracilis* Rambur, *Hist. nat. Ins. Nevrop.*, : 224.

1929. *Vestalis gracilis gracilis* : Fraser, *J. Bombay nat. Hist. Soc.*, 33 : 582.

1934. *Vestalis gracilis gracilis* : Fraser, *Fauna Brit. India. Odon.*, (2) : 126.

Material : 1 F, Khasai Hills, Nongpoh, Stn. No. 4, R. forest, ca 3–6 kms south of circuit house, 30.ix. 88, A.R. Lahiri coll.

Diagnosis : Major part of head on dorsum on thorax and abdomen metallic green. Wings hyaline, iridescent with colours of mother of pearl or blue in some lights, specially the central parts of fore-wings. Discoidal cell traversed 4–6 times in fore wing and 3–5 in hind wing.

Distribution : INDIA : Meghalaya (Nongpoh, Khasi Hills, Garo hills), Assam, Andhra Pradesh, Gujrat, Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal. BURMA, THAILAND, VIETNAM, MALAYSIA.

Remarks : This species is distinguishable from *V. smaragdina* Selys in having untinted wings and from *V. amoena* Selys in having two rows of cells between origins of CUii and IA instead of a single row. It is known to inhabit vegetation in vicinity of and along montane and submontane streams.

Suborder ANISOPTERA

Subfamily CORDULEGASTEROIDEA

This superfamily has single representative family namely Cordulegasteridae.

Family CORDULAGASTERIDAE

No key to the subfamilies of the family Cordulegasteridae is provided as there is single subfamily represented in Meghalaya namely Chlorogomphinae.

Subfamily CHLOROGOMPHINAE

No key to the genera of the subfamily Chlorogomphinae is provided as there is single genus represented in Meghalaya, namely *Chlorogomphus*.

Genus *Chlorogomphus* Selys

1854. *Chlorogomphus* Selys, *Bull. Acad. Belg. Sci.*, (2) 21 : 98.

1936. *Chlorogomphus* Selys : Fraser, *Fauna Brit. India. Odon.*, 3 : 5.

Key to the species of the genus Chlorogomphus

1. Female wing golden yellow at its extreme base; inferior anal appendage of male shallowly bifurcated, beset with robust mid dorsal spine.....*fraseri* St. Quentin.
- Female wing golden yellow, at least its basal half; inferior anal appendage of male not bifurcated, not beset with robust mid-dorsal spine, only two minute teeth or spine.....2.
2. Female wing with only costal border and basal half tinted yellow; 2–3 median nervures in all wings; 16 or 17 cells in anal loop in female.....*campioni* (Fraser).
- Female wing tinted with golden yellow as far as basal antenodal nervure or rarely whole wings is palely enfumed; only 1 median nervure in all wings (rarely 2); 11–15 cells to anal loop in female.....*atkinsoni* (Selys)

Chlorogomphus fraseri St. Quentin

1936. *Chlorogomphus fraseri* St. Quentin, *Konowia*, 15(1/2) : 103.

1936. *Chlorogomphus fraseri* : Fraser, *Fauna Brit. India. Odon.*, 3 : 16.

Distribution : INDIA : Meghalaya (Khasia hills), West Bengal.

Remarks : This species is included on the basis of the literature review. It is distinguished from closely allied *C. campioni* and *C. mortoni* by the shape of inferior anal appendage, by the yellow marking on labrum and by the extensive yellow markings on abdomen. Inferior anal appendages tipped at apex with three mandibulate teeth and a very robust spine between branches of inferior.

Chlorogomphus campioni (Fraser)

1924. *Chogomphus campioni* Fraser, *Rec. Ind. Mus.*, 26 : 427.

1931. *Chlorogomphus campioni* : Fraser, *Rec. Ind. Mus.*, 33 : 447.

1936. *Chlorogomphus campioni* : Fraser, *Fauna Brit. India. Odon.*, 3 : 9.

Distribution : INDIA : Meghalaya.

Remarks : This species is included on the basis of the literature review. It is related closely to *C. xanthoptera* (Fraser) but differs from it, as follows, in female : Wings of female of this species is smaller, pale at apices, deepening in tint towards the base; whereas wings of female of the *xanthoptera* are longer, much broader, uniformly coloured dark golden amber throughout, much darker at apices.

Chlorogomphus atkinsoni (Selys)

1879. *Orogomphus atkinsoni* Selys, *Bull. Acad. Belg. Sci.*, (2) 45 : 682.

1936. *Chlorogomphus atkinsoni* : Fraser, *Fauna Brit. India. Odon.*, 3 : 26.

Distribution : INDIA : Meghalaya (Cherrapunji, Shillong dist., Khasi hills); Assam, Uttar Pradesh, West Bengal.

Remarks : This species is included on the basis of the literature review. It is closely related to *C. selysi* in the entire absence of incomplete basal antenodal nervures. It can be differentiated from same by uniform colouring of the face light brown, unmarked by yellow.

Superfamily AESHNOIDEA

Family AESHNIDAE

This family is divided into two divisions namely Brachytrini and Aeshnini Brachytrini is further subdivided into 3 subfamilies Brachytrinae, Gomphaeshninae and Neopetalinae. Of these, only two have got representative in Meghalaya, while last one is not represented in whole of India. Division Aeshnini has 4 subfamilies Aeshninae, Anactinae, Gynacanthaginae and Polycanthaginae. Of these all, except last subfamily, have representative in Meghalaya. A key to divisions and their subfamilies are provided to give comprehensive picture.

Key to the divisions, subfamilies of the family Aeshnidae

1. R 4+5 and MA running parallel to one another, MA without bulging after nodus.....
.....BRACHYTIRNI2.
- MA gradually converging towards R 4+5 and shortly after nodus distinctly bulged.....
.....AESHNINI.....4.
2. IRiii simple and unforked.....3.
- IRiii symetrically forked.....BRACHYTRINAE.
3. A chain of reddish spots on costal border of all wings, annal loop absent or rudimentary...
.....NEOPETALINAE.
- No chain of reddish spots on costal border of all wings, and loop present.....
.....GOMPHAESHNINAE.
4. Hind wing rounded at base in both sexes, on side of abd. 2 oreillets absent (except in genus
Anaciaeschna). Riii bends abruptly towards pterostigma, anal triangle absent.....
.....ANACTINAE.
- Hind wing in male angulated and excavated at base, rounded in female, on side of abdomen
2 oreillets present, Riii not bending abruptly towards pterostigma, anal triangle always
present.....5.
5. Female genitalia with simple rounded dentigerous plate, number of fine spine to the plate...
.....AESHNINAE.

- Female genitalia with dentigerous plates produced in fewer (two or more) robust spines6.
6. Two long, robust spines to the dentigerous plate.....GYNACANTHAGINAE.
- Four or more, not so long, robust spines to the dentigerous plate.....POLYCANTHAGINAE.

Subfamily GOMPHAESHNIAE

Genus OLIGOAESCHNA

1889. *Jagoria* Selys, *Ann. Mus. Civ. Genova.*, 27 : 470.

1985. *Oligoaeschna* : Allen, D. Davies and Pamela J., *Soc. int. Odonatol rapid Comm.* (suppl. No. 5) p. 21.

1987. *Oligoaeschna* : Lahiri, *Rec. zool. Surv. India. Occ. paper No. 99*, : 13.

Remarks : This genus was originally designated by Karsch (1989), with *J. paeciloptera* Karsch as genotype. Fraser (1936) had described only one species *J. martini* Laidlaw under this genus within Indian limits with its distribution : Assam (Meghalaya; Shillong, Khasi hills), Northern Bengal and Sikkim. Lieftinck (1968) had described 2 more species : *Oligoaeschna decorata* and *O. khasiana* again from Khasi hills (Meghalaya). Lahiri (1987) had also included this in list of Meghalaya Odonata and mentioned in historical account. Though these are included in this work on the basis of literature review so as to make it comprehensive, formulation of key to species of the genus is not feasible nor attempted at this stage.

***Oligoaschna decorata* Lieftinck**

1968. *Oligoaeschna decorata* Lieftinck, *Tijdschr. Ent.*, 111 : 158.

1985. *Oligoaeschna decorata* Allen, D., Davies and Pamela T., *Soc. int. Odonatol rapid Comm.* (suppl. No. 5) : 21.

Distribution : INDIA : Meghalaya (Khasi hills).

Remarks : This species was described from Khasi Hills. Lahiri (1987) has included it in the list of Meghalaya Odonata and also mentioned under historical account. This species is included on the basis of literature review.

***Oligoaschna khasiana* Lieftinck**

1968. *Oligoaeschna khasiana* Lieftinck, *Tijdschr. Ent.*, 111 : 156.

1985. *Oligoaeschna khasiana* : Allen, D., Davies and Pamela T., *Soc. int. Odonatol rapid Comm.* (suppl. No. 5) : 21.

Distribution : INDIA : Meghalaya (Khasi hills).

Remarks : This species was described from Khasi Hills. Lahiri (1987) has included it in list

of Meghalaya Odonata and also mentioned under historical account. It is included on the basis of literature review.

***Oligoaeschna martini* (Laidlaw)**

1921. *Jagoria martini* Laidlaw, *Rec. Ind. Mus.*, 22 : 76.

1936. *Jagoria martini* : Fraser, *Fauna Brit. India. Odon.*, 3 : 59.

1985. *Oligoaeschna martini* : Allen, D., Davies L., Pamela T., *Soc. int. Odonatol rapid Comm.* (suppl. No. 5) : 21.

Distribution : INDIA : Meghalaya, Shillong (Khasi hills), West Bengal.

Remarks : This species was described from Darjeeling, West Bengal, under genus *Jagoria* Karsch. Subsequently this species, with genus itself, was placed under *Oligoaeschna* Selys. Lahiri (1987) has included it in list of Meghalaya Odonata and also mentioned under historical account. It is included on the basis of literature review.

Division BRACHYTRINI

Subfamily BRACHYTRINAE

Key to the genera of the subfamily Brachytrinae

1. Pterostigma long, Not braced, arc distal to distal primary antenodal supplementary nervure from distal side of discoidal cell straight to border of wing.....***Petaliaeschna*** (Fraser).
- Pterostigma short, braced, arc proximal to distal primary antenodal, supplementary nervure from distal side of discoidal cell zigzagged from its origin or absent.....2.
2. Segment 10 of female prolonged into dentigerous plate which end in 2 long divericcate spines; median space in wings with one or more veins...***Periaschna*** Martin.....3.
- Segment 10 of female legs prolonged, dentigerous plate more rounded.....3.
3. Detigerous plate finely spined; only one row of cells between IR₃ and Rspl and also between MA and Mspl.....***Austroaeschna*** Selys.
- Detigerous plate with 4 spines, two median spines longer; more than one row of cells between IR₃ and Rspl and between MA and Mspl.....***Tetracanthagyna*** Selys.

Petaliaeschna Fraser

1927. *Petaliaeschna* Fraser, *Rec. Ind. Mus.*, 29 : 72.

1936. *Petaliaeschna* : Fraser, *Fauna Brit. India. Odon.*, 3 : 79.

No key to the species of genus *Petaliaeschna* is provided as it has sole representative, namely *P. fletcheri* Fraser, in Meghalaya.

***Petaliaeschna fletcheri* Fraser**

1927. *Petaliaeschna fletcheri* Fraser, *Rec. Ind. Mus.*, 29 : 73.

1936. *Petaliaeschna fletcheri* : Fraser, *Fauna Brit. India. Odon.*, 3 : 79.

Distribution : INDIA : Meghalaya, (Shillong dist., Khasi Hills).

Remarks : This species is included on the basis of the literature review. It may be characterized in having pterostigma longer and not braced, the distal position of the arc by the absence of the membrane and by the straight, robust accessory nervure of the discoidal cells.

Genus *Periaeschna* Martin

1909. *Periaeschna* Martin, *Cal. Coll. Selys (Aeschnines)*. 20 : 7, 157.

1936. *Periaeschna* : Fraser, *Fauna Brit. India. Odon.*, 3 : 81.

Key to the species of the genus Periaeschna

1. Discoidal cell long and narrow; frons not markedly raised; dentigerous plate present as prolongation of abd. 10 in female.....*biguttata* Fraser.
- Discoidal cell short and broad; frons raised markedly; dentigerous plate absent to abd. 10 of female.....2.
2. Female wing bases with blackish brown patches; frons with a black stripe on upper surface*magdalena* Martin.
- Female wing bases without blackish brown patches; Frons unmarked on its upper surface*nocturnalis* Fraser.

***Periaeschna ? biguttata* (Fraser)**

1935. *Cephaleaeschna biguttata* Fraser, *Rec. Indian Mus.*, 37 : 321.

1936. *Cephaleaeschna biguttata* : Fraser, *Fauna Brit. India. Odon.*, (2) : 75.

Distribution : INDIA : Meghalaya (Rongtham, Rongjeng, Garo hills).

Remarks : This species is included on the basis of literature review. Fraser (1935) described it as *Cephaleaeschna biguttata*. Lahiri (1987) placed it as *Periaeschna magdalena* Martin; but later on Late Lieftinck identified the same as *Periaeschna ? biguttata* (Fraser).

***Periaeschna magdalena* Martin**

1909. *Periaeschna magdalena* Martin, *Cat. Coll. Selys, (Aeschnines)* 20 : 157.

1936. *Periaeschna magdalena* : Fraser, *Fauna Brit. India. Odon.*, 3 : 82.

Distribution : INDIA : Meghalaya (Garo hills); Sikkim, West Bengal.

Remarks : This species is included on the basis of literature review. It is related with *P. nocturnalis* and *P. unifasciata* From former it is distinguishable in having black line on the crest

of frons (instead being unmarked) and blackish brown marks at base of female wings. Yellow markings on thorax distinguishes it from latter species.

***Periaeschna nocturnalis* Fraser**

1927. *Periaeschna nocturnalis* Fraser, *Rec. Ind. Mus.*, 29 : 71.

1936. *Periaeschna nocturnalis* : Fraser, *Fauna Brit. India. Odon.*, 3 : 86.

Distribution : INDIA : Meghalaya (Shillong dist., Khasi Hills).

Remarks : This species is included on the basis of the literature review. The markings and coloration of this species bear a very close resemblance to *Petaliaeschna fletcheri*. Present species is distinguished from above and other species of the genus in having extensive citron-yellow markings of thorax.

Genus ***Austroaeschna* Selys**

1883. *Austroaeschna* Selys, *Bull. Acad. Sci.* (4). 3 : 732.

1936. *Austroaeschna*, Fraser *Fauna Brit. India, Odon.*, 3 : 61.

***Austroaeschna intersedens* Martin**

1909. *Austroaeschna intersedens* Martin, *cat. coll. Selys.* fasc. 19 : 101.

1936. *Austroaeschna intersedens*, Fraser, *Fauna Brit. India, Odon.*, 3 : 62.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills). BURMA.

Remarks : This species is included on the basis of the literature review. It is restricted to central Khasi hills in Meghalaya. The characteristic venation is sufficient to distinguish it from other Indian Aeshnids.

***Tetracanthagyna* Selys**

1883. *Tetracanthagyna* Selys *Bull. Acad. Belg. Sci.*, (3), 5: 744.

1936. *Tetracanthagyna* : Fraser, *Fauna Brit. India, Odon.*, 3 : 115.

No key to the species of the genus *Tetracanthagyna* is provided as it is represented in Meghalaya by a single species, namely *T. waterhousei* McLachlan.

***Tetracanthagyna waterhousei* McLachlan**

1898. *Tetracanthagyna waterhousei* McLachlan, *Trans. Ent. Soc. Lond.*, 4 : 441.

1936. *Tetracanthagyna waterhousei* : Fraser, *Fauna Brit. India, Odon.*, 3 : 117.

Distribution : INDIA : Meghalaya (Barapani, Khasi hills); West Bengal. VIETNAM, MALAYSIA, INDONESIA.

Remarks : This species is included on the basis of the literature review. It has characteristic short pterostigma with one or two opaque blackish-brown cells in the space beneath it. Denti-gerous plate of female terminates in 4 short robust spine and abd. 3 not constricted in contrast with

species of allied genus, *Gynacantha* Rambur.

Division AESHNINI

Subfamily AESHNINAE

No key to the genera of the subfamily is provided as it is represented by a single genus in Meghalaya namely *Aeshna* Fabricius.

Genus *Aeshna* Fabricius

1775. *Aeshna* Fabricius, *Syst. Ent.*, : 424.

1936. *Aeshna* : Fraser, *Fauna Brit. India, Odon.*, 3 : 123.

No key to the species of the genus *Aeshna* is provided as it is represented in Meghalaya by a single species namely *A. petalura* Martin.

Aeshna petalura Martin

1909. *Aeshna petalura* Martin, *Cat. Coll. Selys. (Aeschnines)*, 18 : 78, 79, 84.

1936. *Aeshna petalura* : Fraser, *Fauna Brit. India, Odon.*, 3 : 128.

Distribution : INDIA : Meghalaya (Khasia hills dist.); Sikkim, West Bengal. TIBET.

Remarks : This species is included on the basis of the literature review. It has characteristic large, markedly broad anal appendage which is shaped like broad paddle of a canoe, flat and laminate, which will distinguish it from all other Aeshnines.

Subfamily ANACTINAE

No key to the genera of this subfamily is provided as it is presented by a single genus in Meghalaya namely *Anax* Leach.

Genus *Anax* Leach

1815. *Anax* Leach, *Edinb. Encycl.* 9 : 137.

1936. *Anax* : Fraser, *Fauna Brit. India, Odon.*, 3 : 134.

No key to the species of the genus *Anax* Leach is provided, as it has single representative in Meghalaya namely *A. guttatus* (Burmeister).

Anax guttatus (Burmeister)

1839. *Aeschna guttatus* Burmeister, *Handb. Ent.*, 2 : 840.

1867. *Anax guttatus* Hagen, *Verh. Zool. Bot. Ges. Wien.*, 15 : 39.

1936. *Anax guttatus* (Burmeister) : Fraser, *Fauna Brit. India, Odon.*, 3 : 140.

Distribution : INDIA : Meghalaya (Khasi hills), Assam, West Bengal, Kerala, Tamil Nadu. BURMA, SIAM, JAVA, SUMATRA.

Remarks : This species is included on the basis of the literature review. It is related to *A. nigrolineatus* but it is easily determined by the abdominal spots being orange instead of blue and presence of the amber tinted spot at the base of hind wings.

Subfamily GYNACANTHAGINAE

This subfamily is represented in Meghalaya by a single genus *Gynacantha* Rambur, hence no key is provided.

Genus *Gynacantha* Rambur

1842. *Gynacantha* Rambur, *Ins, Nevrop.*, : 209.

1936. *Gynacantha* Rambur : Fraser, *Fauna Brit. India, Odon.*, 3 : 94.

Key to the species of the genus Gynacantha

1. Thorax with 2 sharply defined blackish brown stripes on each side; abdomen distinctly tumid at base.....*khasiana* McLachlan.
- Thorax without marked defined stripes; abdomen not tumid or only very slightly tumid at base.....2.
2. Abdominal appendages of male bright ochreous, changing to reddish brown at extreme base and toward apices or entirely reddish brown; pterostigma palest ochreous enclosed by reddish brown nervure*hyalina* Selys.
- Abdominal appendages of male reddish or blackish brown uniformly : pterostigma bright ochreous; enclosed in black nervures*baydera* Selys.

Gynacantha khasiaca McLachlan

1896. *Gynacantha khasiaca* MacLachlan, *Ann. Mag. Nat. Hist.*, (6), 17 : 411.

1936. *Gynacantha Khasiaca* : Fraser, *Fauna Brit. India. Odon.*, 3 : 113.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills), Assam, West Bengal. BURMA

Remarks : This species is included on the basis of the literature review. It is distinguished from other species of the genus *Gynacantha* in having inferior anal appendages of exceptional length (2/3 of length of superiors).

Gynacantha hyalina Selys

1882. *Gynacantha hyalina* Selys, *An. Soc. Espan. Hist. Nat.*, 11 : 19.

1936. *Gynacantha hyalina* : Fraser, *Fauna Brit. India, Odon.*, 3 : 97.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills), Assam, West Bengal, Bihar, Kerala. BURMA, CHINA, JAPAN.

Remarks : This species is included on the basis of the literature review. This is a montane species. It occurs at or around an altitude of 2500 meters. It is very closely related to *G. subinterrupta* and *G. bainbrigges*. From former it differs in having inferior anal appendages more than 1/3 length of superiors. This species also differs from latter in having abdomen 3 to 8 with a dark brown oblique fascia.

Gynacantha bayadera Selys

1891. *Gynacantha bayadera* Selys, *Ann. Mus. Civ. Genova*, 30 : 47.

1936. *Gynacantha bayadera* : Fraser, *Fauna Brit. India. Odon.*, 3 : 103.

Distribution : INDIA: Meghalaya (Rongrengiri, Garo hills); Sikkim, West Bengal. BURMA, THAILAND, INDONESIA, NEW GUINEA, PHILIPPINES.

Remarks : This species is included on the basis of the literature review. It resembles closely to *G. millardi*, but differs from it in having segment 3 constricted. Olivaceous green colour absence of black T-shaped mark on frons distinguishes this species from all other Indian species of the genus *Gynacantha*.

Family GOMPHIDAE

This family has 3 subfamilies represented in Meghalaya viz., Ictinogomphinae, Epigomphinae and Gomphinae.

Key to the subfamilies of Gomphidae

1. Discoidal cell, hyper and subtrigone all traversed by cross veins, several cross veins in addition to Ac in the cubital space.....ICTINOGOMPHINAE.
- Discoidal cell hyper and subtrigone not traversed by cross veins or only discoidal cell, trigone traversed by a single vein.....2.
2. Cross veins connecting MA to RS in hindwing only 3 to 4, branching of RS unsymmetrical..
.....EPIOGOMPHINAE.
- Cross vein connecting MA to RS in hindwing only 2, branching of RS symmetrical.....
.....GOMPHINAE.

Subfamily ICTINOGOMPHINAE

No key to the genera of the subfamily Ictinogomphinae is provided, as it is represented in Meghalaya by a single genus namely *Ictinogomphus* Cowley.

Genus *Ictinogomphus* Cowley

1842. *Ictinus* Rambur, *Ins. Novrop.*, 171.

1934. *Ictinus* : Fraser, *Fauna Brit. India, Odon.*, (2) : 370.

1934. *Ictinogomphus* : Cowley, *Entomologist*, 67 : 200.

No key to the species of the genus *Ictinogomphus* Cowley is provided as it has sole representation in Meghalaya viz., *I. rapax* (Rambur).

***Ictinogomphus rapax* (Rambur)**

1842. *Diastatomma rapax* Rambur. *Ins. Nevrop.* : 169.

1922. *Ictinus rapax* Laidlaw. *Rec. Indian Mus.*, 24 : 370.

1934. *Ictinus rapax* : Fraser, *Fauna Brit. India, Odon.*, 2 : 373.

Material : 1 F, E. Garo Hills dist., Nafa village nr. Tasek, Songsak, Stn. 2, 2.vii. 88, R.K. Ghosh and party coll.

Diagnosis : Face largely yellow, post clypeus black with a large lateral yellow spot on either side, vertex black. Thorax black marked with yellow. Hind femora furnished with an inner and outer row of spines. Abdomen 8 with broad yellow ring. Leaf like expansion of abdomen 8, black, cubital cells 3 in fore wing, 2 in hind wing and 5 cells in anal triangle.

Distribution : INDIA : Meghalaya (E. Garo hills), West Bengal. BURMA, CEYLON, SRI LANKA, MALAYSIA.

Remarks : This species is included on the basis of the literature review. It is known to inhabit both lotic and lentic water bodies, but manily latter. It resembles *I. pertinax* Selys but differs in having anteclypeus yellow instead of black and abdominal segment 8 with basal wing instead of lateral spots.

Subfamily EPIOGOMPHINAE

This subfamily is represented in Meghalaya by 3 genera viz., *Leptogomphus* Selys, *Heliogomphus* Laidlaw, and *Perissogomphus* Laidlaw.

Key to the genera of Epiogomphinae

1. An incomplete basal antenodal nervure is generally present.....2.
- Incomplete basal antenodal nervure is generally absent.....3.
2. Rows of cells between IA & posterior margin in forewing, RS asymetrically forked; no branch to superior anal appendage in male.....*Leptogomphus* Selys.
3. Superior anal appendage in male with an outer robust spine.....*Heliogomphus* Laidlaw.
- Superior anal appendages in male without outer spine.....*Perissogomphus* Laidlaw.

Genus *Leptogomphus* Selys

1878. *Leptogomphus* Selys, *Bull. Acad. Belg.* (2) 46 : 442.

1934. *Leptogomphus* : Fraser, *Fauna Brit. India, Odon.*, (2) 362.

No key to the species of the genus *Leptogomphus* is provided, as it is represented in Meghalaya by a single species viz. *L. bidentatus* Fraser.

***Leptogomphus bidentatus* Fraser**

1930. *Leptogomphus bidentatus* Fraser, *J. Bombay Nat. Hist. Soc.* 34 : 752 (text-figs 1,2, a,b).

1934. *Leptogomphus bidentatus* : Fraser, *Fauna Brit. India, Odon.*, (2) : 367.

Distribution : INDIA: Meghalaya (Shillong, Khasi hills) Assam.

Remarks : This species is included on the basis of the literature review. It has distinct features : the triangles of the hind wings being traversed, the shape of the superior anal appendages will also serve to differentiate it from *L. gestroi* Selys and from *L. inclitus* Selys it is to be distinguished by the yellow frons and by the absence of a humeral stripe.

Genus ***Heliogomphus* Laidlaw**

1922. *Heliogomphus* Laidlaw, *Rec. Ind. Mus.* 24 : 378.

1934. *Heliogomphus* : Fraser, *Fauna Brit. India, Odon.*, 2 : 322.

Key to the species of the genus *Heliogomphus*

1. Labrum unmarked; Lateral spine of superior anal appendages very long and robust, pterostigma braced.....*spirillus* (Fraser).
2. Labrum with 2 small triangular basal whitish green spots. Lateral spine of superior anal appendages short and obtuse; pterostigma unbraced.....*selysi* Fraser.

***Heliogomphus spirillus* (Fraser)**

1922. *Leptogomphus spirillus* Fraser, *Mem. Dept. Agric. India (Ent.)*, 7, no. 7 : 71, (pl. 7, figs, 2 & 2a).

1923. *Heliogomphus spirillus* Fraser, *J. Bombay Nat. Hist. Soc.* 29 : 63.

1934. *Heliogomphus spirillus* : Fraser, *Fauna Brit. India, Odon.*, 2 : 334.

Distribution : INDIA: Meghalaya (Garo and Khasi hills), Assam.

Remarks : This species is included on the basis of the literature review. It may be distinguished from other species of the genus by its unmarked labrum, by the braced pterostigma and by the shape of the superior anal appendages.

***Heliogomphus selysi* Fraser**

1891. *Leptogomphus nietneri* Selys, *Ann. Mus. Civ. Genova*, (2) 10 : 474.

1915. *Heliogomphus selysi* Fraser, *J. Bombay Nat. Hist. Soc.* 30 : 850.

1934. *Heliogomphus selysi* : Fraser, *Fauna Brit. India, Odon.* 2 : 325.

Distribution : INDIA : Meghalaya (Shillong, Tura, Garo hills, Khasi hills), Assam.

Remarks : This species is included on the basis of literature review. It is easily distinguished from all other species of the genus by the total absence of abdominal markings after segment 4.

Genus *Perissogomphus* Laidlaw

1922. *Perissogomphus* Laidlaw *Rec. Indian Mus.*, 24 : 384.

1934. *Perissogomphus* : Fraser, *Fauna Brit. India Odon.*, 2 : 319.

Perissogomphus stevensi Laidlaw.

1922. *Perissogomphus stevensi* *Rec. Indian Mus.*, 24 : 384.

1934. *Perissogomphus stevensi* : Fraser, *Fauna Brit. India Odon.*, 2 : 321.

Distribution : INDIA : Meghalaya (Upper Shillong, Khasi hills), West Bengal.

Remarks : This species is included on the basis of the literature review. Wing venation of this species is markedly close vis-a-vis its size. This is in contrast to other Gomphines.

Subfamily GOMPHINAE

This is single largest subfamily of Gomphinae, which is represented in Meghalaya by 11 genera.

Key to the genera of Gomphinae

1. In hind-wing discoidal cell traversed by a single costal distal oriented nervure and IA and Cuii widely divergent at border of the wing.....*Davidius* Selys.
- In hind wing discoidal cell never traversed and IA nad Cuii rarely or but only slightly divergent at margin of hind wing.....2.
2. Hind wing not excavated at base; tornus rounded in male.....*Anormogomphus* Selys.
- Hind wing more or less excavated at base; tornus more or less angulated.....3.
3. Anal loop present; first postanal cell extending more or less proximal to base of subtrigone in hindwing.....4.
- Anal loop absent; first postanal cell not extending proximal to the base of subtrigone.....5.
4. Branches of inferior anal appendage terminates in two fine branches.....*Megalogomphus* Champion.
- Branches of inferior anal appendages terminates in an acute or obtuse point.....*Onychogomphus* Selys.

5. Wing with 2 row of cells beyond level of node and 2 rows of cells between IA and border of forewing.....*Burmagomphus* Williamson.
- Wing with 3 row of cells at level of node; 3 or more rows of cells between IA and margin of fore wing.....6.
6. Superior anal appendages and branches of inferior of equal length and are equally divaricate; anal triangle well formed.....*Gomphus* Leach.
- Superior anal appendages variable, usually longer than branches of inferior, without spines and processes beneath.....7.
7. Superiros as long as branches of inferiors.....*Anisogomphus* Selys.
- Superior longer than branches of inferior.....8.
8. Superior anal appendage very closely apposed; inferior much shorter its branches closely apposed and curled up hook wise.....*Paragomphus* Cowley.
- Superior anal appendage widely separated forcipate apical ends curling inwards so as to nearly meet or actually overlap and enclose between them an oval space.....9.
9. Inferior anal appendage with widely devericate branches; Hind femora with 2 rows of about 5 very long widely spaced spines; abd. 9 distinctly elongate.....*Merogomphus* Martin.
- Inferior anal appendage with parallel short closely apposed branches; hind femora with only 2 rows of very closely set, gradually lengthening spines; abd. 9 not so elongate.....*Stylogomphus* Fraser.

Genus *Davidius* Selys

1878. *Davidius* Selys, *Bull. Acad. Belg.*, (2) 46 : 667.

1934. *Davidius* : Fraser, *Fauna Brit. India Odon.*, (2) 160.

No key to the species of the genus *Davidius* is provided, as it has sole representation in Meghalaya by *D. Mallyori* Fraser.

Davidius mallyori Fraser

1826. *Davidius mallyori* Fraser, *J. Bombay Nat. Hist. Soc.*, 31 : 167, 168 text fig. 3, 4, pl. i, fig. 5.

1934. *Davidius mallyori* : Fraser, *Fauna Brit. India Odon.*, (2) 169.

Distirbution : INDIA : Meghalaya (Khasi hills), Assam.

Remarks : This species is included on the basis of the literature review. It is closely allied to *D. aberrans*, but is easily distinguished from it and from all other species by the remarkably distinct dorsal thoracic markings.

Genus *Anormogomphus* Selys

1854. *Anormogomphus* Selys, *Bull. Acad. Belg.*, 21(2) : 60.

1934. *Anormogomphus* : Fraser, *Fauna Brit. India Odon.*, (2) : 172.

No key to the species of the genus *Anormogomphus* is provided, as it is represented in Meghalaya by a single species.

Anormogomphus heteropterus Selys

1854. *Anormogomphus heteropterus* Selys, *Bull. Acad. Belg.*, 21(2) : 61.

1934. *Anormogomphus heteropterus* : Fraser, *Fauna Brit. India Odon.*, (2) : 174.

Material : 1 F, East Khasai Hills, Cherrapunjee, 24.v.90, M.S. Shishodia coll.; 1 F, W. Garo Hills dist., Bagmara, S. of Karapara, Stn. No. 3, 16.x. 88, K.K. Roy and party coll.; 1 F, W. Garo Hills dist., Barengapara, S. of Karapara, Stn. No. 4, 17.x. 88, K.K. Ray and Party coll.

Diagnosis : Head and thorax with pale brown markings, Legs sandy yellow with black spines. Hind femora with a group of short closely packed robust spines and a long single spine at distal end. Abdomen pale sandy yellow marked with brown, slightly tumid at base. Terminal segments in male slightly dilated. Superior anal appendage conical widely divericcate with robust basal ventral spine.

Distirbution : INDIA : Meghalaya (Cherrapunji, Khasi hills, West Garo hills), West Bengal.

Remarks : It differs from *A. kiritschenkoi* Bartenef in having pale brown marking on head and thorax and being smaller (abd. 25–27 : 29–31 mm).

Genus *Megalogomphus* Champion

1923. *Megalogomphus* Champion. *Am. Mag. Nat. Hist.* (9) 12 : 668.

1934. *Megalogomphus* : Fraser, *Fauna Brit. India Odon.*, 2 : 291.

No key to the species of the genus *Megalogomphus* is provided, as it is represented in Meghalaya by single species viz., *M. bicornatus* (Fraser).

Megalogomphus bicornatus (Fraser)

1922. *Gomphus bicornatus* Fraser, *Mem. Dept. Agric. India (Ent.)* 7, no. 7 : 72.

1930. *Megalogomphus bicornatus* Laidlaw, *Trans. Ent. Soc. Lond.* 58 : 197.

1939. *Megalogomphus bicorntus* : Fraser, *Fauna Brit. India Odon.*, (2) 313.

Distirbution : INDIA : Meghalaya (Shillong, Khasi hills), Assam.

Remarks : This species is included on the basis of the literature review. It is characterised by occiput having two spines on the posterior border and abodmen black marked with dorsal and basal yellow spots.

Genus *Onychogomphus* Selys1826. *Lindenia* (pars) De Haan, *Bijd. Nat. Wetensch.* 1(2) : 47.1854. *Onychogomphus* Selys, *Bull. Acad. Belg. Sci.* (2), 21 : 30.1934. *Onychogomphus* : Fraser, *Fauna Brit. India Odon.*, (2) : 239.*Key to the species of genus Onychogomphus*

1. 4 transverse nervure between sectors of arc in fore wing from arc to bifurcation of RS.....
.....*maculivertex* (Selys).
- 2 transverse nervure between sectors of arc in forewing from arc to bifurcation of RS.....2.
2. Antehumeral stripes separated from mesothoracic collar; species smaller (Hindwing 25 mm or less).....*modestus* Selys.
- Mesothoracic stripes confluent with mesothoracic collar; species larger (Hindwing 30 mm or more).....3.
3. Anteriolateral stripe black stripe on thorax nearly obsolete represented by mere upper vestige.....*aureus* Laidlaw.
- Anterolateral black stripe prominent unintrupted.....4.
4. In male inferior anal appendage with a basal tooth, in female vulver scale only perceptible as two rudimentary shiny tubercles.....*saundersi duaricus* Fraser.
- In male inferior anal appendage without basal tooth, in female vulver scale extending over basal 2/3 of abd. 9.....*meghalayanus* Lahiri.

Onychogomphus aureus (Laidlaw)1922. *Onychogomphus aureus* Laidlaw. *Rec. Indian Mus.*, 24 : 405.1934. *Onychogomphus aureus* : Fraser, *Fauna Brit. India Odon.*, 2 : 254.1969. *Phaenandrogomphus aureus* (Laidlaw) : Lieftinck, *Dt. ent. Zeit.*, 16 : 214.*Distirbution* : INDIA : Meghalaya (Garo hills), West Bengal.

Remarks : This species is included on the basis of the literature review. The very broad extent of the yellow ground-colour is so marked that it distinguishes from other species of the genus.

Onychogomphus ? *maculivertex* (Selys)1891. *Leptogomphus maculivertex* Selys. *Ann. Mus. Civ. Genova* (2) : 10 : 476.1934. *Leptogomphus maculivertex* : Fraser, *Fauna Brit. India Odon.*, 2 : 369.*Distirbution* : INDIA : Meghalaya (Khasi hills). BURMA.

Remarks : This species is included on the basis of the literature review. Lahiri (1987) pointed that Lieftinck had opined to place this species under genus *Onychogomphus* Martin.

***Onychogomphus meghalayanus* Lahiri**

1987. *Onychogomphus meghalayanus* Lahiri, *Rec. zool. Surv. India, Occ. Paper No. 99*.

Material : Holotype F, Rongrengair, 19.iv. 1973, coll. A.R. Lahiri (Z.S.I. Reg. No. 3919/H13).

Distirbution : INDIA : Meghalaya (Garo hills).

Remarks : This species is included on the basis of the study of its type and the literature review. It differs from closely related species in having restricted black markings and in the shape of its well developed vulver scale.

***Onychogomphus modestus* Selys**

1878. *Onychogomphus modestus* Selys. *Bull. Acad. Belg. Sci.* (2) 46 : 423.

1934. *Neopgomphus modestus* (Selys) : Fraser, *Fauna Brit. India, Odon.*, 2 : 284.

Distirbution : INDIA : Meghalaya (Khasi hills), Himachal Pradesh, Uttar Pradesh. BURMA, SUMATRA.

Remarks : This species is included on the basis of the literature review. This has a prominent subapical spines on the inferior appendages.

***Onychogomphus saundersii duaricus* Fraser**

1924. *Onychogomphus duaricus* Fraser, *J. Bombay nat. Hist. Soc.* 29 : 10001.

1934. *Onychogomphus duaricus* : Fraser, *Fauna Brit. India, Odon.*, 2 : 245.

1977. *Onychogomphus saundersii duaricus* : Tyagi, *Odontologica*, 6 : 278.

Distirbution : INDIA : Meghalaya (Garo hills), West Bengal.

Remarks : This species is included on the basis of the literature review. Fraser (1924, 1939) considered *duaricus* as a distinct species. Subsequently Lieftinck (in litt.) and Tyagi (1977) considered it as a subspecies of *O. saundersii* Selys 1851.

Genus *Burmogomphus* Williamson

1907. *Burmogomphus* Williamson, *Proc. U. S. nat. Mus.*, 33 : 298.

1934. *Burmogomphus* : Fraser, *Fauna Brit. India, Odon.*, 2 : 211.

No key to the species of the genus *Burmogomphus* is provided as it is represented by a single species in Meghalaya, namely *B. vermicularis* (Martin).

***Burmogomphus ? vermicularis* (Martin)**

1904. *Gomphus vermicularis* Martin *Mission Pavie. zool.*, 3 : 214.

1964. *Burmogomphus vermicularis* : Lieftinck, *Zool. verh.* 69 : 15.

Distirbution : INDIA : Meghalaya (Khasi Hills).

Remarks : This species is included on the basis of the literature review. It is known only in the southern parts of Khasi Hills in Meghalaya.

Genus *Gomphus* Leach

1775. *Aeshna* Fabricius, *Ent. Syst.* : 424.

1815. *Gomphus* Leach, *Edinb. Encycl.*, 9 : 137.

1934. *Gomphus* : Fraser, *Fauna Brit. India. Odon.*, 2 : 197.

No key to the species of the genus *Gomphus* is provided as it is represented by single species in Meghalaya namely *G. presonatus* Selys.

***Gomphus personatus* Selys**

1873. *Gomphus personatus* Selys *Bull. Acad. Belg. Sci.* (2) 36 : 497.

1934. *Gomphus personatus* : Fraser, *Fauna Brit. India. Odon.*, 2 : 200.

Distirbution : INDIA : Meghalaya (Khasi hills). BHUTAN, BURMA.

Remarks : This species is included on the basis of the literature review.

Genus *Anisogomphus* Selys

1857. *Anisogomphus* Selys, *Mon. Gomph.*, : 102.

1934. *Anisogomphus* : Fraser, *Fauna Brit. India. Odon.*, (2) : 187.

1953. *Temnogomphus* Laidlaw, *Proc. R. ent. Soc. Lond.* (B) 22 : 190.

Key to the species of the genus Anisogomphus

1. An incomplete basal antenodal nervure always present ; generally 1 cubital nervure in the forewings; no lateral spots on postclypeus or abd. 4 to 6.....***Orities*** Laidlaw.
- An incomplete basal antenodal very rarely present; generally 2 cubital nervure in the forewings; Lateral spots on postclypeus and abd. 4 to 6.....***Caudalis*** Fraser.

***Anisogomphus orities* Laidlaw**

1922. *Anisogomphus orites* Laidlaw, *Rec. Ind. Mus.* 24 : 371.

1934. *Anisogomphus orites* : Fraser, *Fauna Brit. India, Odon.*, 2 : 194.

Distirbution : INDIA : Meghalaya (Shillong, Khasi hills); Assam, Sikkim.

Remarks : This species is included on the basis of the literature review. It is a sub-montane to montane species known to occur upto an altitude of 2000 metres. It is distinguished from *A. bivittatus* Selys in having post clypeus and occiput black instead of yellow and also from *A. occipitalis* by having only a single cubital nervure in all wings of both sexes.

***Anisogomphus caudalis* Fraser**

1926. *Anisogomphus caudalis* Fraser, *J. Bombay nat. Hist. Soc.* 31 : 424.

1934. *Anisogomphus caudalis* : Fraser, *Fauna Brit. India, Odon.*, 2 : 196.

Distirbution : INDIA : Meghalaya (Shillong, Khasi hills), Uttar Pradesh.

Remarks : This species is included on the basis of the literature review. It closely resembles *A. orites*, but differs in head, abdominal markings and shape of superior anal appendages.

Genus *Paragomphus* Cowly

1905. *Mesogomphus* Forster, *Jahrb. Narsan ver Naturk.*, Wiesh 59 : 323.

1934. *Mesogomphus* : Fraser, *Fauna Brit. India. Odon.*, 2 : 228.

1934. *Paragomphus* Cowley, *Entomologist* 67 : 201.

Key to the species of the genus Paragomphus

Lateral prolongations of black extend on to the second segment, abd. 8, 9, 10 entirely yellow.....*lineatus* Selys.

Abd. 7 with its basal half occupied by a large quadrate spot, 8, 9 with the base finely yellow, 10 wholly black.....*echinoccipitalis* Fraser.

***Paragomphus echinoccipitalis* (Fraser)**

1922. *Onychogomphus echinoccipitalis* Fraser, *Mem. Dep. Agric. India (Ent.)* 7 : 75.

1934. *Onychogomphus echinoccipitalis* : Fraser, *Fauna Brit. India, Odon.*, 2 : 257.

1987. *Paragomphus echinoccipitalis* : Lahiri, *Rec. zool. Surv. India. Occ. Paper No.* 99 : 139.

Distirbution : INDIA : Meghalaya (Northern Garo Hills).

Remarks : This species is included on the basis of the literature review. *Paragomphus echinoccipitalis* (Fraser) was placed under genus *Onychogomphus* Selys. Lahiri (1987) placed it under genus *Paragomphus*.

***Paragomphus lineatus* (Selys)**

1850. *Gomphus lineatus* Selys, *Rev. Odon.* : 386.

1924. *Mesogomphus lineatus* Selys : Freaser, *Rec. Indian Mus.*, 26 : 477.

1934. *Mesogomphus lineatus* : Fraser, *Fauna Brit. India, Odon.*, 2 : 230.

Material : 1 M, W. Garo Hills, dist., Bagmara, South of Karapara, Stn. No. 3, 16.x. 88, K.K. Ray and Party coll.

Diagnosis : Major part of head yellow, occiput raised into a slight point at its centre. Thorax sandy yellow marked with dull brown. A line on the humeral suture and two lateral lines close together, these three are parallel. Abd. 2 with a subdorsal black line on each side enclosing a dorsal bilobed yellow spot; 3 to 7 with broad black apical rings, 8 and 9 with wide dilations at their sides, segment 10 sandy yellow with the basal half.

Distirbution : INDIA : Meghalaya (West Garo Hills, Khasi hills), Himachal Pradesh, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal. NEPAL, BURMA.

Remarks : This species is known to inhabit both lotic and lentic water bodies. It differs from *M. henryi* Laidlaw in anal appendages being dull sandy yellow instead of blackish or dark reddish brown, inferior 1/3 or less of superior instead of 1/2.

Genus *Merogomphus* Martin

1904. *Merogomphus* Martin, *Mission Paviae Zool.*, : 214.

1934. *Merogomphus* : Fraser, *Fauna Brit. India. Odon.*, 2 : 309.

No key to the species of the Genus *Merogomphus* is provided, as it is represented by single species in Meghalaya namely *M. martini* (Fraser).

Merogomphus martini (Fraser)

1922. *Platygomphus martini* Fraser, *Mem. Dept. Agric. India (Ent.)* 7 : 68.

1930. *Merogomphus martini* : Laidlaw, *Trans. Rlent. Soc. Lond.*, 78 : 185.

1934. *Merogomphus martini* : Fraser, *Fauna Buit. India. Odon.*, 2 : 313.

Distirbution : INDIA : Meghalaya (Khasi hills, Jaintia hills). BURMA.

Remarks : This species is included on the basis of the literature review. The basal incomplete nervure is more commonly found in the fore-wing and is never present in hind wing of females. Occasionally it is entirely absent in both sexes. The shape of superior anal appendages serves to distinguish this species from *M. longistigma*.

Genus *Stylogomphus* Fraser

1922. *Stylogomphus* Fraser, *Mem. Dept. Agric. Agric. India (Ent.)* 7:69.

1934. *Stylogomphus* : Fraser, *Fauna Brit. India. Odon.*, 2 : 288.

No key to the species of the genus *Stylogomphus* is provided, as it is represented in Meghalaya by single species namely *S. inglisi*.

Stylogomphus inglisi Fraser

1922. *Stylogomphus Inglisi* Fraser, *Mem. Dept. Agric. India (Ent.)* 7 : 70.

1934. *Stylogomphus inglisi* : Fraser, *Fauna Brit. India. Odon.*, 2 : 290.

Distirbution : INDIA : Meghalaya (Khasi-hills), West Bengal.

Remarks : This species is included on the basis of the literature review. In having parallel, closely apposed branches of inferior anal appendage instead of widely divaricate it differs from members of closely allied genus *Merogomphus* Martini.

Genus *Nihonogomphus* Oguma

1926. *Nihonogomphus*, *Oguma Ins. Matsumurana*, 1 : 97.

Material : Holotype M and Allotype F, Rongrengiri, 19.iv. 1973, coll. A.R. Lahiri (Z.S.I. Reg. No. 3917/H13 and 3918/H13).

Nihonogomphus indicus Lahiri

1987. *Nihonogomphus indicus* Lahiri, *Rec. Zool. Surv. India, Occ. Paper No.* 99.

Distirbution : INDIA : Meghalaya (Rongrengiri, Garo hills).

Remarks : This species is included on the basis of the literature review.

Superfamily LIBELLULOIDEA

Key to the families of Superfamily Libelluloidea

1. Eyes with a small sinuous projection at middle of its posterior border, synthorax metallic blue or green; tibiae of males with long membraneous keel on its flexor surface.....CORDULIIDAE.
- Eyes without a projection at its posterior border; synthorax rarely metallic tibia of male with a keel on its flexor surface.....LIBELLULIDAE.

Family CORDULIIDAE

Key to the subfamilies of the family Corduliidae

1. Sectors of arc in fore and hindwings arises from a common point and without any common stalk at its origin.....CORDULIINAE.
- Sectors of arc fore & hindwings fused for a short distance at origin to form a stalk; this stalk in hindwing elongated.....MACROMIINAE.

No key to the genera of the subfamily Corduliinae is provided, as it is represented by a single genus in Meghalaya; namely *Hemicordulina* Selys.

Genus *Hemicordulia* Selys

1870. *Hemicordulia* Selys, *C.R. Soc. Ent. Belg.*, 14 : 5.

1936. *Hemicordulia* : Fraser, *Fauna Brit. India. Odon.*, 3 : 211.

No key to the species of genus *Hemicordulia* is provided, as it is represented in Meghalaya by a single species viz., *H. asiatica* Selys.

Hemicordulia asiatica Selys

1878. *Hemicordulia asiatica* Selys, *Bull. Acad. Belg. Sci.* (2) 45 : 186.

1936. *Hemicordulia asiatica* : Fraser, *Fauna Brit. India. Odon.*, 3 : 213.

Distribution : INDIA : Meghalaya (Jaintia Hills and Shillong dist.); Assam, Kerala, Maharashtra Tamil Nadu. AFRICA.

Remarks : This species is included on the basis of the literature review. It is known to patrol very swiftly over slow running, shallow streams or lakes with muddy bottom.

Subfamily MACROMINAE

Key to the genera of the subfamily Macrominae

1. Hindwing notched at base; 2 to 4 cubital nervure in fore and or hind wings.....2.
- Hindwing rounded at base, hindwing much more broader; 1 or 2 cubital nervure in forewing, only 1 in hindwing.....*Idionyx* Hagen.
2. Cubital nervure 2 or 3 in all wings; IA in forewing not pectinate; small orillets on sides of abd. 2.....*Macromia* Rambur.
- Cubital nervure 4 in forewing and 2 or 3 in hindwings; IA in forewing pectinate; no orillets on side of abd. 2.....*Epopthalmia* Burmeister.

Genus *Idionyx* Hagen

1867. *Idionyx* (Selys MS) Hagen, *Verh. Zool. bot. Ges. Wien.*, 17 : Abh., 58.

1936. *Idionyx* Selys : Fraser, *Fauna Brit. India. Odon.*, 3 : 218.

Key to the species of the genus Idionyx Hagen.

[For Males]

1. Humeral yellow stripe on thorax; abdomen 10 with prominent spine.....2.
- Humeral yellow stripe absent on thorax, abdomen 10 with only blunt mid-dorsal keel not amounting to a spine.....*imbricata* Fraser.
2. Superior anal appendages as long as abd. segment 10 cylindrical, broad at base only, beset with only one long spine.....*optata* Selys.
- Superior anal appendages shorter than abd. 10, compressed, broad at base and also at apex; beset with four spines.....*intricata* Fraser.

[For Female]

1. Vesicle complex, produced; abdomen 2 and 3 without mid-dorsal ridge not yellow.....2.
- Vesicle simple, not produced rounded or slightly notched at apex; abd. 2 and 3 with mid-ridge narrowly yellow, as also joints between 2 segments.....*imbricata*.
2. Humeral stripe present; vesicle surmounted by four tubercles.....*optata* Selys.
- Humeral stripe absent ; vesicle a short tapering horn with bifid apex*intricata* Fraser.

***Idionyx imbricata* Fraser**

1926. *Idionyx imbricata* Fraser, *Rec. Ind. Mus.*, 28 : 197.

1936. *Idionyx imbricata* : Fraser, *Fauna Brit. India. Odon.*, 3 : 232.

Distribution : INDIA : Meghalaya (Shillong dist.) ; Assam.

Remarks : This species is included on the basis of the literature review. The male is easily distinguished from all other Indian species by its long attenuated superior appendages, which are much longer than the inferior.

***Idionyx optata* Selys**

1878. *Idionyx optata* Selys. *Bull. Acad. Belg. Sci.* (2) 45 : 196.

1936. *Idionyx optata* : Fraser, *Fauna Brit. India, Odon.*, 3 : 219.

Distribution : INDIA : Meghalaya (Cherrapunjee, Khasi Hills dist.).

Remarks : This species is included on the basis of the literature review. The male is distinguished from other species of the genus by the curious shape of its anal appendages and by the face being entirely yellow.

***Idionyx intricata* Fraser**

1926. *Idionyx intricata* Fraser, *Rec. Ind. Mus.*, 28 : 197.

1936. *Idionyx intricata* : Fraser, *Fauna Brit. India. Odon.*, 3 : 235.

Distribution : INDIA : Meghalaya (Cherrapunjee, Khasi Hills dist.) Assam.

Remarks : This species is included on the basis of the literature review. The male is easily distinguished by the shape of its anal appendages, which bear some close resemblance to *I. optata*. Present species differs from it by the short, stouter, mid-dorsal spine on segment 10. The female is easily identified by the unique shape of its vesicle.

Genus *Macromia* Rambur

1842. *Macromia* Rambur, *Hist. nat. Ins. Nevrop.*, : 37.

1936. *Macromia* : Fraser, *Fauna Brit. India, Odon.*, 3 : 161.

No key to the species of genus *Macromia* is provided, as it has sole representative *M. moorei* Selys in Meghalaya.

***Macromia moorei* Selys**

1874. *Macromia moorei* Selys. *Bull. Acad. Belg. Sci.* (2) 37 : 28.

1936. *Macromia moorei* : Fraser, *Fauna Brit. India, Odon.*, 3 : 164.

Distribution : INDIA : Meghalaya (Khasai hills dist.); Himachal Pradesh, Uttar Pradesh, West Bengal.

Remarks : This species is included on the basis of the literature review. It is distinguishable by absence of dark brown rays at the base of wings and abd. 10 with mid-dorsal keel and a small tubercle on each side on dorsum.

Genus *Epopthalmia* Burmeister

1839. *Epopthalmia* Burmeister, *Handb. Ent.*, 2 : 844.

1936. *Epopthalmia* : Fraser, *Fauna Brit. India, Odon.*, 3 : 192.

No key to the species of the genus *Epopthalmia* Burmeister is provided, as it has single representation in Meghalaya by *E. vittata vittata* Burmeister.

***Epopthalmia V. vittata* Burmeister**

1839. *Epopthalmia V. vittata* Burmeister, *Handb. Ent.*, 2 : 845.

1936. *Epopthalmia V. vittata* : Fraser, *Fauna Brit. India, Odon.*, 3 : 194.

Material : 1F, Khasai Hills, Umpling, 3.vi. 78, K.P. Singh, coll.

Diagnosis : Frons and vesicle dark metallic blue, rounded spot on each side and crown-shaped spot in the middle. Thorax dark reddish brown and bluish green metallic reflex on its side. Dark costal brown rays on bases of wings of female only. Ternal angle of the hind wing bearing a patch of bright amber colour. Abdomen dark reddish brown, with bright yellow annules, much broader on abd. 3-6. Superior anal appendage slightly angulated on its outer middle spot.

Distribution : INDIA : Meghalaya (Umpling, Khasai hills dist.) ; Andhra Pradesh, Maharashtra, Kerala, Karnataka, Uttar Pradesh, Tamil Nadu, West Bengal.

Remarks : The general dark ochreous colour of this species and abdominal broad yellow annules distinguishes it from other of the same genus. It differs from *E. vittigera* (Rambur) from Burma in having dark costal rays in wings of female only, instead of the wings of both sexes.

Family LIBELLULIDAE

This family has been, though divided into 12 subfamilies, they appear to be untenable due to over-lapping characters. This is found more likely, as compared to Tillyard Fraser (1938-1940) and in accordance with Lahiri (1987). It is, therefore, considered best to treat all representative genera known from Meghalaya under the family Libellulidae.

Key to the genera of Libellulidae

1. Base of discoidal cell in hindwing widely distal to the level of arc; costal side of discoidal cell in forewing markedly angulated; discoidal field beginning with only 1 row of cell....
.....2.
- Base of discoidal cell in hind-wing at level of arc only slightly distal; costal side of discoidal cell in fore-wing not angulated, discoidal field beginning with 2 or more row of cells.....3.
2. Anal loop absent; arc situated between first and second antenodal nervures 5 or 6 antenodal cells*Nannophya* Rambur.
- Anal loop present on supplementary nervures to bridge; discoidal cell in hindwing entire; upto 9 antenodal nervure in fore-wings.....*Tetrathemis* Brauer.
3. Claw without hooks.....*Onychothemis* Brauer.
- Claws with hooks.....4.
4. Claws hooks equal in length to claws giving it bifid appearance at its end, thorax metallic*Zygonyx* Selys.
- Claws-hooks shorter than claws and arises from about middle and not giving it bifid appearance at its ends; thorax generally non-metallic.....5.
5. Anal loop extends to border of hind-wing; apex of loop open, white opalescent spot in the center of hind-wing of male.....*Tholymis* Hagen.
- Anal loop does not extend to border of hind-wing; apex of loop closed.....6.
6. Distal antenodal nervure in fore-wing complete.....7.
- Distal antenodal nervure in fore-wing incomplete.....11.
7. Lobe of prothorax large and fringed with long hairs.....8.
- Lobe of prothorax small, inconspicuous and usually naked.....10.
8. Frons metallic above.....*Brachydiplax* Brauer.
- Frons non-metallic above.....9.
9. Antenodal nervure in fore-wing only six; abd. 1 to 6 conspicuously dilated then suddenly

- slim and cylindrical.....*Acisoma* Rambur.
- Antenodal nervure in fore-wing more than twelve; abdomen 1 to 6 not conspicuously dilated.....*Orthetrum* Newman.
10. Sector of arc in fore-wing arising from a common, long stalk; frons metallic above; discoidal cell in fore-wing traversed.....*Lyriothemis* Brauer.
- Sectors of arc in fore-wing separated at their origin; frons non-metallic above; discoidal cell in fore-wing not traversed.....*Urothemis* Brauer.
11. Lobe of prothorax large and fringed with long hairs.....12.
- Lobe of prothorax small, non-fringed, with no hairs at all 'naked'14.
12. Borders of discoidal field covering markedly at wing border.....*Sympetrum* Newman.
- Borders of discoidal field diverging markedly at wing border.....13.
13. Discoidal cell in hind wing entire; frons non-metallic above; discoidal field in forewing beginning with a row of 2 cells.....*Diplacodes* Kirby.
- Discoidal cell in hind-wing traversed; frons metallic above; discoidal cell in fore-wing beginning with at least 3 row of cells.....*Palpopleura* Rambur.
14. Sectors of arc in fore-wing separated and diverging at origin. Body dark metallic, frons metallic above; wings generally broadly coloured black or black and golden amber.....*Rhyothemis* Hagen.
- Sectors of arc in fore-wing not separate and originate from a common long stalk.....15.
15. Discoidal field with borders converging strongly at wing margin.....16.
- Discoidal field with borders parallel or widely divergent at wing-margin.....17.
16. Very narrow discoidal cell in forewing, its costal side only about 1/4 to 1/3 length of basal; IRii present between Rii and Riii.....*Pantala* Hagen.
- Discoidal cell in fore-wing broader; its costal side about 1/2 of basal; no supplementary nervure IRii present between Rii and Riii.....*Trithemis* Brauer.
17. Hind-wing very broad at base and rather tapered at apex; pterostigma very short and usually unequal in fore-and hind wings.....18.
- Hind-wing not markedly wide at base and apex not markedly tapered; pterostigma variable in size, usually of equal size in fore-and hind wings.....19.

18. Riii markedly undulated; pterostigma in fore-and hind-wing equal; distal and apical angles of anal loop equal.....*Hydrobasileus* Kirby.
 — Riii not undulated but evenly curved; pterostigma of fore-wing longer than that of hind-wing; apical angle of anal loop much more acute than the distal.....*Tramea* Hagen.
19. Cubital nervure more than one in all wings; wings amber-yellow at base or more broadly dark reddish-brown; secondary reticulation developed, specially proximal to node.....*Neurothemis* Brauer.
 — Cubital nervure only 1 in all wings; wings usually uncoloured, or with only small basal yellow marking (except broad medial fascia in *Brachythemis*) no secondary reticulation in the wings.....20.
20. Body colour red or ochreous; wings with basal or medial yellow markings.....21.
 — Body colour variable, usually darker species, never or only partly red or ochreous species.....22.
21. Small yellow markings at wing base; face and frons red, eyes but shortly contiguous; antenodal nervure in fore-wing 9 1/2 to 10 1/2.....*Crocothemis* Brauer.
 — Broad reddish-yellow medial fascia; face & frons and abdomen never red; eyes broadly contiguous; only 6 1/2 to 7 1/2 antenodal nervure in fore-wing.....*Brachythemis* Brauer.
22. Arc between second and third antenodal nervures; only 1 row of cells between IRiii and Rspl.....*Lathrecista* Kirby
 — Arc between first and second antenodal nervures; 2 rows of cells between IRiii and Rspl.....*Potamercha* Karsch

Genus *Nannophya* Rambur

1842. *Nannophya* Rambur, *Hist. nat. Ins. Nevrop.*, 27.

1936. *Nannophya* : Fraser, *Fauna Brit. India, Odon.*, 3 : 321.

***Nannophya pygmaea* Rambur**

1842. *Nannophya pygmaea* Rambur, *Hist. nat. Ins. Nevrop.*, : 27.

1936. *Nannophya pygmaea* : Fraser, *Fauna Brit. India. Odon.*, 3 : 322.

Distribution : INDIA : Meghalaya (Khasi Hills), Assam. CHINA, BURMA, THAILAND, VIETNAM, MALAYSIA, INDONESIA.

Remarks : This species is included on the basis of the literature review. Thorax bright yellow to bright red, abdomen bright red. It can be easily distinguished from all other Libellulines by its very diminutive size; it is the smallest known species of the family Libellulidae.

Genus *Tetrathemis* Brauer1868. *Tetrathemis* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 369.1936. *Tetrathemis* : Fraser, *Fauna Brit. India. Odon.*, 3 : 248.

No key to the species of the genus *Tetrathemis* Brauer is provided, as this genus has sole representative in Meghalaya viz. *T. Platyptera* Selys.

Tetrathemis platyptera Selys1878. *Tetrathemis platyptera* Selys, *Mitt. Mus. Dresden* : 316.1936. *Tetrathemis platyptera* : Fraser, *Fauna Brit. India. Odon.*, 3 : 250.

Distribution : INDIA : Meghalaya (Garo & Khasai hills); Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal. BURMA, THAILAND, MALAYSIA, INDONESIA.

Remarks : This species is included on the basis of the literature review. It is never found away from its watery habitat which is some small, often dirty and stagnant pool.

Genus *Onychothemis* Brauer1868. *Onychothemis* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 170, 365,732.1936. *Onychathemis* : Fraser, *Fauna Brit. India. Odon.*, 3: 402.

No key to the species of the Genus *Onychothemis* is provided, as it is represented in Meghalaya by a single species namely *O. testacea* Laidlaw.

Onychothemis testacea (S.L.) Laidlaw1902. *Onychothemis testacea* Laidlaw, *Proc. Zool. Soc. Lond.*, 78 : 189.

Distribution : INDIA : Meghalaya (Central Khasai hills).

Remarks : This species is included on the basis of the literature review. It is very close to *O. t. ceylonica* Ris, but differs from description of that sub species in body markings.

Genus *Zygonyx* Selys-Hagen1867. *Zygonyx* Selys-Hagen, *Verh. Zool. bot. Ges. Wien.*, 17 : 62.1936. *Zygonyx* : Fraser, *Fauna Brit. India, Odon.* 3 : 391.*Key to the species of the genus Zygonyx* Selys-Hagen

1. Base of hind-wing broadly amber yellow.....*iris davina* Fraser.
- Base of hind-wing uncoloured.....2.
2. Occiput with bright yellow mark at its center; abd. 1 to 3 with broadly yellow mid-dorsal carina; single row of cells between IRiii and Rspl.....*iris iris* Selys.
- Occiput without bright yellow mark at its center; abd. 1 & 2 unmarked with fine mid-dorsal carinal yellow line; two rows of cells between IRiii and Rspl.....

.....*iris intermedia* Lahiri.

***Zygonyx iris davina* Fraser**

1926. *Zygonyx iris davina* Fraser, *J. Bombay nat. Hist. Soc.* 31 : 768.

1936. *Zygonyx iris davina* : Fraser, *Fauna Brit. India, Odon.*, 3 : 397.

Distribution : INDIA : Meghalaya (Khasia hills); Assam, West Bengal.

Remarks : This species is included on the basis of the literature review. It is easily distinguished from other species and sub-species of the genus by possessing broad yellow markings on the body and by the basal yellow area at base of wings in the female.

***Zygonyx iris iris* Selys**

1869. *Zygonyx iris* Selys *Ann. Soc. ent. Belg.*, 12 : 97.

1926. *Zygonyx iris iris* Fraser, *J. Bombay nat. Hist. Soc.*, 31 : 763.

1936. *Zygonyx iris iris* : Fraser, *Fauna Brit. India. Odon.*, 3 : 394.

Distribution : INDIA : Meghalaya (Khasai hills) ; Assam, West Bengal.

Remarks : This sub-species is included on the basis of the literature review. It is related to *I. iris davina*, but is differentiated from same by absence of amber yellow at the base of hind wing and possessing dark brown colour at the extreme apices of wings.

***Zygonyx iris intermedia* Lahiri**

1987. Lahiri, *Rec. Zool. Surv. India, Occ. paper* 99, 216.

Material : Holotype M Barapani, 26.vii. 69, coll. B.D.; Z.S.I. Reg. No. 3920/H13, Paratype M Nongpoh, 4.viii. 72, coll. S.K.C.; Z.S.I. Reg. No. 3921/H13.

Distribution : INDIA : Meghalaya (Khasai hills).

Remarks : This subspecies was described by Lahiri (1987). It was established due to difference with its nearest sub. sp. viz., *Z. i. mildredae* Fraser in having mid-dorsal carina of abd. 7 expanded, sagittate shape instead altogether lacking.

Genus *Tholymis* Hagen

1867. *Tholymis* Hagen, *Stett. Ent. Zeit.*, 28 : 221.

1936. *Tholymis* : Fraser. *Fauna Brit. India. Odon.*, 3 : 410.

No key to the species of genus *Tholymis* provided as it has sole species represented in not only Meghalaya but India.

***Tholymis tillarga* Fabricius**

1798. *Libellula tillarga* Fabricius, *Ent. Syst. Suppl.*, 285.

1890. *Tholymis tillarga* : Kirby, *Syn. Cat. Neur. Odon.*, : 1.

1936. *Tholymis tillarga* : Fraser, *Fauna Brit. India, Odon.*, : 3 : 411.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills, Jaintia hills) ; Assam, Himachal Pradesh, Uttar Pradesh, Maharashtra, Karnataka, Kerala, Manipur, Tamil Nadu, Orissa, Punjab, West Bengal. BURMA, THAILAND, INDONESIA, MALAYSIA, AUSTRALIA, SRI LANKA, TAIWAN, PHILIPPINES, PACIFIC ISLANDS, AFRICA, MADAGASCAR.

Remarks : This species is included on the basis of the literature review. It is found all round the year, species of the genus are crepuscular in habit. It is easily identified from all other species of Indian odonata by its brown fascia and opalescent white spot on hind wing.

Genus *Brachydiplax* Brauer

1868. *Brachydiplax* Brauer, *Verh. Zool. Bot. Ges. Wien.*, 18 : 172.

1936. *Brachydiplax* : Fraser, *Fauna Brit. India. Odon.*, 3 : 323.

Key to the species of the genus Brachydiplax Brauer

1. Bases of all wings burnt-brown or golden brown, dorsum of thorax densely pruinose, sides of thorax and basal segments of abdomen ferruginous.....*chalybea* Brauer.
- Bases of all wings uncoloured or but very pale so, dorsum of thorax dark metallic or yellow marked with black, sides of thorax and basal segments of abdomen not ferruginous*sobrina* (Rambur).

Brachydiplax chalybea Brauer

1868. *Brachydiplax chalybea* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 173.

1936. *Brachydiplax chalybea* : Fraser, *Fauna Brit. India. Odon.*, 3 : 328.

1976. *Brachydiplax chalybea chalybea* : Mital et. al., *Third all India Cong. Zool.*, : 64.

Material : 1 M, Khasai Hills, Upper Shillong, Airport, 11.iv. 88, A.R. Lahiri coll.

Diagnosis : Thorax pruinose white on dorsum, laterally ochreous with vestiges of lines on upper part of humeral and postero-lateral sutures metallic black. Wings hyaline, bases have burnt brown patch extending from level of second antenodal to tornus in hind-wing.

Distribution : INDIA : Meghalaya (Shillong, Khasai hills); Assam, West Bengal. BURMA, JAVA, MALAYSIA, SIAM, SUMATRA, BORNEO, CELEBES, BANGKOK.

Remarks : This species is distinguishable by its larger size (abd. 21-25 : 18-19 *B. farinosa* : 20-24 *B. sobrina*). Bases of all wings burnt brown or golden brown in contrast with uncoloured in *sobrina* and with pale yellow in *farinosa*.

1842. *Libellula Sobrina*, Rambur *Hist. nat. Ins. Nevrop.*, : 114.

1893. *Brachydiplax sobrina* (Rambur) : Kirby, *J. Linn. Soc. Zool.*, 24 : 551.

1936. *Brachydiplax sobrina* : Fraser, *Fauna Brit. India. Odon.*, 3 : 325.

Distribution : INDIA : Meghalaya (Garo hills) : Assam, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Punjab, Uttar Pradesh, West Bengal. NEPAL, BANGLADESH, SRILANKA, BURMA, THAILAND, VIETNAM.

Remarks : This species is included on the basis of the literature review. It is moderate in size (abd. 20-24 in M, 16-22 mm in F) as compared to larger *chalybea* (21-25 in M 21-23F) or smaller *farinosa* (18-19 in M and 17-18 mm in F). The easiest means for determining this species is the large and prominent genitalia (ill developed in *farinosa*). Thorax with black or metallic markings (instead of whole of thorax metallic green as in *farinosa*).

Genus *Acisoma* Rambur

1842. *Acisoma* Rambur, *Hist. nat. Ins. Nevrop.*, 28

1936. *Acisoma* : Fraser, *Fauna Brit. India. Odon.*, 3 : 329.

No key to the species of the genus *Acisoma* is provided, as it has sole representative namely *A. p. panorpoides*.

Acisoma panorpoides panorpoides Rambur

1842. *Acisoma panorpoides* Rambur, *Hist. nat. Ins. Nevrop.*, : 28.

1911. *Acisoma panorpoides panorpoides* Rambur : *Ris Cat. Coll. Selys.*, 12 : 456.

1936. *Acisoma panorpoides panorpoides* : Fraser, *Fauna Brit. India, Odon.* 3 : 330.

Distribution : INDIA : Meghalaya (Garo hills); Assam, Arunachal Pradesh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Punjab, Tamil Nadu, Uttar Pradesh, Bengal. NEPAL, CHINA, SRI LANKA, THAILAND, MALAYSIA, INDONESIA, JAPAN, TAIWAN, PHILIPPINES.

Remarks : This species is included on the basis of the literature review. It is smallest species of the genus but more robust than *Diplacodes* Kirby. It is easily distinguished from all other Indian Libellulids by the shape of abdomen i. e. 1-6 abd. segments are laterally and dorso-ventrally conspicuously dilated.

Genus *Orthetrum* Newman

1833. *Orthetrum* Newman, *Ent. Mag.*, 1 : 511.

1936. *Orthetrum* : Fraser, *Fauna Brit. India. Odon.*, 3 : 291.

Key to the species of the genus Orthetrum Newman

1. Males coloured some shade of violaceous red frons blue-black anteriorly.....

-*pruinorum neglectum* (Rambur).
- Males coloured brown or black with yellow markings; often pruinosed.....2.
2. Abdomen conspicuously swollen at base and then slim, compressed laterally; body black marked with yellow, not pruinosed.....*sabina* (Drury).
- Abdomen conspicuously swollen at base, variable in shape, not compressed laterally; mostly with pruinosed abdomen and thorax3.
3. Base of hind wing with a large black triangular marking.....
.....*triangulare triangulare* (Selys).
- Base of hind-wing without black triangular markings.....4.
4. Cuii in hind-wing arising from the distal side of discoidal cell well away from its posterior angle.....*chrysostigma luzonicum*.
- Cuii in hind-wing arising from the posterior angle of discoidal cell5.
5. Abdomen short and broad; thorax with 2 broad greenish or bluish stripes more or less obscured by pruinescence.....*japonicus internum* Mac Lachlan.
- Abdomen long and rather narrow, often blue with pruinescence; thorax with very narrow whitish or creamy stripes.....6.
6. Face black or frons blackish anteriorly ; membrane black.....*glaucum* (Brauer)
- Face dark brown; membrane white.....*bruneum bruneum* (Fonsscolombe)

***Orthetrum bruinosum neglectum* (Rambur)**

1842. *Libellula neglecta* Rambur, *Hist. nat. Ins. Nevrop.*, : 86.

1990. *Orthetrum pruinorum neglectum* (Rambur) : Ris, *Cat. Coll. Selys.*, 9 : 239.

1936. *Orthetrum pruinorum neglectum* : Fraser, *Fauna Brit. India, Odon.*, 3 : 311.

Material : 2 MM, Khasai Hills, Burnihat, 30. ix. 88, A.R. Lahiri coll.; 1F, East Khasai Hills, Cherrapunjee, 24.v. 90, M. S. Shishodia and party; 1 M, Khasai Hills, Umran, 26.v. 71, S. Biswas and party coll.; 1 M, Khasai Hills, Cherrapunjee, 20. vii. 73, A.K. Ghosh and party coll.; 1 M, Khasai Hills, Lalchand basti, 8.vi. 73, K. Deb coll.; 2 MM, Khasai Hills, Nongpoh, 25.viii. 72, A.K. Ghosh coll.; 1 F, Khasai Hills, Umshing, 27.iii. 68, R.K. Varshney coll.; 1 M, Khasai Hills, Umshing, 21.iv. 72, G.M. Yazdani coll.; 1 M, Khasai Hills, Shillong, 3.ix. 72, A.R. Lahiri coll.; 2 FF Khasai Hills, Barapani, 21. vi. 73, A.K. Ghosh coll.; 1 M Khasai Hills, Shillong, 3.vi. 77. M.S. Jyrwa coll.; 1 F W. Garo Hills dist., Chaipani, S. of Karapara, Stn. No. 1 14.x. 88, K.K. Ray and party coll.; 1 M W. Garo Hills dist., Adogiri, 15 km of E. Tura, Stn. No. 1, 6.x. 88, K.K. Ray and party coll.; 1 M, Shillong, nr. Pitas PLO hill forest, stn. No. 11, alt. 1450 m., 11. iv. 91, S.K. Ghosh and party coll.

Diagnosis : Frons dark brown to blue black anteriorly. Prothorax and thorax reddish brown. Wings enfumed pale brown towards apices. Two rows of cells between IRiii and Rspl. Abdomen purplish red to bright vermillion red, anal appendage red.

Distribution : INDIA : Meghalaya (East Khasi hills, Garo hills and Cherrapunjee); West Bengal. NEPAL, TIBET, CHINA, SRI LANKA, BURMA, MALAYSIA, INDONESIA, TAIWAN.

Remarks : This species is one of the commonest libellulid found from the plains upto an altitude of 2,000 meters. It is known to inhabit small ponds, tanks etc. It is easily differentiated from *O. chrysis* and *O. testaceum* in having abdomen unique violet colour quite different to the red of *O. chrysis* and *O. testaceum*.

***Orthetrum sabina sabina* (Drury)**

1770. *Libellula sabina* Drury, I 11 *Exot. Ins.*, 1 : 114.

1889. *Orthetrum sabina* (Drury) : Kirby, *Trans. Zool. Soc. Lond.*, 12 : 302.

1936. *Orthetrum sabina* : Fraser, *Fauna Brit. India. Odon.*, 3 : 300.

1942. *Orthetrum sabina sabina* (Drury) : *Lieftinck Treubia*, 18 : 475.

Material : 1 M, Khasai Hills, Nr. Umwai, ca 22 Kms. from Cherrapunjee, 15.ix. 88, A.R. Lahiri coll.; 1 M, Meghalaya, 1990, M.S. Shishodia coll.; 2 MM, Dispur, 6.vi. 90, M.S. Shishodia coll.; 1 M, Khasai Hills, Umshing, 25.vii. 72, A.K. Ghosh coll.; 1 F, Khasai Hills, Risa colony 25.xi. 72, S. Biswas coll.; 1 M, Khasai Hills, Umshing, 27.iii. 68, R.K. Varshney coll.; 1 M, Khasai Hills, Shillong, Hyderi park, 12.xii. 71, A.R. Lahiri coll.; 1 F Khasai Hills, Mawpat, 16.vii. 71, R.S. Pillai coll.; 1 F, E. Garo Hills dist. Nafa village, nr. Tasek, Songsak, Stn. 2, 3.vii. 88, R.K. Ghosh and party coll.; 1 F, W. Garo Hills, Hallaidanga. E. of Phulbari, Stn. No. 4, 25.x. 88, K.K. Ray and party coll.; 3 FF, W. Garo Hills, Bokongiri, N. of Phulbari, Stn. No. 2.23 x. 88, K.K. Ray and party coll.; 1 M, 1 F W. Garo Hills, Bamandanga, E. of Phulbari, Stn. No. 6. 27.x. 88, K.K. Ray and party coll.; 1 F, W. Garo Hills, Hallaidanga E. of Phulbari, Stn. No. 4, 25.x. 88, K.K. Ray and party coll.; 1 F W. Garo Hills, Barengaopara, S. of Kherapara, Stn. No. 4, 17.x. 88, K. K. Ray and party coll.; 1 M, 1 F, W. Garo Hills, Bagmara, South of Kherapara, Stn. No. 3, 16.x. 88, K.K. Ray and party coll.; 1 F, Garo hills, William Nagar, 12.iii. 91, B.C. Das and party coll.; 1 M, Jowai, 20. iii. 91, B.C. Das and party coll.; 1 M, 1 F, Shillong, E. Khasai Hills, Moulai 20.iii. 91 A.Kl. Sanyal and party coll.

Diagnosis : Frons yellowish very deeply notched forming two triangular facets in front. Prothorax bright yellow and its anterior and middle lobe blackish brown posteriorly. Thorax green yellow. Sutres of thorax finely black. Abdomen greenish yellow, enormously swollen at base and then abruptly slimmed and compressed laterally to the end.

Distribution : INDIA : Meghalaya (khasi Hills, Garo hills and Shillong); Assam, Bihar, Himachal Pradesh, Punjab, Uttar Pradesh, Manipur. SRI LANKA, BURMA, SIAM AND SAMOA.

Remarks : This is the most commonly occurring *Orthetrum* species. It is easily distinguishable

from all other Indian species of genus *Orthetrum* by its enormously swollen basal abdomen segments. Abdomen is greenish yellow and not pruinosed; in contrast to the pruinosed abdomen and thorax of other species of the genus.

***Orthetrum t. triangulare* Selys**

1878. *Libellula triangularis* Selys Mittl. Mus. Dresden : 314.

1909. *Orthetrum trinagulare triangulare* (Selys) : Ris: Cat. Coll. Selys, 9 : 244.

1936. *Orthetrum triangulare triangulare* : Fraser, Fauna Brit. India, Odon., 3 : 305.

Material : 1 M, Khasai Hills, Shillong, 30.v. 72, S. Biswas coll.; 1 M, Khasai Hills, Monpoh, 25.viii. 72, A. K. Ghosh coll.; 1 M, Khasai Hills, Lalchand basti, 8.vi. 73, K. Deb coll.

Diagnosis : Face frons black. A single yellow spot behind head. Prothorax and thorax velvety black. Base of hind wing with a large blackish brown triangulare marking. Abdomen broad at base tapered gradually to the anal end, anal appendages black.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills, Shillong); Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kashmir, Kerala, Maharashtra, Mizoram, Sikkim, Tamil Nadu, Uttar Pradesh. NEPAL, SRI LANKA, BURMA, VIETNAM.

Remarks : This species is known to occur upto an altitude of 2500 meters. It has robust build and is easily distinguished by black colour and broad black triangular mark at base of hind wings.

***Orthetrum chrysostigma luzonicum* (Brauer)**

1868. *Libellula tluzonica* Brauer Verh. Zool. bot. Ges. Wien., 18 : 169, 732.

1909. *Orthetrum chrysostigma luzonicum* (Brauer) : Ris; Cat. Coll. Selys, 9 : 210.

1936. *Orthetrum chrysostigma luzonicum* : Fraser, Fauna Brit. India, Odon., 3 : 298.

1987. *Orthetrum chrysostigma luzonicum* : Lahiri, Rec. zool. Surv. India, Occ. paper No. 99 : 181.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills and Jaintia hills); Assam, Karnataka, Kerala, West Bengal. NEPAL, SRI LANKA, BURMA, VIETNAM, MALAYSIA, INDONESIA, PHILIPPINES.

Remarks : This species is included on the basis of the literature review. It is a submontane/montane inhabitant associated with stagnant water bodies. Cuii in hind-wing arising from the distal side of discoidal cell well away from its posterior angle in which it differs from *anceps*, *cancellatum*, *japonicum*, *internum*, *glaucum*, *bruneum* and *taeniolum*.

***Orthetrum japonicum internum* Mac Lachlan**

1894. *Orthetrum japonicum internum* Mac Lachlan, : Ann. Mag. Nat. Hist., (6), 13 : 431.

1936. *Orthetrum japonicum internum* : Fraser, Fauna Brit. India, Odon., 3 : 304.

1987. *Orthetrum japonicum internum* : Lahiri, Rec. zool. Surv. India, Occ. paper No. 99 : 181.

Material : 3 MM, Jaintia Hills, Muktapur, 21.v. 90, M. S. Shishodia and party; 2 FF, East Khasai Hills, 24.v.90, M. S. Shishodia coll.; 2 MM, Khasai Hills, Umshing, 27.iii. 68, R. K. Varshney coll.; 2 MM, 2 FF, Khasai Hills, Shillong Peak, 25.v. 68, R. K. Varshney coll.; 1 M, Khasai Hills, Upper Shillong, 6.vi. 74, M. Vasanth coll.; 3 FF, Khasai Hills, Nongkhyllom, 19.v. 82, C. Radhakrishan coll.; 1 M, E. Khasai Hills, Cherrapunjee, 22.iii. 91, A. K. Sanyal and party coll.

Diagnosis : Face and frons olivaceous green. Thorax olivaceous green on mid-dorsum, Laterally pale green with a broad oblique median stripe of reddish brown. Cuii in hind-wing arising from the distal side of discoidal cell well away from its posterior angle. Abdomen broad at base, tapering to the anal end. Segments 1 & 2 with yellow ground colour with a sub-dorsal dark brown stripe through the pruinoscence.

Distribution : INDIA : Meghalaya (East Khasai hills and Cherrapunjee);Himachal Pradesh, Kahsmir, Nagaland, Uttar Pradesh, West Bengal. NEPAL, TIBET, CHINA, VIETNAM.

Remarks : This species is distinguished from others of the genus by having thorax with two broad greenish or bluish stripes obscured by pruinoscence instead of very narrow whitish or creamy stripes.

Orthetrum glaucum (Brauer)

1865. *Libellula glauca* Brauer, *Verh. Zool. bot. Ges. Wien.*, 15 : 1012.

1890. *Orthetrum glaucum* (Brauer) : Kirby, *Syn. Cat. Neur. Odon.*, : 39.

1936. *Orthetrum glaucum* : Fraser, *Fauna Brit. India, Odon.*, 3 : 307.

1987. *Orthetrum glaucum* : Lahiri, *Rec. zool. Surv. India, Occ. paper No. 99* : 179.

Material : 1F, East Khasai Hills, Umsing, 2.x. 88, A. R. Lahiri coll.; 1 F, Khasai Hills, laithyou, ca 1 km. south of Cherrapunjee., 16.ix. 88, A. R. Lahiri coll.; 1 M, Jaintia Hills Muktapur, 21.v. 90, M. S. Shishodia coll.; 1 F, East Khasai Hills, Cherrapunjee, 24.v. 90, M. S. Shishodia coll.; 1 F, Khasai Hills, Hyderi park, 11.iii.73, A.R. Lahiri, coll; 1M, Khasai Hills, Motinagar, 7.vii. 71, R. Giri coll.; 1 F, Khasai Hills, Umtynagar, 30.v. 72, S. Biswas coll.; 3 MM, Khasai Hills Lachumier, 6.vii. 73, K. Deb. coll.; 1 M, Khasai Hills Laitker, 28.viii. 68, S. Biswas, coll.; 2 MM, Khasai Hills, Sumer, 21.vi. 73, A. K. Ghosh coll.; 1 M, Khasai Hills, Upper Shillong, 6.vi. 74, M. Vasanth coll.; 1 M, Khasai Hills, Lalchand basti, 10.x. 63, V. D. Srivastava coll.

Diagnosis : Moderatly large species (Abd. 29-35 mm, hind wing 33-40 mm) with face and frons olivaceous or blackish brown. Abodmen ventrodorsally dialated at segment 1-3, then very slim and of even width to the end, pruinosed pale dirty blue from segment 1 to apical end of segment 8, black for the remainder. Anal appendages black.

Distribution : INDIA : Meghalaya (Khasai hills and Cherrapunjee dist.); Andhra Pradesh, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, CHINA, SRI LANKA, BURMA, THAILAND, MALAYSIA, INDONESIA, NEW GUINEA, PHILIPPINES.

Remarks : This species is strictly montane, known to occur upto an altitude of 1500 meters, In moderately large size it is similar to *O. b. brunneum*, but it differs from it in having membrane black instead of pure white. It also differs from *O. triangulare* by the longer and much narrower abdomen, blue with a black tip and by the dull-coloured thorax and absence of black triangular black mark at base of hind wing.

Orthetrum b. brunneum Fonscolombe

1837. *Libellula brunnea* Fonscolombe, *Ann. Soc. Ent. France.*, 6 : 141, pl. 6, fig. 3.

1909. *Orthetrum brunneum brunneum* Ris, *Cat. Coll. Selys. fasc.*, 9 : 178, 188–191.

1936. *Orthetrum brunneum brunneum* : Fraser, *Fauna Brit. India, Odon.*, 3 : 294.

Material : 3 MM, Jaintia Hills, Garampani, 22.v. 90, M. S. Shishodia coll.

Diagnosis : Face and frons olivaceous green. Thorax pruinosed light blue. Cuii in hind-wing arising from the posterior angle of discoidal cell. Two rows of cells between IRiii and Rspl. Abdomen laterally and dorsoventrally broad at base and tapered gradually to the anal end.

Distribution : INDIA : Meghalaya (Jaintia Hills); Jammu and Kashmir. SOUTH EUROPE, NORTH AFRICA, ASIA.

Remarks : This species resembles in appearance to *O. anceps*. It differs from *O. anceps* by the wings having double row of cells between IRiii and Rspl and by the shape of genitalia in which the notch between the curved hamule and broad foliate base is very deep as comparison to that of *O. anceps*.

Genus *Lyriothemis* Brauer

1868. *Lyriothemis* Brauer, *Verh. zool. bot. Ges. Wien.*, 18 : 180, 365, 728.

1936. *Lyriothemis* : Fraser, *Fauna Brit. India, Odon.*, 3 : 263.

Key to the species of the genus Lyriothemis

Discoidal field with 3 row of cell at begening, a blackish brown streak at base of cell wings
.....*bivittata* (Rambur).

Discoidal field begening with 2 row of cells, No black brown streak at base of wings.....
.....*tricolor* Ris.

***Lyriothemis ? bivittata* (Rambur)**

1842. *Libellula bivittata* Rambur, *Bist. nat. Ins. Nevrop.* : 75.

1909. *Lyriothemis bivittata* (Rambur) : Ris, *Cat. Coll. Selys.*, 9 : 118.

1936. *Lyriothemis bivittata* : Fraser, *Fauna Brit. India, Odon.*, 3 : 296.

Distribution : INDIA : Meghalaya (Garo Hills); Assam, West Bengal. BURMA, THAILAND, VIETNAM, MALAYSIA.

Remarks : This species is included on the basis of the literature review. It is distinguished from all other species of the genus by the blackish-brown streaks at the bases of all wings.

***Lyriothemis tricolor* Ris**

1909. *Lyriothemis tricolor* Ris. *Cat. Coll. Selys. fasc.*, 16 : 1063–1065, figs. 619, 620,

1936. *Lyriothemis tricolor* : Fraser, *Fauna Brit. India, Odon.*, 3 : 270.

Distribution : INDIA : Meghalaya (Shillong Hills); Assam, West Bengal. BURMA.

Remarks : This species is included on the basis of the literature review. It closely resembles *L. cleis*, but is distinguished by the nervures Riii, IRiii, Riv+v and MA not acutely bent down and backwards at their terminations. It is distinguished from *L. acigastra* by its larger size and two short yellow spots on the dorsum of thorax instead of two converging antehumeral stripes and also from *L. bivittata* by the absence of the black streaks at base of wings.

Genus *Urothemis* Brauer

1868. *Urothemis* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 175.

1936. *Urothemis* : Fraser, *Fauna Brit. India, Odon.*, 3 : 441.

No key is provided, as the genus has sole representative viz., *U. signata signata* (Rambur).

***Urothemis signata signata* (Rambur)**

1839. *Libellula sanguinea* Burmeister, *Handb. Ent.*, 2 : 858.

1913. *Urothemis signata signata* : Ris, *Cat. Coll. Selys.*, 16 : 1023.

1936. *Urothemis signata signata* : Fraser, *Fauna Brit. India, Odon.*, 3 : 442.

Distribution : INDIA : Meghalaya (Khasai hills, Jaintia hills); Assam, Bihar, Karnataka, Maharashtra, Manipur, Kerala, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal. TIBET, CHINA, BANGLADESH, SRI LANKA, BURMA, VIETNAM.

Remarks : This species is included on the basis of the literature review. It can be easily distinguished from other Indian Libellulids by having its open venation, low-constant nodal index and basal markings in hind wings.

Genus *Sympetrum* Newman1833. *Sympetrum* Newman, *Ent. Mag.* : I : 511.1936. *Sympetrum* : Fraser, *Fauna Brit. India, Odon.*, 3 : 370.*Key to the species of the genus Sympetrum* Newman

1. Black markings on thorax broad; yellow markings on sides extending to wings; anterior femora yellow on inner side.....*hypomelas* (Selys).
 — Black markings on thorax narrow; lateral yellow markings confined to lower part of sides of thorax; anterior femora entirely black.....*orientale* (Selys).

Sympetrum hypomelas (Selys)1884. *Diplax hypomelas* Selys, *Ann. Soc. Ent. Belg.* 28 : 37.1890. *Sympetrum hypomelas* : Kirby, *Syn. Cat. Neur. Odon.*, 16.1936. *Sympetrum hypomelas* : Fraser, *Fauna Brit. India, Odon.*, 3 : 373.

Distribution : INDIA : Meghalaya (Khasai hills); Assam, Arunachal Pradesh, Himachal Pradesh, Sikkim, Uttar Pradesh, West Bengal. NEPAL, TIBET, CHINA, BURMA.

Remarks : This species is included on the basis of the literature review. It is distinguished from *S. orientale* (Selys) by having broad black marking on thorax and femora of fore leg bright yellow inner side instead black.

Sympetrum orientale (Selys)1883. *Diplax orientale* Selys, *Ann. Soc. Ent. Belg.* 27 : 140.1890. *Sympetrum orientale* : Kirby, *Syn. Cat. Neur. Odon.*, 16.1936. *Sympetrum orientale* : Fraser, *Fauna Brit. India, Odon.*, 3 : 375.

Distribution : INDIA : Meghalaya (Khasai hills, Jaintia hills); Assam. CHINA.

Remarks : This species is included on the basis of the literature review. It closely resembles *S. hypomelas* but differs from it by the sides of thorax a dull red instead of bright yellow, besides the black markings more restricted.

Genus *Diplacodes* Kirby1889. *Diplacodes* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 263, 307.1936. *Diplacodes* : Fraser, *Fauna Brit. India, Odon.*, 3 : 331.*Key to the species of the genus Diplacodes* Kirby

1. Apices of wings tipped with black.....*nebulosa* (Fabricius).
 — Apices of wings hyaline.....*trivialis* (Rambur).

***Diplacodes nebulosa* (Fabricius)**

1793. *Libellula nebulosa* Fabricius, *Entom. Syst.* 2 : 379.

1889. *Diplacodes nebulosa* : Kirby, *Trans. Zool. Soc. Lond.*, 12 : 308.

1936. *Diplacodes nebulosa* : Fraser, *Fauna Brit. India, Odon.*, 335.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills and Jaintia hills); Assam, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Tamil Nadu, Uttar Pradesh, West Bengal. CHINA, SRILANKA, BURMA, VIETNAM, MALAYSIA. INDONESIA, NEW GUINEA, AUSTRALIA.

Remarks : This species is included on the basis of the literature review. It is closely related *D. lefebvrei*, but is distinguished from same in having sharply limited dark area at the apices of wings instead pale diffuse enfumation in *lefebvrei*.

***Diplacodes trivialis* (Ramb.)**

1842. *Libellula trivialis* Rambur, *Hist. nat. Ins. Nevrop.*, 115.

1891. *Diplacodes trivialis* : Karsch, *Ent. Nachr.*, 17 : 246.

1936. *Diplacodes trivialis* : Fraser, *Fauna Brit. India, Odon.*, 3 : 336.

Material : 1 M, Jaintia Hills, Muktapur, 6.vi. 90, M. S. Shishodia and party coll.; 1 M, dispur, 6.vi. 90, M. S. Shishodia coll.; 1 M, Khasai Hills, Lalchand basti, 8.vi. 73, K. Deb coll.; 1 M, Khasai Hills, Umshing, 25.vii. 72, A.K. Ghosh coll.

Diagnosis : Labium, Labrum and bases of mandible creamy yellow, face, frons and vesicle palest azure blue, Prothorax with a mid-dorsal stripe extending full length of dorsum. Thorax greenish-yellow/olivaceous. Sutures are finely black. Whole thorax uniform, pruinosed blue in old adults. Wing hyaline. Abodomen 1–3 greenish yellow, with sutures finely black. Prominent mid-dorsal stripes. Abdomen 4–7 with subdorsal yellow stripes. Abdomen 8–10 black. Anal appendages bright yellow.

Distribution : INDIA : Meghalaya (Khasai hills and Jaintia hills); Andaman Islands, Andhra Pradesh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Orissa, Tamil Nadu, Uttar Pradesh. CHINA, SRI LANKA, BURMA, THAILAND, VIETNAM, MALAYSIA. INDONESIA, NEW GUINEA, JAPAN, RYUDYUS, PHILIPPINES, AUSTRALIA, PACIFIC ISLANDS, IRAQ, SEYCHELLIS.

Remarks : This species is the commonest dragonfly among libellulid species. It has wider distribution in plains as well as upto an altitude of 2500 meters, Presence of clear wings without apical or basal markings and the creamy white anal appendages and deep pruinescence in adult sage distinguished this species from other species of the genus.

Genus *Palpopleura* Rambur

1842. *Palpopleura* Rambur, *Hist. nat. Ins. Nevrop.*, 26 : 129.

1936. *Palpopleura* : Fraser, *Fauna Brit. India, Odon.*, 3 : 316.

No key to the species of the genus *Palpopleura* Rambur, as it has sole species represented namely *P.S. sexmaculata* in not only Meghalaya but whole of India.

Palpopleura s. sexmaculata (Fabricius)

1787. *Libellula sexmaculata* Fabricius, *Mant Inst.*, 1 : 338.

1868. *Palpopleura sexmaculata* (Fabricius) : Brauer *Verh. Zool. bot. Ges. Wien*, 18 : 716.

1936. *Palpopleura sexmaculata sexmaculata* (Fabricius) : Fraser, *Fauna Brit. India, Odon.*, 3 : 318.

Material : 1 F, Dispur, 6.vi. 90, M.S. Shishodia coll.; 1 F, Meghalaya, 6.vi. 90, M.S. Shishodia coll.; 1 M, Jaintia Hills, Khlichriat, 20.v. 90, M.S. Shishodia coll.; 1 F, Khasai Hills, Umshing, 25.vii. 72, A.K. Ghosh coll.; 1 F, Khasai Hills, Nongpoh, 19.ix. 73, S. Biswas coll.; 1 F, Khasai Hills, Nongpoh, 25.viii. 72, A. K. Ghosh coll.; 1 F, Khasai Hills, Mawsynram, 10.x. 72, A. K. Ghosh coll.; 1 M, 1 F, Khasai Hills, Lalchand basti, 8.vi. 73, K. Deb coll.; 2 M, 4 F, Khasi Hills, 5.ix. 75, M. S. Jyrwa coll.; 2 M, 1 F, Khasai Hills, Sumer, 21.vi. 73, A.K. Ghosh coll.; 1 M, Khasai Hills, Upper Shillong, 6.vi. 74, M. Basanth coll.; 1 M, Khasai Hills, Nongstoin, Stn. No. 3, ca 2 kms east of P.W.D.I.B., 21.ix. 88, A.R. Lahiri coll.; 1 F, Khasai Hills, Umtham, 25.vii. 72, A.K. Ghosh coll.; 1 M, Jowai, 20.iii. 91, B.C. Das and party coll.; 1 M, Garo hills, Tambo, William Nagar, 11.iii. 91, B.C. Das and party coll.; 2 M, Shillong, Polo hill forest, alt. 1450 m., 10.iv. 91, S.K. Ghosh and party coll.; 1 M, 1 F, Shillong, Polo hill forest nr. Monsa, alt. 1500 m., 10.iv. 91, S.K. Ghosh and party coll.; 1 M, 1 F, Shillong, Polo hill forest, nr. Pitas, Stn. No. 11, 1450 m, 11.iv. 91, S.K. Ghosh and party coll.; 2 F, Jaintia hills, Mihmgntdu vill., 16.iii. 91, A.K. Sanyal and party coll.; 2 MM, 2 FF, W. Khasai hills, Nongstoin, Mourimia, 14.iii. 91, A.K. Sanyal and party coll.

Diagnosis : Small species (abd. 14–17 mm). Frons and vesicle brilliant metallic blue. A geminate spot on dorsum of middle lobe bright yellow. A black spot at node in fore wing covering $\frac{1}{2}$ to $1\frac{1}{2}$ cells proximal to node. 3 black streaks in the basal half of wing. These are in the subcostal space between sector of arc and in the cubital space.

Distribution : INDIA : Meghalaya (Jaintia hills, Shillong, Khasai hills, Garo hills); Assam, Bihar, Andhra Pradesh, Himachal Pradesh, Kerala, Maharashtra, Manipur, Mizoram, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. TIBET, CHINA, SRI LANKA, BURMA, VIETNAM, MALAYSIA.

Remarks : Characteristic of this species is black spot present at node in forewing covering $\frac{1}{2}$ to $1\frac{1}{2}$ cells proximal to node; a black streak in sub-costal space from base to $\frac{2}{3}$ its length to node; streak between sectors of arc and a streak in cubital space upto discoidal cell. This species in having above markings and frons being metallic above is differentiated from *D. trivialis*, though with which it has superficial resemblance.

Genus *Rhyothemis* Hagen

1867. *Rhyothemis* Hagen, *Stett. Ent.*, 28 : 232.

1936. *Rhyothemis* : Fraser, *Fauna Brit. India, Odon.*, 3 : 419.

No key to the species of the genus *Rhyothemis* Hagen, as it has single species *R. v. variegata* (Linnaeus) not only in Meghalaya but also in whole of India.

Rhyothemis v. variegata (Linnaeus)

1763. *Libellula variegata* Linnaeus, *Amoenitates Acad.*, 6 : 412.

1913. *Rhyothemis variegata variegata* : Ris., *Cat. Coll. Selys.*, 15 : 935.

1936. *Rhyothemis variegata variegata* : Fraser, *Fauna Brit. India, Odon.*, 3 : 423.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills, Jaintia hills); Assam, Himachal Pradesh, Kerala, Maharashtra, Manipur, Orissa, Tamil Nadu, West Bengal. NEPAL, TIBET, BANGLADISH, BURMA, MALAYSIA.

Remarks : This species is included on the basis of the literature review. It has variegated pattern of colour on the wings which can easily distinguish it from other species of the genus. It can also be distinguished from *R. phyllis phyllis* (Sulzer) from Burma by having apices hyaline only in female instead of apices opaque in male and black in female.

Genus *Pantala* Hagen

1861. *Pantala* Hagen, *Syn. Neur. Amer.*, : 141.

1936. *Pantala* : Fraser, *Fauna Brit. India, Odon.*, 3 : 413.

No key to the species of the genus *Pantala* is provided, as it has sole species viz., *P. flavescens* (Fabricius) not only in Meghalaya but whole of India.

Pantala flavescens (Fabricius)

1798. *Libellula flavescens* Fabricius, *Ent. Syst. Supply* : 285.

1861. *Pantala flavescens* : Hagen, *Syn. Neur. N. Amer.*, : 142.

1936. *Pantala flavescens* : Fraser, *Fauna Brit. India, Odon.*, 3 : 413.

Material : 1 M, Khasai Hills, Nongpoh, Stn. No. 4 R. Forest, ca 36 km. south of circuit house., 30.ix. 88, A.R. Lahiri coll.; 1 M, 1 F, Khasai Hills, laithyra, ca. 10 km. south of Cherrapunjee, 16.ix. 88, A.R. Lahiri coll.; 2 MM, 1 F, Khasai Hills, Nr. Mausmai cave stn. No. 5, 18.ix. 88, A.R. Lahiri coll.; 1 M, 1 F, Dispur, 6.vi. 90, M.S. Shishodia and party coll.; 1 M, Jaintia Hills, Khlichriat, 20.v. 90, M.S. Shishodia coll.; 2 FF, W. Garo Hills dist., Bagmara circuit house, Stn. No. 4, 12.vii. 88, R.K. Ghosh and party coll.; 1 F, E. Garo Hills dist., Nafa village, nr. Tasek, Songsak, Stn. 2, 3.vii. 88, R.K. Ghosh and party coll.; 1 M, W. Garo Hills, Bhatbari, E. of Phulbari, Stn. No. 5, 26.x. 88, K.K. Ray and party coll.

Diagnosis : Large species (abd. 29–35 mm.) and of robust build. Prothorax with a transverse belt of dark reddish brown between anterior and middle lobes. Wings hyaline, base of hind wing pale golden yellow upto anal loop. IRiii & Riii vary in their length. Abdomen bright ochreous, dorsum tinted with bright brick red.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills, Jaintia hills); Himachal Pradesh, Uttar Pradesh, Punjab, Rajasthan, West Bengal. CEYLON, TIBET, BURMA, SRI LANKA, MALAYSIA..

Remarks : This species is one of the most commonly occurring Libellulids among plains and submontane habitats. Anal area of hind wing is broad. This species can be distinguished from its nearest genus *Trithemis*, by presence of a conspicuous supplementary nervure (IRii) situated between Rii and Riii.

Genus *Trithemis* Brauer

1868. *Trithemis* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 176.

Key to the species of the Genus *Trithemis* Brauer

1. Legs very long and spidery; pterostigma bicolorous; body yellow marked with black.....
.....*pallidinervis* (Kirby).
- Legs of ordinary length., pterostigma unicolourous; body-colour variable.....2.
2. Thorax and abdomen violaceous black; base of hind-wing with a small dark brown spot; neuration black.....*festiva* (Rambur).
- Thorax and abdomen violaceous, crimson; base of hind-wing with small reddish-brown spot, neuration crimson.....*aurora* (Burmeister).

Trithemis pallidinervis (Kirby)

1889. *Sympetrum pallidinervis* Kirby, *Trans. Zool. Soc. London.*, 12 : 327.

1907. *Trithemis pallidinervis* : Morton, *Trans. ent. Soc. Lond.*, 304.

1936. *Trithemis pallidinervis* : Fraser, *Fauna brit. India, Odon.*, 389.

1987. *Trithemis pallidinervis* : Lahiri, *Rec. Zool. Surv. India, Occ. Paper No. 99* : 214.

Material : 1 F, Khasai Hills, Nongpoh, Stn. no. 1, circuit house compound, 28.ix. 88, A.R. Lahiri coll.

Diagnosis : Labrum black with two large basal citron-yellow spots. Front of frons yellow, upper surface to frons and vesicle metallic purple. Prothorax dull brown or black, a large medial and lateral spot on middle lobe. Thorax olivaceous brown. Dorsum thickly coated with greyish hairs. Leg very long and spidery. Pterostigma bicolourous, black with creamy white ends. Abdomen long and slender, black marked with bright yellow.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills and Jaintia hills); Assam, Andhra

Pradesh, Bihar, Gujrat, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Nagaland, Orissa, Punjab, Uttar Pradesh, West Bengal. TIBET, BURMA, MALAYSIA, INDONESIA, TAIWAN, PHILIPPINES.

Remarks : This species inhabits stagnant water and usually marshy zones. It is distinguishable from other species of the genus having bicolourous pterostigma (black with creamy white ends) and being largest in size. (abdomen 28–32).

***Trithemis festiva* (Rambur)**

1842. *Libellula festiva* Rambur, *Ins. Nevrop.*, : 92.

1868. *Trithemis festiva* : Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 736.

1936. *Trithemis festiva* : Fraser, *Fauna brit. India, Odon.*, 3 : 387.

1987. *Trithemis festiva* : Lahiri, *Rec. Zool. Surv. India, Occ. Paper No. 99* : 213.

Material : 1 M, Khasai Hills, Laithyra, 10 km. south of Cherrapunjee, 16.iv. 88, A.R. Lahiri coll.; 1 M, Khasai Hills, Lalchand basti, 8.vi. 73, K. Deb. coll.

Diagnosis : Frons and vesicle dark brown in front, metallic violet above. Prothorax dark blue. Thorax violaceous black. Legs black. Dark opaque brown mark at base of hind wing, dark rays in sub-costal and cubital spaces, neuration and pterostigma black.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills and Jaintia hills); Assam, Arunachal Pradesh, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Mizoram, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, PAKISTAN, SRI LANKA, BURMA, MALAYSIA, INDONESIA, TAIWAN, LOOVHOO ISLANDS, PHILLIPINES, NEW GUINEA, TURKY, AFRICA.

Remarks : This species occurs in still waters or commonly in streams with sluggish current. It can be distinguished from *T.a. aurora* by having crimson neuration instead of black.

***Trithemis aurora* (Burmeister)**

1839. *Libellula aurora* Burmeister, *Handb. Ent.*, 2 : 859.

1868. *Trithemis aurora* : Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 177, 735.

1936. *Trithemis aurora* : Fraser, *Fauna brit. India, Odon.*, 3 : 383.

1987. *Trithemis aurora* : Lahiri, *Rec. Zool. Surv. India, Occ. Paper No. 99* : 212.

Material : 3 MM, G. Hills, Selbalgiri, 10.v. 88, V.T. Darling coll.

Diagnosis : Face and front of frons ochreous, changing to reddish above. upper surface of frons and vesicle metallic violaceous. Prothorax reddish brown. Thorax dull purple. A superior humeral brown stripe and a narrow black stripe on postero-lateral suture, finally a short lower black line at level of spiracle. A black square with an angular black line crossing, it. Crimson neuration, broad amber-yellow at base of wing, dark brown rays in subcostal and cubital space.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills and Jaintia hills); West Bengal. NEPAL, TIBET, PAKISTAN, SRI LANKA, BURMA, VIETNAM, MALAYSIA, INDONESIA, TAIWAN, PHILIPPINES.

Remarks : This species inhabits upto an altitude of *ca* 1500 meters. It prefers montane streams. It is easily distinguishable from the other Indian species of the genus by having general violaceous colouration.

Genus *Hydrobasileus* Kirby

1889. *Hydrobasileus* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 266.

1936. *Hydrobasileus* : Fraser, *Fauna Brit. India, Odon.*, 3 : 428.

No Key is provided, as this genus has single representative viz. *H. croceus* (Brauer) in Meghalaya.

Hydrobasileus croceus (Brauer)

1867. *Tramea croceus* Brauer, *Verh. Zool. bot. Ges. Wien.*, 17 : 813.

1890. *Hydrobasileus croceus* : Karsch, *Berlin Ent. Zeit.* 33 : 351.

1936. *Hydrobasileus croceus* : Fraser, *Fauna Brit. India, Odon.*, 3 : 429.

Distribution : INDIA : Meghalaya (Khasai hills); Assam, Maharashtra, Karnataka, Kerala, Madhya Pradesh, Rajasthan. BURMA, VIETNAM, INDONESIA, TAIWAN, SRI LANKA, PHILIPPINES, MALAYSIA.

Remarks : This species is included on the basis of the literature review. It inhabits weedy tanks and lakes. It is one of the largest and finest Libellulines and magnificent insect when seen in flight.

Genus *Tramea* Hagen

1861. *Tramea* Hagen, *Syn. Neur. amer.*, 114.

1936. *Tramea* : Fraser, *Fauna Brit. India, Odon.*, 3 : 431.

No key to the species of the genus *Tramea* Hagen is provided, as it has sole representative viz., *T. basilaris burmeisteri* in Meghalaya.

Tramea basilaris burmeisteri Kirby

1839. *Libellula chinensis* Burmeister, *Handb. Ent.*, 2 : 852.

1889. *Tramea burmeisteri* : Kirby, *Trans. zool. Soc. Lond.*, 12 : 316.

1936. *Tramea basilaris burmeisteri* : Fraser, *Fauna Brit. India, Odon.*, 3 : 432.

Material : 3 MM, Khasai Hills, Laithyra, *ca* 10 km. south of Cherrapunjee, 16.ix. 88, A.R. Lahiri coll.

Diagnosis : Labrum reddish brown bordered with black. Postclypeus and frons bright vermilion-red. Prothorax yellowish, thorax olivaceous with reddish tinge on dorsum, bluish laterally.

Abdomen bright reddish brown with black markings. Anal appendages very long, thrice the length of abd. 8 to 10. Two large black spots at base of hindwings surrounded by a golden-yellow areola.

Distribution : INDIA : Meghalaya (Khasai hills), Himachal Pradesh, Punjab, Kerala, Rajasthan, Uttar Pradesh, West Bengal. BURMA, SRILANKA, MALAYSIA.

Remarks : This species inhabits plains, submontane and montane habitats upto an altitude of 2500 meters. It can be distinguished from *T. limbata* (Desjardins) & *T. virginia* (Rambur) by having double spot on hind wing instead of only one.

Genus *Neurothemis* Brauer

1842. *Polyneura* Rambur. Hist. nat. Ins. Nevrop., : 26.

1867. *Neurothemis* Brauer, Verh. Zool. bot. Ges. Wien., 17 : 289/

1936. *Neurothemis* : Fraser, Fauna Brit. India, Odon., : 3 : 350.

Key to the species of the genus Neurothemis Brauer

1. Bases of wings of male broadly black; black area outwardly edged with an opalescent white band.....*tullia tullia* (Drury).
- Bases of wings of male not broadly black; no opalescent white band present.....2.
2. Wings broadly dark reddish brown with neuration very close, enclosed clear window in each wing at apex.....*fulvia* (Drury).
- Wings tinted with pale or golden-yellow at base, reticulation open, no enclosed clear window at apex.....3.
3. Yellow area at base of wings not very sharply defined and rather pale in colour, costal border of wings pale yellow as far as pterostigma, a pale brown humeral stripe on thorax...
.....*intermedia intermedia* (Rambur).
- Yellow area at base of wings very well defined and deep amber yellow as a rule, humeral stripe absent on thorax.....*intermedia atlanta* Ris.

Neurothemis tullia tullia (Drury)

1773. *Libellula tullia* Drury I 11, Exot. Ins., 2 : 85.

1890. *Neurothemis tullia* (Drury) : Kirby, Syn. Cat. neur. Odon., : 8.

1911. *Neurothemis tullia tullia* (Drury) : Ris. Cat. Coll. Selys., 13 : 551.

1936. *Neurothemis tullia tullia* : Fraser, Fauna Brit. India, Odon., 3 : 360.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills); Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Tripura, Sikkim, Uttar Pradesh, West Bengal. NEPAL, TIBET, CHINA, SRI LANKA, BURMA, THAILAND, VIETNAM, MALAYSIA.

Remarks : This species is included on the basis of the literature review. It inhabits swamps or heavily-weeded tanks. It is easily distinguished from other Indian species of the genus by having a white opalescent band bordering basal black in the wings of male and in female by broad black apices of wings.

Neurothemis fulvia (Drury)

1773. *Libellula fulvia* Drury I 11, *Exot. Ins.*, 2 : 84.

1889. *Neurothemis fulvia* (Drury) : Kirby, *Trans. Zool. Soc. Lond.*, 12 : 271.

1936. *Neurothemis fulvia* : Fraser, *Fauna Brit. India, Odon.*, 3 : 353.

Material : 2 FF, E. Garo hills dist., Nafa village, nr. Tasek, Songsak, stn. 2, 2.vii. 88, R. K. Ghosh and party coll.

Diagnosis : Prothorax, thorax and abdomen reddish-brown. Sutures and borders of latter finely black. Legs and anal appendages dark ferruginous. Wings dark reddish brown from base to about middle of pterostigma. Apex of wings opaque brown enclosing a clear window in each wing in male. In female wings are clear amber yellow, a dark ray in subcostal space expanding at node into large quadrate nodal spot.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills, Jaintia hills); Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. NEPAL, CHINA, BANGLADESH, BURMA, THAILAND, VIETNAM, MALAYSIA, INDONESIA.

Remarks : This species inhabits weedy ponds or marshes and occurs from plains to an altitude of 1000 meters. It can be easily distinguished by having clear, hyaline window enclosed in dark reddish-brown wings of male and uniform golden-amber tinted wings with or without clear hyaline window in fore wing of female.

Neurothemis intermedia intermedia (Rambur)

1842. *Libellula intermedia* Rambur, *Hist. nat. Ins. Nevrop.*, : 91.

1889. *Neurothemis intermedia* : Selys. *Ann. Mus. Civ. Genova.*, 27 : 454.

1911. *Neurothemis intermedia intermedia* : Ris, *Cat. Coll. Selys fase.*, 13 : 551, 563, 564.

1936. *Neurothemis intermedia intermedia* : Fraser, *Fauna Brit. India, Odon.*, 3 : 357.

Distribution : INDIA : Meghalaya (Garo hills, Khasai hills, Jaintia hills); Assam, Arunachal Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. NEPAL, SRI LANKA, BURMA.

Remarks : This species is included on the basis of the literature review. Wing marking are very much restricted in which this species is differentiated from all Indian subspecies and species of the genus.

***Neurothemis intermedia atalanta* Ris**

1916. *Neurothemis intermedia atalanta* Ris, *Cat. Coll. Selys.*, 16 : 1168.

1936. *Neurothemis intermedia atalanta* : Fraser, *Fauna Brit. India, Odon.*, 3 : 358.

Distribution : INDIA : Meghalaya; Assam, Kerala, Sikkim, Tripura. NEPAL, BURMA, THAILAND.

Remarks : This species is included on the basis of the literature review. It closely resembles *Neurothemis i. intermedia*, but can be differentiated from *intermedia intermedia* by having yellow area at base of wings very well defined and deep amber yellow. costal border of wings not tinted with yellow and humeral stripe absent in thorax and this species also very smaller than *N. i. intermedia*.

Genus *Crocothemis* Brauer

1868. *Crocothemis* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 367, 736.

1936. *Crocothemis* : Fraser, *Fauna Brit. India, Odon.*, 3 : 343.

No Key is provided, as this has sole representative namely *C. s. servilia* (Drury) in not only Meghalaya but also whole of India.

***Crocothemis s. servilia* (Drury)**

1770. *Libellula servilia* Drury, 111, *Ex. Ins.* 1 : 112.

1868. *Crocothemis servilia* : Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 737.

1911. *Crocothemis servilia servilia* : Ris, *Cat. Coll. Selys.*, 13 : 533.

1936. *Crocothemis servilia servilia* : Fraser, *Fauna Brit. India, Odon.*, 3 : 345..

Material : 2 MM, Khasai Hills, Nr. Umwai, ca. 22 kms. from Cherrapunjee, 15.ix. 88, A.R. Lahiri coll.; 1 F, Dispur, 6.vi. 90; M.S. Shishodia and party coll.; 1 M, 1 F, East Khasai Hills, 24.v. 90, M.S. Shishodia and party coll.; 1 M, 1 F, East Khasai Hills, Cherrapunjee, 24.v. 90, M.S. Shishodia coll.; 2 FF, Jaintia Hills, Muktapur, 21.v. 90, M.S. Shishodia coll.; 4 FF, Khasai Hills Motinagar, 4.xii. 71, R. Giri coll.; 1 M, Jowai, 20.iii. 91, B.C. Das and Party coll.; 1 F, Shillong, 17.iiix. 91, B.C. Das and party coll.; 1 M, Garo hills, William Nagar, 8.iii. 91, B.C. Das and party coll.; 1 F, E. Khasai hills, Lum Nehru Park, Barapani 21.iii. 91, A.K. Sanyal and party coll.

Diagnosis : Major parts of head of male blood red. Middle lobe of prothorax ridged transversely and this ridge bearing a tuft of stiff reddish hairs. Often dorsum of thorax, abdomen and anal appendage blood red. Bases of all wings marked with rich amber yellow apices of wings narrowly pale brown. Female on whole are yellow.

Distribution : INDIA : Meghalaya (Shillong, Cherrapunjee, Khasai hills, Jaintia hills); Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Punjab, Rajasthan, Uttar Pradesh. NEPAL, CHINA, BANGLADESH, SRI LANKA, BURMA, THAILAND, MALAYSIA, INDONESIA, JAPAN, TAIWAN, PHILIPPINES, IRAN, IRAQ.

Remarks : This species is very common of the Indian Libellulids. It can be distinguished from its sub-species *Crocothemis servilia erythraea* (Brulle) by genitalia. Those of *servilia servilia* having posterior end of hamule more obtuse and the hook in *servilia erythraea* having a small spine near its apex, which is absent in *servilia servilia*. In addition to this *Crocothemis servilia servilia* has the middorsal carina of segments 8 and 9 marked with black instead of red without black markings.

Genus *Brachythemis* Brauer

1868. *Brachythemis* Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 736.

1936. *Brachythemis* : Fraser, *Fauna Brit. India, Odon.*, 3 : 363.

No Key is provided, as this genus has sole representative, *B. Contaminata* (Fabr.) in Meghalaya.

Brachythemis contaminata (Fabricius)

1793. *Libellula contaminata* Fabricius, *Entom. Syst.* 2 : 382.

1868. *Brachythemis contaminata* (Fabricius) : Brauer, *Verh. Zool. bot. Ges. Wien.*, 18 : 736.

1936. *Brachythemis contaminata* : Fraser, *Fauna Brit. India, Odon.*, 3 : 365.

Material : 1 M, 1 F, Wari, North of Tura, Stn. No. 1, 10.x. 88, K.K. Ray and Party coll.

Diagnosis : Small sized, stout build Libellulid (Abd. 18–21 mm and hind wing 20–23 mm). Body colour ochreous, olivaceous brown to reddish brown. Prothorax with dark reddish brown transverse stripes, an obscure reddish-brown humeral stripes on dorsum and two on sides of thorax. Wings with bright orange fascia from base to within 2 to 3 cells of pterostigma, fascia absent in female. Abdomen reddish ochreous marked with dorsal and sub-dorsal brown stripes.

Distribution : INDIA : Meghalaya (Wari, North of Tura, Garo Hills); Assam, Bihar, Himachal Pradesh, Madhya, Punjab, Rajasthan, Uttar Pradesh, West Bengal. NEPAL, CHINA, BANGLADESH, SRI LANKA, BURMA, THAILAND, MALAYSIA, INDONESIA, JAPAN, TAIWAN, PHILIPPINES.

Remarks : This is very common species, found in inhabiting almost everywhere. It is inhabiting borders of both lentic (weedy ponds, lakes and lotic slowly moving streams). This species is distinguishable from its allied genus *Crocothemis* in having broad reddish-yellow median fascia instead of small yellow basal markings and lesser number of antennal nervures ($6\frac{1}{2}$ to $7\frac{1}{2}$: $9\frac{1}{2}$ to $10\frac{1}{2}$).

Genus *Lathrecista* Kirby

1889. *Lathrecista* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 264.

1936. *Lathrecista* : Fraser, *Fauna Brit. India, Odon.*, 3 : 280.

No key is provided, as this genus has sole representative, namely *L. a. asiatica* (Fabricius) in Meghalaya.

Lathrecista a. asiatica (Fabricius)

1798. *Libellula asiatica* Fabricius, *Ent. Syst. Suppl.*, 283.

1909. *Lathrecista asiatica asiatica* : Ris, *Cat. Coll. Selys. fasc.*, 9 : 129.

1936. *Lathrecista asiatica asiatica* : Fraser, *Fauna Brit. India, Odon.*, 3 : 281.

Material : 1 M, Khasai Hills, Motinagar, 5.v. 73, M.S. Jyrawa coll.

Diagnosis : Prothorax blackish-brown. Thorax dark coppery-brown on dorsum bright yellow laterally. Two small yellow spots in antealar sinus. Abdomen 1 & 2 with a broad lateral and a mid-dorsal stripe. All sutures on these two segments are finely black. Segment 3–8 bright crimson-red, 9 and 10 black. Wing hyaline with apices enfumed or may be reddish brown to proximal end of pterostigma.

Distribution : INDIA : Meghalaya (Khasai Hills); West Bengal. SAMOA, SUNDAIC ARCHIPELAGO, BORNEO, NEW GUINEA, PHILIPPINES.

Remarks : This species inhabits small stagnant water body. It is closely related to *A. insignis* and *N. lineata* by the yellow spots behind head which are borne by all species of these genera but is easily distinguished from them by the great length of the anal loop. It is also distinguished from allied species of genus *Potamarcha* by having only one row of cell between IRiii and Rspl, instead of two.

Genus *Potamarcha* Karsch

1890. *Potamarcha* Karsch, *Berlin Ent. Zeit.*, 33 : 370.

1936. *Potamarcha* : Fraser, *Fauna Brit. India, Odon.*, 3 : 288.

No Key is provided, as this genus has sole representative, *P. obscura* (Rambur) in Meghalaya.

Potamarcha congener (Rambur)

1842. *Libellula obseura* Rambur, *Hist. nat. Ins. Nevrop.*, 64.

1842. *Libellula congener* Rambur, *Hist. nat. Ins. Nevrop.*, 70.

1991. *Potamarcha congener* (Rambur) : Selys, *Anal Soc. Esp. Hist. nat.*, 20 : 221.

Material : 2 FF, Jaintia Hills, Muktapur, 21.v. 90, M.S. Shishodia coll.; 2 FF, Jaintia Hills, Garampani, 22.v. 90, M.S. Shishodia coll.; 1 F, W. Garo Hills dist., Shibbari, R.W.D./B, Stn. No. 5, 13.vii. 88, R.K.Ghsosh and party coll.

Diagnosis : Face and frons olivaceous yellow. Prothorax dark brown, thorax black and pruinosed in adult. Wing tipped with brown at extreme apices. Two rows of cells between IRiii and Rspl. Arc lying between first and second antenodal nervures. Only 1 cubital nervure to all wings. Anal Appendages black.

Distribution : INDIA : Meghalaya (Jaintia hills and Garo hills); Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Nagaland, Orissa, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. SRI LANKA, NEPAL, BURMA, BANGLADESH, THAILAND, MALAYSIA, INDONESIA, NEW GUINEA, TAIWAN, PHILIPPINES, AUSTRALIA.

Remarks : This species inhabits small weedy, stagnant water body. It is distinguished from *Cratilla lineata* (Brauer) by the absence of supplementary nervure to the bridge and by the incomplete distal antenodal nervure of fore-wings.

(IV : ii) CLASSIFIED LIST OF ODONATES FROM MEGHALAYA

A comprehensive list of Odonates from Meghalaya is provided. Same is arranged systematically under suborders, superfamilies, families, subfamilies, genera, species. This includes all known species so far known, including those which are studied on the basis of material present in the National Zoological Collection of Zoological Survey of India and recent material collected by Z.S.I. survey parties from this state. These are marked with material (a), species which are recorded for the first time are marked with double asterix (**), while species without asterix marks are based on the literature review, while species whose type material has also been examined in addition are marked with single plus (+).

Order : ODONATA

Suborder : A, ZYGOPTERA

Superfamily : I, COENAGRIONOIDEA

Family : 1, COENAGRIONIDAE

Subfamily : ISCHNURINAE

Genus (1) *Ceriagrion* Selys

- | | |
|---------|--|
| Species | 1. <i>C. azureum</i> (Selys) |
| Species | (a) 2. <i>C. coromandelianum</i> (Fabricius) |
| Species | (a) 3. <i>C. fallax</i> Ris |
| Species | (a) 4. <i>C. olivaceum</i> Laidlaw |

Genus (2) *Pseudagrion* Selys

- | | |
|---------|-------------------------------------|
| Species | 5. <i>P. australasiae</i> Selys |
| Species | (a) 6. <i>P. r. rubriceps</i> Selys |
| Species | 7. <i>P. spenci</i> Fraser |

Genus (3) *Aciagrion* Selys

- Species (a) 8. *A. pallidum* Selys
 Species 9. *A. tillyardi* Laidlaw
 Species ** (a) 10. *A. olympicum* Laidlaw

Genus (4) *Enallagma* Charpentier

- Species 11. *E. parvum* Selys

Genus (5) *Ischnura* Charpentier

- Species (a)12. *I. a. aurora* (Hagen)
 Species 13. *I. r. rufostigma* Selys

Genus (6) *Agriocnemis* Selys

- Species 14. *A. clauseni* Fraser
 Species 15. *A. lacteola* Selys
 Species (a) 16. *A. pygmaea* (Rambur)

Genus (7) *Argiocnemis* Selys

- Species (a) 17. *A. obscura* Laidlaw

Family – 2, PROTONEURIDAE

Genus (8) *Ellatoneura* Cowley

- Species 18. *E. atkinsoni* (Selys)
 Species 19. *E. campioni* (Fraser)

Genus (9) *Prodasineura* Cowley

- Species 20. *P. autumnalis* (Fraser)

Family – 3, PLATYCNEMIDIDAE

Subfamily : PLATYCNEMININAE

Genus (10) *Copera* Kirby

- Species (a) 21. *C. annulata* (Selys)
 Species 22. *C. marginipes* (Rambur)
 Species (a) 23. *C. vittata* (Selys)
 Species ** (a) 24. *C. superplatypes* Fraser

- Subfamily : CALICNEMINAE
- Genus (11) *Calicnemia* Strand
- Species 25. *C. eximia* (Selys)
- Species 26. *C. imitans* (Liefelinckr)
- Species 27. *C. mukherjeei* Lahiri
- Species + ** (a) 28. *C. miniata* Selys
- Genus (12) *Coeliceia* Kirby
- Species + 29. *C. bimaculata* Laidlaw
- Species 30. *C. didyma* (Selys)
- Species + 31. *C. fraseri* Laidlaw
- Species 32. *C. sarbottama* Lahiri
- Species + 33. *C. vacca* Laidlaw
- Genus (13) *Indocnemis* Laidlaw
- Species + 34. *I. kempi* Laidlaw
- Superfamily II, LESTIDOIDEA
- Family 4, CHLOROLESTIDAE
- Subfamily : MEGALESTINAE
- Genus (14) *Megalestes* Selys
- Species 35. *M. major* Selys
- Species + 36. *M. raychoudhuri* Lahiri
- Family 5, LESTIDAE
- Subfamily : SYMPECMATINAE
- Genus (15) *Indolestes* Fraser
- Species + 37. *I. indica* Fraser
- Subfamily : LESTINAE
- Genus (16) *Orolestes* McLachlan
- Species + 38. *O. durga* Lahiri
- Genus (17) *Lestes* (Leach)

- Species 39. *L. concinnus* Selys
- Species 40. *L. dorothea* Fraser
- Species + 41. *L. garoensis* Lahiri
- Superfamily – III, CALOPTERYGOIDEA
- Family – 6, AMPHIPTERYGIDAE
- Subfamily : PHILOGANGINAE
- Genus (18) *Philoganga* Selys
- Species 42. *P. montana* Selys
- Family – 7, CHLOROCYPHIDAE
- Genus (19) *Libellago* Selys
- Species 43. *L. I. lineata* (Burmeister)
- Genus (20) *Rhinocypha* Rambur
- Species 44. *R. beatifica* Fraser
- Species 45. *R. biforata delimbata* Selys
- Species 46. *R. ignipennis* Selys
- Species (a) 47. *R. immaculata* Selys
- Species 48. *R. quadrimaculata hemilyalina* Fraser
- Species (a) 49. *R. q. quadrimaculata* Selys
- Species (a) 50. *R. spuria* Selys
- Species ** (a) 51. *R. cuneata* Selys
- Species 52. *R. vitrinella* Fraser
- Family – 8, EUPHAEIDAE
- Genus (21) *Anisopleura* Selys
- Species ** (a) 53. *A. lestoides* Selys
- Species 54. *A. subplatystyla* Fraser
- Genus (22) *Bayadera* Selys
- Species 55. *B. hyalina* Selys
- Species 56. *B. indica* (Selys)

Genus (23) *Euphaea* SelysSpecies 57. *E. ochracea brunnea* SelysSpecies 58. *E. o. ochracea* Selys

Family – 9, CALOPTERYGIDAE

Subfamily : CALIPHAENAE

Genus (24) *Caliphaea* SelysSpecies 59. *C. confusa* Selys

Subfamily : CALOPTERYGINAE

Genus (25) *Echo* SelysSpecies (a) 60. *E. m. margarita* SelysSpecies (a) 61. *E. m. tripartita* SelysGenus (26) *Matrona* SelysSpecies (a) 62. *M. b. basilaris* SelysSpecies (a) 63. *M. b. nigripectus* SelysGenus (27) *Neurobasis* SelysSpecies 64. *N. c. chinensis* (Linnaeus)Genus (28) *Vestalis* SelysSpecies (a) 65. *V. smaragdina* (Selys)Species (a) 66. *V. g. gracilis* (Rambur)

Suborder – B, ANISOPTERA

Superfamily – IV, CORDULEGASTEROIDEA

Family – 10, CORDULEGASTERIDAE

Subfamily : CHLOROGOMPHINAE

Genus (29) *Chlorogomphus* SelysSpecies 67. *C. atkinsoni* (Selys)Species 68. *C. campioni* (Fraser)Species 69. *C. fraseri* St. Quentin

Superfamily – V, AESHNOIDEA

Family – 11, AESHNIDAE

Division –a, BRACHYTRINI

Subfamily : GOMPHAESHNINAE

Genus (30) *Oligoaeschna* Selys

Species 70. *O. decorata* Lieftinck

Species 71. *O. khasiana* Lieftinck

Species 72. *O. martini* (Laidlaw)

Subfamily : BRACHYTRINAE

Genus (31) *Austroaeschna* Selys

Species 73. *A. intersedens* Martin

Genus (32) *Periaeschna* Martin

Species 74. *P. biguttata* (Fraser)

Species 75. *P. magdalena* Martin

Species 76. *P. nocturnalis* Fraser

Genus (33) *Petaliaeschna* Fraser

Species 77. *P. fletcheri* Fraser

Genus (34) *Tetracanthagyna* Selys

Species 78. *T. waterhousei* McLachlan

Division – b, AESHNINI

Subfamily – AESHNINAE

Genus (35) *Aeshna* Fabricius

Species 79. *A. petalura* Martin

Subfamily : ANACTINAE

Genus (36) *Anax* Leach

Species 80. *A. guttatus* (Burmeister)

Subfamily : GYNACANTHAGINAE

Genus (37) *Gynacantha* Rambur

Species 81. *G. bayadera* Selys

- Species 82. *G. hyalina* Selys
- Species 83. *G. khasiaca* McLachlan
- Family – 12 GOMPHIDAE
- Subfamily : GOMPHINAE
- Genus (38) *Anisogomphus* Selys
- Species 84. *A. caudulis* Fraser
- Species 85. *A. orites* Laidlaw
- Genus (39) *Burmagomphus* Williamson
- Species 86. *B. vermicularis* (Martin)
- Genus (40) *Davidius* Selys
- Species 87. *D. malloryi* Fraser
- Genus (41) *Leptogomphus* Fraser
- Species 88. *L. bidentatus* (Fraser)
- Genus (42) *Gomphus* Leach
- Species 89. *G. personatus* Selys
- Genus (43) *Heliogomphus* Laidlaw
- Species 90. *H. selysi* (Fraser)
- Species 91. *H. spirillus* (Fraser)
- Genus (44) *Megalogomphus* Champion
- Species 92. *M. bicornatus* (Fraser)
- Genus (45) *Macrogomphus* Martin
- Species 93. *M. martini* (Fraser)
- Genus (46) *Nihonogomphus* Oguma
- Species + 94. *N. indicus* Lahiri
- Genus (47) *Onychogomphus* Selys
- Species 95. *O. aureus* Laidlaw
- Species 96. *O. maculivertex* Selys
- Species + 97. *O. meghalayanus* Lahiri

- Species 98. *O. modestus* Selys
- Species 99. *O. sundersi duaricus* Fraser
Genus (48) *Paragomphus* Cowley
- Species 100. *P. echinoocipitalis* (Fraser)
- Species (a) 101. *P. lineatus* (Selys)
Genus (49) *Stylogomphus* Fraser
- Species 102. *S. inglisi* Fraser
Genus (50) *Anormogomphus* Selys
- Species ** (a) 103. *A. heteropterus* Selys
Subfamily : EPIGOMPHINAE
Genus (51) *Perissogomphus* Laidlaw
- Species 104. *P. stevensi* Laidlaw
Subfamily : ICTINOGOMPHINAE
Genus (52) *Ictinogomphus* Cowley
- Species ** (a) 105. *I. rapax* (Rambur)
- Superfamily— VI, LIBELLULOIDEA
Family— 13, CORDULIIDAE
Subfamily : CORDULIINAE
Genus (53) *Hemicordulia* Selys
- Species 106. *H. asiatica* Selys
Subfamily : EPIOPHTHALMINAE
Genus (54) *Epopthalmia* Burmeinter
- Species 107. *E. v. vittata* Brauer
Subfamily : MACROMINAE
Genus (55) *Idionyx* Hagen
- Species 108. *I. imbricata* Fraser
- Species 109. *I. intricata* Fraser
- Species 110. *I. optata* Selys

- Genus (56) *Macromia* Rambur
- Species 111. *M. moorei* Selys
- Family : 14, LIBELLULIDAE
- Genus (57) *Tetrathemis* Selys
- Species 112. *T. platyptera* Selys
- Genus (58) *Lyriothemis* Brauer
- Species 113. *L. bivittata* (Rambur)
- Species 114. *L. tricolor* Ris
- Genus (59) *Orthetrum* Newman
- Species (a) 115. *O. glaucum* (Brauer)
- Species (a) 116. *O. japonicum internum* Mclachlan
- Species 117. *O. luzonicum* (Brauer)
- Species (a) 118. *O. pruinatum neglectum* (Rambur)
- Species (a) 119. *O. sabina* (Drury)
- Species *(a) 120. *O. b. brunneum* (Fonscolombe)
- Species 121. *O. t. triangulare* (Selys)
- Genus (60) *Potamarcha* Karsch
- Species (a) 122. *P. congener* (Rambur)
- Genus (61) *Palpopleura* Rambur
- Species (a) 123. *P. s. sexmaculata* (Fabricius)
- Genus (62) *Lathricista* Kirby
- Species *(a) 124. *L. a. asiatica* (Fabricius)
- Genus (63) *Brachydiplax* Brauer
- Species 125. *B. sobrina* (Rambur)
- Species *(a) 126. *B. chalybea* (Brauer)
- Genus (64) *Nanophya* Rambur
- Species 127. *N. pygmaea* Rambur
- Genus (65) *Acisoma* Rambur
- Species 128. *A. p. panorpoides* Rambur

- Genus (66) *Brachythemis* Brauer
- Species (a) 129. *B. contaminata* (Fabricius)
- Genus (67) *Crocothemis* Brauer
- Species (a) 130. *C. s. servilia* (Drury)
- Genus (68) *Diplacodes* Kirby
- Species 131. *D. nebulosa* Fabricius
- Species (a) 132. *D. trivialis* (Rambur)
- Genus (69) *Neurothemis* Brauer
- Species (a) 133. *N. fulvia* (Drury)
- Species 134. *N. intermedia atlanta* (Rambur)
- Species 135. *N. i. intermedia* (Rambur)
- Species 136. *N. t. tullia* (Drury)
- Genus (70) *Sympetrum* Newman
- Species 137. *S. hypomelas* (Selys)
- Species 138. *S. orientale* (Selys)
- Genus (71) *Trithemis* Brauer
- Species (a) 139. *T. aurora* (Burmeister)
- Species (a) 140. *T. festiva* (Rambur)
- Species (a) 141. *T. pallidinervis* (Kirby)
- Genus (72) *Zygonyx* Hagen
- Species 142. *Z. iris davina* Fraser
- Species+ 143. *Z.i. iris* Selys
- Species 144. *Z.i. intermedia* Lahiri
- Genus (73) *Onychothemis* Brauer
- Species 145. *O. testacea* Laidlaw
- Genus (74) *Rhythoemis* Hagen
- Species 146. *R. v. variegata* (Linnaeus)
- Genus (75) *Tholymis* Hagen
- Species 147. *T. tillarga* (Fabricius)

- Genus (76) *Hydrobasileus* Kirby
- Species 148. *H. croceus* (Brauer)
- Genus (77) *Pantala* Hagen
- Species (a) 149. *P. flavescens* (Fabricius)
- Genus (78) *Urothemis* Brauer
- Species 150. *U. s. signata* (Rambur)
- Genus (79) *Tramea* Hagen
- Species *(a) 151. *T. basilaris burmeisteri* Kirby

SUMMARY

Present contribution is a part of survey's programme of "State Fauna Series : Meghalaya" and deals with beautiful insects, the flying wonder of Insect Kingdom : namely Odonates (Dragonflies and Damselflies). It provides a comprehensive account of the faunal element of these insects in Meghalaya vis-a-vis those found in rest of India. A brief historical account, material and method is followed by keys to all level of taxa involved, diagnostic features, material examined, distribution pattern in respect of each constituent species within Meghalaya, rest of India and elsewhere. A systematically arranged, consolidated list of 151 species of Odonates has been also provided. Meghalaya odonates are approximately 1/3 (151:494) of whole Indian component. Of these Zygopterans are represented by 66 species under 28 genera which are spread over 9 families. Anisopterans are represented by 85 species under 51 genera spread over 5 families. Zygoptera and Anisoptera are in ratio of 1: 3.77 approximately (66:85). Among Zygoptera maximum representation is of the family Coenagrionidae (20 : 66) and among Anisoptera family Libellulidae (40:85) has maximum representation. Maps showing distribution pattern of certain interesting species (most abundant rare or endemic) are provided (Maps 1-13) besides generalized labelled diagram of Zygoptera and Anisoptera (Plate I & II); certain anal appendages and genitalia (Plate III & IV). Proportionate occurrences of Meghalaya Odonata vis-a-vis other among, Indian component; Zygoptera vis-a-vis Anisoptera among Meghalaya odonates and of various superfamilies, families among Meghalaya component of these insects (Plate V). One table is also provided indicating quantum of species and genera of odonates in Meghalaya vis-a-vis rest of India.

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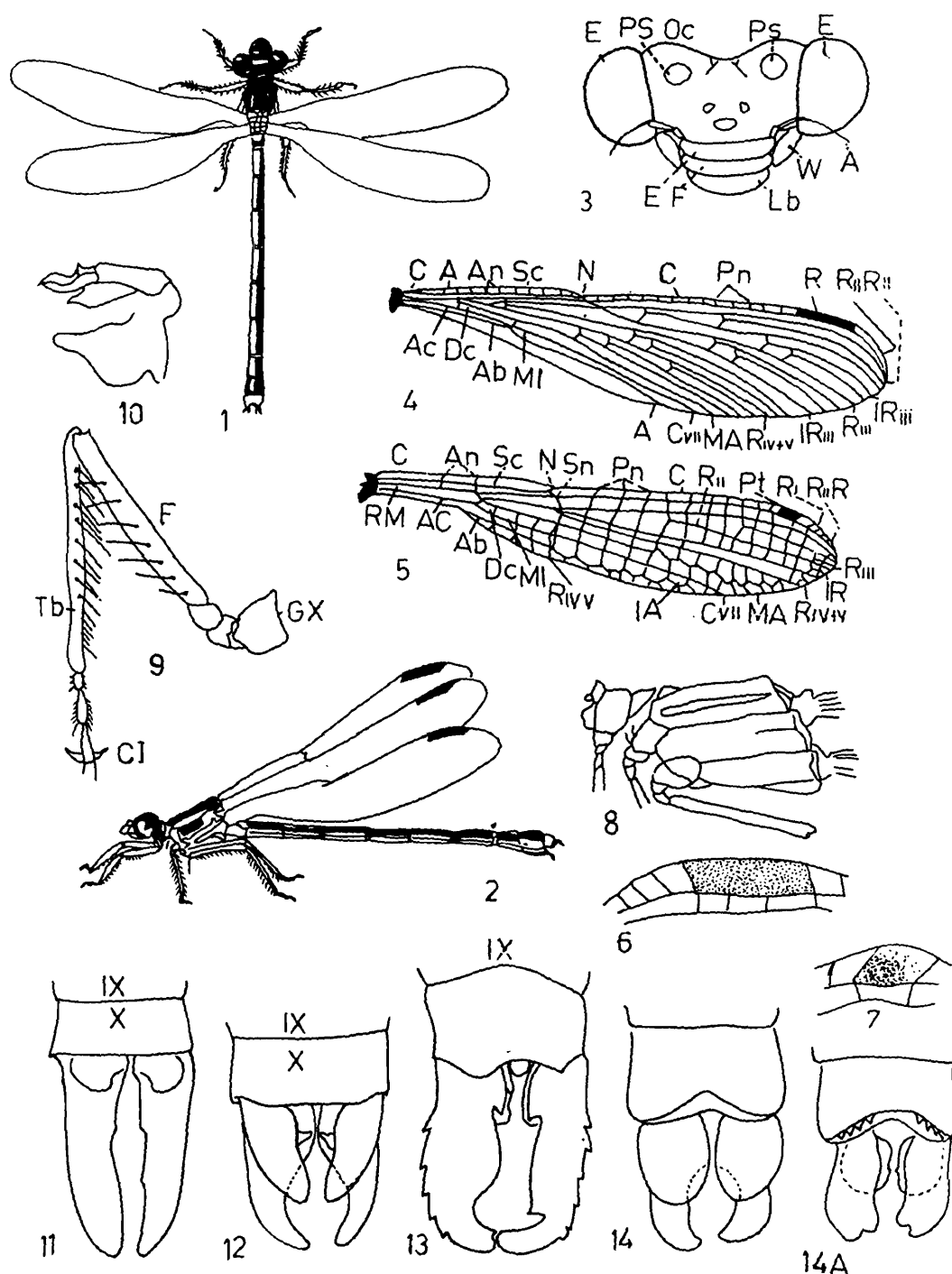
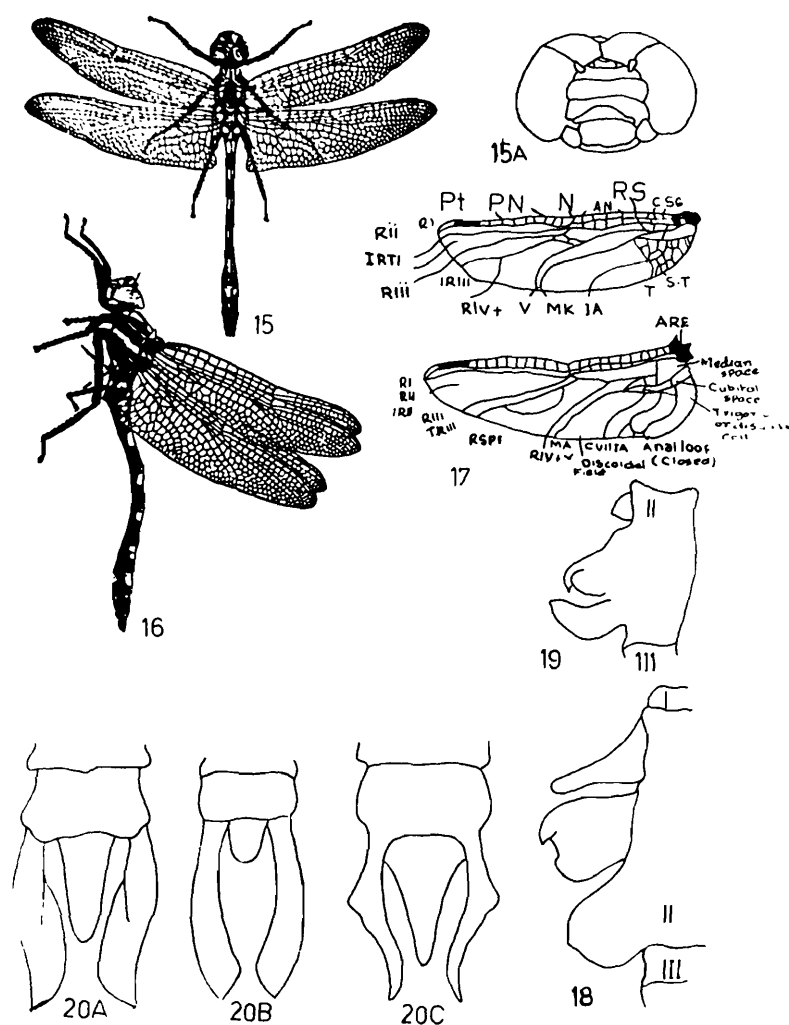


PLATE I.

ZYGOPTERA (DAMSELFLY)

1. Zygoptera (dorsal view); 2. Zygoptera (Lateral view); 3. Head of Zygoptera (dorsal view); 4. Wing of Zygoptera-(Coenagrionidae); 5. Wing of Zygoptera —Agrionidae; 6. Pterostigma of a Lestid damselfly; 7. Pterostigma of a Ischnurid damselfly; 8. Lateral view of thorax of Zygoptera; 9. One of the leg of Zygoptera; 10. Male accessory genital structure of Zygoptera; 11-14A. Dorsal view of anal appendages of certain Zygoptera : *Copera marginipes*, *Calcinemia eximia*, *Lestes concinnus*, *Ceriagrion coromandalianum* and *Pseudagrion australasae* respectively.

**PLATE II****ANISOTERA (DRAGONFLY)**

15. Anisoptera (dorsal view); 15A. Head of Anisoptera (dorsal view) 16. Anisoptera (Lateral view); 16A. *Pterostigma* of *Bradinopyga geminata*; 17. Nodal index-Count of Antenodal and postnodal nervure of all wings; 18. Male accessory genital structure of Anisoptera.

Orthetrum glaucum : 19. Male accessory genital structure of Anisoptera *Trithemis aurora*; 20.A-C. Dorsal view of anal appendages of Anisoptera *Anax guttatus*, *Gynacantha huyalina* and *Macromia moorei* respectively.

Explanation of abbreviations : (Plate I and Plate II)

A=(Head) Antennae, A=(Wings) arc, Ab=Anal bridge, Ac=Head Anteclypeus, Ac=(Wings) Anal crossing
 Al= Anal loop, An=Antenodal nervures, C= (Head) Clypeus, C=(Wings) Costa, Cuii = Second cubitus
 CL= Claw, Cs=Cubital space, Cx=Coxa, Do=discoidal cell, Df=Discoidal field, E=Eye, F=(Head) Frons,
 F=(Leg) Femur, IA=First anal, IRii and IRiii=Branches and intercalated branches of radius, Lb=Labrum,
 M=basis of Mandibles, MA=Anterior median, MI=Principal Sector, MS=Median Space, N=Node, O=Occiput,
 Oc=Ocelli, Pn= Postnodal Nervures, PS=Postocular spots, Pt=Pterostigma, Ri=Radius, Rii, Riii &
 Riv+v=Branches and intercalated branches of radius, R+M=Radius median, RS=Radial Sector,
 RSpl=Supplementary nervure to radius, SC= Subcosta, Sn=Subnode, S.T.=Subtrigone, T=Trigone, Tb=Tibia,
 Th=Trochanter, Tr=Tarsus.

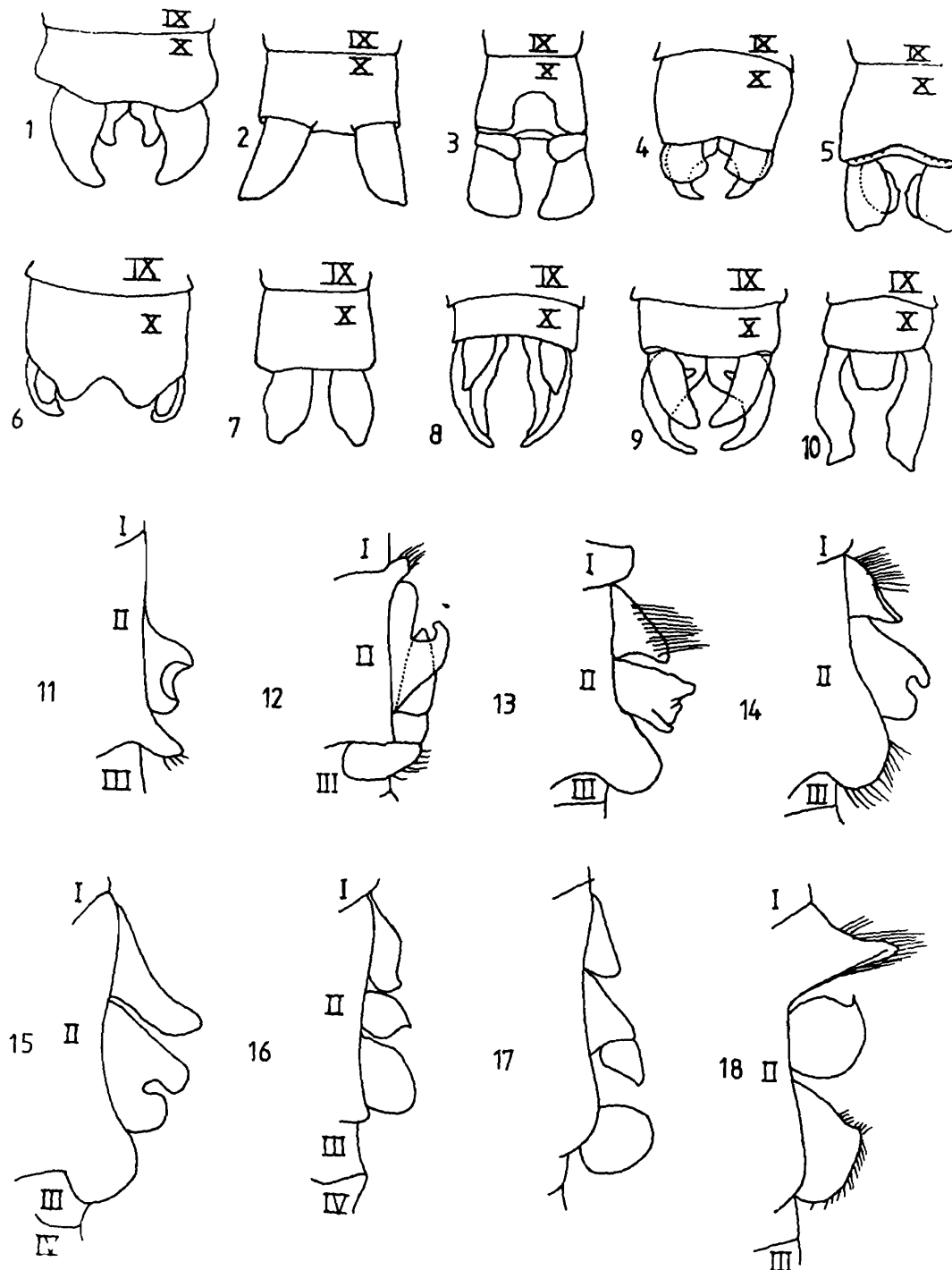


PLATE- III : Certain representative anal appendages: dorsal view:

Figs 1 to 10 [Fig.1-*Aciagrion pallidum*, 2-*Ischura a. aurora* 3- *Enallagma parvum*, 4-*Ceriagrion coromandelianum*, 5-*Pseudagrion australasiae*, 6-*Onychargia atrocyna*, 7-*Agriocnemis pygmaea* 8-*Copera annulata*, 9-*Calicnemia eximia*, 10-*Anax guttatus*.]

Certain representative external genitalia of male, in lateral profile : Figs. 11 to 18 [Fig. 1-*Brachydiplax sobrina*, 12- *Acisoma p. panorpoides*, 13-*Orthetrum sabina*, 14-*O. Pruinsum neglectum*, 15-*O. glaucum*, 16-*Brachythemis contaminata*, 17-*Urothemis s. signata*, 18-*Trithemis festiva*.]

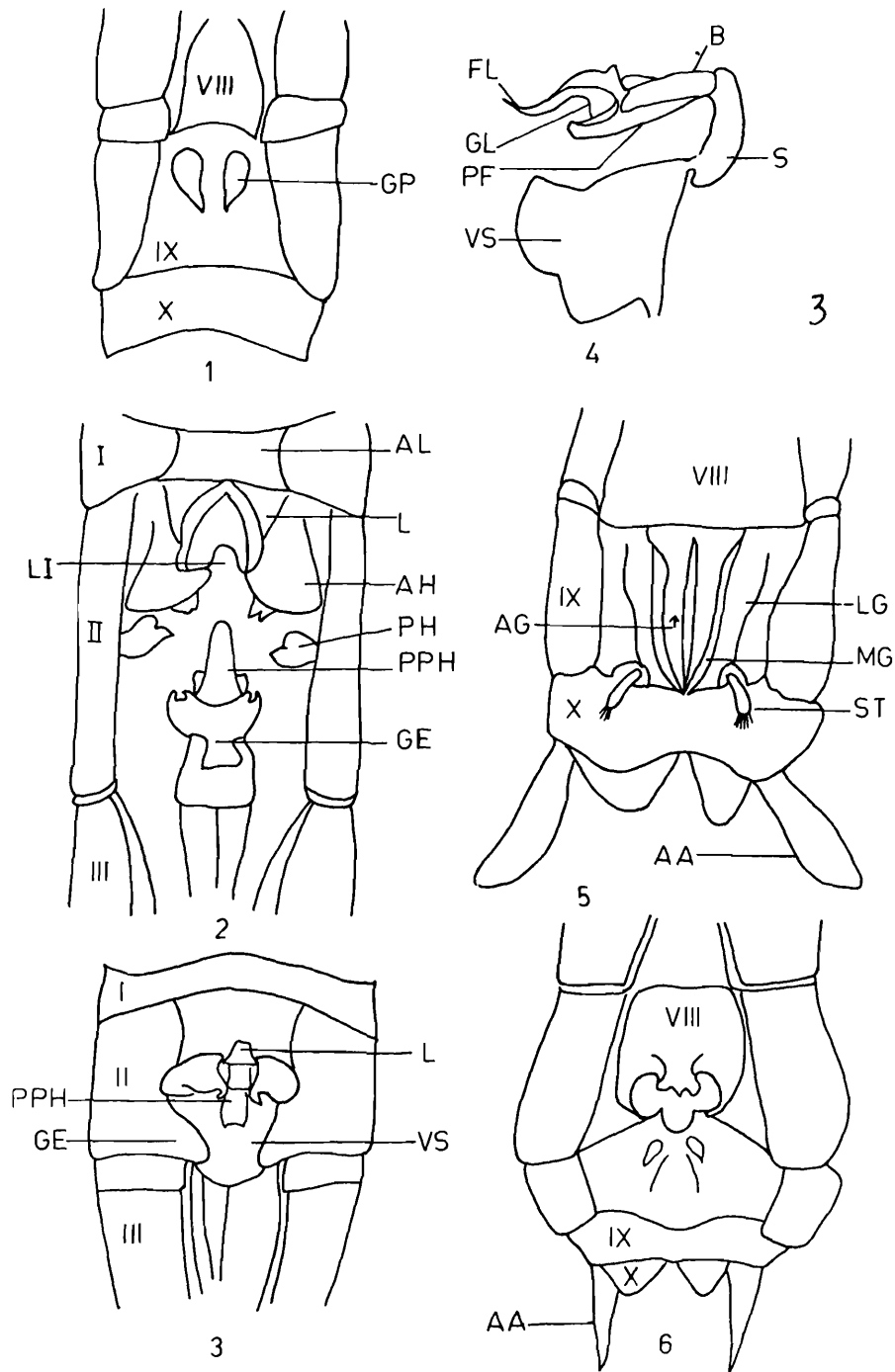


PLATE-IV : Figs. (1-6) : Genitalia of Odonata-Generalized 1. primary genitalia of male, ventral view; 2. Secondary accessory genitalia of Male : Zygoptera; 3. Secondary accessory genitalia of male: Anisoptera; 4. Prothallus and vesicula spermalis of Male Anisoptera (Gomphid); 5. Genitalia of a female Anisoptera (Aeshnid) and 6. Genitalia of a female Anisoptera (Libellulid).

Explanation of Abbreviations : AA-Anal appendage; AG- Anterior gonopophyses; Ah-Anterior hamule; Al-Anterior lassinia; Body-Body; F-Flagella; GE-Genitalia; GL-Glans; GP-Male gonopophyses; L-Lammina, LG-Lateral gonopophyses; LI-Ligula; MG-Median gonopophyses; PF-Preputial fold; Ph-Posterior Hamuli; PPH-Prothallus; S-Stem. ST-Stylet; VS-Vesicula seminalis.

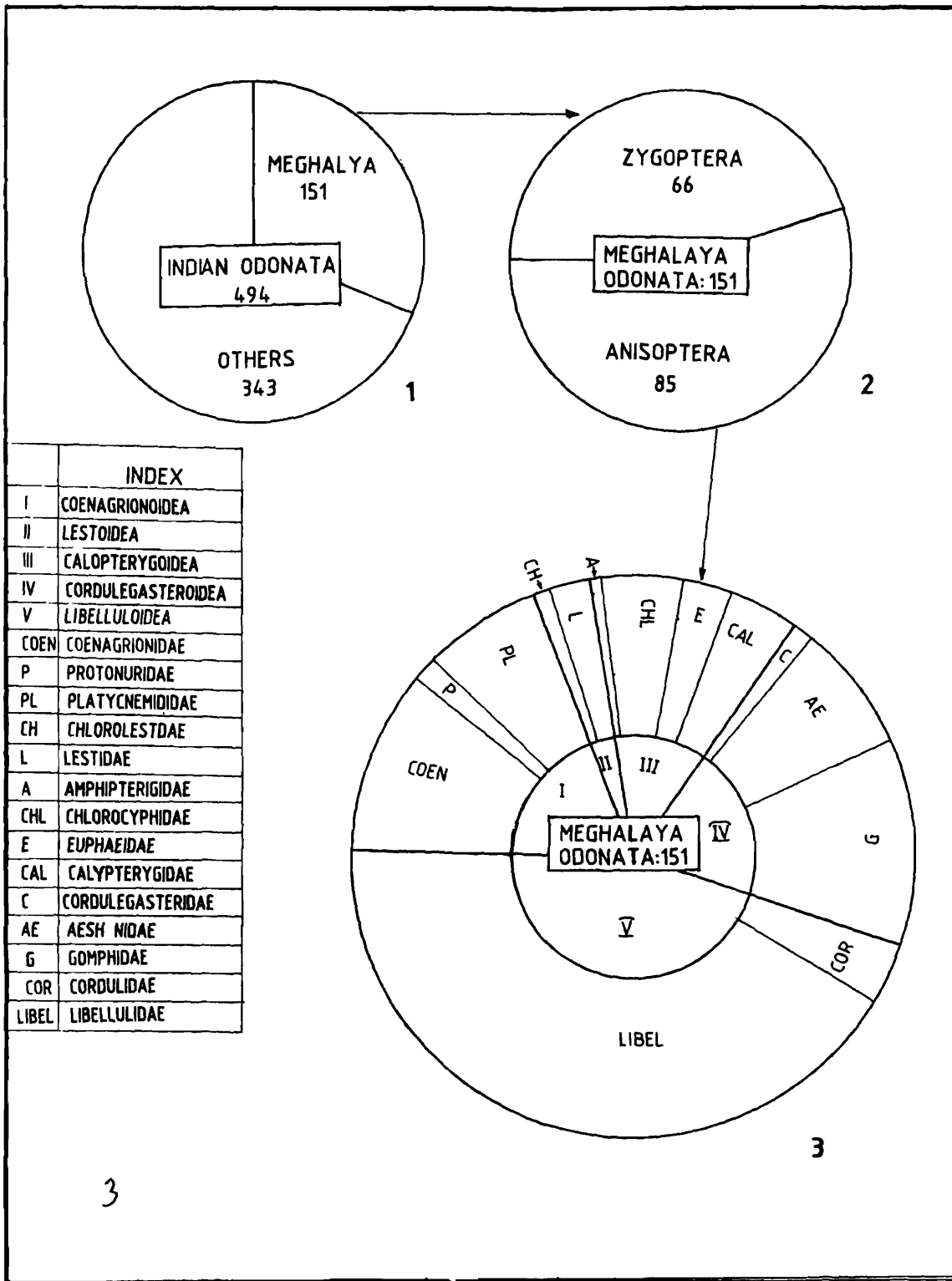


PLATE-V : Proportionate occurrences of-1 : Meghalaya Odonates: Others among Indian Component, 2: Zygoptera: Anisoptera among Meghalaya Odonata and superfamilies & families among Meghalaya Odonata.

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INSECTA : PLECOPTERA

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INTRODUCTION

The stone flies are very much particulars about their niches or habitates. They are found under the stones in high altitudes streams. For this reason their availability are also very few. Quite a few species have been reported from Meghalaya state. Though their availability gradually diminishing due to water pollution by human interference.

In the world about 2500 species have been reported so far. Among these about 113 species are found in India. In Meghalaya state about 16 species have been reported so far. Aubert (1967), Zwick and Sivec (1980) have worked on the Plecoptera of this state.

SYSTEMATIC ACCOUNT

The morphology of Plecoptera is of orthopteran type. Mouth parts are mandibulate, antennae and cerci multiarticulate, bulging lateral eyes. Ocelli 2 to 3. Thorax 3 segmented. Wings membraneous, forewing narrower than hind wing, venation with complex network of cross-vein. Tarsi 3 segmented with 2 claws. Abdomen 10 segmented, cylindrical. Thorax and abdomen often with remnants of nymphal gills in adults.

Except for a lot containing 7 exs no other specimens could be available for study. So, literature records mainly form the basis of this present paper.

List of the Taxa

Family LEUCTRIDAE

1. *Rhopalopsale magnicerca* (Jewett)

Family NEMOURIDAE

2. *Amphinemura amatulai* Aubert
3. *Amphinemura cherrapunjii* (Aubert)
4. *Amphinemura luteipes* Kimmins
5. *Amphinemura nongrimi* Aubert

6. *Amphinemura paraluteipes* Aubert
7. *Amphinemura rahungi* Aubert
8. *Indonemoura assami* (Aubert)
9. *Indonemoura melachloni* (Kimmins)
10. *Indonemoura quadridentata* (Kimmins)
11. *Nemoura brevicauda* Zwick
12. *Mesonemoura paraproctalis* (Aubert)

Family PERLIDAE

13. *Neoperla asperipenis* Zwick
14. *Neoperla katmanduana* Harper
15. *Neoperla quadrata* Wu & Classen
16. *Kamimuria atricornis* Klapalek

Key to the families

- Cerci short, not longer than greater width of the pronotum1
- Cerci long, much longer than greater width of the pronotum2
1. Apical marginal space beyond tip of subcosta with an oblique crossvein, some species with gill remnants in cervical regionNEMOURIDAE
 - Apical marginal space beyond tip of subcosta without oblique crossveins; no gill remnants ever present in cervical region.....LEUCTRIDAE
 2. Remnants of branched filamentous gills on sides or venter of thorax, in position corresponding to location of branched filamentous gills in nymphs.....PERLIDAE

Family LEUCTRIDAE

Genus *Rhopalopsole* Klapalek 1912

1912. *Rhopalopsole* Klapalek, *Ent. Mitt.*, **1** : 348.
1967. *Rhopalopsole* Klapalek, Kawai, *Fauna Japonica*, 41.

1. *Rhopalopsole magnicerca* (Jewett)

1958. *Leuctra* (*Rhopalopsole*) *magnicerca* Jewett, *Proc. Nat. Acad. Sci. (India)*, **28B(IV)** : 321.
1977. *Rhopalopsole magnicerca* (Jewett), Harper., *Orient Insects*, **11** : 55.

Diagnosis : Pronotum somewhat elongated. Ninth sternum of male broadly rounded distally. Subanal lobe fused into a massive median organ. Epiproct a slender hook-cerei lightly sclerotised and bent upwards in lateral view. Ninth tergum bordered posteriorly with a complete row of spinules. Tenth tergum prolonged laterally into a prominent parallel sided lobe, the ventral margin of which is terminated into a long point.

Distribution : INDIA : Meghalaya (Cherrapunjii) West Bengal.

Family NEMOURIDAE

Key to the genera

- Cerci of male markedly modified as copulatory organ. Subanal lobe at most pointed, drawn out backwards and somewhat upwards*Nemoura* Pictet
 Cerci of male not modified as copulatory organ 1
1. Nymphal gill vestiges on the ventral side of prothorax; cerci of male simple: eight sternite of female bears a median chitinised plate *Amphinemura* Ris
 — Nymphal gill vestiges not present on prothorax.....2
2. Epiproct narrow and flat, asymmetrical distally and prolonged by a whip like process; subanal plate divided into two.....*Mesonemoura* Baumann
 Epiproct cylindrical, asymmetrical beyond middle and terminating in a short curved lobe with spinules at base; subanal plate divided into three.....*Indonemoura* Baumann

Family NEMOURIDAE

Genus *Amphinemura* Ris 1902

1902. *Amphinemura* Ris, Schweiz. Ent. Gesell. Mitt. 10 : 384.

1967. *Amphinemura* Ris, Kawai; *Fauna Japonica*, : 15.

Key to the species

1. Subanal plate squarish with a spine at apex.....*A. cherrapunjii*
 Aubert Subanal plate triangular with small
 spicules at the tip.....*A. paraluteipes* Aubert
2. Epiproct large.....3
 Epiproct not so large.....4
3. Epiproct without terminal filament..... *A. rahungi* Aubert
 Epiproct with small terminal filament.....*A. amatulai* Aubert

- Cerci long.....1
 Cerci short.....2
 4. Subanal plate quadrate, with a dorsal process.....*A. nongrimi* Aubert
 Subanal plate broad with two approximated branches.....*A. luteipes* Kimmins

2. *Amphinemura amatulai* Aubert

1967. *Amphinemura amatulai* Aubert, *Mitt. Schweiz. ent. Ges.*, **39** : 242-243.

Diagnosis : Body and legs black brown. Sternite nine of male somewhat pentagonal. Subanal plate triangular, prolonged by a process which is posteriorly recurved. Subanal vesicle globular. Cerci short. Epiproct quite large. In female genital plate with two triangular divergent and uniformly pigmented lobes. Paraproct triangular.

Distribution : India : Meghalaya (Mawlong)

3. *Amphinemura cherrapunjii* (Aubert)

1967. *Protonemoura cherrapunjii* Aubert, *Mitt. Schweiz. ent. Ges.*, **39** : 228.

1980. *Amphinemura cherrapunjii* (Aubert), Zwick & Sivec, *Entomol. Basiliensia*, **5** : 77.

Diagnosis : Body black brown. Sternite nine in male pentagonal with a sharp point. Subanal plate square at the level of median lamella, elongated in the form of regularly incurved tube upto the level of apex of cerci, then prolonged by a conical and sclerotised point, terminated by a blackish spine. Cerci cylindroconical 2 to 3 times longer than wide. Epiproct wide and flattened, terminated by a row of erect spicules.

Distribution : India : Meghalaya (Cherrapunjii)

4. *Amphinemura luteipes* Kimmins

1947. *Amphinemura luteipes* Kimmins, *Ann. Mag. nat. Hist.* **13** (11) : 728-730.

1967. *Amphinemura luteipes* Kimmins, Aubert., *Mitt. Schweiz ent. Ges.*, **39** : 233.

Diagnosis : Head brown, antennae and palpi pale. Legs pale. Ninth tergite of male elevated. Subgenital plate narrow, vesicle slender about 3/4 as long as subgenital plate. Subanal plate moderately broad at base, apex produced upwards in a pair of approximated branches. Outer branch terminating in an upwardly directed hook, inner branch acutely rounded at its apex with a finger like process dorsally and carrying a number of spines. Cerci short and stout.

Distribution : India : Meghalaya (Nongrim); other states : Arunachal Pradesh, Assam, Manipur, West Bengal.

5. *Amphinemura nongrimi* (Aubert)

1967. *Amphinemura nongrimi* Aubert, *Mitt. Schweiz ent. Ges.*, **39** : 239-240.

Diagnosis : Paraproct, median lamella quite broad. Subanal plate quadrate, prolonged by a process broadening in its terminal part with spicules. Subanal vesicle small.

Epiproct slightly reflexed at the apex. Cerci quite short, about 1/2 times as long as wide. In female lobes of the genital plate short and widely separated by their internal margin which are most strongly pigmented. Paraproct triangular.

Distribution : India : Meghalaya (Cherrapunjii, Nongrim), other states : Manipur.

6. *Amphinemura paraluteipes* (Aubert)

1967. *Amphinemura paraluteipes* Aubert, *Mitt. Schweiz. ent. Ges.*, **39** : 234-236.

Diagnosis : Body black brown. Prothorax granulated. Legs yellowish brown. Sternite 9 in male gradually narrowed towards back. Ventral vesicle narrow. Paraproct. Median lamella very wide, rounded at the apex, less pigmented than the subanal plate. Epiproct quite small, dilated at apex with small terminal filament. Genital plate in female with two triangular widely apert lobes.

Distribution : India : Meghalaya (Cherrapunjii, Nongrim); other states : Arunachal Pradesh, Manipur.

7. *Amphinemura rahungi* (Aubert)

1967. *Amphinemura rahungi* Aubert, *Mitt. Schweiz, ent. Ges.*, **39** : 237.

1980. *Amphinemura rahungi* Aubert, Zwick & Sivec, *Entomol. Basiliensia* **5** : 77.

Diagnosis : Body black brown, prothorax brilliant shiny. Legs black brown. Paraproct, median lamella as long as subanal plate. Subanal plate triangular, prolonged dorsally into an elbowed process. External appendages reduced to a fine elbowed lamella. Cerci short. Epiproct long and slender, membranous at the upper surface; tergite 9 very slightly embaded at the posterior margin which bears a few setae. Genital plate in females formed of two divergent triangular lobes.

Distribution : India : Meghalaya (Cherrapunjii, Serrarim); other states. Arunachal Pradesh, Manipur, West Bengal., Nepal.

Genus *Indonemoura* (Bauman) 1975

1946. *Protonemoma indica* Kimmins, *Ann. Mag. nat. Hist.*, **13** (11) : 727-728.

1975. *Indonemoura indica* (Kimmins), Baumann, Smith. *Contri. Zool.*, **211** : 13.

Key to the species

Cerci short and incurved. Subgenital plate with three apical excision, the median the larger
..... *I. quadridentata* (Kimmins)

- Cerci not incurved1
1. Subgenital plate with two prominent teats. Cerci elongate *I. assami* (Aubert)
- Subgenital, plate with convex apical margin. Cerci short*I. melachloni* (Kimmins)

8. *Indonemoura assami* (Aubert)

1967. *Protonemoura assami* Aubert, *Mitt. Schweiz ent. Ges.* **39** : 213-215.

1975. *Indonemoura assami* (Aubert), Baumann, *Smith. Contr. Zool.* **211** : 13.

Diagnosis : Body dark brown. Legs brown with two deep brown ring in the posterior half of femora. Paraproct, median lamella short, chitinised. Subanal plate broad, quadrangular, elongated by a long sclerotised horn. Subanal vesicle long and slender. External appendages slender reclinear with a few subterminal spines. It is shorter than the subanal plate. Epiporocot elongated and slender, at the interior surface a swelling formed by two parallel ridges each with 9-12 spicules. Cerci 2-3 times longer than wide.

Distribution : India : Meghalaya (Cherrapunji, Nongrim), other states : Arunachal Pradesh, U.P.

9. *Indonemoura melachloni* (Kimmins)

1950. *Protonemoura melachloni* Kimmins, *Ann. Mag. nat. Hist.*, **3** (12) : 200-203.

1975. *Indonemoura melachloni* (Kimmins), Baumann, *Smith. Contr. Zool.* **211** : 13.

Diagnosis : Body brownish. 9th tergite in male with a few short spines at the centre of its apical margin. Subgenital plate broad. Supra-anal lobe recurved, strongly chitinised, armed below the apex with a few strong teeth and median excision at its apex. Cerci short, about half as long as subgenital plate. Subgenital plate moderately broad at its base. In female eight sternite pigmented and produced at its centre to form a subgenital plate with a convex apical margin.

Distribution : India : Meghalaya (Dympep)

10. *Indonemoura quadridentata* (Kimmins)

1950. *Protonemoura quadridentata* Kimmins, *Ann. Mag. nat. Hist.*, **3** (12) : 205-206.

1975. *Indonemoura quadridentata* (Kimmins), Baumann, *Smith. Contr. Zool.*, **211** : 13.

Diagnosis : 7th tergite in female unpigmented. The margin of the eight sternite is produced in a large subgenital plate, with three apical excision, the median the larger. The margin thus presents four rounded processes, the inner pair the larger. Subanal plates broad, triangular cerci short.

Distribution : India : Meghalaya (Khasi Hills), other states : Manipur, U.P.

Genus *Nemoura* Pictet 1841

1841. *Nemoura* Pictet, Histoire naturelle generale et particuliere des insects Nevropteres. Famille des Peilides, p. 335.

1967. *Nemoura* Pictet, Kowai, *Fauna Japonica*, 23.

11. *Nemoura brevicauda* Zwick

1980. *Nemoura brevicanda* Zwick, *Entomol. Basiliensia*, 5 : 98.

Diagnosis : Pale brown, Tergite 10 of male with short setae at base. In front of epiproct two elevations are present. Subgenital plate thickened. Paraproct with triangular inner lobe. Epiproct broad in front, protruded base jointed, curved apical sclerite formed two very tall teeth. The central pointed portion of epiproct extend beyond. Cerci short, knobbed. Epiproct broad in the extended hind portion.

Distribution : India : Meghalaya (Shillong); Nepal

Genus *Mesonemoura* Bauman

1922. *Amphinemoura vaillanti* Navas, *Mem. R. Acad. Ciencias Y Artes*, Barcelona, 17 : 9.

1975. *Mesonemoura vaillanti* (Navas), Baumann, *Smith. Contr. Zool.* 211 : 16.

12. *Mesonemoura paraproctalis* (Aubert)

1967. *Protonemoura paraproctalis* Aubert, *Mitt. Schweiz. ent. Ges.* 39 : 224-225.

1975. *Mesonemoura paraproctalis* (Aubert), Baumann *Smith. Contri. Zool.* 21 : 15.

Diagnosis : Body and legs black brown. Ventral vesicle in male large and oval. Paraproct simple. Subanal plate wider than long. Its external margin is thread like. The posterior margin with two expansions. The internal one is triangular, the other in the form of a pallate. Subanal vesicle broad and rounded. Cerci three times wider than long. Epiproct stout and short with a long and slender terminal filament.

Sternite 7 in female with a pigmented area thrice as wide as long. Genital plate with posterior margin rounded.

Distribution : India : Meghalaya (Mawlong, Myuso), other states : Arunachal Pradesh, U.P.

Family PERLIDAE

Key to the genera

With two ocelli*Neoperla* Needham

With three ocelli.....*Kamimuria* Klapalek

Genus *Neoperla* Needham

1905. *Neoperla* Needham, *Biol. Soc. Wash., Proc.* **18** : 108.

1967. *Neoperla* Needham, Kawai, *Fauna Japonica* 148.

Key to the species

Colour light brown, spines on the penis not needle like*N. kathmanduana* Harper

Colour bright yellowish brown, spines on the penis needle like*N. asperipenis* Zwick

13. *Neoperla asperipenis* Zwick

1980. *Neoperla asperipenis* Zwick, *Entomol. Basiliensia*, **5** : 126.

Diagnosis : Yellowish brown. In male deeper middle portion of tergite 9 granular. Projection of tergite 10 erect and pointed. Penis tubular and pointed needle like spine on the apical half.

Distribution : INDIA : Meghalaya (Darugiri, Garo Hills); other states : Assam.

14. *Neoperla kathmanduana* Harper

1977. *Neoperla kathmanduana* Harper, *Oriental Insects*, **11** : 59.

Material Examined : 1 ex, Nongal, Garo Hills, 28.5.90, M.S. Shisodia; 1 ex, Willium Nagar, Garo Hills 27.5.90, M.S. Shisodia, 4 ex, Rang Zeng, Garo Hills, 26.5.90, M.S. Shisodia; 1 Nymph, Cherrapunji, 19.3.91, B. C. Das.

Diagnosis : Ocelli surrounded by a dark ring. Antennae brown, legs light brown, darker at base and external margin of tibiae, tarsi dark.

Male genitalia, 7th tergite produced into a triangular lobe which is slightly turned downwards at the tip. 8th tergum bearing a median sclerotised plate covered with spinules. Tenth tergum divided into hemitergites, each tipped with a series of small ventral spinules and carrying a finger like process.

Distribution : INDIA : Meghalaya (Darugiri, Nongal, Willium Nagar, Garo Hills, Cherrapunji, Khasi Hills) other states : Assam, W.B., Nepal.

15. *Neoperla quadrata* Wu & Classen

1934. *Neoperla quadrata* Wu & Classen, *Bull. Peking nat. Hist.* **9** : 124

Distribution: India : Meghalaya (Khasi Hills).

Remarks : Description could not be given due to non availability of literature.

Genus *Kamimuria* Klapalek

1907. *Kamimuria* Klapalek, *Inter. Acad. Sci. Bols. Bull.*, 12, 2

.1967. *Kamimuria* Klapalek, Kawai, *Fauna Japonica*, 133

16. *Kamimuria atricorvis* Klapalek

1912. *Kamimuria atricornis* Klapalek, *Ceske. spolee Ent.* 9 : 96.

Distribution : INDIA : Meghalaya (Khasi Hills)

Remarks : Description could not be given due to non availability of literature.

SUMMARY

16 species have been recorded so far from the state of Meghalaya. It is evident from the above list that 1 sp. belongs to family Leuctridae, 11 sps. belong to family Nemouridae and 4 sps belong to family Perlidae. The list shows that Nemouridae is the predominant group present in this region. About 4 sps are known to be endemic to this area. Availability of these species specially in the Cherrapunji area are becoming scare probably due to human factors which has altered the ecological parameters with the increasing use of Hill streams e.g. bathing, washing of clothes by soaps and emitting excerta.

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INSECTA : ORTHOPTERA : TETRIGOIDEA

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INTRODUCTION

Tetrigids are commonly known as grouse locusts. They feed on mosses and other forms of vegetation, and are generally harmless to the agricultural crops, except one species which is reported as a pest on vegetables like cabbage. Previous reports on grouse locusts of Meghalaya (earlier the Khasi and Garo Hills of Assam) are limited to the early works of Boliver (1887, 1902), Hancock (1907, 1915) and Kirby (1914). Recently the author (Shishodia, 1991) has published the result of comprehensive study on the group from North Eastern India including Meghalaya. As a result of above studies a total of 25 species, distributed over 12 genera, under three subfamilies, have been reported from Meghalaya. At present there are approximately 1000 species known from the world, and 135 species from India.

No exclusive study on the tetrigid fauna of Meghalaya has been made so far. The present study is based on large collection of tetrigids brought by different survey parties of the Zoological survey of India, from all the districts of Meghalaya, during 1961 to 1991.

The present study deals with 33 species under 13 genera distributed over three subfamilies. Nine species are reported here as new records from Meghalaya and marked with double asterisks. Some species marked with single asterisk have been reported in the literature from Meghalaya, but have not been studied by the author. One species *i.e. Criotettix rugosus* Bolivar is recorded for the first time from India and marked with triple asterisks.

The classification is followed here after Gunther (1938, 1939) and Steinmann (1970).

SYSTEMATIC ACCOUNT

Order ORTHOPTERA

Subfamily TETRIGOIDEA

Family TETRIGIDAE

The tetrigids are small sized insects, generally 6 to 14 mm. long. Their colour corresponds with the soil they live on. Antennae are filiform; frontal costa may or may not divergent widely. The inter ocular distance vary from very narrow, narrow to wide. All species are well characterized

by the relatively enormous pronotum, which covers the abdomen and conceals the hind wings. The tegmina are reduced to small lateral scales, while the hind wings are well developed. Many species exhibit polymorphism in the development of the hind wings and pronotum. The anterior and middle tarsi consist of two segments, while the posterior ones with three segments. The claws of tarsi are not provided with an arolium (Figs. 1-10).

Grouse locusts have been collected from various ecological niches. The specimens were captured either by sweeping with a butterfly net, or on light. These insects are preserved either wet (in spirit) or dry (after proper setting and pinning).

Key to subfamilies

1. Posterior angle of lateral lobes of pronotum acutely produced outwards and generally spined; first segment of posterior tarsi usually longer than the third.....SCELIMENINAE.
- Posterior angle of lateral lobes of pronotum rarely acutely spined; first segment of posterior tarsi generally not longer than the third.2.
2. Posterior angle of lateral lobes of pronotum a little produced outwards, obliquely truncate behind, very rarely acutely spined; first and third posterior tarsal segments nearly equal in length.METRODORINAE.
- Posterior angle of lateral lobes of pronotum truncated downwards, more or less rounded; first and third posterior tarsal segments unequal in length, first rather longer than the third.TETRIGINAE.

I. Subfamily SCELIMENINAE

Key to genera

1. Posterior tibiae and first tarsal segment expanded.*Scelimena* Serville.
- Posterior tibiae and first tarsal segment not expanded.2.
2. Lateral margin of pronotum, behind the shoulders from the side view, distinctly angulated upwards and from top view bent inwards, wider between shoulders; generally brachypterous with strong sculptures.*Thoradonta* Hancock
- Lateral margin of pronotum behind the shoulders produced3.
3. Vertex broader than an eye or sometimes in females only just as broad as an eye but never narrower; eyes not raised above the level of pronotum.....*Criotettix* Bolivar.
- Vertex narrower than an eye or sometimes in females as broad as an eye; eyes slightly or well raised above the pronotum.....4.
4. Generally small or medium sized; posterior angles of lateral lobes of pronotum subspiniform or oblique and obtuse but without forming a lateral spine.....*Loxilobus* Hancock.

- Generally medium or large sized; posterior angles of lateral lobes of pronotum acute or produced into a spine at the anterior margin which is more or less transverse or obliquely directed forward.....*Eucriotettix* Hebard

Genus *Scelimena* Serville, 1839

1. *Scelimena india* Hancock

(Figs. 11-13, Map 1)

1907. *Scelimena india* Hancock, *Trans. R. ent. Soc. Lond.*, : 219.

1970. *Scelimena india* : Steinmann, *Acta zool. hung.*, **16** : 222.

Material examined : 1 M, Tura, West Garo Hills, 15. iii. 1991, A. K. Hazra.

Diagnosis : Frontal costa moderately divergent; posterior angles of lateral lobes of pronotum acutely produced outwards, spine directed straight; pronotum extended upto the apices of posterior tibiae; dorsum granulose, small tubercles present on either side at anterior margin below the prozona; very small tubercle present on median carina at anterior margin; dorsum depressed on either side of median carina just behind the shoulders; inferior margin of anterior, middle and posterior femora without denticles; posterior tibiae and first tarsal segment expanded, but not laminated.

Distributed : India (Arunachal Pradesh and Meghalaya). It is reported previously from Cherrapunji.

Remarks : Lateral and median carina of pronotum swollen at one or two places behind the shoulders.

Genus *Criotettix* Bolivar, 1887

Key to species

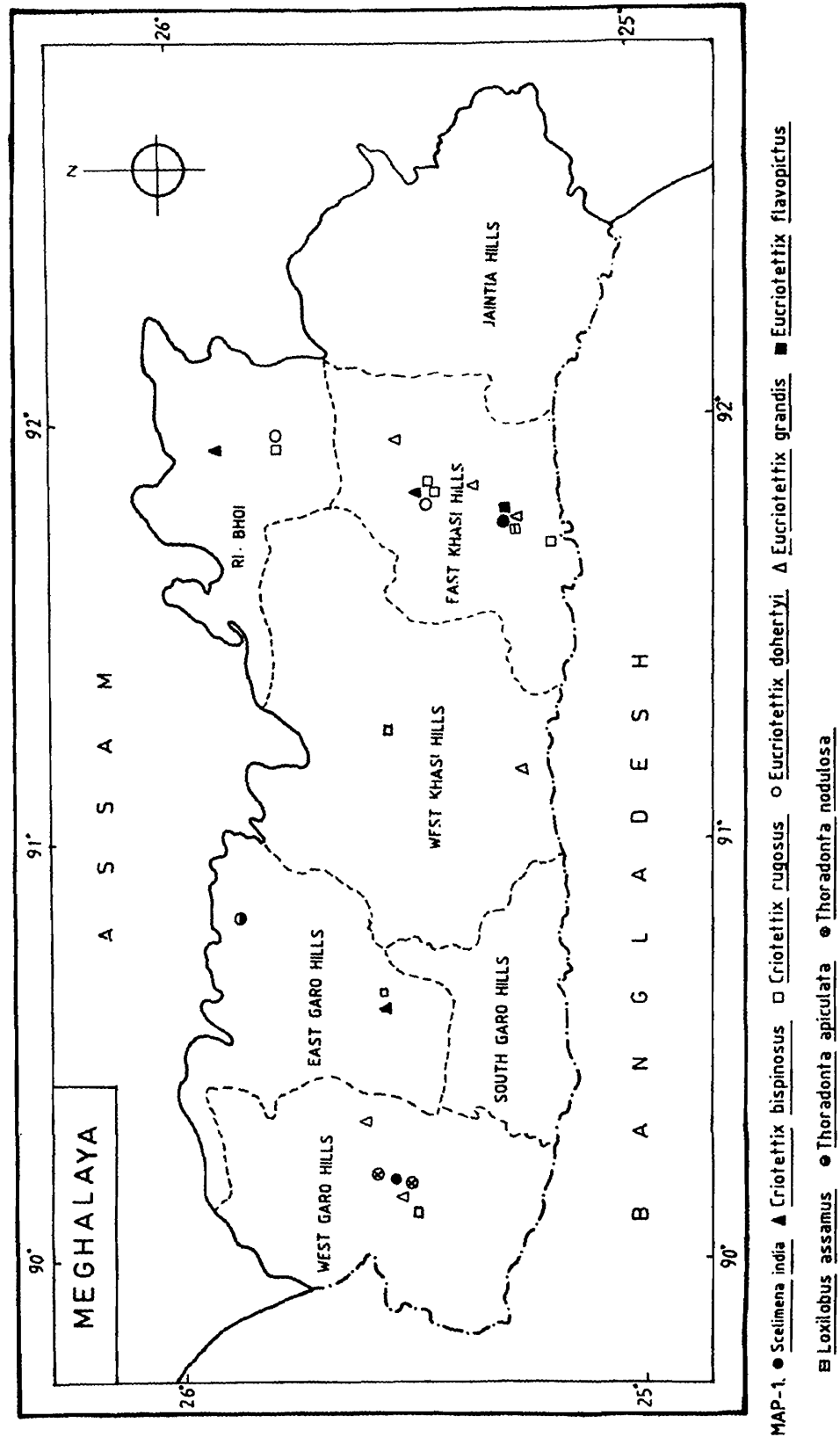
1. Hind process of pronotum extended beyond the apices of posterior femora; posterior angles of lateral lobes of pronotum dilated and laminated, provided with a sharp pointed spine, directed backwards; wings extended upto the apex of pronotum.....*bispinosus* (Dalman).
- Hind process of pronotum very little surpassing the hind femoral apices; posterior angles of lateral lobes of pronotum laminated, truncated at apex; wings shorter than the hind process of pronotum.....*rugosus* Bolivar.

2. *Criotettix bispinosus* (Dalman)

(Figs. 17-18, Map 1)

1818. *Acrydium bispinosus* Dalman, *Kongl. Vet. Akad. Handl.* : 77.

1938b. *Criotettix bispinosus* : Gunther, *Stettin. ent. Ztg.*, **99** : 134.



Map 1 : Showing distribution of *Scelimena india*, *Criotettix bispinosus*, *Criotettix rugosus*, *Eucriotettix dohertyi*, *Eucriotettix grandis*, *Eucriotettix flavopictus*, *Loxilobus assamus*, *Thoradonta apiculata*, *Thoradonta nodulosa* in the districts of Meghalaya.

Material examined : 1 M, Mowkdok, Ri-bhoi Dist., 4. iii. 1970, G. M. Yazdani; 1 F, Nongpoh, East Khasi Hills, 30. ix. 1988, A. R. Lahiri; 1 M, Williamnagar, East Garo Hills, 27. v. 1990, M. S. Shishodia.

Diagnosis : Head not extended; vertex distinctly broader than an eye, slightly narrowed in front; frontal costa moderately divergent; antennae inserted below the middle of eyes; pronotum extended beyond the apices of posterior femora; dorsum granulose; prozonal carinae convergent behind; posterior angle of lateral lobes of pronotum dilated and laminated, apex of anterior margin provided with a sharp pointed spine, directed distinctly backwards; wings extended upto the apex of pronotum; first segment of posterior tarsi longer than the third; all the pulvilli of first segment of posterior tarsi more less equal in length but sometimes the third slightly longer.

Distribution : India (Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Manipur, Meghalaya, Tripura and West Bengal).

Burma; Borneo; China; Hongkong; Java; Luzon; Malaya; Sumatra; Hainan; Sulawesi; Thailand and Taiwan.

Remarks : This species is somewhat related to *Criotettix latifrons* Hebard, not discussed here. It is clearly separable from all the species reported from India, by the sharply pointed spines of posterior angle of lateral lobes of pronotum which are distinctly directed posteriorly.

3. ****Criotettix rugosus* Bolivar

(Map 1)

1887. *Criotettix rugosus* Bolivar, *Anns Soc. ent. Belg.*, 31 ; 228.

Material examined : East Khasi Hills : 1 M, Mawroh, Shillong, 17. iii. 1963. M. Dutta; 1 M, Umsing, Ri-bhoi Dist., 10. i. 1991, R. C. Basu; 1 M Happy Vally, 1560 m, 31. iii. 1991, S. K. Ghosh; 1 M, 1 F, Shella, 17. xi. 1991, R. C. Basu. *West Khasi Hills* : 1 M, Nongstoin, 14. iii. 1991, A. K. Sanyal. *East Garo Hills* : 2 M Williamnagar, 27. v. 1990, M. S. Shishodia. *West Garo Hills* : 1 M, Gasuapara, 28. v. 1991, B. N. Das.

Diagnosis : Vertex equal to an eye, narrow anteriorly, rugose; frontal costa clearly rounded in front of eyes laterally; antennae rather long, inserted a little above the inferior margin of eyes.

Pronotum dorsally rugose, depressed; hind process of pronotum subulate, may or may not surpass the hind femoral apices, posterior angle of lateral lobes laminate, obliquely truncate at apex; median carina of pronotum, even if small, arched in front and behind the shoulders. The proportion of the width of eyes and vertex being 21 : 19.

Distribution : Borneo; Burma.

Remarks : Bolivar (1887) described this species from Borneo and Hancock (1915) from Burma. Gunther (1938) stated that it is found only in Broneo, but here it is recorded from Meghalaya. Hence, the distribution of this species is extended from Borneo to India through Burma.

Genus *Eucriotettix* Hebard, 1929*Key to species*

1. Size small (13–16 mm); posterior angle of lateral lobes of pronotum expanded, truncated or slightly rounded at apex with notch in the middle.....*dohertyi* (Hancock).
- Size large (17–21); posterior angle of lateral lobes of pronotum laminate with sharp spine at anterior margin.....2.
2. Posterior angle of lateral lobes of pronotum laminate, with triangular spine which directed subobliquely or posteriorly.....*grandis* (Hancock).
- Posterior angle of lateral lobes of pronotum directed at right angle, not obliquely or posteriorly.....*flavopictus* (Bolivar).

4. *Eucriotettix dohertyi* Hancock

(Map 1)

1915. *Criotettix dohertyi* Hancock, *Rec. Indian Mus.*, **11** : 86.1929. *Eucriotettix dohertyi* : Hebard, *Revue suisse Zool.*, **36** : 573.

Material examined : 1 F Malki forest, E. Khasi Hills, 24. viii. 1978, M. S. Jyrwa; 1 M, Umsing, Ri–bhoi Dist., 10. i. 1991, R. C. Basu.

Diagnosis : Head a little exserted above the pronotal surface; interocular distance much narrower than the breadth of an eye; eyes raised above the vertex; pronotum extended beyond the apex of abdomen; dorsum granulose; posterior angle of lateral lobes of pronotum expanded, obliquely truncated, the angle little prominent, notched in the middle, not at all spined.

Distribution : India (Assam and Meghalaya).

Remarks : Both genera *Criotettix* Bolivar and *Eucriotettix* Hebard are separated on the basis of interocular distance of vertex. In the material examined, the interocular distance is slightly narrower than the breadth of an eye.

5. *Eucriotettix grandis* (Hancock)

(Figs. 14-15, Map 1)

1915. *Criotettix grandis* Hancock, *Mem. Dip. Agric. India ent. Ser.*, **4** : 134.1938b. *Eucriotettix grandis* : Gunther, *Stettin. ent. Ztg.*, **99** : 182.

Material examined : *East Khasi Hills* : 1 F Barapani, Shillong, 6. vi. 1973, A. K. Ghosh; 2 F, Langiong, 5 kms. west of Mawphlong, 28. iv. 1978, K. P. Singh; 1 M, Cherrapunji, 19. iii. 1991, B. C. Das.

West Khasi Hills : 2 M, Balat, 5. viii. 1981, M. R. Rynth.

West Garo Hills : 1 M, 2 F, Tura, 5 and 16. iii. 1991, A. K. Hazra; 1 M, Sungsing river bed, 18. iii. 1991, A. K. Hazra.

Diagnosis : Head a little elevated; vertex narrower than an eye, a little narrowed in front; frontal costa moderately divergent behind the paired ocelli; antennae located on the inferior margin of eyes; pronotum angularly excavate in the middle, otherwise truncate anteriorly, extended beyond the apices of posterior femora; dorsum granulose, rugulose, a little convex between the shoulders, deplanate, broadly depressed behind the shoulders, generally linear rugulae present on pronotal process; wings extended upto the apex of pronotum; first segment of posterior tarsi longer than the third; first pulvilli of first hind tarsal segment acute and smaller, second also acute and a little longer than the first, third pulvilli either equal to or slightly longer than the second but not acute.

Distribution : India (Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal).
Nepal and Burma.

Remarks : It is closely related to *Eucriotettix annadalei* (Hancock), not discussed here, by the large size of the body, exserted head and colouration of body. The species is variable in colouration.

6. **Eucriotettix flavopictus* (Bolivar)

(Map 1)

1902. *Criotettix flavopictus* Bolivar, *Annls Soc. ent. Fr.*, **70** : 582.

1929. *Eucriotettix flavopictus* : Steinmann, *Acta zool. hung.*, **16** : 224.

Diagnosis : Vertex slightly narrower than an eye, carinated in the middle; frontal ridge between the antennae somewhat compressed. Pronotum smooth on dorsum, wide and raised between the shoulders, irregularly granulose behind; median carina continuous; spine on each side of posterior angle of lateral lobes of pronotum directed at right angle, transverse, not oblique; posterior femoral margins above tri- or quadri-dentate; wings long; front femora finely crenulated; lower carinae of the middle legs rather indistinctly bilobate, upper crina of the hind femora with 3 or 4 denticles.

Distribution : India (Kerala, Karnataka, Tamilnadu, Maharashtra and Meghalaya).
Burma (Dawna Hills).

Remarks : Generally, this species is found in South India, but Hancock (1907) has recorded it from Cherrapunji.

Genus **Loxilobus** Hancock, 1904

7. **Loxilobus assamus* Hancock

(Fig. 16, Map 1)

1907. *Loxilobus assamus* Hancock, *Trans. R. ent. Soc. Lond.*, : 223.

1970. *Loxilobus assamus* : Steinmann, *Acta zool. hung.*, **16** : 223.

Diagnosis : Size smaller than *Criotettix* Bolivar or *Eucriotettix* Hebard; head not exerted; vertex narrower than an eye, attenuate in front, depressed on either side; antennae located below the middle of eyes; frontal costa bifurcate just behind the paired ocelli; pronotum extended behind upto the apices of posterior femora; dorsum tuberculose and granulose; posterior angle of lateral lobes of pronotum a little laminate outwards which is subtriangular and obliquely truncate; wings extend upto the apex of pronotum or a little shorter; first segment of posterior tarsi longer than the third; first and second pulvilli acute at apex and shorter than the third.

Distribution : India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal). Hancock (1907) recorded this species from Cherrapunji.

Remarks : This species reminds immediately *Coptotettix annandalei* Hancock, but in the latter the posterior angle of lateral lobes of pronotum are much dilated and obliquely truncated at apex whereas in *Loxilobus assamus* Hancock, they are less dilated and subtriangular at apices.

Genus *Thoradonta* Hancock, 1908

Key to species

1. Vertex narrow (0.64–0.75); external surface of hind femur at upper and medial areas with a series of nodules.....*nodulosa* (Stål).
- Vertex wide (0.75–0.86); spine of upper lobe of posterior angle of lateral lobes of pronotum not constricted or sinuated in front, directed posteriorly; external surface of hind femur without nodules.....*apiculata* Hancock.

8. *Thoradonta apiculata* Hancock

(Figs. 19–20, Map 1)

1915. *Thoradonta apiculata* Hancock, *Rec. Indian Mus.*, **11** : 81–82.

1970. *Thoradonta apiculata* : Steinmann, *Acta zool. hung.*, **16** : 225.

Material examined : 2 M, Dainadubei Inspection Bunglow (at light), East Garo Hills, 16. ix. 1975, N. Muralidharan.

Diagnosis : Size small but stout; head not exerted; vertex distinctly wider than an eye, not narrowed anteriorly; frontal costa bifurcate behind the paired ocelli; antennae inserted below the eyes; pronotum truncate anteriorly, deplanate on shoulders, extend upto the apex of hind femora or a little beyond; dorsum scabrous with irregular depressions and convexities, a little dilated towards humeral angles; posterior angle of lateral lobes of pronotum slightly dilated and laminated, upper lobe produced into a small sharp spine with a wide base, slightly directed posteriorly, lower lobe blunt with serrated margins; wings extended upto the apex of pronotum; first tarsal segment of posterior tarsi longer than the second.

Distribution : India (Arunachal Pradesh, Assam, Manipur, Meghalaya and West Bengal). Burma.

Remarks : *Thoradonta apiculata* Hancock is close to *Thoradonta sinuata* Hancock, but can be distinguished from it by much elongated pronotal process, less dilated posterior angle of lateral lobes of pronotum, abruptly contracted and posteriorly directed narrow spine of posterior angle of lateral lobes of pronotum.

9. *Thoradonta nodulosa* (Stål)

(Map 1)

1860. *Tetrix nodulosa* Stal, *Freq. Eugenie Resa Oyth.* : 346.

1915. *Thoradonta nodulosa* : Hancock, *Rec. Indian Mus.*, **11** : 82.

1970. *Thoradonta nodulosa* : Steinmann, *Acta zool. Hung.*, **16** : 225.

Material examined : West Garo Hills : 1 M, 1 F, 1 km North East of Rongram Inspection Bungalow, 28. ix. 1975, N. Muralidharan; 1 F, Tura, 15. iii. 1991, A. K. Hazra.

Diagnosis : Size moderate; head not exerted; vertex generally wider than the breadth of an eye; antennae situated on the inferior margin of eyes; pronotum transverse anteriorly extend a little beyond the apices of posterior femora; dorsum rugose, depressed in front and behind the shoulders; upper lobe of lateral margin of pronotum produced into a sharp spine which is directed posteriorly, lower lobe obliquely produced with a pointed apex; posterior femora stouter, crassate and with a series of nodules on the upper marginal and paginal areas; first article of posterior tarsi a little longer than the third; all the pulvilli more or less equal in length.

Distribution : India (Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal).

Borneo, Hainan; Java; Singapore; Srilanka and Sumatra.

Remarks : This species has series of nodules on the upper marginal and paginal areas of posterior femora.

II. Subfamily METRODORINAE

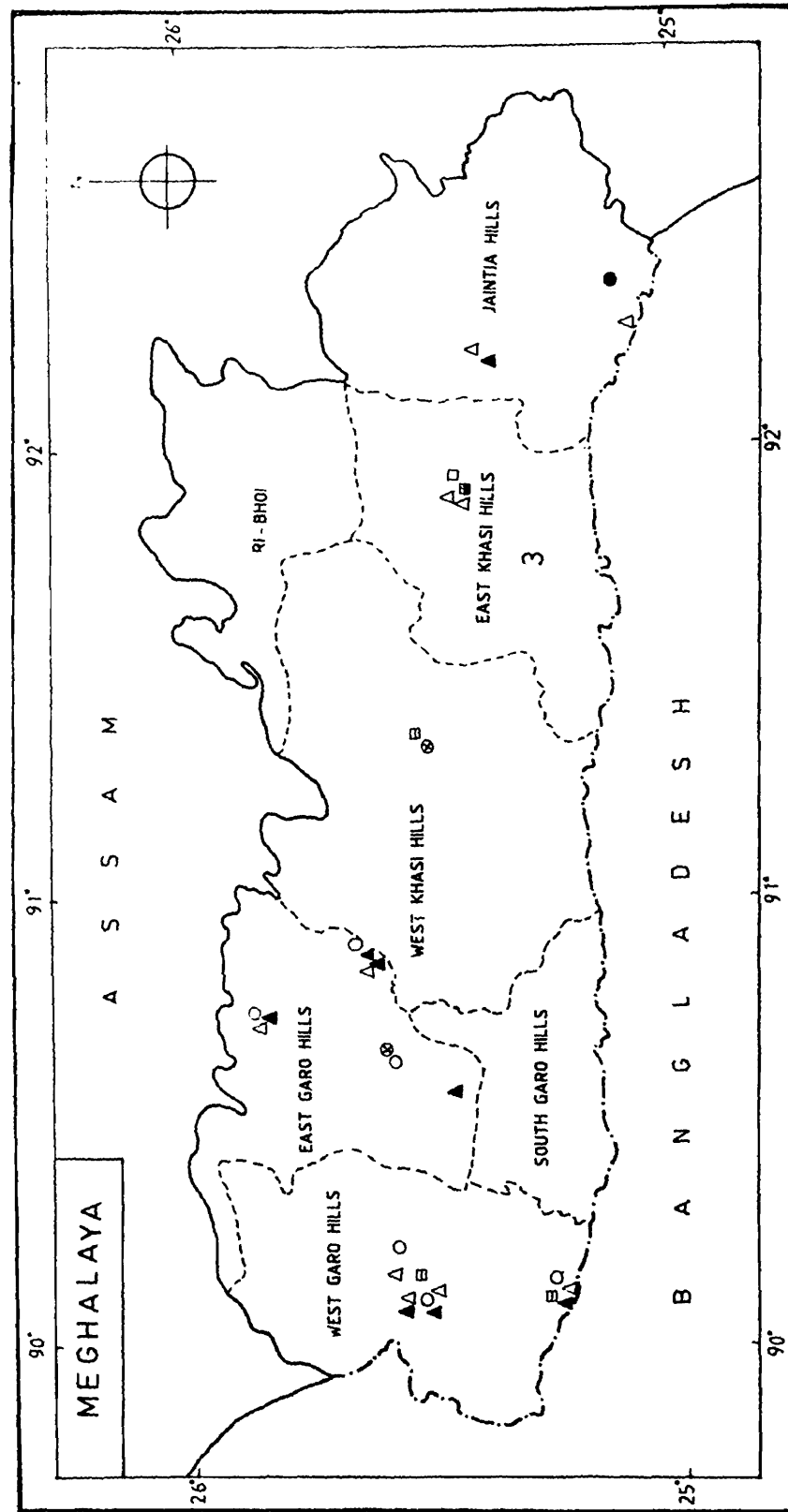
Key to genera

1. Vertex horn visible on lateral carinulae; pronotum between the shoulders strongly elevated to an obtuse gibbosity.....*Xistrella* Bolivar.
- Vertex horn not visible on lateral carinulae; pronotum between the shoulders without any gibbosity.....*Bolivaritettix* Günther.

Genus *Bolivaritettix* Günther, 1939

Key to species

[based on the description given by Kirby (1914) and Shishodia (1991)]



MAP-2. □ Bolivaritettix insignis □ Bolivaritettix sikkimensis ■ Hyboella sp.
 ● Xistrella arorai ● Teredorus carmichaeli ○ Euparatettix personatus
 ▲ Euparatettix tenuis ▲ Euparatettix histricus ■ Paratettix alatus

Map 2 : Showing distribution of *Bolivaritettix insignis*, *Bolivaritettix sikkimensis*, *Hyboella sp.*, *Xistrella arorai*, *Teredorus carmichaeli*, *Euparatettix personatus*, *Euparatettix tenuis*, *Euparatettix histricus*, *Paratettix alatus* in the districts of Meghalaya.

1. Dorsum of pronotum granulate, rough with irregular linear tubercles, convex between shoulders; prozonal carinae converging behind.....*sikkimensis* (Bolivar).
 — Dorsum of pronotum rugose, but without linear tubercles; fossulae not distinct behind shoulders; prozonal carinae parallel.....*insignis* (Kirby).

10. **Bolivaritettix insignis* (Kirby)

(Map 2)

1914. *Mazarredia insignis* Kirby, *Faun. Brit. India, Orth.*, : 54.

1970. *Bolivaritettix insignis* : Steinmann, *Acta zool. hung.*, **16** : 227.

Diagnosis : Interocular distance wider than an eye; pronotum extending upto the apex of wings; middle carina of pronotum well marked, with a short parallel carina on each side in front; front and middle femora slightly compressed and widened; hind femora moderately thickened, entire; first joint of hind tarsi more or less equal to third.

Distribution : India (Karnataka, Meghalaya and Uttar Pradesh).

Remarks : Previously recorded from Shillong.

11. ***Bolivaritettix sikkimensis* (Bolivar)

(Fig. 22, Map 2)

1909. *Mazarredia sikkimensis* Bolivar, *Bol. Real. Soc. Espan.*, **9** : 398.

1970. *Bolivaritettix sikkimensis* : Steinmann, *Acta zool. hung.*, **16** : 227.

Material examined : *West Garo Hills* : 3 M, 1 F, Sing-song, Tura, 15. iii. 1991, A. K. Hazra; 1 F, Moymonsing Border, 30. iv. 1991, B. N. Das.

West Khasi Hills : 1 M, Nongstoin, 21. iii. 1991, A. K. Hazra.

Diagnosis : Robust built, larger with fairly broad shoulders; head not exerted above the pronotal surface; vertex broader than an eye; frontal costa bifurcated behind the paired ocelli; antennae placed below the inferior margin of eyes; pronotum truncate anteriorly, extend beyond the apex of posterior femora; dorsum granulate, rough, irregular linear tuberculae; prozonal carinae distinct and convergent behind; posterior angle of lateral lobes of pronotum wide, truncate at apex; elytra narrowly rounded at apex; wings extended upto the apex of pronotal process.

Distribution : India (Assam, Sikkim and West Bengal).

China; Hainan and Taiwan.

Remarks : This species is nearer to *Bolivaritettix singlaensis* (Hancock) and *B. sculptus* (Bolivar), especially with the latter, but can be easily distinguished from both of them by the less elevated lateral carinulae above the eyes, the anteriorly depressed median carina of pronotum and the length of pronotum which is between 14–16 mm.

Genus *Hyboella* Hancock, 191512. ***Hyboella* sp.

(Figs. 44 & 45, Map 2)

Material examined : 1 M (Partly damaged), Mawpat, Shillong, East Khasi Hills, 16. iv. 1979, S. G. Patil.

Diagnosis : *Male* : Head and pronotum on the same level; eyes not raised above the head; interocular distance more than the width of an eye; texture granular; median and lateral carinulae only visible anteriorly, indistinctly converging posteriorly; a glossa present on either side of median carinulae; frontal sulcus normally produced; antennae filiform, placed at the lower margin of eyes.

Pronotum roundly produced anteriorly, extended upto the hind margin of posterior femora or slightly beyond the subgenital plate, wide and deeply notched in the middle; lateral carinae of pronotum absent; prozona also absent; median carina indistinctly visible on shoulders, distinct on the rest; lateral lobes of pronotum turned downwards, wide and roundly produced; first segment of posterior tarsi longer than the third; third pulvilli longer than the previous two.

Measurement (in mm) : Body length 10.00; pronotum length 8.6; shoulders width 2.6; hind femora length 6.4; maximum width of hind femora 2.3; interocular distance 1.1; eye width .5.

Remarks : This is interesting specimen and differs from the hitherto known species of this genus in respect of characters like : surface of head and pronotum finely granulate, interocular distance much wider, eyes slightly raised above the level of head, head and pronotum in same level, hind margin of pronotum wide and deeply notched in the middle, and lateral carinae of pronotum absent.

Genus *Xistrella* Bolivar, 190913. ***Xistrella arorai* Shishodia, 1991

(Fig. 21, Map 2)

1991. *Xistrella arorai* Shishodia, *Rec. zool. Surv. India, Occ. Paper No.* 140 : 101.

Material examined : 1 M, Nongstoin, West Khasi Hills, 23. ix. 1988, A. R. Lahiri; 1 F, Williamnagar, East Garo Hills, 27. v. 1990, M. S. Shishodia.

Diagnosis : Moderately large species; head exerted above the pronotal surface; vertex as broad as an eye, narrowed in front, median carinula low, lateral carinulae lower to the eyes, reflexed laterally vertex horn not visible, front margin low; eyes elevated above the vertex, a little approximate in front; pronotum extended beyond the apices of posterior tibiae; dorsum smoothly granulate, convex between the middle of shoulders, a little elevated in front of the sulci; oblique lateral lines run parallel on either side of median carina which join the lateral carinae anteriorly, obscurely visible behind the shoulders; humeral angles obscurely produced; posterior angle of

lateral lobes of pronotum turned downwards, apex widely rounded; first and third segments of posterior tarsi equal in length.

Distribution : India (Arunachal Pradesh, Manipur nad West Bengal).

Remarks : *Xistrella arorai* Shishodia is closely related to *Xistrella inermis* (Hancock), but can be easily separated by more elongated body and pronotum, absence of depression on median carina of pronotum on shoulders, oblique lateral lines on either side of median carian which join the lateral carinae anteriorly and obscurely visible on the pronotal process.

III. Subfamily TETRIGINAE

Key to genera

1. Vertex narrow than an eye, strongly narrowed in front, thus making it triangular in shape...
.....*Teredorus* Hancock.
- Vertex may or may not narrow than an eye, but not triangular in shape as said above.....2.
2. Vertex and eyes obviously raised above the level of pronotum; antennae inserted between the lower border of eyes.....3.
- Vertex and eyes very little or not at all raised above the level of pronotum; antennae scarcely placed below the middle of eyes.....4.
3. Vertex narrower than an eye and truncate; frontal costa arcuately produced between the middle of eyes; median carina of pronotum not undulated; posterior femora with less conspicuous nodosities on the externo-medial surface.....*Euparatettix* Hancock.
- Vertex still narrower than an eye; antennae inserted distinctly below the inferior margin of eyes; median carina of pronotum a little or very well undulated; posterior femora with distinct nodosities on externo-medial surface.....*Ergatettix* Kirby
4. Body generally smooth or a little granulose; vertex equal to or a little narrower than an eye, generally expanded, or subtransverse, carinated in front; abbreviated carinae distinctly present; median carina of pronotum percurrent, not at all interrupted.....
.....*Hedotettix* Bolivar.
- Body generally granulose or tuberculose; vertex not expanded in front; abbreviated carinae indistinctly present; median carina of pronotum not percurrent.....5.
5. Vertex narrower and more narrowed in front; frontal carinulae interrupted internally or recurved; dorsum of pronotum a little rugose, often bearing round or abbreviated lineate tubercles; median carina of pronotum very fine and wavy or not.....*Coptotettix* Bolivar.
- Vertex narrower or equal or rarely wider than an eye, but not narrowed in front, with a concavity on either side; median carina of pronotum a little raised but not wavy.....
.....*Paratettix* Bolivar.

Genus *Teredorus* Hancock, 190614. *Teredorus carmichaeli* Hancock

(Figs. 23–25 & 43, Map 2)

1915. *Teredorus carmichaeli* Hancock, *Rec. Indian Mus*, **11** : 110.

Material examined : Jaintia Hills : 1 F, Sonapurdi, Jowai road, 28. viii. 1974, A. R. Lahiri; 1F, Sonapurdi, Jowai road, 28. viii. 1974, A. R. Lahiri. Shishodia (1991) wrongly reported this specimen as *Teredorus frontalis* Hancock.

Diagnosis : Size medium; colour ashy grey with pale variegations or dark brown; head a little or not exserted; vertex small, strongly narrowed in front, triangular; antennae inserted below the eyes; eyes pear to globular in shape, drawing antero-medially to form a triangular vertex; dorsum of pronotum smoothly granular; humeral angles obtuse; abbreviated carinae absent on shoulders; posterior angle of lateral lobes of pronotum turned downwards, apices round to subtruncate; first and third tarsal segments equal in length, all the pulvilli more or less equal in length.

Distribution : India (Meghalaya and West Bengal).

Remarks : Shishodia (1991) has recorded *Teredorus carmichaeli* and *T. frontalis* from Sonapurdi (Meghalaya). Later on he studied both specimens in detail and found that these specimens are *T. carmichaeli* Hancock.

Genus *Euparatettix* Hancock, 1904*Key to species*

1. Hind tibiae dense black with white annulations just behind the knees; frontal costa generally narrowly sulcate.....*personatus* (Bolivar).
- Hind tibiae subunicoloured or obscurely marked but never dense black; frontal costa generally moderately sulcate.....2.
2. Stature very slender; head exserted; pronotum narrow between shoulders; median carina of pronotum substraight percurrent.....*tenuis* Hancock.
- Stature more robust and larger; head a little exserted; pronotum moderately dilated between shoulders; median carina of pronotum arcuate forward, often little undulate before the shoulders, low on shoulders and straight behind.....*histricus* (Stål).

15. *Euparatettix personatus* (Bolivar)

(Map 2)

1887. *Paratettix personatus* Bolivar, *Annl. Soc. ent. Belq.*, **31** : 278.1904. *Euparatettix personatus* : Hancock, *Spolia zeylan.*, **2** : 145–6.

Material examined : East Garo Hills : 1 M, 2 F, Dainadubi inspection bungalow (at light),

14. ix. 1975, N. Muralidharan; 1 M, Songsok Inspection bungalow (at light), 21. ix. 1975, N. Muralidharan; 2 F, Darugiri road, 29. xi. 1977, K. R. Rao; 4 M, 4 F, Williamnagar, 27. v. 1990, M. S. Shishodia; 3 M, Williamnagar, 300 m, 1. x. 1991, R. K. Varshney.

West Garo Hills : 1 F, 1 km South East of Rongram inspection bunglo, 25. ix. 1975, N. Muralidharan. 1 M, Damalgiri, Tura, 17. iii. 1991, A. K. Hazra; 4 F, Rongram, 29. iv. 1991, B. N. Das; 1 F, Tura, 200 m, 3. x. 1991, I. J. Gupta.

Diagnosis : Size medium; vertex not produced in front of eyes; paired ocelli placed nearly between the middle of eyes; pronotum extended beyond the apices of posterior femora; dorsum granulose and rugulose; posterior angle of lateral lobes of pronotum turned downwards, narrow, rounded at apex; wings extended beyond the pronotal apex; first segment of posterior tarsi a little longer than the third; hind tibiae dense black with one or two white or light yellow annulations just behind knees and another one at the apical third of hind tibiae.

Distribution : India (Arunachal Pradesh, Assam, Manipur, Madhya Pradesh, Maharashtra, Meghalaya, Tripura and West Bengal).

Bangladesh; Burma; Java; Pakistan; Philippines; Sri Lanka and Taiwan.

Remarks : This species can be distinct by the narrow frontal sulcus, exerted head, narrow vertex, indistinctly undulate median carina on the hind process of pronotum and dense black hind tibiae with one or two white annulations.

16. *Euparatettix tenuis* Hancock

(Map 2)

1912. *Euparatettix tenuis* Hancock, *Mem. Dep. Agric. India, ent. Ser.*, 4 : 153.

1970. *Euparatettix tenuis* : Steinmann, *Acta zool. hung.*, 16.

Material examined : *East Khasi Hills*; 1 F, Risa colony, Shillong, 11. ix. 1963, S. N. Prasad; 1 F, Motinagar, Shillong, 11. xi. 1971, R. Giri. *East Garo Hills* : 1 F, Dainadubi Inspection Bungalow (at light), 14. ix. 1975, N. Muralidharan; 1 F, Rongjeng, 26. v. 1990, M. S. Shishodia. *West Garo Hills* : 2 F, Rongram, 28. ix. 1975, N. Muralidharan; 1 M, 1 F, Garobadha, Tura, 1. vi. 1990, M. S. Shishodia; 1 M, Digri, Cherang, Tura, 16. iii. 1991, A. K. Hazra; 1 F, Damalgiri, Tura, 17. iii. 1991, A. K. Hazra; 1 F, Gasuapara, 28. iv. 1991, B. N. Das.

Diagnosis : Slender large sized species; pronotum truncate anteriorly, extend behind beyond the middle of hind tibiae; dorsum finely granulose, not convex between shoulders, narrowly slender between shoulders and acuminate posteriorly; median carina nearly straight and entire; posterior angle of lateral lobes of pronotum turned downwards, narrow, apex rounded; wings extend beyond the apex of pronotal process; posterior femora without nodosities on external face; first and second pulvilli of hind tarsi short and acute, the third longer than the previous two.

Distribution : India (Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh, and West Bengal).

Bangladesh and Burma.

Remarks : It is very slender species and closely related to *Euparatettix histricus* (Stål).

17. *Euparatettix histricus* (Stål)

(Map 2)

1860. *Tetrix histrica* Stål, *Freg Eugenes Resa Orth.*, : 347.

1929. *Euparatettix histricus* : Günther, *Revue suisse Zool.*, **44** : 133.

Material examined : *East Garo Hills* : 1 F, Dainadubi, inspection bungalow (at light), 16. ix. 1975, N. Muralidharan; 1 M, Darugiri road, 29. xi. 1977, K. R. Rao; 1 F, Rongjeng, 26. v. 1990, M. S. Shishodia. *West Garo Hills* : 1 F, Wari, North of Tura, 10. x. 1988, K. K. Roy; 1 F, Garobadha, 1. vi. 1990, M. S. Shishodia; 1 F., Digri, Cherang, Tura, 16. iii. 1991, A. K. Hazra; 1 F, Damalgiri, Tura, 17. iii. 1991, A. K. Hazra. *Jaintia Hills* : 1 F, Jowai, 21. v. 1990, M. S. Shishodia.

Diagnosis : Size medium to large; pronotum extend beyond the middle of hind tibiae; dorsum finely granulose, wide between shoulders; posterior angle of lateral lobes of pronotum turned downwards, moderate in size and rounded at apex; wings extend beyond the pronotal apex; posterior femora without nodosities on external face; hind tibiae light yellow or dirty brown; first and second pulvilli short and acute, third longer than the previous two.

Distribution : India (Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Mararashtra, Manipur, Meghalaya, Orissa, Tamilnadu, Tripura and West Bengal).

Afghanistan; Africa; Borneo; Burma; Caledonia; Celebes; China; Holland; Iran; Indonesia; Java; Malaya Islands; Mindanao; Pakistan; Philippines; Queensland; Saudi Arabia; Sri Lanka, Sumatra; Taiwan.

Remarks : This species is closely related to *Euparatettix tenuis* Hancock, and can be recognised by its larger size, a little exserted head, convex dorsum and less elevated median carina on shoulders.

Genus *Paratettix* Bolivar, 1887

Key to species

1. Tegmina minute; wings abbreviated or absent.....*hancockus* (Shishodia & Varshney).
- Tegmina medium; wings extended upto or beyond the pronotal apex.....2.
2. Pronotum extended beyond the apex of posterior femoral apices.....3.
- Pronotum not extended beyond the apex of posterior femoral apices; frontal costa widely sulcated; dorsum of pronotum deplanate; shoulder wide.....*curtipennis* Hancock.
3. Median carina of pronotum compressed, raised and generally arched in front.....
.....*cingalensis* (Walker).

- Median carina of pronotum not compressed, raised as above, but not arched in front.....4.
- 4. Vertex broader than an eye; dorsum wide between the shoulders.....5.
- Vertex equal or slightly narrower than an eye; dorsum not wide between the shoulders...
.....6.
- 5. Vertex a little wider than an eye; dorsum of pronotum rugulose, slightly scabrous; median carina of pronotum not undulate; posterior femora strongly serrulate above towards the apices, with an acute elevated denticle.....*hirsutus* Brunner.
- Vertex fairly wider than an eye; dorsum rugose, tuberculose, subtumid forward; the front border obtusely angulated; median carina of the pronotum compressed, subgibbose forward behind the front border, and depressed just before the shoulders; hind femoral carinae minutely subserrulate above towards the knees, antegenicular denticle a little prominent
..... *rotundatus* Hancock.
- 6. Vertex not narrowed forward; frontal costa widely sulcate; dorsum of pronotum deplanate, shoulders wide; posterior angle of lateral lobes of pronotum wide, rounded at apices; superior carina of posterior femora at the apical third serrulately lobate, antegenicular lobe acute, spinose.....*alatus* Hancock.
- Vertex narrowed forward; frontal costa not widely sulcate; dorsum of pronotum not deplanate; posterior angle of lateral lobes of pronotum narrow and narrowly rounded at apex; superior carina of posterior femora normal.....*tricarinatus* Bolivar.

Genus *Paratettix* Bolivar, 1887

18. *Paratettix alatus* Hancock

(Figs. 26–27, Map 2)

1915. *Paratettix alatus* Hancock, *Rec. Indian Mus.*, **11** : 113.

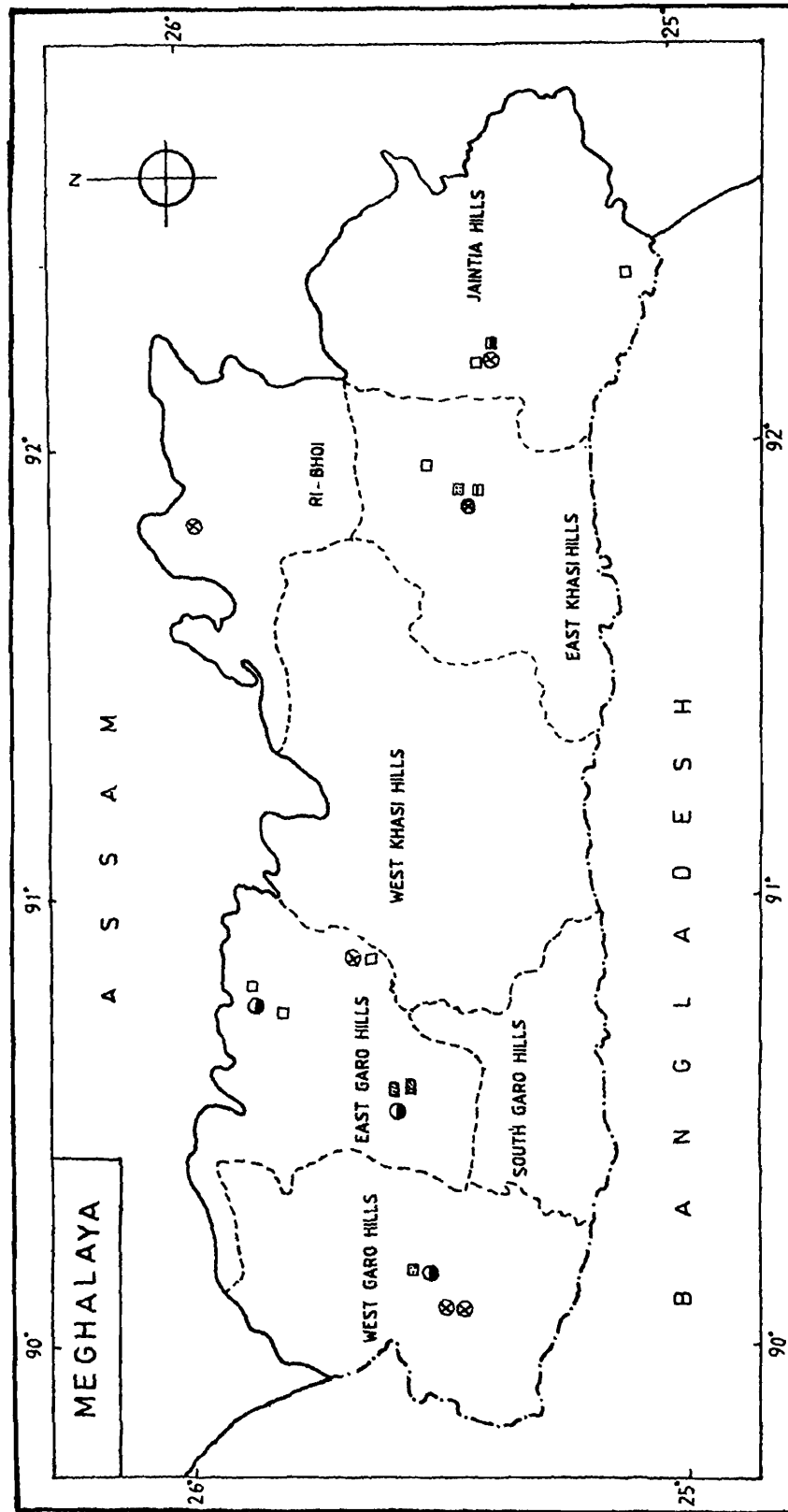
1970. *Paratettix alatus* : Steinmann, *Acta zool. hung.*, **16** : 233.

Material examined : 1 F, Darugiri, East Garo Hills, 14. v. 1979, S. B. Roy.

Diagnosis : Body moderately stout and hirsute below; head exerted; vertex fossulate on either side of median carinula; frontal costa moderately sulcate behind the antennae and widely sulcate in front of the antennae; pronotum and wings extended beyond the apices of posterior femora; dorsum granulose, rugulose, a little tumid between the shoulders and planate behind them; abbreviated carinae absent; posterior angle of lateral lobes of pronotum turned downwards, rounded at apex; anterior and middle femora hirsute below, posterior femora stout, crassate; third pulvilli longer than the second.

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

Remarks : This species is the caudate form of *Paratettix curtispennis* (Hannock). Since the Type specimen is not available, the author is unable to synonymise it with the latter.



Map 3 : Showing distribution of *Paratettix cingalensis*, *Paratettix curtipennis*, *Paratettix hancockus*, *Paratettix hirsutus*, *Paratettix rotundatus*, *Paratettix tricarinatus* in the districts of Methalaya.

19. *Paratettix cingalensis* (Walker)

(Figs. 32 & 46, Map 3)

1914. *Paratettix cingalensis* : Kirby, *Faun. Brit. India, Orth.* : 63.

Material examined : Jaintia Hills : 1 M, 1 F, Sonapurdi, Jowai road, 28. viii. 1974, A. R. Lahiri; 1 F, Jowai, 21. v. 1990, M. S. Shishodia. *East Garo Hills* : 2 M, Dainadubi (at light), 16. ix. 1975, N. Muralidharan; 1 F, Rongjeng. 26. v. 1990, M. S. Shishodia. *East Khasi Hills* : 1 M, 1 F, Barapani, Shillong, 4. viii. 1980, Asket Singh; 1 M, Cherrapunji, 19. iii. 1991, B. C. Das.

Diagnosis : Size medium; head a little exserted; vertex equal to or a little broader than an eye, a little elevated in front, not narrowed anteriorly, frontal carinae truncate; antennae placed below the middle of eyes; pronotum extend beyond the femoral apices; dorsum granulated; median carina compressed, raised, generally arched in front, low behind; wings extend beyond the pronotal apex; first and second pulvilli acute, shorter than the third, third longer than previous and not acute.

Distribution : India (Arunachal Pradesh, Assam, Malabar, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim and Tamilnadu).

Borneo; Hainan; Malaya; Mindanao; Sri Lanka; Sumatra and Taiwan.

Remarks : Dorsal surface of pronotum in front of shoulders dark brown, while the pronotal processes and the lateral side brown, dorsum behind the shoulders with a triangular dark brown spot. The specimen from South India have their median carina of pronotum more elevated in comparison with North East Indian Specimens.

20. **Paratettix curtipennis* Hancock

(Fig. 29-31, Map 3)

1912. *Coptotettix curtipennis* Hancock, *Mem. Dep. Agric. India, ent. Ser.*, 4 : 146.1970. *Paratettix curtipennis* : Steinmann, *Acta zool. hung.*, 16 : 233.

Diagnosis : Size medium but robust; vertex produced in front as far as eyes, front margin transverse; antennae situated on the lower margin of eyes; frontal costa widely sulcate; pronotum extend upto the apex of abdomen or shorter; dorsum convex, wide and deplanate between shoulders, granulose and rugulose; posterior angle of lateral lobes of pronotum wide, rounded at apex; wings extend upto the apex of pronotum or a little surpass; posterior femora stout, crassate margins, with angular lobe before the knees; third pulvilli longer than the first two.

Distribution : India (Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal).

Burma; China (South); Laos; Nepal; Taiwan and Vietnam.

Remarks : Previously recorded from Upper Shillong, 6,000 ft. This species is short winged form.

21. *****Paratettix hancockus*** (Shishodia & Varshney)

(Figs. 40–41, Map 3)

1912. *Coptotettix parvulus* Hancock, *Mem. Dep. Agric. India, ent. Ser.*, **4** : 145 (Preoccupied).1987. *Coptotettix hancockus* Shishodia & Varshney, *J. Bombay nat. Hist. Soc.*, **84** (1) : 167.1987. *Paratettix hancockus* : Shishodia, *Bull. zool. Surv. India*, **8** (1–3) : 132.

Material examined : 1 F, Lailad, Ri-bhoi Dist., 20. v. 1980, C. R. Krishnan; 1 M, Shillong, *East Khasi Hills* : 17. iii. 1991, B. C. Das. *Jaintia Hills* : 2 M, 1 F, Jowai, 21. v. 1990, M. S. Shishodia. *East Garo Hills* : 1 M, 1 F, Rongjeng, 26. v. 1990, M. S. Shishodia. *West Garo Hills* : 1 M, 3 F, Tura, 15 & 16. iii. 1991, A. K. Hazra.

Diagnosis : Size small; head slightly or not exserted above the pronotum; vertex as broad as or slightly narrower than an eye, fossulate on either side of median carinula, ampliate behind the fossulae; antennae inserted at the base of eyes; pronotum extend upto the middle of hind femora, apex widely rounded; dorsum finely granulose or rugulose, wide and convex between shoulders, depressed behind the shoulders, dark brown band present behind shoulders; posterior angle of lateral lobes of pronotum wide and rounded at apex; tegmina minuate, wings abbreviated or absent; posterior femora stout, with one angular lobe before the knees; third pulvilli longer than the previous two.

Distribution : India (Arunachal Pradesh, Assam, Bihar, Manipur, Sikkim, Tripura and West Bengal). Bangladesh.

Remarks : This species show variation in colouration, granulations etc. The extend of dark markings behind the shoulders varies from lateral spots to lateral transvers band. Shishodia (1991) reported that the compressed elevation and granulation of pronotum depend upon the age of specimen, as they grow older the granulation and elevation become distinct.

22. ***Paratettix hirsutus*** Brunner

(Figs. 36–38, Map 3)

1893. *Paratettix hirsutus* Brunner, *Annali Mus. Civ. Stor. nat. Giacomo Doria*, **33** : 110.1970. *Paratettix hirsutus* : Steinmann, *Acta zool. hung.*, **16** : 232.

Material examined : *East Garo Hills* : 1 M Dainadubi, inspection bungalow (at light), 16. ix. 1975, N. Muralidharan; 1 M, Songsok, inspection bungalow (at light), 21. ix. 1975, N. Muralidharan. *West Garo Hills* : 1 M, 1 km South East of Rongram, inspection bungalow, 25. ix. 1975, N. Muralidharan.

Diagnosis : Body moderately stout; head not exserted; vertex as wide as an eye; antennae located on the inferior margin of eyes; pronotum extend beyond the apices of posterior femora; dorsum granulose, wide and convex between the shoulders, depressed behind; posterior angle of lateral lobes of pronotum turned downwards and rounded apex; wings extend beyond the apex of

pronotum; anterior and middle femora hirsute; hind tibiae with two whitish bands; posterior femora stout, antegenicular denticle strongly spinose and elevate; third pulvilli of first segment of posterior tarsi longer than the second.

Distribution : India (Assam, Meghalaya and Tripura).

Burma.

Remarks : Shishodia (1991) recorded this species from Meghalaya.

23. ***Paratettix rotundatus* Hancock

(Fig. 33, Map 3)

1915. *Paratettix rotundatus* Hancock, *Rec. Indian Mus.*, **11** : 112.

1970. *Paratettix rotundatus* : Steinmann, *Acta zool. hung.*, **16** : 233.

Material examined : 1 M, Nongthymai, Shillong, East Khasi Hills, 25. vi. 1973, R. S. Giri. *East Garo Hills* : 1 M, Songsok, 2. v. 1991, B. N. Das; 2 F, Williamnagar, 300 m, 1. x. 1991, R. K. Varshney. *West Garo Hills* : 3 F, Gasuapara, 2. v. 1991, B. N. Das.

Diagnosis : Body moderately stout and hirsuta below; frontal costa moderately arcuate between the antennae; antennae situated nearly on the inferior margin of eyes; pronotum a little obtusely angulate anteriorly and extend beyond the apices of posterior femora; dorsum tumid between shoulders, planate behind, granulose and tuberculose; wings extend beyond the apices of posterior femora; anterior femora hirsute on margins; posterior femora stout, antegenicular denticle prominent; third pulvilli a little longer than the second, all the pulvilli spinose.

Distribution : India (Arunachal Pradesh, Assam and West Bengal).

Remarks : *Paratettix rotundatus* Hancock, *P. alatus* Hancock and *P. hirsutus* Brunner are three similar species under the genus *Paratettix* Bolivar (Shishodia, 1999).

24. ***Paratettix tricarinatus* Bolivar

(Map 3)

1887. *Paratettix tricarinatus* Bolivar, *Annls Soc. ent. Belq.*, **31** : 282.

1987. *Paratettix tricarinatus* : Shishodia, *Fauna of Orissa : State Fauna Series* No. 1, Pt. 1 : 95.

Material examined : 6 M, 8 F, Jowai, Jaintia Hills 21. v. 1990, M. S. Shishodia; 1 F, Rongjeng, East Garo Hills, 26. v. 1990, M. S. Shishodia.

Diagnosis : Size medium; head a little or not at all exerted above the surface of pronotum; vertex narrower than an eye, and narrowed forward, front margin truncate, lateral carinulae and middle carinula raised; pronotum extend beyond the apices of posterior femora; dorsum granulose, convex on shoulders, with one indistinct oblique line on either side of shoulders which meet the lateral carinae anteriorly; posterior angle of lateral lobes of pronotum wide, apex narrowly rounded; wings surpass the pronotal apex; third pulvilli longer than the first two.

Distribution : India (Orissa, Tripura and West Bengal).

Mindanao; Malaya; Sulawesi; Sumatra; Philippines; Papua and Taiwan.

Remarks : Shishodia (1988 and 1991) recorded it from Orissa and West Bengal. It is recorded here for the first time from Meghalaya.

Genus **Hedotettix** Bolivar, 1887

Key to species

1. Vertex angulate in front; frontal costa strongly produced before the eyes, front of head oblique; median carina of pronotum very low, compressed a little or not.....*costatus* Hancock.
- Vertex not angulate in front; frontal costa not produced as above; median carina of pronotum not very low.....2.
2. Frontal costa widely sulcate, the rami more or less abruptly widened between the antennae; median carina of pronotum more or less compressed-arcuate forwards before the shoulders, highest at sulci; dorsum convex.....*gracilis* (De Haan).
- Frontal costa not widely sulcate, the rami not widened between the antennae; median carina of pronotum a little compressed, low arcuate forward.....3.
3. Moderately large; frontal costa strongly arcuate; blades of ovipositor generally long; second and third pulvilli of the first joint of hind tarsi more or less equal in size.....*grossus* Hancock.
- Moderate; frontal costa less strongly arcuate; second and third pulvilli of the first joint of hind tarsi not equal in size.....*antennatus* Hancock.

25. *Hedotettix attenuatus* Hancock

(Map 4)

1904. *Hedotettix attenuatus* Hancock, *Spolia zeylan.*, 2 : 108, 149, 151.

1987. *Hedotettix attenuatus* : Shishodia, *Fauna of Orissa* : State Fauna Series No. 1, Pt. 1 : 98.

Material examined : *West Khasi Hills* : 1 F, Jakrim, 1460 m, 4. xii. 1971, K. R. Rao; 1 M, Nongstoin, 13, iii. 1991, A. K. Sanyal. *East Khasi Hills* : 1 M, 1 F, Batjora, Ri-bhoi Dist., 5. vi. 1990, M. S. Shishodia; 2 F, Shillong, 30. iii. 1991, A. K. Hazra. *East Garo Hills* : 1 M, 2 F, Dainadubi, 14. ix. 1975, N. Muralidharan; 3 F, Songsok, 21. ix. 1975, N. Muralidharan; 5 M, 6 F, Williamnagar, 27. v. 1990, M. S. Shishodia; 4 M, 2 F, Nongal, 28. v. 1990, M. S. Shishodia; 2 F, Matahckgiri, 7. v. 1991, B. N. Das; 2 M, 1 F, Williamnagar, 300 m, 1. x. 1991, R.K. Varshney. *West Garo Hills* : 2 F, 1 km South-East of Rongram, 25. ix. 1975, N. Muralidharan; 1 M, 3 F, Garobadha, 1. vi. 1990, M. S. Shishodia; 2 M, 1 F, Gasuapara, 28. iv. 1991, B. N. Das. *Jaintia Hills* : 1 M, Jowai, 18. iii. 1991, A. K. Hazra.

Diagnosis : Body small to large; vertex narrower than an eye, front margin subtransverse, meet the lateral carinulae roundly; frontal costa roundly arched, frontal sulcus gently wide anteriorly; paired ocelli placed above the middle of eyes; antennae situated below the middle of eyes; pronotum extend upto the apex of hind femora or beyond it; dorsum smooth or finely granulose, convex between shoulders, median carina straight posteriorly; posterior angle of lateral lobes of pronotum turned downwards, narrowly rounded at apex; wings extend upto the pronotal apex or beyond; third pulvilli longer than the second and not acute at apex.

Distribution : India (Arunachal Pradesh, Assam, Manipur Meghalaya, Orissa, Sikkim, Tripura and West Bengal).

Sri Lanka.

Remarks : This species is closely related to *Hedotettix gracilis* (De Haan) and show dimorphism in the length of pronotum and wings.

26 ***Hedotettix costatus* Hancock

(Fig. 28, Map 4)

1912. *Hedotettix costatus* Hancock, *Mem. Dep. Agric. India, ent. Ser.*, 4 : 147-148.

1987. *Hedotettix costatus* : Ingrisch, *Dtsch. ent. Z.*, 34 : 130.

Material examined : 1 M, 1 F, Williamnagar, East Garo Hills, 27, v. 1990, M. S. Shishodia.

Diagnosis : Medium in size; head not exserted above the pronotum; vertex equal to or a little narrower than an eye, expanded, angularly produced in front, carinate in middle with a depression on either side; frontal costa gently furcate; pronotum extend beyond the hind femoral apices; dorsum finely granulose; wings extend beyond the pronotal apex; third pulvilli not acute, longer than the previous two.

Distribution : India (Assam, Bihar, Sikkim, Tripura, Uttar Pradesh and West Bengal).

Bangladesh and Nepal.

Remarks : This species somewhat resembles with the European species *Tetrix subulata* (Linnaeus), but its interocular distance is either equal or less than the breadth of an eye.

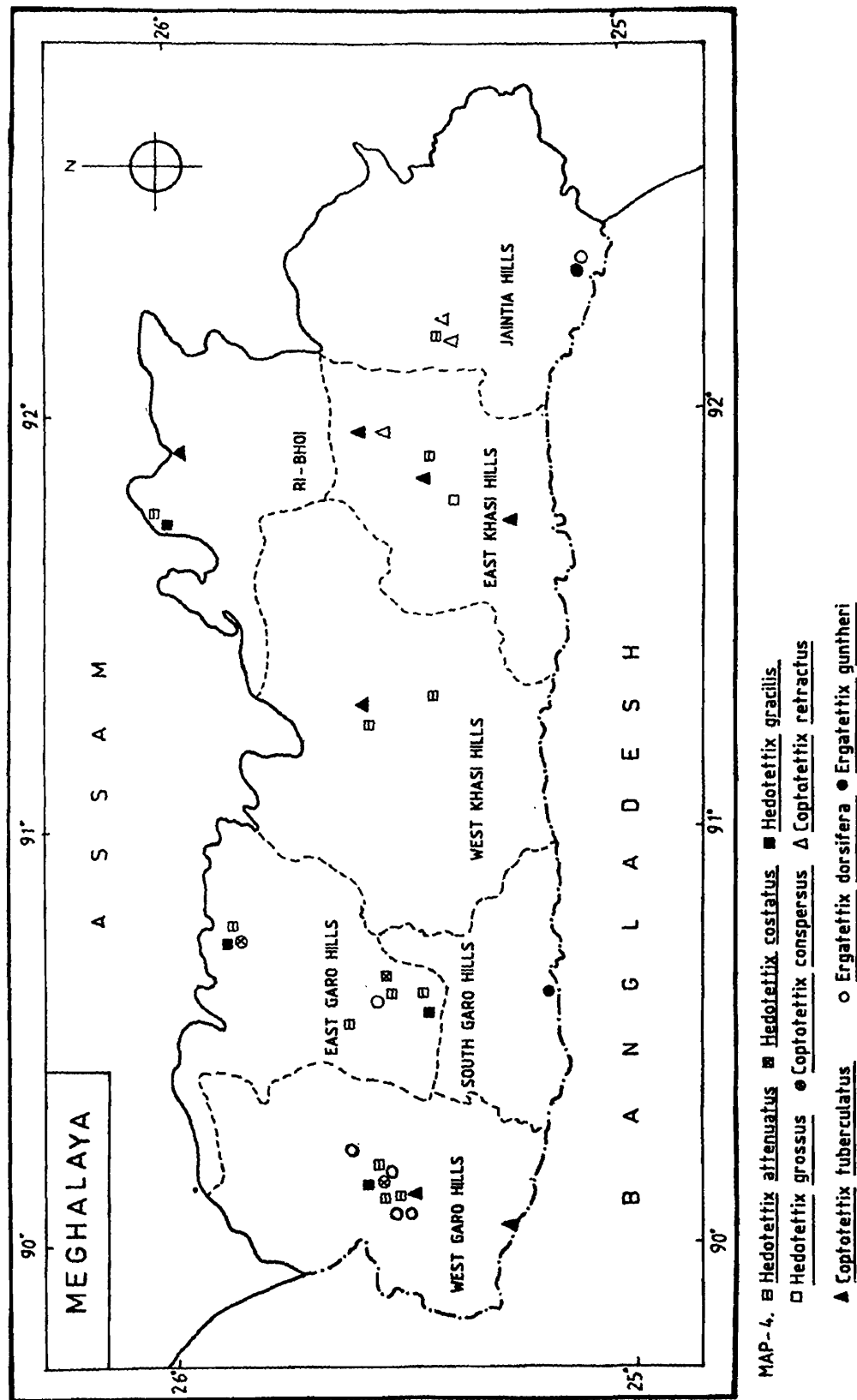
27. *Hedotettix gracilis* (De Haan)

(Fig. 35, Map 4)

1842. *Acridium* (*Tetrix*) *gracile* De Haan, *Temminck. Verhandel., Orthopt.*, : 167, 169.

1914. *Hedotettix gracilis* : Kirby, *Faun. Brit. India, Orth.*, 72.

Material examined : West Garo Hills : 1 M, 1 km West-East of Rongram inspection bungalow, 28. ix. 1975, N. Muralidharan, East Garo Hills : 1 M, Darugiri Forest Rest House (at



Map 4 : Showing distribution of *Hedotettix attenuatus*, *Hedotettix costatus*, *Hedotettix gracilis*, *Hedotettix grossus*, *Coptotettix conspersus*, *Coptotettix retractus*, *Coptotettix tuberculatus*, *Ergatettix dorsifera* and *Ergatettix guntheri* in the districts of Meghalaya.

light), 14. v. 1979, S. B. Roy; 1 F, Nongal, 28. v. 1990, M. S. Shishodia. *Ri-bhoi Dist.* : 1 F, Batjora, 5. vi. 1990, M. S. Shishodia.

Diagnosis : Body small to large; head not exserted above the pronotum, vertex equal to or narrower than an eye, front margin rounded, frontal costa widely sulcate, the rami widened between the antennae; antennae inserted below the middle of eyes; pronotum and wings extend posteriorly upto the apex of hind femora or beyond; dorsum finely granulose, elevated and tectiform between shoulders; abbreviated carinae present on either side of shoulders; humeral angle obtusely rounded; third pulvilli of posterior tarsi longer than the previous two.

Distribution : India (Arunachal Pradesh, Assam, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tripura and West Bengal).

Bangladesh; Burma; Celebes; Java; Pakistan; Sri Lanka; Sumatra; Taiwan; Thailand and Vietnam.

Remarks : Two types of specimens are found in the same locality—one with small and other with large pronotum and wings. This show that the species occur in macro and microform.

28. *Hedotettix grossus* Hancock

(Fig. 39, Map 4)

1915. *Hedotettix grossus* Hancock, *Rec. Indian Mus.*, **11** : 124.

Material examined : 1 F, Mowphlong, East Khasi Hills, 6. viii. 1963, V. D. Srivastava.

Diagnosis : Stature moderately large; vertex a little narrower than an eye, slightly depressed on either side, front margin subroundly bent laterally; frontal costa not widened between the antennae; pronotum and wings extend beyond the hind femoral apices; dorsum granulose, tectiform; abbreviated carinae between shoulders distinct; humeral angle obtusely rounded; third pulvilli not pointed and longer than the previous two.

Distribution : India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Tripura and West Bengal).

Remarks : This species appears to be intermediate between *Hedotettix gracilis* (De Haan) and *Hedotettix attenuatus* Hancock.

Genus *Coptotettix* Bolivar

Key to species

1. Pronotal length small (10.5 mm); posterior angle of lateral lobes of pronotum obtusely rounded; body grey and palpi white coloured.....*retractus* Hancock.
- Pronotal length large (12–14.5 mm); posterior angle of lateral lobes of pronotum truncate or subtruncate.....2.

2. Dorsum convex between shoulders, tubercles without flattened head thickenings; posterior angle of lateral lobes of pronotum narrowed, subtruncate apically.....*retractus* Hancock.
- Dorsum flattened between shoulders, tubercles with flattened head thickenings; posterior angle of lateral lobes of pronotum truncate at apex.....*tuberculatus* Bolivar

29. *Coptotettix conspersus* Hancock

(Fig. 34, Map 4)

1915. *Coptotettix conspersus* Hancock, *Rec. Indian Mus.*, 11 : 119.

1970. *Coptotettix conspersus* : Steinmann, *Acta zool. hung.*, 16 : 234.

Material examined : East Garo Hills : 4 M, 3 F, 1 km West of Dainadubi inspection bungalow, 16. ix. 1975, N. Muralidharan. West Garo Hills : 1 F, 1 km South-East of Rongram inspection bungalow, 25. ix. 1975, N. Muralidharan.

Diagnosis : Medium in size; vertex not produced in front of eyes, fossulae present; frontal costa wide between antennae; pronotum and wings extend beyond the hind femoral apices; dorsum convex with abbreviated curved carinae which may be broken in some cases, finely rugulose forwards and tuberculose backwards; median carina gently undulate behind; third pulvilli either equal to or longer than the previous two.

Distribution : India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Orissa, Tripura, Uttar Pradesh and West Bengal).

Sri Lanka.

Remarks : The colour, size, abbreviated and median carinae of pronotum are variable in this species.

30.** *Coptotettix retractus* Hancock

(Map 4)

1915. *Coptotettix retractus* Hancock, *Rec. Indian Mus.*, 11 : 120.

1970. *Coptotettix retractus* : Steinmann, *Acta zool. hung.*, 16 : 234.

Material examined : 1 F, Barapani, Shillong, East Khasi Hills, 4. viii. 1980, Asket Singh; 1 M, 2 F, Jowai, Jaintia Hills, 21. v. 1990, M. S. Shishodia.

Diagnosis : Body colour grey, palpi white; head not at all exerted; frontal costa strongly arcuately produced; median carina of pronotum pluri-undulate posteriorly, prozonal carinae convergent backwards; posterior angle of lateral lobes of pronotum rounded at apex; first and second pulvilli acute, third longer than second and straight below.

Distribution : India (Bihar), Pakistan.

Remarks : It is recorded here for the first time from Meghalaya.

31. ***Coptotettix tuberculatus* Bolivar

(Map 4)

1887. *Coptotettix tuberculatus* Bolivar, *Annl. Soc. ent. Belg.*, **31** : 291.1991. *Coptotettix tuberculatus* : Shishodia, *Rec. zool. Surv. India, Occ. Paper* No. 140.

Material examined : Ri-bhoi Dist. : 1 F, Umsing, Shillong, 13. vi. 1963, V. D. Srivastava; East Khasi Hills : 1 F, Mawpat, Shillong, 16. iv. 1979, S. G. Patil; 1 F, Cherrapunji, 19. iii. 1991, B. C. Das. West Khasi Hills : 2 M, Nongstoin, 14. iii. 1991, A. K. Sanyal. West Garo Hills : 5 M, 2 F, Tura, 16. iii. 1991, 16. iii. 1991, A. K. Hazra. 1F, Damalgiri, Tura, 17.iii.1991, A.K. Hazra. Jaintia Hills : 1 F, 1 Jowai 8. iii. 1991, A. K. Sanyal.

Diagnosis : Size medium; head not or a little exserted above the pronotum; vertex narrower than an eye; frontal sulcus not wide; pronotum and wings extend upto the last abdominal segment or beyond, acute at apex; dorsum flattened above, granulose, rugulose and tuberculose with flattened head thickenings, fossae located in front as well as behind shoulders; median carina distinctly elevated behind, irregularly broken with depressions; posterior angle of lateral lobes truncate at apex; third pulvilli longer than the previous two.

Distribution : India (Arunachal Pradesh and Manipur). Burma.

Remarks : Shishodia (1991) reported this species from Arunachal Pradesh and Manipur for the first time from India. Now the author is recording it from Meghalaya for the first time.

Genus *Ergatettix* Kirby, 1914*Key to species*

1. Median carina of pronotum distinctly undulate; lateral carina with small dilated lobes on the hind process of pronotum; middle femora sufficiently flattened, margins lobate; hind femora strongly tuberculate on externo-medial surface.....*güntheri* Steinmann.
- Median carina of pronotum indistinctly or distinctly undulate but not like the above; lateral carinae without dilated lobes on the hind process of pronotum; middle femora less flattened, margins indistinctly or a little lobate; hind femora with less protuberant tubercles on externo-medial surface.....*dorsifera* (Walker).

32. *Ergatettix dorsifera* (Walker)

(Map 4)

1871. *Tettix dorsifera* Walker, *Cat. Derm. Salt. Brit. Mus.*, **5** : 8251929. *Ergatettix dorsifera* : Hebard, *Revue suisse Zool.*, **36** : 588.

Material examined : Jaintia Hills : 3 M, Sonapurdi, Jowai road, 28. viii. 1974, A. R. Lahiri. East Garo Hills : 1 M, 3 F, Songsok inspection bungalow (At light), 21. ix. 1975, N. Muralidharan;

3 M, 2 F, Williamnagar, 27. v. 1990, M. S. Shishodia; 1 M, 1 F, Songsok, 2. v. 1991, B. N. Das; 1 F, Williamnagar, 300 m. 1. x. 1991, R. K. Varshney. *West Garo Hills* : 1F, 1 km South-East of Rongram inspection bungalow, 25. ix. 1975, N. Muralidharan; 1 M, 3 F, Gasuapara, 28. iv. 1991, B. N. Das; 1 M, 1 F, Tura, 290 m, 3. x. 1991, S. K. Ghosh.

Diagnosis : Size medium, head distinctly exserted above the surface of pronotum; vertex narrower than an eye; antennae situated below the inferior margin of eyes; pronotum and wings extend beyond the apex of hind femora; dorsum wide between shoulders, rugulose; median carina depressed in front, undulate behind the shoulders, lateral carinae wavy; posterior femora elongate, crassate, external surface with protuberant tubercles; first and second pulvilli small and spinose, third equal to or longer than second.

Distribution : India (Arunachal Pradesh, Assam Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tamilnadu, Tripura, Uttar Pradesh and West Bengal). Bangladesh; Burma; Central Asia; Greater Sunda Island and South China; Sri Lanka; Sumatra and Taiwan.

Remarks : This species is quite similar to *Ergatettix gütheri* Steinmann.

33. *Ergatettix güntneri* Steinmann

(Fig. 42, Map 4)

1912. *Euparatettix nodulosus* Hancock, *Mem. Dep. Agric. India, ent. Ser.*, 4 : 155.

1970. *Ergatettix güntneri* : Steinmann, *Acta zool. hung.*, 16 : 234.

(new name for *nodulosus* Hancock).

Material examined : 2 F, 2 M, Sonapurdi, Jowai road, 28. viii. 1974, A. R. Lahiri; 1 M, 1 F, Sibbari, South Garo Hills, 26. iv. 1991, B. N. Das.

Diagnosis : Similar to previous species except median carina strongly undulate behind the shoulders; lateral carinae also wavy with nodules especially towards the apex of pronotal process; posterior femora elongate, crassate, external surface with distinct projecting tubercles, margins finely serrulate, with small lobe before the apex of superior margin; first and second pulvilli small and spinose, third equal to or longer than the second.

Distribution : India (Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Tripura, Uttar Pradesh and West Bengal). Bangladesh and Sri Lanka.

Remarks : The specimens of this species studied from Meghalaya, Tripura and West Bengal are bigger in size than those of Arunachal Pradesh.

SUMMARY

Thirty three species are reported here, out of which nine species are new records and one being the first record from India.

ACKNOWLEDGEMENT

The author is grateful to Director, Zoological Survey of India, for laboratory facilities.

Table 1 : Showing distribution of Taxa in Meghalaya

	Ri-bhoi	E. Khasi Hills	W. Khasi Hills	E. Garo Hills	W. Garo Hills	S. Garo Hills	Jaintia Hills
<i>Scelimena india</i>	-	+	-	-	+	-	-
<i>Criotettix bispinosus</i>	+	+	-	+	-	-	-
<i>Criotettix rugosus</i>	+	+	+	+	+	-	-
<i>Eucriotettix doherty</i>	+	+	-	-	-	-	-
<i>Eucriotettix grandis</i>	-	+	+	-	+	-	-
<i>Eucriotettix flavopictus</i>	-	+	-	-	-	-	-
<i>Loxilobus assamus</i>	-	+	-	-	-	-	-
<i>Thoradonta apiculata</i>	-	-	-	+	-	-	-
<i>Thordonta nodulosa</i>	-	-	-	-	+	-	-
<i>Bolivaritettix insignis</i>	-	+	-	-	-	-	-
<i>Bolivaritettix sikkimensis</i>	-	-	+	-	+	-	-
<i>Hyboella sp.</i>	-	+	-	-	-	-	-
<i>Xistrella arorai</i>	-	-	+	+	-	-	-
<i>Teredorus carmichaeli</i>	-	-	-	-	-	-	+
<i>Euparatettix personatus</i>	-	-	-	+	+	-	-
<i>Euparatettix tenuis</i>	-	+	-	+	+	-	+
<i>Euparatettix histricus</i>	-	-	-	+	+	-	+
<i>Paratettix alatus</i>	-	-	-	+	-	-	-
<i>Paratettix cingalensis</i>	-	+	-	+	-	-	+
<i>Paratettix curtipennis</i>	-	+	-	-	-	-	-
<i>Paratettix hancockus</i>	+	+	-	+	+	-	+
<i>Paratettix hirsutus</i>	-	-	-	+	+	-	-
<i>Paratettix rotundatus</i>	-	+	-	+	+	-	-
<i>Paratettix tricarinatus</i>	-	-	-	+	-	-	+
<i>Hedotettix attenuatus</i>	+	+	+	+	+	-	+
<i>Hedotettix costatus</i>	-	-	-	+	-	-	-
<i>Hedotettix gracilis</i>	+	-	-	+	+	-	-
<i>Hedotettix grossus</i>	-	+	-	-	-	-	-
<i>Coptotettix conspersus</i>	-	-	-	+	+	-	-
<i>Coptoptettix retractus</i>	-	+	-	-	-	-	+
<i>Coptotettix tuberculatus</i>	+	+	+	-	+	-	+
<i>Ergatettix dorsifera</i>	-	-	-	+	+	-	+
<i>Ergatettix giintheri</i>	-	-	-	-	-	+	+

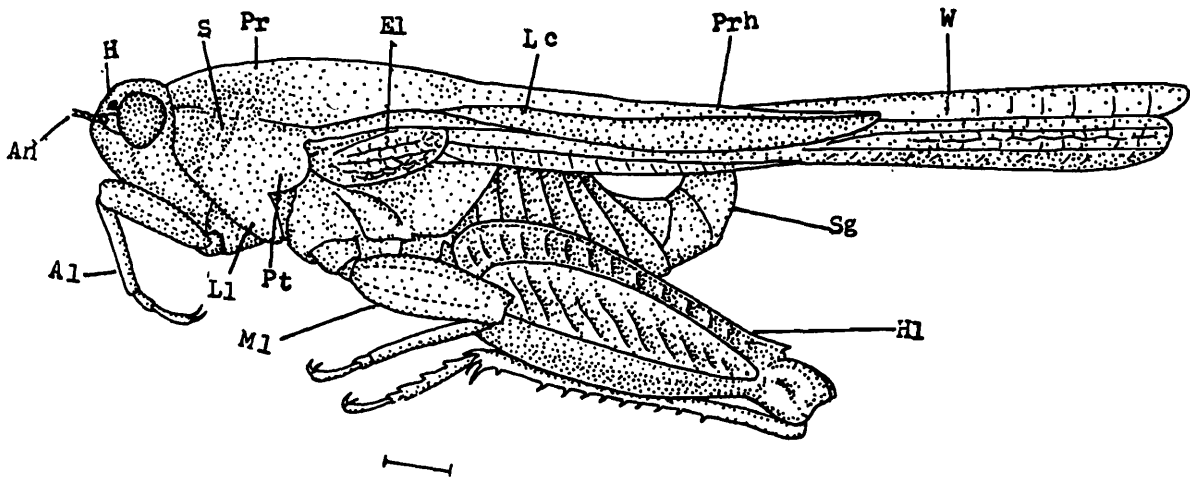
Table 2 : Showing distribution of Taxa in India

	Ar.P.	Assam	Bihar	Karn.	Keral.	M. P.	Mahr.	Mani.	Megh.	Miz.	Nagl.	Or.	Sik.	T.N.	Tr.	U.p.	W.B.
<i>Scelimena india</i>	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<i>Criotettix bispinosus</i>	+	+	+	-	-	+	-	+	+	-	-	-	-	-	+	-	+
<i>Criotettix rugosus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eucriotettix doherty</i>	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<i>Eucr. grandis</i>	+	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	+
<i>Eucr. flavopictus</i>	-	-	-	+	+	-	+	-	+	-	-	-	-	+	-	-	-
<i>Loxilobus assamus</i>	+	+	-	-	-	-	-	+	+	-	+	-	+	+	-	-	+
<i>Thoradonta apiculata</i>	+	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+
<i>Th. nodulosa</i>	-	+	-	-	-	-	-	+	+	-	-	-	+	-	+	-	+
<i>Bolivaritettix insignis</i>	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	+	-
<i>Bol. sikkimensis</i>	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+
<i>Hyboella sp.</i>	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+
<i>Xistrella arorai</i>	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+
<i>Teredorus carmichaeli</i>	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+
<i>Euparatettix personatus</i>	+	+	-	-	-	+	+	+	+	-	-	-	-	+	-	-	+
<i>Eup. tenuis</i>	+	+	+	-	-	-	-	+	+	-	-	-	+	-	+	+	+
<i>Eup. histricus</i>	+	+	+	-	-	+	+	+	+	-	-	+	-	+	+	-	+
<i>Paratettix alatus</i>	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	+
<i>Par. cingalensis</i>	+	+	-	-	+	+	+	+	+	-	-	+	+	+	-	-	+
<i>Par. curtispennis</i>	+	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	+
<i>Par. hancockus</i>	+	+	+	-	-	-	-	+	-	-	-	-	+	-	+	-	+
<i>Par. hirsutus</i>	-	+	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-
<i>Par. rotundatus</i>	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Par. tricarinatus</i>	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+
<i>Hedotettix tenuatus</i>	+	+	-	-	-	-	-	+	+	-	-	+	-	-	+	-	+
<i>Hed. costatus</i>	-	+	+	-	-	-	-	-	-	-	-	-	+	-	+	+	+
<i>Hed. gracilis</i>	+	+	-	-	-	+	+	+	+	-	-	+	+	-	+	-	+
<i>Hed. grossus</i>	+	+	-	-	-	-	-	+	+	-	-	-	-	-	+	-	+
<i>Coptotettix conspersus</i>	+	+	-	-	-	-	-	+	+	-	-	+	-	-	+	+	+
<i>Copt. retractus</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Copt. tuberculatus</i>	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
<i>Ergatettix dorsifera</i>	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+
<i>Ergatettix güntheri</i>	+	+	+	-	-	+	+	+	-	-	-	+	-	-	+	+	+

Ar.P. = Arunachal Pradesh; Karn. = Karnataka; Keal. = Kerala; M. P. = Madhya Pradesh; Mahr. = Maharashtra; Man. = Manipur; Megh. = Meghalaya; Miz. = Mizoram; Nagl. = Nagaland; Or. = Orissa; Sik. = Sikkim; T. N. = Tamilnadu; Tr. = Tripura; U. P. = Uttar Pradesh; W. B. West Bengal.

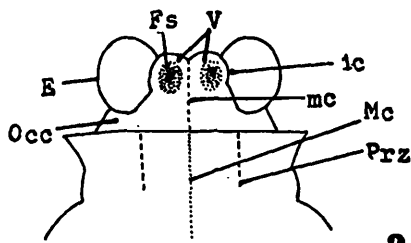
LIST OF ABBREVIATIONS USED

Ad, Antegenicular denticle	Occ, Occiput
Al, Anterior leg	Pa, Paginal area
An, Antenna	Pd, Pedicel
Ao, Anterior occilus	Plv, Pulvilli
Cl, Claw	Po, Paired ocelli
Cx, Coxa	Pr, Pronotum
E, Compound eye	Prh, Hind pronotal process
El, Elytra	Prz, Prozonal carina
Fc, Frontal costa	Pt, Paranota
Fh, Hind femur	R, Rami
Fl, Flagellum	S, Sulci
Fs, Fossulae	Sc, Scape
Gd, Genicular denticle	Sf, Frontal sulcus
H, Head	Sg, Subgenital plate
Hl, Hind leg	T, Tibia
Ic, Inferior carina	Ta, Tarsi
lc, Lateral carinulae	Ta 1, First tarsal segment
Lc, Lateral carina	Ta 2, Second tarsal segment
Ll, Posterior angle of lateral lobe lobe of pronotum	Ta 3, Third tarsal segment
Lma, Lower marginal area	Tr, Trochanter
mc, middle/median carinula	Uc, Superior carina
Mc, Median carina	Uma, Upper marginal area
Mf, Middle femur	V, Vertex
	W, Wing

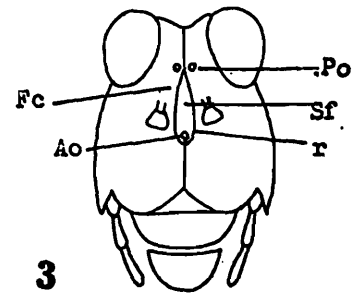


Scale 1mm.

1



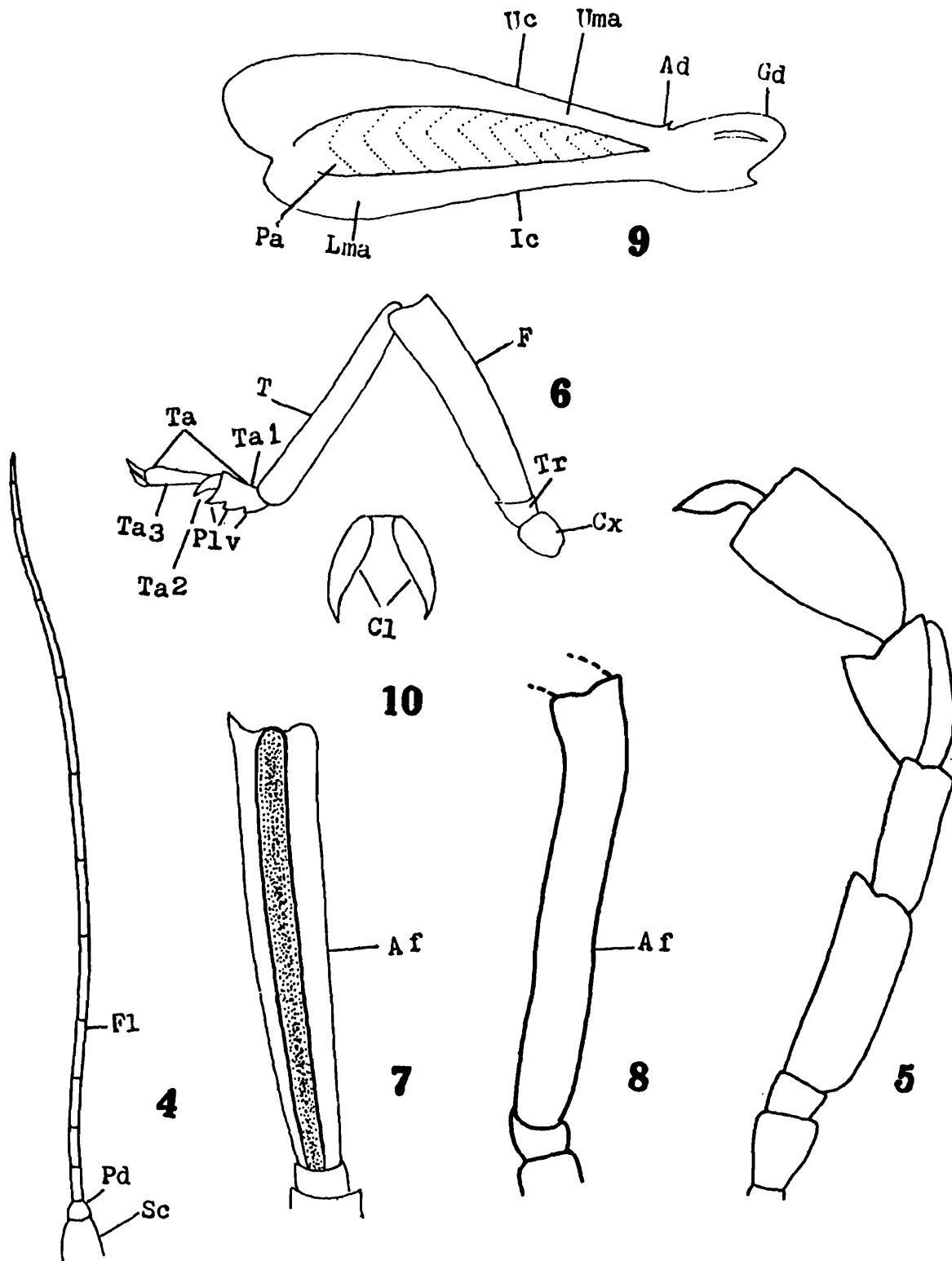
2



3

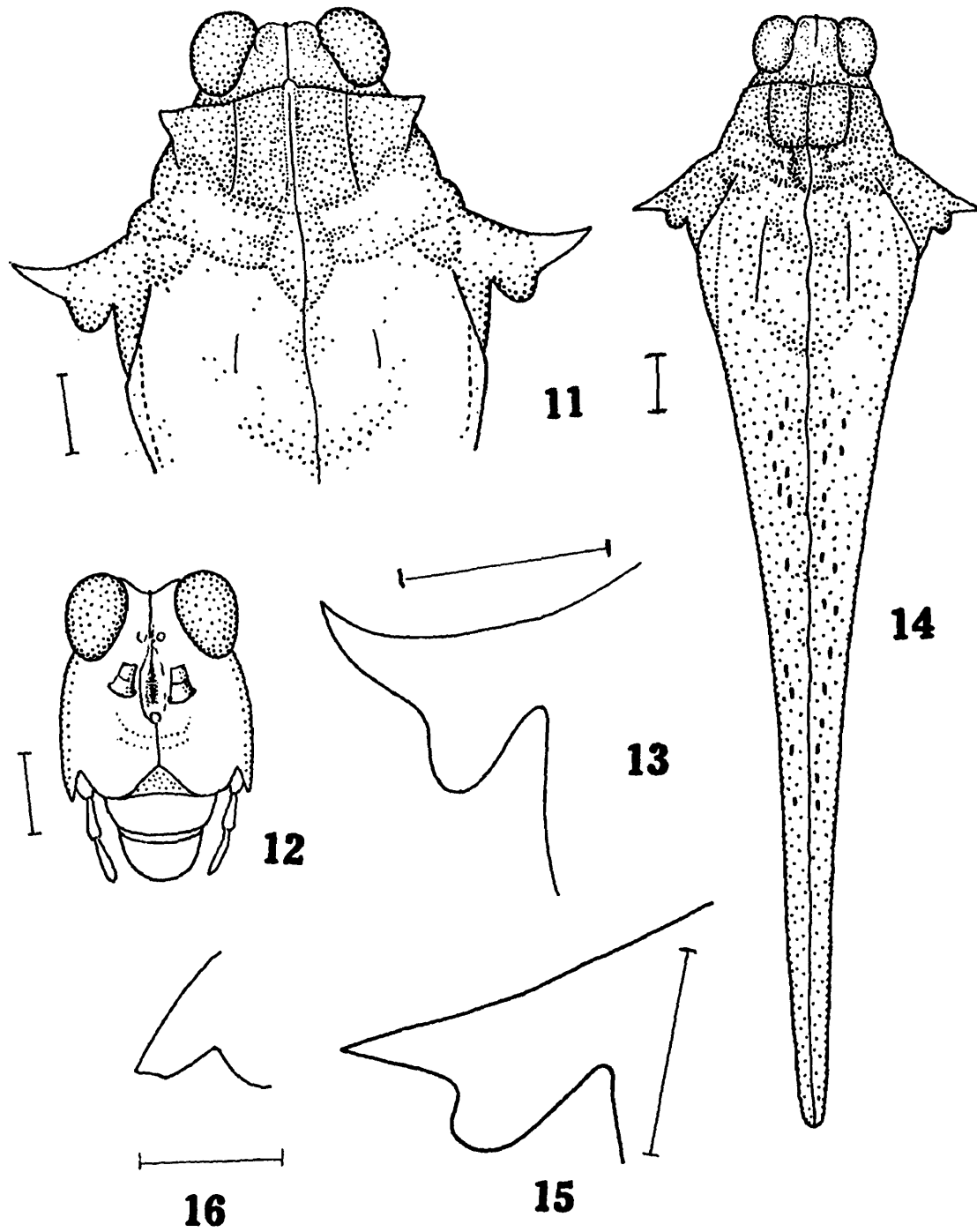
PLATE—1

Fig. 1. Morphology of *Paratettix rotundatus* Hancock (Dorso-lateral view). Fig. 2. Dorsal view of the head of tetrigid (Magnified). Fig. 3. Front view of the head of tetrigid (Magnified).



PLATE—2

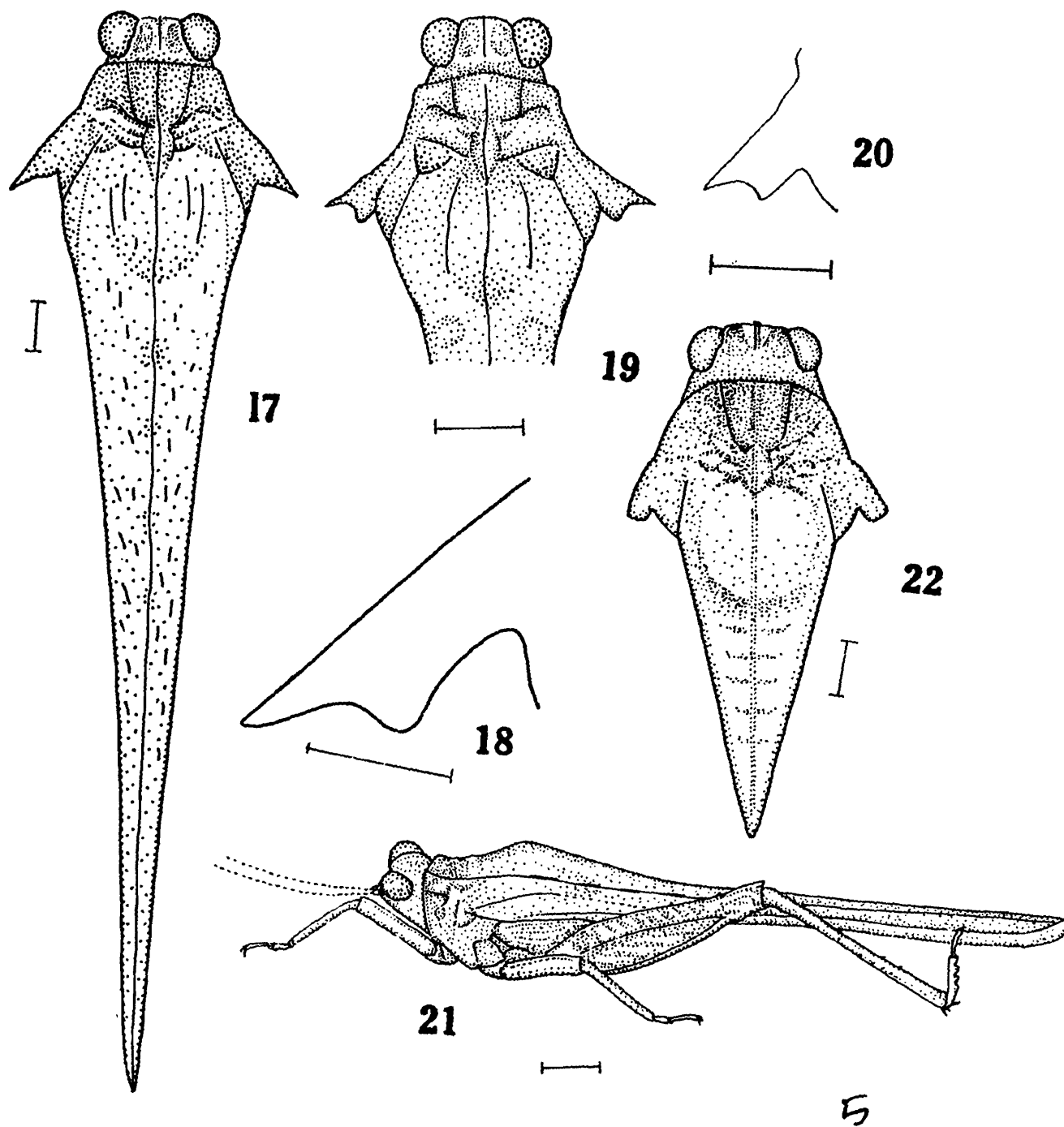
Fig. 4. Antenna of *Scelimena discalis* (Hancock) (Magnified). Fig. 5. Antenna of *Tripetalocera ferruginea* Westwood (Magnified). Fig. 6. Posterior leg of tetrigid (Magnified). Fig. 7. Dorsal view of anterior femur of *Saussurella cornuta* (De Haan) (Magnified). Fig. 8. Dorsal view of anterior femur of *Loxilobus assamus* Hancock (Magnified). Fig. 9. Posterior femur with external face. Fig. 10. Claw of posterior leg.



Scale 1 mm.

PLATE—3

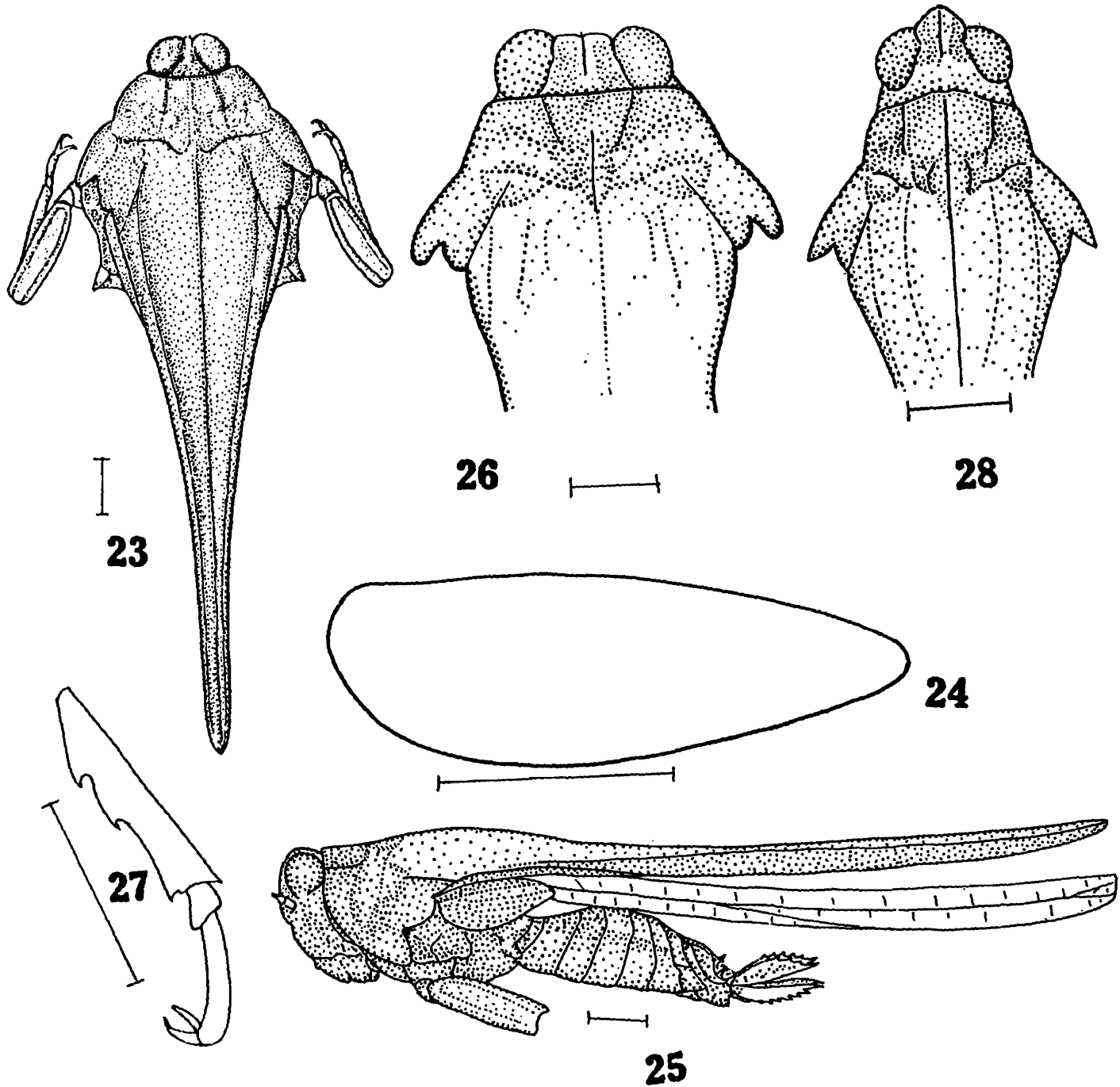
Fig. 11. Dorsal view of head and thorax of *Scelimena india* Hancock. Fig. 12. Front view of *S. india* Hancock. Fig. 13. Posterior angles of lateral lobes of pronotum of *S. india* Hancock (Magnified). Fig. 14. Dorsal view of *Eucriotettix grandis* (Hanc.). Fig. 15. Posterior angles of lateral lobes of pronotum of *E. grandis* (Hancock). Fig. 16. Posterior angles of lateral lobes of pronotum of *Loxilobus assamus* Hancock.



Scale 1 mm.

PLATE—4

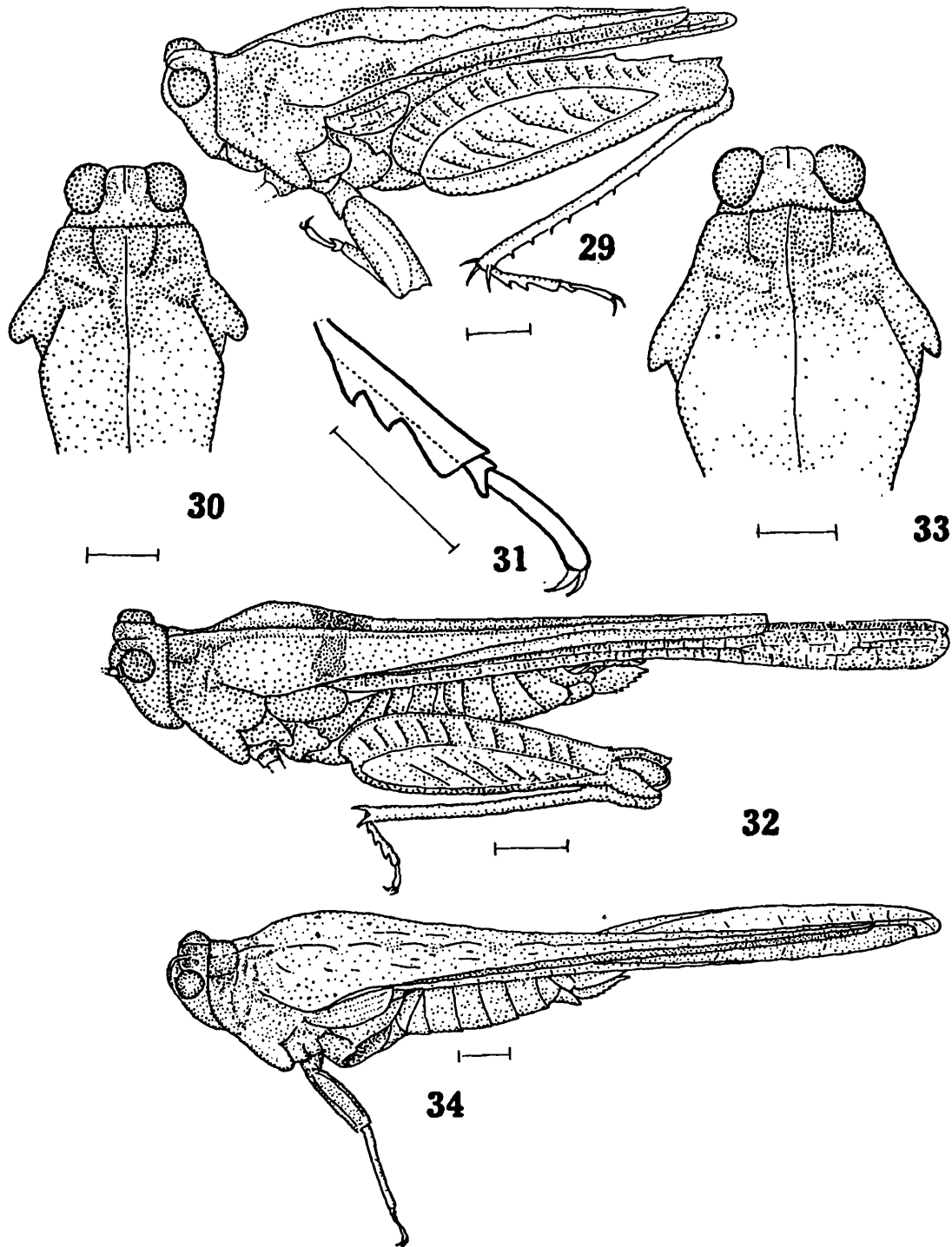
Fig. 17. Dorsal view of *Criotettix bispinosus* (Dalman). Fig. 18. Posterior angles of lateral lobes of *Criotettix bispinosus* (Dalman). Fig. 19. Dorsal view of head and thorax of *Thoradonta apiculata* Hancock (Type). Fig. 20. Posterior angle of lateral lobes of pronotum of *T. apiculata* Hancock. Fig. 21. Dorso-lateral view of *Xistrella arorai* Shishodia. Fig. 22. Dorsal view of *Bolivaritettix sikkimensis* (Bolivar).



Scale 1 mm.

PLATE—5

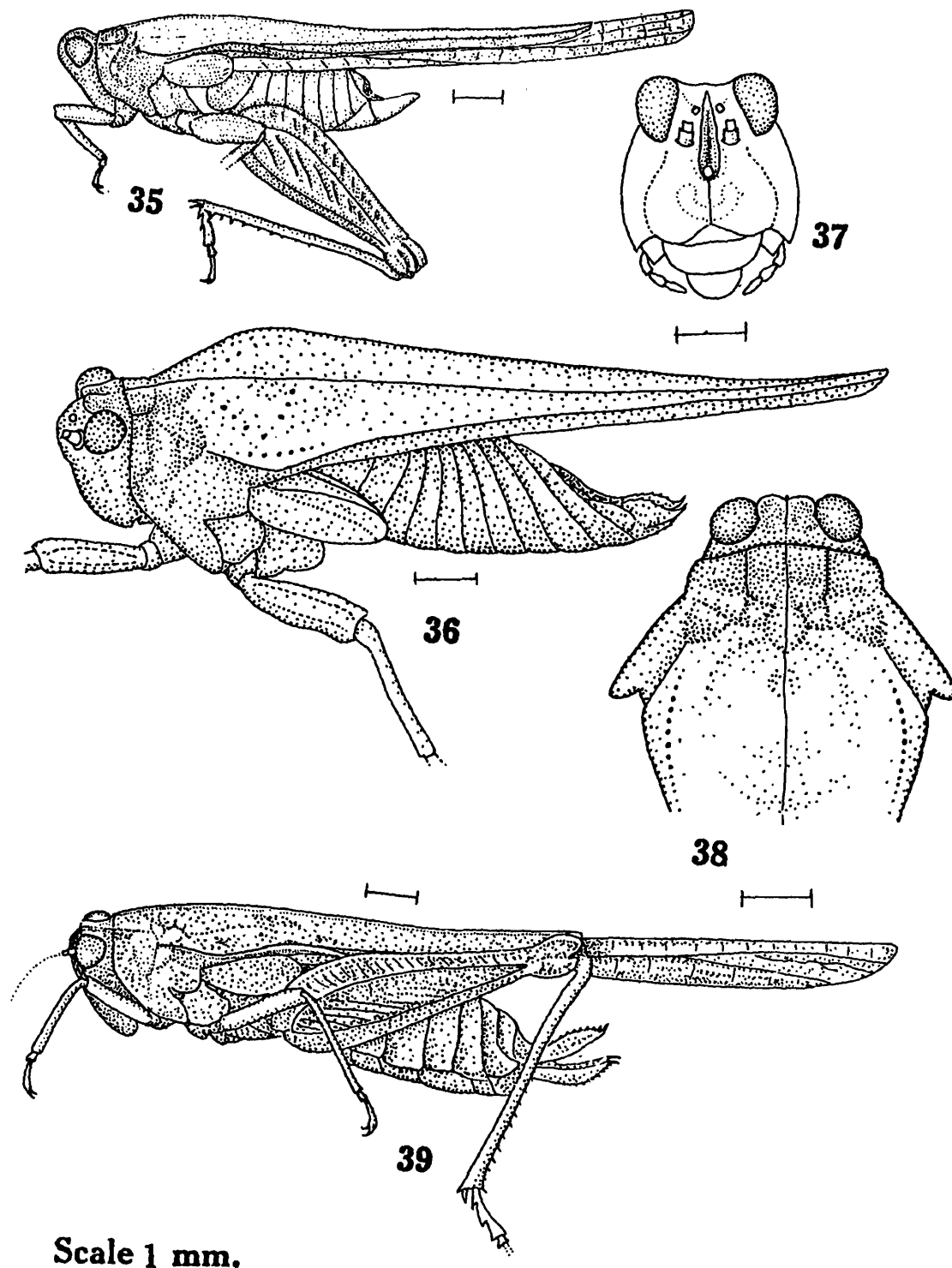
Fig. 23. Dorsal view of *Teredorus carmichaeli* Hancock. Fig. 24. Tegmen of *T. carmichaeli* Hancock. Fig. 25. Dorso-lateral view of *T. carmichaeli* Hancock. Fig. 26. Dorsal view of head and thorax of *Paratettix alatus* Hancock. Fig. 27. Posterior tarsal segments, of *P. alatus* Hancock. Fig. 28. Dorsal view of head and thorax of *Hedotettix costatus* Hancock.



Scale 1 mm.

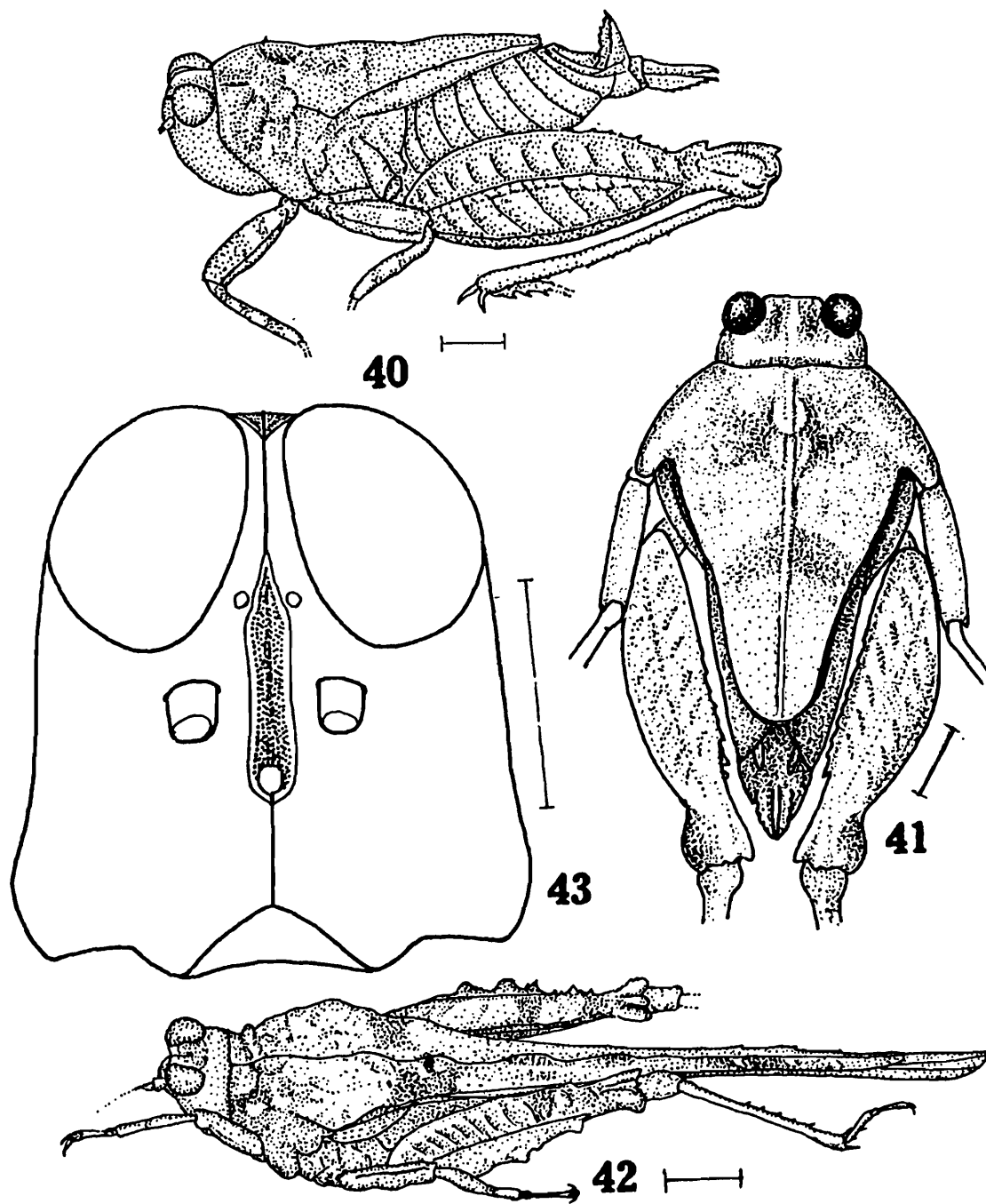
PLATE—6

Fig. 29. Dorso-lateral view of *Paratettix curtipennis* (Hancock). Fig. 30. Dorsal view of head and thorax of *Paratettix curtipennis* (Hancock). Fig. 31. Posterior tarsal segments of *P. curtipennis* (Hancock). Fig. 32. Dorso-lateral view of *P. cingalensis* (Walker). Fig. 33. Dorsal view of head and thorax of *Paratettix rotundatus* (Hancock). Fig. 34. Dorso-lateral view of *Coptotettix conspersus* Hancock.



PLATE—7

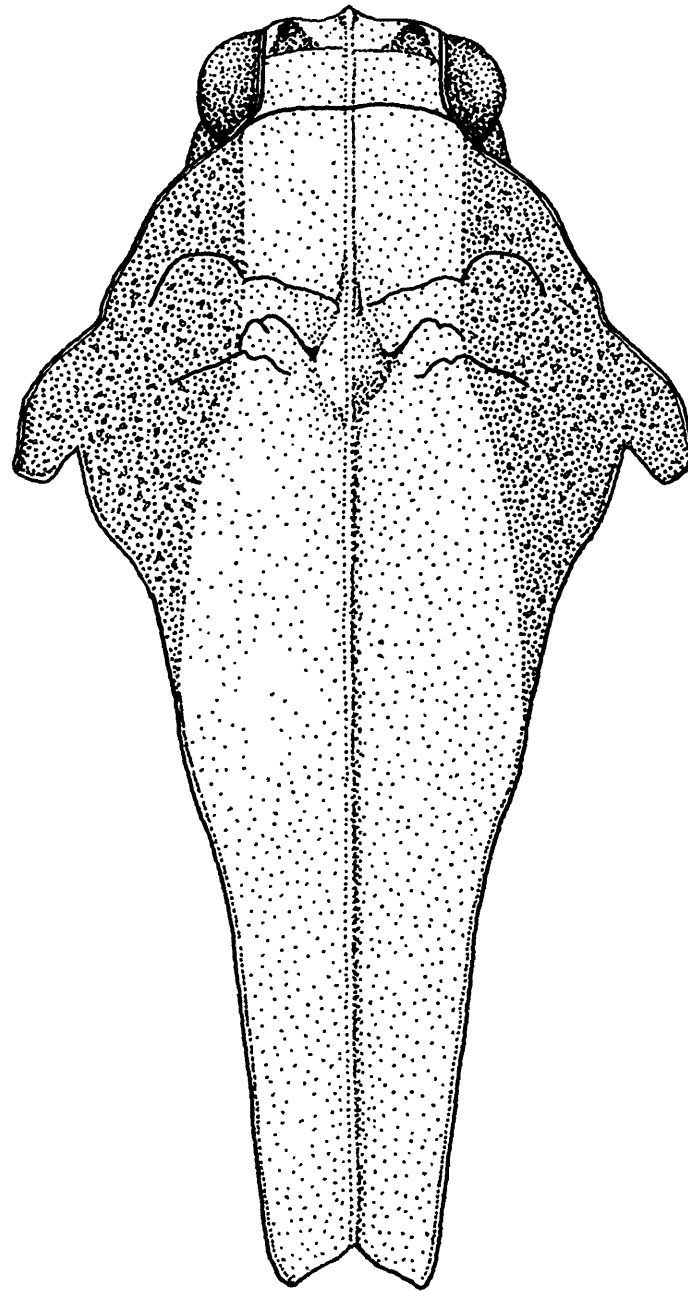
Fig. 35. Dorso-lateral view of *Hedotettix gracilis* (De Haan). Fig. 36. Dorso-lateral view of *Paratettix hirsutus* Brunner. Fig. 37. Front view of head of *P. hirsutus* Brunner. Fig. 38. Dorsal view of head and thorax of *P. hirsutus* Brunner. Fig. 39. Dorso-lateral view of *Hedotettix grossus* Hanc. (Type).



Scale 1 mm.

PLATE—8

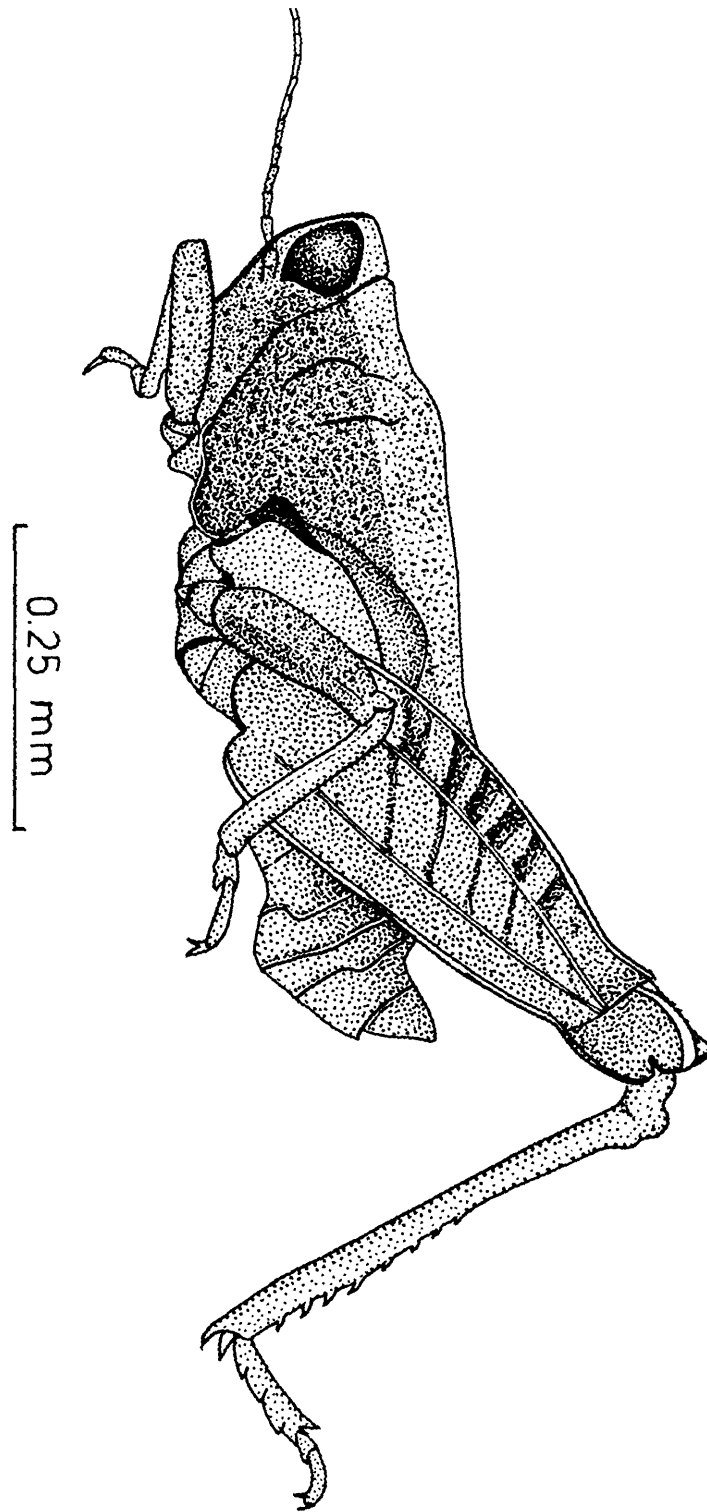
Fig. 40. Dorso-lateral view of *Paratettix hancockus* (Shishodia & Varshney). Fig. 41. Dorso-lateral view of *P. hancockus* (Shishodia & Varshney). Fig. 42. Dorso-lateral view of *Ergatettix güntheri* (Steinmann). Fig. 43. Front view of *Teredorus carmichaeli* Hancock.



0.25mm

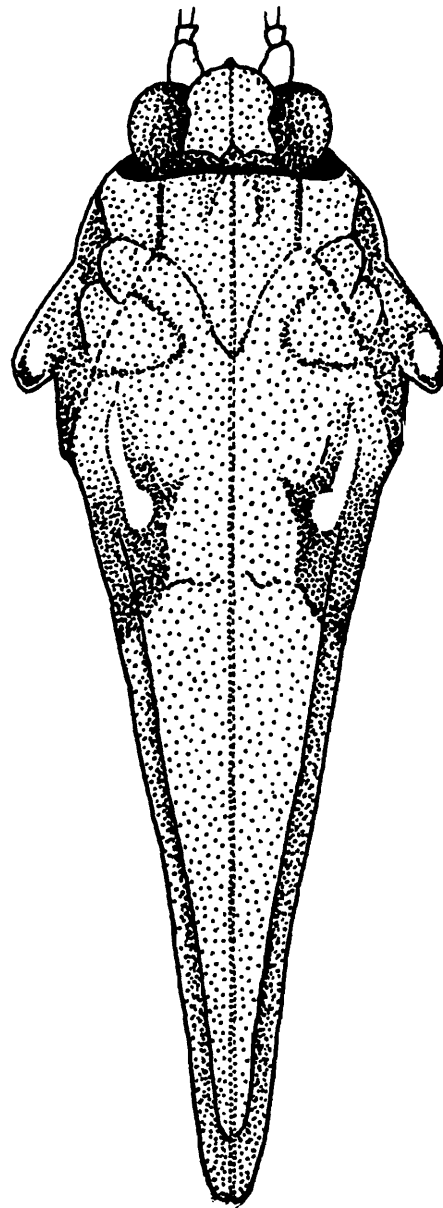
PLATE—9

Fig. 44. Dorsal view of *Hyboella* sp.



PLATE—10

Fig. 45. Dorso-lateral view of *Hyboella* sp.



1mm

PLATE—11

Fig. 46. Dorsal view of *Paratettix cingalensis* (Walk.).

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INSECTA : ORTHOPTERA : ACRIDOIDEA

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INTRODUCTION

The large superfamily Acridoidea of the order Orthoptera, commonly called grasshoppers which also includes the destructive locusts have attracted the attention of entomologists, since the agriculture was practised about 10,000 years ago. Besides this many species of this superfamily have recently become major pests of crops and pastures due to modern used methods (Uvarov, 1966). The superfamily is divided into two families namely Pyrgomorphidae and Acrididae. Earlier notable workers in the world on taxonomy of this group of insects are Brunner von Wattenwyl (1893), Bolivar (1884), Uvarov (1927, 1929, 1953, 1966, 1977), Dirsh (1956, 1961), Kevan (1959, 1969) and Willemse (1931, 1939, 1955, 1957).

The study of the Indian Acridoidea was first initiated by Stål (1860). Thereafter notable contributions were made by the authors like Walker (1870), Saussure (1884, 1888) and Bolivar (1902, 1909, 1918). The most notable work on Indian grasshoppers was made by Kirby (1914). He wrote "Fauna of British India, Orthoptera, Vol. I" Uvarov (1921, 1942) has studied the taxonomy of Indian Acridoidea. Tandon (1975) Tandon and Khera (1978) and Tandon and Shishodia (1972, 1989) made a series of publication on Indian grasshoppers, from different states. Shishodia and Hazra (1985, 1986) have studied the Acridoidea fauna of Silent valley and Arunachal Pradesh, Bhowmik (1986) gave an account of West Bengal fauna of this group. Subsequently Hazra et al. (1993) studied in great details the Acridoidea fauna from all the districts of West Bengal.

As regards to the study of Acridoidea fauna from the state of Meghalaya there are only stray records of some species which were made by Willemse (1932) Uvarov (1942) and Varshney (1970). The species *Oedipodacris aberrans* was described by Willemse in 1932 from Cherapunji.

The first collector of this group of insect from the state was Mr. B. Warren. The collection was made by him from Cherapunji during 12 th May to 19th May, 1909. He collected several examples of *Gastrimargus africanus* and *Acrida exaltata*.

Under this superfamily there are about 6,400 species distributed under 1148 genera known from the world, of which 350 species under 157 genera are known from India and 55 species under 42 genera of which 42 species are new records from the state of Meghalaya and marked with double asterisk.

The species *Phonogaster cariniventris* was so far recorded from the state of Tamil Nadu, its occurrence in north-eastern areas is interesting. The migratory locust *Locusta migratoria migratorioides* has so far been recorded from Delhi, Orissa and Tamilnadu in India but its occurrence in the high altitude of North-Eastern state is quite interesting. It indicates the rapid change of environment in this area, due to shifting cultivation, deforestation and other human activities in most part of present Meghalaya. As a result grasshoppers are concentrating in a small patches of grassfields and forests areas, and during breeding season they may move in masses to nearby cultivated fields. Similar phenomenon was recorded by Tandon and Khera (1978) in Arunachal Pradesh. During our recent survey to Meghalaya we have noticed a maximum concentration of grasshoppers in some areas near Cherapunji Jowai and Jaintia hills.

The Zoological Survey of India have conducted a number of faunistic exploration in Meghalaya since 1990 till 1992 under a departmental scheme of state fauna study. The present study is based on a large collections comprising more than 3,500 examples of grasshoppers.

We have also examined the earlier collections of grasshoppers from the state present in the National Zoological Collections. Some species we have recorded on the basis of literature only as we could not collect or received the collection from other parties during the present scheme.

The present work provides key to the families, subfamilies, genera and species. For easy identification of the species diagnostic characters are given to each species.

SYSTEMATIC ACCOUNT

General Morphology of Acridoidea

(Fig. 1)

Body colour : In most cases their body colour is green, brown, dark brown, yellow or grey. Sometimes a mixture of greenish brown or grey and dark brown depending upon the substratum of the surrounding niches.

Head : The head is hypognathus and conical e.g. in *Atractomorpha crenulata* and elongated type of head are also found.

Eyes : Eyes are placed laterally on either side of head.

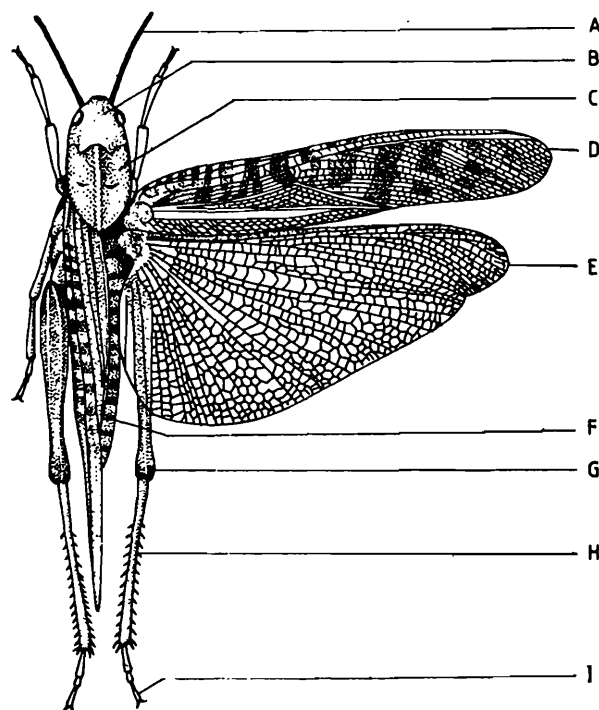
Antennae : These are important taxonomic character because on the basis of antennae the order is divided into two superfamilies one is long horned—Tettigonoidea and other is short horned-Acridoidea. The shape and size of antennae are variable in most cases, it is filliform or may be narrow at the base and apex and flattened in the middle and termed as ensifera.

Wings : The fore wings are called tegmina. The hind wings are called “Wings” The hind wing base may have some colour variation which are of taxonomic values.

Legs : The hind legs bear the most important diagnostic character for generic and species level identification.

Abdomen and genitalia : External genitalia such as supra-anal plate or epiproct in some cases used for identification of species.

Subgenital plate : This structure is very important from the taxonomic point of view. In male it is more or less simple and present on ninth of sternum. In female this structure is present on the eighth sternum. The ventral surface may be flat or concave with two longitudinal ridges in the middle.



A- Antenna; B- Head; C- Thorax; D- Forewing; E- Hindwing
F- Abdomen; G- Femur; H- Tibia; I- Tarsus.

Fig. 1. General Morphology and body parts of a typical grasshopper (Schematic diagram).

Ovipositor : The terminal segment of female is modified to form ovipositor and consists of two anterior or lower ovipositor valves and two posterior or upper ovipositor valves. It is variable in different species.

Phallic complex : This is male internal genital structure and is very stable character for identification of subfamilies as well as genera and species.

Collection and preservation of grasshoppers

Most convenient method for collection of various species of Acridoidea is by sweeping with the help of insect net fitted in stainless steel 'Y' handle.

Their general habitats are grassfields, forest floors, vegetable fields and paddy fields. The ideal season for collection is premonsoon and prewinter.

After killing in a killing jar the grasshoppers are kept in paper envelopes with proper labeling, then in the laboratory the dried specimens are kept in a relaxing jar and before final preservation in the insect cabinet the specimens are pinned through the base of tegmina either left or right not through the pronotum. The preservatives used in the insect cabinets are naphthalene, paradichlorobenzene and camphor—carbolic acid ball. For more details the “Manual-collection, preservation and identification of insects and mites of economic importance” published by the Director, Zoological Survey of India (1986) may be consulted.

List of Taxa

Family PYRGOMORPHIDAE

1. *****Atractomorpha crenulata*** (Fabricius)
2. *A. burri* Bolivar
3. *****A. psittacina psittacina*** (De Hann)
4. *Aularches miliaris miliaris* (Linnaeus)
5. *****Chrotogonus trachypterus trachypterus*** (Blanchard)
6. *****Tagasta indica*** Bolivar
7. *****Chlorizeina unicolor unicolor*** Brunn.

Family ACRIDIDAE

Subfamily TRUXALINAE

8. *****Aulacobothrus*** sp.
9. *****Phonogaster cariniventris*** Henry

Subfamily ACRIDINAE

10. *Acrida exaltata* (Walker)
11. *****Aiolopus thalassinus tamulus*** (Fabricius)
12. *Ceracris nigricornis nigricornis* (Walker)
13. *Ceracris* sp.
14. *****Ditopternis venusta*** (Walker)
15. *****Gastrimargus africanus africanus*** (Saussure)
16. *Gastrimargus marmoratus* (Thunberg)
17. *****Gonista bicolor*** Bolivar
18. *****Heteropternis respondens*** (Walker)

19. ***Holopercna darjeelingensis* (Bolivar)
20. ***Locusta migratoria migratorioides* (Reiche & Fairmaire)
21. ***Oedaleus abruptus* (Thunberg)
22. *Oedipodacris aberrans* Willemse
23. ***Orthochtha indica* Uvarov
24. ***Phlaeoba infumata* Brunner
25. ***Phlaeoba antennata* Brunner
26. *Phlaeoba panteli* Bolivar
27. ***Pternoscirta cincteafemur* (Walker)
28. ***Trilophidia annulata* (Thunberg)

Subfamily HEMIACRIDINAE

29. ***Spathosternum prasiniferum prasiniferum* (Walker)
30. ***Gesonula punctifrons* (Stål)

Subfamily OXYINAE

31. *Oxya fuscovittata* (Marschall)
32. *Oxya hyla hyla* Serville
33. ***Oxya japonica japonica* (Thunberg)
34. ***Oxya velox* (Fabricius)
35. ***Caryanda paravicina* (Willemse)

Subfamily COPTACRIDINAE

36. ***Coptacra ensifera* Bolivar
37. *Coptacra foedata* (Serville)
38. ***Eucoptacra praemorsa* (Stål)
39. ***Eucoptacra binghami* Uvarov
40. ***Eucoptacra saturata* (Walker)

Subfamily TROPIDOPOLINAE

41. ***Tristria pulvinata* (Uvarov)
42. ***Oxyrrhepes obtusa* (de Haan)

Subfamily CATANTOPINAE

43. ****Catantops pinguis innotabilis** (Walker)
 44. ****Stenocatantops splendens** (Thunberg)
 45. *Xenocatantops humilis humilis* (Serville)
 46. ****Assamacris striata** Uvarov
 47. ****Paraconophyma** sp.
 48. ****Gerenia intermedia** Brunner

Subfamily EYPREPOCNEMIDINAE

49. ****Choroedocus robustus** (Serville)
 50. ****Eyprepocnemis alacris alacris** (Serville)
 51. *Eyprepocnemis rosea* Uvarov
 52. ****Tylotropidius varicornis** (Walker)

Subfamily CYRTACANTHACRIDINAE

53. ****Chondacris rosea** (de Geer)
 54. ****Pachyacris vinosa** (Walker)
 55. ****Patanga succincta** (Johansson)

Order ORTHOPTERA

Super family ACRIDOIDEA

Key to families

1. Foveolae of the vertex contiguous, superior and forming the extremity of the fastigium. Stridulatory mechanism absent.....PYRGOMORPHIDAE
 — Foveolae lateral or inferior, never forming the tip of the fastigium. Stridulatory mechanism presentACRIDIDAE

Family PYRGOMORPHIDAE

Key to the genera

1. Anterior margin of prosternum strongly reflexed and dilated**Chrotogonus** Serville
 — Anterior margin of prosternum neither reflexed nor dilated.....2
 2. Antennae remote from the eyes, placed in front of the ocelli.....3
 — Antennae near the eyes and inserted below the ocelli.....4

3. Tegmina long and narrow, body moderately slender.....
*Atractomorpha* Saussure
- Tegmina rather short and broader; body very robust.....*Tagasta* Bolivar
4. Pronotum strongly tuberculate above, with two large contiguous humps in front; tegmina and wings long, reaching at least upto the apex of abdomen; body large and robust.....
*Aularches* Stål
- Pronotum not tuberculate above, humps totally absent; tegmina and wings rudimentary about the same length as the pronotum; body slender.....*Chlorizeina* Brunner

Genus *Atractomorpha* Saussure 1862

Key to the species

1. Body-form comparatively broad, stout and rather short; lateral pronotal lobe without a membranous area.....*burri* Bolivar
- Body-form more slender and elongate; lateral pronotal lobe often with a membranous area near posterior margin2
2. General body form very slender; fastigium of vertex very long; apex of male abdomen acute; majority of specimen with a membranous area near the posterior margin of lateral pronotal lobe*psittacina* (De Haan)
- Body form not exceptionally slender; fastigium of vertex comparatively short; male abdomen with apex more obtuse; always with membranous area at the posterior margin of lateral lobe of pronotum*crenulate* (Fabr.)

1. *****Atractomorpha crenulata*** (Fabricius)

(Map 1)

1793. *Truxalis crenulata* Fabricius, *Ent. Syst.*, 2 : 28.

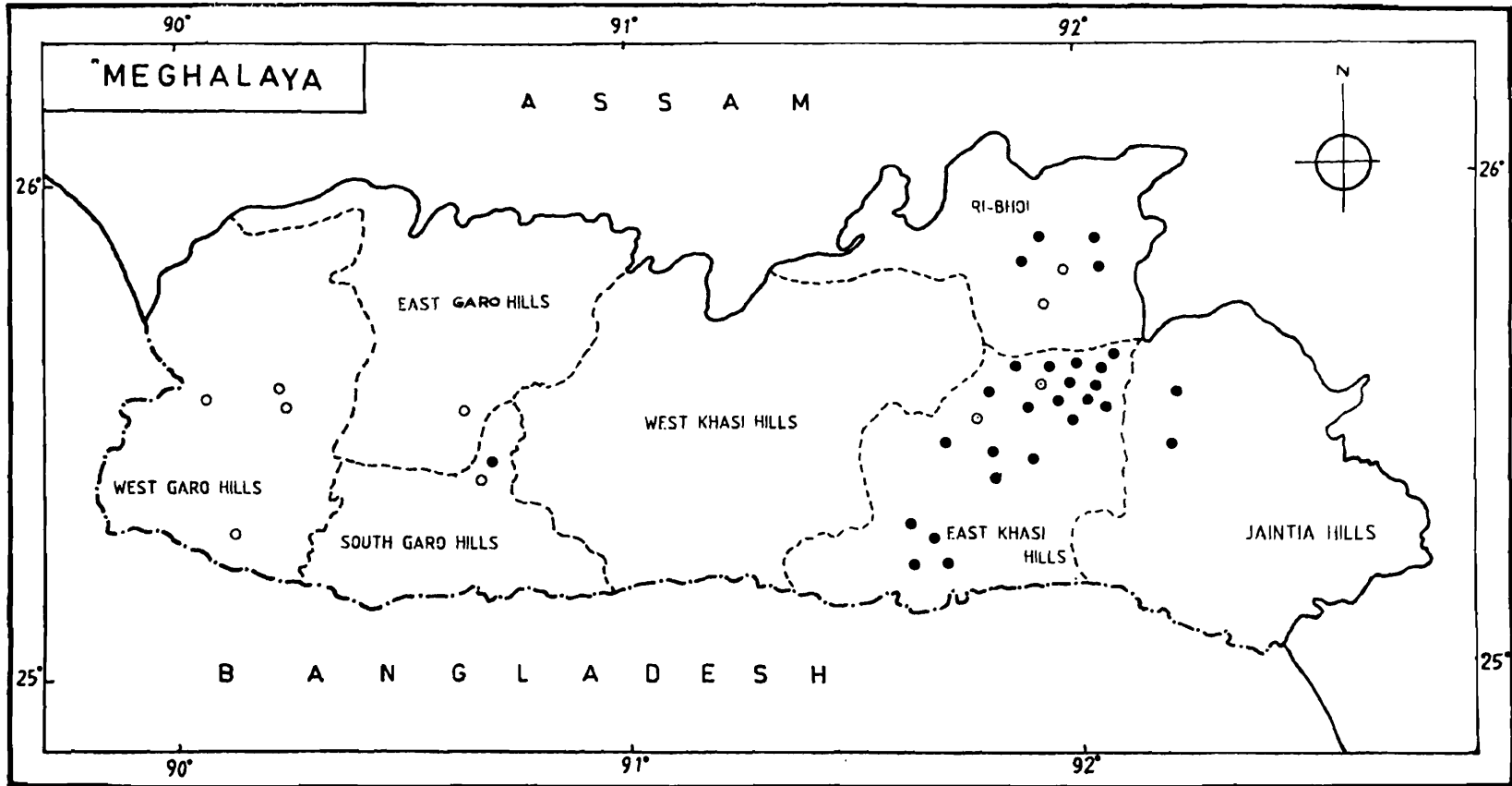
1914. *Atractomorpha crenulata* Kirby, *Fauna Brit. India*, (Acrididae) : 181.

1969. *Atractomorpha crenulata* : Keven and Chen, *Zool. J. Linn. Soc.* 48 : 187.

Material examined : *Ri-Bhoi and E. Khasi Hills* : 1 M, 1F, Shillong, E. Khasi hill, 21.i.64, coll. A.K. Mondal; 1 F, Laitkor peak, 12.5.78, coll. S.J.S. Hattar; 1 M, Barapani, 4. viii.80, coll. Dr. Asket Singh.

South and E. Garo Hills : 1 F, Tombo, William Nagar, 11.iii.91, coll B.C. Das and party; 3 M, 2 F, Rangsakgiri, 1.v.91, coll. B.N. Das.

W. Garo Hills : 1 F, Garobadha, 1.vi.90, coll. M.S. Shishodia. 1 M, Tura, 3. vi.90, coll. M.S. Shishodia. 1 F, Damalgiri, 17.iii.91, coll. A.K. Hazra; 2 M M, Tura, 22.iv.91, coll. B.N. Das.



- 1. *Atractomorpha crenulata* ○
- 2. *Atractomorpha burri* ●

Map 1. Showing distribution of *Atractomorpha crenulata* and *Atractomorpha burri*.

Diagnostic characters : Body slender, greenish, antenna short, lateral pronotal lobes usually with distinct membranous area, specially in female, hind femora not actually convex. Hind wings normally rosy.

Distribution : India : Meghalaya (East Khasi hills, E. Garo hills, W. Garo hills), West Bengal, Andaman and Nicobar Islands, Andhra Pradesh, Bihar, Goa, Jammu and Kashmir, Kerala, Lakshadweep, Orissa, Rajasthan; Bangladesh; Burma; N.W. Sumatra; Pakistan; South Vietnam and Sri Lanka.

Remarks : The size and colour of *Atractomorpha crenulata* is extremely variable. Specimen of Eastern region of India are similar with Orissa in shape and colour. Body slender, fastigium of vertex short, tegmina large and with well developed membranous area in lateral side of the pronotum.

2. *Atractomorpha burri* Bolivar

(Map 1)

1905. *Atractomorpha burri* Bolivar, Bol. Soc. Espan Hist. nat., 5 : 197, 203.

1969. *Atractomorpha burri* : Kevan and Chen, *Zool. J. Linn. Soc.*, 43 : 158, 160, 193.

Material examined : *Ri-Bhoi and E. Khasi Hills* : 2 M, Umtru, 7.iv.91, coll. S.K. Saha; 3 M Pynsula, 11.xi.1991, coll. R.C. Basu; 2 M, 3 F, Nongram, 13.xi.91, coll. R.C. Basu; 1 M, Umsing, Shillong, 23.vii.63, coll. M.R. Rynth; 1 F, Batjora, 5.vi.90, coll. M.S. Shishodia; 1 M, Shillong, 4.ix.71, coll. R.S. Giri; 1 M, Shillong, 9.ii.73, Reg. no. 8630, coll. R.S. Giri; 1 M, Shillong, Reg. no. 9800, 15.ix.74, coll. R.S. Giri, 1 M, Shillong, 10.viii.62, coll. S.N. Prasad; 1 M, 1 F, Limsing, 12.iii.91, coll. R.C. Basu; 1 M, Shillong, Reg. no. 45, 10.ix.71, coll. R.S. Giri; 1 M, Shillong 18.ix.63, coll. S.N. Prasad; 1 M, Cherrapunji, 24.v.90, coll. M.S. Shishodia; 1 M, Shillong, 29.x.74, coll. M.S. Jyrwa; 1 M, Nongpoh; 12.xi.91, coll. R.C. Basu; 1 M, Motinogar, Reg. no. 16874, 11.xi.71, 1 M, Shillong, 4.1.63, M. 44/8 coll. R. Giri; 1 F, Shillong. Reg. no. 2242, 4.xii.62, coll. S.N. Prasad; 1 M, Shillong, 16.vii.71, coll. R.S. Pillai; 1 M, 1 F, (nymph) Mulki forest, Shillong, 19.viii.80, M.S. Jyrwa; 2 M, 1 nymph, Limsing sliding, 8.vii.63, coll. S. Biswas; 1 F, Shillong, 30.iii.91, coll. A.K. Hazra; 1 M, Naya bunglow, 23.v.75, coll. S.J.S. Hattar; 1 F, Nongstoin, 7.vii.62, coll. S.N. Prasad; 1 F, Barapani, Shillong, 9.v.75, coll. M.S. Jyrwa; 1 F, Plo hill forest, 20.ix.91, coll. R.K. Varshney.

South and E. Garo Hills : 1 F, William nagar, 12.iii.91 coll. B.C. Das.

Jaintia Hills : 1 F, Jaintia hill, 17.iii.91, coll. A.K. Sanyal; 1 M, Jowai, 23.iii.91, coll. A.K. Hazra.

Diagnostic characters : Body comparatively short and moderately stout; fastigium of vertex as long as eye; eye long and elongated-oval; lateral lobes of pronotum without membranous area in metaxona.

Distribution : India : Meghalaya (E. Khasi hill, E. Garo hills, W. Garo hills, Jaintia hill). North West India including Arunachal Pradesh, Orissa, West Bengal; Bhutan; Bangladesh; Malaya to Indo-china.

3. ***Atractomorpha psittacina psittacina*** (De Haan)

(Fig. 2, Map 2)

1842. *Acridium (Truxalis) psittacina* Haan, Temminck, Verhandel, Orth. : 146.

1969. *Atractomorpha psittacina psittacina* : Kevan and Chen, *Zool. J. Linn. Soc.*, 48 : 191.

Material examined : W. Garo Hills : 1 M, 1F, 1 nymph, Damalgiri, 17.iii.91, coll. A.K. Hazra; 1 M, 3F, Tura, 5.x.91, coll. R.K. Varshney.

Diagnostic characters : Slender body, fastigium of vertex narrower and longer; membranous area present near the posterior margin of the pronotal lobe. Hind wing comparatively long in relation to tegmina. Colour of the wing usually dull magenta purple, at extreme base.

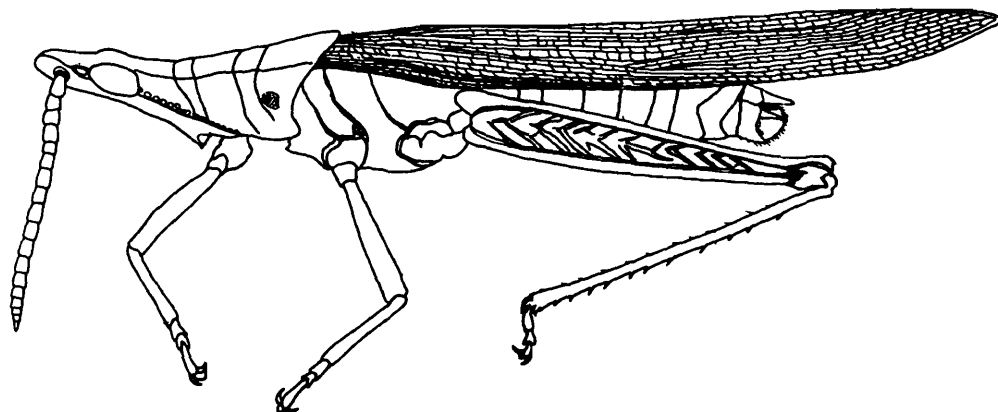


Fig. 2. *Atractomorpha Psittacina* (Male)

Distribution : India : Meghalaya (West Garo hills, Jaintia hills), Arunachal Pradesh, Assam, Rajasthan. The whole range of South and East Asia.

Remarks : It is found in very limited area of north easterns and western region of India and is a vety rare specimen in the state of West Bengal.

Genus: *Aularches* Stål, 1873

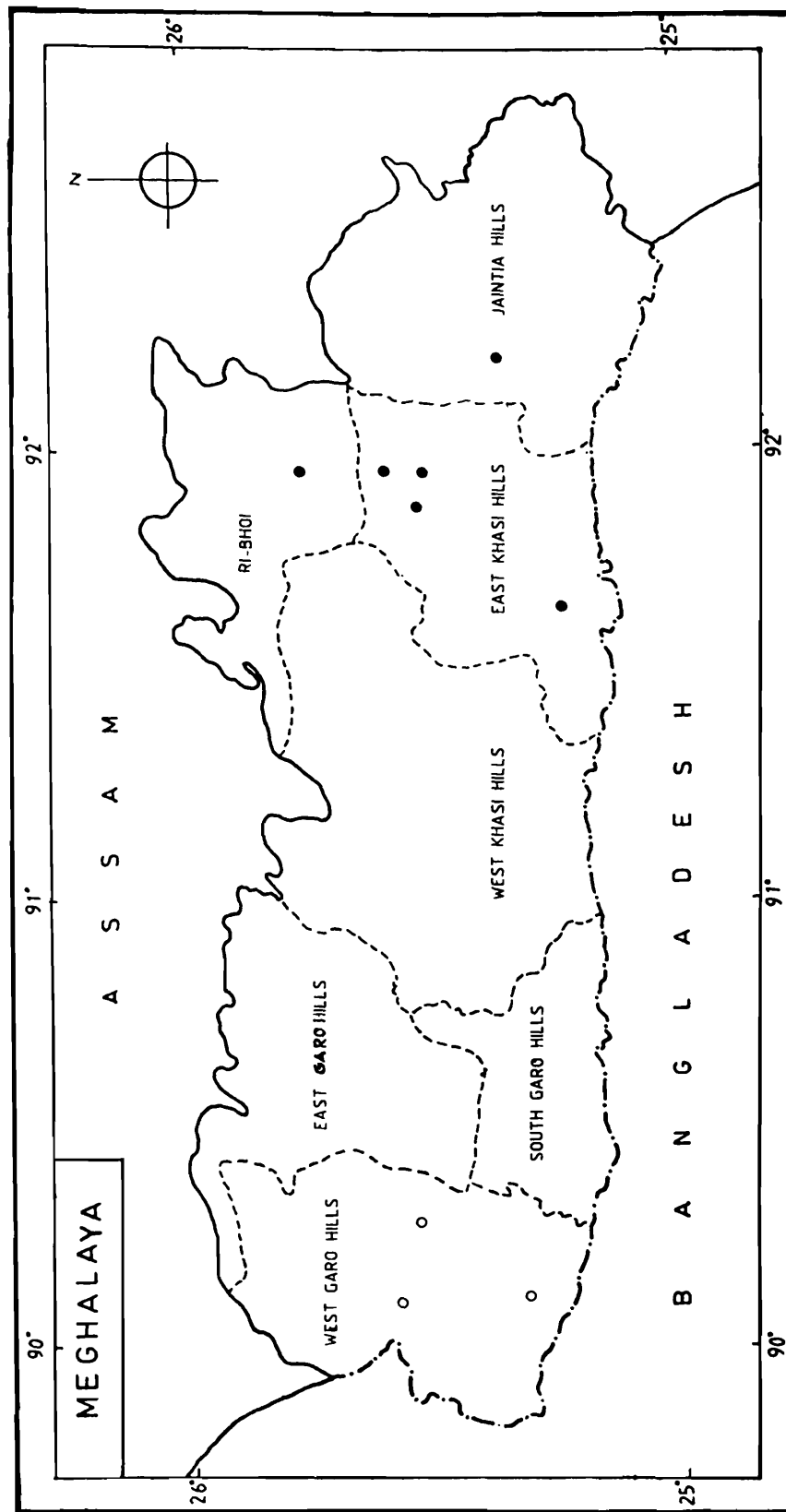
4. ***Aularches miliaris miliaris*** (Linnaeus)

(Map 2)

1758. *Gryllus (Locusta) miliaris* Linnaeus, *Syst. Nat.* (ed. x) 1 : 432.

1914. *Aularches miliaris* : Kirby *Fauna Brit. India Orth.*, (Acrididae): 168.

Material examined : Ri-Bhoi and East Khasi Hills : 1 M, Barapani Rd. 23.iv.77, coll. A.R.



Map. 2. Showing distribution of *Atractomorpha psittacina psittacina* and *Aularches miliaris miliaris*.

Lahiri; 1 F, Barapani, 25.viii. 78, P.T. Cherian; 4 F, Barapani Dam area, 10.ix.88, A.R. Lahiri coll.; 5 M, 1 F, Old Barapani Rd., Shillong, 18.ix.91, R.K. Varshney; 2 M, Barapani, near Umium Lake and around, 19.ix.1991.

Jaintia Hills : 2 M, 2 F, Garampani, Jowai, 17.ix.1990, coll. C. Radhakrishnan.

Diagnostic characters : Large size, body stout, head yellowish, pronotum yellow on the sideways. The space between the sulci with several strong pointed conical blackish tubercles on each side. Tegmina thickly reticulated with yellow nervures and with variable number of large and small yellowish spots. Wings purple brown, darker towards the base.

Distribution : India : Meghalaya (East Khasi hill, Jaintia hill) West Bengal, Jammu and Kashmir, Orissa, Sikkim, Tamil Nadu and Uttar Pradesh; Indonesia; Java; Nepal and Sri Lanka.

Remarks : *Aularches miliaris miliaris* is strictly confined to thick forest region of north Bengal. It has been collected in the reserve forest adjoining Teesta river bed in October, 1987 in Swarming condition.

Genus *Chrotogonus* Serville 1839

5. ****Chrotogonus trachypterus trachypterus** (Blanchard)

(Map 3)

1836. *Ommenecha trachypterus* Blanchard, *Annls. Soc. ent. Fra*, 5 : 618.

1959. *Chrotogonus trachypterus trachypterus* : Kevan, *Publicoes cult. Co. Diam. Angola*, no. 43 : 147.

Material examined : *E. Khasi Hills*, 1 F, Umthan, 25.viii.1980, C.R. Krishnan; 1 nymph, Polobazar, Shillong. 19.ix.91. coll. R.K. Varshney.

Diagnostic characters : Medium size, hind wing hyaline, occasionally tinged yellowish brown but never infumated or infuscated. It reaches upto second or third segment of the abdomen.

Distribution : India : Meghalaya (East Khasi hills); Madhya Pradesh, Orissa, Rajasthan; Bangladesh; Nepal; Pakistan.

Remarks : Brachypterus species generally found in dry condition on a bare sandy ground and a pest of various crops.

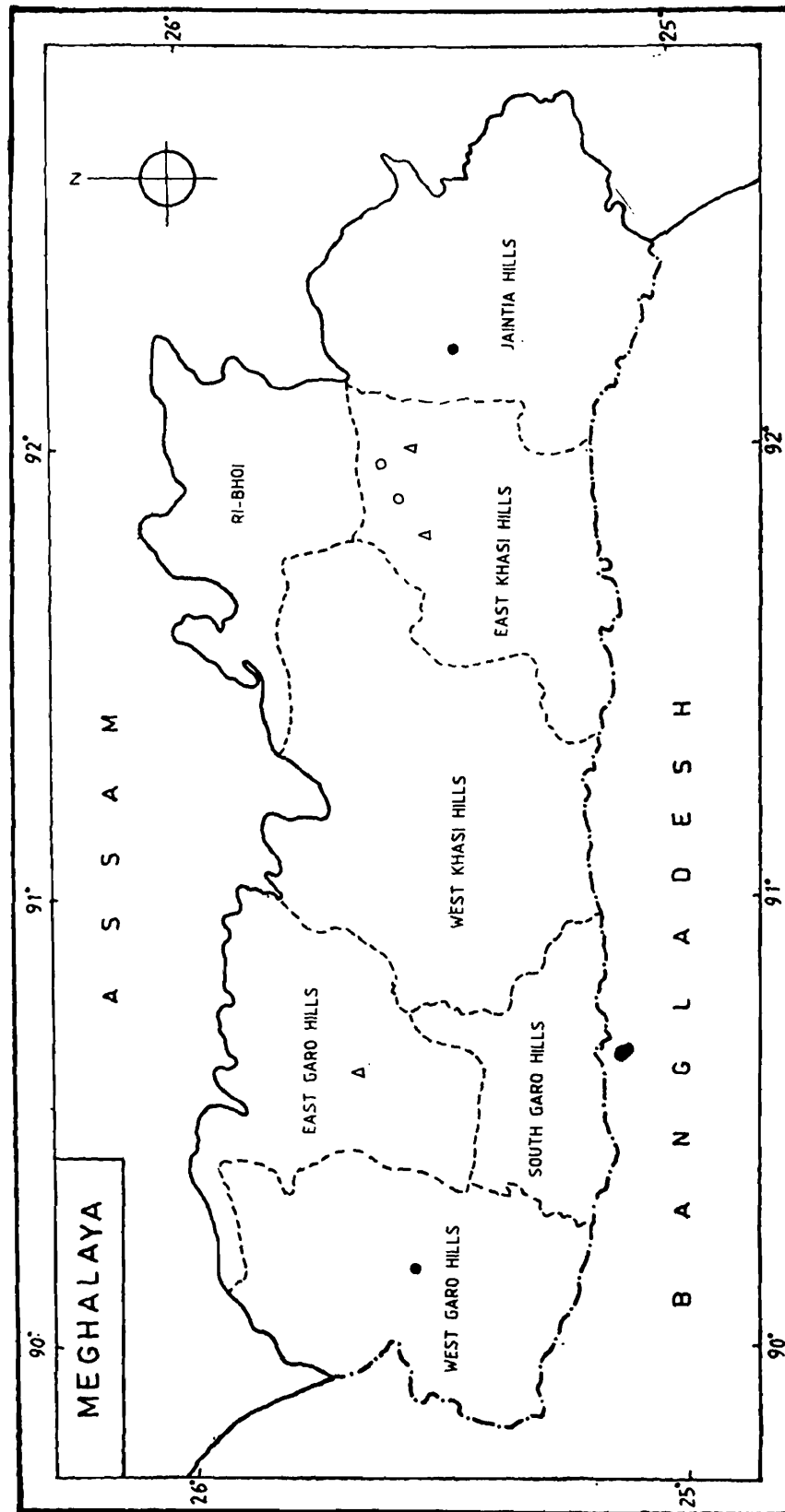
Genus *Tagasta* Bolivar, 1905

6. ****Tagasta Indica** Bolivar

(Map 3)

1905. *Tagasta indica* Bolivar, *Bol. Soc. Espan. hist. Nat.*, 5 : 112-113.

Material examined : *Jaintia Hills* : 1 F, Garampani Forest, Jowai, 9.xii.1975, S.K. Chanda; *West Garo Hills*, 1 M, Rongram, 27.ix.1975, N. Muraleedharan coll.



6

- 5. *Chrotogonus trachypterus trachypterus* ○
- 6. *Tagasta indica* ●
- 7. *Chlorizeina unicolor unicolor* A

Map. 3. Showing distribution of *Chrotogonus trachypterus trachypterus*, *Chlorizeina unicolor unicolor* and *Tagasta indica*.

Diagnostic characters : Colour olivaceous; fastigium of vertex equilaterally triangular; antennae inserted near the eyes; cheeks with a row of large yellow granules behind each eye; pronotum rounded in front, and obtusely angulated behind, median carina almost, and lateral carinae wholly obsolete; tegmina nearly as long as the hind femora, with the tip narrowly obtuse, with a brown spot at the base; wings deep rose colour.

Distribution : India : Meghalaya (Jaintia hills, West Garo hills) Arunachal Pradesh and West Bengal); Bhutan.

Remarks : Recorded for the first time from Meghalaya.

Genus *Chlorizeina* Brunner, 1893.

7. ****Chlorizeina unicolor unicolor** Brunner

(Map 3)

1893. *Chlorizeina unicolor* Brunner *Ann. Mus. Stor. nat. Genova*, **33** : 131.

1914. *Chlorizeina unicolor*, Kirby, *Fauna Brit. India*, p. 174.

1969. *Chlorizeina unicolor unicolor*, Kevan, *Trans. Amer. ent. Soc.*, **94** : 369.

Material examined : *E. Khasi Hills* : 1 F, Nongpoh, 19.ix.73, coll. S. Biswas; 1 F, Barnihat, 31.vii.73, coll. M. Datta; *East Garo Hills*, 1 M, Songsoke, 19.ix.1975, N. Muraleedharan coll.

Diagnostic characters : The body is pale green and uniform, fastigium of vertex more parabolic, pronotum not so wide posteriorly. Tegmina of male sometimes pointed and extends beyond the 3rd segment of the abdomen and sometimes obtuse, extending to the 8th segment, wings very short. Hind femora beneath suffused with red, the genicular lobe partly black. Hind tibiae dull blue hipped with black Male—'N' or 'U' shaped of posterior epiphalic bridge, anterior process is more or less round and posterior process hanging downwards, lateral process more or less 'U' shaped and elevated.

Distribution : India : Meghalaya (East Khasi hills, E. Garo hills), Eastern Assam hills. Eastern parts of Thailand; West Laos; Upper Burma.

Remarks : The most remarkable feature for the above species are parabolic type of fastigium on the vertex, pronotum not so widened posteriorly, lateral part of male epiproct is concave and male cerci not so extended apically.

Family ACRIDIDAE

Key to subfamilies

1. Prosternal tubercle or process usually absent.....2
- Prosternal tubercle of process present3

2. Stridulatory serration on inner side of hind femur present**TRUXALINAE**
 — Stridulatory serration on inner side of hind femur absent**ACRIDINAE**
3. Radial area of tegmen with a series of regular, parallel stridulatory veinlets ...Hemiacridinae
 — Stridulatory veinlets of radial area of tegmen absent4
4. Lower external lobe of hind knee with spine-like apex.....**OXYINAE**
 — Lower external lobe of hind knee with apex rounded, angular or subacute, but not spine-like
5
5. Last abdominal tergite in male (in most of the genera) with well developed furcula; Supra-anal plate mostly with attenuate or trilobate apex.....**COPTACRIDINAE**
 — Last abdominal tergite without well developed furcula; supra-anal plate variable.....6
6. Mesosternal interspace closed**TROPIDOPOLINAE**
 — Mesosternal interspace mostly open7
7. Mesosternal lobes rounded or obtusangular but not rectangular8
 — Mesosternal lobes rectangular**CYRTACANTHACRIDINAE**
8. Dorsum of pronotum flat or weakly tectiform with median and lateral carinae linear (lateral carinae sometimes obliterated); male cercus with strongly compressed lobiform or subacute apex**EYPREPOCNEMIDINAE**
 — Dorsum of pronotum of variable shape; lateral carinae, if present, not linear; male cercus variable, but not as mentioned above**CATANTOPINAE**

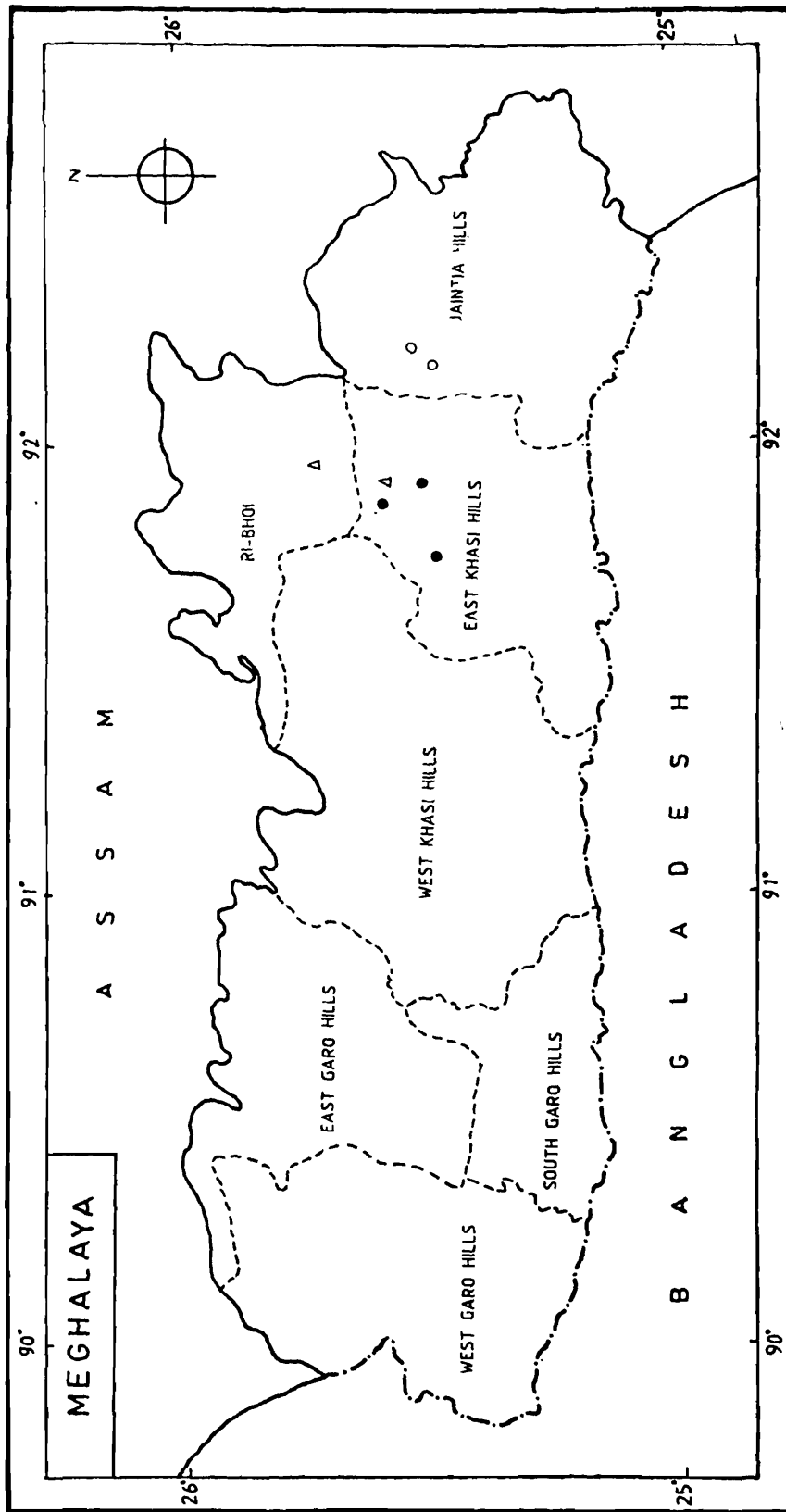
Subfamily **TRUXALINAE***Key to genera*

1. Temporal foveolae visible from above, head not elongated, fastigium of vertex not longer than eye; antennae filliform; pronotum without parallel subsidiary carinae on dorsum and sides.....***Aulacothrus*** Bolivar
 — Temporal foveolae not visible from above, head elongated, fastigium or vertex longer than eye; antennae ensiform; pronotum with numerous parallel subsidiary carinae on dorsum and sides***Phonogaster*** Henry

Genus ***Aulacothrus*** Bolivar, 19028. *****Aulacothrus*** sp.

(Map 4)

Material examined : *E. Khasi hills* : 3 M, Mowpet Shillong, 16.viii.1971, S.G. Patil; 5 M, 1 F, Jakren, 4.xii.1977, K.R. Rao; 1 M, Umtham, C.R. Krishnan.



8. *Aulacobothrus* sp. ● 9. *Phonogaster cariniventris* ○

6

Map 4. Showing distribution of *Aulacobothrus* sp. and *Phonogaster cariniventris*.

Diagnostic characters : Head short; eyes situated on the middle part of the head; vertex short, with long lateral margins which is in the form of a carina extend far over onto the occiput; foveolae distinct, visible from above; antennae filiform; pronotum with weak and usually concave lateral carinae; tegmina and wings well developed; hind femora with rounded dorsal genicular lobes.

Distribution : India : Meghalaya (Khasi hills); Africa, China and in the pampas of South America.

Remarks : Two species were studied in the present collection. These species could not be traced upto any specific species recorded so far.

Genus *Phonogaster* Henry, 1940

9.** *Phonogaster cariniventris* Henry, 1940

(Map 3)

1940. *Phonogaster cariniventris* Henry, *Trans. R. ent. Soc. Lond.* **90** (19) : 510-511.

Material examined : Jaintia Hills : 6M, 4F, Jowai, 21.v.1990, M.S. Shishodia.

Diagnostic characters : Head elongated, porrect, longer than pronotum, with a median carina running full length and several other parallel carinae; fastigium broad, margins raised, apex obtusely rounded; antennae reaching nearly at the base of hind coxa, basal segments tricarinate, remaining segments cylindrical; pronotum with two supplementary carinae on each side of dorsal field between the median and lateral carinae, several black dots on lateral lobes of pronotum; tegmina extended beyond the hind knees, acute at apex; tergites 3-5 each with a pair of sharp, longitudinal ridges on each side in the lower part; hind femur elongated, then, knees with upper and lower lobes acute, inner face provided with a row of stridulatory pegs; supra-anal plate triangular, cerci tapering; subgenital plate conical, apex truncate. Colour light brown.

Distribution : India : Meghalaya (Jaintia hills), Tamil Nadu; This species is collected for the first time from Meghalaya.

Remarks : The specimens were collected from the grasses of long and narrow blades with brown colour.

Subfamily ACRIDINAE

1. Fastigium of vertex horizontally produced; and forming an angle with the frontal ridge2
- Fastigium of vertex rounded in front, which is nearly vertical8
2. Head long, conically ascending, fastigium of vertex extended considerably in front of the eyes, broader and truncated at apex.....*Acrida* Linnaeus

- Head equal to or somewhat greater than that of the pronotum; hind femur with rounded dorso-external and dorso-internal genicular lobes.....*Gonista* Bolivar
- 3. Foveolae of vertex obsolete or not visible from above4
- Foveolae of vertex visible from above, triangular*Aiolopus* Fieber
- 4. Tegmina rudimentary, not reaching behind the middle of 2nd tergite, wings also rudimentary; lateral carinae absent.....*Oedipodacris* Willemse
- Tegmina and wings well developed, lateral carinae present.....5
- 5. Lateral carinae straight, continuous6
- Lateral carinae of pronotum diverging posteriorly7
- 6. Dark brown strip runs behind the eye laterally, which continue to pronotum and tegmina; posterior tibiae red.....*Orthochtha* Karsch
- No dark brown strip present behind the eye, pronotum and tegmina laterally; posterior tibiae not red.....*Phlaeoba* Stål
- 7. Antennae filiform, much longer than head and pronotum*Ceracris* Walker
- Antennae ensiform, longer than head and pronotum.....*Holopercna* Karsch
- 8. Carina of pronotum complete, or cut by one groove9
- Dorsum of pronotum or its carina cut by two grooves, which, when viewed sideways, is strongly bilobed in front.....*Trilophidia* Stål
- 9. Thorax rather short10
- Thorax long; pronotum with strong crest or acutely tectiform*Gastrimargus* Saussure
- 10. Basal half of tegmina opaque.....11
- Basal and apical portions of tegmina subhyaline*Locusta* Linnaeus
- 11. Transverse veins in apical part of tegmina erect, the cells square or oblong12
- Transverse veins of apical part of tegmina oblique, arranged zig-zag...*Pternoscirta* Saussure
- 12. Wings without well-marked fascia.....13
- Wings with well-marked fascia; pronotum with pale marks arranged so as to form an x.....*Oedaleus* Fieber
- 13. Internal calcaria or spine of posterior tibiae not greatly unequal, normal.....*Dittopternis* Saussure
- Internal spine of posterior tibiae greatly unequal, the lower one much longer than the other, abruptly hooked at apex, very acute.....*Heteropternis* Stål

Family ACRIDIDAE

Subfamily ACRIDINAE

Genus *Acrida* Linnaeus, 175810. *Acrida exaltata* (Walker)

(Map 5)

1859. *Truxalis exaltata* (Walker) *Ann. Mag. nat. Hist.* 4 (3) : 222.1954. *Acrida exaltata* : Dirsh, *Bull. Soc. Fouad. Ent.*, 38 : 149.

Material examined : South and East Garo Hills : 1 M, Rongrengiri, 29.v.1990, M.S. Shishodia; 1 M, Songsak, 2.v.1991, B.N. Das.

West Garo hills : 1M, Garobadha, 1.iv.1990, M.S. Shishodia; 1M, Damalgiri, 17.iii.1991, A.K. Hazra; 1F, Kherapara, 4.x.1991, R.K. Varshney.

East Garo hills : 1 F, Cherrapunji, 19.v.1909, B. Warren; 1F, Shillong, 22.ix.1926, R.B.S. Sewell; 2 M, 1 F, 5 &6. vi.1990, M.S. Shishodia; 2F, Old Barapani, 6.vi.1963, A.K. Ghosh.

West Khasi hills : 1 M, Umtham, 26.ix.1973, S. K.Chanda.

Diagnosis : Moderate in size. Head conically ascending and equal in length of pronotum. Pronotal disc weakly tectiform; male subgenital plate, in profile, comparatively long, the upper margin with a small projection.

Distribution : India : Meghalaya (E. Garo hills, W. Garo hills, Jaintia hills, E. Khasi hills and West Khasi hills), Arunachal Pradesh, Bihar, Goa, Himachal Pradesh, Madhya Pradesh, Jammu and Kashmir, Kerala, Rajasthan, Tamil Nadu, West Bengal; Afghanistan; Bangladesh; Iran; Pakistan; Saudi Arabia; S.E. Tibet; Yemen and West Aden.

Genus *Aiolopus* Fieber, 185311. *****Aiolopus thalassinus tamulus*** (Fabricius)

(Fig. 3, Map 5)

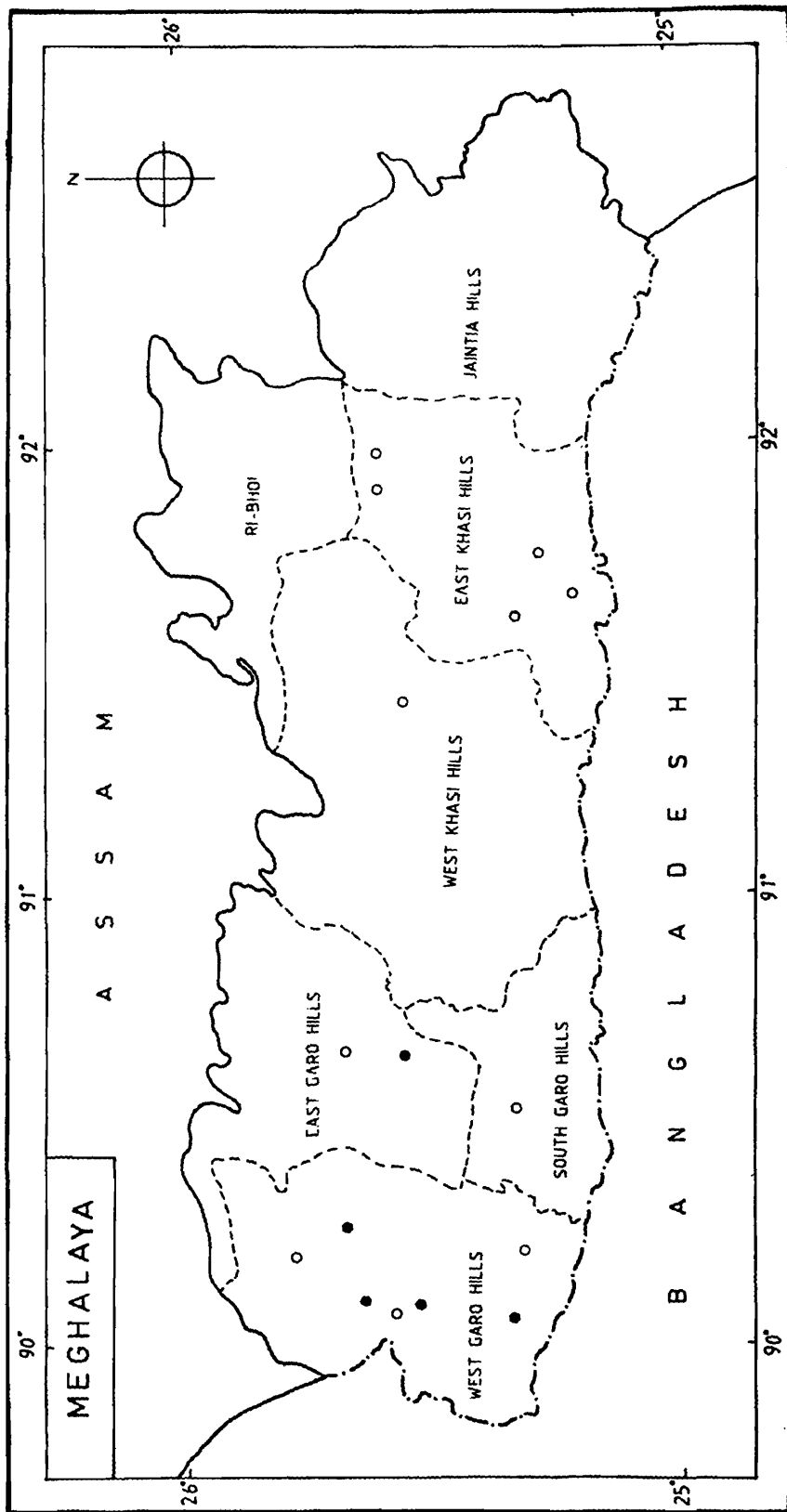
1798. *Gryllus tamulus* Fabricius, *Ent. Syst. Suppl.*, : 195.1968. *Aiolopus thalassinus tamulus* : Hollis, *Bull. Br. Mus. nat. Hist. (Ent)* 22(1) : 347.

Material examined : East Garo Hills : 4 M, 5F Rongrengiri, 29.v.1990, M.S. Shishodia.

West Garo hills : 1F, Ranginsim, 13.xi.1978, K.P. Singh; 1F, Kyrdemkulai, 17.i.1979, M.R. Rynth; 2 M, 3F, Tura, Damalgiri, 21.iv.1991, B.N. Das; 3M, 3F, Barangapara, 23.iv.1991, B.N. Das.

Jaintia Hills : 1M, Khliehriat, 20.v.1990, M.S. Shishodia.

Diagnosis : Antennae as long as head and pronotum together; fastigium with front angle more acute; foveolae narrowly trapezoid, about twice as long as wide; frontal ridge gradually



b

10. *Acrida exaltata* ○ 11. *Aiolopus thalassinustamulus* ●

Map 5. Showing distribution of *Acrida exaltata* and *Aiolopus thalassinustamulus*.

narrowing and almost angular towards fastigial end, sparsely punctured; pronotum somewhat saddle-shaped, posterior margin rounded; posterior femur unicolours, without any oblique fascia or marking; posterior tibiae usually with red colouration in apical fourth and broadly separated from black band by a wide bluish grey band.

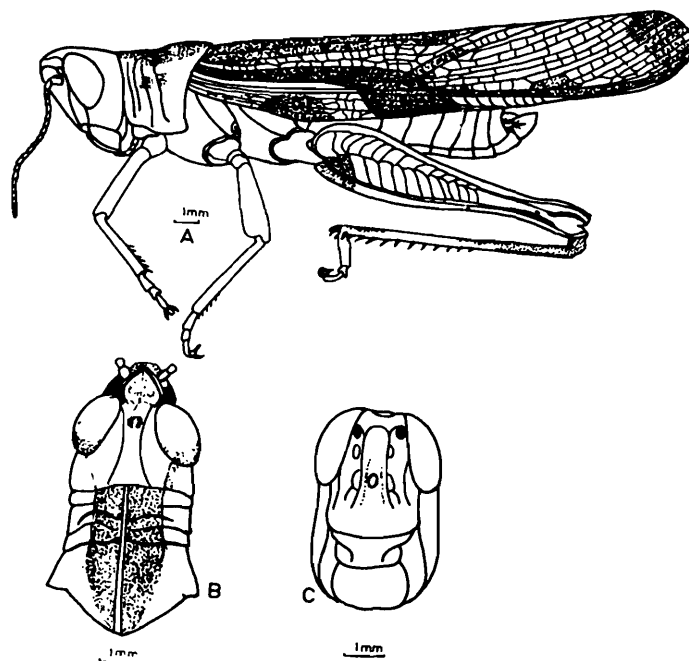


Fig. 3. A. *Aiolopus thalassinus tamulus* (Male); B. Head and Pronotum; C. Head anterior view.

Distribution : India : Meghalaya (East Garo hills, West Garo hills, Jaintia hills, West Bengal, Andaman and Nicobar Island, Bihar, Himachal Pradesh, Karnataka, Madhya Pradesh, Tamil Nadu; Australia; Borneo; Japan; Java; Sri Lanka; Sumatra.

Genus *Ceracris* Walker, 1870

12. *Ceracris nigricornis nigricornis* (Walker)

(Map 6)

1870. *Ceracris nigricornis* Walker, *Cat. Derm. Salt. Br. Mus.*, 4 : 791.

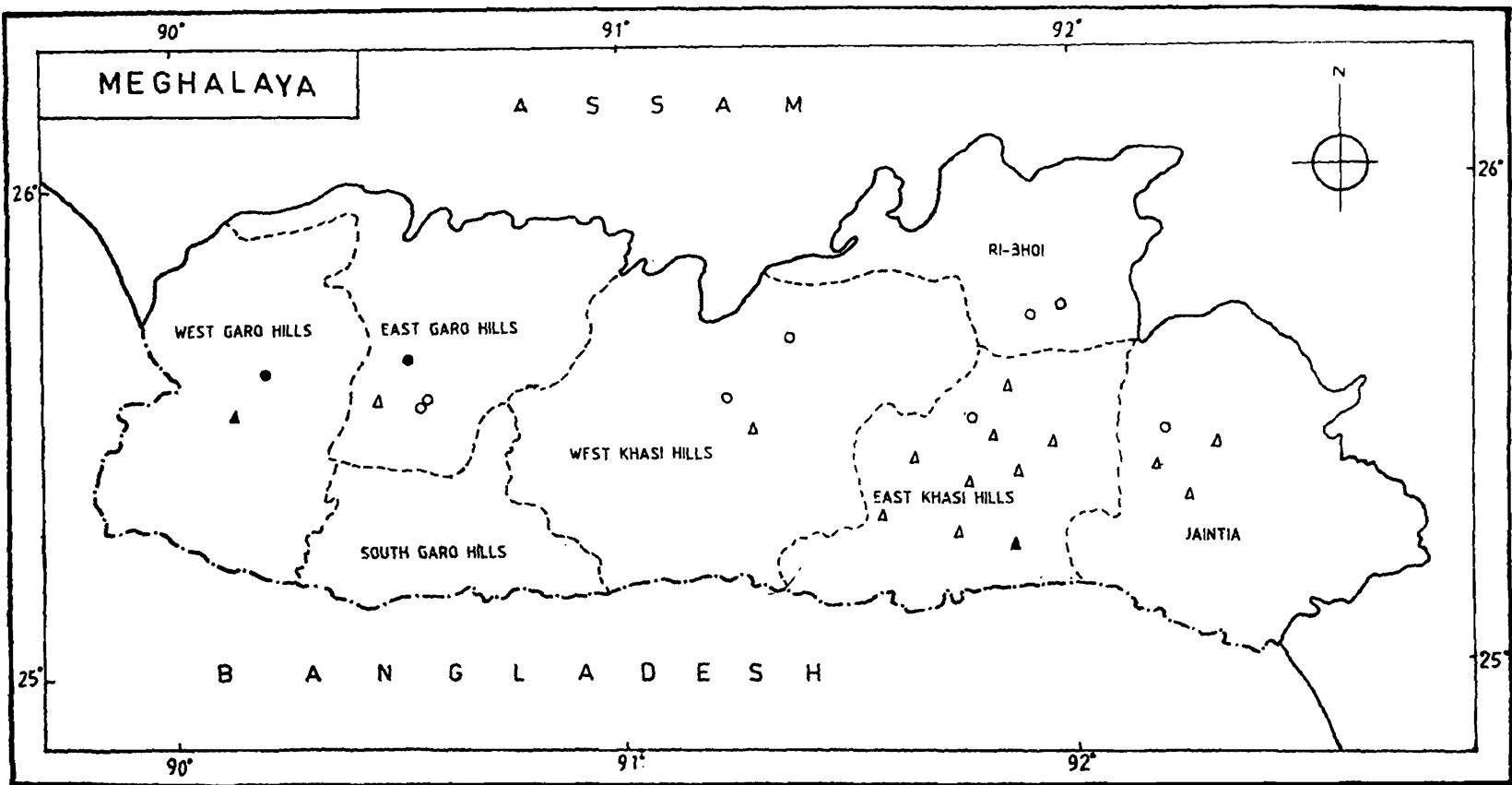
1925. *Ceracris nigricornis nigricornis* : Uvarov, *Ent. Mitt. Berl.*, 14 : 13.

Material examined : East Garo Hills : 1 F, William nagar, 11.iii.1991, B.C.Das.

Jaintia Hills : 1M, Umphrenais 31.x.1964, R.P.G.

East Khasi Hills : 1F, Barapani, 25.xi.1978, P.T. Cherian; 1F, Elephant falls, 28.vii.1979, C. Radhakrishna; 1M, Barapani Road, 19.viii.1980 A. Singh.

West Khasi hills : 2M, Mowphlong, 8.x.1963, M.Dutta; 1F, Mamphlang, 13.vi.1964, S. Biswas.



12. *Ceracris nigricornis nigricornis* ○ 13. *Ceracris sp.* ●
 14. *Dittopternis venusta* △ 15. *Gastrimargus africanus africanus* ▲

Map 6. Showing distribution of *Ceracris nigricornis nigricornis*, *Ceracris sp.*, *Dittopternis venusta* and *Gastrimargus africanus africanus*.

Diagnosis : Size medium; Brownish-green or olive-green colour; face and pronotum coarsely punctured; tegmina brown, with anal field apple green or olive green; hind femora more or less reddish, especially below, with a narrow pale pre-apical ring, preceded by a narrow blackish ring; hind tibiae dirty bluish, with the base black, a pale part basal ring, followed by blackish ring.

Distribution : India : Meghalaya (East Garo hills, and East Khasi hills), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Tamil Nadu, Uttar Pradesh and West Bengal; Afghanistan.

13. *Ceracris* sp.

(Map 6)

Material examined : *East Garo Hills* : 1 M, Balat, 5.viii.1981, M. R. Rynth.

West Garo Hills : 1F, Rongram, 24.ix.1975, N. Muraleedharan.

Diagnosis : Colour same as in previous species except hind femur which is red. Antennae damaged.

Distribution : India : Meghalaya (East Garo hills, West Garo hills); Burma.

Genus *Dittopternis* Saussure, 1884

14. ****Dittopternis venusta** (Walker)

(Map 6)

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

1914. *Dittopternis venusta*: Kirby, *Fauna British India. Orthopt.* (Acrididae): 140.

Material examined : *East Garo Hills* : 1 M, William nagar, 11.iii.1991, B.C.Das.

Jaintia Hills : 1M, 1F, Mukhla village, 17.iii.1991, A.K. Sanyal; 4M, 12F, Jowai, 24.iii.1991, A.K.Hazra.

East Khasi Hills : 1M, 2F, Mowpat, Shillong, 16.vii.1971, R.S. Pillai; 1F, Mowsamaram, 1.iv.1972, S. Biswas; 1F, Cherrapunji, 20.iv.1975, M.R. Rynth; 1F, Mowsami cave, 20.iv.1978, M.R. Rynth; 1M, 4F, Mowpat, Shillong, 16.iv.1979, S.G..Patil; 1M, Motingar, 26.iv.1979, M.S. Jyrwa, 1M, Pynursla, 22.viii.1980, A. Singh; 1F, Lydow, Cherrapunji, 29.iii.1991, S. K. Saha.

West Khasi hills : 5M, 1F, Nongstoin, 21-22—iii.1991, A.K. Hazra.

Diagnosis : Brown above, pale beneath; vertex with four diverging rows of pale granules running backwards from between the eyes; a blackish band runs backwards from each eye over the occiput and part of pronotum, bordered above and below by a slight yellow line; tegmina, with the basal half and costa brown, with a large yellow blotch and a smaller yellowish spots; wings hyaline, yellow at base, with a broad suffused blackish band beyond; hind tibiae black at base followed by a light yellow band, then blue.

Distribution : India : Meghalaya (E. Garo hills, Jaintia hill, E. Khasi hills, W. Khasi hills), Karnataka, Madhya Pradesh, Orissa, Tamilnadu and West Bengal; and Sri Lanka.

Remarks : This species is most abundant in the East Khasi hills districts.

Genus *Gastrimargus* Saussure, 1884

Key to species

1. Internal ventral surface of hind femur blue-grey to blue-black.....*africanus* (Saussure)
- Internal ventral surface of hind femur straw-coloured. (Hind wing fascia, especially in female, with dark pigment diffusing outwards along 3A and subsequent veins towards wing tip.....*marmoratus* (Thunberg)

15. ** *Gastrimargus africanus africanus* (Saussure)

(Map 6)

1888. *Oedaleus (Gastrimargus) marmoratus* var *africana* Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, **30** (1) : 39.

1982. *Gastrimargus africana africana* : Ritchie, *Bull. Br. Mus. nat. Hist. (Ent)* **44** (4) : 248.

Material examined : E. Khasi Hills : 2 F, Cherrapunji, (now in Meghalaya), 12 & 19.v.1909, B. Warren; West Garo hills : 1 F Kherapara, 24.iv.1991, B.N. Das.

Diagnosis : Fastigium of vertex concave; pronotum with median carina moderately arcuate, superficially intersected by posterior sulcus, hind margin sharply angular; tegmina surpassing hind knees by one third to half of hind femur length; pale band distinct; hind wing basal area bright yellow with complete dark fascia, dark spots at apex; internal ventral surface of hind femur blue-grey to blue-black.

Distribution : India (Orissa, Sikkim and West Bengal); Africa; Arabia, Burma; Nepal; Sri Lanka; Thailand and Tibet.

Remarks : Female specimens collected from Cherrapunji were wrongly identified by W.F. Kirby as *Gastrimargus transversus* (Thunberg), which are present in the national collections of Zoological Survey of India, Calcutta.

16. *Gastrimargus marmoratus* (Thunberg)

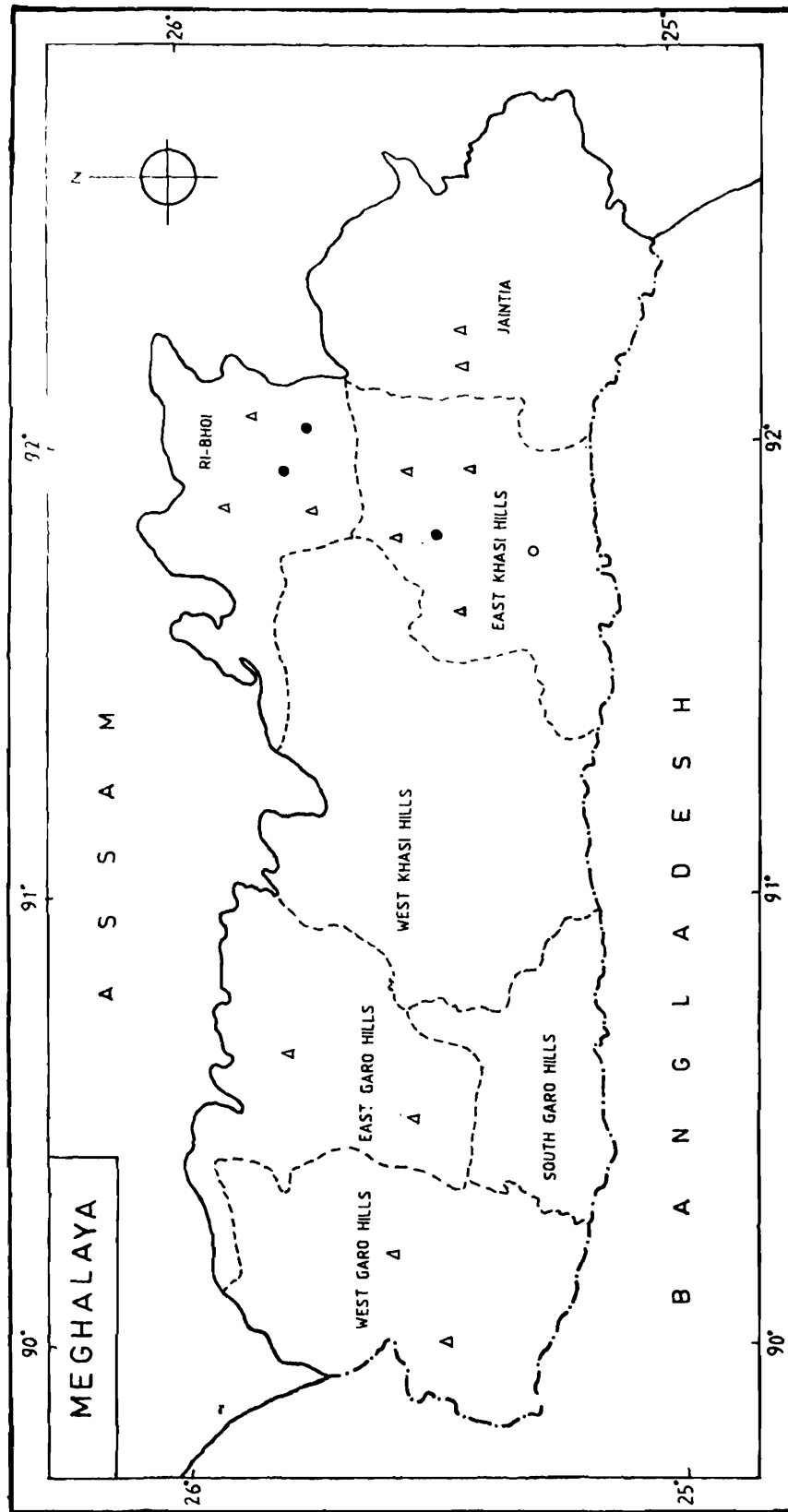
(Map 7)

1815. *Gryllus marmoratus* Thunberg, *Mem. Acad. Sci. St. Petersb.* **5** : 232.

1815. *Gryllus transversus* Thunberg, *Mem. Acad. Sci. St. peterab.* **5** : 232.

1982. *Gastrimargus marmoratus* : Ritchie, *Bull. Br. Mus. nat. Hist. (Ent)* **44** (4) : 262.

Material examined : E. Khasi Hills : 2 M, Cherrapunji, (No date on the label).



16. *Gastrimargus marmoratus* ○ 17. *Gonista bicolor* ● 18. *Heteropternis respondsens* △

Map 7. Showing distribution of *Gastrimargus marmoratus*, *Gonista bicolor* and *Heteropternis respondsens*.

Diagnosis : Fastigium of vertex convex, median carinulae distinct throughout; pronotum with median carina arcuate, shallowly intersected by posterior sulcus; hind margin acutangular; tegmen surpassing hind knees by two-fifths of hind femur length.

Pronotum x marking with posterior arms usually indistinct; transverse bands on tegmen sometimes reduced; hind wing fascia complete, dark pigments towards the apex, basal area pale yellow; ventral surface of hind femur straw-colour.

Distribution : It is widely distributed in SE. Asia from Assam north-east to Japan, south-west to Sumatra, and south east to the Vogelkop peninsula of New Guinea. In India it is recorded from Andhra Pradesh, Assam, Bihar, Karnataka, Maharashtra, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Remarks : No specimen was obtained during present survey. It is based on previously collected material present in the national collection, date and name of collector are not present on the label. One of the specimen has transverse band in intercalate space which do not extend upward to the costal area, the other transverse band present beyond the middle of tegmen is very faint and narrow.

Genus *Gonista* Bolivar, 1898

17. *****Gonista bicolor*** (De Haan)

(Map 7)

1842. *Acridium (Opsomala) bicolor* De Haan, *Verh. Ned. Overz. Bezitt. Orth.*, 147, 148.

1951. *Gonista bicolor* : Willemse, *Publities natuurh. Genoot. Limburg*, Recks 4 : 108.

Material examined : East Khasi Hills : 1 M, Umran, 22.i.1981, R Mathew; 1M, Kyrdemkulai, 1.xi.1983, R. Zoramthengi; 2 M, Old Barapani, 18. ix. 1991, Y.P. Sinha.

Diagnosis : Head small, much shorter than the pronotum; eyes situated almost on the middle of the head; vertex projecting forward and depressed; antennae sword shaped; apex of tegmina and wings sharpened; dorsal genicular lobes of hind femur rounded.

Distribution : India : Meghalaya (East. Khasi hills); Korea; Eastern China; Japan; on the Islands of the Malayan Archipelago.

Remarks : The genus is very nearly related to *Gelastorrhinus* and differs principally in the hind knees, which from above are not at all produced into small spines or lobes. Willemse (1951) and Tinkham (1935-36) have stated that this species is living on open grassland and in the tall grass on the hillsides.

Genus *Heteropternis* Stål, 1873

18. *****Heteropternis respondens*** (Walker)

(Map 7)

1859. *Acrydium respondens* Walker, *Ann Mag. nat. Hist.*, (3) 4 : 223.

1986. *Heteropternis respondens* : Bhowmik, *Tech. Mongr. Zool. Surv. India.*, No. 14 : 65-66.

Material examined : East Khasi Hills : 1 M, Bloong, 27.viii. 1971, R. Giri, 1F, Naya Bunglow, 16.v. 1978, S.G.Patil; 1F, Umthan, 25.viii.1980, C.R. Krishnan; 1M, Burnihat, 22.iv.1981., F.P.Sati, 2M, 4F, Umsing, Shillong, 23.iv.1963, V.D. Srivastava; 1M, Umsing, 21.i.1964, A.K. Mondal; 14M, 3F, Umphirna, 10.iv.1964, S.J.S. Hatter; 2M, 2F, Mopat, 16.vii.1971, R.S.Pillai and S.G. Patil; 1M, Mawmaram, 11.iv.1972, S. Biswas; 4MM, 4FF, Laitkor peak, 12.v.1978; 3M, 2F, Barapani, 4.viii.1980, Asket Singh; 3M, 9F, Sahraim, 26.iii.1991, A.K. Hazra; 4M, 5F, Shillong, 26.iii.1991, A.K. Hazra; 3M, 3FF, Barapani 29.iii.1991, A.K.Hazra.

South and East Garo Hills distts. : 2MM, Narangiri, 29.v.1990, M.S. Shishodia; 1M, Nongwal, ix. 1991, R.K.Varshney.

West Garo Hills distt. : 1M Tura, 15.iii.1991, A.K. Hazra and R.S.Burman; 2 M, Garopara, 28.iv.1991, B.N. Das.

Jaintia Hills distt. : 1M, 1F, Jowai, 17.iii.1991, A.K. Hazra; 1F, Jowai, 20.iii.1991, B.C.Das.

Diagnosis : Medium in size, head smooth or slightly granulated; principal sulcus placed somewhat before the middle; wings without curved dark band; hind tibiae red, internal calcaria greatly unequal.

Distribution : India : Meghalaya (as stated), Arunachal Pradesh, Bihar, Karnataka, Orissa, Tmil Nadu, Uttar Pradesh, Sikkim, West Bengal; Bangladesh; Burma; China; Java; Japan; Malacca ; Nepal; Sri lanka; Philippines; Sumatra; Taiwan; Thailand.

Genus *Holopercna* Karsch, 1891

19. *****Holopercna darjeelingensis*** (Bolivar)

(Map 8)

1914. *Sjoestedtia darjeelingensis* Bolivar, *Trab. Mus. Cienc. nat. Madr.*, Madrid, **20** : 77.

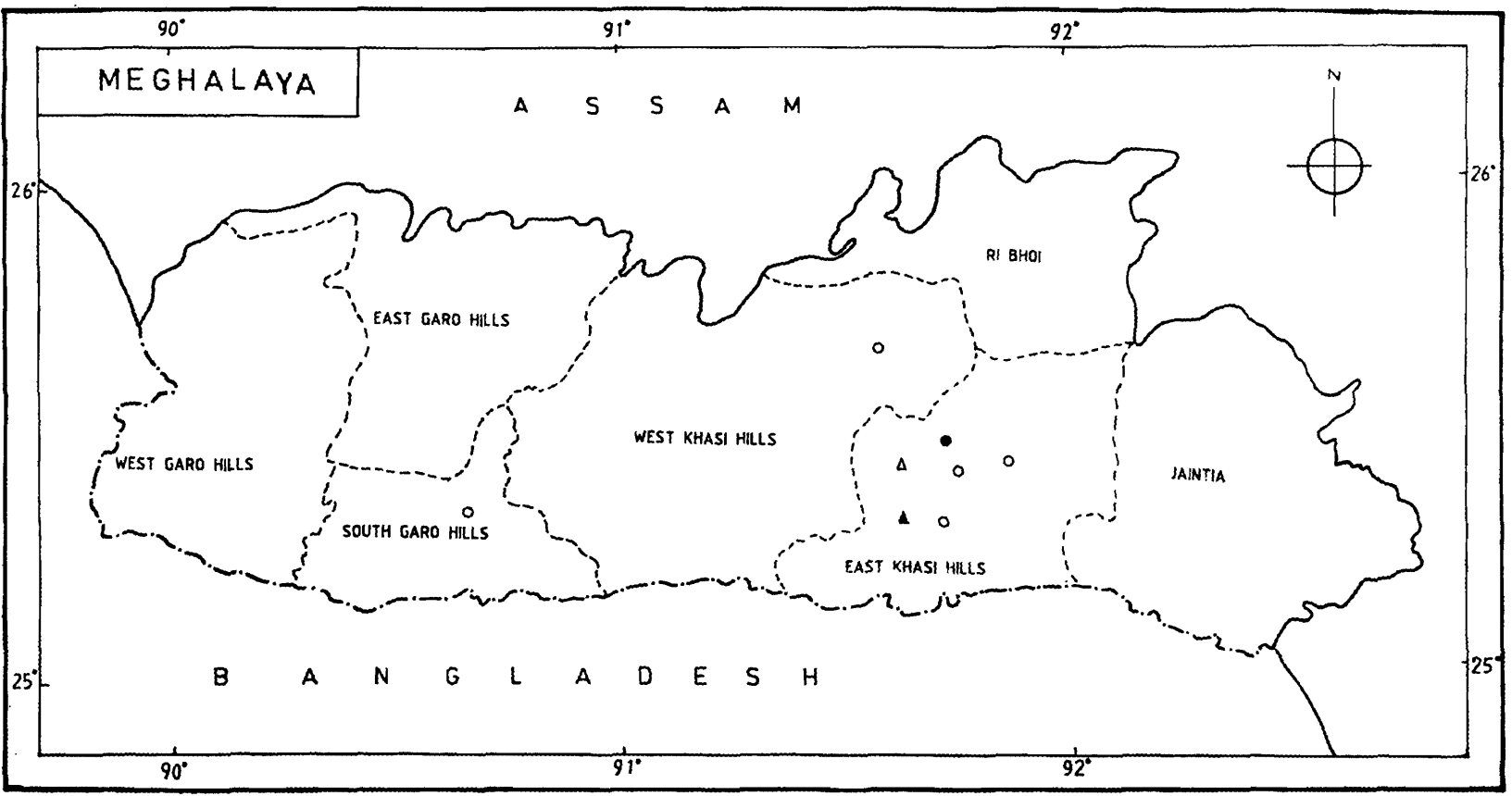
1984. *Holopercna darjeelingensis* : Jago, *Trans. Amer. Ent. Soc.*, **109** : 78.

Material examined : East Khasi Hills and Ri-Bhoi : 2M, Umtynger, 9.ix.1964, M.S. Jyrwa, 3M, 1F, Cherrapunji and around, Shella 22.ix. 1991, Y.P. Sinha; 1 F, Synpep, 27.ix.1977, K.R. Rao.

West Khasi Hills : 2 M, 1 F, Mairang 25,26.ix.1975, S.K. Chanda.

Diagnosis : Wings blue in the middle, followed by a black band, varying in width, but generally with broad band, curving from the middle of the costa to above the anal angle, extending from costa to anal region; wings without dark spot at the apex; hind femora blue; tibiae alternately banded with blue and black.

Distribution : India : Meghalaya (Khasi hills), Assam, Himachal Pradesh, Sikkim, Uttar Pradesh and West Bengal.



19. *Holoperca darjeelingensis* ○ 20. *Locusta migratoria migratorioides* ●
 21. *Oedaleus abruptus* △ 22. *Oedipodacris aberrans* ▲

Map 8. Showing distribution of *Holoperca darjeelingensis*, *Locusta migratoria migratorioides*, *Oedaleus abruptus* and *Oedipodacris aberrans*.

Genus *Locusta* Linnaeus, 175820.** *Locusta migratoria migratorioides* (Reiche & Fairmaire)

(Map 8)

1850. *Oedipoda migratorioides* Reiche & Fairmaire, *Voy. Abyssinei*, **3** : 430.1902. *L-ocusta migratorioides* : Kirby, *The Uganda Protectorate* **1** : 468.1951. *Locusta migratoria migratorioides* : Uvarov, *Bull. Off. nat. anti-Acrid.*, Paris.

Material examined : East Khasi Hills : 1 F, Umroi-Barapani, 30.iv.1968, R.K. Varshney; Garo Hills, 1F, Siju Cave area, 27.x.1991, B.N. Das.

Diagnosis : This species is of large size (48mm.). General colouration green or brown, head sometimes slightly inflated; pronotum less tectiform than *Gastrimargus*, anterior and posterior margin angulated; tegmina mottled and reticulated with brown; wings hyaline; hind femora rather long, not much thickened at base; hind tibiae reddish. *Locusta migratoria migratorioides* occurs in two forms (form *Solitaria* and form *gregaria*). The two forms are very sharply different but intermediate forms also exist.

Distribution : It occurs in the whole Ethiopian Region and whole of eastern hemisphere except Arctic and northern region. In India it is recorded so far from Delhi and Orissa.

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

Genus *Oedaleus* Fieber, 185321. ***Oedaleus abruptus* (Thunberg)

(Fig. 4, Map 8)

1815. *Gryllus abruptus* Thunberg, *Mem. Acad. Sci. St.-Peterb.* **5** : 233.1884. *Oedaleus abruptus*: Saussure, *Man. Soc. Phys. hist. nat. Genove* **28** (1) : 110, 117.1981. *Oedaleus abruptus* : Ritchie, *Bull. Br. Mus. nat. hist. (Ent.)* **42** (3) : 104.

Material examined : East Khasi Hills : 1 F, 3.viii.1973, M. Dutta.

Diagnosis : Size small; fastigium of head almost flat; pronotum with incomplete white cruciform marks, strongly carinated and entire, posterior margin pointed, the median sulcus visible on the sides of the pronotum before the middle; tegmina brown at base; wings hyaline at the base, with a broad black transverse band, curving inwards to the anal angle; hind tibiae red, with a yellow ring at the base.

Distribution : India (Andhra Pradesh, Bihar, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Orissa, Rajasthan, Tamilnadu, Uttar Pradesh and West Bengal); Bangladesh, Burma, China, Indo-China, East Nepal, Pakistan, Sri Lanka and Thailand.

Remarks : Though this species is well distributed all over the India but rarely occurring on high altitudes. It is recorded here for the first time from Meghalaya.

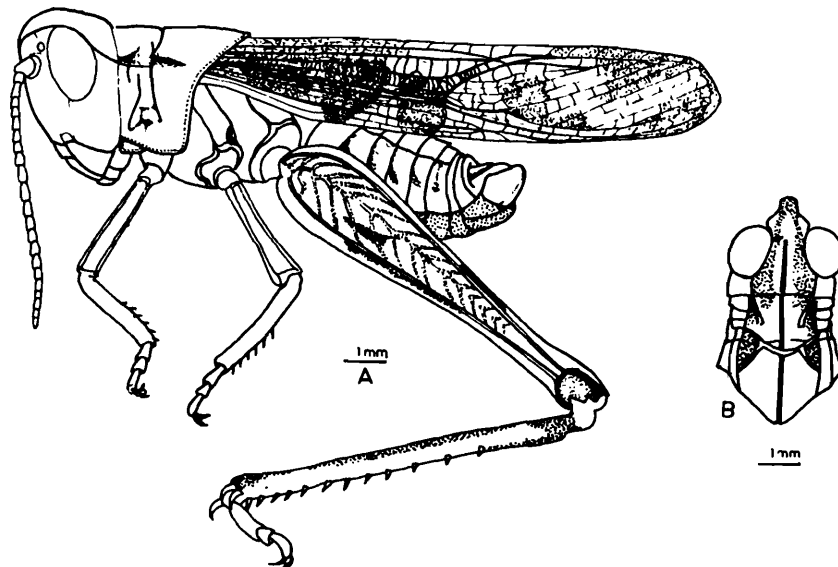


Fig. 4. A. *Oedipodacris abruptus* (Male) B. Head and pronotum.

Genus *Oedipodacris* Willemse, 1932

22. *Oedipodacris aberrans* Willemse

(Map 8)

1932. *Oedipodacris aberrans* Willemse, *Annl. Soc. ent. Fr.*, **101** : 289.

Diagnosis : (Female): Size medium, body robust; antennae filiform and reaching the posterior margins of the pronotum; head thick and as long as the pronotum; face slightly reclinate; fastigium of vertex strongly sloping, margins indistinct, passing in a round angle into the frontal ridge; temporal foveolae absent; vertex convex; pronotum coarsely punctured, anterior margin obtusely angulated in advance, posterior angle obtusely rounded; first transverse sulcus distinct on the disc, second and third distinct on the disc and on the lobes, third sulcus far behind the middle; lateral keels absent, median keel indicated by an indistinct sculpuration; tegmina rudimentary, lateral, not reaching behind the middle of the 2nd tergite, oval, apex rounded; wing rudimentary; prosternal tubercle absent; hind femora thick, reaching apex of abdomen; supra-anal plate long, triangular, apex obtusely pointed, with a median sulcus throughout; cercus cylindrical, apex pointed, not reaching the supra-anal plate; valves of ovipositor narrow, apex not recurved but obtuse; subgenital plate longer than broad, posterior margin triangularly angulated

Distribution : India : Meghalaya (Khasi Hills).

Remarks : Willemse (1932) described the species under new genus *Oedipodacris*. Though he placed the genus under *Oedipodinae*, considered here *Acridinae*, has under resemblance with the subfamily *Catantopinae* in its general forms. In absence of male specimen, he could not decide

the systematic position of the genus. During the present study, the authors could not find out any material of the species. The locality label, date of collection etc. not written.

Genus *Orthochtha* Karsch, 1891

23. *****Orthochtha indica*** Uvarov

(Map 9)

1942. *Orthochtha indica* Uvarov, Ann. Mag. nat. Hist. (11) 9 : 587.

Material examined : Khasi Hills : 1M, Kyrдем Kulai 8.iii.1979, S.K. Chanda.

Diagnosis : Head shorter than pronotum, face oblique, frontal ridge broadly sulcated throughout, fastigium of vertex longer than wide; antennae very long, extending back beyond the base of hind femur, basal segments flattened, remaining round; pronotum long, laterally compressed, disc flat, slightly rounded in prozona, very weakly tectiform in metazona, all the carinae distinct, lateral carinae straight and parallel in prozona and weakly divergent in metazona; tegmina reaching a little beyond hind knees; last tergite with broad parabolic excision; supra-anal plate tongue shaped; cercus as long as plate; subgenital plate short, obtusely conical.

General colouration very light yellowish green; a brownish black lateral fascia runs along the sides of fastigium, behind the eyes, along the upper margin of lateral pronotal lobes and along the basal third of the radial veins.

Distribution : India : Meghalaya (E. Khasi Hills), Delhi, Himachal Pradesh, Maharashtra.

Remarks : Recorded for the first time from Meghalaya State.

Phlaeoba Stål, 1860

Key to species

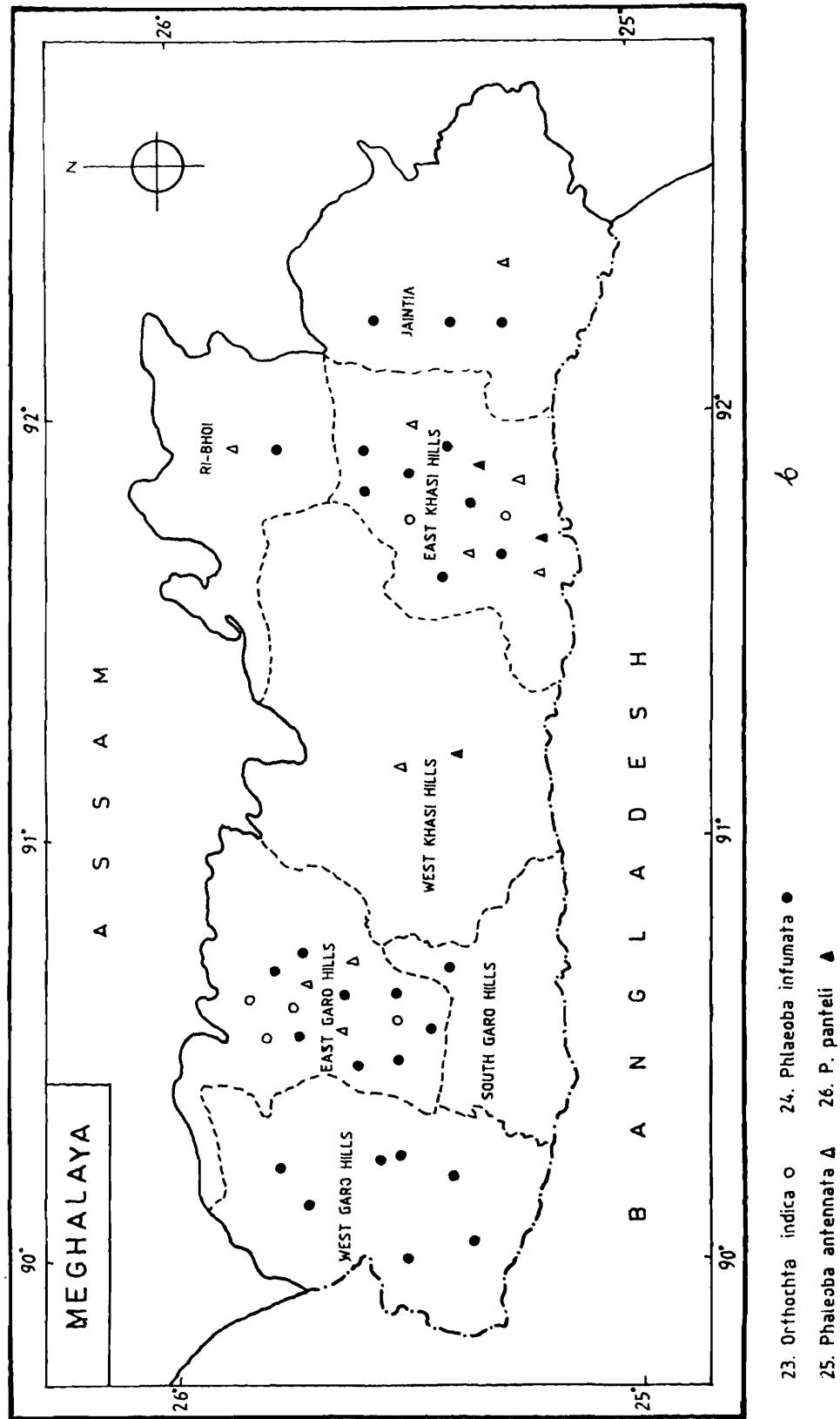
1. Wings more or less fuscous at apex.....2
- Wings hyaline at apex (pronotum very rugulose).....*panteli* Bolivar
2. Antennae unicolorous.....*infumata* Brunner
- Antennae ringed or tipped with obscure yellow.(Posterior tibiae sordid blue or reddish).....*antennata* Brunner

24. *****Phlaeoba infumata*** Brunner

(Figs. 5 and 6, Map 9)

1893. *Phlaeoba infumata* Brunner von Wattenwyl, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 33 : 124.

1914. *Phlaeoba infumata* : Kirby, *Fauna British India, Orthopt. (Acrididae)* : 103.



Map 9. Showing distribution of *Orthochtha indica*, *Phlaeoba infumata*, *Phlaeoba antennata* and *Phlaeoba panteli*.

Material examined : *South and East Garo Hills* : 1M, Kyrdem, Kulai, 26.vii.1978, R. Mathew; 2 M, Rongzeng, 8.vii.1988, K.P. Singh; 1 M, Narangiri, 29.v.1990, M.S.Shishodia; 5 M, 3F, Samphalgiri, Williamnagar, 9.12.iii.1991, B.C.Das; 1F, Williamnagar, 30.ix.1991, R.K. Varshney; 2M, Nongwal 10.x.1991, R.K. Varshney.

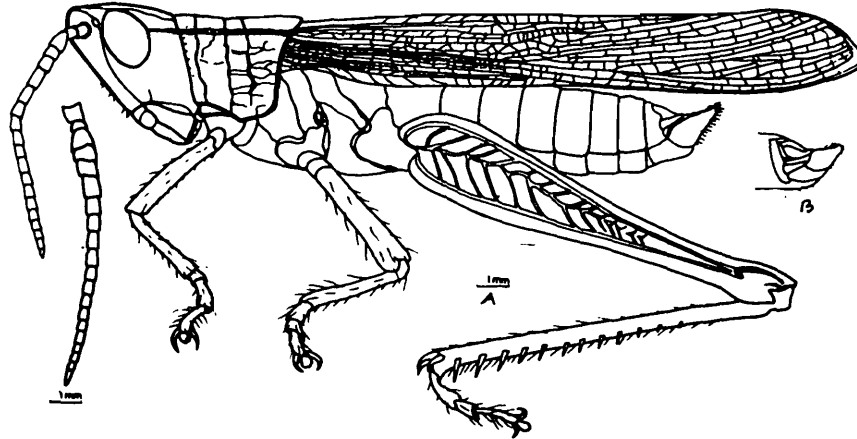


Fig. 5. A. *Phlaeoba infumata* (Male); B. Last abdominal part.

West Garo Hills : 1 M, Baghmara, 7. xi. 1988, K. P. Singh; 4 M , 2 F, Tura, 17. iii. 1991, A. K. Hazra; 2 M, River Semi, 18. iii. 1991, A. K. Hazra and R. S. Burman; 1 M, 3 F, Barangapara, 23. iv. 1991, B. N. Das; 2 M, 1 F, Tura, on way to Shila, 22. ix. 1991, R. K. Varshney; 1 M, Keapara, 24. ix. 1991, B. N. Das; 2 M, 2 F Keapara, 4. x. 1991, R. K. Varshney.

Jaintia Hills : 1 M, Mukha village, 17. iii. 1991, A. K. Sanyal; 2 M, Mawstam, 26. ix. 1991, R. K. Varshney.

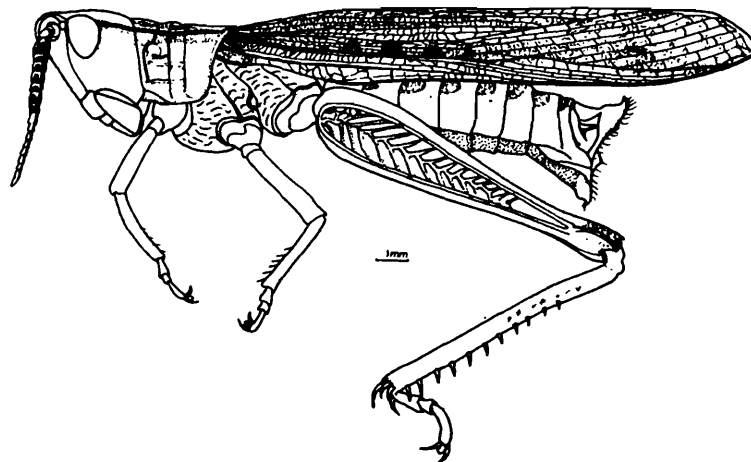


Fig. 6. *Phlaeoba infumata* (Female)

Ri-Bhoi and East Khasi Hills : 1 M, Shillong, 13. vii. 1962, S. N. Prasad; 1 M, Cherrapunji, 18. i. 1975, A. K. Ghosh; 3 M, 2 F, and 1 nymph, 11. iv. 1978, K. P. Singh; 6F, 6 M, 12. v. 1978, S. J. S. Hatter; 1 M, Old Barapani, 8. vii. 1988, R. Mathew; 2 MM, 1 F, Cherrapunji, 27. iii. 1991, S. K. Saha; 2 M, 2 nymph, Mawirang, 4. iv. 1991, S. K. Ghosh; 1 F, Old Barapani, 18. ix. 1991, R. K. Varshney.

Diagnostic characters : Size medium. Head and pronotum equally broad shaped; unicoloured ensiform antennae; wings have smoky colouration at apex.

Distribution : India : Meghalaya (East Garo hill, West Garo hill, Jaintia hill, East Khasi hill), Arunachal Pradesh, Bihar, Delhi, Himachal Pradesh, Madhya Pradesh, Orissa, Rajasthan, Tamilnadu, West Benal, Madhya Pradesh. Bangladesh; S. China; Island Hainan; S. & N. Kungtung; Kwsangmi; Malacca; Tenasserian.

25. ***Phlaeoba antennata*** Brunner

(Map 9)

1893. *Phlaeoba antennata* Brunner, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 33 : 125.

1914. *Phlaeoba antennata* : Kirby *Fauna British India, Orthopt. (Acrididae)* : 102.

Material examined : *East Garo Hills* : 1 M, Dumragiri 13. xi. 1978, K. P. Singh; 2 M, 1 F, Shela, 5. xii. 1980, A. Singh; 4 M, Nongal, 28. v. 1990, M. S. Shishodia.

East Khasi hills : 1 M, 1 F, Burnihat, 31. vii. 1973, M. Dutta; 1 F, Mawsmi Cave, 20. iv. 1975, R. Giri; 1 M, Cherrapunji, 15. ix. 1988, A. R. Lahiri; 1 M, Nongpoh, 30. ix. 1988, A. R. Lahiri; 1 M, Cherrapunji and around Shella, 22. ix. 1991, Y. P. Sinha.

West Khasi Hills : 1 F, Khabri, 17. xii. 1981, M. R. Rynth.

Jaintia Hills : 1 M, 1 F, 3 km from Sonapurdi on Khliehriat road, 175 m., 27. viii. 1974, A. R. Lahiri.

Diagnostic characters : Size medium. Colour olive-brown, a broad yellow band running from the vertex to the end of the tegmina, at least in the male; antennae ensiform, with black tipped; pronotum smooth, with all the three carinae well marked; tegmina narrow; wings bluish hyaline at base, infumated at apex.

Distribution : India : Meghalaya (East Garo hill and East Khasi hill), Arunachal Pradesh, Assam, Kerala, Rajasthan and West Bengal. Bagladesh.

26. ***Phlaeoba panteli*** Bolivar

(Map 9)

1902. *Phlaeoba Panteli* Bolivar, *Ansl Soc. ent. Fr.*, 70 : 589.

1914. *Phlaeoba panteli* : Kirby, *Fauna British India, Orthopt. (Acrididae)* : 104.

Material examined : *East Khasi Hills* : 1 M, Umsra, near Nongpoh, Cherrapunji, 25. xii. 1956, H. Khajuria; 1 F, Rongthymari, 21. x. 1971, R. Giri.

West Khasi Hills : 1 M, Nonythywal, 27. x. 71, R. Giri ?

Diagnostic characters : Medium size; ferruginous brown with scattered black dots; antennae ensiform, shorter than head and pronotum together, brown at apex; vertex with marginal carinae converging behind the eyes; the median carina continued on the head and pronotum; pronotum truncate in front, abtusely angulate behind; head and pronotum very rugose; tegmina longer than abdomen; wings bluish hyaline.

Distribution : India : Meghalaya (East & West Khasi hills), Bihar, Himachal Pradesh, Meghalaya and Tamilnadu. Afghanistan.

Genus *Pternoscirta* Saussure

27. *****Pternoscirta cinctifemur*** (Walker)

(Map 10)

1859. *Acridium cinctifemur* Walder, *Ann. Mag.*

1914. *Pternoscirta cinctifemur* : Kirby, *Fauna British India, Orth.*, 1 : 134, fig. 97.

Material examined : *Jaintia Hills* : 1 F, Garampani, 22. v. 1940, M. S. Shishodia.

East Khasi Hills : 1 F, Mawsmai Cave, 20. iv. 1975, M. Rynth; 1 M, Kyrdem, Kalai, 17. i. 1979, M. Rynth.

Diagnosis : Head and pronotum brown in colour and granulated. Pronotum and abdomen with a continuous median carina. Wing red at base, then smoky hyaline, margins are more deep cloudy. Posterior femur stout, posterior tibiae with 9 to 10 black spines. Valves of ovipositor short and slightly curved.

Distribution : India : Meghalaya (Jaintia hills, Khasi hills), Assam, Goa, Orissa, Tamilnadu and West Bengal. Eastern Nepal; Sri Lanka.

Genus *Trilophidia* Stål, 1873

28. *****Trilophidia annulata*** (Thunberg)

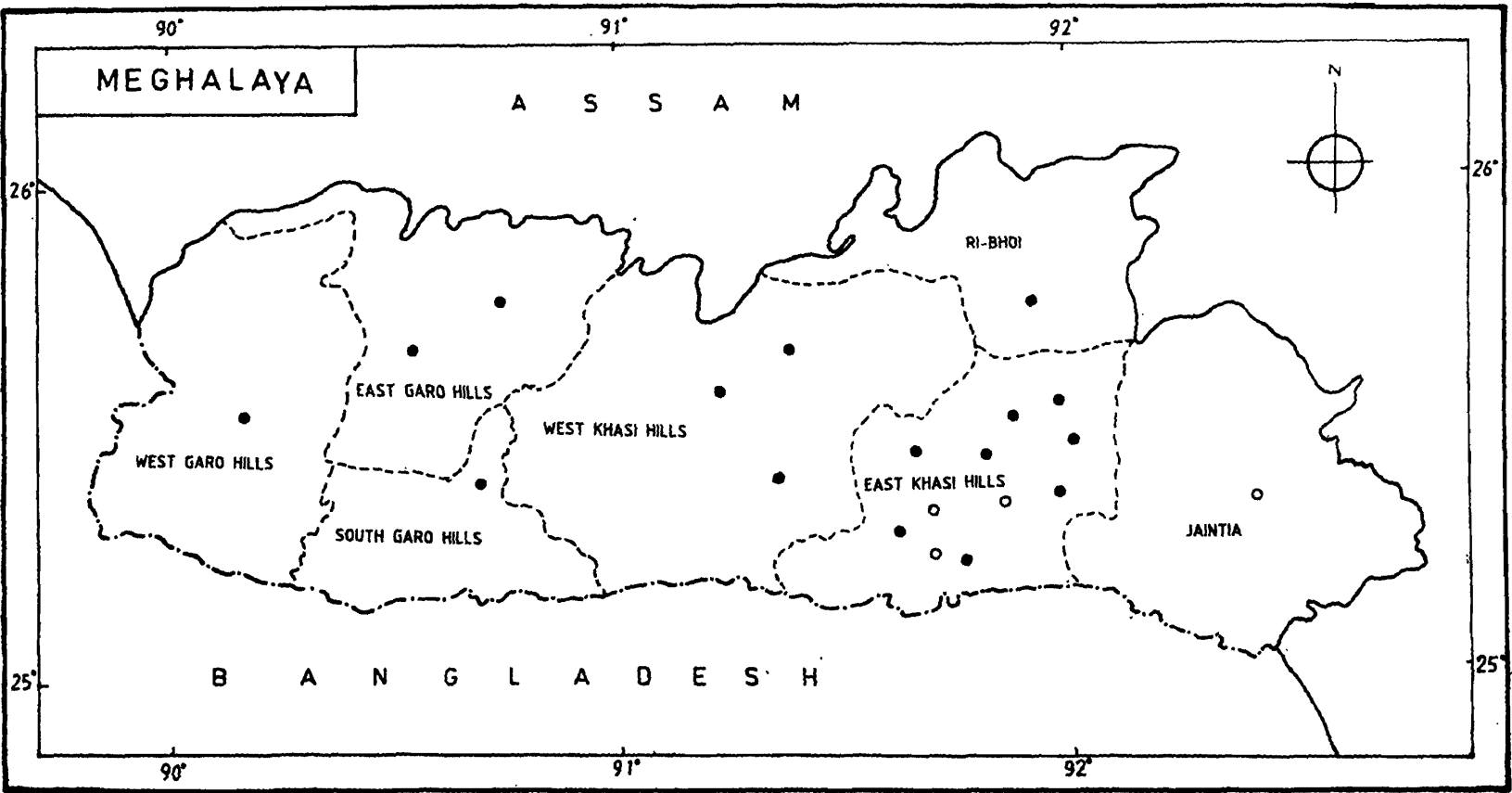
(Fig. 7, Map 10)

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

1965. *Trilophidia annulata* : Hollis, *Trans. R. ent. Soc. Lond.*, 117 (8) : 251

Material examined : *East Garo Hills* : 7 M, 3 F, Narangree, 29. vi. 1990, M. S. Shishodia, 2 M, Tura, 3. vi. 1990, M. S. Shishodia; 2 M, 1 nymph, Nongwal, bibra, 1. x. 1991, R. K. Varshney.

West Garo Hills : 1 M, Tura, 21. iv. 1991, B. N. Das.



27. *Pternoscirta cinctifemur* ○ 28. *Trilophidia annulata* ●

Map 10. Showing distribution of *Pternoscirta cinctifemur* and *Trilophidia annulata*.

Ri-Bhoi and East Khasi Hills : 1 M, Motinagar, 15. xi. 1973, R. S. Giri, 1 F, Laitkan peak, 12. v. 1978, S. Hatter; 1 M, Shillong, 24. viii. 1978, M. S. Jyrwa; 1 F, Lailad, 20. v. 1980, C. Radhakrishnan; 1 M, Barapani, Shillong, 4. viii. 1980, A. Singh; 1 M, 1 F, Pynursla, 22. viii. 1980, A. Singh; 2 M, Mawphlong, 28. x. 1980, A. Singh; 2 M, 3 F, Batjora, 5-6. vi. 1990, M. S. Shishodia; 1 M, Nongpoh, 12. xii. 1991, R. C. Basu.

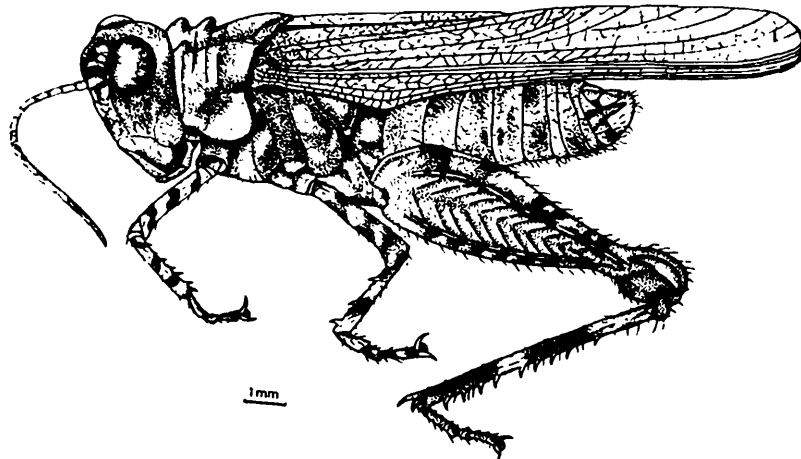


Fig. 7. *Trilophidia annulata* (Male)

West Khasi Hills : 1 M, Nongstoin, 14. iii. 1991, A. K. Singh 2 M, Damalgiri, 21. iv. 1991, B. N. Das; 1 F, Sibbari, 26. iv. 1991, B. N. Das.

Diagnosis : Brown or grey with black markings, pubescent beneath; pronotum rugose, with a high median carina, forming two teeth in front, and with lateral carinae; tegmina grey, some times with two indistinct brown bands; wings yellow at the base, and brown or black beyond; hind tibiae brown, with a pale band towards the base, and with a slight pale band beyond the middle.

Distribution : India: Meghalaya (E. Garo hills, W. Garo hills, E. Khasi hills), Andhra Pradesh, Arunachal Pradesh, Bihar, Goa, Kerala, Himachal Pradesh, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Tamilnadu, Uttar Pradesh; Bangladesh; Burma; Hongkong; Japan; Java; Korea; Malaya; Mongolia; Pakistan; Sarawak; Singapore; Sri Lanka; Sumatra; Taiwan.

Subfamily HEMIACRIDINAE

Key to genera

1. Prosternal process spathulate; fastigium of vertex not much produced before eyes, parabolic or obtusely angular; pronotum distinctly tricarinate.....*Spathosternum* Krauss.
- Prosternal process conical; fastigium of vertex elongate, projecting far in front of eyes; pronotum not distinctly tricarinate.....*Gesonula* Uvarov.

Genus *Spathosternum* Krauss29. ***Spathosternum prasiniferum prasiniferum* (Walker)

(Fig. 8, Map 11)

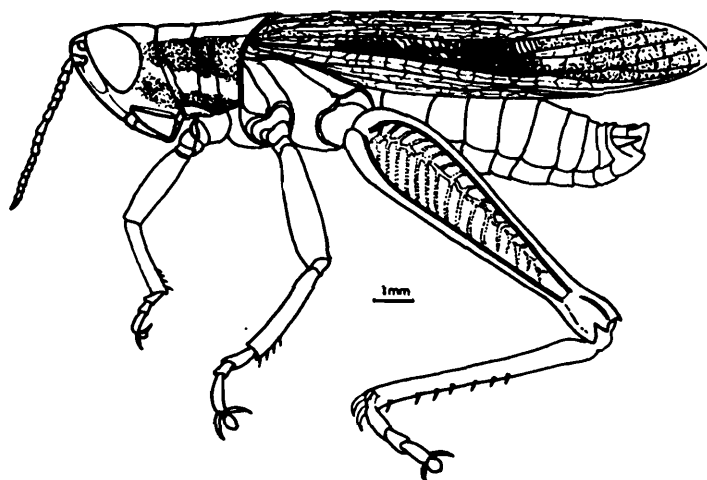
1871. *Heteracris* (?) *prasinifera* Walker, *Cat. Derm.Salt. Brit. Mus.*, 5 suppl. : 65.1936. *Spathosternum prasiniferum prasiniferum* : Tinkham, *Lingnan. Sci. J.*, 15 : 51.

Material examined : *South and East Garo Hills* : 1F, Rongzeng, 26.v.1990, M.S. Shishodia; 1M, Williamnagar, 27.v.1990, M.S.Shishodia; 8M, 4F, Narangiri, 29.v.1990, M.S.Shishodia; 5M, 2F, Williamnagar, 10-12.iii.1991, B.C.Das; 1M, Williamnagar, 8.ix.1991, R.K. Varshney.

West Garo Hills : 1M, 5F, Garobadha, 1.vi.1990, M.S.Shishodia; 3M, Tura, 3.vi.1990, M.S. Shishodia; 1M, Kherapara, 24. iv.1991, B.N. Das; 1M, Siju cave, 27.iv.1991, B.N. Das.

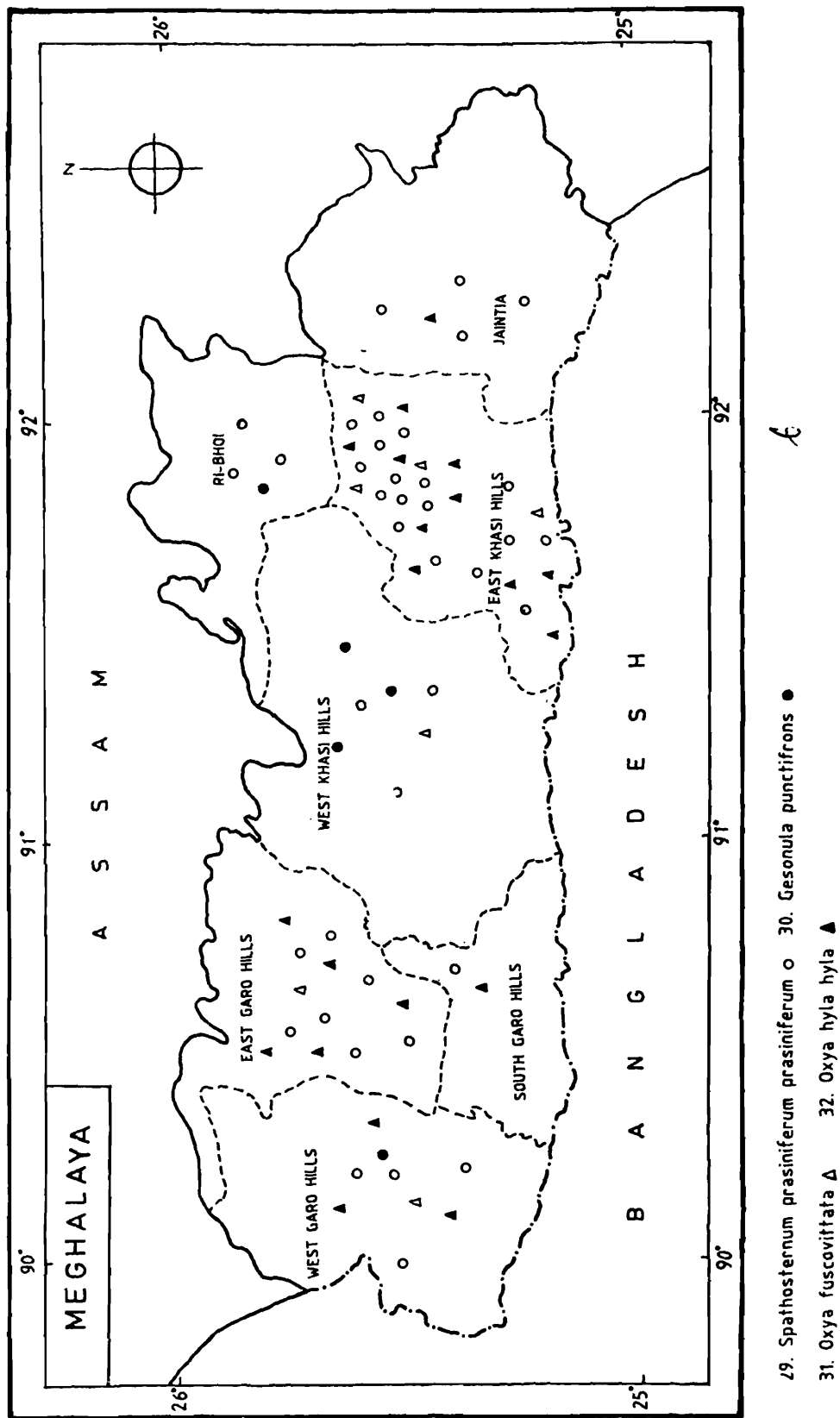
Jaintia Hills : 5M, 4F, Garampani , 22.v.1990, M.S. Shishodia; 1F, Jowai, 27.i.1991, R.K. Varshney; 1F, Jowai, 20.iii.1991, B.C.Das; 1M, Eight mile, 25.ix.1991, R.K. Varshney.

Ri-Bhoi and East Khasi Hills : 1M, 2F, Parade ground Shillong, 3.viii.1962, S. N. Prasad; 1F, Shillong, 24.vii.1962, A.Singh; 1M, 1F, Umranlan, 17.x.1963, M. Dutta; 1F, Shillong, 6.vi.1971, S. Biswas; 3 F, Umsing, 17.x.1973, M.R. Rynth; 1M, Lumparing, Shillong, 6.ii.1974, R. .S. Giri;

Fig. 8. *Spathosternum prasiniferum prasiniferum* (Male)

1M, 1F, Malki forest, Shillong, 13.ii.1974, M.S.Jyrwa; 1F, Naya Bunglow, 6.v.1978, S.G. Patil; 2M, Barapani, 30.iv.1978, S.G.Patil; 1M, Nongpoh, 11.v.1978, K.P. Singh; 1F, Kydem, Kalai, 26.vii.1978, R. Mathew; 1M, Barapani, 6.vii.1979, R.Mathew; 2 M, 1F, Barapani, 4.vii.1980, A. Singh; 1M, 2F, Elephant falls, 22.viii.1980, A. Singh; 15 M, 13F, Batzora 5-6, vi. 1990, M.S. Shishodia; 1M, 1F, Nongpoh, 12.ii.1991, R.C. Basu; 4F, Shillong, 30.iii.1991, A.K. Hazra; 2 M, 2 F, Barapani, 11.ix.1991, R.C. Basu; 1M, 1F, Nongrum, 13.xi.1991, R.C. Basu.

West Khasi Hills : 1 M, Umran, 27.vi.1979, K.K. Rai; 1F, Nongstoin, 23.ix.1988, A. .R. Lahiri; 2 M, Nongstoin, 14.iii.1991, A.K. Sanyal.



Map 11. Showing distribution of *Spathosternum prasiniferum prasiniferum*, *Gesonula punctifrons*, *Oxya fuscovittata* and *Oxya hyla hyla*.

Diagnosis : Broad blackish or dark green stripe runs behind the lower part of the eyes and below the lateral carinae of the pronotum; central area of tegmina with a longitudinal black streaks generally almost obsolete in the male and well marked in the female, but very variable some times being entire; tegmina reaching distal end of hind femora or slightly beyond it; wings well developed.

Distribution : India : Meghalaya (East Garo hills, West Garo hills, Jaintia hills, East Khasi hills, West Khasi hills), Andhra Pradesh, Arunachal Pradesh, Bihar, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamilnadu; Burma; S.E. China; Thailand and Vietnam.

Genus *Gesonula* Uvarov, 1940

30. *****Gesonula punctifrons*** Stål

(Fig. 9, Map 11)

1860. *Acridium (Oxya) punctifrons* Stål, Kongl. Freg. Eug. Resa Omkring Jordan : Insecta : 336.

1963. *Gesonula punctifrons* : Mistchenko, *Locusts and grasshoppers of U.S.S.R. and Adjacent countries, Catantopinae* Leningrad : 172.

Material examined : West Garo Hills : 1M, Tura, 19.iii.1991, A.K. Hazra.

West Khasi Hills : 1M, 1F, Nongpoh, 17.x.1970, K. Rao; 3F, Khabri, 17.xii.1981, M.R. Rynth; 1M, Jarkan, 25.iii.1991, S.K. Saha; 1M, Umran, 1.iv.1991, S. .K. Saha.

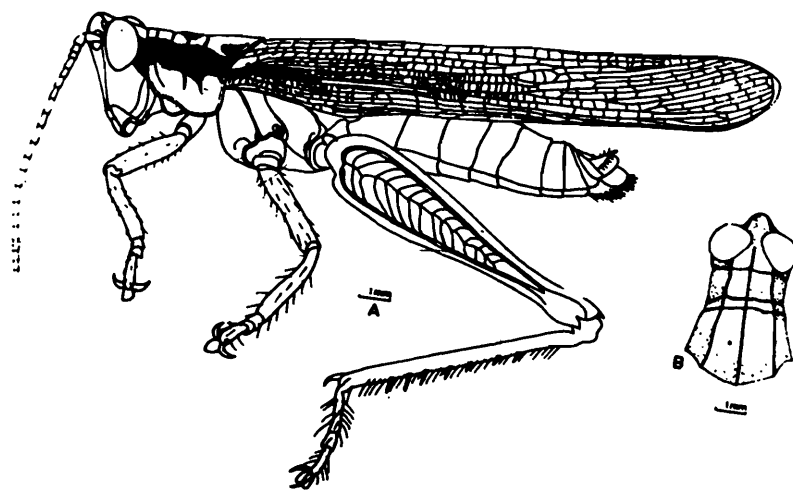


Fig. 9. A. *Gesonula punctifrons* (Male); B. Head and pronotum

Diagnosis : Eyes large; antennae longer than head and pronotum together; pronotum narrow, long, rugose; lateral lobes very wide; supra-anal plate spoon shaped, wide basally; hind tibiae dirty bluish, reddish at base, blackish at apex, the apical part modified for swimming.

Distribution : India: Meghalaya (West Garo hills and East Garo hills), Andaman, Arunachal Pradesh, Assam, Goa, Kerala, Orissa and Tamilnadu; Burma; Borneo; China; Hainan; Japan; Java; Malacca; Philippines; Sri Lanka; Taiwan; Tongking and Thailand.

Subfamily OXYINAE

Key to genera

1. External apical spine of hind tibiae present; 10th abdominal tergite (in male) with or rarely without furcula on hind margin; male epiphallus with ancorae *Caryanda* Stal
- External apical spine of hind tibiae absent; 10th abdominal tergite (in male) without furcula; male epiphallus without ancorae..... *Oxya* Serville

Genus *Oxya* Serville, 1831

Key to species (Male)

1. Supra-anal plate with a tubercle on each side of a median apical process.....2
- Supra-anal plate without lateral tubercles.....3
2. Cercus laterally compressed, apex weakly bifurcate..... *fuscovittata* (Marschall)
- Cercus not laterally compressed, apex obtuse or truncate *hyla hyla* Serville
3. Cercus conical with subacute apex; valvular plate of cingulam very long, upcurved, rolled almost into a cylinder, with an expanded apex..... *velox* (Fabricius)
- Cercus with truncate or subacute apex; valvular plate of cingulam with deep posterior emargination *Japonica japonica* (Thunberg)

Key to species (Female)

1. Anterior margin of tegmen with a dense row of short bristles extending from costal bulge to apex of tegmen; ovipositor valves with long teeth, the apical ones curved.....2
- Anterior margin of tegmen weakly or not at all spined; valves of ovipositor with short teeth.....3.
2. Ventral surface of subgenital plate very flat, and without lateral longitudinal ridges, widen posteriorly..... *fuscovittata* (Marschall)
- Ventral surface of subgenital plate flat or concave only in median posterior half, not widening posteriorly..... *hyla hyla* Serville
3. Posterior ventral basivalvular sclerite without spines on inner ventral margin.....
- *velox* (Fabricius)
- Posterior ventral basivalvular sclerite of ovipositor with a large spine on its inner ventral margin..... *Japonica japonica* (Thunberg)

Genus : *Oxya* Serville, 1831

31. *Oxya fuscovittata* (Marschall)

(Fig. 10, Map 11)

1836. *Gryllus fuscovittata* Marschall, *Annlh. Wien. Mus. Naturg.*, 1 : 211.

1971. *Oxya fuscovittata* : Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)* 26 (7) : 289.

Material examined : East Garo Hills : 1M, Batjora, 6.vi.1990, M.S. Shishodia.

West Garo Hills : 4 M, 1F, Tura, 3.vi.1990, M.S. Shishodia.

East Khasi Hills : 1M, 2F, Shillong, 3.viii.1962, S.N. Prasad; 1M, 1F, Umsing, 17.x.1963, M. Rynth; 1M 3F, Cherrapunji, 18.xii.1978, P.T. Cherian; 1M, Khasi hill, 22.viii.1980, A. Singh.

West Khasi Hills : 1M. Khabri, 17.xii.1981, M.R. Rynth.

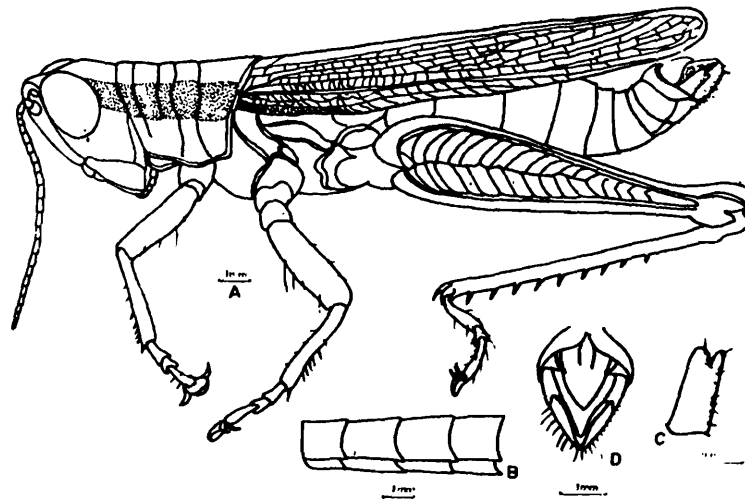


Fig. 10. *Oxya fuscovittata* (Male): B. Terga; C. Cercus; D. Supra-anal plate.

Diagnosis : Integument finely pitted and shiny; female large in size; cercus of male compressed and weakly bifurcate, and ventral surface of subgenital plate in female, almost completely flat or weakly concave.

Distribution : India: Meghalaya (E.Garo hills, W.Garo hills, E. Khasi Hills), Andhra Pradesh, Jammu and Kashmir, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal; Afghanistan; Pakistan; U.S.S.R. (South West).

Remarks : Specimens of Meghalaya of this species is comparatively smaller than the specimens of other states of India.

32. *Oxya hyla hyla* Serville Hancock

(Fig. 11, Map 11)

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

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

Material examined : South and East Garo Hills : 1M, 1F, Rongzeng, 26.v.1990, M.S. Shishodia; 1M, Narangree, 27.v.1990, M.S. Shishodia; 2M, William nagar, 11.iii.1991, B.C. Das; 1M, 2F, Rongram, 29.iv.1991, B.N.Das; 1M, Songsak, 2.v.1991, B.N. Das; 2M, Damalgiri, 6.v.1991, B.N. Das; 3M, 3F, Metahakgiri, 7.v.1991, B.N. Das.

West Garo Hills : 1M, Tura, 3.vi.1990, M.S. Shishodia; 2M, Siju cave, 15.i.1991, B. Nandi; 2F, Garo Para, 28.iv.1991, B.N. Das; 1M, Maimonsingh, 30.iv.91, B.N. Das.

Jaintia Hills : 1M, Jowai, 20.iii.1991, B.C. Das.

East Khasi Hills : 4M, 9F, Umsing, 5.xii.1965, S.G. Patil; 4M, 4F Umsing, 13.iv.1975, M. Rynth; 3 M, 3F, Naya Bunglow, 23.v.1978, S.J.S. Hatter; 2M, Cherrapunji, 18.xii.1978, P.T. Cherian; 4 M, 5F, Khasi hills 22.viii.1980, A. Singh; 2 M, Nongpoh, 1.iv.1991, S.K. Saha; 3 M, 1F, and 8N, Cherrapunji 8.xi.1991, R.C. Basu; 2 M, 1F, Nongpoh, 12.xi.1991, R.C. Basu; 2 M, Nongram, 13.xi.1991, R.C. Basu.

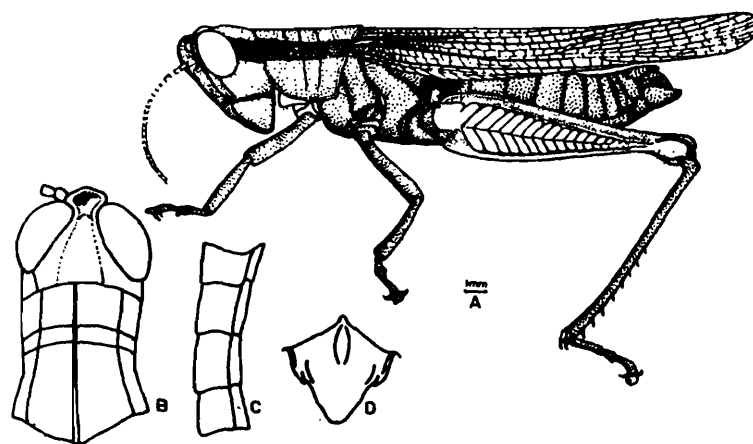


Fig. 11. A. *Oxya hyla hyla* (Male); B. Head and pronotum; c. Terga; D. Supra-anal plate.

Diagnosis : Body finely regulose, shiney; size small; antennae longer than head and pronotum; supra-anal plate trapezoidal with triangular apical projection; on both sides of supra-anal plate small tubercle present; circus with sub-acute apex; subgenital plate in female with two longitudinal ridges extending forwards from posterior margin.

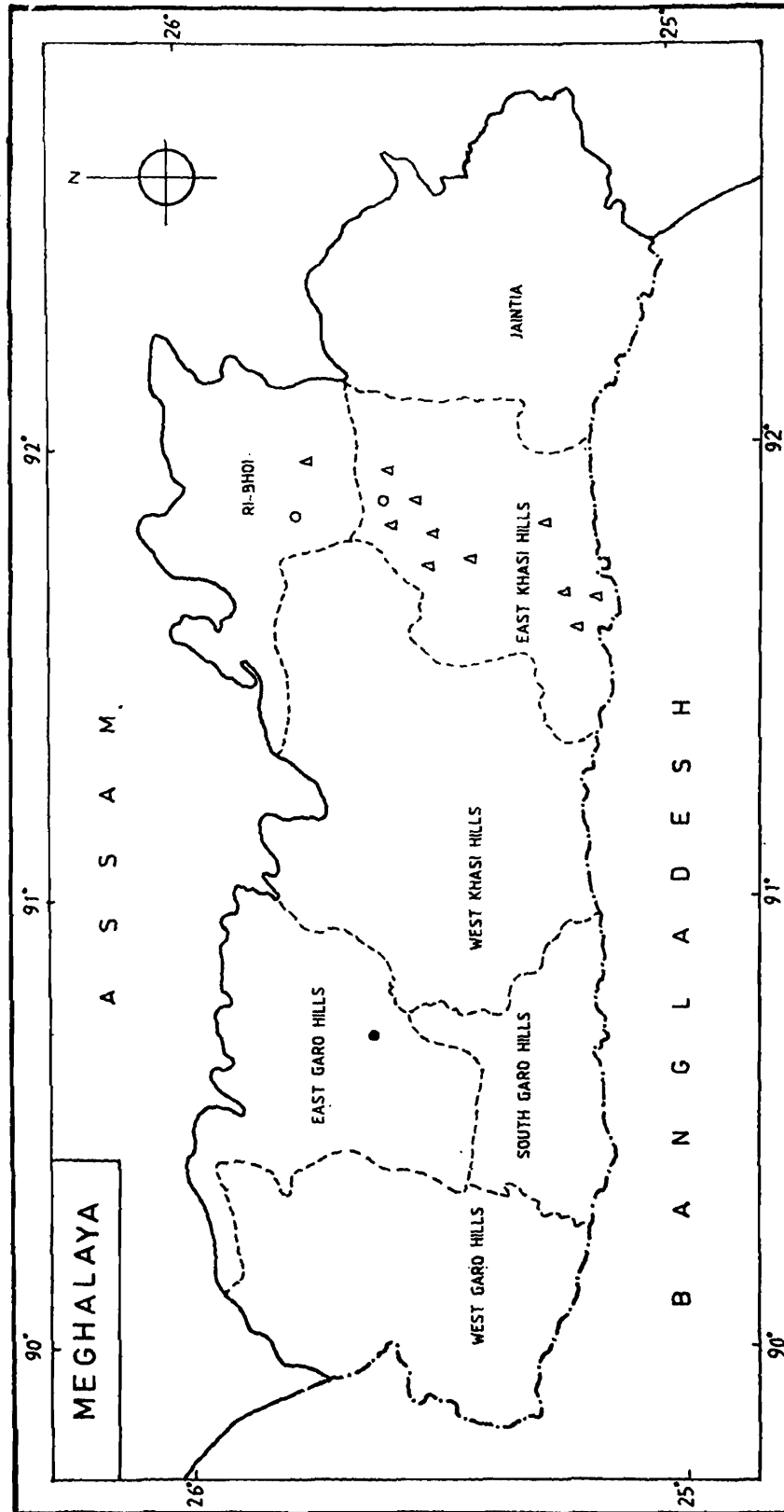
Distribution : India : Meghalaya (E. Garo hill, W.Garo hill, Jaintia hill and E. Khasi hill), Arunachal Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Orissa, Rajasthan, Tamilnadu, Tripura, Uttar Pradesh and West Benal; Afghanistan; Bangladesh; Madagascar; Nepal; Pakistan; Persia; Sri Lanka.

33. *****Oxya japonica japonica*** (Thunberg)

(Map 12)

1824. *Gryllus japonica* Thunberg, *Mem. Acad. Sci. St.-Petersb.*, 9 : 429.

1971. *Oxya japonica japonica* : Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)* 26 (7) : 302.



33. *Oxya japonica japonica* ○ 34. *Oxya velox* ● 35. *Caryanda paravicina* △ 6

Map 12. Showing distribution of *Oxya japonica japonica*, *Oxya velox* and *Caryanda paravicina*.

Material examined : East Khasi Hills : 1M, 26.ix.1926, R.B.S. Sewell.

Diagnosis : Supra-anal plate of male rounded triangular, with very well developed basal folds; cercus conical with subacute or truncate at apex. In female, ventral surface of subgenital plate with a deep median longitudinal cavity posteriorly, median pair of spines on posterior margin well developed.

Distribution : India : Meghalaya (E. Khasi hill), Andaman, Karnataka, Uttar Pradesh; Burma; Barneo; Celebes; China; Hawaii; W. Malayasia; E. Pakistan (Now Bangladesh); Sumatra; Taiwan; Thailand; Timor.

34. ***Oxya velox* (Fabricius)

(Map 12)

1787. *Gryllus Velox* Fabricius, *Mantissa Insectorum*, 1 : 239.

1971. *Oxya Velox* : Hollis, *Bull. Br. Mus. nat. Hist.* (Ent.) 26 (7) : 297.

Material examined : E. Garo Hills : 1M, Samorda, 21.i.1991, B. Nandi.

E.Khasi Hills : 1F, Nongpoh, 25.xii.1956, H. Khajuria.

Diagnosis : Size smaller than the preceding species described under the genus; antennae with 24-26 segments; supra anal plate with rounded triangular posterior projection; cercus conical, with sub-acute apex; female longer than male; subgenital plate of female in posterior half ventrally, with a medium longitudinal cavity bordered on each side by a lateral longitudinal sidge.

Distribution : India : Meghalaya (E. Garo hills), Himachal Pradesh, Jammu & Kashmir, Rajasthan and West Bengal; Bangladesh; Burma; China; Pakistan and Thailand.

Genus *Caryanda* Stål, 1878

35. ***Caryanda Paravicina* (Willemse)

(Map 12)

1925. *Oxya paravicina* Willemse, *Tidjschr Ent.* 68 : 55.

1975. *Caryanda paravicina* : Hollis, *Bull. Br. Mus. nat. Hist.* (Ent.) 31 No. 6 : 218.

Material examined : Ri-Bhoi and East Khasi Hills : 1F, Mokring, 16.iv.1962, S.N. Prasad; 2M, 1F, Parade ground, Shillong, 3.viii.1962, S.N. Prasad; 6M, 1F, E.R.S. Shillong, 4.vii.1972, R.S. Giri; 1M, Mowphlang, 31.ix.1973, A.K. Ghosh; 1M, Barapani, 6.vii.1979, R. Mathew; 1F, Shilla, Elephant Falls, 22.viii.1980, A. Singh; 2M, 5F, Pynursla, 22.viii.1980, A. Singh; 1F, Cherrapunji, 16.ix.1988, A.R. Lahiri.

Diagnosis : Integument finely pitted and shiny; dorsum of pronotum almost cylindrical, with parallel sides; posterior margin of metazona rounded; tegmina strongly reduced, extending to

posterior margin of third abdominal tergite; hind wing strap-like; posterior margin of 10th abdominal tergite with a rhomboidal projection on either side of mid line; cercus conical; posterior margin of subgenital plate of female flat, with two widely spaced spines.

Distribution : India : Meghalaya (E. Khasi hills), N.E. India.

Subfamily COPTACRIDINAE

Key to genera

1. Frontal costa parallel-sided, not wider between antennae than the vertex between eyes.....*Coptacra* Stål
- Frontal costa distinctly widened between antennae and wider than the vertex between the eyes.....*Eucoptacra* Bolivar

Genus *Coptacra* Stål, 1873

Key to the species

1. Antennae distinctly ensiform; wing yellowish hyaline.....*ensifera* Bolivar
- Antennae not ensiform; wing hyalinous.....*foedata* Serville

Genus : *Coptacra* Stål, 1873

36. *****Coptacra ensifera*** Bolivar

(Map 13)

1902. *Coptacra ensifera* Bolivar, *Annl. Soc. ent. Fr.*, **70** : 621.

1914. *Coptacra ensifera* Kirby, *Fauna British India*, Orhoptera, Acrididae : 239.

Material examined : West Khasi hills : 1F, Garampani, 10.ix.1988, A.R. Lahiri.

Diagnosis : Fastigium shortly tricarinate between the eyes, the middle carina produced backwards; pronotum rugose, lateral carinae of pronotum absent; wings yellowish hyaline; legs embeded with gray hairs; posterior tibiae red.

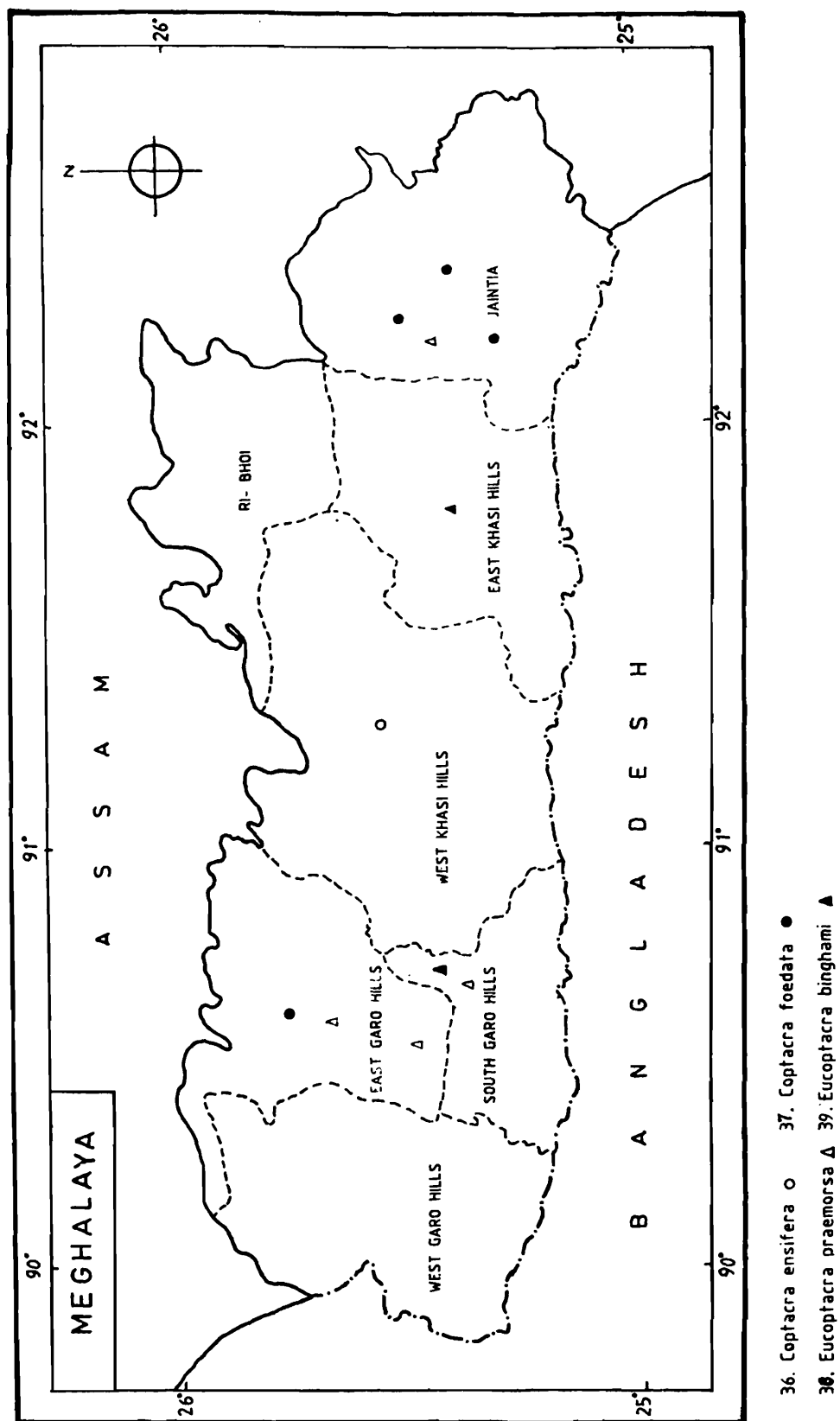
Distribution : India : Meghalaya (West Khasi hills),and Tamilnadu.

37. *Coptacra foedata* (Serville)

(Map 13)

1839. *Acridium foedatum* Serville, *Hist. Nat. Ins. Orih.*, 662.

1873. *Coptaera foedata*: Stål, *Rec. Orth.* **1** : 58.



Map 13. Showing distribution of *Coptacra ensifera*, *Coptacra foedata*, *Eucoptacra praemorsa* and *Eucoptacra binghami*.

1907. *Catantops foedatus* : Karny, *Akad. Wiss. Wien. Vienna*, **116** : 313,331.

1957. *Coptacra foedata* : Willemse, *Publitiës natuurh. Hist. Genoot. Limburg*, **10** : 448-449.

Material examined : East Garo hills : 1F, Nongal, 28.v.1990, M.S. Shishodia.

Jaintia hills : 1M, Muktapur, 21.v.1990, M.S. Shishodia; 1F, Garampani, 22.v.1990, M.S. Shishodia; 2M, Jowai, 20.iii.1991, B.C. Das.

Diagnosis : Colour brown or yellowish brown. Body rugosely punctate. Antennae reaching beyond the hind margin of pronotum. Fastigium of vertex subhorizontal and narrowing anteriorly. Prosternal spine conical, straight and apex pointed. Tegmina with the anterior and posterior margin nearly parallel; wing hyaline or sub hyaline; hind femur relatively longer.

Distribution : India : Meghalaya (E. Garo hills and Jaintia hills) and Sikkim; Burma; China; Taiwan; Java; Philippines; French Indo-China and Ambon.

Genus *Eucoptacra* Bolivar, 1902

Key to the species

1. Tegmina with an oblique callous whitish fascia, formed by irregular venules, a little beyond the middle.....2
- Tegmina without oblique whitish fascia.....*saturata* (Walker)
2. Tegmina distinctly with an oblique narrow callous; hind femur with a well limited black spot near the middle of area superio-externa; subgenital plate of female with the hind margin more or less triangularly expanded*binghami* Uvarov
- Tegmina with only a faint indication of a white callous stripe near the middle; hind femur without distinct black spot near the middle of area superio externa; subgenital plate of female with the hind margin broadly rounded or triangularly expanded.....*praemorsa* Stål

38. ***Eucoptacra praemorsa* (Stål)

(Map 13)

1860. *Acridium* (*Catantops*?) *praemorsa* (Stål), *Kongl. Freg. Eng. Resa Omkring Jordon, Insects*: 330.

1914. *Eucoptacra praemorsa* : Kirby, *Fauna Brit. India, Orthopt.(Acridiidae)* : 240.

Material examined : East Garo hills : 1F, Rongrangiri, 13.xi.1978, K.P.Singh; 1M, 1F, Williumnagar, 12.iii.1991, B.C. Das.

Jaintia hills : 2M, Jowai, 20.iii.1991, B.C.Das.

Diagnosis : Brownish testaceous; frontal costa distinctly widened between antennae and wider than the vertex between the eyes; tegmina extending beyond the hind femora; hind femora

without distinct black spot in or near the middle area supra externa; subgenital plate of female with the hind margin broadly rounded or triangularly expanded.

Distribution : India : Meghalaya (E. Garo hills and Jaintia hills), Arunachal Pradesh, Kerala, Maharashtra, Sikkim, Tamilnadu and West Bengal; Burma; China; Taiwan and Tenasserim.

39. *****Eucoptacra binghami*** Uvarov

(Map 13)

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

Material examined : South Garo hill : 1F, Williamnagar, 12.iii.1991, B.C. Das; East Khasi hill; 2F, Lailad, 8.iv.1981, J.P.Sati.

Diagnosis : Head rugulose; frontal ridge flat; frontal costa distinctly widened between the eyes; tegmina with a distinct, oblique, narrow callows fascia; last abdominal tergite, in male well developed fuscula; posterior femora with a black spot before the middle of superio-external area; subgenital plate, in female, little triangularly expanded at the hind margin.

Distribution : India : Meghalaya (E. Khasi hill) Kerala; Burma; Thailand; Tonkin, Federation of Malaya State.

40. *****Eucoptacra saturata*** (Walker)

(Map 14)

1870. *Acridium saturata* Walker, *Cat. Derm. Salt. Brit. Mus. nat. Hist.*; Part IV : 628.

Material examined : East Garo hills : 2M, Nongal, 28.v.1990, M.S. Shishodia; 2 M, Narangiri, 29.v.1990, M.S. Shishodia.

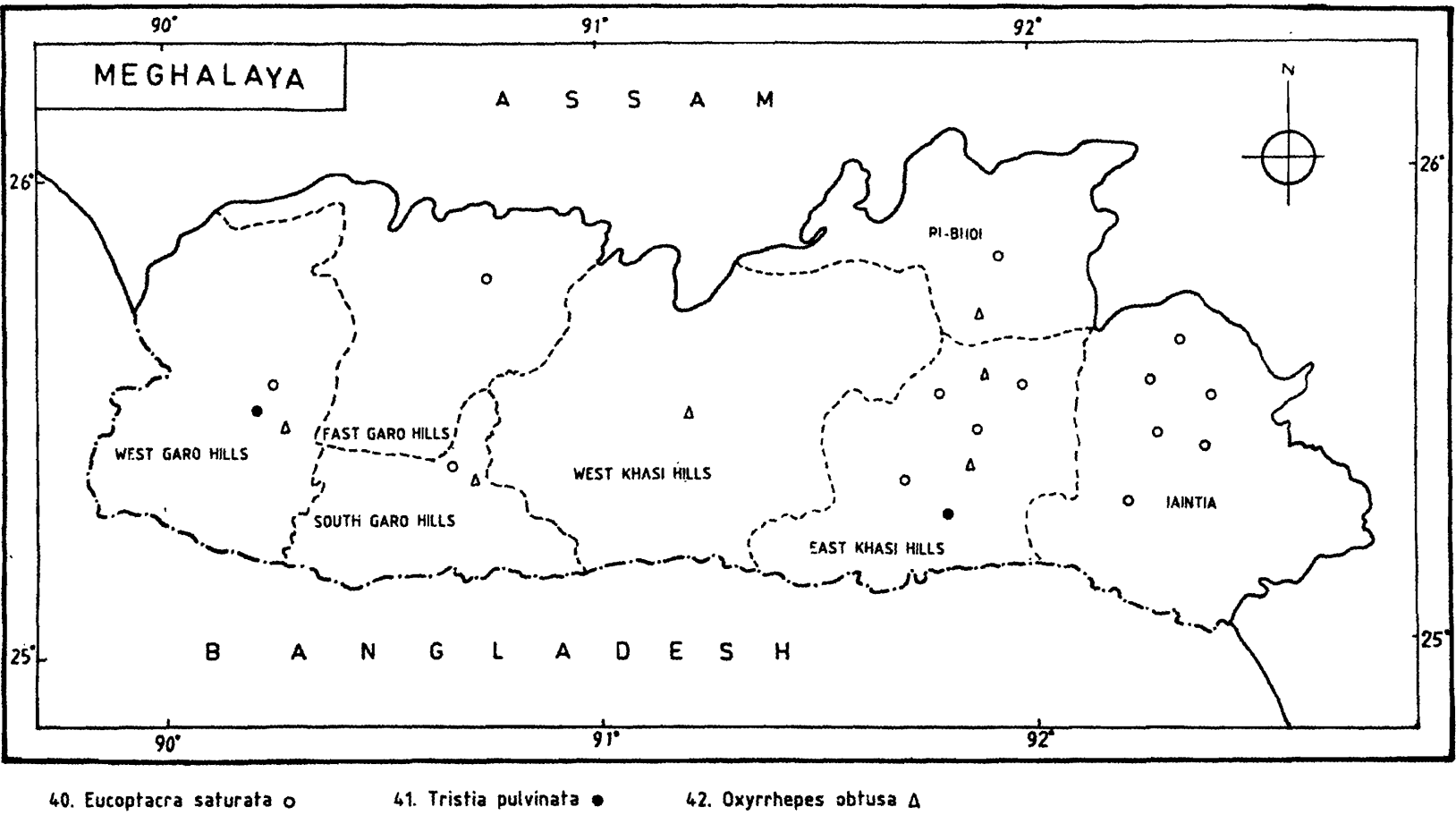
West Garo hill : 1M, Selbalgiri, 10.v.1988, C. Radhakrishnan.

Jaintia hills : 1F, Jowai, 21.v.1990, M.S. Shishodia, 2M, 1F, Muktapur, 21.v.1990, M.S. Shishodia; 3M, 1F, Garampani, 22.v.1990, M.S. Shishodia; 1M, Jowai, 20.iii.1990, B.C.Das; 1M, Jowai, 24.iii.1991, A.K. Hazra.

East Khasi hills : 1M, Shella, 5.xii.1980, Asket Singh; 1F, Nongpoh, 1.iv.1990, S.K.Saha; 5M, 1F, Butjora, 5.vi.1990, M.S. Shishodia; 1M, Marmain, 8.iv.1991, S.K. Saha.

Diagnosis : Ferruginous in colour; head short, smooth, higher than prothorax, apex of vertex flat, nearly rounded; prothorax finely scabrous, widening slightly hindward; prosternal spine stout, slightly acute; hind femora black beneath, as long as the abdomen; hind tibiae red, nearly as long as the hind femora; tegmina little shorter than the body, with numerous small marks formed by blackish bordered veins; hind wing hyaline or grey, tinged with blackish.

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



Map 14. Showing distribution of *Eucoptacra saturata*, *Tristia pulvinata* and *Oxyrrhepes obtusa*.

Subfamily TROPIDOPOLINAE

Key to genera

1. Size medium. Fastigium of vertex parabolic, convex; frontal ridge almost flat; prosternal process strongly widened, with lateral margins raised, inclined backwards touching mesonotum; wings rounded at apex, shorter than abdomen.....*Tristria* Stål
- Size moderately stout, fastigium of vertex obtuse angular; frontal ridge somewhat sulcate; poststernal process conical, compressed laterally, inclined but not touching mesosternum; wings acute at apex, longer than abdomen.....*Oxyrrhepes* Stål

Genus *Tristria* Stål 187341. *****Tristria pulvinata*** (Uvarov)

(Map 14)

1921. *Tapinophyma pulvinata* Uvarov, *Ann. Mus. nat. Hist.*, (9) 7 : 497.1929. *Tristria pulvinata* Uvarov, *Revue Suisse Zool.*, 29 : 559.*Material examined* : West Garo hills : 1M, Tura, 3.vi.1990, M.S.Shishodia.*East Khasi hills* : 1F, Umtham, 29.v.1964, A.K. Mondal; 1M, Batjora, 5.vi.1990, M.S. Shishodia.

Diagnosis : Fastigium of vertex parabolic, moderately narrow; prosternal tubercle curved backwards, almost square in section, strongly widened apically, with slightly concave apical surface; tegmina and wings extending upto the apex of subgenital plate or shorter; male cercus in apical third incurved, down curved, and laterally flattened; female subgenital plate with an angular projection on the anterior margin on either side of midline; male subgenital plate almost linear, compressed knife-like.

Distribution : India : Meghalaya (W. Garo hill and E. Khasi hill) Assam, Bihar, Karnataka, Maharashtra, Tamilnadu, Uttar Pradesh and West Bengal; Sri Lanka.

Genus *Oxyrrhepes* Stål 187342. *****Oxyrrhepes obtusa*** (De Haan)

(Map 14)

1842. *Acridium (Oxya) Obtusum* de Haan, *Verh. Ned. Overz., Bezitt. Orth* : 155, 156.1955. *Oxyrrhepes obtusa* : Willemse, *Publities, natuurh. Genoot. Limburg*, Reeks VIII : 32. 33.

Material examined : East Khasi hills : 1F, Old Barapani, 23.iv.1977, A.R. Lahiri; 1F, Nongkhyllom, Reserve forest (Umtasor), 25.iv.1984, C. Radhakrishnan; 1F, Williamnagar.

East Garo hills : 12.3.91, B.C. Das.

West Garo hills : 1M, Tura, 16.3.1991, A.K. Hazra; 1M, Nongstoin, West Khasi hills 20.3.1991, A.K. Hazra.

Diagnosis : Fastigium ov vertex short, sloping, obtuse at the tip, front moderately oblique; frontal ridge sulcated; antennae filiform, situated between eyes or scarcely in front of them; prosternal tubercle conical, compressed laterally; tegmina and wings well developed; mesosternal lobes meeting in a straight line; wings hyaline pointed, twice as long as broad; hind femora about as long as the abdomen, the genicular lobes triangular, not longer than the tips of the femora; hind tibiae with an external apical spine.

Distribution : India (Arunachal Pradesh, Karnataka, Madhya Pradesh, Sikkim, Tamilnadu and West Bengal); Bali; Burma; Celebes; China; Indo-China; Java; Lombok; Sri Lanka; Sumatra; Taiwan etc.

Remarks : Recorded for the first time from Meghalaya.

Subfamily CATANTOPINAE

Key to genera

1. Tegmina lateral, narrow, apically expanded, extending slightly beyond posterior margin of 1st abdominal tergite; wings hardly perceptible.....*Paraconophyma* Uvarov
- Tegmina and wings well developed, as long as or slightly shorter than abdomen2
2. Pronotum slightly tectiform; vertex between eyes wider than frontal ridge; tegmina with a black spot.....*Gerenia* Stål
- Pronotum flat or subcylindrical; vertex between eyes narrower than frontal ridge; tegmina without a black spot.....3
3. Tegmina reaching upto the 8th tergite of abdomen; cercus long, directed obliquely upwards, bifurcate apically*Assamacris* Uvarov
- Tegmina extending beyond the apex of abdomen; cercus may or may not bifurcate.....4
4. Pronotum subcylindrical, slightly narrowing forwards; prosternal tubercle thick, cylindrical or slightly antero-posteriorly compressed with rounded apex.....*Catantops* Schaum
- Pronotum not subcylindrical; prosternal tubercle not cylindrical and never with rounded apex.....4
5. Pronotum constricted in the middle; prosternal tubercle conical*Xenocatantops* Dirsh and Uvarov
- Pronotum disc not constricted; prosternal tubercle laterally compressed.....*Stenocatantops* Dirsh and Uvarov

Genus *Catantops* Schaum

43. *****Catantops pinguis innotabilis*** (Walker)

(Map 15)

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

1956. *Catantops pinguis innotabilis* : Dirsh, *Publföes cult. Co. Diam. Angola*, 28 : 105.

Material examined : East and South Garo Hills : 3FF, Williamnagar, 12.iii.1991, B.C. Das; 1M, 2F, Nongwal, 1.x.1991, R.K. Varshney.

West Garo Hills : 1F, River Somi, 18.iii.1991, B.C. Das; 1M, 3F, Tura, 21.iv.1991, A.K. Hazra; 1F, Tura, Dabu, 22.iv.1991, B.N. Das.

Jaintia Hills : 2M, 2F, Jowai, 20.iii.1991, B.C. Das.

Ri-Bhoi and East Khasi Hills : 1M, Mokring, 16.iv.1962, S.N. Prasad; 2M, 1F, Parade ground, Shillong, 3.viii.1963, S.N. Prasad; 6M, 1F, Shillong, 4.vii.1972, R.S. Giri; 1F, Mowphlong, 21.ix.1973, A.K. Ghosh; 1F, Barapani, 6.vii.1979, R. Mathew; 1F, Elephanta falls, Shillong, 22.viii.1980, A. Singh; 2M, 5F, Pynula, 22.viii.1980, A.Singh; 1F, Cherrapunji, 16.ix.1988, A.K. Lahiri.

Diagnosis : Prosternal tubercle short, subcylindrical at base, weakly compressed with rounded apex; lateral lobe of pronotum without coloured pattern; external disc of hind femur without the black median spot below the upper carinula (the spot is different size in the transient form).

Distribution : India: Meghalaya (E. Garo hill, West Garo hill, Jaintia hill, E. Khasi hill), Arunachal Pradesh, Assam, Himachal Pradesh, Kerala, Orissa, Tamilnadu, Uttar Pradesh, West Bengal; Burma; Java; Indo-China; Malaya; New Guinea; Philippines; Sri Lanka; Sumatra; S. Tibet; Thailand; Yunnan.

Genus *Stenocatantops* Dirsh and Uvarov, 1953

44. ***Stenocatantops splendens* (Thunberg)

(Map 15)

1815. *Gryllus splendens* Thunberg, *Nova Acta Soc. Sci. Upsal.*, Upsaliae 7 : 236.

1953. *Stenocatantops splendens* Dirsh and Uvarov, *Tijdschr. Ent.* The Hague. 96 (3) :237.

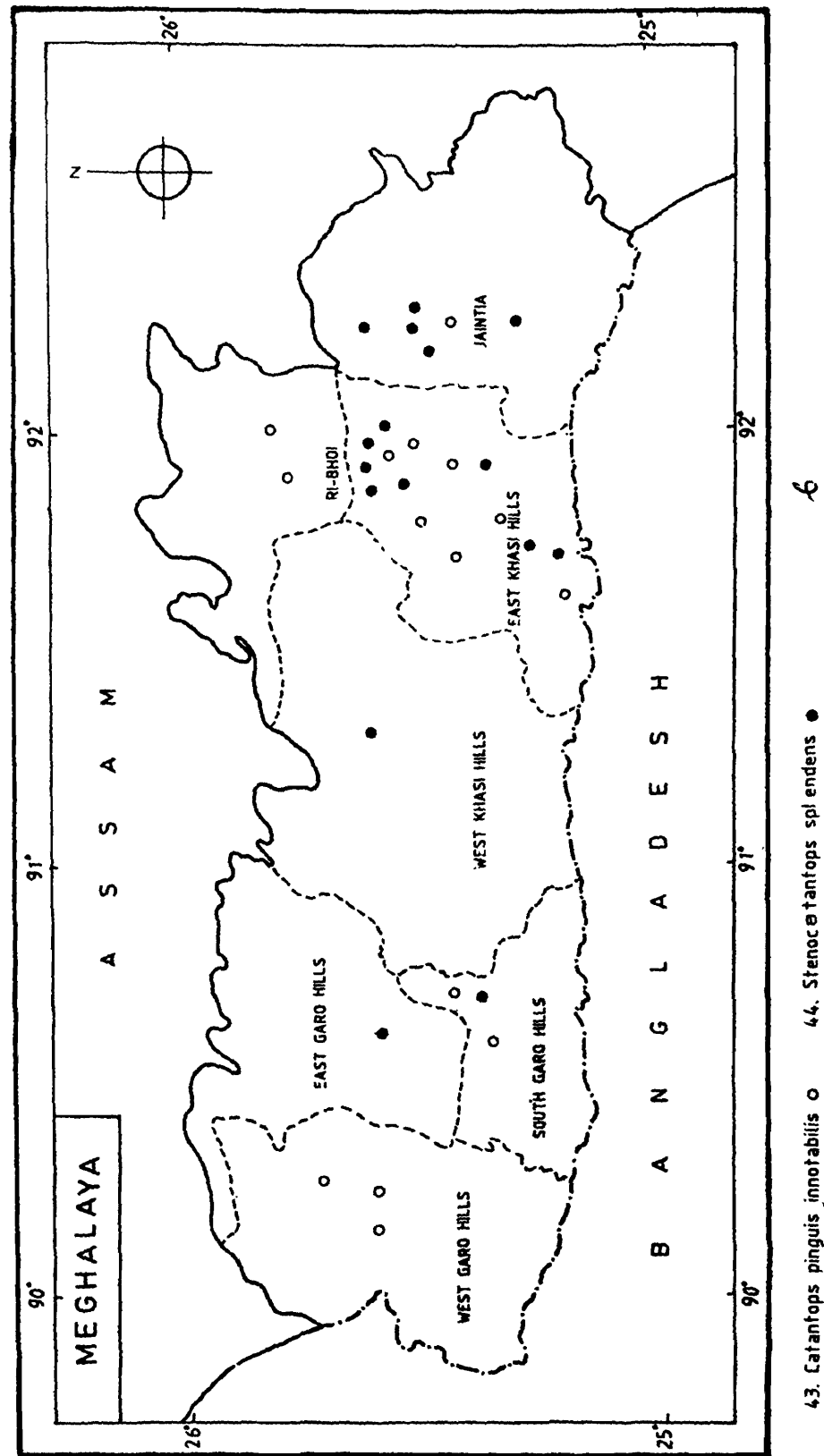
Material examined : South and East Garo hills : 2F, Mawblang, 21.iv.1973, R.S. Pillai; 1M, 4F, Williamnagar, 11-12.iii.1991, B.C. Das.

Jaintia hills : 2M, 1F, Khlihriat, 20.v.1990, M.S. Shishodia; 1M, Jowai, 21.v.1990, M.S. Shishodia; 2M, 4F, Mukhla village, 17.iii.1991, A.K.Sanyal; 4M, Jowai, 20.iii.1991, B.C.Das; 31M, 39F, Jowai, 23-24.iii.1992, A.K. Hazra.

East Khasi hills : 2M, Cherrapunji, 22.v.1971, R.S. Pillai; 1M, Shillong peak, 15.x.1971, R.S. Pillai; 2M, 1F, Cherrapunji, 18.xii.1978, P.T. Cherian; 2M, Shillong, 16.ix.1979, S.G.Patil; 1F, Cherrapunji, 24.v.1990, M.S.Shishodia; 2M, 7F, Cherrapunji, 16.iii.1991, A.K. Hazra.

West Khasi hills : 1M, Nongstoin, 14.iii.1991, A.K. Sanyal.

Diagnosis : Colour brown or brownish testaceous. Body elongate. Middle joints of the antennae about twice or three times as long as broad. Prosternal tubercle strongly curved and inclined backwards in profile.



Map 15. Showing distribution of *Catantops pinguis innotabilis* and *Stenocatantops splendens*.

Distribution : India: Meghalaya(E. Garo hills, Jaintia hills, E. Khasi hills and W. Khasi hills), Andaman and Nicobar Island, Arunachal Pradesh, Assam, Madhya Pradesh, Orissa, Tamilnadu, Uttar Pradesh and West Bengal; Burma; Ceylon; China; Hainan; Java; Korea; Malaya; New Guinea; Philippine Island; Sumatra.

Genus *Xenocatantops* Dirsh, 1953

45. *Xenocatantops humilis* (Serville)

(Map 16)

1839. *Acridium humile* Serville, *Ins. Orth.*, 662.

1953. *Xenocatantops humilis humilis* : Dirsh and Uvarov, *Tijdschr. Ent.*, **96** : 237.

Material examined : *South and East Garo Hills* : 1M, 2F, Narangiri, 29.v.1990, M.S. Shishodia; 1M, Williamnagar, 12.iii.1991, B.C. Das.

West Garo hills : 3F, Tura, 15.iii.1991, A.K. Hazra; 4FF, Tura 22.iii.1991, A.K. Hazra; 1M, Damalgiri, 21.iv.1991, B.N. Das; 2F, Tura, 22.iv.1991, B.N. Das; 1M, Siju cave, 22.iv.1991, B.N. Das.

Jaintia hills : 1F, Jalong, 9.iii.1991, K.K. Roy; 2M, 1F, Jowai, 21.v.1990, M.S. Shishodia; 1M, 1F, Garampani, 22.v.1990, M.S. Shishodia; 1M, 2F, Jowai, 24.iii.1991, A.K. Hazra.

Ri-Bhoi and East Khasi hills : 1M, Shillong peak, 14.x.1970, S.K. Talukdar; 1M, 1F, Motinagar Shillong, 4.xii.1971, R. Giri; 1M, Malki forest, 19.ii.1973, R.S. Giri; 1M, Shella, 5.xii.1980, Asket Singh; 1F, Nongpoh, 30.ix.1988, A.R. Lahiri; 1M, Samorda, 31.i.1991, B.N. Nandi; 1M, Umran, 1.iv.1991, S.K. Saha.

Diagnosis : Median segments of antennae twice as long as broad; prosternal tubercle slightly inclined backwards, conical, with obtuse apex; external disc of hind femur yellowish, with two brown fasciae, broadening forwards the lower margin and fused with the brown lower margin femur; male cercus with rounded apex.

Distribution : India: Meghalaya (E. Garo hills, W. Garo hills, Jaintia hills, E. Khasi hills), Arunachal Pradesh, Assam, Kerala, Madhya Pradesh, Tamilnadu, Uttar Pradesh and West Bengal; Borneo; Burma; Indo-China; Java; Malaya; Nepal; New Guinea; Philippines; Sri Lanka; Sumatra; Thailand; Tibet; Yunnan.

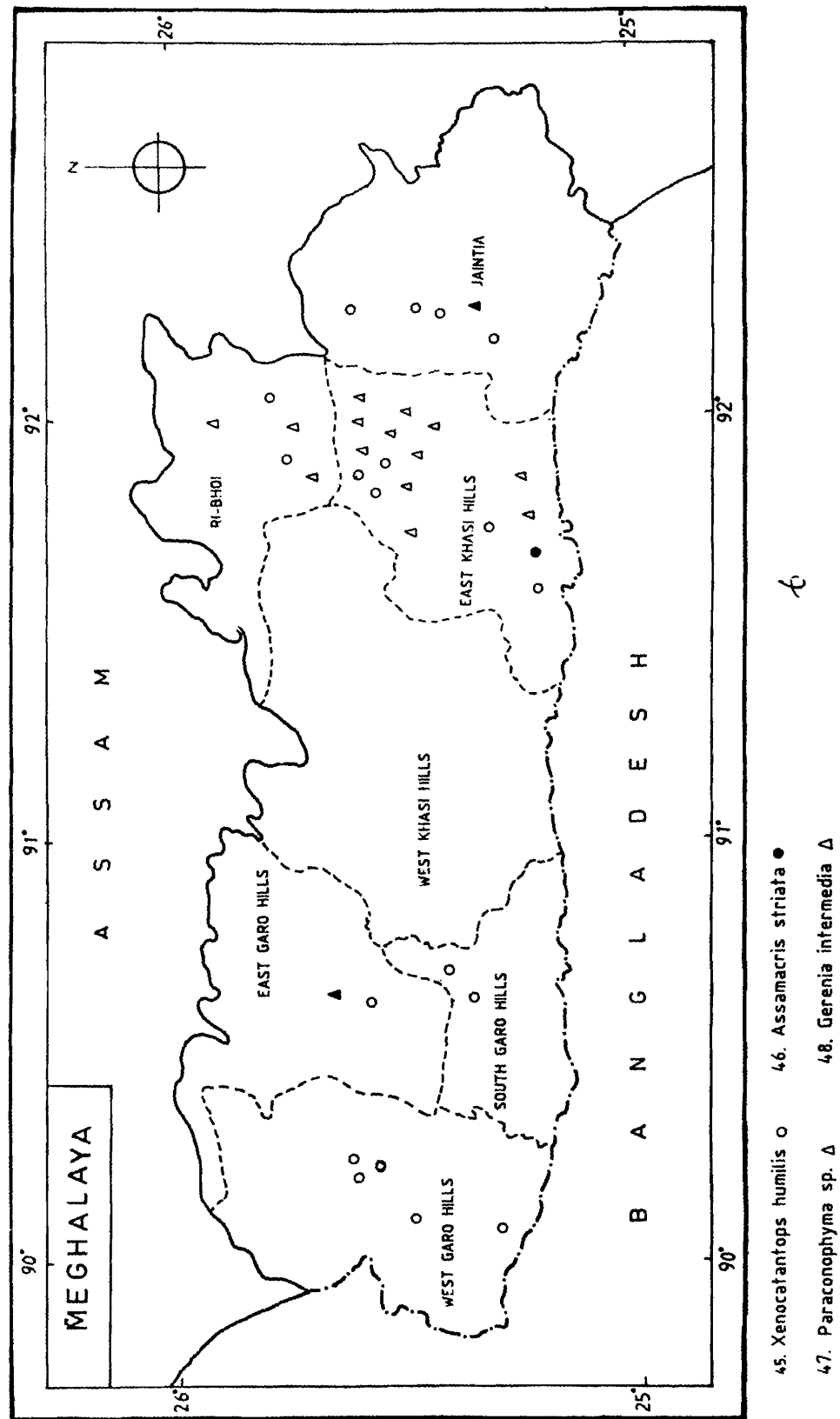
Genus *Assamacris* Uvarov, 1942

46. ****Assamacris striata** Uvarov

(Map 16)

1942. *Assamacris striata* Uvarov, *Ann. Mag. nat. Hist.* (11) **9** : 593.

Diagnosis : Fastigium of vertex pear shaped, longer than wide, surface slightly concave, rugulose; occiput with a weak median carinula; surface of pronotum honey-combed pattern; tegmina



Map 16. Showing distribuion of *Xenocatantops humilis*, *Assamacris striata*, *paraconophyma* sp. and *Gerenia intermedia*.

reaching 8th tergite, with parabolic apex; last tergite with a shallow rounded median emargination flanked by small projections; supra-anal plate with a shallow and broad median sulcus, interrupted in the middle; cercus long, directed obliquely upwards, weakly bi-sinuate, almost bi-furcate apically, but the upper branch represented only by a subacute tubercle, while the lower is long conical and weakly decurved.

Colouration olivaceous brown; sides and the middle of fastigium, flask-shaped spot on the occiput and post-ocular fascia of the head are black, or blackish brown; pronotum above and laterally down to the middle of the lobes is dark brown, with sharp pale yellow divergent lateral stripes, which are bi-rufcate in metazona.

Distribution : India (Assam : Cherrapunji— now in Meghalaya); Burma.

Remarks : We have no collection of this species.

Genus *Paraconophyma* Uvarov, 1921

47. *****Paraconophyma*** sp.

(Map 16)

Material examined : *Ri-Bhoi and East Khasi Hills* : 2F, Motinagar, Shillong, 3.ii.1961. S.N. Prasad; 1M, 3F, Parade ground, Shillong, 3.viii.1962, S.N. Prasad; 1M, Lalchand Basti, Shillong, 27.viii.1963, V.D.Srivastava; 1F, Risa Colony, Shillong, 6.vi.1971, S.Biswas; 3M, 1F, Motinagar, Shillong, 11.xi.1971, R.S.Giri; 1F, Shillong, 21&26.ix.1973, R.S.Giri; 3F, Motinagar, Shillong, 6& 21.xi.1974, R.S. Giri; 1F, Risa Colony, Shillong, 8.ix.1977, M.S. Jyrwa; 1F, Malki forest, Shillong, 24.viii.1978, M.S. Jyrwa; 1F, Cherrapunji, 8.xii.1978, P.T.Churian; 2F, Parade Ground, Shillong, 22.viii.1980, M.S.Jyrwa; 2F, Umthem, East Khasi Hills, 25.viii.1980, C.R.Krishnan; 1M, Umran, Khasi Hills, 22.i.1981. R. Mathew.

Diagnosis : Body thick, rough; head thick, short, smooth or punctate; frons slightly sloped; vertex short, narrow, fastigium rounded; foveolae distinct, pointed; antennae stout and thin, filiform, extending beyond the pronotal margin; pronotum narrowed anteriorly, with 3 transverse grooves, 1st and second grooves not intersecting median carina, 3rd groove crossing median carina; lateral carinae weak or distinct anteriorly, effaced posteriorly; anterior margin slightly and posterior margin distinctly medially triangularly incised; tegmina lateral, narrow, extending beyond posterior margin of 1st abdominal tergite; wings hardly perceptible; hind femora short, stout; hind tibiae shorter than hind femora; prosternal tubercle short, conical; supra-anal plate in male trapezoidal, narrowed apically, elevated dorsally; supra-anal plate in female triangular; cerci conical, pointed.

Distribution : India : Himachal Pradesh, Jammu and Kashmir, Nepal; Uttar Pradesh, West Bengal; Afghanistan; Iran.

Genus *Gerenia* Stal, 187848. ***Gerenia intermedia* Brunner

(Map 16)

1893. *Gerenia intermedia* Brunner, *Annali Mus. civ. Stor. nat. Giacomo Doria*, **33** : 161.1914. *Gerenia intermedia* : Kirby, *Fauna British India*, Orthoptera (Acrididae) : 243-244.

Material examined : East Garo Hills : 1M, Dainadubi, 15.ix.1975, N. Muralidharan; *Jaintia hills* : 1M, Garampani, 19.ix.1979, P.T. Cherian.

Diagnosis : Head broad, interocular distance wide; fastigium of the vertex short; antennae short, filiform; pronotum with the median carina tectiform, cut by all the three sulci, the latter placed just behind the middle, hind border obtusely angulated; prosternal tubercle pointed; tegmina and wings almost reaching upto the abdominal tip, the former with a shining black spot in the radial area, which is longer than broad.

Distribution : No specific locality is mentioned by Kirby (1914).

Subfamily EYPREPOCNEMIDINAE

Key to genera

1. Male cercus wide, compressed on apical half, apex rounded*Choroedocus* Bolivar
- Male cercus narrow, may be slightly compressed at base, but acute to subacute at apex...2
2. Posterior femur moderately long, produced beyond abdomen, neither inflated basally nor strongly narrowing on apical half; prosternal tubercle with rounded or inflated apex.....
.....*Eyprepcnemis* Fieber
- Posterior femur long, produced far beyond end of abdomen, inflated basally and strongly narrowing on apical half; prosternal process almost spathulate, with rounded, sometimes slightly inflated apex.....*Tyloptropidius* Stål

Genus *Choroedocus* Bolivar, 191449. ***Choroedocus robustus* (Serville)

(Map 17)

1839. *Acridium robustum* Serville, *Ins. Orth.*, : 647.1921. *Choroedocus robustus* : Uvarov, *Trans. ent. Soc. Lond.*, **69** : 109.

Material examined : East Garo Hills : 1F, Jolegri, 3 km. from Siju cave, 24.x.1991, Y.P. Sinha; 1F, Rewak, 7km from Siju cave, 26.x.1991, Y.P. Sinha.

Jaintia Hills : 1F, 3km. from Sonapurdi on Khliehriat Road, 175m, 27.viii.1974, A.R.Lahiri; 1F, Garampani, Jowai, 17.ix.1990, Y.P. Sinha.

Ri-Bhoi and E. Khasi Hills : 1F, Umsing, 19.ix.1972, A.K. Ghosh; 1F, Ranikor, 3.viii.1981, M.R. Rynth; 1F, Risa Colony, Shillong, 29.viii.1981, M.S. Jyrwa; 4 F, Sumer, 8.ix.1982, A. Husain; 1F, Nongkhylllem, Wild Life Reserve Forest (Umtasor), 24.ix.1982, K.P. Singh; 2M, 2F, Barapani near Umium Lake and around, 19.ix.1991, Y.P. Sinha.

Diagnosis : Moderately large; antennae filiform, median segments almost twice as long as wide; fastigium rounded in front; frontal ridge flat, narrowing between antennae; prosternal tubercle gradually tapering apically, weakly incurved and pubescent; tegmina without spots; supra-anal plate tongue shaped, apex broadly rounded; cercus wide, thick, strongly compressed, incurved and down curved.

Distribution : India: Meghalaya (E. Khasi hills), Arunachal Pradesh, Assam and West Bengal; Bangladesh.

Genus *Eyprepocnemis* Fieber, 1853

Key to species

1. Hind wing colourless at base; body large in size*a. alacris* (Serville)
- Hind wing pinkish at base; body small in size*rosea* Uvarov

Genus *Eyprepocnemis* Fieber, 1853

50. ***Eyprepocnemis alacris alacris* (Serville)

(Map 17)

1839. *Acridium alacre* Serville, *Hist. Nat. Ins. Orth.*; 682

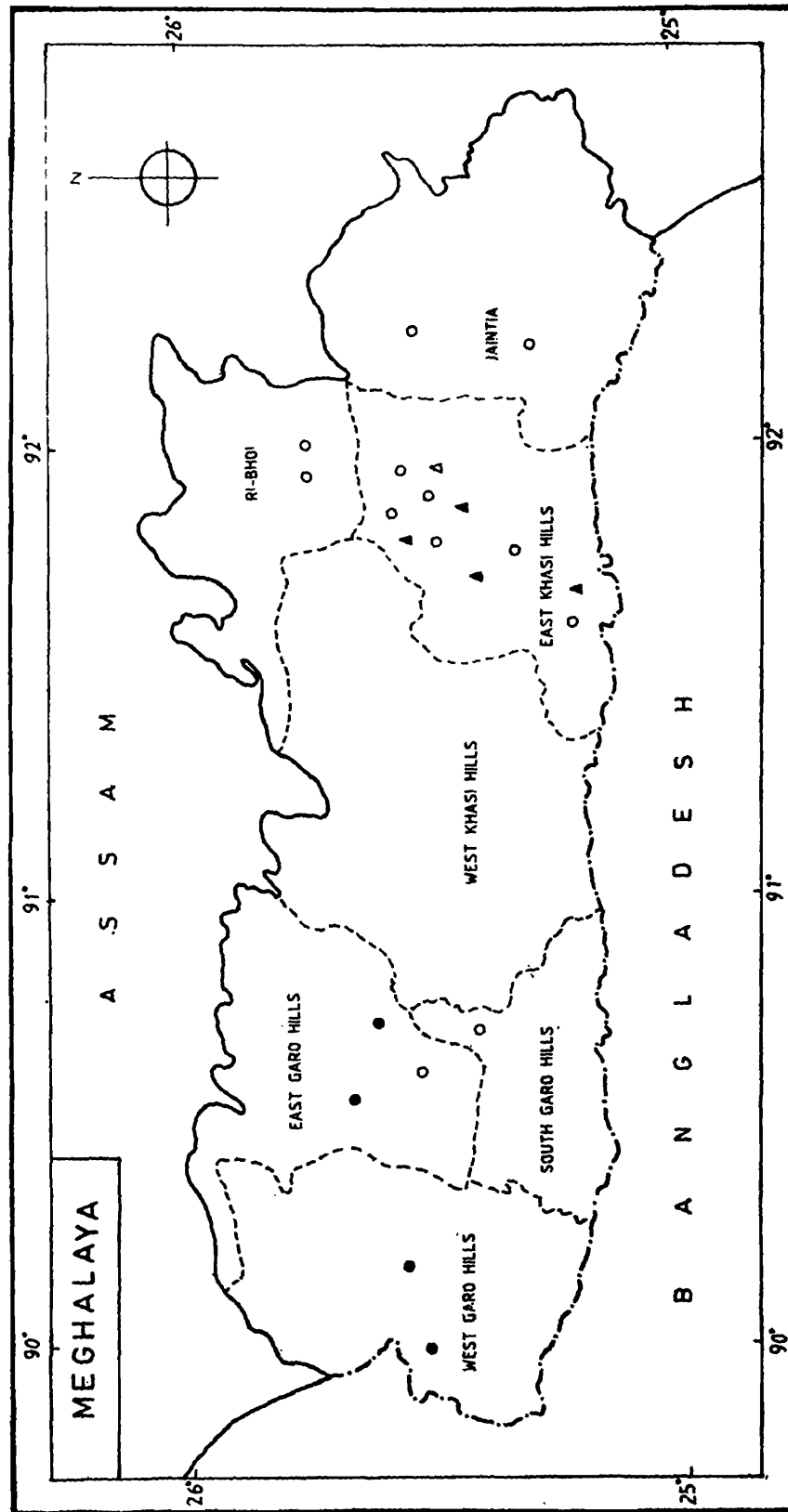
1958. *Eyprepocnemis a alacris* : Dirsh, *Proc. R. ent. Soc. Lond.*, (B) 27 (3-4) : 40.

Material examined : *East Garo hills* : 1F, Rongzeng, 26.v.1990, M.S. Shishodia; 1F, Narangree, 29.v.1990, M. S. Shishodia.

West Garo hills : 1M, Garobadha, 1.v.1990, M.S. Shishodia; 1M, Tura, 17.iii.1991, A.K. Hazra.

Diagnosis : Concavity of fastigium of vertex distinct, with a low apical carinula, separating it from frontal ridge; Pronotum above with a characteristic narrow dark spot; lateral carinae of pronotum converging forwards; prozona about as long as metazona; dark spots present on the wings; hind tibiae bluish gray with two whitish ring at the base and reddish at apex; male cercus gradually narrowing towards apex, incurved and down curved.

Distribution : India : Meghalaya (E. Garo hills, W, Garo hills), Andhra Pradesh, Bihar, Goa, Himachal Pradesh, Kerala, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamilnadu; Afghanistan; Bangladesh; East Persia; Pakistan and Sri Lanka.



- 49. *Choroedocus robustus* ○
- 50. *Eyprepocnemis alacris alacris* ○
- 51. *Eyprepocnemis rosea* Δ
- 52. *Tylotropidius varicornis* ●

Map 17. Showing distribution of *Choroedocus robustus*, *Eyprepocnemis alacris alacris*, *Eyprepocnemis rosea* and *Tylotropidius varicornis*

51. *Eyprepocnemis rosea* Uvarov

(Map 17)

1942. *Eyprepocnemis roseus* Uvarov, *Ann. Mag. nat. Hist.* (11) 9 : 597.1976. *Eyprepocnemis rosea* : Tandon, *Rec. Zool. Surv. India, Occ.* Paper No 3 : 13.

Diagnosis : Size small *i.e.* 19-27 mm.; pronotum relatively short, obtusely tectiform above; median carina well distinct, lateral carinae distinct in prozona and obsolescent in metazona; all the sulci distinct, typical sulcus placed behind the middle; prosternal tubercle tongue shaped; last tergite with a broad and shallow median excision, flanked by weak projections; supra-anal plate elongate; triangular; cercus longer than the plate, subgenital plate short, obtusely conical.

Tegmina reaching the apex of abdomen plate in male, and to the middle of supra-anal plate in female; wings light rose basally; hind tibiae with 8 external and 9 internal spines.

Distribution : India (Himachal Pradesh, Meghalaya and Uttar Pradesh).

Remarks : We have not found this species in the present collection. Uvarov (1942) reported this species from Assam; Shillong (now in Meghalaya).

Genus *Tylotropidius* Stål, 187352. *****Tylotropidius varicornis*** (Walker)

(Map 17)

1870. *Heteracris varicornis* Walker, *Cat. Derm. Salt. Brit. Mus.* 4 : 667.1914. *Tylotropidius varicornis* : Kirby, *Fauna British India, Orthopt.* (Acrididae) : 265.

Material examined : East Khasi hills : 1F, Shillong, 13.v.1960, S.N. Prasad; 1F, Limsing, Shillong, 23.iv.1963, V.D. Srivastava; 1M, Mawpet, Shillong, 25.ix.1964, S. Biswas; 1M, Barapani, Shillong, 29.iii.1991, A.K. Hazra and R.S. Barman.

Diagnosis : Yellowish to greenish yellow in colour; pronotum brown with lateral carinae pale; prosternal tubercle compressed, truncated, bituberculate at apex; tegmina with a row of triangular whitish spots upon the radial-stripe in the costal area; wings bluish hyaline; hind femora thickened at the base, very slender towards the tip; hind tibiae and tarsi dull blue; supra-anal lamina of male elongate triangular sulcated; cerci straight, slightly compressed, acuminate.

Distribution : India; Meghalaya (E. Khasi hills), Andhra Pradesh, Goa, Orissa, Rajasthan, Tamilnadu, West Bengal; Burma; Sri Lanka.

Subfamily CYRTACANTHACRIDINAE

Key to genera

1. Prosternal tubercle strongly curved backward, touching or almost touching mesosternum, inflated in middle, with conical apex.....*Chondracris* Uvarov
- Prosternal tubercle straight, vertical or slightly incurved backward but far from reaching mesosternum, conical or compressed.....2
2. Tegmina with oblique venation in apical part; transverse veins situated obliquely to principal veins; hind tibiae with 7 spines on outer dorsal margin; prosternal tubercle conical; male cercus conical with acuminate apex; male subgenital plate acuminate, apex pointed*Pachyacris* Uvarov
- Tegmina with straight venation in apical part; transverse veins forming almost right angle with principal veins; hind tibiae with 8 spines on outer dorsal margin; prosternal tubercle almost cylindrical with rounded apex; male subgenital plate long, curved upwards, apex pointed*Patanga* Uvarov

Subfamily CYRTACANTHACRIDINAE

Genus *Chondracris* Uvarov, 192353. *****Chondracris rosea*** (de Geer).

(Map 18)

1773. *Acrydium roseum* de Geer, *Mem. Ins.*, 3 : 488.1923. *Chondracris rosea* : Uvarov, *Bull. ent. Res.*, 14 : 39.

Material examined : Ri-Bhoi and E. Khasi hills : 1F, 1km. from Sonapurdi on Badarpur Rd., 275M., Jaintia Hills, 27.viii.1974, A.R. Lahiri; 2F, Sumer, East Khasi Hills, 8.ix.1982, A Hussain; 1M, Barapani, East Khasi Hills, 10.ix.1988, A.R. Lahiri and B.N. Das; 1M, Shillong, 19.ix.1991, R.K. Varshaney.

Diagnosis : Fastigium of vertex almost flat, tegmina surpassing the top of hind femur by a distance distinctly less than the length of pronotum, with oblique venations in apical part, transverse vein situated obliquely to principal vein, wings infumate throughout, with or without rosy at base; hind femur brown or yellowish brown with an indication of 2-3 blackish transverse bands from above; male cercus elongate, conical with acuminate apex.

Distribution : India : Meghalaya (East Khasi hills), Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Goa, Manipur, Tamilnadu, Tripura, Himachal Pradesh, Mizoram, Orissa, Uttar Pradesh, West Bengal; Burma; China; Nepal; Bangladesh, Thailand; Indonesia, Korea; Japan; Vietnam; Manchuria; Hainan Islands and Taiwan.

Genus *Pachyacris* Uvarov, 192354. *****Pachyacris vinosa*** (Walker)

(Map 18)

1870. *Acridium vinosum* Walker, *Cat. Derm. Salt. Brit. Mus.* Part III. 587.1914. *Orthacanthacris vinosa* : Kirby *Fauna British India*, Orthoptera (Acrididae) : 228.1923. *Pachyacris vinosa* : Uvarov, *Ann. Mag. nat. Hist. Lond.* (9) 11 : 478.

Material examined : Ri-Bhoi and E. Khasi hills: 1M, Crinoline view, Shillong, 19.ix.1967, R.K. Varshney; 1F, Samber Camp, 9kms. S.W. of Bagha, N.C. & Mikir Hills, 17.xi.1970, S.K. Talukder.

Diagnosis : Fastigium of vertex almost flat, distinctly sloping; frontal ridge above the ocelli slightly dilated; antennae pale; pronotum with no lateral carinae; median carina strong, cut by the usual transverse sulcus; mesosternal lobes slightly converging posteriorly with the inner angle acute, prothorax gradually narrowed anteriorly; posterior tibiae without external spine at apex; tegmina obliquely truncate at apex wings red at the base.

Distribution : India (Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Orissa, Uttar Pradesh and West Bengal); Burma; China; Nepal; and Thailand.

Genus *Patanga* Uvarov, 192355. *****Patanga succincta*** (Johansson)

(Map 18)

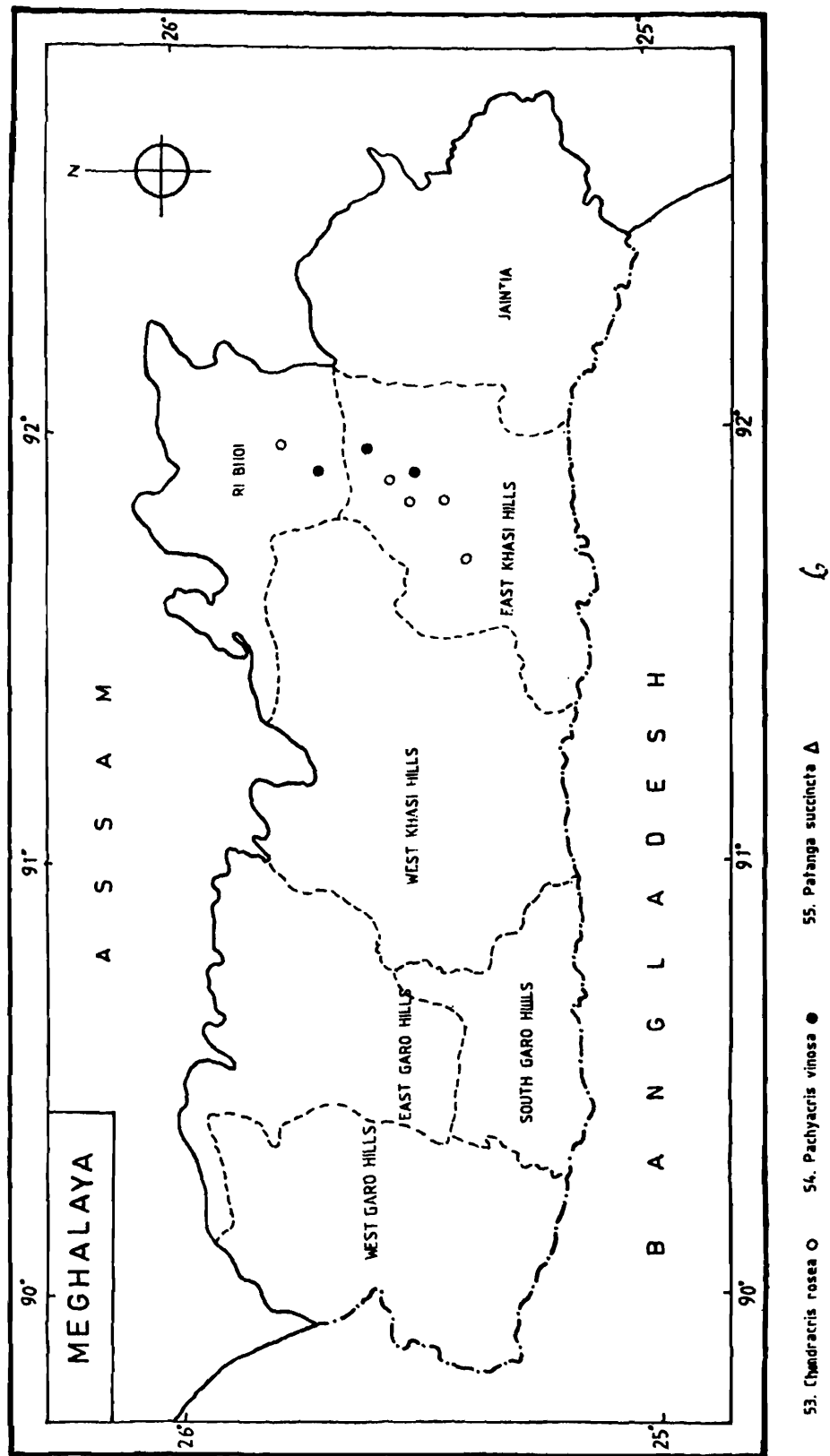
1763. *Gryllus locusta succinctus* Johansson, *Centuria Insectorum rariorum.* 6 : 398.1914. *Orthacanthacris succincta* Kirby, *Fauna British India*, Orthoptera (Acrididae) : 227.1923. *Patanga succincta* : Uvarov, *Ann. Mag. nat. Hist. London* (9) 12 : 364.

Material examined : Ri-Bhoi and E.Khasi hills : 1M, Botanical Garden, Shillong, 24.v.1960, S.N. Prasad; 1F, Pologround, Shillong, 31.i.1961, S.N. Prasad; 1F, Nongkrem, Khasi hills, 10.iv.1964, A.K. Mondal; 5F, Umtyngar, 17.xii.1964, R.P. Ghosh; 1F, Risa Colony, Shillong, 30.xi.1976, M.S. Jyrwa; 1F, Tripura Casth Road, Shillong, 28.v.1981, M.S. Jyrwa.

Diagnosis : General colouration pale with grey brown or more or less uniformly greyish or brownish; vertex in the middle with a broad yellow or reddish brown band continuing on pronotum; pronotum stouter, shorter, hind margin obtuse to rectangular; prosternal tubercle not bent backwards; cerci in male stouter and broader in lateral aspect, more incrassately compressed.

Distribution : India (Arunachal Pradesh, Goa, Delhi, Himachal Pradesh, Maharashtra, Rajasthan, Tamilnadu, Uttar Pradesh and West Bengal); Australia; Burma; Borneo; China; Hainan Islands; Japan; Java; Pakistan; S.E. Asia; Sri Lanka; Taiwan.

Remarks : Recorded for the first time from Meghalaya.



Map 18. Showing distribution of *Chondracris rosea*, *Pachyacris vinosa* and *Patanga succincta*.

Table 1. Showing taxa in different districts of Meghalaya

	Jaintia Hills	East Khasi Hills	Ri-bhoi	West Khasi Hills	East Garo Hills	South Garo Hills	West Garo Hills
	1	2	3	4	5	6	7
Family PYRGOMORPHIDAE							
1. <i>Atractomorpha crenulata</i> (Fabricius)	-	+	+	-	+	+	+
2. <i>A. burri</i> Bolivar	+	+	+	-	+	+	-
3. <i>A. psittacina psittacina</i> (De Haan)	-	-	-	-	-	-	-
4. <i>Aularches miliaris miliaris</i> (Linnaeus)	+	+	+	-	-	-	-
5. <i>Chrotogonus tr. trachypterus</i> (Blanc.)	-	+	-	-	-	-	-
6. <i>Tagasta indica</i> Bolivar	+	-	-	-	-	-	+
7. <i>Chlorizeina unicolor unicolor</i> Brunn.	-	+	-	-	+	-	-
Family ACRIDIDAE							
Subfamily Truxalinae							
8. <i>Aulacobothrus</i> sp.	-	+	+	-	-	-	-
9. <i>Phonogaster cariniventris</i> Hen.	+	-	-	-	-	-	-
Subfamily Acridinae							
10. <i>Acrida exaltata</i> (Walker)	-	+	+	+	+	+	+
11. <i>Aiolopus thalassinus tamulus</i> (Fabric.)	+	-	-	-	+	-	+
12. <i>Ceracris nigricornis nigricornis</i> (Walker)	+	+	+	+	+	+	-
13. <i>Ceracris</i> sp.	-	-	-	-	+	-	+
14. <i>Dittopternis venusta</i> (Walker)	+	+	+	+	+	+	-
15. <i>Gastrimargus africanus africanus</i> (Saussure)	-	+	-	-	-	-	+
16. <i>Gastrimargus marmoratus</i> (Thunberg)	-	+	-	-	-	-	-
17. <i>Gonista bicolor</i> Bolivar	-	+	-	-	-	-	-
18. <i>Heteropternis respondens</i> (Walker)	+	+	+	-	+	+	+
19. <i>Holopercna darjeelingensis</i> (Bolivar)	-	+	+	+	-	-	-
20. <i>Locusta migratoria migratorioides</i> (Riche & Fair)	-	+	-	-	-	+	-

Contd. Table-1

	1	2	3	4	5	6	7
21. <i>Oedaleus abruptus</i> (Thunberg)	-	+	-	-	-	-	-
22. <i>Oedipodacris aberrans</i> Willemse	-	+	-	-	-	-	-
23. <i>Orthochtha indica</i> Uvarov	-	+	-	-	-	-	-
24. <i>Phlaeoba infumata</i> Brunner	+	+	+	-	+	+	+
25. <i>Phlaeoba antennata</i> Brunner	+	+	-	+	+	-	-
26. <i>Phlaeoba panteli</i> Bolivar	-	+	-	+	-	-	-
27. <i>Pternoscirta cinctifemur</i> (Walker)	+	+	-	-	-	-	-
28. <i>Trilophidia annulata</i> (Thunberg)	-	+	+	+	-	-	-
Subfamily Hemiacidinae							
29. <i>Spathosternum prasiniferum prasiniferum</i> (Walker)	+	+	+	+	+	+	+
30. <i>Gesonula punctifrons</i> Stål	-	-	-	+	-	-	+
Subfamily Oxyinae							
31. <i>Oxya fuscovittata</i> (Marschall)	-	+	-	+	+	-	+
32. <i>Oxya hyla hyla</i> Serville	+	+	-	-	+	+	+
33. <i>Oxya japonica japonica</i> (Thunberg)	-	-	+	-	-	-	-
34. <i>Oxya velox</i> (Fabricius)	-	-	-	-	+	-	-
35. <i>Caryanda paravicina</i> (Willemse)	-	+	+	-	-	-	-
Subfamily Coptacridinae							
36. <i>Coptacra ensifera</i> Bolivar	-	-	-	+	-	-	-
37. <i>Coptacra foedata</i> (Serville)	+	-	-	-	+	-	-
38. <i>Eucoptacra praemorsa</i> (Stål)	+	-	-	-	+	-	-
39. <i>Eucoptacra binghami</i> Uvarov	+	+	-	-	-	+	-
40. <i>Eucoptacra saturata</i> (Walker)	+	+	-	-	+	-	+
Subfamily : Tropidopolinae							
41. <i>Tristria pulvinata</i> (Uvarov)	-	+	-	-	-	-	+
42. <i>Oxyrrhepes obtusa</i> (de Haan)	-	+	-	+	-	+	+
Subfamily Catantopinae							
43. <i>Catantops pinguis innotabilis</i> (Walker)	+	+	+	-	+	+	+
44. <i>Stenocatantops splendens</i> (Thunberg)	+	+	-	+	+	+	-
45. <i>Xenocatantops humilis humilis</i> (Serville)	+	+	+	-	+	+	+
46. <i>Assamacris striata</i> Uvarov	-	+	-	-	-	-	-
47. <i>Paracconophyma</i> sp.	-	+	+	-	-	-	-
48. <i>Gerenia intermedia</i> Brunner	+	-	-	-	+	-	-

Contd. Table-1

	1	2	3	4	5	6	7
Subfamily Eyprepocnemidinae							
49. <i>Choroedocus robustus</i> (Serville)	+	+	+	-	-	-	-
50. <i>Eyprepocnemis alacris alacris</i> (Serville)	-	-	-	-	+	-	+
51. <i>Eyprepocnemis rosea</i> Uvarov	+	-	+	-	-	-	-
52. <i>Tylotropidius varicornis</i> (Walker)	-	-	+	-	-	-	-
Subfamily : Cyrtacanthacridinae							
53. <i>Chondracris rosea</i> (De Geer)	-	+	+	-	-	-	-
54. <i>Pachyacris vinosa</i> (Walker)	-	+	+	-	-	-	-
55. <i>Patanga succincta</i> (Johansson)	-	+	+	-	-	-	-

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TETTIGONIIDAE : ORTHOPTERA

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INTRODUCTION

The family Tettigoniidae includes long-horned grasshoppers are very attractive in appearance. They are widely distributed in tropical and subtropical parts of the world, but are poorly known from India. Nearly 4,000 species are known from the world, of which only 80 species are known to occur in India. They have so far been recorded from the North-eastern India, Eastern India and Western Ghats of South India, various parts of Western India and in Andaman and Nicobar Islands. Some members of this family are considered agricultural pests. The important morphological characters of this group are : antenna very long even exceeding 30 segments, hearing organ near the base of the fore tibia, stridulating organ at the base of the tegmina, tarsus 4-segmented and depressed, ovipositor composed of 3 pairs of valves.

It is the first detailed report of the Tettigoniidae from Meghalaya. A total of 14 species under 13 genera are reported in this paper, of these 13 species are recorded here for the first time from the area. Keys to Subfamilies, genera and species are given. Intensive survey may reveal many more species from the State.

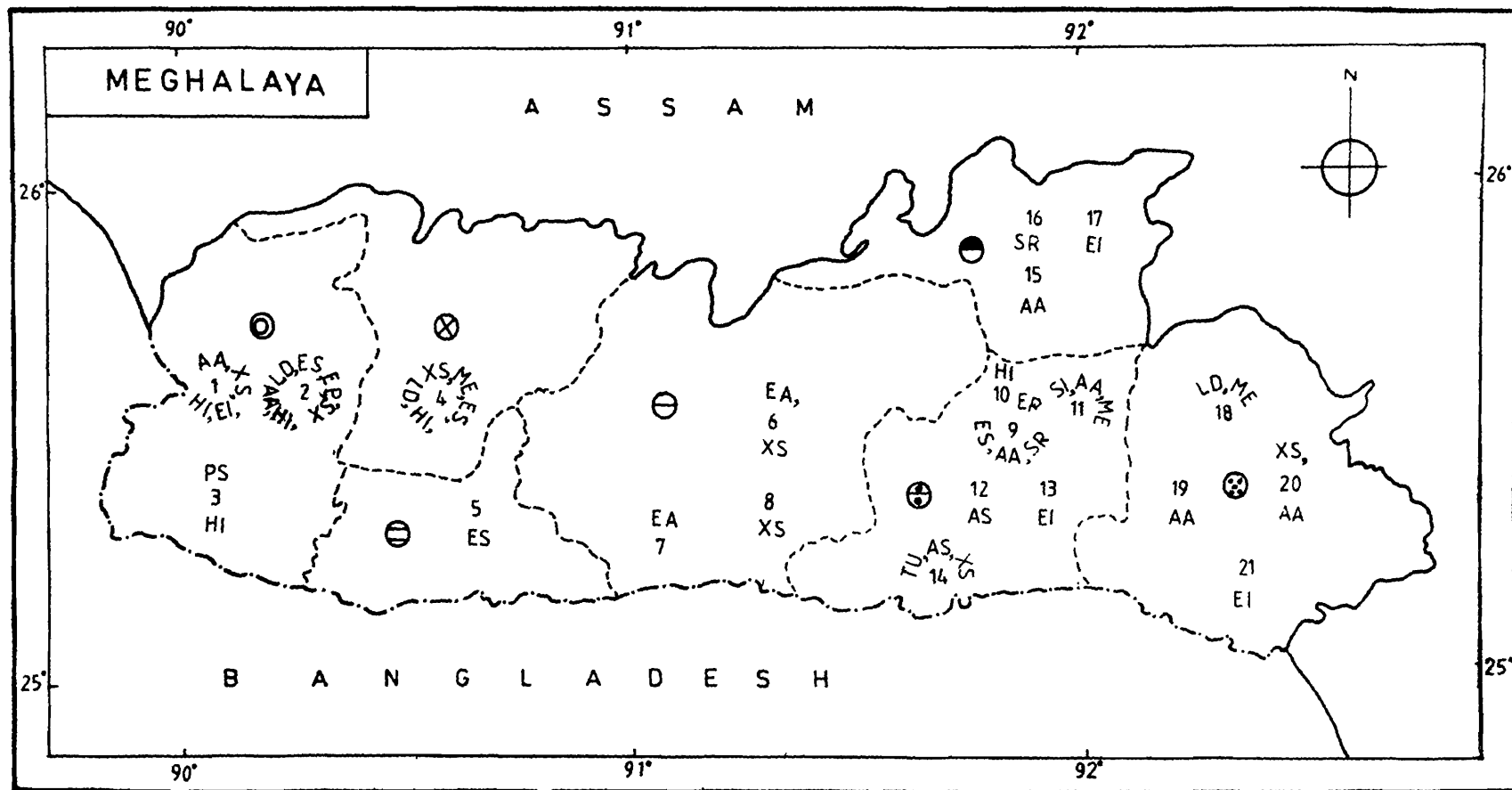
The classification is followed here after Günther (1938, 1939) and Steinmann (1970).

SYSTEMATIC ACCOUNT

Family TETTIGONIIDAE

Key to subfamilies

1. Male subgenital plate with a pair of styles; first two tarsi grooved laterally.....2.
- Male subgenital plate without style; first two tarsi without groove laterally (two series of spines present on posterior tibia, which continue up to the apex).....**PHANEROPTERINAE.**
2. Fore tibia without apical spine.....3.
- Fore tibia with long movable spines, fastigium narrow, strongly compressed laterally**LISTROSCELINAE.**



EXPLANATION OF MAP FOR DISTRICTS

West Garo hills Dist.; East Garo hills Dist.; South Garo hills Dist.; West Khasi hills Dist.; East Khasi hills Dist.; Ri-Bhoi Dist.; Jaintia hills Dist.

(For localities) : 1. Damalgiri; 2. Tura; 3. Silbalgiri; 4. Williamnagar; 5. Siju; 6. Nongstoin; 7. Ranikar; 8. Sejlilieh; 9. Shillong; 10. Nongthymmai; 11. Barapani; 12. Mausmai; 13. Mouthlong forest; 14. Cherrapunji; 15. Nongpoh; 16. Jailad; 17. Umang; 18. Nongtian; 19. Jowai; 20. Modhymai; 21. Jarain

EXPLANATION OF MAP (For species of Tettigoniidae)

Letana despecta : LD. *Trigonnocorypha unicolor* : TU. *Elemaea securigera* : ES. *Allodapa aliena* : AA. *Holochlora indica* : HI. *Sathrophyllia rugosa* : SR. *Sanaa imperialis* : SI. *Acanthoprion suspectum* : AS. *Pseudophyllus* sp. : PS. *Euhexacentrus annulicornis* : EA. *Xiphidiopsis straminula* : XA. *Mecopod elongata* : ME. *Euconocephalus incertus* : EI. *Euconocephalus pallidus* : EP.

- 3. Pronotum bears two distinct sutures, antennal socket strongly marginal, fastigium shortened apically by crowded antennary fossa..... **PSEUDOPHYLLINAE**.
- Pronotum without suture.....4.
- 4. Fore and middle femora spined below, fastigium cone-shaped, male subgenital plate bifurcated at apex..... **COIPHORINAE**.
- Fore and middle femora unspined below, fastigium not produced, male subgenital plate bifurcated at about the middle..... **MECOPODINAE**.

Subfamily PHANEROPTERINAE

Key to genera of Phaneopterinae

- 1. Antenna slender, about double the length of body, elytron very narrow and thickly reticulated*Letana* (1 species only).
- Antenna not so long2.
- 2. Margin of pronotum crenulate, sulcate; meso and metanotal lobes triangular.....*Trigonocorypha* (1 species only).
- Shape of pronotum different.....3.
- 3. Hind margin of pronotum circular.....4.
- Hind margin of pronotum truncate, epiproct subconical.....*Elimaea* (1 species only).
- 4. Epiproct conically produced; radius sector 2 arises from the middle of elytron; ovipositor serrate.....*Allodapa* (1 species only).
- Epiproct triangular; radius sector 2 arises from before the middle of elytron; ovipositor not serrate.....*Holochlora* (1 species only).

Genus 1. *Letana* Walker, 1869

1869. *Letana* Walker, *Cat. Derm. Salt. B.M.* ii. : 277.

1. *Letana despecta* (Brunner)

1878. *Pyrrhicea despecta* Brunner, *Mon. Phan.* : 115.

1906. *Letana despecta* : Kirby, *Syn. cat. Orthopt.* 2 : 400.

Material examined : East Garo hills Dist. : 1 F, Williamnagar, 8. iii. 1991, Coll. B. C. Das; West Garo hills Dist. : 1 M, Neharu park, Tura, 17. iii. 1991, Coll. R. S. Barman; Jaintia hills Dist. : 1 F, Nontiang, 11. iii. 1991, Coll. K. K. Roy.

Diagnosis : Fastigium conically produced, pronotum concave at anterior margin and convex at posterior margin; an oval shaped mirror-like stridulating organ basally at right tegmina; only hind femur spinose; male subgenital plate bifurcated at base and developed uniformly wide and curved; cerci long, rod-shaped, slightly bend and bears a spine at apex; ovipositor curved.

Distribution : India : Meghalaya (East Garo hills, West Garo hills and Jaintia hills Dists.) and West Bengal. Also known from China.

Remarks : The species was recorded by the present author from West Bengal (1993). Here, it is being recorded for the first time from Meghalaya.

Genus 2. *Trigonocorypha* Stal, 1873

1873. *Trigonocorypha* Stal, *Oefu. Vet. Akad. Forh.* **30** (4) 639.

2. *Trigonocorypha unicolor* (Stal)

1814. *Gryllus (Tettigonia) unicolor* Stal, *Spectre. Saut.* : 13.

1906. *Trigonocorypha unicolor* : Kirby, *Syn. Cat. Orth.* **2** : 448.

Material examined : East Khasi hills Dist. : 1M, Cherrapunji, Cave, 26. iii. 1991. Coll. R. S. Barman.

Diagnosis : Fastigium conically produced with semicircular apex; pronotum concave at anterior margin, posterior margin almost straight; elytron highly undulating at anterior margin, posterior margin almost straight, anal vein very short, hind wing wholly transparent except a little brown area dorsally at apex; fore femur only with 2 or 3 spines and maximum in the hind pair; male subgenital plate with deep concavity, style conically developed; ovipositor curved with a pair of horny projections at base.

Distribution : India : Meghalaya (East Khasi hills Dist.); Orissa, Rajasthan and West Bengal; also from Java.

Remarks : The species was recorded by the present author from West Bengal (1993). Here it is being recorded for the first time from Meghalaya.

Genus 3. *Elimaea* Stal, 1874

1874. *Elimaea* Stal, *Recens. Orth.* **2** : 11, 27

3. *Elimaea securigera* Brunner

1891. *Elimaea securigera* Brunner. *Verh. Zool. Bot. Ges. Win. Vienna*, **40** : 47.

Material examined : East Garo hills Dist. : 2M, Williamnagar, 9. iii. 1991, Coll. B. N. Das; 4 F, 1M Tomba, Williamnagar, 11. iii. 1991, Coll. B. N. Das; West Garo hills Dist. : 1M, Siju

Cave, 27. iv. 1991, Coll. B. N. Das; 2M, Walbakgiri, Tura, 5. ix. 1991, Coll. R. K. Varshney; *East Khasi hills Dist.* : 1M. Elephant falls, Shillong, 22. viii. 1980, Coll. ?; 1M. Nongpoh, 28. ix. 1988, Coll. A. R. Lahiri; 1M. Barapani, 4. iv. 1980, Coll. Asket Singh.

Diagnosis : Medium sized species; fastigium cone-shaped, poorly developed; posterior margin of pronotum semicircular; both edge of elytron straight; male subgenital plate with profuse tiny spines arranged innerside, ovipositor hook shaped, epiproct with acute apex.

Distribution : India : Meghalaya (East Garo hills, West Garo hills and E. Khasi hills Dists.), Assam and West Bengal. Also known from Sri Lanka.

Remarks : The species was recorded by the author from West Bengal (Barman, 1993), Here it is being recorded for the first time from Meghalaya.

Genus 4. *Allodapa* Brunner, 1878

1878. *Allodapa* Brunner, *Brunn. Mon. Phan.* p. : 23, 221.

4. *Allodapa aliena* Brunner, 1891

1891. *Allodapa aliena* Brunner, *Verh. Zool. Bot. Ges. Wien.* 41 : iii.

Material examined : *West Garo hills Dist.* : 1 F, Khirapasa, 4. ix. 1991, Coll. R. K. Varshney; 1 F, Damalgiri, Tura, 17. iii. 1991, Coll. R. S. Barman; *Jaintia hills Dist.* : 1 F, Modymani, 14. iii. 1991, Coll. K. K. Roy; 1 F, Jowai, 26. ix. 1991, Coll. R. S. Barman. *East Khasi hills Dist.* : 1 M, Unium, Polo Bazar, Shillong, 18. ix. 1991, Coll. R. K. Varshney; 1 M, Barapani, 11. ix. 1991, Coll. R. C. Basu; 1 F, Nongpoli, 30. ix. 1988, Coll. A. R. Lahiri.

Diagnosis : Fastigium conically produced; posterior margin of pronotum circular, both edge of elytron almost straight, bristles in hind tibia well developed and predominant than other tibia; ovipositor curved, apical region serrate; apex of male subgenital plate deeply notched inside.

Distribution : India : Meghalaya (West Garo hills, Jaintia hills and East Khasi hills), Assam, Tamil Nadu and West Bengal. Also known from Sri Lanka; Penang (?).

Remarks : The species was recorded from West Bengal by the present author (1993). Here it is being recorded for the first time from Meghalaya.

Genus 5. *Holochlora* Stal, 1873

1873. *Holochlora* Stal, *Ofv. Vét. Akad. Forh.* 30 (4) : 42.

5. *Holochlora indica* Kirby, 1906

1906. *Holochlora indica* Kirby, *Syn. Cat. Orthopt.* 2 : 430.

Material examined : East Garo hills Dist. : 1M, 1 F, Williamnagar, 30. x. 1991, Coll. R. K. Varshney; 1M, 1 F, Rongsagiri, 1. iv. 1991, Coll. B. N. Das; 1 M, Williamnagar, 9. iii. 1991, Coll. B. N. Das. West Garo hills Dist : 1 F, Tura, 19. iv. 1991, Coll. B. N. Das; 1M Silbalgiri, 15. x. 1983, Coll. J. R. B. Alfred; 1 F, Damalgiri, Tura, 17. iii. 1991, Coll. R. S. Barman. East Khasi hills Dist. : 1M, Nongthymmai, Shillong, 17. viii. 1974, Coll. R. S. Giri.

Diagnosis : Fastigium conically produced with round apex, anterior margin of pronotum concave and posterior margin convex; radius sector 2 arises from middle of wing and bifurcates at its basal third; hind femur, with spines on apical half and anterior two pairs bare of spines; male subgenital plate at the region of bifurcation form a circle, style foot shaped; circus gradually narrowed and curved at apex; ovipositor curved and serrate at apical region.

Distribution : India : Meghalaya (East Garo hills, West Garo hills and East Khasi hills), Orissa, Tamil Nadu and West Bengal.

Remarks : The species was recorded by the present author from West Bengal (1993); it is being recorded here first from Meghalaya.

Subfamily PEUDOPHYLLINAE

Key to genera of Peudophyllinae

1. Femur compressed at posteroventral margin.....2.
- Only hind femur compressed.....3.
2. Male subgenital plate broad, flat; Rs_2 originates from before middle of wing.....*Sathrophyllia* (1 species only).
- Male subgenital plate large, long; RS_2 originates at or somewhat beyond middle of wing.....*Sanaa* (1 species only).
3. Elytra with swelling on shoulder lobe; pronotum with 2 spines.....*Acanthoprion* (1 species only).
- Elytra without swelling on shoulder lobe; pronotum unarmed.....*Pseudophyllus* (1 species only).

Genus 6. *Sathrophyllia* Stal, 1874

1874. *Sathrophyllia* Stal, *Rec. Orthopt.* 2 : 54.

6. *Sathrophyllia rugosa* (Linnaeus)

1758. *Gryllus* (*Tettigonia*) *rugosa* Linnaeus, *Syst. Nat.* (10 ed) 1 : 430.

1954. *Sathrophyllia rugosa* : Beier, *Rev. der. Pseud. Madred.* : 233.

1962. *Sathrophyllia rugosa* : Beier, *Das. Tierreich* 73 : 199-200.

Material examined : East Khasi Hills Dist. : 1 F, Shillong, 5. ix. 1963, Coll. M. Rynth; 1 F, Jailad, 8. iv. 1981, Coll. J. P. Sathi; 1 F, B. S. Camp, Shillong, 24. vii. 1976, Coll. A. K. Ghosh.

Diagnosis : Median crest, large, often swollen on the basal part of pronotum, appearance rugose, colour ash brown, tegmina convex, femur with semirounded grooves ventrally, all tibiae spotted, ovipositor blade-like.

Distribution : India : Meghalaya (East Khasi hills), Karnataka, Sikkim, Tamil Nadu and West Bengal. Also known from Sri Lanka, Sumatra, Java (?).

Remarks : The species is being recorded here first time from Meghalaya.

Genus 7. *Sanaa* Walker, 1870

1870. *Sanaa* Walker, *Cat. Orthopt. Brit. Mus.* 3 : 438.

7. *Sanaa imperialis* (White)

1846. *Locusta (Acanthodis) imperialis* White, *Ann. Mag. nat. Hist. London*, 18 : 23. pl. 1.

1870. *Sanaa imperialis* : Walker, *Cat. Dern. Salt. Brit. Mus.* 3 : 438.

Material examined : East Khasi hills Dist. : 3 F, Shillong, no other details.

Diagnosis : Head yellow in front, rest brown. Body deep brownish black, lighter brown below. Elytron somewhat bulging at the base, black and brown, three to six small yellowish-green subtriangular spots on the outer edge; some black transverse marks near the tibia of hind leg, tarsi of forelegs blackish brown, ovipositor yellow.

Distribution : India : Meghalaya (East Khasi hills Dist.), and Assam. Also from Nepal.

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

Genus 8. *Acanthoprion* Pictet & Saussure, 1892

1892. *Acanthoprion* Pictet & Saussure, *Icon. Saut. Vertes* : 26.

8. *Acanthoprion suspectum* (Brunner)

1895. *Aprion suspectum* Brunner Von Wattenwyl. *Monogr. Pseudophyll.* : 77.

1954. *Acanthoprion suspectum* : Beier, *Revis. Pseudophyll.* : 200.

Material examined : East Khasi hills Dist. : 1M, 1 F, Mousmai, Cherrapunji, 20. vii. 1973, Coll. A. K. Ghosh.

Diagnosis : Brownish species; fastigium conically produced with blunt apex; posterior margin of pronotum almost conically produced; elytron uniformly brown; radius sector 2 arises from basal third of wing; ovipositor sword shaped.

Distribution : India : Meghalaya (East Khasi hills) and West Bengal.

Remarks : The species is being recorded first time in Meghalaya.

Genus 9. *Pseudophyllus* Serville, 1831

1831. *Pseudophyllus* Serville, *Ann. Sci. Nat. Paris*, 22 : 143.

9. *Pseudophyllus* sp.

Material examined : West Garo hills Dist. : 1 F, Silbalgiri, 15. x. 1983, Coll. J. R. B. Alfred.

Distribution : India : Meghalaya (West Garo Hills Dist.)

Remarks : The specimen could not be studied further due to its damaged condition.

Subfamily LISTROSCELINAE

Key to genera

1. Posterior margin of pronotum semicircular with a little incurving in the middle; fore and middle tibiae with highly developed spines.....*Euhexacentrus* (1 species only).
- Posterior margin of pronotum oval shaped, fore and middle tibiae armed with less developed spines.....*Xiphidiopsis* (1 species only).

Genus 10. *Euhexacentrus* (Stal) 1877

1877. *Euhexacentrus* Stal, *Ofv. K. Ventensk. Akad. Forh.* No. 10 p. 46.

10. *Euhexacentrus annulicornis* (Stål)

1877. *Hexacentrus annulicornis* Stal, *Ofv. K. Ventensk. Acad. Forh.* No. 10 : 46.

1922. *Euhexacentrus annulicornis* : Hebard, *Proc. Acad. nat. Sci. Phelade.* 74 : 271.

Material examined : West Khasi hills Dist. : 1 F, Nongstoin, 21. ix. 1988, Coll. A. R. Lahiri; 1 M, Ranikar, 3. viii. 1981, Coll. M. R. Rynth.

Diagnosis : Medium sized species; yellowish-buff coloured; vertex dark brown dorsally; elytron pale green or green yellow, both edges bearily straight; hind femoral spines blackish brown except paler apical ones; mele subgenital plate slightly longer than broad; basal third of ovipositor swollen, its length nearly half the length of body.

Distribution : India : Meghalaya (West Khasi hills), Assan, Maharashtra and West Bengal. Also known from Philippine.

Remarks : The species was recorded from West Bengal by the present author (1993). This species is being recorded here for the first time from Meghalaya.

Génus 11. *Xiphidiopsis* Redtenbacher, 1891

1891. *Xiphidiopsis* Redtenbacher, *Mon. Conoc. Verh. Zool. bot. Ges. Wien.* ; 531.

11. *Xiphidiopsis straminula* (Walker)

1871. *Locusta straminula* Walker, *Cat. Derm Salt. Brit. Mus.* 4 Suppl. : 36.

1966. *Xiphidiopsis straminula* : Beier, *Orthopteran. Catalogus*, part 9 : 267.

Material examined : *East Garo hills Dist.* : 1 F, Williamnagar, 30. ix. 1991, Coll. R. K. Varshney, *West Garo hills Dist.* : 1M, Tura, 3. ix. 1991, Coll. R. K. Varshney; 1 F, 1 M, Mymonsingh Border area, 30. iv. 1991, Coll. B. N. Das; 2 M, 1 F, Damalgiri, Tura, 17. iii. 1991, Coll. R. S. Barman; 1 M, 1 F, Neheru Park, Tura, 17. iii. 1991, Coll. R. S. Barman; 2 F, 2M, Tura, 17. iii. 1991, Coll. A. K. Hazra; 2 F, 1M, Tura, 17. iii. 1991, Coll. R. S. Barman; 1M, Tura, 3. x. 1991, Coll. R. K. Varshney. *Jaintia hills Dist.* : 2 F, 1M, Modymnai, 14. iii. 1991, Coll. K. K. Roy. *East Khasi hills Dist.* : 4M, 8 F, Cherrapunjee, 26. iii. 1991, Coll. R. S. Barman; 3M, 1 F, Barapani, 29. iii. 1991, Coll. R. S. Barman; 1M, Moupat, Shillong, 16. iv. 1991, Coll. S. G. Patil; 2 F F, 1M, Barapani, 21. iii. 1991, Coll. A. K. Sanyal; 1M, Shillong, 20. ix 1991, Coll. R. K. Varshney. *West Khasi hills Dist.* : 3M, 5 F, Sejlieh, Nongstoin, 21. iii. 1991, Coll. R. S. Barman.

Diagnosis : Slender straw coloured species, vertex brown, dorsally with a pale longitudinal line, mesonotum unicolourous with vertex; middle and hind tibia bears a round dark brown spot basally at anterodorsal region, fore and mid tibiae with two rows of spines ventrally; male subgenital plate rectangular with two styles projecting outwards; cerci of male highly developed with a spinous projection; ovipositor nearly half the length of body.

Distribution : India : Meghalaya (East Garo hills, West Garo hills, Jaintia hills, East Khasi hills and West Khasi hills Dists.), Tamil Nadu and West Bengal. Also known from Sri Lanka.

Remarks : The species was recorded by the present author from West Bengal (1993); This is being recorded here for the first time from Meghalaya.

Subfamily MECOPODINAE

Génus 12. *Mecopoda* Serville, 1831

1831. *Mecopoda* Serville, *Ann. Sci. Nat.* 22 154.

Diagnosis : Fastigium uniformly wide; posterior margin of pronotum one and a half times the width of anterior margin, tympanum highly developed; thorns at borders of fore tibia comparatively fewer dorsally than ventrally; arrangement of hind tibial thorns just the reverse, hind femur bare of bristles dorsally.

12. *Mecopoda elongate* (Linn.)

1758. *Gryllus elongatus* Linnaeus, Syst. nat. (10 ed.) 1 : 429.

1922. *Mecopoda elongate* : Hebard, Proc. Acad. Nat. Sci. Phila, 74 ; 182.

Material examined : East Garo hills Dist. : 2M 2 F, Williamnagar, 3. ix. 1991, Coll. R. K. Varshney; 1 F, Williamnagar, i. x. 1991, Coll. I. J. Gupta; 1 M, Williamnagar, 30. ix. 1991, Coll. S. K. Ghosh. Jaintia hills Dist. : 1 F, Nontiang, 1. iii. 1991, Coll. K. K. Roy. East Khasi hills Dist. : 1 F, Polo ground, Shillong, 18. iii. 1991, Coll. B. C. Das; 1 F, Fruit Garden, Shillong, 10. v. 1978, Coll. M. S. Tyra; 1 F, Risa Colony, Shillong, 30. xi. 1976, Coll. M. S. Tyra; 1F. Ward Lake, Shillong, 22. X. 1973, Coll. K. Deb; 1 F, Barapani Dam area, 10. ix. 1988, Coll. A. R. Lahiri.

Diagnosis : Brownish species; fastigium wide, posterior end of pronotum almost double the width than anterior region; sub costa sharply sinuate just beyond middle; male subgenital plate developed conically from region of bifurcation; ovipositor straight being slightly narrowed at apex.

Distribution : India : Meghalaya (East Garo hills, Jaintia hills and East Khasi hills), Andaman islands, Assam, Karnataka, Maharashtra, Orissa, Uttar Pradesh and West Bengal.

Ramarks : The species is being recorded here for the first time from Meghalaya.

Subfamily COPIPHORINAE

Genus 13. *Euconocephalus* Karny, 1907

1907. *Euconocephalus* Karny, Aleh. Zool. bot. Ges. Wien. 4 (3) : 39.

Diagnosis : Mesosternal patch oval or triangular, rarely at the end with prolonged bump; fastigium conically protruded with obtuse apex; pronotum selate type; radius sector 2 originates from little before the middle of wing.

Key to species of Euconocephalus

1. Fastigium protruded obtusely; radius sector 2 arises from middle of wing; length of ovipositor three-fourth the length of body.....*pallidus*.
- Fastigium protruded conically; radius sector 2 arises much before middle of wing; length of ovipositor subequal to the length of body.....*incertus*.

13. *Euconocephalus incertus* (Walker)

1869. *Conocephalus incertus* : Walker, Cat. Derm. Salt. Mus., 2 : 320.

1906. *Conocephalus incertus* : Kirby. Syn. Cat. Orthopt., 2 : 251.

1912. *Euconocephalus incertus* Karny, Gen. Insectorum 2 (139) : 35.

Material examined : West Garo hills Dist. : 1M, Damalgiri, Tura, 17. iii. 1991, Coll. R. S. Barman. Jaintia hills Dist. : 1 F, Jarain, 10. iii. 1991, Coll. K. K. Roy. East Khasi hills Dist. :

1 F, Umang, 21. i. 1964, Coll. A. K. Mondal; 1M, Shillong, 19. x. 1974, Coll. R. S. Geri; 1 M, Mowthlang forest, 27. xi. 1974, Coll. T. K. Sengupta; 1 F, Fruit Garden, Shillong, 8. iii. 1978, Coll. M. S. Tyra; 1 F, Lowsontum, Shillong, 2. xii. 1965, Coll. S. N. Prasad; 2 F, Umran, 16. ix. 1971, Coll. S. Biswas; 1M, Nongpho, 24. xii. 1973, Coll. M. Datta.

Diagnosis : Greenish species; vertex conically produced; pronotum broadly rounded at posterior margin; radius sector 2 arises much before middle of wing; male subgenital plate bears two styles at apex, style bifurcated apically; ovipositor subequal to the length of body.

Distribution : India ; Meghalaya (West Garo hills, Jaintia hills and East Khasi hills), Orissa and West Bengal.

Remarks : The species is being recorded here for the first time from Meghalaya.

14. *Euconocephalus pallidus* (Redtenbacher)

1891. *Conocephalus pallidus* Redtenbacher, *Verh. zool. bot. Ges. Vien.*, **41** : 414.

1922. *Euconocephalus pallidus* : Hebard, *Proc. Acad. Nat. Sci. Phil.*, **74** : 239-240.

Material examined : *West Garo hills Dist.* : 1M, Tura, 15. iii. 1991, Coll. R. S. Barman. *East Khasi hills Dist.* : 1 F, Shillong, 24. vii. 1962, Coll. S. N. Prasad.

Diagnosis : Greenish species; vertex protruded obtusely; pronotum circular at posterior margin; radius sector 2 arises from middle of wing; male subgenital plate with 2 style-like projections; style bifurcated at apex; ovipositor highly developed about three-fourth the length of the body.

Distribution : India : Meghalaya (West Garo Hills and East Khasi Hills), Himachal Pradesh and West Bengal.

Remarks : The species is the first time record from Meghalaya.

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INSECTA : DERMAPTERA

G. K. SRIVASTAVA

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INTRODUCTION

Information on the Meghalay, prior to Biswas et.al (1975) is scattered. In this work for the first time a preliminary list was presented on the basis of published records and the available material. Altogether 27 species were listed, of which records of *Diplatys rufescences* (Kirby) is not known to me through literature or specimens and that of *Forcipula decolyi* Bormans appears to be doubtful since the material of *Forcipula* Bolivar, examined has been found to belong to other two species known from the area. The occurrence of *Anisolabis gaudens* Burr from Khasi Hills in based on 3 nymphs (not males as states in Biswas et. al, p. 29) is difficult to determine, should be rejected.

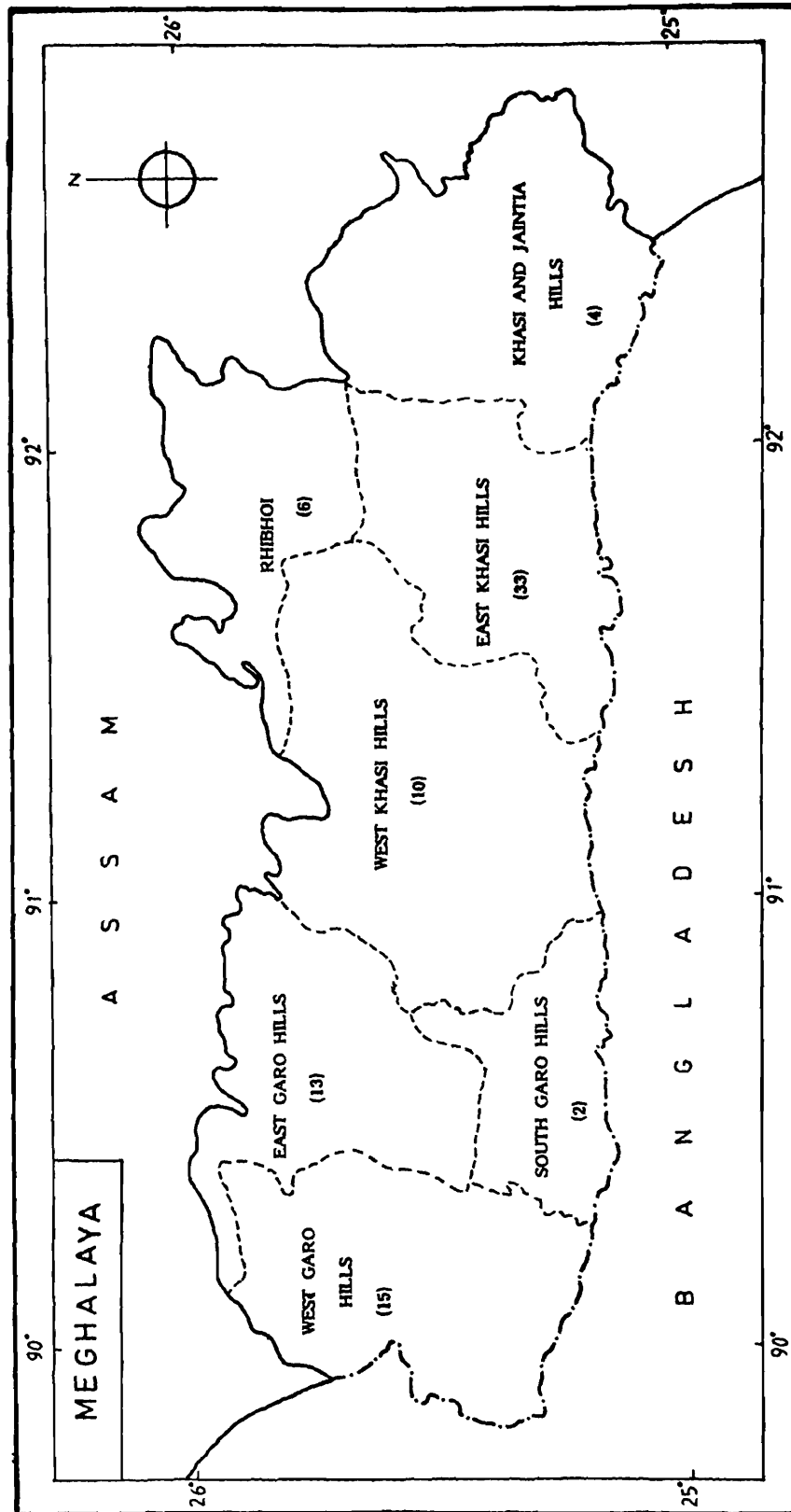
Burr's (1910) record of *Echinosomsumatranum* (Haan) from 'Khasi Hills, Sibsagar' is from Assam. *Nannisolabis formicoides* Burr, has been reported from Meghalaya by Steinmann (1983) is also doubtful since only females are recorded. Moreover, this species is recorded by its type specimens from Western Ghats, South India and represents autochthonus form from Indian Pennisular Plateau.

The present study deals with 49 species under 31 genera, including two species viz., *Marava sakaii* and *Chaetospania Kapoori* described as new to science. Besides, following synonymies are proposed : *Kosmetor bosei* Kapoor under *Eudohrnia metallica* (Dohrn) and *Ancchura virgae* Kapoor and *Forficula cherapunjiae* Kapoor under *Forficula planicollis* (Kirby). The type material of synonymised species has been examined.

The total number of species recorded from the State represents 15.31% of Indian and 2.45% of world fauna which is estimated to be 320 and 2000 species, respectively.

During the course of study the material preserved in the Survey and procured from other institutes/museums in India and abroad were examined. Attempt was made to check the existing records of species through the available material.

Generally, in this, group males are necessary for proper determination of species since the taxonomy of the Order is mainly based on male genitalia. However, isolated females of common species could be placed with certain degree of accuracy on comparison with specimens of same



Map of Meghalaya showing districtwise distribution of species indicated by numbers inside brackets

sex in association with those of opposite sex. Diagnostic features of the species are given based on specimens from the area. Wherever, only females are available, the information about males is based on the specimens from adjoining States.

To have a general idea of external features and male genitalia, figs. 1-5 may be referred.

ZOOGEOGRAPHICAL NOTES

Most of the area comes under mountain or submountain zone with hill ranges varying between 1000 ft to 6000 ft. and enjoys heavy to very heavy rain fall. This has led to the growth of tropical monsoon forests with rich flora and fauna.

A perusal of Map and table will reveal that out of 49 species, maximum number i.e. 33 are recorded from East Khasi Hills district followed in descending order, i.e. 15 from West Garo Hills, 13 from East Garo Hills, 10 from West Khasi Hills, 6 from Ri-Bhoi, 4 from Jaintia Hills and 2 from South Garo Hills.

There is predominance of mountain dwelling forms which are represented by the members of genera *Aborolabis* Srivastava, *Nala Zacher*, *Homotages* Burr, *Timmonenus* Burr, *Allodahlia* Verhoeff, *Eudohrnia* Burr and *Forficula* L. Occurrence of genera, *Acrania* Burr, *Cranopygia* Burr, *Schizodiplatys* Steinmann, *Diplaty* Serville, *Haplodiplatys* Steinmann and *Echinosoma* Burr, indicate the presence of tropical and subtropical elements which are distributed both in mountain and submountain habitats.

The highest number of species from East Khasi Hills, indicate that it has been more thoroughly explored. Extensive surveys in the tracts of Garo Hills and Jaintia Hills may bring promise of knowledge about the distribution of species, especially that are known in the adjoining NE States, especially Assam.

PYGIDICRANOIDEA

PYGIDICRANIDAE

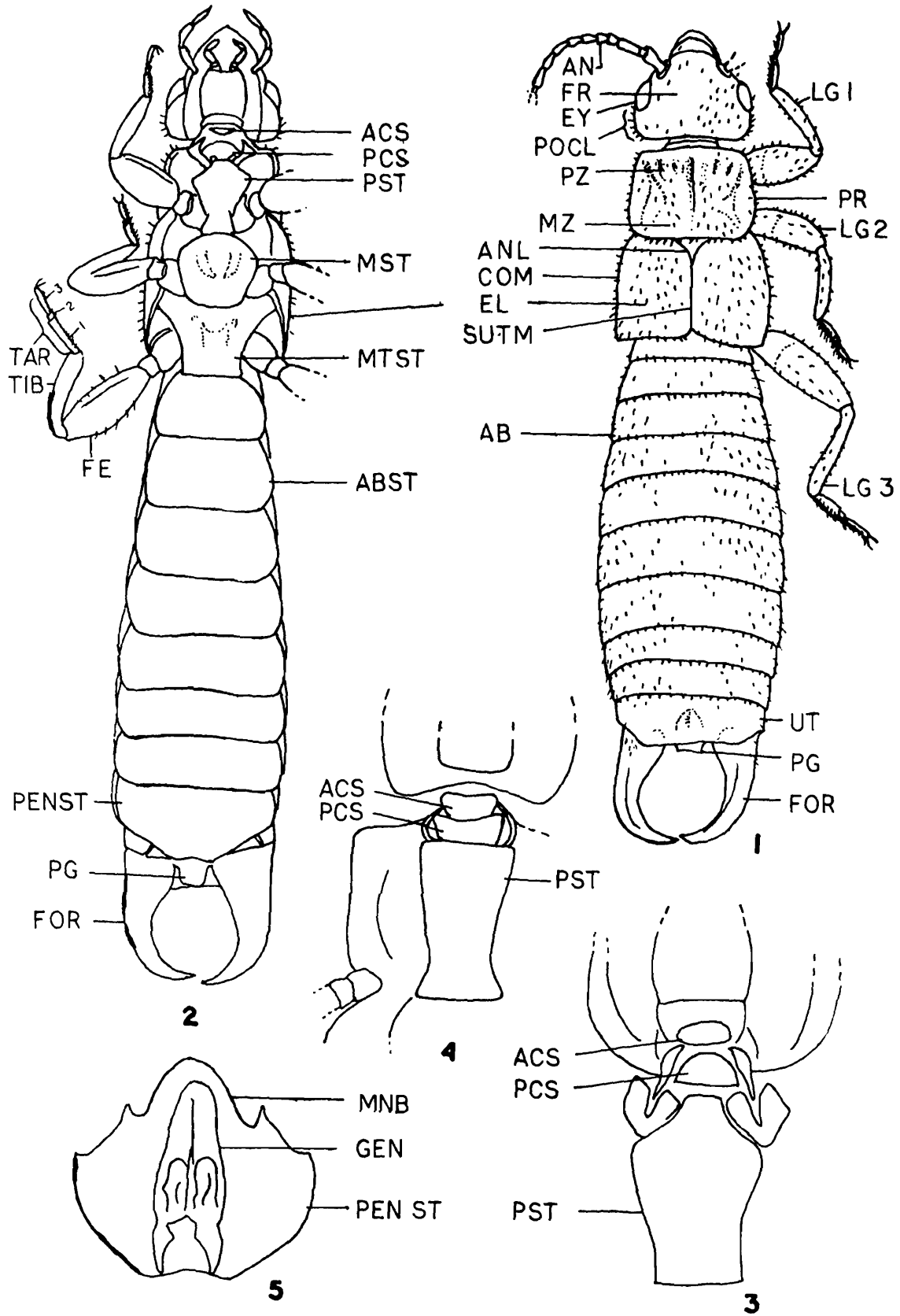
PYGIDCRANINAE

Key to genera (based on males only)

- 1(2). Parameres armed, may be provided with tooth or process internally or externally.....*Cranopygia* Burr
- 2(1). Parameres neither knobbed nor hooked externally or internally, occasionally external apical angle with a convexity, may be inflated internally; narrow, of uniform width or dilated at base and tapering apically, tip hooked or befid.....*Acrania* Burr

Acrania Burr

1915. *Acrania* Burr, *J. R. Micr. Soc.*, 1915 : 436 (Type-species : *Pygidicrana picta* Guerin Meneville, 1838).



Figs. 1-5: General external features.

1986. *Mucrocranopygia* Steinmann, *Das Tierreich*, **103** : 266 (Type-species : *Pygidicrana horsfieldi* Kirby, 1891).

1992. *Acrania*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 44.

Key to species (based on males only)

- 1(2). Distal lobes shorter than the whole armature excluding paramers, short, stout; virga at rest characteristically bent or placed, with a well marked sclerotised process near base.....
.....*A. assamensis* (Hincks)
- 2(1). Distal lobes longer than the whole armature, excluding parameres; virga thin, tubular and extending beyond the distal lobe.....*A. fletcheri* (Bharadwaj and Kapoor)

Acrania assamensis (Hincks)

Figs 6

1955. *Cranopygia assamensis* Hincks, *Ann. Mag. ant. Hist.*, (12) 8 : 819 (Male; India, Khasi Hills, Nangstoin State).

1986. *Paracranopygia assamensis*; Steinmann, *Das Tierreich*, **102** : 281.

1992. *Acrania assamensis*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 46

Diagnostic characters : Head pronotum, elytra and wings yellow but head on margins and frons marked with brownish black; pronotum with an irregular brownish stripe on either side of median line; elytra along the humeral fold and wings roughly along the external half blackish brown. Penultimate sternite with hind margin rounded with a median depression. Forceps contiguous at base, afterwards curved enclosing an oval space, terminating into a tooth internally afterwards margin straight and contiguous, crenulate. Genitalia as seen in fig. 6

Female Unknown

Measurements : Male : Length: body (including forceps) 33.0 mm.

Distribution : Meghalaya : West Khasi Hills, Nongstion.

Remarks : This species is so far known by its Holotype Male only.

Acrania fletcheri (Bharadwaj and Kapoor)

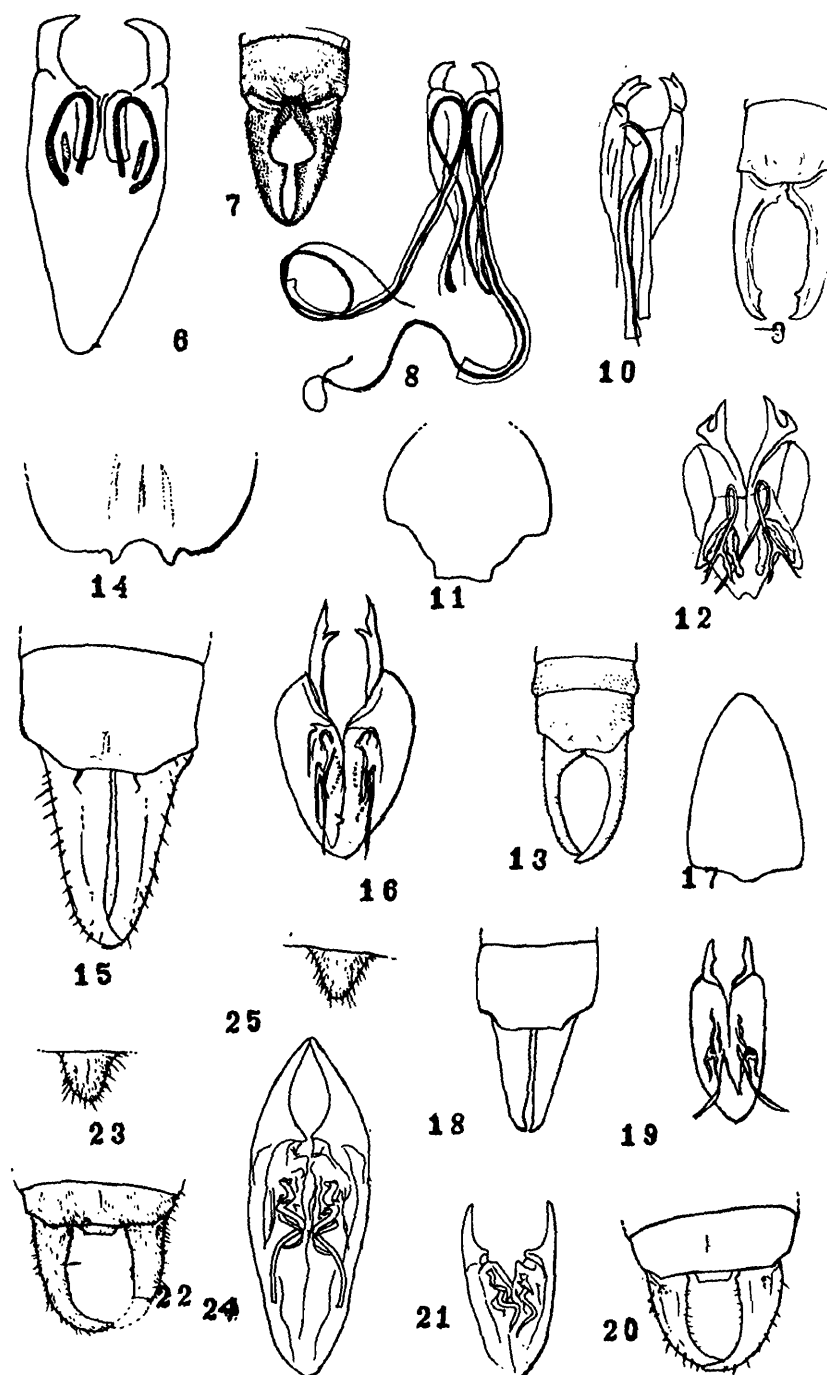
Figs. 7-8

1967. *Cranopygia fletcheri* Bharadwaj and Kapoor, *Bull. ent.*, 8 (2) : 1 (Male; India, Meghalaya, Shillong, 5000 ft.).

1986. *Epicranopygia fletcheri*; Steinmann, *Das Tierreich*, **102** : 270.

1992. *Acrania fletcheri*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 45.

Material examined : Meghalaya : East Khasi Hills dist. Shillong : Charfurlong, 1450 m, 1 nymph, 9. iv. 1991 (*S. K. Ghosh and party*), Fruit Garden, 1 male, 18. vi. 1976 (*M. S. Jayrwa*),



Figs; 6-25: *Acrania assamensis* (Hincks), Male, 6. Genitalia; *Acrania fletecheri* (Bharadwaj and Kapoor), Male, 7. Ultimate tergite and forceps, 8. Genitalia; *Cranopygia eximia* (Dohrn), Male, 9. Ultimate tergite and forceps, 10. Genitalia; *Nanopygia angustatus* (Burr) Male 11. Penultimate sternite, 12. Ultimate tergite and forceps, 13. Genitalia; *Diplatys papovi* Bey-Bienko; Male, 14. Penultimate sternite, 15. Ultimate tergite and forceps, 16. Genitalia; *Haplodiplatys shillongensis* Srivastava, Male, 17. Penultimate sternite, 18. Ultimate tergite and forceps, 19. Genitalia *Echinosoma convolutum* Hincks, Male, 20. Ultimate tergite and forceps, 21. Genitalia; *Echinosoma dentiferum* Borelli, Male, 22. Ultimate tergite and forceps, 23. Genitalia, female, 24-25. Pygidium.

Upper Nongthynmai (inside a house), 1 male, 30. v. 1974 (*M. Vasanth*), Garampani forest, 1 male, 13. xii. 1975 (*S. K. Chanda*).

Diagnostic characters : Male : General colour blackish brown or smoky black, head with yellow stripe on occiput and pronotum laterally yellow. Elytra and wings well developed. Penultimate sternite with hind margin in middle truncate. Forceps stout, depressed, internally at base contiguous with one or two teeth, branches incurved enclosing pear shaped space in a little beyond basal half, afterwards straight with apices gently hooked, internal margin crenulate. Genitalia as seen in fig. 8.

Female : Agrees with male in most characters except that forceps simple and straight.

Measurements : Male, Length: body-17.5-27.5 mm, forceps-5.3-6.5 mm; Female, Length : body-21.0 mm, forceps-4.5 mm.

Distribution : India : Meghalaya : East Khasi Hills and West Garo Hills dists.

Cranopygia Burr

1908. *Cranopygia* Burr, *Ann. Mag. nat. Hist.*, **8** (2) : 384, 389 (Type-species : *Pygidicrana cumingi* Dohrn, 1863).
1986. *Epicranopygia* Steinmann, *Das Tierreich*, **102** : 269 (Type-species : *Pygidicrana picta* Guerin-Meneville, 1839).
1986. *Paracranopygia* Steinmann, *Das Tierreich*, **102** : 227 (Type-species : *Forficula pallidipennis* Haan, 1842).
1992. *Cranopygia*; Srivastava, *Rec. zool. Surv. India*, **92** 91-4) : 43.

Cranopygia eximia (Dohrn)

Figs. 9-10

1863. *Pygidicrana eximia* Dohrn, *Stettin ent. Ztg.*, **24** : 49 (Male; Darjeeling).
1974. *Cranopygia meghalayana* Biswas and Ghosh in Biswas, Lahiri and Ghosh, *Orient Ins.*, **8** (4) : 420, figs. 1,2 (Male; India : Meghalaya, Garo and Khasi Hills).
1975. *Cranopygia ungulata* Srivastava, *Entomologists Rec. J. Var.*, **87** : 121, figs. A, B (Male, Female; India; Naga Hills).
1986. *Epicranopygia eximia*; Steinmann, *Das Tierreich*, **102** : 274.
1988. *Cranopygia eximia*; Srivastava, *Fauna of India, Dermaptera* : 81, figs. 91-94.
1992. *Cranopygia eximia*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 44.

Diagnositic characters: Male : General colour blackish brown, head with a yellow spot in middle; pronotum yellow with a broad fuscous stripe on either side of middle line and meeting posteriorly; elytra with a broad yellow stripe extending up to apical one third; wings yellow, externally blackish brown and legs yellow but femora shaded with black.

Head longer than broad. Penultimate sternite with hind margin in middle emarginate. Ultimate tergite and forceps and genitalia as seen in figs. 9-10.

Female : Forceps simple and straight.

Measurements : Male, Length : body-30.6-36.0 mm, forceps-6.0-9.5 mm; Female, Length : body-25.0-30.7 mm, forceps-5.8-8.0 mm.

Distribution : India : Meghalaya : East Garo Hills Dist.; Nagaland (Naga Hills).

Remarks : Srivastava (1988) has defined the status of the species on the basis of its 'Holotype M' and other material preserved in the Zoological Survey of India, Calcutta.

DIPLATYINAE

Key to the genera (on males only)

- 1(2). Parameres with a deep cleft along the axis dividing it into two lobes.....*Nannopygia* Dohrn.
- 2(1). Parameres not divided along the axis.
- 3(4). Parameres internally armed with one or more teeth, often separated by deep cavity or emargination.....*Diplatys* Serville
- 4(3). Parameres usually simple, internally without any prominent teeth, occasionally margin undulated, feebly emarginated or with fine serrations.....*Haplodiplatys* Hincks.

Nannopygia Dohrn

1863. *Nannopygia* Dohrn, *Stettin ent. Ztg.*, **24** : 60 (Monobasic, Type-species : *N. gerstaeckeri* Dohrn, 1863).

1974. *Schizodiplatys* Steinmann, *Acta zool. Hung.*, **20** (1 & 2) : 189 (Type species : *Cylindrogaster nigriceps* Kirby, 1891).

1992. *Nannopygia*; Srivastava *Rec. zool. Surv. India*, **92** (1-4) : 46 (Reinstated).

Nannopygia angustatus (Burr)

Figs. 11-13

1910. *Diplatys angustatus* Burr, *Fauna British India, Dermaptera* : 40, 43 (Male; North Bengal: Purneah Dist., Bhogaon).

1974. *Schizodiplatys angustatus*; Steinmann, *Acta zool. Hung.*, **20** (1 & 2) : 189.

1992. *Nannopygia angustatus*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 46.

Material examined : India : Meghalaya : East Garo Hills dist., Songsek, 1 male (genitalia mounted between two coverslips and pinned with the specimen), 21. ix. 1975 (*N. Muraleedharan*).

Diagnostic characters : Male : General colour dark brownish black. Eyes moderately prominent. Pronotum slightly broader than long, contracted posteriorly. Elytra and wings well

developed. Penultimate sternite posteriorly produced into a narrow lobe with its hind margin truncated and feebly emarginate in middle, characteristic (fig. 11). Ultimate tergite, forceps and genitalia as seen in figs. 12-13.

Female : Not known.

Measurements : Male, Length : body-9.0 mm, forceps-1.8 mm.

Distribution : India : Meghalaya : East Garo Hills dist., W. B. (North Bengal) and Arunachal Pradesh.

Remarks : In the collections of the Survey one male from Arunachal Pradesh, Itanagar is preserved.

Diplatys Serville

1831. *Diplatys* (pars) Serville, *Ann. Sci. Nat.*, **22** : 33 (Monobasic, Type-species : *Forficula macrocephala* Palisot de Beauvois, 1805).

1992. *Diplatys*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 47.

Diplatys papovi Bey-Bienko

Figs. 14-16

1959. *Diplatys papovi* Bey-Bienko, *Ent. Obzor.*, **38** (3) : 593 (Male, Female : China : Yunnan, Mangshih).

1988. *Diplatys papovi* : Srivastava, *Fauna of India, Dermoptera* : 113 (Male, Female; Meghalaya, Garo Hills, Anogiri).

Material examined : India : Maghalaya : West Garo Hills dist., Anogiri, 1 male (genitalia mounted between two coverslips and pinned with the specimen), 4 females, 8. xi. 1973 (S. Biswas).

Diagnosis characters : Male : General colour dark brownish black, wings internally at base yellow.

Head about as long as broad; eyes prominent, one and half times longer than the post-ocular area. Pronotum slightly longer than broad, sides straight, broadly rounded posteriorly. Elytra and wings well developed. Penultimate sternite weakly transverse, smooth, covered with fine pubescence, postero-lateral angles rounded, hind margin sub-truncate with a concavity in middle, on either side of it with an externally directed hooked tooth, margin finely serrated. Ultimate tergite, forceps and genitalia as seen in figs. 15-16.

Female : Agrees with males in most characters except that pronotum apically in middle yellow; head more elongated and forceps simple and straight.

Measurements : Male; Length : Body-8.7-11.0 mm, forceps-1.0-1.5 mm; Female : Length : body- 9.1-10.5 mm, forceps- 1.0-1.5 mm.

Distribution : India : Meghalaya : West Garo Hills dist. Also reported from China (Yunnan, Mangshih).

Remarks : Presence of this species in Meghalaya indicates the incursion of Indo-Chinese element in the N. E. India.

Haplodiplatys Hincks

1955. *Haplodiplatys* Hincks, *Syst. memo. Dermaptera*, **1** : 17 (Type species *Haplodiplatys niger* Hincks, 1955).
1974. *Haplodiplatys*; Steinmann, *Acta zool. Hung.*, **20** (1-2) : 201. (Redefined).
1992. *Haplodiplatys*; Srivastava, *Rec. zool. Surv. India*, **92** (1-4) : 50.

Haplodiplatys shillongensis Srivastava

Figs. 17-19

1988. *Haplodiplatys shillongensis* Srivastava, *Fauna of India, Dermaptera* : 192, figs 266-271 (Male, Female; India : Meghalaya : Shillong).

Material examined : India : Meghalaya : East Khasi Hills, Shillong, Holotype Male (genitalia mounted between two coverslips and pinned with the specimen), Paratype Female, 20. v. 1979, ex rotten wood (*G. K. Srivastava*), Risa Colony, Paratype 1 Male (hind portion broken off), 1. v. 1995, Tripura Castle Road, Paratype 1 Male, 17.7.1992.

Diagnositc characters : Male : General colour yellowish brown with varying degree of shades on certain body parts.

Head transverse; eyes prominent, distinctly longer than the post-ocular area. Antennae 20-segmented or more; elytra and wings well developed, covered with fine, short pubescence. Penultimate sternite longer than broad, hind margin in middle with a convex lobe, a triangular depression in middle in posterior one third. Ultimate tergite, forceps and genitalia as seen in figs. 18-19.

Female : Agrees with males in most characters except penultimate sternite obtusely triangular posteriorly and forceps simple and straight.

Measurements : Male : Length : body-9.8-10.8 m, forceps-1.0-1.1; Female : Length : body-13.1 mm, forceps-1.04 mm.

Distribution : India : Meghalaya : East Khasi Hills.

Remarks : In Srivastava (1988), length of forceps for Paratype Female is given as 10.4 m which is a misprint. It should read as "1.04 m"

ECHINOSOMATINAE

Echinosoma Serville

1839. *Echinosoma* Serville, *Hist. nat. Orth.* : 34 (Type species : *Forficula afra* palisot de Beauvois, 1805).

Remarks : Only two species of this genus are recorded from the area. Steinmann's (1983) record of *Echinosoma trilineatum* Borelli, from Meghalaya : Jaintia Hills is referable to *Echinosoma convolutum* Hincks (Srivastava, 1988, p. 260, figs. 16-18).

Key to species

- 1(2). Male genitalia with virga S-shaped, female pygidium truncate apically.....*E. convolutum* Hincks
 2(1). Male genitalia with virga apically almost straight or gently curved; female pygidium obtuse or convex posteriorly.....*E. dentiferum* Borelli

Echinosoma convolutum Hincks

Figs. 20-21

1959. *Echinosoma convolutum* Hincks, *Syst. Mono. Dermaptera*, 2 : 152 (Male, Female; Burma and Tonkin (Vietnam)).

1974. *Echinosoma garoensis* Lahiri and Ghosh (pars) in : Biswas, Lahiri and Ghosh, *Orient. Ins.*, 8 (4) : 421 (1 Females with truncate pygidium posteriorly; India : Meghalaya).

1988. *Echinosoma convolutum*; Srivastava, *Fauna of India, Dermaptera* : 226, figs. 326-331.

1983. *Echinosoma trilineatum* (nec Borelli); Steinmann, *Rev. suisse zool.*, 90 (3) : 543 (specimens from Meghalaya)

Material examined : India : Meghalaya : West Garo Hills, Anogiri, Paratype 1 Female of *Echinosoma garoensis* Lahiri and Ghosh, 8. ix. 1973, ex under the bark of Jack fruit tree.

Diagnostic characters : Male : General colour smoky brown, abdominal tergites reddish black or blackish brown.

Head about as long as broad; eyes almost equal to post-ocular area in length. Pronotum transverse, elytra and wings well developed. Sides of abdominal segments 5th to 7th obtuse angled and faintly carinated. Pygidium transverse, hind margin lightly concave. Ultimate tergite, forceps and genitalia as seen in figs. 20-21.

Female : Agrees with males in most characters except penultimate sternite obtuse posteriorly and forceps simple and straight. Pygidium vertical about as long as broad or longer, hind margin truncate with faint emargination in middle.

Measurements : Male : Length : body-9.5-12.6 mm, forceps-1.5-2.2 mm; Female : Length : body-8.4-14.5 mm, forceps-1.6-2.8 mm.

Distribution : India : Meghalaya : West Garo Hills; Arunachal Pradesh, Assam and West Bengal (Darjeeling dist. only). Known from Myanmar and Vietnam.

Remarks : This species is presently known from Meghalaya from a single female determined as *E. garoensis* Lahiri and Ghosh and single male from Meghalaya, Khasi Hills (now Jaintia Hills dist.), 12 km No. de Dewki, 500-800 m, 29. x. 1993 (*Besuchet Lobl*) det. by Steinmann (1983) as *Echinosoma trilineatum* (Borelli).

Echinosoma dentiferum Borelli

Figs. 22-25

1912. *Echinosoma dentiferum* Borelli, *Bull. Mus. Hist. nat. Paris*, **18** (4) : 223 (Male; Bhutan).
 1974. *Echinosoma garoensis* Lahiri and Ghosh (pars) in Biswas, Lahiri and Ghosh, *Orient Ins.*, **8** (4) : 421 (Holotype Male, Allotype Female and Paratype 1 Female with obtuse pygidium; India : Meghalaya).
 1988. *Echinosoma dentiferum*; Srivastava, *Fauna of India, Dermaptera* : 229, Figs. 332-338 (India : Arunachal Pradesh, Meghalaya, West Bengal and Uttar Pradesh; Bhutan).

Material examined : India : Meghalaya : Ri-Bhoi dist., Barapani along the old Barapani Road, 1 Male (Genitalia mounted between two coverslips and pinned with the specimen), 1 Female, 2 nymphs, 21. v. 1979; East Khasi Hills dist., on road from Mawsamai to Sella, 1 Female, 3 nymphs, 25. v. 1979 (G. K. Srivastava).

Diagnositc characters : Male : General colour blackish brown; thick setae and fine pubescence all over the body, sides of abdomen with long and stiff hairs besides long pubescence, forceps with long and short, fine yellow pubescence in basal half.

Head about as long as broad; pronotum transverse. Elytra and wings well developed. Penultimate sternite transverse; punctation shallow and coalescent, covered with fine, long, yellow pubescence, hind marginate emarginate in middle. Pygidium vertical, weakly transverse, hind margin feebly concave and laterally with a fine tubercle. Ultimate tergite and forceps and genitalia as seen in figs. 22-23.

Female : Pygidium triangular narrowed posteriorly or comparatively broader with hind margin obtuse or convex (Figs. 24-25).

Measurements : Male : Length : body-11.5-13.0 mm, forceps-1.7-1.8 mm; Female : Length : body-10.0-10.5 mm, forceps-1.45-1.5 mm.

Distribution : India : Meghalaya : Ri-Bhoi, East Khasi Hills and West Garo Hills; Arunachal Pradesh, West Bengal and Uttar Pradesh. Also known from Bhutan.

PROLABISCINAE

Parapsalis Borelli

1921. *Parapsalis* Borelli, *Boll. Musei. Zool. Anal. Comp. R. Univ. Torino*, **35** (736) : 3 (Type species : *Parapsalis laevis* Borelli, 1921).
1959. *Protolabis* Bey-Bienko, *Ent. Obozr.*, **38** : 579 (Type-species : *Protolabis aroliata* Bey-Bienko, 1959).
1959. *Prolabisca* Bey-Bienks, *Ent. Obozr.*, **38** : 943 (Type-species : *Prolabisca aroliata* (Bey-Bienko, 1959).
1988. *Parapsalis*; Srivastava, *Fauna of India, Dermaptera* : 238 (Type-species : *Chaetospania infernalis* Burr, 1913 (= *Parapsalis laevis* Borelli, 1921 and *Prolabisca aroliata* (Bey-Bienko, 1959).

Parapsalis infernalis (Burr)

Figs. 26-28

1913. *Chaetospania infernalis* Burr, *Ent. Mitt. Berlin*, **2** : 67, fig. 3 (Male, Dorssal view).
1978. *Prolabisca infernalis*; Nishikawa, *Trans. Shikoku ent. Soc.*, **13** (1-2) : 44, figs. 1-9.
1984. *Prolabisca infernalis*; Srivastava, *Bull. zool. Surv. India*, **5** (2-3) : 105, figs. 5-7 (Lectotype Male, Paralactotype 1 Female and 1 nymph designated).
1988. *Parapsalis infernalis*; Srivastava, *Fauna of India. Dermaptera* : 238, figs. 345-351.

Material examined : India : Meghalaya : Ri-Bhoi dist., Barapani, along side old Barapani road, 1 male (genitalia mounted between two coverslips and pinned with the specimen), ex under bark, 21. v. 1979 (G. K. Srivastava); East Garo Hills dist., Dianadubi, 1 nymph, 18. xi. 1974 (T. Sengupta).

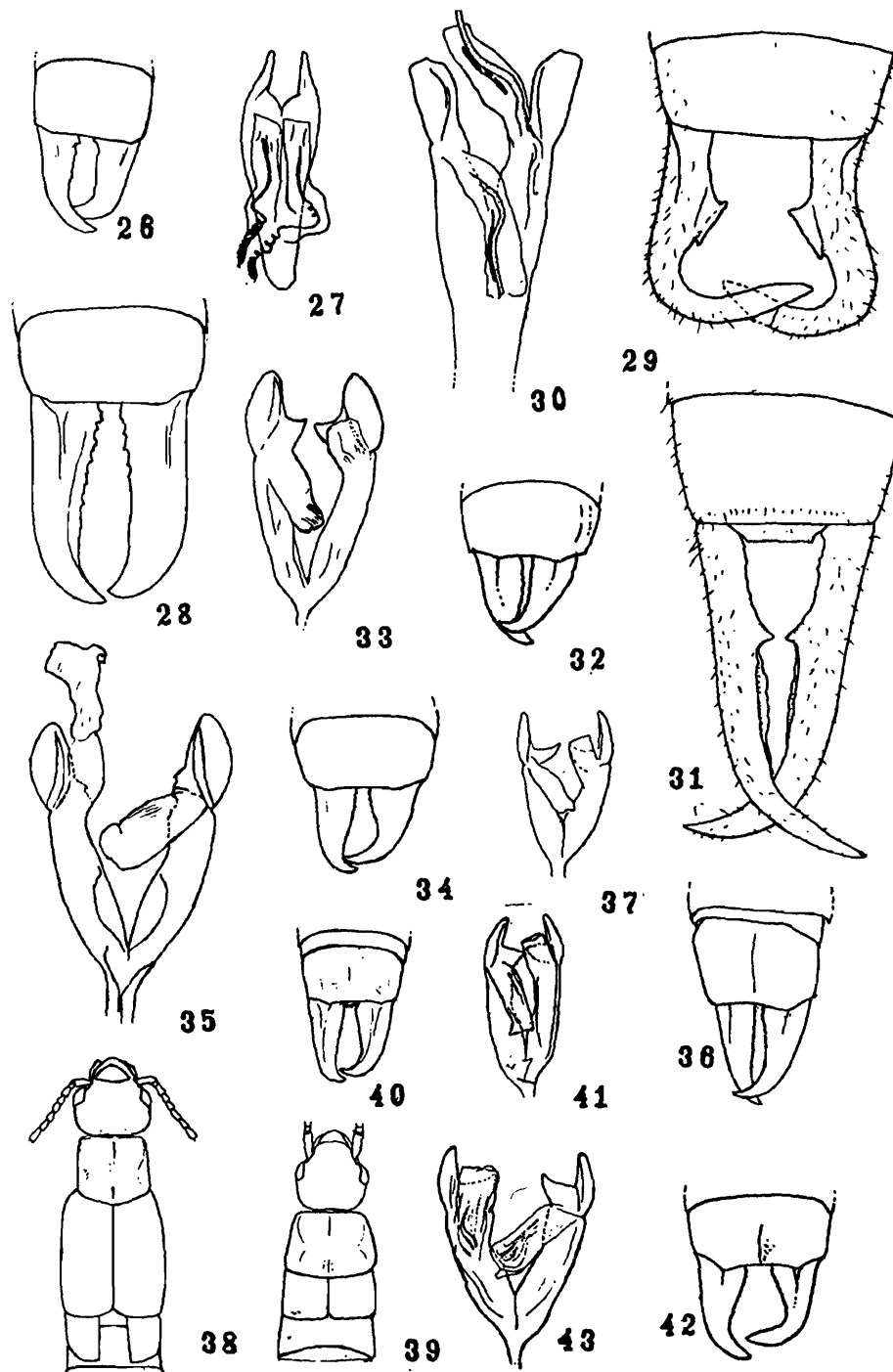
Diagnostic characters : Male : General colour shining dark brown or black. Elytra and wings finely pubescent. Form depressed.

Head weakly depressed, smooth; eyes smaller than post-ocular area. Pronotum longer than broad. Elytra abbreviated glabrous with scutellum visible, sometimes well developed. Penultimate sternite transverse, broadly rounded posteriorly with slight emargination in middle. Ultimate tergite and forceps and genitalia as seen in figs. 26-27.

Female : Penultimate sternite triangularly rounded posteriorly and forceps simple and straight (fig. 28).

Measurements : Male : Length : body-6.5-8.5 mm, forceps- 1.2-1.5 mm; Female : Length: body-6.1-7.1 mm, forceps-1.3-2.0

Distribution : India : Meghalaya : Ri-Bhoi and East Garo Hills dists., West Bengal (Darjeeling and Jalpaiguri dists.), Arunachal Pradesh. Also know from Bhutan, China (South), Taiwan and Borneo.



Figs. 26-43: *Parapsalis infernalis* (Burr), Male, 26. Ultimate tergite and forceps, 27. Genitalia, Female, 28. Ultimate tergite and forceps; *Platylabia brindlei* Srivastava, Male, 29. Ultimate tergite and forceps, 30. Genitalia, Female, 31. Ultimate tergite and forceps; *Aborolabis emarginata* Srivastava, Male, 32. Ultimate tergite and forceps, 33. Genitalia; *Aborolabis meghalayaensis* Srivastava, Male, 34. Ultimate tergite and forceps, 35. Genitalia; *Aborolabis kalaktangensis* Srivastava, Male, 36. Ultimate tergite and forceps, 37. Genitalia; *Aborolabis sikkimensis* Srivastava, Male, 38-39. Anterior portion of body, 40. Ultimate tergite and forceps, 41. Genitalia; *Aborolabis pervicina* (Burr), Male, 42. Ultimate tergite and forceps, 43. Genitalia.

Remarks : This species is unique since it shares the characters of Pygidicruidae and Anisolabididae.

ANISOLABOIDEA

ANISOLABIDIDAE

PLATYLABIINAE

1867. *Platylabia* Dohrn, *Stettin. ent. Ztg.*, **28** : 347 (Type-species : *Platylabia major* Dohrn, 1867).
 1876. *Labidophora* Scudder, *Proc. Boston Soc. nat. Hist.*, **18** : 297 (New name for *Platylabia* Dohrn because of its similarity with *Platylabus* Wesm., 1845).
 1910. *Plaex* Burr, *Fauna British India. Dermaptera* : 68 (Type-species : *Platylabia sparattoides* (Bormans, 1900 = *Platylabia major* Dohrn, 1867).
 1981. *Platylabia*; Srivastava, *Rec. zool. Surv. India*, **4** (1) : 103.

Platylabia brindlei Srivastava

Figs. 29-31

1981. *Platylabia brindlei* Srivastava, *Bull. zool. Surv. India*, **4** (1) : 106 (Male, Female; India : Meghalaya, Cherrapunji nr. Mawsami cave).

Material examined : India : Meghalaya : East Khasi Hills, Cherrapunji, near Mawsami cave, 1300 m, Holotype Male (genitalia mounted between two coverslips and pinned with the specimen), Paratype 1 Female 25. v. 1979 (G. K. Srivastava).

Diagnostic characters : Male : Form depressed, finely pubescent. General colour brownish black; antennae with one or two pre-apical segments whitish.

Head transverse; antennae 24-segmented; pronotum longer than broad. Elytra normal, scutellum visible and wings abbreviated as narrow lateral lobes projecting beyond elytra. Penultimate sternite broadly rounded posteriorly with a slight emargination in middle. Pygidium vertical, strongly transverse, narrowed posteriorly and margin straight. Ultimate tergite and forceps and genitalia as seen in figs. 29-30.

Female : Pygidium vertical; forceps almost straight, internally armed at middle with a tooth and margin dorsally as well as ventrally serrated (fig. 31).

Measurements : Male : Length : body-9.1 mm, forceps-1.6 mm, Female : Length : body-9.9 mm, forceps-2.7 mm.

Distribution : India : Meghalaya : East Khasi Hills dist.

Remarks : This species is known by its type specimens only.

ANISOLABIDINAE

Key to genera (based on males only)

- 1(2). Paramers armed internally at base with a tooth long and narrow of varying size.....
 *Aborolabis* Srivastava

- 2(1). Parameres about as long a broad, roughly square..... *Euborellia* Burr

Aborolabis Srivastava

1969. *Aborolabis* Srivastava, *Entomologists Rec. J. Var.*, **18** : 246, fig. 1 (Type-species : *Anisolabis pervicina* Burr, 1913).

Key to species (based on males only)

- 1(2). Penultimate sternite emarginate posteriorly, parameres broader.....*A. emarginata* Srivastava
 2(1). Penultimate sternite entire or with a slight emargination in middle
 3(4). Parameres longer than its internal basal tooth.....*A. meghalayensis* Srivastava.
 4(3). Parameres about as long as its internal basal toot
 5(6). Sides of abdominal segments ecarinate.....*A. kalaktangensis* Srivastava
 6(5). Sides of certain abdominal segments carinate
 7(8). Elytra and wings well developed or former abbreviated and latter absent; sides of abdominal segments 6th to 9th obtuse angled posteriorly and with a linear convexity; ultimate tergite quadrate.....*A. sikkimensis* Srivastava
 8(7). Apterous; sides of abdominal segments 6th to 9th acute angled posteriorly, carinate; ulitmate tergite generally transverse.....*A. pervicina* (Burr)

Aborolabis emarginata Srivastava

Figs. 32-33

1976. *Aborolabis emarginata* Srivastava, *J. zool. Soc. India*, **26** (1 & 2) : 134, figs. 1C-E (Male, Female; India: Arunachal Pradesh).

In press *Aborolabis emarginate*; Srivastava, *Rec. zool. Surv. India*.

Material examined : India : Meghalaya : East Khasi Hills dist., Shillong : Fruit Garden, 1 Male, 16. vii. 1979, Malki Forest, 3 Males, 23. ix. 1975, 1 Female, 7. viii. 1974, Laitkor Forest, 1 Female, 21. iv. 1976, Lumpring, 1 Female, 5. x. 1974 (*M. S. Jyrwa*); Laitkor Forest, 1 Male, 18. xii. 1981 (*R. Mathew and party*); Malki Forest, 2 Males (genitalia taken out and kept in the same vial as the specimens), 13. iii. 1973, 4 nymphs, 29. iv. 1972, Fruit Garden, 1 Male, 24. iv. 1975, Motinagar, 1 Male (genitalia taken out and kept in the same vial as the specimen), 1 Female, 18. ix. 1973 (*R. S. Giri*); West Khasi Hills dist., Mawphlong, 2 Males, 1 Female, 22. v. 1976 (*S. Biswas*); 2 Males, 1 Female, 11. v. 1972 (*A. K. Ghosh*), 1 Male (genitalia mounted between two coverslips and pinned with the specimen), 9. vi. 1990 (*G. Prasad*); 3 Males (genitalia taken out and kept in the same vial as the specimen), 1 Female and 2 nymphs, 18. v. 1979 (*P. T. Cherian*), 2 Males, 5 Females, 18. v. 1979 (*G. K. Srivastava*).

Diagnostic characters : Male : General colour blackish brown, Antennae with three basal and one or two preapical segments yellowish.

Head about as long as broad; pronotum slightly expanded posteriorly. Apterous; sides of abdominal segments 6th to 9th acute angled, carina present on 7th and 8th only. Penultimate sternite with posterior margin broadly emarginate. Ultimate tergite and forceps and genitalia as seen in figs. 32-33.

Female : Sides of abdominal segments rounded, ecarinate and forceps simple and straight.

Measurements : Male : Length : body- 11.25-11.7 mm, forceps 1.8-2.0 mm; Female : Length : body-9.25-12.9 mm, forceps-1.8-2.0 mm.

Distribution : India : Meghalaya : East Khasi Hills dist. and West Khasi Hills dist.; Arunachal Pradesh.

Aborolabis meghalayaensis Srivastava

Figs. 34-35

In press. *Aborolabis meghalayaensis* Srivastava, *Rec. zool. Surv. India* (Male, female; India : Meghalaya, forest around Mawsamai Cave, Cherrapunji, 1300 m).

Material examined : India : Meghalaya : East Khasi Hills dist., Forest around Mawsami cave, Cherrapunji, Holotype Male (genitalia mounted between two coverslips and pinned with the specimen), Paratype 1 Female, 25. v. 1979 (*G. K. Srivastava*).

Diagnostic characters : Male : General colour dark brownish black with traces of red on certain body parts.

Head about as long as broad; eyes shorter than post-ocular area. Pronotum about as long as broad, gently widened posteriorly. Apterous. Abdomen punctate, sides of segments 5th to 9th acute angled posteriorly but segments 7th to 9th only rugose. Penultimate sternite triangular, scarcely emarginate in middle posteriorly. Ultimate tergite and forceps and genitalia as seen in figs. 34-35.

Female : Forceps simple and straight.

Measurements : Male : Length : Body-13.1 mm, forceps-2.1 mm; Female : Length : body-14.5 mm, forceps-2.7 mm.

Distribution : India : Meghalaya : East Khasi Hills. So far this species is known from the type locality only.

Aborolabis kalaktangensis Srivastava

Figs. 36-37

1972. *Aborolabis kalaktangensis* Srivastava, *Rec. zool. Surv. India*, **66** (1-4) : 134, figs. 1C-E (male, Female; Arunachal, Kameng dist. Kalaktang village).

Material examined : India : Meghalaya : East Khasi Hills dist., Shillong, Lumparing, 1 Male (Genitalia mounted between two coverslips and pinned with the specimens), 9. viii. 1976 (*M. S. Jayrwa*).

Diagnostic characters : Male : General colour brownish with traces of black on abdomen only. Head with frons convex, sutures obsolete; eyes shorter than post-ocular area. Pronotum quadrate. Apterous. Abdomen long, slender, finely punctulate, sides of segments 6th to 9th acute angled, ecarinate and smooth. Penultimate sternite with posterior margin rounded. Ultimate tergite and forceps and genitalia as seen in figs. 36-37.

Female : Forceps simple and straight.

Measurements : Male : Length : body-9.3-13.3 mm, forceps-1.6-1.72 mm; Female : Length-12.21-7.42 mm, forceps-1.33-1.72 mm.

Distribution : India : Meghalaya, East Khasi Hills dist.; Arunachal Pradesh and Sikkim.

Aborolabis sikkimensis Srivastava

Figs. 38-41

In press. *Aborolabis sikkimensis* Srivastava, *Rec. zool. Surv. India* (Male, Female; India : Sikkim, Rangpo).

Material examined : India : Meghalaya : West Khasi Hills dist., Mawphlong, 2 Males (macropterous), 1 Male (genitalia mounted between two coverslips and pinned with the specimen), 18. v. 1979 (P. T. Cherian).

Diagnostic characters : Male : General colour dark brownish black; basal antennal segment with a yellow ring.

Head longer than broad; eyes shorter than post-ocular area. Pronotum about as long as broad, expanded posteriorly. Elytra well developed or abbreviated, i.e., shorter than pronotum in length. Sides of abdominal segments 6th to 9th obtuse angled posteriorly, with a linear convexity, weaker on 5th and 9th. Penultimate sternite truncate posteriorly. Ultimate tergite and forceps and genitalia as seen in figs. 40-41.

Female : Sides of abdominal segments convex posteriorly, without linear convexity and forceps simple and straight.

Measurements : Male : Length : body-10.2-10.6 mm, forceps-2.0; Female : Length : body-11.6 mm, forceps-2.1 mm.

Distribution : India : Meghalaya : West Khasi Hills dist. and Sikkim.

Remarks : This species can be easily distinguished by the presence of elytra and wings; slender build and a linear convexity on the sides of abdominal segments 6th to 9th.

Aborolabis pervicina (Burr)

Figs. 42-43

1913. *Anisolabis pervicina* Burr, *Rec. Indian Mus.*, **8** (2) : 137 (Male Female; India : Assam and Arunachal Pradesh).

1969. *Aborolabis pervicina*; Srivastava, *Entomologist's Rec. J. Var.*, **81** : 246, fig. 1.

Diagnositc characters : Male : General color shining reddish to blackish brown.

Head tringular; eyes shorter than post-ocular area. Pronotum quadrate, gently widened posteriorly. Abdomen punctate, sides of segments 6th to 9th acute angled posteriorly, carinate and striate. Penultimate sternite broadly rounded, punctulated, posterior margin truncate. Ultimate tergite and forceps and genitalia as seen in figs. 42-43.

Female : Sides of abdominal segments ecarinate and convex; forceps simple and straight.

Measurements : Male : Length : body-8.0-16.0 mm, forceps-2.0-3.0 mm; Female : Length : body-7.0-18.0 mm, forceps-2.0-3.5 mm.

Distribution : India : Meghalaya : East Garo Hills, East and West Khasi Hills dist. (records to be checked), Arunachal Pradesh, Sikkim and West Bengal (North).

Remarks : Amongst the Anisolabid specimes examined from Meghalaya during the course of present study, this species could not be found. However, Srivastava and Lahiri (1983) have recorded this species on a large series from various places in Meghalaya. Perhaps it may have specimens of this as well as other species recorded in preceding pages. A proper checking is needed to establish the occurrence of *A. pervicina* from the area which is one of the most common species in the mountain and submountain regions of NE India.

Euborellia Burr

1909. *Borellia* Burr, *Deut. Ent. Z.*, **190** : 325 (Type-species : *Anisolabis moesta* (Gene) in Serville, 1839).

1910. *Euborellia* Burr, *Proc. U. S. Natl. Mus.*, **38** : 448, Foot note (New name for *Borellia* Burr, 1909 preoccupied by *Borellia* Rehn, 1906, Orthoptera).

Key to species (based on males only)

- 1(2). Usually apterous.....*E. annulipes* (Lucas)
 2(1). Elytra and wings well developed
 3(4). Sides of abdominal segments ecarinate.....*E. plebeja* (Dohrn)
 4(3). Sides of abdominal segments carinate.....*E. femoralis* (Dohrn)

Euborellia annulipes (Lucas)

Figs. 44-45

1847. *Forficesila annulipes* Lucas, *Annl. Soc. ent. Fr.*, (2) **5** : 84 (Sex ?; Jardin des Plantes Paris (introduced)).

1915. *Euborellia anulipes*; Burr, *J. R. micr. Soc.*, **1915** : 527, 528 and 545.

Material examined : India : Meghalaya : West Khasi Hills, Mawphlong, 5 Males (1 Male, with genitalia), 18. v. 1979 (*P. T. Cherian*), 1 Male, 25. v. 1979 (*G. K. Srivastava*); East Garo Hills, Rongrengiri, 1 Male, 21. iv. 1973 (*S. Biswas*).

Diagnostic characters : Male : General colour shining blackish brown.

Elytra and wings generally absent rarely present; abdomen with sides of segments 6th to 9th acute angled and carinate. Penultimate sternite with hind margin rounded in middle. Ultimate tergite and forceps and genitalia as seen in figs. 44-45.

Female : Sides of abdominal segments convex and ecarinate; forceps simple and straight.

Measurements : Male : Length : body-9.5-10.5 mm, forceps-1.9-2.1 mm; Female : body-11.0-13.6 mm, forceps-2.6-3.1 mm.

Distribution : India : Meghalaya : West Khasi Hills, East Garo Hills dist.

It is known to occur throughout the world.

Remarks : The general body colour and size are highly variable.

***Euborellia plebeja* (Dohrn)**

Figs. 46-48

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

1927. *Euborellia plebeja*; Hebard, *Proc. Acad. nat. Sci. Philad.*, **79** : 27.

Material examined : India : Meghalaya : East Khasi Hills; Cherrapunji, on road from Mawsamai to Sella, 3 Males (1 male with genitalia mounted between two coverslips and pinned with the specimen), ex under loose bark of a tree stump, 26. v. 1979 (*G. K. Srivastava*).

Diagnostic characters : Male : General colour blackish brown to reddish.

Head slightly longer than broad; eyes smaller than post-ocular area. Elytra and wings well developed; sides of abdominal segments acute angled posteriorly but ecarinate. Penultimate sternite gently narrowed posteriorly with hind margin obtuse and scarcely emarginate in middle. Ultimate tergite and forceps and genitalia as seen in figs. 47-48.

Female : Forceps simple and straight.

Measurements : Male : Length : body-9.1-10.1 mm, forceps-1.6-2.0 mm; Female : Length : body-11.4-13.0 mm, forceps-2.5-3.0 mm.

Distribution : India : Meghalaya : East Khasi Hills.

Widely spread in the Oriental Region, perhaps with world wide distribution.

***Euborellia femoralis* (Dohrn)**

Figs. 49-51

1863. *Labidura femoralis* Dohrn, *Stettin ent. Ztg.*, **24** : 321 (Female; Sri Lanka).

1954. *Euborellia femoralis*; Hincks, *Verh. Naturf. Ges. Basel*, **65** (1) : 11, fig. 2 (Male genitalia).

Material examined : India : Meghalaya : East Khasi Hills dist. on road from Mawsamai to Sella, 1 Male (genitalia mounted between two coverslips and pinned with the specimen), ex under loose bark of tree stump, 26 v. 1979 (*G. K. Srivastava*).

Diagnostic characters : Male : General colour brownish black. Pronotum longer than broad, gently rounded posteriorly; elytra and wings well developed; sides of abdominal segments 7th to 9th acute angled posteriorly and carinate. Penultimate sternite briefly rounded posteriorly. Ultimate tergite and forceps and genitalia as seen in figs. 50-51.

Female : Sides of abdominal segments posteriorly convex and forceps simple and straight.

Measurements : male : Length : body-8.4-9.2 mm, forceps-1.5-1.6 mm; Female : Length : body-8.7-9.6 mm, forceps-1.7-1.8 mm.

Distribution : India : Meghalaya : East Khasi Hills dist.

Widely distributed in India, Bhutan, Nepal, Myanmar, Sri Lanka, Indonesia (Sumatra, Java, Borneo and Sumba) and China.

BRACHYLABIDINAE

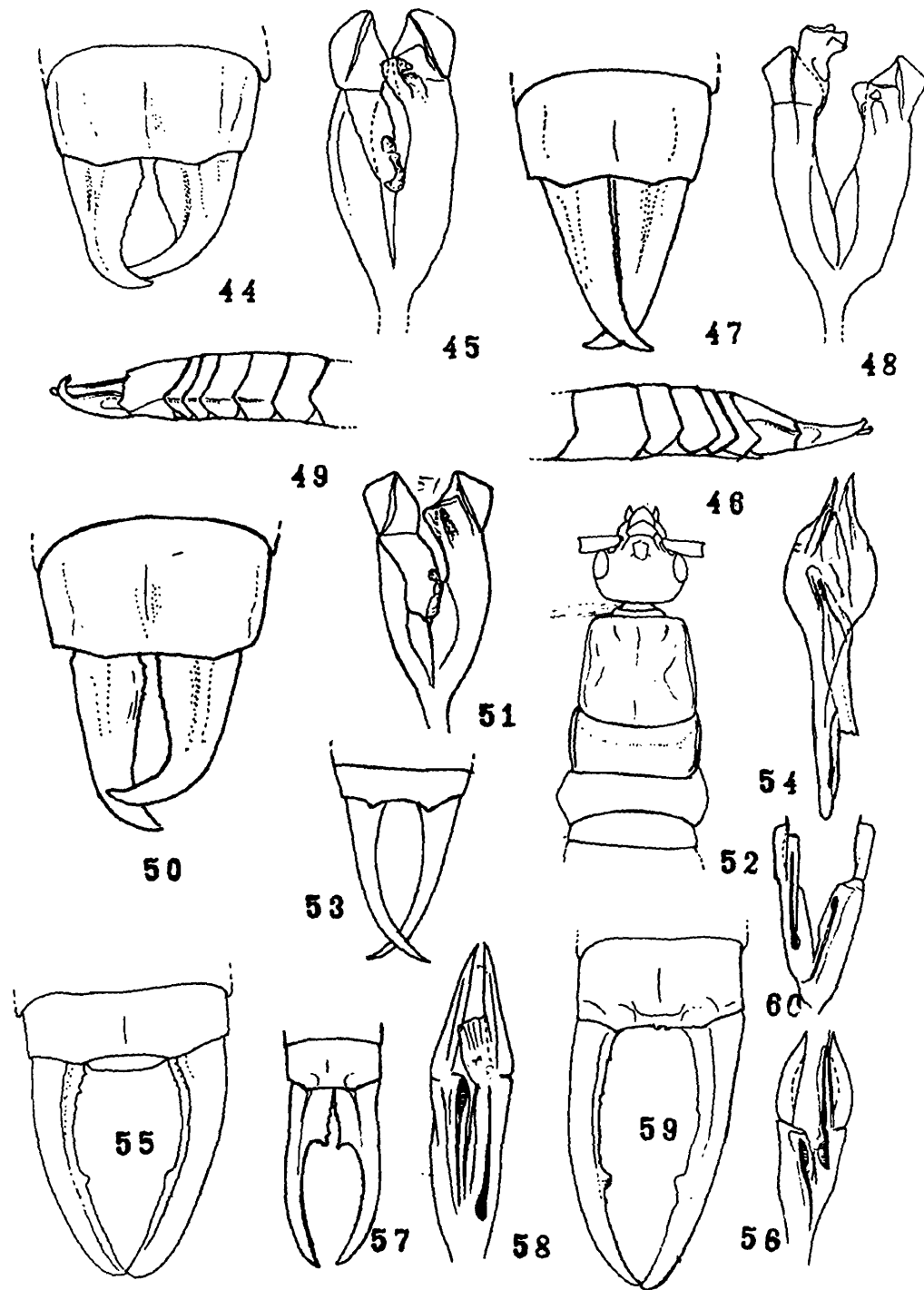
Genus *Metisolabis* Burr

1910. *Metisolabis* Burr, *Fauna British India. Dermaptera* : 108 (Type-species : *Brachylabis voeltzkowi* Burr, 1908).
1966. *Metisolabis*; Popham and Brindle, *Entomologist*, 99 : 245 (= *Isolabis* Verhoeff, 1902).
1969. *Metisolabis*; Brindle, *Fauna de Madagascar, Tannarive*, 30 : 40.
1989. *Metisolabis* : Steinmann, *Das Tierreich*, 105 : 281.

Metisolabis caudelli (Burr)

Figs. 52-54.

1908. *Brachylabis caudelli* Burr. *Ann. Mag. nat. Hist.*, (18) 2 : 251 (Holotype Female; Burma, Carin Cheba).
1910. *Metisolabis caudelli*; Burr, *Fauna British India, Dermaptera* : 109.
1968. *Isolabis caudelli*; Popham and Brindle, *Entomologist*, 99 : 245.
1982. *Metisolabis caudelli*; Srivastava, *Entomologica Basilliensia*, 7 : 63, figs. 2-4.
1983. *Ctenisolabis fletcheri* (nec Burr, 1910); Steinmann, *Revue suisse zool.*, 90 (3) : 554 (1 Female, India : West Bengal, Darjeeling).
1983. *Ctenisolabis aciculata* Steinmann, *Revue suisse zool.*, 90 (3) : 545, fig. 3 (1 Female India : Meghalaya).
1983. *Ctenisolabis loebli* Steinmann, *Revue suisse zool.*, 90 (3) : 546, fig. 4 (1 Female; India : W. B., Darjeeling).
1983. *Brachylabis philetas* (nec Burr, 1901); Steinmann, *Revue suisse zool.* 90 (3) : (1 Male nec Female; India : W. B., Darjeeling dist., Algarah).
1992. *Metisolabis caudellii*; Srivastava, *Rec. zool. Surv. India*, 92 (1-4) : 54 (Above synonymy proposed).



Figs. 44-60: *Euborellia annulipes* (Lucas), Male, 44. Ultimate tergite and forceps, 45. Genitalia; *Euborellia plebeja* (Dohrn), Male, 46. Sides of abdominal segments, 47. Ultimate tergite and forceps, 48. Genitalia; *Euborellia femoralis* (Dohrn), Male, 49. Sides of abdominal segments, 50. Ultimate tergite and forceps, 51. Genitalia; *Metisolabis caudelli* (Burr), Male, 52. Anterior portion of body, 53. Ultimate tergite and forceps, 54. Genitalia; *Nala lividipes* (Dufour), Male, 55. Ultimate tergite and forceps, 56. Genitalia; *Nala nepalensis* (Burr), Male, 57. Ultimate Tergite and Forceps, 58. Genitalia; *Labidura riparia* (Pallas) Male, 59. Ultimate tergite and forceps, 60. Genitalia.

Material examined : India : Meghalaya : East Khasi Hills, Shillong; Nongthymma, 1 Female, 21. viii. 1974 (*R. S. Giri*), Motinagar, 2 Males, 30. v. 1974 (*S. Biswas*), Risa Colony, 1 Female, 23. viii. 1971 (*R. S. Giri*), Motinagar, 1 Female, 6. ix. 1960 (*S. N. Prasad*).

Diagnostic characters : Male : General colour dark blackish brown; body covered with fine pubescence. Head longer than broad; basal antennal segment longer than the distance between antennal bases; eyes about as long or longer than post-ocular area. Apterous, mesonotum laterally with a sharp, raised carina. Penultimate sternite transverse, broadly rounded posteriorly with a distinct emargination in middle. Ultimate tergite and forceps and genitalia as seen in figs. 53-54.

Female : Forceps simple and straight.

Measurements : Male : Length : body-9.3-10.3 mm, forceps-1.2-1.3 mm; Female : Length : body-8.2-13.1 mm, forceps-1.3-2.2 mm.

Distribution : India : Meghalaya : East Khasi Hills dist.; West Bengal and Arunachal Pradesh.

Also recorded from Myanmar and Borneo, latter needs checking.

Remarks : Length of eye in relation to post-ocular area and the shape of forceps, in males, are variable to some extent.

LABIDURIDAE

NALINAE

Genus *Nala* Zacher

1910. *Nala* Zacher, *Ent. Rdsch.*, 1910 : 29 (Type-*Labidura lividipes* H. Luc. = *Forficula lividipes* Dufour, 1828).

1910. *Paralabidura* Burr. *Trans. R. ent. Soc. Lond.*, 1910 : 184 (Type-species : *Forficula lividipes* Dufour, 1828).

Key to species (based on males only)

- 1(2). Forceps with branches cylindrical, incurved, often with a minute tooth in apical one third.....*N. lividipes* (Dufour).
 2(1). Forceps with inner dilation in basal half, afterwards branches cylindrical, almost straight with apices gently hooked.....*N. nepalensis* (Burr).

Nala lividipes (Dufour)

Figs 55-56

1820. *Forficula pallipes* Dufour, *Ann. gener. des Phys. Bruxelles*, 4 : 316, pls. 116, fig. 7, 7a and 7b (Male, Female : Lower Catalonia, Spain).

1828. *Forficula lividipes* Dufour, *Ann. Sci. Nat.*, 13 : 340 (New name proposed).

1911. *Nala lividipes*; Burr, *Genera Insect.*, 122 : 36

Material examined : India : Meghalaya : East Garo Hills dist., Songsek, 1 Male, 1 Female, 330 m, 18. xi. 1973 (*S. Biswas*), Darugiri, 1 Male, 2 Females, at light, 14. v. 1979 (*S. B. Roy*); West Garo Hills dist. nr. Rongram, 1 Male, 4. iii. 1975 (*S. Biswas*).

Diagnostic characters : Male : General colour brownish black to black or extremely variable.

Eyes shorter than gena in length; pronotum longer than broad, rounded posteriorly. Elytra and wings well developed, former with a ridge along the costal margin. Penultimate sternite triangular, emarginate in middle posteriorly. Ultimate tergite and forceps and genitalia as seen in figs. 55-56.

Female : Ultimate tergite narrowed posteriorly and forceps simple and straight.

Measurements : Male : Length : body-6.1-8.7 mm, forceps 1.5-2.6 mm; Female : Length : body-6.0-9.0 mm, forceps-1.5-1.6

Distribution : India : Meghalaya : East and West Garo Hills dists.; Worldwide.

Remarks : Generally it is attracted to light in larger numbers during monsoon period.

Nala nepalensis (Burr)

Figs. 57-58

1907. *Labidura nepalensis* Burr, *Rec. India Mus.*, 1 : 208 (Male, Female; Nepal).

1910. *Nala nepalensis* : Zacher, *Ent. Rdsch.*, 1910 : 184.

1910. *Paralabidura nepalensis*; Burr, *Trans. R. ent. Soc. Lond.*, 1910 : 185.

1911. *Nala nepalensis*; Burr, *Genera Insect.*, 122 : 36.

Material examined : India : Meghalaya : West Khasi Hills dist., Nongstoin, Nangbha River bed, 3 Males, 1 Female, 5 nymphs, 22. ii. 1991 (*A. K. Hazra and party*).

Diagnostic characters : Male : General colour brownish black with varying intensity, finely pubescent.

Elytra and wings well developed, former keeled along the costal margin. Penultimate sternite narrowed posteriorly with hind margin slightly emarginate in middle. Forceps internally lamellate in basal half. Ultimate tergite and forceps and genitalia as seen in figs. 57-58.

Female : Forceps simple and straight.

Measurements : Male : Length : body-7.2-8.6 mm, forceps-2.3-5.4 mm; Female : Length : body-6.7-12.5 mm, forceps-2.0-2.7 mm.

Distribution : India : Meghalaya : East Garo Hills and West Khasi Hills dists.

It is widely distributed in the mountain regions of North India, Pakistan, Myanmar, Bhutan, Malaya and Indo-China.

Remarks : It commonly inhabits under stones on the edge of streams and rivers in mountain regions of North India. So far it has not been reported from Hills of South India.

LABIDURINAE

Key to genera (based on males only)

- 1(2). Sides of certain abdominal segments, in normal males, with spines or crests; forceps long and slender, generally arcuate in basal half, afterwards almost straight; paramers apically with an epimerite.....*Forcipula* Bolivar
- 2(1). Sides of abdominal segments without spines or crests; forceps stout and arcuate; paramers apically without a distinct epimerite.....*Labidura* Leach

Genus *Labidura* Leach

1815. *Labidura* Leach, *Edin. Encycl.*, 9 (1) : 48 (Type species *Forficula riparia* Pallas, 1773).

Labidura raparia (Pallas)

Figs. 59-60

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

1863. *Labidura riparia*; Dohrn, *Stettin. ent. Ztg.*, 24 : 313.

1986. *Labidura riparia*; Srivastava, *Rec. zool. Surv. India. Occ. pap.*, 89 : 4.

Material examined : India : Meghalaya : Ri-Bhoi Dist., alongside Old Barapani Road, 2 Males, 2 Females, 1 nymph, 3. v. 1975, ex under stones (*M. Dutta*); East Garo Hills dist., Songsek village, 330 mm, 1 Male, 18. xi.1973 (*S. Biswas*), Darugiri, 1 Male, 15. v. 1989, at light (*J. K. Jonathan*), West Garo Hills dist., Rongram, 1 Male, 4. iii. 1975 (*S. Biswas*).

Diagnostic characters : Male : General colour yellowish brown to dark or light blackish brown.

Elytra and wings well developed, latter often very short only tips projecting. Ultimate tergite with hind margin straight, sometimes with a pair of sharp, posteriorly directed spines. Ultimate tergite and forceps and genitalia as seen in figs. 59-60.

Female : Forceps simple and straight.

Measurements : Male : Length : body-14.0-24.0 mm, forceps-4.0-10.0 mm; Female : Length : body-12.0-19.0 mm, forceps-3.0-5.0 mm.

Distribution : India : Meghalaya : Ri-Bhoi, East and West Garo Hills, East Khasi Hills and Jaintia Hills dists.

A very widely distributed species throughout the globe.

Genus *Forcipula* Bolivar

1897. *Forcipula* Bolivar, *Ann. Soc. ent. Fr.*, 66 : 282 (Type species : *Labidura quadrispinosa* Dohrn, 1863-designated by Kriby, 1904).

1974. *Genitalata* Kapoor, *Zool. J. Linn. Soc.*, 55 (1) : 83, figs. 1-4 (Type species : *Genitalata mahajani* Kapoor, 1974).

Key to species (based on males only)

- 1(4). Sides of certain abdominal segments with a sharp spine
- 2(3). Body covered with short and long dense pubescence; elytra and wings well developed; pronotum about as long as broad; sides of abdominal segments 3-5 with a sharp spine (directed externally).....*F. trispinosa* (Dohrn)
- 3(2). Body covered with comparatively fine and sparse pubescence; elytra well developed but wings concealed; sides of abdominal segments 3-5 with a hooked spine and on 6th a small tubercle present.....*F. borellii* Chopard
- 4(1). Sides of certain abdominal segment with a pair of spines, of which dorsal one is larger and hooked.....*F. clavata* Liu

Forcipula trispinosa (Dohrn)

Figs. 61-62

1863. *Labidura trispinosa* Dohrn, *Stettin. ent. Ztg.*, **24** : 310 (Male : India, Orientali).
1891. *Labidura pugnax* Kriby, *J. Linn. Soc. (Zool.)*, **25** : 510, pl. 12, fig. 1 (Male, Female, North India).
1900. *Forcipula trispinosa*; Bormans and Krauss, *Das Tierreich*, **11** : 30.
1910. *Forcipula trispinosa* var. *minor* Burr, *Fauna British India, Depmaptera*, : 93, pl. 3, fig. 260 (Male; Nepal).
1966. *Forcipula trispinosa* sub. sp. *minor*; Brindle, *Ann. Mag. nat. Hist.*, (13) **9** : 268.
1980. *Forcipula afghana* Steinmann, *Acta. zool. hung.*, **26** (1-3) : 243.

Material examined : India : Meghalaya : West Garo Hills dist., Rongram, 1 Male, 4. iii. 1975 (S. Biswas).

Diagnostic characters : Male : General colour blackish brown, all over body dense long and short pubescence present. Pronotum about as long as broad; elytra and wings well developed; sides of abdominal segments 3-5 with a sharp spine of which last one short. Ultimate tergite and forceps and genitalia as seen in fig. 61-62.

Female : Forceps simple and straight.

Measurements : Male : Length : body-15.5-22.5 mm, forceps-6.0-15.0 mm; Female : Length: body-14.0-28.0 mm, forceps 5.7-9.0 mm.

Distribution : India : Meghalaya : East and West Khasi Hills dists; and Punjab, Uttar Pradesh, West Bengal and Arunachal Pradesh. Also known from Nepal.

Remarks : It commonly occurs on the edge of river and streams in mountain regions only.

In a large population, specimens with minor or weaker form of forceps are not uncommon. In these, sides of abdominal spines are poorly developed and forceps are almost straight throughout with internal spine not well marked.

Forcipula borellii Chopard

Figs. 63-64

1924. *Forcipula borellii* Chopard, *Rec. Indian Mus.*, **26** (1) : 90, pl. 5, figs. 35-41 (Male, Female; Siju Cave, Garo Hills).

1986. *Forcipula borellii*; Srivastava, *Rec. zool. Surv. India. Occ. pap.*, **89** : 18, figs. 15, 16 (From the Type).

Material examined : India : Meghalaya : West Garo Hills dist., Balphakram National Park, 1 Male, 1 Female, 20. ii. 1991 (*J. R. B. Alfred*).

Diagnostic characters : Male : General colour dark blackish brown; sparsely and finely pubescent.

Pronotum longer than broad; elytra well developed, finely punctulate; wings concealed. Sides of abdominal segments 3-5 with a hooked spine. Ultimate tergite and forceps and genitalia as seen in figs. 63-64.

Female : Sides of abdominal segments without spine and forceps simple and straight.

Measurements : Male : Length : body-15.5-23.0 mm, forceps-6.0-15.0 mm, Female : Length : body-14.0-28.0 mm, forceps-5.7-9.0 mm.

Distribution : India : Meghalaya : South and West Garo Hills dists.

This is the second record of the species after a lapse of 70 years from the area close to its type locality.

Forcipula clavata Liu

Figs. 65-66

1946. *Forcipula clavata* Liu, *J. W. China Border Res. Soc.*, **16** : 22, pl. 2, fig. 8 (Male, Female; China : Pan-Chi, Peh-Chi in Chunking).

1986. *Forcipula clavata*; Srivastava, *Rec. zool. Surv. India, Occ. pap.* **89** : 15, figs. 11-14.

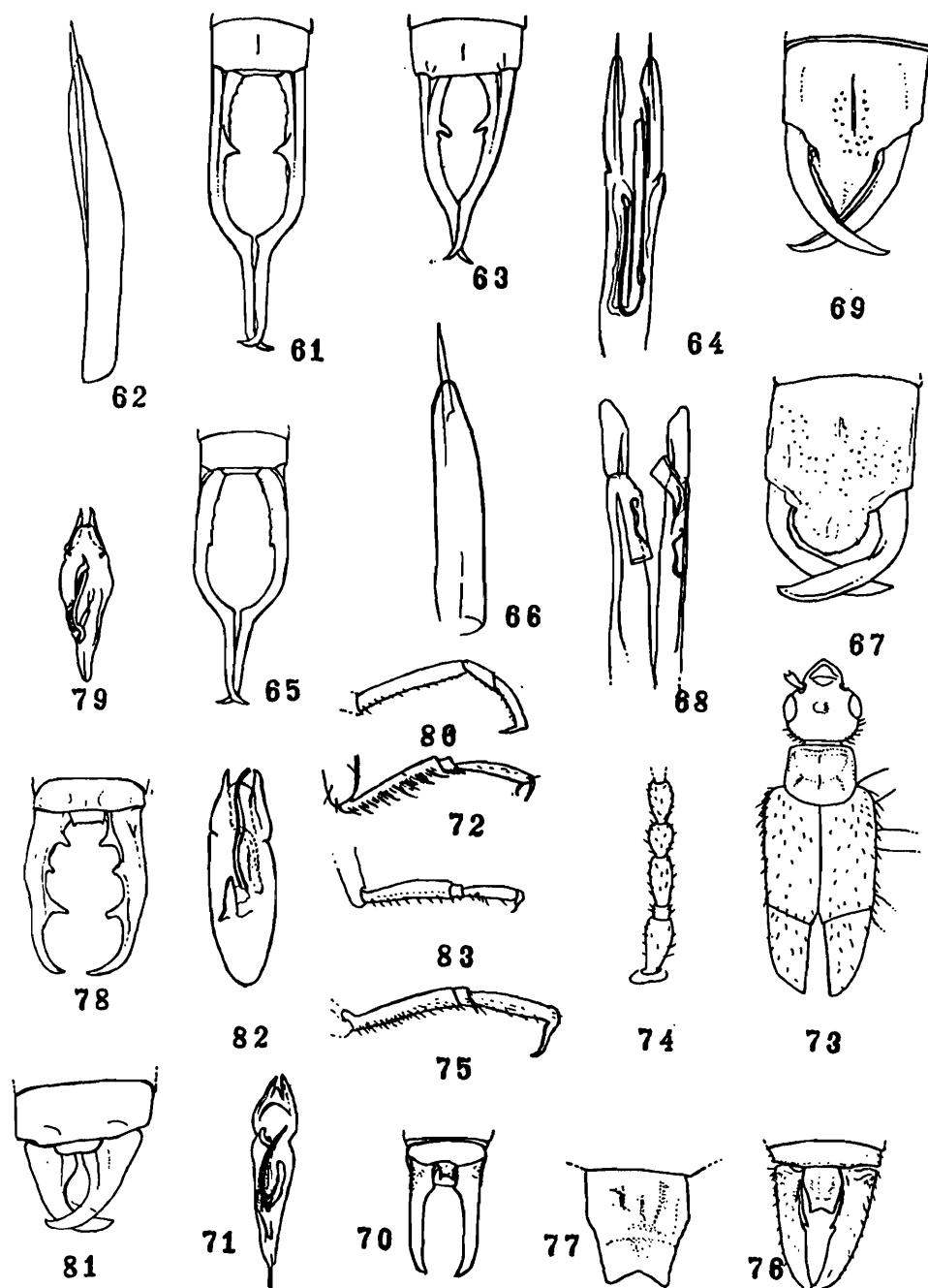
Material examined : India : East Khasi Hills, Shillong, 1 Male, 3. ix. 1930 (*H. S. Rao*)-det. as *Forcipula india* Brindle by Srivastava (1986).

Diagnostic characters : Male : General colour dark brown to blackish brown; body finely pubescent.

Elytra and wings well developed, former feebly punctulated; sides of abdominal segments 3-5 with a pair of spines, of which dorsal one larger and hooked. Forceps internally crenulated ending into a sharp small teeth in basal half of remote part. Ultimate tergite and forceps and genitalia as seen in figs. 65-66.

Female : Sides of abdominal segments without spines and forceps simple and straight.

Measurements : Male : Length : body-20.0-25.0 mm, forceps 12.0-17.0 mm; Female : Length : body-23.0-25.5 mm, forceps-5.5-7.1 mm.



Figs. 61-83: *Forcipula trispinosa* (Dohrn), Male, 61. Ultimate tergite and forceps, 62. Genitalia; *Forcipula borellii* Chopard, Male, 63. Ultimate tergite and forceps, 64. Genitalia; *Forcipula clavata* Liu, Male, 65. Ultimate tergite and forceps, 66. Genitalia; *Apachyus feae* Bormans, Male, 67. Ultimate tergite and forceps; 68. Genitalia, Female, 69. Ultimate tergite and forceps; *Irdex nitidipennis* (Bormans), Male, 70. Ultimate tergite and forceps, 71. Genitalia, 72. Hind Tarsi; *Marava sakaii* sp. n., Holotype Male, 73. Anterior portion of body, 74. A few basal antennal segments, 75. Hind tarsi, 76. Ultimate tergite and forceps, 77. Pygidium, enlarged; *Homotages feae* (Bormans), Male, 78. Ultimate tergite and forceps, 79. Genitalia, 80. Hind tarsi; *Paralabella curvicauda* (Motschulsky), Male, 81. Ultimate tergite and forceps, 82. Genitalia, 83. Hind tarsi.

Distribution : India Meghalaya : East Khasi Hills dist., and Arunachal Pradesh.

Also known from China.

APACHYOIDEA

APACHYIDAE

Genus *Apachyus* Serville

1831. *Apachyus* Serville, *Ann. Sci. Nat.*, **22** : 35 (Type species : *Forficula depressa* Palisot Beauvois, 1805).

1839. *Apachya* Serville, *Hist. nat. Orth.* : 54 (Emendation of *Apachyus* Serville, 1831).

Apachyus feae Bormans

Figs. 67-69

1891. *Apachyus pascoei* Kirby, *J. Linn. Soc. (Zool.)*, **25** : 521, pl. 20, fig. 1.

1894. *Apachyus feae* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) **14** : 373 (male, Female; Burna).

1910. *Apachyus feae*; Burr, *Fauna British India. Dermaptera* : 33, pl. 1, figs. 1-2, pl. 10, fig. 93.

1983. *Apachyus feae*; Srivastava and Lahiri, *Rec. zool. Surv. India*, **81** : 284 (1 Female; Garo Hills, Songkhama).

1993. *Apachyus feae*; Srivastava, *Annali Mus. civ. Stor. nat., Giacomo Doria*, **89** : 226, figs. 15-20 (Lectotype Male and Paralectotypes Female and nymph designated and figured).

Material examined : India : Meghalaya : East Khasi Hills, Shillong, 1 nymph, 15. xi. 1930 (H. S. Rao).

Diagnostic characters : Male : General colour dark brownish black; body strongly depressed. Ultimate tergite rugose with small tubercles, anal process roughly pentagonal; penultimate sternite obtusely pointed posteriorly. Ultimate tergite and forceps as seen in figs. 67-68.

Female : Penultimate sternite acutely produced posteriorly; ultimate tergite dorsally with several small tubercles, anal process triangular. Ultimate tergite and forceps as seen in figs. 69.

Measurements : Male : body (excluding anal process)-26.5-40.0 mm, forceps-5.0-7.0 mm; Female (excluding anal process)-25.0-35.0 mm, forceps-5.6-7.0 mm.

Distribution : India : Meghalaya : East Khasi Hills (on the basis of above record) Garo Hills East and West dists). Sikkim, Assam and Arunachal Pradesh and West Bengal (Darjeeling dist.).

Also reported from Bhutan, Myanmar, China (Yunnan) and Vietnam.

Remarks : Although only a nymph is recorded from the area which agrees well with other nymphs of the species present in the Survey collection; the present identification may in all possibilities, be taken as correct.

The above information is based on the material from other areas, examined by the author.

FORFICULOIDEA

SPONGIPHORIDAE

IRDEXINAE

Irdex Burr, 1911

1911. *Irdex* Burr. *Dt. ent. nat. Biblthk.*, 1911 : 59 (Type species : *Spongophora nitidipennis* Bormans, 1894).

Remarks : According to Srivastava (1985) *Spongophora nitidipennis* Bormans, 1894 and *Chaetospania jupiter* Burr, 1900 are two distinct and valid species. Former is the type of this genus and latter belongs to *Apovostox* Hebard.

Irdex nitidipennis (Bormans)

Figs. 70-72

1894. *Spongophora nitidipennis* Bormans, *Annali Mus. civ. Stor. Nat. Giacomo Doria*, (2) 14 : 282 (1 Male; Burma).
1894. *Spongophora lutea* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) 14 : 383 (Males, Females; Burma).
1900. *Spongiphora nitidipennis*, Bormans and Krauss, *Das Tierreich*, 11 : 58.
1911. *Irdex nitidipennis*; Burr, *Dt. ent. natn. Biblthk.*, 1911 : 59.
1913. *Spongovostox aborum*, Burr, *Rec. Indian Mus.*, 8 (2) : 140 (Male, Female; India).
1975. *Sponogovostox wuermalli* Brindle, *Entmologica Basiliensia*, 1 : 33 (Male, Female, Bhutan).
1983. *Labia lutea* (nec Bormans); Srivastava and Lahiri, *Rec. zool. Surv. India*, 81 : 284 (Male, Female; India : Assam and Meghalaya).
1985. *Irdex nitidipennis*; Srivastava, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 85 : 209, figs. 4-15 (species redescribed).

Material examined : India : Meghalaya : East Khasi Hills, Cherrapunji, nr. Mawsamai Cava, 1 Male (Brachypterus), 1 nymph, ex under bark of a tree, 25. v. 1979, Shillong, 1 Male, 1 Female (Macropterus), at light, 21. v. 1979 (G. K. Srivastava).

Diagnostic characters : Male : General colour brownish yellow to dark brown.

Eyes usually shorter than post-ocular area in brachypterus form and longer in macropterus form. Elytra with row of thick setae on costal margin, each arising from a tubercle. Legs long, slender, hind tarsi with 1st segment five times longer than broad. Ultimate forceps and tergite and genitalia seen in fig. 70-71.

Female : Ultimate tergite slightly narrowed posteriorly and forceps simple and straight.

Measurements : Male : Length : body-6.0-10.1 mm, forceps-2.5-4.0 mm; Female : Length : body-4.2-9.7 mm, forceps-1.0-4.2 mm.

Distribution : India : Meghalaya : East Khasi Hills and West Garo Hills dists.

Remarks : Most of the previous records under this name need checking which may perhaps refer to *Apovostox jupiter* Burr, which was considered as its synonym by Burr and subsequent authors.

It is a variable species as far as the shape of male pygidium and inner armature of forceps is concerned.

SPONGIPHORINAE

Genus *Marava* Burr

1911. *Marava* Burr, *Dt. ent. natn. Biblthk.*, 1911 : 59, 60 (Type species : *Labia grandis* Dubrony, 1879 = *Forficula arachidis* Yersin, 1860).

1911. *Prolabia* Burr, *Dt. ent. natn. Biblthk.*, 1911 : 60 (Type species *Forficula arachidis* Yersin, 1860).

1911. *Andex* Burr, *Dt. ent. natn. Biblthk.*, 1911 : 60 (Type species *Labia nigroflavida* Rehn, 1905).

Marava sakaii sp. n.

Figs. 73-77

Holotype Male : General colour dark blackish brown; antennae and mouth parts light brown; legs yellowish, middle femora blackish brown in basal half, hind femora in basal half and tibia in most part except near apices blackish brown, forceps light blackish brown; finely pubescent, all over the body.

Head slightly longer than broad, smooth, convex sutures obsolete, hind margin straight. Eyes prominent, longer than post-ocular area and basal antennal segment. Antennae 13-segmented (right antennae with 10-segments, apical one broken off), 1st stout, about as long as the distance between antennal bases; 2nd short; 3rd gently expanded apically; 4th slightly shorter than preceding, clavate; 5th about as long as third, subclavate; remaining subclavate and gradually increasing in length distally except apical one thin, somewhat rod shaped. Pronotum slightly broader than long, sides straight, gently widened posteriorly, hind angles and margin rounded; prozona raised and metazona depressed, median sulcus faintly marked. Legs typical for the genus, hind tarsi with 1st segment slightly longer than the combined length of 2nd and 3rd segments. Elytra and wings well developed, former obscurely punctulated. Abdomen smooth, convex, enlarging upto the 9th tergite. Penultimate sternite transverse, microreticulated, hind margin obtusely produced in middle. Ultimate tergite strongly transverse, impunctate, with pubescence above, weakly convex, gently depressed in middle posteriorly and tumid above the base of forceps, hind margin incrassate and straight between the branches of forceps. Pygidium projecting, gently sloping at base, afterward horizontal, enlarged in middle, hind margin concave with angles produced. Forceps with branches depressed, almost straight, tapering apically with tips gently hooked, internal margin with dorsal and ventral border, at about middle on ventral border with a sharp small, posteriorly directed tooth.

Female : Unknown.

Measurements : Male : Length body-4.2 mm, forceps-1.6 mm and pygidium-0.6 mm.

Material examined : India : Meghalaya : East Khasi Hills, Cherrapunji, near Mawsamai Cave, 1300 m, Holotype male (penultimate sternite mounted on a card and pinned with the specimen), ex under bark of a tree, 25. v. 1979 (G. K. Srivastava coll.) deposited in Z.S.I.

Remarks : In the Oriental Region only three species viz., *Marava arachidis* (Yersin), a cosmopolitan species; *Marava luzonica* (Dohrn) from Indo-Australian region and *Marava nigrella* (Dubrony) from java, China, Burma and Philippine Isls., are known to occur.

Of these only one species, namely, *M. arachidis* is reported from India.

The described species differs from last two of the above species in having the eyes prominent, distinctly longer than the post-ocular area. Besides it can be easily differentiated from *M. arachidis* and *M. nigrella* (Dubrony) by the shape of pygidium being broadest in the middle with its hind margin distinctly concave and angles produced into a point (vs traingular and truncate posteriorly in *M. nigrella* and broad with hind margin straight or lightly concave with angles oblique in *M. arachidis*).

The species is named after Prof. Seiroku Sakaii of Daito Bunka University, Tokyo, Japan.

HOMOTAGINAE

Genus *Homotages* Burr

1909. *Homotages* Burr, *Dt. ent. Z.*, **1909** : 327 (Type species- *Anechua feae* Bormans, 1888).

1911. *Homotaes* Burr, *Genera Insect.*, **122** : 77.

1971. *Homotages*, Brindle, *Ent. Tidskr.*, **93** : 13.

1977. *Homotages*; Srivastava, *Ceylon J. Sci. (Bio. Sci.)*, **12** (2) : 109.

1985. *Homotages*; Srivastava, *Annali Mus. civ. Stor. nat. Giacomo Doria*, **85** : 206.

Remarks : Family Homotaginae was erected by Srivstava (1985).

Homotages feae (Bormans)

Figs. 78-80

1888. *Anechura feae* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, **6** (2) : 445 (Male; Burma).

1909. *Homotages feae*; Burr, *Dt. ent. Z.*, **1909** : 327.

1977. *Homotages feae*; Srivastava, *Ceylon J. Sci. (Bio. Sci.)*, **12** (2) : 109.

Material examined : India : Meghalaya : East Khasi Hills, Upper Shillong, Elephant Falls, Female, 7. i. 1978 (K. R. Rao); West Khasi Hills, Mawphlong, Female, 18. v. 1979 (G. K. Srivastava).

Diagnostic characters: Male: General colour dark or reddish black; elytra with an orange humeral spot, often ill defined or obscure; forceps often partially or complete orange reddish.

Legs long and slender, hind tarsi with 1st segment distinctly longer than the combined length of 2nd and 3rd segments; 2nd long and slender, of uniform width except for slight narrowing at base. Forceps undulaed, in profile, inner margin with two or three pointed teeth or branches horizontal without internal teeth. Ultimate tergite and forceps and genitalia as seen in figs. 78-79.

Female: Pygidium subvertical, narrowed posteriorly with hind margin straight or emarginate with angles sharp.

Measurements: Male: Length: body- 10.6-15.3 mm, forceps 3.9-7.1 mm; female: body- 10.4-14.6 mm, forceps- 4.7-5.5 mm.

Distribution: India: Meghalaya: East and West Khasi Hills dists and West Bengal and Uttar Pradesh.

Also Known from Nepal and Myanmar.

LABIINAE

As already indicated (Srivastava, 1993) genera based on the external characters and shaps of male parameres may prove to be stable. The following key to genera, represented from the area, is based on the above conclusion.

Key to genera (based on males only)

- 1(2). Eyes large or very large, as long or longer than post-ocular area *Apovostox* Hebard
- 2(1). Eyes small, mormally shorter than the post-ocular area.....
- 3(4). Branches of forceps in both sexes not strongly setulose; those of male without a ventral inner flange and those of female narrowed from base to apex with inner margin never strongly dentate or crenulate. *Paralabella* Steinmann
- 4(3). Branches of forceps in both sexes strongly setulose, bearing numerous long stiff hairs; those of male with or without a ventral flange, and those of female not narrowed from base to apex but almost parallel-sided for most of the length, and inner margin with at least a ventral inner flange, the margins of which strongly dentate or crenulate
- 5(6). Head transverse, depressed, both head and pronotum usually punctured and pubescent, at least partially; branches of forceps in both sexes usually with a ventral inner flange, or this weakly indicated; abdomen strongly depressed, usually larger in size *Chaetospania* Karsch
- 6(5). Head quadrate or only slightly transverse, tumid, not depressed; head and pronotum impunctate and glabrous or punctured and pubescent; branches of male forceps simple,

with a ventral inner flange, those of female with a ventral and dorsal inner flange, or with dorsal flange represented by a dorsal inner flange, or with dorsal flange represented by a dorsal tooth; abdomen less depressed; smaller species *Chaetolabia* Brindle

Genus *Paralabella* Steinmann

1989. *Paralabella* Steinmann, *Das Tierreich*, **106**: 470 (Type species *Forficula annulata* Fabricius, 1793).

Paralabella curvicauda Motschulsky

Figs. 81-83

1863. *Forficesila curvicauda* Motschulsky, *Bull. Soc. Imp. Moscou.*, **36**: 2, pl. 2, fig. 1 (Male, Female; Nura Illia Mountains, Ceylon).

1864. *Labia curvicauda*: Dohrn, *Stettin. ent. Ztg.*, **25**: 428.

1926. *Labia curvicauda* var. *flavicollis*; Boreili, *Treubia*, **8**: 263.

1976. *Labia curvicauda*; Srivastava, *Rec. zool. Surv. India, Occ. pap.*, **2**: 32.

1989. *Paralabella curvicauda*; Steinmann, *Das Tierreich*, **106**: 497, figs. 920-922.

Material examined: India: Meghalaya: East Khasi Hills, Cherrapunji, nr. Mawsamai Cave, 1 Male, 1 Female, ex under bark of a log, 25.v. 1979, on road from Mawsami to Sella, 1 Male, 1 Female, 1 nymph, ex. under bark of stem of dead tree, 26.v. 1979, along the road between Pynursila to Pamshutia, 1 Male, 1 Female, ex banana sheath 27.v. 1979 (*G.K. Srivastava*).

Diagnostic characters: Colour black or brown; head elytra and wings black; abdomen and forceps reddish brown often shaded with black in parts; antennae blackish or reddish brown with one or two ante-apical segments pale. Size small, form depressed.

Head convex, hind margin emarginate; eyes small, shorter than post ocular length. Elytra and wings well developed, covered with dense microscopic hairs. Penultimate sternite with hind margin rounded. Pygidium transverse, declivent in basal half, hind margin straight. Ultimate tergite and forceps and genitalia as seen in figs. 81-82.

Female: Pygidium narrower and more prominent and forceps simple and straight.

Measurements: Male: Length: body- 5.6-6.8 mm, forceps- 0.5-1.1 mm; Female: Length: body : 5.9-7.2 mm, forceps- 0.9-1.5 mm.

Distribution: India: Meghalaya: East Khasi Hills and West Garo Hills dists; occurs throughout India.

It is one of the most common species of Dermaptera generally occurring under bark of trees and rotten banana stem sheath throughout the world.

Remarks: forceps, in males, are greatly widened internally and this lamellate portion is acutely produced posteriorly.

Apovostox Hebard

1927. *Apovostox* Hebard, *Proc. Acad. nat. Sci. Philad.*, **79**: 29 (Type species *Labia pygidiata* Dubrony, 1879).
1927. *Argusina* Hebard, *Proc. Acad. nat. Sci. Philad.*, **79**: 38 (Type species: *Argusina lita* Hebard, 1927).
1985. *Apovostox*; Srivastava, *Annali Mus. civ. Stor. nat. Giacomo Doria*, **85**: 208 (genus resurrected).

Apovostox stella samsingensis Srivastava

Figs. 84-85

1975. *Irdex stella samsingensis* Srivastava, *Dr. B. S. Chauhan Comm. Vol.* (Zool. Soc. India) : 270, figs. 3, A-D.
1983. *Apovostox pygidiatus* (nec Dubrony); Steinmann, *Revue suisse Zool.*, **90**(3): 550 (2 Males; India, Meghalaya, Khasi Hills, Mawphlong).
1992. *Apovostox pygidiatus* (nec Dubrony); Sakaii, *Dermapterorum Catalogus*, xxiv: Iconographia VIII: 4506 (two coloured photographs of Males labelled as: *Apovostox pygidiatus* (Dubrony, 1879) Geneve Mus. India. det. by Steinmann (1983) SS 746-24 and SS 747-1).

Material examined: India: Meghalaya: East Khasi Hills dist., Cherrapunji, nr. Mawsamai Cave, 1300 m, 1 Male (genitalia mounted between two coverslips and pinned with the specimen), 25. v. 1979, ex under bark of tree (*G.K. Srivastava*).

Diagnostic characters: Male: General colour blackish brown; antennae light brown; legs yellow with femora in most part except near apex light blackish brown. Body covered with microscopic pubescence, forceps with long and short pubescence.

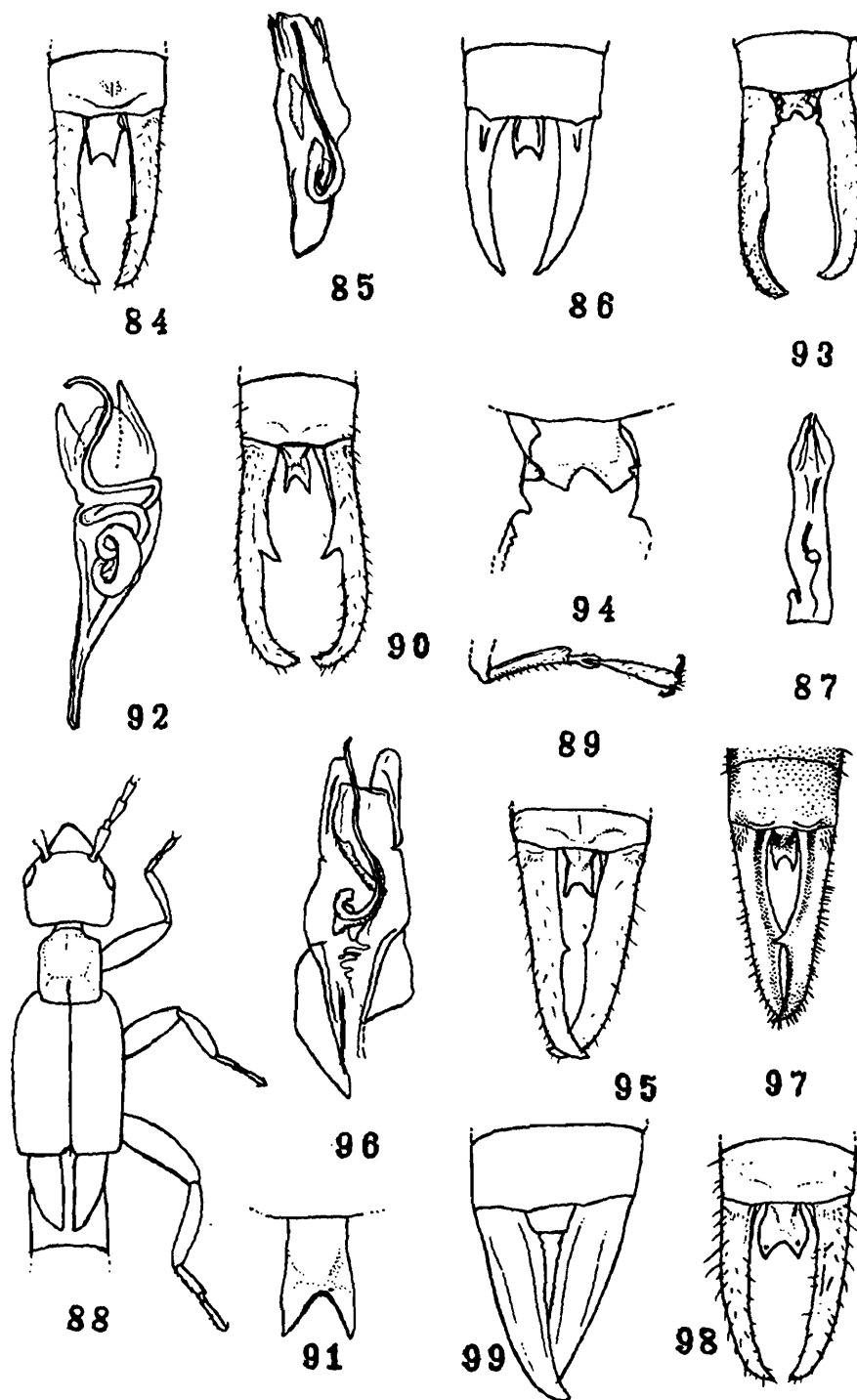
Eyes about as long as post-ocular area; pronotum longer than broad, hind margin briefly rounded. Elytra and wings well developed. Pygidium projecting, broader in middle, narrowed basally and apically, a short posteriorly directed tooth present in basal one third on lateral margin, hind margin concave. Ultimate tergite and forceps and genitalia as seen in figs. 84-85.

Female: Forceps simple and straight.

Measurements: Male: Length: body 7.1-7.8 mm, forceps- 2.3-2.7 mm; Female: Length: body- 7.1-7.5 mm, forceps- 1.8-2.1 mm.

Distribution: India: Meghalaya: East and West Khasi Hills dists. and West Bengal (Darjeeling dist.).

Remarks: Steinmann (1983) referred two males from Meghalaya to *Apovostox pygidiatus* (Dubrony). From the photographs of these two specimens given by Sakaii (1992), it is evident that they belong to this species.



Figs. 84-99: *Apovostox stella samsingensis* Srivastava, Male, 84. Ultimate tergite and forceps, 85. Genitalia; *Chaetospania luxor* Steinmann, Male, 86. Ultimate tergite and forceps, 87. Genitalia; *Chaetospania kapoori* sp.n., Holotype Male, 88. Anterior portion of body, 89. Hind tarsi, 90. Ultimate tergite and forceps, 91. Pygidium, enlarged, 92. Genitalia, Female, 93. Ultimate tergite and forceps, 94. Pygidium, enlarged; *Chaetospanis silvestrii* Borelli, Male, 95. Ultimate tergite and forceps, 96. Genitalia; *Chaetospania shillongensis* Srivastava, Male 97. Ultimate tergite and forceps; *Chaetospania bihastata* (Borg), Male, 98. Ultimate tergite and forceps, Female, 99. Ultimate tergite and forceps.

Genus *Chaetospania* Karsch

1867. *Platylabia* (part) Dohrn, *Stettin. ent. Ztg.*, **28**: 347.
 1876. *Labidophora* (part) Scudder, *Proc. Boston Soc. nat. Hist.*, **18**: 297.
 1886. *Chaetospania* Karsch, *Berl. ent. Ztg.*, **30**: 87 (Type species *Chaetospania inornata* Karsch, 1886).
 1902. *Sparattina* Verhoeff, *Zool. Anz.*, **25**(665): 198 (Type species *Sparattina flavicollis* Verhoeff, 1902).
 1990. *Chaetospania*; Steinmann, *Das Tierreich*, **106**: 174 (under family Sparattinae, tribe Chaetospanini).

Key to Species (based on males only)

- 1(2). Size smaller (length of body including forceps 6.0-6.5 mm); wings concealed; forceps internally unarmed *C. luxor* (Steinmann)
 2(1). Size larger (length of body including forceps- 7.8-9.5 mm); wings well developed; forceps internally armed with a sharp tooth
 3(4). Pygidium on sides with a pair of denticles, posterior emargination broadly rounded, posterolateral tooth less stout *C. shillongensis* Srivastava
 4(3). Pygidium without any teeth on sides, hind margin with emargination triangular and posterolateral tooth stout *C. kapoori* sp.n.

Chaetospania luxor Steinmann

Figs. 86-87

1988. *Chaetospania luxor* Steinmann, *Acta. zool. hung.*, **34**: 416 (Males, Female; India: Meghalaya, Garo Hills, Dainadubi, 250 m).

Diagnostic characters : Male : General colour dark brownish red. Eyes small; antennae 11-jointed, 1st shorter than the distance between antennal bases. Tegmina short and wings concealed. Ultimate tergite transverse, smooth. Pygidium widest in middle, lateral margin broadly convex, hind margin emarginate. Forceps arcuate, internally unarmed. Genitalia as seen in fig. 87.

Female : Agrees with males in most characters except that ultimate tergite slightly narrower posteriorly; pygidium transverse, narrowed posteriorly with hind margin faintly emarginate and forceps almost straight, except at apices gently hooked, trigonal near base, inner margin with one or two small denticles.

Measurements : Male and female : Length : body and forceps together-6.0-6.5 mm.

Distribution : India : Meghalaya : East Garo Hills dist.

Remarks : This species is known from its type series only and above details are taken from Steinmann (1988).

From the available description it may belong to *Chaetolabia* Brindle and coming very close to *C. bihastata* (Borg, 1904). Smaller size (6.0-6.5 mm), short elytra, concealed wings, less pubescent body (no mention or indication through original description and diagrams), shape of male pygidium and forceps and female pygidium support the above conclusion.

Therefore, the above record should be treated with reserve.

***Chaetospasia kapoori* sp. n.**

Figs. 88-94

Holotype : Male : General colour blackish brown to brown; antennae with a few basal and apical segments yellowish brown and legs brown.

Head slightly longer than broad, convex, sutures obsolete, hind margin emarginate in middle. Eyes small, shorter than post-ocular area. Antennae 13-segmented, 1st stout, expanded apically; 2nd short, about as long as broad; 3rd long and cylindrical; 4th slightly shorter than preceding segment; 5th slightly longer than 3rd, narrowed basally, afterwards segments gradually increasing in length distally except the apical one shorter. Pronotum slightly longer than broad, sides straight, hind margin subtruncate, median sulcus faint, prozona weakly raised and metazona depressed. Legs short, stout, hind tarsi with 1st segment equal to 3rd. Elytra and wings well developed, smooth and shining. Abdomen narrowed at base, afterwards almost parallel sided, smooth, tergites moderately convex, on sides long and short pubescence present. Penultimate sternite transverse, smooth and hind margin broadly rounded. Ultimate tergite transverse, smooth, sparse pubescence present especially on sides, weakly convex, gently sloping and depressed in middle posteriorly, hind margin straight in middle, emarginate and oblique above the branches of forceps. Pygidium longer than broad, at base wider, gently declivent, posteriorly divided by a median, roughly triangular emargination in apical half. Forceps remote at base, tapering apically, almost straight in basal half afterwards gently incurved with apices broadly hooked and pointed, trigonal in basal one third, afterwards depressed, internal margin differentiated into dorsal and ventral borders in basal one third and armed at middle with a sharp, posteriorly directed pointed tooth. Genitalia as seen in fig. 92.

Female : Agrees with males in most characters except that pygidium is strongly declivent with posterior emargination not so deep and angles broad and forceps depressed, internal margin differentiated into dorsal and ventral borders, at base armed with one or two larger tooth and afterwards finely serrated with one slightly larger tooth at middle.

Measurements : Holotype male : Length : body-7.1 mm, forceps-2.4 mm, pygidium-0.4 mm; Paratypes 2 Males : Length : body-5.5-5.6 mm, forceps-2.3-2.4 mm, pygidium-0.3-0.4 mm; Paratype 1 Female : body-5.7 mm, forceps-2.3 mm.

Material examined : India : Meghalaya : East Khasi Hills dist. Shillong Botanical Garden, Holotype Male (genitalia mounted between two coverslips and pinned with the specimen), Paratypes,

3 Males (1 male without forceps), 1 Female and 2 nymphs, ex under bark of a dead tree, 20. v. 1979 (G. K. Srivastava) deposited in Z.S.I.

Remarks : Amongst the Oriental species the described species comes close to *Chaetospania silvestrii* Borelli, 1926 in having somewhat similar male pygidium, in being deeply notched posteriorly but differs in having antennal segments longer, especially 3rd longer than 4th (*vs* 3rd about as long as 4th in *C. silvestrii*), elytra and wings shining and smooth (*vs* faintly punctate); pygidium with posterolateral angles acute (*vs* acuminate); forceps with internal tooth larger (*vs* smaller) and genitalia with paramers acute angled apically and virga convoluted (*vs* paramers obtuse angled apically and virga almost straight).

Chaetospania silvestrii has been recorded from Bhutan on one Male and one female by Brindle (1975). The shape of male pygidium as figured by him resembles more like that of *Chaetospania feae* Bormans which exhibits great variation intraspecifically.

Chaetospania shillongensis Srivastava

Fig. 97

1988. *Chaetospania shillongensis* Srivastava, *Rec. zool. Surv. India*, **79** : 479, figs. 2A-C (1 Male, 1 Female; India : Meghalaya : Shillong).

Diagnostic characters : Male : General colour brown to dark blackish brown, on certain parts and legs clear yellow. Form depressed, pubescent.

Head smooth, depressed; eyes shorter than post-ocular area; antennae 13-segmented, 1st about as long as the distance between antennal bases. Elytra and wings well developed. Penultimate sternite broadly rounded posteriorly; ultimate tergite weakly transverse; forceps internally armed with a sharp tooth in middle. Pygidium prominent, at base declivent, afterward deplanate, sides convex with a pair of minute points, hind margin broadly emarginate, posterolateral angles produced into sharp point. Ultimate tergite and forceps as seen in fig. 97.

Female : Agrees with males in most characters except that ultimate tergite slightly narrower posteriorly; pygidium short, sub-vertical, narrowed posteriorly and forceps simple and straight, internally at base with a lamellate area.

Measurements : Male : Length : Body-7.0 mm, forceps-2.45 mm; Female : body-6.4 mm, forceps-1.5 mm.

Distribution : India : Meghalaya : East Khasi Hills dist.

Known only from the type locality.

Genus *Chaetolabia* Brindle

1972. *Chaetolabia* Brindle, *Insects of Micronesia*, **5** (2) : 150 (Type species-*Labia esakii* Menozzi, 1941).

Chaetolabia bihastata (Borg)

Figs. 98-99

1904. *Platylabia bihastata* Borg, *Ark. Zool.*, **1** : 572, pl. 26, fig. 6 (Male; Cametoon).
 1911. *Labia curvicauda*; Burr, *Genera Insect.*, **122** : 56 (partim).
 1948. *Labia bihastata*; Hincks, *Entomologist's mon. Mag.*, **84** : 95 (Ivory Coast; species redescribed).
 1973. *Chaetolabia bihastata*; Brindle, *Ann. Mus. Roy. Afr. Centr. Tervuren*, in-8, *Zool.*, **205** : 160, fig. 201.
 1993. *Chaetolabia bihastata*; Srivastava, *State Fauna Series 3 : Fauna of West Bengal*, **4** : 414 (Z.S.I.).

Material examined : India : Meghalaya : East Khasi Hills dist, Cherrapunji, on road from Mawsamai to Sella, 1 Female, ex under bark of a tree, 26. v. 1979 (G. K. Srivastava).

Diagnostic characters : Male (not represented in the collection from the area) : General colour yellowish brown to dark brown with shades of blackish brown on certain body parts.

Head convex about as long as broad, hind margin faintly emarginate; eye much shorter than post-ocular area. Pronotum slightly longer than broad, gently widened posteriorly. Elytra abbreviated; wings scarcely projecting beyond elytra. Pygidium narrowed and declivent at base, afterwards rectilinear, enlarged in middle, posterior margin deeply emarginate with postero-lateral angles produced into minute point. Forceps with branches remote at base, tapering apically, depressed, almost straight, internal margin differentiated into dorsal and ventral borders in basal half only (Fig. 98).

Female : Agrees with male in most characters except ultimate tergite gently narrowed posteriorly; pygidium transverse, convex, narrowed posteriorly and branches of forceps more strongly depressed, internal margin dentate ventrally.

Measurements : male : Length : body-4.0-5.1 mm, forceps-1.3-1.5 mm; Female : Length : body-3.5-5.0 mm, forceps-1.0-1.3 mm.

Distribution : India : Meghalaya : East Khasi Hills dist.

Remarks : Although only a female specimen is represented it has been found to agree well with a large series of specimens of the same sex associated with males.

Perhaps on further exploration of the area it may be found to occur there.

CHELISOCHIDAE

Steinmann (1987) has proposed certain genera on the basis of shape of parameres. It appears very tempting to use his arrangement but does not help in identification and proper generic placement of species. For this reason Burr's (1911) classification with minor modifications is followed in the present work.

CHELISOCHINAE

Key to the genera (based on males only)

- 1(2). Distal antennal segments long and slender, elytra and wings uniformly coloured or more commonly yellow with fuscous markings.....*Proreus* Burr
- 2(1). Distal antennal segments broad and short; elytra and wings unicolorous and dark.....*Chelisoches* Scudder

Genus *Proreus* Burr

1907. *Proreus* Burr, *Trans. R. ent. Soc. Lond.* **1907** : 129 (Type species : *Forficula simulans* Stal, 1860).
1910. *Proreus*; Burr, *Fauna British India, Dermaptera* : 136.
1911. *Proreus*; Burr, 1911. *Genera Ins.*, **122** : 64.
1968. *Proreus*; Popham and Brindle, *Entomologist*, **101** : 133.

Proreus tezpurensis (Srivastava)

Figs. 100-101

1969. *Hamaxas tezpurensis* Srivastava, *Zool. Anz.*, **182** : 136, figs. 1-3 (Male, Female; India : Assam, Tezupr).
1970. *Hamaxas tezpurensis* ; Srivastava, *Newsl. zool. Sruv. India*, **1** (2) : 23 (Male, Female; India, Tripura, Barma Chara, Teliamura).
1976. *Proreus tezpurensis*; Srivastava, *Rec. zool. Surv. India. Occ. pap.*; **2** : 50.
1993. *Proreus tezpurensis*; Srivastava, State Fauna Series 3 : *Fauna of West Bengal* (Zool. Surv. India) : 416.

Material examined : India : Meghalaya : East Garo Hills dist., Williamnagar, 1 Female, 11. iii. 1991 (B. C. Das & party).

Diagnostic characters : Male : General colour dark copper brown, abdominal segments and antennae black. Form depressed and pilose.

Head depressed, occiput raised; eyes small, less than twice the length of post-ocular area. Pronotum slightly longer than broad, all margins straight; elytra abbreviated, axillary angles rounded off to show a triangular scutellum. Ultimate tergite transverse, hind margin with two pairs of projecting tubercles with inner pair in middle and external pair situated over the bases of forceps close to internal margin. Forceps with branches remote at base with a tooth internally, afterwards tapering apically, branches may be short, strongly inversed (Cyclolabic form) or slightly elongated (Marcolabic form).

Female : Ultimate tergite slightly narrowed posteriorly; pigidium broader, convex, declivent at base, apically narrowed, hind margin in middle concave with postero-lateral angle spiniform.

Measurements : Male : Length : body-8.5-9.1 mm, forceps-1.5-2.6 mm; Female : Length : body-10.1-11.5 mm, forceps-2.0-2.8 mm.

Distribution : India : Meghalaya : East Garo Hills dist., West Bengal and Tripura.

Remarks : Only a female is represented from the area but it has been compared with other female specimens collected in association with males from West Bengal and Tripura. The above identification may be taken as reliable. The details of males are based on specimens available in the National Collection of the Survey.

This species occurs mainly in rotten banana stem, bamboo nodal scales and the leaf axils of sugar cane.

Chelisoches Scudder

1839. *Lobophora* Serville, *Hist. nat. Ins. Orth.* : 32 (Type species *Lobophora rufitarsis* Serville, 1839 = *Forficula morio* Fabricius, 1775)-name preoccupied by *Lobophora* Curtis, 1825-Lepidoptera).
1876. *Chelisoches* Scudder, *Proc. Boston Soc. nat. Hist.*, 8 : 292 (new name for *Lobophora* Serville).
1907. *Enkrates* Burr, *Trans. ent. Soc. Lond.*, 1907 : 131 (Type species : *Forficula flavipennis* Fabricius, 1793).
1911. *Kleiduchus* Burr, *Genera Ins.*, 122 : 64 (Type species : *Forficesila australicus* Le Guillou, 1814).

Chelisoches brevipennis Borelli

Fig. 102

1923. *Chelisoches brevipennis* Borelli, *Boll. Musie zool. Anat. comp. R. Univ. Torino*, 38 (13) : 12 (Male, Female; Philippine, Palawan N.).
1929. *Chelisoches bimammatus* Hebard, *Trans. Am. Ent. Soc.*, 55 : 338 (Male and Female; Sumatra : Selangor, Batu Caves).
1977. *Chelisoches brevipennis*; Srivastava, *Newsl. zool. Surv. India*, 3 (3) : 134 (Male, Female; Sumatra and India).

Material examined : India : Meghalaya : South Garo Hills dist., Siju Cave (500'), 3 Males, 2 Females and 1 Nymph, 6. iii. 1965 (A. S. Rajagopal).

Diagnostic characters : Male : build robust, general colour black, often shaded with red on certain body parts.

Head with occiput raised; antennae with 19 segments or more; eyes shorter than post-ocular area. Pronotum longer than broad; elytra well developed, wings scarcely projecting beyond elytra. Penultimate sternite rounded posteriorly with slight emargination in middle. Ultimate tergite and forceps as seen in fig. 102. Pygidium vertical, broader at base, narrowed apically, hind margin bifid.

Female : Agrees with male in most details except that less stout, ultimate tergite narrowed posteriorly; pygidium posteriorly produced into a narrow spine with a apex somewhat concave; forceps simple and straight.

Measurements : Male : Length : body-12.6-16.8 mm, forceps-3.5-6.9 mm; Female : 12.1-18.1 mm, forceps-3.8-4.9 mm.

Distribution: India : Meghalaya : South Garo Hills dist., Arunachal Pradesh and West Bengal. Also known from Sumatra and Philippine Islands.

FORFICULIDAE

OPISTHOCOSMIINAE

Key to genera (based on males only)

- 1(2). Antennae with basal segment thick, clubbed, remaining thinner, legs comparatively short, femora especially anterior pair thick, hind tarsi with 1st segment almost equal to 3rd and 2nd, broadly lobed; paramers narrow, aciculate.....*Timomenus* Burr
- 2(1). Antennae with 1st segment stout but not clubbed, remaining thin; legs long and slender, hind tarsi with 1st segment distinctly longer than 3rd and 2nd, briefly lobed; parameres broad, flat
- 3(4). Pronotum truncate anteriorly; sides of certain abdominal segments often with small tubercles, but not recurved; forceps cylindrical, often undulated and armed on upper surface with vertical teeth.....*Eparchus* Burr
- 4(3). Pronotum truncate anteriorly; sides of abdominal segments gently recurved; forceps depressed.....*Hypurgus* Burr

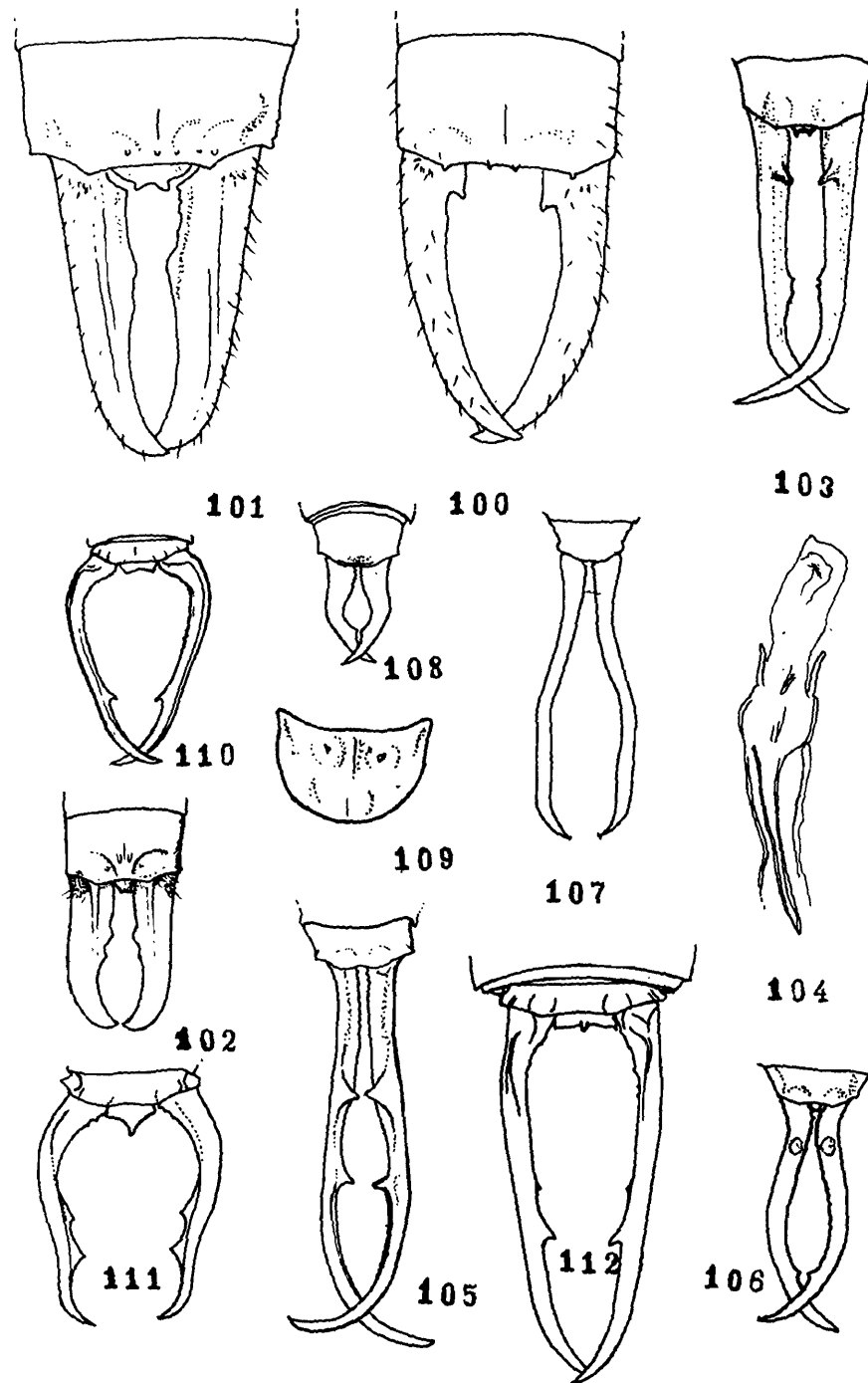
Genus *Timomenus* Burr

1907. *Timomenus* Burr, *Trans. R. ent. Soc. Lond.*, 1907 : 96 (Type species-*Opisthocosmia oannes* Burr, 1900).

1907. *Rhadamanthus* Burr, *Trans. R. ent. Soc. Lond.*, 1907 : 121 (Type species-*Forficula lobophoroides* Dohrn, 1865).

Key to species (based on males only)

- 1(2). Colour generally black, occasionally brownish, shining, elytra and wings unicolorous; pronotum slightly narrowed posteriorly; forceps contiguous at base, gradually diverging upto basal two thirds, afterwards strongly bowed or elongated; pygidium short, as long as broad, vertical, convex, hind margin straight.....*T. lugens* (Bormans)
- 2(1). Colour blackish brown, head black, elytra and wings brick red with a fuscous stripe along the inner margin; pronotum not narrowed posteriorly; forceps remote at base, enclosing an elliptical space; pygidium vertical, transverse, hind margin wavy, posterolateral angles produced into minute point.....*T. oannes* (Burr)



Figs. 100-112: *Proreus tezpurensis* (Srivastava), Male, 100. Ultimate tergite and forceps, Female, 101. Ultimate tergite and forceps; *Chelisochea brevipennis* Borelli, Male, 102. Ultimate tergite and forceps; *Timomenus oannes* (Burr), Male, 103. Ultimate tergite and forceps, 104. Genitalia, *Timomenus lugens* (Bormans), Male, 105. Ultimate tergite and forceps; *Eparchus insignis* (Haan), Male, 106. Ultimate tergite and forceps; *Eparchus simplex* (Bormans), Male 107. Ultimate tergite and forceps; *Hypurgus humeralis* (Kirby), Male, 108. Ultimate tergite and forceps; *Allodahlia scabriuscula* (Serville), Male, 109. Pronotum, 110. Ultimate tergite and forceps, *Allodahlia macropyga* (Westwood), Male, 111. Ultimate tergite and forceps; *Allodahlia coriacea* (Bormans), Male, 112. Ultimate tergite and forceps.

Timmomenus oannes (Burr)

Fig. 103-104

1900. *Opisthocosmia oannes* Burr, *Ann. Mag.nat. Hist.*, (7) VI : 85 (Male; Assam).
 1907. *Timmomenus oannes*; Burr, *Trans.R. Soc. Lond.*, 1907 : 96, pl. 4, fig. 1.
 1923. *Timmomenus oannes*; Hebard, *Mem. Dept. Agric. India Ent. Ser.*, 7 : 239 (Males, Females; Shillong, Khasi Hills).

Material examined : India : Meghalaya : East Khasi Hills dist., Shillong, Risa colony, 1 Male (genitalia mounted between two coverslips and pinned with the specimen), 20. ix. 1978 (P. T. Cherian). Charfurlong, 1 Male, 9. v. 1991 (S. K. Ghosh), Bishnupur, 1 Male, 2. v. 1960 (S. N. Prasad); Ri-Bhoi dist.: Umshing, 1 Male, 10. xi. 1991 (R. C. Basu).

Diagnostic characters : Male : General colour reddish black, head and forceps black, antennae with basal segments black, remaining brownish black; pronotum on sides yellowish; legs with femora black and tibiae and tarsi brownish; elytra and wings brick red with a fuscous band along the sutural margin, latter with a fuscous band extending posteriorly and base of external margin or black with inner wing tip yellow; abdomen blackish brown.

Head slightly longer than broad, hind margin almost straight, frons weakly convex, sutures obsolete, smooth; eyes distinctly shorter than post-ocular area; antennae 13-segmented, 1st stout, gently narrowed basally, longer than the distance between antennal bases; 2nd short; 3rd cylindrical; 4th a little stouter but shorter than preceding, 5th onwards long and cylindrical gradually increasing in length. Pronotum about as broad as long, anterior margin straight, sides gently convex, hind margin rounded, prozona convex, metazoan depressed, median sulcus faintly marked. Legs with fore-femora thickened, hind tarsi with 1st segment stout, flat below and trigonal above, 2nd lobed, 3rd narrowed and slightly longer than 1st. Elytra and wings well developed, smooth. Abdomen strongly convex, enlarged in middle, micro-reticulated or obscurely punctate, sides of segments 5th—9th convex, 5th or 6th with a small tubercle posteriorly, 7th to 9th striated. Penultimate sternite transverse, hind margin broadly rounded with slight emargination in middle. Ultimate tergite weakly transverse, narrowed posteriorly, hind margin oblique on sides above bases of forceps and in middle thickened and straight, smooth or obscurely punctuated, sloping backwards, depressed in middle posteriorly and tumid above bases of forceps. Pygidium vertical, transverse, posteriorly in middle two tubercles and posterolateral angle produced into minute point. Forcep with branches remote and cylindrical at base, and undulated in basal one third, tapering apically almost straight, gently incurved in apical one third and somewhat compressed, on upper surface in basal one third a triangular vertical tooth present and on the internal margin a small tooth is present at apical one third. Genitalia with parameres aciculated (fig. 104).

Female: Not examined; reported by Hebard (1923).

Measurements: Male: Length: body- 10.0-14.0 mm, forceps 4.0-7.0 mm; Female: Length: body- 10.8-12.0 mm, forceps- 6.4-6.5 mm.

Distribution: India: Meghalaya: East Khasi Hills and Ri-Bhoi dists; Assam and Arunachal Pradesh. Also known from China (Yunnan) and Vietnam.

***Timomenus lugens* (Bormans)**

Figs. 105

1904. *Opisthocosmia lugens* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) **14**: 398 (Male: Burma).
1905. *Opisthocosmia aesculapius* Burr, *Bol. R. Soc. Espan. Nat.*, **1905** : 230 (Male: Bhutan).
1907. *Eparchus lugens*: Burr, *Trans. R. ent. Soc. Lond.*, **1907**: 121.
1910. *Timomenus lugens*; Burr, *Fauna British India, Dermaptera*: 198
1924. *Timomenus lugens*; Chopard, *Rec. Indian Mus.*, **26**(1): 91 (1 Male; Siju Cave, Garo Hills).
1987. *Timomenus lugens*; Srivastava, *Annali Mus. civ. Stor. nat. Giacomo Doria* **35**: 504, figs. 58-73 (Lectotypes & Paralectotypes designated and figured).

Material examined: India: Meghalaya: East Garo Hills, Darugiri, 1 Male, 14.v. 1979 (S.B. Roy).

Diagnostic Characters: Males: General colour shining black with metallic lusture, often elytra dull and tarsi brownish black, wings with a yellow patch at inner apical angle.

Antennae with 1st segment strongly clubbed, shorter than the distance between antennal bases; pronotum narrowed posteriorly, side and posterior margin forming an arc or semicircular. Elytra and wings well developed. Legs typical for the genus, hind tarsi with 1st segment stout, almost equal to 3rd, clad with thick pubescence on underside. Sides of abdominal segments 6th to 9th obtuse angled with a faint ridge and with or without tubercles. Ultimate tergite and forceps as seen in fig. 105. Genitalia with a parameres aciculate.

Female: Pygidium short, rounded; forceps simple and straight, subcontiguous and internally serrated throughout.

Measurements: Male: Length: body- 8.7-11.8 mm, forceps- 4.5-10.1 mm; Female: Length: body- 8.4-10.5 mm, forceps- 4.3-5.4 mm.

Distribution: India: Meghalaya: South, East and West Garo Hills dists., West Bengal (Darjeeling dist) and Arunachal Pradesh.

Remarks: Some variations in the general body colour, size and in the vestiture of the sides of abdominal segments, especially in Males are noticed.

Genus *Eparchus* Burr

1907. *Eparchus* Burr, *Trans. R. ent. Soc. Lond.*, **1907**: 120 (Type species—*Forficula insignis* Haan, 1842).

1908. *Taipinia* Shiraki, *Trans. Sapparo nat. Hist. Soc.*, 2 (1-2): 105 (Type- *Taipinia pulla* Shiraki, 1908).
1911. *Narberia* Burr, *Genera Insect.*, 122: 94 (Type species—*Opisthocosmia biroi* Burr, 1902).

Key to species (based on males only)

- 1(2). Sides of abdominal segments 5 or 5-8 with a conical tubercle; forceps horizontal at base with a strong rounded tubercle above, often weakly developed *E. insignis* (Haan)
- 2(1). Sides of abdominal segments 7-9 convex or obtuse angled with an oblique serrated ridge, sometimes ridge absent; forceps undulated with a faint ridge or strong tooth above close to inner margin at basal two thirds *E. simplex* (Bormans)

Eparchus insignis (Haan)

Figs. 106

1842. *forficula insignis* Haan, *Verh. nat. Gest. nederl. Overz. Bezitt*: 243, fig. 15 not fig. 14 as mentioned in text (Male, Female; Java).
1865. *Opisthocosmia insignis*; Dohrn, *Stettin. ent. Ztg.*, 26: 81.
1907. *Eparchus insignis*; Burr, *Trans. R. ent. Soc. Lond.*, 1907: 121.
1954. *Eparchus insignis* (Haan) var. *inermis* Boeseman, *Zool. verh.*, Leiden, 21: 114.
1983. *Eparchus insignis*; Srivastava and Lahiri, *Rec. zool. Surv. India*, 81: 287^o (Meghalaya).

Material examined: India: Meghalaya: East Khasi Hills dist., Shillong, Laitkor Forest, 1 Male, 18.ix. 1975, Malki Forest, 2 Males, 4 Females, 16.iv. 1975, Motinagar Forest, 3 Males, 1 Female, 22.i. 1976 (*M.S. Jyrwa*), Risa Colony, 1 Female, 20.viii. 1975 (*B. Biswas*).

Diagnostic characters: Male: General colour dark brownish black, elytra generally with a yellow spot and inner wing tip yellow.

Head smooth; eyes shorter than the post-ocular area. Pronotum slightly longer than broad; elytra and wings well developed. Legs long and slender, hind tarsi with 1st segment distinctly longer than remaining two segments together. Sides of abdominal segments 6th to 8th tuberculated. Forceps contiguous near base and with a vertical tubercle, afterwards incurved. Ultimate tergite and forceps as seen in fig. 106.

Female: Forceps simple and straight, without basal vertical tooth.

Measurements: Male: Length: body- 7.8-10.4 mm, forceps- 3.9-5.6 mm; Female; Length: body- 8.2-10.5 mm, forceps- 2.3-3.4 mm.

Distribution: India: Meghalaya: East and West Khasi Hills and East Garo Hills dists.; West Bengal, Sikkim, Assam and Arunachal Pradesh. Also known from Sri Lanka, Nepal, Myanmar, Siam, Java, Celebes and Hainan.

It is generally found in mountain regions.

Eparchus simplex (Bormans)

Fig. 107

1894. *Opisthocosmia simplex* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) 14: 396 (Male, Female; Burma).
1910. *Hypurgus simplex*; Burr. *Fauna British India, Dermaptera*: 189.
1911. *Narberia simplex*; Burr, *Genera Insect.*, 122: 95.
1912. *Eparchus oberthuri* Borelli, *Bull. Mus. Hist. nat. Paris*, 18: 239, fig. 4 (Male, Female; Bhoutan anglais).
1923. *Eparchus inermis* Hebard, *Mem. dept. Agric. India, Ent. Ser.*, 7: 237, pl. 21, fig. 29 (Male; Shillong, Khasi Hills, Assam).
1959. *Eparchus panfilovi* Bey-Bienko, *Ent. Obozr.*, 38(3): 62 (Male; China: Yunnan).
1981. *Eparchus simplex*; Srivastava, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 83: 302, figs. 42-50 (Lectotype and Paralectotypes designated and figured).

Diagnostic characters: Male: General colour dark blackish brown, head lighter in colour, wings with a basal yellow spot externally and forceps reddish brown.

Elytra and wings well developed; eyes about as long as the post-ocular area. Pronotum about as long as broad, gently contracted posteriorly with hind margin rounded. Sides of abdominal segments 7th to 9th convex or recurved, often provided with a serrated ridge. Legs long and slender, hind tarsi distinctly longer than remaining two segments together. Ultimate tergite and forceps as seen in fig. 107.

Female: Sides of abdominal convex but never with a serrated ridge and forceps simple and straight.

Measurements: Male: Length: body- 8.7-12.7 mm, forceps- 3.3-8.1 mm; Female: Length: body- 11.0-11.1 mm, forceps- 5.6-5.8 mm.

Distribution: India: Meghalaya: East Khasi Hills dist.; West Bengal and Arunachal Pradesh. Also recorded from Nepal, Bhutan, Myanmar and China. It is mainly a mountain species.

Remarks: No specimens were available for study. Above observations are based on the material present in the National Collections of the Survey. This species was recorded from Shillong by Hebard (1923) under the name *Eparchus inermis*, a synonym of the species.

Genus *Hypurgus* Burr

1907. *Hypurgus* Burr, *Trans. R. ent. Soc. Lond.*, 1907: 101 (Type species- *Opisthocosmia humeralis* Kirby, 1891).
1911. *Thalperus* Burr, *Genera Insect.*, 122: 92 (Type species- *Hypurgus kuhlgatzi* Burr. 1909).
1923. *Sadiya* Hebard, *Mem. Dep. Agric. India Ent. Ser.*, 7(11): 230 (Type species- *Sadiya grata* Hebard, 1923).

Hypurgus humeralis (Kirby)

Fig. 108

1891. *Opisthocosmia humeralis* Kirby, *J. Linn. Soc. Zool.*, **23**: 523 (Female; Ceylon).1907. *Hypurgus humeralis*; Burr, *Trans. R. ent. Soc. Lond.*, **1907**: 101.1911. *Hypurgus humeralis* var. *vittatus* Burr, *J. Asiat. Soc. Bengal*, **7**(11): 799.

Material examined : India: Meghalaya: Garo Hills, 1 Male (genitalia mounted between two coverslips and pinned with the specimen), May, '80- no further data.

Diagnostic characters: Male: General colour chocolate brown, elytra with a yellow spot extending from humeral angle to middle, sometimes spot missing, wings in basal half yellow with a brownish black stripe along the sutural margin.

Head convex, smooth; eyes prominent, about as long as postocular length; antennae 12-segmented, 1st longer than the distance between antennal bases. Pronotum longer than broad, antero-lateral angles projecting. Abdomen convex, sides of abdominal segments 5th to 8th finely rugose and tuberculated. Ultimate tergite and forceps as seen in fig. 108.

Female: Sides of abdominal segments smooth, and forceps subcontiguous and straight.

Measurements: Male: Length: body- 7.4-9.4 mm, forceps- 2.1-2.2 mm; Female: Length: body- 8.1-10.6 mm, forceps- 2.0-2.1 mm.

Distribution: India: Meghalaya: Garo Hills (East and West), West Bengal, Karnataka, Madhya Pradesh, Orissa and Assam. Also distributed in Sri Lanka, Myanmar, China (Yunnan) and Borneo.

Remarks: Male forceps may be strongly arcuate with a internal tooth in a little beyond middle or almost straight.

ALLODAHLIINAE

Genus *Allodahlia* Verhoeff

1902. *Allodahlia* Verhoeff, *Zool. Anz.*, **25**(665): 194 (Type species- *Forficula brachynota* Haan, 1842).

Key to species (based on males only)

- 1(2). Pronotum crescent shaped with antero-lateral angles produced into spine; elytra and wings scabrous with small tubercles; pygidium transverse, with hind margin truncate, sometimes postero-lateral angles produced into minute point; forceps internally armed with a single spine *A. scabriuscula* (Haan)
- 2(1). Pronotum squarish, antero-lateral angles obtusely produced; elytra and wings punctulated; pygidium transverse or triangular, posteriorly in middle with a spine; forceps armed internally with a pair of spines

- 3(4). Pygidium triangular with a strongly pointed median spine; forceps stout, strongly undulated
 *A. macropyga* (Westwood)
- 4(3). Pygidium transverse, postero-laterally and in middle with a short spine, often with a lobe
 in middle; forceps thin, cylindrical, slightly undulated..... *A. coriacea* (Bormans)

Allodahlia scabriuscula (Serville)

Figs. 109-110

1839. *Forficula scabriuscula* Serville, *Histoire Naturelle des Insectes Or-hopteres*: 38 (Holotype Female: 'Amerique meridionale' (Locality erroneous).

1902. *Allodahlia scabriuscula*; Verhoeff, *Zool. Anz.*, 25(665): 194.

Material examined: India: Meghalaya: East Khasi Hills dist., Cherrapunji, Cave site, 1 Male, 1 Female, 26.iii. 1991 (A.K. Hazra and party); West Garo Hills dist. Nakrek Biosphere Reserve, 1 Male, 27.ii. 1991 (J.R.B. Alfred and party).

Diagnostic characters: Male: General colour dull blackish or brownish black.

Pronotum crescent shaped, anterolateral angles produced into sharp point; eyes shorter than post-ocular area. Elytra and wings scabrous with numerous small tubercles. Abdomen convex, micro-reticulated. Pygidium transverse, hind margin truncate with or without minute point at postero-lateral angle. Ultimate tergite and forceps as seen in fig. 110.

Female: Pygidium small, rounded, forceps simple and straight.

Measurements: Male: Length: body- 10.5-15.5 mm, forceps- 7.0-12.5 mm; Female: Length: body- 10.5-15.5 mm, forceps- 5.5-7.0 mm.

Distribution: India: Meghalaya: West Garo Hills, East Khasi Hills and Jaintia Hills dists; Arunachal Pradesh and West Bengal. Also recorded from Bhutan, China (South) Vietnam, Sumatra, Java, Bali, Borneo, Philippine Islands and Taiwan.

It is a mountain dwelling form occurring all along the Himalaya beyond 3000 m.

Allodahlia macropyga (Westwood)

Fig. 111

1839. *Forficula macropyga* Westwood, *Ills. Himalayas*, 2: 53 (Male, Female; by Inference Himalayas).

1910. *Allodahlia macropyga*: Burr, *Fauna British India. Dermaptera*: 151.

Material examined: India: Meghalaya: East Khasi Hills dist., Umtyangar, 1 Male, 20.iv. 1978 (M. R. Rynth).

Diagnostic characters: Male: General colour reddish brown; head shining black, inner wing tip with a patch of yellow, legs sometimes reddish.

Pronotum, transverse, antero-lateral angles weakly projecting, sides gently convex and hind margin briefly rounded. Elytra and wings well developed, both punctulated, former with humeral angle not prominent, keeled along the costal margin. Ultimate tergite on lateral margin triangularly produced. Pygidium triangular posteromedian spine short but sharp. Ultimate tergite and forceps as seen in fig. 111.

Female: Ultimate tergite contracted posteriorly; pygidium short, rounded and forceps subcontiguous and straight.

Measurements: Male: Length: body- 9.2-11.5 mm, forceps- 5.7-7.0 mm; Female: Length: body- 12.0-13.3 mm, forceps- 5.1-5.8 mm.

Distribution: INDIA: Meghalaya: East Khasi Hills dist., Uttar Pradesh and Arunachal Pradesh.

Also occurs in Nepal, Bhutan, Myanmar, China (Yunnan), Thailand, Vietnam and Philippine Islands.

It is essentially a mountane species

Allodahlia coriacea (Bormans)

Figs. 112

1879. *Forficula brachynota* Dubrony, *Annali Mus. civ. Stor. nat. Giacomo Doria*, 14: 383 (nec Haan, 1842 and Dohrn, 1865).

1894. *Anechura coriacea* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) 14: 403 (Male; Burma).

1907. *Allodahlia coriacea*; Burr, *Rec. Indian Mus.*, 1: 209.

1959. *Allodahlia coriacea* sub. sp. *signata* Bey-Bienko, *Ent. Obozr.*, 38: 620.

1972. *Allodahlia orchroptera* Brindle, *Entomologists mon. Mag.*, 108: 27 (Holotype Male from Burma and other specimens from India: Sikkim).

Material examined : India : Meghalaya : East Khasi Hills dist., Shillong, Lum Paring, 1 Male, 3. v. 1976 (*R. S. Giri*); West Garo Hills dist., Nakrek Biosphere Reserve, 2 Females, 27. ii. 1992 (*J. R. B. Alfred and party*).

Diagnostic characters : Male : General colour blackish brown or reddish brown; legs especially femora lighter in colour and inner wing tip yellow.

Pronotum transverse, punctate, punctures sparse on prozona but pronounced on sides and metazona and coalescent, gently contracted posteriorly, antero-lateral angles obtusely produced. Elytra keeled along the costal margin and convex, strongly punctate and punctures coalescent. Wings almost smooth, with a few obscure punctures. Legs long and slender, hind tarsi with 1st segment distinctly longer than remaining two segments together. Abdomen spindle, punctulated punctures not coalescent on each tergite, in posterior half less pronounced. Ultimate tergite, pygidium and forceps as seen in figs. 112.

Female : Ultimate tergite narrowed posteriorly; pygidium narrowed posteriorly, convex with a median convexity above.

Measurements : Male : Length : body-11.1-15.0 mm, forceps-6.0-6.5 mm; Female : Length : body-11.0-14.0 mm, forceps-6.0-6.2 mm.

Distribution : India : Meghalaya : West Garo Hills and East Khasi Hills dists.; West Bengal (Darjeeling dist.) and Arunachal Pradesh. Also known from Myanmar, China (Yunnan), Borneo and Burma.

It is primarily a mountain inhabiting species.

EUDOHRNINAE

Eudohrnia Burr

1907. *Eudohrnia* Burr, *Trans. ent. Soc. Lond.*, **1907** : 97 (Type species *Forficula metallica* Dohrn, 1865).

Eudohrnia metallica (Dohrn)

Figs. 113-115

1865. *Eudornia metallica* Dohrn, *Sttetin ent. Ztg.*, **26** : 90 (Male, Female; Assam).

1888. *Anechura metallica*; Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) **6** : 444.

1907. *Eudohrnia metallica*; Burr, *Trans. ent. Soc. Lond.*, **1907** : 97.

1946. *Sandax pubescence* Liu, *Jl. W. Chin Border Res. Soc.*, **16** : 15. pl. 1, fig. 1 (Male; China: Mount Omei-Type repository not known).

1967. *Kosmetor bosei* Bharadwaj and Kapoor, *Bull. Ent.* **8** (2) : 6, figs. 13-15 (Male; Assm, Shillong, 5,000 ft.-Type deposited in the Division of Entomology, Agricultural Research Institute, New Delhi)-**Syn. n.**

Material examined : India : Khasi Hills (no other data), 1 ex (forceps missing), Reg. No. 5316/14, Zool. India, Calcutta (*J. Wood Mason*); East Khasi Hills dist., Cherrapunji, 1 Male, 17. v. 1907; 1 ex. (hind portion of body missing), 19. v. 1907, 1 Male, 17. v. 1909 (genitalia mounted between two coverslips and pinned with the specimen), (*B. Warren*), all det. by Burr as *Eudohrnia metallica* (Dohrn) and preserved in the National Collection at the Zoological Survey of India.

1 Mae, labelled s 'Holotype Male', Assam, 5000 ft., Shillong, 15-20 May, 1924, coll. Bose' and det. as *Kosmetor bosei* sp. n. by V.C. Kapoor.

Diagnostic characters : Male : General colour dull brownish black or black with bluish green or purplish sheen; elytra in some specimens brownish; wing tip yellow.

Head weakly convex, sutures distinct, hind margin emarginate; antennae 15 (+ ?)-segmented, stout, first segment flat above and sides projecting sharply or faintly; 3rd slightly longer than 4th; remaining long and slender; eyes about half as long as genae, Pronotum pentagonal, anterior

margin straight and angles acute, laterally lightly convex, gently contracted posteriorly with margin obtusely rounded, prozona tumid, smooth, separated from metazona by a transverse suture, punctate. Elytra and wings ample, former strongly and densely punctate, latter faintly so. Abdomen long and cylindrical, gradually enlarging posteriorly, faintly punctate, sides of segments convex, rugosely punctate, lateral tubercles distinct; penultimate sternite obtusely rounded posteriorly; ultimate tergite declivient, smooth and punctate stripes alternating, laterally faintly emarginate, tumid above the roots of forceps and depressed inbetween. Pygidium transverse, posterolaterally and in middle with a spine, latter often blunt. Forceps remote at base, long and cylindrical, tapering, apices gently hooked and pointed, carinate above near base, internally minutely crenulate and at middle with a sharp tooth, often weak, afterwards branches unarmed. Genitalia as seen in fig. 115.

Female : As male except that the ultimate tergite narrowed posteriorly, tumid elevations above the roots of forceps comparatively weaker; pygidium short, obtuse and forceps simple, straight, faintly crenulate internally near base, only.

Measurements : Male : Length : body-10.7-24.7 mm, forceps-7.1-11.2 mm; Female : Length : body-12.0-16.3 mm, forceps-6.6-7.7 mm.

Distribution : India : Meghalaya : East Khasi Hills dist.; Arunachal Pradesh, Sikkim and Madhya Pradesh.

Also known from Nepal, South China, Myanmar and Vietnam.

Remarks : The Holotype Male of *Kosmetor bosei* Kapoor, present in the collections of Division Entomology, Indian Agricultural Research Institute, New Delhi was examined. The basal antennal segment is depressed above with and lateral flange or carina and is identical to this species. In all other details also *K. bosei* agrees well with *E. metallica*. For this reason former is treated as synonym.

FORFICULINAE

Genus *Forficula* Linnaeus

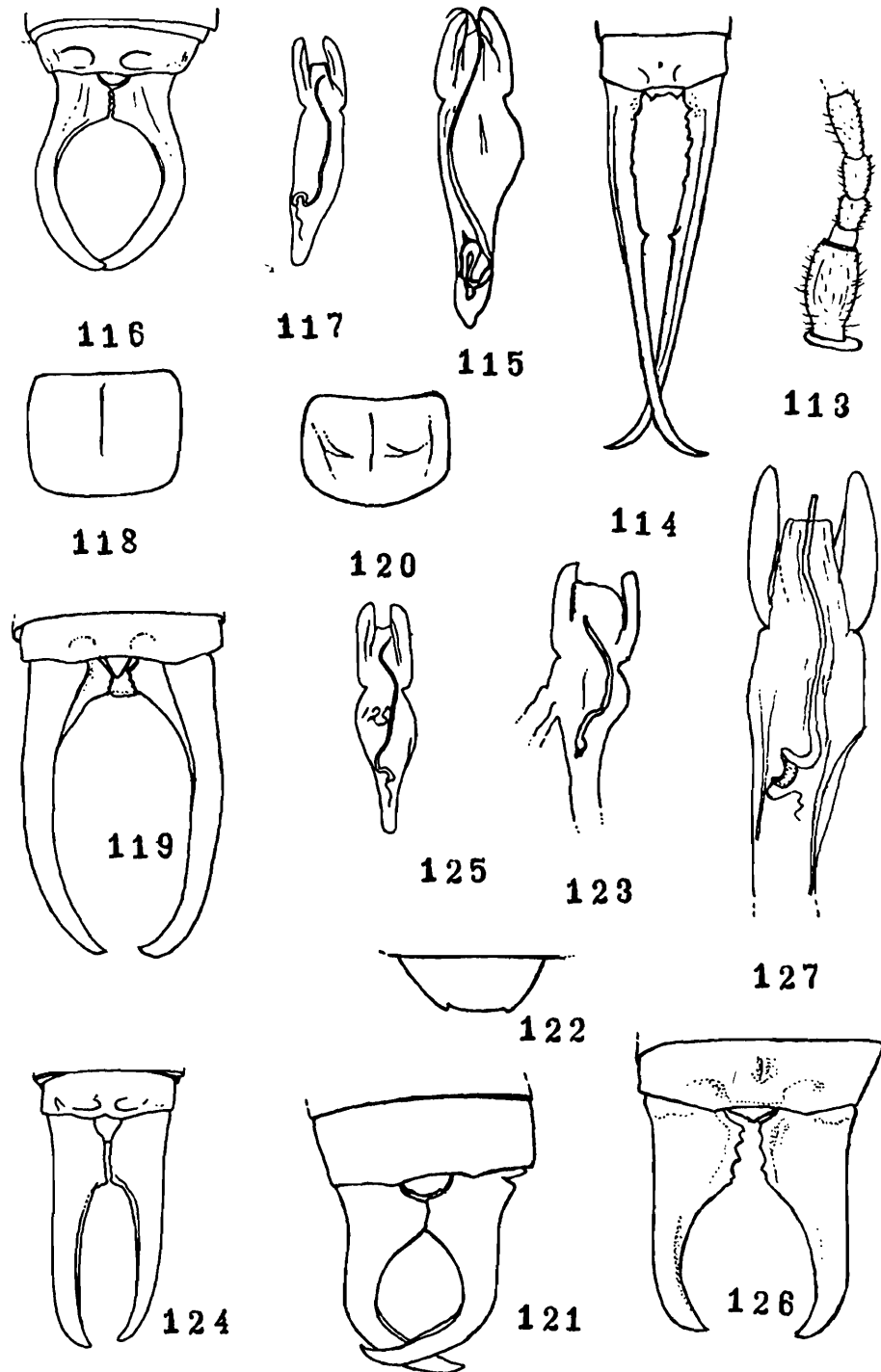
1758. *Forficula* Linnaeus, *syst. Nat.*, **10** : 423 (Type species- *Forficula auricularia* Linnaeus, 1758-designated by Latreille, 1810, *Consid. Gener. Ord. Nat.* : 443).

1924. *Forficula* Houlbert, *Thysa. Derm., Oth., de France*, **1** : 246 (Type species-*Forficula decipiens* Gene, 1832).

1927. *Emiforficula* Menozzi, *Ent. Mitt.*, **16** : 239 (Type species *Forficula ornata* Bormans, 1884).

Key to species (based on males only)

- 1(2). Pygidium longer than broad, tongue shaped, hind margin convex; forceps deplanate in basal half with internal margin crenulated, inner apical angle of lamellation obtuse or acute.....*E. beelzebub* (Burr)



Figs. 113-127: *Eudohrnia metallica* (Dohrn), Male, 113. A few basal antennal segments, 114. Ultimate tergite and forceps, 115. Genitalia; *Forficula planicollis* Kirby, Male, 116. Ultimate tergite and forceps, 117. Genitalia, 118. Pronotum, 119. Ultimate tergite and forceps, 120. Pronotum, 121. Ultimate tergite and forceps, 122. Pygidium, enlarged, 123. Genitalia; *Forficula beelzebub* (Burr), Male, 124. Ultimate tergite and forceps, 125. Genitalia; *Forficula genitalia* Kapoor, Male, 126. Ultimate tergite and forceps, 127. Genitalia.

(Figs. 118-119 redrawn from the Holotype Male of *Anechura virgae* Kapoor and figs. 120-123 from the Holotype Male of *Forficula cherapunjiae* Kapoor).

- 2(1). Pygidium short, not as above; forceps, lamellate in basal one-fourth or slightly more but always less than half the length of forceps, inner apical angle not prominent and margin crenulated
- 3(4). Pronotum of same width throughout; pygidium obtuse with two small spines posterolaterally or slightly elongated with posterior margin concave; forceps deplanate in basal one fourth.....*F. planicollis* Kirby
- 4(3). Pronotum gently widened posteriorly; pygidium short subvertical, triangular; forceps internally dilated in basal one third or a little more but less than half the length.....*F. genitalia* Kapoor

Forficul planicollis Kirby

Figs. 116-123

1891. *Forficula planicollis* Kirby, *J. Linn. Soc. Zool.*, **23**: 525 (Female; North India).
1904. *Forficula planicollis*; Burr, *Trans. R. ent. Soc. Lond.*, **1904**: 320 (2 Males, 1 Female; Darjiling-male described).
1904. *Forficula ambigua* Burr, *Trans. R. ent. Soc. Lond.*, **1904**: 321 (2 Males, 2 Females; Darjeeling).
1923. *Forficula labongae* Hebard, *Mem. Dep. Agric. India. Ent. Ser.*, **7**: 226 (Male; India, Darjeeling).
1965. *Forficula bhatnagari* Gangola, *Entomologist*, **92** : 229 (Male; Nainital).
1972. *Forficula gardneri* Kapoor, Bharadwaj and Banerjee, *Bull. Ent. Delhi*, **12**(1): 37 (Male, Female; India, Darjeeling dist.).
1968. *Anechura virgae* Kapoor, *Proc. Linn. Soc. Lond.*, **179**(1): 33 (Holotype Male; Khasi Hills, Assam, Cherrapunji, 1355m)-**Syn. n.**
1968. *Forficula cherapunjiae* Kapoor, *Entomologist*, **101**: 11 (Holotype Male; Khasi Hills, Assam, Cherrapunji, 1355m)-**Syn. n.**

Material examined: India: Meghalaya: Ri-Bhoi dist., Old Barapani Road, 1 Male, 20.iv. 1979 (J.K. Jonathan); East Khasi Hills dist., Shillong, Sericulture, 3 Males, 2 Females (brachypterous), 23.iv. 1967, (S. Biswas), Shillong Bisnupur, 2 Males, 2 Females (brachypterous) 23.iv. 1960, 1 Female (brachypterous), 21.v. 1960, 1 Male (Brachypterous) 30.iv. 1960 (S.N. Prasad); Shillong, Sericulture Garden, 1 Male, 20.ix. 1960 (B.K. Tikader)- det. as *Forficula ambigua* Burr by Biswas, Lahiri and Ghosh, 1975, 3 Males, 23,27.iv. 1967 (S. Biswas)- det. as *Forficula ambigua* Burr by Biswas, Lahiri and Ghosh, 1975, Shillong, Motinagar, 1 Male, 24.iv. 1960 (S.N. Prasad)- det. as *Forficula ambigua* Burr by Biswas Lahiri and Ghosh, 1975; Shillong, Laitkor, 1 Male, 16.viii. 1965 (B.K. Tikader); West Khasi Hills dist., Mawphlong, 1 Male, 13.iv. 1927 (Gopi Ram), 1 Male, 28.iv. 1971 (S. Biswas).

Holotypé Male labelled as "Under stones, Cherapunji, 1355 m (Khasi Hills, Assam, India, 4.iv. 1966, (Joseph Jonathan), det. as *Anechura virgae* sp.n., by V.C. Kapoor and Holotype Male labelled as 'Cherapunji, 1355 m (Khasi Hills, Assam), 4.iv. 1966 (Joseph Jonathan), det. as

forficula cherapunjiae sp. n. by V. C. Kapoor-both preserved in the Division of Entomology, I.A.R.I., New Delhi.

Diagnostic characters: Male: General colour blackish brown to yellowish brown.

Head longer than broad, frons moderately convex, smooth, sutures fine, hind margin gently emarginate in middle; eyes small, shorter than post-ocular area. Antennae 12-segmented, 1st stout, about as long as the distance between antennal bases; 2nd short; 3rd long and cylindrical; 4th slightly shorter but a trifle stouter; 5th slightly longer than 3rd, stouter, afterwards segments slightly increasing in length except last two. Pronotum weakly transverse, sides straight, hind margin briefly rounded, prozona feebly convex and metazona depressed, median sulcus faint. Elytra and wings smooth, latter sometimes concealed. Legs long and slender, hind tarsi with 1st segment stout, compressed, ventrally clad with a row of thick pubescence, slightly longer than 3rd; 2nd lobed. Abdomen greatly enlarged in middle (with strongly bowed forceps) and elongated (with elongated forceps), weakly and finely punctulated. Penultimate sternite transverse, hind margin obtusely produced in middle. Ultimate tergite strongly transverse, above the bases of forceps feebly tumid or with raised tubercles. Forceps at base deplanate for a short distance with internal margin serrulate, strongly bowed (in f. *cyclolabia*) and elongated (in f. *macrolabia*). Pygidium (in forma *cyclolabia*) short, rounded posteriorly with a pair of tubercles and (in f. *macrolabia*) elongated with hind margin emarginate.

Female: Agrees with males in most characters except that ultimate tergite slightly narrowed posteriorly and pygidium convex above, below slightly longer than broad, hind margin posterolaterally and in middle with a small point and forceps simple and straight.

Measurements: Male: Length: body- 7.1-10.0 mm, forceps- 2.6-3.5 mm; Female: Length: body- 6.4-10.5 mm, forceps- 1.5-2.8 mm.

Distribution: India: Meghalaya: Ri-Bhoi, East and West Khasi Hills dists., West Bengal (Darjeeling dist.), Uttar Pradesh, Arunachal Pradesh and Sikkim.

Also recorded from Nepal, Bhutan, Myanmar and China (Yunnan).

Remarks: It is primarily distributed in hilly regions and shows great variations in the body size and colour, shape of ultimate tergite, pygidium and forceps in males.

The *Forficula cherapunjiae* Kapoor represents the brachypterous form with cyclobic form of forceps and *Anechura viragae* Kapoor possesses macrolabic form of forceps-and are treated as synonyms. The latter is very similar to *F. ambigua* Burr, a synonym of this species. It may be stated here that *F. cherapunjiae* Kapoor and *Anechura virgae* Kapoor were collected together by the same person i.e., 'Under stones, Cherapunji, 1355 m (Khasi Hills, Assam), 4.iv. 1966 collected by Joseph Jonathan).

The holotype males of both species have been examined and figures drawn from them are given for comparison.

The detailed description of the species is given here for the future workers to understand the species properly. In past it was not adequately described, that has perhaps led to a long list of synonyms under the species.

***Forficula beelzebub* (Burr)**

Figs. 124-125

1900. *Chelisothes beelzebub* Burr, *Annl. soc. ent. Belg.*, **44**: 51 (Male; Kurseong, Bengal, India).

1904. *Forficula beelzebub* Burr, *Trans. R. ent. Soc. Lond.*, **1004**: 322.

1905. *Forficula acer* Burr, *J. Asiat. Soc. Bengal*, **1(2)**: 30 (Male; Mung Phu, India).

1905. *Forficula celeris* Burr, *J. Asiat. Soc. Bengal*, **1(2)**: 3 (Male, Female; Khasi Hills, Assam, India).

1909. *Forficula ingota* Burr, *Ann. Mag. nat. Hist.*, (8) **4**: 120 (Male; India).

Material examined: India: Meghalaya: East Khasi Hills dist.: Shillong, Charfurlong, 1450m, 1 Male, 2 Females and 3 nymphs, 9.iv. 1991 (S.K. Ghosh and party), Motinagar Forest, 3 Females, 6.xi. 1986, 3 Males, 1 Females, 11.iii. 1976, 2 Females, 14.iv. 1976, 1 Female, 9.vii. 1980, 1 Female, 18.ix. 1978, Laitkor Forest, 1 Female, 1.iii. 1976, Botanical Garden, 1 Female, 1.ix. 1976, Tripura Castle, 1 Male, 3 Females, 8.v. 1975, Malki forest, 4 Males, 1 Female, 5.vi. 1976 (M.S. Jyrwa), Risa Colony, 2 Females, 28.viii. 1976 (A.R. Lahiri), 1 Male, 29.vii. 1975 (M. Vasanth), Upper Shillong, Nongthynmai, 1 Male, 22.iii. 1974, 1 Female, 13.iii. 1974 (M. Vasanth); Jaintia Hill dist., Shangpung, 1 Male, 1 Female, 6.xii. 1975 (S.K. Chanda), Ri-Bhoi dist, Barapani (Old), 1 Female 20.iv. 1979 (J.K. Jonathan).

Diagnostic characters: Male: General colour brownish black, testaceous or orange reddish with shades of black on certain body parts; head generally black but in specimens occurring at high altitudes red; abdomen and forceps orange or reddish, former on sides black.

Head smooth, convex. Pronotum transverse. Elytra and wings well developed. Abdomen long or short, densely and strongly punctate. Pygidium prominent, slightly longer than broad, subvertical, generally covered by basal lamellation of forceps, hind margin convex. Forceps stout, dilated internally in a little less than basal half, afterwards almost straight (in f. cyclolabia) or incurved and elongated (in f. macrolabia), internally margin of lamellate portion crenulated with inner angle obtuse or acute. Genitalia as seen in fig. 125.

Female: Agrees with males in most characters except that ultimate tergite narrowed posteriorly and forceps simple and straight.

Measurements: Male: Length : body- 8.7-12.2 mm, forceps- 3.1-8.8 mm; Female: body- 8.2-12.3 mm, forceps- 2.7-3.4 mm.

Distribution: India: Meghalaya; Ri-Bhoi, East Khasi Hills and Jaintia Hills dists; West Bengali (Darjeeling dist.); Himachal Pradesh; Uttar Pradesh and Arunachal Pradesh.

Also reported from Nepal, Bhutan and Africa.

It is mainly distributed in motane and submontane habitats.

***Forficula genitalia* Kapoor**

Figs. 126-127

1968. *Forficula genitalia* Kapoor, *Entomologist*, **101**: 16, pl. 4, figs. 1-3 (Holotype Male; W.B.; Darjeeling).

1993. *Forficula genitalia*; Srivastava, State Fauna Series, 3: *Fauna of West Bengal* (Z.S.I.): 434, figs. 215-217 (Holotype Male).

Material examined: India: Meghalaya: East Khasi Hills, Shillong, Squit Falls, 1 Male (genitalia mounted between two coverslips and pinned with the specimen), 25.v. 1967 (R. K. Varshney); Nongkrem, 1 Male, 20.i. 1969 (B. Dutta).

Diagnostic characters: Male: General colour yellowish brown or smoky brown; antennae, pronotum on sides, elytra, wings and legs dirty whitish yellow, abdomen dark blackish brown or yellowish brown, forceps yellowish brown or light brown.

Head convex, smooth, sutures faint; eyes shorter than postocular area; basal antennal segment shorter than the distance between antennal bases. Pronotum gently widened posteriorly, sides straight, hind margin and angles rounded. Elytra and wings well developed. Abdomen long or short, gently dilated posteriorly, finely punctulated. Penultimate sternite transverse, posterior margin rounded, feebly obtuse in middle. Pygidium vertical, triangular. Ultimate tergite strongly transverse, sides straight, disc above weakly convex, punctulated, sloping backwards, feebly tumid above the bases of forceps and depressed in middle, hind margin incrassate, sinuate in middle, oblique above bases of forceps. Forceps depressed, internally lamellate in basal one third or a little more, with its inner margin dentate, afterward branches attenuated, compressed, strongly curved or sometimes less so. Genitalia as seen in fig. 127.

Female: Unknown.

Measurements: Male: Length: body- 6.8-9.2 mm, forceps- 1.8-2.7 mm.

Distribution: India: Meghalaya: East Khasi Hills dist., West Bengal (Darjelling dist.).

Remarks: The two males present before me agree well with the type of the species except for minor variations in body colour which is not unusual in this group.

The pygidium in Holotype Male is triangular and is identical to that of two males listed above.

SUMMARY

The present paper deals with 49 species under 31 genera, including two new species viz., *Marava sakaii* and *Chaetospania kapoori*. Besides *Kosmetor bosei* Kapoor is synonymised under

Table

District-wise distribution of species

Name of Species	West Garo Hills	East Garo Hills	South Garo Hills	West Khasi Hills	East Khasi Hills	Ri-Bhoi	Jaintia Hills
PYGIDICRANIDAE							
1. <i>Acrania assamensis</i> (Hincks)				+			
2. <i>Acrania fletcheri</i> (Bharadwaj and Kapoor)	+				+		
3. <i>Cranopygia eximia</i> (Dohrn)		+					
4. <i>Nannopygia angustaus</i> (Burr)		+					
5. <i>Diplatys papovi</i> Bey-Bienko	+						
6. <i>Haplodiplatys shillongensis</i> Srivastava					+		
7. <i>Echinosomaa convolutum</i> Hincks	+						
8. <i>Echinosoma dentiferum</i> Borelli	+				+	+	+
9. <i>Parapsalis infernalis</i> (Burr)						+	
ANISOLABIDAE							
10. <i>Platylabia brindlei</i> Srivastava					+		
11. <i>Aborolabis emarginata</i> Srivastava				+	+		
12. <i>Aborolabis meghalayaensis</i> Srivastava						+	
13. <i>Aborolabis kalaktangensis</i> Srivastava						+	
14. <i>Aborolabis sikkimensis</i> Srivastava				+			
15. <i>Aborolabis pervicina</i> (Burr)		+		+	+		
16. <i>Euborellia annulipes</i> (Lucas)				+			
17. <i>Euborellia plebeja</i> (Dohrn)					+		

Name of Species	West Garro Hills	East Garro Hills	South Garro Hills	West Khasi Hills	East Khasi Hills	Ri-Bhoi	Jaintia Hills
18. <i>Euborellia femoralis</i> (Dohrn)					+		
19. <i>Metisolabis caudelli</i> (Burr)					+		
LABIDURIDAE							
20. <i>Nala lividipes</i> (Dufour)	+	+					
21. <i>Nala nepalensis</i> (Burr)		+		+	+		
22. <i>Labidura riparia</i> (Pallas)	+	+			+	+	+
23. <i>Forcipula trispinosa</i> (Dohrn)	+	+					
24. <i>Forcipula borellii</i> Chopard	+						
25. <i>Forcipula clavata</i> Liu					+		
APACHYIDAE							
26. <i>Apachyus feae</i> Bormans	+	+			+		
SPONGIPHORIDAE							
27. <i>Irdex nitidipennis</i> (Bormans)	+				+		
28. <i>Marava sakaii</i> sp. n.					+		
29. <i>Homotages feae</i> (Bormans)				+	+		
30. <i>Paralabella curvicauda</i> (Motschulsky)	+				+		
31. <i>Apovostox stella samsingensis</i> Srivastava				+	+		
32. <i>Chaetospania luxor</i> Steinmann		+					
33. <i>Chaetospania kapoori</i> sp. n.					+		
34. <i>Chaetospania shillongensis</i> Srivastava					+		

Name of Species	West Garro Hills	East Garro Hills	South Garro Hills	West Khasi Hills	East Khasi Hills	Ri-Bhoi	Jaintia Hills
35. <i>Chaetolabia bihastata</i> (Borg)					+		
CHELISOCHIDAE							
36. <i>Proreus tezpurensis</i> (Srivastava)		+					
37. <i>Chelisoche brevipennis</i> Borelli			+				
FORFICULIDAE							
38. <i>Timmomenus oannes</i> (Burr)					+	+	
39. <i>Timmomenus lugens</i> (Bormans)	+	+	+				
40. <i>Eparchus insignis</i> (Haan)		+		+	+		
41. <i>Eparchus simplex</i> (Bormans)					+		
42. <i>Hypurgus humeralis</i> (Kirby)	+	+					
43. <i>Allodahlia scabriuscula</i> (Serville)	+				+		+
44. <i>Allodahlia macropyga</i> (Westwood)					+		
45. <i>Allodahlia coriacea</i> (Bormans)	+				+		
46. <i>Eudohrnia metallica</i> (Dohrn) (= <i>Kosmetor bosei</i> Kapoor)-Syn. n.					+		
47. <i>Forficula planicollis</i> Kirby (= <i>Anechura virgae</i> Kapoor)-Syn. n. (= <i>Forficula cherrapunjiae</i> Kapoor)-Syn. n.				+	+	+	
48. <i>Forficula beelzebub</i> (Burr)					+	+	+
49. <i>Forficula genitalia</i> Kapoor					+		
Total =	15	13	2	10	33	6	4

Eudohrnia metallica (Dohrn) and *Ancehura virgae* Kapoor and *Forficula cherapunjiae* Kapoor under *Forficula planicollis* (Kirby). Notes in brief for all the species dealt with are provided.

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INSECTA : BLATTARIAE

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INTRODUCTION

Order Blattariae includes common cockroaches. The name "cockroach" has been derived from the Spanish word Cucaracha. From the geological aspect they constitute a very old Order, and thus exhibit unique specialisation along with certain primitive features. However, they are generally characterized by the following : variable filiform antennae, head mostly or completely covered above by a large shield like pronotum, mandibulate mouth parts, legs similar to each other, coxae large and closely approximated, ocelli usually represented by fanestras, tarsi 5 segmented, fore wings modified into more or less thickened tegmina and with marginal costal vein, female with reduced ovipositor which is concealed by enlarged 7th abdominal sternum, male genitalia asymmetrical and largely concealed by 9th sternum which bears a pair of styles, cerci many segmented, and without stridulatory and auditory organs.

Cockroaches are small to medium sized (10 – 49 mm.) insects. Majority of them are terrestrial occurring predominantly in tropical and subtropical regions. Some of the species are semi-aquatic (Shelford, 1909). These insects do not fly well as the wings of many species are reduced or absent, specially in females. Nymphs and adults, both are found among fallen leaves on the surface of the soil, under stones, in thick grass, or among low vegetation and debris, and inside buildings. Some of the species are cave dwellers and a few are myrmecophilous. The majority are nocturnal, but the tree and bush species are diurnal in habit. A few species are household pests. The food consists of dead animals (even their own kind) and vegetable matter. The household species feed on starchy material, such as bread crumbs and other articles of human food. *Panesthia* and *Cryptocerus* (Cleveland, 1934) feed on dead wood. The economic importance of the group is not much, but they are medically important as they mechanically transmit any food/garbage or water borne diseases.

Blatta orientalis is used in preparation of the homoeopathic medicines, which is used in asthma.

The knowledge on Blattariae fauna of India is very meagre and limited to early workers like Kirby (1903, 1904), Shelford (1906, 1910), Hanitsch (1915, 1923) and Chopard (1922). Later on Princes (1964, 1965, 1966, 1967 and 1969) has done a notable work on the group. Rehn (1951)

has published a revisionary studies on the Blattariae, on the basis of wings, upto generic level. Roth (1979a and 1979b) has revised the subfamily Panesthinae. The Blattariae include about 3,500 species (Imms, 1963) from whole world of which 148 species are recorded from India.

The present study deals with Meghalaya fauna consisting of a total of 26 species which are distributed under 20 genera, 10 subfamilies and 5 families. Nine species recorded for the first time from this state and two species from India. This study is based on the collections brought by different survey parties of the Zoological Survey of India, from all the districts of Meghalaya, during 1983-1993, as well as earlier materials present in the National Zoological Collection.

The specimens were collected from various ecological niches as far as possible. They were captured by sweeping with the help of butterfly net, hand picking and on light trap.

The classification is followed after Rehn (1951) and Princis (1960).

SYSTEMATIC ACCOUNT

Order BLATTARIAE

Key to suborders of Blattariae

1. Anteroventral margin of the middle and hind femora without spine, rarely 1-4 small spines on fore and hind margin, ninth sternite of male variable.....BLABEROIDEA.
- Anteroventral margin of the middle and hind femora with spine, ninth sternite of male specialized or unspecialized.....2.
2. Subgenital plate of male symmetrical with 2 styles, female with valve divided longitudinally.....BLATTOIDEA.
- Subgenital plate of male more specialized, female without valve.....EPILAMPROIDEA.

Suborder BLATTOIDEA

Family BLATTIDAE

Subfamily BLATTINAE

Key to the genera of Blattinae

1. Tegmina of both sexes fully developed or absent; hind wings present, or vestigial.....2.
- Tegmina short, in the form of lateral pads; hind wings absent.....*Neostylophyga* Shelford.
2. Tegmina and wings fully developed; pronotum with a pair of large spot, usually of light yellowish background.....3.
- Tegmina and wings usually reduced, yellow spots background absent.....4.
3. Pronotum broad behind the middle, sides deflexed.....*Periplaneta* Burmeister.

- Pronotum broad before the middle, its sides not deflexed.....*Homalophilpha* Stål.
- 4. Arolia subobsolete; tegmina and wings reduced, covering two-thirds of the abdominal terga only.....*Blatta* Serville.
- Arolia moderately developed; tegmina and wings squamiform or quadrate, and some time fully developed.....*Heberdina* Bey-Bienko.

Genus *Periplaneta* Burmeister, 1838

1. *Periplaneta americana* (Linnaeus)

(Map 1)

1758. *Blatta americana* Linnaeus, *Syst. naturae*, (10th Ed.). 1 : 424.

1868. *Periplaneta americana* : Walker, *Cat. Blatt. Brit. Mus.*, London : 124.

1924. *Periplaneta americana* : Chopard, *Rec. Indian Mus.*, 26 : 173.

1966. *Periplaneta americana* : Princis, *Orthopt. Catalog.*, part 7 : 405.

Material examined : East Garo hills : 2 F F, (1 F nymph). Songsok, 16. xi. 1973, coll. S. Bsiwas; 4 M M, (2 M nymph), 3 F F (2 F nymph), 21. vii. 1975, coll. S. Biswas. East Khasi hills : 1 F Shillong, 17. viii. 1973, coll. R. S. Giri; 1 M, Naya Bunglow, 14. vi. 1981, coll. J. P. Sati.

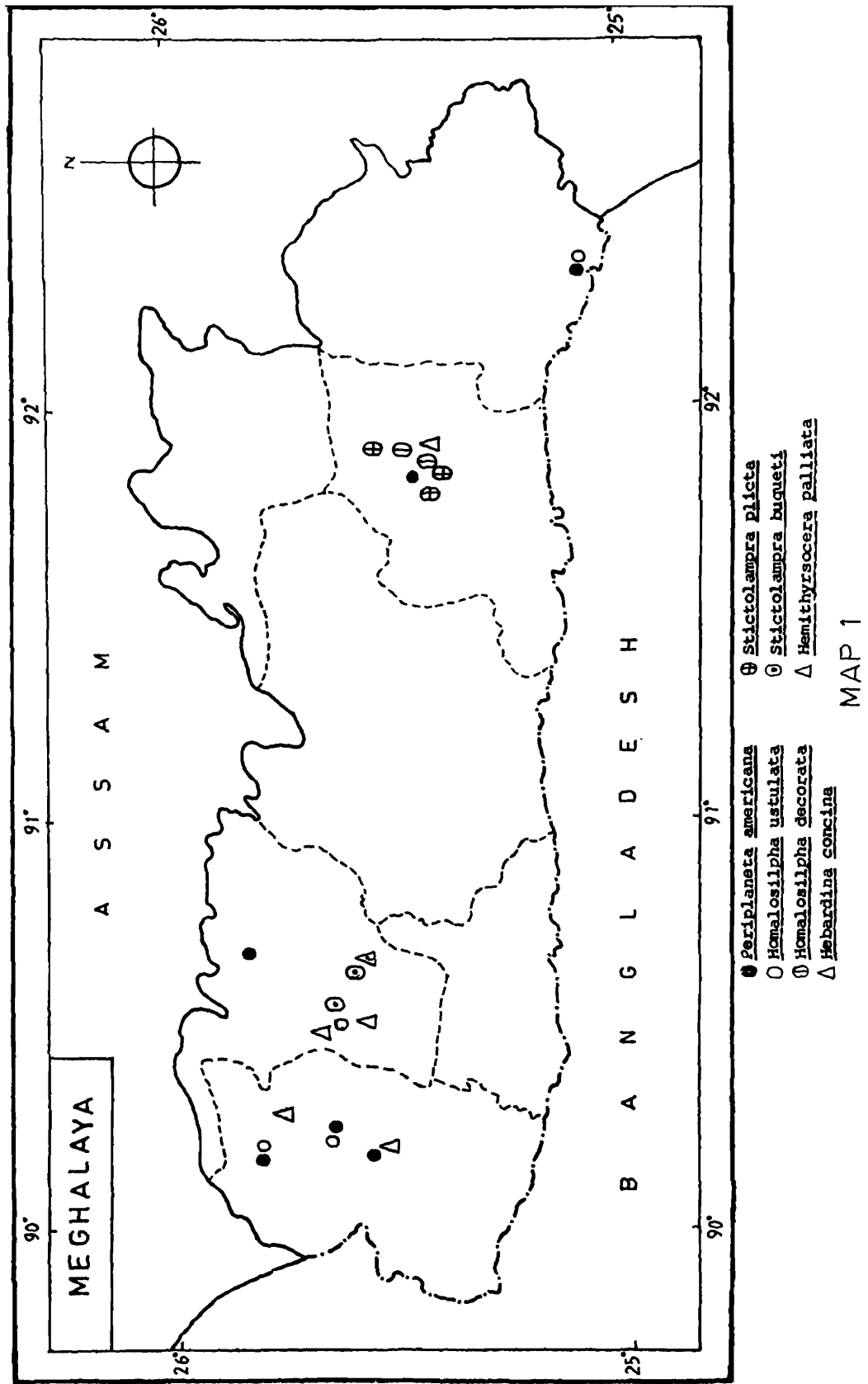
Diagnostic features : Male : Size large. Head with vertex exposed, interocular distance narrower than the width of antennal socket. Ocelli small. Pronotum flattened, smooth, subelliptical, sides deflexed, wider behind the middle, and all angles broadly rounded (Fig. 1a). Femora and tibiae strongly spined, posterior metatarsus longer than the remaining joints. Supra-anal plate with a v-shaped excavation at the posterior margin (Fig. 1b). Subgenital plate symmetrical and devided at the posterior margin.

Colour : Reddish brown. Pronotum with a yellow narrow band at lateral margin, and another broad at posterior margin. Tegmina uniformly reddish brown.

Female : Supranal plate with a deep acute median emargination. Subgenital plate with mesodistal portion with valves (Fig. 1c).

<i>Measurements (in mm.) :</i>	<i>Male</i>	<i>Female</i>
Total body length	28-33.0	27-32
Pronotum length	7.4-9.0	8-9.0
Pronotum width	9-10.8	10.5-11.5
Tegmen length	27.2-29.5	27.5-30.7

Remarks : This is cosmopolitan species and one of the most important domestic cockroach pest and thrives in tropical and subtropical climates all over the world. It is recorded first time from this state.



Map 1 : Showing distribution of *Periplaneta americana*, *Homalosilpha ustulata*, *Homalosilpha decorata*, *Heberdina concina*, *Stictolampra plicata*, *Stictolampra buqueti*, *Hemithyrsocera palliata* in different district of Meghalaya.

Genus *Homalophilpha* Stal, 1874

Key to the species of *Homalophilpha*

- 1. Supra-anal plate of male with deep emarginate at the posterior margin.....
.....*ustulata* (Burmeister).
- Supra-anal plate of male with a small notch at the posterior margin.....*decorata* (Serville).

2. *Homalophilpha ustulata* (Burmeister)

(Map 1)

1838. *Periplaneta ustulata* Burmeister, *Handb. Ent. Berlin*, 2 (2) : 503.

1915. *Homalophilpha ustulata* : Hanitsch, *J. Straits. Br. R. Asiat. Soc.*, 69 : 108.

1966. *Homalophilpha ustulata* : Princis, *Orthopt. Catalog.* part 8 : 458-459.

Material examined : East Garo hills : 1 M, 2 FF (1 F nymph). Songsok, 16. xi. 1973, coll. S. Biswas; 1 M, (1 F nymph), anogiri-forest, 21. vii. 1975, coll. S. Biswas; 1 M, 1 F, Anogiri, 22. vii. 1975, coll. S. Biswas.

Diagnostic features : Male : Size medium. Head with vertex exposed, ocelli small. Pronotum discoidal, greatest width before the middle, all angles broadly rounded, anterior margin transeverse and posterior margin a little convex in shape. Anteroventral margin of front femur with a row of stout spines, largest near the middle. Abdomen with posteriolateral corner of all segments with tooth like appearance. Supra-anal plate small, a deep emarginate at apex. Subgenital plate short with concave apex. Style elongate and slender.

Colour : Reddish dark. Pronotum yellow in all sides, disc with two black curved longitudinal stripes medially. Tegmina uniformly brown.

Female : Supra-anal plate with a little notch at the posterior margin. Subgenital plate shallowly convex at the posterior margin.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total length of the body	24-28.0	25-28.5
Length of Pronotum	6.5-7.8	6.7-7.8
Width of Pronotum	7.5-8.6	10-10.5
Length of Tegmen	23-30.0	27-31.0

Distribution : India (Meghalaya, Andaman Islands, Arunachal Pradesh, Assam, Orissa, Sikkim and West Bengal). Borneo, Celebes; Java; Malaysia; Sumatra.

Remarks : This species is newly recorded from this state. It closely resembles to *Periplaneta americana* but here the pronotum is discoidal and maximum width before the middle. It is easily recognised by its remarkable pronotal design.

3. *Homalophilpha decorata* (Serville)

(Map 1)

1839. *Blatta decorata* Serville, *Hist. nat. Ins. Orth. Paris* : 99.

1906. *Epilampra decorata* : Shelford, *Trans. ent. Soc. London* : 270.

1915. *Homalophilpha decorata* : Hanitsch, *J. Straits. Br. R. Asiat. Soc.*, 1 : 467.

1966. *Homalophilpha decorata* : Princis, *Orthopt. Catalog.* part 8 : 458.

Material examined : East Khasi hills : 1 F, Shillong, 12. iv. 1973, coll. M. S. Jayrwa; 1 F, Upper Shillong, 24. v. 1974, coll. M. S. Jayrwa; 1 M, Shillong, 21. vi. 1976, coll. A. K. Sen.

Diagnostic features : *Male* : Size medium. Head with vertex slightly exposed. Ocelli small. Pronotum flattened, smooth, much wider before the middle, anterior margin transeverse, posterior margin obtusely rounded. Anteroventral margin of front femur with a row of stout spines and largest near the middle. Supra-anal plate small, subrectangular with a small notch medially. Subgenital plate transeverse at apex. Style small, and of equal size.

Colour : Body shining, and of deep brown colour. Concolours with head and legs. Pronotum with a deep golden yellow lateral curved line, originated from the anterior margin and not reaching to the posterior margin.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Toal body length	19.0	20.0
Pronotum length	3.6	3.7
Pronotum breadth	4.5	4.8
Tegmina length	18.2	19.0

Distribution : India (Meghalaya). Borneo; Java; Sarawak; Sumatra.

Remarks : Though it is cosmopolitan in distribution, but newly recorded not only from the Meghalaya but also from India. It is easily recognised by its dark casteneous pronotum with a lateral curved orange vittae.

Genus *Heberdina* Bey-Bienko, 1838

4. *Heberdina concina* (De Haan)

(Map 1)

1842. *Blatta (Periplaneta) concina* De Haan, in *Temminck verhand.* Orth. : 50.

1929. *Blattina concina* : Hebard, *Pr. Ac. nat. Sci. Philadelphia*, 81 : 84.

1966. *Heberdina concina* : Princis, *Orthopt. Catalog.*, part 8 : 466.

1990. *Heberdina concina* : Roth, *Mem. Mus. Victoria*, 50 (2) : 357-378.

Material examined : East Garo hills : 4 M M, Rongram 28. ix. 1975, coll. N. Muralidharan; 1 F, Rongrenjin, 5. xi. 1978, coll. K. P. Singh. East Khasi hills : 1 F Shillong, 26. vi. 1981, coll. M. S. Jayrwa.

Diagnostic features : *Male* ; Size small. Head with vertex a little exposed. Eye space greater than the antennal socket. Pronotum trapizoidal, anterior margin weakly convex or entire, posterior margin shallowly convex, lateral margin rounded. Tegmina and wings squami-form or rounded, at least three segments exposed, hind margin much smaller and narrower than tegmina. Anteroventral margin of front femur with feebly curved spines which abruptly decrease in size towards the apex. Arolia moderately developed. Supra-anal plate small and transeverse. Subgenital plate small, anterior margin entire with two styles.

Colour : Uniformly black or deep brown on head, pronotum and tegmen.

Female : Tegmina reduced to small pads covering the lateral areas of the first two segments.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length	12.5-14.0	13.5-15.8
Pronotum length	3.5-3.8	3.6-4.2
Pronotum breadth	4.5-5.0	4.6-5.7
Tegmen length	8.5-14.0	7.0-10.0

Distribution : India (Meghalaya, Arunachal Pradesh, Assam, Gujarat, Sikkim, Tamilnadu, and West Bengal). Australia; Borneo; Burma; Celebes; Japan, Java, Malakka; Malayasia; Sumatra, Philippines; Vietnam.

Remarks : This species varies considerable in size. The females tend to be larger than males.

Genus *Neostylopyga* Shelford, 1911

5. *Neostylopyga rhombifolia* (Stål)

(Map 1)

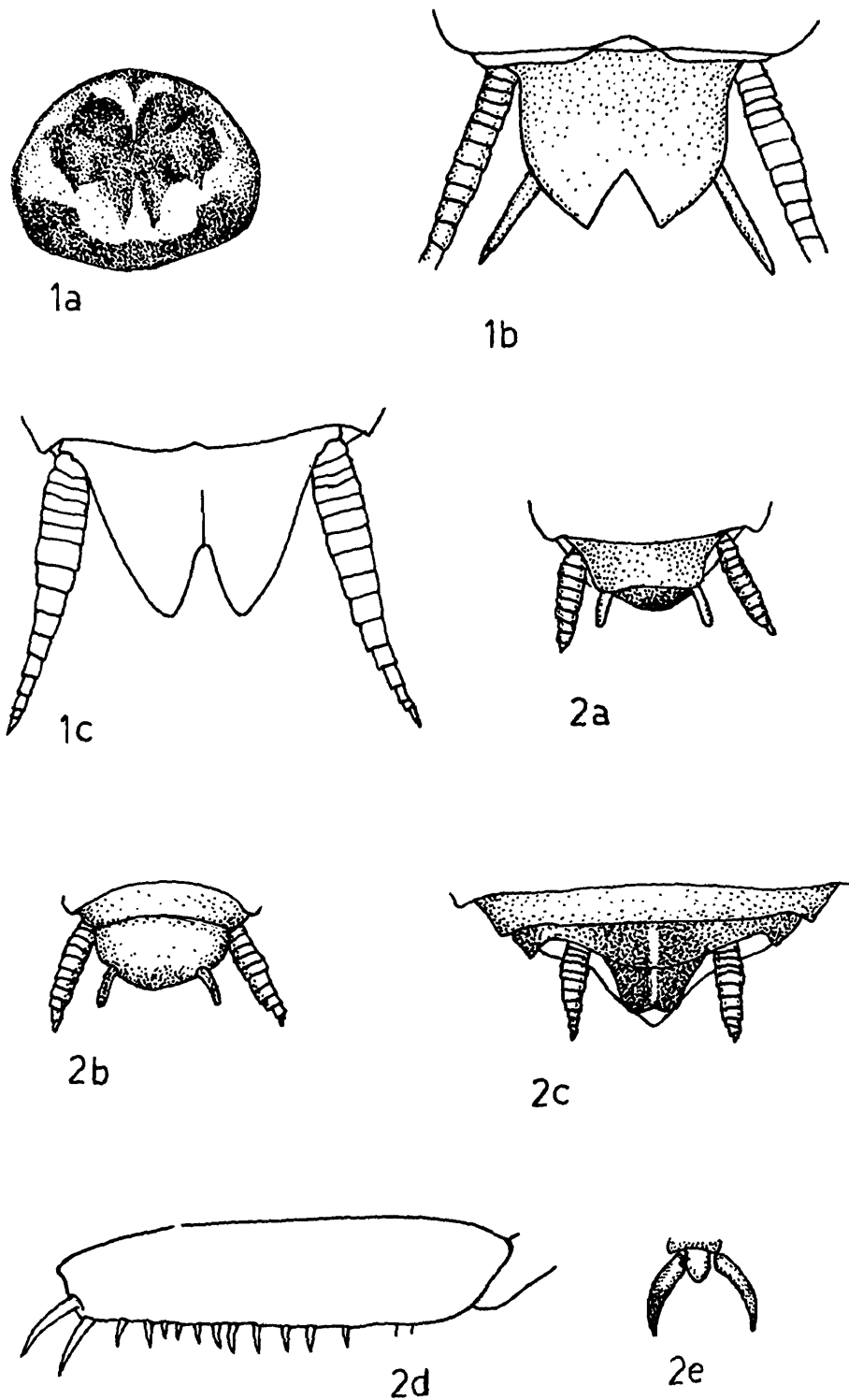
1813. *Blatta rhombifolia* Stål, *Repres. exact. coloree dapre's natured. spectres etc.*, 2 : 5,4.

1915. *Stylopyga rhombifolia* : Hanitsch, *J. Straits Br. R. Asiat*, 69 : 105, 163.

1965. *Neostylopyga rhombifolia* : Princis, *Orthop. Catalogus.*, part 8 : 534-536.

Material examined : East Garo hills : 2 M M, 1 F, Narangiri, 29. v. 1990, coll. M. S. Shishodia.

Diagnostic features : *Male* : Size medium. Vertex a little exposed. Pronotm with anterior margin a little convex or entire, posterior margin straight, lateral margin rounded, and maximum width just at the posterior margin. Tegmina reduced. Wings absent. Posterolateral tergite a little



Figs. 1a-1c, *Periplaneta americana*, fig. 1a, pronotum (dorsal); fig. 1b, supra-anal plate of male (dorsal); fig. 1c, supra-anal plate of female (dorsal).

Figs. 2a-2b, *Blatta orientalis*, fig. 2a, supra-anal plate and subgenital plate of male; fig. 2b, subgenital plate of male (ventral); fig. 2c, terminal abdominal segments of female (dorsal); fig. 2d, anterior femur; fig. 2e, tarsal claws and arolium of male.

indented. Supra-anal plate triangular with deeply notched medially. Subgenital plate compressed with obtuse apex. Style thin and slender.

Colour : Vertex black at the anterior end. Reddish yellow spot present from 1st to the 5th terga laterally and from 6th to last terga black.

Female : Anterior margin of pronotum a little concave medially. Posterior margin with maximum width. Tegmen with posterior margin obtusely rounded. Supra-anal plate slightly depressed medially.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length	24.0-32	22-27.5
Pronotum length	8.0-9	6.5-7
Pronotum breadth	9.0-10.5	8.5-9.5
Tegmen length	0.5-0.7	0.3-0.4

Distribution : India (Meghalaya, Andaman and Nicobar Islands, Andhra Pradesh, Bihar, Madhya Pradesh, Orissa, Uttar Pradesh, and West Bengal). Borneo; Celebes; Java; Malaysia; Sarawak; Sumatra.

Remarks : This species is new record from Meghalaya. It is easily identified by tegminal rudiments with variegated markings.

Genus *Blatta* Linnaeus, 1758

6. *Blatta orientalis* Linnaeus

(Map 1)

1758. *Blatta orientalis* Linnaeus, *Systema naturae*, 1 (10th ed.) Holmiae : 424.

1966. *Blatta orientalis* : Princis, *Orthop. Cat.*, part 8 : 475-491.

Material examined : East Garo hills : 2 M M, 3 F F, Narangiri, 29. v. 1990, coll. M. S. Shishodia.

Diagnostic features : Male : Head with vertex exposed. Tegmen and wings reduced, covering only about two thirds of abdominal terga. Anteroventral margin of front femur as (Figure 2d). Abdominal tergite 1 unspecialized, tarsal claws as (figure 2e) Supra-anal plate a little concave at the anterior margin (Fig. 2a). Subgenital plate obtusely rounded at apex (fig. 2b).

Colour : Black.

Female : Anteroventral margin of front femur with strongly spined. Tegminae short. Hind wing absent. Supra-anal plate with a mediolongitudinal ridge, posterior margin angulate emarginate. Subgenital plate triangular, lateral margin a little concave (Fig. 2c).

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total length of the body	20-23	19-22.5
Pronotum length	5.3-6.3	5.6-6.5
Pronotum width	7.0	8-8.3
Tegmen length	12-13	4.5-5

Distribution : Cosmopolitan.

Remarks : This species is cosmopolitan domiciliary pest.

Suborder EPILAMPROIDEA

Key to the family of Epilamproidea

1. Pronotum and anterior wings always with distinct instead of less darker punctation; anterior wings flat instead of deep convex; sub-costa provided rami anteriorly.....EPILAMPRIDAE.
- Pronotum and anterior wings may not with darker punctation; anterior wings flat, hardly deep convex; subcosta rarely with rami anteriorly.....2.
2. Posterior wings of the most part lacking apical triangle between Cu_1 and 3A. Subgenital plate with most distinct shape but never ectoboidem type.....BLATTETLLIDAE.
- Posterior wing continuously with single apical triangle between Cu_1 and 3A; subgenital plate always ectoboidem type.....ECTOBIDAE.

Family EPILAMPRIDAE

Subfamily EPILAMPRINAE

Antennae setaceous, never plumose, occasionally slightly incrassate. Pronotum variable in form. Tegmina coriaceous, fully developed or reduced or absent. Supra-anal plate of male more or less quadrate with obtuse angles, subbilobed in female. Femora with sparsely or strongly spined beneath. Middle metatarsus longer, tarsal joint insignificant.

Key to the genera of Epilamprinae

1. Wing truncate or acuminate at apex.....*Rhabdoblatta* Kirby:
- Wing rounded at apex.....*Stictolampra* Hanitsch.

Genus *Rhabdoblatta* Kirby, 1903

7. *Rhabdoblatta ridleyi* (Kirby)

(Map 1)

1903. *Hedia horologica* Kirby, *Ann. Mag. nat. Hist.*, **12** (7) : 273-279.

1910. *Rhabdoblatta horologica* : Shelford, *Gen. Ins.* 109 ; 1-27.

1965. *Rhabdoblatta ridleyi* : Princis, *Orthopt. Catalog.*, part II 672-673.

Material examined : Khasi hill : 1 M, without locality and date.

Diagnostic features : Male : Size large. Head with vertex exposed (fig. 3). Ocelli large, close to the eye. Pronotum elliptical broader than long, nearly concealing the head. Pronotum with anterior margin transverse, posterior margin obtusely rounded, lateral margin rounded. Tegmen densely reticulated, the costal area with slightly oblique numerous veins. Supra-anal plate broad with two flattened styles. Cerci long. Anteroventral margin of front femur with 3 spines near the proximal end and another 2 near the distal end.

Colour : Head light reddish brown in the middle, yellowish grey behind and below the eyes. Pronotum light grey, the sides subhyaline, rather dark in the middle but not towards the extremity, with numerous shallow black punctures. Tegmina light grey with numerous black spot.

Distribution : India (Meghalaya). Java; Singapore.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total length of the body	35.5	45.0
Pronotum length	6.1	8.3
Pronotum width	7.8	10.1
Tegmen length	31.7	40.5

Remarks : No specimens of this species has been collected during the present survey. However, I have studied the species on the basis of a specimen present in the National Zoological Collection.

Genus *Stictolampra* Hanitsch, 1931

Key to the species of Stictolampra

1. Head with vertex covered by pronotum.....**plicata** (Nava's).
- Head with vertex not covered by pronotum.....**buqueti** (Serville).

8. *Stictolampra plicata* (Nava's)

(Map 1)

1904. *Opisthoplatia plicata* Nava's. *Bol. Soc. aragon. cienc. nat.* **3** : 130.

1910. *Rhcnoda plicata* : Shelfore. *Gem. Ins.* **101** : 9.

1967. *Stictolampra plicata* : Pincis, *Orthopt. Catalog.* part II : 683.

Material examined : East Garo hills : 1 Fn, Songsok, 16. x. 1973, coll. S Biswas. West Garo hills: 1 Fn Anogiri, 7.ix.1973, coll. S. Biswas. East Khasi hills : 1Mn, 1Fn, Uran, 14.ii.1971, coll. S. Biswas; 1Fn, Mawphlong, 13.vii.1973, coll. R.S.Pillai; 1Fn, Shillong, 6.vii.1974, coll. M.S. Jyrwa; 1Fn, Motinagar.

Diagnostic features : Nymph: head with vertex covered by pronotum. Tegmen and wings absent.

Colour : Brownish testaceous. Pronotum testaceous with irregular black spots.

Distribution : India (Maghalayá and West Bengal); Borneo; Java; Malaysia.

Remarks : No adult specimen of this species has been found during the present study. According to Herbard (1929) majority of the Malayan record of the species are referable to be early stages of other Epilamprinae.

9. *Stictolampra buqueti* (Serville)

(Map 1)

1839. *Blatta buqueti* Serville, *Hist. nat. Ins. Orth.*, paris : 93.

1915. *Rhabdoblatta buqueti* : Hanitsch, *J. Straits. Br. R. Asiat. Soc.*, **69** : 73, 161.

1948. *Rhabdoblatta buqueti* : Bruijining, *Zool. Meded.*, **29** : 40, 137.

1967. *Stictolampra buqueti* : Serville, *Orthop. Catalog.*, part II : 685.

Material examined : East Garo hills ; 1 M, Songsok, 14. iv. 1973, coll. S. Biswas; 1 M, Rongrangiri, 19. iv. 1973, coll. S. Biswas; 1 M, Songsok, 18. xi. 1974, coll. S. Biswas. *East Khasi hills* : 1 M, Shillong, 1. xi. 1975, coll. M. S. Jayrwa.

Diagnostic features : *Male* : Size medium. Head with vertex a little exposed, Pronotum broader than long, anterior margin truncated or slightly convex, lateral side obtusely angular. Tegmina and wings extending beyond the abdomen. Anteroventral margin of front femur with four equal shaped strong spine and distally bristle shaped spines arranged serially. Supra-anal plate symmetrical, posterior margin semicircular, with a notch in the middle (Fig. 4a). Subgenital plate with anterior margin convex, posterior margin more or less straight. (Fig. 4b).

Colour : Brownish testaceous. Pronotum testaceous with irregular black spots.

Distribution : India (Maghalaya). Borneo; Java; Malaysia; Sumatra.

<i>Measurements (in mm).</i>	<i>Male</i>	<i>Female</i>
Total body length	29.0	32.0-33
Length of pronotum	7.0	8.0
Width of pronotum	8.5	9.7
Length of tegmen	27-28	30-32

Remarks : This species is newly recorded not only from Meghalaya but also from India.

Family ECTOBIDAE
 Subfamily THEGANOPTERYGINAE
 Genus *Hemithyrsocera* Saussure, 1893

Key to genera of Hemithyrsocera

1. Yellow golden lateral margin present all around the pronotum.....*palliata* (Fabr.).
 — Yellow golden lateral margin reach the anterior margin of pronotum.....*ignobilis* (Shelford).

10. *Hemithyrsocera palliata* (Fabricius)

(Map 1)

1798. *Blatta palliata* Fabricius, *Suppl. Ent. Syst.*, Hafniae : 186.

1915. *Hemithyrsocera palliata* Hanitsch, *J. Straits Br. R. Asiat Soc.*, **69** : 28, 159.

1971. *Hemithyrsocera palliata* : Princis, *Orthopt. Catalog.* part 4 : 1124.

Material examined : East Garo hills : 1 M, Rongrangiri, 11. xi. 1978, coll. K. P. Singh.
 East Kahsi hills : 1 F, Motinagar, 16. ii. 1971, coll. R. Giri. West Kahsi hills : 1 M, Degrangiri.
 10. xi. 1973, coll. S. Biswas.

Diagnostic features : *Male*: Size small, moderately slender body. Head not very broad, vertex slightly exposed, ocellar spots forming an angle with the intervening area, face with lateral margin decidedly converging ventred. Pronotum with anterior margin shallowly convex, outer lateral margin rounded, caudal margin moderately produced and posterior margin a little obtusely rounded. Tegmina showing a tendency apically angular or apical angulation, costal area shorter than the anal area, subcostal vein a little curved, branching in the middle, media and cubitus are fused. Anteroventral margin of front femur with a row of heavy spines which generally decrease in size distally. Supra-anal plate transeverse. Subgenital plate with anterior margin transeverse, partly covered by seventh abdominal segments, apex rounded.

Colour : Blackish, cerci with apex whitish. The golden yellow colour of lateral margin reach from anterior to posterior margin.

<i>Measurements (in mm)</i> :	<i>Male</i>	<i>Female</i>
Total body length	10-11.5	9.5-12
Pronotum length	2.2	2-2.6
Tegmen length	9.0-9.5	8.7-9.5

Distribution : India (Meghalaya, Arunachal Pradesh, Assam, Himachal Pradesh, Kerala, Uttar Pradesh). Burma; China; Java; Malacca; Thailand.

Remarks : It is a small sized species. It is not recorded from Meghalaya earlier.

11. *Hemithyrsocera ignobilis* Shelford

1906. *Hemithyrsocera ignobilis* Shelford, *Trans. ent. Soc.* London : 238.

1971. *Hemithyrsocera ignobilis* : Princis, *Orthopt. Catalag.* part 4 : 1125.

Diagnostic features : Small size. Remaining characters are similar as in the preceeding species.

Colour : The golden lateral margin of the pronotum reach the anterior margin, but are not curved inwards.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length		12.5
Tegmen length		10.0

Distribution : India (Meghalaya).

Remarks : No specimen of this species has been found during the present study. It is based on Shelford's (1906) description.

Family BLATTELLIDAE

Head with vertex more or less exposed. Tegmen and wings absent or present. Legs long, slender. Anterior femur with a row of spines followed by a row of short spines or spine-like setae at the apex. Tarsal claws symmetrical. Cerci short, not projecting much beyond the supra-anal plate.

Key to the genera of Blattellidae

1. Wings present (Cubital veins of wing straight or feebly curved apical triangular area narrow).....2.
- Wings absent.....*Typhloblatta* Chopard.
2. Cubital vein of wings without incomplete branches, but with tranverse veinlets.....*Blattella* Caudell.
- Cubital vein of wings with one to six incomplete branches.....*Symploce* Hebard.

Genus *Blattella* Caudell, 190312. *Blattella germanica* Linnaeus

(Map 1)

1767. *Blatta germanica* Linnaeus, *Syst. naturae* 1 (2) (ed. 12) : 688.

1895. *Phyllodromia germanica* : Tepper, *Trans. R. Soc. S. Austral.*, 19 : 150.

1969. *Blattella germanica* : Princis, *Orthopt. Catalog.* part 13 : 807-823.

Material examined : *East Garo hills* : 1 M, 1 F, Rongran giri, 18. iv. 1973, coll. S. Biswas; 1 F, Degrangiri, 10. xi. 1973, coll. S. Biswas; 3 F F, Arivilla, 6. iii. 1976, coll. S. Biswas. *West Garo hills* : 1 M, 6 F F, Anogiri, 8. ii. 1975, coll. S. Biswas. *East Khasi hills* : 5 F F, Cherapunji, 18. i. 1975, coll. S. Biswas; 2 M M, Shillong, 11. ix. 1973, coll. M. S. Jayrwa; 1 M, Upper Shillong, 26. xi. 1976, coll. M. Vasant; 2 M M, 3 F F, Kyrdam, 8. ii. 1979, coll. S. K. Chnda; 3 M M, 3 F F, Mawlai ·16. xii. 1981, coll. M. R. Rynth.

Diagnostic features : *Male* : Size small. Head with vertex exposed, Interocular space $\frac{3}{5}$ th wide between antennal sockets. Pronotum transeverse, gradually rounded laterally (Fig. 5a). Tegmen relatively elongated, the subcosta is shorter than anal field, discoidal vein forked before median point. 2 to 7 Abdominal tergites with latero-caudal portion produced as lobes, 7 and 8 tergite narrowly visible. Anteroventral margin of front femur as (Figure 5b). Supra-anal plate semi-circular or sub-triangular, with lateral margin moderately convergent, weakly convex at the posterior region. Subgenital plate with posterior margin forming a large broad rounded lobe. Styles simple, small, and symmetrical.

Colour : General colour testaceous.

Female : Interocular space $\frac{3}{4}$ th width between the antennal sockets. Supra-anal plate moderately triangular, apex obtusely emarginate. Subgenital plate large.

<i>Measurements (in mm)</i> :	<i>Male</i>	<i>Female</i>
Total body length	10.5-11.5	10-12.5
Pronotum length	0.3	0-3
Tegmen length	10.7	12.5

Distribution : Cosmopolitan.

Remarks : The so called "German cockroach" is a cosmopolitan species which has been able to establish itself almost everywhere that man has settled.

13. *Blattella humberian* (Saussure)

(Map 2)

1863. *Polyzosteria humberiana* Saussure, *Mem. Soc. Geneve*, 17 : 131.

1969. *Blattella humberiana* : Princis, *Orthopt. Catalog.* part 13 : 842-843.

Material examined : *East Garo hills* : 1 F, Songsok, 14. iv. 1973 coll. S. Biswas; 1 F, Rongiri, 13. xi. 1973, coll. S. Biswas; 2 M M, Dianadubi, 14. ix. 1975, coll. N. Muralidharan. *East Khasi hills* : 1 M, 1 F, Mawpat, 6. ii. 1976, coll. S. Biswas; 1 F, Shillong, 14. xii. 1976, coll. M. S. Jyrawa; 1 M, Mawphlong, 18. vi. 1979, coll. P. T. Cherian; Jaintia hills: 3 M M, 4 F F, Garampani, 15. xii. 1975, coll. S. K. Chanda.

Diagnostic features : Size small. Head with vertex exposed. Cerci slender. Supra-anal plate strongly transeverse, with distal margin broadly convex. Subgenital plate symmetrical.

Colour : Colour brown. Head yellow, frontal region yellowish brown.

Female : Subgenital plate simple, free margin broadly convex but suddenly and distinctly concave below cerci.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length	9.5-10.0 mm	1.0-1.3,
Pronotum length	3	3-3.5
Pronotum breadth	3.5	3.5
Tegmen length	1.2 mm	1.2-1.4 mm

Distribution : Widely distributed species in the world.

Remarks : This species is recorded first time from Meghalaya.

Genus *Symploce* Hebard, 1916

14. *Symploce biligata* (Walker)

(Map 2)

1868. *Ischnoptera biligata* Walker, *Cat. Blatt. Brit. Mus.*, London : 123.

1924. *Ischnoptera fulvastra* : Chopard, *Rec. Ind. Mus.*, 26 : 168.

1969. *Symploce biligata* : Princis, *Orthopt. Catalog.*, part 13 : 886.

Material examined : *East Garo hills* : 4 M M, 2 F F, Rongrangiri, 18. iv. 1973, coll. S. Biswas; 2 M M, Rongrangiri, 11. xi. 1976, coll. K. P. Singh; *West Garo hills* : 1 F, Tura, 14. ii. 1971, coll. G. M. Yazdani; 1 M, 1 F, Degrangiri, 10. xi. 1973, coll. S. Biswas; *Jayantia hills* : 1 M, Garmpani, 15. xii. 1975, coll. S. K. Chanda. *East Khasi hills*; 1 M, Umthan, 23. vii. 1971, coll. S. Biswas; 1 F, Matinagar, Shillong, 26. vii. 1975, coll. M. S. Jayrwa; 7 M M, Mawphalong, 18. vi. 1976, coll. P. T. Cherian.

Diagnostic features : *Male* : Medium size. Head free, vertex exposed; ocelli large and round. Pronotum smooth, anterior margin convex, lateral margin much rounded, posterior margin obtuse angulate. Tegmina exceeding the abdomen, the plical notch is scarcely indicated, radial vein bifurcate beyond its middle. Tergite 7th at the base with two big, rounded tubercles before a glandular depression (Figure 5a). Anteroventral margin of front femur with 2 apical spine and 13 small spines. supra-anal plate a little projecting behind and subtruncated at apex. Subgenital plate large, a little asymmetrical, with short cylindrical styles, inserted near the apex (Fig. 5b).

Colour : Rufo-testaceous uniform colouration. Fore head presenting a brown band between the eyes. In female abdomen with two longitudinal brown stripes.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length	11.5-13.0	12-13
Pronotum length	3.5	3.5
Tegmen length	13-14.5	14-15.0

Distribution : India (Meghalaya and Orissa). Ceylon; Sumatra.

Remarks : This species first time recorded from Meghalaya. It is very close to *Gislenia himalyica* (Br.) but the fore head shows a distinct brown band.

Geuns *Typhloblatta* Chopard, 1924

15. *Typhloblatta caeca* (Chopard)

1921. *Spelaeoblatta* 7 *caeca* Chopard, *Rec. Indian Mus.* **22** : 511, 512.

1969. *Typhloblatta caeca* : Princis, *Orthopt. Catalog.*, part 13 : 997.

Material examined : *Jaintia hills* : 1 M, nymph Rupmath cave, north of Jaintia pur, all. 1000-1500., date nil, coll. Friel and W. Ballantinae.

Diagnostic features : Medium size. Head exposed; ocelli and ocelliform spots absent; antennae much longer than body. Pronotum with anterior margin widely rounded, posterior margin slightly convex. Tegmen and wings absent. Anteroventral margin of front femur with 4 rather strong spines followed by a series of spiniform bristles. Arolia absent between the claws. Cerci rather long, slender. Supra-anal plate slightly triangular. Subgenital plate with posterior margin convex.

Colour : Bright yellow to almost orange, in the middle light grey. Legs and antennae concolours.

<i>Measurements (in mm) :</i>	<i>Male</i>
Total length of the body	11.5
Pronotum length	3.5
Pronotum width	3.5

Distribution : India (Meghalaya).

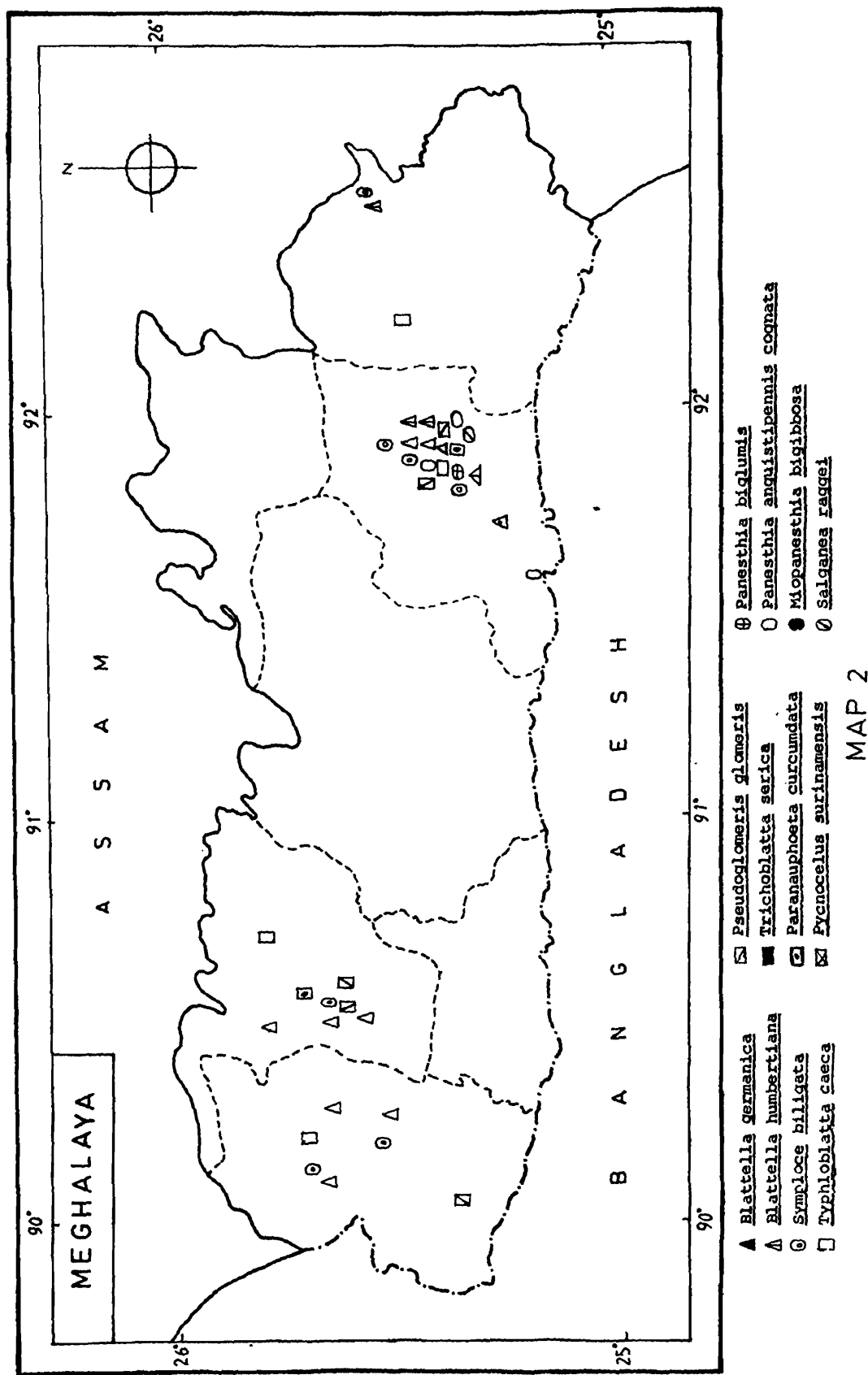
Remarks : This species is described based on a single immature specimen (Chopard, 1921). It is very distinct from all the known cavernicolous blattids. It is easily identified by unusual length of the antennae, legs, cerci and complete absence of tegmen and wings.

Superfamily BLABEROIDEA

Family DEROCALYMMIDAE

Key to the genera of family Derocalymmidae

1. Anteroventral margin of front femur with equal shaped small hairy spine present serially.....2.
- Anteroventral margin of front femur without spine.....*Paranauphoeta* Brunner
2. Pronotum strongly arched shaped on the back, posterior margin subspherical, supra-anal plate inwardly curved like a bow.....*Pseudoglomeris* Brunner
- Pronotum a little arch shaped on the back side, posterior margin truncate. Supra-anal plate quadrate.....*Trichoblatta* Saussure & Zehnt



Map 2 : Showing distribution of *Blattella germanica*, *Blattella humberiana*, *Symptoe biligata*, *Typhloblatta caeca*, *Pseudoglomeris glomeris*, *Trichoblatta serica*, *Paranauphoeta curcundata*, *Pycnocelus surinamensis*, *Panesthia biglumis*, *Panesthia bigibbosa*, *Salganea raggei*. in different districts of Meghalaya.

Genus *Pseudoglomeris* Brunner, 189316. *Pseudoglomeris glomeris* (Saussure)

(Map 2)

1863. *Perisphaeria glomeris* : Saussure, *Mem. Soc. Geneve*, 17 : 135.1895. *Pseudoglomeris glomeris* : Saussure and Zehntner, *Rev. Suisse Zool.*, 3 : 93-40.

Material examined : East Garo hills : 1 F, Warangiri, 6. iv. 1973, coll. S. Biswas. East Khasi hills : 1 M, Shillong, 3-8. xii. 1930, coll. H. S. Rao; 2 FF, Rongiri, 21. iv. 1973, coll. S. Biswas.

Diagnostic features : Size small. Body strongly arched shaped, convex. Head with vertex covered by pronotum, ocelli large. Pronotum elevated on the back side, parabolic, irregularly punctured, front margin wide, posterior margin subshperical, all angles a little produced. Tegmen extends beyond the last abdominal segment. Front femur with anterioventral margin equal shaped, small hairy spines present serially. Cerci bow shaped and inwardly curved. Supra-anal plate with posterior margin triangulate.

Colour : Dark. Tip of antennae, tarsi, cerci, golden yellow. Pronotum pitch black.

Female : Pronotum unequal, Strongly arched shaped.

<i>Measurements (in mm) :</i>	<i>Male</i>
Total body length	24.00
Pronotum length	8.0
Pronotum width	11.5

Distribution : India (Meghalaya, Orissa, Tamil Nadu, West Bengal). Burma; Ceylon; Java; Malayasia.

Remarks : This species is recorded first time from Meghalaya. It is easily identified by its shape of pronotum.

Genus *Trichoblatta* Saussure and Zehntner, 189517. *Trichoblatta sericea* (Saussure)

(Map)

1863. *Perisphaeria blepharodera* Saussure, *Mem. Soc. Geneve*. 17 : 138.1895. *Trichoblatta sericea* : Saussure, and Zehntner, *Rev. Swisse zool.*, 3 : 45.1968. *Trichoblatta sericea* ; Princis *Orthopt. Catalog.*, part 6 : 208.

Material examined : East Khasi hills : 1 M, 3 FF, Shillong, 3-9. xii. 1930, coll. H. S. Rao.

Diagnostic features : Male : Small to medium size. Body strongly arched shaped. Head concealed or covered by pronotum; pronotum transeverse, punctate, rounded on every side and posteriorly a little arched. Elytra elongate, basally punctate, furrow through anali, apex rounded, costal margin extend beyond the margin, ulner vein branches 3-2 apically. Anteroventral margin of front femur with serially arranged small spines. Supra-anal plate posteriorly a little arched. Subgenital plate transeverse.

Colour : Black, ♂ reddish black.

Female : Body elliptical to a little arched. Pronotum transeverse, a little angularly extended in two direction. Supra-anal-plate transeverse and quadrate. Cerci hardly equally longer.

Colour : Reddish in colour, wings subhylline to reddish yellow or deep yellow.

Distribution : India (Meghalaya and Tamil Nadu).

Remarks : This species is fairly common in Tamil Nadu.

Genus *Paranauphoeta* Brunner, 1893

18. *Paranauphoeta circumdata* (De Haan)

(Map 2)

1842. *Blatta Nauphoeta circumdata* De Haan in Temmink, *Verhand. Natural. Geschied nederl. Oversz. Bezitt.*, 16 zool., Leiden : 52.

1915. *Paranauphoeta circumdata* : Hanitsch, *J. Straits Br. R. Asiat. Soc.* no. 69 : 138, 165.

1964. *Paranauphoeta circumdata* : Princis, *Orthopt. Catalog.*, part 6 : 250.

Material examined : *East Garo hills* : 1 F, Songsok, 15. iv. 1973, coll. S. Biswas. *East Khasi hills* : 1 M, Shillong, 6. vii. 1974, coll. M. S. Jayrawa.

Diagnostic features : Male : Size medium. Head with vertex prominent, exposed. Pronotum with thin plate, a little depressed medially, anterior margin rounded, posterior margin truncate, lateral margin rounded. Tegmina with scutellum triangular in shape, anterior margin weakly sigmoid, posterior margin rounded. Wing subtruncate apically and distinct, plical notch absent. Femur with anterior ventral margin without spine, arolae medially placed between the equal claws. Supra-anal plate with anterior margin transeverse, posterior margin shallowly convex, a small elevation in the middle.

Colour : Beautiful painted. Pronotum black and laterally golden border at both sides. Antennae brown, testaceous at the base and sulphur colour at apex. Tegmina with two golden yellow spot.

Female : Subgenital plate convex at the anterior margin, and posterior margin semicircular. Cerci short.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length	21.5	24.0
Pronotum length	7.0	7.5
Tegmen length	17.0	18.0

Distribution : India (Meghalaya, Assam, Sikkim and West Bengal). Borneo; Cambodia; Java; Malayasia; Sumatra.

Remarks : This species is not only recorded for the first time from Meghalaya. The most beautiful painted with two golden yellow spot on tegmina.

Family PYCNOSCELIDAE

Subfamily PYCNOSCELINAE

Genus *Pycnoscelus*

19. *Pycnoscelus surinamensis* (Linnaeus)

(Map 2)

1758. *Blatta surinamensis* Linnaeus, *Syst. naturae*, (10th Ed.) 1 : 424.

1903. *Pycnoscelus surinamensis* : Rehn, *Trans. Am. ent. Soc.*, **29** : 131, 136.

1964. *Pycnoscelus surinamensis* : Prinsis, *Orthopt. Catalog.*, part 6 : 264.

Material examined : East Khasi hills : 1 F, Motinagar, 16. ii. 1971, coll. R. Giri.

Diagnostic features : *Female* : Medium size. Vertex with head exposed, ocelli large, approximate to the eye. Pronotum laterally rounded, posterior margin convex. Tegmen and wings extending scarcely upto the apex of the abdomen; subgenital plate with unequally rounded at apex. (Fig. 7).

Colour : Shiny, blackish brown, with buff lateral margins on the translucent tegmina. The anterior and lateral edges of the pronotum are also buff coloured.

<i>Measurements (in mm) :</i>	<i>Female</i>
Total body length	16.0-20.0
Pronotum length	4.5-5.4
Pronotum width	6.5-7
Tegmen length	18-20.0

Distribution : Cosmopolitan.

Remarks : It has been previously reported from Sizu cave (Meghalaya), Garo hills. This species is normally exists as female. Occasionally parthenogenitic males occur in cultures of

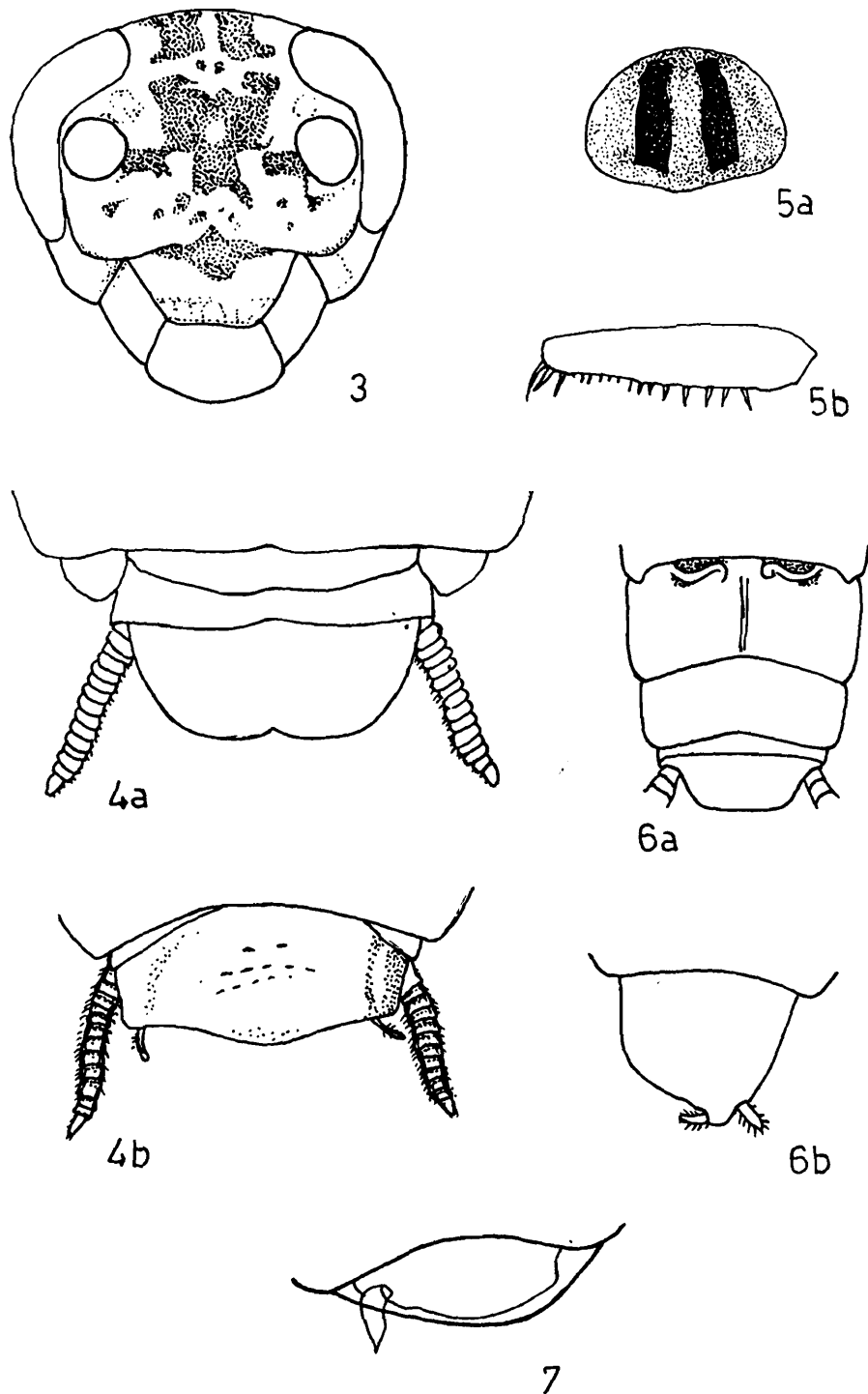


Fig. 3a, *Rhabdoblattu ridleyi*, head.

Figs. 4a-4b, *Stictolampra buqueti*, fig. 4a, supra-anal plate of male (dorsal); fig. 4b, subgenital plate male (ventral).

Figs. 5a-5b, *Blattella germanica*, fig. 5a, pronotum; fig. 5b, anterior femur.

Figs. 6a-6b, *Symploce biligata*, fig. 6a, tergite 7th fig. 6b, subgenital plate (ventral).

Figs. 7, *Pycnocelus surinamensis*, fig. 7, subgenital plate of female (ventral).

surinamensis but they are nonfunctional, when mated to parthenogenetic females (Roth, 1967). In male, eight sternite is rounded posteriorly, the ninth completely hidden and bearing one style.

Family PANESTHIDAE

Subfamily PANESTHINAE

Key to the subfamily Panesthinae

1. Femora with anteroventral margin with two distinct spines. (Certain genera of Perisphaerinae may fall here specially immature specimen, may also run out here unless carefully judged)...
— Femora unarmed on anteroventral margin or with a single short spine.....2.
2. Both sexes fully winged; seventh dorsal segment of abdomen laterally with round holes, fifth dorsal segment of abdomen with lateral projection.....*Salganea* Stål.
— Seventh dorsal segment of abdomen, laterally entire or only punctate.....3.
3. Sixth segment of abdomen with posterolateral angle produced into a sharp point.....
.....*Miopanesthia* Saussure.
— Sixth segment of abdomen with postero lateral angle not produced as only triangular or so.....*Panesthia* Serville.

Genus *Panesthia* Serville, 1831

Key to the species of Panesthia

1. Punctations on the surface of supra-anal plate, 7th abdominal tergite and sternite stellate like; colour band absent on tegmen and terga.....*Stellata* Saussure.
— Punctations on the surface of the supra-anal plate, 7th abdominal tergite and sternite not stellate like.....2.
2. Tegmina with a narrow transverse black basal line, except at base of the marginal field, followed by a broad yellowish or reddish brown band extending behind about one third from the base; anterolateral corners of 5th abdominal tergite with a transeverse groove.....
.....*regalis* Walker
— Tegmina black to dark brown; anterolateral corner of 5th abdominal tergite without a transverse groove; nymphs with a broad yellow band on the meso and metanotum.....
.....*angustipennis cognata* Bey-Bienko

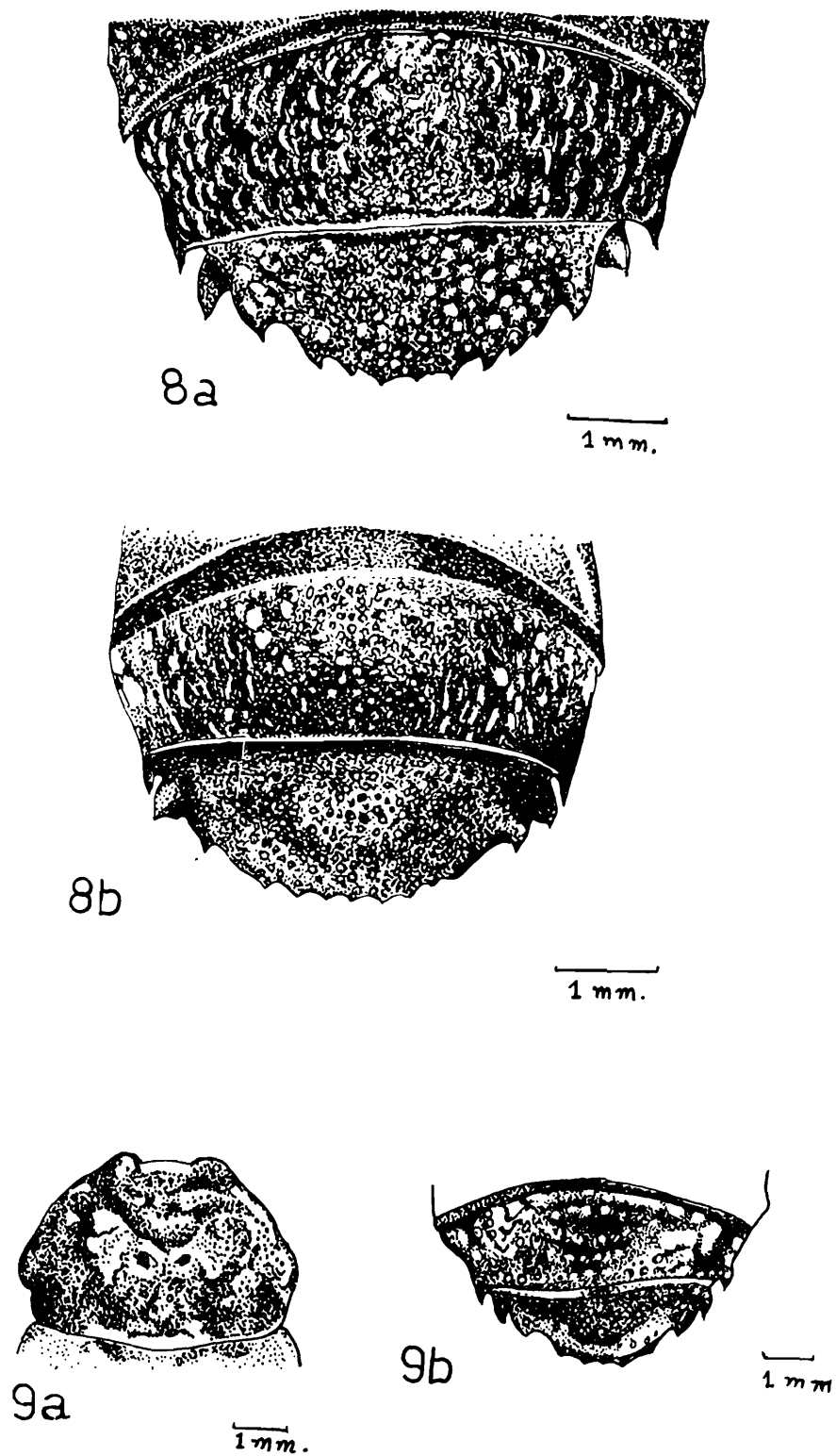
Genus *Panesthia* Serville, 1831

20. *Panesthia stellata* Saussure

1895. *Panesthia stellata* Saussure, *Rev. Suisse Zool.*, 3 : 313.

1965. *Panesthia stellata* : Princis, *Orthopt. Catalog.*, part 7 : 313.

1979. *Panesthia stellata* : Roth, *Aust. J. Zool.*, suppl. ser. no. 74 : 63-65.



Figs. 8a-8b, *Panesthia stellata*, fig. 8a, abdominal tergite 7th and supra-anal plate of male; fig. 8b, abdominal tergite 7th and supra-anal plate of female.

Figs. 9a-9b, *Panesthia regalis*, fig. 9a, pronotum; fig. 9b, abdominal tergite 7th and supra-anal plate of female.

Material examined : Khasi hills : 7 MM, 9 FF, (4 MM, and 7 FF, nymphs.) without locality and date and collector.

Diagnostic features : *Male* : Head finely punctate, vertex not foveolate and exposed. Pronotum widest below the middle, anterior margin a little concave, disc tubercle closely situated or absent. Tergite one to five punctate, laterally and from the 7th tergite densely punctate, the spaces between the punctuations with a stellate shape appearance. Anterolateral corners of all abdominal tergite without holes, posterior lateral margin of 7th tergite with slightly indented. Anteroventral margin of 7th tergite with slightly indented. Anteroventral margin of front femur with 2 to 3 spines and a distal small spines. Supra-anal plate densely punctate with 7 to 9 distinct teeth at the hind margin (Fig. 8a). Subgenital plate narrowly but broadly exposed.

Colour : Reddish brown to black.

Female : Anterior margin of pronotum shallowly concave, disc tubercle absent or finely indicated. Hind margin of supra-anal plate 6 to 10 teeth (Fig. 8b)

<i>Measurements (in mm)</i> :	<i>Male</i>	<i>Female</i>
Total length of the body	26.0-31.0	26.0-34.0
Pronotum length	5.2-7.0	5.0-7.3
Pronotum width	9.0-11.5	9.0-11.5
Tegmen length	27-30.0	27.0-31

Distribution : India (Meghalaya, Assam, Nagaland, Sikkim and West Bengal).

Bangladesh; Bhutan; Burma.

Remarks : We have not found this species in the present collection. Bey Bienko reported this species from Khasi hills without locality and date. Further according to Roth 1979 the brachypterous form of *stellata* is similar to macropterous individuals, except for the reduced tegmina.

21. *Panesthia regalis* Walker

1868. *Panesthia regalis* Walker, *Cat. Brit. Mus. nat. Hist.* London : 21.

1904. *Panesthia bengalica* : Kirby, *Syn. Cat. Orth.*, 1 : 20.

1979. *Panesthia regalis* : Roth, *Aust. J. Zool. suppl. ser.*, 74 : 117-119.

Material examined : Khasi hills : 2 MM, and 1 F, nymph, (no exact locality, date and name of collector); *N. Khasi hills* : 1 M, and 3 FF, nymphs.

Diagnostic features : *Male* : Head finely punctate, ocellus spot small and irregular in shape, vertex hardly exposed. Pronotum with anterior margin distinctly excavated, disc of anterior half depressed, its floor to some extent granular with small lateral mounds (Fig. 9a). Tegmina and wings extended at the end of abdomen or slightly beyond. Lateral margin of 7th tergite slightly concave, the caudal angle with a posteriorly directed spine, Antero-ventral margin of front femur

without spine or with a minute distal spine. Supra-anal plate with hind margin 5 shallow but distinct teeth, the lateral angle subacute (fig. 9b). Subgenital plate considerably exposed and curved.

Colour : Antennae with 4 to 8 segments pale from the base, tegmina with a narrow black basal region followed by a large yellowish patch, legs black.

Female : Anterior margin of pronotum more shallowly excavated, the tegmina and wings are mutilated.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total length of the body	30.0-35	32.0-33.0
Pronotum length	6.5-8.0	7.3-7.6
Pronotum width	11.3-12.2	11.8-12.8
Tegmen length	26.0-30.0	

Distribution : India (Meghalaya, Assam, Nagaland, West Bengal). Annam; Bangladesh; Bhutan and Burma.

Remarks : This species is generally occurs in forest specially in the hilly region. However, Roth (1970) reported this species from Meghalaya but we have not come across any specimens of this species during our surveys.

22. *Panesthia angustipennis cognata* Bey-Bienko

(Map 2)

1970. *Panesthia angustipennis cognata* Bey-Bienko, *Entomol. Rev.*, 49 : 529.

1979. *Panesthia angustipennis cognata* : Roth, *Aust. J. Zool. suppl. Ser. no. 74* : 42-45.

Material examined : East Khasi hills : 1 M, 2 F, Janakhmukh, 18. xii. 1911, 6000 ft, coll. S. W. Kemp; 1 F, Shella, 25. vii. 1981, coll. C. Radhakrishnan.

Diagnostic features : *Male* : Size large. Head densely punctate, vertex usually with a small foveolae and exposed. Pronotum a little convex at the anterior margin, mesal tubercle closely situated (Fig. 10a). Tegmina and wings absent. All the anterolateral corners of the abdominal tergites devoid of holes. Anteroventral margin of front femur usually with a minute distal spine, and in posterior margin with a large distal spine. Supra-anal plate with largely punctures, hind margin serrulate, usually with 6-10 small teeth. Subgenital plate with apical margin weakly convex.

Nymph : Lack of adult pronotal characters. A broad yellow band on the mesonotum extending to both anterior and posterior borders but not to lateral border, similar colour yellow band on the metanotum which does not reach the dark hind border, and the dark lateral region is wider than

those mesonotum. Pronotum flattend to convex, anterior margin entire, anterior half depressed, the floor slightly rough.

<i>Measurements (in mm) :</i>	<i>Male</i>	<i>Female</i>
Total body length	31-45.5	28-43.5
Pronotum length	6.2-9.8	5.8-9.8
Pronotum breadth	9-14	9.5-13
Tegmen length	26-34.0	28-43.5

Distribution : India (Meghalaya, Assam, Sikkim, West Bengal). Bhutan; Burma; China; South China; Thailand; Vietnam; North & South Vietnam.

Remarks : Only single nymph of this species is available in the present study. The subspecies is easily identified with the half of yellowish colour on meso and mtanotum. Most of the specimens are mutilated at the apex of the tegmen.

Genus *Miopanesthia* Saussure, 1895

23. *Miopanesthia bigibossa* Saussure

(Map 2)

1895. *Miopanesthia bigibbia* Saussure, *Rev. Suisse Zool.*, 3 : 325.

1965. *Miopanesthia bigibbosa* : Princis, *Orth. Cat.*, part 7 : 328.

1979. *Miopanesthia bigibbosa* : Roth, *Aust. J. Zool. suppl. ser. 74* : 137-138.

Material examined : Khasi hills : 2 MM, (1 M, nymph) 1903, Khasi hills. *East Khasi hills* : 1 F, Shillong, 9. x. 1986, coll. M. S. Jayrwa.

Diagnostic features : Size medim. Head punctate, ocelli large, rounded, vertex not foveolate. Pronotum transeverse, anterior margin entire, laterally outwardly curved, a pair of mounds are declined by a shallow channel posteriorly which separate the acute tubercles. Tegmina and wings broad and longer than the abdomen. Abdominal tergites punctate, punctuations increase towards the posterior margin, tergite 7th on the lateral margin feebly convex terminating wih posteriorly directed spine (Fig. 11a). Anteroventral margin of front femur with 1 to 2 spines. Supra-anal plate with hind margin entire (Fig. 11b). Subgenital plate large with apex rounded.

Colour : Reddish brown, ocelli yellow. Legs and abdominal sternites casteneous.

<i>Measurements (in mm):</i>	<i>Male</i>	<i>Female</i>
Total length of the body	22-24	20-23
Pronotum length	5-5.8	5-5.5
Prontum width	7.7-9.0	8.1-8.3
Tegmen length	24	

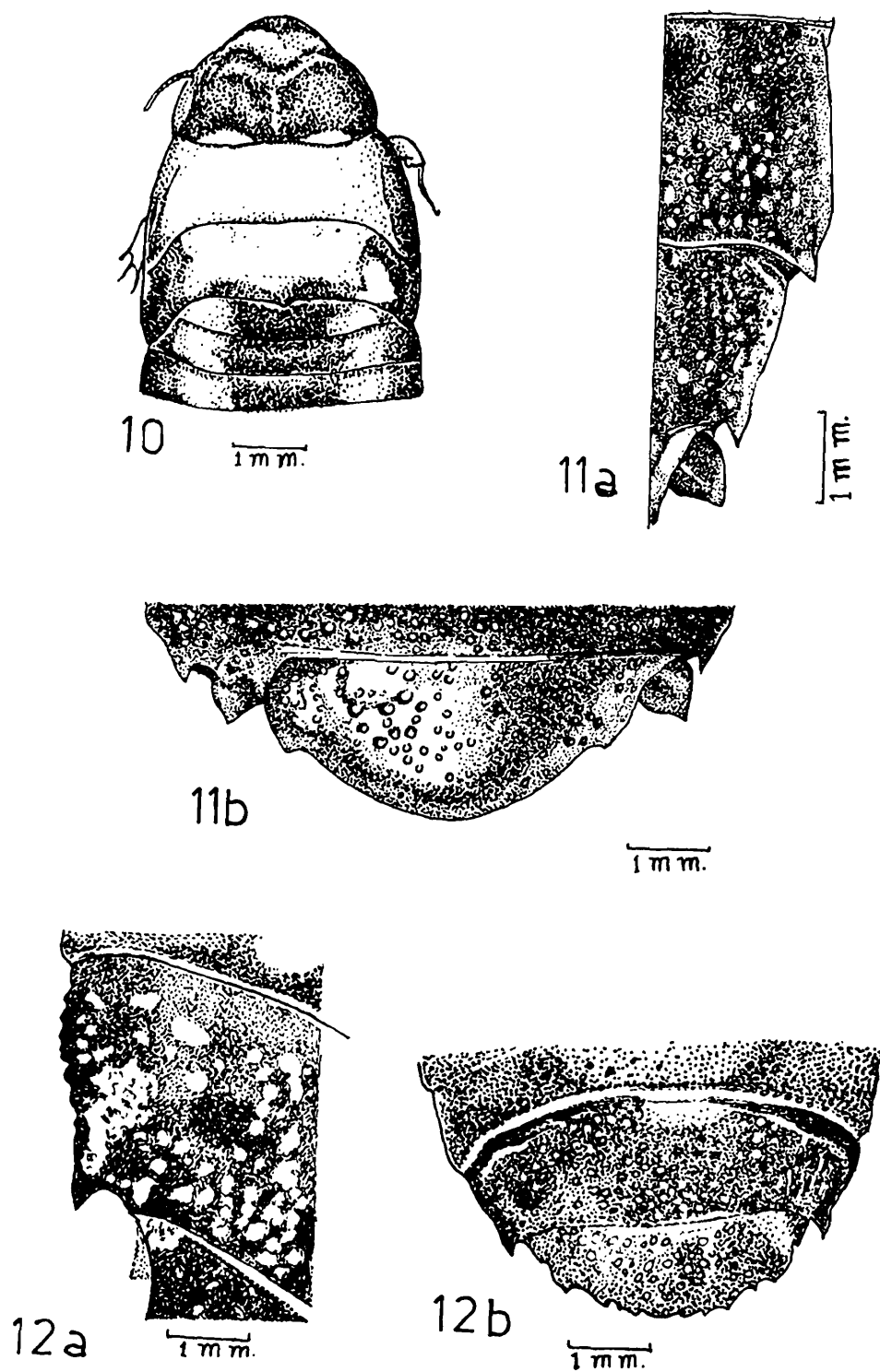


Fig. 10, *Panesthia angustipennis cognata*, pronotum meso and metanotum of female.

Figs. 11a-11b, *Miopanesthia bigibbosa*, fig. 11a, lateral margins of abdominal tergite 7th and supra-anal plate; fig. 11b, supra-anal plate of male.

Figs. 12a-12b, *Salganea biglumis*, fig. 12a, cercus and lateral portion of abdominal tergite of male; fig. 12b, supra-anal plate and abdominal tergite of male.

Distribution : India (Meghalaya and West Bengal). Bhutan; Burma.

Remarks : This species is very rarely found in the state, and I have found only in the forest of East Khasi hills district of Meghalaya.

Genus *Salganea* Stål, 1879

Key to the genera of Salganea

1. Tegmina and wings fully developed; anteroventral margin of front femur with or without spines.....2.
- Tegmina and wings reduced to lateral pads, subrectangular, not reaching the hind margin of metanotum; anteroventral margin of front femur without spines.....*biglumis* (Saussure).
2. Anterior margin of pronotum with a v-shaped emargination, anterior two third depressed, Anteroventral margin of front femur with 1-3 spines.....*raggei* Roth.
- Anterior margin of pronotum slightly concave, anterior half depressed medially; anteroventral margin of front femur without spine.....*incerta* (Brunner).

24. *Salganea biglumis* (Saussure)

(Map 2)

1895. *Panesthia biglumis* Saussure, *Rev. Suisse Zool.*, 3 : 319.

1957. *Salganea biglumis* : Bey-Bienko, *Entomol obozr.*, 36 : 902.

1979. *Salganea biglumis* : Roth, *Aust. J. zool.*, suppl. Ser. No. 69 : 75-76.

Material examined : East Khasi hills : 3 F F, 23. vii. 1971, coll. S. Biswas.

Diagnostic features : Female : Size large; head punctate, vertex slightly exposed, ocelli small, elliptical. Pronotum with anterior margin shallowly incurved, a few punctation on posterior half dorsally, with a pair of small tubercles on disc. Tegmina and wings mutilated, or fully developed. Meso and metanotum sparsely punctate. 7th tergite densely punctate on apical half, lateral margin crenulated, caudal angle with small oblique tooth (Fig. 12a). Anteroventral margin of hind femur without spine, posterior margin with a small minute spine. Supra-anal plate punctate, posterior margin with 9-12 triangular teeth (12b). Subgenital plate with hind margin rounded.

Colour : Head, thorax and abdominal tergites black. Abdominal sternite reddish brown, shading to black laterally. Legs reddish brown.

Measurements (in mm) :

	<i>Female</i>
Total length of the body	28-30.0
Pronotum length	5-6.0
Pronotum width	9-9.5
Tegmen length	4-4.5

Distribution : India (Meghalaya, Assam, Nagaland and West Bengal). Burma; Taiwan; Thailand.

Remarks : Only female specimens are studied here. *Salganea biglumis* is differentiated from *Salganea incerta* in the absence of laterally placed tegmina and excised anterior pronotal margin.

25. *Salganea raggei* Roth

(Map 2)

1979. *Salganea raggei* Roth, *Aust. J. Zool.*, Suppl. Ser. 69 : 30-35.

Material examined : East Khasi hills : 1 M, Janakhmukh, 600, 18. xii. 1911, coll. S. W. Kemp; 3 FF, 1 M, and 6 nymph, sadiya; North Khasi hills : 4 MM, 3 F, (2 MM and 2 FF) nymphs, other data not available).

Diagnostic features : Male : Head punctulate, ocelli large, vertex not foveolate, exposed. Pronotum hairless, anterior margin with a v-shaped emargination, a small reflexed tubercle behind the margin on each side of the mid line. Tegmina and wings mutilated, probably fully developed. Abdominal tergite 1-5 punctate, punctuation denser laterally and tergite 6-7th, laterocaudal angle of abdominal segment with short bluntly rounded oblique spines. Anteroventral margin of front femur without spine. Supra-anal plate transeverse, densely covers with small and large punctuation, hind margin with 8-16 mostly obtuse subequal teeth (some may be fused together). Curcus bulbous conical.

Colour : Head, pronotum, tegmina and abdominal tergite black. Legs and abdominal sternite reddish brown. Last sternite black.

Female : Pronotum with anterior margin less excised, disc tubercle slightly prominent. Hind margin of supra-anal plate with 11-14 subequal teeth.

<i>Measurements (in mm)</i> :	<i>Male</i>	<i>Female</i>
Total length of the body	29-48	30.5-49
Pronotum length	6.3-10.1	7.0-12.0
Pronotum width	10-16	11-16.5

Distribution : India (Meghalaya, Assam, Nagaland, Sikkim). Bangladesh; Bhutan; Burma; China; Hainan; Nepal; Taiwan; Thailand; North Vietnam; South Vietnam.

Remarks : I have not found this species in the present study. This species is principally a main land species (Roth 1979). It shows a little variation with *S. biglumis*, except elongated tegmina and wings.

26. *Salganea incerta* (Brunner)1893. *Panesthia incerta* Brunner, *Ann. Mus. civ. Stor. Nat.*, **33** : 50.1979. *Salganea incerta* : Roth, *Aust. J. Zool.* suppl. Ser. No. 69 : 73-75.

Diagnostic features : *Male* : Body large. Head punctate, ocelli small, vertex not foveolate, exposed. Pronotum with anterior margin with v-shaped portion depressed granular, remaining surface punctate with a pair of small disc tubercles, posterior margin transeverse with a minute tubercle on each side of the midline. Tegmina and wings mutilated, probably fully developed. Abdominal tergite 1-6 sparsely punctate. Tergite 7th more densely punctate. Front femur with anteroventral margin without spine. Supra-anal plate densely punctate, posterior margin with 9-12 small unequal teeth. Subgenital plate with posterior margin rounded.

Colour : Head black. Thorax and abdominal tergite black. Abdominal sternite reddish brown.

Female : Teeth of supra-anal plate bluntly rounded, unequal in width.

<i>Measurements (in mm)</i> :	<i>Male</i>	<i>Female</i>
Total length of the body	18-26	20-27
Pronotum length	3.6-5.2	4.4-5.8
Pronotum width	6.5-8.7	7.6-9.1

Distribution : India (Meghalaya, Assam, Nagaland). Burma; Thailand.

Remarks : I have not found this species in the present collection. Roth (1979) reported this species from Khasi hills.

SUMMARY

The present paper deals with 26 species of Blattids, distributed over 5 families and 20 genera collected from the districts of Meghalaya. Nine species are recorded for the first time from the state. A key to the identification of Suborders, families, subfamilies, genera and species of Blattariae has been provided. Diagnostic features are given for identification of species. The distribution maps are also provided for each species known from various districts of Meghalaya.

ACKNOWLEDGEMENT

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INSECTA : MANTODEA

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INTRODUCTION

Praying mantids are familiar for their role in biological control of insect pest of field crop. Their peculiar habit, habitat and structure attracted naturalist from old days. There are about 2000 species of mantids on earth (Richards & Davies, 1977). According to Ehrmann, R. (1993), there are 432 genera and 2210 species of mantids.

Present investigation on this group reveals of existence of 67 genera and 160 species from India. The North-Eastern India holds about 44 genera and 86 species alone.

In Meghalaya, 17 genera and 24 species occur. This is based on the collections done by the scientists of Zoological Survey of India. Extensive collections were attempted by the Eastern Regional Station at Shillong. Other collections were gift or by the authors which later on deposited to National Zoological Collection of Zoological Survey of India.

Mantids prefer warm, moist, undisturbed green thicket of forest. Best collection could be achieved at altitude between 3000 ft. to 4000 ft. In Meghalaya, the Nongpoh area with the Nongklylum Reserve Forest provides best habitat for mantids.

SYSTEMATIC ACCOUNT

Morphology : Mantids are mostly green, sometimes brown of various shades; body stick-like elongated by the extended prothoracic region. Head very much movable, hypognathus; with 3 ocelli, a pair of compound eyes; mouth parts mandibulate. Fore legs long and raptorial; middle and hind legs normal, often with lobe like expansion, even on fore legs. Fore wings thicker and less transparent than hind wings; often with colour patches or marks. Males with style and females with ovipositor, as seen in blattids.

Collection and preservation :

Since these insects are alert, the collection becomes tough. But the most difficult task is to find them out in thick or thin vegetation. Their elongated body matches uniquely and sit motionless

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till disturbed. Once disturbed, they immediately hide in such a way and in a difficult place that then it becomes really tough to find any more.

A mantid in view can be easily captured by a hand net or even by hand. One weak point for them is that most of them are weak flier. Mantids are attracted to light, and light trapping is another easy method for collection.

Preservation :

Mantids collected from field are killed by anesthatization in killing bottles containing benzene or chloroform vapour and then dried by sun. They can be preserved wet or dry. In dry method, they are initially set-pinned and then kept in air-tight, insect and fungus proof insect cabinets with proper care. By this process, the colour of specimen gradually becomes straw-yellow to brown. In case of wet method, they are preserved in 50% alcohol or weak formaline. Alcohol preserves natural colour for many years; still the colour fades away in the long run.

List of taxa :

In Meghalaya, 17 genera and 24 species are so far known. They belong to 9 subfamilies and 2 families as listed below.

A. Family HYMENOPODIDAE

Subfamily ACROMANTINAE

Tribe ACROMANTINI

1. *Acromantis montana*
2. *Anaxarcha graminea*
3. *Anaxarcha acuta*
4. *Euantissa pulchra*

Subfamily HYMENOPODINAE

5. *Crebroter apicalis*
6. *Crebroter urbanus*
7. *Crebroter laevicollis*
8. *Crebroter sp.*

B. Family MANTIDAE

Subfamily CHOERADODINAE

9. *Choeradodis squilla*

Subfamily CALIRIDINAE

10. *Caliris masoni*
11. *Leptomantis indica*
12. *Leptomantis montana*

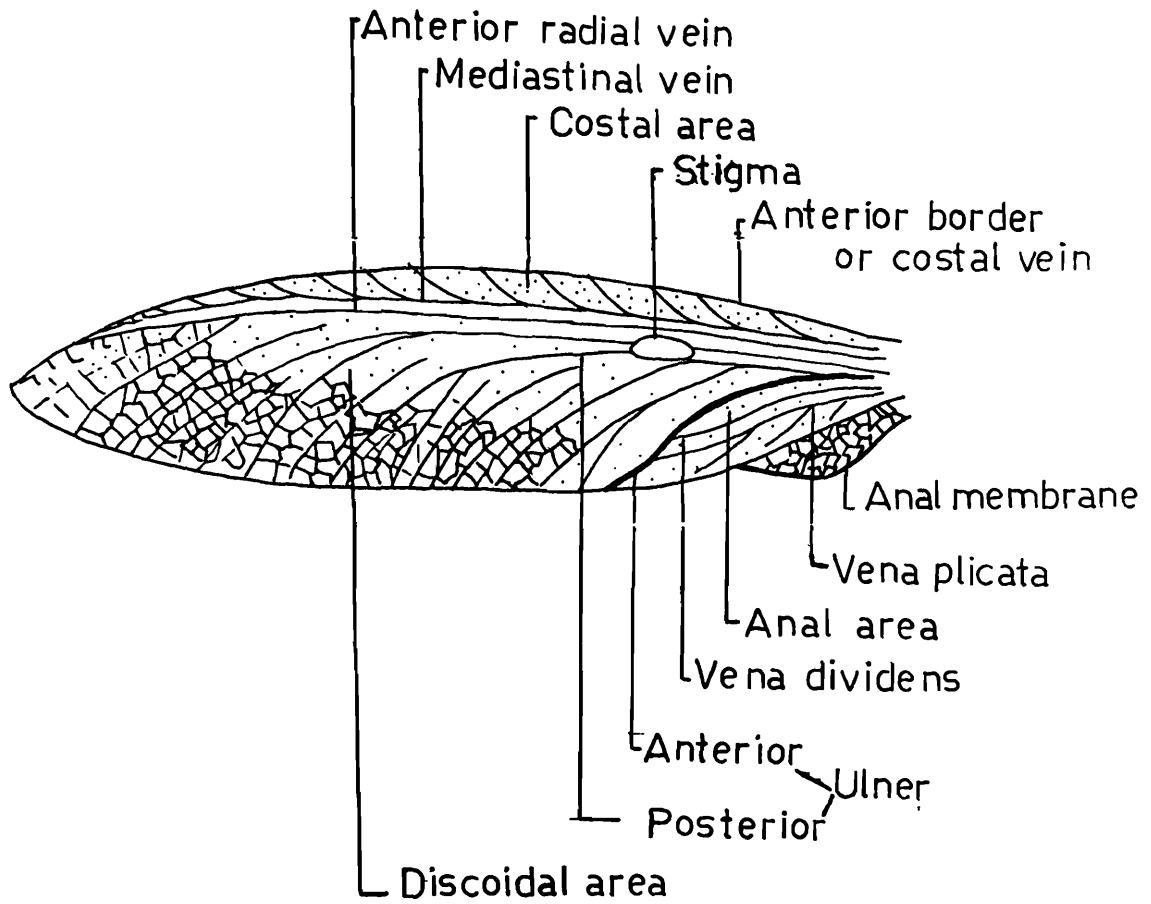


Fig 1. Fore wing

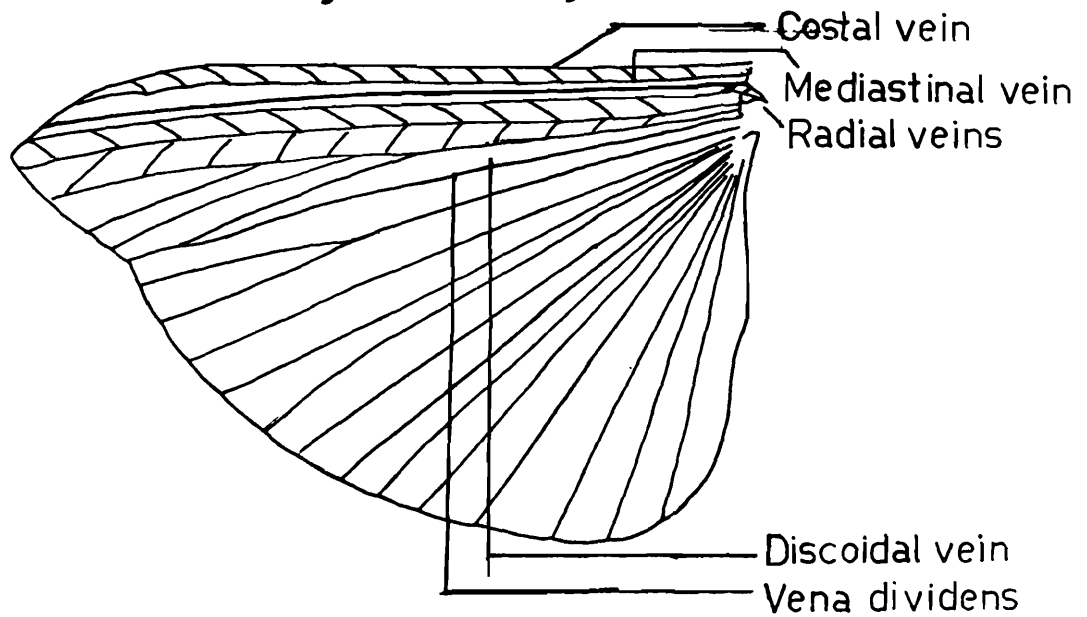


Fig 2 Hind wing

Fig. 1. Fore wing; Fig. 2. Hind wing

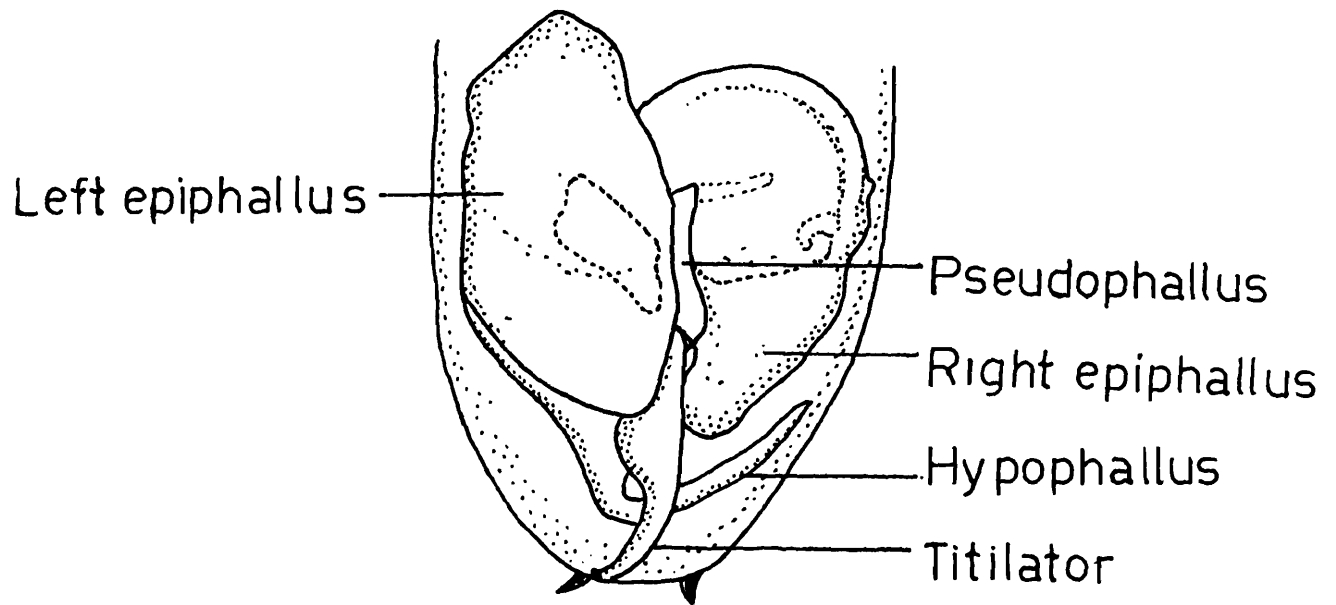


Fig.3a

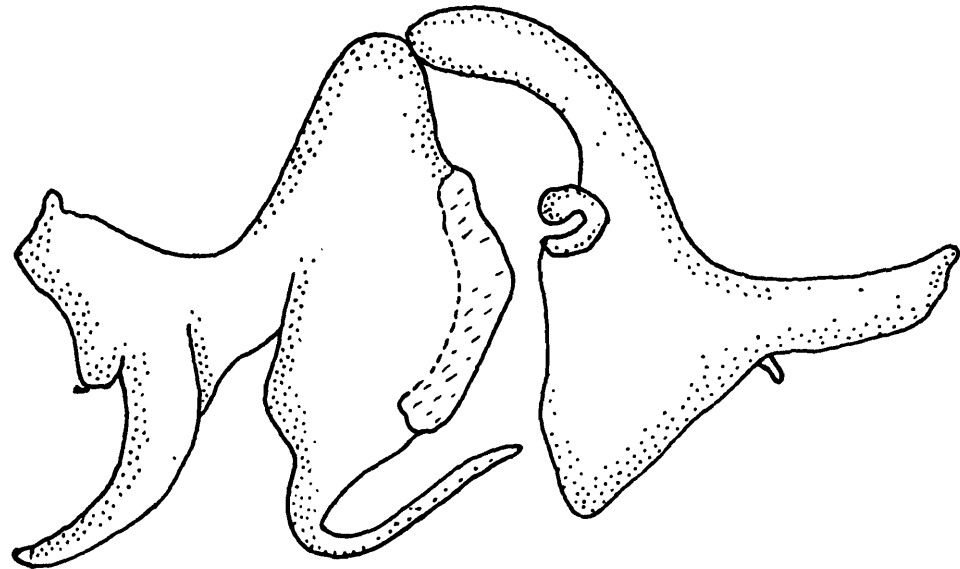


Fig.3b

Fig. 3a. Genitalia of male mantid in dorsal view; 3b. Same with plates opened

Subfamily THESPINAE

Tribe THESPINI

13. *Thespis* sp.

Subfamily IRIDOPTERYGINAE

Tribe TROPIDOMANTINI

14. *Eomantis guttatipennis*

Subfamily LITURGUSINAE

15. *Humbertiella similis*

Subfamily AMELINAE

16. *Gimantis authaemon*

17. *Gonypeta punctata*

Subfamily MANTINAE

Tribe MANTINI

18. *Hierodula* (*Hierodula*) sp.

19. *Hierodula* (*Rhombodera*) *crassa*

20. *Tenodera aridifolia*

21. *Tenodera angustipennis*

22. *Tenodera fasciata*

23. *Statilia maculata*

24. *Mantis religiosa*

Key to families

External spines of anterior tibiae are many, very close-beset and bent at base.....HYMENOPODIDAE.

Above Spines are lesser in number, straight and well separated.....MANTIDAE.

Family HYMENOPODIDAE

Key to subfamilies

1. Frontal sclerite with tubercles or longitudinal ridges at lateral corner and devoid of any winglike keels; disc not depressed. Eyes within the circumference of head.....ACROMANTINAE.
- Frontal sclerite with 2 lateral wing like keels; disc depressed. Eyes bulging and extend beyond the circumference of head.....HYMENOPODINAE.

Subfamily ACROMANTINAE

Key to genera

1. Disc of pronotum smooth. Upper edge of anterior femora a little arched. Middle and hind femora with narrow expansions.....*Acromantis*
- Upper edge of anterior femora straight. Middle and hind femora without expansions.....2.
2. Frontal sclerite with a projecting point at upper edge. Pronotum slender, a little longer than anterior coxae.....*Anaxarcha*
- Frontal sclerite with arched upper edge. Pronotum shorter than anterior coxae.....*Euantissa*

Genus *Acromantis* Saussure 1870

1870. *Acromantis* Saussure, *Mitt. Schweiz. Entomol. Ges.*, **3** : 229.

1927. *Acromantis* Giglio-Tos, *Das Tierreich.*, **50** : 524.

Vertex above the ocelli with a small tubercle. Transverse frontal sclerite; upper margin produced into a projecting point; lateral side with minute tubercle. Internal apical lobes of anterior coxae divergent. Upper edge of anterior femora slightly arched and a little sinuate at apex. Margins of pronotum finely tuberculated. Middle and hind femora with a lobe near apex. Tips of wings truncated.

1. *Acromantis montana* Giglio-Tos, 1915

1915. *Acromantis montana*, Giglio-Tos, *Boll. Mus. Torino.*, **30** (702) : 7.

1927. *Acromantis montana* Giglio-Tos, *Das Tierreich.*, **50** : 527.

Material examined : South Garo Hill district : 1 M, Balphagram, 450 mts., 23. iii. 76, S. Biswas, coll. East Garo Hill district : 1 M, Songak, 300 mts., 16. ix. 73, S. Biswas coll. East Khasi Hill district : 1 M, Risa Colony, 19. ix. 71, R. S. Giri, coll.

Diagnosis : Tubercle above the median ocellus is very small, spiniform. Margins of pronotum with minute, blackish tubercles; metazona of prosternum black. In anterior legs, coxae with 5–6 small spines; superior edge of femora without any hump (as in *A. insularis*); longer internal spines and discoidal spines are entirely black. In fore wings, longitudinal oblique veins without any distinct deep brown patch; distal half of costal area reddish brown. Costal area of hind wings deep reddish at the distal half and entire tips are almost of same colour; cells of discoidal area larger and elongated.

Measurements (mm) : M : Body 24.0–25.0; Pronotum 7.5–8.0; Fore wing 19.0–20.0.

Distribution : India : Meghalaya (East Khasi Hills, East Garo and South Garo Hills.) Arunachal Pradesh, Tripura. Java, Sumatra.

Remarks : The species is a new record from India.

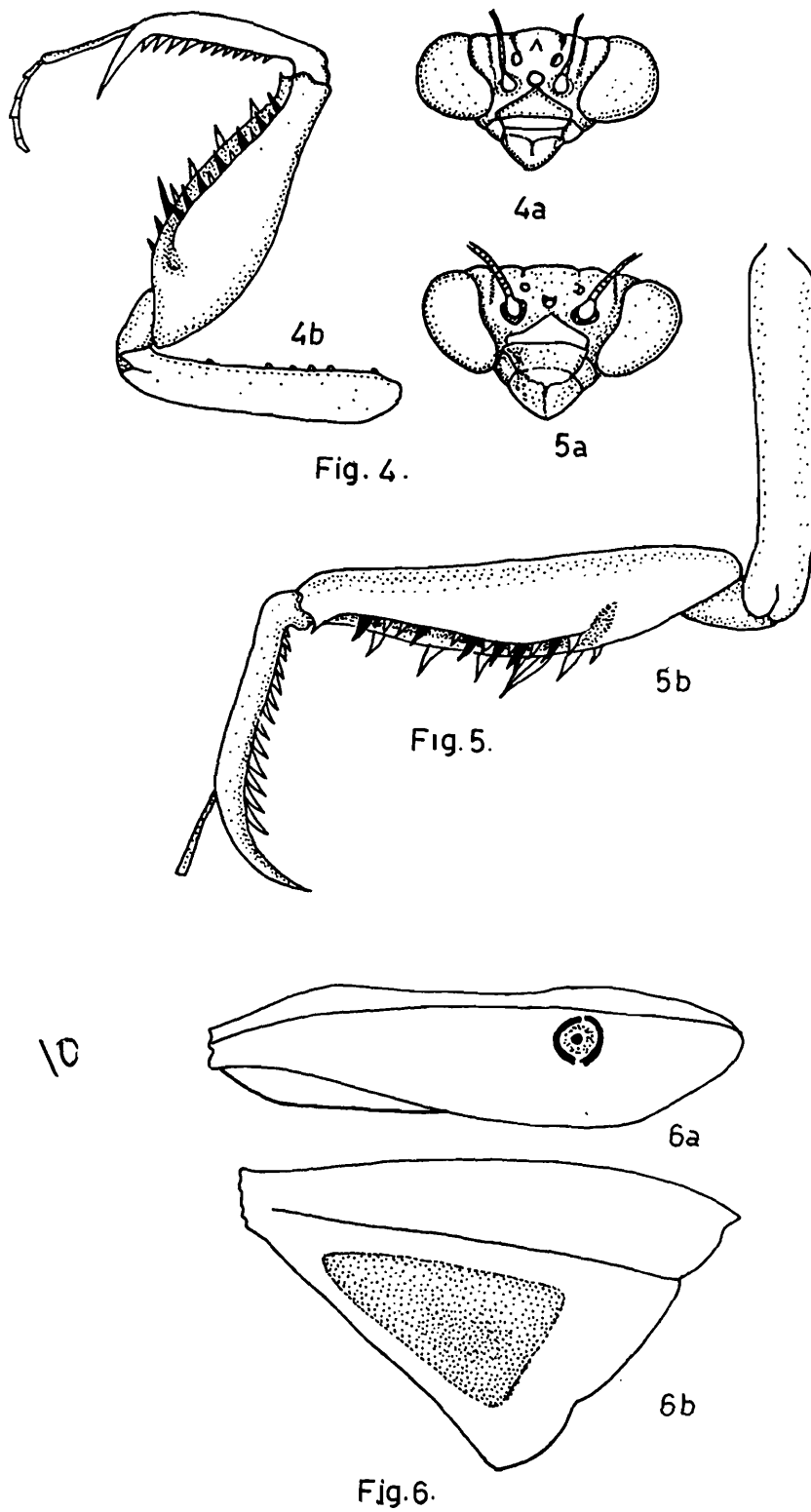


Fig. 4. *Acromantis montana* M; 4a. Head X 10; 4b. Right fore leg X 10; Fig. 5. *Anaxarcha graminea* F; 5a. Head X 10; 5b. Right fore leg X 10; Fig. 6. *Creobroter urbanus* M; 6a. Fore wing X 5; 6b. Hind wing X 5

Genus *Anaxarcha* Stål, 1877

1877. *Anaxarcha* Stål, *Bih. K. Svenska Ak.*, 4 (10) : 81.

Vertex 4 grooved. Eyes big. Ocelli distinct. Summit of vertex excavated. Pronotum slender with denticles on lateral borders.

Key to species

Longer internal spines of anterior femora black; with black dot at their bases and also at the anterior edge of claw groove.....*acuta*.
Above spines black but black dots absent on claw groove as well as at bases of spines.....
.....*graminea*.

2. *Anaxarcha graminea* Stål, 1877

1877. *Anaxarcha graminea* Stål, *Bih. K. Svenska Ak.* 4 (10) : 87.

1927. *Anaxarcha graminea* : Giglio-Tos, *Das Tierreich*, 50 : 521.

Material examined : East Khasi Hill district : 1 F, Shillong peak, 27. xii. 67, B. K. Tikader, coll.

Diagnosis : Metazona of prosternum gradually narrowed after coxal dialation and then, widened a little towards base; with a black median patch behind coxal joint. In anterior legs, coxae with 7–8 very minute spines; femora with balck longer internal spines. Fore wings longer than abdomen; costal area hyaline, cross veins are almost parallel; discoidal area densely reticulated, semi-opaque; longitudinal veins oblique. Hind wings pinkish, hyaline; apical angles pointed.

Measurements (mm) : F : Body 33.0; Pronotum 10.0; Fore wing 24.0.

Distributinon : India : Meghalaya (East Khasi Hills), Kerala, Sikkim, West Bengal.

Remarks : This species is a new record from Meghalaya. This species is common one in comparison to other species of this genus. Colour variation observed in a species from Kerala.

3. *Anaxarcha acuta* Beier, 1963

1963. *Anaxarcha acuta* Beier, *Stuttg. Beitr. Nat.*, 106 : 9.

Material examined : East Khasi Hills : 1 F, Umtham, 20. i. 69, B. Datta, coll.; 1 F, Nongthumai, 11. x. 74, R. S. Giri, coll., Regd. No. 7792; 1 F, Mawphlang, 17. ix. 64, S. Biswas, coll., Regd. No. 4738B.; 1 M, Lumparing, 15. x. 74, M. S. Jyrwa, Regd. No. 9814; 1 M, Malki (?), 29. viii. 74, M. S. Jyrwa, coll., Regd. No. 9870; 1 M, Motinagar, 20. ix. 74, M. S. Jyrwa, coll.; 1 M, Riblong, 8. ix. 66, S. Biswas, coll.

Diagnosis : Body bright green. Frontal sclerite transverse, with a granule at each lateral side; upper margin angular, ending in a sharp projection. Lateral edges of pronotum with tubercular

spines and without dark line; entire prozona and the metazona upto the middle of length with a fine groove in M, but carinated in F. Only longer internal spines of anterior femora black and with black dot at their bases. Claw groove with a black dot at its anterior margin. Fore wings densely reticulated, semi-hyaline. Hind wings hyaline; costal area and apex brownish-green.

Measurements (mm) : Body M 30.0–36; F 31.0–36.5; pronotum M 8.0–9.0, F 9.5–11.0; fore wing M 17.0–18.0, F 20.0–25.0.

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

Remarks : The specimens from meghalaya are comparatively smaller in size.

4. *Euantissa pulchra* (Fabricius) 1787

1787. *Mantis pulchra* Fabricius, *Mant. Ins.*, 1 : 229.

1927. *Euantissa pulchra* : Giglio-Tos, *Das Tierreich.*, 50 : 540.

Material examined : East Khasi Hills dist. (?) : 1 ex. (damaged), Khasi & Jaintia Hills, 25. v. 67, R. K. Varshney coll.

Diagnosis : Small green mantid. Frontal sclerite with two minute lateral grooves; upper edge arched. Metazona of pronotum with almost parallel margins. Costal area of fore wing yellow, rest areas green. Posterior borders of hind wings deep brownish.

Measurements (mm) : (Sex ?) : Pronotum 4.0, fore wing 11.0.

Distribution : India : Meghalaya : (East Khasi Hills (?)), North-Eastern India, Southern India. Sri Lanka.

Remarks : This species is quite common in green bushes.

Subfamily HYMENOPODINAE

Genus *Creobroter* Audinet – Serville 1838

1839. *Harpax* (*Creobroter*) Audinet-Serville, *Hist. Nat. Ins. Orth.*, 160.

1927. *Creobroter* : Giglio-Tos, *Das Tierreich*, 50 : 555.

Vertex above the ocelli with a tubercle. Eyes conical. Frontal sclerite transverse, excavated and bicarinated. Dialation of pronotum distinct. Superior border of anterior femora straight; with pre-apical lobes on middle and posterior femora. Fore wings with eye-like mark.

Key to species

1. In fore wing, the eye-spot is placed in the middle; anal membrane blackish; a small, round yellow spot near dorso-lateral base.....*apicalis*.
- Above eye-spot appears a little proximal than in middle. Hind wings blackish.....2.

2. Eye-spot contains no black spot. Hind wings totally hyaline, excepting a very small smoky patch in anal area.....sp.
 — In fore wing, eye spot with 1–2 black spot at centre; base with or without round yellow spot3.
3. Base of fore wing without yellow spot; anal membrane black (M). In hind wing, the discoidal area colourless, anal area widely smoky.....*urbanus*.
 — Above yellow spot present. Smoky patch on hind wing restricted to center, paler in M
*laevicollis*.

5. *Creobroter apicalis* (Saussure), 1869

1869. *Creobotra apicalis* Saussure, *Mitt. Schweiz. Entomol. Ges.*, **3** : 73.

1927. *Creobroter apicalis* : Giglio-Tos, *Das Tierreich.*, **50** : 558.

Material examined : East Garo Hills district : 1 F, Songsak, 300 mts., 16. ix. 73, S. Biswas. East Khasi Hills dist. : 1 F, Rilbong, 8. ix. 66, S. Biswas, coll. Ri-Bhoi district : 2 F, Nongpoh, Nongkhylum Reserve Forest, ? x. 1982, T. K. Mukherjee, coll.

Diagnosis : Vertex with a spine. Borders of pronotum dentate in F. Anterior coxae with 6–8 spines in F. Eye-spot on fore wing contains 2 black spot; anal area blackish with blackish veinlets. Hind wing pink at base; costal area yellowish, discoidal and anal areas brownish with hyaline veinlets excepting at borders.

Measurements (mm) : F : Body 32.0, pronotum 8.0, fore wing 25.5.

Distribution : India : Meghalaya : (East Garo, East Khasi, Ri-bhoi), Assam, Karnataka, Orissa, Manipur, Sikkim, West Bangal.

Remarks : This is a common species of the genus in India. It shows size variation in different ecological conditions.

5. *Creobroter urbanus* (Fabricius) 1775

1775. *Mantis urbana* Fabricius, *Syst. Ent.*, 278.

1927. *Creobroter urbanus* : Giglio-Tos, *Das Tierreich*, **50** : 558.

Material examined : Ri-bhoi dist. 1 M, Nongpoh, Nongkhylum Reserve Forest, 19. x. 82, R. Mathew, Regd. No. 18223.

Diagnosis : Anterior coxae finely denticulated. Fore wing without yellow spot at base; plicata vein 2 branched.

Measurements (mm) : M : Body 22.5, pronotum 5.0, fore wing 20.0.

Distribution : Meghalaya : (Ri-Bhoi). Java.

Remarks : This is a rare species in India. It is smaller than other species of the same genus in Meghalaya.

7. *Creobroter laevicollis* (Saussure) 1870

1870. *Creobotra laevicollis* Saussure, *Mitt. Schweiz. Entomol. Ges.*, **3** : 242.

1927. *Creobroter laevicollis* : Giglio-Tos, *Das Tierreich*, **50** : 557.

Material examined : East Garo Hill district (?) : 1 M, Garo Hills, 16. ix. 73, S. Biswas, coll. Ri-Bhoi district : 1 M, Nongpoh, 19. x. 82, Mathew, Regd. No. 18233. East Khasi Hill district : 1 M, Rilbong, 8. ix. 66, S. Biswas, coll.

Diagnosis : Prozona denticulated at borders. Anterior coxae with 5–6 spiniform denticles. Fore wing with a yellow spot latero-basally; eye-spot a little in front of middle, contains one black dot; anal membrane mostly blackish. Hind wing pink at base; smoky patch less distinct, occupies central area only.

Measurements (mm) : M, Body 31.0, pronotum 7.0, fore wing 32.0.

Distribution : India : Meghalaya (East Garo, East Khasi, Ri-Bhoi), Andhra Pradesh, Assam, Sikkim, West Bengal. Java.

Remarks : The species so far shows restriction in distribution in North-Eastern, Eastern India and Java.

8. *Creobroter* sp.

Material examined : Ri-Bhoi dist. : 1 M, Nongkhylum Reserve Forest, 19. x. 82, R. Mathew, coll.

Diagnosis : Margins of pronotum setaceous, not dentate. In anterior legs, coxae with 6–7 minute spines; femora with 3 pale brownish transverse bands; tibiae with 13–14 internal spines. Both wings longer than body; in fore wings, the eye mark is within the basal half and contains no black dot; a round yellow spot at base; in hind wing, the pale smoky patch seen in middle of anal area.

Measurements (mm) : M Body 47.0, pronotum 7.5, fore wing 46.0.

Distribution : India : Meghalaya (Ri-Bhoi)

Remarks : This specimen is distinctly bigger than other observed M of this genus from Meghalaya. The absence of black dot in eye-mark is another character not seen in other species.

Subfamily CHOERADODINAE

Genus *Choeradodis* Audinet – Serville 1831

1831. *Choeradodis* Audinet-Serville, *Ann. Sci. nat.* **22** : 50.

1927. *Choeradodis* : Giglio-Tos, *Das Tierreich*, **50** : 334.

Big body, Wide head. Eyes less prominent and round. Frontal sclerite more wide than length. Pronotum foliaceous, rhomboidal. Anterior coxae spinulated. Anterior femora dilated; claw groove near middle.

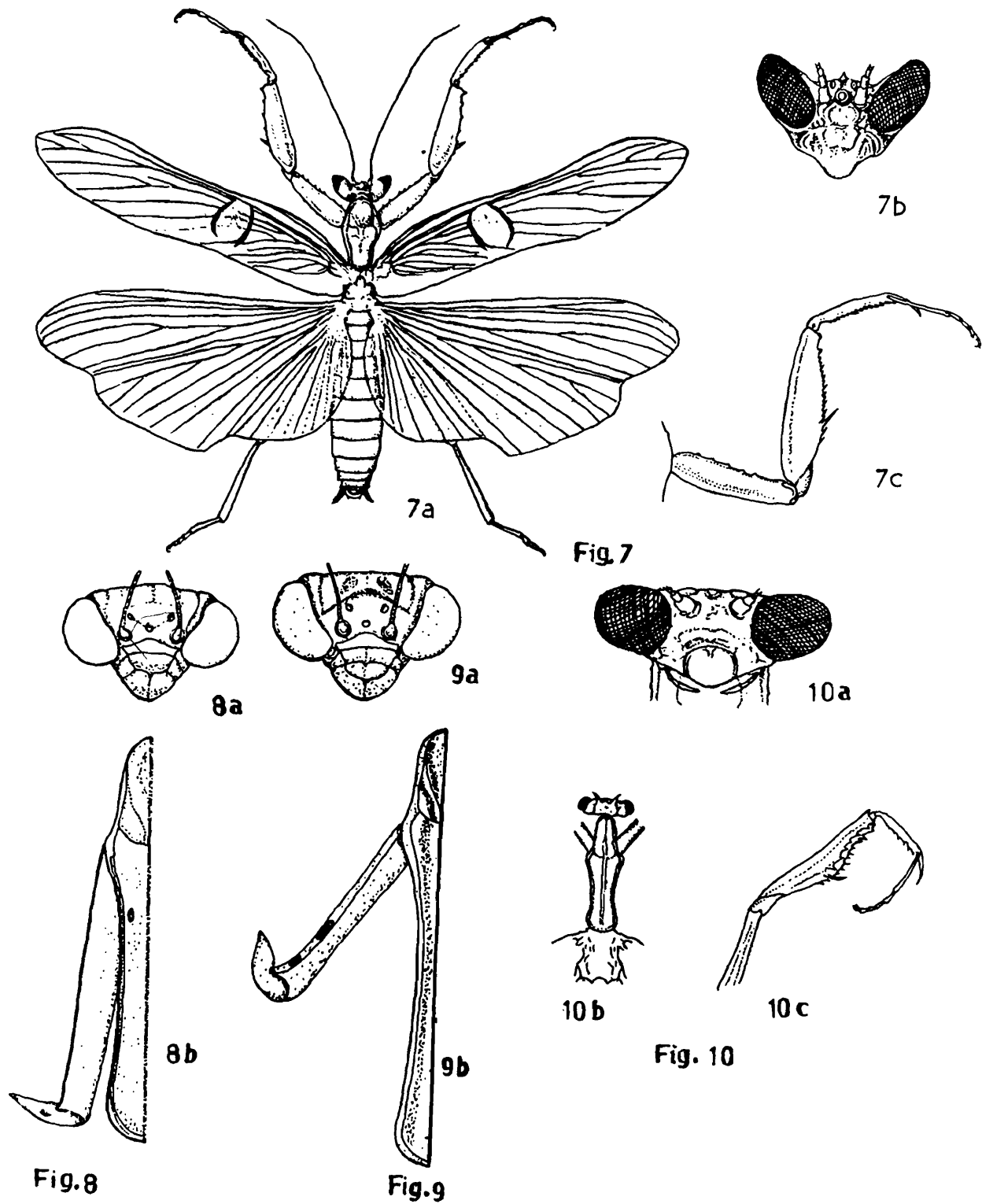


Fig. 7. *Creobroter* sp. M; 7a. Entire X 1.5; 7b. Head X 3.6; 7c. Right fore leg X 3.2; Fig. 8. *Leptomantis indica* M; 8a. Head X 10; 8b. Pronotum X 10; Fig. 9. *Leptomantis montana* M; 9a. Head X 10; 9b. Pronotum X 10; Fig. 10. *Thespis* sp. M; 10a. Head X 14; 10b. Pronotum with head X 3; 10c. Right fore leg X 4

9. *Choeradodis squilla* Saussure, 1869

1869. *Choeradodis squilla* Saussure, *Mitt. Schweiz. Entomol. Ges.*, **3** : 72.

1927. *Choeradodis squilla* : Giglio-Tos, *Das Tierreich*, **50** : 338.

Material examined : East Garo Hills : 1 F, Darugir Forest I. B. Compound, 12. iv. 71, R. S. Pillai coll. (Stn. 10, lot. 11).

Diagnosis : Superior border of frontal sclerite arched in the middle. Dialation of pronotum wider than *C. cancellata*; borders a little arched postero-laterally. Fore wings longer than abdomen; costal area narrow. Inner surface of anterior femora with a wide elongated black patch in the upper half extending upto superior edge of claw groove.

Measurements (mm) : F : Body 53.5, pronotum 18.0, fore wing 38.5.

Distribution : India : Meghalaya (East Garo).

Remarks : This species seems to be vary near to *C. cancellata* by the structures and colouration. Also the locality of both are same (Eastern India, Sri Lanka). A nymph (F) is recorded by Wood-Mason (1889) to occur nera Killing River in the North Khasi Hills. This latter one was not yet available for study.

Subfamily CALIRIDINAE

Key to genera

1. Discoidal spines are arranged in a row. Anterior tibia with 6 external spines.....*Caliris*.
- First discoidal spine is placed by the side of the second (not in row). Anterior tibia with 7 external spines.....*Leptomantis*.

Genus *Caliris* Giglio-Tos, 1915

1915. *Caliris* Giglio-Tos, *Bull. Soc. Entomol. Ital.*, **46** : 82.

1927. *Caliris* : Giglio-Tos, *Das Tierreich*, **50** : 303.

Vertex 4 grooved; summit truncated, above the level of eyes. A rounded tubercle near the eye. Frontal sclerite transverse; superior border sinuated, forms a sharp angle in the middle. Pronotum with distinct, rounded dialation; length as that of coxae. Anterior tibia with 6 external spines, the 6th being longest. Anterior femora with straight and crenulated upper margin; claw groove near base; discoidal spine 4, which are beset on an internally arched line. Fore wings wide, borders almost parallel, opaque; costal area a little wide. Hind wings coloured. Supra anal plate short, triangular and transverse.

10. *Caliris masoni* (Westwood) 1889

1889. *Iris masoni* Westwood, *Revis. Mant.*, 32.

1927. *Caliris masoni* : Giglio-Tos, *Das Tierreich*, **50** : 304.

Material examined : Ri-Bhoi dist. : 1 F, Nongpoh, x. 1983, T. Mukherjee, coll.

Diagnosis : In pronotum, the borders are finely denticulated; metazona carinated. In anterior legs, coxae spinous at both edges with a row of tubercles on inside. Internal apical lobes divergent; femora bears dot at apices of external spines; tibiae with 14 internal spines. Fore wings with parallel and oblique veinlets; stigma hyaline; apices of wings pointed and reach extremity of abdomen; end of discoidal vein with 2 orange marks. Hind wings hyaline, opaque; outer area with irregular dark brown and orange yellow patches.

Measurements (mm) : F : Body 37.0, pronotum 10.5, fore wing 21.5.

Distribution : India : Meghalaya (Ri-Bhoi), Assam, West Bengal.

Genus *Leptomantis* Giglio-Tos, 1915

1915. *Leptomantis* Giglio-Tos, *Bull. Soc. Entomol. Ital.*, **46** : 87.

1927. *Leptomantis* : Giglio-Tos, *Das Tierreich*, **50** : 306.

Slender body. Colour green, sometime pale green to straw yellow. A prominent tubercle near eye between former and vertex. Frontal sclerite transverse, narrow; upper edge arched; Pronotum long and slender; metazona longer than anterior coxae. In anterior leg, coxae with smooth lateral borders; claw groove in the middle of femur. Fore wing semi-opaque in F, hyaline in M.

Two species are known in Meghalaya

Key to species

- Frontal sclerite less arched in the middle of upper edge. Metazonal borders with continuous black lines.....*indica*.
 — Frontal sclerite more arched in the middle. Metazonal lateral black line discontinuous.....
*montana*.

11. *Leptomantis indica* Giglio-Tos, 1915

1915. *Leptomantis indica* Giglio-Tos, *Bull. Soc. Entomol. Ital.*, **46** : 88.

1927. *Leptomantis indica* : Giglio-Tos, *Das Tierreich*, **50** : 308.

Material examined : West Garo Hills dist. : 2 M, Rongram, 4. ix. 78, K. P. Singh, coll.

Diagnosis : Black oblique patches on prozona are distinct. In anterior legs, coxae without any spot; trochanter with deep brown spot; femora with a black spot at external proximity.

Measurements (mm) : M : Body 30.0, pronotum 8.5, fore wing 22.0.

Distribution : India : Meghalaya (West Garo), Assam, Himachal Pradesh, Tamil Nadu, West Bengal.

Remarks : This species shows variation in the depth of colour of spots on body in MF specimens. Colour on trochanter is insignificant which was also suggested by Werner (1930). The present M specimen also bear black dot on prozona.

12. *Leptomantis montana* Beier 1941

1941. *Leptomantis montana* Beier, *Ann. Naturf. Mus. Wien*, 52 : 139.

Material examined : West Garo Hills : 2 M, Rongram, 4. ix. 78, K. P. Singh, coll.

Diagnosis : Metazona less dotted black on lateral margins. Anterior coxae externally with two black spots; trochanter spotless. Costal area of fore wing opaque along anterior two-third width, rest areas hyaline; veinlets of discoidal area incomplete. Hind wings hyaline.

Measurements (mm) : M : Body 27.0, pronotum 9.0, fore wing 17.5.

Distribution : India : Meghalaya (West Garo), Assam, West Bengal.

Remarks : The species is close to *L. sumatrana* and *L. lactea*, as pointed by Beier (1941). The characters, however, show affinities to *L. parva* than those species.

Subfamily THESPINAE

Tribe THESPINI

13. *Thespis* sp.

Material examined : East Khasi Hills *dist.* : 1 M, Fruit Gardens, 9. ix. 80, M. S. Jyrwa, coll.

Diagnosis : Delicate, dirty-brown body. Lateral lobes of vertex round and raised above the level of eyes. Ocelli distinct. Eyes laterally round. Frontal sclerite about thrice wider than high; a black band continues over disc of frontal sclerite and eyes. Antennae setaceous.

Pronotum with oval coxal dialation; surface granular; lateral margin with black minute spines; carina narrow; prosternum blackish, with median brownish strip and a median black line; with two pairs of dark spot, one near base, other above them. In anterior legs, femora with 3 transverse black bands; claw groove near the middle, dorsal edge slightly sinuated; discoidal and external spines 4 in number, all black at apices; 3rd discoidal spine (from base) longest; internal spine 12 in number; tibiae with 2 bands and 7 external spines.

Middle and hind legs are proportionately long, with black bands; femora with genicular spines.

Anterior borders of fore wings setaceous, longer than abdomen; both borders parallel; stigma with black dot at each corner. Hind wings hyaline, with brownish dots near apex of discoidal area.

Supra anal plate transverse, rounded posteriorly with a carina; cerci short, flattened.

Measurements (mm) : M : Body 30.0, pronotum 8.0, fore wing 30.0.

Distribution : India : Meghalaya.

Remarks : The specimen shows affinities with the genus *Paramusonia*, from which it differs by the shape of supra anal plate, number of spines on anterior tibia and other characters. In some respect it bears affinities with the genus *Thespis*.

Subfamily IRIDOPTERYGINAE

Tribe TROPIDOMANTINI

Genus *Eomantis* Giglio-Tos, 1915

1915. *Eomantis* Giglio-Tos, *Bull. Soc. Entomol. Ital.*, **46** : 47.

Small insect. Frontal sclerite transverse. Eyes rounded. Metazona of pronotum distinctly carinated. Anterior femora with 3 discoidal and 4 external spines; claw furrow placed more proximally than in middle. Some of the external spines on anterior tibiae elongated.

14. *Eomantis guttatipennis* (Stål), 1877

1877. *Tropidomantis guttatipennis* Stål, *Bih. K. Svenska Ak.* **4** (10) : 51.

1927. *Eomantis guttatipennis* : Giglio-Tos, *Das Tierreich*, **50** : 141.

Material examined : East Garo Hills : 1 M, Rongram, 4. ix. 78, K. P. Singh, coll.; 2 M F, Rongram Inspection Bunglow, 27. ix. 75, N. Muraleedharan, coll.

Diagnosis : A pair of small, less prominent elongated tubercles may be visible between frontal sclerite and median ocellus (in M). Anterior legs with 9 external spines on tibiae; a shallow pit on disc of femur is bordered by 3rd discoidal and proximal 2 external spines. Fore wings in M almost hyaline; in F subopaque with pale whitish central opaque spots in few cells of basal half.

Measurements (mm) : Body M 22.0, F 22.5; pronotum F 4.5, M 4.6; fore wing F 19.0, F 20.5.

Distribution : India : Meghalaya (East Garo), Assam, Bihar, Gujrat, Karnataka, Tamil Nadu, Uttar Pradesh, West Bengal. Tibet.

Remarks : Anterior radial and mediastinal veins are well separated, run parallelly towards distal end and finally lost in cell formation.

Subfamily LITURGUSINAE

Genus *Humbertiella* Saussure, 1869

1869. *Humbertiella* Saussure, *Mitt. Schwiz. Entomol. Ges.*, **3** : 55.

1927. *Humbertiella* : Giglio-Tos, *Das Tierreich*, **50** : 64.

Bark coloured, small insect. Vertex straight; eyes bulging, round. Pronotum longer than width, feebly wider anteriorly; lateral margins smooth; disc tuberculated. 9 external spines on anterior tibiae.

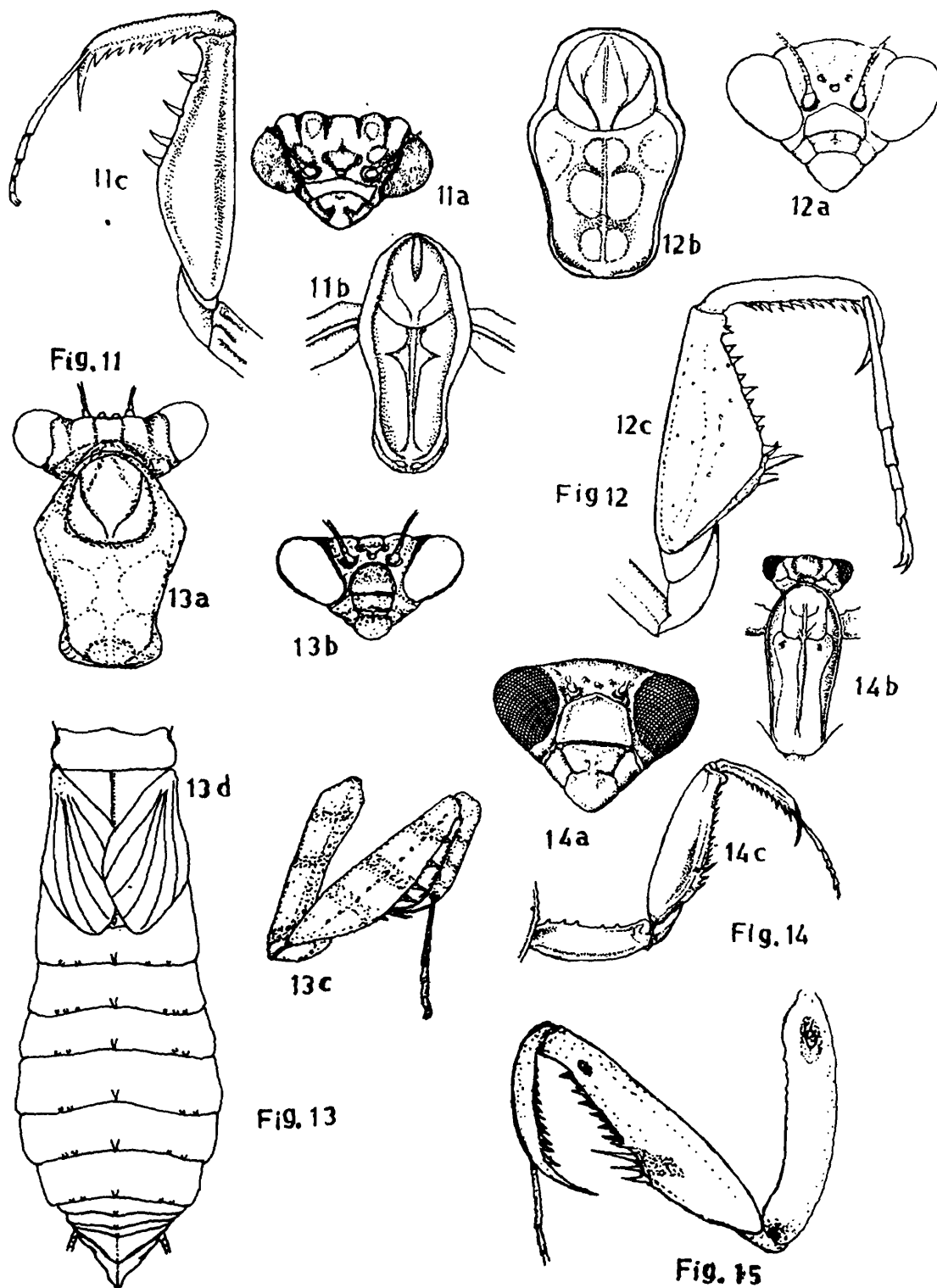


Fig. 11. *Eomantis guttatipennis* F; 11a. Head X 9; 11b. Pronotum X 11; 11c. Left fore leg X 9; Fig. 12. *Gimantis authaemon* F; 12a. Head X 7; 12b. Pronotum X 7; 12c. Right fore leg X 7; Fig. 13. *Gonypeta punctata* F; 13a. Head and pronotum X 9; 13b. Head X 10; 13c. Right fore leg X 7.3; 13d. Dorsal view of abdomen X 7.3; Fig. 14. *Hierodula (Hierodula)* sp. F; 14a. Head X 3.5; 14b. Head and pronotum X 1.5; 14c. Right fore leg X 1.5; Fig. 15. *Mantis religiosa* F; 15a. Inner view of right fore leg X 5

15. *Humbertiella similis* Giglio-Tos, 1917

1897. *Humbertiella indica* Bolivar, Ann. Soc. ent. France, **66** : 303 (F).

1927. *Humbertiella similis* : Giglio-Tos, *Das Tierreich*, **50** : 65.

Material examined : East Khasi Hills : 1 M, Laitkor, 18. ix. 75, M. S. Jyrwa, coll. Regd. No. 12532.

Diagnosis : Frontal sclerite brown; superior edge almost straight in the middle. Bosseles of pronotum moderately prominent. In anterior legs, coxae with an internal small narrow, transverse black line at distal end and an external small black longitudinal patch; femora brown, internally a black longitudinal line; claw groove with black patches, also on inner side of 1st external spine; longer internal spines black at their apical halves only. Both wings longer than abdomen, hyaline but smoky; transverse veinlets of costal area not parallel.

Measurements (mm) : M : Body 26.5, pronotum 4.5, fore wing 26.0.

Distribution : India : Meghalaya (EAsst Khasi), Himachal Pradesh, Jammu, Madhya Pradesh, Orissa, Uttar Pradesh. Nepal, Sri Lanka.

Remarks : Essential differences between *H. indica* and *H. similis* are the arrangement of veinlets of costal are of fore wings. Number of branches of vena plicata is variable within a species. Hence these two species come very close to each other, since the parallel nature of costal veinlets are obvious in proximal portion.

The species are much alert and have good camouflage colouration. They are frequent on blackish to brown barks of trees near ground.

Subfamily AMELINAE

Genus *Gimantis* Giglio-Tos, 1915

1915. *Gimantis* Giglio-Tos, *Bull. Soc. Entomol. Ital.*, **46** : 161.

1927. *Gimantis* : Giglio-Tos, *Das Tierreich*, **50** : 175.

Frontal sclerite transverse, disc smooth, upper margin is arched in the middle. Bosseless on pronotum rounded. Anterior femora with 4 external spines which are regularly spaced; 2nd and 3rd spines smaller than rest. Anterior tibiae with 11 external spines.

16. *Gimantis authaemon* (Wood-Mason) 1882

1882. *Gonypeta authaemon* Wood-Mason, *J. Asiat. Soc. Bengal.*, **51** : 26.

1927. *Gimantis authaemon* : Giglio-Tos, *Das Tierreich*, **50** : 175.

Material examined : Ri-Bhoi district : 1 M, Nongkhyllum (Umtasor) 24. ix. 82, K. P. Singh, coll. Regd. No. 18200. East Garo Hill district : 1 F, Songsak, 19. ix. 75, N. Muraleedharan, coll.

Diagnosis : Frontal sclerite black. Pronotum denticulated on dialated area; metazona of prosternum with 2 longitudinal wide stripes of black. Disc of femora in between external and internal spines with a black spot near 1st and 2nd external spines.

Measurements (mm) : F : Body 30.0, pronotum 7.3, fore wing 16.5.

Distribution : India : Meghalaya (Ri-Bhoi, E. Garo). Myanmar.

Genus *Gonypeta* Saussure 1869

1869. *Gonypeta* Saussure, *Mitt. Schweiz. Entomol. Ges.* **3** : 55.

1927. *Gonypeta* : Giglio-Tos, *Das Tierreich*, **50** : 172.

Small, brownish body. Head wide with rounded eyes. Frontal sclerite appears semicircular, broad, will high, smooth. Pronotum short; dialation prominent; metazona about twice longer than prozona. In anterior legs, femur with 4 discoidal and 4 external spines; of latter, the proximal two closer to each other; tibia with 9–10 external spines. Posterior metatarsus nearly as long as rest segments taken together. Wings reduced in F only.

.17. *Gonypeta punctata* (De Haan) 1842

1842. *Mantis (oxypilus) punctata* De Haan, *Verh. nat. Gesch. Nederl Bezitt., Ins.* : 85(M).

1927. *Gorypeta punctata* : Giglio-Tos, *Das Tierreich*, **50** : 173.

Material examined : East Khasi Hills district : 1 F, Motinagar, 12. vi. 1976, M. S. Jyrwa, coll. (previously labelled as *Gonypeta* sp.).

Diagnosis : Body brownish. Lateral lobes of vertex raised above the level of eyes. Pronotum straw coloured, with fine black dots; metazona finely carinated and finely crenulated at lateral edges. In anterior legs, internal sides blackish; all spines are black; coxae finely denticulated; with pale yellow and blackish external bands; femora similarly coloured; tibia with 10 external spines. Both wings reduced, extending only upto 1st abdominal segment.

Measurements (mm) : F : Body 22.0, pronotum 5.5, fore wing 5.2.

Distribution : India : Meghalaya (East Khasi Hills), Karnataka, Tamil Nadu, Uttar Pradesh. Java.

Remarks : From the study of 1 F, and 2 M, from Java, it appeared that colour variation is prominent. Werner (1933 and 1935) observed this even in same locality.

Subfamily MANTINAE

Tribe MANTINI

Genus *Hierodula* Burmeister 1838

1838. *Hierodula* Burmeister, *Handb. Ent.*, **2** : 536.

1927. *Hierodula* : Giglio-Tos, *Das Tierreich*, **50** : 435.

Frontal sclerite higher than width; no tubercle between eyes and antennae. Pronotum carinated. In anterior legs, coxae with contiguous internal apical lobes; femora with 4 discoidal and 4 external spines; claw groove near the middle appearing a little basally situated. Middle and hind femora with rounded genicular lobes and apical spines. Anterior border of fore wing smooth; costal area densely reticulated. Hind wings hyaline. Supra anal plate transverse, triangular; cerci conical, cylindrical.

Key to subgenera

- Dilation of pronotum does not extends upto base.....*Hierodula*.
 — Above extends upto base.....*Rhombodera*.

18. *Hierodula (Hierodula) sp.*

Material examined : Ri-Bhoi district : 1 F, Nongkhymlum Reserve Forest, 19. x. 82, R. Mathew, coll. Regd. No. 18223.

Diagnosis : Brown body. In anterior coxae, strong premarginal spines present; verrucose patches at the bases of smaller spines; obtuse tubercular spines 4 in number. Prosternum with blackish band; borders of metazona more parallel. Fore wings brown.

Measurements (mm) : F : Body 68.5, pronotum 23.8, fore wings 50.0.

Distribution : India : Meghalaya (Ri-Bhoi), Arunachal Pradesh, Assam.

Remarks : This specimen shows much similarities with *Hierodula (Hierodula) saussurei*. Still due to presence of some distinct differences. it can not be said with certainty to be the same species.

19. *Hierodula (Rhombodera) crassa* Giglio-Tos, 1912

1912. *Hierodula (Rhombodera) crassa* Giglio-Tos, *Bull. Soc. Entomol. ital.*, **43** : 93.

1927. *Hierodula (Rhombodera) crassa* : Giglio-Tos, *Das Tierreich*, **50** : 453.

Material examined : East Khasi Hills : 1 F, Bishnupur, 27. vii. 60, S. N. Prasad, coll.

Diagnosis : Frontal sclerite with spiniform structure at superior angle, at the base of which the two carinae converge. Pronotum oval, maximum width placed in front of middle; margin scarcely denticulated; prosternum with two pairs of black dots near base and similar one pair in mesosternum. In anterior legs, coxae with 6-9 conical spines; discoidal and longer internal spines of femora black.

Measurements (mm) : F : Body 55.0, pronotum 17.0, fore wing 48.0.

Distribution : India : Meghalaya (E. Khasi), Madhya Pradesh.

Remarks : Anterior coxae internally with two rows of callous (whitish) spots. Claw groove bears reddish patch.

Genus *Tenodera* Burmeister, 1838

1838. *Tenodera* Burmeister. *Handb. Ent.*, 2 : 534.

1927. *Tenodera* : Giglio-Tos, *Das Tierreich*, 50 : 412.

Slender, elongated body. Vertex convex, raised above the eyes. Frontal sclerite 2–3 times wider than high. Metazona prismatic in cross-section. In anterior legs, coxae greenish; femora with 4 discoidal and 4 external spines. Posterior femora with an apical spine. Fore wings long, narrow, not crenulated at anterior border and without any transverse band.

Key to species

1. Hind wings with reddish brown patch at base.....*aridifolia*.
- Hind wings without smoky patch.....2.
2. Anterior coxae spinous in M F.....*angustipennis*.
- Anterior coxae appears spineless.....*fasciata*.

17. *Tenodera aridifolia* (Stoll) 1813

1813. *Mantis aridifolia* Stoll, *Represent Spectres* : 65.

1927. *Tenodera aridifolia* : Giglio-Tos, *Das Tierreich*, 50 : 414.

Material examined : South Garo Hills district : 1 M, Belpagram, 450 mtrs., 25. iii. 76, S. Biswas, coll; 1 F, Siju cave area, 9. ix. 78, K. P. Singh, coll.; East Khasi Hills district : 1 F, Risa colony, 6. ix. 74, R. Mathew, coll.; 1 F, Motinagar, 14. x. 73, R. S. Giri, coll.; 1 ex. (damaged), Insectory Building Compound, Z. S. I., Shillong, S. K. Shobhani, coll.; 2 M F, Laitkar, 18. ix. 75, M. S. Jyrwa, coll.; 1 F, Fishery compound, Risa Colony, 26. ix. 74, M. S. Jyrwa, coll. Ri-Bhoi district : 1 M, Nongkhylum Reserve Forest, 19. x. 82, R. Mathew, coll.

Diagnosis : A feeble groove between the two carinae of frontal sclerite. Pronotum carinated in F, feebly in M; metazona longer than anterior coxae; lateral borders smooth in M, denticulated in F. In anterior legs, coxae spinous in F, less in M; discoidal spines of femora usually black at tips, often blackish in F. Costal area of fore wings green, discoidal area semiopaque in F, partly hyaline in M. Hind wings hyaline; a deep reddish brown patch near base of discoidal area; transverse veinlets of both areas similarly coloured; anal area smoky-brown with hyaline fenestrae.

Measurements (mm) : Body M 76.0; F 78.0; pronotum M 26.0, F 29.0; fore wing M 53.0, F 53.5.

Distribution : India : Meghalaya (E. Khasi, Ri-Bhoi, South Garo), Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Sikkim, Uttar Pradesh. West Bengal. China; Formosa; Indonesia; Lombok.

Remarks : This a very common species of the genus.

21. *Tenodera angustipennis* Saussure, 1869

1869. *Tenodera angustipennis* Saussure, *Mitt. Schweiz. Entomol. Ges.*, **3** : 69.

1927. *Tenodera angustipennis* : Giglio-Tos, *Das Tierreich*, **50** : 417.

Material examined : East Garo Hills district : 1 M, Kadamkolai, 1. xi. 83, T. Mukherjee, coll.

Diagnosis : Pronotum not carinated. In anterior legs, coxae with 13–14 minute spines; femoral spines black at tips, with black femoral brush and a blackish line along claw groove. Costal area of fore wings light green, opaque, discoidal area subopaque and anal area colourless. Hind wings transparent; costal area without spot; discoidal area with a faint brownish patch at base and with pale brownish transverse veinlets up to middle of discoidal area.

Measurements (mm) : M : Body 82.5, pronotum 29.5, fore wing 57.0.

Distribution : India : Meghalaya (E. Garo), Sikkim. China; Japan.

Remarks : The colour on femoral brush and on claw groove is additional character for the species which may be due to local variation.

22. *Tenodera fasciata* (Olivier) 1792

1792. *Mantis fasciata*, Olivier, *Enc. meth.* **7** : 640.

1927. *Tenodera fasciata* : Giglio-Tos, *Das Tierreich*, **50** : 416.

Material examined : East Khasi Hills : 1 F Motinagar, 12. vi. 76, M. S. Jyrwa, coll. Regd.. No. 7457.

Diagnosis : Frontal sclerite with angular upper margin which is sinuated on either ends. Pronotal dialation less; metazona carinated; borders finely serrated; prosternum with a pair of whitish spot and also a pair fo tubercular whitish spots. In anterior legs, coxae finely serrated; femoral spines black at apices only. Costal area of fore wings opaque; anterior half of discoidal area densely reticulated, rest subopaque. Hind wings hyaline; costal area a little opaque, transverse veinlets blood–red coloured; transverse veinlets of posterior part of discoidal area pale brownish; tips of hind wings brownish; no reddish patch at base.

Measurements (mm) : F : Body 87.0, pronotum 32.5, fore wings 57.0.

Distribution : India : Meghalaya (E. Khasi). Assam, Manipur, West Bengal. China.

Genus *Statilia* Stål, 1877

1877. *Statilia* Stål, *Bih. K. Svenska. AK.* **4** (10) : 36.

1927. *Statilia* : Giglio-Tos, *Das Tierreich*, **50** : 410.

Frontal sclerite transverse; upper margin arched and angular. In anterior legs, coxae with contiguous internal apical lobes; claw groove distal to middle of femora; tibiae with 7 external spines. Middle and hind femora without genicular spines.

23. *Statilia maculata* (Thunberg) 1784

1784. *Mantis maculata* Thunberg, *Nov. Ins. Spec.*, 3 : 61.

1927. *Statilia maculata* : Giglio-Tos, *Das Tierreich*, 50 : 410.

Material examined : East Khasi Hills district : 1 F, Old Barapani Road, 23. iv. 77, A. R. Lahiri, coll. Regd. No. 14740; 1 F, Umran, 16. vii. 71, S. Biswas, coll. Regd. No. 2737; 1 F, Barapani, 24. ix. 67, R. K. Varshney, coll. West Garo Hill district : 1M, Rongram 1B., 3.ix.78, K.P. Singh, coll.

Diagnosis : Vertex with black patches. Prosternum also with black patch near coxal joint. In anterior legs, coxae with 7–8 triangular whitish spines, few spinules and with internal black patch; femora with shining pale yellow patch, bordered anteriorly by a black line; some F with entirely black longer internal spines and with deep smoky wings. Costal area of fore wings opaque, discoidal area semiopaque in F, almost hyaline in M.

Measurements (mm) : Body M 55.0, F 48.0, pronotum M 14.0, F 15.0; fore wing M 34.0, F 33.0.

Distribution : India : Meghalaya (E. Khasi, West Garo), Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Sikkim, Uttar Pradesh, West Bengal.

Eastern Asia.

Remarks : This is a very common species of the genus. It inhabits tall grass lands and in shrubs with damp soil underneath.

Genus *Mantis* Linnaeus, 1758

1758. *Gryllus* (*Mantis*) Linnaeus, *Syst. Nat.* 10 : 425.

1927. *Mantis* : Giglio-Tos, *Das Tierreich*, 50 : 405.

Frontal sclerite a little wider than high, bicarinate or smooth; upper border a little angular. Internal apical lobes or anterior coxae divergent. Claw groove placed in the middle. Middle and hind femora without apical spine. Hind wings not coloured.

24. *Mantis religiosa* Linnaeus, 1758

1758. *Mantis religiosa* Linnaeus, *Syst. Nat.* 10 : 426.

1927. *Mantis religious* : Kaltenbach, *Ann. Naturhistor. Mus. Wien*, 82 : 530.

Material examined : East Khasi Hills dist. : 2 F, Upper Shillong 16. viii. 62, S. N. Prosad, coll.; 1 F, Shillong Peak, 27. xii. 67, B. K. Tikader, coll.

Diagnosis : Frontal sclerite with smooth disc. Metazona carinated; prosternum with two small rounded tubercles near its base. In anterior legs, coxae with divergent internal apical lobes, with callous spots internally; a black spot at base, often enclosing an oval yellow spot; anterior edge with 6–8 spines and few spinules between them; claw groove yellow; longer internal spines entirely black. Fore wing subhyaline; stigma elongated (cream coloured spot).

Measurements (mm) : F : Body 67.0, pronotum 19.0, fore wing 47.0.

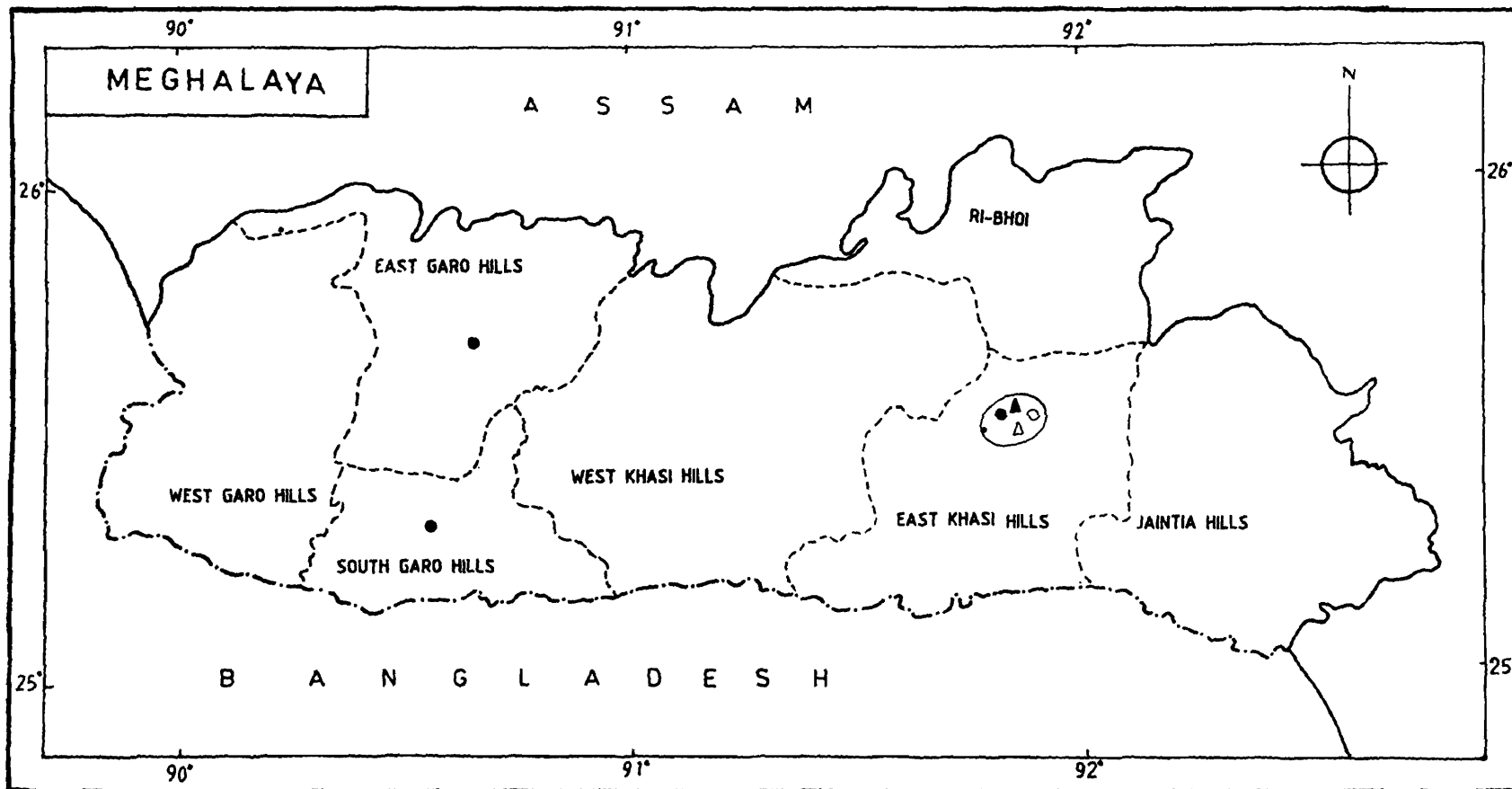
Distribution : India : Meghalaya (E. Khasi), Karnataka, Madhya Pradesh, Manipur, Uttar Pradesh, West Bengal. Europe; Africa; Australia.

Table 1 : DISTRICT-WISE DISTRIBUTION OF MANTODEA FAUNA OF MEGHALAYA

	West Khasi Hills	East Khasi Hills	Ri-bhoi	West Garo Hills	East Garo Hills	South Garo Hills	Jaintia Hills
	1	2	3	4	5	6	7
Family Hymenopodidae							
Subfamily Acromantinae							
Tribe Acromantini							
1. <i>Acromantis montana</i>	-	+	-	-	+	+	-
2. <i>Anaxarcha graminea</i>	-	+	-	-	-	-	-
3. <i>Anaxarcha acuta</i>	-	+	-	-	-	-	-
4. <i>Euantissa pulchra</i>	-	+	-	-	-	-	-
Subfamily Hymenopodinae							
5. <i>Creobroter apicalis</i>	-	+	+	-	+	-	-
6. <i>Creobroter urbanus</i>	-	-	+	-	-	-	-
7. <i>Creobroter laevicollis</i>	-	+	+	-	+	-	-
8. <i>Creobroter sp.</i>	-	-	+	-	-	-	-
Family Mantidae							
Subfamily Choeradodinae							
9. <i>Choeradodis squilla</i>	-	-	-	-	+	-	-
Subfamily Caliridinae							
10. <i>Calires masoni</i>	-	-	+	-	-	-	-
11. <i>Leptomantis indica</i>	-	-	-	+	-	-	-
12. <i>Leptomantis montana</i>	-	-	-	+	-	-	-
Subfamily Thespinae							
Tribe Thespini							
13. <i>Thespis sp.</i>	-	+	-	-	-	-	-
Subfamily Tridopteryginae							
Tribe Tropidomantini							

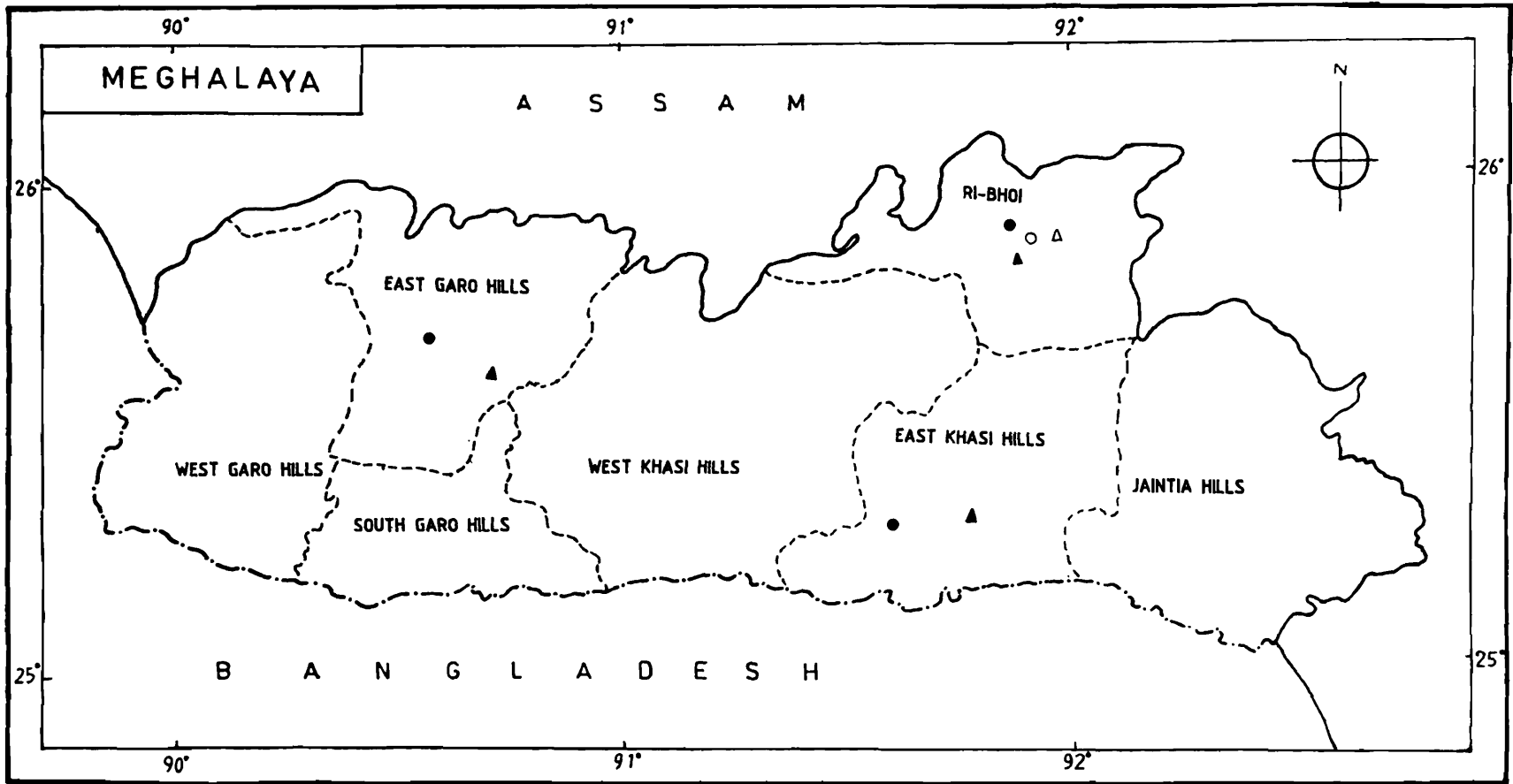
Contd.....Table 1

	West Khasi Hills	East Khasi Hills	Ri-bhoi	West Garo Hills	East Garo Hills	South Garo Hills	Jaintia Hills
	1	2	3	4	5	6	7
14. <i>Eomantis guttatipennis</i>	-	-	-	+	-	-	-
Subfamily Liturgusinae							
15. <i>Humbertiella simitis</i>	-	+	-	-	-	-	-
Subfamily Amelinae							
16. <i>Gimantis authaemon</i>	-	-	+	-	+	-	-
17. <i>Gonypeta punctata</i>	-	+	-	-	-	-	-
Subfamily Mantinae							
Tribe Mantini							
18. <i>Hierodula (Hierodula) sp.</i>	-	-	+	-	-	-	-
19. <i>Hierodula (Rhombodera)</i> <i>crassa</i>	-	+	-	-	-	-	-
20. <i>Tenodera aridifolia</i>	-	+	+	-	-	+	-
21. <i>Tenodera angustipennis</i>	-		-	-	+	-	-
22. <i>Tenodera fasciata</i>	-	+	-	-	-	-	-
23. <i>Statilia maculata</i>	-	+	-	+	-	-	-
24. <i>Mantis religiosa</i>	-	+	-	-	-	-	-



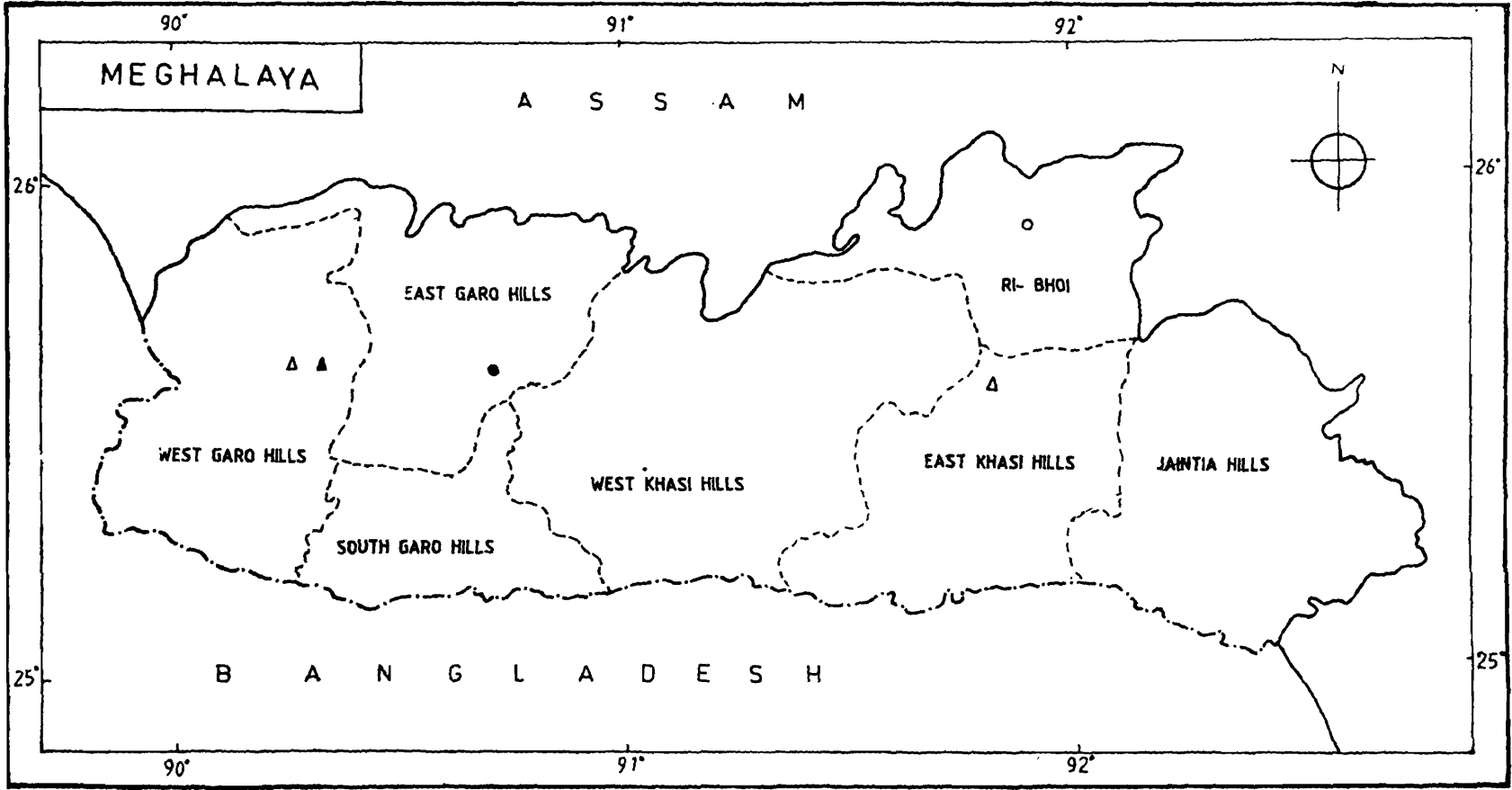
Map : 1

● *Acromantis montana* ○ *Anaxarcha graminea* △ *Anaxarcha acuta* ▲ *Euantissa pulchra*



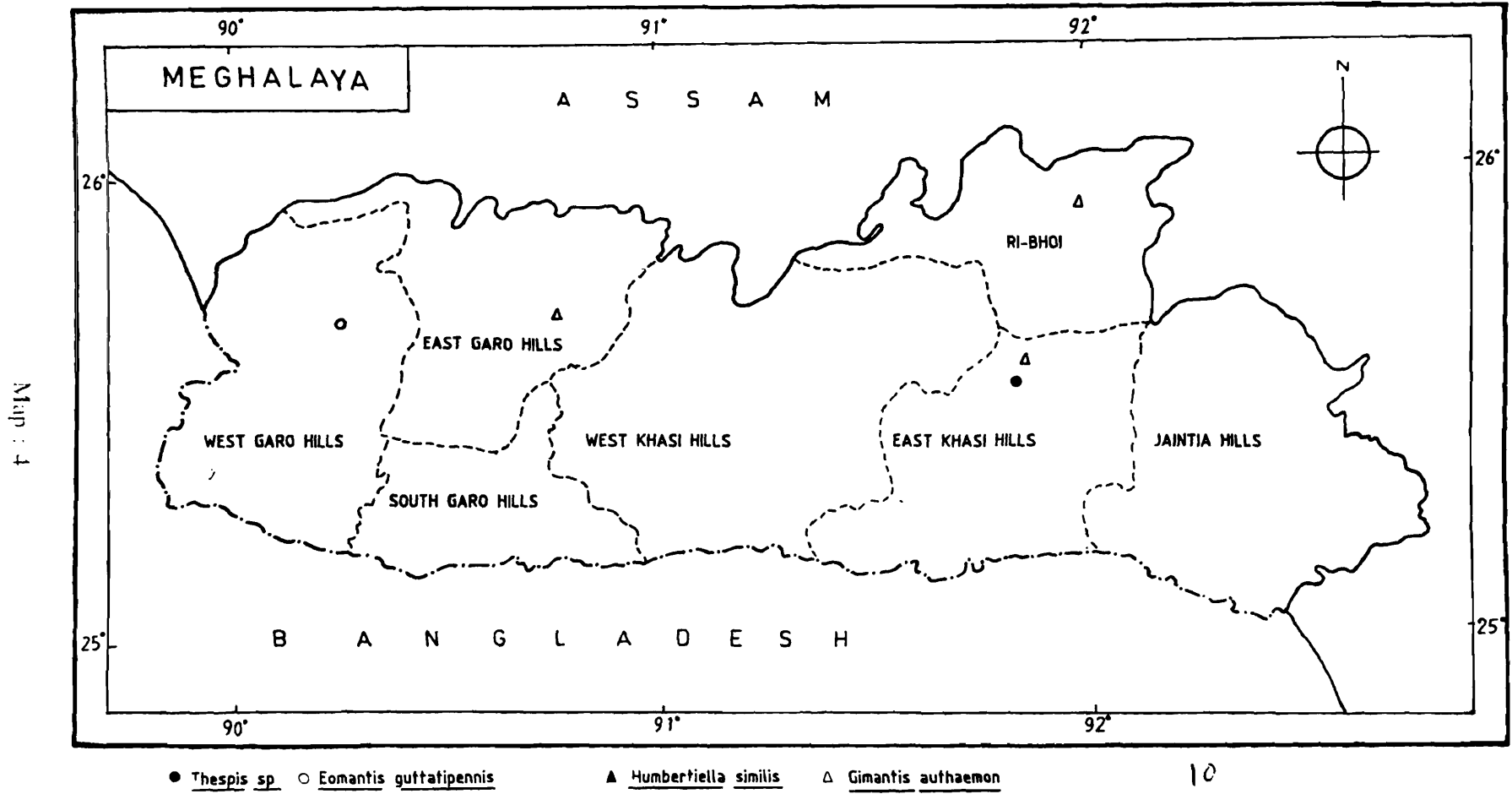
Map : 2

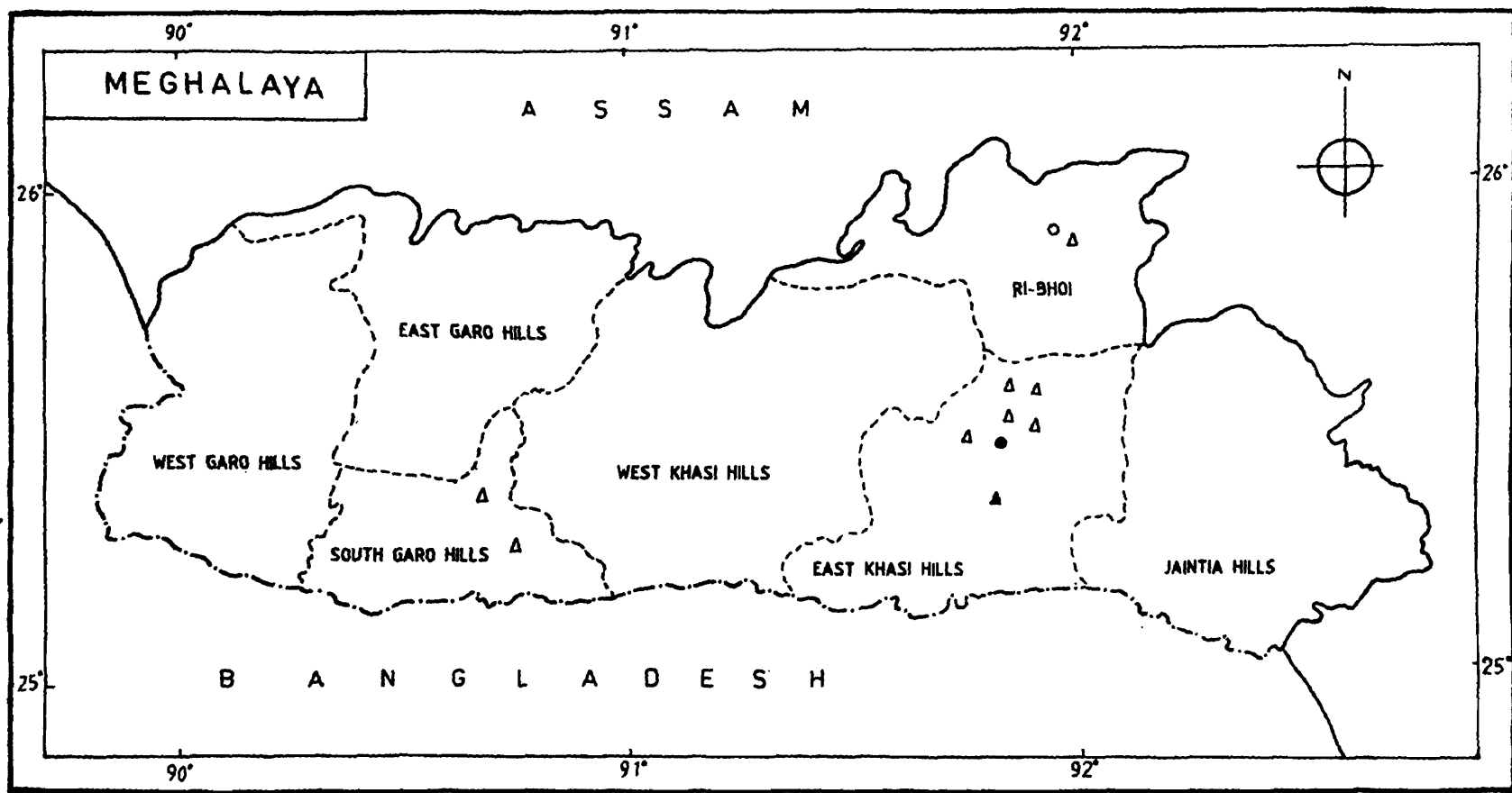
● *Creobroter apicalis* ○ *Creobroter urbanus* ▲ *Creobroter laevicollis* △ *Creobroter sp.*



Map : 3

● Choerododis squilla ○ Caliris masoni ▲ Leptomantis indica △ Leptomantis montana

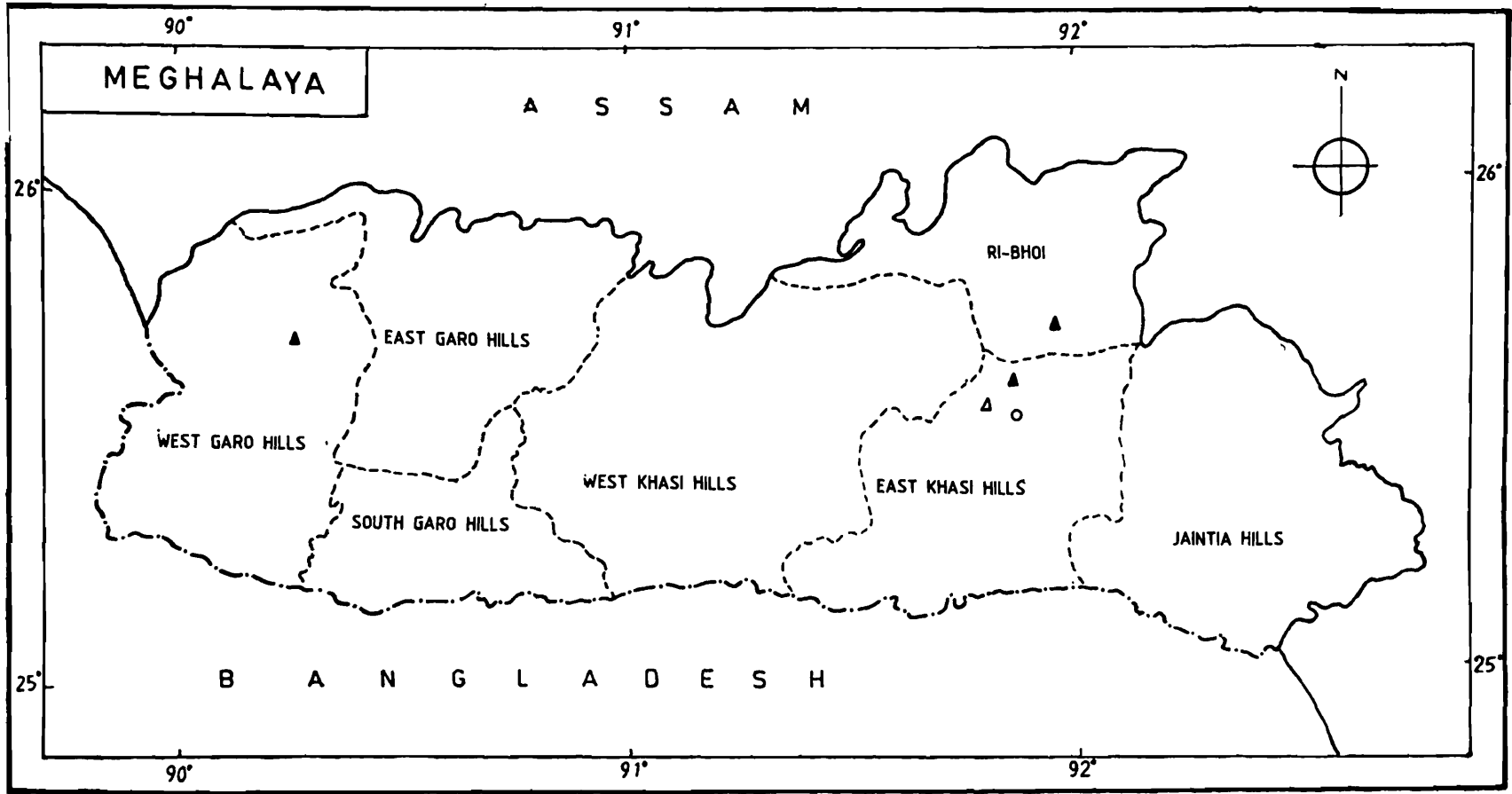




Map : 5

● *Gonypeta punctata* ○ *Hierodula (Hierodula) sp.* ▲ *Hierodula (Rhombodera) crassa* △ *Tenodera aridifolia*

10



Map : 6

● *Tenodera angustipennis* ○ *Tenodera fasciata* ▲ *Statilia maculata* △ *Mantis religiosa*

Remarks : This species is very widely distributed and probably had spreaded from the Old World in early geological period.

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INSECTA : PSOCOPTERA

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INTRODUCTION

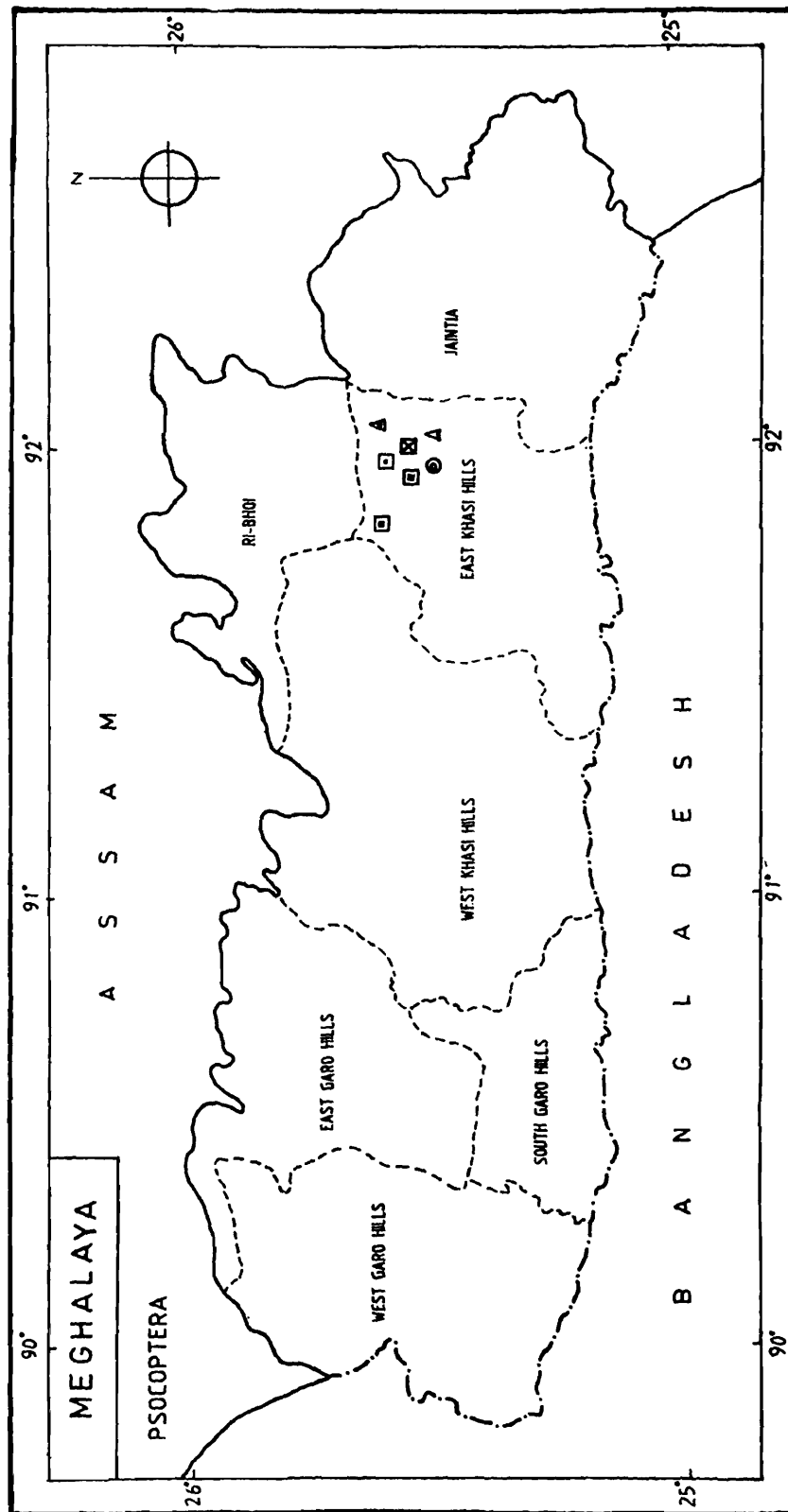
Psocoptera, popularly known as 'Book-Lice' or 'Psocids' are insects of much economic importance, specially damage caused to our valuable books, zoological and Botanical specimens, herbarium and other house hold material. A few individuals may occasionally disseminate plant disease by feeding pathogenic fungi and leaving viable spores in faeces deposited elsewhere. These may also act as vectors for some animal parasites.

These are very small, soft bodied insects and may be winged or apterous with two or three segmented tarsi and biting type mouth parts. These insects are relatively less conspicuous and lesser represented order of insects.

The order is known to be represented in India by 85 species, under 40 genera and 18 families vis-a-vis a little more than 2500 species world over under 230 genera and 31 families. Major component of Indian Psocoptera are represented under Families : Peripsocidae (10 species), Psocidae, Caeciliidae (nine species each); these 3 families taken together represent a little more than half of Indian Psocoptera (28 : 57). Psocoptera fauna of Meghalaya is represented by 6 species under 6 genera and 4 families; leaving thereby further scope of additional species for the state.

HISTORICAL BACKGROUND

Perusal of literature reveals that relatively lesser contribution has been made on these insects from Meghalaya; though Srivastava and Roy (In press) have reported from West Bengal 39 species of Psocoptera under 24 genera and 15 families. Dutta (1966,69,70) contributed mainly on these insects from Meghalaya describing 5 new species and redescribing a species; these 6 species belongs to 6 genera and 4 families. Type material of Psocoptera deposited in Zoological Survey of India have been examined and salient diagnostic features of each species of Psocoptera, basing on these observations, are provided in present paper; along with affinity with allied taxa, distribution in Meghalaya, India or elsewhere if applicable. Number of diagrams supporting salient features of Meghalaya Psocoptera are also provided.



Distribution map :

Map-1. Showing distribution of 6 Psocopteran species in Meghalaya viz., *Dypsocus coleoptratus*, *Stenepsocus mirabundus*, *Trichadenotecnum distinctum*, *Psococerastis nilae*, *P. minutus* and *Ectopsocus briggsi*

SYSTEMATIC ACCOUNT

A brief mention is made of salient morphological features, with special reference to taxonomic importance and supported by diagrams (Plates : I to IV). Collection and study techniques are also provided, alongwith comprehensive list of technical terms used and key to various level of taxa.

GENERAL MORPHOLOGY

Psocids are small insects; length ranging between 1.5 to 5 mm. Head is small with chewing mouth parts, long filiform 13-50 segmented antennae. Small prothorax but no projecting cerci. Two pairs of thin, membranous wing with similar texture and reduced venation; forewing longer and with pterostigma. In certain forms wings may be small and scale like or may be altogether absent (apterous). Thorax is proportionate to the body, abdomen generally globular or may be oblong in few cases. The genital armature lodged at the last abdominal segment (VII to IX), is well sclerotised, both in male and female and is furnished with gonapophyses, hypandrium, subgenital plate, epiproct and paraproct.

COLLECTION AND PRESERVATION

Psocids can be collected in field from foliage, bushes and straws, specially from semidry leaves by beating them with stick, wooden rod over a white enamel tray. Psocids infecting books stationary etc. can be collected by jerking them over tray (Srivastava, 1990). These then can be collected by fine brush dipped in alcohol and preserved in same in glass vials. Some are preserved dry and mounted on cards, but former is more suitable on permanent basis. These then can be observed on slide under microscope as such or as permanent mounted slides. These may also be stained. The sclerotized parts, specially genitalic armature can be dissected from musculature and treated by KOH solution and then dehydrated and mounted on slide.

TERMS AND EXPLANATION USED IN KEY AND TEXT

Pterostigma :	The black or opaque spot present in subcostal region of forewing.
Ctenidiobothria :	These structures are found in tarsal segment of the leg.
Gonapophyses :	These are the modified, sclerotised rod-like processes associated with 7th and 8th abdominal sternites in female specimens.
Subgenital plate :	The modified sclerotised plate like structure in female genitalic structure which bear lobes and setae.
Hypandrium :	This is formed by 9th sternite in male genitalic structure. It is in shape of claspers and separates the pene from rest of genitalic armature.

- Epiproct : The sclerotized structure with short spurs or hooks found both in male and female genital armature.
- Paraproct : The modified and sclerotised bulbous structure found both in male and female genitalic structure and possess trichobothria.
- Radula : Strongly sclerotised organ of penes frame.

SYSTEMATIC ACCOUNT

Psocoptera fauna of Meghalaya is represented by 6 species, 6 genera and 4 families viz., Caeciliidae, Stenopsocidae, Psocidae and Peripsocidae. Familiwise systmetic list, key to the families and species component of Meghalaya Psocoptera is provided, here under, alongwith original and recent reference, salient points and distribution.

SYSTEMATIC LIST OF PSOCOPTERA KNOWN FROM MEGHALAYA :

- I. Family CAECILIIDAE
 - Genus 1 *Dypsocus*
 - (i) *D. coleoptratus*
- II. Family STENOPSOCIDAE
 - Genus 2 *Stenopipsocus*
 - (ii) *S. mirabundus*
- III. Family PSOCIDAE
 - Genus 3 *Trichodenotecnum*
 - (iii) *T. distinctum*
 - Genus 4 *Psococerastis*
 - (iv) *P. nilae*
- IV. Family PERIPSOCIDAE
 - Genus 5 *Peripsocus*
 - (v) *P. ninutus*
 - Genus 6 *Ectopsocus*
 - (vi) *E. briggsi*

Key to the families represented

1. Antennae more than 20 segmented.....2.
- Antennae less than 20 segmented.....3.
2. Forewing veins with 1 row of setae, M apparently 2 branched.....CAECILIIDAE.
- Forewing veins with more than 1 row of setae, M 3 branched or absent, claws with subapical tooth.....STENOPSOCIDAE.
3. Forewing membrane with dense clothing of setae, Areola postica fused to M.....PSOCIDAE.
- Forewing membrane without dense clothing of setae or if setae present they are limited in area or sparse, wing glabrous.....PERIPOCIDAE.

Family CAECILLIDAE

Genus *Dypsocus* Hagen

1866. *Dypsocus*, *Verh. Zool.-bot. Ges. Wien*, 16 : 249.

No key to the species of the genus is provided, as it has sole representative in Meghalaya.

Dypsocus coleopteratus Hagen

1858. *Psocus coleopteratus* Hagen, *Verh. Zool.-bot-Ges. Wien*, 8 : 474.

1866. *Dypsocus coleoptratus* Hagen, *Verh. Zool.-bot. Ges. Wien*, 16 : 207.

1069. *Dypsocus coleoptratus* : Dutta, *Zoologischer Anzeiger*, Bd. 183, Heft 1/2.

Material ; 1 M, 1 F, Shillong, Khasi Hills, Meghalaya, coll. V. D. Srivastava.

Salient features : Small species (M 3.10-3.15 and F 2.50 to 2.70 mm). In female forewing dark smoky, anteriorly, almost half of pterostigma R_1 , R_5 close to r_3 ; r_5 and r_3 entirely transparent but hindwing much less smoky, much more transparent. Subgenital plate bilobed at its apical margin, inner margin serrated, row of minute spines. Gonopophyses with sword-shaped ventral valve, extending 2/3 dorsal valve. Male genitalia with external parameres spoon-shaped 'apically' internal parameres joined in the middle with to form slender arch apically. Epiproct crescent-shaped with whorl of prominent tubercles in the middle and 5 stout around it.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills). SRI LANKA (=CEYLON).

Family STENOPSOCIDAE

Genus *Stenepipsocus* Badonnel

1946. *Stenepipsocus* Badonnel. *Rev. Zool. Bot. afr.*, 39 (2) : 155.

No key to the species of the genus is provided, as it has sole representation in Meghalaya.

Stenepipsocus mirabundus Dutta

1969. *Stenepipsocus mirabundus* Dutta, *Zoologischer Anzeiger*, **183** (1/2) : 145.

Material : Holotype 3 F F, (7763/HB, 7764/HB, 7765/HB and 7632/HB) Botanical garden, Shilong, Khasi hills Meghalaya (=Assam), 23. ii. 65, B. N. Prasad coll. (on slide).

Diagnositic features : Moderate sized species (Body : 3.15, Forewing and hindwing longer than body 4.35 and 3.55 mm respectively). Body dark brown.

Forewing deeply smoky on proximal half, pterostigma at tip, M_1 to M_3 , 2/3 of aerole postica and veins; a smoky band across posterior angle of pterostigma. Hindwing also smoky, subcostal cell, Cu, An, ax basally dark. Subgenital plate have 'V' shaped apical lobe; gonopophyses has dagger shaped ventral valve but dorsal valve less prominent; condyle sharply pointed.

Remarks : This species was described on female, male not recorded and is second species of the genus in India. First record was of *S. animalicus* Dutta from Annamalai Hills (Madras). Present species differs from same in having longer fore and hindwings (4.35, 3.35 : 2.84, 2.14), longer body (3.15 : 3.00 mm) wings less smokey and ctenidiobothria on first joint of hind tarsus 21 : 25.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills), Tamil Nadu (Madras).

Family PSOCIDAE

Key to Genera of PSOCIDAE

1. Forewings are not simple, heavily patterned.....*Trichadenotecnum* Enderlin.
- Forewings are simple, not heavily patterned.....*Psococerastis*.

Genus *Trichadenotecnum* Enderlin

1908. *Trichadenotecnum* Enderlin, *Boll. lab. Zool. Portici*. 3 : 329.

1967. *Trichadenotecnum* : Smithers, *Austral. Zool.*, **14** (1) : 114.

No key to species of the genus is provided, as it has sole representative in Meghalaya.

Trichadenotecnum distinctum Dutta

1969. *Trichadenotecnum distinctum* Dutta, *Zool. Anz.*, 183.

Material : Holotype 1 M (7727/HB) and type 1 M, (7630/HB), Botanical Garden, Shillong, Khasi Hills, Meghalaya (=Assam), 23. ii. 1965, B. K. Tikader coll. (on slide).

Diagnostic features : Moderate sized species (Length of forewing and hindwing 4 : 3 mm). Epicranium and postclypeus pale yellow, anteclypeus greyish. Forewing hyaline with dark brown spots disposed mostly in pterostigma and apical margin. Hindwing also hyaline, grey in subcostal area, veins dark brown. Ctenidiobothria of first joint of hind tarsus 11. Penial organ bladder

shaped, sclerotized with prominent radula. Hypandrium asymmetrical median tongue broad based ending with fine, long stout spines. Paraproct with distal hook, each with oval field of 17 tricobothria.

Remarks : This species is the sole representative of the genus in Meghalaya. Ray (1979) described another species *I. apertum* Thornton as new record from West Bengal.

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills).

Genus *Psococerastis* Pearman

1932. *Psococerastis* Pearman, *Ent. Month. Mag.* **68** : 202.

1967. *Psococerastis* : Smithers, *Austr. Zool.*, **14** (1) : 98.

No key the species of the genus is provided, as it has sole representative in Meghalaya.

Psococearstis nilae Dutta

1966. *Psococearstis nilae* Dutta, *Journ. Bengal Nat. Hist. Soc.*, **35** (1) : 24.

Material : Type Holotype F F (in 5 parts on slide) (Nos. 7575/HB, 7578/HB, 7586/HB, 7587/HB and 7726/HB) Cherapunji, Khasi Hills, Meghalaya (=Assam), 8.x. 1914, 1341 met. alt., S. W. Kemp, coll.

Diagnostic features : Species is only known by its female, male is not described. Moderate sized species length of body forewing and hindwing respectively 4.44, 6.09 and 4.31. Abdomen with light brown transverse bands. Fore and hind wing hyaline except in fore wing: pale brown pterostigma from posterior angle to radial sector; pale brown stripe from 'm + cu' to 'ax'; all veins in both wings except 'an' light to moderate brown. Ctenidiobothria 61 on hind tibia. Subgenital plate with number of long setae, Epiproct laterally well chitinized, Paraproct posteriorly protruding with two robust setae and number of smaller setae. Ventral valve of gonopophyses chitinized apically pointed dorsal valve flat, external valve oval, setose.

Remarks : This species can be differentiated from other members of the genus by brown colouration on its wings.

Distribution : INDIA : Meghalaya (Cherapunji, Khasi Hills).

Family PERIPSOCIDAE

Key to the genera of the family Peripsocidae represented in Meghalaya

1. Male epiproct unornamented.....*Peripsocus*
- Male epiproct, normally unornamented.....*Ectopsocus*

Genus *Peripsocus* Hagen

1866. *Peripsocus* Hagen, *Verh. zool.-bot. Ges. Wien* **16** : 203.

1967. *Peripsocus* : Smithers, *Austr. Zool.*, **14** (1) : 68.

No key to the species of the genus is provided, as it has sole representative in Meghalaya.

***Peripsocus minutus* Dutta**

1969. *Peripsocus minutus* Dutta, *Zool. Anz.* **183** (5/6) : 443.

Material : 3 M (7596/HB, 7597/HB, 7598/HB (on slide) and 1 F (7576/HB : Wet) Shillong, Assam (=Meghalaya), April, 1965, B. K. Tikadar coll.

Diagnostic features : Small sized species (Body length M : F 2.24 : 2.75; Forewing M, F, 2.70 : 3.15 mm) Thorax dark brown, abdomen pale yellow. Ctenidiobothria first joint of hind tarsus of both male and female : 20 Forewing not hyaline but smoky; pterostigma reddish R_3 , R_5 with grey patches at tip, veins darkbrown. Hindwing hyaline, dark grey streak in subcostal part. Paraproct in M with 36, in F with 24 trichobothria. Epiroct in M with 5 and in M 10 long setae. Male gonopophyses with ventral valve styliform, dorsal valve with proximal half sclerotised, apical part flat with long setae; external valve subtriangular; ventral valve spinosus, extending 1/4 of dorsal. Female subgenital plate with apical lobe converging, divided; part anterior to apical lobe setose, highly sclerotised.

Remarks : This species is distinguishable from closely akin *P. quercicola* Enderlin by shape of apical lobe of subgenital plate and dorsal and ventral valve of gonopophyses.

Distribution : INDIA : Meghalaya (Shillong Khasi Hills).

Genus *Ectopsocus* McLachlan

1899. *Ectopsocus* McLachlan, *Ent. month Mag.*, **35** : 277.

1967. *Ectopsocus* : Smithers, *Austr. Zool.*, **14** (1) : 64.

No key to the species of the genus is provided, as it has sole representative in Meghalaya.

***Ectopsocus briggsi* McLachlan**

1899. *Ectopsocus briggsi* McLachlan, *Ent. Mon. Mag.* **35** : 234.

1968. *Ectopsocus briggsi* : Thornton and Wong, *Oriental and Pacific Peripsocidae*. 93.

1970. *Ectopocus briggsi* : Dutta, *Journal Bengal Nat. Hist. Soc.* **36** (1) : 75.

Material : 2 F, Botanical garden, Shillong, Khasi Hills Nov. 65, B. K. Tikadar coll. (6000 ft. alt.).

Diagnostic features : Small species (Body length 2 mm : Forewing length 2.32 mm). Epicranium yellow, grey on vertex, clypeus, labrum, antennae, maxillae and also legs eyes black, ocelli red. Thorax white, abdomen with 7 dark brown bands. Forewing and hindwing hyaline, in forewing pterostigma (except central position); 'm + cu' and veins at tips dark grey. 13 ctenidiobothria on first joint of hind tarsus. Subgenital plate has prominent apical lobes and beset with 6 long subapically, 4 setae apically. Epiroct rounded apically; beset with 4 + 4 setae (4 minuate subapically

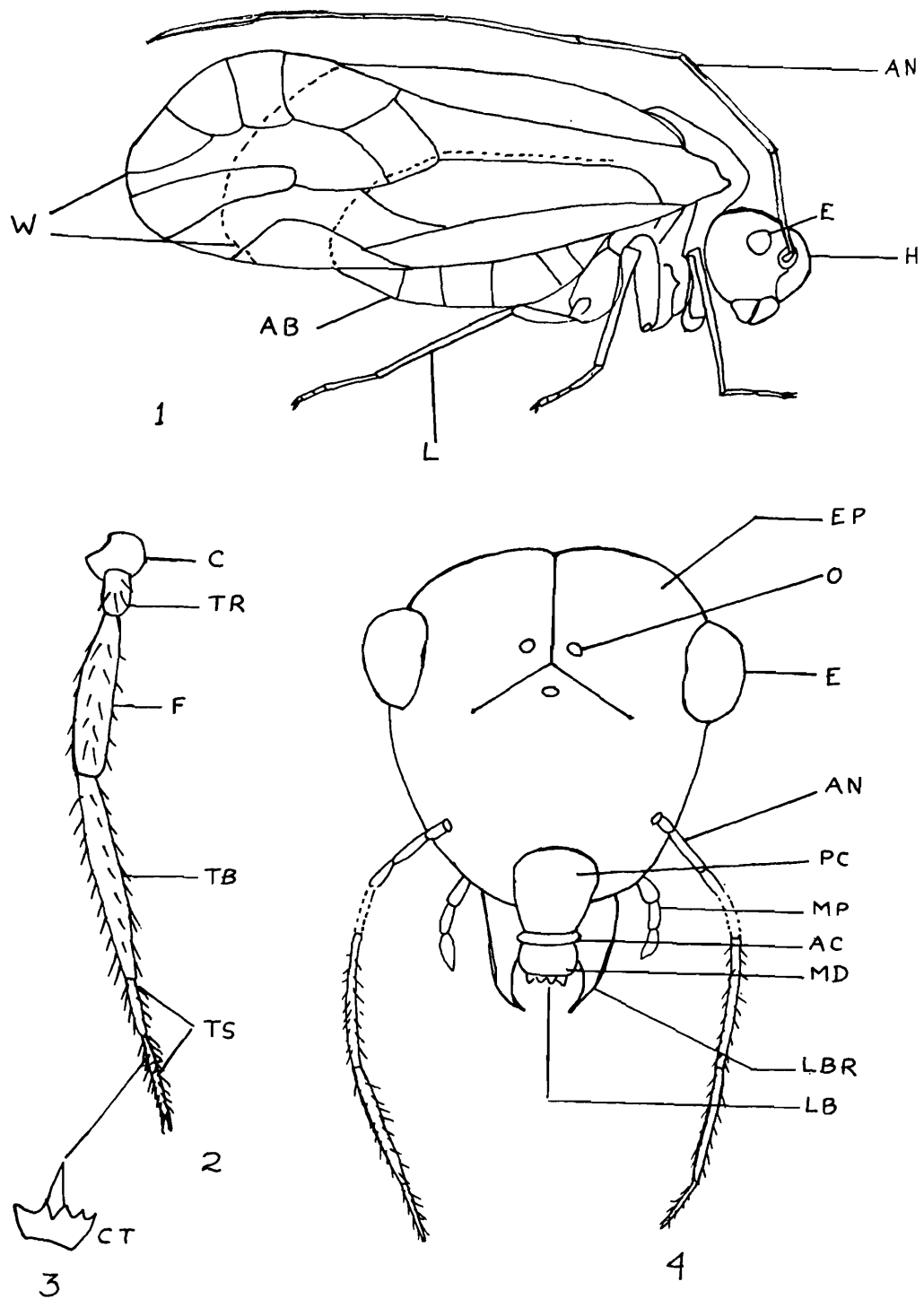


Plate-I : Fig. 1. Generalized diagram of Psocoptera (lateral view), 2. Leg. 3. Clendiobothria, Head (Frontal view). AB-Abdomen, AC-anteclypeus, AN-Antenna. C-Cosca, CT-Clendiobothria. E-Eye. Ep-epicranium, F-funner, H-head, Lb-labium. LBR-labrum, L-leg, MD-mandible. MP-maxillary palp. O-ocellus, P-postclypeus, TB-tibia, TR-trochanter, TS-torsal segments. W-wings,

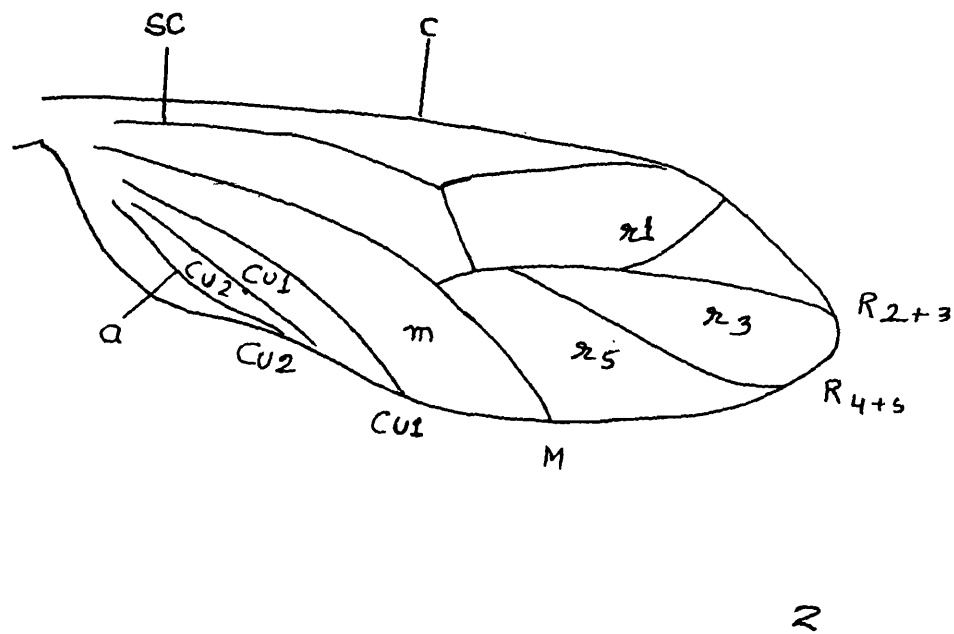
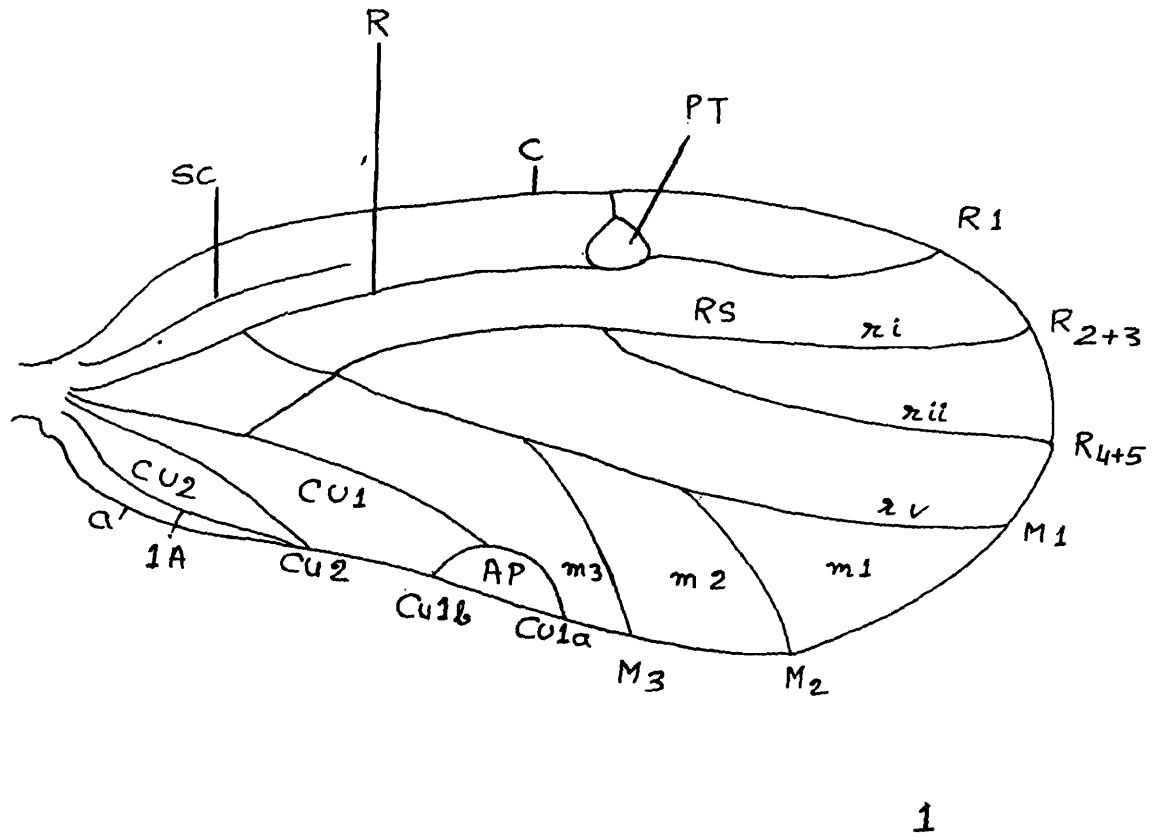


Plate-II : Fig. 1, forewing and its venations and Fig-2, hindwing and its venations (abbreviations of veins as that of insect wings.)

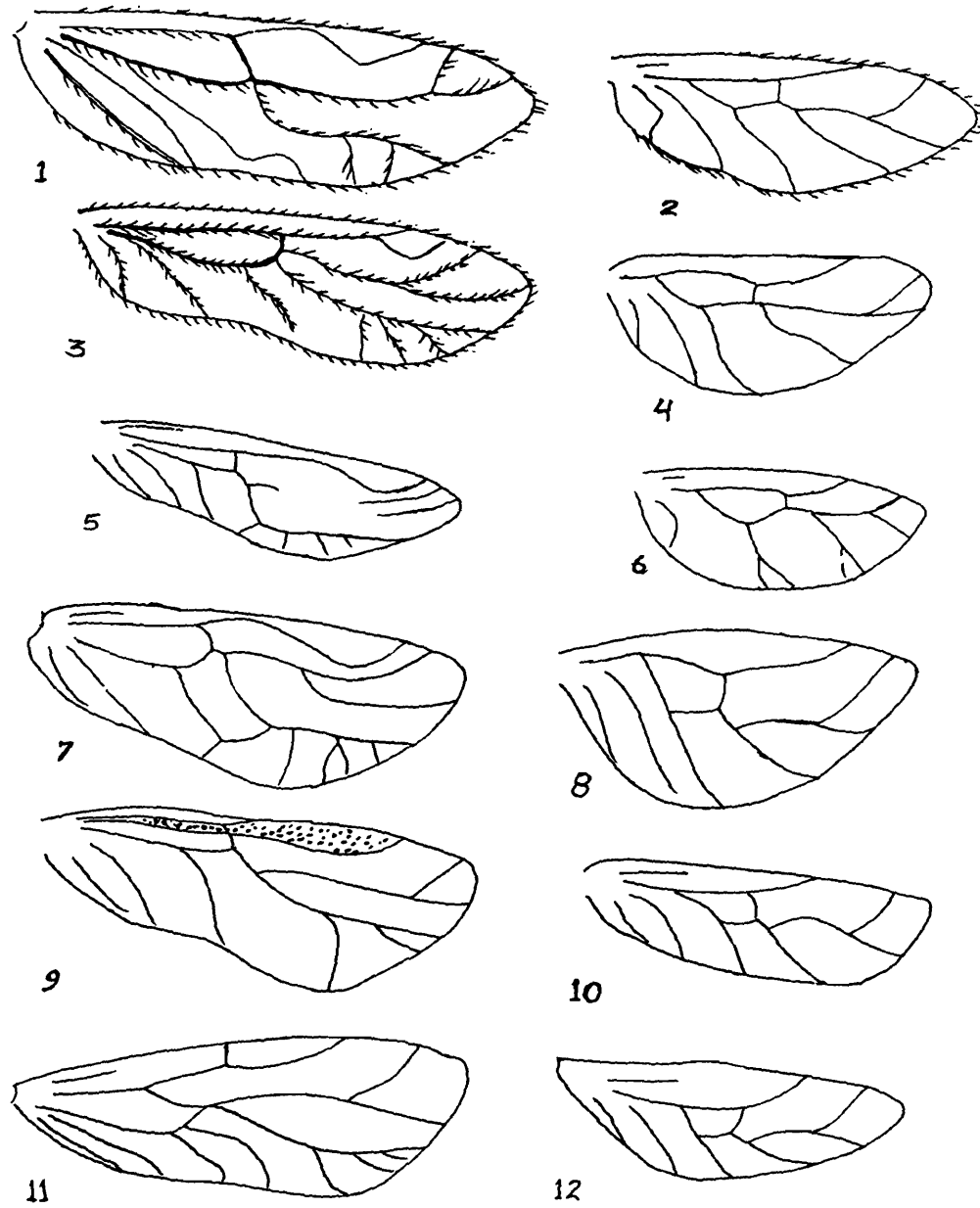


Plate-III : Figs : venation 1,2-fore and hindwing of *Dypsocus coleopratus*; 3,4-fore and hindwing of *Stenepipsocus mirabundus*; 5,6-fore and hind wing of *Trichodenotectum distinctum*; 7,8-fore and hind wing of *Psococerastis nilae*; 9,10-fore and hindwing of *Peripsocus minutus*; 11,12-fore and hind wing of *Ectopsocus briggsi*

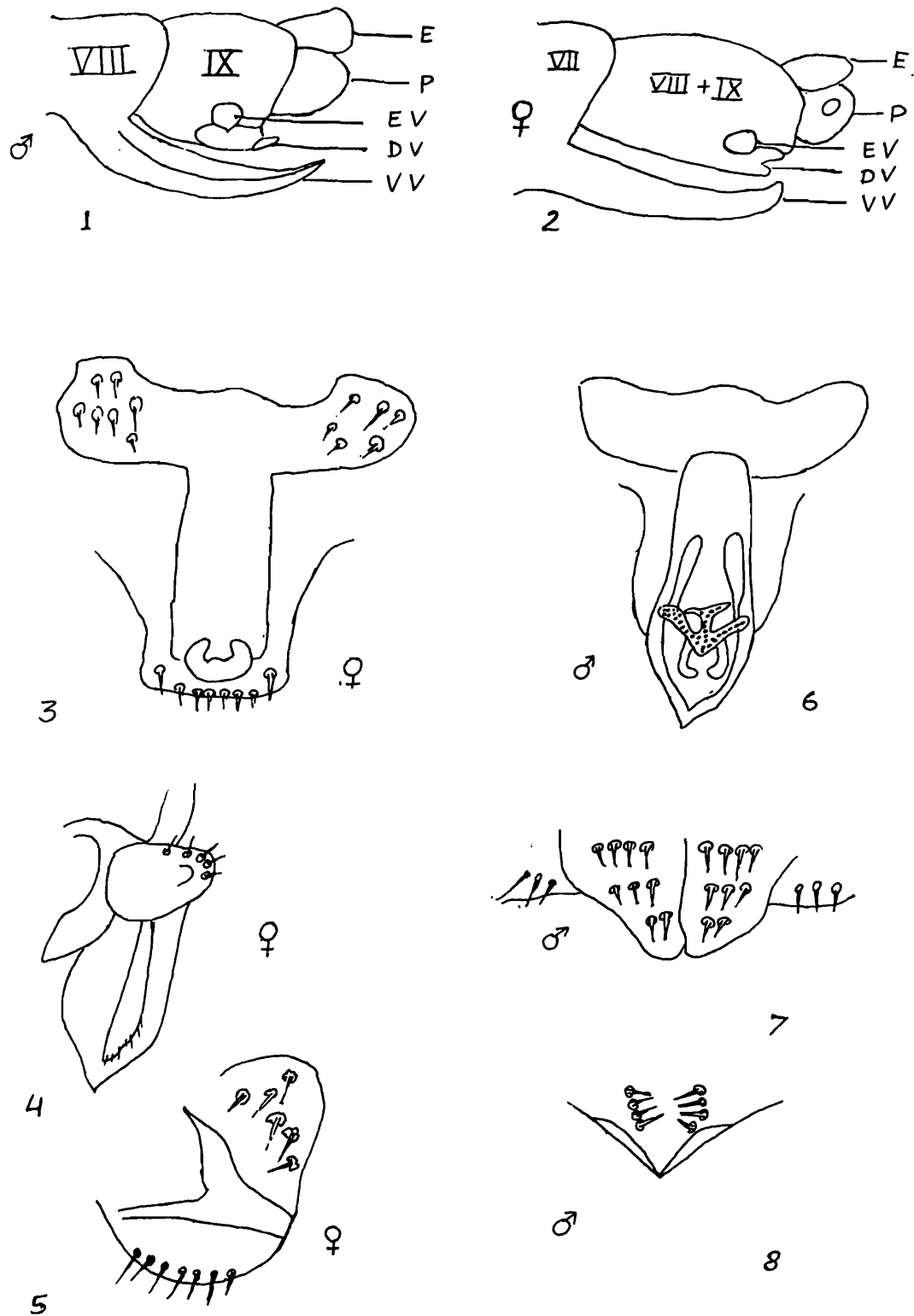


Plate-IV : Figs 1 and 2-generalized representation of male and female genitalia respectively; 3, 4,5-female genital part (respectively); 6,7,8-male genitalic part (respectively).

+ 4 long in the middle). Gonopophyses styliform dorsal valve shorter than ventral (external) with 7/8 long setae marginally.

Remarks : This species was first recorded from India (Meghalaya : Shillong). Dutta (1970) further recorded it from Shillong and had also provided additional characters, specially variation in colouration. Indian counter part differs from Australian (McL., 1899) and European (Bad. 1943) in having 4 + 1 (long setae on each apical lobe of subgenital plate and a short spine in between two inner setae).

Distribution : INDIA : Meghalaya (Shillong, Khasi Hills). AUSTRALIA, ENGLAND, BELGIUM, NEWZEALAND.

SUMMARY

Present paper deals with known Psocopteren fauna of Meghalaya and study of their type material present in the National Zoological Collection. This includes 6 species under 6 genera and 4 families. Key to different level of taxa represented in Meghalaya is also formulated. There saliant points have been included, besides distribution.

ACKNOWLEDGEMENTS

Author is thankful to Dr. A. K. Ghosh, Director, Zoological Survey of India for facilities and to Dr. S. K. Bhattacharya, Joint Director and Dr. S. K. Tandon, Joint Director, incharge Entomology Division for their help and encouragement. Thanks are also due to Dr. J. R. B. Alfred, Addl. Director, collaborator Meghalaya State Fauna for his valuable suggestions and also elaborating on the format of this paper.

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INSECTA : ISOPTERA (TERMITE)

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INTRODUCTION

Termites occur in abundance in the tropics, less so in the warm temperate regions of the World. The estimated world fauna stands today to a number of about 2000 species, of which a little over 300 are known to occur in India (Roonwal & Chhotani, 1989).

The State of Meghalaya finds its place in the history of termite study very recently in 1956 when Roonwal and Sen-Sarma described two species, namely *Parrhinotermes khasii khasii* and *Hypotermes nongpriangi* from the area. This study was based on a collection from the bank of the river Nong-Priang in Khasi Hills (390m) collected by S.L. Hora in 1923. The last one has been synonymised under *H. xenotermitis* by Krishna (1965). The same authors (1968) also reported another species *Capritermes dunensis* from the state which is now transferred to *Pericapritermes* based on a collection from Shillong by A.P. Kapur in 1959.

An excellent account of termite fauna of the Assam Region is credited to Roonwal & Chhotani (1962) wherein they reported 34 species and subspecies from the area including description of 13 new species. Interestingly enough, the main bulk of species to a total of 24 are actually from Meghalaya including 12 new species excepting a single one from Manipur. All the collection from Meghalaya was made by S.L. Hora (1923), H. Khajuria (1956-57), A.N. Fernandez (1957), A.P. Kapur (1958) and M.L. Roonwal (1959) from different localities between 1923 to 1959.

However, out of these 24 species, *Reticulitermes chinensis* Snyder does not exist in the area, whereas its closest species *R. assamensis* Gardner occurs in the area (Roonwal and Chhotani 1989). *Speculitermes cyclops rongrensis* Roonwal and Sen-Sarma has been transferred to *Indotermes* by Roonwal and Chhotani (1989). *Odontotermes assamensis* has been synonymised under *Odontotermes obesus* by Thakur (1981) and *Hypotermes nongpriangi* under *H. xenotermitis* by Krishna (1965).

As such, it appears that there exist a total of 22 species and subspecies of termites in the Meghalaya. Lahiri, *et al.* (1977) listed 21 species from the area including the addition of three new records bringing a total of 25 species all together prior to under taking the present study.

The present study is based on a very good collection compiled by the different survey parties (vide list below) including the staff members of the Isoptera Section (vide Map for collecting localities). In the present endeavour 16 species have been collected, of which 4 species are new record from the area.

The state with its topographic and ecological varieties supports quite rich fauna in the hot and humid forests in the lower hill slopes and valleys particularly in the soil, felled logs, bark, rotten wood, timbers in storage and in human uses. The warm temperate hill tops particularly support quite a few species mostly belonging to the genera *Reticulitermes* and *Nasutitermes*.

The most interesting ecological niches are found in the felled old logs with assemblage of quite a number of species each being restricted in its respective niche in the log habitats.

The species which are known from the area, but not represented by any collection, have been dealt with the material present in the collection of Zoological Survey of India, Calcutta. However, the unidentified collection studied in the present context, is listed below :

1. A Collection from Garo, Khasi Hills, Meghalaya, coll. A. Hussain, S.K. Sobhani, T.V. Darlong, K.P. Singh, A.K. Karmakar and C. Radhakrishna, 1965-1989.
2. A small collection from Garo hill, District Meghalaya, coll. M.S. Shishodia, June, 1990.
3. A fairly large collection from Khasi-Garo hills, Meghalaya, coll. A.R. Lahiri, Oct., 1990.
4. A Small collection from Khasi hills Districts Meghalaya, coll.S.K. Ghosh, 1991.
5. A Small collection from Meghalaya, coll. H.C. Ghosh, 1992.

The paper deals with the taxonomic account of 31 species and subspecies of termites from the state including their synonymies, list of material, measurement, distribution, biological and taxonomic remarks, etc. In addition running workable keys have been appended in the systematic account for identification of the species represented from the state.

SYSTEMATIC ACCOUNT

(a) *General morphology* : Termites have three major castes, namely, Imago, Soldier and Worker. The general morphology has been dealt recently by Roonwal and Chhotani (1989) in details in the faunal contribution. Identification of termite species is mostly based on the characteristic feature of soldier caste. As such, the characters of the soldiers used for the preparation of keys are as follows : Length and width of head, length of mandibles (except in Nasute forms) and distance of tooth (if present) from the tip of the mandible ; length and width of pronotum and postmentum, number of antennal segments, etc. Since such characters are illustrated and described in numerous papers, hence these are not incorporated here just to avoid repetition.

Best method of collection of soil termites is with the help of a sovel pushing it into the soil

and spread the material on a tray and ultimately picking up the termites with help of a forcep. Wood-eating forms are collected by the forceps after cutting the wood with the help of a hand axe. All The collections are preserved in 70% alcohol kept in small vials. Collection of queen from the soil nest needs caution to trace the royal chamber wherein the queen lives.

(b) *List of Taxa*

Family RHINOTERMITIDAE

Subfamily HETEROTERMITINAE

1. *Reticulitermes assamensis* Gardner
2. *R. saraswati* Roonwal and Chhotani

Subfamily COPTOTERMITINAE

3. *Coptotermes heimi* (Wasmann)
4. *C. travians* Haviland

Subfamily RHINOTERMITINAE

5. *Parrhinotermes khasii khasii* Roonwal and Sen-Sarma
6. *Schedorhinotermes translucens* (Haviland)

Family TERMITIDAE

Subfamily APICOTERMITINAE

7. *Anoplotermes shillongensis* Roonwal and Chhotani

Subfamily TERMITINAE

8. *Pericapritermes dunensis* (Roonwal and Sen-Sarma)
9. *P. latignathus durga* (Roonwal and Chhotani)
10. *Procapritermes tikadari* (Roonwal and Chhotani)

Subfamily MACROTERTERMITINAE

11. *Hypotermes obscuriceps* (Wasmann)
12. *H. xenotermitis* (Wasmann)
13. *Macrotermes annandalei* (Silvestri)
14. *Macrotermes estherae* (Desneux)
15. *M. khajuriai* Roonwal and Chhotani
16. *M. maesodensis* Ahmad

17. *M. obesi* Holmgren
18. *M. pakistanicus* Ahmad
19. *M. umsaе* Roonwal and Chhotani
20. *Odontotermes distans* Holmgren and Holmgren
21. *O. fear* (Wasmann)
22. *O. giriensis* Roonwal and Chhotani
23. *O. horai* Roonwal and Chhotani
24. *O. horni* (Wasmann)
25. *O. kapuri* Roonwal and Chhotani
26. *O. obesus* (Rambur)
27. *O. redemanni* (Wasmann)

Subfamily NASUTITERMITINAE

28. *Nasutitermes cherraensis* Roonwal and Chhotani
29. *N. garoensis* Roonwal and Chhotani
30. *N. kali* Roonwal and Chhotani

Family INDOTERMITIDAE

31. *Indotermes rongrensis* (Roonwal and Sen-Sarma)

Key to the families of Isoptera (Soldier)

1. Tarsi with 3 segmentsINDOTERMITIDAE
- Tarsi with 4 segments.....2
2. Pronotum flat without any anterior lobe.....RHINOTERMITIDAE
- Pronotum saddle-shaped with anterior lobeTERMITIDAE

Key to the subfamilies of Rhintermitidae (Soldier)

1. Mandibles each with one to two sharply pointed teeth: fontanelle situated more anteriorly in between antennal carinae with groove running from it generally upto the tip of labrum or upto base of clypeus.....RHINOTERMITINAE.

- Mandible with only a few crenulations in the basal half; fontanelle situated at the base of clypeus without any groove running forward.....2.
- 2. Head oval or roundly oval; fontanelle very large; soldier strictly monomorphic
.....COPTOTERMITINAE
- Head subsquarish or rectangular; fontanelle small; soldier generally monomorphic, sometimes dimorphic.....HETEROTERMITINAE

Family RHINOTERMITIDAE

Subfamily HETEROTERMITINAE

Genus *Reticulitermes* Holmgren, 1913

1. Subgenus *Reticulitermes* Holmgren

1913. Holmgren K. Sv. Vet. Akad. Handl., 50 (2) : 15.

2. Genus *Reticulitermes* Holmgren

1920. Banks and Snyder U.S. Nat. Mus. Bull., No. 108 : 42-43.

1989. Roonwal and Chhotani, *Fauna of India (Isoptera)*, 1 : 494-497

3. Genus *Leucotermes* (in part) Holmgren

1911. Holmgren, K. Sv. Vet. Akad. Handle., 46 (6) : 69.

Key to the species Reticulitermes (Soldier caste)

- Small species; head-length without mandibles 1.53 mm, head-width 1.00 mm.....
.....*saraswati* Roonwal and Chhotani
- Larger species; head-length without mandibles 1.75-2.15 mm, head-width 1.08-1.20mm...
.....*assamensis* Gardner

1. *Reticulitermes assamensis* Gardner

1945. *Reticulitermes assamensis* Gardner

1962. *Reticulitermes chinensis* Snyder : Roonwal and Chhotani, *Proc. nat. Inst. Sci., India* (B) 28 (4) : 301 (parts).

1989. *Reticulitermes assamensis* Gardner : Roonwal and Chhotani, *Fauna of India (Isoptera)*, 1 498-501.

Material studied : 10 S. and 31 W in four lots, uper Shillong, Nr, H.Q./ Eastern Air Command, coll. P.H. Roy, 11.ix.1988; 8 S and 36 W, Nongstoim, coll. P.H. Roy, 11.ix.1988.

Measurements (in mm) : Head length 1.75-2.15; Max. head width 1.08-1.20; Max. length of Mandible 0.95-1.12; Length of pronotum 0.42-0.52; Width of pronotum 0.77-0.87; Number of antennal segments 15-16.

Distribution : INDIA : Meghalaya (present record ; Shillong and Nongstoin); Elsewhere : Assam, Arunachal Pradesh, Sikkim, West Bengal. Bhutan and China.

Remarks : The species is fairly common in the upper ridges of the hilly tracts of Meghalaya infesting mostly the dead portion of pine trees or felled logs in the forest floor. It is a cold loving species and is very close to *R. chinensis*, a species predominantly found in the eastern Himalayan tract, from which it differs in having low frontal hump. The species is very distinct in its elongated head capsule.

2. *Reticulitermes saraswati* Roonwal and Chhotani

1962. *Reticulitermes saraswati* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) **28** (4) : 303.

1989. *Reticulitermes saraswati*, Roonwal and Chhotani, *Fauna of India*, (Isoptera), **1** : 506-508.

Material studied : S (Holotype), 1 W (Morphotype) and 6 W, (Paramorphotypes), Shillong, coll. A.P. Kapur, 20.xiii.1958.

Measurements (in mm) : Head length 1.53; Max. head width 1.00; Max length of Mandible 0.86; Length of pronotum 0.40; Width of pronotum 0.67; Number of antennal segments 11+.

Distribution : INDIA : Meghalaya (type locality).

Remarks : This is a very rare species and till date only once collected from its type-locality in Shillong. It is unknown from any where else in India.

Subfamily COPTOTERMITINAE

Genus *Coptotermes* Wasmann, 1896

1. Subgenus *Coptotermes* (of genus *Termes* Linn.) Wasmann

1896. Wasmann, *Ann. Mus. City. Stor. Nat. Genova.*, **16** (36) : 629.

2. Genus *Coptotermes* Wasmann

1898. Haviland, *J. Linn. Soc. Lond. (Zool)*, **26** (169) : 390.

1989. Roonwal and Chhotani, *Fauna of India (Isoptera)*, **1** : 418-419.

Key to the species of Coptotermes (Soldier caste)

Postmentum : Minimum width smaller, 0.23-0.29mm, contraction index (minimum width/maximum width)0.59-0.69.....*travians* Haviland

Postmentum : Minimum width greater, 0.25-0.34 mm, contraction index 0.63-0.76
.....*heimi* (Wasmann)

3. *Coptotermes heimi* (Wasmann)

1902. *Arrhinotermes heimi* Wasmann, *Zool. Jharb., Abt. Syst.*, **17** (1) : 104.

1989. *Coptotermes heimi*, Roonwal and Chhotani, *Fauna of India, (Isoptera)*, **1** : 449-457.

Material studied : 12 S, 2 W, near Barapani Lake, ex "tree trunk on fencing pole" coll. A.R. Lahiri and P.H. Roy, 10.ix.1988.

Measurements (in mm) : Head length 1.20-1.35; Max. head width 1.05-1.25; Max. length of Mandible 0.70-0.89; Length of pronotum 0.40-0.48; Width of pronotum 0.75-0.85; Number of antennal segments 14-16.

Distribution : INDIA : Meghalaya (present record : Barapani, Charikuty and Songsok). It is a very widely distributed species in the India. ELSEWHERE : Pakistan, Bangladesh, Bhutan, Nepal, new Guinea, Papua and Oman.

Remarks : The species is not so very common in Meghalaya as it is so elsewhere in India and Pakistan. Generally it occurs in dead wood, under bark, in hollows in wood, fence posts, even in carton nest in hollows of standing trees or even wood works in houses. As such, it is rated as one of the most destructive species in its place of occurrence. The species is very close to *C. travians* and needs extreme caution for their differentiation. Biology of the species is fairly well known (Roonwal, 1959; Maiti, 1983 and Roonwal and Chhotani 1989).

4. *Coptotermes travians* Haviland

1898. *Termes (Coptotermes) travians* Haviland, *J. Linn. Soc. (Zool.)* **26** : 169.

1962. *Coptotermes travians*, Roonwal and Chhotani *Indian Species of the Termite Genus Coptotermes* New Delhi (*Ent. Monogr., Indian Coun. agric. Res.*, No. 2), pp.61-69.

1989. *Coptotermes travians*, Roonwal and Chhotani, *Fauna of India, (Isoptera)*, **1** : 461-467.

Material studied : Sev. S. and W., Umsa Nonkharai, coll. H. Khajuria, 24.xii.1956, ex. 'a log of wood.'

Measurements (in mm): Head length 1.40-1.42; Max. head width 1.23-1.24; Max. length of Mandible 0.78-0.82; Length of pronotum 0.48; Width of pronotum 0.90; Number of antennal segments 14-15.

Distribution : INDIA : Meghalaya (earlier reported from Umsa Nongkharai), Assam, West Bengal, Orissa, Andaman and Nicobar Isls. ELSEWHERE : Bangladesh, Burma, Malayasia, Singapore and Indonesia.

Remarks : The species is well spread in the Central Oriental region, but occurs sparsely in the north-east India upto Calcutta which marks its western limit. Its habitats and nature of infestation are almost identical to that of *C. heimi*.

Subfamily Rhinotermitinae

Key to the genera of Rhinotermitinae

1. Soldier monomorphic; mandibles finely serrated basally; smaller species.....*Parrhinotermes*
*Parrhinotermes*
- Soldier dimorphic; mandibles not serrated basally; larger species*Schedorhinotermes*
*Schedorhinotermes*

Genus *Parrhinotermes* Holmgren, 19101. Genus *Parrhinotermes* Holmgren

1910. Holmgren, *Zool. Anz.*, **35** : 285.

1989. Roonwal and Chhotani, *Fauna of India (Isoptera)*, **2** : 527-528.

5. *Parrhinotermes khasii khasii* Roonwal and Sen-Sarma

1956. *Parrhinotermes khasii* Roonwal and Sen-Sarma, *India J. agric. Sci.*, **26** : 5,6-11.

1989. *Parrhinotermes khasii khasii* Roonwal and Chhotani, *Fauna of India, (Isoptera)*, **1** : 529-532.

Material studied : S (Holotype) and 2 W (Paramorphotype), Bank of Nongpriang River, Khasi Hills, coll. S. L. Hora, 20.x.1923, under bark of a dead tree.

Measurements (in mm): Head length 1.22; Max. head width 1.01; Max. length of mandible 0.65; Length of pronotum 0.67; Width of pronotum 0.68; Number of antennal segments 13.

Distribution : INDIA : Meghalaya (earlier reported from Bank of Nongpriang Stream and Wagtsi), Arunachal Pradesh. Elsewhere : China.

Remarks : The species is the only representative of the genus in India and is restricted only in Meghalaya State. It's biological information is limited only to the extent of having been recorded under bark of a dead tree lying on soil. It's closest subspecies *P. khasii ruiliensis* Tasi and Huang occurs in China (Ruili Xian).

Genus *Schedorhinotermes* Silvestri 19091. Subgenus *Schedorhinotermes* (of *Rhinotermes*) Silvestri

1909. Silvestri, In Michaelsens and Hartmeyer's, *Die Fauna Sudwest Australia*. Vol. **2** : 289.

2. Genus *Schedorhinotermes* Silvestri

1949. Snyder, *Smiths, misc. Colls.*, **112** : 89.

1989. Roonwal and Chhotani, *Fauna of India (Isoptera)*, **1** : 532-533.

6. *Schedorhinotermes translucens* (Haviland)

1898. *Termes translucens* Haviland, *Trans. Linn. Soc. London*, **26** (169) : 394.

1949. *Schedorhinotermes translucens*, Snyder, *Smiths, misc. Colls.*, **112** : 96.

1989. *Schedorhinotermes translucens*, Roonwal and Chhotani, *Fauna of India, (Isoptera)*, **1** : 559-563.

Material studied : 1 S (Major), Wagtisi, Garo Hills Dist. coll. R.S. Pillai, 11.iv.1971.

Measurements (in mm) : Head length 1.62; Max. head width 1.52; Max. length of Mandible 0.92; Length of pronotum 0.52; Width of pronotum 0.96; Number of antennal segments 16⁺.

Distribution : INDIA : Meghalaya (earlier reported from Wagtisi). Elsewhere : Bangladesh, Malaysia, Sarawak, Borneo (type locality) Indonesia (Java, Macassar) and Papua New Guinea.

Remarks : The species was so far known in the name of *S. brevialetus* as reported earlier from Meghalaya (Lahiri, *et al.*, 1977) but has since been assigned to *S. translucens* by Roonwal and Chhotani (1989). It is rarely found in the area and its biology is completely unknown.

Family TERMITIDAE

Subfamily APICOTERMITINAE

Genus *Anoplotermes* Fr. Miller, 1873

1. Genus *Anoplotermes* Fr. Miller

1873. Miller, *Jenaische Zeitschr. Med. Naturw.*, **7** (3) : 347.

1949 Snider, *Smiths misc. Colls.*, **112** : 103.

7. *Anoplotermes shillongensis* Roonwal and Chhotani

1960. *Anoplotermes shillongensis* Roonwal and Chhotani, *Sci. and Culture*, **25** (12) : 701.

1962. *Anoplotermes shillongensis* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) **28** (4) : 312-313.

1989. *Anoplotermes shillongensis*, Roonwal and Chhotani, *Fauna of India (Isoptera)* **1** : 101.

Material studied : S (Holotype) and several workers (Paratype), Shillong, coll. A.P. Kapur, 22.xii.1958; 1 W, Rongrengiri, coll. A.N. Fernandez, 13.i.1957.

Measurements (in mm): Head length 0.70-0.75; Max. head width 0.85-0.90; Diameter of mid-dorsal spot on head 0.05-0.07; Length of pronotum 0.53-0.55; Number of antennal segments.

Distribution : INDIA: Meghalaya (earlier reported from Shillong and Rongrengiri). Elsewhere : None.

Remarks : The species belongs to *Anoplotermes* which is mostly confined to the Neotropical and Ethiopian Regions only. The record of a lone species only in India, occurring in Meghalaya has been explained in the light of Wegener's continental Drift Theory by Roonwal and Chhotani (1989). Biologically, the species is completely unknown.

Subfamily TERMITINAE

Key to the genera of Termitinae

Mandible slightly asymmetrical, long and slender, tips incurved, left not so twisted; anterior margin of labrum incurved with long antero-lateral projection.....*Procapritermes*

Mandibles strongly asymmetrical, not so long and slender, left mandible strongly twisted, anterior margin of labrum straight with very weak antero-lateral projections.....*Pericapritermes*.

Genus *Pericapritermes* Silvestri 1914

1. Genus *Pericapritermes* Silvestri, 1994

1914. Silvestri, *Boll. Lab. Zool. Gen. Agr. Portici*, **9** : 134.

1984. Bose, *Rec. zool. Surv. India, Occ. Paper*, No. **49** : 151.

Key to the species of Pericapritermes (Soldier caste)

Labrum weakly concave at anterior margin. Smaller species (head-length to base of mandibles) 2.35-2.50 mm; head-width 1.30-1.40 mm.....*dunensis* (Roonwal and Sen-Sarma)

Labrum weakly convex at anterior margin. Larger species (head-length to base of mandibles) 2.66-3.00 mm; head-width 1.47-1.60 mm.....*latignathus* durga (Roonwal and Chhotani)

8. *Pericapritermes dunensis* (Roonwal and Sen-Sarma)

1960. *Capritermes dunensis* Roonwal and Sen-Sarma, *Contributions to the Systematics of Oriental Termites*, New Delhi, *Ent. Monogr., Indian Coun. agric. Res.*, **1** : 28.

1968. *Pericapritermes dunensis* Krishna, *Bull. amer. Mus. nat. Hist.*, **138** (Art 5) : 294.

1983. *Pericapritermes dunensis*, Maiti, *Rec. zool. Surv. India*, No. **42** : 86.

Material studied : Sev. S & W'Shillong, coll. A.P. Kapur, 27.iii.1959, ex. "ground"

Measurements (in mm): Head length 2.35-2.50; Max. head width 1.30-1.38; Max. length of Mandible(left) 1.60-1.65; Length of pronotum 0.40-0.43; Width of pronotum 0.83-0.88; Number of antennal segments 14.

Distribution : INDIA : Meghalaya (present record: Shillong; also reported from Cherrapunji), Uttar Pradesh and West Bengal.

Remarks : So far the species is known to occur in the hilly tracts of the Himalaya including the east Khasi Hill District.

9. *Pericapritermes latignathus durga* (Roonwal and Chhotani)

1962. *Capritermes latignathus durga* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) 28 (4) : 125.

1968. *Pericapritermes latignathus durga*, Krishna, *Bull. Amer. Mus. nat. Hist.*, 138 (Art 5) : 290-294.

Material studied : S (Holotype), Sev. S. (Paratypes) and Sev. W. (Paramorphotypes), Cherrapunji, coll. M.L. Roonwal and A.P. Kapur, 1.v.1959.

Measurements (in mm) : Head length 2.66-3.00; Max. head width 1.47-1.60; Max. length of Mandible 1.75-2.00; Length of pronotum 0.37-0.40; Width of pronotum 0.83-1.00; Number of antennal segments 14.

Distribution : INDIA : Meghalaya (present record from Cherrapunji; also reported from Mawphlog).

Remarks : The species is very rare in the area, mostly inhabits humus soil.

Genus *Procapritermes* Holmgren

1. *Procapritermes* Holmgren

1912. Holmgren, *K. Sv. Vet. Akad. Handle*, 48 (4) : 97, 113.

1984. Bose, *Rec. zool. Surv. India, Occ. Paper* no. 49 : 154.

10. *Procapritermes tikadari* (Roonwal and Chhotani)

1962. *Pseudocapritermes tikadari* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) 28 (4) : 319.

1968. *Procapritermes tikadari*, Krishna, *Bull. Amer. Mus. nat. Hist.* 138 (Art 5).

Material studied : 1 S (Holotype) and Several S & W. (Paratype), Cherrapunji, coll. M.L. Roonwal and A.P. Kapur, 7 v. 1959.

Measurements (in mm): Head length 2.23-2.50; Max. head width 1.23-1.36; Max. Length of Mandible 1.93-2.6; Length of pronotum 0.30-0.33; Width of pronotum 0.70-0.80; Number of antennal segments 14.

Distribution : INDIA : Meghalaya (present record from Cherrapunji ; also reported from Shillong).

Subfamily MACROTERMITINAE

Key to the genera of MACROTERMITINAE

1. Labrum with hyaline tip; soldier caste dimorphic.....*Macrotermes*
- Labrum without hyaline tip; soldier caste monomorphic.....2
2. Soldier smaller than worker; mandible short thin and delicate, basal outer margin strongly incurved; smaller species*Microtermes*
- Soldier generally larger than worker; mandible large and stout; basal outer margin not so strongly incurved.....3.
3. Left mandible with a prominent tooth on inner margin; basal half of mandible smooth.....
.....*Odontotermes*
- Left mandible without a tooth; basal half of mandible crenulate*Hypotermes*.

Genus *Hypotermes* Holmgren, 19121. *Odontotermes* (*Xenotermes*) Holmgren1912. Holmgren, K. Sv. Vet. Akad. Handl, **48** : 36-39.2. *Odontotermes* (*Hypotermes*)1949. Snyder, *Smiths. misc. Coll.*, **112** : 2443. *Hypotermes* Holmgren1956. Roonwal and Sen-Sarma, *Indian J. Agric. Sci.*, **26** (1) : 211984. Bose, *Rec. zool. Surv. India, Occ. paper*, No. **49** : 200.*Key to the species of Hypotermes* (Soldier caste)

1. Lateral sides of head straight, tapering gradually anteriorly; mandible about half the head-length of lateral base of mandible.....*obscuriceps* (Wasmann)
- Laterlal sides of head convex; mandibles less than half the head-length to lateral base of mandibles.....*xenotermitis* (Wasmann).

11. *Hypotermes obscuriceps* (Wasmann)1902. *Termes obscuriceps* Wasmann, *Zool. Jahrb., Abt.Syst.*, **17** (1) : 113.1913. *Odontotermes* (*Hypotermes*) *obscuriceps*, Holmgren, K. *Vetensk. Akad. Handl.*, **50** (2) : 141.1984. *Hypotermes obscuriceps*, Bose, *Rec. zool. Surv. India, Occ paper* No. **49** : 200-202.

Material studied : 1 S, 28 W, Garampani, coll. V.T. Darlong and party, 20.x.1987; 1 S, 5 W, 3 kms. from Sutnga, alt. 3,000, coll. V.T. Darlong and party, 4.xii.1987; 24 S, 42 W,

Langkhera forest, Nongpoh, in a small log, coll.A.R. Lahiri and P.H. Roy, 30.ix.1988; 18 S, 20 W, Umling forest, gallery from teak plant coll. A.R. Lahiri and P.H. Roy, 29.ix.1988; 17 S, 23 W, Songsok reserve forest, coll. B. Nandi and party, 19.1.1991.

Measurements (in mm): Head length 1.06-1.15; Max. head width 0.92-1.00; Max. length of Mandible 0.62-0.67; Length of pronotum 0.38-0.45; Width of pronotum 0.60-0.72; Number of antennal segments 16.

Distribution : INDIA : Meghalaya (present record from Garampani, Sutnga, Langkhera (Nongpoh), Umling, Songsok; also reported from Umsa Nongkharai, Howai, Mawblong, Shillong, Rongrengiri, Rongsongiri, Anogiri, Darugiri and Ramgiri. Elsewhere : Sri Lanka and Vietnam (doubtful).

Remarks : This soil inhabiting species is fairly common in India including Meghalaya. It is known to construct earthen mounds and to cause damage to timber in houses in Sri Lanka. Such records are unknown in India. It attacks the teak plantation in Meghalaya and rubber trees in addition to attacking timbers in houses.

12. *Hypotermes xenotermitis* (Wasmann)

1896. *Termes xenotermitis* Wasmann, *Ann del. Mus. Civ. di Stor/Nat. Genova, ser. 2*, 16(36). 72 : 628.

1913. *Odontotermes (Hypotermes) xenotermitis* Holmgren, *K. Vetensk. Akad. Handl.*, 50 (2) : 143.

1983. *Hypotermes xenotermitis*, Maiti, *Rec. zool. Surv. India, Occ. Paper No. 42* : 115-117.

1956. *Hypotermes nongpriangi* Roonwal and Sen-Sarma, *Indian J. agric.Sci.*, 26 (1) : 21.

Material studied : 10 S, 7 W, Nongoph forest, coll. A.R. Lahiri and P.H. Roy, 30.ix.1988; 16 S, 20 W, Barapani forest, coll A.R. Lahiri and P.H. Roy, 10.ix.1988; 20 S, 50 W, Langkhera forest, Nongpoh, coll. A.R. Lahiri and P.H. Roy, 30.ix.1988; 6 S, 4 W, Umsning, coll.A.R. Lahiri and P.H. Roy, 2.x.1988; 8 S, 8W, Wallen Basti, Cherrapunji, coll. A.R. Lahiri and P.H. Roy, 15.ix.1988.

Measurements (in mm) : Head length 0.32-0.41; Max. head width 1.10-1.16; Max. length of Mandible 0.38-0.45; Length of pronotum 0.43-0.48; Width of pronotum 0.73-0.80; Number of antennal segments 16.

Distribution : INDIA : Meghalaya present record from Barapani Langkhera (Nongpoh), Umsning, Wallen Basti (Cherrapunji) ; earlier reported from Shillong, Assam, Bengal. Elsewhere : Bangladesh, Burma, Thailand.

Genus *Macrotermes* Holmgren, 1909

1. *Termes (Macrotermes)* Holmgren

1909. Holmgren, *K. Sv. Vet. Akad. Handl.*, 44 (3) : 193 (No description).

2. *Macrotermes* Holmgren

1949. Snyder, *Smiths. misc. Coll.* **112** : 208.

1984. Bose, *Rec. zool. Surv. India, Occ. Paper*, No. 49 : 160.

Key to the species of Macrotermes (Soldier Major)

1. Smaller species, head length 3.57-3.80 mm2.
- Large species, head-length 4.75-4.80 mm3.
2. Head, postmentum and pronotum fairly hairy; postmentum almost devoid of distinct constriction in the middle.....*khajuriai* Roonwal & Chhotani.
- Head, postmentum and pronotum much less hairy; postmentum with fairly distinct contraction about the middle*maesodensis* Ahmad.
3. Head almost oval narrowing anteriorly; head length 4.75 mm, head width 4.00 mm...
.....*estherae* (Desneux)
- Head somewhat subsquarish but narrowing anteriorly; head length 4.80 mm, head width 3.86 mm.....*annandalei* (Silvestri)

13. *Macrotermes annandalei* (Silvestri)

1914. *Termes annandalei* Silvestri, *Rec. Indian Mus.*, **8** : 427.

1949. *Macrotermes annandalei* Snyder, *Smithsonian misc. Coll.*, **112** : 208.

Material studied : 1 S (major) and 1 W, Songsok, Garo Hills, coll. S. Biswas, 16.xi.73 (*det.* P.K. Maiti).

Measurements (in mm): Head length 4.80; Max. head width 3.86; Max. length of Mandible 2.46; Length of pronotum 10.38; Width of pronotum 2.67; Number of antennal segments 17.

Distribution : INDIA : Meghalaya (present record from Songsok; earlier reported from Anogiri and Debrangiri). Elsewhere : China.

14. *Macrotermes estherae* (Desneux)

1908. *Termes estherae* Desneux, *Ann. Soc. Ent. Belg.*, **51** (12) : 390.

1913. *Termes (Macrotermes) estherae*, Holmgren, *K. Vetensk. Akad. Handl.*, **50** (2) : 94.

1949. *Macrotermes estherae*, Snyder, *Smiths misc. Coll.*, **112** : 211.

1983. *Macrotermes estherae*, Maiti, *Rec. zool. Surv. India, Occ. Paper*, No. **42** : 89.

Material studied : Several S (minor), Songsok reserve forest, coll. B. Nandi and party, 11, 15.i.1991; 1 S (maj) 8 S (minor) and 8 W, Tura, coll. B. Nandi and party, 5.i.1991.

Measurements (in mm): S. Major; Head length 4.75; Max. head width 4.00; Max. length of Mandible 2.00; Length of pronotum 1.20; Width of pronotum 1.50; Number of antennal segments 17. S.Minor; Head length 1.84-1.90; Max. head width 1.52-1.56; Max. length of Mandible 1.14-1.19.

Distribution : INDIA : Meghalaya (present record from Songsok and Tura), .Maharashtra and Tamil Nadu. Elsewhere : Sri Lanka.

Remarks : The species is predominantly found in South India and Sri Lanka and only sparse population occur in the eastern Himalayan foot hills including Meghalaya. It is primarily a non-mound building species as observed in the study area, although its subterranean nest is indicated by the presence of earthen hillocks of about 2.8 cm height (Roonwal, 1970). The species is easily recognised from the characteristic transverse weak wrinkles on the surface of the postmentum.

15. *Macrotermes khajuriae* Roonwal and Chhotani

1962. *Macrotermes khajuriae* Roonwal and Chhotani, *Proc. nat. Inst.Sci. India* (B), **28** (4) : 329.

1983. *Macrotermes khajuriae* Maiti, *Rec. zool. Surv. India, Occ. Paper*, No. **42** : 92.

Material studied : S (maj) (Holotype), 4 S (3 maj. & 1 minor) (Paratype) & worker, Umsa Nonghari, coll. H. Khajuria, 23. xii. 1956, ex. a log of wood; 12 S, 27 W, Shella, coll. A.R. Lahiri and P.H. Roy, 18.ix.1988.

Measurements (in mm) : S. major : Head length 3.65-3.80; Max. head width 2.85-2.95; Max. length of Mandible 1.66-1.70; Length of pronotum 1.05-1.10; Width of pronotum 1.86-2.00; Number of antennal segments 16-17.

Distribution : INDIA : Meghalaya : Garo and Khasi hills. (present record from Shella; also reported from Anogiri and Umsa-Nongkharai).

Remarks : The species is so far known only in the hilly tracts of Meghalaya and the sub-Himalayan West Bengal. It is generally found in the mud-plaster around the logs lying on the soil. It is recorded in close association with *Odontotermes parvidens* in West Bengal (Maiti, 1983).

16. *Macrotermes maesodensis* Ahmad

1965. *Macrotermes maesodensis* Ahmad, *Bull Amer. Mus. nat. Hist.*, **131** : 31.

Material studied : 1 S (maj), 3 S (min) and several W, Langkhera reserve forest, Nongpoh, coll. A..R. Lahiri and P.H. Roy, 30.ix.1988.

Measurements (in mm): S. major : Head length 3.57; Max. head width 2.73; Max. length of Mandible 1.65; Length of pronotum 0.96; Width of pronotum 1.84; Number of antennal segments 17.

S. Minor : Head length 1.73-1.75; Max. head width 1.38-1.42; Max. length of Mandible 1.19-1.23; Length of pronotum 0.61-0.63; Width of pronotum 0.96-1.00; Number of antennal segments 17.

Distribution : INDIA : Meghalaya (present record only from Langkhera). Elsewhere : Thailand.

Remarks : This is the first record of occurrence of this species in India. Biology of the species is quite unknown.

17. *Microtermes obesi* Holmgren

1913. *Microtermes obesi* Holmgren, K, *Svenska vetensk. Akad*, **50** (2) : 150.

1913. *Microtermes anandi*, Holmgren, *J. Bombay nat. Hist.Soc.*, **22** (1) : 114; Roonwal and Chhotani, 1962, *Proc. nat. Inst. Sci., India*, B, **28** : 362.

1989. *Microtermes obesi*, Thakur, *Indian Forest Rec. (N.S.) Ent.*, **15** (1) : 68-69.

Material studied : Two lots, Umling, coll. P.H. Roy; 1 S, 1W, 24.ix.1988 and 6 S, 11 W, 29.ix.1988; 1 S, 11 W, Umran, coll. P.H. Roy, 28.ix.1988; 2 S, 6 W, Langkhera, coll. P. H. Roy, 1.x.1988; 2 S, 7 W, Umsning, coll. P.H. Roy, 2.x.1988.

Measurements (in mm) : Head length 0.85-0.95; Max. head width 0.78-0.84; Max. length of Mandible 0.90-0.92; Length of pronotum 0.42-0.43; Width of pronotum 0.51-0.54.

Distribution : INDIA : Assam, Bihar, Meghalaya (present record from Langkhera, Umling, Umran and Umsning; also reported from Rongrengiri and Umsa Nongkharai), Karnataka, Orissa, Maharashtra. Elsewhere : Sri Lanka, Bangladesh and Pakistan.

Remarks : It is a very common fungus growing species in Indian subregion but not so common in the study area. The species generally lives underground or in the mounds of *Odontotermes* within its own separately constructed nest. It is one of the serious pests of sugarcane, wheat, vegetables, etc.

18. *Microtermes pakistanicus* Ahmad

1955. *Microtermes pakistanicus* Ahmad, *Biologia*, **1** (1) : 25.

1964. *Microtermes pakistanicus*, Chatterjee and Thakur, *Indian For. Rec.*, **10** (11) : 239-242.

1979. *Microtermes pakistanicus*, Sen-Sarma and Thakur, *Indian For. Rec. (N.S.) Ent.*, **13** (1) : 29-30, 53.

Material studied : 5 S, 6 W, Nongstoin, coll. P.H. Roy, 26.ix.1988; 8S, 12 W, Umling, coll. P.H. Roy, 29.ix.1988; 35 S, 33 W, in four lots, Langkhera, coll. P.H. Roy, 30.ix.1988, ex. 'Under soil' and 'small log'; 8 S, 8 W, Umsning, coll. P.H. Roy, 2.x.1988; 1 S, 9 W, Tura, coll. B. Nandi and party, 9.i.1991; 4 S, 2 W, Songsak, coll. B. Nandi and party, 19.i.1991.

Measurements (in mm) : Head length 0.85-0.96; Max. head width 0.82-0.88; Max. length of Mandible 0.54-0.57; Length of pronotum 0.42-0.48; Width of pronotum 0.55-0.61.

Distribution : INDIA : Meghalaya (present record only from Langkhera, Nongstoin, Songsok, Tura and Umsning, earlier reported from Rongrwingiri and Umsa Nongkharai), Assam and Tripura. Elsewhere : Bangladesh, Indonesia, Singapore, Thailand.

19. *Microtermes umsa* Roonwal and Chhotani

1962. *Microtermes umsa* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) **28** (4) : 370-374.

Material studied : 1 S, Rongrengeri, Garo Hills, coll. H. Khajuria, 1.ii.1957, ex "a wooden log"

Measurements (in mm): Head length 0.90-1.00; Max. head width 0.83-0.97; Max. length of Mandible 0.55-0.60; Length of pronotum 0.40-0.50; Width of pronotum 0.60-0.73; Number of antennal segments 15.

Distribution : INDIA : Meghalaya (earlier reported from Rongrengiri and Umsa Nongkharai).
ELSEWHERE : None.

Genus *Odontotermes* Holmgren, 19101. *Termes* (*Odontotermes*) Holmgren

1911. Holmgren, *K. Sv. Vet. Akad. Handl.*, **46** : 11 (No description).

2. *Odontotermes* Holmgren

1912. Holmgren, *K. Sv. Vet. Akad. Handl.*, **48** : 35-40.

1981. Thakur, *Indian Forest Rec. (N.S.)Ent.*, **14** (2) : 7-13.

1984. Bose, *Rec. zool. Surv. India. Occ. Paper* no. 49 : 162.

Key to the species of Odontotermes (Soldier)

1. Distal segments of antennae distinctly darker than proximal segments2
- Distal segments of antennae not darker than the proximal segments, rather uniformly coloured5
2. Tooth on the left mandible placed near the apices; mandible feebly built, tooth index less than 0.28.....3
- Tooth on the left mandible placed near the apical third; mandibles feebly to strongly built, tooth index always more than 0.28.....4
3. Head capsule widest near the posterior third; lateral sides sharply converging anteriorly; larger species, head length 1.30-1.35 mm; head width 1.15-1.25mm large.....*O. kapuri* Roonwal and Chhotani
- Head capsule widest near the middle; lateral sides weakly arched, converging both anteriorly and posteriorly; small species, head length 1.15-1.27 mm; head width 1.05-1.11 mm.....*O. giriensis* Roonwal and Chhotani
4. Mandibles long; outer margin strongly incurved near the basal third; labrum longish; head-mandibular index 0.69-0.79.....*O. redemanni* (Wasmann)

- Mandibles short, slender and with weakly curved outer margin; labrum short and broadly rounded anteriorly; head-mandibular index, 0.59-0.67.....*O. obesus* (Rambur)
- 5. Tooth on the left mandible rudimentary or small, bluntly pointed6
- Tooth on the left mandible prominent7
- 6. Head capsule distinctly narrowed anteriorly; antennae 17 segmented, comparatively larger species.....*O. distans* Holmg. et Holmg.
- Head capsule with sides almost parallel; indistinctly narrowed anteriorly; antennae 16 segmented*O. horai* Roonwal & Chhotani
- 7. Tooth on the left mandible placed near the middle, mandible-tooth index 0.50-0.54; head-capsule widest near the posterior third; sides weakly but distinctly convergent anteriorly...
.....*O. feae* (Wasm.)
- Tooth on the left mandible placed near the proximal end of middle one-third, mandible-tooth index 0.56-0.60; head capsule widest in the middle, sides parallel, indistinctly converging anteriorly.....*O. horni* (Wasm.)

20. *Odontotermes distans* Holmgren and Holmgren

1917. *Odonotermes (Cyclotermes) distans* Holmgren and Holmgren, *Mem. Dep. Agr, India*, 5 (3) : 153.

1917. *Odontotermes (Odontotermes) parvidens* Holmgren and Holmgren, *Mem. Dep. Agr. India*, 5 (3) : 154.

1949. *Odontotermes (Odontotermes) distans*, Snyder, *Smithsonian misc. Coll.* 112 : 225.

1989. *Odontotermes distans*, Thakur, *Indian Forest Rec. (N.S.) Ent.*, 15 (1) : 44-45.

Material studied : 5 S, 60 W, 17 kms from Jowai on way to Mynso village, coll. A. K. Karmakar and party, 5.i. 1988; 2 S, 16 W, Narliang, Jaintia hills, coll. G. Radhakrishna and party, 7.v.1987; two lots, Umran, coll. P.H. Roy; 2 S, 8 W, 27.ix.1988 and 6 S, 16 W, 28.ix.1988; 11 S, 10 W, Barapani, coll. P. H. Roy, 10.ix. 1988; 8 S, 7 W, Umling, coll P. H. Roy, 29.ix. 1988; 2 S, 8 W, Adibasti, coll. P. H. Roy, 10.ix.1988; 1 S, 4 W, Samanda, coll. B. Nandi and party, 20.i.1991; 5 S, 5 W, Circuit house building, Nongpoh, coll. A. R. Lahiri and P. H. Roy, 27.viii.1988.

Measurements (in mm): Head length 1.85-1.90; Max. head width 1.55-.65; Max. length of Mandible 1.25-1.27; Tooth distance from the tip 0.76-0.81; Length of pronotum 0.65-0.75; Width of pronotum 1.00-1.12.

Distribution : INDIA : Meghalaya [present record from Adibasti, Barapani, Near Jowai, Narliang, Nongpoh, Samanda, Umling and Umran; earlier reported (as *O. parvidens*) from Barapani,

Damra, Lawsohtun, Ronasongiri, Old Barapani roadside, Tobongiri, Umran, Umsa Nongharai, Umshining, Umsning, Umtham], Uttar Pradesh. Elsewhere : Bangladesh and Pakistan.

Remarks : This is a variable species in its shape and size of head, tooth, pronotum, labrum, antennal segments, etc. As such, a couple of species is synonymised under it including *O. parvidens*, a very widely distributed species in India. However, large size of soldier's head and mandibular minute tooth serve its distinguishing feature. It occurs in hollows and scars of trees, in galleries, railway sleepers, fence posts, bamboo poles, etc. like many other members of *Odontotermes*. The species causes minor damage to bark of young and old trees in its places of occurrence.

21. *Odontotermes feae* (Wasmann)

1896. *Termes feae* Wasmann, *Ann. Mus. Stor. nat. Genova*, (2) 16 : 625.

1913. *Odontotermes (Odontotermes) feae* Holmgren, *K. Vetensk. Akad. Handl.* 50 (2) : 129.

1914. *Odontotermes feae* Silvestri, *Rec. Indian Mus.*, 8 (5) : 428.

1984. *Odontotermes feae*, Bose, *Rec. zool. Surv. India, Occ. Paper* No. 49 : 179.

Material studied : 8 S, 17 W, Kyllang rock, Alt. 5,900' coll. V.T. Darlong and party, 6.iii. 1987; 28 S, 117 W, Nongkhyllan Wetland Sanctuary, coll. A. Hussain and party, 19.i.1988; 4 S, 18 W, Sonapabar, coll. G. Radhakrishna and party, 30.x. 1986; 1 S, 6 W, 90 kms away from Shillong towards Klanguli, coll. M.S. Jyrwa, 7.v.1987; 4 S, 8 W, 5 kms. from Nongkhlaw towards Boko, coll. C. Radhakrishna and party, 4.vii.1986; 10 S, 16 W, 10 kms. South-west of Nongstoin on Syrkon road, coll. K.P. Singh and party, 29.v. 1987; 7 S, 22 W, 2 kms north of Nongkhlaw, coll. A.K.Karmakar and party, 20.ii.1987; 4 S, 4 W, Umsning, coll. A. R. Lahiri and P. H. Roy, 2 .x.1988.

Measurements (in mm): Head length 2.25-3.49; Max. head width 1.70-2.21; Max. length of Mandible 1.35-1.48; Tooth distance from the tip 0.65-0.71; Length of pronotum 0.76-0.85; Width of pronotum 1.46-1.52; Number of antennal segments 17.

Distribution : INDIA : Meghalaya (present record from Klanguli, Kyllang rock, Near Nongkhlaw, Nongkhyllam, Nongstoin, Sonapahar and Umsning; earlier reported from Amuka village, Anogiri, Charikuty, Damra, Darugiri, Debrangiri, Holaidanga, Napak Bill, Nongkharai, Rongrengiri, Rongsongiri, Songsok, Tura, Umsa-Nongkharai and Wagtsi), Assam, Maharashtra. Elsewhere : Bangladesh, Burma, Thailand and Vietnam.

Remarks : This large fungus growing species is very common throughout India including the study area. It is a very closely allied to *O. horni*, as such needs caution to isolate them. The species is mostly collected from soil and earthen plasters on wood. It also construct earthen mounds and recorded in Barkuda Island (Roonwal and Chhotani, 1966) and in Thailand (Ahmad, 1965).

The species is injurious to bark of young and old plantation, wooden structure in buildings, fence post and in other use. The seedlings of Eucalyptus and teak are easily attacked (Maiti, 1983).

22. *Odontotermes giriensis* Roonwal and Chhotani

1962. *Odontotermes giriensis* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) 28 (4) : 341.

1989. *Odontotermes giriensis*, Thakur *Indian Forest Rec. (N.S.) Ent.*, 15 (1) : 45.

Material studied : 3 S, 4 W, 2 kms north of Nongkhlan on way to Assam, coll. A. K. Karmakar and party, 8.iv.1982; 2 S, 19 W, Balphakram National Park, coll. V.T. Darlong and party, 12.v.1988; 25 S, 17 W, Nongstoin, coll. P.H. Roy, 21.ix.1988; 12 S, 62 W, Umling, coll. P. H. Roy, 29.ix.1988; 9 S, 7 W, Near Forest Conservation office, Nongpoh, coll. P. H. Roy, 28.ix.1988; 4 S, 57 W, Baghmara Reserve forest, coll. B. Nandi, 12.i. 1991; 1S, 80 W, Baghmara, coll. B. Nandi and party, 18.i.1991; two lots, Songsak. coll. B. Nandi and party; 1 S, 25 W, 18.i.1991; 11 S, 170 W, 19.i.1991.

Measurements (in mm): Head length 1.15-1.27; Max. head width 1.05-1.11; Max. length of Mandible 0.63-0.71; Tooth distance from the tip 0.15-0.18; Length of pronotum 0.52-0.58; Width of pronotum 0.73-0.80; Number of antennal segments 15-16.

Distribution : INDIA : Meghalaya : Garo and Khasi hills (present record from Baghmara, Balphakram, Nongpoh, Near Nongkhlan, Near Nongkhlaw, Songsok and Umling; earlier reported from Rongrengiri and Shillong), Assam, Arunachal Pradesh, Tripura, Uttar Pradesh.

Remarks : It is quite common species in the area and inhabits the soil like the other members of the genus *Odontotermes*. Biologically, the species is quite unknown.

23. *Odontotermes horai* Roonwal and Chhotani

1962. *Odontotermes horai* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) 28 (4) : 346.

1981. *Odontotermes horai*, Thakur, *Indian Forest Rec. (N.s.) Ent.*, 14 (2) : 63.

Material studied : 29 S and 70 W, in five lots, Barapani, coll. P. H. Roy, 10.ix.1988; 38 S and 31 W in four lots, Laittrah, Near Cherrapunjee, coll. P. H. Roy, 16.ix.1988; 11 S and 12 W in two lots, Lynthwala, coll. P. H. Roy, 16.ix.1988; 12 S and 18 W, in two lots, Shella, coll. P. H. Roy, 30.ix.1988; 4 S, 2 W, Langkhera, ex 'Gallery on Sal tree', coll. P. H. Roy, 10.ix. 1988.

Measurements (in mm): Head length 1.62-1.78; Max. head width 1.28-1.42; Max. length of Mandible 1.06-1.19; Tooth distance from the tip 0.63-0.71; Length of pronotum 0.54-0.64; Width of pronotum 0.92-1.15; Number of antennal segments 15-16.

Distribution : INDIA : Meghalaya : Khasi hills (present record from Barapani, Laittrah, Langkhera, Lynthwala and Shella; earlier reported from Nongpriang); Arunachal Pradesh and West Bengal. Elsewhere : Nepal.

Remarks : This is not a very common species, but quite fairly known as one of the soil-inhabiting species in the area.

24. *Odontotermes horni* (Wasmann)

1902. *Termes horni* Wasmann, *Zool. Jahrb. (Syst.) Jena*, **17**(1) : 111.

1912. *Odontotermes (Odontotermes) horni*, Holmgren, K, *Svenska Vetensk.akad, Handl.*, **48** : 36.

1949. *Odontotermes horni*, Snyder, *Smithsonian Misc. Coll.* **112** : 229.

1984. *Odontotermes horni*, Bose, *Rec. zool. surv. India, Occ. Paper*, No. 49 : 184-187.

Material studied : 5 S, 21 W, 5 kms away from Mawhati on the way to Umlaper. Alt. 340 m, coll. A. K. Karmakar and party, 27.vii.1988; 8 S, 200 W, Baghmara, coll. B. Nandi and party, 13.i.1991; 1 S, 5 W, 1 Im, Nongstoin, coll. A. R. Lahiri and P.H. Roy, 29.ix. 1988; 5 S, 5 W, near Kendrem falls, ca 29 kms south of Cherrapunji, coll. A. R. Lahiri and P. H. Roy, 15.ix.1988.

Measurements (in mm): Head length 2.50-2.78; Max. head width 1.92-2.15; Max. length of Mandible 1.45-1.54; Tooth distance from the tip 0.82-0.90; Length of pronotum 0.82-1.00; Width of pronotum 1.5-1.65; Number of antennal segments 17.

Distribution : INDIA : Meghalaya (present record from Baghmara, Kendrem falls, Near Mawhati and Nongstoin; earlier reported from Adugiri, Thadlaskein and Umran), Manipur, South India. Elsewhere : Sri Lanka.

Remarks : This is very much identical to *O. feae* (Wasmann) in its morphological features, distribution pattern and other biological criteria. However, unlike the former species, it is reported to be a pest of tea plantation in Sri Lanka (Harris, 1961) and rubber plants in Vietnam (Roonwal, 1970). Quite frequently, it is found in the study area particularly in the lower ridges of the hilly tracts.

25. *Odontotermes kapuri* Roonwal and Chhotani

1862. *Odontotermes kapuri* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) **28** (4) 352.

1981. *Odontotermes kapuri*, Thakur, *Indian Forest Rec. (N.S.) Ent.*, **14** (2) : 75.

Material studied : 2 S, 2 W, Kendrem falls, Cherrapunji, coll. P. H. Roy, 15.ix.1988; 6 S, 24 W, Rongra, coll. B. Nandi and party, 12.i.1991.

Measurements (in mm): Head length 1.30-1.35; Max. head width 1.15-1.25; Max. length of Mandible 0.75-0.80; Tooth distance from the tip 0.18-0.21; Length of pronotum 0.57-0.62; Width of pronotum 0.95-1.00; Number of antennal segments 17.

Distribution : INDIA : Meghalaya [Cherrapunji (type locality); present record from Kendrem falls and Rongra] Tripura and West Bengal. Elsewhere : Bhutan.

Remarks : The species is sparsely known in the study area. The distribution shows its prevalence in the hilly area, although it is not unknown in the plains as found in Cooch Behar, West Bengal (Maiti, 1983).

26. *Odontotermes obesus* (Rambur)

1842. *Termes obesus* Rambur, *Hist. nat. Ins. Neuropteres*, : 304.
 1949. *Odontotermes (Odontotermes) obesus* snyder, *Smithsonian Misc. Coll.*, **112** : 285.
 1977. *Odontotermes obesus*, Lahiri, Ghosh and Biswas, *Bull Mag. Sci. Soc.*, B 2 : 38.
 1981. *Odontotermes obesus*, Thakur, *Indian Forest Rec. (N.S.) Ent.*, **15** (1) : 55-57.

Material studied : The species included here is based on the report of Lahiri, *et al.* (1977).

Distribution : INDIA : Meghalaya (earlier reported from Anogiri, Mawblong, Mawpat, Mawphlong, Nepak Bill, Shillong, Songkhama and Songsok); All over India. Elsewhere : Pakistan, Bangladesh and Burma.

Remarks : It is one of the commonest species in India and spreads from Pakistan to Burma up to 2000 m altitude except in very cold territories. It is as variable in its morphological features as its earthen mound that it constructs in rainy but well drained areas. It feeds mainly on woody surface, debris, dry leaves, grasses, cowdung etc. It also attacks various agricultural crops proving its pest status to a great extent. The species is well studied with regard to its biology (Roonwal, 1970; Maiti, 1983).

27. *Odontotermes redemanni* (Wasmann)

1893. *Termes redemanni* Wasmann, *Wien. Ent. Zeitg.*, **12** (7) : 239.
 1913. *Odontotermes redemanni*, Holmgren, *K. Svenska Vetensk. Akad. Handl.* **50** (2) : 110.
 1989. *Odontotermes redemanni*, Thakur, *Indian Forest Rec. (N.S.) Ent.* **15** (1): 60.

Material studied : 2 S, 4 W, Baghmara, coll. B. Nandi and party 13.i.1991; 2 S, 50 W, Songsak coll. B. Nandi and party, 18.i.91.

Measurements (in mm): Head length 1.18-1.27; Max. head width 1.02-1.12; Max. length of Mandible 0.74-0.83; Tooth distance from the tip 0.22-0.28; Length of pronotum 0.44-0.52; Width of pronotum 0.71-0.86; Number of antennal segments 16.

Distribution : INDIA : Meghalaya (only present record from Baghmara and Songsok). Elsewhere : Sri Lanka.

Remarks : The species was unknown so far from Meghalaya, in spite of its wide occurrence throughout India and Sri Lanka. The species is extremely closely allied to *O. obesus* and almost identical in its morphology, biology and ecology. Like its sister species, it occupies a pest status in India. Many authors attempted to isolate these two species by their structure of mounds providing little convincing results.

Subfamily NASUTITERMITINAE

Genus *Nasutitermes* Dudley 18901. *Nasutitermes* Dudley1890. Dudley, *Trans, N,Y, Acad. Sci.*, **9** : 158.1984. Bose, *Rec. zool. Surv. India, Occ. Paper no. 49* : 206.*Key to the species of Nasutitermes* (Soldier caste)

1. Mandibular spine either absent or present; Soldier caste dimorphic
.....*cherraensis* Roonwal and Chhotani
- Mandibular spine prominent and well developed; Soldier caste monomorphic
.....2
2. Larger species; Head-length with rostrum 1.50-1.57mm; head-width 0.87-0.93 mm.....
.....*garoensis* Roonwal and Chhotani
- Smaller species; Head-length with rostrum 1.30-1.36 mm; head-width 0.73-0.77
mm.....*kali* Roonwal and Chhotani

28. *Nasutitermes cherraensis* Roonwal and Chhotani1962. *Nasutitermes cherraensis* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) **28**(4) : 374.*Material studied* : S (Holotype) Cherrapunji, coll. A.P. Kapur, 24.xii.1958.*Measurements* (in mm) : Head length with rostrum 1.80; Head length without rostrum 1.10; Max. head width 1.00; Length of pronotum 0.23; Width of pronotum 0.57; Number of antennal segments 12-14.*Distribution* : INDIA : Meghalaya (earlier reported from Cherrapunjee and Pynursla).*Remarks* : This is one of the restricted species, so far known from its type-locality only.29. *Nasutitermes garoensis* Roonwal and Chhotani1962. *Nasutitermes garoensis* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) **28**(4) : 379.1983. *Nasutitermes garoensis*, Maiti, *Rec. zool. Surv. India, Occ. paper no. 42* : 123.*Material studied* : 1S (Holotype), Rongrengiri, Garo Hills, coll. H. Khajuria, 9.i.1957, ex. 'a log'*Measurements* (in mm) : Head length with rostrum 1.54; Head length without rostrum 0.87; Max. head width 0.90; Length of pronotum 0.16; Width of pronotum 0.43; Number of antennal segments 12.*Distribution* : INDIA : Meghalaya (previous record from Rongrengiri).

Remarks : The species is a very rare one and so far known only from its type-locality in Meghalaya.

30. *Nasutitermes kali* Roonwal and Chhotani

1962. *Nasutitermes kali* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India*, (B) 28(4) : 384.

Material studied : S (Holotype), Umsa, Nongkherai, coll. H. Khajuria, 25.xii.1956

Measurements (in mm): Head length with rostrum 1.36; head length without rostrum 0.83; Max. head width 0.77; Length of pronotum 0.13; Width of pronotum 0.37; Number of antennal segments 11-12.

Distribution : INDIA : Meghalaya (previous record from Umran and Umsa, Nongkherai).

Remarks : This is also a very uncommon species and so far unknown from elsewhere except its type-locality.

Family INDOTERMITIDAE

Genus *Indotermes* Roonwal and Sen-Sarma

1. Genus *Indotermes* Roonwal and Sen-Sarma

1958. Roonwal and Sen-Sarma (in Roonwal), *Trans. Bose Res. Inst.*, 22 : 81-82.

1989. Roonwal and Chhotani, *Fauna of India (Isoptera)*, 1 : 602-603

31. *Indotermes rongrensis* (Roonwal and Chhotani)

1962. *Speculitermes cyclops rongrensis* Roonwal and Chhotani, *Proc. nat. Inst. Sci. India.*, (B) 28 (4) : 314.

1986. *Indotermes rongrensis*, Roonwal and Chhotani, *Rec. zool. Surv. india*, 83 (3 and 4) : 155-162.

1989. *Indotermes rongrensis* Roonwal and Chhotani, *Fauna of India (Isoptera)* 1 : 609.

Material studied : The species is based on the study of workers only, hence the measurements are not included here. Soldier is only known from Bangladesh.

Distribution : INDIA : Meghalaya (earlier reported from Shillong, Umsa Nongkherai and Rongrengiri).

Remarks : The species was originally described as *Speculitermes cyclops rongrensis* by Roonwal and Chhotani (1962). Reassessment of the status of the species has made it possible to assign it into *Indotermes rongrensis* Roonwal and Chhotani. The species is infrequently found in the state invariably living in soil. Humus soil primarily the choice of its habitat.

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