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FAUNA OF MIZORAM—AN OVERVIEW

RAMAKRISHNA
Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053

Mizoram, a land of rolling hills located in the extreme southeastern part of the seven northeastern states of India, the details of the state is in table. The southern most end of the Purbachal Himalayan range is located in Mizoram. The geographic location (between 21°58′ to 24°35′ N latitude and 92°15′ to 93°20′ to 93°29′ E longitude and covers an area of nearly 21,087 sq. km.) of the state is unique with the tropic of Cancer dividing the state into two halves and also wedged between the other two nations (Bangladesh and Myanmar) in south west and south east respectively. The typical topography of Mizoram is traversed by numerous streams and rivers, in consonance of the trend of ranges and spurs, the course of the water bodies are generally aligned in north-south direction. The rivers have cut the hill ranges at all points almost at right angles resulting in the barbed patters. Innumerable streams and rivulets form the drainage system of which two distinct types river emerges, one north flowing and the other south flowing, however, all arises from the central highland. There are a few and small patches of flat lands of which the largest is Champhai stretching about 11.27 km, other small patches of plains are found is N. Vanlaiphai, Thenzawl and Chamdur. Most of these flat lands are now covered under permanent rice cultivation.

According to Rodgers and Panwar (1988), the mountains now represent a biogeographic crossroads for the Indian, Indo-Malayan, and Indo-Chinese biota's. Therefore the hills of Mizoram forms the part of the large eco-region representing the semi-evergreen sub-montane rain forests that extend from the midranges of the Arakan Yoma and Chin Hills north into the Chittagong Hills of Bangladesh, the Mizo and Naga hills along the Myanmar-Indian border, and into the northern hills of Myanmar.

MIZORAM AT A GLANCE

Location :	Latitude 21°58′ & 24°35′ N Longitude 92°15′ & 93°29′ E
Area :	21,087 Sq Kms North-South 277 Kms East-West 121 Kms
Inter State Border :	(a) With Assam—123 Kms (b) With Tripura—277 Kms (c) With Manipur—95 Kms (a) With Myanmar—404 Kms (b) With Bangladesh—318 Kms
Temperature :	11°-21° C in winter 20°-30° C in summer
Average rainfall :	2500 mm per annum
Population :	8,91,058 (Census 2001) Female = 4,31,275. Male = 4,59,783
Sex Ration :	938 female per 1000 male
Capital :	Aizawl
Literacy :	88.49 (Second Highest in the country)
Highest Point :	Phawngpui (Blue Mountain) 2,210/2065 M
District :	8
Block :	22
Sub-Division :	23
Autonomous District Council :	3
State Animal :	Serow (Saza)
State Bird :	Hume's Bar tailed Pheasant (Vavu)

State Flower : Dancing Girl (Aiting)
State Tree : Mesual Ferrea/Nahar (Herhse)
Longest River : Tlawng 185.15 Kms

Hill Ranges

The entire state of Mizoram presents a mountainous terrain or a land of rolling hills with more or less parallel hill ranges running in north-south direction with deep river valleys. As many as 21 major hills ranges or peaks of different heights run through the length and breadth of the state, with scattered plains. The eastern and southern part of the state is higher than the northern region. The hill ranges varies from 700-1300 m in altitude. The average height of the hills to the west of the state is about 1,000 metres. These gradually rise up to 1,300 metres to the east. Some areas, however, have higher ranges which reach up to a height of over 2,000 metres. The isolated peaks in the hill ranges are common, the most important one being the Phongphuithlang with 1900 m. The Blue Mountain, situated in the southeastern part of the state, is the highest peak in Mizoram, located at an altitude of 2157 m msl. The other peaks are Lengtenthlang, Ngurthlang, Mawmrang, Tawitlang, Chalfilh, Lurh etc. The state capital Aizawl perched on an altitude, about 4000 ft. high ridge surrounded by the lush valleys of the rivers Tuirual on the east and Tiawng in the west.

The Mizo hills forming a part of the Naga Arakan Yoma represent the eastern extremity of the tectonic domain of Surma Valley which in turn, extends to meet Great Himalayan Arc in the north. The region was a part of the Tethys sea in the Archean period and the rocks eroded during this period formed the deposits of sediments and limestone. The hill ranges consists of sandstones and shale's of Tertiary age thrown with long folds and the ridges have an average height of 900 m, the lowest in the north located at an altitude of 40 m and the highest peak located in the south eastern part of the state attaining a height of 2157 m above main sea level (***Phawngpui*** peak or the Blue Mountain). The present status is the outcome of the upland movement during the orogenic phase of the early Pleistocene period. At places, folding has been so intense that the rock beds stand up vertically resulting in the virtually bare hill slopes. The region is still unstable and falls into the important seismic zone of the world. Their folded structure is a synclinorium consisting of broad synclines and tight-faulted anticlines. Earthquakes in this region are generally shallow, though a few quakes of intermediate depth have occurred. Earthquakes of higher intensity occur along and across the international border, in Myanmar's Chin Division. The seismic hazard map of India was updated in 2000 by the Bureau of Indian Standards (BIS) reveals that the states of Mizoram and Tripura lie entirely in Zone V. (Ref. ASC : Seismicity in Mizoram and Tripura).

Geology

The eastern part of the state is identified as the Paleogene Barrail group of rocks (Nandy *et. al.* 1972), while, a fold lithographic classification on the northern part (Sundara Moorthy *et. al.* 1987). Recent analysis and mapping by the Geological Survey of India indicate that the area exposes a sequence of inter-bedded and interlaminated shale and sandstone, with minor amount of siltstone and conglomerate belonging to Middle and Upper Bhuban Formation of the Surma group. The sharp rugged hills and narrow V-shaped valleys, covered with lush green vegetation are the first order geomorphologic features of this young terrain.

Rivers and Lakes

The important rivers and streams that drain the hill ranges of the state are the River Tlawng (also known as Dhaleswari or Katakhal), Tut (Gutur), Turial (Sonai) and Tuivawl which flow through the northern territory and eventually join the Barak river in Cachar district. The western part of the state is drained by Karnaphuli (Khawthlang Tuipui) and its tributaries. The Koldovne (Chhimtuipui) originates in Myanmar, is yet another important river of the south Mizoram and has four tributaries. All along the river stretch, the area is swampy which has many herbaceous shrubs and trees. The common tree species are *Barringtonia acutangula, Lagerstroemia parviflora.*

Several swamps and lakes abound the state, the most important are Palak, Tamdil, Rungdil, and Rengdil. The Palak lake is situated in Chhimtuipui District in southern Mizoram and covers an area of nearly 30 hectares. It is believed the lake was created as a result of an earthquake or a flood. The Tamdil lake (*'Tamdil'* means of 'Lake of Mustard Plant') is a natural lake situated at about 65 kms from Aizawl. Herbs in most part of the lake catchments are mainly of *Phragmites karka, Alpenia alughas, Saccharum spontaneum, Erianthus arundunaceous, Polygonum microcephalum, Elaeocharis ramulosa, Scirpus supinus, Cyperus difformis, Fimbristylis dichotoma, Utricularia exoleta.* Recently, *Eicchornia crassipes* has invaded many parts of the lake and other water bodies of the state. Records of a quatic species include *Ludwigia octovalvis, L. prostrate, Osbechia chinensis, Nymphoides cristata, Trapa natans, Pistia stratoites, Spirodela polyrhiza, Hydrilla verticillata, Limnophila sessiles* etc.

Rivers and Lakes

Sl. No.	Name of River	Length in Km.
1.	Tlawng (Dhaleswari or Katakhal)	185
2.	Tlau	159
3.	Chhimtuipui (Kolodyne)	138
4.	Khawthlangtuipui (Karnaphuli)	128
5.	Tuichang	120
6.	Tuirial	117
7.	Tuichawng	107
8.	Mat	90
9.	Tuipui	86
10.	Tuivawl	72
11.	Teirei	70
12.	Tuirini	59
13.	Seriul	56
14.	Langkaih	68

(*Source* : scatsenvis.nic.in)

Administrative set up & People

Mizoram was granted Statehood on February 20, 1987 (as per the Statehold Act 1986) and thus became the 23rd State of the Indian Union, and at present the state (area : 21,081 km^2) is subdivided into eight districts viz., Aizawl (capital), Lunglei, Kolasib, Mammit, Serchhip, Saiha, Chhimtuipui, Lawngtlai. The population of the state stood 8,91,058 (2001 Census) and the literacy of 88.5%—the second highest among all the states of India, after Kerala. Historically, the people of Mizoram came from Sinlung or Chhinlungsan located on the banks of the Yalung River in China, and therefore Mangoloid in origin similar to that of many tribes of northeast Indian states. The earliest Mizos who migrated to India were known as Kukis, the second batch of immigrants was called New Kukis. The Lushais were the last of the Mizo tribes migrate to India. the Mizos are divided into numerous tribes, the largest of which is the Hmar, which comprises almost two-thirds of the state's population. Others include Mara, Lushei, Pawi, Ralte. The Riang, a subtribe of Tripuri and the Chakma of Arakanese origin, are a non-Mizo tribe living in Mizoram.

Climate

The climate in Mizoram is moderate, cool and pleasant the whole year but during the months of May-September the state receives south-west and north-east monsoon with an annual rainfall of 200-250 cm. Rainfall is generally evenly distributed. Mizoram, as a whole, gets an average rainfall of about 3,000 mm with Aizawl town having 2,380 mm and Lunglei 3,178 mm. the temperature varies from 20°-30° C during summer, 11°-21° C during winter which lasts from December-February and the relative humidity varies from 70-80%. The upper reaches of the hills are usually cool while the lower reaches are relatively warm and humid. Storms break out during March-April.

Floristic Diversity

The mountainous terrain of tropics, undulating hill ranges, rivers, lakes and moderate climate with

an annual rainfall of around 2500 mm contribute significantly the floristic diversity of the state. The vegetation of the state is divided in to four types based on the nature of forests viz., Tropical wet evergreen and semi evergreen, montane subtropical, temperate and bamboo forests. The floristic diversity as recorded by Botanical Survey of India (1999) comprises of 2141 species of flowering plants, 6 species of gymnosperms and 211 species of pteridophytes as detailed below.

Group	Family	Genera	Species
ANGIOSPERMS	176	905	2141
Monocot	26	200	514
Dicot	150	705	1627
GYMNOSPERMS	4	6	6
PTERIDOPHYTES	35	66	211

Forests

Mizoram has a vast area of forest covering as much as 17,494 sq. km. which forms about 83 per cent of the total geographical area of the state. Of which, about 42.4 per cent (8,936 km^2) of the geographical area is under dense forest while 40.6 per cent (8,558 km^2) are open forest and 17% Non forest area (Source : Forest Survey of India Dec. 2002). In terms of the recorded forest area, Reserved forests constitute about 44.7 per cent (7,127 km^2), Protected forest constitute 22.4 (3,568 km^2) percent and Unclassified forest constitute 32.9 percent (5,240 km^2) of the geographical area. Broadly, the forests of Mizoram can be classified into : 1 Tropical Wet Evergreen and Semi Evergreen Forest; 2. Montane Subtropical Forest; 3. Temperate Forest and; 4. Bamboo Forest. However, Champion and Seth, classify the forest in Mizoram under three types *viz.* (1) Tropical wet-evergreen forests; (2) Tropical semi-evergreen forests and; (3) Montane sub-tropical pine forests. The National Remote Sensing Agency, (NRSA) Hyderabad (1979) classified the forest into six categories *viz.* (1) Sub-tropical evergreen forest; (2) Tropical evergreen forest; (3) Tropical moist deciduous forest; (4) Bamboo forest; (5) Quercus forest and (6) Jhum land-current, old and abandoned. Jhum or Shifting Cultivation continues to be the principal and prevalent method of Cultivation. Over 35,000 hectares of land which is about 34 per cent of the total cropped area has been put under Jhum Cultivation during 2000-01.

1. Tropical Wet Evergreen and Semi Evergreen Forests

Located below 900 m. south eastern and partly western part of the state, with rainfall varying between 200-250 cm annually. Tall trees, canopy dense, few epiphytes, Tree ferns, orchids, small palms and bryophytes fairly common, ground vegetation is rich with grasses and sedges along the river banks. Dominant tree species in the top canopy are *Dipterocarpus turbinatus, D. macrocarpus, Michelia champaca, Talauma hodgsonii, Artacarpus chaplasha, Amoora wallichii, Duabanga grandiflora, Schima wallichii, Adina cardifolia, Terminalia myriocarpa* and others. Drier places exhibits trees such as *Bombax cieba, Juglans regia, Phyllanthus emblica, Erythrina arborescens, Albizia labbek, A. procera, Lagerstroemia speciosa, Sterculia villosa* and others. The middle canopy in the area includes trees such as *Litsea laeta, Dysoxylum binceatariferum, Pterospermum semisagitatum, Hydnocarpus kurzii, Sterculia indica, Dillenia indica, Elaecarpus lanceaefolis, Stereospermum personatum* etc. The lower canopy exhibits maximum diversity of smaller trees and shrubs. Climbers and epiphytic orchids are also common in the area. Areas abandoned after Jhum and where canopies are not distinct, trees such as *Aporosa oblonga, Mallotus phillipensis, Maesa ramentacea, Cardia spp., Bridella retusa, Macaranga denticulate, Murraya exotica, Dalbergia stipulacea,* and *Bauhinia variegata* are common. The ground flora is full of herbs and climbers.

Montane Subtropical Forest

Located between 900-1500 m altitude in the eastern fringes of bordering Kachin hills of Myanmar, exhibits mixed pine forests of *Pinus, Quercus, Castonopsis, Podocarpus, Schima, Prunus, Myristica* and other species. *Calamus erectus, Caryota urens, Didymocarpus nana, Licaual pelta, Phoenix humilis* are common. The shrub species of *Lyonia, Gaultheria, Rhus* and herbaceous species of *Potentilla fulgens, Rhununculus, Artemesia, Elsholtzia* are common.

Temperate Forest

The primary forest located above 1500 m in the areas such as Pharpak, Thuldang and Phawngpui Reserve Forest, exhibits an admixture of tropical and subtropical vegetation. Trees belonging to *Pinus kesiya, Actinodaphnae macroptera, Betula alnoides, Exbucklandia populnea, Dillenia pentagyna, Kadsura heterophylla, Michelia doltsopa, M. champaca, Garcenia anomala, Schisandra neglecta, Quercus deulbata, Rhododendron arboretum, R. wattii, R. vitchinanum* etc. Shrubs include *Psittosporum podocarpum, Xylosoma controversum, Camella caudate, Mahonia spp. Rubus spp., Clerodendon infortunatum, Rosa spp. Sorbus* and others. The herbaceous plants include *Hypericum elodoides, H. mananthemum, Plantago major, Potentilla fulgens, Impatiens spp., Centella asiatica, Cyanotis cristata.* Several ferns and fern allies such as *Selaginella, Lycopodium, Cyosorus, Dryopteris, Devallodes, Athromeris, Egenolfia, Hypolepis* species are common.

Bamboo Forest

The state is rich in bamboo, located in the tropical and subtropical areas mostly adjacent to Tripura border, arisen out of Jhumming. Also located along the river banks on the eastern and western side. The common species are *Melocanna baccifera, Bambusa tulda, B. pallida, Dendrocalamus hamiltonii, Schizostachyum polymorphum,* and *S. dalloa.* 30% of Mizoram is covered with wild bamboo forests, many of which are largely unexploited. In spite of that, Mizoram harvests 40% of India's 80 million-ton annual bamboo crop. Relationship with bamboo flowering and the increase in the rat population has been observed in the state, resulting in the crop raid by the rats and subsequent crop loss leading to the famine.

(For details refer : *Floristic diversity and conservation strategies in India:* Publ. : BSI (1999)

DISTRICT WISE FOREST COVER

District	Geographic Area	Forest Cover				Scrub
		Dense Forest	Open forest	Total	Percent	
Aizawl	3,575	1,508	1,607	3,115	87.13	91
Champhai	3,185	1,356	1,119	2,475	77.71	43
Kolasib	1,382	782	540	1,322	95.66	0
Lawngtlai	2,557	946	920	1,866	72.98	120
Lunglei	4,536	1,862	1,795	3,657	80.62	12
Mamit	3,025	1,119	1,520	2,719	89.88	12
Saiha	1,400	630	506	1,136	81.14	43
Serchhip	1,421	653	551	1,204	84.73	23
Total	21,081	8,936	8,558	17,494	82.98	467

Protected Areas in Mizoram

There are 9 (nine) Protected Areas in Mizoram which include 2 National Parks and 7 Wildlife Sanctuaries. Dampa Wildlife Sanctuary has been declared a Tiger Reserve under Project Tiger.

1. Phawngpui (Blue Mountain) **National Park** located in south-east Mizoram. The river Kolodyne (Chhimtuipui) flows along the eastern side of the Park and also forms the international border with Myanmar. The highest point in Mizoram, Phawngpui Peak (2157 m) is located within this Park.

2. Murlen National Park located on the eastern border of Mizoram close to Myanmar and comprises of large tracts of relatively undisturbed Tropical Evergreen and Semi-evergreen forests.

3. Dampa Tiger Reserve situated in north-west Mizoram along the Indo-Bangladesh border, Dampa Tiger Reserve is the largest protected area of the State having an area of 500 sq km. It consists of moist deciduous forests in the lower reaches and evergreen and semi-evergreen forests with natural grasslands at higher altitudes.

4. Ngengpui Wildlife Sanctuary located on the southern end of the state with finest patches of tropical rain forests having mature *Dipterocarpus* (*Thingsen*).

5. Khawnglung Wildlife Sancturay with an area of 35 sq km, the area is located in Lunglei District, with both tropical semi and evergreen forests.

6. Tawi Wildlife Sanctuary with an area (35.75 sq km) lies comprises of an admixture of primary forests interspersed with secondary growth and bamboo species.

7. Lengteng Wildlife Sanctuary having an area of 60 sq km lies in eastern Mizoram, north of Murlen National Park and comprise of the second highest peak of the State. The forests comprise of Tropical Evergreen and Sub-tropical Broad-leaf types which is still fairly undisturbed.

8. Thorangtlang Wildlife Sanctuary with an area of 50 sq km, the sanctuary was notified in 2002 from the existing Reserved Forest and situated about 200 kms south-west of Aizawl.

9. Pualreng Wildlife Sanctuary having an area of approximately 50 km^2. The preliminary notification has been issued to declare the area as a sanctuary.

Faunal Resource

Himalayan region is endowed with biodiversity richness, and in fact, eastern Himalaya is considered one of the hot spots of the world. Several factors have contributed to this richness, *viz.*, topographical variety along with great diversity of climate, different forest type which is further sub-divided on the basis of predominant plant species. Himalaya in the northeast represents the transition zone between Indian, Indo-Malayan, and Indo-Chinese bio-geographical regions as well as meeting place of the Himalayan Mountains and Peninsular India. This unique position coupled with physiography, has led a foundation for the proliferation of a variety of habitats, which harbours a diverse biota with high level of endemism (Mani, 1974). The northeast is thus a biogeographical "Gateway" for much of India's fauna and flora and as a consequence, is one having the richest biological value (Rodgers & Panwar, 1988).

Knowledge on the faunal resource of the state was scanty and no detailed systematic scientific inventory of the faunal wealth was attempted earlier. It is for this reason, the scientists of Zoological Survey of India conducted a detailed study of the state and the present volume is the outcome of such study. It deals with nearly 1468 species belonging to 891 genera under 295 families, of which insects alone form 37% with 520 species, the next abundant group is the birds with nearly 370 species and subspecies distributed in the state. A detailed account of the species which are new to science from the faunistic study

undertaken as well as the faunal distinctness is given below. Besides the faunal distinctness, the state is known to harbour several domesticated animals, the details of which is given :

Domestic animals of Mizoram

No.	Name of Animals	Numbers
1.	Cattle	33,312
2.	Buffalo	5,365
3.	Mithun	2,594
4.	Sheep	699
5.	Goat	16,036
6.	Horse & Ponies	2,002
7.	Donkey	5
8.	Pig	1,63,181
9.	Dog	33,746
10.	Cattle	19,737
11.	Poultry	12,94,489
12.	Duck	12,171
13.	Rabbit	1,545
14.	Others	342

(Statistical Handbook, Mizoram, 2000)

NEW SPECIES DESCRIBED FROM MIZORAM

Class NEMATODA
Subclass ENOPIDA
Order ASCARIDIDA
Superfamily HETRAKOIDEA
Family ASCARIDIIDAE
Subfamily HETERAKINAE

1. ***Heterakis mizoramensis*** sp. nov.,

Subfamily METETERAKINAE

2. ***Meteterakis gekkonis*** sp. nov.,

Order OXYURIDA
Superfamily OXYUROIDEA
Family OXYURIDAE

3. ***Syphacia (Syphacia) pearsoni*** sp. nov.,

Superfamily SPIRUROIDEA
Family SPIRURIDAE

4. ***Spirura tupiae*** sp. nov.,

Superfamily RICTULARIOIDEA
Family RICTULAROIDEAE

5. ***Pterygodermatities (Mesopectines) viverriculae*** sp. nov.,

Superfamily DIPLOTRIAENOIDEA
Family DIPLOTRIAENIDAE
Subfamily DIPLOTRIAENINAE

6. ***Diplotriaena coracinae*** sp. nov.,
7. ***Diplotriaena enicuri*** sp. nov.,

Superfamily APROCTOIDEA
Family APRCTIDAE
Subfamily APROCTINAE

8. ***Squamofilaria indica*** sp. nov.,

Superfamily STRONGYLOIDEA
Family CHABERTIIDAE
Subfamily OESOPHAGOSTOMINAE

9. ***Kuntzistrongylus indicus*** sp. nov.,

Superfamily TRICHOSTONGYLOIDEA
Family MOLINEIDAE
Subfamily MOLINEINAE

10. ***Trichoskrjabinia mabuyi*** sp. nov.,

Order TYLENCHIDA
Suborder TYLENCHINA
Family DOLICHODORIDAE
Subfamily HOPLOLAIMINAE
Genus ***Aphasmatylenchus***

11. ***Aphasmatylenchus mizoramensis*** sp. nov.,

Genus ***Scutellonema***

12. ***Scutellonema scutellonema*** sp. nov.,
13. ***Chaetenorista lushaiensis*** sp. nov.,

Class ARANEAE
Family SALTICIDAE

15. ***Marpissa mizoramensis*** sp. nov.,

Family CLUBIONIDAE

16. ***Cheiracanthium aizwalensis*** sp. nov.,

Family ARANEIDAE

17. ***Larinia teireae*** sp. nov.,

Order ACARINA
Family PHYTOSEIIDAE

18. ***Phytoseius (Phytoseius) mizoramensis*** sp. nov.,

Family TYLDEIDAE

19. ***Tydeus wallachii*** sp. nov.,

Faunal distinctness

Sl. No.	Group	Number of			Faunal distinctness
		Families	Genera	Species/ Subspecies	
1.	**Mammalia**	25	61	84	First Records from Mizoram *Tupaia belangeri assamensis* *Anourosorex squamipes* (Monotypic) *Rousettus leschenauti leschenaultia* *Cynopterus brachiotis* *Megaerops niphanae* *Sphaerias blanfordi* *Eonycteris spelaea* *Macroglossus sobrinus sobrinus* *Rhinolophus rouxi rouxi, R. lepidus lepidus,* *Rhinolophus pearsoni* *Hipposideros lankadiva, H. cineraceus,* *Myotis formosus formosus,* *M. montivagus montivagus* (First Record for India), *M. muricola* (First authentic record), *Eptesicus pachyotis,* *Pipistrellus circumdatus,* *Scotozous dormeri* *Tylonycteris pachypus fulvida* *Barbastella leucomelas darjelingensis* *Murina tubinaris, M. cyclotis cyclotis,* *Harpiocephalus mordax,* *Harpiola grisea* *Harpiola grisea* *Hystrix brachyuran subcristata* *Cannomys badius badius* *Rattus nitidus obsoletus* *Niniventer niniventer mentosus* *Mus pahari pahari*
2.	**Aves**	59	205	370	Distribution—370 spp. Includes Podicipididae (2 spp.); Ardeidae (8 spp.); Anatidae (9 spp.); Accipetridae (16 spp.); Falconidae (6 spp.); Phasianidae (15 spp.); Turnicidae (5 spp.); Jacanidae (2 spp.); Charadridae (4 spp.); Scolopaecidae (1 w 2 spp.); Columbidae (17 spp.); Cuculidae (12 spp.); Tytonidae (3 spp.); Strigidae (13 spp.); Caprimulgidae (4 spp.); Apodidae (7 spp.); Alcidinidae (8 spp.); Meropidae (2 spp.); Coracidae (2 spp.);

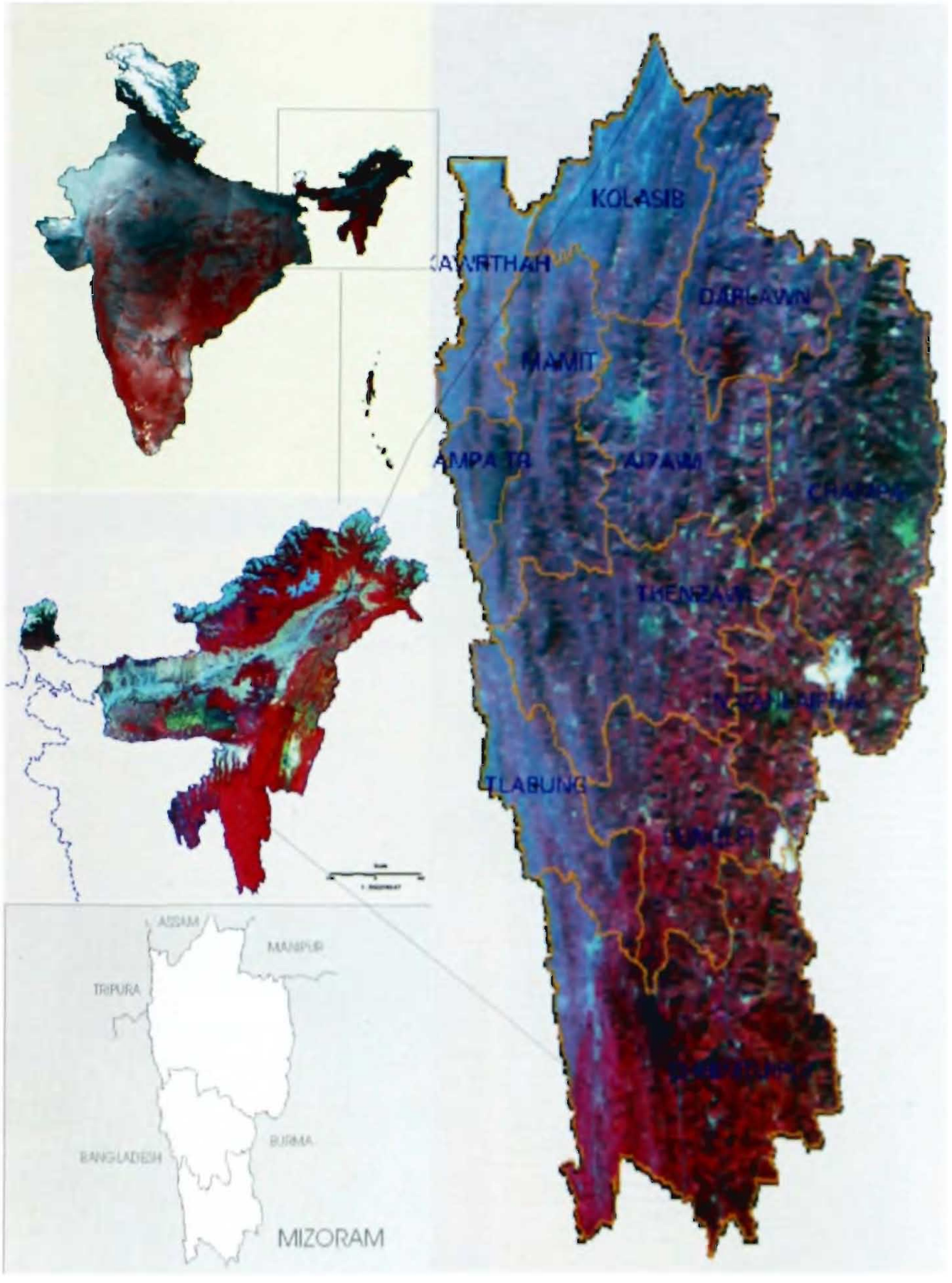
Sl. No.	Group	Number of			Faunal distinctness
		Families	Genera	Species/ Subspecies	
					Bucerotidae (3 spp.); Capitonidae (5 spp.); Picidae (18 spp.); Eurylaimidae (2 spp.); Pittidae (2 spp.); Hirundinidae (3 spp.); Motacillidae (7 spp.); Camphephagidae (4 spp.); pycnonotidae (10 spp.); Lanidae (3 spp.); turdinidae (28 spp.); Timaliinae (56 spp.); Panurinae (3 spp.), (10 spp.); Muscicapinae (15 sp.); Paridae (4 spp.); Sittidae (4 spp.); Nectarinidae (7 spp.); Emberizinae (4 spp.); Fringillidae (4 spp.); Esrellidae (2 spp.); Passerinae (2 spp.); Sturnidae (9 spp.), Oriolidae (2 spp.); Dicruridae (6 spp.); Corvidae (6 spp.) and one species each of the family Pandionidae, Otididae, Podargidae, Trogonidae, Upupidae, Indicatorinidae, Irenidae, Cinclidae, Monarchinae, Aegithalidae, Zosteropodidae, and Cerithiidae. Ornithological account—215 spp.
3.	**Reptilia**	14	47	71	7 species first recorded from the state—*Japalura variegata, Ahaetulla prasina, Lycodon jaoi, Oligodon albocinctus, Psammodynastes pulverulentus, Sibynophis collaris, Trimeresurus albolaris, Tropidophorus assamensis* recorded second time after 84 years (1912 by Annandale)
4.	**Amphibia**	6	8	13	*Pedostibes kempii* (Recorded after 74 years) *Hyla annectens, Rana gerbillus,* *Polypedatus leucomastax,* *Rhacophorus bipenctatus* (first record from State) *Microhyla berdmorei* (Second record from north-east India) *Rana cyanophlyctis* (used as food)
5.	**Pisces**	20	49	89	24 species (17 genera) are first records 3 species, *Salmostoma sladoni, Barilius shanensis, Pseudolaguvia tuberculatus* are new records to India.
6.	**Mollusca**	17	40	65	Freshwater 20 species (13 genera, 6 families) and Land molluscs 45 species (27 genera, 11 families). 9 freshwater species and 15 land forms restricted to Northeast states. One species new records to India (*Lamellidens phenchooganjensis*) and one species has shown the extension of distribution from Northwest to northeast India.

Sl. No.	Group	Number of			Faunal distinctness
		Families	Genera	Species/ Subspecies	
7.	**Nematoda**	24	35	49	Nematode parasites of vertebrates, of this 10 species are new to science, others first records of the state.
8.	**Nematoda**	08	10	19	Plant and soil nematodes of agricultural plants
9.	**Nematoda**	02	06	06	Plant parasitic nematodes of the order Tylenchida with 2 new species to the science
10.	**Trematoda**	08	12	14	5 species is from the rumen of goat and 2 from cattle, 2 species from cow and buffalo, 1 species from pig and man, 3 species from fish (*Barbaus sarana, Puntius sophore, Xemontedon cancilla*), 1 species from from *Bufo*.
11.	**Aranae (Spiders)**	13	27	44	3 species belonging to 3 genera and 3 families are new to science, rest are new records to the state
12.	**Acari (Plant mites)**	10	22	55	2 Species are new to science, one species first record to India, rest of the species are new records to the state
13.	**Acari (Ixodid ticks)**	01	07	12	2 genera and 8 species are new records to the state
14a.	**Insecta : Collembola**	03	12	21	This is the first consolidate record of soil inhabiting insects
14b.	**Insecta : Odonta**	12	41	64	12 species are new records to the state
14c.	**Insecta : Orthoptera**				Acridoidea (shorthorned grasshoppers) includes 2 new records to India and all 40 species are new to the state
	Acridoidea	02	32	40	
	Tettigonidae	01	15	24	Of the 24 species, 12 are new record to the state and 2 are new record to the country.
	Tetrigidae	01	15	27	All species are new records to the state and 2 genera are new record to the country.
14d.	**Insecta : Dermaptera**	05	13	15	
14e.	**Insecta : Isoptera**	03	10	15	10 species are recorded for the first time.
14f.	**Insecta : Hemiptera**	07	15	19	19 species of aquatic insects are new records to the state and one species is new to India.
		05	13	15	15 species of Terrestrial Pentatomids are the first record to the state.
		01	12	13	All 13 species are first record from the state.
		06	16	22	All 22 species of Cicadellodea are the first record to the state.

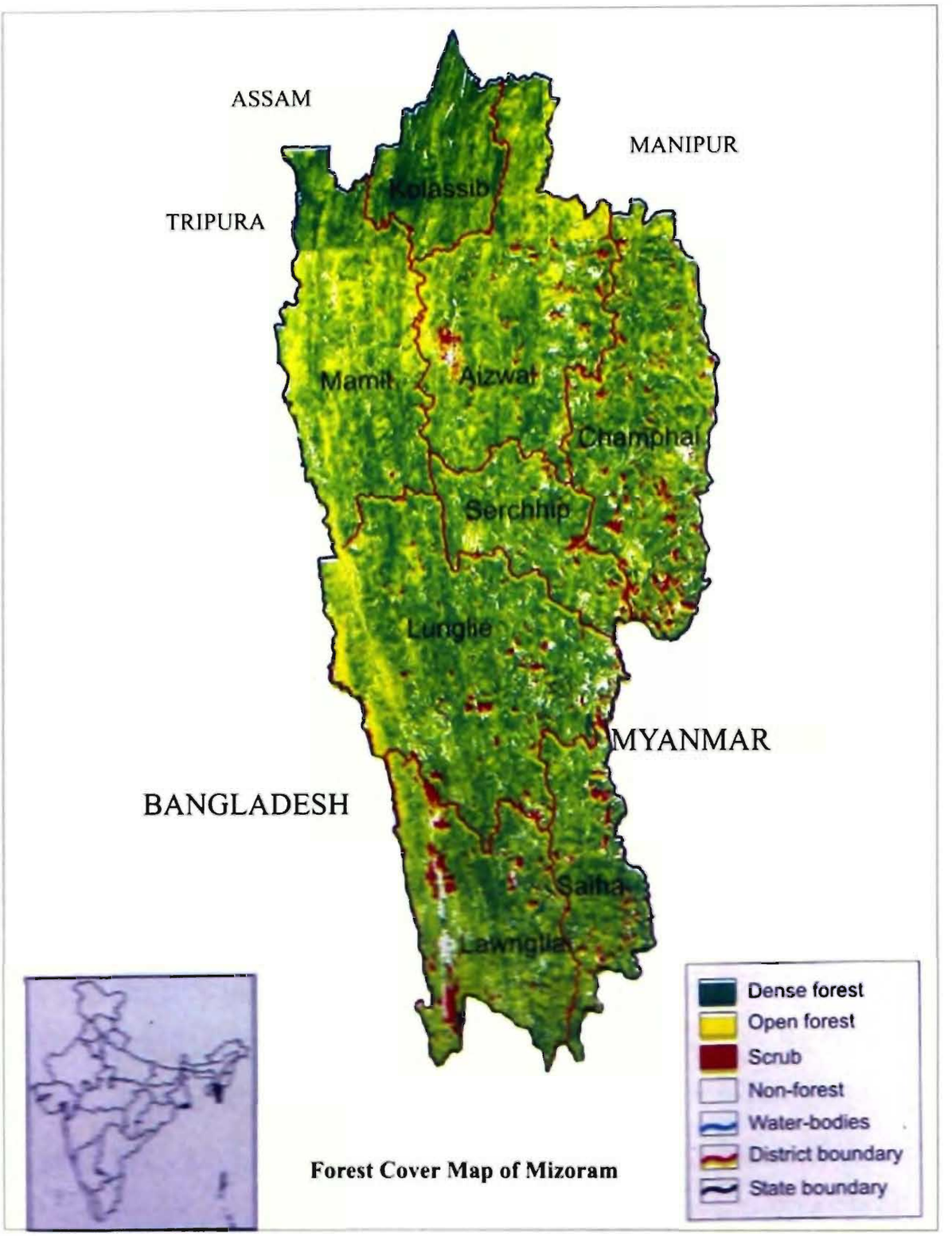
Sl. No.	Group	Number of			Faunal distinctness
		Families	Genera	Species/ Subspecies	
14g.	**Insecta : Coleoptera**	01	14	14	14 species of Scarabaeid beetels are described from the state and all are new records
		01	06	12	All 12 Sylvanid beetles are new records
		01	02	02	Of the 2 Colydidid beetles, one species new to science, the family is first record to India
		01	05	07	Endomychid beetles, 2 species are new records to India and 5 species are new to state
		01	03	03	3 species of Languriids are new to the state
		01	01	01	Lone sp of Discolomid is new record
		01	08	11	11 spp of Lathrid beetles are new record
14h.	**Insecta : Diptera**	12	28	37	Of the 37, 6 species are confined to India, 10 species belongs to Orient, 21 species extend beyond Orient and 16 species are new
		01	06	06	1 species new to science, 5 species are new records to the state
		01	07	08	All 8 species belongs to Muscidae
		01	14	20	Of the 20, 19 species of Syrphids are first record to the state
14i.	**Insecta : Lepidoptera**	05	27	39	Of the 39, 14 species belongs to Pieridae, 7 species belongs to Hesperiidae, 1 species of Hypsidae, 2 species of Ctenuchidae, 15 species to Arctidae.
		01	20	24	24 species of Geometrid moths are new record to state and 1 species is new to India
		04	12	26	9 species belong to othe family Papilionidae, 10 species belong to Nyhmphalidae, 2 species to Lasciocampidae and 5 species to Lymantgriidae, All are new records
		03	40	56	Of the 56, 40 species belongs to Nymphalidae, 15 spp. Belongs to Lycaenidae and a lone species of Saturnidae. All are definitive new record.

Animal Fossils Mizoram

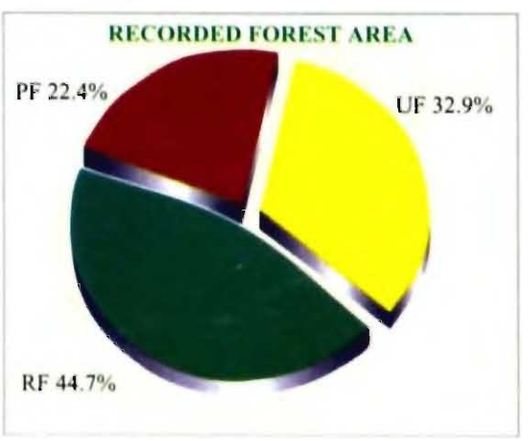
Paleontologically the first fossil record from Mizoram dates back to 1891 by La Touche (*Schiszaster* sp.), with no further record of geological exploration seems to be available. The recent work of 1972 by Nandi *et. al.*, recording species of foraminifera and ostracoda and Saxena & Mukherjee (1973) recording mollusks, echinoids, shark tooth etc., depicting the fauna of the region is of marine origin, a part of the Tethys sea, belonging to Lower Miocene age. The present exploration includes fossil remains of 117 species; of which 19 species belongs to Protozoa, 9 species of arthropoda, 61 species of mollusca, 3 species of echinodermata, 12 species of Pisces and one species each of bryozoa and Ichnofossil. Besides showing the marine origin, the fossil record also revealed their resemblances to Tertiary fauna of Garo hills and Miocene fauna of Myanmar. A significant feature of the animal fossil records of Mizoram is that the components collected were of Indo-Pacific fauna resembling the fossil fauna of Mediterranean zone and indicative of the continuity of the marine habitat between Europe, Asia and Africa.

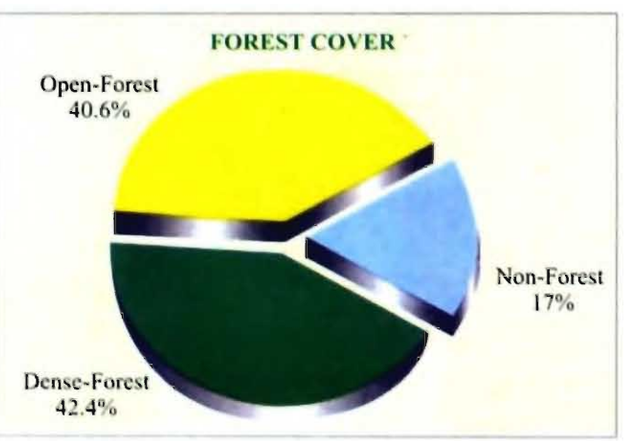


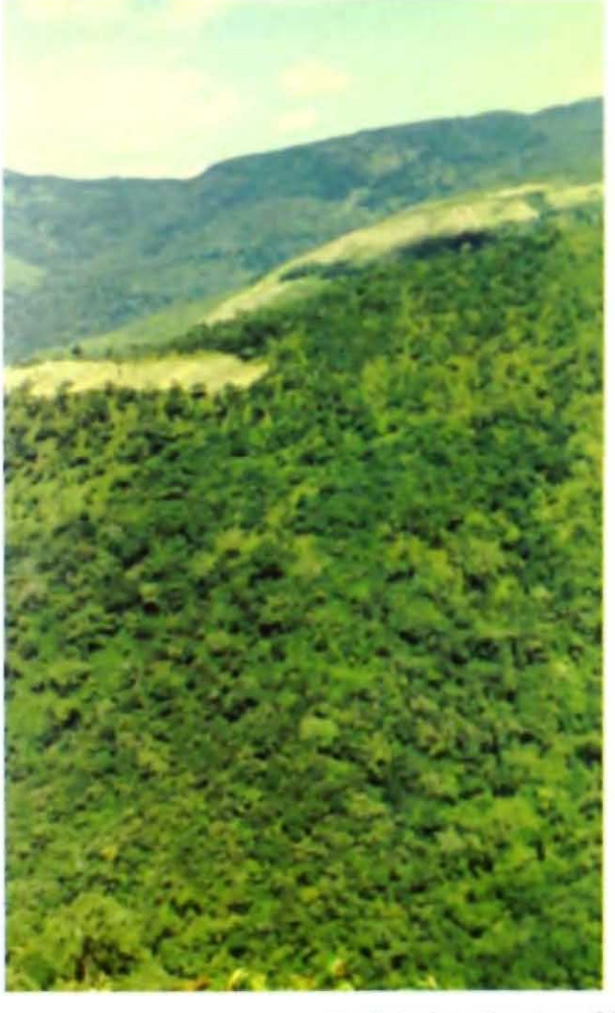
MAP SHOWING THE LOCATION OF MIZORAM IN INDIA

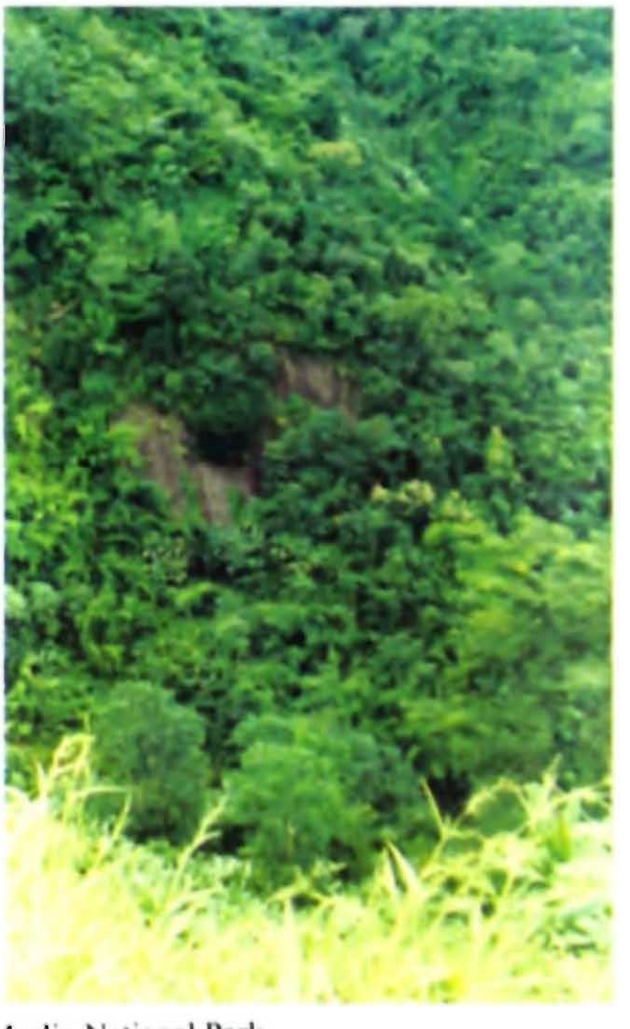


Forest Cover Map of Mizoram









Undulating forests of Murlin National Park.

Perennial Waterbody inside Sanctuary

Human settlement adjousning forests.

Degraded forests

Moist evergreen forests.

Zool. Surv. India
State Fauna Series **14**, *Fauna of Mizoram* : 13-30, 2007

DORYLAIMIDA : NEMATODA

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INTRODUCTION

Nematodes are most important and highly diversified groups of multicellular invertebrate animals. They occur in almost every kinds of climatic conditions, from the arctic to the tropic and from ocean depths to tops of mountains. Most species are free living in soil, brackish or marine and fresh water while others are parasites of animals and plants. Some species of nematodes can survive in temperature below freezing point while others can survive in the rocky soil during hot summers. Both free-living and plant parasitic nematodes are generally microscopic or very small in size ranging between 0.3 to 12 mm in length except *Paralongidorus maximus*, a dorylaim nematode measuring about 1 cm in length.

The members of the order *Dorylaimida* are commonly known as Dorylaims. The Dorylaims are found in all types of soil, in every conceivable type of habitats and usually dominate both in numbers and in species over all other soil inhabiting nematodes. They can be easily recognised at lower magnification by their smooth cuticle, usually "dragger-shaped" feeding apparatus, bottle shaped oesophagus and the absence of copulatory organ, bursa in males. The dorylaim nematodes possess highly diversified type of feeding apparatus and feeding behaviour.

It was probably, the first species of Dorylaims was described in 1845, the real foundation for the taxonomic study of this group was established in 1936 with the publication of a monograph of the nematode genera *Dorylaimus* Dujardin, *Aporcelaimus* n.g., *Dorylaimoides* n.g. and *Pungentus* n.g. by Gerald Thorne and Helen Heinly Swanger. In 1939, Thorne also published another important monograph on the nematodes of the super-family *Dorylaimoidea* and subsequently he published monographs in the year 1964, 1967 and 1974. In 1873, Butsehli, for the first time, included drawing of soil nematodes and worked out keys for identification of nematodes, the principles of which are still used in diagnosis. Micoletzky (1883-1921) wrote a monograph on free living nematodes. Goodey (1885–1953) made significant contribution to the field of Nematology. He published an important book entitled "Soil and fresh water nematodes", Baker (1962) published a check list of the nematode super-families *Dorylaimoidea*. Significant contribution on this group have come from the nematologists like De Man, Cobb, Filipjev, Coomans, Loof, Heyns, Carbonell, Ferris, Andrassy. Among the Indian nematologist like, Siddiqi, Jairajpuri, Baqri, Maqsood Ahmad, Washim Ahmad, and Bajaj have made important addition to the taxonomy of this group. The world fauna of Dorylaimida contains approximately 1800 known species grouped in over 215 genera. In India the order Dorylaimida comprises of approximately 500 species grouped in over 110 genera.

The state Mizoram is situated at the Eastern margin of our Country. Mizoram got state-hood

in the year 1972, previously it was under the state of Assam. Mizoram is a land of hills and few valleys with a pleasant climate and beautiful natural scenario. Cultivation is the main occupation of the people of Mizoram. The methods of Jhuming and shifting cultivation are widely practiced by the farmers of Mizoram. Regarding the State Fauna of Mizoram, a survey work was conducted by Dr. S.C. Ghosh and Party in the year 1996 to collect the nematodes associated with agricultural crops and orchards from the two districts of Mizoram with special emphasis on plant parasitic and soil nematodes. Among the soil bourne pests, plant parasitic and soil nematodes are generally overlooked due to their small size. The nematodes are most important and highly diversified group of multicellular invertebrate animals. They occur in almost every kind of climatic condition, from aretic to the tropic and from ocean depths to top of mountains.

The pathogenic nature of phytoparasitic nematodes was discovered during the second half of nineteenth century while in India it received due attention only during the last three decades when it was established that phytoparasitic nematodes causes a considerable damage 25-30% yield losses to agricultural and horticultural plants. Recently there has been more emphasis on the study of phytoparasitic nematodes belonging to the order Tylenchida while nematodes belonging to the order Dorylaimida have been neglected. There are some importatnt ecto-parasites belonging to the super-families Longidoroidea and Tricodoroides causing damage to our agricultural crops and orchards.

However, there are very little information, available about the plant and soil nematodes and their distribution in the soil of Mizoram state. Practically there had been no work on this aspect. This is not that each one every hill and valley has been sampled and probably that is not feasible within a short time limit even then the present study may serve a preliminary account of the Dorylaimid nematode fauna of Mizoram state.

MORPHOLOGY

The nematodes are vermiform circular in transverse section, colourless, bilaterally symmetrical with external cuticle and pseudocoel round worm. They possess longitudinal muscles for locomotion. The intestine is a hollow tubular structure extending upto rectum. Circulatory and respiratory system are both wanting. The excretory system with a single duct and consist mainly of the circumenteric nerve ring. The reproductive system consists of one or two tubular gonads, opening separately through a ventrally located vulva in female whereas in the male the gonads empty into cloaca where copulatory structures known as spicules are situated. Both free living and plant parasitic nematodes are generally microscopic or very small in size ranging between 0.3 to 12 mm in length except *Paralongidorus maximus*, a dorylaim nematode measuring about 1 cm in length. The life cycle consists of egg laid by the female followed by four larval stages prior to attaining the adult stage.

MATERIALS AND METHODS

For the study of Dorylaimid fauna of Mizoram, two faunistic field survey works were conducted during the period 1995–1996 covering about two districts of Mizoram State. Dorylaimid nematodes associated with orchards and agricultural crops have been collected from different districts of Mizoram state. The methodology comprises with :

i. Collection of soil samples from the host plants.
ii. Extraction of nematodes from the soil samples
iii. Fixation and preservation of the nematodes
iv. Dehydration of the nematodes
v. Preparation of permanent slides of the dehydrated nematodes.
vi. Measurements.

COLLECTION OF SOIL SAMPLES : Soil samples were collected from the rhizosphere of orchards and agricultural plants in the moist soil 5 x 5 cm area was taken upto the depth of 15 cm with the help of shovel to make one sub-sample. Five sub-samples were collected from one field which were mixed thoroughly to form a bulk of soil sample. From that soil sample 500 gms. soil was collected to form one sample. The nematodes migrate down to lower depths to avoid high temperature and unfavourable condition during the hot summer days. So, in the dry or semidry fields the sampling depths were increased upto 20 cm. The soil was then collected in a polythene bag. The opening end of the polythene bag was closed properly with a rubber band inserting relevant data like host, locality, date, altitude. These soil samples were brought to the laboratory and stored in fridge to avoid evaporation.

EXTRACTION OF NEMATODES FROM THE SOIL SAMPLES : To extract the nematodes from the soil samples, approximately 500 gm soil is placed in a bucket (A) of 15 lits. capacity of water. One third volume of the bucket is then filled with water. The soil and water are thoroughly mixed to prepare a uniform suspension. The bucket (A) is then left undisturbed for 20-30 seconds to allow the bigger soil particles to settle at the bottom while the nematodes are floating or moving on the upper surface of the suspension. The suspension is then filtered through a coarse sieve (2 mm pore) to remove the plant debris and is collected in another bucket (B). Thus this process is repeated thrice to make the suspension dilute for passing the suspension through fine sieve of 350 mesh.

The suspension of Bucket (B) being free from stone, leaves and organic matter is also made into a uniform solution by hand and allowed to settle for 20-30 seconds. Then the solution is passed through a fine sieve (350 mesh size). Most of the fine soil particles pass through the sieve while the larger soil particles and the nematodes are retained on the 350 mesh sieve. The residue of the sieve is collected in a 250 ml. Beaker.

The residue is then poured gently on the moist double tissue paper placed on a small supporting coarse sieve of 2 mm pores. The coarse sieve with residue on the tissue paper is put on a petridish filled with water touching the bottom of the coarse sieve.

After 24 hours all the nematodes penetrate and pass into the fresh water kept in the petridish through the tissue paper while the slow moving nematodes penetrate very slow through the tissue paper. The residue is then (after 24 hours) examined under a stereoscopic binocular for sluggish nematodes and are collected.

FIXATION AND PRESERVATION OF NEMATODES : The fresh water containing the nematodes was kept in a big test tube and allowed to settle down at the bottom for 2-3 hours A portion of water from the upper level of the test tube was removed slowly by a glass dropper so that the nematodes which settle at the bottom of the test tube may remain undisturbed. The nematodes were then fixed in F. A. solution (Baqri, 1990) for preservation. The F. A. solution was prepared as follows :

1. Formalin (40% formaldehyde)–	10 ml.
2. Glacial acetic acid–	4 ml.
3. Distilled water–	86 ml.

For killing the nematodes, the fixative (F.A.) was taken in a separate test tube, at least double volume of the nematode suspension kept in another test tube. The fixative was heated and the boiled fixative was quickly poured into the nematodes suspension tube. Thus the nematodes were fixed and safely preserved for a long period. The fixed nematodes were transferred to a specimen tube.

DEHYDRATION OF NEMATODES : The nematodes were transferred from the preservatives to a glycerol-alcohol solution in a glass cavity

block. The glycerol-alcohol solution was prepared as follows :

i. 30% alcohol – 95 ml.

ii. Glycerol – 5 ml.

Small amount of Lacto-phenol was added in the glycerol-alcohol solution to avoid the growth of fungi. The mature males and females were picked up under a stereoscopic binocular microscope by a fine needle and transferred to the glycerol-alcohol solution in a glass cavity block. The cavity block containing the nematodes was kept in a dessicator at room temperature for dehydration of the nematodes.

PREPARATION OF PERMANENT SLIDES : The dehydrated nematodes were finally mounted in pure anhydrous glycerol. A small drop of anhydrous glycerol was kept on the glass slide. The dehydrated nematodes of almost same thickness and size were selected under stercoscopic binocular microscope and were transferred to the glycerol drop kept on the glass slide with the help of a hair needle. The nematodes were arranged in the centre of the drop and kept according to the suitable size and thickness of glass wool to prevent any pressure on the nematodes. A clean round glass cover slip, gently warmed over a small flame, is placed over the glycerol drop. Finally, "Gycel" or common nail polish was applied on the outer edges of the round cover slip with the help of a hairbrush to make permanent slide for taxonomic sludies.

MEASUREMENTS OF THE OF NEMATODES : De Man's formula was followed for identification and measurements of nematodes. All the measurements are in mm unless otherwise mentioned.

L = Total body length (mm)

a = Total length ÷ maximum body width.

b = Total length ÷ oesophagus length.

c = Total length ÷ tail length.

$$v = \frac{\text{Distance of the vulva from anterior end} \times 100}{\text{Total body length}}$$

$$T = \frac{\text{Distance from cloacal aperture to anterior} \times 100}{\text{Total body length}}$$

$$G_1 = \frac{\text{Length of anterior gonad} \times 100}{\text{Total body length}}$$

$$G_2 = \frac{\text{Length of posterior gonad} \times 100}{\text{Total body length}}$$

SYSTEMATIC LIST

Superfamily DORYLAIMOIDEA De man, 1876
Family DORYLAIMIDAE De man, 1876
Subfamily Dorylaiminae, De man, 1876
Genus 1. ***Dorylaimus,*** Dujardin, 1845

1. *D. innovatus,* Jana & Baqri 1982

Family Dorylaimidae, De man, 1876
Subfamily Laimydorinae, Andrassy, 1969
Genus 2. ***Laimydorus*** Siddiqui, 1969

2. *L. baldus* Baqri and Jana, 1982
3. *L. minimus* Baqri 1991
4. *L. siddiquii* Baqri and Jana 1982

Subfamily THORNENEMATINAE Siddiqi, 1969
Family THORNENEMATIDAE Siddiqi, 1969
Genus 3. ***Thornenema*** Andrassy, 1959

5. *T. nadicaudatum* De and Baqri, 1986
6. *T. conura* De and Baqri, 1986
7. *T. novum* De and Baqri, 1986

Subfamily APORCELAIMINAE Heyns, 1965
Family APORCELAIMIDAE Heyns, 1965
Genus 4. ***Aporcelaimellus*** Heyns, 1965

8. *Aporcelaimellus heynsi* 1965
9. *A. tropicus* Jana and Baqri, 1981
10. *A. chauhani* Baqri and Khera, 1975
11. *A. coomansi* Baqri and Khera, 1975
12. *A. obscurus,* Heyns, 1965
13. *A. indicus,* Baqri and Jairajpuri, 1968

Subfamily Dorylaimoidinae, Siddiqi, 1969
Family Dorylaimoididae Siddiqi, 1969
Genus 5. ***Dorylaimoides*** Thorne & Swanger (1936)

14. *D. micoletzkyi* Baqri, 1991

Subfamily XIPHINEMATINAE Dalmasso, 1969

Family XIPHINEMATIDAE Dalmasso, 1969

Genus 6. ***Xiphinema*** Cobb 1913

15. *X. monohysterum* Brown, 1968

Subfamily CEPHALODORYLAIMINAE Jairajpuri, 1967

Family NORDIIDAE Jairajpuri and A. H. Siddiqi, 1964

Genus 7. ***Acephalodorylaimus*** Ahmad and Jairajpuri, 1983

16. *A. Attenuatus* Ahmad and Jairajpuri, 1983

Subfamily NEOACTINOLAIMINAE Thorne, 1967

Family ACTINOLAIMIDAE Thorne, 1939

Genus 8. ***Neoactinolaimus*** Thorne, 1967

17. *N. agilis* Thorne, 1967

Subfamily NYGOLAIMINAE Thorne, 1935

Family NYGOLAIMIDAE Thorne, 1935

Genus 9. ***Laevides*** Heyns, 1968

18. *L. laevis* Thorne, 1974

Subfamily QUDSIANEMATINAE Jairajpuri, 1965

Family QUDSIANEMATIDAE Jairajpuri, 1965

Genus 10. ***Labronemella*** Andrassy, 1985

19. *L. hemicaudata* Baqri 1991

SYSTEMATIC ACCOUNT

Phylum NEMATODA Tudolphi (Lankester, 1977)

Class ADENOPHORA

Order DORYLAIMIDA Pearse, 1942

Key to the Suborders of order DORYLAIMIDA

1. Feeding apparatus provided with odontostyle ..... DORYLAIMINA
- Feeding apparatus provided with mural tooth 2
2. Mural tooth located on sub-ventral wall of pharyngeal cavity, basal expanded part of oesophagus fairly long and without triquetrous chamber ..... NYGOLAIMINA.

Suborder DORYLAIMINA Pearse, 1936

Key to the Superfamilies of DORYLAIMINA

1. Cheilostome strongly selerotised. Provided with plate or basket–like structures, frequently accompained by large onchi with or without denticles ..... ACTINOLAIMOIDEA
- Cheilostome usually thin walled without onchia or denticles 2
2. Odontostyle long and attenuated oesophagus with only three glands.... LONGIDOROIDEA
- Cheilostome usually thin walled without onchia or denticles 2
- Odontostryle comparatively much smaller, Oesophagus with five glands 3
3. Expanded part of Oesophagus enclosed in spiral muscular sheath..... BELONDIROIDEA
- Expanded part of oesophagus not enclosed in spiral muscular sheath 4
4. Sub-cuticle coarsely stricated, provided with abundant radial striae; expanded part of oesophagus usually a small basal bulb..... ..... TYLENCHOLAIMOIDEA
- Sub-cuticle not striated, radial striaefew, if present, expanded part of oesophagus usually about one-half total oesophagus length .... DORYLAIMOIDEA

Family DORYLAIMIDAE De Man, 1876

Key to the Subfamilies of DORYLAIMIDAE

1. Cuticle with longitudinal ridges 2
- Cuticle without longitudinal ridges 3
2. Tail dissimilar in sexes, elongate-conoid to filiform in females and short, bluntly conoid in males ..... DORYLAIMINAE
3. Vestibule provided with minute to strongly developed sclerotised plates; S_2N located much anterior to oesophageal base..... ..... THORNENEMATINAE
- Vestibule not provided with sclerotised plates; S_2N towards Oesophageal base .... LAIMYDORINAE

Subfamily DORYLAIMINAE De Man, 1876

Genus ***Dorylaimus*** Dujardin, 1845

1. ***Dorylaimus innovatus*** Jana and Baqri, 1982

1982. *Dorylaimus innovatus* Jana and Baqri, *Indian Journal of Nematology*, **12** (2) : 263-271.

Material : 1♀, 1♂, 6.4.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oryza sativa*).

Locality : Thenzawl, Dist. Aizawl, Mizoram.

Diagnosis : *Female* : Medium size nematode, body ventrally curved upon fixation, tapering towards the both ends. Cuticle finely striated transversely, 8-10 µm thick at mid body and 10-12 µm at tail region. Lip region marked by a depression at the base of oesophagus. Amphids stirrup-shaped, guiding ring at 28-30 µm from anterior end. Odontophore 48-50 µm long, Nerve ring at 210-225 µm long from anterior end. Cardia 22-25 µm long, elongated-conoid, encircled by intestinal tissue. Oesophago-intestinal disc present. Rectum 80 µm long and pre-rectum about 280 µm long. Oesophagus about 900 µm long. Maximum body width 112 µm long.

Vulva a transverse slit, situated at 1875 µm long from anterior extremity, Vagina 60 µm long extending inwards. Female reproductive system amphidelphic. Tail elongate- conoid with sub-acute terminus, 305 µm long with three coudal pores on each side.

Male : Similar to female in general morphology except the dissimilar tail shape and male genital system. Spicule 108-110 µm long. Lateral guiding pieces rod like 20-22 µm long. In addition to an adanal pair, a series of 45 contiguous ventromedian supplements are present. Copulatory muscles in large numbers, extended upto supplement region. Pre-rectum 515-520 µm long. Tail short, bluntly rounded measuring about 34 µm long. Maximum body width 102 µm long.

Measurement: *Female* : L = 4.29 mm. a = 38.30, b = 4.7, c = 14.6, v = 43.70

Male : L = 4.25 mm, a = 41.66, b = 4.8, c = 125.

Subfamily LAIMYDORINAE Andrassy, 1969

Key to the genera of LAIMYDORINAE

1. Guiding ring sclerotised "double", pre-rectum in male begining well infront of supplements ..... ***Laimydorus***
– Guiding ring not sclerotised, single or weakly "double", pre-rectum in male short, usually begining within the range of supplements 2
2. Male tail with rounded terminus ventromedian supplements in two groups .... ***Calodorylaimus***

Genus ***Laimydorus*** Siddiqi, 1969

Key to the species of *Laimydorus*

1. More than 2.5 mm long nematodes, Tail length more than 340 µm ..... *L. Siddiquii*
– Less than 2.5 mm long nematodes, Tail length less than 250 µm 2
2. Body length less than 2.5 mm but not less than 2.00 mm; tail length more than 200 µm but less than 350 µm ..... *L. Baldus*
3. Body length less than 1.5 mm. Tail length less than 180 µm ..... *L. minimus*

2. ***Laimydorus baldus*** Baqri and Jana, 1982

1982. *Laimydorus baldus*; Baqri and Jana, *Nematologica;* **28** : 195-197.

Material : 3♀♀, 05.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oryza sativa*).

Locality : Thenzawl, Dist. Aizawl, Mizoram.

Diagnosis : *Female* : Big sized nematodes, body more or less straight upon fixation, tapering towards the both ends. Cuticle finely striated transversely, 2-4 µm thick.

Lip region marked by a depression, amphids stirrup-shaped, 5-6 µm apart from the anterior extrimity. Sensillar pouches 16-18 µm from the amphidial apertures. Odontostyle 24-25 µm long, their aperture 9-11 µm long and odontophore 28-30 µm long. Guiding ring at 14-15 µm from anterior end. The maximum body width 59-60 µm long. The length of Oesophagus 490-500 µm long. The length of oesophagus 490-500 µm long. Cardia elongated, rounded, measuring about 18-20 µm long. Oesophago-intestinal disc absent.

Vulva a transverse slit, situated at 925-935 µm from anterior extrimity, vagina 23-25 µm long. Female reproduction system amphidelphic. The anterior and posterior gonads are 415-430 µm and 445-450 µm long respectively. Overy reflexed, Oocytes arranged first in a single row, then in double row and in multiple rows at growth. Tail elongated, filiform measuring about 195-215 µm long with 4-5 cauded pores on each side.

Male : Not found.

Measurement : *Female* : L = 2.15-2.30 mm., a = 35.38-36.44, b = 4.38-4.6, c = 10.69-11.02, v = 40.65-43, G_1 = 19.30-20, G_2 = 19.34-19.56.

Distribution : Widely distributed in India.

3. *Laimydorus minimus* Baqri, 1991

1991. *Laimydorus minimus*; Baqri, *Rec. zool. Surv. India, Occ. Paper No.* **128** : 32-34.

Material : 3♀♀, 06.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Lemon (*Citrus limon*).

Locality : Pukpui, Lunglei Dist. Mizoram.

Diagnosis : *Female* : Body ventrally curved when fixed, tapering towards both ends. Cuticle finely striated, 2-6 µm thick (thickest on tail region). Dorsal and ventral body pores indistinct. Lip region marked off by a depression, Amphids stirrup-shaped, their aperture 6-7 µm from anterior extrimity. Odontostyle 32-35 µm long and their aperture 10-12 µm long. Guiding ring at 18-20 µm from anterior extrimity. Odontophore shorter than odontostyle measuring about 25-32 µm long. Oesophagus at 370-380 from anterior end. Cardia tongue-shaped, enveloping by intestinal tissue. Nerve ring at 130-145 µm from anterior end. Prerectum and rectum 130-140 µm and 30-40 µm long respectively.

Vulva longitudinal, situated at 690-700 µm long from anterior end. Maximum body width comprises from 38-40 µm long. Female reproductive system amphidelphic. The uterus and oviduct separated by sphincter Ovaries are reflexed. The combind length of oviduct and uterus 270 µm and 280 µm of anterior and posterior gonad respectively. Tail elongated, tapering gradually with a sharp acute terminus, measuring about 160-165 µm with two caudal pores on each side.

Male : Not found.

Measurement : *Female* : L = 1.35-1.39 mm., a = 34.73-35.52, b = 3.55-3.75, c = 8.18-8.42, v = 50.35-51.11.

Distribution : India, Andhra Pradesh, Sikkim, Mizoram.

4. *Laimydorus siddiquii* Baqri and Jana, 1982

1982. *Laimydorus siddiquii*; Baqri and Jana, *Nematologica*. **28** : 192 - 195.

Material : 3♀♀, 06.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oryza sativa*).

Locality : Pukpui, Lunglei Dist. Mizoram.

Diagnosis : *Female* : Body ventrally curved upon fixation, tapering in both ends. Cuticle finely striated transversely, 2-5 µm thick (thickest at tail region). Lip region marked by a depression, Amphids stirrup-shaped situated at 5-6 µm from anterior end. Odontostyle 23-25 µm long .and its aperture occupying 10-12 µm long. Odontophore

28-30 µm long. Guiding ring 12-15 µm long from anterior end. Nerve ring at 156-160 µm from anterior end. Cardia tongue-shaped, measuring 25-27 µm long.

Female reproductive system amphidelphic, ovaries reflexed. Vulva situated at 1320-1350 µm from anterior end. Maximum body width varies from 55-58 µm long. Anterior genital branch 425-450 µm and posterior genital branch 480-500 µm long. Pre-rectum 230-235 µm and rectum 35-40 µm long. Tail filiform measuring about 330-340 µm long.

Male : Not found.

Measurement : *Female* : L = 2.70-2.80 mm., a = 48.27-49, b = 4.28-4.34, c = 8.18-8.23, v = 48.21-48.88, G_1 = 15.74-16.66, G_2 = 17.77 – 17.85.

Distribution : India, Andhra Pradesh, West Bengal and Mizoram.

Subfamily THORNENEMATINAE Siddiqi, 1969

Key to the genera of THORNENEMATINAE

1. Body length 0.93 or less than 1 mm, Tail short conoid, with broad rounded tip, 18-20 µm long ..... *T. Nadicaudatum*
2. Body length above 1 mm. but less 1.50 mm. Tail elongated-conoid, rounded 125-127 µm long ..... *T. Conura*
3. Body length less than 1.20 mm. Tail filiform, 160-163 µm long ..... *T. Novum.*

Family THORNENEMATIDAE Siddiqi, 1969

Sub family THORNENEMATINAE Siddiqi, 1969

Genus ***Thornenema*** Andrassy, 1959

5. ***Thornenema nodicaudatum*** Dey and Baqri, 1986

1986. *Thornenema nodicaudatum*; Dey and Baqri, *Indian J. Helminth* (n.s.), 3(2) : 49.

Material : 2♀♀, 2♂♂, 03.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Coconut (*Cocos nucifera*).

Locality : New Serchip, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body slightly ventrally curve upon fixation, tapering gradually towards both ends. Cuticle with transverse striations, 2-3 µm thick. Lip region slightly narrower than adjoining body. Amphids stirrup-shaped. Odontostyle 10-11 µm long. Orontophore 14-15 µm long. Guiding ring 6-7 µm apart from anterior extrimity. Nerve ring at 85-87 µm from anterior end. Cardia tongue shaped measuring about 15-17 µm long and 7-8 µm wide. Oesophago-intestinal disc present, Oesophagus 195-198 µm long. Vulva a transverse slit, situated at 480-485 µm from anterior end, length of vagina 15-16 µm long. Female reproductive system amphidelphic. Maximum body width 36-37 µm long, Oesophagus 205 µm long. Combined length of oviduct and uterus for both anterior and posterior gonads are 205-208 µm long and 225-230 µm long respectively. Ovaries with single flexure, Rectum 18-20 µm and pre-rectum 48-50 µm long. Tail elongated, gradually tapering to a narrow rounded tip, 45-50 µm long with two caudal pores on each side.

Male : Similar to female in general shape and morphology but it differ in tail and reproductive system. Odontostyle 11-12 µm, aperture 4 µm, odontophore 13-14. Spicules 32-35 µm long, maximum body width 34-35 µm. Lateral guiding pieces well developed, rod-shaped, 7 µm long. In addition to the adanal pair, 7-8 regularly spaced ventromedian supplement present. Testis 415-440 µm long. Subventral papillae 2-3 in number. Copulatory muscles extended upto the last supplement. Tail short, conoid, with brood rounded tip, 18-20 µm long.

Measurement : *Female* : L = 0.92- 0.93 mm., a = 25.13-25.55, b = 4.48-4.53, c = 20.44-20.66, v = 52.15-52.17, G_1 = 22.28-22.60, G_2 = 24.19-24.73.

Male : L = 0.81-0.85 mm., a = 23.82-24.28, b = 4.15-4.29, c = 42.5-42.63, T = 51.29-51.76.

Distribution : Widely distributed in India.

6. ***Thornenema conura*** Dey and Baqri, 1986

1986. *Thornenema conura*; Dey and Baqri, *Indian Journal of Helminth* (n.s.), 3(2) : 52.

Material : 2♀ ♀, 06.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oriza sativa*).

Locality : Thenzawl, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body slightly ventrally curve upon fixation, tapering towards both ends. Cuticle with fine transverse striation, 2-3 µm thick. Lateral and ventral body pores indistinct.

Lip region offset by a depression, narrower than adjoining body. Amphids stirrup-shaped, their aperture 4-5 µm from anterior end. Odontostyle 12-13 µm long. Guiding ring 8-9 µm from anterior end. Odontophore 17-18 µm long. Nerve ring at 98-99 µm from anterior end. Cardia tongue-shaped measuring about 65-70 µm long. Rectum 25 µm long. Prerectum about 65 µm long. Oesophagus about 208-210 µm from anterior end. Oesophago-intestinal disc absent.

Vulva a transverse slit, situated at 585-590 µm from anterior extremily, vagina 15-16 µm long. Female reproductive system amphidelphic, anterior and posterior sexual branches well-developed. Combined length of oviduct and uterus for both anterior and posterior gonads are 275-280 µm long and 280-288 µm long respectively, ovaries with single flexure. Tail elongated-conoid, tapering gradually to a narrow rounded tip, measuring about 125-127 µm long.

Male : Not found.

Measurement : *Female* : L = 1.32-1.38 mm., a = 33-33.65, b = 6.34-6.57, c = 10.56-10.86, v = 42.75-44.31, G_1 = 20.83-21.21, G_2 = 20.86-21.21.

Distribution : India, West Bengal, Mizoram.

7. ***Thornenema novum*** Dey and Baqri, 1986

1986. *Thornenema novum*; Dey and Baqri, *Indian J. Helminth* (n.s.), 3(2) : 55.

Material : 2♀ ♀, 06.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil associated with the roots of Banana (*Musa paradiciaca*).

Locality : New Serchhip, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body almost straight when fixed, tapering slightly towards both ends. Cuticle finely striated, 1-3 µm thick (thickest on tail). Dorsal, ventral and lateral body pores indistinct.

Lip region marked by a depression. Amphids stirrup-shaped, their apertures occupying 4-5 µm from anterior end. Odontostyle 10-12 µm long. Odontophore about 16-17 µm long. Nerve ring at 85-90 µm from anterior end. Cardia tongue-shaped, enveloped by intestinal tissue. Maximum body width 31-33 µm long. Oesophagus at 250 µm from anterior extrimity. Oesophago-intestinal disc present. Pre-rectum about 42-45 µm long and rectum about 23-25 µm long.

Vulva a transverse slit, situated at 525-535 µm from anterior end, vagina 12-14 µm long. Female reproductive system amphidelphic but the anterior gonad is weekly developed. The combined length of oviduct and uterus for both anterior and posterior gonads are 135-140 µm long and 150-160 µm long respectively. Ovaries with single of flexure. Tail long, filiform, measuring about 160-163 µm long with two caudal pores on each side.

Male : Not found.

Measurement : *Female* : L = 1.10-1.20 mm., a = 35.80-37.5, b = 4.44-4.70, c = 6.93-7.40, v = 44.58-47.29, G_1 = 12.16-12.61, G_2 = 12.97-13.84.

Distribution : India, West Bengal, Mizoram.

Family APORCELAIMIDAE Heyns, 1965

Subfamily APORCELAIMINAE Heyns, 1965

Genus ***Aporcelaimellus*** Heyns, 1965

Key to the species of *Aporcelaimellus*

1. Body length less than 1.3 mm; G_2 = 7.87-8.03 ..... *A. heynsi*
– Body length more than 1.3 mm, G_2 more than 10 2
2. Body length more than 2.3 mm; G_2 = 10.19.. ..... *A. obscurus*
3. Body length 1.87 mm; G_2 = 13.97 ... *A. indicus*
– Body length 1.62-1.73 mm, G_2 = 17.34 .... *A. tropicus*

8. ***Aporcelaimellus heynsi*** Baqri and Jairajpuri, 1968

1968. *Aprocelaimellus heynsi*; Baqri and Jairajpuri, *Journal of Helminthology*, **42**; Nos. 3/4 : 248.

Material : 1♀, 31.03.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oriza sativa*).

Locality : Thenzawl, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body cylindroid, gradually tapering anterior to slender part of oesophagus and curved in posterior upon fixation. Cuticle finely striated, 2.5 µm thick at anterior end and 3 µm thick at mid body and tail region. Lip region set-off from the body. Odontostyle 12 µm long and its aperture measure about 8 µm long. Guiding ring at 7 µm from anterior end. Oesophagus 352 µm long, oesophago-intestinal disc present. Cardia hemispheroid. Nerve ring at 90 µm long from anterior end. Maximum body width 38 µm long.

Vulva pore like, situated at 690 µm from anterior end. Vagina 12 µm long. Female reproductive system amphidelphic. Anterior and posterior genital branch 168 µm and 158 µm long respectively. Anal body width 24 µm long. Rectum and pre-rectum 23 µm and 76 µm long respectively. Tail conoid, 41 µm long with rounded terminus.

Male : Not found.

Measurement : *Female* : L = 1.29 mm., a = 33.94, b = 3.6, c = 31.46, v = 53.48, G_1 = 13.02, G_2 = 12.24.

Distribution : India, West Bengal, Uttar Pradesh, Andhra Pradesh and Mizoram.

9. ***Aporcelaimellus tropicus*** Jana and Baqri, 1981

1981. *Aprocelaimellus tropicus*; Jana and Baqri, *Bull. zool. Surv. India*, **3**(3) : 221.

Material : 5♀♀, 01.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Mango (*Mangifera indica*).

Locality : Serchhip, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body cylindrical, gradually tapering anterior to slender part of oesophagus and curved in posterior half of its length upon fixation. Cuticle finely striated, 3 µm thick at anterior end and 4 µm at mid body and tail region. Lip region set-off by a depression, wider than the adjoining body. Amphids 6-8 µm wide, stirrup-shaped and apparently divided by a thin partition wall. Odontostyle 11-14 µm long, aperture 7-8 µm long. Guiding ring 6-7 µm from anterior end. Odontophore 18-20 µm long. Nerve ring at 110-120 µm from anterior end. Cardia tongue-shaped enveloped by intestinal tissue. Oesophago-intestinal disc absent. Oesophagus varies from 375-380 µm long from anterior end. Maximum body width 38-39 µm long.

Vulva a transverse slit, situated at 920-955 µm long from anterior extremity. Vagina 15-20 µm long, surrounded by sphincter muscles, moderately sclerotized at vulva-vagina; junction. Female reproductive system amphidelphic. Uterus and oviduct separated by sphincter muscles. Utiri filled

with sperms. Pre-rectum 80-110 µm long, Rectum 20-30 µm long Tail bluntly conoid, 22-23 µm long.

Male : Not found.

Measurement : *Female* : L = 1.62-1.73 mm., a = 42.63-44.35, b = 4.32-4.55, c = 73.63-75.21, v = 55.20-56.79, G_1 = 17.85-19, G_2 = 17.34-18.2.

Distribution : India, West Bengal, Andhra Pradesh and Mizoram.

10. *Aporcelaimellus chauhani* Baqri and Khera, 1975

1975. *Aprocelaimellus chauhani*; Baqri and Khera, *Dr. B. S. Chauhan Comm.*, Vol : 171.

Material : 3 ♀ ♀, 04.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oriza sativa*).

Locality : Thenzawl, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body ventrally curved, slightly tapering towards the anterior end. Cuticle finely striated transversely, 3 µm thick in mid body, and 4-6 µm at tail region. Lateral ventral and dorsal body pores are not distinct. Lip region well offset by a constriction, wider than the adjoining body. Amphids stirrup-shaped, odontophore 18-19 µm from amphidial aperture. Odontostyle 16-19 µm from amphidial aperture. Odontostyle 16-19 µm long, aperture 8-10 µm long. Oesophagus 370-380 µm long from anterior extremity. Guiding ring 7-8 µm from anterior extremity. Nerve ring at 115-130 µm from anterior end. Cardia conoid with rounded terminus, enveloped by intestinal tissue. Oesophago-intestinal disc present. Pre-rectum 45-70 µm long, rectum 25-35 µm long. Body width 49-52 µm long.

Vulva a transverse slit, situated at 615-650 µm from anterior end. Vagina 20-25 µm long, surrounded by a feeble sphincter, with moderately sclerotized distal region which is far from vulvar opening. Gonads are amphidelphic, typical and short Anterior gonad 170-185 µm long, posterior gonad 190-195 µm long. Tail dorsally convex-conoid with sub-acute terminus, 50-51 µm long.

Male : Not found.

Measurement : *Female* : L = 1.22-1.29 mm., a = 24.80-24.89, b = 3.29-3.39, c = 24.4-25.29, v = 50.38-50.40, G_1 = 13.93-15.16, G_2 = 14.72-15.11.

Distribution : Darjeeling, West Bengal, Thenzawl, Aizawl Dist. Mizoram, India.

11. *Aporcelaimellus coomansi* Baqri and Khera, 1975

1975. *Aprocelaimellus chauhani*; Baqri and Khera, *Dr. B. S. Chauhan Comm.*, Vol : 174.

Material : 3 ♀ ♀, 03.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oriza sativa*).

Locality : Thenzawl, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body ventrally curved in posterior half upon fixation, tapering towards anterior end. Cuticle with distinct striation, 3 µm thick in mid body, 6-7 µm at tail region. Lip region offset by a constriction, wider than adjoining body. Amphids stirrup-shaped. Odontostyle 16-18 µm long, aperture 10-12 µm long. Guiding ring about 6-8 µm from anterior end. Odontophore 28-30 µm long. Nerve ring at 145-148 µm from anterior end. Cardia longue-shaped, enveloped by intestinal tissue. Oesophago-intestinal disc present. Maximum body width 55-56 µm long. Oesophagus length 460-475 µm long. Rectum 32-42 and pre-rectum 76-122 µm long.

Vulva a transverse slit, situated at 1000-1020 µm from anterior end, Vagina 20-25 µm long. Female reproductive system amphidelphic, typical and short. Anterior Gonad 260-270 µm and posterior Gonad 275-280 µm long. Tail convex-conoid with blunt terminus, measuring about 50-51 µm long.

Male : Not found.

Measurement : *Female* : L = 1.78-1.80 mm., a = 32.14-32.36, b = 3.78-3.86, c = 35.6-36, v = 56.17-56.66, G_1 = 14.60-15, G_2 = 15.44-15.55.

Distribution : Darjeeling, West Bengal, Thenzawl, Aizawl Dist. Mizoram, India.

12. ***Aporcelaimellus obscurus*** (Thorne and Swanger, 1936), Heyns, 1965

1936. *Aprocelaimellus obscurus*; Thorne and Swanger, *Capita. Zool.*, **6** : 223.

1965. *Aprocelaimellus obscurus*; Heyns, *Entomol. Mem., S. Africa*, **10** : 1-51.

Material : 5♀♀, 03.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Lemon (*Citrus limon*).

Locality : New Serchhip, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Medium size with robust body, cuticle thick, smooth, its thickness varies between 3-4 µm at different places of the body. Lip region set-off by deep constriction, wider than the adjoining body. Amphids broad and shallow, their apertures 5 µm apart from anterior end. Nerve ring 152 µm from anterior extremity. Spear 22 µm long and its aperture 8mm long. Spear extension 50 µm long, simple. Guiding ring thick, 6 µm apart from anterior extremity. Oesophago-intestinal disc. Present, cardia tongue-shaped 25 µm long and 18 µm wide. Oesophagus- 520-525 µm long.

Vulva pore-like, 1125-1130 µm long from anterior end, vagina 30-32 µm long, Gonads amphidelphic, combined length of oviduct and uterus 245-250 µm and 248-255 µm of the anterior and posterior gonads respectively. Overies with single flexures. Maximum body width varies from 70-72 µm. Rectum 28-31 µm long and pre-rectum varies from 80-82 µm long. Tail bluntly conoid 29-31 µm long.

Male : Not found.

Measurement : *Female* : L = 2.20-2.30 mm., a = 31.71-31.94, b = 4.26-4.38, c = 76.55-76.66, v = 49.13-50.67, G_1 = 11.03-11.26, G_2 = 11.08-11.27.

Distribution : Widely distributed in India.

13. ***Aporcelaimellus indicus*** Baqri and Jairajpuri, 1968

1968. *Aprocelaimellus indicus*; Baqri and Jairajpuri, *Journal of Helminthology*, **42**; Nos. 3/4 : 250.

Material : 2♀♀, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of paddy (*Oryza sativa*).

Locality : Pukpui, Lunglei Dist. Mizoram.

Diagnosis : *Female* : Stout body, cylindroid, tapering gradually anterior to slender part of oesophagus and curve posterior to vulva. Cuticle smooth, its thickness varies between 3-6 µm at various places in the body. Lip region set off by deep constriction, wider than the adjoining body. Amphids broad and shallow, their apertures 4 µm from anterior end. Spear 16 µm long, its aperture 9 µm long. Spear extension 35-37 µm simple. Guiding ring thick 8 µm from anterior extremity. Anterior slender part of oesophagus 10-15 µm wide, not well demarcated from the posterior expanded portion, narrowing slightly as it passes through the nerve ring. Nerve ring 150-152 µm from anterior end. Oesophagus length varies between 475-480 µm, maximum body width 47-48 µm long. A cushion-shaped oesophago-intestinal disc present. Cardia hemispheroid.

Vulva pore-like, situated at 1360-1380 µm from anterior end, vagina 25-28 µm long, Gonads amphidelphic. Combind length of oviduct and uterus varies between 360-365 and 375-380 µm long of the anterior and posterior gonad respectively. Ovaries with single flexure, no sperms found in the uteri. Rectum 40-42 µm long and pre-rectum measures about 128-130 µm. Tail conoid ventrally arcuate with rounded tip, 55-58 µm long. Anal body width 28-30 µm long.

Male : Not found.

Measurement : *Female* : L = 2.35-2.39 mm., a = 49.79-50, b = 4.97, c = 41.20-42.72, v = 57.74-57.87, G_1 = 26.08-26.44, G_2 = 27.17-27.53.

Distribution : Widely distributed in India.

Family DORYLAIMOIDIDAE Siddiqi, 1969

Subfamily DORYLAIMOIDINAE Siddiqi, 1969

Genus ***Dorylaimoides*** Thorne and Swanger, 1936

1936. *Dorylaimoides micoletzkyi* (de Man 1921) Thorne & Swanger, *Capita Zool.*, 6 : 22-34.

14. ***Dorylaimoides micoletzki*** (Thorne & Swangar, 1936) Baqri, 1991

1991. *Dorylaimoides micoletzki*; Baqri, *Rec. zool. Surv. India, Occ. Paper No.* **128** : 77-79.

Material : 6♀ ♀, 31.03.1996 collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Lemon (*Citrus limon*).

Locality : Thenzawl, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body 'C' shaped when fixed, tapering gradually towards both ends. Cuticle finely striated, 3-5 µm thick (thicknest on tail region). Lip region offset by a depression. Amphids stirrup-shaped. Odontostyle measuring 8-10 µm ventrally and 10-14 µm dorsally. Guiding ring 6-8 µm from anterior end. Odontophore 15-18 µm long. Cardia rounded. Nerve ring at 95-115 µm from anterior extremity. Rectum 18-22 µm and pre-rectum 100-150 µm long. Vulva a transverse slit, situated at 570-650 µm from anterior end. Vagina 18-20 µm long. Female reproductive system amphidelphic, Ovaries reflexed. Maximum body width 35-38 µm long. Oesophagus length 200-215 µm long. Tail elongate conoid, terminus dorsally bent, measuring about 82-85 µm long, 2-3 caudal pores on each side.

Male : Not found.

Measurement : *Female* : L = 1.28-1.42 mm., a = 36.57-37.36, b = 6.4-6.6, c = 15.60-16.70, v = 44.57-45.77.

Distribution : Andhra Pradesh, Sikkim, West Bengal, and Mizoram.

Family XIPHINEMA Dalmasso, 1969

Subfamily XIPHINEMA Dalmasso, 1969

Genus ***Xiphinema*** Cobb, 1913

15. ***Xiphinema monohysterum*** Brown 1968

1968. *Xiphinema monohysterum*, Brown, *Nematologica*, **13** : 633.

Material : 1♀, 07.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Tomato (*Lycopersicon esculentum*).

Locality : Pukpui, Lunglei Dist. Mizoram.

Diagnosis : *Female* : Body long, slender, arcuate ventrally when fixed, tapering slightly towards head and tail. Lip region continuous 10 µm wide, slightly rounded. Amphids stirrup shaped with slit like aperture. Spear long and slender 145 µm long. Guiding ring 73 µm behind the head. Oesophagus typical of the genus, 340 µm long. Anterior part of oesophagus slender, with an 'S' bent near its junction with the posterior part when spear is not extended. Reproductive system mono-opisthodelphic, vulva a transverse sliit with well developed associated masculature, 615 µm long from anterior region, vagina 23 µm wide. Tail dorsally convex-conoid with sub digitate tip, 68 µm long.

Male : Not found.

Measurement : *Female* : L = 2.26 mm., a = 64.57, b = 6.64, c = 33.23, v = 27.21, G_2 = 10.84.

Distribution : Widely distributed in India and Mizoram state.

Family NORDIIDAE Jairajpuri and A.H. Siddiqi, 1964

Subfamily CEPHALODORYLAIMINAE Jairajpuri, 1967

Genus ***Acephalodorylaimus*** Ahmad and Jairajpuri, 1983

16. ***Acephalodorylaimus attenuatus*** Ahmad & Jairajpuri 1983

1983. *Acephalodorylaimus attenuatus*, Ahmad & Jairajpuri, *Nematologica*, **28** : 233 246.

Material : 1♀, 06.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Paddy (*Oryza sativa*).

Locality : Pukpui, Lunglei Dist. Mizoram.

Diagnosis : *Female* : Body 'C' shaped upon fixation, gradually tapering towards the both ends. Cuticle smooth, 2-3 µm thick at various places of the body (thickest at tail, 3 µm) Lip region 8 µm wide and 4 µm high, marked with a slight constrction at the base of lip region Amphid stirrup-shaped, 4 µm from anterior end. Odontophore 16 µm long. Guiding ring single, 7 µm from anterior end, cardia tongue-shaped, 12 µm long, 5 µm wide. Nerve ring at 85 µm from anterior end. Oesophagus length 200 µm from anterior end, maximum body width 22 µm long.

Female reproductive system mono-prodelphic, vulva a transverse slit, situated at 400 µm from anterior end. Vagina 8-9 µm long. Overy reflexed, short. Tail elongate conoid, ventrally arcuate, with pointed rounded tip, 65 µm long with two caudal pores on each side.

Male : Not found.

Measurement : *Female* : L = 0.78 mm., a = 35.45, b = 3.9, c = 12, v = 51.28.

Distribution : Sikkim, West Bengal, Andhra Pradesh and Mizoram

Family ACTINOLAIMIDAE Thorne, 1939

Subfamily NEOACTINOLAIMINAE Thorne, 1967

Genus ***Neoactinolaimus*** Thorne, 1967

17. ***Neoactinolaimus agilis*** Thorne 1967

1967. *Neoactinolaimus agilis*, Thorne, *univ. Puertorico Agr. Exp. Sta-Tech; paper no.* **43** : 1 48.

Material : 1♀, 06.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Brinjal (*Solonum melogina*).

Locality : Pukpui, Lunglei Dist. Mizoram.

Diagnosis : *Female* : Body straight upon fixation, tapering slightly towards the both ends. Cuticle finely striated transversely, 3-5 µm thick (thickest at tail .region). Lip region slightly wider than adjoining body. Amphids stirrup-shaped, 10 µm from anterior end. Odontostye 25 µm long. Guiding ring 19 µm from anterior end. Odontophore 30 µm long. Oesophagus about 510 µm long, maximum body width 44 µm long.

Vulva pore-like, situated 1130 µm long from anterior end. Female reproductive system amphidelphic, length of vagina 19 µm long. Female tail elongate, filiform, tapering gradually, measuring about 215 µm long.

Male : Not found.

Measurement : *Female* : L = 2.39 mm., a = 54.31, b = 4.68, c = 11.11, v = 47.28.

Distribution : Widely distributed in India, Mizoram.

Family NYGOLAIMIDAE Thorne, 1935

Subfamily NYGOLAIMINAE Thorne, 1935

Genus ***Laevides*** Heyns, 1968

18. ***Laevides laevis*** (Thorne, 1939) Thorne, 1974

1974. *Laevides laevis*, Thorne, *S. Dakota State univ. Agr. Exp. Sta. Tech. Bul.*, **41** : 1 – 120.

1982. *Laevides laevis* Ahmad and Jairajpuri, *Rec. zool. Surv. India, Occ. Paper No.* 34 : 31.

Material : 4♀♀, 03.04.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Jackfruit (*Artocarpus heterophyllus*).

Locality : New Serchhip, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body more or less straight upon fixation. Cuticle 2-3 µm thick at mid body and 3-4 µm on tail region. Lip region continuous with body contour. Amphids stirrup-shaped, their apertures slit-like. Nerve ring surrounding anterior slender part of oesophagus at 185-190 µm from anterior end. Cardia small and hemispherical. Oesophagus 440-450 µm long, Vulva a transverse slit, situated at 970-980 µm long from anterior end. Female reproductive system amphidelphic overies reflexed. A distinct sphincter present at oviduct-uterus junction. Maximum body width 39-40 µm long.

Rectum 22-27 µm, pre-rectum 35-90 µm long. Tail hemispherical to convex-conoid, slightly clavate 26-29 µm long.

Male : Not found.

Measurement : *Female* : L = 1.80-1.86 mm., a = 46.05-46.15, b = 4.0-4.1, c = 64.13-69.29, v = 52.68-53.88.

Distribution : Uttar Pradesh, Himachal Pradesh, Manipur, Mizoram.

Family QUDSIANEMATIDAE Jairajpuri, 1965

Subfamily QUDSIANEMATINAE Jairajpuri, 1965

Genus ***Labronemella*** Andrassy, 1985

19. ***Labronemella hemicaudata*** Baqri, 1991

1991. *Labronemella hemicaudata; Rec. zool. Surv. India, Occ. Paper No.* 128 : 37-40.

Material : 1♀, 31.03.1996, collected by S.C. Ghosh & party.

Habitat : Soil around the roots of Lemon (*Citrus limon*).

Locality : New Serchhip, Aizawl Dist. Mizoram.

Diagnosis : *Female* : Body ventrally curved upon fixation. Cuticle finely striated, 5-8 µm thick (thickest at tail region). Lip region discolaimoid type, 21 µm wide and 7 µm high, off set by a constriction. Amphids stirrup-shaped, their aperture 6 µm from anterior end. Guiding ring at 17 µm from anterior extriemities. Odontophore 45 µm long. Oesophagus length 500 µm.

Reproductive system amphidelphic, vulva a transeverse slit, situated at 1170 µm from anterior end, length of vagina 30 µm long, ovaries reflexed. Maximum body width 60 µm long. Tail rounded, 22 µm long with two caudal pores on each side.

Male : Not found.

Measurement : *Female* : L = 2.15 mm., a = 35.83, b = 4.3, c = 97.72, v = 54.41.

Distribution : Sikkim, Mizoram.

SUMMARY

Some Dorylaimid nematodes are important ectoparasites of agricultural as well as horticultural plants. The nematodes included in the present study were collected from the two districts of Mizoram state, such as Aizawl and Lunglei. There is no information available on the plant and soil nematodes and their distribution in the soil of Mizoram state. After investigations, it has been found that the order Dorylaimida is represent by nine families in the areas surveyed. Systematic studies of nineteen species belonging to the ten genera have been reported along with diagnostic characters of each species. The techniques of collection , preservation and taxonomy with key to the order, families, sub families, genera and species are dealt in this work. The species distribution of Mizoram state has also been included. The present study may serve as

preliminary account of the Dorylaimid nematode fauna of Mizoram.

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The List of the species, distribution and host plants

Sl. No.	Family	Name of the species	Host Plant	Distribution Districts
1.	Dorylaimidae	*Dorylaimus innovatus*	Paddy (*Oryza sativa*)	Thenzawl, Aizawl Dist.
		Laimydorus baldus	Paddy (*Oryza sativa*)	Thenzawl, Aizawl Dist.
		Laimydorus minimus	Lemon (*Citrus limon*)	Pukpui, Lunglei Dist.
		Laimydorus siddiqi	Paddy (*Oryza sativa*)	Pukpui, Lunglei Dist.
2.	Thornenematidae	*Thornenema nodicaudatum*	Coconut (*Cocos nucifera*)	New Serchhip, Aizawl Dist.
		Thornenema conura	Paddy (*Oryza sativa*)	Thenzawl, Aizawl Dist.
		Thornenema novum	Banana (*Musa paradisiaca*)	New Serchhip, Aizawl Dist.
3.	Aporecelaimidae	*Aporcelaimellus hynsi*	Paddy (*Oryza sativa*)	Aizawl Dist.
		Aporcelaimellus tropicus	Mango (*Mangifera indica*)	Serchhip, Aizawl Dist.
		Aporcelaimellus chauhani	Paddy (*Oryza sativa*)	Thenzawl, Aizawl Dist.
		Aporcelaimellus coomansi	Paddy (*Oryza sativa*)	Thenzawl, Aizawl Dist.
		Aporcelaimellus obscurus	Lemon (*Citrus limon*)	New Serchhip, Aizawl Dist.
		Aporcelaimellus indicus	Paddy (*Oryza sativa*)	Lunglei Dist.
4.	Dorylaimoididae	*Dorylaimoides micoletzki*	Lemon (*Citrus limon*)	Thenzawl, Aizawl Dist.
5.	Xiphinematidae	*Xiphinema monohysterum*	Tomato (*Lycopersican esculentum*)	Pukpui, Lunglei Dist.
6.	Nordiidae	*Acephalodorylaimus attenuatus*	Paddy (*Oryza sativa*)	Pukpui, Lunglei Dist.
7.	Actinolaimidae	*Neoactinolaimus agilis*	Brinjal (*Solanum melongena*)	Pukpui, Lunglei Dist.
8.	Nygolaimidae	*Laevides laevis*	Jackfruit (*Artocarpus heterophyllus*)	New Serchhip, Aizawl Dist.
9.	Qudsianematidae	*Labronemalla hemicaudata*	Lemon (*Citrus limon*)	New Serchhip, Aizawl Dist.

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PHYTOPHAGOUS NEMATODES (ORDER TYLENCHIDA, SUBORDER TYLENCHINA)

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INTRODUCTION

Plant-parasitic nematodes have been grouped under the order Tylenchida, though some of the members belonging to the order Dorylaimida are also plant-parasitic in nature. They are the largest and economically the most important group of plant parasitic nematodes. The greatest diversity of parasitic nematodes occurs amongst the parasites of roots. But they also feed on the buds, stem, crown, leaves and on developing seeds. Although most of the tylenchids are ectoparasitic, they may also exist in the aerial portion like seeds, may be endoparasitic, semi endoparasitic and migratory root endoparasitic in nature.

There is evidence that several highly adapted root parasites (e.g. *Heteroderidae*) have co-evolved with their hosts (Krall and Krall, 1970). They have a long history of about 400 million years, most likely originated in the Devonian period of the Palaozoic Era (Maggenti, 1971, Siddiqi, 1983a). But Siddiqi (1986) differs that the time of the origin of Tylenchida is assumed to be about the middle of the Paleozoic Era with a history of about 600 million years. Early Tylenchida must have been bulk feeders on bacteria, fungi and algae with their stylet-like stoma. Later with the evolution of the protrusible stylet, they evolved as parasites of rhizoids and roots.

In India, near about 600 species of Tylenchids under 70 genera have been reported (Ahmad, 1996). The State of Mizoram was surveyed during the year 1995-96. Among the three districts of this state, two districts, i.e., Aizawl and Lunglei were surveyed. The whole state is hilly and with tremendous hilly terrain having very little plain lands. Natural forests are enormous but agricultural lands as well as agriculture were very scanty. Only some terrace hill cultivation and Kitchen gardens were observed, from which soil samples were collected. Some horticultural practices with fruit plants were also observed.

As the soils except the forest areas are almost barren and as the entire state is hilly, the soils are mostly rocky and with minimum carbon content. As a result the soil nematode population is scanty. In addition to the above, a second factor stood constraint to get the tylenchid collection, that is acute scarcity of water. This is tragic that when the average rainfall in Mizoram is sufficiently high this water are not properly stored and the supply of water in pipe lines are low. This factor compelled not to process the soil samples for extraction of nematodes and the samples were brought to Kolkata after significant time gap when most of the tylenchids perished and only some dorylaimids could survive.

As because no other survey has been conducted in this remote North-Eastern state of India, the few genera and species which have been mentioned in this report are all new records from Mizoram.

MATERIALS AND METHODS

The collected soil samples were processed by standard methods and nematodes were extracted

from the soil by modified Baermann funnel technique (Chiristie and Perry, 1951). The collected nematodes were fixed with hot F.A. solution (Baqri, 1990). The fixed specimens were dehydrated in glycerin-alcohol solution by keeping it in desiccator. Finally, the specimens were mounted in anhydrous glycerin to make permanent slides.

MORPHOLOGY AND TERMINOLOGY

The nematodes are colourless, triploblastic, bilaterally symmetrical, unsegmented, pseudocoeclomate, round worms. They are called eel worms because of their serpentive eel-like body and round worm because of this body being circular in cross section. The plant parasitic nematodes are nearly microscopic, their body size among tylenchids usually range between 0.3 to 1.0 mm, rarely upto 3.0 mm. They are phasmidian but also may not have phasmids. Only the taxonomically important morphological characters are being discussed.

Body shape : All migratory tylenchida are eel-like and vermiform. The body is elongate cylindrical, tapering towards the extremities. The body posture on death or in relaxed condition (=habitus) is used as a diagonostic character.

Body wall and Cuticle : The body-wall consists of an outer cuticle, middle hypodermis and the inner somatic muscle layer. The cuticle is the exoskeleton of nematodes which covers the entire body. The cuticular markings and modifications are the improtant morphological diagnostic characters.

i. *Transverse markings and annules* : The outer layer of cuticle is marked with definite transverse grooves or striae. The portion between two consecutive striae is called annule.

ii. *Lateral field and Longitudinal markings* : Laterally, the body cuticle is marked by longitudinal incisures (lines, involutions). The lateral field is the area overlying the lateral hypodermal chord and is always marked by lateral markings. This area is actually provided with longitudinal ridges or lines which are called lateral lines or incisures. The transverse lines often intrude into the lateral lines and the patterns is known as areolation. Lateral fields and presence or absence of areolation are important taxonomic characters.

Lip region or cephalic region : The lip region or cephalic region or head of the nematodes show enormous variation and is very important taxonomic character. This region is characterized by the presence of a cuticularized framework which is basically hexaradiate. The framework may be low arched or high arched. The sclerotization may be weak or strong.

Nerve ring and other sensory structures : The nerve ring encircles the isthmus of the oesophagus. The hemizonid is the major latero-ventral commissure near the exerctory pore. The cephalids are the anterior ones just behind the cephalic region. The hemizonion occurs a little behind the hemizonid and caudalids in the tail region. These all are highly refractive band-like structure. The presence or absence of hemizonid and hemizonion and their position in relation to excretory pore are important taxonomically.

Amphids : These are paired lateral chemoreceptors located in the cephalic region on lateral lips, generally close to oral aperture. The amphid aperture may be pore-like, oval to rounded or may be slit-like transversely, longitudinally or obliquely.

Deirids : There are paired, small protruberances one on each side in the centre of lateral fields in the oesophageal region close to the level of excretory pore. The presence or absence of deirids in an important diagnostic character at higher level of hierarchy.

Phasmids : These are paired, lateral chemoreceptors usually one on each side of tail. They may sometimes be pre-anal or even situated more anteriorly or rarely absent. The usual location

of phasmid is in the centre of lateral field. Some times phasmids are large plate-like or shield-like and are called scutella. The shapes and position of phasmids are important taxonomic character.

Stoma : The oral opening or mouth leads to stoma. The stoma is basically made up of two parts : the anterior chelostome and the posterior oesophagostome. Both are highly sclerotized and possess hypodermic niddle like stomatostylet or style or spear.

Stylet : The stylet or spear of Tylenchida is a stomatostylet. It is composed of two parts–anterior conus and posterior shaft. The shaft bears three basal knobs of which one knob is dorsal and two are subventral. The tylenchid stylet varies in length from 5 μm to 180 μm. The size and shape of the stylet are important diagnostic feature.

Oesophagus (Pharynx) : In most tylenchids, the corpus is divided into precorpus and post corpus (or, procorpus and metacorpus). The oesphageal glands form a diverticulum overlapping the anterior intestine. The pre-corpus has six cells, running longitudinally from the median bulb to the base of the stylet. The post corpus or median oesophageal bulb is generally muscular.

Oesophageal glands : In tylenchids, there are three unicellular, uninucleate oesophageal glands, one each in the three sections of the glandular portion of oeasophagus either enclosed in the basal bulb or hanging free in the body cavity over lapping the intestine.

Oesophago-Intestinal Valve : This valve is comonly called cardia and present at the junction of oesophagus and intestine in all tylenchids.

Intestine : The intestine is a hollow tubular structure extending upto rectum. It may be cellular or syncytial and oligocytous. The intestine is divided into two parts–a short anterior part and a very long mid intestine.

Female Reproductive System : The female nematode possess either two sets of reproductive organs (Didelphic) or only one set (Monodelphic). When these are two sets, these are usually one on each side of vulva (Amphidelphic). When a single set is present it may be either anterior to vulva (mono-prodelphic) or posterior to vulva (mono-opisthodelphic). These are very important taxonomically.

Vulva : The vulva is a transverse slit-like aperture which may be transversely oval but rarely rounded. The position of vulva on the body, the presence of lateral vulval membrane and epiptygma are important diagnostic characters.

Vagina : The vagina is a short, narrow and flattened tube lined with cuticle and well developed musculature. The number of dilator and constrictor vaginae muscles vary in different species. The female genital tract comprises of uterus, oviduct, spermatheca and ovary.

Uterus : The uterus is the largest and most complex part of the reproductive tract. The upper (distal) part of uterus is differentiated into a sperm storage organ (spermatheca).

Ovary : The ovary is a hollow elongate tube and contain few to large number of oocytes. In tylenchida, the ovary is straight and outstretched except in some anguinids and heteroderids.

Male Reproductive System : The male reproductive organs consists of a single outstretched testis (monorchic) which leads to vas deferens, ejaculatory duct and finely opens to outside through cloaca. The secondary sexual organs like, gubernaculum, cloacal lips, genital papillae and bursa or caudal alae are very important taxonomically.

Tail : The presence of true tail, i.e. post-anal elongation of body is a unique feature of nematodes. Different shapes of tail, i.e. elongate, filliform, blunt, rounded, arcute, spicate, mammilate etc. and its size is taxonomically important character.

SYSTEMATIC LIST OF GENUS/ SPECIES DISCRIBED

(Classification after Maggenti *et al.*,1987)

Suborder TYLENCHINA Thorne, 1949

Superfamily TYLENCHOIDEA Orley, 1880

Family DOLICHODORIDAE Chitwood, 1950

Genus ***Dolichodorus*** Cobb, 1914

Family HOPLOLAIMIDAE Filipjev, 1934

Subfamily HOPLOLAIMINAE Filipjev, 1934

Genus ***Rotylenchus*** Filipjev, 1936

Genus ***Helicotylenchus*** Steiner, 1945

1. ***Helicotylenchus delhiensis*** Khan and Nanjappa, 1972
2. ***H. digonicus*** Perry, 1959

Genus ***Scutellonema*** Andrassy, 1958

3. ***Scutellonema scutellonema*** n. sp.

Genus ***Aphasmatylenchus*** Sher, 1965

4. ***Aphasmatylenchus mizoramensis*** n. sp.

Key to the Suborders of order TYLENCHIDA

1. Parasites of coelome or coelomic tissues of annelida, amphibia; terminal excretory duct and pore sucker like ..... MYENCHINA
- Free living or parasites of plants and arthropods; terminal excretory duct and pore not sucker like 2
2. Mycetophagous or non-root phyto-parasitic; arthropod-parasitic cycle present; oesophago-intestinal junction at or anterior to nerve ring, if posterior to it, then either oesophagal base with a prominent stem-like extension or two anterior most cells of intestine modified to act as valve; phasmid absent ..... HEXATYLINA
- Fungus feeding absent; arthropod-parasitic cycle absent, single generation cycle, non-mycetophagous or root-parasitic forms; oesophago-intestinal junction well behind nerve ring; phasmids may be present or absent ..... TYLENCHINA

Key to the Super-families of sub-order TYLENCHINA

1. Oral aperture round or oval, post corpus not massive and not amalgamated, cuticle never retrorse or with scales, spines, appendages or a double cuticle, phasmids or phasmid-like structure present ..... TYLENCHOIDEA
- Oral aperture dorsoventrally or slit like or 'I' shaped, postcorpus massive and amalgamated with pre-corpus. Cuticle either thin and finely annulated or thick or coarsely annulated with retrorse annules, seales, spines or an extra cuticular body sheath; phasmids absent ..... CRICONEMATOIDEA

Key to the available families of super-family TYLENCHOIDEA

1. Medium to large sized nematodes (1-3.5 mm); lip region roughly quadrangular to conspicuously four-lobed; tail long, filiform to spicate in females ..... DOLICHODORIDAE
- Small to moderately large (0.5-1.5 mm); lip region elevated, high arched; tail typically short, rarely longer ..... HOPLOLAIMIDAE

Family DOLICHODORIDAE Chitwood, 1950

Diagnosis : Medium to large sized nematodes (1-3.5 mm long), vermiform with deeply annulated thick cuticle. Lateral field each with 3-4 lines. Deirids present. Phasmids pore like on the tail or just anterior to it. Lip region elevated, rounded. Lip region roughly quadrangular to conspicuously four-lobed in En face view. Stylet long to very long. Conus markedly longer than shaft; basal knobs rounded, laterally or posteriorly directed without any anterior indentation. Oesophago-intestinal valve strongly developed. Female reproductive system amphidelphic. Vulval flaps and epiptygma absent. Tail long, filiform to spicate in females.

Genus ***Dolichodorus*** Cobb, 1914

1914. *Dolichodorus* sp. Cobb, N.A. North American free living freshwater nematodes. Contributions to a Science of Nematology, II. *Trans. Am. Micr. Soc.*, **33** : 69-134.

Female : Body straight to slightly arcuate upon fixation. Phasmids just postanal. Cephalic region four lobed and deeply set off from body. Stylet very long (about 54-170 µm). Median and basal bulb well developed. Female tail convex conoid anteriorly, then conoid spicate to filiform.

Male : Not found.

Habitat and distribution : Rhizospheric soil of orange in Thenzawl and West Phaileng of Aizwal District, Mizoram, India.

Family HOPLOLAIMIDAE Filipjev, 1934

Diagnosis : Small to moderately large (0.5-1.5 mm). Females vermiform to kidney shaped. Lateral fields typically with four lines. Deirids absent. Phasmids small pore like or large scutellum like. Lip rigion elevated. Stylet strong; knobs rounded, indented or tulip shaped. Median bulb strong. Oesophageal glands generally overlapping the anterior portion of intestine. Female genital system mostly amphidelphic, rarely monoprodelphic. Epiptygma and vulval flaps generally present, sometimes inconspicuous. Tails generally short, less than two anal body width long, rarely longer.

Subfamily HOPLOLAIMINAE Filipjev, 1934

Diagnosis : Adult females vermiform. Lateral field with four lines or less. Phasmids small or enlarged (scutellum), rarely absent. Lip region high arched, strongly sclerotized. Stylet strong, basal knobs well developed. Oesophageal glands either not overlapping intestine or enlarged and overlapping intestine. Ovaries always outstretched with equal length or posterior branch may be smaller and reduced to post-vulval uterine sec. Tail generally short with various shapes.

Key to the available genera of subfamily HOPLOLAIMINAE

1. Phasmids absent or not detectable .... *Aphasmatylenchus*
– Phasmids present; pore-like or scutellum-like 2
2. Phasmids large, scutellum-like .... *Scutellonema*
– Phasmids small, pore-like 3
3. Lip region offset, dorsal oesophageal gland orifice less than ¼ th stylet length behind stylet base. Oesophageal glands overlapping intestine dorsally ..... *Rotylenchus*
– Lip region continuous; dorsal oesophageal gland orifice ¼ to ½ stylet length behind stylet base; oesophageal glands overlapping tentestine ventrally ..... *Helicotylenchus*

Genus *Aphasmatylenchus* Sher, 1965

Aphasmatylenchus mizoramensis n. sp.
(Fig. 1, A-C)

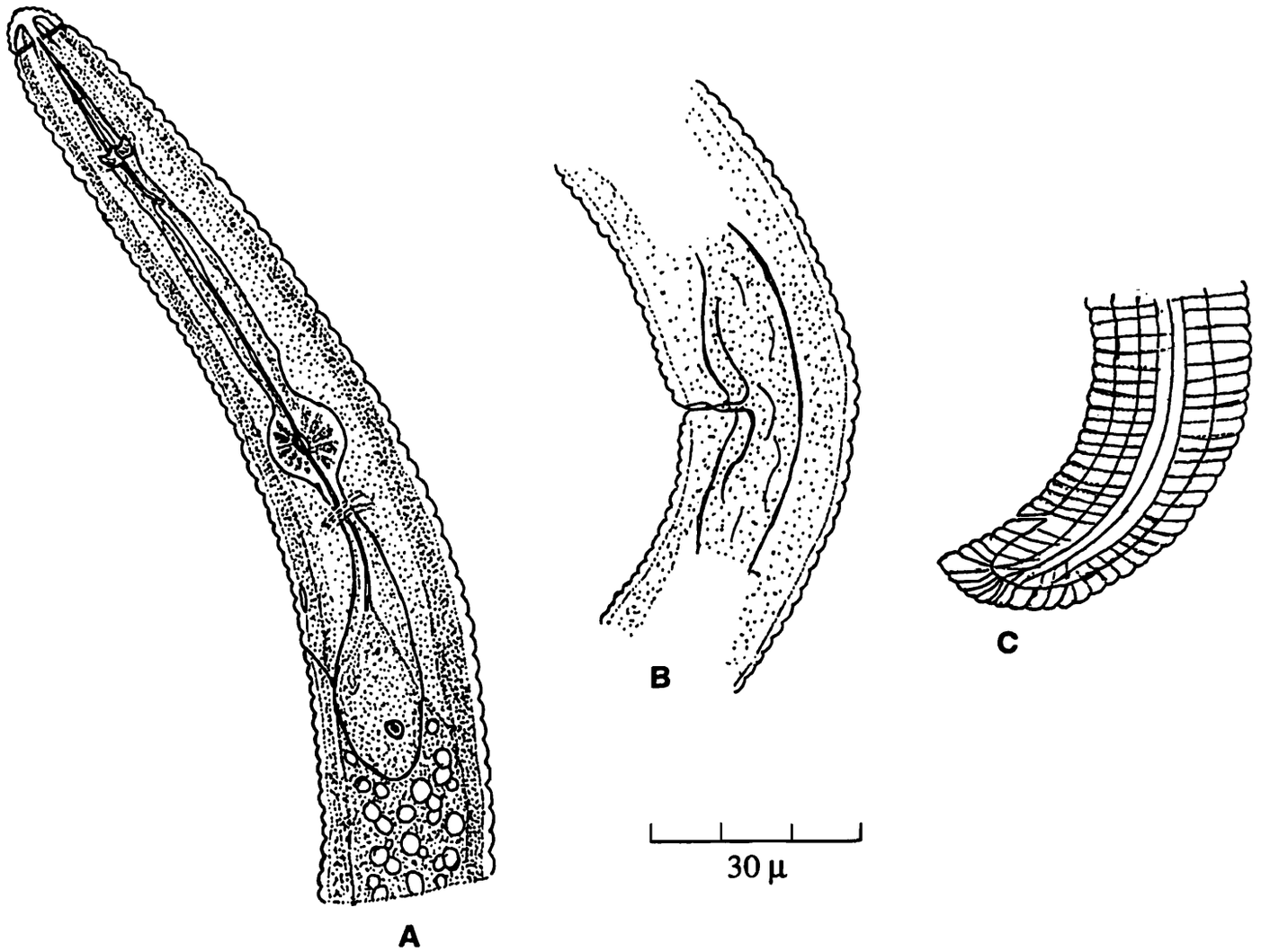
Dimensions : *Paratype females (n = 8)* : L = 0.66-0.69 mm; a = 22.33-27.5; b = 6.29-7.33; c = 45.33-56.66; v = 60.0-63.63; c′ = 0.8-1.0; Stylet length = 20 µ-22 µ, Tail length = 12 µ-15 µ.

Holotype female : L = 0.67 mm; a = 24.81; b = 6.97; c = 55.83; v = 61.34; c′ = 1.0; Stylet length = 21µ; Tail length = 12 µ.

Body 'C'-shaped to circular upon fixation. Head region almost hemispherical, slightly but distinctly set off from the body with six annules. Amphid slit-like at the base of the labial disc. Length of spear 21 µ, spear knobs indented with three anteriorly directed projections. Oesophageal glands large, forming a lobe overlapping the intestine almost ventrally. Excretory pore slightly posterior to the oesophago-intestinal junction. Ovaries paired, outstretched, vulva slightly post-equatorial without any flap or epiptygmata. Intestine overlapping anus into tail region, hanging like a sac. Phasmids absent. Tail short, about one anal-body width long, tail tip conoid.

Male : Not found.

Type habitat and locality : The specimens were collected from the soil associated with jackfruit tree (*Artocarpus* sp.) from the campus of Agricultural Rest House, Kolasib, Aizawl District, Mizoram, India.



Figs. 1(A-C). : *Aphasmatylenchus mizoramensis* n. sp. A. Anterior end; B. Vulval region; C. Tail end showing tail tip.

Type specimens : The types have been deposited to the National Zoological Collections, Zoological Survey of India, Kolkata-700 053, India.

Diagnosis and relationship : *Apasmatylenchus mizoramensis*, the proposed new species comes closer to *A. nigeriensis* Sher, 1965 and *A. variabilis* Germani and luc , 1984, but this differs from *A. nigeriensis* Sher, 1965 by having a shorter body length, shorter spear (L = 1.01-1, 46 mm, spear = 29-32 µ in *A. nigeriensis*) , and also by possessing stylet knobs with three anteriorly directed indentations. Tail is also shorter in the newly proposed species with a conoid terminus (in *A. mnigeriensis* tail is 1.75 anal-body width long with a hemispherical terminus).

Although the present species markedly resemble *A. variabilis* Germani and Luc, 1984 in respect of their general body shape and length, stylet length, as well as their tail shape, but it distinctly differs from the former one in having stylet-knobs with three anteriorly projected indentations and by lacking 'Serpentine' in the intestine at the mid body (in *A. variablis* stylet-knobs are round and 'Serpentine' in the intestine present). Further more, internal epiptygmata in vulva is absent in the proposed new one and the tail is shorter (internal epiptygmata in vulva present in *A. variabis* and tail is longer), which sufficiently differentiate them as two separate species.

The comparison of the above features with the nearest allies makes significant differences to propose the present species as a new one.

The present species *Aphasmatylenchus mizoramensis* is named after the state of Mizoram

as because the genus is being reported for the first time from the above mentioned state as well as from India.

REMARKS

The genus *Aphasmatylenchus* created a lot of controversies regarding its placement in the family and subfamily levels among different authors. Originally Sher (1965) created a new subfamily Aphasmatylenchinae under the family Hoplolaimidae to accommodate the only as well as the type genus *Aphasmatylenchus*.

In Golden's (1971) system of classification subfamily Aphasmatylenchinae has been placed under the family Hoplolaimidae with the single genus, in which the original inclusion of the genus by Sher (1965) had been accepted. On the contrary, Siddiqi (1971) removed the subfamily Aphasmatylenchinae with the only genus *Aphasmatylenchus* from the family Hoplolaimidae. He included it in the composition of the family Belonolaimidae and 'it appears the most natural one' (Krall, 1985). But Siddiqi (1986) again accepted the original view of Sher (1965) regarding the incorporation of the genus in the family and subfamily levels. Fotedar and Handoo (1978) raised Aphasmatylenchinae to family rank.

Maggenti *et al.* (1987) reappraised the classification of suborder Tylenchina and in this modified scheme of classification they included *Aphasmatylenchus* under subfamily Hoplolaiminae. Subsequently, Fortuner (1987) questioned about the origin and evolution of the genus because of the absence of any known intermediate genus between *Aphasmatylenchus* and the ancestral proto-Hoplolaimidae. He firmly advocated not to create a separate taxon for this genus and ignored the subfamily Aphasmatylenchinae as a taxon under Hoplolaimidae.

Genus *Scutellonema* Andrassy, 1958

Scutellonema scutellonema n. sp.
(Fig. 2, A-D)

Paratype Females (n = 5) : L = 0.87 mm-0.98 mm; a = 28.21-33.53; b = 7.02-8.19; c = 65.83-75.00; c′ = 0.52-0.6; V = 53.84 - 57.84; v′ = 54.65-57.0; Stylet length = 26 µm to 29 µm; Tail length = 13 µm-15 µm.

Holotype female : L = 0.98 mm; a = 28.89; b = 8.05; c = 70.0; c′ = 0.56; v = 55.74; v′ = 55.73; stylet length = 28 µm; tail length = 14 µm.

Female : Body 'C'-shaped upon fixation; head elevated, lip region with four to five annules, hemispherical, almost continuous or slightly set off, 5-7 µm. wide and 8-10 µm high. Spear 26-29 µm long. Spear knobs rounded without indentation or any projection. Excretory pore just above the oesophageal glands at the level of isthmus. Oesophageal glands overlapping the intestine on its dorsal side. Cuticle 2 µm wide at the equatorial region of the body.

Vulva transverse and slightly post equatorial in position (V = 53.84-57.84). Vaginal glands absent. Reproductive system amphidelphic, outstretched, lengths of anterior and posterior genital branch almost same or slightly vary. Length of vagina 11-12 µm Epiptygma not detected.

Phasmids in the form of enlarged scutella, almost filling the lateral field with a diameter of 6-7 µm, situated at the level of anus or slightly posterior to it. Lateral field with four incisures. Tail short, 13-15 µm long Number of cuticular rings on tail ranges from 8 to 10. Tip of the tail usually blunt and obtuse, often with slight invagination.

Male : Not found.

Diagnosis and relationship : *Scutellonema scutellonema* n. sp. is characterised by its enlarged scutellum like phasmids, absence of vaginal

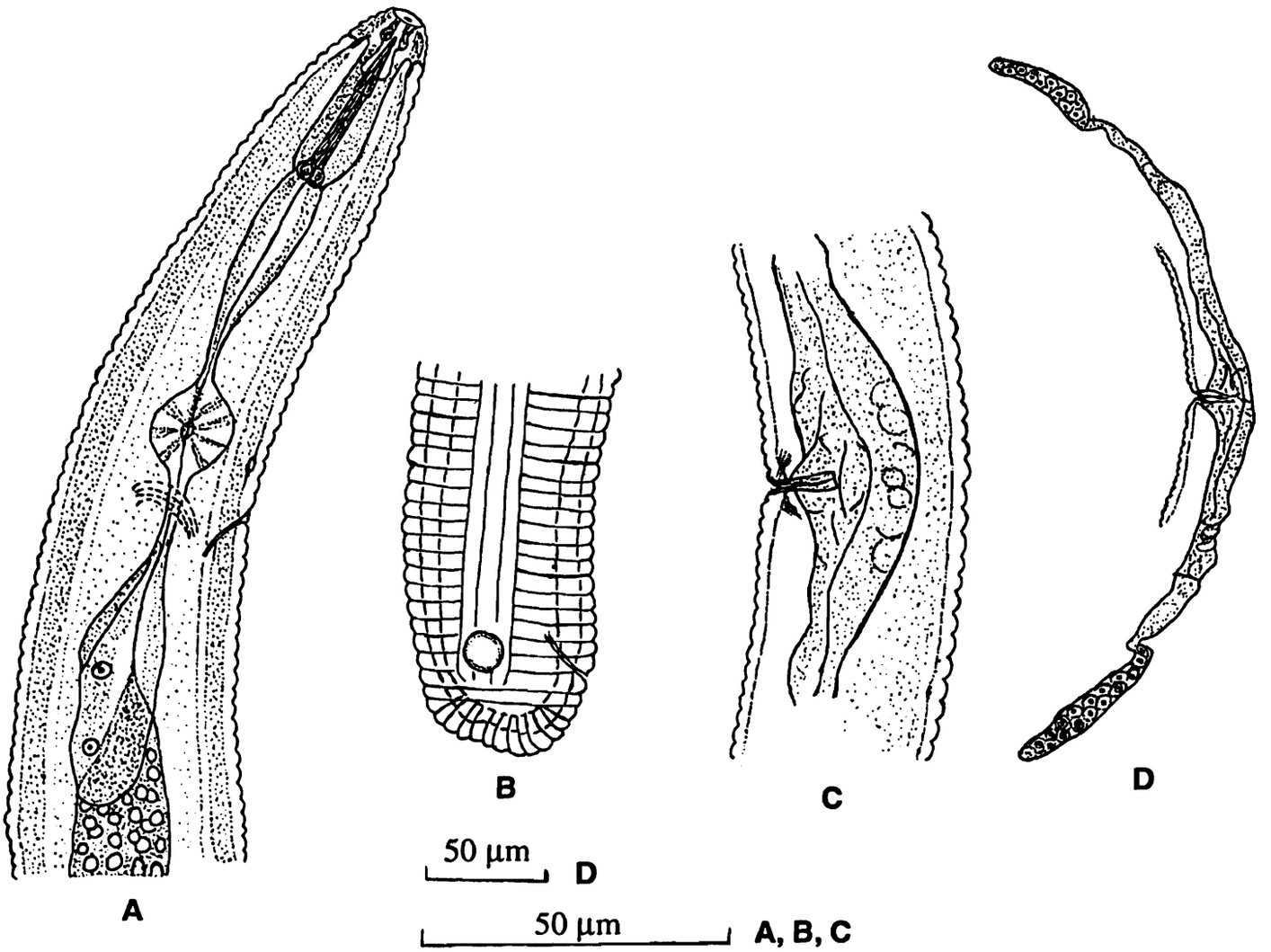


Fig. 2(A-D). : *Scutellonema scutellonema* n. sp. A. Anterior end; B. Tail region of female showing large scutellum and tail tip; C. Portion of female reproductive system showing vulva; D. Entire reproductive system of female.

glands, much shorter tail length and blunt tail tip, often with sligth invagination, although it has some overlapping characters with its nearest allies such as *Scutellonema bradys* (Steiner and Le Hew, 1933) Andrassy, 1958, *S. aberrans* (Whitehead, 1959) Sher, 1961, *S. magniphasmum* Sher, 1963, *S. grande* Sher, 1963 and *S. validum* Sher, 1963.

First of all, it is the most important to note that the proposed species significantly differs from its all other closely related ones except *S. magniphasmum* Sher, 1963 in having enlarged scutella with a diameter of 7 µm.

The newly proposed species comes closer to *Scutellonema bradys* (Steiner and Le Hew, 1933) Andrassy, 1958 in various measurements particularly in stylet length (25-29 µm in *S. bradys*) but differs significantly from the former one in having a shorter body length, a greater c-value, less number of tail annules (L = 77-1.02 mm and c = 29-44, number of tail annules 14-20 in *S. bradys*) and also having no vaginal glands whereas *S. bradys* has four well developed vaginal glands.

The species under description resembles *S. aberrans* (Whitehead, 1959) Sher, 1961 having almost same range in body and spear length (L = 0.65-0.98 mm. and spear = 25-31 µm in *S. aberrans*). But it shows its distinctiveness by possessing large scutellum like phasmids (diameter of phasmid in *S. aberrans* 3-4 µm). It also differs from the former one in the shape of lip region, tail tip and number of tail annules and having no epiptygma at vulva (in *S. aberrans* lip region round

and set off, tail round with 15 to 22 annules, paired and conspicuous epiptygma).

The present species is close to *S. magniphasmum* Sher, 1963 in general body shape (except tail tip) and in having large scutella with more or less same diameter (7 µm) almost completely filling the lateral field. But it differs from the former species in having longer body, shorter spear, in shape of tail tip and in other measurement values and possessing no epiptygma (in *S. magniphasmum*, L = 0.75-0.87 mm, spear = 34-38 µm, a = 20-27, c = 40-70, tapering tail with rounded tip and inconspicious paired or unpaired epiptygma).

Although the present species shows similarities with *S. grande* Sher, 1963 in some measurement values and in the structure of lip region, but exhibits differences with shorter stylet length, tail shape, number of tail annules, in size of scutella and vulva without epiptygma (in *S. grande* Spear = 35-39 µm, tapering tail with rounded terminus, tail annules 14-22, diameter of scutellum = 3 µm, epiptygma paired but inconspicuous).

Finally, the proposed species, although comes closer to *S. validum* Sher, 1963, it can be distinctly differentiated by shorter body and spear length, large scutella and in tail shape (in *S. validum* L = 0.81-1.10 mm, spear = 33-38 µm, scutellum = 4 µm and round tail) and having no anterior projection in spear knob and epiptygma with vulva.

The genus *Scutellonema* Andrassy, 1958 was established for the presence of large scutellum like phasmid and as the present species also possesses significantly large scutellum, hence the specific name is being being proposed after the generic name.

Type habitat and locality : Soil around the roots of cucumber plants (*Cucumis sativus* L.) collected from Pukpui village, Lunglei district of Mizoram, India.

Type specimens : Collected by the authors. The types have been deposited with the National Zoological Colections, Zoological Survey of India, Kolkata-700 053, India and registered with the Holotype No. WN 843 and Paratype No. WN 844 (on the slide).

Genus ***Rotylenchus*** Filipjev, 1936

1936. *Rotylenchus* sp. Filipjev, I.N. On the classification of the Tylenchinae. *Proc. Helminth. Soc. Wash.*, **3** : 80-82.

Female : Body spiral to 'C'-shaped. Cephalic region rounded, annulated, set off or continuous. Basal annule with longitudinal indentations; labial disc usually distinct. Oesophageal glands extending over intestine dorsally and laterally. Lateral field with four lines. Phasmids small, pore-like usually located in or near anal region. Stylet and stylet knobs average sized; knobs rounded or indented. Ovaries paired & symmetrical. Epiptygma present. Female tail short, hemispherial.

Male : Not found.

Habitat and Distribution : Soil associated with paddy and banana in Aizawl and Lunglei districts, Mizoram. The genus is fairly common in India.

Genus ***Helicotylenchus*** Steiner, 1945

Helicotylenchus delhiensis Khan and Nanjappa, 1972

1972. *H. delhiensis* Khan, E. And Nanjappa, C. K. Four new species in the super family Hoplilaimoidea (Tylenchida, Nematoda) from India. *Bull. Ent.* (1970), **11** : 143 149.

Female : Body spirally coiled on fixation. Lip region continuous with body, hemispherical with 3-4 annules. Cephalic region moderately sclerotised. Stylet length 24-27 µ, cones being 40-47.6 % of the total stylet, knobs almost rounded. Oesophageal gland overlapping the intestine ventrally. Vulva inform of a stransverse slit, post equatorial; ovaries paired, outstretched; oocytes in

a single row; spermatheca offset. Phasmids small pore-like at the level of annus or slight anterior to it. Tail short, annules on tail prominent; number of tail annules 12-13. Tail tip conoid or bluntly rounded.

Dimensions : L = 0.56-0.66 mm; a = 23.63-27.2, b = 3.8-5.00; c = 37.14-46.4; c′ = 1.0; v = 59.49-66.81 ; v′ = 61.76-67.39; stylet length = 24-27 µm.; m = 40-47.6; tail length = 12-17 µm.

Male : Not found.

Habitat and Distribution : Soil associated with Jackfruit in Kolasib and Pineapple in West Phaileng of Aizawl district, Mizoram.

***Helicotylenchus digonicus*, Perry 1959**

1959. *H. digomicus* Perry, V. G. A note on digonic hermaphroditism in spiral nematodes (*Helicotylenchus* spp.) *Nematologica,* 4(1) : 87-88.

Female : Body assumes open spiral or 'c'-shaped on fixalion. Lip region continuous with the body, hemispherical with 4 annules; cephalic frame work scelrotised. Stylet 24-27 µ long. Well developed with round to anteriorly flat basal knobs. Vulvular apparatus distinct. Oesophageal gland overlapping the anteriormost portion of intestine ventrally. Vulva inform of transverse slit. Both the genital branches well developed and outstreched; oocytes in a single row; spermatheca present. According to Perry (1959) these species considered as a 'digonic hermaphrodite. Phasmids slightly anterior to anus. Lateral lines 4, nonareolated. Tail with 10-12 annules, with bluntly rounded tip.

Remark : *H. digonicus* is being reported for the first time from India. Perry (1959) identified the unique character 'spermagonium' in each uterus of this species. Although the present specimens are longer than the originally described species with a comparatively shorter tail; these resemble *H. dgonicus* in all other characters.

Dimensions : L = 0.90-0.98 mm; a = 23.52-27.85, b = 6.0-7.14; c = 57.14-61.22; c′ = 0.5-0.6; v = 55-57.16; stylet length = 25-29.4 µm; tail length = 14.7-17.5 µm.

Male : Not found.

Habitat and Distribution : Soil associated with Paddy and Banana in Pukpui of Lunglei district, Mizoram.

CONCLUSION

This would have to be agreed that reporting of only six tylenchids actually does not reflect the true picture of species diversity of tylenchids in Mizoram. This in fact, that population of nematodes are relatively poor in Mizoram soil compared to those of other states like West Bengal, Tripura or Meghalaya etc. But actual member of species which were collected there could not be recorded as the soils were not immediately subjected to filtration and suspension due to scarcity of water. The delay in extraction helped the tylenchids to perish.

All the species, whether they are tylenchids or dorylaimids, are first/new record from the state as the soil of Mizoram was never tasted for such work. The presence of two new species under two separate genera like *Scutellonema* and *Aphasmatylenchus* in the report are very much indicative that if the survey and processing of soil samples are conducted in proper form as desirable can definitely yield a good number of new genera and species.

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List of genera and species available in Mizoram

Family	Name	Host Plant	Distribution
Dolichoridae	*Dolichodorus* sp.	Orange	Thenzawl, West Phaileng of Aizawl Dist.
Hoplolaimidae	*Aphasmatylenchus mizoramensis* n. sp.	Jack Fruit	Kolasib, Aizawl Dist.
	Scutellonema scutellonema n. sp.	Cucumber	Pukpui, Lunglei Dist.
	Rotylenchus sp.	Paddy & Banana	Aizawl & Lunglei Dist.
	Helicotylenchus astriatus	Jack Fruit, Pineapple	Kolasib & W. Phileng, Aizawl Dist.
	H. digonicus	Paddy, Banana	Pukpui, Lunglei Dist.

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 43-82, 2007

NEMATODE PARASITES OF VERTEBRATES

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INTRODUCTION

Mizoram, one of India's north-eastern State, situated between longitude 92.15′′ to 93.29′′E and latitude 21.58′′ to 24.35′′N covering an area of 21,081 sq. km. It is bounded on the west by Tripura State and Bangladesh and on the east and south by the Chin hills of Myanmar (formerly Burma). Manipur and the Cachar district of Assam are on the noroth of Mizoram.

Formerly known as Mizo hills district of Assam, from which it was first seperated as a Union Territory in 1972. It was made a seperate fullflaged State of India in 1987. For Administrative point of view it is divided into three districts, namely, Aizawal, Chhimtuipui and Lunglei, with headquarters at Aizawal, Chhimtuipui and Lunglei respectively.

Topographically, Mizoram is within the hill areas of north-east region. Major portion of the total land of the State is under forest cover. As such fauna as well as flora of the State is very rich. Mizoram has warm tropical climate. Temperatures are high in the vallys and cooler in the mountains. The South-west Monsoon arrives early in the region some time in May and lasts till September. It results in an annual rainfall of 254 cm. But in the southern part of the State it rains more. Hot and humid Climate is an ideal situation for survival propogation of helminth parasites in general.

There has been no dearth of initiative to investigate the nematode parasites of vertebrates hosts in Mizoram State. However, the following reports deals with a considerable collection of nematodes made by the senior author while surveying the State during 3rd December, 1993 to 7th January, 1994, 31st March to 6th May, 1995 and 5th January to 4th February, 1997.

The present work was under taken as a part of the Programme initiated by the Zoological Survey of India, Kolkata, to assess the faunal richness of the State.

This report comprises 49 species, contained in 35 genera, 24 families and 5 orders, of which 10 species are new to science. Most of the remaining species are well known in India, but reported from Mizoram for the first time. Keys for the subfamilies, genera and species, wherever necessary are provided. The classification followed for higher taxa is more or less based on the CIH keys.

It also includes a host parasite list.

All measurements are in millimeter.

MATERIAL AND METHOD

(i) ***Host collection*** : The vertebrate hosts examined for the nematode infection in the present study were collected during Mammalian and Avifauna survey from 1993 to 1997 on three occations, in different localities in Aizawal, Lunglei and Chhimtuipui districts of Mizoram. The hosts examined from these localities include some reptiles, amphibia, birds, small mammals

and fishes. Hosts were either purchased from the market or animal collectors or collected in the field by trapping, netting etc. Apart from the hosts mentioned above, intestines of some domesticated animals; slaughted locally, were also collected for examination.

(ii) ***Host examination*** : Living reptiles, amphibia, birds and mammals (mostly rodents) etc. were brought to the field laboratory and dissected for search of helminth parasite. Hosts were dissected in the laboratory as soon as possible in order to remove the worms in the living condition. Various organs of the hosts were carefully examined for the infection. All the worms collected were fixed as soon as possible.

The collected parasites were washed with the help of a pippet, brush or a needle in normal saline to remove extraneous matter attached to the worms.

(iii) ***Fixation and Preservation*** : Nematodes collected from visceral organs were fixed by putting them straight in a clean petridish and 70% steaming alcohal was poured over them. But in the case of filariids, for better result, they were fixed instantly by immersing them directly from body cavity to 70% steaming alcohal instead of washing them in normal saline as otherwise the specimens will burst. The worms thus fixed was preserved in a vaial in 70% alcohal with a few drops of glycerine and a proper lebel with the name of host, locality, location of the parasite, date of collection and collector's name was given.

(iv) ***Study of worms*** : During study the specimens were cleared either in Creosote (Beech wood) or Lactophenol. Before restoring them into 70% glycerinealcohal, they were washed in 70% acid alcohal, to prevent their darkening. In the case of delicate and small specimens glycerine was used as clearing agent.

LIST OF PARASITIC NEMATODES OF VERTEBRATE HOSTS RECORDED FROM MIZORAM

Subclass I ADENOPHOREA

Order I ENOPLIDA

Superfamily 1 TRICHINELLOIDEA

Family I TRICHURIDAE (Ransom, 1911) Railliet, 1915

Subfamily CAPILLARINAE Railliet, 115

Genus 1. ***Capillaria*** Zeder, 1800

1. *Capillaria hepatica* (Bancroft, 1894) Travassons, 1915
2. *Capillaria* sp.

Subclass II SECERNENTEA

Order II ASCARIDIDA

Superfamily 1 ASCARIDOIDEA

Family II ASCARIDIDAE Baird, 1853

Subfamily ASCARIDINAE (Baird, 1853) Hartwich, 1974

Genus 2. ***Ascaris*** Linnaeus, 1758

3. *Ascaris* Sp.

Subfamily TOXOCARINAE (Hartwich, 1954) Osche, 1958

Genus 3. ***Toxocara*** Stiles, 1905

4. *Toxocara mystax* (Zeder, 1800)

Superfamily II COSMOCERCOIDEA

Family III COSMOCERCIDAE (Railliet, 1916 subfam.) Travassos, 1925

Subfamily COSMOCERCINAE Railliet, 1916

Genus 4. ***Cosmocercoides*** Wilkii, 1930

5. *Cosmocercoides dukae* (Holl, 1928)

Genus 5. ***Oxysomatium*** Railliet and Henry, 1916

6. *Oxysomatium macintoshii* (Stewart, 1914) Karve, 1927

Superfamily III HETERAKOIDEA

Family IV ASCARIDIIDAE Travassos, 1919

Genus 6. ***Ascaridia*** Dujardin, 1845

7. *Ascaridia galli* (Schrank, 1788) Freeborn, 1923

Family V HETERAKIDAE Railliet and Henry, 1912

Subfamily HETERAKINAE Railliet and Henry, 1912

Genus 7. ***Heterakis*** Dujardin, 1845

8. *Heterakis spumosa* Schneider, 1866

9. *Heterakis mizoramensis* sp.n.

10. *Heterakis gallinae* (Gmelin, 1790) Freeborn, 1923

11. *Heterakis* sp.

Subfamily II METETERAKINAE Inglis, 1967

Genus 8. ***Meteterakis*** Karve, 1930

12. *Meteterakis gekkonis* sp.n.

13. *Meteterakis* sp.

Superfamily IV SEURATOIDEA

Family VI SEURATOIDAE (Hall, 1916) Railliet, 1906

Subfamily SEURATINAE Hall, 1916

Genus 9. ***Skrjabinura*** Gnedina, 1933

14. *Skrjabinura* sp.

Family VII QUIMPERIIDAE (Gendre, 1928) Baylis, 1930

Subfamily QUIMPERIINAE Gendre, 1928

Genus 10. ***Gendria*** Baylis, 1930

15. *Gendria ranarum* Karve, 1944

Superfamily V SUBULUROIDEA

Family VIII SUBULURIDAE (Travassos, 1914) Yorke and Maplestone, 1926

Subfamily SUBULURINAE Travassos, 1914

Genus 11. ***Subulura*** Molin, 1860

Subgenus ***Subulura*** Molin, 1860

16. *Subulura (Subulura) galloperdices* (Baylis and Daubney, 1922)

Order III OXYURIDA

Superfamily OXYUROIDEA

Family IX PHARYNGODONIDAE Travassos, 1919

Genus 12. ***Pharyngodon*** Diesing, 1861

17. *Pharyngodon* sp.

Family X OXYURIDAE Cobbold, 1864

Genus 13. ***Syphacia*** Seurat, 1916

Subgenus ***Syphacia*** Petter and Quentin, 1976

18. *Syphacia (syphacia) pearsoni* sp. n.

Order IV SPIRURIDA

Superfamily I PHYSALOPTEROIDEA

Family XI PHYSALOPTERIDAE (Railliet, 1893 subfam.) Leiper, 1908

Subfamily I THUBUNAEINAE (Sobolev, 1949 tribe) Chadaud, 1975

Genus 14. ***Thubunaea*** Seurat, 1914

19. *Thubunaea tulsidasi* Dey Sarkar, 2000

Subfamily II PHYSALOPTERINAE Railliet, 1893

Genus 15. ***Physaloptera*** Rudolphi, 1819

20. *Physaloptera brevispiculum* V. Linstow, 1906

21. *Physaloptera* sp.

Genus 16. ***Pseudophysaloptera*** Baylis, 1934

22. *Pseudophysaloptera* sp.

Superfamily II SPIRUROIDEA

Family XII SPIRURIDAE Oerley, 1885

Genus 17. ***Spirura*** Blanchard, 1849

23. *Spirura tupiae* sp.n.

Genus 18. ***Protospirura*** Seurat, 1914

24. *Protospirura muris* (Gmelin, 1790) Seurat, 1915

Family XIII SPIROCERCIDAE (Chitwood and Wehr, 1932 subfam.) Chabaud, 1975

Subfamily I SPIROCERCINAE Chitwood and Wehr, 1932

Genus 19. ***Cylicospirura*** Vevers, 1922

Subgenus ***Gastronodus*** (Singh, 1934 gen.)

25. *Cylicospirura (Gastronodus) strasseni* (Singh, 1934)

Subfamily II MASTOPHORINAE, Quentin, 1970

Genus 20. ***Mastophorus*** Diesing, 1853

26. *Mastophorus magnus* Khera, 1954

Superfamily III HABRONEMATOIDEA

Family XIV HABRONEMATIDAE (Chitwood and Wehr, 1932) Ivaschkin, 1961

Subfamily I HABRONEMATINAE Chitwood and Wehr, 1932

Genus 21. ***Habronema*** Diesing, 1861

27. *Habronema tripurensis* Dey Sarkar, 2000

28. *Habronema otusi* Dey Sarkar, 2000

Subfamily II HISTOCEPHALINAE Gendre, 1922

Genus 22. ***Viguiera*** Seurat, 1913

29. *Viguiera* sp.

Family XV CYSTIDICOLIDAE (Skrjabin, 1946 subfam.) Chabaud, 1975

Genus 23. ***Parascarophis*** Campana-Rouset, 1955

30. *Parascarophis* sp.

Superfamily IV ACUARIOIDEA

Family XVI ACUARIIDAE (Railliet, Henry and Sissoff, 1912 subfam.) Seurat, 1913

Genus 24. ***Acuaria*** Bremser, 1811

31. *Acuaria* sp.

Superfamily V THELAZIOIDEA

Family XVII THELAZIIDAE Skrjabin, 1915

Subfamily OXYSPIRURINAE (Skrjabin, 1915 fam.) Yamaguti, 1961

Genus 25. ***Oxypsirura*** Drasche in Stossich, 1897

32. *Oxyspirura* sp.

33. *Oxyspirura* sp.

Superfamily VI RICTULARIOIDEA

Family XVIII RICTULARIIDAE (Hall, 1915 subfam.) Railliet, 1916

Genus 26. ***Pterygodermatites*** Wedl, 1861

Subgenus ***Mesopectines*** Quentin, 1969

34. *Pterygodermatites (Mesopectines) viverriculae* sp.n.

35. *Pterygodermatites (M.)* sp.

36. *Pterygodermatites (M.)* sp.

37. *Pterygodermatites (M.)* sp.

Superfamily VII DIPLOTRIAENOIDEA

Family XIX DIPLOTRIAENIDAE (Skrjabin, 1916 subfam.) Anderson, 1958

Subfamily I DIPLOTRIAENINAE Skrjabin, 1916

Genus 27. ***Diplotriaena*** Railliet and Henry, 1909

38. *Diplotriaena coracinae* sp.n.

39. *Diplotriaena enicuri* sp.n.

40. *Diplotriaena nepalensis* Soota and Chaturvedi, 1967

Subfamily II DICHEILONEMATINAE Wehr, 1935

Genus 28. ***Hamatospiculum*** Skrjabin, 1916

41. *Hamatospiculum dicruri* Tubangui, 1934

Superfamily VIII APROCTOIDEA

Family XX APROCTIDAE (Yorke and Maplestone, 1926 subfam.) Skrjabin & Schikhobalova, 1945

Subfamily APROCTINAE Yorke and Maplestone, 1926

Genus 29. ***Squamofilaria*** Schmerling, 1925

42. *Squamofilaria indica* sp.n.

43. *Squamofilaria* sp.

Family XXI ONCHOCERCIDAE (Leiper, 1911)

Subfamily SPLENDIDOFILARIINAE Chabaud and Choquet, 1953

Genus 30. ***Chandlerella*** Yorke and Maplestone, 1926

44. *Chandlerella* sp.

Order V STRONGYLIDA

Superfamily ANCYLOSTOMATOIDEA

Family XXII ANCYLOSTOMATIDAE (Looss, 1905) Lane, 1917

Subfamily ANCYLOSTOMATINAE Looss, 1905

Genus 31. ***Ancylostoma*** (Dubini, 1843) Crepling, 1845

Subgenus 45. ***Ancylostoma (Ceylancylostoma)*** Lane, 1916

45. *Ancylostoma (Ceylancylostoma) ceylanicum* Lane, 1916

Superfamily II DIAPHANOCEPHALIDAE Travassos, 1920

Genus 32. ***Kalicephalus*** Molin, 1861

46. *Kalicephalus indicus* Ortlep, 1923

Superfamily III STRONGYLOIDEA Weinland, 1853 : Hall, 1916

Family XXIII CHABERTIIDAE (Popova, 1952, subfam.) Lichtenfels, 1980

Subfamily OESOPHAGOSTOMINAE Railliet, 1916

Genus 33. ***Oesophagostomum*** Molin, 1861

Subgenus ***Oesophagostomum*** Molin, 1861

47. *Oesophagostomum (Oesophagostomum) dentatum* (Rudolphi, 1803) Molin, 1861

Genus 34. ***Kuntzistrongylus*** Licestenfels 1980

48. *Kuntzistrongylus indicus* sp.n.

Superfamily IV TRICHOSTRONGYLOIDEA

Family XXIV MOLINEIDAE (Skarjabin and Schulz, 1937 Subfam.) Durette-Diesset and Chabaud, 1977

Subfamily MOLINEINAE Skrjabin and Schulz, 1937

Genus 35. ***Trichoskrjabinia*** Travassos, 1937

49. *Trichoskrjabinia mabuyi* sp.n.

COLLECTION OF MATERIAL

Some vertebrate hosts belonging to different groups were examined in the field. The following hosts were found infected with the nematode parasite indicated. Besides nematodes, some other helminth parasites were also recovered but are not included here.

HOST PARASITE LIST

Host	Habitat	Parasites
MAMMALIA		
Order : RODENTIA		
Family : MURIDAE		
Rattus rattus bullocki	Intestine	1. *Pterygodermatis (Mesopectiness)* sp. 2. *Kuntzistrongylus indicus* sp.n.
	Stomach	*Mastophorus magnus*
	Caecum	1. *Heterakis spumosa* 2. *Kuntzistrongylus indicus* sp.n.
Rattus nitidus obsoletus	Caecum	*Heterakis spumosa*
Niviventer niviventer mentosus	1. Stomach 2. Caecus	1. *Mastophorus magnus* 2. *Heterakis spumosa*
Mus pahari	1. Stomach 2. Intestine 3. Caecum	1. *Protospirura muris* 2. *Ascaris* sp. 3. *Heterakis spumosa*
Cannomys badius badius	1. Intestine 2. Caecum	1. *Capillaria hepatica* 2. *Heterakis spumosa*
Family : SCIURIDAE		
Belomis pearsoni trichotis	Intestine	*Syphacia (syphacia) pearsoni* sp.n.
Order : INSECTIVORA		
Family : SORICIDAE		
Suncus murinus griffithi	Stomach nodules	*Cylicospirura (Gastronodus) strasseni*
Order : CARNIVORA		
Family : VIVIRRIDAE		
Viverricula indica	Stomach and intestine	1. *Toxocara mystax,* 2. *Ancylostoma (Ceylancylostoma) ceylanicum* 3. *Pterygodermatites (Messopectines) viverriculae* sp.n.
Family : FELIDAE		
Felis bengalensis	Stomach	*Physaloptera brevispiculum*
Order : CHIROPTERA		
Family : VESPERTILIONIDAE		
Murina tubinaris	Intestine	*Pseudophysaloptera* sp.
Harpiocephalus mordax	Intestine	*Pterygodermatites (Mesopectines)* sp.

Host	Habitat	Parasites
Order : SCANDENTIA		
Family : TUPAIIDAE		
Tupia belangeri assamensis	Intestine	1. *Pterygodermatites (Mesopectines)* sp. 2. *Spirura tupiae* sp.n.
Order : ARTIODACTYLA		
Family : SUIDAE		
Pig (Domistic)	Intestine	*Oesophagostomum (O.) dentatum*
AVES		
Order : GALLIFORMIS		
Family : PHASIANIDAE		
Domestic Fowl	Intestine	1. *Ascaridia gally,* 2. *Heterakis gallinae*
Order : STRIGIFORMIS		
Family : STRIGIDAE		
Otus bakkamoena	Intestine Intestine nodules Caecum Horny layer of gizzard	*Capillaria* sp. Physaloptera sp. 1. *Subulura (S) galloperdicis.* 2. *Heterakis* sp. *Habronema otusi.*
Glaucidium radiatum	Caecum Oesophagus	*Heterakis* sp. *Capillaria* sp.
Glaucidium cuculoides	Caeum Horny layer of gizzard	*Heterakis mizoramensis* sp. n. *Habronema tripurensis.*
Order : PASSERIFORMIS		
Family : MUCICAPIDAE		
Myiophoneus caeruleus	Body cavity	*Diplotriaena nepalensis*
Enicurus schistaeus	Body cavity	*Diplotriaena enicuri* sp. n.
Niltava sundara	Body cavity Gizzard Intestine Eya	*Squamofilaria* sp. *Viguiera* sp. *Skrjabinura* sp. *Oxyspirura* sp.
Niltava grandis	Gizzard	*Acuaria* sp.
Rhipidura aureola	Neck muscele	*Chandlerella* sp.
Cinclidium leucarum	Eye	*Oxyspirura* sp.

Host	Habitat	Parasites
Family : DICRURIDAE		
Diorurus remifer	Neck muscles	*Hamatospiculum dicruri.*
Family : CAMPEPHAGIDAE		
Coracina novachollandiae	Body cavity	*Diplotriaena coracinae* sp.n.
REPTILIA		
Order : SQUAMATA		
Suborder : SURIA		
Family : GEKKONIDAE		
Gekko gecko	Stomach and intestine	1. *Thubunea tulsidasi* 2. *Pharyngodon* sp. 3. *Meteterakis gekkonis* sp.n.
Family : SCINCIDAE		
Mabuya carinata	Intestine	*Trichoskrjabinia mabuyi* sp.n.
Family : AGAMIDAE		
Japalura sp.	Intestine	*Cosmocercoides dukae*
Suborder : SURPENTES		
Family : COLUBRIDAE		
Xenochrophis piscator	Intestine	1. *Kalicephalus indicus* 2. *Oxysomatium macintoshii*
AMPHIBIA		
Order : ANURA		
Family : RANIDAE		
Rana sp.	Intestine	*Oxysomatium macintoshii*
Rana cyanophlyctsi	Intestine	*Gendria ranaram.*
Rhacophrous sp.	Intestine	1. *Oxysomatium macintoshii* 2. *Meteterakis* sp.
FISH		
An unidentified fish	Intestine	*Parascarophis* sp.

SYSTEMATIC ACCOUNT

Class NEMATODA

Subclass I ADENOPHOREA

Order I ENOPLIDA

Superfamily TRICHINELLOIDEA

Family I TRICHRIDAE (Ransom, 1911) Railliet, 1915

Subfamily CAPILLARIINAE Railliet, 1915

Genus 1. *Capillaria* Zeder, 1800

Two species of the genus *Capillaria* are being reported from Mizoram.

1. ***Capillaria hepatica*** (Bancroft, 1864) Travassos, 1915

1894. *Trichocephalus hepatica* Bancroft, *Journ. & Proc. Roy. Soc. N. S. W.* Sydney, **27**(1893) : 86-90.

1915. *Capillaria hepatica* Travassons, *Mem. Inst. Osw. Cr.*, **7**(2) : 158.

Material : One male, eight females and some fragments of female; Z.S.I. Reg. No. WN845; host-Bamboo Rat, *Cannomys badius badius*; location-Liver and stomach; locality-Teirei Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 28.xii.1993; Coll. S.R. Deysarkar.

Diagnosis : Body very slender, capillary; oesophagial portion slilghtly thinner than the posterior portion. Well developed dorsal and ventral bacillary bands present. Owing to the habitat of the worms, complete specimens rarely obtained.

Male : Body about 30.5 long, 0.038 wide; posterior extermityof the male blunt and without alae, a pair of subventral lobes present behind the cloacal apertune and each of these lobes having a papilla; spicule single, well developed and chitinized, measuring 0.425 in length. The spicule sheath membranous and protrusible, without spines and funnel-shaped dilatation when fully everted.

Female : Body about 40.0-50.0 long, 0.1-0.23 wide; the vulva very prominent with a protrusible membranous funnel-shaped structure; eggs with polar plugs (0.04-0.078) × (0.026-0.045) in diameter.

Distribution : India : Mizoram (Aizawl district).

Elsewhere : Cosmopolitan.

2. ***Capillaria*** SP.

Material : One immature male, three females, Z.S.I. Reg. No. WN846; host-Barred Owlet, *Glaucidium radiatum;* location-oesophagus; locality-Sairep, Lunglei district, Mizoram; 15-i-1997; Coll. S.R. Dey Sarkar.

Remarks : In the absence of a mature male specific identification is not possible.

Subclass SECERNENTEA

Order II ASCARIDIDA

Superfamily (I) ASCARIDOIDEA

Family II ASCARIDIDAE Baird, 1853

Two subfamilies of the family Ascarididae is being reported from Mizoram.

Key to the subfamalies

- Oesophagus with globular to ellipsoidal posterior ventriculus ..... TOXOCARINAE
- Oesophagus without ventriculus .... ASCARIDINAE

Subfamily ASCARIDINAE (Baird, 1853) Hartwich, 1976

Genus 2. *Ascaris* Linnaeus, 1758

Only one species of the genus *Ascaris* is being reported from Mizoram.

3. ***Ascaris*** sp.

Material : Three females, Z.S.I. Reg. No. WN847; host-*Rattus rattus bullocki*; location-Stomach; locality-Bilkhawthlir, Aizawal district; 3-i-1994; Coll. S.R. Dey Sarkar.

Six adult females, one juv. female, Z.S.I. Reg. NO. 848; host-Mouse, *Mus pahari*; location-Intestine; locality-Sairep, Lunglei district, Mizoram; 15-i-1997; Coll. S.R. Dey Sarkar.

Diagnosis : Nematodes of yellowish-white in colour. Cuticle transversly striated; body slightly tapering to both ends; mouth with three hexagonal lips, dorsal lip with two large papillae and one small papilla on each letero-ventral lip. Lip pulps trilobed.

Female : Body 43.5-63.5 long, 0.96-1.3 wide; nerve ring 0.72 from the head; oesophagus 2.96-3.2 long; vulva 9.44 from the anterior end; tail 0.448-0.5 long, conical; eggs oval (0.048 × 0.08) in diameter.

Remarks : In the absence of a male specific identification is not possible.

Subfamily TOXOCARINAE (Hartwich, 1954 fam.) Osche, 1958

Genus 3. ***Toxocara*** Stiles, 1905

The genus *Toxocara* is represented in Mizoram by one species.

4. ***Toxocara mystax*** (Zeder, 1800)

1800. *Fusaria mystax* Zeder, *Erstèr Natchtrag zur Naturgeschichte der Eingeweidewiirmer & C. Leipzig* : 45-47.

1936. *Toxocara myslax* Baylis, F.B.I., Nematoda. vol. **1** : 60.

Material : Five males, six females and some fragments of males and female; Z.S.I. Reg. No. WN849; host-*Viverricula indica*; location-Stomach and intestine; locality : Sairep, Lunglei district, Mizoram; 17-i-1997; Coll. S.R. Dey Sarkar.

Diagnosis : Cervical alae present; body coarsely striated, ventrally bent; interlabia absent; intestinal caecum absent; lips without dentigerus ridges.

Male : Body 30.0-70.0 long; pulp of the lips with two long digitiform anterior lobes; cervical alae broad, increasing to a maximum width towards their posterior ends; striations on the alae very conspicuous; spicules similar, slightly unequal, measuring 1.6-2.0 long; tail with a terminal digitiform appendage, marked off by a constriction; preanal papillae about 20 pairs, post anal papillae 5 pairs and one double subventral papilla between the cloaca and the base of the appendage.

Female : Body 40.0-108.0 long; vulva towards anterior part of the body; eggs (0.065 × 0.075) in diameter.

Distribution : India : Mizoram (Lunglei district), Punjab, Orissa, West Bengal; Cosmopolitan.

Superfamily (II) COSMOCERCOIDEA

Family III COSMOCERCIDAE
(Railliet, 1916 Subfam.)
Travassos, 1925

Subfamily COSMOCERCINAE
Railliet, 1916

Two genera of the subfamily cosmocercinae is being reported from Mizoram.

Key to the genera

Caudal papillae two types, rosette and simple ..... *Cosmocerocoides* Wilkie, 1930

Caudal papillae, one type, simple .... *Oxysomatium* Railliet and Henry, 1916

Genus 4. ***Cosmocerocoides*** Wilkie, 1930

Mizoram is represented by one species of the genus *Cosmocercoides*.

5. ***Cosmocercoides dukae*** (Holl, 1928) Travassos, 1931

1928. *Cosmocerca dukae* Holl, *J. E. Michell. Scient. Soc.* **43** : 184-186.

1931. *Cosmocercoides dukae* Travassos, *Mems. Inst. Oswaldo Cruz.* **25** : 237-298.

Material : Four males, 13 females and one juv. female, Z.S.I. Reg. No. WN 850; host-a lizard, *Japalura* sp.; location-intestine; locality-Sairep, Lunglei district, Mizoram; 16-iv-1995; Coll. S.R. Dey Sarkar.

Diagnosis : *Male* : Body 6.2-6.4 long; spicules equal 0.16-0.18 long; gubernaculam 0.13-0.15 long; caudal papillae 41 and of two types, 10 simple and small, postanal and in pairs and 31 rosttes, of which 23 preanal in two rows with uneven number, 10 in one and 13 in the other and 8 adanal, grouped together; tail 0.2-0.24 long and pointed.

Female : Body 6.9-7.1 long; vulva 4.0-4.2 from anterior end; eggs (0.066 × 0.044) in diameter; tail 0.27-0.33 long and pointed.

Remarks : All the species of the genus *Cosmocercoides* occur in the amphibian hosts. It is however, the genus and the species recorded first time from a reptilian host (Lizard).

Distribution : India : Mizoram (Lunglei district), West Bengal (Darjeeling); Uttaranchal, Mukteswar, Nainital; Western Himalaya.

Elsewhere : U.S.A., North Carolina and Taxas.

Genus 5. ***Oxysomatium*** Railliet and Henry, 1916

Oone species of the genus *Oxysomatium* is being reported from Mizoram.

6. ***Oxysomatium macintoshii*** (Stewart, 1914) Karvey, 1927

1914. *Oxysoma macintoshii* Stewart, *Rec. Indi. Mus. Calcutta,* **10** : 165-168.

1927. *Oxysomatium macintosshii* Karve, *Ann. & Mag. Nat. Hist.,* **20**(9) : 620-628.

Material : One female, Z.S.I. Reg. No. WN 851; host-*Rhacophorus* sp.; location-intestine; locality-North Khawbung (ca. 1500M), 15 km. North of Champai, Aizawal district; 10-xii-1993; one male, 25 females, Z.S.I. Reg. No. WN 852; host-Rana sp.; location-intestine and rectum; locality-Tierei, Dampa Wild Life Sanctuary, Aizawal, district; 25-xii-1993; two males, 16 femals; Z.S.I. Reg. No. 853; host-a snake, *Xenochrophis piscator*; location-intestine; locality-Tierei, Dampa W. L. Sanctuary; 27-xii-1993; two females, Z.S.I. Reg. No. WN 854; host-*Rana cyanophlyctis*; location-intestine and rectum; locality-Sairep, Lunglei district; 17-iv-1995; four females; Z.S.I. Reg. No. WN 855; host-*Bufo melanostictus*; location-intestine; locality-Seling; 15-ix-1994; coll. of the above-S.R. Deyy Sarkar; two males, 60 females; Z.S.I. Reg. No. WN 856; host-*Bufo melanostictus;* location-intestine; locality-Thenzawl, Aizawal district; 31-iii-1996; Coll. S.C. Ghosh; one female, Z.S.I. Reg. No. WN 857; host-*Rana cyanophlyctis*; location-intestine; locality-Lunglei, Lunglei district; 5-iv-1996; Coll. S.C. Ghosh; 2 males, 4 females : Z.S.I. Reg. No. WN 858; host-*Bufo melanostictus*; location-intestine; locality-Tierei Dampa W. L. Sanctuary, Aizawal district, Mizoram; 16-iv-1996; Coll. S.C. Ghosh.

Diagnosis : Mouth with three small lips. Buccal cavity absent. Oesophagus with a posterior bulb. Male tail tapering rapidly behind the anus, ending in a sharp point. Spicule two, equal. Gubernaculam present. Female : vulva behind the middle of the body.

Male : Body 2.0-2.5 long; spicules equal, relatively long, about 0.24 long; gubernaculum 0.022-0.032 long; caudal papillae 27 pairs, 18 pairs postanal and 9 pairs preanal in position.

Female : Body 3.0-6.0 long; vulva about the middle of the body; tail narrow, 0.35-0.41 long; viviparous.

Remarks : The species and the genus is being reported for the first time in India from a snake (*Xenochrophis piscator*).

Distribution : India : Mizoram (Aizawal and Lunglei districts), widely distributed.

Elsewhere : Myanmar; Africa : Tanganica, Niger Valley.

Superfamily (III)HETERAKOIDEA

Family IV ASCARIDIIDAE Travassos, 1919

Genus 6. ***Ascaridia*** Dujardin, 1845

Only one species of the genus *Ascaridia* is being reported from Mizoram.

7. ***Ascaridia galli*** (Schrank, 1788) Freeborn, 1923

1788. *Ascaris galli* Schrank, *Verzeichnis der bisher hinlanglich,* etc., Munchen : 9

1923. *Ascaridia galli* Freeborn, *Science, N. Y. (New Ser.),* **57**: 692-693.

Material : Two males, 8 females : Z.S.I. Reg. No. WN 859; host-Domestic Fowl; location-intestine; locality-Thenzawl, Aizawal district, Mizoram; 31-iii-1996; Call. S.C. Ghosh.

Diagnosis : Large nematodes of yellow-white colour. Cuticle transversely striated. Mouth with three lips, with denticles. Dorsal lip with two papillae, lateroventrals with one each.

Male : Body 26.0-70.0 long; preanal sucker present, slightly oval, 0.2-0.24 away from cloaca, caudal alae narrow; caudal papillae 10 pairs, vairable in number and position; spicules sub equal, 1.0-1.5 long.

Female : Body 50.0–120.0 long, 0.8–1.85 wide; tail about 1.78 long; vulva at about middle of the body; eggs (0.065–0.088) × (0.04–0.05) in diameter.

Distribution : India : Mizoram (Aizawal district) Widely distributed.

Elsewhere : Cosmopolitan.

Family (V) HETERAKIDAE Ralliet and Henry, 1912

Two subfamilies of the family Heterakidae are being reported from Mizoram.

Key to the subfamilies

Interlabia present. Well developed caudal alae supported by pedunculated papillae. Few sessile papillae on tail. Parasites mainly of birds rarearly mammals ..... HETERAKINAE

Interlabia absent. Caudal alae supported by few pairs of large flesby papillae. Many sessile papillae on tail. Parasites of amphibians, reptiles and mammals ..... METETERAKINAE

Subfamily (I) HETERAKINAE Railliet & Henry, 1912

Genus 7. ***Heterakis*** Dujardin, 1845

Four species of the genus Heterakis, one from mammals (Rodent) and three from birds are being reported from Mizoram.

Key to the species

1. Parasites of birds, spicules unequal 2
— Parasites of mammal (rodent), spicules subequal ..... *Heterakis spumusa*
2. Spicules of males unequal, similar alate, longer about 0.38 long and shorter about 0.3 long, both rounded tips .... *Heterakis mizoramensis* sp.n.
— Spicules of males unequal, dissimilar longer about 2.6 long, with narrow alae and a simple conical tip, shorter about 1.3 long, with broad alae and dauble curve .... *Heterakis gallinae*

8. ***Heterakis gallinae*** (Gmelin, 1790) Freeborn, 1923

1790. *Ascaris gallinae* Gmelin, *Caroli a Linne. System naturae* etc. pt. 6. : 3034.

1923. *Heterakis gallinae* Freeborn, *Science N. Y. (New ser.),* **57** : 692-693.

Material : Several examples; host-Domestic Fowl; location-intestine; locality-Thenzawl, Aizawal district, Mizoram; 31-iii-1996; Coll. S.C. Ghosh.

Diagnosis : *Male* : Body 7.0-12.0 long, 0.24-0.35 wide; lateral alae well developed; cervical papillae at about 0.55 from the head; caudal alae broad, tail about 0.3-0.5 long; preanal sucker well developed 0.1-0.2 from the cloaca; caudal papillae 12 pairs, 4 pairs between the cloaca and tail tip, 4 pairs pedunculated and 2 pairs sessile papillae near the cloaca and 2 pairs pedunculated papillae near the sucker; spicules unequal, dissimilar, right longer 0.6-1.3 long with narrow alae and a simple conical tip, left shorter, 0.6-1.3 long with broad alae and dauble curve.

Female : Body 8.0-15.0 long; tail tapering and pointed 1.0-1.2-long with a pair of minute papillae; vulva 3.7-4.75 from the posterior end.

Distribution : India : Mizoram (Aizawal district) Widely distributed.

Elsewhere : Cosmopolitan.

9. ***Heterakis mizoramensis*** sp. n.
(Fig. 1. a, b, c, d)

Material : Holotype, one male, Z.S.I. Reg. No. WN 860; host-Barred Owlet, *Glaucidium cuculoides;* location-caecum; locality-Ngenpui, Chhimtuipui district, Mizoram; 9-iv-1995; Coll. S.R. Dey Sarkar. Paratypes-4 males, 3 females; Z.S.I. Reg. No. WN 861; other details as in holotype.

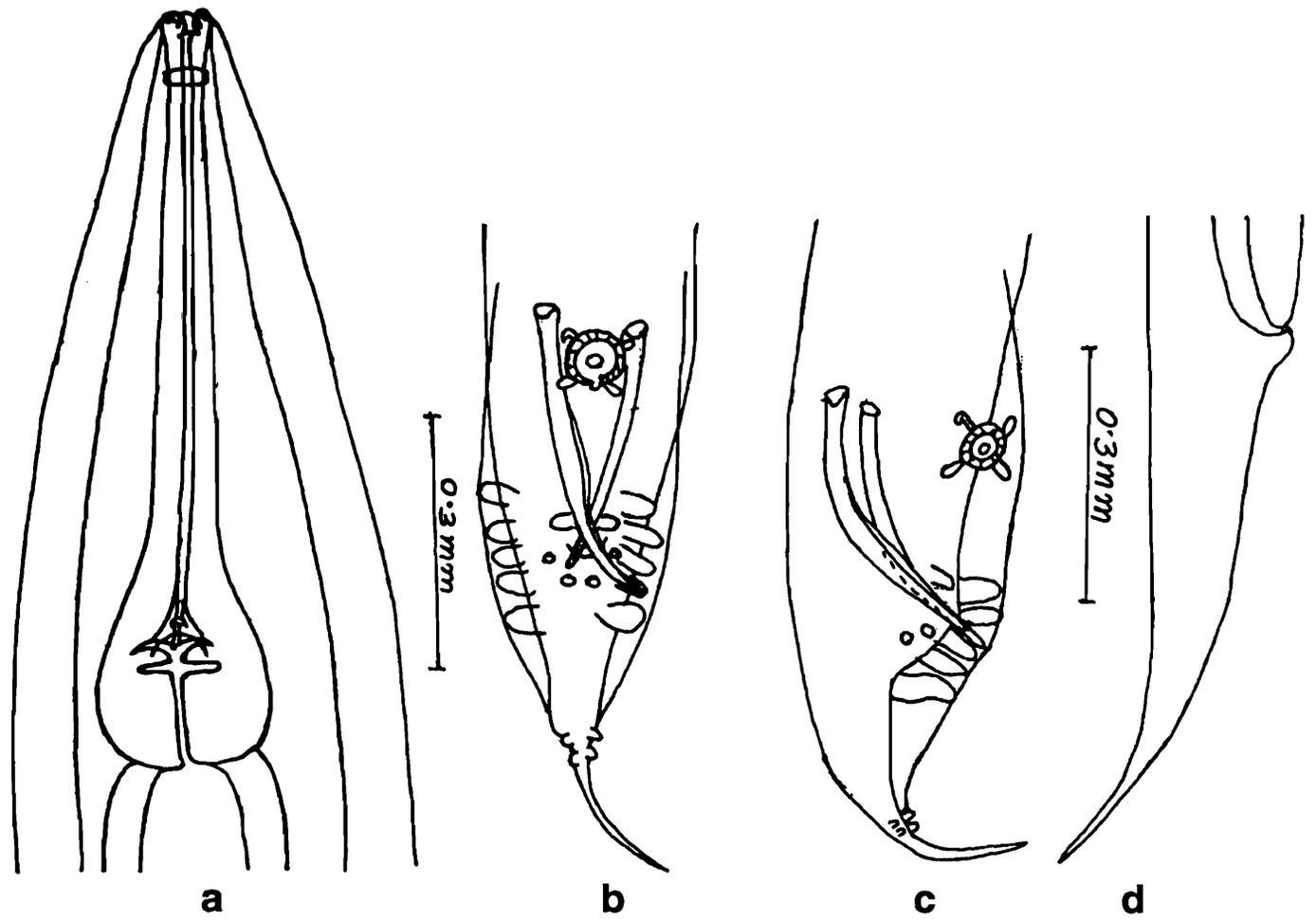

Fig. 1. : *Heterakis mizoramensis* sp. n.; (a) Anterior end of female, lateral view. (b) Posterior end of male, ventral view. (c) Posterior end of male, lateral view. (d) Posterior end of female, lateral view.

Diagnosis : Lips without cordons. Body with well developed lateral alae. Caudal alae of male well developed and supported by pedunculated fleshy papillae. Spicules unequal, similar and alate. Vulva of female post equatorial, prominent; some swelligs present on the cuticle anterior and posterior to the vulva, which may be due to the action of the male preanal sucker during copulation.

Male : Body 8.8-10.56 long, 0.27-0.30 wide; nerve ring 0.064 and excretory pore 0.35-0.4 from the anterior end; cervical alae extended upto 2.75-2.8 from the head; oesophagus including bulb, 0.85-0.90 long, bulb (0.192-0.224) × (0.128-0.16) in diameter; preanal sucker round (0.048 × 0.048) in diameter and 0.144-0.192 away from the cloacal aperture; tail 0.34-0.42 long; filamentus; caudal alae well developed; spicules similar, unequal, alate, longer 0.38-0.42 long, shorter 0.27-0.30 long, tip round; caudal papillae 12 pairs, elaborated as—parasuctorials, 2 pedunculate; paracloacals 4 pedunculate of these 3 lateral and one ventral; postanal 6, 4 pedunculate lateral, and 2 sessile, ventral in position.

Female : Body 11.04-12.32 long, 0.38-0.4 wide; nerve ring at 0.08 from the head; cervical alae extended up to 3.84 from anterior end; oesophagus including bulb 0.93-1.0 long, bulb (0.20-0.24 × 0.16) in diameter; vulva post-equatorial in position, 6.24-6.48 from the anterior end, covered by a flap which over hangs the vulva; tail 0.66-0.72 long, papillae absent, tapering, ending in a fine point; eggs (0.48-0.064) × (0.048-0.032) in diameter.

Discussion : The present species comes closer to *Heterakis gallinae* (Gmellin, 1790), *Heterakis beramporia* Lane, 1914, *Heterakis bosia* Lane,

1914, *Heterakis isolonchi* V. Linstow, 1906 and *Heterakis papillosa* (Bloch, 1782) in number of caudal papillae viz. 12 pairs, but differs from them in body measurements, arrangement of caudal papillae, shape and size of spicules.

This is the first report of the genus from the above specific host.

10. ***Heterakis spumosa*** Schneider, 1866

1866. *Heterakis spumosa* Schneider, *Monographie der Nematoden.* Berlin : 77.

Material : One female, Z.S.I. Reg. No. WN 862; host-Rat, *Rattus nitidus obsolatus*; location-caeca; locality-Aizawal district, Mizoram; 8-xii-1993; 2 females, Z.S.I. Reg. No. WN 863; one male, 4 females Z.S.I. Reg. No. WN 864; host-Rat, Rattus rattus bullocki; location-caeca; locality-North Khawbung (1500m), 15 km North of Champai; Aizawal district; 15-xii-1993 respectively; 26 males, 38 females, Z.S.I. Reg. No. WN 865; host-Bamboo Rat, *Cannomys badius badius*; locality-Teirei, Dampa Wild Life Sanctuay, Aizawal district; 27-xii-1993; one male, Z.S.I. Reg. No. WN 866; host-*Rattus rattus bullocki*; location-caeca; locality-Bilkhawthlir, Aizawal district; 3-i-1993; one male, 2 females, Z.S.I. Reg. No. WN 867; host-Rat, *Niviventer niviventer mentossus*; location-caeca; locality-Ngenpui (190m), Chhimtuipui district, Mizoram; 10-iv-1995; one male, 2 females, Z.S.I. Reg. No. WN868; 7 males, 5 females; Z.S.I. Reg. No. WN869; host-*Rattus rattus bullocki*; location-intestine; locality-Sairep, Lunglei district; 20-iv-1995 and 23-iv-1995; 37 males, 57 females; Z.S.I. Reg. No. WN 870; host-*Mus pahari*; location-caeca; locality-Sairep, Lunglei district; 15-i-1997; one male, 7 females, Z.S.I. Reg. No. WN 871; 2 males, 6 females, Z.S.I. Reg. No. WN 872; host-*Rattus rattus bullocki*; location-caeca and rectum; locality-Sairep, Lunglei district; 16 and 17-i-1997; 5 males, 7 females, Z.S.I. Reg. No. WN 873; host-*Mus pahari*; location-caeca; locality-Sairep, Lunglei district; 16-i-1997; collector of all the above-S.R. Dey Sarkar.

Diagnosis : *Male* : Body 6.4-10.85 long, 0.26-0.35 wide; lateral alae beginning at about 0.2 from the head and extended upto preanal sucker; tail 0.25-0.32 long, pointed; caudal alae wide; preanal sucker about 0.2 from the cloaca; caudal papillae 10 pairs, paracloacal group 5 pairs, 2 pairs near preanal sucker and 3 pairs posterior group; spicules subequal, flattened, tapering and longitudinally striated, 0.2-0.37 long.

Female : Body 7.0-13.0 long, 0.3-0.52 wide; lateral alae beginning at 0.2 from the anterior end and extended to the tip of the tail; 0.68-0.9 long, with a pair of papillae at about 0.45 from the tip vulva posterior to middle of the body, with prominent lips.

Remarks : The incidence of infection in the hosts (Rats and Mice) is high, is shown by the fact that all the species of the hosts examined (20 examples) found infected by these parasites.

Distribution : India : Mizoram : All districts.

Elsewhere : Cosmopolitan.

11. ***Heterakis*** sp.

Material : One female, Z.S.I. Reg. No. WN 874; host-Barred Owlet, *Glaucidium radiatum*; location-caecum; locality-Sairep, Lunglei district, Mizoram; 15-i-1997 Coll. S.R. Dey Sarkar.

Remarks : In the absence of a male specific identification is not possible.

Subfamily (II) METETERAKINAE Inglis, 1957

Genus 8. ***Meteterakis*** Karve, 1930

Two species of the genus *Meteterakis* are being reported from Mizoram. One is new and the other is very wellknown.

12. ***Meteterakis gekkonis*** sp. n.
(Fig. 2)

Material : Holotype, One male; Z.S.I. Reg. No. WN 875; host-Gekko, *Gekko gecko*; location-intesting; locality-Ngenpui, Chhimtuipui district, Mizoram; 12-iv-1995; Coll. S.R. Dey Sarkar.

Paratypes, 4 females, Z.S.I. Reg. No. WN 876; other particulars same as holotype.

Diagnosis **: Body short and stout; head without cordons; mouth with three lips; the anterior flange not project beyond the main mass of the lips. Cuticle finely striated with narrow lateral alae. The structure of the oesophagus being typical of the genus. Male tail bent ventrally, ended in a sharp point. Caudal alae narrow, supported by fleshy papillae. Spicules, two, equal, similar, massive, non-alate and well developed. Gubernaculum mass present, developed from the walls of the cloaca, very distinct. Vulva prominent and preequatorial in position.**

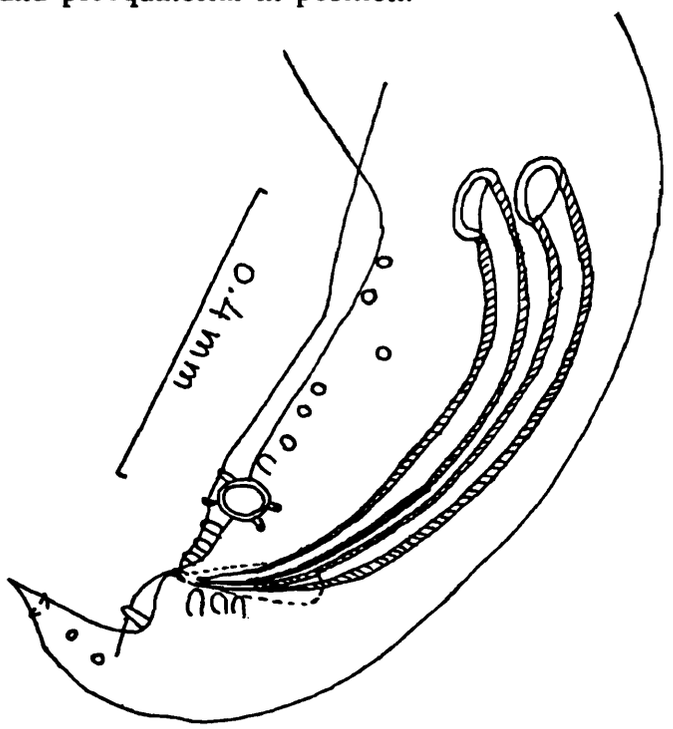

Fig. 2. : ***Meteterakis gekkonis*** sp. n. Posterior end of male, lateral view.

Male : Body 6.75 long, 0.416 wide; nerve ring 0.096 and excretory pore 0.72 from the anterior end; oesophagus, with bulb 1.26 long; bulb (0.192 × .0192) in diameter; preanal sucker 0.096 away from the cloaca; spicules ventrally bent, equal, non-alate, massive, 0.75 long, with striated lateral margins, broad based and narrow apex; gubernaculum mass 0.16 long; caudal papillae 20 pairs, 7 pairs presuctorial, sessible; 2 pairs suctorial, 3 pairs between sucker and cloacal opening, 3 pairs large fleshy paracloacal and the remaining post cloacal in position; tail 0.24 long, ending in a sharp point; caudal alae comparatively narrow.

Female : Body 7.84-9.12 long, 0.4-0.58 wide; nerve ring 0.112-0.128 from anterior end; oesophagus with bulb 1.2-1.63 long; bulb (0.256 × 0.224-0.240) in diameter; vulva prominent, 3.2-3.52 away from the anterior end; tail straight, conical, ending in a sharp point, without papillae, eggs (0.064 × 0.032) in diameter.

Discussion : In having massive and non-alate spicules, the present species comes closest to *Meteterakis japonica* (Wilkie, 1930), *Meteterakis mabuyi* Chakravarty (1944), *Metetrakis andamansis* Soota and Chaturvedi, 1970 and *Meteterakis tripurae* Dey Sarkar, 2000. But, differs from them in body measurements, number and arrangement of caudal papillae, size and shape of spicules and also in number of fleshy papillae.

Hence, the present species is regarded as different from all the known species of the genus *Meteterakis* and is named as *Meteterakis gekkonis* sp. n.

13. ***Meteterakis*** sp.

Material : One female, Z.S.I. Reg. No. WN 877; host-*Rhacophorus* sp.; location-intestine; 4 females, Z.S.I. Reg. No. WN 878; host-Calotes sp.; location-intestine; locality-Sairep, Lunglei district, Mizoram; 17-iv-1995 and 19-iv-1995; Coll. S.R. Dey Sarkar.

Remarks : In the absence of a male specimen, specific identification is not possible.

Superfamily (IV) SEURATOIDEA

Family (VI) SEURATIDAE (Hall, 1916) Railliet, 1906

Subfamily SEURATINAE Hall, 1916

Genus 9. ***Skrjabinura*** Gnedina, 1933

One species of the genus *Skrjabinura* is being reported from Mizoram.

14. ***Skrjabinura*** sp.

Material : One female, Z.S.I. Reg. No. WN 879; host-a bird, *Niltava sundara*; location-intestine; locality-Sairep, Lunglei district, Mizoram; 16-iv-1995; Coll. S.R. Dey Sarkar.

Diagnosis : Body large. Head with one pair lateral amphid and two pairs submedian papillae; cephalic alae extending beyond level of nerve ring. Mouth without lips; at the base of the buccal capsule three oval chitinuous plates present. Oesophagus simple.

Male : Absent.

Female : Body Spirally twisted, 17.28 long, 0.83 wide; oesophagus 0.64 long, without any constriction in the middle, nerve ring 0.176 from the head; anus terminal; vulva at 0.8 from the anterior end, eggs lacling.

Remarks : In absence of a male, specific identification is not possible. Genotype and so far sole species is *Skrjabinura spiralis* Gnedina, 1933, from *Caprimulgus europaeus* in Russia. Incidentally this is the first report of a species of the genus *Skrjabinura* from India.

Family (VII) QUIMPERIIDAE (Gendre, 1928) Baylis, 1930

Subfamily QUIMPERIINAE Gendre, 1928

Genus 10. ***Gendria*** Baylis, 1930

Only one species of the genus *Gendria* is reported from amphibian hosts.

15. ***Gendrir ranarum*** Karve, 1944

1944. *Gendria ranarum* Karve, *Proc. Ind. Acad. Sc.*, **19**(3): 71.

Material : One male, 4 female, Z.S.I. Reg. No. WN 880; host-*Rana cyanophlyctis*; location-intestine; locality-Lunglei, Lunglei district, Mizoram; 5-iv-1996; Coll. S.C. Ghosh.

Diagnosis : Mouth as shallow dipression without definite lips, but with a dorsal and two subventral teeth. Cuticle finely striated, inflated anteriorly forming oval expansion. Oesophagus undevided, club shaped. Cervical alae absent. Tail conically pointed in both sexes. In male preanal sucker present. Gubernaculam present. Female vulva a little behind middle of the body.

Male : Body 8.00 long, 0.24 wide; nerve ring 0.16 from the anterior end; cervical papillae and excretory pore not observed; tail 0.144 long; sucker 0.32 from the cloacal aperture; spicules equal, similar, 0.24 long; gubernaculum 0.032 long; caudal papillae 15 pairs clear, 8 preanal, 1 adanal and 6 postanal in position.

Female : Body 12.66-15.36 long, 0.24-0.27 wide; nerve ring 0.192-0.22 from the anterior end; oesophagus 0.46-0.48 long; vulva 4.56-6.56 from the posterior end.

Distribution : India : Mizoram (Lunglei distrct), Marakaram, Tamil Nadu; Poona, Maharashtra.

Superfamily (V) SUBULUROIDEA

Family (VIII) SUBULURIDAE (Travassos, 1914) Yorke and Maplestone, 1926

Subfamily SUBULURINAE Travassos; 1914

Genus 11. ***Subulura*** Molin, 1860

Subgenus ***Subulura*** Molin, 1860

16. ***Subulura (Subulura) galloperdicis*** (Baylis and Daubnery, 1922)

1922. *Subulura galloperdicis* Baylis and Daubney, *Mem. Indian Mus. Calcutta*, **7** : 301.

Material : One male, one female, Z.S.I. No. WN 881; 6 males 3 females, Z.S.I. Reg. No. WN 882; host-Collard Scops Owl, *Otus bakkamoena*; location-Caecum; locality-Lungsen, Lunglei district, Mizoram; 23-i-1997, 26-i-1997; Coll. S.R. Dey Sarkar.

Diagnosis : MALE : Body 9.5-17.76 long, 0.3-0.35 wide; cervical alae narrow, extended 0.9-1.76 from the anterior end oesophagus with bulb 1.56-1.68 long; tail 0.21-0.24 long with a slender terminal spike; sucker spendle shaped, 0.32-0.65 from cloaca; caudal papillae 11 pairs, 4 preanal,

2 adanal, and 5 pairs postanal in position; spicules equal 0.76-1.36 long; gubernaculum with a spur, 0.16-0.18 long.

Female : Body 11.5-22.0 long, 0.35 wide; tail 0.72-1.1 long; vulva 8.8-8.96 from the head end; eggs 0.035 × 0.065 in diameter.

Distribution : India : Mizoram (Lunglei district), Madhya Pradesh, West Bengal, Tripura. Arizona.

Order III OXYURIDA

Superfamily OXYUROIDEA

Family (IX) PHARYNGODONIDAE Travassos, 1919

Genus 12. ***Pharyngodon*** Diesing, 1861

One species of the genus *Pharyngodon* is being reported from Mizoram.

17. ***Pharyngodon*** sp.

Material : Eighteen females, Z.S.I. Reg. No. WN 863; host-*Gokko gecko*; location-intesting; locality-Ngenpui, Chhimtuipui district, Mizoram; 12-iv-1995; Coll. S.R. Dey Sarkar.

Diagnosis : Small specimens, body taper to each extremity; mouth with three distinct lips. Buccal cavity absent. Cuticle thick and transversely striated. Oespphagus with a posterior bulb. Excretory pore post oesophageal. Lateral alae absent. Female tail filamentus having conspicuous spines.

Male : Absent.

Female : Body 4.64-7.23 long; oesophagus including bulb 0.56-0.58 long; excretory pore 0.72-0.88 from the head; vulva 0.088-1.02 from the enterior end; tail constricted behind the anus and continued as a long filamentus process, about 0.9 long, having 20-25 posteriorly directed cuticular spines; eggs oval, 0.128 × 0.032 in diameter, having opercula at each pole.

Remarks : In absence of a male specific identification is not possible.

Family (X) OXYURIDAE Cobbold, 1864

Genus 13. ***Syphacia*** Seurat, 1916

Subgenus ***Syphacia*** Petter and Quenten, 1976

One species of the genus *Syphacia (Syphacia)* is being recorded from Mizoram.

18. ***Syphacia (Syphacia) pearsoni*** sp.n. (Fig. 3a, b, c)

Material : Holotype, one male, Z.S.I. Reg. No. WN 884; host-Hairy-footed Flying Squirrel, *Belomis pearsoni trichotis*; location-intestine; locality-Ngenpui, Chhimtuipui District, Mizoram; 12-iv-1995; Coll. S.R. Dey Sarkar. Paratypes 8 males, several females; Z.S.I. Reg. No. WN 885; other particulars same as for the holotype.

Diagnosis : Small, soft and thin worms, tapering towards each extremity, the middle region being relatively stout. Cutical thin, delicate and finely striated. Mouth with three distinct lips. Cervical alse present, Oesophagus club shaped, with a spherical bulb seperated by a constriction. Male with three ventral cuticular swellings, posterior to the cloacal aperture. Two narrow caudal alae suppoted by a pair of large fleshy papillae present.

Male : Body 1.6-1.92 long, 0.144-0.192 wide; nerve ring 0.096-0.112 and excretory pore 0.288-0.336, both from the anterior end; diameter of the head measuring 0.032; oesophagus including bulb 0.384-0.416 long; tail tapering, ended in a fine point, 0.192-0.256 long; spicule single, measuring 0.128-0.16 long; gubernaculum relatively stout as compare to the spicule; 0.064-0.08 long, directed obliquily; caudal papillac 5 pairs, 2 pairs preanal and 3 pairs postanal in position; of the postanal papillae 2 pairs sessile and one pair large and fleshy; caudal aperture lined by a complete and proninent chitinus ring.

Female : Body 4.16-5.08 long, 0.22-0.30 wide; nerve ring 0.096-0.112 and excretory pore 0.35

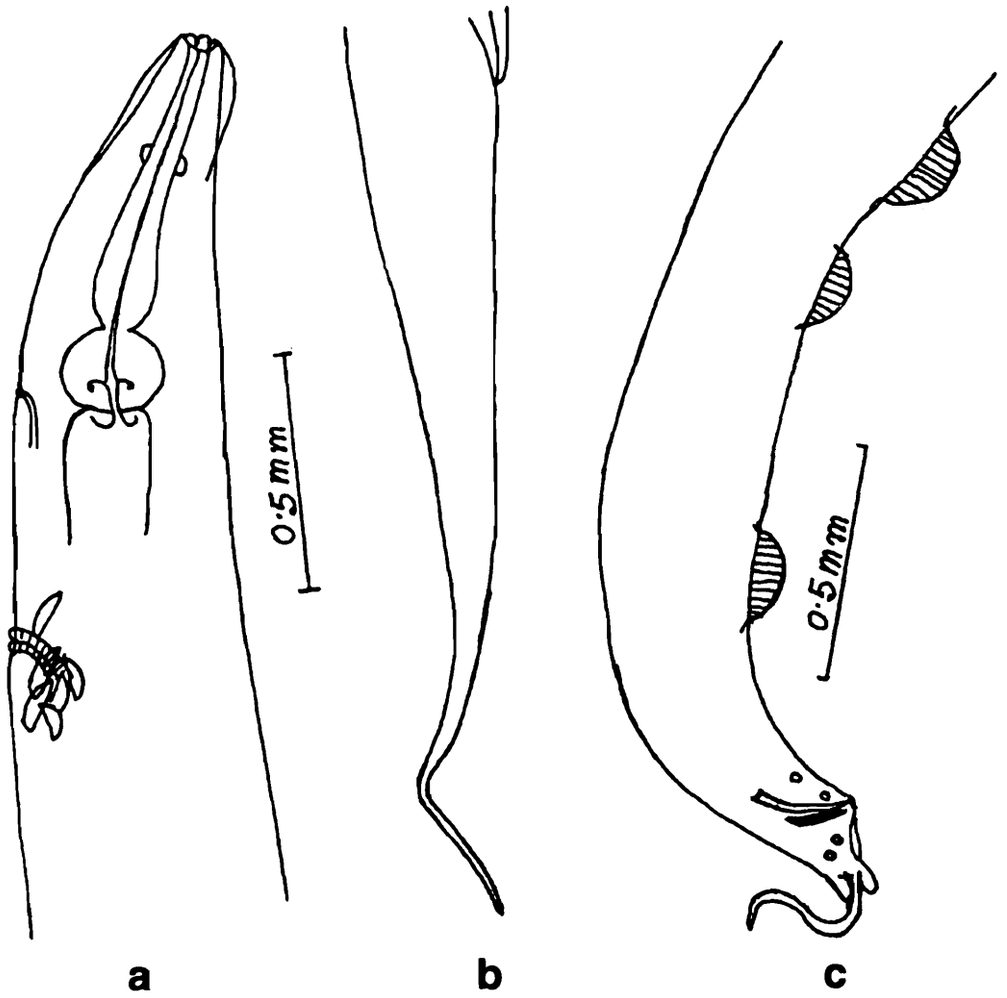

Fig. 3. : *Syphacia (Syphacia) pearsoni* sp. n.; (a) Anterior end of female, showing vulva, lateral view. (b) Posterior end of female, lateral view. (c) Posterior end of male, lateral view.

from the anterior end; oesophagus with bulb 0.40-0.48 long; bulb (0.08-0.096 × 0.08-0.112) in diameter; tail long, delicate, tapering and pointed, 0.912-1.12 long; vulva prominent, post-oesophageal, 0.6-0.8 from the anterior end; ovaries two, eggs large, tipically oxyurid, measuring (0.08 × 0.032) in diameter.

Discussion : The present species comes nearest to *Syphacia obvelata* (Rudolphi, 1802), and *Syphacia stroma* (V. Linstow, 1884) Morgan, 1932 in the presence of cervical alae and caudal alae. But differs from both of them in having a complete prominent chitinus ring round the cloaca and a gubernaculum stouter than the spiculs. It also comes closer to *Syphacia teneri* Khera, 1954 in possessing a completed prominent chitinus ring round the cloaca and a gubernaculum stouter than the spicule, but differs from it in having cervical alae and caudal alae. The present species also differs from *Syphacia obvelata, Syphacia stroma* and *Syphacia tineri*, in number and arrangement of caudal papillae and presence of a pair of fleshy papillae and in various body measurements. Hence, the present species is regarded as different from all the known species of the genus *Syphacia* Seurat, 1916 and the name *Syphacia* (*Syphacia*) *pearsoni* sp.n. is being proposed to accomodate it.

Order IV SPIRURIDA

Superfamily (I) PHYSALOPTEROIDEA

Family XI PHYSALOPTERIDAE (Railliet, 1893 subfam.) Leiper, 1908

Two subfamilies of the family Physalopteridae are being reported from Mizoram.

Key to the subfamily

- Cuticular Collar weakly developed. Cuticular projection beyond cephalic extremity absent. Caudal papille often many, very difficult to differentiate from the cuticular ornamentation surounding them. Parasites mainly of reptiles, rarely of amphibians.....THUBUNAEINAE
- Cuticular collar well developed. Cuticular projection beyond cephalic extremity present. Caudal papillae few, clearly distinct from cuticular ornamentation. Parasites of Vertebrates except fishes..... ..... PHYSALOPTERINAE

Subfamily (I) THUBUNAEINAE
(Sobolev, 1949 Tribe)
Chaubad, 1975

Genus 14. ***Thubunaea*** Seurat, 1914

One species of the genus *Thubunaea* is being reporded from Mizoram.

19. ***Thubumaea tulsidasi*** Dey Sarkar, 2000

2000. *Thubunaea tulsidasi* Dey Sarkar, *Zool. Surv. India : Fauna of Tripura, State Fauna Series,* 7(Part-4) : 119.

Material : Two males (one immature), 11 females, Z.S.I. Reg. No. WN 886; host-*Gekko gecko*; location-stomach; locality-Ngenpui, Chhimtuipui district. Mizoram; 12-iv-1995; Coll. S.R. Dey Sarkar.

Diagnosis : Body soft, delicate and slender. White in colour when alive. Four papillae present on the outer margin of the head. Lips unequal, the left being smaller than the right, the left lip with three forwardly directed teeth, the middle teeth being larger than the laterals. A slight cuticular collar present at the base of the lips. Oesophagus divided into two parts, an anterior muscular and a posterior glandular.

Male : Body 10.0-10.8 long, 0.26 wide; pharynx 0.048 long; nerve ring 0.18-0.22 from the anterior end; cervical papillae and excretory pore about the level of nerve ring; oesophagus divided into two parts, about 1.9 long; caudal alae well developed; tail tip blunt, 0.19 long; caudal end curved ventrally; the ventral surface of the tail tuberculated; spicules similar, unequal, small, the right shorter, 0.09 long and the left longer being 0.128 long; caudal papillae 12 pairs, 5 pairs preanal, one pair adanal and 6 pairs postanal, pedunculated; gubernaculum absent.

Female : Body 14.0-15.8 long, 0.35-0.38 long; pharynx, cervical papillae and excretory pore as in male; entire oesophagus 2.2-2.4 long; tail 0.13-0.14 long, rounded tip with a pair of papillae; valva postoesophageal, 2.4-2.6 from the anterior end, vagina muscular, directed posteriorly; eggs round 0.032 × 0.032 in diameter.

Remarks : This is the second report of the species from the same type host, *Gekko gecko* from a new locality, incidentally from the same topographical area, i.e. North East Hill States of India.

Distribution : Mozoram : Lunglei district.

Elsewhere : Tripura, noth district.

Subfamily (II) PHYSALOPTERINAE
Railliet, 1893

Two genera of the subfamily Physalopterinae are being reported from Mizoram.

Key to genera

- Caudal papillae scanty, sessile or slightly pedunculate. Spicules rudimentary or absent. Parasites of insectivorus mammals..... ..... ***Pseudophysaloptera*** Baylis, 1934
- Caudal papillae well developed, pedunculate and sessile and of usual number. Spicules well developed. Parasites mainly of birds of prey and Carnivora..... ..... ***Physaloptera*** Rudolphi, 1819

Genus 15. ***Physaloptera*** Rudolphi, 1819

Two species of the genus *Physaloptera* are being reported from Mizoram.

20. ***Physaloptera brevispiculum*** V. Linstow, 1906

1906. *Physaloptera brevispiculum* V. Linstow, *Spolia Zeylanica,* Colombo, **3** : p 166.

Material : One male, 3 females, Z.S.I. Reg. No. WN 887; host-Leopard Cat, *Felis bengalensis*; location-stomach; locality-Sairep, Lunglei district, Mizoram; 26-iv-1995; Coll. S.R. Dey Sarkar.

Diagnosis : Mouth with a collar. Lips rounded, each lip with a large triangular and slightly recurved outer tooth, and three inner teeth of equal length. Oesophagus divided into a anterior muscular and a posterior glandular. A prepouch like sheath of cuticle present at the posterior end in both sexes.

Male : Body 20.5 long, 1.0 wide; cervical papillae present behind the junction of the two portions of the oesophagus; tail about 1.5 long; caudal alae well developed; ventral surface of posterior end covered with continuous longitudinal cuticular ridges; 4 pairs usual pedunculate lateral and 13 pairs sessile ventral and subventral papillae present; spicules unequal, varies in length.

Female : Body 25.0-30.5 long; vulva equatorial; eggs measuring (0.033-0.036) × (0.028-0.032) in diameter.

Distribution : India : Mizoram (Lunglei district), West Bengal.

Elsewhere : Sri Lanka; Malaya; Africa, Nigeria.

21. ***Physaloptera*** sp.

Material : Two juv. females, Z.S.I. Reg. No. WN888; host-*Otus bakkamoena*; location-intestine; locality-Ngenpui, Chhimtuipui district, Mizoram; 10.iv.1995; Coll. S.R. Dey Sarkar.

Genus 16. ***Pseudophysaloptera*** Baylis, 1934

One species of the genus *Pseudophysaloptera* is being reported from Mizoram.

22. ***Pseudophysaloptera*** sp.

Material : Elevan females, Z.S.I. Reg. No. WN 889; 20 females, Z.S.I. Reg. No. WN 890; 11 females, Z.S.I. Reg. No. WN 891; 4 females, Z.S.I. Reg. No. WN 892; host Tube-nosed Bat, *Murina tubinaris*; location-intestine; locality-Sairep, Lunglei district, Mizoram; 17-iv-1995, 19-iv-1995, 24-iv-1995 and 25-iv-1995; Coll. S.R. Dey Sarkar.

Remarks : In absence of a male, specific identification is not possible. This is the first report of a species of the genus *Pseudophysaloptera* from the above specific host.

Superfamily (II) SPIRUROIDEA

Family (XII) SPIRURIDAE Oerley, 1885

Two genera of the family Spiruridae are being reported from Mizoram.

Key to genera

- Pseudolabia poorly developed, not projecting beyond oral opening. Oral opening without denticulate border. Oesophageal region of the body with one or two ventral hump ....***Spirura*** Blanchard, 1842
- Pseudolabia well developed, projecting beyond oral opening, each ornamented with small teeth. Oesophageal region of the body without ventral hump ..... ***Protospirura*** Seurat, 1914

Genus 17. ***Spirura*** Blanchard, 1849

One species of the genus *Spirura* is being reported from Mizoram.

22. ***Spirura tupiae*** sp. n.
(Fig. 4. a-c)

Material : HOLOTYPE : one male, Z.S.I. Reg. No. WN 893; host-Tupia, *Tupia belanceri assamensis*; location-intestine; locality-Tierei, Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 27-xii-1993; Coll. S.R. Dey Sarkar. PARATYPES : 5 females, Z.S.I. Reg. No. WN 894; other particulars as in holotype.

Diagnosis : Lips small. Body thickened posteriorly, anterior end bend ventrally. Cuticle with fine transvese striations and with a ventral hump at

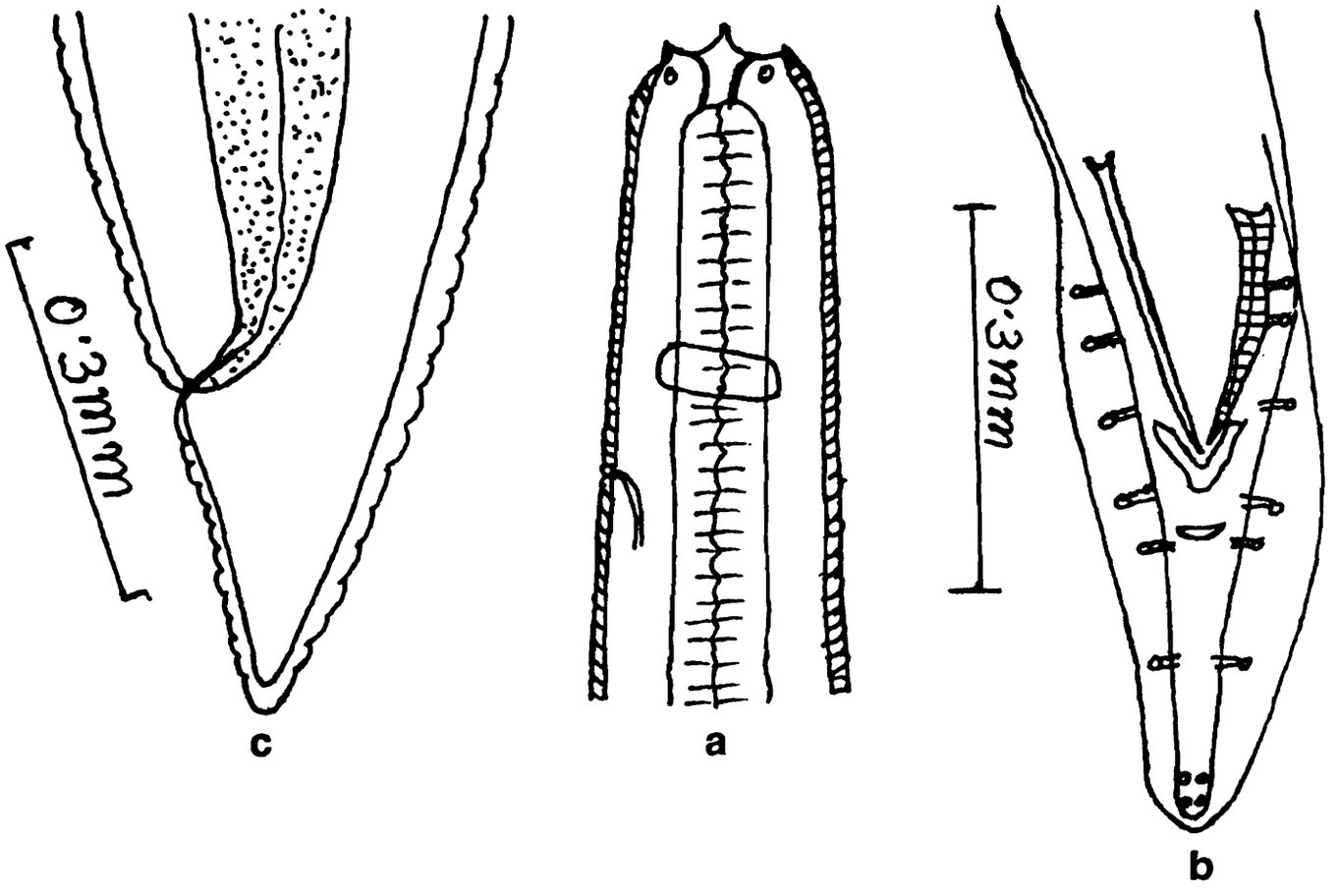

Fig. 4 : *Spirura tupiae* sp. n.; (a) Anterior end of female, lateral view. (b) Posterior end of male, ventral view. (c) Posterior end of female, lateral view.

some distance from the anterior end. Cervical alae absent. Oesophagus long, indistinctly divided into two parts, a very short anterior muscular and a long slightly wider posterior glandular portion. Tail of male with broad alae. Spicules dissimilar, subequal, the left shorter, wide and transversely striated. Median papilla absent. Gubernaculam present. Tail of female conical, tip pointed. Vulva in the posterior half of the body.

Male : Body 9.2 long, 0.19 wide; nerve ring 0.192 from anterior end; pharynx 0.032 long; excretory pore very clear, 0.24 from the anterior end; the ventral hump 0.99 away from the head end; anterior muscular oesophagus 0.256 long, posterior glandular portion measuring 3.34; tail 0.272 long with broad alae; caudal papillae 8 pairs, 4 pairs pedunculat preanal, one pair pedunculate adanal, and 3 pairs postanal in position, of the postanals papillae, 2 pairs near the tip of tail, sessile; spicules subequal, dissmilar, longer (right), 0.24 long, tubular with pointed tip and the shorter (left) measuring 0.224 long, wide and transversely striated with pointed tip; gubernaculam 0.048 long, 'V' shaped.

Female : Body 12.24–23.36 long, 0.24–0.56 wide; nerve ring 0.208–0.256 from the anterior end; pharynx 0.032–0.064 long; excretory pore as in male, 0.27–0.35 from the head end; the ventral hump 1.17–1.66 away from the anterior end; oesophagus as in male, muscular 0.32–0.4 long and glandular portion 4.64–5.76 long; tail conical, 0.192–0.288 long; vulva prominent 3.63–8.16 from the posterior end; eggs (0.024 × 0.032) in diameter.

Discussion : The present species comes closer to *Spirura talpae* (Gmelin, 1790) Blanchard, 1849, in size of body, shape of spicules and in the position of vulva in female, but differs in the following respect : in having lesser number (8 versus 9) of caudal papillae, in absence of a median preanal papilla and also in distribution of caudal papillae.

Hence, the present species is regarded as different from all the known forms of the genus *Spirura* Blanchard, 1849 and the name *Spirura tupiae* sp. n. is being proposed to accomodate it.

Incidentally, this the first report of the genus and species from the above specific host.

Genus 18. ***Protospirura*** Seurat, 1914

One species of the genus *Protospirura* is being reported from Mizoram.

24. ***Protospirura muris*** (Gmelin, 1790) Seurat, 1915

1790. *Ascaris muris* Gmelin, *Systema naturae,* etc. pt. **6** Vermes : 3032.

1915. *Protospirura muris* Seurat, *C. R. Soc. Biol.*, **78**(17) : 565.

Material : One male, one female, Z.S.I. Reg. No. WN 895; host–*Mus pahari*; location–Stomach; locality–Tuikul. Duty post No. 1, Murlen National Park (850 m.) ca 10 km. North of North Khawbung, Aizawl district, Mizoram; 17.xii.1993; Coll. S.R. Dey Sarkar.

Diagnosis : Body stout, finely striated, tapering anteriorly; mouth compressed laterally; lips two, each lip with three distinct lobes, the median being larger than the subdorsal and subventral; each lobe bearing five denticles at its apex, the median denticle being larger than the others.

Male : Body 38.08 long, 0.56 wide; nerve ring 0.4 from the anterior end; diameter of the head, 0.24; pharynx measuring 0.112 long; oesophagus divided into two parts, anterior muscular, 0.56 long, posterior glandular, 5.2 long, entire oesophagus 5.76 long; tail spirally coiled in two turns, 0.224 long; caudal alae well developed, alae with cuticular elevations, arranged in longitudinal rows; caudal papillae 6 pairs of large pedunculate, 4 pairs preanal and 2 pairs postanal in position, in addition 2 pairs minute sessile papillae near the tail tip and a median papilla on the anterior lip of the cloaca present; spicules two, unequal, the right longer 0.67 long and the left 0.35 long, tips blunt; gubernaculum 0.112 long.

Female : Body 60.5 long, 1.28 wide; nerve ring 0.48 from the head end; diameter of the head 0.3; pharynx 0.16 long; oesophagus as in male, entire oesophagus 6.8 long; tail curved ventrally, measuring 0.35 long, tip bluntly rounded; vulva very difficult to locate, about 30.4 from the anterior end; eggs (0.04 × 0.032) in diameter.

Distribution : India : Mizoram (Aizawal district).

Elsewhere : Cosmopolitan.

XIII Family SPIROCERCIDAE (Chitwood and Wehr, 1932 subfam.) Chabaud, 1975

Two subfamilies of the family Spirocercidae are being reported from Mizoram.

Key to subfamily

– Lips poorly developed, not raised above oral opening ..... SPIROCERCINAE

– Lips highly developed, forming 6 denticulate labial lobes, separate over oral opening .... MASTOPHORINAE

Subfamily (1) SPIROCORCINAE Chitwood and Wehr, 1932

Genus 19. ***Cylicospirura*** Vevers, 1922

Subgenus ***Gastronodus*** (Singh, 1934 gen)

25. ***Cylicospirura (Gastronodus) strasseni*** (Singh, 1934) Chabaud, 1975

1934. *Gastronodus strasseni* Singh, *Curr. Sci.* Bangalor, **2**(8) : 287.

1975. *Cylicospirura (Gastronodus) strasseni* Chabaud, *CIH Key to Nematode Parasite of Vertebrates* No. **3** : 33.

Material : Seven males, 3 females and some fragmantes, Z.S.I. Reg. No. WN 896; host–Hose Shrew, *Suncus murinus griffithi*; location–Stomach nodules; locality–Bilkhawtlir, Aizawal district, Mizoram; 30.i.1994; Coll. S.R. Dey Sarkar.

Diagnosis : Medium sized worms, blood red while alive. Body coiled. Cuticle thick with transverse striations. Mouth opening more or less hexagonal oral cavity with six teeth. Cervical papillae and pharynx present. Caudal alae of male well developed. Spicules unequal and dissimilar. Vulva of female in the oesophageal region.

Male : Body 14.0–26.0 long, 0.3–0.56 wide; pharynx 0.32 long, nerve ring0.35 from the anterior end; oesophagus divided into two parts, entire oesophacus 2.5–3.0 long; tail short, rounded tip, 0.24 long with well developed alae; caudal papillae 12 pairs, 6 pairs preanal pedunculate, 6 pairs postanal of which two pairs sessile near the tip and a large median papilla anterior to cloaca; spicules unequal, dissimilar longer 2.56–2.7 long pointed, shorter 0.45–0.62 long, enclosed by a broad and rounded alae; gubernaculum 'V' shaped, 0.064 long.

Female : Body 25.0–35.5 long; anus subterminal; tail rounded with a pair of lateral papillae; vulva in the oesophageal region, 0.82–1.5 away from the anterior end.

Distribution : India : Mizoram (Aizawal district), Andhra Pradesh (Hydrabad), West Bengal.

Elsewhere : Bangladesh.

Subfamily (2) MASTOPHORINAE Quentin, 1970

Genus 20. *Mastophorus* Diesing, 1853

One species of the genus *Mastophorus* is being reported from Mizoram.

26. *Mastophorus magnus* Khera, 1954

1954. *Mastiphorus magnus* Khera, *Indian Jour. of Helminthology*, 6(2) : 76.

Material : One male, Z.S.I. Reg. No. WN 897; host–*Rattus rattus bullocki*; location–Stomach; locality–Bilkhawthlir, Aizawal district, Mizoram; 30.i.1994; Coll. S.R. Dey Sarkar. 5 females, Z.S.I. Reg, No. WN 898; host–*Niviventer niviventer mentosus*; location–Stomach; locality–Ngenpui, Chhimtuipui district, Mizoram; 8.iv.1995; 2 males, 2 females, Z.S.I. Reg. No. WN 899; host–*Mus pahari*; location–Stomach; one female, Z.S.I. Reg. No. WN 900; host–*Rattus rattus bullocki*; location–Stomach; locality–Sairep, Lunglei district, Mizoram; 15.i.1997 and 17.i.1997; Coll. S.R. Dey Sarkar.

Diagnosis : Body large, stout, tapering anteriorly; cuticle thick and striated; mouth compressed laterally, with two trilobed lips; lips highly developed, separate over oral opeining; each lobe hearing at its apex six denticles, the median denticle being larger than the others; four sub-median papillae present at the bases of the subdorsal and subventral lobes; the mouth followed by a cylindrical pharynx, connected to the body wall by a number strands; oesophagus very long, undivided.

Male : Body 25.5–32.6 long, 0.5–0.72 wide; nerve ring 0.48–0.56 from the anterior end; pharynx 0.144 long; oesophagus 3.4–4.0 long; caudal end spirally coiled in two turns; tail short, 0.4–0.48 long; caudal alae well developed; ventral surface of the caudal region and alae covering with rectangular cuticular elevations arranged in longitudinal rows; caudal papillae 6 pairs, pedunculated, 4 pairs preanal and 2 post anal in position median papillae absent; spicules two, unequal, the right longer and a little stouter than the left, measuring 1.2–1.3 in length and the left 0.96–1.04 long; both the spicules being expanded at their proximal end; the right spicule blunt at distal end, the left with pointed tip; gubernaculum plough-share shaped, measuring 0.08–0.096 in length.

Female : Body 54.5–59.0 long, 0.9–1.0 wide; nerve ring 0.5–0.56 from the anterior end, pharynx upto 0.24 long; oesophagus as in male 5.8–6.0 long; tail short, tip rounded, 0.44–0.48 long; vulva at about 20.8 from the posterior end, not prominent; eggs oval and thick shelled (0.066 × 0.032) in diameter.

Distribution : India : Mizoram (All districts), Lucknow, Uttar Pradesh.

Remarks : Khera (1954) described the species from *Rattus rattus* from Lcknow, Uttar Pradesh, India. The present specimens agree with it in all major characters except in certain body measurements. The genus and the species however, form new locality records from Mizoram.

Superfamily (III) HABRONEMATOIDEA

Family (XIV) HABRONEMATIDAE (Chitwood & Wehr. 1932) Ivaschkin, 1961

Two subfamilies of the family Habronematidae are being reported from Mizoram.

Key to subfamily

Posterior border of the lips and pseudolabia without ornamentation. ..... HABRONEMATINAE

Posterior border of lips and pseudolabia with ornamentation. ..... HISTOCEPHALINAE

Subfamily (1) HABRONEMATINAE Chitwood and Wehr. 1932

Genus 21. ***Habronema*** Diesing, 1861

Two species of the genus *Habronema* are being reported from Mizoram.

Key to species

Lateral alae present .. *Habronema tripurensis*

Lateral alae absent ..... *Habronema otusi*

27. ***Habronema otusi*** Dey Sarkar, 2000

2000. *Habronema otusi* Dey Sarkar, *Zool. Surv. India : Fauna of Tripura, State Fauna Series,* 7(Part-4) : 122.

Material : Three males, 5 females Z.S.I. Reg. No. WN 901; 2 males, one female, Z.S.I. Reg. No. 902; 3 males, 5 females, Z.S.I. Reg. No. WN 903; 4 males, 14 females, Z.S.I. Reg. No. WN 904; host–Collard scops owl, *Otus bakkamoena*; location–Horny layar of gizzard; locality–Teired, Dampa Wildlife Sanctuary, Aizawal district; Ngenpui, Chhimtuipui district and Lungsen, Lunglei district, respectively; 24.xii.1993, 10.iv.1995, 23.i.1997 and 26.i.1997; Coll. S.R. Dey Sarkar.

Diagnosis : Cuticle coarsely striated transversely. Lateral alae absent. Cervical papillae not traceable; pharynx well cuticularised. Oesophagus distinctly divided in to two parts. Caudal alae symmetrical.

Male : Body 11.2–12.5 long, 0.32–0.35 wide; pharynx 0.06–0.08 long; oesophagus muscular portion narrow, 0.40–0.56 long, glandular portion comparatively wider, upto 3.04 long; tail spiral, 0.16–0.19 long; caudal alae wide, tip ended in a spike; spicules similar, unequal, the left being longer, 1.2–1.32 long, with a spear at the tip; the right smaller, 0.37–0.5 ling, pointed; gubernaculam 0.04–0.048 long; caudal papillae 8 pairs, 4 pairs preanal, pedunculate, 4 pairs postanal, of the postanal papillae 2 pairs sessile near the tip of the tail; in additon one median papilla on the anterior lip of the cloaca.

Female : Body 12.16–13.0 long, 0.32 wide; pharynx 0.06 long; oesophagus as in male, muscular 0.48–0.5 long, glandular oesophagus 3.12–3.15 long; tail conical, ended in a sharp point, about 0.16 long; vulva equatorial, about 6.08 from the posterior end.

Distribution : India : Mizoram (Aizawal and Chhimtuipui districts), Tripura.

Remarks : This the second report of the species from the same type host, *Otus bakkamonna* from a new locality, incidentally from the same topographical area i.e. North East Hill States of India.

28. ***Habronema tripurensis*** Dey Sarkar, 2000

2000. *Habronema tripurensis* Dey Sarkar, *Zool. Surv. India : Fauna of Tripura, State Fauna Series,* 7(Part-4) : 123.

Material : Two males, 2 females Z.S.I. Reg. No. WN 905; host–Barred Owlet, *Glaucidium*

cuculoides ruficens; location–under horny layer of gizzard; locality–Ngenpui, Chhimtuipui district, Mizoram; 9.iv.1995; Coll. S.R. Dey Sarkar.

Diagnosis : Body elongated, coarsely striated, lateral alae two, wide and symmetrical, started from the head; Cervical papillae at the junction of the pharynx and oesophagus. Oesophagus distinctly divided into a short anterior muscular and a long posterior glandular.

Male : Body 7.12–10.64 long, 0.24–0.32 wide; pharynx 0.064 long; cervical papillae 0.064 from the head; lateral alae wide, starting near the head end extended upto 1.36 of the body; oesophagus upto 2.56 long; caudal end spiral; tail 0.24 long caudal alae symmetrical, meet in a point beyond the tail tip; spicules similar, unequal, the left 1.07–1.2 long, with a spear at the tip, right smaller, 0.38–0.56 long, tip blunt; gubernaculam 0.048 long; caudal papillae 9 pairs, 4 pairs pedunculated and one pair sessile preanal, the rest postanal; of the postanal papillae 2 pairs pedunculated and two pairs sessile near the tip discernible.

Female : Body 11.2–20.0 long, 0.24–0.35 wide; pharynx and cervical papillae as in male; lateral alae starting from the head, extended upto 1.76 of the body; oesophagus upto 2.3 long; tail conical, pointed, 0.24–0.3 long; vulva slightly postequatorial, 6.4–10.2 from anterior end.

Distribution : India : Mizoram : Chhimtuipui districts, Tripura.

Remarks : This is the second report of the species from the same type host, *Glaucidium cuculodes ruficens* from a new locality, incidentally from the same topographical area, i.e. North East Hill States of India.

Subfamily (2) HISTOCEPHALINAE Gendre, 1923

Genus 22. ***Viguiera*** Seurat, 1923

One species of the genus *Viguiera* is being reported from Mizoram.

29. ***Viguiera*** sp.

Material : One adult and 2 subadult females, Z.S.I. Reg. No. WN 906; host–*Niltava sundara*; location–under horny layer of gizzard; locality–Teirei, Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 24.xii.1993; Coll. S.R. Dey Sarkar.

Diagnosis : Body thin, filiform. Round head provided with appendages. Cuticle thin, transversely striated. Two pairs of submedian cephalic papillae present. Pharynx short, cylindrical and thick walled. Oesophagus long divided into two parts, anterior muscular and posterior glandular. Vulva very close to anus.

Remarks : In the absence of a male specific identification is not possible.

Family (XV) CYSTIDICOLIDAE (Skrjabin, 1946 subfam.) Chabaud, 1975

Genus 23. ***Parascarophis*** Compana-Rouset, 1975

One species of the genus *Parascarophis* is being reported from Mizoram.

30. ***Parascarophis*** sp.

Material : One sub adult female, Z.S.I. Reg. No. WN 907; host–a fish; location–intestine; locality–Kolasib, Aizawal district, Mizoram; 1.i.1994; Coll. S.R. Dey Sarkar.

Diagnosis : Body with fine transversely striated cuticle. Cephalic extremity coverd by a circular disc with two amphids and four submedian papillae. Lips two, large, bilobed, lateral, each with two large teeth. Cervical papillae present, minute. Vulva post equatorial.

Remarks : In the absence of a male and a mature specimen specific identification is not possible.

Superfamily (IV) ACUARIOIDEA

Family (XVI) ACUARIIDAE (Railliet, Henry and Sissoff, 1912 Subfam) Seurat, 1913

Genus 24. ***Acuaria*** Bremser, 1811

One species of the genus *Acuaria* is being reported from Mizoram.

31. ***Acuaria*** sp.

Material : Two females Z.S.I. Reg. No. WN 908; host–*Niltava grandis*; location–under horny layer of gizzard; locality–Sairep, Lunglei district, Mizoram; 24.iv.1995; Coll. S.R. Dey Sarkar.

Diagnosis : Mouth with two lateral lips from which the cordons originate. Cordons rectiliner and extending longitudinally, not recurrent and not anastomosing. Body slender. Pharynx long and narrow. Oesophagus distinctly divided into two parts anterior muscular and posterior glandular.

Male : Absent.

Female : Body 18.8–20.88 long, 0.16 wide; pharynx 0.16 long; cordons extended posteriorly upto 0.35 from the head; oesophagus 2.0–2.24 long; tail 0.16–0.17 long; tapering to a blunt point; valva 9.28–10.8 from the posterior end.

Remarks : In the absence of a male specific identification is not possible.

Superfamily (V) THELAZICIDEA

Family (XVII) THELAZIIDAE Skrjabin, 1915

Subfamily OXYSPIRURINAE (Skrjabin, 1915 fam.) Yamaguti, 1961

Genus 25. ***Oxyspirura*** Drasche in Stissich, 1897

Two species of the genus *Oxyspirurs* are being reported from Mizoram.

32. ***Oxyspirura*** sp.

Material : Two pieces of a female, Z.S.I. Reg. No. WN 909; host–a bird, *Cinclidium leucurum*; location–under nictitating membrane of eye; locality–Sairep, Lunglei district, Mizoram; 16.iv.1995; Coll. S.R. Dey Sarkar.

Remarks : In absence of a male, specific identification is not possible.

33. ***Oxyspirura*** sp.

Material : One female, Z.S.I. Reg. No. WN 910; host–a bird, *Niltava sundara*; location–under nictitating membrane of eye; locality–Sairep, Lunglei district, Mizoram; 13.i.1997; Coll. S.R. Dey Sarkar.

Remarks : In absence of a male, specific identification is not possible.

Superfamily (VI) RICTULARIOIDEA

Family (XVIII) RICTULARIIDAE (Hall, 1915 subfam.) Railliet, 1916

Genus 26. ***Pterygodermatites*** Wedl, 1861.
Subgenus ***Mesopectines*** Quentin, 1969

Four species of *Pterygodermatites* (*Mesopectines*) are being reported from Mizoram.

34. ***Pterygodermatites (Mesopectines) viverriculae*** sp. n.
(Fig. 5. a-d)

Material : Holotype, one male, Z.S.I. Reg. No. WN 911; host–Smaller Indian Civet Cat; *Viverricula indica*; location–intestine; locality–Sairep, Lunglei district, Mizoram; 17.i.1997; Coll. S.R. Dey Sarkar. Paratypes 8 males and one subadult male, 14 adult and 10 subadult females, ZSI Reg. No. WN 912; other particulars same as for the holotype.

Diagnosis : Medium sized worms with two longatudinal subventral rows of large, flattened spines or combs, contiguous anteriorly, becoming stout and spaced at regular intervals in mid body region and gradually decreasing in size caudally. Cuticle transversely striated; Oral opening somewhat displaced dorsally, never totally dorsal

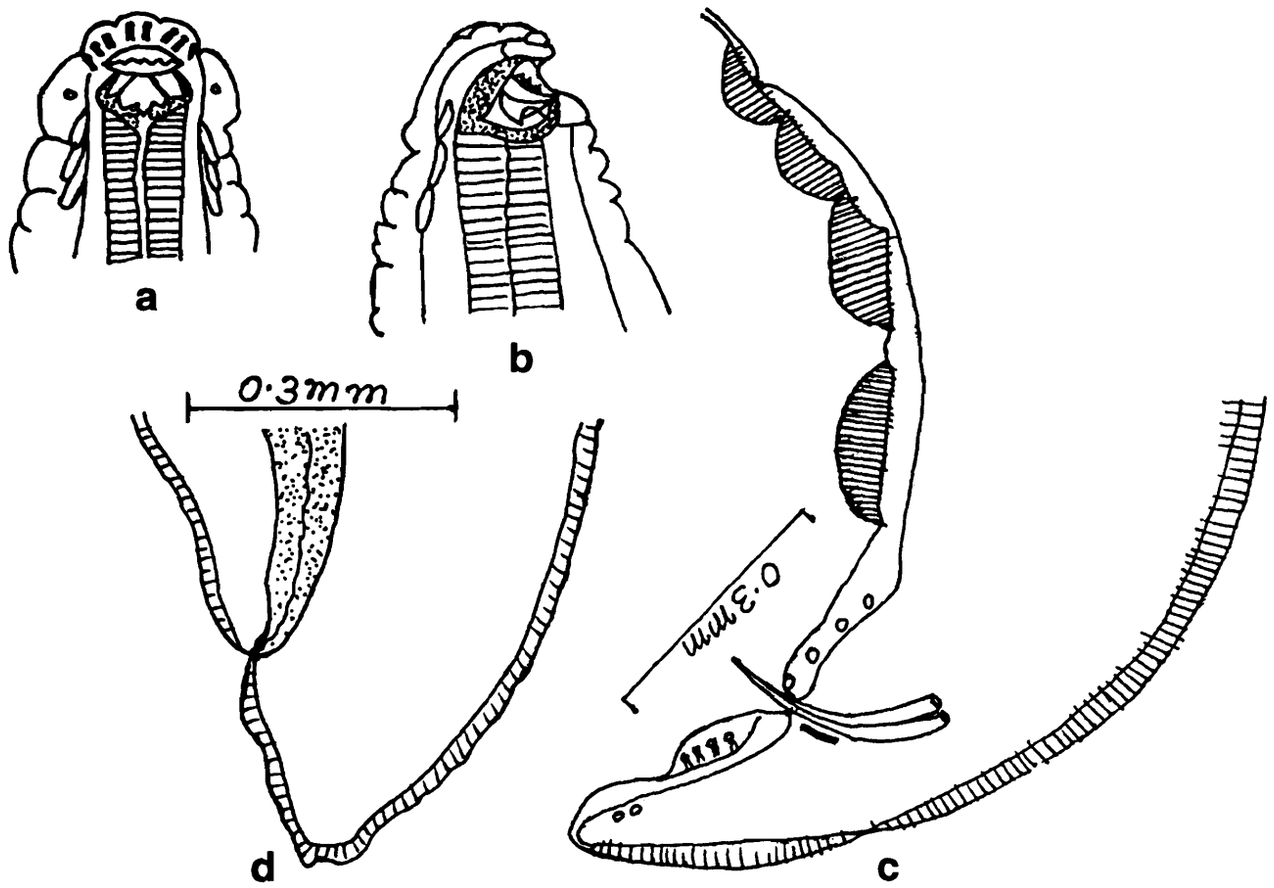

Fig. 5. : *Pterygodermatites (Mesopectines) viverriculae* sp. n.; (a) Anterior end of female, ventral view. (b) Anterior end of female, lateral view. (c) Posterior end of male, lateral view. (d) Posterior end of female, lateral view.

and transverse and surrounded by peribuccal denticles in the form of a crown; buccal capsule well chitinised, infundibular and with 3 oesophsgeal teeth. Oesophagus divided into a short, anterior muscular portion and a long posterior glandular portion.

Male : Body 5.12–8.24 long, 0.48–0.704 wide; buccal capsule 0.064 deep and 0.032–0.048 wide, nerve ring 0.32–0.35 from anterior end; oesophagus muscular portion 0.56–0.64 long; entire oesphagus 1.63–2.48 long; cuticular spines 65 pairs; midventral fans 4, close together, the fan farthest from the cloaca being the smallest, whereas the fam next to cloaca being the largest the last fan 0.48–0.83 ahead of the cloaca; narrow caudal alae present; tail 0.208–0.288 long, tip blunt; caudal papillae 10 pairs, 4 pairs preanal and 6 pairs postanal in position; spicules similar, equal, 0.192–0.24 long, with pointed tips; gubernaculum 0.048 long, ventrally placed.

Female : Body 20.0–27.68 long, 0.72–0.96 wide; buccal capsule (0.08 × 0.048) in diameter, in dorsal view; oesophagus 4.8–5.2 long, division not very clear; nerve ring 0.4–0.48 from the head; cuticular spines 100–110 pairs, begining behind the cephalic extremity and extended upto 2/3rd of the body; vulva postoesophageal, 6.0–6.72 from the anterior end; prevulver spines 48–50 pairs; tail conical, without a terminal spike, 0.32–0.35 long; eggs (0.032 × 0.024) in diameter.

Discussion : The present species comes closest to *Pterygodermatites (Mesopectines) houdermeri* (Hsu, 1935) Quentin, 1969 (from *Vivera zibetta* in Vietnam) in having equal spicules, equal number of caudal papillae, in number of cuticular spines and midventral fans in males, but differs from it in various body measurements, distribution of caudal papillae, (in *P.houdermeri* caudal papillae 10 pairs, preanal 3 pairs and post anal 7 pairs in position), presence of caudal alae and

gubernaculum in the male. Hence, the present species has been considered new to science and a new specific name *Pterycodermatites (Mesopectines) viverriculae* sp. n is being proposed to accomodate it.

35. ***Pterygodermatites (Mesopectines)*** sp.

Material : Anterior fragment of a female, 2SI Reg. No. WN 913; Host-*Rattus* rattus bullocki; location-intestine; locality-Sairep, Lunglei district, Mizoram; 17.i.1997; cell. S.R. Dey Sarkar.

Diagnosis : Body with two longitudinal subventral rows of spines. Oral opening somewhat displaced dorsally and surrounded by peribuccal denticles in the form of crown; buccal capsule well chitinised. Prevulvar Spines 42 pairs; vulva 4.0 from the naterior end.

Remarks : In absence of a complete specimen identification is not possible.

36. ***Pteryoodermatites (Mesopecrines)*** sp.

Material : Eleven females, Z.S.I. Reg. No. WN 914; host–*Harpiocephalus mordax*; location–intestine; locality–Sairep, Lunglei district, Mizoram; 25.iv.1995; Coll. S.R. Day Sarkar.

Diagnosis : Medium sized worms; anterior end narrower than the posterior end; anterior end bent ventrally in the form of a half circle; body with two longitudinal rows of subventral spines; cuticle transversely striated; oral opening displaced dorsally and surrounded by peribuccal denticles in the form of a crown; buccal capsule well chitinised, infundibular and with three oesophageal teeth.

Male : Absent.

Female : Body 14.0–28.35 long, 0.45–0.56 wide; buccal capsule (0.04 × 0.08) in diameter, in dorsal view; nerve ring 0.48 from the head end; oesophagus 3.28–3.44 long; cuticular spines 68–70 pairs, beginning behind the cephalic extermity and extended upto posterior third of the body; vulva 2.72–3.04 from the anterior end; prevulvar spines 38–40 pairs; tail short, conical, with a terminical spike, 0.16 long; eggs (0.032 × 0.048) in diameter.

Remarks : In absence of a male specimen specific identification is not possible.

37. ***Pterycodermatites (Mesopectines)*** sp.

Material : Ten females, Z.S.I. Reg, No. WN 915; host–*Tupia belangeri assamensis*; location–intestine; locality–Teirei, Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 23.xii.1993; Coll. S.R. Dey Sarkar.

Male : Absent.

Female : Body 18.56–22.16 long, 0.56–0.60 wide; buccal capsule well chitinised, infundibular, with 3 oesophageal teeth; nerve ring 0.38–0.41 from the anterior end; oesophagus anterior muscular portion 0.64–0.8 long, glandular portion 3.68–4.0 long; cuticular spines 93–95 pairs, commencing behind the cephalic extremity and extending upto anus; vulva 3.6 away from the head; prevulvar spines 43–45 pairs, postvulvar spines 50 pairs; tail short, conical with a terminal spike, 0.176–0.224 long.

Remarks : In the absence of a male specific identification is not possible. However, this is the first report of the genus from the above specific host.

Superfamily (VII) DIPLOTRIAENOIDEA

Family (XIX) DIPLOTRIAENIDAE (Skrjabin, 1916 subfam.) Anderson, 1958

Two subfamilies of the family Diplotriaenidae are being reported from Mizoram.

Key to subfamilies

– Mouth simple, with trident like structures on each side of anterior end of oesophagus. Anus subterminal, vulva in oesophageal region. Parasites of cavties of birds .... DIPLOTRIAENINAE

– Mouth without trident like structures. Oral opening bordered by cuticulrised elevations. Tail moderately long with alae, rarely subterminal without alae. parasites of cavities of reptiles and birds. ..... DICHEILONEMATINAE

Subfamily (1) DIPLOTRIAENINAE
Skrjabin, 1916

One genus of the subfamily Diplotriaeninae is being reported from Mizoram.

Genus 27. ***Diplotriaena*** Railliet and Henry, 1909

Three species of the genus *Diplotriaena* are being reported from Mizoram.

Key to species

1. Right spicule spirally twisted. 2
– Right spicule not spirally twisted. .... *Diplotriaena coracinae* sp. n.
2. Caudal papillae 5 pairs; preanal 3 pairs. .... *Diplotriaena nepalensis*
– Caudal papillae 8 pairs; preanal 2 pairs. .... *Diplotriaena enicuri* sp. n.

38. ***Diplotriaena coracinae*** sp. n.
(Fig. 6 a and b)

Material : Holotype, one male, Z.S.I. Reg. No. WN 916; host–Large Cucku Shrike, *Coracina novachollandea*; location–body cavity; locality–Lungsen, Lunglei district, Mizoram; 24.i.1997; Coll. S.R. Dey Sarkar.

Paratype, one female Z.S.I. Reg. No. WN 917; other details as in holotype.

Diagnosis : Body long, delicate, smooth and tapering at both extremities. Anterior end characterised by presence of one pair of tridents on either side of the oespphagus. Oesophagus devided into two parts, anterior part muscular and smaller, posterior part longer, glandular.

Male : Body 28.8 long, 0.672 wide; tridents two in number, equal 0.16 long; nerve ring, 0.24 from the anterior end; oesophagus 2.88 long, muscular 0.29 and glandular 2.59 long; spicules unequal, left more or less straight, 0.944 long; right not spirally twisted, curved, 0.512 long;

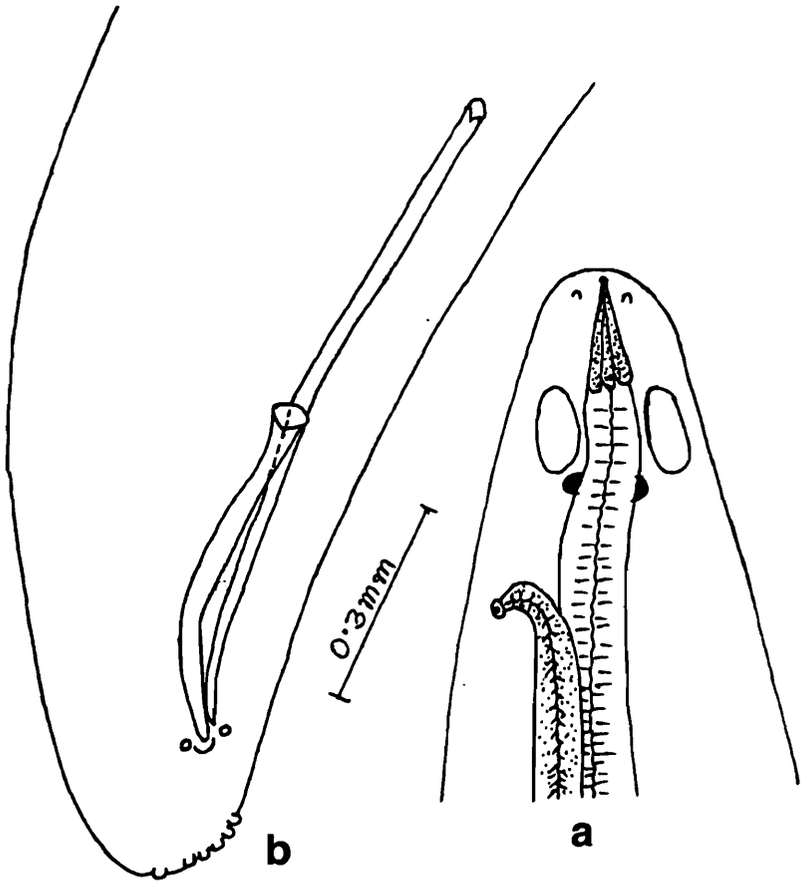

Fig. 6. : *Diplotriaena coracinae* sp. n.; (a) Anterior end of female. (b) Posterior end of male.

cloaca subterminal 0.16 from the posterior end; caudal papillae 8 pairs, one pair preanal, ventral and 7 pairs postanal in position.

Female : Body 48.48 long, 0.832 wide; nerve ring 0.32 from the anterior end tridents 0.176 long; muscular oesophagus 0.48 long and glandular oesophagus 4.00 long; vulva prominent, 0.48 away from the anterior end; anus 0.272 from the posterior end; eggs oval, thin shelled, measuring (0.048 × 0.032), embryonated.

Discussion : Though a single male and a female specimens are available for study *Diplotriaena coracinae* sp. n. differs from all the other recorded species of the genus in various body measurements and number and arrangement of caudal papillae. However, it comes nearer to *Diplotriaena kumaunensis* Singh, 1962, in the shape of the right spicule and position of vulva, but differs from it in the following respects : in *Diplotriaena kumaunensis* body is shorter (male 28.8 versus 22.1 and female 48.5 versus 34.2–41.3 long), both spicules are longer (left 0.094 versus 0.623 and the right 0.512 versus 0.431); caudal papillae 5 pairs, 3 preanal, one adanal and one postanal. In the present species there are 8 pairs of caudal palillae, one preanal and 7 postanal in position.

39. ***Diplotriaena enicuri*** sp. n.
(Fig. 7 a, b and c)

Material : Holotype, one male, Z.S.I. Reg. No. WN 918; host–Fork Tail, *Enicurus schistaceus*; location–body cavity; locality–Tukuil duty post-1, Murlen National Park (850m), 10 km North of North Khawbung, Aizawal district, Mizoram; 18.xii.1993; Coll. S.R. Dey Sarkar.

Paratype, one male, 2 females, Z.S.I. Reg. No. WN 919; other particulars as in holotype.

Description : Male : Body 20.48–22.4 long, 0.432–0.528 wide; tridents, two-equal, 0.08–0.112 long; nerve ring 0.24–0.256 from the anterior end; oesophagus divided into two parts, the anterior muscular part 0.288–0.32 and the posterior

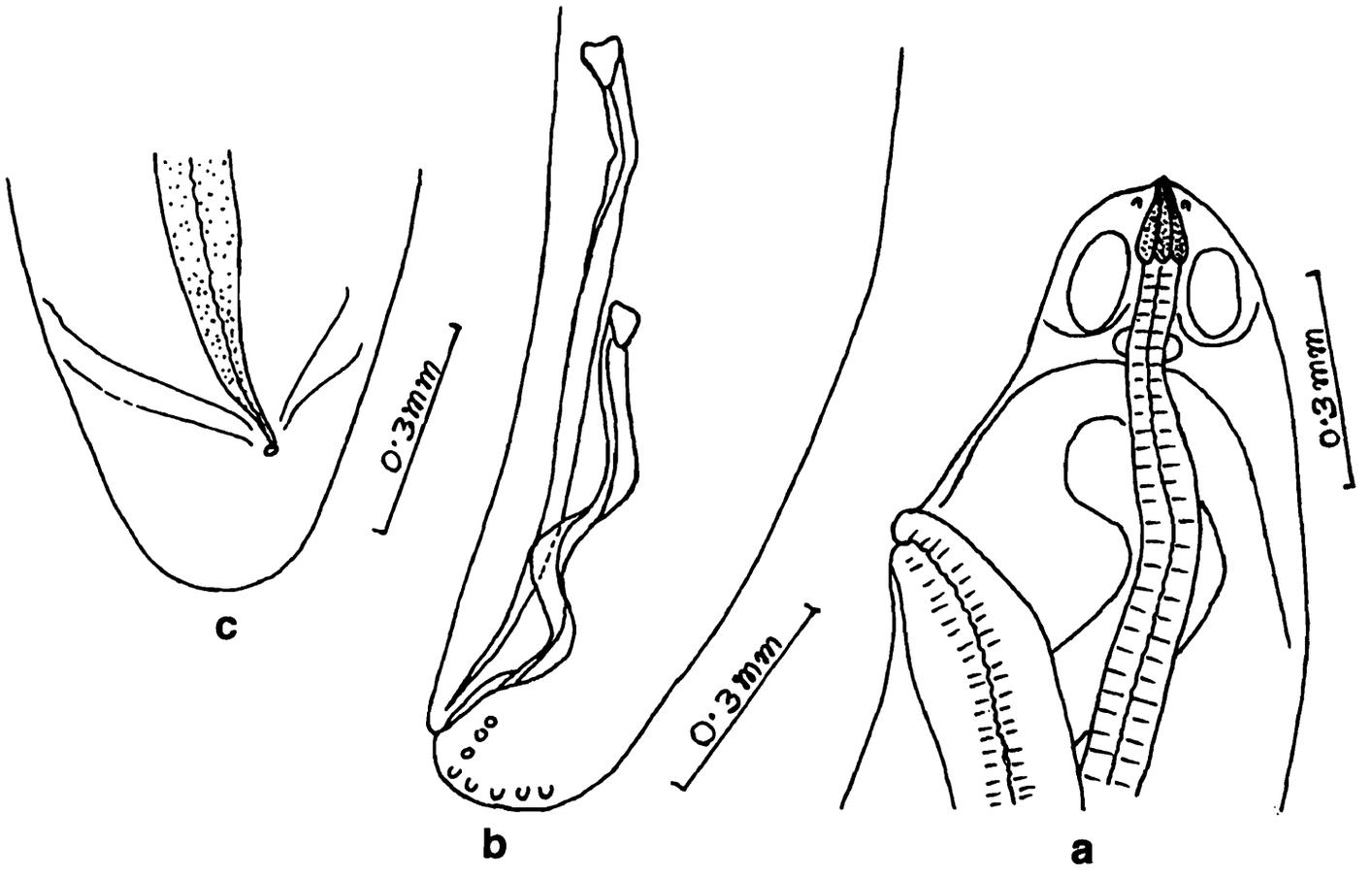

Fig. 7. : *Diplotriaena enicuri* sp. n.; (a) Anterior end of female, lateral view. (b) Posterior end of male, lateral view. (c) Posterior end of female, ventral view.

glandular part 2.27–2.80 in length; spicules unequal, dissimilar with pointed tips, the left more or less straight, 0.864–0.928 long, right spirally twisted, about two turns, length 0.56–0.608 along the curves and 0.608–0.688 in straight line; cloaca subterminal 0.048 from the posterior end; caudal papillae 8 pairs, 2 pairs preanal, one pair appear to be adanal and 5 pairs postanal in position.

Female : Body 42.0–45.5 long, 0.604–0.688 wide; tridents as in male, 0.117 long; nervë ring 0.24–0.288 from the anterior end; muscular oesophagus 0.4 long and glandular part 3.04 long; vulva anterior, 0.56 from the head end; anus 0.192–0.24 from the posterior end; eggs granular.

Discussion : The present species comes closer to *Diplotriaena dubia* (Maplestone, 1931), *Diplotriaena urocissae* (Maplestone, 1931), *Diplotriaena corrugata* (Wehr. 1930) and *Diplotriaena chandragiriensis* Soota and Chaturvedi, 1971 in size of its spicules but differs in the following respect : from *D. dubia* it differs in its larger body size, in having a greater number of caudal papillae (8 pairs versus 4 pairs) from *D. urocissae* it differs in its larger body size and in having greater number of caudal papillae (8 versus 2) from *D. corrugata* it differs in its larger body size and in having greater number of caudal papillae (8 versus 7). From all the above mentioned species the new one differs in the shape of its right spicules which is spirally twisted. It also differs from the preceding species in being smaller and in the shape of its right spicule.

40. ***Diplotriana nepalensis*** Soota and Chaturvedi, 1967

1967. *Diplotriaena nepalensis* Soota and Chaturvedi, *J. Zool. Soc. India*, **19**(1 & 2) : 33.

Material : Two males, 3 females and some fragments of male and female, Z.S.I. Reg. No. WN 920; host–The Himalayan Whistling Thrush, *Myiophoneus caerulues temminckii*; location–Body cavity; locality–Tukuil duty Post-1, Murlen National Park (850 m), 10 km North of North Khawbung, Aizawal district, Mizoram; 17.xii.1993; Coll. S.R. Dey Sarkar.

Diagnosis : Male : Body 24.5–25.9 long; 0.48–0.51 wide; tridents with transverse ridges and pointed tips, 0.16–0.176 long; nerve ring 0.192–0.24 from anterior end; spicules dissimilar and unequal, left more or less straight, 1.02 long and the right spirally twisted in two turns, 0.608 in straight line, 0.736–0.8 long along the curves; cloaca subterminal 0.08 from the posterior end; caudal papillae 5 pairs, 3 prenal and 2 postanal.

Female : Body 46.5–51.8 long; tridents as in male; vulva anterior, 0.576–0.64 from the anterior end.

Distribution : India : Mizoram (Aizawal district), West Bengal, Meghalaya.

Elsewhere : Nepal.

Subfamily (II) DICHEILONEMATINAE Wehr. 1935

One species of the genus *Hamatospiculum* is being reported from Mizoram.

41. ***Hamatospiculum dicruri*** Tubangui, 1934

1934. *Hamatospiculum dicruri* Tubangui, *Phlipp. J. Sc.*, **55**(2) : 115-124.

Material : One male, Z.S.I. Reg. No. WN 921; host–Deongo, *Dicrurus remifer*; location–neck muscles; locality–Sairep, Lunglei district, Mizoram; 26.iv.1995; Coll. S.R. Dey Sarkar.

Diagnosis : Mouth with two small projecting lateral lips; anterior extremity provided with four pairs of submedian head papillae and a pair of lateral papillae; lateral alae absent.

Description : Male : Body 23.04 long, 0.48 wide; cuticle finely striated; head round with a thickened cap; end on view showing epaulette structures; oesophagus divided into two parts, anterior muscular 0.32 and posterior glandular, 4.64 long; nerve ring 0.20 from anterior end spicules very unequal, left longer, 1.19 long, right

smaller 0.32 long; tail short, rounded, 0.064 long; caudal alae very narrow; caudal papillae sessile, minute, consisting of 6 preanal and 3 postanal.

Female : Body 38.0–54.0 long.

Distribution : Mizoram : Lunglei district. *Elsewhere* : Philippines.

Superfamily (VIII) APROCTOIDEA

Family (XX) APROCTIDAE (Yorke and Maplestone, 1926 subfam.) Skrjabin & Schikhobalova, 1945

Subfamily APROCTINAE Yorke and Maplestone, 1926

Genus 29. ***Squamofilaria*** Schmerling, 1925

Two species of the genus *Squamofilaria* are being reported from Mizoram.

42. ***Squamofilaria indica*** sp. n.
(Fig. 8 a, b, and c)

Material : Holotype, one male, Z.S.I. Reg. No. WN 922; host–Collard Scops Owl, *Otus bakkamoena*; location–body cavity; locality–Lungsen, Lunglei district, Mizoram; 26.i.1997; Coll. S.R. Dey Sarkar. Paratypes 4 females, ZSI Reg. No. WN 923; other particulars as for the holotype.

Diagnosis : Mouth without lips. Buccal cavity short, broad and funnel shaped; cuticle unstriated with a few scattered bosses present in both sexes. Oesophagus cylindrical and undivided. Tail short and round in both sexes. Spicules in male short and equal. Gubernaculum absent.

Male : Body 13.52 long, 0.32 wide; buccal cavity 0.024 deep; nerve ring 0.192 from the

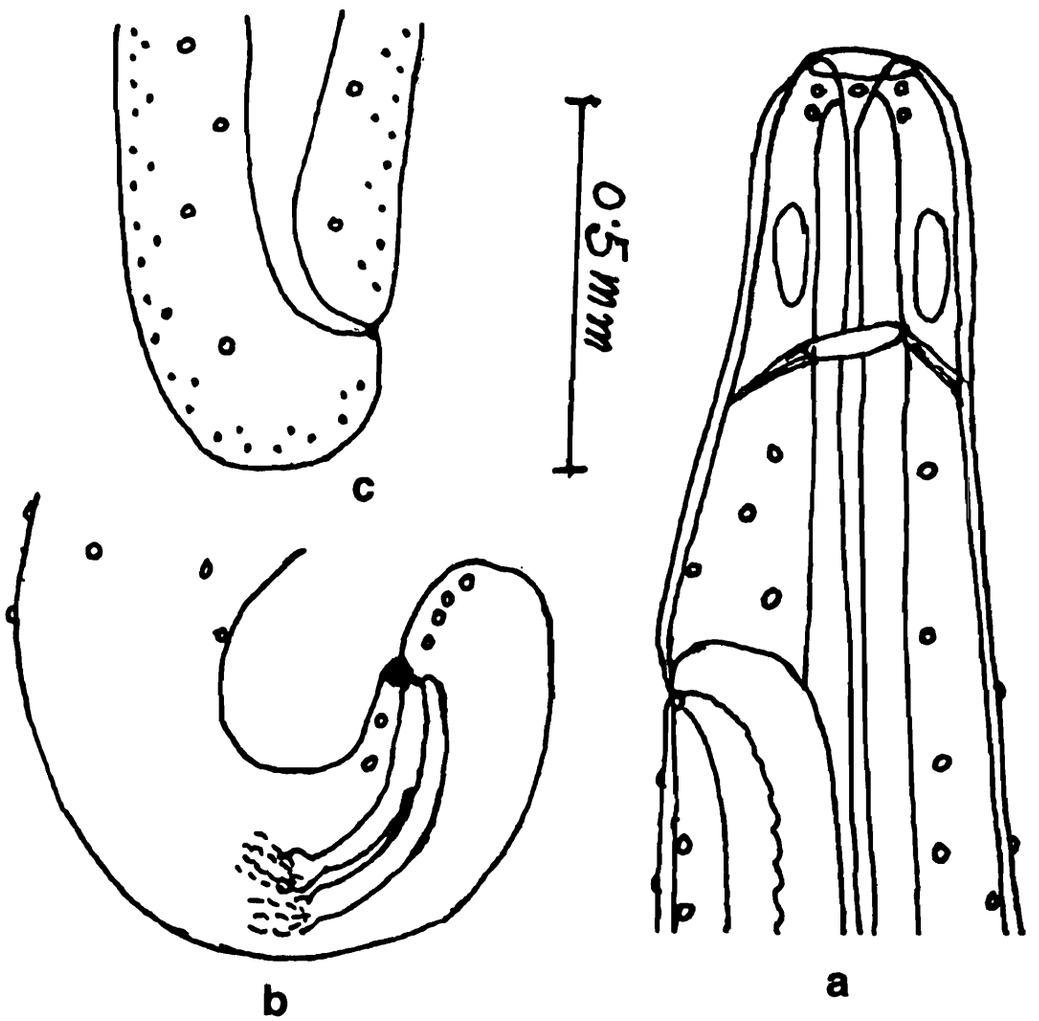

Fig. 8. : *Squamofilaria indica* sp. n.; (a) Anterior end of female, lateral view. (b) Posterior end of male, lateral view. (c) Posterior end of female, lateral view.

anterior end; oesophagus 0.4 long, 0.048 wide; tail 0.064 long, rounded tip; spicules equal, rounded distally and massive in the proximal end, 0.16 long; caudal papillae 6 pairs, 2 pairs preanal, 4 pairs postanal and a single median preanal papilla present.

Female : Body 28.64–33.2 long, 0.60–0.64 wide; buccal cavity 0.048 deep; nerve ring 0.27–0.32 from the anterior end; oesophagus as in male, 0.56–0.64 long, 0.064 wide; tail short, rounded, 0.08–0.096 long; vulva in the oesophageal region, 0.51–0.53 from the anterior end; eggs (0.024 × 0.064) in diameter; uterus full of microfilaria.

Discussion : The present species comes nearer to *Squamofilaria glaucidiumae* Dey Sarkar, 2000, in having equal spicules, and resemblance of relative body measurements. But differs from it in number and arrangement of caudal papillae. Hence, the present species is regarded as fifferent from all the known forms under the genus *Squamofilfia* Schmerling, 1925 and a new specific name *Squamofilaria indica* sp. n. is being proposed to accomodate it.

43. ***Squamofilaria*** sp.

Material : One subadult female. Z.S.I. Reg. No. WN 924; host–a bird, *Niltava sundra*; location–Body cavity; locality–Teired, Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 23.xii.1993; Coll. S.R. Dey Sarkar.

Diagnosis : Female body 13.76 long, 0.26 wide; buccal cavity short, funnel shaped, 0.016 deep; cuticle finely striated, without bosses; nerve ring 0.16 from the anterior end; oesophagus undivided 0.72 long, 0.064 wide; tail short, round, 0.08 long; vulva prominent, in the oesophageal region, 0.46 from the anterior end; eggs grannular.

Remarks : In tha absence of a male or a mature specemen specific identification is not possible.

Family (XXI) ONCHOCERCIDAE (Leiper, 1911)

Subfamily SPLENDIDOFILARIINAE Chabaud and Choquet, 1953

Genus 30. ***Chandlerella*** Yorke and Maplestone, 1926

One species of the genus *Chandlerella* is being reported from Mizoram.

44. ***Chandlerella*** sp.

Material : Two damaged females, Z.S.I. Reg. No. WN 925; host–a bird, *Rhipidura aureola*; location–neck muscles; locality–Sairep, Lunglei district, Mizoram; 18.iv.1995; Coll. S.R. Dey Sarkar.

Diagnosis : Mouth without lip-like structures. Cephalic papillae 4 pairs. Cuticle smooth, thin and without bosses. Oesophagus well developed, broad and divided into two parts, anterior muscular and posterior glandular, and clearly demarcated from the intestine. Vulva at about the middle of the oesophagus.

Remarks : In the absence of a male specific identification is not possible.

V. Order STRONGYLIDA

Superfamily (1) ANCYLOSTOMATOIDEA

Family (XXII) ANCYLOSTOMATIDAE (Looss, 1905) Lane, 1917

Subfamily ANCYLOSTOMATINAE Looss, 1905

Genus 31. ***Ancylostoma*** (Dubini, 1843) Creplin, 1845

Subgenus ***Ancylostoma (Ceylancylostoma)*** Lane, 1916

One species of the genus and subgenus *Ancylostoma (Ceylancylostoma)* is being reported from Mizoram.

45. ***Ancylostoma (Ceylancylostoma) ceylanicum*** Lane, 1916

1915. *Ancylostoma ceylanicum* Leiper, *J. Roy. Army. Med. Corps.*, **24**(6) : 571-573.

1916. *Ancylostoma (Ceylancylostoma) ceylanicum* Lane, *Ind. J. Med. Res.* Calcutta, **4**(1) : 78-91.

Material : Nine males, 16 females, Z.S.I. Reg. No. WN 926; host–Smaller Indian Civet Cat, *Viverricula indica*; location–intestine; locality–Sairep, Lunglei district, Mizoram; 17.i.1997; Coll. S.R. Dey Sarkar.

Diagnosis : Male : Body 7.7–8.5 long, 0.35 wide; cuticle finely striated; buccal capsule about 0.157 in length; ventral teeth consist of one large pair and a rudimentary inner pair; oesophagus about 0.75 long cervical papillae and excretory pore at 0.6 and the nerve ring at 0.46 from the head end; the medio-lateral and postero-lateral rays of the bursa close together; spicules equal, about 0.8 long; gubernaculum 0.075 long.

Female : Body 9.0–10.5 long, 0.375 wide; tail 0.16 long; the vulva at about 3.5 from the posterior end; eggs (0.05 × 0.03) in diameter.

Distribution : India : Mizoram (Lunglei district), West Bengal.

Elsewhere : China; Japan; Formosa; Korea; Saim; Philippines.

Superfamily (II) DIAPHANOCEPHALOIDEA

Family (XXIII) DIAPHANOCEPHALIDAE Travassos, 1920

One genus of the family Diaphanocephalidae is being reported from Mizoram.

Genus 32. ***Kalicephalus*** Molin, 1861, Creplin, 1845

One species of the genus *Kalicephalus* is being reported from Mizoram.

46. ***Kalicephalus indicus*** Ortlepp, 1923

1923. *Kalicephalus indicus* Ortlepp, *J. Helminthol.*, **1**(2) : p. 61.

Material : Three males, 6 females; Z.S.I. Reg. No. WN 923; host–a snake, *Xenochrophis piscator*; location–stomach and duodenum; locality–Teirei, Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 27.xii.1993; Coll. S.R. Dey Sarkar.

Diagnosis : Male : Body 4.2–6.2 long, 0.19–0.32 wide; the mouth directed straight forward without leaf-crown; dorso-ventral diameter of the head at its widest part about 0.15–0.17; buccal capsule 0.108–0.16 long; the duct of the dorsal oesophageal gland extended more than half the length of the capsule; oesophagus upto 0.27 long; cervical papillae small, at 0.3 from the head end; nerve ring and excretory pore at 0.07–0.1 and 0.14–0.29 respectively; genital cone 0.06 long; spicules equal, alate, 0.32–0.47 long; gubernaculum 0.16 long; copulatory bursa trilobed.

Female : Body 6.4–9.2 long, 0.32–0.39 wide; vulva prominent, close to anus, 0.99–1.9 from the posterior end; the posterio uteriane branch usually runs posteriorly for a distance of 0.2–0.5 from the vulva and then turns forward; tail 0.14–0.19 long, with a terminal spike.

Distribution : India : Mizoram (Lunglei district), West Bengal.

Elsewhere : China; London; South Africa.

Superfamily (III) STRONGYLOIDEA

Family (XXIV) CHABERTIIDAE (Popova, 1952 subfam.) Lichtenfels, 1980

Subfamily OESOPHAGOSTOMINAE Railliet, 1916

Two genera of the subfamily Oesophagostominae are being reported from Mizoram.

Key to genera

– Cervical inflation with transverse cervical groove present. External leaf-crown with more than 8 elements. Gubernaculum present. Vulva close to anus. Parasites of Pig .... ***Oesophaoostomum*** Molin, 1861

– Cervical inflation with transverse cervical groove absent. External leaf-crown with 19 or more elements. Gubernaculum present or absent. Vulva well anterior to anus. Parasites of Asian rodents (*Rattus*) .... ***Kuntzistronoylus*** Lichtenfels, 1980

Genus 33. ***Oesephaoostomum*** Molin, 1861

Subgenus ***Oesophagostomu*** Molin, 1861

47. ***Oesophaoostomum (Oesophagostomum) dentatum*** (Rudolphi, 1803) Molin, 1861

1803. *Stronoylus dentatus* Rudolphi, *Arch. Zool. u. Zool.*, 3(2) : 12.

1861. *Oesophaoostomum (O) dentatum* Molin, *Mem. R. Ist. Veneta.*, 9(1860) : 443.

Material : Several examples; host–Pig (domestic); locality–slaughted localy at Tierei, Aizawal district, Mizoram; 25.xii.1993; Coll. S.R. Dey Sarkar.

Diagnosis : Male : Body 8.0–12.0 long; cervical goove extended to some distance on to the lateral surface; lateral alae absent; external leaf-crown with 9 elements and the internal leaf-crown with 18 small elements; oesophagus not swallen at the anterior end, 0.5 long; cervical papillae at the posterior end of the oesophagus; spicules alate, tapering to a blunt point, 1.32–1.5 long; gubernaculum trowel-shaped, 0.116–0.14 long.

Female : Body 10.5–15.0 long; tail tapering, 0.25–0.43 long; vulva at 0.28–0.39 from the anus.

Distribution : Mizoram : Aizawal district.

Elsewhere : India : West Bengal, Meghalaya. Cosmopolitan.

Genus 34. ***Kutzistronoylus*** Lichtenfels, 1980

One new species of the genus *Kuntzistronoylus* is being reported from Mizoram.

48. ***Kuntzistronoylus indicus*** sp. n.
(Fig. 9 a-d)

Material : HOLOTYPE : One male, Z.S.I. Reg. No. WN 928 host–Rat, *Rattus rattus bullocki*; location–intestine; locality–Teirei, Dampa Wild Life Sanctuary, Aizawal district, Mizoram; 26.xii.1993, Coll. S.R. Dey Sarkar. PARATYPES : 3 females, Z.S.I. Reg. No. WN 929; other particulars as for the holotype.

Diagnosis : Mediam sized worms without cervical groove and lateral alae. Head with cushion like cephalic expansion. Cuticle striated transversely. Oral opening with internal and external leaf crowns. Elements of external and internal leaf crown equal in thickness. Oesophsaous short, cylindrical anteriorly and expanded posteriorly. Body length about 17 to 18 times length of oesophagus. Copulatory bursa well developed. Spicules of male equal, non-alate, prebursal papillae and gubernaculum present. Vulva of female well anterior to anus.

Male : Body 9.44 long, 0.224 wide; buccal capsule 0.048 deep; external leaf crown containing about 20 elements and that of internal 18 elements; oesophagus 0.512 long, expanded posteriorly; cervical papillae and nerve ring at 0.24 from the anterior end; bursa well developed, short with thick rays; prebursal papillae at 0.128 from the cloacal opening; ventral rays parallel, equal; venterolateral ray shorter than other laterals; externodorsal arising from the common trunk with the dorsal and not reaching the margin of the bursa, the dorsal bifurcate for about half its length, each branch giving off a small lateral twig; spicules equal, 0.64 long, nonalate, tapering to pointed tips; gubernaculum present, 0.048 long; genital cone well developed, 0.064 long, with two large dorsal papillae, ventral papillae not observed.

Female : Body 10.08–11.84 long, 0.32–0.4 wide; buccal capsule 0.032–0.048 deep; corona radiata as in male; cervical papillae 0.208–0.288 from the anterior end; oesophagus as in male, 0.56–0.69 long; vulva prominent, 0.448–0.512 from the anus; vagina short, vestibule kidny shaped; tail 0.192–0.240 long, conically pointed; eggs (0.048 × 0.032) in diameter.

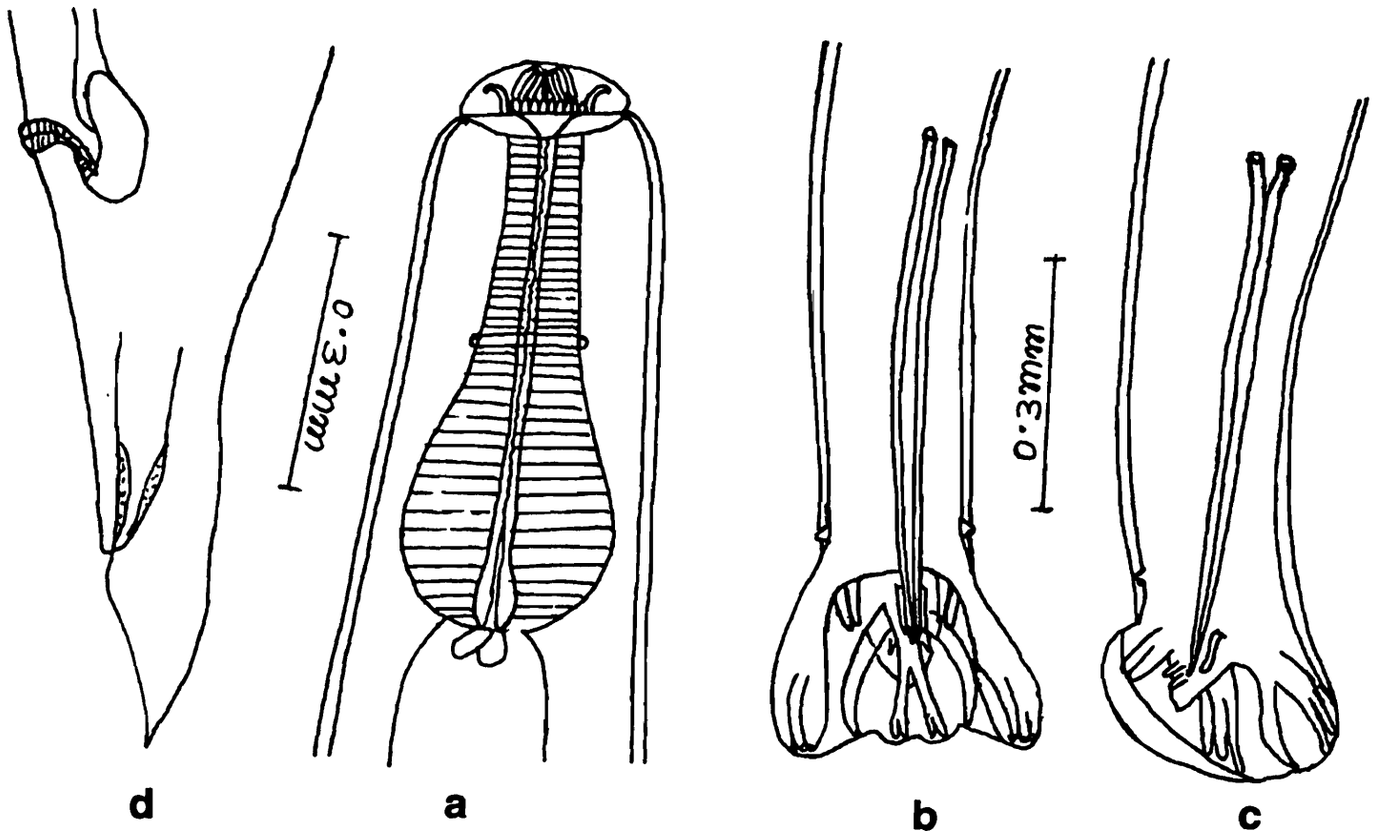

Fig. 9. : *Kuntzistrongylus indicus* sp. n.; (a) Anterior end of female lateral view. (b) Posterior end of male, ventral view. (c) Posterior end of male, lateral view. (d) Posterior end of female, showing vulva, lateral view.

Discussion : The present species comes closer to *Kuntzistrongylus selfi* (Schmidt and Kuntz, 1975) Lichtenfeks, 1980, in having cushion like cephalic expansion, similar bursal system, presence of prebursal papillae, well developed genital cone with two large dorsal papillae; vulva of female well anterior to anus and vagina with kidny shaped vestibule, but differs from it in having comparatively longer oesophagus, nonalate spicules and presence of a gubernaculum in the male. Hence, the present species is regarded as different from *Kuntzistrongylus selfi* (Schmidt and Kuntz, 1975) and a new specific name *Kuntzistrongulus indicus* sp. n. is being proposed to accomodate it.

In view of the above observations the diagonestic character of the genus is to be emended accordingly.

Genus ***Kuntzistrongylus*** Lichtenfels, 1980

Diagnosis (emended) : Oesophagostominae. Medium sized worms without cervical groove. Head with cushion like cephalic expansion. Oral opening with internal and external leaf crowns; elements of internal and external leaf crown equal in thickness. Cephalic papillae short and conical. Buccal capsule wider anteriorly. Extra chitinous supports absent. Oesophagus short, thick, widen posterorly. Cervical papillae near middle of oesophageal swelling. Bursa of male short with thick rays. Ventral rays parallel. Venterolateral ray shorter than other laterals. Externodorsal ray originate from the stem of the dorsal ray. Prebursal papillae present. Genetal cone well developed with two large dorsal papillae and a single ventral papilla. Spicules with wide alae or without alae. Gubernaculam absent or present. Female : Vulva well anterior to anus, vagina short, with kidny shaped vestibule. Tail conically pointed.

Genotype : *Kuntzistrongylus selfi* (Schmidt and Kuntz, 1975).

Syn. : *Oesophagostomum (Conoweberia) selfi* Schmidt and Kuntz, 1975, in *Rattus coxinga coxinga* from Taiwan.

Superfamily (IV) TRICHOSTRONGYLOIDEA

Family (XXV) MOLINIIDAE (Skrjabin and Schulz, 1937 subfam.) Durette-Desset and Chabaud, 1977

Subfamily MOLINIINAE Skrjabin and Schulz, 1937

Genus 35. ***Trichoskrjabinia*** Travassos, 1937

49. ***Trichoskrjabinia mabuyi*** sp. n.
(Fig. 10 a-d)

Material : HOLOTYPE : One male, Z.S.I. Reg. No. WN 930; host–*Mabuya multifasciata multifasciata*; location–intestine; locality–Ngenpui, Chhimtuipui district, Mizoram; 12-iv.1995; Coll. S.R. Dey Sarkar. PARATYPES : 6 males, 3 females, Z.S.I. Reg. No. WN 931; other particulars as in holotype.

Diagnosis : Head with a single head vescicle. Cuticle with transverse striations and longitudinal ridges. Cervical alae and cervical papillae present.

Male : Body 6.16–7.12 long, 0.112–0.120 wide; cephalic vescicle 0.016 long; lateral cervical alae started at 0.16 from the anterior end and extended upto 0.34–0.56, behind the oesophagus; cervical papillae minute, 0.32 from the head end; nerve ring 0.112–0.128 and excretory pore 0.16–0.25 from the anterior end; oesophagus 0.29–0.34 long; bursa well developed, symatrical; dorsal lobe small; prebursal papillae minute; ventral rays equal, fused; anterodorsal ray issolated and thicker than the other laterals; the medio and posterc laterals fused, equal, thinner than the ventrals; all pairs of rays reaching the margin of the bursa; externodorsal arising from a common trunk with the dorsal and reaching bursal margin; dorsal tapering distally with two pairs of lateral twigs near its tip; spicules equal, complex, alate internally, terminating in three process, one of which larger than the others, 0.128–0.136 long; gubernaculum well developed, 0.048 long; genital cone 0.024 long with two small ventral papillae.

Female : Body 7.76–8.96 long, 0.112 wide; cephalic vesicle and cervical lateral alae present as in male; cervical papillae 0.256–0.288 from the head; oesophagus 0.32–0.38 long; vulva prominent, 2.4–2.72 from the posterior end; the ovijector with short obliquely directed vagina;

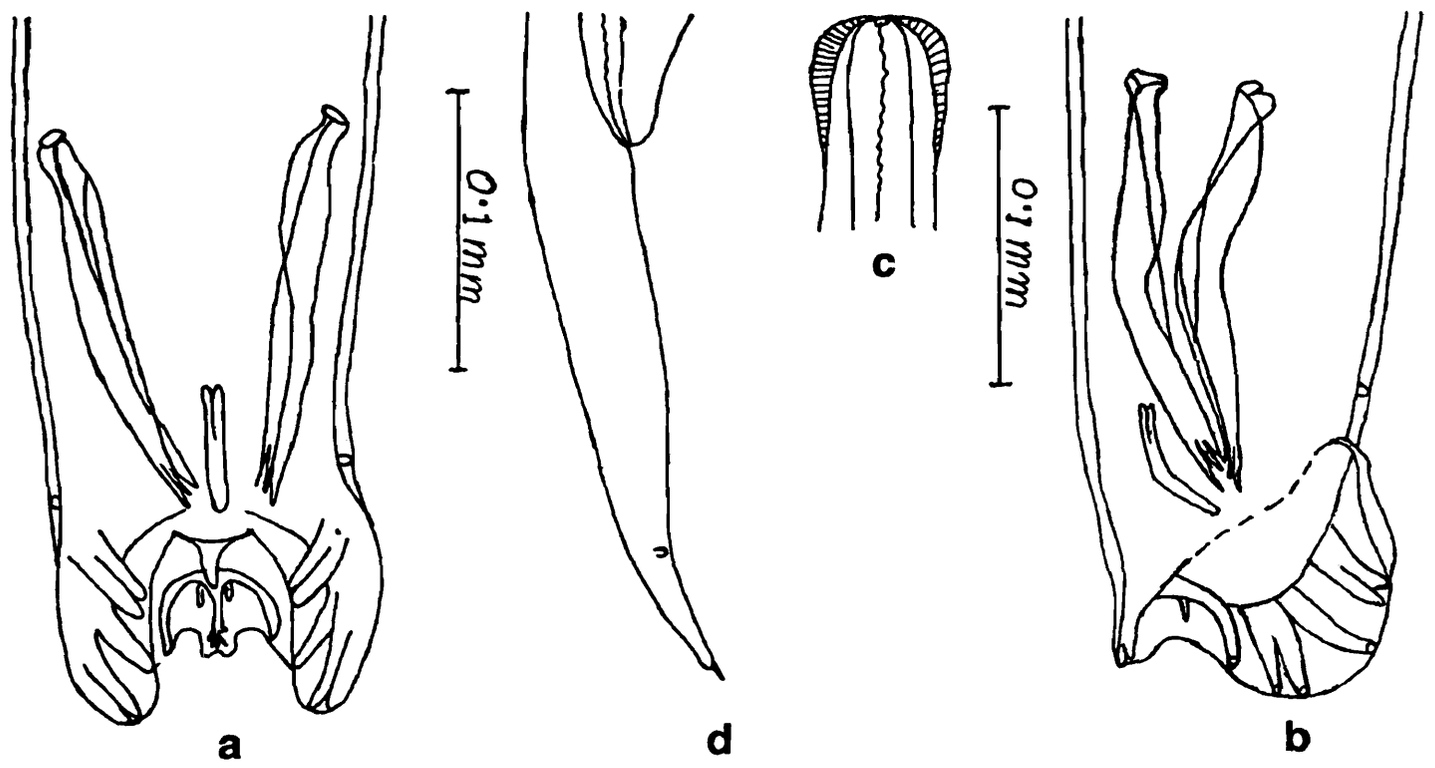

Fig. 10. : *Trichoskrjabinia mabuyi* sp. n.; (a) Posterior end of male, ventral view. (b) Posterior end of male, lateral view. (c) Anterior end of female, lateral view. (d) Posterior end of female, lateral view.

eggs (0.064 × 0.032) in diameter; tail elongated, ending in a spike, 0.176 long with a pair of papillae at 0.048–0.064 from the tip.

Discussion : The present species comes closer to *Trichoskrjabinia malayana* (Baylis, 1933) Travassos, 1937, in having single head vescicle, similar bursal system, presence of gubernaculum, prebursal papillae and spicules with three terminal processes, but differs from it in possessing cervical lateral alae, cervical papillae, female tail with a pair of papillae and also in relative body measurements. Hence, the present species is regarded as different from *Trichoskrjabinia malayana* (Baylis, 1933) Travassos, 1937 and named as *Trichoskrjabinia mabuyi* sp. n.

In view of the above observations the diagnosis of the genus is to be emended accordingly.

This the first report of the genus from the above specific host.

Genus ***Trichoskrjabinia*** Travassos, 1937

Diagnosis (emended) : Molineidae. Head with a single vescicle. Cuticule with transverse striations and longitudinal ridges. Cervical alae present or absent. Male : Bursa symetrical, dorsal lobe well differentiated. Prebursal papillae minute; ventral rays equal; externolaterals larger than ventrals, seperated from other laterals to near its base; the anterolaterals thicker than the other laterals and well seperated from mediolaterals; all pairs of rays reaching the margin of the bursa; externodorsal arising from a common trunk with the dorsal and reaching the bursal margin; dorsal tapering distally, with two pairs of lateral twigs near its tip. Spicules alate internally, terminating in three processes, one of which is larger than the others; gubernaculum present or absent. Female : Tail digitiform, with a pair of papillae, ending in terminal spike; vulva in posterior half of the body. Amphidelphic; eggs morulated.

Genotype : *Trichoskrjabinia malayana* (Baylis, 1933) Travassos, 1937

Syn. : *Oswaldocruzia malayana* Beylis 1933, in *Heossmys grandis*; Malaya.

SUMMARY

The paper deals with 49 species of nematodes, spread in 35 genera and 25 families from vertebrate hosts of Mizoram State. Ten species reported here are new to science and the others are being recorded for the first time from the area.

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TREMATODES

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INTRODUCTION

Mizoram state lies in the North eastern corner of the Country. It is a newly formed state and was carved out of a part of the former state of Assam. Mizoram is the state of hills and valleys. It is the youngest state of India having attained state hood on 20th February, 1987 after being a Union Territory since 1972. The state surrounded by Myanmar in the South East, Bangladesh and Tripura in the west and a common boundary with Assam and Manipur States in the North. It has hilly and precipitus terrain with deep gorges and the eastern part of the state are mostly covered with high hills as compared to other parts of the State. Aizawal, Chimtuipui and Lungley are the three districts of the State with 21,081 sq. kms. total land area. The total road lines are 2665 kms. approximately. The population comprises approximately 493,757. The average rain fall of the state is 200-250 cms. annually with hot and humid climate. The climate is ideal for survival and propagation of the helminth parasites.

HISTORICAL BACKGROUND

Study on helminth parasites of vertebrate hosts from the Mizoram State have not yet been done so far. But some reports on helminth parasites are available from the neighbouring states like Burma, Assam and Tripura which were done by Evans and Ranni (1908-1912), Jackson (1921), Bhalerao (1924-35), Meggit (1927-1935), Chandler (1926), Gogate (1932-1939).

Trematodes from elephant, pig, horse and cattle etc. were recorded by Fischoeder (1902-1903), Looss (1907), Pande (1935), Srivastava & Ghosh (1967), Soota & Ghosh (1977), Yadav & Tandon (1989-1992), Roy & Tandon (1990-1992), Ghosh & Chakraborty (1994) and Ghosh & Dutta (1994).

Most of the hosts are found in Mizoram state are also available in Burma, Assam and Tripura State. So, while studying the helminth parasites of Mizoram state all the record should be included.

The present study based on the compilation of the published work on digenetic trematodes of vertebrates of neighbouring state as well as on digenetic trematodes collected from vertebrate hosts of the state by the Survey tour undertaken by the author.

The present volume will be helpful for the future workers interested to study of digenetic trematodes of the state. Systematic account and important diagnostic characters have been dealt in the present study for identification. The diagnosis of the described specimens have been taken from the original description.

MATERIALS AND METHODS

Host specimens are to be collected from different localities as far as possible.

Specimens were dissected by scissors or scalpal to open the vicera was kept in Petridish with normal saline. The gut/vicera was then opened by the fine scissors. After some time the

worms came out and were collected by the fine dropper and kept in a watch glass or cavity block. For the study of excretory system the worms were studied alive under the microscope. Specimens with the help of a fine brush were kept on the glass slide and covered with a cover slip and pressed gently with the help of a neddle. A drop of AFA was to be poured into the specimens for fixation and it was covered with a Petridish to avoid evaporation. After 1/2 an hour the specimens were removed from the glass slide and were kept into the tubes in 70% alcohol with proper lebels. The specimens were brought to the laboratory for further processing.

In the laboratory the specimens were washed in 70% alcohol further, after that these were placed in cavity blocks with borax carmine (alcoholic) for staining. Over staining is preferred mainly for trematodes and differentiated with acid alcohol. At the time of differentiation the specimens were seen under the binocular till better results came. After that the specimens were washed in 70% alcohol to remove traces of acid. It was then dehydrated in various grades of alcohol, 80%, 90%, 96% and 100%, at 10-15 minutes interval. After completing dehydration the specimens were kept in clearing agent Xylol and clove oil. Before mounting in Canada balsam the specimens very much required to rinse in Xylol, rendering it transparent and free from excess of colve oil and it was mounted in Canada balsam. The prepared slides then kept on hot plate for drying in low temperature. Label had to be pasted on the left side of the glass slide with proper data. Another label was to be pasted on right side for identification report. The materials were then ready for study.

MORPHOLOGY

Digenetic trematodes are flat, leaf like elongated animals. Body size of the digenea varies from a millimeter to several centimeters. The flukes are soft bodied animals with 3 layers like, Circular outer, oblique middle and longitudinal inner layers. There is no body cavity. Digenetic trematodes are endoparasite, due to that, the reproductive system, nervous system, excretory system and mode of locomotion have been reduced. Blood vascular system is wanting. Except few families like didymozoidae and schistosomatidae the digenetic trematodes are monocious.

Family PARAMPHISTOMIDAE Fischoeder, 1901

Sub-family PARAMPHISTOMINAE Fischoeder, 1901

Genus ***Ceylonocotyle*** Nasmark, 1937

Ceylonocotyle scoliocoelium (Fischoeder, 1901) Nasmark, 1937

1901. *Paramphistomum scoliocoelium* Fischoeder, *Zool. Anz. Bd.* **25**(643) : 367-375.

1937. *Ceylonocotyle scolliocoelium* Nasmark, *Zool. Bidr. Uppsala,* **16** : 301-565.

Material examined : Nil.

Host - Goat, Cattle

Location - Rumen

Diagnosis : Body elongate, 4.08-6.95 long, 1.82-2.66 wide. Mouth terminal. Oral sucker 0.39-0.50 long, 0.29-0.41 wide. Oesophagus long with oesophageal bulb, 0.46-1.21 long, intestinal caeca wide, extending in front of acetabulum. Acetanulum 0.78 in diameter.

Testes two, anterior testis 0.55-1.21 long, 0.73-1.51 wide and Posterior testis 0.59-1.33 long, 0.61-1.47 wide.

Ovary oval, situated just behind caecal bifurcation. Vitellaria follicular, extending from caecal bifurcation to Posterior end of body. Genital pore located behind caecal bifurcation. Eggs 12-17 x 6-8.

Remarks : *Ceylonocotyle* was established by Nasmark 1937 and placed under the family Paramphistomidae Fischoeder, 1901 and Subfamily Paramphistominae fischoeder, 1901.

Skrjabin, 1949 considered the Nasmark's classification. In 1953 Price and McIntosh accepted the Genus Orthocoelium Stiles and Goldberger, 1910 as a valid Genus. But Yamaguti 1958 placed the genus Ceylonototyle under the genus Orthocoelium (Stiles et Goldberger, 1910).

Distribution : India : Mizoram, Tripura, West Bengal, Meghalaya, Punjab, Uttar Pradesh, Tamil Nadu, Kerala.

Ceylonocotyle dawesi Gupta, 1958
Syn. ***Orthocoelium dawesi***

1958. *Ceylonocotyle* dawesi Gupta. *Res. Bull. Punjab. Univ. Sci.*, **140** : 67-93.

Material examined : Nil.

Host - Goat

Location - Rumen

Diagnosis : Body oval shaped, 2.86-4.40 mm long, 1.81-2.75 mm wide. Acetalulum 0.38-0.66 mm in diameter. Oral sucker 0.66-0.82 mm long, 0.49-0.55 mm wide, oesophagus 0.88-1.04 mm long, is a curved tube without an oesophageal bulb. The intestinal caeca are convoluting, reaching the level of the middle of the acetabulum.

Testes, tandem, placed infront of acetabulum. Anterior testis 0.38-0.49 mm long, 1.37-1.65 mm wide; posterior testis 0.55-0.66 mm long, 1.15-1.43 mm wide. Pars-musculosa coiled and highly muscular. Genital pore lies 0.6-1.04 mm behind the anterior extremity of the body.

Ovary posttesticular, 0.22-0.36 mm long, 0.26-0.51 mm wide. Mehlis gland 0.22-0.32 mm long, 0.28-0.40 mm wide. Laurers canal opens infront of the excretory pore. Genital atrium is provided with a genital sphincter. Vitellaria extends throughout the caecal end.

Eggs 0.096-0.128 x 0.056-0.076.

Distribution : India, Mizoram, Nagaland, Meghalaya, Punjab, Kerala, Tripura, Assam, Tamil Nadu.

Remarks : Gupta (1958) established the species collected from Bos indicus at Madras. Mehra (1980) synonimised the species with C. scoliocaelium and Mukherjee and Chauhan (1967), Gupta (1993) retained the species as valid species. Roy & Tandon (1992) recorded this species from Meghalaya as *Orthocoelium dawesi.* Present author recognised as valid species.

Ceylonocotyle dicranocoelium
(Fischoeder, 1901) Nasmark, 1937

1901. *Paramphistomum dicranocoelium* Fischoeder, *Zool. Anz.*, **25**(646) : 367-375.

1937. *Ceylonocotyle dicranocoelium* Nasmark *Zool. Bidr. Uppsala,* **16** : 301-365.

Mateial examined : Nil.

Host - Goat, Cattle

Diagnosis : Body 2.90-6.40 in diameter. Acetabulum 5.50-7.10 in diameter. Sphincter present. Oesophagus 0.60-6.44 in length, oesophageal bulb present.

Testes lobed, tandem. Ovary posttesticular. Genital pore without sphincter. Vitellaria extending throughout the caecal length.

Distribution : India, Mizoram, Tripura, Meghalaya, U.P. and Assam.

Sub-family PARAMPHISTOMINAE
Fischoeder, 1901

Genus ***Paramphistomum*** Fischoeder, 1900

Syn. ***Gigantocotyle***, Nasmark, 1937

Paramphistomum epiclitum Fischoeder, 1904

1904. *Paramphistomum epiclitum* Fischoeder *Ctbl. Bl. F. Bakt. U. Par.*, **35** : 598-601.

Material examined : Nil.

Host Cattle

Diagnosis : Body large, 7.48-9.52 long, 2.63-3.23 in wide. Acetabulum 1.6-1.78 in diameter. Pharynx 0.95-1.1 length, 0.93-1 1 wide, Oesophagus 1.1-1.43 long, intestinal caeca, coiled,

their blind ends terminate at the level of the anterior border of the acetabulum.

Testes lobed, tandem, anterior testis 0.66-1.87 long, 1.48-2.2 wide, Posterior testis 0.55-1.1 long, 1.21-2.2 wide.

Ovary posttesticular, 0.16-0.33 long, 0.33-0.66 wide. Vitellaria extending from Pharyngeal level to anterior of actetabulum. Genital pore post caecal.

Eggs : 12-14 x 48-64.

Distribution : India, Mizoram, Nagaland, Tripura, Assam, Meghalaya, Punjab.

Sub-family GASTRODISCINAE Monticelli, 1892

Genus ***Gastrodiscoides*** Leiper, 1913

Gastrodiscoides hominis
(Lewis et McConnell, 1876) Leiper, 1913

1913. *Gastrociscoides hominis* Leiper

Material examined : Nil.

Host - Pig, Man

Location - Intestine

Diagnosis : Body oval, divided into two portion, anterior portion conical, posterior portion flattened, 5.0-8.0 long; 3.01-4.2 wide. Papillae absent. Oral sucker with a pair of evaginations. Oesophageal bulb present. Acetabulum, small. Intestinal caeca undulating reaching upto acetabular zone.

Testes lobed, tandem, situated middle third of the body. Ovary posttesticular. Genital pore post bifurcal. Eggs 15 x 7 in diameter.

Distribution : Mizoram, Assam, Bihar, Orissa, West Bengal, U.P.

Genus ***Calicophoron*** Nasmark, 1937

Calicophoron Calicophoron
(Fischoeder, 1901) Nasmark, 1937

1901. *Paramphistomum Calicophorum, Zool. Anz.*, **24** : 367-375.

1937. *Calicophoron calicophoron* Nasmark, *Zool. Bidr. Uppsala,* **16** : 301-565.

Material examined : Nil.

Host - Goat, Cattle

Location - Rumen

Diagnosis : Body conical, 5.03-8.02 long and 2.5-3.5 wide. Tegment aspinose. Oral sucker, 0.6-1.0 in diameter, Oesophagus long with oesophageal bulb, intestinal caeca extending upto the end of acetabulum. Acetabulum 1.5-2.0 in diameter.

Testes strongly lobed, diagonal, size variable. Genital pores Post bifurcal, surrounded by genital sucker.

Ovary posttesticular, intestine coils scanty, vitellaria fallicular; Eggs 125-140 x 55-68 mm.

Distribution : India : Mizoram, West Bengal, Tripura, Nagaland, Uttar Pradesh.

Elsewhere : China, Sri Lanka, Africa, Saigon, Indonesia.

Family GASTROTHYLACIDAE Stiles et Goldberger, 1910

Sub-Family GASTROTHYLANIDAE Stiles et Goldberger, 1910

Genus ***Gastrothylax*** Poirier, 1883

Gastrothylax cruminifer
(Creplin, 1847) Poirier, 1883

1847. *Amphistoma cruminifer* Creplin. *Arch. Naturg. Berlin* **13**(61) : 30-35.

1883. *Gastrothylax cruminifer* Poirier. *Bull. de la Soc.* Philomatry Paris (1982-83) **7**(2) : 73-80.

Material examined : Nil.

Host - Goat, Cattle

Diagnosis : Body elongate, 9.00-18.00 length, 5.00-5.05 wide, oral sucker 0.82 x 0.7 in diameter, oesophagus short, S-shaped, intestinal caeca extending up to anterior end of testes. Acetabulum 1.63 x 2.30 in diameter.

Testes two, symmetrical, Preacetabular, lobed. Genital pore anterior to caecal bufurcation. Ovary situated in between the two testes, vitellaria fellicular extending throughout the body. Eggs 115-145 x 60-70 mm.

Distribution : Mizoram, West Bengal, U.P., Meghalaya, Andhra Pradesh, Tripura, Punjab.

Elsewhere : Sri Lanka, China, Burma.

Genus ***Fischoederius*** Stiles et Goldberger, 1910

Fischoederius elongatus (Poirier, 1883) Goldberger, 1910

1883. *Gastrothylax elongatus* Poirier. *Bull. de la Soc. Philomath.*, 73-80.

1910. *Fischoederius elongatus*. Stiles and Goldberger, *Hyg. lab. Bull.*, **60** : 1-259.

Material examined : Nil

Host - Cattle, Goat

Diagnosis : Body elongate, 6.00-15.00 long, 3.00-4.00 wide, oral sucker 0.57-0.80 long, 0.50-0.60 wide. Oesophagus 0.50-0.80 long, intestinal caeca wavy, extending upto the middle of the body. Acetabulum 1.25-2.00 in diameter.

Testes two, tandem, irregularly lobed. Genital pore, prebifurcal at oesophageal zone, ovary situated in between the two testes. Vitellaria follicular, extending from caecal bifurcation to testicular zone. Uterus mainly in the middle of the body extending upto the testes. Eggs 125-135 x 63-68 mm.

Distribution : Mizoram, Nagaland, West Bengal, tripura, U.P., Tamil Nadu, Punjab.

Elsewhere : Sri Lanka, Japan.

Family FASCIOLIDAE Raillet, 1893

Sub-Family FASCIOLINAE Stiles et Hassal, 1898

Genus ***Fasciola*** Linnaeus, 1758

Syn. ***Cladocoelium*** Dus. 1845

Fasciola gigantica Cobbold, 1855

1855. *Fasciola gigantica* Cobbold, *N. Phil. J. N. S.*, 2(2): 262-266.

Material examined : Nil.

Host Cow, Buffalo

Diagnosis : Body long, 2.50-7.50 long. Oral sucker small, oesophagus short, intestinal caeca branched. Acetabulum 1.50-2.50 in diameter. Testes two, tandem branched. Ovary branched, pretesticular, vitellaria contiguous. Uterine coils extending between acetabulum to ovary. Eggs. 125-119 x 6-12 mm.

Distribution : Mizoram, Nagaland, Assam, Tripura.

Elsewhere : America, Africa, Burma.

Family SCHISTOSOMATIDAE Poche, 1907

Sub-Family SCHISTOSOMATINAE Stiles et Hassall, 1898

Genus ***Schistosoma*** Weinland

Schistosoma indicum Montgomery, 1906

1906. *Schistosoma indicum* Montgomery, *J. Trop, Vet. Sci.* 1(2) : 138-174.

Material examined : Nil.

Host Cow, Buffalo

Diagnosis : Body of male is curved like c-shaped, 4.1-19.4 long, 0.16-0.73 wide. Tegument spined, oral sucker small, oesophagus with oesophageal gland, intestinal caeca unite and form a single caecum again it bifurcate at Preacetabular zone, further unite at the poisterior end of body and ends blindly. Acetabulum pedunculate, larger than oral sucker

Testes in two rows, 5-16 in number. Seminal vesicle kidney shaped. Female body cylindrical 4.9-26.4 long, 0.08-0.09 wide. Ovary situated at the middle of the body. Genital pore median, postacetabular. Vitellaria extensive. Genital pore midventral, postacetabular. Eggs 7-10 x 27-43 with terminal spines.

Distribution : Mizoram, Tripura, Assam, Meghalaya, Bihar, West Bengal, U.P., Andhra Pradesh.

Allocreadium chilkai (Chatterjee) Madhavi, 1978

1956. *Psilostomum chilkai* Chatterjee, *Indian J. Helminth.*, **8** : 96-99.

1969. *Allocreadium fasciatusi* Kakaji. *Ann. Parasit.*, **44**(2) : 132.

1978. *Allocreadium chilkai.* Madhavi. *J. Helminth.*, **52** : 58.

Material examined : Nil.

Host - Barbus sarana

Location Intestine, Locality -Tlungvel, Mizoram.

No. of specimens : 13 on 2 slides.

Diagnosis : Body elongated, 3.92-5.58 long and 1.39-1.44 wide. Tegument aspinose, Oral sucker 0.41-0.49 long, 0.42-0.52 wide, Prepharyns absent; pharynx 0.20-0.24 long and 0.13-0.27 wide; Oesophagus long; intestinal caeca bifurcated at 0.75-1.04 mm from anterior end of the body, caeca extending upto the posterior end of the body. Ventral sucker round, pre-equatorial, slightly larger than oral sucker, 0.59 in diameter.

Testes tandem, Post equatorial, anterior testis 0.43-0.56 long; 0.56-0.57 wide; Posterior testis 0.40-0.56 long, 0.56-0.59 wide. Cirrus sac Pre-acetabular, flask-shaped, enclosing bipartite seminal vescile.

Genital pore between acetabulum and caecal bifurcation.

Ovary, round, sub median, anterior to testes, 0.32-0.49 long, 0.36-0.38 wide. Receptaculum seminis retort shaped. Posterior to ovary. Vitellaria fallicular, extending from level of caecal bifurcation to Posterior end of body. Uterine coils less. Eggs 82-94 x 57-61 mm. Excretory esicle tubular.

Remarks : Chatterjee (1956) described *Psilostomum chilkai* was collected from Lates calcarifer from Chilka lake, Kakaji (1969) described *Allocreadium fasciatusi* from *Trichogaster fasciatus* at Lucknow. Madhavi recorded *Allocreadium fasciatusi* from *Aplocheilus melastigma* at Andhra Pradesh. She also considered that *Psilostomum chilkae* Chatterjee 1956 is identical to *Allocreadium fasciatusi* Kakaji, 1969. Thus *Allocreadium fasciatusi* becomes a synonym of *P. chilkai* with new combination. The present specimens collected from Barbas sarana at Tlungvel, Mizoram and identified as *Allocreadium chilkai* (Chatterjee, 1956) Madhavi, 1978 with new host record.

Distribution : Orissa, U.P., Andhra Pradesh, West Bengal, Mizoram.

Family BRACHYCOELIIDAE Johnston, 1912

Sub-Family MESOCOELLIINAE Faust, 1924

Genus *Mesocoelium* Odhner, 1916

1910. *Mesocoelium* Odhner, *Res. Swedish. Zool. Exped.* Egypt & White Nile 1901 pt. 4, No. 23 A : 88.

Mesocoelium sociale (Luhe 1901) Odhner, 1910

1901. *Distoma sociale* Luhe, *Centralbl. Bakteriol.*, 1 Abt, **30**(4) : 171.

1910. *Mesocoelium sociale* Odhner, *Res. Swedish Zool. Exped. Egypt & White Nile* 1901. Pt. 4, No 23A : 88.

1920. *Mesocoelium sociale* Sewell, *Rec. Indian Mus.*, **19**(3) : 81.

1927. *Mesocoelium megitti* Bhalerao, *Ann. Mag. Nat. Hist.*, **20**(9) : 611.

1956. *Mesocoelium varunae* Baugh, *Proc. Natn. Acad. Sci.* India Sec. B. **26**(6) : 421.

Material examined :

Host - Bufo melanostictus

Location : Intestine, Locality - Seling

No. of specimens - 36 on single slide

Diagnosis : Body 1.82-2.62 long, 0.56-0.73 wide elongate. Tegument aspinose Ventral sucker, Preequatorial, 0.19-0.21 in diameter. Oral sucker terminal, larger than ventral sucker, 0.22-0.27 long, 0.21-0.27 wide, Prepharynx short, Pharynx 0.09-0.10 in diameter; oesophagus 0.12-0.15 long, intestine bifurcated at 0.48 from the anterior end of body and extended upto end of vilellarian zone.

Testes two, entire, right testis 0.17-0.22 in diameter, left testis 0.13-0.25 in diameter. Cirrus Sac. Preacetabular, genital openings pre bifurcal.

Ovary entire, 0.17-0.20 long, 0.16-0.18 wide. Seminal receptacle posterior to ovary. Vitellaria follicular, extending from oral sucker to the end of intestine. Eggs 32-47 x 28-32.

Remarks : *Mesocoelium sociale* (Luhe, 1901) established as a type species of the genus. But Frietas (1967) mentioned that *M. sociale*, *M. varunae* and *M. megitti* identical (1819) with *M. monas* (Rud. 1819) but Yamaguti (1971) retained *M. megetti* status. Bhalerao, 1927 has been described from Burma.

Distribution : India, Cosmopolitan.

Family MONORCHIIDAE Odhner, 1911

Sub-Family ASYMPHYLODORINAE Szidat, 1943

Genus ***Asymphylodora*** Looss

1890. *Asymphylodora* Looss, *Zool. Jahrb. Abt. Syst.* **12**(56) : 598.

1943. *Parasymphylodora* Szidat, *Z. Parasitenkd.*, **13**(1) : 25-61.

Asymphylodora Kedarai Srivastava, 1951

1951. *Asymphylodora Kedarai* Srivastava. *Indian J. Helminth.*, **3**(1) : 7.

Host : *Puntius* sophore

Location : Intestine, Locality - Tlungvel

No. of specimens - Nine on single slide.

Diagnosis : Body oval, 1.13-1.26 long, 0,41-0.43 wide. Spinose in acetabular region. Acetabulum preequatorial, 0.13-0.15 long, 0.15-0.17 wide, longer than oral sucker, oral sucker 0.11-0.14 long, 0.15-0.17 wide. Prepharynx absent, pharynx well developed 0.07-0.08 long 0.08-0.09 wide, oesophagus broad, intestinal caeca bifurcated near anterior border of acetabulum, extending upto the anterior end of testis.

Testis smooth, ovoid, single, 0.26-0.28 long, 0.14-0.18 wide, situated at the posterior end of body. Cirrus sac saccular, posterodorsal to acetabulum, elongate, enclosing bipartite seminal vesicle. Pars prostatica surrounded by prostate gland cells. Genital pore, submarginal, near caecal bifurcation.

Ovary, spherical, pyriform posttesticular, 0.14-0.15 long, 0.10-0.15 wide. Seminal receptacle absent. Vitellaria fellicular, extra caecal, extending from the level of caecal bifurcation to posterior end of ovary. Uterus filling most of the hind body. Eggs 2-3 x 16-20. Excretory vesicle tubular, pore terminal.

Remarks : Srivastava (1951) described *Asymphyloda kedarai* collected from *Puntius sophore*. The present specimens collected from puntius sophore at Tlungvel, Mizoram and identified as *A. kedarai* Srivastava, 1951. Though there are some difference like testis is ovoid, ovary pyriform, uterus in most of hind body and size of eggs.

Distribution : India, West Bengal, U.P. Mizoram.

Family OPECOELIDAE Ozaki, 1925

Sub-Family OPECOELINAE Stunkard, 1931

Genus : ***Opegaster***, Ozaki, 1928

1928. *Opegaster Ozaki*, *Japanese J. Zool.*, **2**(1) : 17-24.

1976. *Godavaritrema* Karyakarte & Yadav, *Marathwada Univ. J. Nat. Sci.*, **15**(8) : 157-164

1981. *Gangatrema* Agrawal, G.P. & Kumar, *Japanese J. Parasit.*, **30**(1) : 9.

Opegaster beliyai Pande, 1937

1937. *Opegaster beliyai* Pande, *Proc. Natn. Acad. Sci.*, **7**(2) : 113.

1976. *Opegaster beliyai* Basantha Kumari and Srivastava, C.B. *Newsl. Zool. Surv. India*, **2**(5) : 201.

Material examined :

Host : *Xenotedon canlila*

Location : Intestine, Locality : Tlungvel.

No. of specimens : 8 on single slide.

Diagnosis : Body 0.99-1.16 long, 0.56-0.60 wide. Ventral sucker 0.22-0.26 in diameter. Oral sucker 0.12-0.15 in diameter, smaller than ventral sucker. Prepharynx short, Pharynx 0.06-0.09 in diameter; oesophagus long, intestinal caeca bifurcated at 0.22-0.48 from the anterior end of body and extended upto the posterior end of body where uniting to form an anal canal opening ventrally in front of posterior end of body.

Testes two, anterior testis 0.11-0.28 in diameter, posterior testis 0.10-0.28 in diameter, cirrus sac very short, enclosing a very small part of anterior male duct before opening genital opening. External seminal vesicle very long. Genital pore lateral, submarginal.

Ovary kidney shaped, Post testicular, 0.13-0.15 long, 0.08-0.09 wide, vitellaria follicular, extending from middle of oesophagus to posterior end of body. Eggs 61-77 x 36-45. Excretory vesicle tabular.

Remarks : Pande (1937) described the species from Allahabad recovered from *Glossogobius giuris*. Vasanta Kumari and Srivastava C.B. (1976) recorded from *Macrognathus aculeatus* and *Channa punctatus*. Present spcimens recovered at Tlungvel, Mizoram from *Xenontedon cancila*. This is a new host and locality record of the species.

Distribution : India : West Bengal, U.P., Mizoram.

Family ALLOCREADIIDAE (Loose 1902) Stossich, 1903

Sub-Family ALLOCREADIINAE Looss, 1902

Genus ***Allocreadium*** Looss, 1900

1900. *Allocreadium* Looss. *Zool. Anz.*, **23** : 602.

1962. *Rhynchocreadium* Srivastava. *Indian J. Helminth.*, **14** : 1.

1969. *Rhynchocreadium* Kakaji *Ann. Parasite*, **44**(2) : 141.

Allocreadium Mehrai Gupta, 1956

1956. *Allocreadium mehrai* Gupta. *Indian J. Helminth.*, **8** : 103.

1962. *Rhynchocreadium aculeata* Srivastava. *Indian J. Helminth.*, **14** : 1-4.

1965. *Rhynchocreadium singhia* Prashad. *Zool. Anz.*, **175** : 4-6.

1976. *Rhynchocreadium aculeata*. Vasanta Kumari & Srivastava. *Newl. zool. Surv. India*, **2**(5) : 200.

Material examined :

Host - Mastocembelus Puncalus.

Location - Intestine. Locality - Tlungvel Mizoram.

No. of specimens - 3 on one slide.

Diagnosis : Body elongated, 3.07-3.12 long, 0.59-0.67 wide. Tegument aspinose. Ventral sucker Preequatorial, round 0.25-0.27 in diameter. Oral sucker subterminal, 0.24-0.25 long; 0.22-0.23 wide, Pre-pharynx absent, Pharynx 0.09-0.10 long and 0.082-0.94 wide; oesophagus short; intestinal caeca extending up to the posterior end of body.

Testes tandem, anterior testis 0.29-0.32 long; 0.30-0.32 wide, posterior testis 0.31-0.35 long; 0.26-0.31 wide. Cirrus sac flask shaped, antero-dorsal to acetabulum, enclosing seminal vesicle, pars prostatica and ejaculatory duct. Genital opening anterior to acetabulum.

Ovary entire, oval, preequatorial, Pretesticular, 0.12-0.14 long, 0.15-0.16 wide. Receptaculum seminalis present near to ovary. Vitellaria follicular, extending from ovary to posterior end of body. Uterine coils less. Eggs 14-19 x 10-13 mm. Excretory vesicle tubular.

Remarks : The present specimens were collected from *Mastocembelus Puncalus* at Tlungvel.

The species was recovered by Vasanta Kumari and Srivastava, C.B. (1976) from *Glossogobius giuris* at Calcutta.

Distribution : India : West Bengal, U.P., M.P., Mizoram.

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SUMMARY

The present work is a report on the fauna of digenetic trematodes of vertebrate hosts from Mizoram. Studies are mainly based on the collections brought by the author at the time of faunistic survey tour from Mizoram. Reports of various workers have also been included as far as possible. History of taxonomic studies made from not only from Mizoram but also other neighbouring states of North eastern region, have been briefly discussed. A chapter of collection, preservations, morphological characteristics and distribution have been included.

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MOLLUSCS

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INTRODUCTION

Mizoram with about 18,501 sq. kms area is covered with ranges of hills, which run almost north and south with an average height of 914.4 m on the west, rising to 1219.2 m further east and here and there to over 2438.4 m. The sides of the hills are covered with forest and dense bamboo jungle except for those places where already cleared for cultivation. Streams or rivers are invariably to be found in the narrow valleys of their base. The most important rivers, Tlong or Dhaleswari, the Sonai and the Tuivel, drain towards northern portion of the state and fall into the river Barak. In the southern portion the rivers are drained by the kaladyne on the east with its tributaries and the rivers Tuichang, Tyee and Tuipui; while the Karnaphuli, at the mouth of which stands Chittagang, with its tributaries the Tuichang, Kao, Deh, Phairang and Tuilanpui forms the western drainage system. There are several scattered plains of considerable size with an elevation of about 1371.6 m and covered with a thick layer of rich alluvial soil. They are surrounded by hills which slope gently towards the plain, but generally very steep and often precipitious on the either side.

Hills consists of sandstones and shales of Tertiary age thrown with long folds, the axes of which run nearly north and south. Hill sides are covered with dense forest of Bamboo jungle. Herbaceous plants are not common but ferns and orchids occur in large quantity.

The climate is moist during rainy season, even on the lower hills. On the higher ridges it is fairly cool and pleasant even at the hottest season of the year. In March-April violent storms from north west sweep over the hills. The districts have abundant rainfall, averaging 200 cms at Aizwal and 325 cms at Lunglei but the precipitation is still heavier.

Our knowledge on the molluscs of Mizoram is very scanty. Although our knowledge of land molluscs is confined mainly on the works of Blanford & Godwin-Austen (1908), Gude (1914 & 1921), but there was no mention of any locality of Mizoram as defined at present may be because of the inclusion of these parts under Assam. However there was a mention of 'Lushai Hills' in the British fauna which has been taken as 'Mizoram' because the Lushai Hills are under Mizoram. But there was no records of molluscs from these hills. Subba Rao and Dey (1986) reported 13 species of freshwater molluscs from Terei (Mizoram). Mitra and Dey (1990) reported 23 species of land molluscs from Mizoram with all the species as new records and 2 of them reported for the first time from India. Subba Rao *et. al.* (1995) while studying the molluscan fauna of Meghalaya recorded 8 species from Mizoram.

The present work is based on both the named and unnamed collections present in the National Zoological Collections and from the literature records.

The classification followed here is that of Vaught (1989).

LIST OF LAND AND FRESHWATER MOLLUSCS FROM MIZORAM

A. Freshwater :

Class : GASTROPODA
Subclass : PROSOBRANCHIA
Order : MESOGASTROPODA
I. Family : VIVIPARIDAE

Genus ***Bellamya*** Jousseaume

1. ***Bellamya bengalensis f. typica*** (Lamarck) — A

Genus ***Cipangopaludina*** Hannibal

2. ***Cipangopaludina lecythis*** (Benson) — A

II. Family : THIARIDAE

Genus ***Thiara*** Roeding

3. ***Thiara (Thiara) scabra*** (Mueller) — A, C
4. ***Thiara (Tarebia) granifera*** (Lamarck) — A

Genus ***Brotia*** H. Adams

5. ***Brotia (Antimelania) costula*** (Rafinesque) — A, L, C

Genus ***Paludomus*** Swainson
Subgenus ***Paludomus*** s. str.

6. ***Paludomus (Paludomus) blanfordiana*** Nevill — A, L, C
7. ***P. (P.) conica*** Gray — A
8. ***P. (P.) pustulosa*** Annandale — A
9. ***P. (P.) regulata*** (Benson) — A

Subclass : PULMONATA
Order : BASOMMATOPHORA
III. Family : LYMNAEIDAE

Genus ***Lymnaea*** Lamarck
Subgenus ***Pseudosuccinea*** Baker

10. ***Lymnaea (Pseudosuccinea) acuminata f. hians*** Sowerby — A
    L. (P.) acuminata f. malleata Annandale & Rao — A
    L. (P.) acuminata f. rufescens Gray — A
11. ***L. persica*** Issel — A

IV. Family : PLANORBIDAE

Genus ***Indoplanorbis*** Annandale & Rao

12. ***Indoplanorbis exustus*** (Deshayes) — A

Genus ***Gyraulus*** Charpentier

13. ***Gyraulus labiatus*** (Benson) — A

Class : BIVALVIA
Order : UNIONOIDA
V. Family : UNIONIDAE

Genus ***Lamellidens*** Simpson

14. ***Lamellidens phenchooganjensis*** Preston — A

Genus ***Parreysia*** Conrad

15. ***Parreysia (Parreysia) favidens assamensis*** Preston — C
P. (P.) favidens plagiosoma (Benson) — C
16. ***P. (P.) sikkimensis*** (Lea) — A, C

Subgenus ***Radiatula*** Simpson

17. ***Parreysia (Radiatula) caerulea*** (Lea) — A

Genus ***Solenaia*** Conrad

18. ***Solenaia soleniformis*** (Benson) — A

Genus ***Trapezoideus*** Simpson

19. ***Trapezoideus exolescens exolescens*** (Gould) — A

Order : VENEROIDA
VI. Family : CORBICULIDAE

20. ***Corbicula striatella*** Deshayes — C

B. Land :

Class : GASTROPODA
Subclass : PROSOBRANCHIA
Order : MESOGASTROPODA
VII. Family : CYCLOPHORIDAE

Genus ***Cyclophorus*** Montfort

Subgenus ***Glossostylus*** Kobelt & Mollendorff

21. ***Cyclophorus (Glossostylus) aurora*** (Benson) — C
22. ***C. theobaldianus*** (Benson) — A, L. C
23. ***C. zebrinus*** Benson — A

Genus ***Alycaeus*** Gray

Subgenus ***Alycaeus*** s. str.

24. ***Alycaeus (Alycaeus) burti*** Godwin-Austen — A

Genus ***Chamalycaeus*** Kobelt & Mollendorff

25. ***Chamalycaeus edei*** (Godwin-Austen) — C
26. ***C. (Dicharax) khasiacus*** (Godwin-Austen) — A

Genus ***Cycloryx*** Godwin-Austen

27. ***Cycloryx graphicus*** (Blanford) C

Genus ***Pearsonia*** Kobelt

28. ***Pearsonia kempi*** Godwin-Austen C

Genus ***Pterocyclus*** Benson

29. ***Pterocyclus parvus*** Pearson A, L

VIII. Family : DIPLOMMATINIDAE

Genus ***Diplommatina*** Benson

30. ***Diplommatina butleri*** Godwin-Austen

Subclass : PULMONATA

Order : STYLOMMATOPHORA

IX. Family : SUBULINIDAE

Genus ***Allopeas*** Baker

31. ***Allopeas gracile*** (Hutton) A, C

Genus ***Curvella*** Chaper

32. ***Curvella khasiana*** Godwin-Austen A, C

Genus ***Glessula*** von Martens

33. ***Glessula crassula*** (Reeve) C
34. ***G. gemma*** (Reeve) A, C
35. ***G. orobia*** (Benson) A, C
36. ***G. tenuispira*** (Benson) A, C

X. Family : ACHATINIDAE

Genus ***Achatina*** Lamarck

37. ***Achatina fulica fulica*** (Bowdich) A

XI. Family : STREPTAXIDAE

Genus ***Gulella*** Pfeiffer

38. ***Gulela bicolor*** (Hutton) A

Genus ***Haploptychius*** Mollendorff

39. ***Haploptychius burmanicus*** (Blanford) A

XII. Family : PLECTOPYLIDIDAE

Genus ***Plectopylis*** Benson

Subgenus ***Endothyrella*** Zilch

40. ***Plectopylis (Endothyrella) affinis*** Gude A
41. ***P. (E.) plectostoma*** (Benson) A, C

XIII. Family : HELIXARIONIDAE

Genus ***Kaliella*** Blanford

42. ***Kaliella barrakporensis*** (Pfeiffer) A

Genus ***Sesara*** Albers

43. ***Sesara diplodon*** (Benson) A
44. ***S. galea*** (Benson) A

Genus ***Sivella*** Blanford

45. ***Sivella castra*** (Benson) A, L. C

XIV. Family : ARIOPHANTIDAE

Genus ***Austenia*** Nevill

46. ***Austenia cacharica*** Godwin-Austen A
47. ***A. gigas*** (Benson) A

Genus ***Girasia*** Gray

48. ***Girasia burtii*** (Godwin-Austen) A
49. ***G. radha*** (Godwin-Austen) A

Genus ***Khasiella*** Godwin-Austen

50. ***Khasiella climacterica*** Benson A, L, C
51. ***K. vidua*** Hanley & Theobald A, L, C

Genus ***Macrochlamys*** Benson

52. ***Macrochlamys lubrica*** Benson L, C
53. ***M. molecula*** Benson A
54. ***M. pungi*** (Theobald) A
55. ***M. petasus*** (Benson) A
56. ***M. sequax*** Benson A, C
57. ***M. uda*** Godwin-Austen A, C
58. ***M. vesica*** Godwin-Austen A

Genus ***Parmarion*** P. Fischer

59. ***Parmarion martensi*** Simroth A

Genus ***Staffordia*** Godwin-Austen

60. ***Staffordia daflaensis*** Godwin-Austen A

XV. Family : LIMACIDAE

Genus ***Deroceras*** Rafinesque

61. ***Deroceras laeve*** (Mueller) A

XVI. Family : CAMAENIDAE

Genus ***Amphidromus*** Albers

62. ***Amphidromus sylheticus*** Reeve — A, C

Genus ***Chloritis*** Beck

63. ***Chloritis delibrata*** Benson — A, C

XVII. Family : BRADYBAENIDAE

Genus ***Plectotropis*** von Martens

64. ***Plectotropis oldhami*** (Benson) — A

65. ***P. tapeina*** (Benson) — A, C

Abbreviations used :
A—Aizawl, C—Chhimtuipui, L—Lunglei, Fig.—Figures/Figures, mm.—Millimeters, Coll.—Collectors, s. str.—Sensu Stricto

SYSTEMATIC ACCOUNT

A. Freshwater

Key to the families

1. Shell univalve. 2
– Shell with two valves 5
2. Shell operculate 3
– Shell non operculate 4
3. Operculum with concentric growth lines ..... VIVIPARIDAE
– Operculum with spiral growth lines ..... THIARIDAE
4. Shell discoidal; columellar axis not twisted. ..... PLANORBIDAE
– Shell extended and dextrally coiled; columellar axis twisted. ..... LYMNAEIDAE
5. Shell subrhomboidal or transversly elongate, without concentric sculpture. ... UNIONIDAE
– Shell ovately trigonal, with concentric sculpture. ..... CORBICULIDAE

Class : GASTROPODA
Order : MESOGASTROPODA
Family : VIVIPARIDAE
Subfamily : BELLAMYINAE

Key to the genera

1. Shell medium, with or without coloured bands, when without bands, the shell feebly ridged or keeled, edge of mantle not thickened and without a conspicuous sphincter. ..... ***Bellamya*** Jousseaume
– Shell large, without coloured bands or ridges, edge of mantle thickened with a conspicuous sphincter musele. ..... ***Cipangopaludina*** Hannibal

Genus ***Bellamya*** Jousseaume

1866. *Bellamya* Jousseaume, *Bull. Soc. zool. France*, 11 : 478; (Type species : *Paludina bellamya* Jeusseaume).

Bellamya bengalensis* f. *typica (Lamarck)

1822. *Paludina bengalensis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6(2) : 174.

1989. *Bellamya bengalensis* f. *typica* : Subba Rao in *Handbook Freshwater Molluscs of India* : 45, fig. 55.

Material examined : (i) 9 exs., paddy field, Champhai, Aizawl, 8.8.94, coll. K.V. Surya Rao and A. Dey; (ii) 3 exs., Rondia, 12.3.95, coll?

Measurements :

Length	Diameter	Height of the aperture
35.00-25.50	26.50-18.85	13.40-7.50

Diagnosis : Shell thin, ovately conoid, body whorl as high as the spire, whorls tumid; umbilicus narrow; aperture suborbicular with a narrow black margin; dark bands variable and irregular with alternating broad and narrow bands.

Distribution : India : Common throughout. *Elsewhere* : Bangladesh, Myanmar, Sri Lanka.

Genus *Cipangopaludina* Hannibal

1912. *Cipangopaludina* Hannibal, *Proc. malac. Soc. Land.*, 10 : 194; (Type-species : *Paludina malleata* Reeve)

Cipangopaludina lecythis (Benson)

1836. *Paludina lecythis* Benson, *J. Asiat. Soc. Beng.*, **5** : 745; (Type locality : Manipur).

1989. *Cipangopaludina lecythis* : Subba Rao, in *Handbook Freshwater Molluscs of India* : 50, fig. 73.

Material examined : (i) 17 exs., paddy field, Champhai, 8.8.94, coll. K.V. Surya Rao and A. Dey; (ii) 2 exs., Tian river, 25 kms east of Champhai, 21.3.94, coll. A.K. Karmakar.

Measurements (in mm) :

Length	Diameter	Height of the aperture
42.00-26.00	24.45-21.50	23.50-16.35

Diagnosis : Shell oilve green when fresh, spire conical, apex acuminate; whorls tumid and flattened above; suture deep; aperture large and broadly oval, columella curved.

Distribution : India : Mizoram, Meghalaya, Manipur, Tripura. *Elsewhere* : China, Myanmar, Vietnam.

Remarks : This species is restricted to the north eastern part of India and is recorded for the first time from Mizoram.

Family THIARIDAE

Key to the genera

1. Shell ovately conical, aperture larger than spire. ..... ***Paludomus*** Swainson
- Shell elongate or turretted, aperture shorter than the spire. 2
2. Shell broader and larger (above 5 cms in length), operculum round with a central nucleus. ..... ***Brotia*** H. Adams
- Shell narrower, shorter (upto 5 cms in length), operculum pear shaped with a basal nucleus. ..... ***Thiara*** Roeding

Genus *Thiara* Roeding

1798. *Thiara* Roeding, *Museum Boltenianum*, **2** : 109; (Type species : *Helix amarula* Linnaeus).

Key to the Subgenera

Shell generally spinose or sharply nodulose; whorls angular between suture and periphery and descending in shape ..... ***Thiara*** s. str.

Shell granulose or nodulose with axial and spiral ridges sometimes with dark brown lines, whorls fairly rounded and gradually increasing ..... ***Tarebia*** H. A. Adams

Subgenus *Thiara* s. str.

Thiara (*Thiara*) *scabra* (Mueller)

1774. *Buccinum scabra* Mueller, *Hist. Verm. Terr. Fluv.*, **2** : 135, (Type-locality, Tranquebar).

1989. *Thiara* (*Thiara*) *scabra* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 96.

Material examined : (i) 1 ex., Sangao, Chhimtuipui, 5.2.87, coll. H.C. Ghosh; (ii) 1 ex., Turial river, 10.11.95, coll. H.P. Mookherjee.

Measurements (in mm) :

Length	Diameter	Height of the aperture
7.90-7.85	3.60-3.55	4.00-3.95

Diagnosis : Whorls regularly increasing in size; sutures distinct; sculptured with characteristic vertical ribs bearing prominent spines directed

obliquely outward, surfaces with rough spiral striations, striations nor the umbilical region form strong ridges.

Distribution : India : Throughout, except Kashmir. *Elsewhere* : Indonesia, Java, Mauritius, Pacific Islands, Philippines, Sychelles, Timor.

Remarks : It is reported for the first time from Mizoram.

Subgenus ***Tarebia*** H. & A. Adams

Thiara (Tarebia) granifera (Lamarck)

1822. *Melania granifera* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6(2) : 167; (Type-locality : ?).

1989. *Thiara (Tarebia) granifera* : Subba Rao in : *Handbook Freshwater Molluscs of India*, 101, Figs. 212, 213.

Material examined : (i) 1 ex., Turial river, 30 kms NE of Zarkawt, 10.11.95, coll. H.P. Mukherjee.

Measurements (in mm) :

Length	Diameter	Height of the aperture
18.25	4.50	4.65

Diagnosis : Shell elongately conical; spire sharp; whorls flat; sculptured with distinct spiral rows of nodules; height of the body whorl more than half of the total length of the shell.

Distribution : India : Mizoram, Assam, Bihar, Madhya Pradesh, Maharashtra, West Bengal. *Elsewhere* : Malagasy, Malaysia, Pacific Islands, Philippines, Taiwan.

Remarks : It is recorded for the first time from Mizoram.

Genus ***Brotia*** H. & A. Adams

1866. *Brotia* H. Adams, *Proc zool. Soc. Lond.*, 1866 : 50; (Type species : *Melania pagodula* Gould).

Subgenus ***Antimelania*** Crosse and Fischer

Brotia (Antimelania) costula (Rafinesque)

1833. *Melania costula* Rafinesque, *Atlantic J.*, **5** : 166; (Type-locality : Gomti river at Jaunpur, Uttar Pradesh).

1986. *Brotia (Antimelania) costula* Subba Rao and Dey, *J. Hydrobiol.*, 2(3) : 26.

1989. *Brotia (Antimelania) costula*; Subba Rao in : *Handbook Freshwater Molluscs of India* : 108, figs. 192, 194, 197, 198.

Material examined : (i) 3 exs., Sabri stream, Chhimtuipui Dist., 30.11.81, col. J.P. Sati and R. Zoranthanga, (ii) 9 exs., Darlak, 26.2.84, (iii) 6 exs., Bangwa, 26.2.84, (iv) 8 exs., Terei river, Darlak, 28.2.84, coll. A. Dey, (v) 2 exs., Saiha, Chhimtuipui, 8.1.87, (vi) 1 ex., Sangan, Chhimtuipui, 30.1.87, coll. H.C. Ghosh (vii) 1 ex., Turial river, Aizawl Dist., 10.1.92, (viii) 3 exs., Nat river, Lunglei dist., 20.1.92, (ix) 1 ex., Dargo, 12.5.93, coll. S.J.S Hutter, (x) 6 exs., Tuikal, Nov. 1993, (xi) 20 exs., Terei, Dampa sanctuary, Aizawl, 27.10.93, (xii) 1 ex., Nagenpui, Chhimtuipui, 9.4.95, coll. S.S. Saha, (xiii) 5 exs., Aizawl market, 3.8.94, (xiv) 7 exs., Kangriati Lui Hill stream, Virangte, 15.8.94, (xv) 3 exs., Champhai market, Champhai, 9.8.94, coll. K.V. Surya Rao and A. Dey, (xvi) 1 ex., Sairop, Lunglei, 16.4.95, coll. T.P. Bhattacharya, (xvii) 6 exs., Aizawl, 8.11.95, (xviii) 1 ex., Turial river, 30 kms. SE of Zarkhev, 10.11.95, coll. H.P. Mookherjee.

Measurements (in mm) :

Length	Diameter	Height of the aperture
56.35-15.20	25.20-7.60	24.10-6.90

Diagnosis : Shell elongate with 12 to 14 regularly increasing whorls; sculptured with spiral ridges or nodules; axial ribs prominent, often with spines.

Distribution : India : Mizoram, Assam, Manipur, Meghalaya, West Bengal. *Elsewhere* : Indonesia, Malaya Archipelago, Myanmar.

Remarks : The highly variable nature of the shell has resulted in a large number of varities and subvarities being described. Annandale (1921) remarked that these are not always constant. The shell collected from mudflats of Nat river at Lunglei are with rows of prominent spinous nodules on whorls resembling the subspecies

Brotia costula episcopalis. It is an edible species and large quantities of this species are sold in the market.

Genus ***Paludomus*** Swainson

1840. *Paludomus* Swainson, *Treatise on Malacology*, p. 340; (Type species : *Melania globulosa* Gray).

Subgenus ***Paludomus*** s. str.

Key to the species

1. Shell with prominent spiral grooves. .... *P. regulata* Benson
– Shell with microscopic spiral striae. 2
2. Shell globosely conical, larger (above 15 mm in height), spiral striae restricted to sutural region. ..... *P. conica* (Gray)
– Shell globosely inflated, smaller (upto 15 mm in height), spiral striae not restricted to sutural region. 3
3. Shell yellowish, brown bands showing through the aperture. ..... *P. blanfordiana* Nevill
– Shell uniform-black, brown bands not showing through the aperture. .... *P. pustulosa* Annandale

Paludomus* (*Paludomus*) *blanfordiana Nevill

1877. *Paludomus blanfordiana* Nevill, *J. Asiat. Soc. Beng.*, **46**(2) : 37; (Type-locality : Ava, Burma).

1986. *Paludomus blanfordiana* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(5) : 25.

1989. *Paludomus* (*Paludomus*) *blanfordiana* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 112, figs. 222, 239.

Material examined : (i) 10 exs., Sabri stream, Chhimtuipui, 30.11.81, (ii) 1 ex., Phairang, Lunglei, 6.2.92, coll. J.P. Sati, (iii) 1 ex., Teirei, Dampa Sanctuary, Aizawl, 23.12.93, (iv) 25 exs., Turial river, 30 kms SE of Aizawl, 8.8.94, (v) 9 exs., Kangari Lui Hill stream, Vairangte, 9.4.95, (vi) 8 exs., Kangrai Lui Hill stream, Vairangte, 15.8.95, coll. K.V. Surya Rao and A. Dey, (vii) 14 exs., Turial river, 30 kms SE of Zarkawt, 10.1.95, coll. H.P. Mookherjee, (viii) 1 ex., Knoll, Ngenpui, 6.497, coll. S.K. Chattopadya.

Measurements :

Length	Diameter	Height of the aperture
15.80-9.15	16.00-7.25	13.40-7.00

Diagnosis : Shell ovately globose with inflated bodywhorl; Sculptured with fine spiral striae and transverse growth lines, aperture oval; margin of collumellar callous fringed with chocolate brown colour; dark yellow, often coated with black encrustation, body whorl with three dark chocolate brown bands.

Distribution : India : Mizoram, Assam, Meghalaya, West Bengal. *Elsewhere* : Myanmar.

Paludomus* (*P.*) *conica (Gray)

1834. *Melania conica* Gray, Griffith *Cuvier Moll.*, pl. 14, fig. 5.

1986. *Paludomus conica* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 26.

1989. *Paludomus* (*P.*) *conica* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 113.

Material examined : (i) 16 exs., Darlak, 26.2.84, (ii) 9 exs., Bangwa, 26.2.84, coll. S. Biswas and party, (iii) 2exs., Archang, Chhimtuipui, 23.1.87, (iv) 1 ex., Sangao, Chhimtuipui, 6.2.87, coll. H.C. Ghosh, (v) 1 ex., Tuichawng, Lungsen, Lunglei, 5.2.91, (vi) 1 ex., Phairang, Lunglei, 6.2.91, (vii) 2 exs., Tlawn river, Lunglei, 12.2.91, (viii) 9 exs., Phakhanlui, 18 kms N. of Rotang, Lunglei, 6.12.91, coll. J.P. Sati, (ix) 7 exs., Darza, 12.5.93, coll. S.J.P. Hutter; (x) 2 exs., Terei, Dampa Sanctuary, Aizawl, 27.12.93, coll. S.S. Saha; (xi) 7 exs., Aizawl market, 3.8.94, (xii) 4 exs., Kangriati lui, Vairangte,15.8.94, coll. K.V. Surya Rao and A. Dey; (xiii) 2 exs., Ngenpui, Chhimtuipui, 10.4.95, coll. T.P. Bhattacharya; (xiv) 71 exs., Turial river, 8.11.95, coll. H.P. Mookherjee.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
18.10-20.00	20.00-12.25	17.75-13.15

Diagnosis : Shell globosely conical; smooth except 3-4 spiral ridges near the suture; whorls five; dark brown, often ornamented with dark spiral bands.

Shell in this species is variable, based on differences in forms of spire and aperture, number of subspecies, forms were described.

Distribution : India : Mizoram, Assam, Meghalaya, Manipur. *Elsewhere* : Bangladesh, Bhutan.

Remarks : This species is commonly used as food and is sold in the market.

Paludomus* (*P.*) *pustulosa Annandale

1921. *Paludomus pustulosa* Annandale, *Rec. Indian Mus.*, **22** : 563, figs. 11 A & B; (Type-locality : Stream in the south part of the Manipur valley).

1986. *Paludomus pustulosa* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 26.

1989. *Paludomus* (*P.*) *pustulosa* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 116, fig. 234.

Material examined : (i) 28 exs., 9 kms. west of Darlak, 23.4.84, coll. S. Biswas and party.

Measurements (in mm) :

Length	Diameter	Height of the aperture
16.10-10.20	13.60-7.50	11.50-6.00

Diagnosis : Shell ovate, thick; sculptured with coarse longitudinal lines and minute granules, interior of shell olivaceous, sometimes with traces of two or three broad chestnut bands.

Distribution : India : Mizoram, Manipur.

Remarks : It is found attached to rocks and crevices in the rapid running streams.

Paludomus* (*P.*) *regulata Benson

1856. *Paludomus regulata* Benson, *Ann. Mag. nat. Hist.*, **2**(7) : 496.

1986. *Paludomus regulata* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 26.

1989. *Paludomus* (*P.*) *regulata* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 118, fig. 236.

Material examined : (i) 18 exs., Terei river, Dampa sanctuary, Aizawl, 28.12.93, coll. S.S. Saha; (ii) 3 exs., Aizawl market, 3.8.94, coll. K.V. Surya Rao and A. Dey.

Diagnosis : Shell ovate; spire sharp and pointed; whorls five; body whorl with four dark brown bands, the second from the top broader than the others; sculpture with groove like spiral ridges; suture deep.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
15.00-7.80	10.15-5.35	9.90-5.20

Distribution : India : Mizoram, Meghalaya, West Bengal. *Elsewhere* : Myanmar.

Remarks : It is recorded for the first time from Mizoram.

Subclass : PULMONATA

Order : BASOMMATOPHORA

Family : LYMNAEIDAE

Genus ***Lymnaea*** Lamarck

1799. *Lymnaea* Lamarck, *Prodr. Nouv. Class Coq.*, : 75; (Type species : *Limnaea stagnalis* Linnaeus).

Key to the Subgenera

1. Spire scarely exerted, canalised at base, bodywhorl greatly inflated. .. ***Radix*** Montfort

– Spire distinctly exerted, not canalised at base, bodywhorl moderately inflated. .... ***Pseudosuccinea*** Baker

Subgenus ***Pseudosuccinea*** Baker

Lymnaea* (*Pseudosuccinea*) *acuminata form ***hians*** Sowerby

1837. *Limnaea acuminata* f. *hians* Sowerby in Reeve, *Conch. Icon.*, **18** : sp. no. 57; (type-locality : Malabar).

1986. *Lymnaea acuminata* f. *hians* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 27.

1989. *Lymnaea* (*Pseodosuccinea*) *acuminata* f. *hians* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 127, figs. 260, 261.

Material examined : (i) 42 exs., Naljal, 29.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
11.55-8.60	6.25-5.00	9.10-6.45

Diagnosis : Shell ovate, dwarf, spire high and narrow; bodywhorl inflated and little angular; aperture large.

Distribution : India : Mizoram, Kerala.

f. malleata Annandale and Rao

1925. *Limnaea acuminata* f. *malleata* Annandale and Rao, Rec. Indian Mus., **27** : 182, fig. 1; (Type-locality : Wazirabad, Peshwar).

1986. *Lymnaea acuminata* f. *malleata* : Subba Rao and Dey, *J. Hydrobiol*, **2**(3) : 27.

1989. *Lymnaea* (*P.*) *acuminata* f. *malleata* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 127, figs. 260, 261.

Material examined : (i) 10 exs., Darlak, 29.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
17.10-13.15	9.65-7.50	12.75-10.35

Diagnosis : Shell very similar to the preceding form but can be readily distinguished by its typical texture and well defined malleated sculpture of the bodywhorl.

Distribution : India : Mizoram, Manipur, Punjab. *Elsewhere* : Pakistan.

f. rufescens Gray

1820. *Limnaea rufescens* Gray, *Genera of Shells*, **1** : pl. 178, fig. 2.

1989. *Lymnaea* (*P.*) *acuminata* f. *rufescens* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 127, figs. 254, 255.

Material examined : (i) 20 exs., Paddy field, Champhai, 8.8.94-12.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
23.50-17.00	11.60-8.00	16.50-12.00

Diagnosis : Shell narrower than typical form, spire longer; aperture uniformly less expanded; reddish in colour.

Distribution : India : Common throughout, but it is recorded for the first time from Mizoram.

Lymnaea persica Issel

1865. *Limnaea auricularia* var. *persica* Issel, *Moll. Miss. Ital. Persia* (Terins) : 47; (Type-locality : Iran).

1986. *Lymnaea persica* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 27.

1989. *Lymnaea* (*Radix*) *persica* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 133, figs. 304, 305.

Material examined : (i) 4 exs., pond 4 kms east of Darlak, 29.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
13.80-13.60	3.20-3.15	10.80-10.60

Diagnosis : Bodywhorl abruptly inflated and expanded, spire very short not canalised at base, columella strongly twisted; aperture large.

Distribution : India : Mizoram, Himachal Pradesh, Jammu & Kashmir. *Elsewhere* : Iran, Pakistan.

Family : PLANORBIDAE

Genus ***Indoplanorbis*** Annandale and Rao

1921. *Indoplanorbis* Annandale and Rao, *Rec. Indian Mus.*, **22**(4) : 578; (Type species : *Planorbis exustus* Deshayes)

Indoplanorbis exustus (Deshayes)

1834. *Planorbis exustus* Deshayes in Belanger, Voy. *Indes-Orientale* p. 417, pl. 1, figs. 11-13; (Type locality : Malabar coast).

1986. *Indoplanorbis exustus* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 27.

1989. *Indoplanorbis exustus* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 142, figs. 326, 327.

Material examined (i) 40 exs., pond 4 kms east of Darlak, 29.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Length	Diameter	Height of the aperture
4.60-4.25	10.90-6.75	4.25-4.10

Diagnosis : Shell depressedly coiled, large, thick, sinistral, suture deeply impressed; aperture ear shaped.

Distribution : India : Throughout. *Elsewhere* : Celebes, China, Java, Malaysia, Myanmar, Pakistan, Persia, Sri Lanka, Sumatra.

Genus ***Gyraulus*** Charpentier

1837. *Gyraulus* (Agassiz MS) Charpentier, *Neue Denkschr. Allg. Schweg. Gessell*, 1, no. 221; (Type species : *Planorbis albus* Mueller = *Planorbis hispidus* Draparnaud SD).

Gyraulus labiatus (Benson)

1850. *Plaborbis labiatus* Benson, *Ann. Mag. nat. Hist.*, (2)5 : 350; (Type-locality : In Stagne prope urben, Moradabad).

1986. *Gyraulus labiatus* : Subba Rao and Dey, *J. Hydrobiol.*, 2(3) : 27.

1989. *Gyraulus labiatus* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 155, figs. 342-344.

Material examined : (i) 29 exs., pond, Naljal, 29.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Diameter	Thickness
5.80-4.00	1.65-9.85

Diagnosis : Shell obliquely striated, suture impressed, whorls 3 1/2, bodywhorl slightly descending in front, aperture oblique, heart shaped, whitish rib within the aperture.

Distribution : India : Mizoram, Madhya Pradesh, Maharashtra, Tamil Nadu, West Bengal, *Elsewhere* : Myanmar.

Remarks : It closely agrees with *G. convexiusculus*, but has less number of whorls and a conspicuous ridge in inner surface of the tip.

Class : BIVALVIA

Order : UNIONOIDA

Family : UNIONIDAE

Key to the genera

1. Shell soleniform, hinge toothless (edentulous). ..... ***Solenaia*** Conrad
- Shell not soleniform, hings with cardinal and lateral teeth. 2
2. Shell elongate, anterior end narrow, posterior broad with a slight wing. ..... ***Lamellidens*** Simpson
- Shell not elongate, but ovate or rounded or rhomboidal or trapezeided, wing absent. 3
3. Shell rounded to subrhemboidal, tumid, umbones prominent, cardinals vertically striate, compressed. ..... ***Parreysia*** Conrad
- Shell trapezoidal, umbones less prominent, cardinals elongate, without any striations. ..... ***Trapezoideus*** Simpson

Genus ***Lamellidens*** Simpson

1900. *Lamellidens* Simpson, *Proc. U. S. natn. Mus.*, **22** : 854; (Type species : *Unio marginalis* Lamarck).

Lamellidens phenchooganjensis Preston

1912. *Lamellidens phenchooganjensis* Preston, *Rec. India Mus.*, **7** : 306; (Type-locality : Phencheoganj, Central Sylhet, Bangladesh).

1989. *Lamellidens phenchooganjensis* Subba Rao in : *Handbook Freshwater Molluscs of India* : 168, figs. 406, 407.

Material examined : (i) 4 exs., Vairangte, 15.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Length	Width	Thickness
125.00-124.50	60.10-60.00	37.20-37.00

Diagnosis : Shell elongately ovate, dark brownish black, Umbones flat anterior side angled above, gently rounded below; postero-dorsal margin more rapidly sloping in a slight curve.

Distribution : India : Mizoram. *Elsewhere* : Bangladesh.

It is recorded for the first time from India.

Remarks : The material studied exactly agree with the holotype in National Zoological Collections (M 4868/1). The shells are bigger and thicker than the type.

Genus ***Parreysia*** Conrad

1853. *Parreysia* Conrad, *Proc. Acad. nat. Sci. Philad.*, **6** : 267; (Type species : *Unio multidentatus* Philippi).

Key to the Subgenera

1. Ventral margin swollen, thick, sculpture with strong beak. ..... ***Parreysia*** s. str.
- Ventral margin almost straight, comparatively thin, sculpture on beak mild, outer surface with radiating or zigzag or divaricate ridges. .... ***Radiatula*** Simpson

Subgenus ***Parreysia*** s. str.

Key to species

1. Shell large, more elongate, proportionally less convex. 2
- Shell small, short and broad, proportionally more convex. ..... *P. sikkimensis* Preston
2. Shell narrower, both posterior and anterior margins rounded. .... *P. favidens plagiosoma* Benson
- Shell broader, both anterior and posterior margins angulate. .... *P. favidens assamensis* Preston

Parreysia (Parreysia) favidens assamensis Preston

1912. *Parreysia favidens* var. *assamensis* Preston, *Rec. Indian Mus.*, **7** : 299; (Type locality : Digong, Assam).

1989. *Pareysia (P.) favidens assamensis* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 181, figs. 468, 469.

Material examined : (i) 5 exs., Rondia, 12.2.95, coll. ? (ii) 2 valves, Knoll, Nagenpui, 6.4.97, coll. S.K. Chattopadhya.

Measurements (in mm) :

Length	Width	Thickness
41.00-22.55	29.20-14.00	18.70-8.25

Diagnosis : Shell convex, anterior side more rounded and posterior slightly attenuate, dorsal margin rather less posteriorly angulated.

Distribution : India : Mizoram, Assam, Bihar.

Remarks : It is recorded for the first time from Mizoram.

Parreysia (P.) favidens plagiosoma Benson

1862. *Unio plagiosoma* Benson, *Ann. Mag. nat. Hist.*, (3)10 : 191.

Material examined : (i) 9 exs., Nagenpui, Chhimtuipui, 10.4.95, coll. S.S. Saha.

Diagnosis : Shell thinner and narrower than in typical form, ovately, trigonal, anterior margin well rounded, posterior margin broader, dorsal margin evenly sloping.

Distribution : India : Mizoram, Assam, Bihar, West Bengal.

Remarks : It is reported for the first time from Mizoram.

Parreysia (P.) sikkimensis (Lea)

1859. *Unio sikkimensis* Lea, *Proc. Acad. nat. Sci. Philad.*, **3** : 151; (Type locality : Sikkim).

1986. *Parreysia (Parreysia) sikkimensis* : Subba Rao and Dey, *J. hydrobiol.*, **2**(3) : 29.

1989. *Parreysia (Parreysia) sikkimensis* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 185, figs. 488, 489.

Material examined : (i) 8 valves Bangwa, 6.4.84, coll. S. Biswas and party; (ii) 2 valves, Knoll, Ngenpui, 6.4.97; (iii) 1 valve, Kwarang Lui, 6.4.97, coll. S.K. Chattopadhya.

Measurements (in mm) :

Length	Width
32.80-31.00	24.70-23.15

Diagnosis : Shell more convex, proportionate to its size, stout, broad and ovate.

Distribution : India : Mizoram, Assam, Sikkim, West Bengal.

Subgenus ***Radiatula*** Simpson

Parreysia (Radiatula) caerulea (Lea)

1831. *Unio caerulea* Lea, *Trans. Amer. Phil. Soc.*, **4** : 95, pl. 13, fig; (Type locality : Hooghly river, 100 miles from Calcutta).

1986. *Parreysia (Radiatula) caerulea* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 25.

1989. *Parreysia (Radiatula) caerulea* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 188, fig. 515, 517.

Material examined : (i) 3 valves, Bangwa, 26.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Length	Width
30.00-29.50	16.25-16.00

Diagnosis : Shell variable in shape and sculpture; posterior umbonal carina very distinct; sculptured with zigzag ribs at the umbonal region extending to the half of the valve.

Distribution : India : Mizoram, Assam, Bihar, Meghalaya, Orissa, Punjab, Uttar Pradesh, West Bengal. *Elsewhere* : Myanmar, Nepal, Pakistan.

Genus ***Solenaia*** Conrad

1868. *Solenaia* Conrad, *Am. J. Conch.*, **4** : 246; (Type species : *Mycetopus emarginatus* by OD).

Solenaia soleniformis (Benson)

1836. *Anodon soleniformis* Benson, *J. Asiat. Soc. Beng.*, **5** : 750; (Type locality : Assam).

1986. *Solenaia soleniformis* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 25.

1989. *Solenaia soleniformis* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 175, figs. 442, 443.

Material examined : (i) 12 exs., Teirei river, 25.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Length	Width	Thickness
143.55-126.15	45.40-35.70	29.20-16.75

Diagnosis : Shell soleniform, elongate and rather narrow, compressed, anterior end narrower, posterior end broader and sloping, hinge without teeth.

Remarks : Hora (1926) studied the distribution and habits of this species. Large number of this species are collected by local people for their consumption.

Genus ***Trapezoideus*** Simpson

1900. *Trapezoideus* Simpson, *Proc. U. S. natn.* Mus., **22** : 858; (Type species : *Unio foliacea* Gould).

Trapezoideus exolescens exolescens (Gould)

1843. *Unio exolescens* Gould, *Proc. Boston. Soc. nat. Hist.*, **1** : 141; (Type locality : Tavoy, Burma).

1986. *Trapezoideus exolescens exolescens* : Subba Rao and Dey, *J. Hydrobiol.*, **2**(3) : 29.

1989. *Trapezoideus exolesens exolescens* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 194, figs. 432, 548-5.

Material examined : (i) 3 exs., Bagwa, 26.2.84; (ii) 6 exs., Terei river, 29.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Length	Width	Thickness
35.50-35.00	18.75-18.60	12.00-11.90

Diagnosis : Shell compressed, elongate, trapezoidal, umbo depressed, occasionally prominent, dorsal and ventral margin parallel to each other.

Distribution : India : Mizoram, Assam, Manipur, Nagaland. *Elsewhere* : Myanmar.

Remarks: It is recorded for the first time from Mizoram.

Order : VENEROIDEA

Family : CORBICULIDAE

Genus ***Corbicula*** Megerle von Muehlfeld

1811. *Corbicula* Megerle von Muehlfeld, *Mag. Gessel. Naturf. Berlin*, **5** : 56; (Type species : *Tellina fluminalis* Mueller).

Corbicula striatella Deshayes

1854. *Corbicula striatella* Deshayes, *Proc. zool. Soc. Lond.*, **22** : 344; (Type locality : Pondicherry).

1989. *Corbicula striatella* : Subba Rao in : *Handbook Freshwater Molluscs of India* : 204, figs. 575, 576.

Material examined : (i) valve (Juv) Rondia, 12.2.95, (ii) 5 exs., Sangao, Chhimtuipui, 5.2.87, coll. H.C. Ghosh.

Measurements (in mm) :

Length	Width	Thickness
21.85-10.00	18.60-8.80	12.75-6.00

Diagnosis : Shell thick, tumid, triangular to ovate, dorsal margin arched on anterior side, striae

regular, concentric and raised into ridges, pallial line with a trace of sinus, musele scars well developed.

Distribution : India : Throughout. *Elsewhere* : Afghanistan, Myanmar, Pakistan.

Remarks : It is recorded for the first time from Mizoram.

Edible shell fish resources and marketing

Molluscs form staple food for the people of Mizoram (Subba Rao and Dey, 1986). Almost all the freshwater molluscs which occur abundantly in local aquatic bodies are used as food. Local people, both Mizo and Riang, are very fond of shell fishes. Fourteen species of freshwater molluscs (Table-1) serve as food to the local people, either regularly or occassionally. The flesh of all these species are being consumed by the people. The molluscs are either collected by themselves from the streams or are purchased by them from the local market.

As the gastropods are easily available, they are consumed regularly; but the bivalves are consumed occasionally since they are not easily available.

Molluscs are collected regularly from the freshwater bodies and sold to the market. There are regular markets of these shell fishes. The market rate of some species of freshwater molluscs are given in Table-II.

The snails thus procured are boiled in water after keeping them overnight in water to allow them to shed their excreta. Extracting the flesh by removing shell from it and by adding chilli powder and spices, the meat will be consumed. In case of *Brotia* and *Paludomus* the shells are boiled and then after removing their operculum the meat is sucked directly.

B. Land Molluscs

Key to the families

1. Animal without external shell. .... LIMACIDAE
– Animal with external shell. 2
2. Shell more than 30 mm in length. .... ACHATINIDAE
– Shell less than 30 mm in length 3
3. Shell with operculum 4
– Shell without operculum. 5
4. Shell higher than broad. .... DIPLOMMATINIDAE
– Shell broader than high. .... CYCLOPHORIDAE
5. Shell with simple peristome. 6
– Shell with srongly reflected peristome. 8
6. Shell higher than broad, imperforate. .... SUBULINIDAE
– Shell broader than high, perforate. 7
7. Shell partly internal or external, when external, subglobosely depressed; dart sac present. ..... ARIOPHANTIDAE
– Shell usually trochiform and narrowly perforate, or flatly conoid with widely open umbilicus; dart sac usually absent. .... HELIXARIONIDAE ..... (Kaliella, Sesara and Sivella)
8. Shell higher than broad. .. STREPTAXIDAE
– Shell broader than high. 9
9. Shell sinistral, with spiral sculpture. .... PLECTOPYLIDIDAE
– Shell dextral, without spiral sculpture. ... 10
10. Shell very coarsely sculptured, without any band. ..... BRADYBAENIDAE
– Shell finely sculptured with bands. .... CAMAENIDAE

Order : MESOGASTROPODA

Family : CYCLOPHORIDAE

Key to the genera

1. Sutural tube present. 2
– Sutural tube absent. 5
2. Body whorl regularly rounded, sutural tube open at one end. ..... ***Pearsonia*** Kobelt

Table 1. : Freshwater species used as food.

Sl. No.	Name	Common Name		Frequency of consumption
		Riang	Mizo	
1.	*Cipangopaludina lecythis* (Benson)	Chikangbook	Chenkal	Regularly
2.	*Bellamya bengalensis* f. *typica* (Lamarck)	do	do	do
3.	*Brotis costula* (Rafinesque)	do	do	do
4.	*Paludomus conica* Gray	do	do	do
5.	*Paludomus blanfordiana* Nevill	do	do	do
6.	*Paludomus regulata* (Benson)	do	do	do
7.	*Paludomus pustulosa* Annandale	do	do	do
8.	*Lamellidens phenchoogensis* Preston	Clampy (Beta)	Tuikep	Occasionaly
9.	*Solenia soleniformis* (Benson)	Clampy (Beta)	Tuikep	Occasionaly
10.	*Parreysia* (*P.*) *favidens assamensis* Preston	Clampy (Beti)	Tuikep	Occasionaly
11.	*P.* (*P.*) *favidens plagiosoma* Benson	Clampy (Beti)	Tuikep	Occasionaly
12.	*P.* (*Radiatula*) *caerulea* (Lea)	Clampy (Beti)	Tuikep	Occasionaly
13.	*P.* (*P.*) *sikkimensis* (Lea)	Clampy (Beti)	Tuikep	Occasionaly
14.	*Trapezoideus exolescens exolescens* (Gould)	Clampy (Beti)	Tuikep	Occasionaly

Table 2. : Market rates

Sl. No.	Name	Champhai	Aizawl	Vairangte
		Rs. 2–3/- per packet (20–25 adult specimens)	Rs. 4–7/- per packet (40–50 specimens)	Rs. 2–3/- per packet (20–25 specimens)
1.	*Cipangopaludina lecythis* (Lenson)	do	do	do
2.	*Bellamya bengalensis* f. *typica* (Lamarck)	do	do	do
3.	*Brotia costula* (Rafinesque)	do	do	do
4.	*Paludomus conica* (Gray)	do	do	do
5.	*Paludomus blanfordiana* Nevill	do	do	do
6.	*Paludomus regulata* Benson	do	do	do
7.	*Paludomus pustulosa* Annandale	do	do	do

- Body whorl irregularly inflated and constricted, sutural tube closed at both ends. 3

3. Sutural tube extremely short, usually club shaped. ..... ***Cycloryx*** Godwin-Austen
- Sutural tube long and linear. 4

4. Shell depressed and broad (twice as broad as high), umbilicus broader. ....***Chamalycaeus*** Kobelt and Moellendroff
- Shell more conoid (marginally broader than high), umbilicus narrower. ...***Alycaeus*** Gray

5. Shell discoidal, whorls visible on both sides, peristome with a wing like protrusion. .... ***Pterocyclus*** Benson
- Shell conoidal, whorls not visible on both sides, peristome without wing like protrusion. ..... ***Cyclophorus*** Montfort

Genus ***Alycaeus*** Gray

1850. *Alycaeus* Gray, *Nomencl. Moll. Brit. Mus.*, **1** : 27; (Type species : *Cyclostoma gibbum* Eydoux).

Key to the subgenera

1. Shell with a hollow ridge on the body whorl. ..... ***Dicharax*** Kobelt and Moellendorff
- Shell without a ridge on the body whorl..... .....***Alycaeus*** s. str.

Subgenus ***Alycaeus*** s. str.

Alycaeus (Alycaeus) burti Godwin-Austen

1874. *Alycaeus burti* Godwin-Austen, *J. Asiat. Soc. Beng.*, **43**(2) : 149, pl. 3, fig. 9; (Type locality : Akha Hills, Bhutan).

1990. *Alycaeus burti* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 49, figs. 1 & 2.

Material examined : (i) 25 exs., Darlak, 26.2.84, coll. S. Biswas and party.

Measurement (in mm) :

Height	Diameter	Height of aperture
4.25-2.90	6.50-4.70	2.00-1.70

Diagnosis : Shell turbinate, thick, openly umbilicate; markedly ribbed on the body whorl and finely costulate on the apex; spire conoid, apex sharp, suture well impressed; whorls five; aperture oblique, laterally oval, angular on inner upper margin; peristome thickened, double.

Distribution : India : Mizoram, Arunachal Pradesh, Assam. *Elsewhere* : Bhutan.

Subgenus ***Dicharax*** Kobelt and Moellendorff

1859. *Dicharax* Kobelt and Mollendorff, *Nachr. Deuts. Malak. Ges.*, **32** : 186; (Type species : *Alycaeus hebes* Benson).

Alycaeus (Dicharax) khasiacus Godwin-Austen

1871. *Alycaeus khasiacus* Godwin-Austen, *J. Asiat. Soc. Beng.*, **40**(2) : 90, pl. 3, figs. 4, 4a, 4b; (Type locality : Cherrapunji, Khasi Hills, Meghalaya).

1995. *Alycaeus (Dicharax) khasiacus* : Subba Rao *et. al.*, *State Fauna Series, ZSI*, **4**(6) : 40, pl. 2, fig. 3.

Material examined : (i) 3 exs., Zoo Garden, Aizawl, 4.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Height	Diameter	Height of aperture
2.70	3.75	1.85

Diagnosis : Shell subturbinately depressed, openly umbilicate; spire conoid, apex blunt; suture impressed; whorls four, rounded; aperture oblique, rounded, slightly angulate; peristome double, the inner continuous; nearly smooth; the outer expanded; operculum distinctly concave externally.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Manipur. *Elsewhere* : Myanmar.

Remarks : It is recorded for the first time from Mizoram.

Genus ***Chamalycaeus*** Kobelt & Moellendorff

1897. *Chamalycaeus* Kobelt and Mollendorff, *Nachr. Deuts. Malak. Ges.*, **29** : 151; (Type species : *Alycaeus andamanicus* Benson).

Chamalycaeus edei Godwin-Austen

1914. *Alycaeus edei* Godwin-Austen, *Land and Freshwater Molluscs of India*, **2** : 391, pl. 149, figs. 2, 2a; (Type locality : Narainpur, Cachar).

1921. *Alycaeus edei* : Gude, *Fauna Brit. India, Mollusca*, **3** : 227.

Material examined : (i) 2 exs., Sangao, Chimtuipui, 30.1.87, coll. H.C. Ghosh.

Measurements (in mm) :

Length	Diameter	Height of aperture
3.20	5.50	2.40

Diagnosis : Shell openly umbilicate, globose, without costulation on apical whorls, fine costulations near sutural tube; whorls 5-4, peristome double, solid; aperture oval horizontally. Distinguished by its smooth apical whorls.

Distribution : India : Mizoram, Assam.

Remarks : It is recorded for the first time from Mizoram.

Genus *Cycloryx* Godwin-Austen

1914. *Cycloryx* Godwin-Austen, *Land and Freshwater Mollusca of India*, **2** : 334; (Type species : *Alycaeus constrictus* Benson).

Cycloryx graphicus Blanford

1862. *Alycaeus graphicus* Blanford, *J. Asiat. Soc. Beng.*, **31** : 137; (Type locality : Arakan Hills, Pegu, Burma).

1995. *Alycaeus (Cycloryx) graphicus* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 41, pl. 2, fig. 5.

Material examined : 3 exs., Bualpui, Chhimtuipui, 14.1.95, coll. H.C. Ghosh.

Measurements (in mm) :

Height	Diameter	Height of aperture
3.0	3.50	2.25

Diagnosis : Shell ovately globose, turbinate, distinctly costulate on lower whorls; umbilicus covered by the extension of the left edge of the outer lip; spire conical, moderately high; whorls 4, rounded; aperture circular; peristome double, expanded and slightly reflected.

Distribution : India : Mizoram, Assam, Meghalaya, Nagaland, West Bengal. *Elsewhere* : Myanmar.

Remarks : It is the first record of this species from Mizoram.

Genus *Cyclophorus* Montfort

1810. *Cyclophorus* Montfort, *Conchyl. Syst.*, **2** : 290; (Type species : *Helix volvulus* Mueller).

Key to the subgenera

1. Bodywhorl dilated in front. ....***Salpingophorus*** Kobelt and Moellendorff
- Bodywhorl not dilated in front. .... ***Glossostylus*** Kobelt and Moellendorff

Subgenus *Glossostylus* Kobelt & Molendorff

1897. *Glossostylus* Kobelt and Mollendorff, *Nachr. Deuts. Malak.* Ges., **29** : 106; (Type species : *Cyclostoma validum* Sowerby).

Cyclophorus (G.) aurora (Benson)

1851. *Cyclophorus aurora* Benson, *Ann. Mag. nat. Hist.*, (2)7 : 186.

1921. *Cyclophorus (Glossostylus) aurora* : Gude, *Fauna Brit. India, Mollusca*, **3** : 57.

Material examined : (i) 1 ex., Bualpui, Chhimtuipui, 8.1.87, (ii) 1 ex., Saiha, 10.1.87, coll. H.C. Ghosh; (iii) 7 exs., Chhimtuipui, 6.2.87.

Measurements (in mm) :

Height	Diameter	Height of aperture
27.30-26.50	35.60-34.40	16.10-15.80

Diagnosis : Shell large, openly umbilicate, globosely turbinate with spiral keels 5-6 of which are more raised, bodywhorl subangulate at the periphery; aperture circular, peristome reflected.

Distribution : India : Mizoram, Sikkim, West Bengal. *Elsewhere* : Bhutan.

Remarks : It is recorded for the first time from Mizoram.

Subgenus *Salpingophorus* Kobelt & Moellendorff

1897. *Salpingophorus* (Part) Kobelt and Mollendorff, *Nachr. Deuts. Malak Ges.*, **29** : 108; (Type species : *Cyclostoma perdix* Broderip & Sowerby).

Key to the species

1. Shell with zig-zag markings towards apex, bodywhorl subangulate, umbilical cavity wide. ..... *C. theobaldianus* Benson

– Shell with zig-zag markings throughout, borywhorl sharply carinate, umbilical opening contracted. ..... *C. zebrinus* (Benson)

Cyclophorus (S.) theobaldianus Benson

1857. *Cyclophorus theobaldianus* Benson, *Ann. Mag. nat. Hist.*, (2) : 19 : 206.

1990. *Cyclophorus theobaldianus* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 51, pl. 2, figs. 1 & 2.

Material examined : (i) 1 ex., Kolasib, 1994, coll. A.K. Hazra; (ii) 2 exs., Turial village, Aizawl, 4.8.94, coll. K.V. Surya Rao and A. Dey; (iii) 1 ex., Ngenpui, Chhimtuipui, 10.4.95, coll. S.S. Saha; (iv) 8 exs., Sairep, Lunglei, 22.4.95, coll. T.P. Bhattacharya.

Mesurements (in mm) :

Height	Diameter	Height of aperture
38.65-35.60	51.85-41.0	21.55-21.0

Diagnosis : Shell large, solid, turbinately depressed, openly umbilicate; granulately sculptured by elevated spiral lines, decussated by fine, close, oblique markings; zig-zag chocolate markings on apical whorls; whorls 5, convex, body whorl with dark band below the periphery; peristome considerably thickened.

Distribution : India : Mizoram, Assam, Manipur, Meghalaya. *Elsewhere* : China, Mergui Archipelago, Myanmar.

Cyclophorus (S.) zebrinus (Benson)

1836. *Cyclostoma zebrinum* Benson, *J. Asiat. Soc. Beng.*, **5** : 355; (Type locality : Silhet (=Sylhet), Bangladesh).

1990. *Cyclophorus zebrinus* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 51, pl. 2, figs. 6 & 6a.

Material examined : 4 exs., Darlak, 28.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
21.55-21.20	23.80-23.65	10.0-10.95

Diagnosis : Shell smaller, thinner, narrowly umbilicate, sub-lenticular decussately sculptured with spiral striae and subdistant, oblique lines; zig-zag chocolate markings above, whorls 5, flattened above, body whorl keeled; aperture subvertical, large, peristome thin, reflected, edge of umbilicus angulate.

Distribution : India : Mizoram, Arunachal Pradesh, Manipur, Meghalaya. *Elsewhere* : Bangladesh, China, Mergui Archipelago, Myanmar.

Genus ***Pearsonia*** Kobelt

1902. *Pearsonia* Kobelt, *Das Tierreich Liof.*, **16** : 171; Type species : *Spiraculum hispidum* Pearson.

Pearsonia kempi (Godwin-Austen)

1915. Spiraculum kempi Godwin-Austen, *Rec. Indian Mus.*, **8** : 496, pl. 39, figs. 4 & 5; (Type locality : Abor Hills).

1921. *Pearsoni kempi* : Gude, *Fauna Brit. India*, Mollusca, **3** : 119.

Material examined : 1 ex., Furpak, Chhimtuipui, 8.2.87, coll. H. C. Ghosh.

Measurement (in mm) :

Height	Diameter	Height of aperture
6.40	22.85	5.90

Diagnosis : Shell rather flatly discoid, widely umbilicate, brownish, with a broad peripheral band; spire much depressed, scarcely raised, decussately sculptured with transverse growth lines and close spiral lirae; whorls 5, rounded, aperture circular, peristome double, expanded and reflected.

The single shell available had the breathing tube broken.

Distribution : India : Mizoram, Arunachal Pradesh.

Remarks : This species is endemic to north-east India and is recorded for the first time from Mizoram.

Genus ***Pterocyclus*** Benson

1832. *Pterocyclus* Benson, *J. Asiat. Soc. Beng.*, **2** : 11; (Type species : *Pterocyclus rupestris* Benson).

Pterocyclus parvus (Pearson)

1833. *Spiraculum parvum* Pearson, *J. Asiat. Soc. Beng.*, **2** : 592, pl. 20, fig. 7.

1990. *Pterocyclus parvus* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 52, pl. 5, figs. 1 & 2.

Material examined : (i) 3 exs., Darlak, 28.4.94, coll. S. Biswas and party; (ii) 1 ex., Lunglei, 17.11.95, coll. H.P. Mookherjee.

Measurements (in mm) :

Height	Diameter	Height of aperture
8.35-3.80	28.20-7.60	9.95-2.60

Diagnosis : Shell white, subdiaphanous with a dark brown line along the periphery; ornamented with brown zig-zag markings above; spiracle situated near the mouth; umbilicus largely dilated.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Nagaland. *Elsewhere* : Bangladesh, Myanmar.

Family : DIPLOMMATINIDAE

Genus ***Diplommatina*** Benson

1840. *Diplommatina* Benson, *Ann. Mag. nat. Hist.*, (2)4 : 193; (Type species : *Bulimus folliculus* Pfeiffer).

Diplommatina butleri Godwin-Austen

1892. *Diplommatina butleri* Godwin-Austen, *Proc. zool. Soc. Lond.*, p. 512.

1990. *Diplommatina butleri* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 52, figs. 3a & 3b.

Material examined : 12 exs., Darlak, 28.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Length	Diameter	Height of aperture
6.10-4.65	3.65-2.65	1.40-1.00

Diagnosis : Shell tumid and ovately fusiform, dextral, very finely and closely costulate; spire rapidly attenuate, apex sharp, suture well impressed; whorls 8, last three swollen and rounded; peristome double, much thickened, continuous; columellar teeth strong.

Distribution : India : Mizoram, Manipur, Nagaland. *Elsewhere* : Myanmar.

Order : STYLOMMATOPHORA

Family : SUBULINIDAE

Key to the genera

1. Shell imperforate, columella truncate at base. ..... ***Glessula*** von Marten
– Shell narrowly perforate, columella rounded at base. 2
2. Shell narrowly elongate, upto 3 mm in width, not sinuate below. ..... ***Allopeas*** Baker
– Shell ovately turreted, above 3 mm in width, columella sinuate below. ..... ***Curvella*** Chaper

Genus ***Allopeas*** Baker

1935. *Allopeas* Baker, *Nautilus*, **48**(3) : 84; (Type species : *Bulimus gracile* Hutton.)

Allopeas gracile (Hutton)

1834. No. 5. *Bulimus Allopeas gracile* (Hutton) : (mihi) *gracile* Hutton, *J. Asiat. Soc. Beng.*, 3 : 39; (Type locality : Mirzapore, Uttar Pradesh).

1997. *Allopeas gracile* : Surya Rao *et. al.*, *Fanua of Delhi, State Fauna Series*, **6** : 125, pl. 3, fig. 3.

Material examined : (i) 1 ex., Saiha, Chhimtuipui, 10.1.87, coll. H.C. Ghosh; (ii) 17 exs., Near Govt. Press, Aizawl, 3.8.94; (iii) 1 ex., Circuit House Compound, Aizawl, 4.8.94; (iv) 2 exs., Zoo Garden, Aizawl, 4.8.94; (v) 11 exs., Turial village, Aizawl, 4.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Length	Diameter	Height of aperture
14.20-7.10	3.50-2.35	3.70- 2.85

Diagnosis : Shell small tapering, whorls rounded, the last whorl equallying the preceeding two whorls together in width; suture deep; aperture longer than broad, semiovate, peristome thin, columellar lip straight, rounded below.

Distribution : India : Mizoram, Common throughout. *Elsewhere* : Archipelago, Bangladesh, china, East Africa, Japan, Malaya Peninsula, Myanmar, Pakistan, Philippines, Polynesia and Sri Lanka.

Genus *Curvella* Chaper

1885. Curvella Chaper, *Bull. Soc. zool. France*, **10** : 49; (Type species : *Curvella sulcata* Chaper).

Curvella khasianus (Godwin-Austen)

1872. *Bulimus (Harpaulus) khasianus* Godwin-Austen, *Proc. zool. Soc. Lond.*, p. 516, pl. 36, fig. 7.

1995. *Curvella khasiana* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 63, pl. 11, figs. 6 & 7.

Material examined : (i) 1 ex., Zoological Garden, Aizawl, 4.8.94, coll. K.V. Surya Rao and A. Dey; (ii) 2 exs., Bualpui, Chhimptuipui, 14.1.95, coll. H.C. Ghosh.

Measurements (in mm) :

Length	Diameter	Height of aperture
12.15-12.00	6.0-5.90	6.0-5.95

Diagnosis : Shell subperforate, ovately turreted, thin, spire conical, apex blunt, suture moderate, whorls 6-7, rather convex, bodywhorl tumid and large; aperture vertical, semiovate, peristome simple, sharp and rounded.

Distribution : India : Mizoram, Meghalaya, Nagaland, Sikkim, West Bengal. *Elsewhere* : Myanmar.

Genus *Glessula* von Martens

1850. *Electra*, Albers, *Die Heliceen* : 194 (as section of *Achatina*).

1860. *Glessula* von Martens, *Die Heliceen* ed. **2** : 254 (as subgenus of *Cionella*); Type species : *Achatina ceylanica* Pfeiffer.

Key to the species

1. Shell with more than 10 whorls. .... *G. tenuispira* Benson
– Shell with less than 10 whorls. 2
2. Shell larger, above 15 mm in length. .... *G. crasula* (Reeve)
– Shell smaller, below 15 mm in length. 3
3. Shell smooth, glossy, finely sculptured, columella more curved. ... *G. gemma* (Reeve)
– Shell coarsely sculptured, columella less curved. ..... *G. orobia* (Benson)

Glessula crassula (Reeve)

1850. *Glessula crassula* (Benson) Reeve, *Conch. Icon.*, **5** : *Achatina*. pl. 22, fig. 120; (Type locality : Khasi Hills).

1995. *Glessula crassula* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 63, pl. 11, figs. 5 & 6.

Material examined : 1 ex., Sangao, Chhimtuipui, 30.1.87, coll. H.C. Ghosh.

Measurements (in mm) :

Length	Diameter	Height of aperture
17.0	8.30	6.85

Diagnosis : Shell pyramidally conical, whorls 7, flatly rounded, vertically striate, suture deep and exacavated, columella arched and truncated below; aperture small.

Distribution : Mizoram, Assam, Meghalaya, Nagaland, West Bengal.

Remarks : It is recorded for the first time from Mizoram.

Glessula gemma (Reeve)

1850. *Achatina gemma* Reeve, *Conch. Icon.*, **5** : *Achatina*, pl. 22, fig. 120.

1995. *Glessula gemma* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 63, pl. 12, figs. 1 & 2.

Material examined : (i) 1 ex., Sangao, Chhimtuipui, 30.1.87; (ii) 1 ex., Tangkwalony, 15.2.87, coll. H.C. Ghosh; (iii) 5 exs., Zoo Garden, Aizawl, 4.8.94; (iv) 22 exs., Near Govt. Press, Aizawl, 8.8.94, coll. K.V. Surya Rao and A. Dey; (v) 1 ex., Kawn Kawn village, Chhimptuipui, 4.4.94, coll. S.K. Ghosh and M. Prashad; (vi) 9 exs., Zarkawt, Aizawl, 9.11.95; (vii) 7 exs., Dampa Wild Life Sanctuary, Terai, 13.11.95, coll. H.P. Mookherjee and party.

Measurements (in mm) :

Length	Diameter	Height of aperture
11.0-6.40	4.90-4.0	4.50-2.80

Diagnosis : Shell oblong, conical, chocolate brown when fresh, whorls 6, rounded, smooth, columella strongly arched, abbreviated; aperture nearly round.

Some of the shells are longer than typical *Gemma* and are with fine sculpture, but can be identified as *Gemma* by their form of aperture.

Distribution : India : Mizoram, Karnataka, Kerala, Meghalaya, Orissa, West Bengal. *Elsewhere* : Bangladesh, Myanmar.

Glessula orobia (Benson)

1860. *Achatina orobia* Benson, *Ann. Mag. nat. Hist.*, (3)**5** : 461.

1914. *Glessula orobia* : Gude, *Fauna Brit. India*, Mollusca, **2** : 427.

Material examined : (i) 9 exs., Furpak, Chhimtuipui, 1987; (ii) 1 ex., Bualpui, Chhimptuipui, 14.187, coll. H.C. Ghosh; (iii) 1 ex., Zarkawt, Aizawl, 11.11.95, coll. H.P. Mookherjee and party.

Measurements (in mm) :

Length	Diameter	Height of aperture
10.80-10.70	6.0-5.95	4.80-4.70

Diagnosis : Shell olivaceous green, somewhat nearer to that of *G. gemma*. More tumid and more coarsely sculptured with vertical striae; whorls 6-7, well rounded, suture not much impressed; columella less arched than in *G. gemma*.

Distribution : Mizoram, Nagaland and West Bengal.

Remarks : It is recorded for the first time from Mizoram.

Glessula tenuispira Benson

1836. *Achatina tenuispira* Benson, *J. Asiat. Soc. Beng.*, **5** : 353.

1995. *Glessula tenuispira* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 64, pl. 12, figs. 7 & 8.

Material examined : (i) 1 ex., Kawn Kawn village, Chhimtuipui, 4.4.94, coll. S.K. Ghosh and M. Prashad; (ii) 1 ex., Zoo Garden, Aizawl, 4.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Length	Diameter	Height of aperture
25.0-1850	5.90-5.0	5.60-4.75

Diagnosis : Shell elongate, turreted with fine vertical striae; spire long, apex blunt, suture impressed; whorls 14 1/2, slightly convex; aperture oval; columellar margin curved.

Distribution : India : Mizoram, Arunachal Pradesh, Meghalaya, West Bengal. *Elsewhere* : Myanmar.

Family : ACHATINIDAE

Genus *Achatina* Lamarck

1799. *Achatina* Lamarck, *Hist. nat. Anim. Sans. Vert.*, **7** : 75; (Type species : *Bulla achatina* Linnaeus).

Subgenus *Lissachatina* Bequaert, 1950

1950. *Lissachatina* Bequaert, *Bull. Mus. Comp. Zool. Harvard*, **105**(1) :

Achatina (L.) fulica fulica (Bowdich)

1821. *Helix fulica* Ferussac, *Tabl. Syst. Limacens*, *49*, No. 347 (nom. nud.); (Type locality : Madagascar).

1822. *Achatina fulica* Lamarck' Bowdich, *Elements of Conchology*, **1**, pl. 13, fig.

1995. *Achatina fulica fulica* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 65, pl. 13, figs. 7 & 8.

Material examined : 2 exs., Vairangte, 15.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Length	Diameter	Height of aperture
112.50-112.00	53.45-53.40	55.0-53.90

Diagnosis : Shell large, heavy, ovately conical, pale yellowish to whitish with brown streaks all over the whorls; whorls 8, rapidly increasing in size, last whorl large, more than half of the total length; suture deep with short spiral striations; aperture ovate, large, outer lip simple; columella strongly arched and truncate below.

Distribution : India : Mizoram, Assam, Andhra Pradesh, Andaman and Nicobar Islands, Bihar, Gujarat, Kerala, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Tamil Nadu, Tripura, West Bengal. *Elsewhere* : Malagasy, Mauritius, Scychelles, Singapore, Zanzibar.

It is reported for the first time from Mizoram.

Remarks : Introduced from Mauritius in India this species is a known agri-horticultural pest. Several methods were tried to control this menace but none proved effective. However, the massive flesh of this robust snail is in great demand in Europe as a delicacy and rearing of this species for export purposes is being taken up recently, at several places in India.

Family : STREPTAXIDAE

Key to the genera

1. Shell depressedly ovate, without tooth on peristome ....***Haploptychius*** (Moellendorff Ms) Kobelt
- Shell cylindrically turreted, with tooth on peristome. ..... ***Gulella*** Pfeiffer

Genus ***Gulella*** Pfeiffer

1856. *Gulella* Pfeiffer, (Bourguignat, 1876). *Bull. Soc. Sci. Phys. nat. Toulouse*, **3** : 73.

Gulella bicolor (Hutton)

1834. *Pupa bicolor* Hutton, *J. Asiat. Soc. Beng.*, **3** : 86.

1908. *Ennea bicolor* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae) : 99.

1991. *Gulella (Huttonella) bicolor* : Subba Rao and Mitra, *Rec. zool. Surv. India, Occ. Paper.* No. **126** : 73.

Material examined : 10 exs., Near Govt. Press, Aizawl, 3.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Length	Diameter	Length of aperture
5.0-4.90	1.30-1.20	1.40-1.35

Diagnosis : Shell small and narrow, subcylindrical, coarsely ribbed, sutures crenulate, bodywhorl compressed and indented on both sides; aperture with two parietal folds and two blunt teeth.

Distribution : India : Mizoram, common throughout rest of the country. *Elsewhere* : A tropical species, widely distributed through S.E. Africa, West Indies. also Scychelles, Mascarene.

Genus ***Haploptychius*** (Moelendorff Ms.) Kobelt

1905. *Haploptychius* (Moellendorff Ms.) Kobelt in Martini & Chemnitz, *Syst. Conch. Cab. Lief* p. 506.

Haploptychius burmanicus (Blanford)

1864. *Streptaxis burmanicus* Blanford, *J. Asiat. Soc. Beng.*, **33** : 245.

1908. *Streptaxis burmanicus* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae) : 6, fig. 5.

1990. *Haploptychius burmanicus* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 65.

Material examined : 1 ex., Darlak, coll. S. Biswas and party.

Measurements (in mm) :

Length	Diameter	Length of aperture
4.40	7.75	2.0

Diagnosis : Shell umbilicate, white, with fine close, flexuously costulation above, spire convex; whorls 6-6$^{1}/_{2}$, slightly convex, aperture semioval; peristome white, expanded, outer margin arcuate with a small tooth on its inner margin.

Distribution : India : Mizoram. *Elsewhere* : Myanmar.

Family : PLECTOPYLIDIDAE

Genus ***Plectopylis*** Benson

1860. *Plectopylis* Benson, *Ann. Mag. nat. Soc. Hist.*, (3)**5** : 244; (Type species : *Helix achatina* (Gray).

Subgenus ***Endothyra*** Gude

1899. *Endothyra* Gude, *Sci, Gossip*, **6** : 148; (Type species : *Helix (Plectopylis) Plectostoma* Benson).

Key to the species

1. Shell without decussating sculpture below.... ..... *P. affinis* Gude
- Shell with decussating sculpture below. ....*P. plectostoma* (Benson)

Plectopylis affinis Gude

1897. *Plectopylis affinis* Gude, *Science Gossip*, N.S., **3** : 276, fig. 41; (Type locality : Khasi Hills, Meghalaya).

1990. *Plectopylis affinis* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 53, pl. 2, figs. 3 & 4.

Material examined : 10 exs., Darlak, 28.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Height	Diameter	Height of aperture
4.60-4.15	8.30-7.53	3.10-2.70

Diagnosis : Shell sinistral, disc shaped, widely and deeply umbilicate; radiately plicate, decussated by spiral lines above, whorls 7, narrow, increasing slowly; peristome white, thickened and reflected, aperture ear-shaped, vertically elongate.

The parietal armature has one vertical plate, two elongate denticles and two short horizontal folds. The palatal armature has six folds.

Distribution : India : Mizoram, Arunachal Pradesh, Meghalaya. Endemic to the north-eastern India.

Plectopylis plectostoma (Benson)

1836. *Helix plectostoma* Benson, *J. Asiat. Soc. Beng.*, **5** : 351; (Type locality : Sylhet).

1995. *Plectopylis plectostoma* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 61, pl. 10, figs. 1 & 2.

Material examined : (i) 1 ex., Bualpui, Chhimtuipui, 14.1.87; (ii) 3 exs., Vawmbuk, Chhimtuipui, 19.1.87, coll. H.C. Ghosh (iii) 8 exs., Zoo Gardens, Aizawl, 4.5.94; (iv) 1 ex., Vairangte, 16.8.94, coll. K.V. Surya Rao and A. Dey; (v) 1 ex., Zarkawt, 9.11.95, coll. H.P. Mookherjee and party.

Measurements (*in mm*) :

Height	Diameter	Height of aperture
8.0-3.25	9.50-5.80	3.50-1.70

Diagnosis : Shell sinistral, lenticular, with a conical spire, deeply but narrowly umbilicate; whorls 7, narrow, bodywhorl little descending in front; coarsely sculptured with radial plicae and spiral striae giving the shell a granular appearance; aperture ear-shaped, peristome thickened and reflected, edge of umbilicus angulate; parietal and palatal armature present. Paraietal armature with two minute denticles on the posterior side and one horizontal fold. Palatal armature with six horizontal folds.

It differs from the preceding species being distinctly sculptured below, having 5 rows of hairs instead of 4 and also being angulate at the umbilical region.

Distribution : India : Mizoram, Arunachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal. *Elsewhere* : Bangladesh and Myanmar.

Family : HELIXARIONIDAE (=Helicarionidae)

Key to the genera

1. Shell depressedly conoid, twice as broad as high, widely umbilicate. ..... ***Sivella*** Blanford
– Shell trochiform, nearly as broad as high, narrowly perforate. 2
2. Shell with spiral sculpture. .....***Sesara*** Albers
– Shell without spiral sculpture. .... ***Kaliella*** Blanford

Genus ***Sivella*** Blanford

1863. *Sivella* Blanford, *Ann. Mag. nat. Hist.*, (3)**2** : 86; (Type species : *Helix castra* Benson).

Sivella castra (Benson)

1852. *Helix castra* Benson, *Ann. Mag. nat. Hist.*, (2)**10** : 349.

1990. *Sivella castra* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 55, pl. 111, figs. 3 & 4.

1995. *Sivella castra* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 67, pl. 14, figs. 1 & 2.

Material examined : (i) 1 ex., Sangao, Chhimtuipui, 2.2.87, coll. H.C. Ghosh; (ii) 8 exs., Jhigdawl (Kolasib), 4.9.59, coll. Y.P. Sinha; (iii) 1 ex., Phairang (Lunglei), 8.2.91, (iv) 8 exs., Phakhanglui (Lunglei), 6.12.95, coll. J.P. Sati; (v) 3 exs., Darlak, 8.2.84, coll. S. Biswas and party.

Diagnosis : Shell depressedly conoid, widely umbilicate, thin, acutely keeled, rather strongly, obliquely striate; suture shallow, whorls 6.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Sikkim, West Bengal. *Elsewhere* : Malaysia, Myanmar, Thailand.

Genus ***Kaliella*** Blanford

1863. *Kaliella* Blanford Godwin-Austen, *Ann. Mag. nat. Hist.*, (3)9 : 83; (Type species : *Kaliella barrakporensis* Pfeiffer).

Kaliella barrakporensis Pfeiffer

1852. *Helix barrakporensis* Pfeiffer, *Proc. zool. Soc. Lond.*, p. 156.

1908. *Kaliella barrakporensis* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae), p. 258.

Material examined : (i) 12 exs., Aizawl, 2.8.94, (ii) 5 exs., Champhai, 8.8.94, coll. K.V. Surya Rao and A. Dey; (iii) 2 exs., Dampa Wild Life Sanctuary, 12.11.95, coll. H.P. Mookherjee and party.

Measurements (*in mm*) :

Height	Diameter	Height of aperture
3.8-2.60	3.20-2.55	1.65-1.45

Diagnosis : Shell small, subperforate, thin, pyramidally trochiform; finely, obliquely ribbed above; spire conical, suture impressed, whorls 6, convex; aperture oblique, subquadrately lunate; peristome thin; columellar margin slightly oblique, reflected.

Distribution : India : Mizoram, Bihar, Jammu & Kashmir, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. *Elsewhere* : Madagascar, Myanmar, Sri Lanka.

Genus ***Sesara*** Albers

1860. *Sesara* Albers, *Heliceen* ed. 2 : 91; (Type species : *Sesara infrendens* Gould).

Key to the species

1. Shell without teeth in the aperture. .... *S. galea* (Benson)

– Shell with teeth in the aperture..... ..... *S. diplodon* (Benson)

Sesara diplodon (Benson)

1859. *Helix diplodon* Benson, *Ann. Mag. nat. Hist.*, (3)3 : 187.

1908. *Sesara diplodon* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae), p. 247.

1990. *Sesara diplodon* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 59, figs. 4-5.

Material examined : (i) 3 exs., Darlak, Feb. 84, coll. S. Biswas and party; (ii) 2 exs., Vairangte, 15.8.94, coll. K.V. Surya Rao and A. Dey; (iii) 2 exs., Zarkawt, 11.11.95, (iv) 2 exs., Dampa, Teirei, 13.11.95, coll. H.P. Mookherjee and party.

Measurements (*in mm*) :

Height	Diameter	Height of aperture
5.00-4.90	6.60-5.65	2.60-2.50

Diagnosis : Shell thin, smooth, narrowly perforate, trochiform, with fine decussating sculpture; suture impressed and marginate, whorls 7, convex, bodywhorl keeled at the periphery, impressed in the umbilical region and the basal margin near the aperture forming a hollow ridge-like elevation; aperture trapezoidal, palatal teeth two, a small and conical subcolumellar and a outer lamellar having two portions, the inner being slightly higher.

Distribution : India : Mizoram, Assam, Arunachal Pradesh, Meghalaya. *Elsewhere* : Bangladesh, Myanmar, Pakistan.

Sesara galea (Benson)

1859. *Helix galea* Benson, *Ann. Mag. nat. Hist.*, (3)3 : 388; (Type locality : Khasi Hills).

1908. *Sesara galea* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca, (Testacellidae and Zonitidae), p. 249.

1990. *Sesara galea* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 61, figs. 7-9.

Material examined : 2 exs., Darlak, 12.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Height	Diameter	Height of aperture
4.45-4.35	6.80-6.70	2.85-2.50

Diagnosis : Differs from the preceeding species in not having the ridge on the base and also in the aperture being edentulous.

Distribution : India : Mizoram, Assam, Meghalaya.

Family : ARIOPHANTIDAE

Ariophantidae, the largest family of land pulmonates is represented by 6 genera and 15 species in Mizoram.

Key to the genera

1. Shell partly internal, ear-like or plate-like, not enclosing the animal. 2
- Shell external, subglobosely depressed, enclosing the animal. 4
2. Shell ear-like with distinct coiling. ..... ***Austenis*** Nevill
- Shell plate-like, without coiling. 3
3. Shell usually calcareous, animal with a horse-shoe shaped keel above.... ***Parmaion*** Fischer
- Shell usually membranaceous, animal without horse-shoe shaped keel above.. ***Girasia*** Gray
4. Shell with distinct sculpture above. 5
- Shell without distinct sculpture above. ..... ***Macrochlamys*** Benson
5. Shell with spiral sculpture above, animal without caudal gland. ..... ***Staffordia*** Godwin-Austen
- Shell without spiral scalpture above, animal with a caudal gland. ..... ***Khasiella*** Godwin-Austen

Genus ***Austenia*** Nevill

1878. *Austenia* Nevill, *Hand list of Mollusca in the Indian Museum*, **1** : 16; (Type species : *Austenia gigas* Benson).

Key to the species

1. Shell larger, above 20 mm in diameter. ..... *A. gigas* (Benson)
- Shell smaller, below 20 mm in diameter. ..... *A. cacharica* Godwin-Austen

Austenia cacharica Godwin-Austen

1888. *Girasia cacharica* Godwin-Austen, *Moll. India*, **1** : 240, pl. 50, figs. 4, 4a; (Type locality : North Cachar Hills)

1908. *Girasia cacharica* : Blanford and Godwin-Austen, *Fauna of Brit. India*, Mollusca (Testacellidae and Zonitidae), p. 196.

Material examined : (i) 15 exs., Sangao, Chhimtuipui, 31.1.87, coll. H.C. Ghosh; (ii) 2 exs., Aibawk, Aizawl, 9.12.93; (iii) 1 ex., Murlen National Park, Aizawl, 17.12.93, coll. S.S. Saha; (iv) 1 ex., Pukhui, Lunglei, 10.6.94, coll. S.K. Ghosh and M. Prashad; (v) 6 exs., Lunglei, 17.11.95, coll. H.P. Mookherjee.

Measurements (in mm) :

Thickness	Diameter
5.50-4.80	13.40-12.65

Diagnosis : Shell solid, oval, smooth, pale olive in colour; apex small, not projecting; whorls 1½; aperture ovate, columellar margin sinuate.

Animal pinkish grey with black markings.

Distribution : India : Mizoram, Assam, Nagaland.

Remarks : It is recorded for the first time from Mizoram.

Austenia gigas (Benson)

1836. *Vitrina gigas* Benson, *J. Asiat. Soc. Beng.*, **5** : 350.

1908. *Austenia gigas* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae) : 192, figs. 66, 67.

Material examined : 1 ex., Lunglei, 9.9.89, coll. J.P. Sati.

Measurements (in mm) :

Shell	Thickness	Diameter
	15.0	33.0

Diagnosis : Shell thick, polished, subovately depressed; spire small, flat; suture impressed; whorls 2, very rapidly increasing, the last depressed above; aperture very large and oblique, ovate, columella strongly arcuate. A little thinner than in typical *A. gigas*.

Animal large (56.0 mm in preserved condition), brownish.

Distribution : India : Mizoram, Meghalaya. *Elsewhere* : Myanmar.

Remarks : It is recorded for the first time from Mizoram.

Genus ***Girasia*** Gray

1855. *Girasia* Gray, *Cat. Pulm. Brit. Mus.*, 61; (Type species : *Girasia hookeri* Gray).

Key to the species

1. Animal bigger (above 40.0 mm), shell membranaceous, greenish in colour. .... *G. radha* Godwin-Austen
– Animal smaller, (less than 40.0 mm), shell horny, dull white in colour. .... *G. burtii* Godwin-Austen

Girasia burtii (Godwin-Austen)

1876. *Helicarion (Hoplites) burtii* Godwin-Austen, *J. Asiat. Soc. Beng.*, **45**(2) : 314, pl. 8, figs. 6; (Type locality : Brelli Tea Garden, Tezpur, Assam).

1990. *Girasia burtii* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 56, pl. 3, fig. 9.

Material examined : 3 exs., Bangwa, coll. S. Biswas and party.

Measurements (in mm) :

Shell	Length	Diameter
	32.0-27.15	12.05-6.50

Diagnosis : Animal grey brown with a curved jaw; central projection absent; rachidian teeth narrow and long, tricuspid; shell rther oval, dull white, horny, apex scarcely developed, projecting in the middle.

Distribution : India : Mizoram, Assam.

Girasia radha (Godwin-Austen)

1876. *Helicarion (Hoplites) radha* Godwin-Austen, *J. Asiat. Soc. Beng.*, **45**(2) : 314, pl. 8, fig. 4; (Type locality : Bank of Radha Pokri, Darang, Assam).

1990. *Girasia Radha* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 57, pl. 5, fig. 7.

Material examined : (i) 3 exs., Darlak, coll. S. Biswas and party; (ii) 2 exs., Vairangte, 15.8.94, coll. K.v. Surya and A. Dey; (iii) 1 ex., Kolasib, 4.9.89, coll. Y.P. Sinha.

Measurements (in mm) :

Length of the shell	Diameter of the shell
62.35-58.75	17.55-16.80

Diagnosis : Animal rich ochr, with a few grey-black spots on the mantle and tail. Mantle 1/3rd of the total length.

Shell membranaceous, greenish, rather like a long strip with a projecting tip above, margin of peristome convex.

Distribution : India : Mizoram, Assam.

Genus ***Khasiella*** Godwin-Austen

1899. *Khasiella* Godwin-Austen, *Moll India*, **2** : 129; (Type species : *Khasiella vidua* Blanford).

Key to the species

1. Spire nearly flat with a conical apex, portion of shell below the keel deeper than the portion above. ..... *K. climacterica* (Benson)
– Spire conical with an acute apex, portion of the shell below the keel equal to the portion above. ..... *K. vidua* (Hanley and Theobald)

Khasiella climacterica (Benson)

1836. *Helix climacterica* Benson, *J. Asiat. Soc.* Beng., **5** : 352.

1990. *Khasiella climacterica* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 57, pl. 3, fig. 5 & 6.

Material examined : (i) 6 exs., Darlak, Mizoram, coll. S. Biswas and party; (ii) 1 ex., Bank of Koladin river, Sangao, Chhimtuipui; (iii) 1 ex., Bualpui, Chhimtuipui, 19.1.87, coll. H. C. Ghosh and M. Prashad; (iv) 1 ex., Lunglei, 18.11.95, coll. H. P. Mookherjee and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
7.25-6.80	25.30-12.75	4.20-4.00

Diagnosis : Shell imperforate, keeled, depressedly conoid, coarsely costulate, spire nearly flat, apex rather acute; whorls 7-8, narrow; aperture scarcely oblique, narrow, angulately lunate, peristome obtuse, slightly thickened inside, basal margin arcuate, columellar margin curved, slightly expanded.

Distribution : India : Mizoram, Assam, Arunachal Pradesh, Meghalaya, Nagaland. *Elsewhere* : Myanmar.

Khasiella vidua (Hanley and Theobald)

1876. *Helix vidua* Hanley and Theobald (Blanford Mss.), *Conch. Indica*, p. 130, figs. 2 & 3.

1908. *Khasiella vidua* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae), p. 158.

Material examined : (i) 1 ex., Saiha, Chhimtuipui, 13.1.87, 9ii) 1 ex., Tawngkalawng, Chhimtuipui, 16.2.87; (iii) 1 ex., Sangao, Chhimtuipui 30.1.87, coll. H.C. Ghosh; (iv) 2 exs., Phairang, Lunglei, 8.2.91, coll. J.P. Sati; (v) 4 exs., Dampa, Teirei, 13.11.95, coll. H.P. Mookherjee and party; (vi) 2 exs., Sairep, Lunglei, 19.4.95, coll. T.P. Bhattacharya.

Measurements (in mm) :

Height	Width	Height of aperture
9.60-5.90	15.50-8.90	5.50-5.00

Diagnosis : Shell imperforate, conoidly depressed to turbinate with close and arcuate filiform costulate striations; spire depressedly conoid, apex sharp; suture impressed; whorls 8, narrow, convex; aperture oblique, lunate; peristome white.

It differs from the preceeding species in having a more conoid spire and a wider aperture and also in being angulate and not keeled at the periphery.

Distribution : India : Mizoram, Assam, Meghalaya. *Elsewhere* : Bangladesh.

Remarks : It is reported for the first time from Mizoram.

Genus ***Macrochlamys*** Benson

1832. *Macrochlamys* Benson, *J. Asiat. Soc. Beng.*, **1** : 76; (Type species : *Macrochlamys petrosa* Hutton).

Key to the species

1. Shell upto 6 mm in diameter. 2
– Shell above 6 mm in diameter. 3
2. Shell more conical, nearly as broad as high. ..... *M. pungi* (Theobald)
– Shell distinctly broader than high. ..... *M. molecula* (Benson)
3. Shell upto 10 mm in diameter, with almost closed perforation. 4
– Shell above 10 mm in diameter with open perforation. 5
4. Shell with fine spiral sculpture, body whorl slightly descending. ..... *M. uda* Godwin-Austen
– Shell without spiral sculpture, body whorl not descending in front. ..... *M. petasus* (Benson)
5. Shell above 20 mm in diameter, peristome thickened inside. ..... *M. lubrica* Benson
– Shell upto 20 mm in diameter, peristome not thickened inside. 6
6. Shell with spiral sculpture above. ..... *M. sequax* (Benson)
– Shell without spiral sculpture above. ..... *M. vesica* Godwin-Austen

Macrochlamys lubrica Benson

1852. *Helix lubrica* Benson, *Ann. Mag. nat. Hist.*, (2)**10** : 349; (Type locality : Darjeeling).

1995. *Macrochlamys lubrica* : Subba Rao et. al., *State Fauna Series*, 4(8) : 75, pl. 18, figs. 1 & 2.

Material examined : (i) 1 ex., Bualpui, Chhimtuipui, 16.1.97; (ii) 1 ex., Vawmbuk, Chhimtuipui, 21.1.87, coll. H.C. Ghosh; (iii) 1 ex., Sairep, Lunglei, 19.4.95, coll. T.P. Bhattacharya.

Measurements (in mm) :

Height	Diameter	Height of aperture
11.40-11.30	25.0-24.95	9.90-9.86

Diagnosis : Shell thin, much depressed, smooth, polished, perforate; spire flat, suture impressed; whorls 5, convex; aperture broadly lunate; peristome thickened inside, columellar margin curved and reflected.

Remarks : Shell in this species with its labiate peristome is strikingly similar to that of *Bensonia mainwaringi* from Darjeeling. It can be distinguished by its more depressed form being more than twice as broad as high.

Distribution : India : Mizoram, Meghalaya, Sikkim, West Bengal.

Macrochlamys molecula (Benson)

1859. *Helix molecula* Benson, *Ann. Mag. nat. Hist.*, (3)3 : 389.

1995. *Macrochlamys molecula* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 75, pl. 18, figs. 3 & 6.

Material examined : (i) 1 ex., Aizawl, 3.8.94, coll. K.V. Surya Rao and A. Dey.

Measurements (in mm) :

Height	Diameter	Height of aperture
2.85	4.0	1.80

Diagnosis : Shell narrow, depressedly conoid, perforate, thin, spire low, conoid with convex sides and obtuse apex; suture well impressed; whorls 5–5½; aperture scarcely oblique; broadly lunate; peristome thin, straight, columellar margin reflected.

Distribution : India : Mizoram, Assam, Meghalaya. *Elsewhere* : Myanmar, Thailand.

Remarks : It is for the first time recorded from Mizoram.

Macrochlamys pungi (Theobald)

1859. *Helix pungi* Theobald, *J. Asiat. Soc. Beng.*, p. 307.

1908. *Macrochlamys pungi* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae), p. 122.

Material examined : (i) 19 exs., Aizawl, 3.8.94, (ii) 1 ex., Champhai, 8.8.94, coll. K.V. Surya Rao and A. Dey; (iii) 1 ex., Zarkawt, Aizawl, 11.11.95, coll. H.P. Mookherjee and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
5.25-3.80	6.15-4.60	3.60-2.10

Diagnosis : Shell small, perforate, conoidly turbinate, rather thin, chest-nut brown; suture deep; whorls 6½, convex, regularly increasing, the last not descending, rounded at the periphery; aperture almost vertical, roundly lunate; peristome thin; columellar margin slightly expanded and reflected.

Distribution : India : Mizoram, Andaman and Nicobar Islands, Manipur. *Elsewhere* : Myanmar.

Remarks : It is for the first time recorded from Mizoram.

Macrochlamys petasus (Benson)

1859. *Helix petasus* Benson, *Ann. Mag. nat. Hist.*, (3)3 : 388; (Type locality : Pheithan, Myanmar).

1908. *Macrochlamys petasus* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca, (Testacellidae and Zonitidae) p. 115.

1991. *Macrochlamys petasus* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 75, pl. 18, figs. 2 & 7.

Material examined : (i) 17 exs., Darlak, 12.2.84; (ii) 5 exs., Naljal, 14.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
4.80-3.70	8.70-6.75	4.0-3.00

Diagnosis : Shell smooth, depressed, very narrowly perforate, thin, whorls 6, bodywhorl bluntly subangulate, increasing slowly, flatly convex above; spire low, convexly conoid, suture scarcely impressed; aperture subvertical, broadly lunate; peristome very narrowly labiate.

Distribution : India : Mizoram, Meghalaya. *Elsewhere* : Myanmar.

Remarks : Recorded for the first time from Mizoram.

Macrochlamys sequax (Benson)

1859. *Helix sequax* Benson, *Ann. Mag. nat. Hist.*, (3)3 : 270; (Type locality : Darjeeling).

1995. *Macrochlamys sequax* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 76, pl. 19, figs. 5 & 6.

Material examined : (i) 1 ex., Sangao, Chhimtuipui, 30.1.87; (ii) 2 exs., Chhimtuipui, 2.2.87, coll. H.C. Ghosh; (iii) 1 ex., Zarkawt, 8.11.95; (iv) 10 exs., Zemabawk, 9.11.95, (v) 5 exs., Dampa Wild Life Sanctuary, Terei, 13.11.95, coll. H.P. Mookherjee and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
11.15-6.25	20.0-12.95	9.90-6.20

Diagnosis : Shell rather broadly perforate, thin, depressed; spire low, suture impressed; whorls 5,

convex, rapidly increasing with fine decussating sculpture; aperture slightly oblique, broadly lunate, much broader than high, peristome thin, columellar margin curved.

Distribution : India : Mizoram, Meghalaya, West Bengal.

Remarks : Recorded for the first time from Mizoram.

Macrochlamys uda Godwin-austen

1899. *Macrochlamys uda* Godwin-Austen, *Land and Freshwater Moll. India*, **2** : 123, pl. 94, fig. 1; (Type locality : Toruputu peak).

1908. *Macrochlamys uda* : Blanford and Godwin-Austen, *Fauna Brit. India*, Mollusca (Testacellidae and Zonitidae) p. 104.

Material examined : (i) 2 exs. Sangao, Chhimtuipui, 31.1.87; (ii) 1 ex., Tangkwalong, 15.2.87, coll. H.C. Ghosh; (iii) 6 exs., Aizawl, 4.8.94; (iv) 1 ex., Sairep, Lunglei, 16.4.95, coll. T.P. Bhattacharya; (v) 1 ex., Champhai, 8.8.94, coll. K.V. Surya Rao and A. Dey; (vi) 7 exs., Zarkawt, 8.11.95, coll. H.P. Mokherjee and party.

Mesurements (*in mm*) :

Height	Diameter	Height of aperture
3.90-2.10	7.90-8.20	5.65-1.70

Diagnosis : Shell imperforate or subperforate, smooth, depressed; spire low, convexly conoid, suture impressed; whorls 6, convex; aperture oblique, lunate; peristoma slightly obtuse, basal margin arcuate; columellar margin oblique, early straight and slightly expanded.

It can be easily distinguished by its nearly closed perforation and slightly drooping bodywhorl.

Distribution : India : Mizoram, Assam, Manipur, Meghalaya, Nagaland.

Remarks : Recorded for the first time from Mizoram.

Macrochlamys vesica Godwin-Austen

1900. *Macrochlamys vesica* Godwin-Austen, *Land and Fresheater Moll. India*, **2** : 134, 136, pl. 94, figs. 3, 3a.

1990. *Macrochlamys vesica* : Mitra and Dey, *Rec. zool. India*, **86**(1) : 58, pl. 3, figs. 7 & 8.

Material examined : (i) 14 exs., Darlak, 2.2.84, coll. S. Biswas and party.

Measurements (*in mm*) :

Height	Diameter	Height of aperture
9.95-5.50	14.45-11.18	7.25-5.70

Diagnosis : Shell thin, polished, pale yellow, conoid, perforate; suture shallow, whorls 5; aperture ovate, subvertical, columellar margin vertical not reflected.

Distribution : India : Mizoram, Assam, Arunachal Pradesh, Meghalaya. *Elsewhere* : Bangladesh.

Genus ***Parmarion*** Fischer

1856. *Parmarion* Fischer, *Act. Soc. Linn. Bordeaux*, **20** : 395.

Parmarion martensi Simroth

1893. *Parmarion martensi* Simroth, *Erg. Weber*, **3** : 107, pl. 7, fig. 8, pl. 8, figs. 20-22.

1995. *Parmarion martensi* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 69, pl. 15, figs. 4 & 5.

Material examined : 1 ex., Terei, Dampa Sanctuary, Aizawl, 27.12.93, coll. S. S. Saha.

Measurements (*in mm*) :

Length	Diameter
25.0	5.55

Diagnosis : Animal slug-like, greyish yellow with brownish spots on the mantle. Mantle shield covers the back anteior to the internal sac which is encircled by a horse shoe shaped keel. Posterior to the visceral hump the body is dorsally keeled and tapering to the tail ending in a mucus gland and an overhanging process. Mantle lobe and shield minutely wrinkled.

Shell thin, lying flat on the dorsal side of the visceral hump, covered completely by the mantle lobe except a small area.

Distribution : India : Mizoram, Meghalaya, *Elsewhere* : South China, Amman, Malaya, Indonesia.

Remarks : Recently this species was for the first time reported from India (Subba Rao et. al., 1995). Now it is subsequently reported from Mizoram.

Genus ***Staffordia*** Godwin-Austen

1907. *Staffordia* Godwin-austen, *Land and Freshwater Moll. India*, **2** : (Type species : *Staffordia daflaensis* Godwin-Austen).

Staffordia daflaensis Godwin-Austen

1876. *Staffordia daflaensis* Godwin-Austen, *J. Asiat. Soc. Beng.*, **45**(2) : 311, pl. 8, fig. 9; (Type locality : Shengorh Peak, Dafla Hills).

1990. *Staffordia daflaensis* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 62, pl. 4, figs. 1 & 2.

Material examined : 2 exs., Darlak, 8.2.84, coll. S. Biswas and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
9.60	28.55	10.20

Diagnosis : Shell depressedly conoid, solid, umbilicate; regularly sculptured with broad-ridged spiral ribbings and vertical striae; spire low, sides convex, suture shallow; whorls 6; aperture broadly ovate; peristome acute, sinuous above and slightly so below; columellar margin very oblique and descending.

Distribution : India : Mizoram, Arunachal Pradesh.

Family : LIMACIDAE

Genus ***Deroceras*** Rafinesque

Deroceras laeve (Mueller)

1774. *Limax laevis* Muellar, *Hist. Verm. Terr. fluv.*, **2** : 1.

1983. *Deroceras (D.) laeve* : Wiktor, *Annales Zoologici*, **37**(1-3) : 163, figs. 79-81.

Material examined : (i) 3 exs., Aibawk, Aizawl, 9.12.93, coll. S.S. Saha; (ii) 4 exs., Zarkawt, Aizawl, 8.11.95, coll. H.P. Mookherjee and party.

Measurements (in mm) :

	Length	Diameter
	17.70-10.0	4.10-2.60

Preserved specimens :

Shell	3.0	2.0

Diagnosis : Animal small, upto 20 mm when alive, narrow, dark greyish, with a few irregular darker spots, body surface with longitudinal grooves, posterior end narrow, mantle extends nearly half of body length; pneumostome behind middle of mantle; posterior keel feeble and short. Sole of foot tripartite, two lateral zones darker, middle zone with 'V' shaped grooves.

Distribution : India : Mizoram, Manipur.

Remarks : In Mizoram these slugs were collected from moist beds of flowering plants. Essentially Palaearctic in distribution, this species as also the family was recently recorded for the first time from India (Surya Rao *et. al.*, 2000).

Family - CAMAENIDAE

Key to genera

1. Shell dextral, depressed. ..... ***Chloritis*** Beck
– Shell sinistral, elongate. ..... ***Amphidromus*** Albers

Genus ***Amphidromus*** Albers

1850. *Amphidromus* Albers, *Die Heliceen*, 138; (Type species : *Helix perversa* Linnaeus.)

Amphidromus sylheticus (Reeve)

1849. *Amphidromus sylheticus* Reeve, *Conch. Icon.*, 5, *Bulimus*, pl. 77, fig. 564; (Type locality : Southern slopes of Khasi and Garo Hills).

1990. *Amphidromus sylheticus* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 63, pl. 4, figs. 3 & 4.

1995. *Amphidromus sylheticus* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 82, pl. 23, figs. 6; pl. 24, fig. 1.

Material examined : (i) 2 exs., Thindawl (Kolasib), 4.9.89, coll. Y.P. Sinha; (ii) 1 ex., Ngenpui, Chhimtuipui, 10.4.95, coll. T.P. Bhattacharya; (iii) 4 exs., Darlak, coll. S. Biswas and party.

Measurements (in mm) :

Length	Diameter	Height of aperture
25.90-25.70	13.20-13.00	11.40-11.30

Diagnosis : Shell sinistral, greenish yellow, umbillicate, ovate-conic; first whorl weakly punctulate; whorl 5½, slightly convex; aperture oblique, ovate, slightly brown in colour; peristome white and reflected, columella slightly concave at edge.

Distribution : India : Mizoram, Meghalaya. *Elsewhere* : Myanmar, China.

Genus *Chloritis* Beck

1838. *Chloritis* Beck, *Index Moll.*, p. 29.

Chloritis delibrata (Benson)

1836. *Chloritis delibrata* (Benson), *J. Asiat. Soc. Beng.*, **5** : 352; (Type locality : Sylhet).

1990. *Chloritis delibrata* var. *fasciata* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 63, pl. 4, figs. 5 & 6.

1995. *Chloritis delibrata* : Subba Rao *et. al.*, *State Fauna Series*, **4**(8) : 83, pl. 23, fig. 4.

Material examined : (i) 1 ex., Naljal, coll. S. Biswas; (ii) 3 exs., Sangao, Chhimtuipui, 2.2.87, coll. H.C. Ghosh; (iii) 1 ex., Mizoram; (iv) 2 exs., Kawn Kawn village, Chhimtuipui, 4.4.94, coll. S.K. Ghosh and M. Prashad.

Measurements (in mm) :

Height	Diameter	Height of the aperture
8.25-4.50	19.30-17.50	8.20-7.65

Diagnosis : Shell discoidal, widely umbilicate, finely striate, spire flat; suture deep; apex depressed; whorls 4½, convex, bodywhorl abruptly descending in front, subangulate around the umbilicus; aperture oblique, ovate; peristome white, reflected and thickened.

Some of the shells posses a single supra-peripheral band on the bodywhorl and perhaps belong to the variety *fasciata* of Godwin-Austen.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, West Bengal.

Family : BRADYBAENIDAE

Genus *Plectotropis* von Martens

1860. *Plectotropis* von Martens, *Die Heliceen*, ed. 2, pl. 21; (Type speices : *Helix elegantissima* Pfeiffer).

Key to the species

1. Shell more widely and openly umbilicate, bodywhorl abruptly descending in front. .... *P. oldhami* (Benson)
– Shell less widely umbilicate, bodywhorl gradually descending in front. .... *P. tapeina* (Benson)

Plectotropis oldhami (Benson)

1859. *Helix oldhami* Benson, *Ann. Mag. nat. Hist.*, (3)**3** : 185; (Type locality : Ava, Burma).

1914. *Plectotropis oldhami* : Gude, *Fauna Brit. India*, Mollusca, **11** : 212.

Material examined : (i) 2 exs., Vairangte, 15.8.94, coll. K.V. Surya Rao and A. Dey; (ii) 2 exs., Zarkawt, Aizawl, 11.11.95, coll. H.P. Mookherjee.

Measurements (in mm) :

Height	Diameter	Height of aperture
7.30-6.75	14.40-13.45	5.30-5.20

Diagnosis : Shell depressedly conoid, very widely and openly umbilicate exposing subsequent whorls; obliquely and flexuosly striate, suture impressed, whorls 6½, narrowly wound, bodywhorl abruptly descending near the aperture; bluntly angulate at the periphery; aperture oblique, subcircular, peristome discontinuous, reflected.

It differs from *P. tapaeina*, its closest ally being more depressed more widely umbilicate, blunter at the periphery and also having a bodywhorl that descends abruptly in front.

Distribution : India : Mizoram, Assam. *Elsewhere* : Myanmar.

Remarks : Recorded for the first time from Mizoram.

Plectotropis tapeina (Benson)

1836. *Helix tapeina* Benson, *J. Asiat, Soc. Beng.*, **5** : 352. (Type locality : Sylhet).

1990. *Plectotropis tapeina* : Mitra and Dey, *Rec. zool. Surv. India*, **86**(1) : 54, pl. 3, figs. 1 & 2.

1995. *Plectotropis tapeina* : Subba Rao *et. al.*, *State Fauna Series*, 4(8) : 83, pl. 24, figs. 2 & 3.

Material examined : (i) 3 exs., Furpak Chhimtuipui, 24.1.87; (ii) 1 ex., Sangao Chhimtuipui, 30.1.87, coll. H.C. Ghosh; (iii) 1 ex., Terei, 13.11.95, coll. H.P. Mookherjee; (iv) 5 exs., Darlak, coll. S. Biswas and party.

Measurements (in mm) :

Height	Diameter	Height of aperture
11.10	17.65	7.25

Diagnosis : Shell depressed, openly umbilicate; spire subconoid, carinate at the periphery, inflated at the base; edge of umbilicus angulate; suture impressed; whorls 6½, flatly convex; bodywhorl gradually stooping in front; aperture oblique, lunate; peristome discontinuous and reflected.

Shell in this species shows considerable variations, particularly in elevation of spire and also in the form of umbilicus. The variety *akowtongensis* Theobald from Myanmar is closer to the other species *P. oldhami*, differing in being more depressed and the bodywhorl being less deflected.

SUMMARY AND GENERAL REMARKS

A total of 65 species spread over 40 genera and 17 families are studied by us. Freshwater molluscs are represented by 20 species under 13 genera and 6 families. The present report adds 7 species to the list of 13 freshwater molluscs recorded erlier by Subba Rao and Dey (1986), from Mizoram. Out of these 20 species, 9 are restricted to the north-eastern region. *Lamellidens phenchooganjensis* Preston, hitherto known from Bangladesh, its type locality, is now for the first time recorded from India. *Lymnaea persica* Issel, so far known from northwest India, is now for the first time recorded from the north-east.

The present list of 45 species of land molluscs under 27 genera and 11 families, adds 22 species to the list of 23 species reported by Mitra and Dey (1990) earlier, from Mizoram. All these 22 species are new records from the state of Mizoram. Out of these 45, only 5 species are distributed throughout the country. Incidentally, 4 of these are cosmopolitan species having world-wide distribution. Fifteen are restricted endemic to the north-east and 25 do also occur in some of the neighbouring south-east Asian countries like, Bangladesh, China, Myanmar, Nepal etc., a few of these 25, extend further to the Indo-Malayan region, occurring in Malayasia, Thailand, etc. *Deroceras laeve*, the limacid slug is essentially Palaearctic in distribution, being reported from India recently by Surya Rao *et. al.* (2000).

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INSECTA : COLLEMBOLA

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INTRODUCTION

Collembolas are small and primarily 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 range from 0.25 mm to 6 mm in length. Antennae with 4 to 6 segments. Some species can live freely even on the surface of water (viz;- *Podura aquatica*). Few species are living permanently on glacier or snow fields.

HISTORICAL BACK GROUND

The first taxonomic study of Collembola from India is of Ritter (1911). A. D. Imms (1912) made significant contribution on Indian Collembola. The knowledge of Indian Collembola was further enriched through the contribution of several workers like—Carpenter (1913, 1924), Handschin (1920), Mukherjee (1932), Denis (1936), Salmon (1957-1969), Baijal (1955, 1968), Choudhuri (1963-1966), Choudhuri and Roy (1965), Yosii (1966a,b), Mitra (1966-2000), Prabhoo (1971) and Hazra (1995-2001).

CONTENTS OF PRESENT PAPER

The present study of Collembolan Fauna is based on collection made during 1994-1996 from Mizoram by Zoological Survey of India as a part of the Action plan on 'State Fauna' This contribution is the first consolidated record of this group of insects from the state of Mizoram involving 21 species under 12 genera of 3 families.

SYSTEMATIC ACCOUNT

Order COLLEMBOLA

Suborder ARTHROPLEONA

Key to the superfamilies of ARTHROPLEONA

First thoracic segment dorsally distinct with dorsal setae..... .....PODUROIDEA Womersley, 1933.

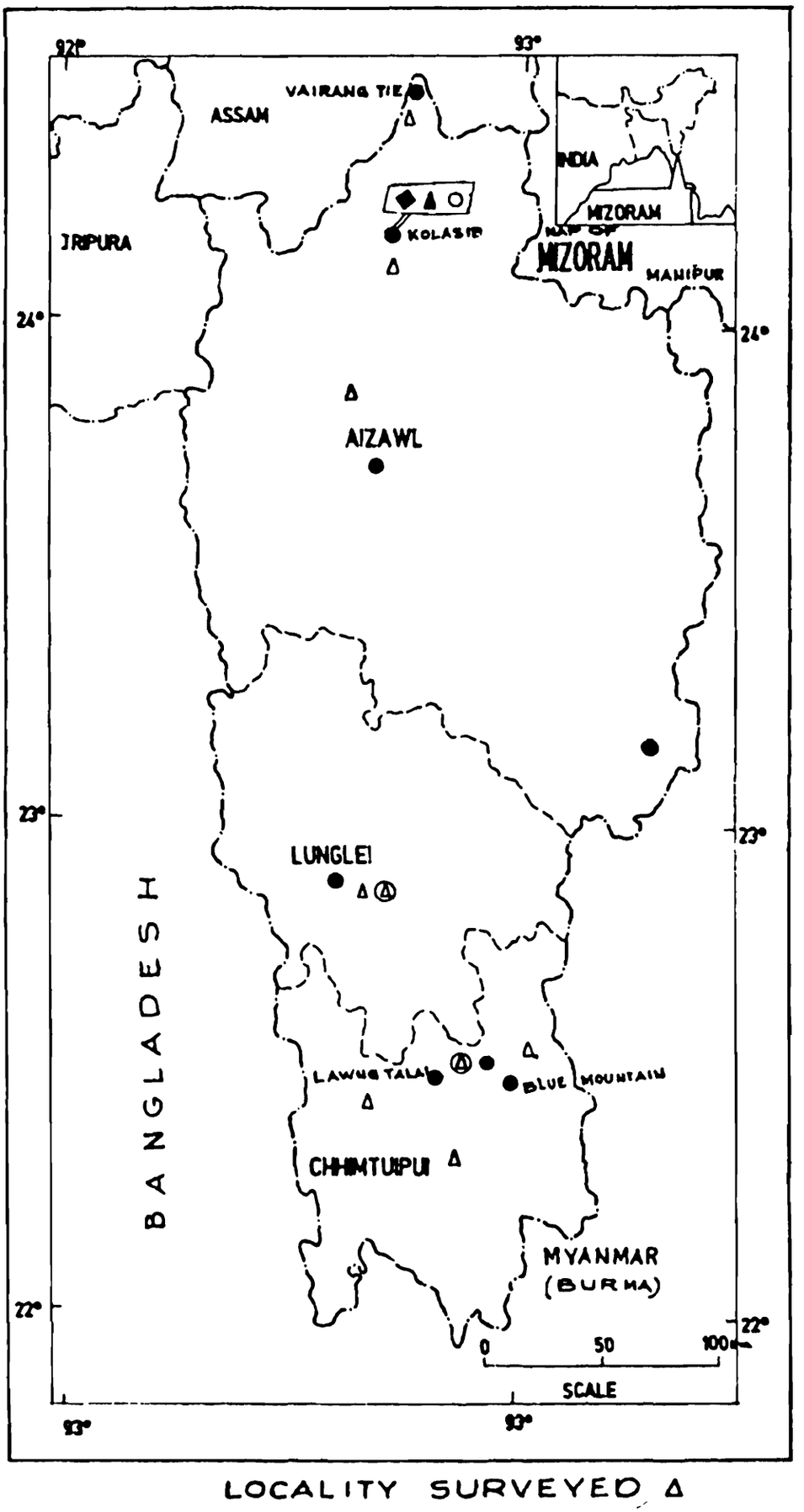
First thoracic segment without dorsal setae and frequently more or less reduced or hidden dorsally by mesothoracic segment..... .....ENTOMOBRYOIDEA Womersley, 1933

Key to the families of PODUROIDEA

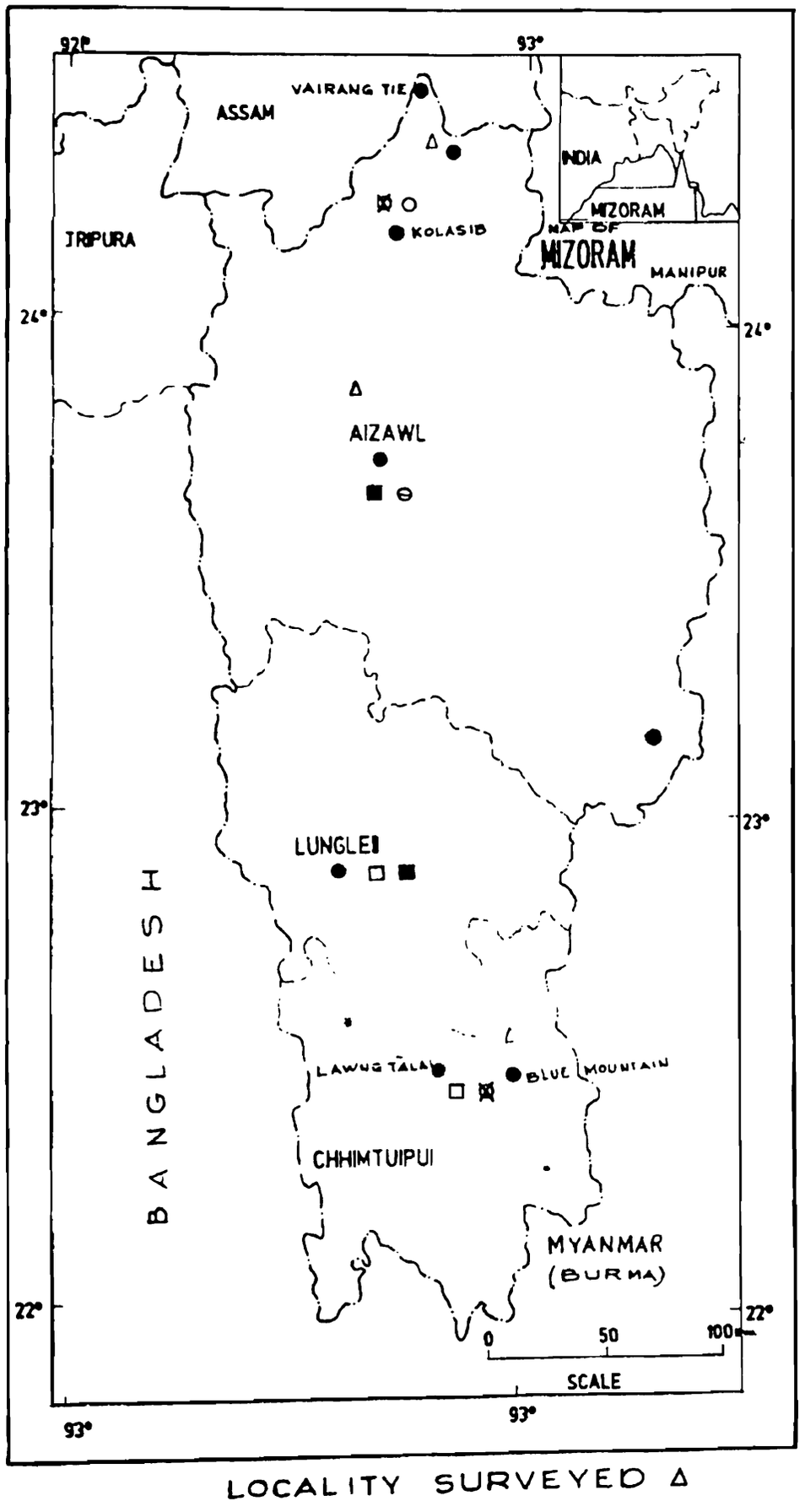
1. Pseudocelli present, at least an antennal base or dorsum of fifth abdominal segment..... ..... ONYCHIURIDAE, Gervais, 1841
2. Pseudocelli absent .... HYPOGASTRURIDAE, Bourlet, 1839

Key to the families of ENTOMOBRYIDEA

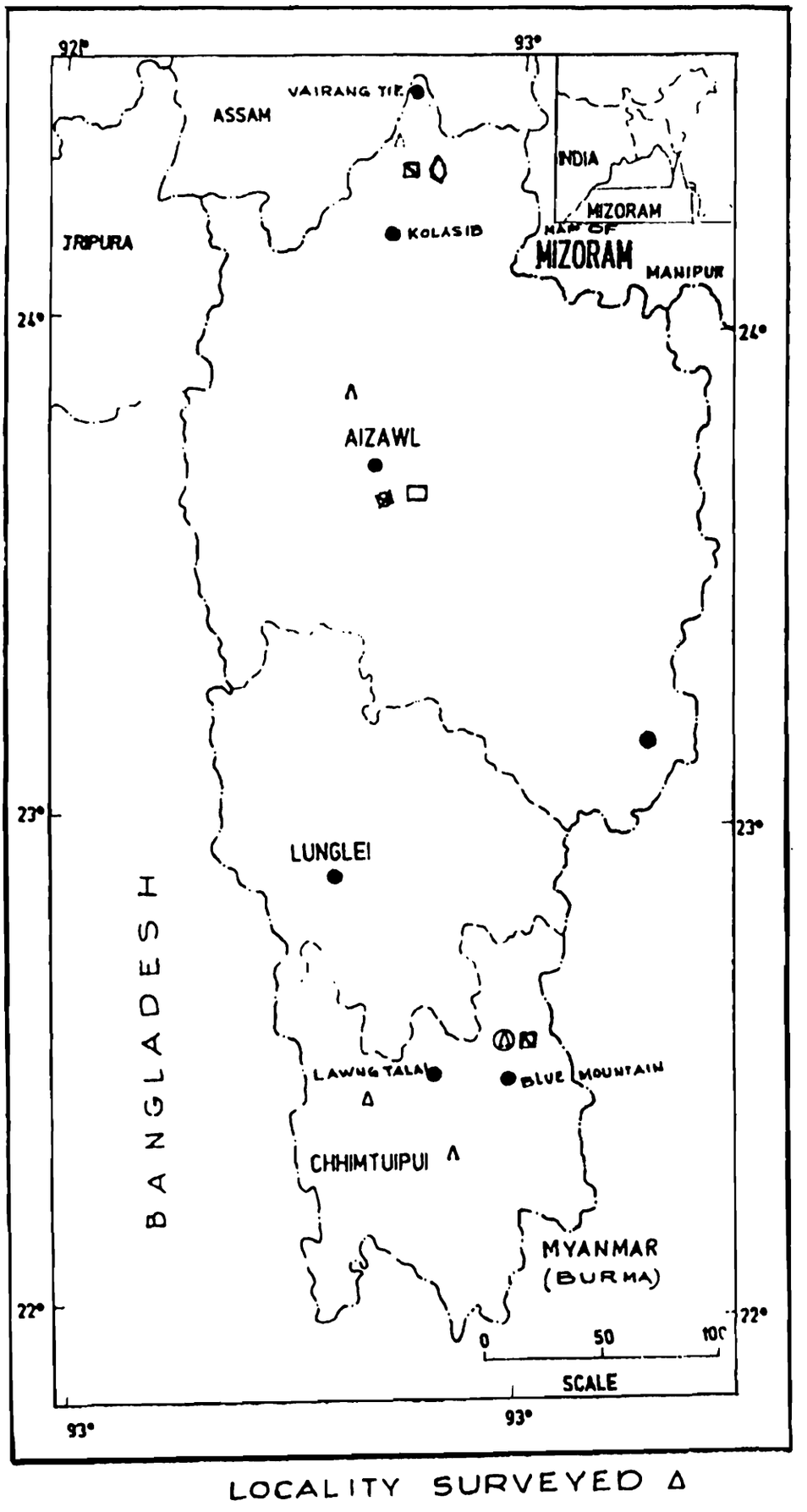
1. Hind coxae usually with trochanteral organ. Abdomen IV appreciably larger than abdomen III. Scales present or absent often ciliated. Furcula well developed. .... ENTOMOBRYIDAE, Tomosvary, 1882.
2. Hind coxae without trochanteral organ. Abdomen III and IV usually subequal; the abdomen IV never more than one and one-half



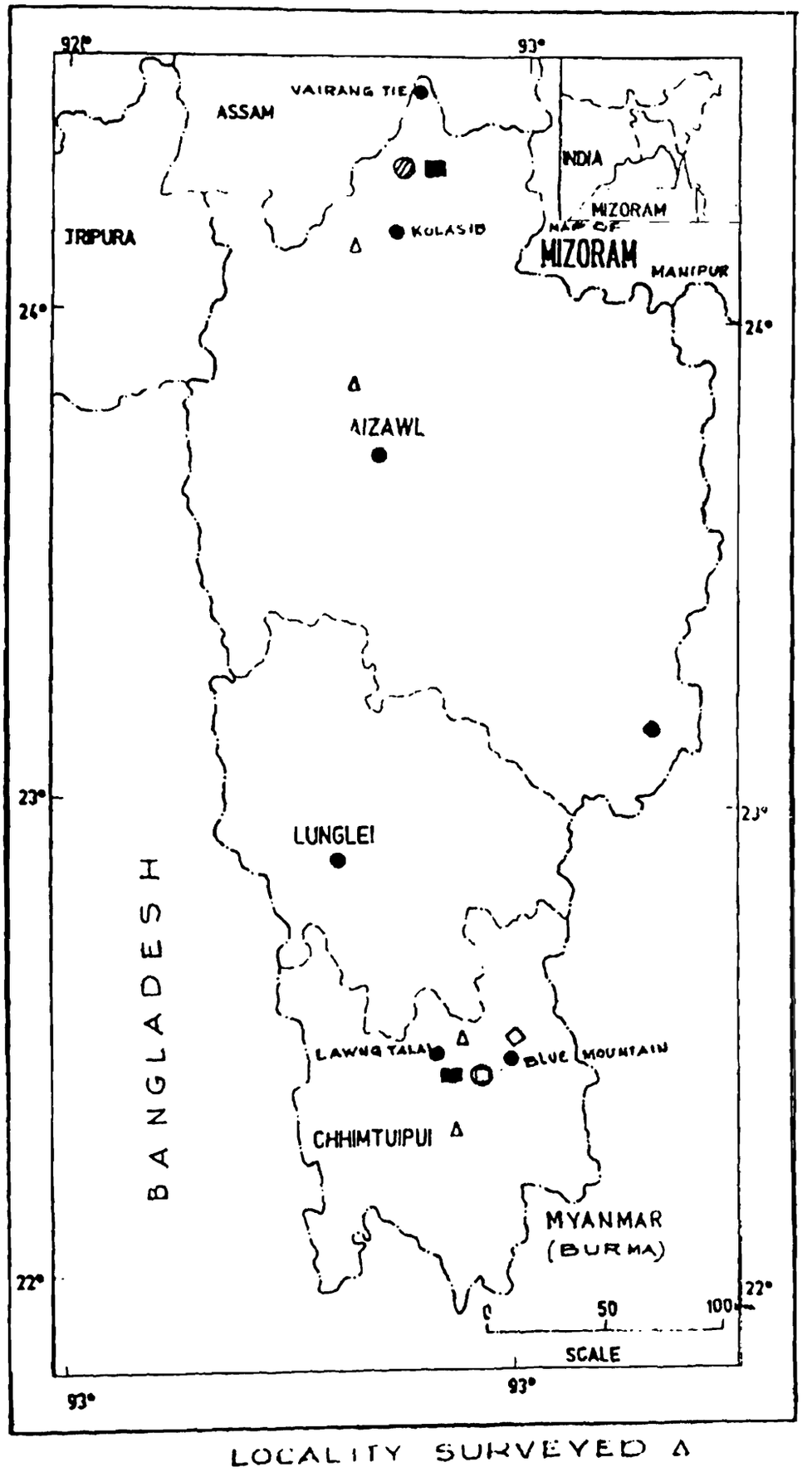
Map. 1. Showing the distribution of collembola in different districts of Mizoram.
▲ *Salina indica*; ● *Dicranocentroides indica*; ◆ *Salina biformis*; Ⓐ *D. flavescens*; O *Salina tricolor tricolor*; Δ *D. fasciculatus.*



Map. 2. Showing the distribution of collembola in different districts of Mizoram.
□ *Dicranocentroides salmoni*; ■ *Lepidocyrtus medius*; ⊗ *Callyntrura japonica*; Δ *Salina montana*; ● *Aphysa ceylonica*; ⊖ *Dicranocentrus indiucs*



Map. 3. Showing the distribution of collembola in different districts of Mizoram.
□ *Lepidocyrtus malayanus*; ◊ *Homidia cingula*; ⊛ *Lepidocyrtus magnificus*; ⊗ *Hypogastrura indovaria*; □ *Xenylla obscura*.



Map. 4. Showing the distribution of collembola in different districts of Mizoram.
○ *Cyphoderus javanus*; ◈ *Lobella* (s. str) *assamensis*; ■ *Isotomurus baltcatus*; ◇ *I. krepelini*.

times as long as the abdomen III, the other posterior abdominal segments often fused. Scales usually not present. .... ISOTOMIDAE, Börner, 1913.

Key to the subfamilies of ENTOMOBRYIDEA

1. Dentes dorsally crenulated and curving upwards basally in the line with manbrium..... ..... ENTOMOBRYINAE, Schaeffer, 1896.
- Dentes not crenulated, straight and usually forming a basal angle with manubrium. 2
2. Dental spine absent. 3
- Dental spine present on the basal portion of the dentes only. .... TOMOCERINAE, Schaeffer, 1896.
3. Eyes and pigment absent; dentes with large dorsal scale without apical lobe. .... CYPHODERINAE, Börner, 1913.
- Eyes and pigment present; dentes without dorsal scale and with apical lobe. .... PARONELLINAE, Börner, 1913.

Family HYPOGASTRURIDAE

Presence of true pseudocelli and the simplicity of the sense organ of the third antennal segment.

Subfamily HYPOGASTRURINAE

This subfamily represents two genera and species from Mizoram.

I. Genus ***Hypogastrura*** Bourlet, 1839

1. ***Hypogastrura indovaria*** Salmon, 1970.

1970. *Hypogastrura indovaria* Salmon. *Trans. Biol. Sci.*, **12**(13) : 149

Material examined : 1 Km west from Aizwal Circuit House, Aizwal, 12-IV. 1994. Coll. A.K. Hazra, 78 exs. Kwankwan, Road side Hill Stream. 4.IV.1994. Coll. A.K. Hazra.

Diagnostic characters : Brownish black granular, ocelli on black fields. Sparse to heavy clothing of short and long curved simple setae. Antennae shorter than Head. P.A.O. very irregular consists of 4-12 indistinct disconnected lobes. With or without central boss. Abd. VI with two long anal spines on papillae. Tenent hairs never clavate. Mucro finely granulate and spoon-shaped with two distinct lamellae. Body length upto 0.8 mm.

Distribution : India : Manipur, Mizoram, Sikkim.

II. Genus ***Xenylla*** Tullberg, 1869

The genus represented by single species.

2. ***Xenylla obscura*** Imns. 1970.

1912. *Xenylla obscura* Imns.

1970. *Xenylla obscura* Salmon, *Roy, Soc. N. Z. Biol. Sci.*, **12**(13) : 145-152.

Material examined : Tukul south. Aizwal, 31.III.1994, Coll. A.K. Hazra, 55 exs.

Diagnostic characters : Colour indigo-blue, segmental margins and ventral side pale. Ant. ratio as 10 : 12 : 12 : 14. P.A.O. absent. Unguis carinate, without lateral teeth, but with 1,1,1 inner tooth near the apex. Unguiculus absent. Ventral tube with 4 + 4 setae. Tenent hair 2, 2, 2 very long and capitate at the end. Dentes and mucro separated. Mucro short, obtuse and blunt on apex, with a narrow rounded lamella, which is often very obscure. Body length upto 1.4 mm; elongate in shape.

Distribution : India : Mizoram, Manipur, Nagaland, Sikkim & Maharashtra (Bombay).

Subfamily NEARNURINAE, Salmon, 1964

III. Genus ***Lobella*** Börner, 1839

The genus is represented by two species from Mizoram.

3. ***Lobella (Lobella) assamensis*** Yosii, 1966.

1966. *Lobella (L.) assamensis* Yosii, *J. of. re. College of Arts and Sci. Chiba Univ.*, **4**(4) : 461-531.

Material examined : Chawnhu Forest, Lawngtlai, 2.IV.1994, Coll. A.K. Hazra. 2 exs.

Diagnostic characters : Body length 1.5 mm. Totally white in alcohol. Antennae subequal to head in length. Ant. III and IV dorsally confluent. Ant. IV. with 3 obscure apical bulbs and 8 sensory setae. Eyes 3 + 3, poorly pigmented. Post antennal field conspicuous. Mandible with '5' distal teeth.

Distribution : Mizoram, Assam (Difu).

4. *Lobella kraepelini* (Börner) 1906.

1906. *Protanura kraepelini* Börner
1910. *Neanura dubiosa* Riter
1912. *Neanura pudibunda* Imms.
1917. *Protanura spinifera* Carpenter
1959. *Lobella kraepelini* Yosii, *Contr. Biol. Lab. Kyoto. Univ. Vol. No.* **10** : 1-65.

Material examined : Siahatla Hills slope, Saiha, 7.IV.1994, Coll. A.K. Hazra, 3 exs, Chawnhu Forest, Lawngtlai, 2.IV.1994, Coll. A.K. Hazra, 12 exs.

Diagnostic characters : Body length upto 2.3 mm. Colour red in living and milky white in alcohol. Ant. Head as 5 : 6. Ant. III and IV are almost fused dorsally. P.A.O. present. Eyes 3 + 3. Mandibles are well developed, triangular in shape and with 6 teeth. Maxillae are elongated, distally 2 toothed and accompanied by a fringed hyalene lamella. A paired tubercle of Abd. VI. are also situated for apart to each other, thus giving rise to the species a prominent feature to distinguish it from other related species of the genus.

Distribution : India : Mizoram, Arunachal Pradesh.

Family ENTOMOBRYIDAE

Subfamily ENTOMOBRYINAE Schaeffer, 1896

Dentes crenulated dorsally. Mucrone fulcate with basal spine, it is short and hook-like. Body with hairs or scales or both the chaetotaxy of head and trunk and eye numbers are useful in identifying the members of this family.

IV. Genus *Lepidocyrtus* Bourlet, 1839

The genus is represented by three species. From Mizoram.

Key to the species of *Lepidocyrtus*

1. Dental lobe with accessory apparatus. .... *Lepidocyrtus* (*Acrocyrtus*) *malayanus* Yosii, 1959.
– Dental lobe without accessory apparatus. ... 2
2. Th. II is very prominent and protruded over the head. Abd. II : IV = 1 : 7. .... *L. magnificus* Carpenter, 1917.
– Th. II is protruded considerably over the head. Abd. III : Abd. IV = 1 : 3. .... *L. medius* Schaeffer, 1893.

5. *Lepidocyrtus (Acrocyrtus) malayanus* Yosii, 1959

1959. *Lepidocyrtus (Acrocyrtus) malayanus* Yosii, *Centr. Biol. Lab. Kyoto. Univ.*, **10** : 28.

Material examined : Saiha village, 52 Km from Saiha, towards blue Mountain. 8.IV.1994, Coll. A.K. Hazra, 20 exs., Hill Slopes Circuit House, Saiha. 6.IV.1994, Coll. A.K. Hazra, 12 exs.

Diagnostic characters : Body length is 2.5 mm. Ground colour brownish white, antennae distally with bluish pigment from Ant. II. Eye 6+6. Scales are present dorsally upon Ant. I & II. Ratio of Ant. segs = 9 : 18 : 11 : 23; Th. II : III = 7 : 3; Abd. III : IV = 1 : 5. Manubrium : dentes = 9 : 8. Dorsal appendix of dental lobe is prominent, acutely pointed in profile.

Distribution : India : Mizoram, Manipur, Sikkim, Tripura (West Dist.).

Elsewhere : Singapore, Malaya.

6. *Lepidocyrtus* (S. str.) *magnificus* Carpenter, 1924

1924. *Lepidocyrtus* (S. str.) *magnificus* Carpenter, *Rec. Ind. Mus. Cal.*, **26** : 285-289.

Material examined : New Saiha, 7.IV.1994, Coll. A.K. Hazra, 15 exs.

Diagnostic characters : Colour pale-yellow with Ant. III and Ant. IV, edge of Th. II and III and last abdominal segment dark violet. Antennae twice as long as head. Relatively short III antennal segment. Mesonotum Four times as long as metanotum. Abd. IV seven times as long as Abd. III. Mucro stout with strong teeth, the dorsal spine short.

Distribution : India : Manipur, Mizoram, Sikkim, Tripura (West Dist.), Assam.

7. ***Lepidocyrtus*** (S. str.) ***medius*** Schaeffer, 1898

1898. *Lepidocyrtus* (S. str.) *medius* Schaeffer, *Cantr. Biol. Lab. Kyoto. Univ.*, **10** : 26

1913. *Lepidocyrtus* (S. str.) *medius* Börner, *Tijdschr.* V. *Entomon.*, **56** : 44-61.

1926. *Lepidocyrtus* (S. str.) *medius* Handschin, *Treubia*, **8** : 446-461.

1949. *Lepidocyrtus* (S. str.) *medius* Uchida *Insecta Mats. Sapporo.*, **17** : 38-47.

Material examined : Kolasib, P.W.D. Rest House. Mizoram, 31.X.1996, Coll. S.K. Mitra, 10 exs., Hill Slope Circuit House, Saiha, 6.IV.1994, Coll. A.K. Hazra, 12 exs. Zemabawk, 13.IV.1994, Coll. A.K. Hazra, 2 exs.

Diagnostic characters : Colour brownish white. Antennae pigmented purple distally. A median spot between eyes. Ant. segments as 12 : 28 : 30 : 42. Th. II is protruded considerably over the head. Th. II : III as 15 : 7. Abd. III : IV = 1 : 3. Manubrium : dens as 1 : 1. Mucro with apical tooth elongated, antennal tooth is little smaller.

Distribution : India : Mizoram, Manipur, Sikkim, Tripura (west Dist.).

Elsewhere : Singapore.

V. Genus ***Dicranocentrus*** Schött, 1925

This genus is represented only by single species from Mizoram.

8. ***Dicranocentrus indicus*** Bönet. 1930

1930. *Dicranocentrus indicus* Bönet.

1960. *Dicranocentrus indicus* Yosii, *Kyoto. Univ. Sci. Expd. Kara and Hindukush*, **8** : 333-405.

Material examined : Behind Forest Rest House, Vairengte, 16.IV.1994, Coll. A.K. Hazra, 2 exs., Hill Slope, circuit House, Saiha, 6.IV.1994, Coll. A.K. Hazra, 10 exs. Zoo garden, Aizwal, 30.III.1994, Coll. A.K. Hazra, 25 exs.

Diagnostic characters : Body length upto 3.2 mm. Antennae reddish-violet. Eye black. Antennae 5 jointed. Ant. I being sub divided. Ant. IV is elongated and distinctly annulated. Manubrium is dorsally beset with many plumose setae. No dental spine. Mucro is bidentate equally and with or without a basal spine.

Distribution : India : Mizoram, Manipur, Nagaland.

Elsewhere : Formosa, South Pacific Islands.

VI. Genus ***Homidia*** Börner, 1906

9. ***Homidia cingula*** Börner, 1906

1906. *Homidia cingula* Börner.

Material examined : About 20 km north east of Vairengte, 16.IV.1994, Coll. A.K. Hazra, 2 exs., Zemabawk, 4 km from Aizwal, 13.IV.1994, Coll. A.K. Hazra, 2 exs.

Diagnostic characters : Black ground yellowish. Blue black pigment forming transverse band on the IIIrd and IV abdominal segments. Body not compressed. Dental spine 33 in numbers. Apical mucronal tooth smaller than anteapical.

Distribution : India : Mizoram, Manipur, Sikkim.

Subfamily CYPHODERINAE Börner, 1913

Reduced number of Ocelli, scale-like foliate appendages and sometimes dental spices and appendages present. Only one genus has been recorded from Mizoram.

VII. Genus ***Cyphoderus*** Nicolet, 1842

10. ***Cyphoderus javanus*** Börner, 1906

1906. *Cyphoderus Javanus* Börner, *Mitt. Nat. Hist. Mus. Hamburg*, **23** : 180.

1966. *Cyphoderus Javanus* Yosii, *Kyoto Univ. Expd. Karakorum and Hind*, **8** : 381.

1971. *Cyphoderus Javanus* Prabhoo, *Oriental Insects.*, **5(1)** : 38.

Material examined : 25 km away from Variengte, near Aizwal, 16.IV.1994, Coll. A.K. Hazra, 2 exs., Zemabawk, 4 km from Aizwal, 13.IV.1994, Coll. A.K. Hazra, 12 exs.

Diagnostic characters : Eye lacking, white without trace of pigment. Elongated mucro with a well developed lamellated anteapical tooth. Large fringed scale on dens, unguis and unguiculus both have enlarged using like teeth.

Distribution : India : Mizoram, Manipur, Sikkim, West Bengal (Calcutta), Kerala.

Elsewhere : Java, Malaya, Thailand, Japan.

Subfamily PARONELLINAE Börner, 1913

The members of this subfamily can be distinguished from other Entomobryids by the right and short dentes, presence of dental scale appendages on the terminal part of dentes. The mucrones in majority cases are plump, lobed into several teeth and is different in shape from the members of subfamily Entomobryinae.

Key to genera of subfamily PARONELLINAE from Mizoram.

1. Body covered with scale. 2
– Body not covered with scale. 4
2. Eye 8 + 8 3
– Eye reduced in Number.
3. Basal seta of the outer maxillary ramus is blunt. Callyntrura Börner.
– Basal seta of the outer maxillary ramus is pointed. ..... ***Dicranocentroides*** Schott.
4. Mucro stout, usually tridented, dentes not annulated. ..... ***Salina*** Macgillivary.
– Mucro vestigial, sometimes visible as hook let fused with dentes; dentes annulated.

VIII. Genus *Callyntrura* Börner, 1906

The genus is represented by single species from Mizoram.

11. *Callyntrura japonica* (Kinoshita, 1917)

1954. *Handschinphysa japonica* Yosii.

1977. *Callyntrura japonica* Yosii, *Forest Res. Centre, Sepilok, Sand. East Malaysia*, pp : 1-37.

Material examined : D.F.O. complex, Lawngtlai, 3.IV.1994, Coll. A.K. Hazra, 4 exs. Kwankwan village, Lawngtlai, 4.IV.1994, Coll. A.K. Hazra, 2 exs.

Diagnostic characters : Body length is '3' mm. Ground colour creamish white, Head dark, the base of the antennae are more deeper in colour. Thorax is obscurely dusky all over along the marginal area of each segments. Fourth abdominal segments bears a narrow transverse patch. Antennae scaled. Ventral tube deeply dark. Furcula long, scaled dens without spines but with prominent dorsal vesicle. Mucro elongated with teeth.

Distribution : India : Mizoram, Manipur, Meghalaya.

Elsewhere : Japan.

IX. Genus *Aphysa* Ritter, 1911

Represented by single species from Mizoram.

12. *Aphysa ceylonica* (Ritter, 1911)

1911. *Campylothorax ceylonica* Ritter, *Ann. Wiener. Nat. Hist. Hobmus.* **24** : 388.

1966. *Callyntrura ceylonica* Yosii, 1966, *Kyoto Univ. Sci. Expd. Kara and Hind*, **8** : 375.

Material examined : Keyicham, Kolasib, 15.IV.1994, Coll. A.K. Hazra, 2 exs.

Diagnostic characters : Upto 2.5 mm. long. Body coloured yellow or brownish when the clothing of setae and scales is fully present; continuous band of black pigment along the sides of the body from the ocellar field to Abd. V. Bluish pigment on the whole of Ant. IV and III and a little on over segments especially at the base of Ant. I. Ant. about 1.5 times as long as the body;

antennal ratio as 36 : 35 : 25 : 90. Abd. III/IV as 8/32. Furcula segments as 10 : 13 : I; dens with a rudimentary. mucro with seven teeth, most of which clearly striated.

Distribution : India : Kerala, Mizoram. Ceylon.

X. Genus ***Dicranocentroides*** (Imms, 1912)

The genus is represented by four species from Mizoram.

Key to the species of *Dicranocentroides*

1. Body devoid of dark pigmented patches..... ..... *Dicranocentroides flavescens* Yosii.
- Body with distinct dark pigmented patches .. 2
2. Ground colour of Body brown with faint purple-blue pigment all over body. Abd. IV with faint longitudinal strands descending from its anterior margin; tergal margin darkest; Ant. I, II, III each with a pigmented distal ring ... .*D. indica* (Handschin) 1929.
3. Thorax II totally pigmented, Abd. III with its lateral extensions and Abd. IV totally dark, no distinct transverse band on Abd. IV. In living specimens shining metallic golden pigment occurs posteriorly on head, Th. II, Abd. I, II, posteromedially on Abd. IV..... ..... *D. fasciculatus* Salmon, 1957.
- Median patches on Th. II. may be absent but anterior margin always pigmented, Abd. III and its lataral extensions pigmented. Abd. IV. with medially and posteriorly pigmented transvers band. No shining metallic pigment occurs in living conditions..... ..... *D. salmoni* Mitra, 1975.

13. ***Dicranocentroides flavescens*** Yosii, 1966

1966. *Dicramocentroides fasciculatus* f. n. *flavescens* Yosii, *Res. kyoto. Univ. Sci. Expd. Karakoram and Hindukush*, 1955, **8** : 333-405.

Material examined : Sairep, Lunglei, Mizoram, 17.IV.1995, Coll. T. P. Bhattacharyya, 20 exs., Pythor village, 25 km from Lawngtlai on Saikha road. 4.IV.1994, Coll. A.K. Hazra, 10 exs.

Diagnostic characters : Body length 2-3.5 mm. A dark patch, characteristic of the species, present on vertex in between two ocellar fields. Dark patches absent on body. oceli 8 + 8. Relative length index of Ant. I : II : III : IV = 15 : 17 : 12 : 19. Th. II : III = 14 : 8.5. Legs all similar, unguiculus lanceolate, acuminate with 2 external teeth. Abd. I : II : III : IV : V : VI = 5 : 6 : 4 : 39 : 5.5 : 2. Ventral tube long with a row of macrochaetae-anteriorly. Manubrium : Mucrodens = 28 : 38, dentes armed with two closely opposed rows of spines on inner margin. Mucro large, parallel sided with '6' teeth.

Distribution : India : Mizoram, Manipur, Sikkim, Tripura (West Distt.), West Bengal, Maharashtra, Uttar Pradesh.

15. ***Dicranocentroides fasciculatus*** Imms, 1912

1912. *Dicranocentroides fasciculatus* Imms, *Proc. Zool. Soc. London*, 80-125.

1917. *Paronella crassicornis* Carpenter, *Rec. Ind. Mun. Cal.*, **8** : 561-568. *New Syn.*

1957. *Dicranocentroides, fasciculatus* Salmon, *Acta. Zool. Cracov.* **11(14)** : 313-362.

1975. *Dicranocentroides fasciculatus* Mitra, *Rec. Zool. Sum. Ind.* **71** : 57-95.

Material examined : 52 km from Saiha towards Blue Mountain, 8.IV.1994, Coll. A.K. Hazra, 25 exs., Sairep, Lunglei, Mizoram, 17.IV.1995, Coll. T. P. Bhattacharyya, 6 exs.

Diagnostic characters : Th. II always with reddish to brown pigment. Abds. III, IV, V usually dark brown. Head 1 + 1 dark ocellar field; Th. II : III ≒ 46 : 32; Abd. I : II : III : IV : V : VI = 21 : 21 : 13 : 108 : 9 : 4. Manubrium : mucrodens = 85 : 122; each dentes armed with an inner row of spines which transit into stiff ciliated setae distally, mucro large with 5-6 teeth.

Distribution : India : Manipur, Mizoram, Nagaland, Sikkim, U.P.

16. ***Dicranocentroides salmoni*** Mitra, 1975

1957. *Dicronocentroides fasciculatus* Salmon. *Acta. Zool. Cracov.* **11(14)** : 313-362.

1957. *Handschinphysa crassicornis* Sessu Salmon ibid.

1975. *Dicranocentroides salmoni* Mitra, *Rec. Zool. Surv. India.*, **71** : 57-95.

Material examined : Hill slope, near Circuit House Saiha, 7.IV.1994, Coll. A.K. Hazra, 20 exs. Chawnhu Forest, Lawngtlai, 2.IV.1994, Coll. A.K. Hazra, 25 exs., Sairep, Lunglei, 17.IV.1995, Coll. T. P. Bhattacharyya, 36 exs.

Diagnostic characters : Body length upto 2-3 mm. Antennae subequal to the length of head and body : Th. III, Abds I, II almost always dark pigmented. Th. II : III = 14 : 10; Abds. I : II : III : IV : V : VI = 7 : 7 : 4 : 37 : 4 : 2. Manubrium : mucrodens = 28 : 40 each dentes armed with a row of stout spines that beyond three-fourth of its length transit into stiff, mucro large with six prominent teeth.

Distribution : India : Mizoram, Nagaland, Manipur, Meghalaya, Assam, Sikkim.

XI. Genus *Salina* MacGillivary 1894 (Imms, 1912)

The genus is represented by four species from Mizoram.

Key to the species of *Salina*

1. Mucro long, narrow, superficially lobed into teeth, dental scale appendage relatively small, each tergite with many macrochaetae. 2
- Mucro short, broad, deeply lobed into teeth, dental scale appendage relatively large, each tergite with reduced number of macrochaetal. 4
2. Body without any pigment, sometime tergal margins of Th. II, III, Abd. I, II darker. .... *Salina indica* (Imms)
- Body always with patches involving blue-black or orange pigment; blue-black pigment sometimes suffused with orange pigment. 3
3. Ths. II with transverse orange bands, paired orange patches on Th. II. Abd. I, II, III : Abd. IV medially with patches of orange pigment which tend to unite with two other patches present posteriorly. ..... *S. biformis* Mitra.
4. Lateral margins of Th. II, III and Abd. I, II darker; darker pigment intrudes from tergal margin of Abd. II to its posterodorsal margin. ..... *S. montana* (Imms).
- Pigment does not cover entire surface of any segment. ..... *S. tricolor tricolor.*

17. *Salina indica* (Imms, 1912)

1912. *Cremastocephalus indicus* Imms, *Proc. Zool. Soc. London*, 80-125.

1957. *Salina indica* Salmon, *Acta. Zool. Cracov.*, **11**(14) : 313-362.

1973. *Salina indica* Mitra, *Oriental Insects.*, **7**(2) : 159-202.

Material examined : Kolasib, P.W.D. Rest House campus, 01.XI.1996, Coll. S.K. Mitra, 40 exs.

Diagnostic characters : Ground colour yellowish, overlaid irregularly by violet pigment which usually follows a lateral edegs of the terga. Ocelli on black fields 8 + 8. General clothing of short to medium length ciliated setae with some long, stout, lightly field setae at the apex of mesoterfum and along the dorsal surface of the thorax. Apex of dens with scale like appendage. Mucro bearing three plain teeth.

Distribution : India : Mizoram, Sikkim, Tripura (west and south Distt.), West Bengal, Manipur, Uttar Pradesh.

18. *Salina biformis* Mitra, 1966

1966. *Salina bifornis* Mitra, *Oriental Insects*, **7**(2): 159-202.

Material examined : Kolasib, near Hospital Road side, vegetation, 01.XI.1996, Coll. S.K. Mitra, 10 exs.

Diagnostic characters : Ocelli 8 + 8, each group arranged in 2 longitudinal parallel rows, macrochaetae subobliquely truncated and broadly acuminate present on head. Ths II, III and Abds. I-IV; unguis short, curved with 2 external basolateral, paired inner basal & two distal unpaired teeth. Ventral tube anteriotely on anterior face with 4 + 4 macrochaetae and 7 + 7 microchaetae. Body length 1.2-1.4 mm.

Distribution : India : Mizoram, U. P. (Dehradun Distt., Nainital Distt.), Haryana.

19. ***Salina montana*** (Imms, 1912)

1912. *Cremastocephalus montanus* Imms, *Proc. Zool. Soc. London*,: 80-125.

1957. *Salina montana* Salmon, *Acta. Zool. Cracov.*, **11(14)** : 313-362.

1973. *Salina montana* Mitra, *Oriental Insects.*, **7(2)** : 159-202.

Material examined : Road side Hill Stream, Kwan Kwan, 4.IV.1994, Coll. A.K. Hazra, 12 exs.

Diagnostic characters : Body length 2 mm. Ground colour of Head and body usually white, sometime pale-yellow; Head pear shaped, with 1 + 1 dark ocellar field, each field with 8 + 8 ocelli. Relative length index of the antennal segments = 47 : 67 : 57 : 93; Th. II : III = 29 : 17; Abds. I : II : III : IV : V : VI = 13 : 23 : 4 : 79 : 14 : 8.5; manubrium : mucrodens = 58 : 63; mucro short, broad, prominently lobed into three teeth, dental scale appendage large, striated apically, subequal to the length of mucro.

Distribution : India : Mizoram, Manipur, Uttar Pradesh, West Bengal.

20. ***Salina tricolor tricolor*** (Handschin, 1928)

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

1929. *Salina tricolour* Handschin, *Rev. Suisse. Zool.*, **36** : 229-262.

1973. *Salina tricolor tricolor* Mitra, *Oriental Insects*, **7(2)** : 159-202.

Material examined : Kolasib, P.W.D. Rest House, from Grass, 31.X.1996, Coll. S.K. Mitra, 6 exs.

Diagnostic characters : General ground colour of head and body pale yellow; Abds. V and VI with symmetrical patches of orange to dark pigment; antennae pale yellow to dark brown with diffused blue pigment along the edgs : legs generally brown with diffused blue pigment. Head pear-shaped dorsally; relative length index of Ant. I : II : III : IV : V = 26 : 33 : 29 : 46; Ths. II : III = 9 : 4; Abds. I : II : III : IV : V : VI = 4 : 9 : 1.5 : 29 : 4 : 2.5; manubrium : mucrodens = 22 : 25; mucro deeply lobed into three teeth, dental scale appendage striated longitudinally, subequal to mucro.

Distribution : India : Mizoram, Manipur, Nagaland, Kerala.

Family ISOTOMIDAE Börner, 1913

Subfamily ISOTOMINAE Schaeffer, 1896

Head prognathus, tracheae absent. Antennae inserted in front half of head. P.A.O. usually present; always simple. Mucro short.

XII. Genus ***Isotomurus*** Börner, 1906

21. ***Isotomurus balteatus*** (Reuter, 1876)

1976. *Isotoma balteatus* Reuter. *Med. Soc. Fauna et. Flora Fenn.*, **1** : 82

1963. *Isotomurus balteatus* Yosii, *Cantr. Biol. Lab. Kyoto. Univ.*, **15** : 4.

Material examined : Kolasib, P.W.D. Rest House, From Grass, 31.X.1996, Coll. S.K. Mitra, 10 exs; Lawngtlai on Saika Road, 4.IV.1994, Coll. A.K. Hazra, 50 exs.

Diagnostic characters : Colour with a violettish black pigment which from distinct transverse band on the anterior margin of tergites. Antennal ratio = 10 : 15 : 16 : 26; Ant. IV with two short subapical sense rods. P.A.O. as large as anterior ocellus. Ocelli 8 + 8. Furcula reaches forward to the ventral tube, segments as 5 : 12 : 1. Dens distinctly annulated with dorsal side; mucro with a small apical, 2 large subapical and large external lateral teeth.

Distribution : India : Mizoram, Manipur, Tripura, Kerala.

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INSECTA : ODONATA

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INTRODUCTION

Odonata includes both dragon and damselflies, but sometimes called only dragonflies. In India Odonata are found in almost all the environmental conditions viz., higher Himalayan mountain ranges, deserts and sea coasts etc. However, as per habitat, these insects are abundant in the vicinity of the aquatic bodies. Odonates are completely carnivorous insect and their feeding habits are in some way beneficial to human beings. Sometimes, however, adult or larvae of some species may turn into a serious pest for culturing honey bees and on fingerlings of fishes. The larvae of odonates generally serve as food for fishes and ducks, while the adults are prayed upon by other carnivorous insects, lizards and birds etc.

STUDY AREA

Mizoram, the land of highlanders, is among the youngest States of India. It was given a status of State on 20th February, 1987, after being a Union Territory since 1972. Mizoram is situated in northeastern corner of India. It has international borders on three sides : Myanmar in the east and south; Bangladesh in the west; while Indian States of Assam (Cachar district) and Manipur in the north.

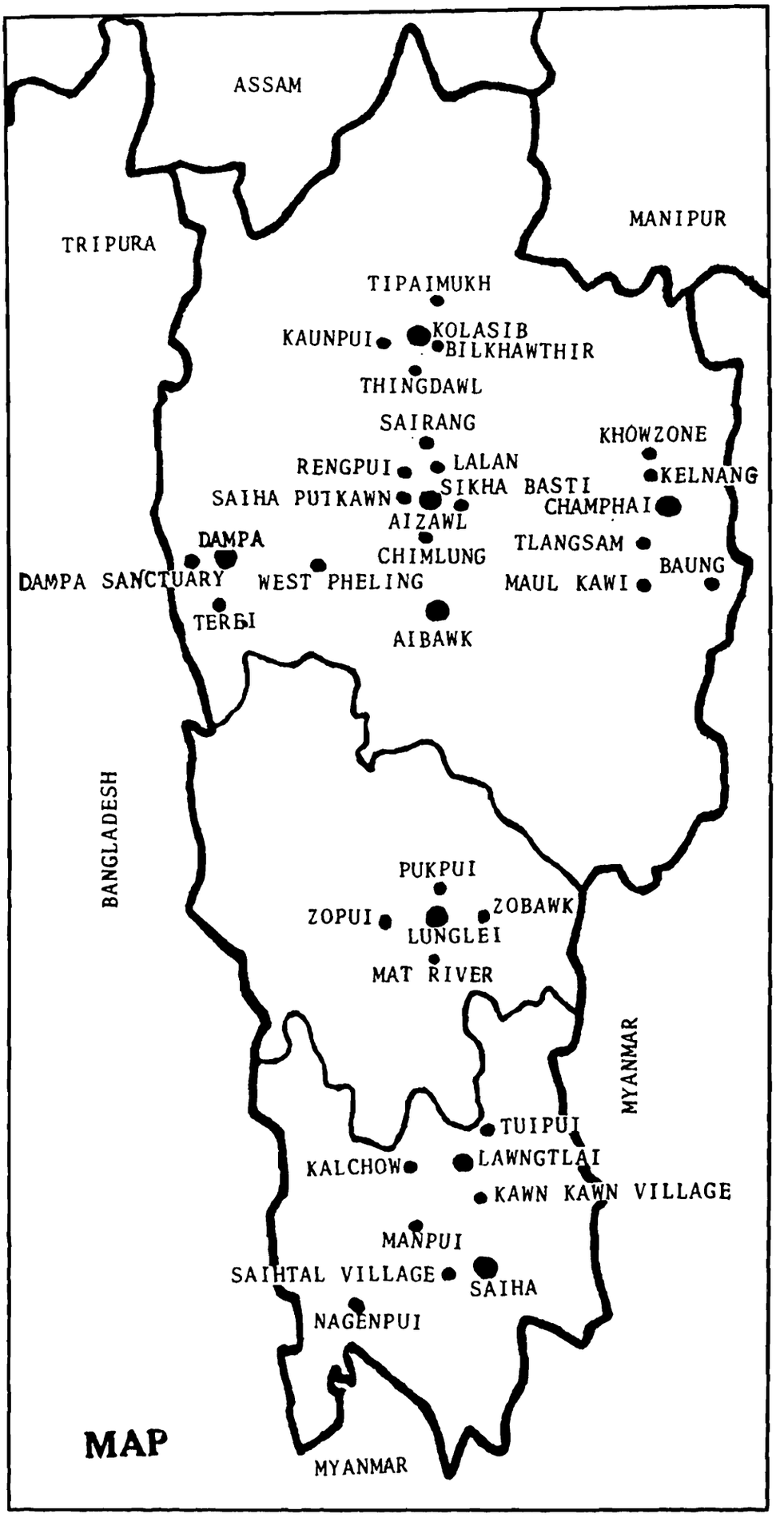
Topographically, Mizoram has hills and precipitous terrain with deep gorges in between. The ranges have an average height of 900 m. and run in the north-south direction. The eastern and southern regions are higher than that of western and northern regions. The highest peak is PHAWANGPUI (Blue Mountain) in the south, which is 2157 m. height, while the lowest point is BAIRABI, which is only 40 m. above the mean sea level. There are innumerable rivers, streams, waterfalls, which flow to brim in the monsoon. The evergreen forests and moderate climate have made the State an ideal. Premonsoon rain comes around March-April, while normal monsoon starts from June till September with heavy rain occasionally upto October.

ODONATE FAUNA

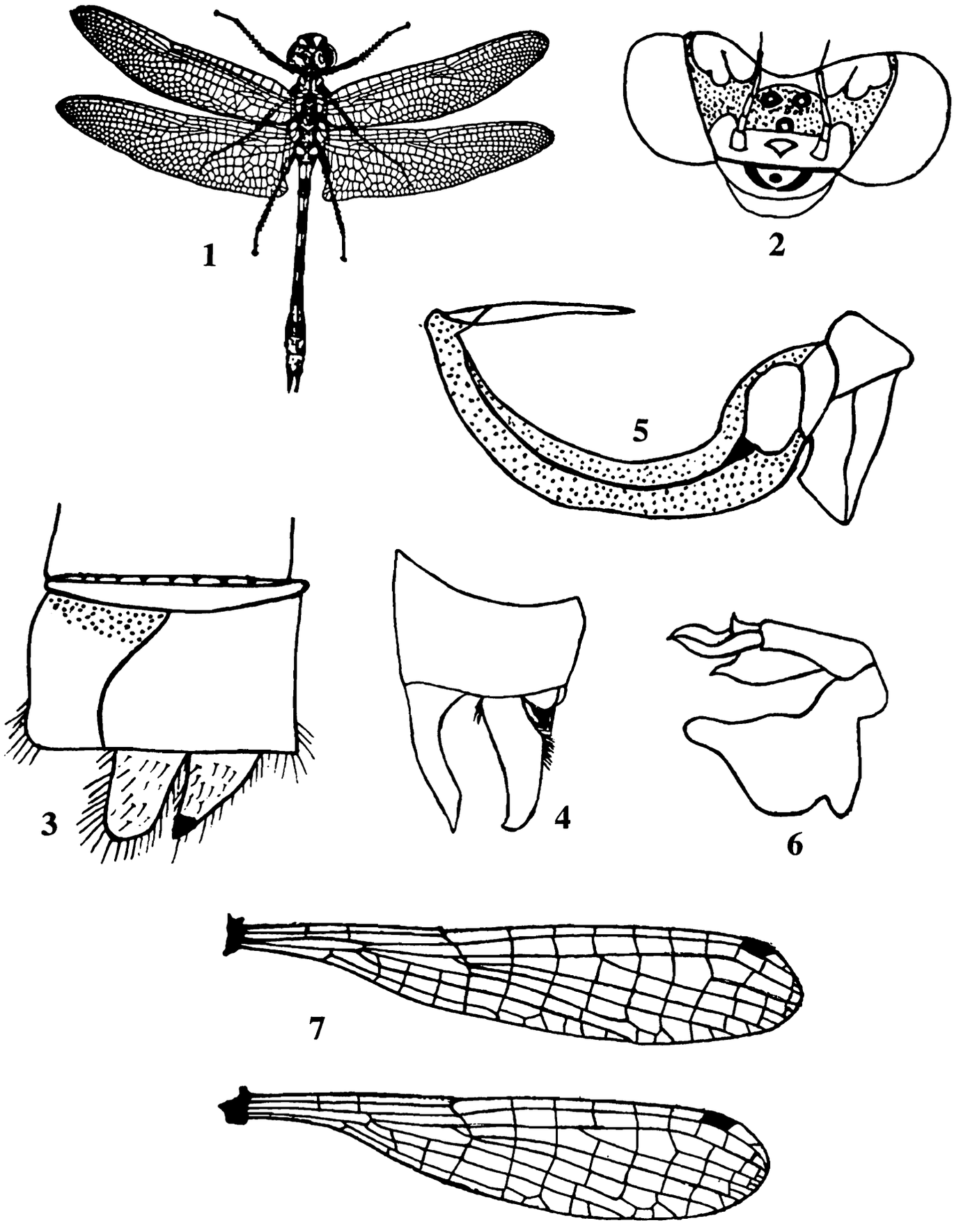
Extensive consultation of available literature reveals that there is no consolidated account on the Odonata fauna of Mizoram. In sporadic contribution, published by Fraser (1933, 1934 and 1936), Lahiri (1979), Mitra (1994), Prasad and Varshney (1995), Prasad (1997a) and Prasad (1997b) have reported a total of 48 species and subspecies from there.

At present various developmental programmes are being undertaken by both Governmental and non Governmental Organizations dwindlings the natural habitats of dragonflies. To record the existing fauna therefore, this study become essential. It is part of the State Fauna Series, which has been undertaken by the Zoological Survey of India. In this study Odonata materials brought by various parties of ZSI covering almost all districts of the Mizoram State (see map) are studied. Material present in the collections of the Eastern Regional Station, Shillong, have also been studied and included in the present paper. Details of material studied are indicated under each species.

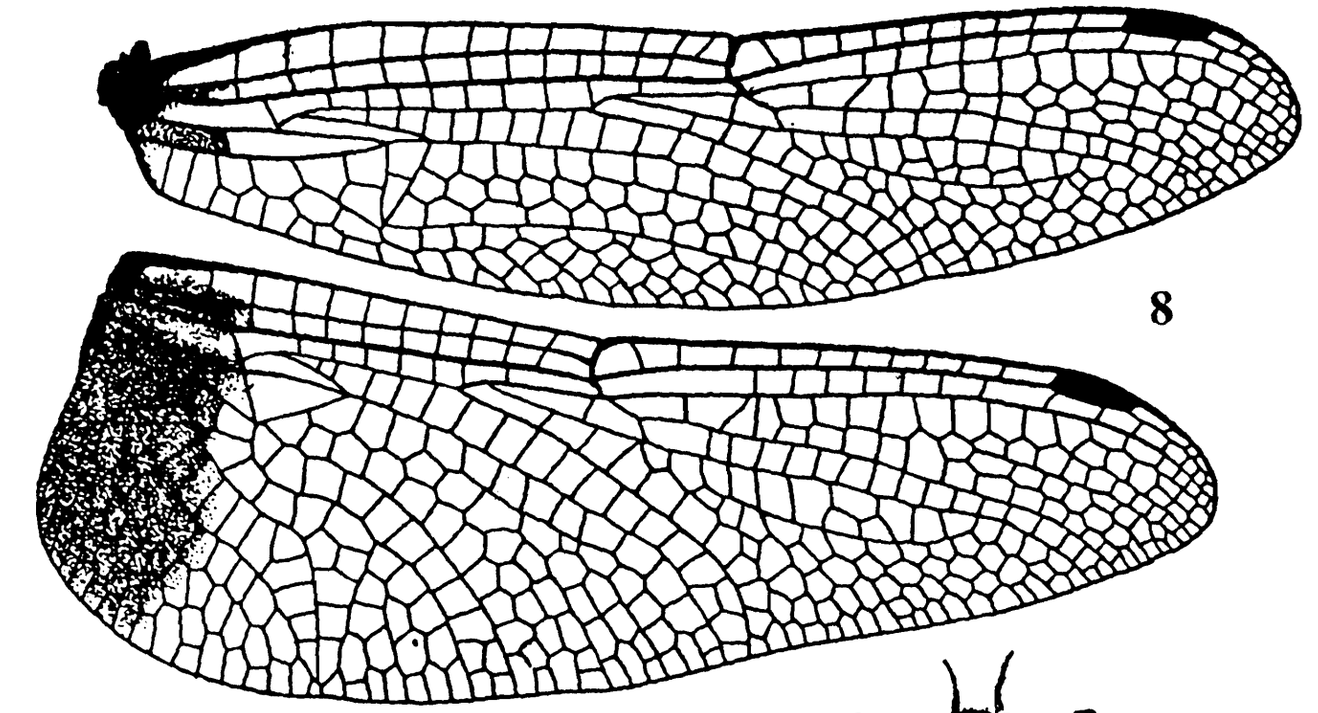
In the light of the present study, the Odonata fauna of the State of Mizoram comprises of 64



Map : Map of Mizoram showing the collection sites.



Figs. 1-7. : Adult dragonfly; 2. Head of a damselfly; 3. Male 10th abdominal segment and anal appendages of damselfly; 4. Male 10th abdominal segment and anal appendages of dragonfly; 5. Penis (Propallus) of damselfly; 6. Penis (Propallus) of dragonfly; 7. Fore and hindwing of damselfly.



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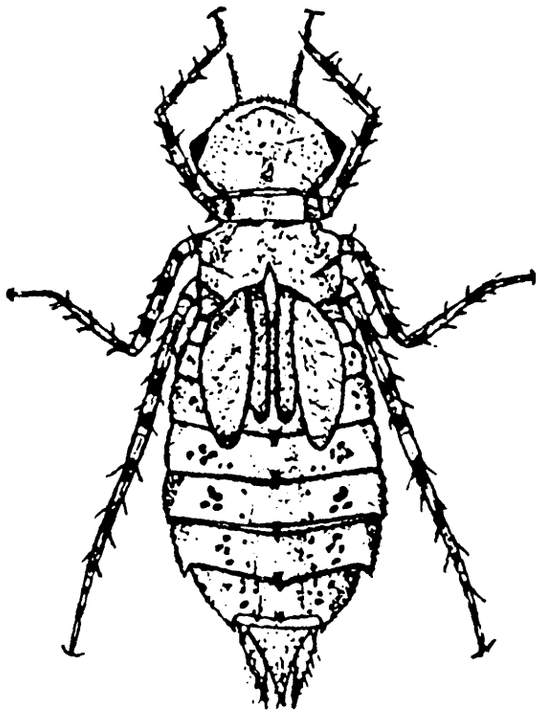

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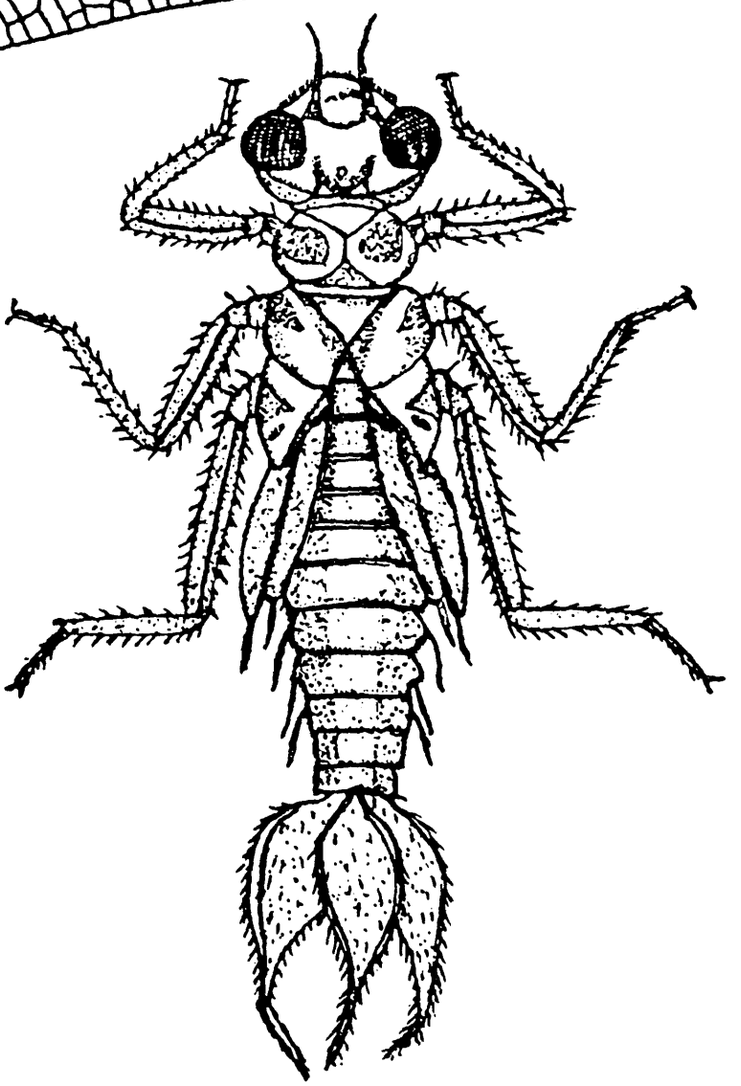

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Figs. 8-10. : Fore and hindwing of dragonfly; 9. Larva of dragonfly; 10. Larva of damselfly.

species/subspecies under 41 genera and 12 families. Of these, 12 species/subspecies are recorded for the first time from this State in the present study.

GENERAL MORPHOLOGY

Detailed morphological descriptions of adult as well as larvae are given by Fraser (1933, 1934, 1936 and 1956) and Tillyard (1917). A brief account is given here.

Adults (Figs. 1-8) are air breething insects with a large head, which is linked with thorax by delicate connection, antennae minute, filiform, eyes large covering major portion of head in Libellulids and other families of suborder Anisoptera, but in suborder Zygoptera this is not so large and separated by wide gap. Prothorax, mesothorax and metathorax are fused, angled forwardly, so are their repsective legs. Wings are paired, may be membranous, coloured or clear, reticulated, almost of same shape and size in Zygoptera, while in most of Antisoptera the posterior pair (hind wing) of wing wider, specially in their anal area. Abdomen lie behind thorax is long, slender, ten segmented terminating in paired anal appendages (superior anal appendages and inferior anal appendages). Males in Zygoptera possess paired superior and inferior appendages, while males of Anisoptera possess a pair of superior and inferior appandages. Most characteristic feature of male genitalia (accessory genitalia) is that these are shifted to the underneath of 2nd and 3rd abdominal segments, while gonopore are in their usual position. Ovipositors are simple for exophytic forms (most of Anisoptera) or strong serrated for endophytic forms (most of Zygoptera).

Larvae (figs. 9 & 10) are long, elongated cylindrical and stout, broad bodied in benthic forms. These have extensile, prehensile labium. Zygopterans have abdominal gills and caudal filament, which are lacking in Anisopterans and these breath by clocal chamber suited for necessary exchange of disolved oxygen.

TECHNICAL TERMS

A list of technical terms used in the key and text etc., are arranged alphabetically.

Anal Appendage : Present at the end of 10th abdominal segment. Males of suborder Zygoptera possess paired superior and inferior appendages; while in males of suborder Anisoptera possess a pair of superior and single inferior anal appendages.

Anal Triangle : A triangular area present at extreme base of hindwing in Anisoptera.

Antenodal Nervures : Short transverse nervures running from the costal to radius, proximal to node.

Caudal Gill : Acessory respiratory organs at the distal end of Zygopteran larvae.

Cubital Space : A name used for the anal crossing. It is present posterior to basal space and extending to the base of discoidal cell.

Discoidal Cell : A well defined triangular or quadrilateral space present near the wing base, distal to cubital space.

Discoidal Field : Space lying distal to discoidal cell and bounded outwardly by the wing border. Nervures MA and Cuii constitute its anterior and posterior borders respecitively.

Hypertrigone : Narrow triangular cell above discoidal cell of Anisopterans.

Imago : Adult.

Nodal Index : Count of ante and post nodal nervures in fore and hindwings.

Node : A thick part of the wing present at costal margin near base of Zygoptera but in middle of Antisoptera.

Ocellus : Simple eye, three uniformly in all Odonata, disposed in a line in front of vesicle or in a triangle around vesicle on the vertex of head.

Postnodal Nervures : Nervures present between the costa and the radius on the distal side of the node.

Pterostigma : Small thickened spot on the apical side on costal border.

Radius : From the base of wing, lying between the subcosta and media.

Sectors of arc : Origins of nervures RIV + V and MA.

Subcosta : Present below the costa, but upto the node.

Subnode : An oblique vein descending from the node extending obliquely outward into the body of the wing and transversing the space present between Ri and Rii.

Teneral : Freshly emerged adult.

Tornus : Part of basal and posterior part of wing, may be angular or rounded in Anisoptera.

Vertex : Dorsal surface of head, bearing vesicle and ocelli.

Vesicle : Small protuberance present on vertex of head.

Vulvar scales : Sheath covering ovipositor, formed of two plates attached to ventrals segments of 8th and 9th abdominal segments.

MATERIAL AND METHOD

Collection techniques :

A. For Adult : Specimens are collected with the help of a butterfly net, then they are killed in a bottle of Benzene, Acetone or cynide fumes. The specimens are taken out from the Jar and exposed to air for drying. The abdomen of the specimen is to be straightend and wings are to be kept spread out. The dried specimens are put in a paper envelope containing blotting paper to soak the body fluid emitted by the dead specimen. The envelope must contain a label giving the collection date, locality, name of collector, altitude and habitat etc.

B. For Larvae : Collection of Odonata larvae is very different from collecting adults. Different methods and equipments are used depending on the habits and habitats of the group concerned. Normally larvae are collected by a water net fitted with wire mesh. Collection of larvae is made by pulling this net from the weedy ponds, bank of streams etc., then spreading the material on the bank on a smooth surface or on white rexine cloth. Larvae are also collected by means of an ordinary basket. Those larvae which remain attached to the lower surface of pebbles and stones lying at the bottom of the hill streams. Stones and pebbles are turned over to remove the larvae attached on their lower surface. Larvae of family Gomphidae generally burrow in the sand and between the small pebbles and sotnes. These sands and pebbles are stirred with the foot. Larvae can then be collected from the disturbed sand, by placing a net a little downstream.

Study technique : Material of imagos are made ready for study by usual process of relaxing, properly spreading, setting and pinning. Set specimens are examined under bioncular microscope by fixing it at desirable angle, level over plasticine cone/mounds fixed on slide or over convenient size of pith/thermocol plate.

SYSTEMATIC LIST

A comprehensive list of the odonates known from Mizoram is given below, arranged systematically. Species/subspecies recorded for the first time from the Mizoram are marked with an asterisk (*).

Order ODONATA
Suborder ZYGOPTERA
Superfamily COENAGRIONOIDEA
Family COENAGRIONIDAE

1. Genus ***Ceriagrion*** Selys

1. ***Ceriagrion azureum*** (Selys)
2. ***C. coromandelianum*** (Fabricius)
3. ***C. fallax cerinomelas*** Leiftinck
4. ***C. olivaceus*** Laidlaw

2. Genus ***Pseudagrion*** Selys

5. ****Pseudagrion decorum*** (Rambur)

3. Genus ***Aciagrion*** Selys

6. ***Aciagrion borneense*** Ris

4. Genus ***Ischnura*** Charpentier

7. ***Ischnura aurora aurora*** (Brauer)
8. ****I. rufostigma mildredae*** Fraser
9. ***I. senegalensis*** (Rambur)

5. Genus ***Agriocnemis*** Selys

10. ***Agriocnemis lacteola*** Selys
11. ****A. pieris*** Laidlaw
12. ***A. pygmaea*** (Rambur)

6. Genus ***Mortonagrion*** Fraser

13. ***Mortonagrion aborense*** (Laidlaw)

Family PLATYCNEMIDIDAE

7. Genus ***Calicnemia*** Strand

14. ***Calicnemia eximia*** (Selys)
15. ***C. miniata*** (Selys)
16. ****C. pulverulans*** (Selys)
17. ***C. sudhaae*** Mitra

8. Genus ***Coeliccia*** Kirby

18. ****Coeliccia bimaculata*** Laidlaw
19. ***C. loogali*** Laidlaw
20. ****C. renifera*** (Selys)

9. Genus ***Copera*** Kirby

21. ****Copera marginipes*** (Rambur)

Family PROTONEURIDAE

10. Genus ***Prodasineura*** Cowley

22. ***Prodasineura*** **verticalis** ***burmanensis*** Fraser

Superfamily LESTOIDEA
Family LESTIDAE

11. Genus ***Lestes*** Leach

23. ***Lestes dorothea*** Fraser

Family SYNLESTIDAE

12. Genus ***Megalestes*** Selys

24. ***Megalestes irma*** Fraser
25. ***M. major*** Selys

Superfamily CALOPTERYGOIDEA
Family CALOPTERYGIDAE

13. Genus ***Caliphaea*** Selys

26. ***Caliphaea confusa*** Selys

14. Genus ***Echo*** Selys

27. ****Echo margarita margarita*** Selys

15. Genus ***Matrona*** Selys

28. ***Matrona basilaris nigripectus*** Selys

16. Genus ***Neurobasis*** Selys

29. ***Neurobasis chinensis chinensis*** (Linn.)

17. Genus ***Vestalis*** Selys

30. ****Vestalis gracilis gracilis*** (Rambur)

Family CHLOROCYPHIDAE

16. Genus ***Rhinocypha*** Rambur
Subgenus ***Aristocypha*** Laidlaw

31. ***Rhinocypha (Aristocypha) quadrimaculata*** Selys
32. ***R. (A.) spuria*** (Selys)

19. Genus ***Indocypha*** Laidlaw

33. ***Indocypha vittata*** (Selys)

Family EUPHAEIDAE

20. Genus ***Anisopleura*** Selys

34. ***Anisopleura comes*** Hagen

21. Genus ***Euphaea*** Selys

35. ***Euphaea ochracea*** **ochracea** Selys

Suborder ANISOPTERA
Superfamily AESHNOIDEA

Family GOMPHIDAE

22. Genus ***Mergomphus*** Martin

36. ***Merogomphus martini*** (Fraser)

23. Genus ***Paragomphus*** Cowley

37. ****Paragomphus lineatus*** (Selys)

24. Genus ***Ictinogomphus*** Cowley

38. ***Ictinogomphus rapax*** (Rambur)

Family AESHNIDAE

25. Genus ***Gynacantha*** Rambur

39. ***Gynacantha subinterrupta*** Rambur

Superfamily LIBELLULOIDEA

Family CORDULIIDAE

26. Genus ***Idionyx*** Hagen

40. ***Idionyx imbricata*** Fraser

Family LIBELLULIDAE

27. Genus ***Amphithemis*** Selys

41. ***Amphithemis curvistyla*** Selys

28. Genus ***Orthetrum*** Newman

42. ***Orthetrum anceps*** (Schneider)
43. ***O. glaucum*** (Brauer)
44. ****O. japonicum internum*** MacLachlan
45. ***O. pruinosum neglectum*** (Rambur)
46. ***O. sabina sabina*** (Drury)
47. ***O. triangulare triangulare*** (Selys)

29. Genus ***Potamarcha*** Karsch

48. ****Potamarcha congener*** (Rambur)

30. Genus ***Acisoma*** Rambur

49. ***Acisoma panorpoides panorpoides*** Rambur

31 Genus ***Brachythemis*** Brauer

50. ***Brachythemis contaminata*** (Fabricius)

32. Genus ***Crocothemis*** Brauer

51. ***Crocothemis servilia servilia*** (Drury)

33. Genus ***Diplacodes*** Kirby

52. ***Diplacodes trivialis*** (Rambur)

34. Genus ***Indothemis*** Ris

53. ***Indothemis limbata limbata*** (Selys)

35. Genus ***Neurothemis*** Brauer

54. ***Neurothemis fluctuans*** (Fabricius)
55. ***N. fulvia*** (Drury)
56. **N. intermedia intermedia** (Rambur)

36. Genus ***Sympetrum*** Newman

57. ***Sympetrum hypomelas*** (Selys)

37. Genus ***Trithemis*** Brauer

58. ***Trithemis aurora*** (Burmeister)
59. ***T. festiva*** (Rambur)
60. ***T. pallidinervis*** (Kirby)

38. Genus ***Palpopleura*** Rambur

61. ***Palpopleura sexmaculata sexmaculata*** (Fabricius)

39. Genus ***Pantala*** Hagen

62. ***Pantala*** **flavescens** (Fabricius)

40. Genus ***Tramea*** Hagen

63. ***Tramea virginia*** (Rambur)

41. Genus ***Tholymis*** Hagen

64. ***Tholymis tillarga*** (Fabricius)

SYSTEMATIC ACCOUNT

Order Odonata comprises of three suborders, namely Zygoptera, Anisozygoptera and Anisoptera. Of these, suborders Zygoptera and Anisoptera are represented in Mizoram.

Key to Suborders

1. Distance between inner margins of eyes greater than their own diameter; in males inferior anal appendages paired and placed below the anal opening; discoidal cell in both wings simple, entire or traversed by nervures, closely similar in both pairs of wings. ..... ZYGOPTERA

– Distance between inner margins of eyes always less than their own diameter; in males inferior anal appendage single and placed above anal opening; discoidal cell is subdivided into a triangle plus supratriangle. .... ANISOPTERA

Suborder ZYGOPTERA

Diagnostic characters : Head transversely elongated; middle lobe of labium fissured and subequal to lateral lobe; distance between inner margins of eyes greater than their own diameter; ocelli not set in vesicle lying free in middle of vertex. Male genitalia with deeply cleft lamina; anterior hamules well developed; posterior hamules inconspicuous. In male both superior and inferior anal appendages are placed above and below anal opening respectively. Ovipositor well developed in female. Both pairs of wings are similar in shape and venation.

Distribution : Cosmopolitan.

Key to the superfamilies of ZYGOPTERA

1. Only two (exceptionally -3) antenodal nervures present; postnodals in strict alignment with the veins below; anal vein fused at base with the posterior of wing. 2

– Never less than 5 antenodal nervures present; postnodal not in line with the veins below them; anal veins separate from posterior border of wing from its base. .... CALOPTERYGOIDEA

2. The veins IRiii and Riv+v begining much nearer to the nodus than to orculus; genital hamules of male quadrate. .... COENAGRIONOIDEA

– The veins IRiii and Riv+v begining much nearer to the arculus than to the nodus; genital hamules of male elongate. ..... LESTOIDEA

Superfamily : COENAGRIONOIDEA

Diagnostic characters : Small to medium sized insects, some times may be very small; shape of postrior lobe of prothorax variable; males with anterior hamules quadrate. Wings petiolated, only 2 antenodal nervures present; postnodal nervures in strict alignment with cross veins beneath. Usually IR_3 and R_{4+5} originate closer to the nodus than the *Arc*; intercalated sectors usually absent.

Distribution : Cosmopolitan.

Key to the families of superfamily COENAGRIONOIDEA

1. 1A, Cuii reduced, former even absent. ....PROTONEURIDAE

– 1A, Cuii neither reduced nor absent. 2

2. Discoidal cell with costal and hinder side subequal, inner distal angle obtuse. .... PLATYCNEMIDIDAE

– Discoidal cell with costal side much shorter than hinder side, inner distal angle acute or subacute. ..... COENAGRIONIDAE

Family : COENAGRIONIDAE

Diagnostic character : Nervures 1A and Cuii of normal length; medio-anal link almost always angulated; no accessory cross vein basal to *Ac* in the cubitoanal space; discoidal cell with costal margin much shorter than inner margin and with the inner angle subacute or acute; subdiscoidal cell free from inner wing margin.

Key to the genera of family COENAGRIONIDAE

1. Arc situated well distal of the level of the distal antenodal cross vein. 2

– Arc situated at or slightly distal of the distal antenodal cross vein. 3

2. Junction of ab and 1A (medio-anal link) markedly angulated. .....***Agriocnemis*** Selys

– Junction of ab and 1A not angulated, continued on in the same straight line. ....***Mortonagrion*** Fraser

3. Ab arising from inner wing margin at or slightly proximal to the point where Ac meets it; pterostigma of similar colour in both pairs of wing. 4

– Origin of Ab distinctly proximal to the point where Ac meets it; pterostigma differing in colour in fore and hindwing. .... ***Ischnura*** Charpentier

4. Pterostigma in hindwing much smaller than forewing. ..... ***Aciagrion*** Selys

– Pterostigma in both wings nearly equal. 5

5. Frontal ridge present. .....***Ceriagrion*** Selys

– Frontal ridge absent..... ***Pseudagrion*** Selys

Genus *Ceriagrion* Selys

1876. *Ceriagrion* Selys, Bull. *Acad. Belg Sci.*, **43** : 525.

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

1967. *Ceriagrion*, Asahina, *Jap. J. Zool.*, **5** : 255.

Diagnostic characters : Medium sized; yellow, orange, olivaceous or rarely bluish sometimes partly marked with black or red. Frons with a well-developed ridge; posterior lobe of prothorax generally simple and rounded. Male anal appendages subequal to or more and usually shorter than 10th abdominal segment. Terminal fold of penis generally unbranched; no vulver spine in females. Wings hyaline; pterostigma rectangular; 9-16 postnodals in forewing wnd 8-14 in hindwing. Arc situated at or slightly distal to the level of distal antenodal nervure; discoidal cell with inner margin about twice as long as costal margin, Ab arising from inner wing margin at a point where Ac meets it or rarely slightly proximal to that point.

Distribution : Africa, Cambodia, China, Europe, India, Indonesia, Japan, Laos, Madagascar, Malaysia, Mauritius, Myanmar, Nepal, Pacific Islands, Sychelles, Sri Lanka, Thailand and Vietnam.

Key to the species of Genus *Ceriagrion* Selys

1. Ab arising distinctly proximal to the point where Ac meets; abdomen yellow changing to black on segments 7-10. .... *fallax cerinomelas* Lieftinck

– Ab arising at the point where Ac meets; abdomen yellow, brown or unmarked with black. 2

2. Abdomen uniformly dull olivaceus in colour. ..... *olivaceum* Laidlaw

– Abdomen not uniformly dull olivaceus; variable colour and markings present or absent. 3

3. Abdomen bright citron yellow. .... *coromandelianum* Fabricius

– Abdomen pale azure-blue in colour. .... *azureum* (Selys)

1. *Ceriagrion azureum* (Selys)

1891. *Pseudagrion azureum* Selys, *Ann. Mus. Civ. Genova*, (2) **10**(30) : 513-515.

1933. *Ceriagrion azureum*, Fraser, *Fauna Brit. India, Odon.*, **1** : 328-330.

Material examined : 4♂♂, 1♀, Zobawk, dist. Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	35.00	25.00	24.50
Female :	33.00	26.50	26.00

Distribution : India : Mizoram, Assam, Meghalaya, and West Bengal.

Elsewhere : Myanmar (Burma).

Remarks : There are 15-17 postnodal nervures in forewing and 12-14 in hindwing of males and 14-16 in forewing and 13 in hindwing of female. It has uniform glossy torquoise-blue abdomen with dorsal shield-like black spot on 9th and 10th abdominal segments.

2. *Ceriagrion coromandelianum* (Fabricius)

1798. *Agrion coromandelianum* Fabricius, *Ent. syst. suppl.*, : 287.

1933. *Ceriagrion coromandelianum*, Fraser, *Fauna Brit. India Odon.*, **1** : 315-316.

Material examined : 1♂, Tipaimukh Road, 7 kms. N. E. of Kolasib, district Aizawl, 2.9.1989, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	27.00	21.50	21.00

Distribution : Throughout India.

Elsewhere : Cambodia, China, Laos, Myanmar (Burma), Nepal, Pakistan, Sri Lanka, Thailand (Asahina, 1967) and Vietnam.

Remarks : This species is a very common and occurring throughout India. Agree faily well with the description of the species. It can easily be separated from other species by having pale citron yellow abdomen.

3. ***Ceriagrion fallax cerinomelas*** Lieftinck

1927. *Ceriagrion cerinomelas* Lieftinck, *Tijdschr. v. Ent.*, **70** : 88-91.

1967. *Ceriagrion fallax cerinomelas*, Ashina, *Jap. J. Zool.*, **15** : 284-286.

Material examined : 3♂♂, Zobawk, dist. Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	31.5-33.00	22.00-23.00	21.00-22.00

Distribution : India : Mizoram.

Remarks : Abdominal segment 6th (half) and from 7th to 10th are entirely black. Pterostigma brown and covers more than a cell. 14-15 postnodals nervure in forewing and 12-13 in hindwing.

4. ***Ceriagrion olivaceum*** Laidlaw

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

1933. *Ceriagrion olivaceum*, Fraser, *Fauna Brit. India, Odon.*, **1** : 324-326.

Material examined : 1♀, Champhai Tourist Lodge Campus, 13.10.1995, coll. A.K. Sanyal and 1♀, Dampa sanctuary, 9.11.1995, coll. M.S. Shishodia.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	33.00	23.00	23.00

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Kerala, Manipur, Maharashtra, Meghalaya, Orissa, South Andaman, Uttar Pradesh and West Bengal.

Elseehere : Cambodia, Laos, Malaysia, Myanmar (Burma), Thaliand and Vietnam.

Remarks : It is distinguishable from all other species of the genus in having uniform olivaceous colouring. Specimens of this species are found commonly near or among the long grasses in the vicinity of water body.

Genus ***Pseudagrion*** Selys

1867. *Pseudagrion* Selys, *Bull. Acad. Belg. Sci.*, (2), **42** : 490.

1933. *Pseudagrion*, Fraser, *Fauna Brit. India, Odon.*, **1** : 274-276.

Diagnostic characters : Medium sized, marked with black, green, orange or red, occassionaly partly pruinosed; postocular coloured spots usually present. Frons without ridge; posterior lobe of prothorax simple and rounded in males, with a forwardly directed ungulated processes. Male anal appendages may be as long as or shorter than 10th abdominal segment. Terminal fold of penis often deeply bifid and usually with a short projection on either side; female without vulver spine. wing hyaline 8-17 postnodal nervures in forewing and 7-14 in hindwing; pterostigma narrow and rectangular; arc situated at the level of the distal antenodal vein; ab arising from inner wing margin at the point when Ac meets it.

Distribution : Africa, Australia, China, India, Indonesia, Japan, Madagascar, Malaysia, Mauritius, Myanmar (Burma), Nepal. New Guinea, Pacific Islands, Philippines, Sri Lanka, Syria, Taiwan, Thailand and Vietnam.

This genus is represented in Mizoram by a single species viz., *Pseudagrion decorum* (Rambur), hence no key is provided.

5. ***Pseudagrion decorum*** (Rambur)

1842. *Agrion decorum* Rambur, *Ins. Neurop.*, : 258.

1933. *Pseudagrion decorum*, Fraser, *Fauna Brit. India* Odon., **1** : 268-269.

Material examined : 4♂♂, Thingdawl and around, 10 kms. South of Kolasib, dist. Aizawl, 4.9.1989, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	28.00	20.00-21.00	19.50-20.00

Distribution : Throughout continental India.

Elsewhere : Nepal, Myanmar and Sri Lanka.

Remarks : Thorax palest blue, with three fine black lines on middorsal carinal ridge and a thicker black stripe, superior anal appendages azure blue, tipped apically with black, a small basal spine narrowly bifid at apex.

Genus ***Aciagrion*** Selys

1867. *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** : 333-334.

Diagnostic characters : Medium sized, very slender in built; bluish or reddish, marked with black, sometimes partly pruinosed; postocular colour spots present. Male superior anal appendages shorter than 10th abdominal segment, triangular or squarish, shallowly notched and sometimes with a prominent tooth present at apex. Penis shaft with a few spines subapically, terminal fold broad, vulver spine present in female. Wings hyaline and narrow. 9-14 postnodals nervure in forewing and 8-11 in hindwing. Arc situated at the level of distal antenodal nervure. ab arising from the inner wing margin from the point where Ac meets it.

Distribution : Africa, Australia, China, India, Indonesia, Japan, Malaya, Myanmar, Nepal, New Guinea, Sri Lanka and Thailand.

This species is represented in Mizoram by a single species, hence no key is provided.

6. ***Aciagrion borneense*** Laidlaw

1919. *Aciagrion hisopa* (Selys) ? race *occidentalis Rec. Indian Mus.*, **16** : 186.

1933. *Aciagrion occidentale*, Fraser, *Fauna Brit. India*, Odon., **1** : 335-337.

1911. *Aciagrion borneense*, Ris, *Ann. Soc. ent. Belg.*, **55** : 234-235.

Material examined : 2♂♂, 1♀, Zobawk, dist. Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	25.00	17.00	16.00
Female :	25.00	19.00	18.00

Distribution : India : Mizoram, South India and West Bengal.

Elsewhere : Sri Lanka.

Remarks : It is among smallest species under the genus. Triangular black spot present on 8th abdominal segment. In one male specimen face, frons and occiput completely black. Pterostigma brown and covers less than a cell, pterostigma of forewing are approximately double in size as compared with hindwing. Arc situated at the level of second antenodal nervure.

Genus ***Ischnura*** Charpentier

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

1933. *Ischnura*, Fraser, *Fauna Brit. India*, Odon., **1** : 346-347.

Diagnostic characters : Small sized damselfly; body colour may be yellow, blue, green or reddish, marked with black. Postocular coloured spots present; female polychromatic; posterior lobe of prothorax variable, simple and rounded or shallowly tripartite; in male a pair of dorsal tubercle present at the apex of 10th abdominal segment. Vulver spine present in female. Wings

hyaline; 8-12 postnodal nervures present in forewing and 6-9 in hindwing. Arc situated at or slightly distal to the level of distal antenodal nervure. In males pterostigma differing in shape and colour in fore and hindwing. Ab arising from inner wing margin well proximal to the point where Ac meets it.

Distribution : Cosmopolitan.

Key to the species of genus *Ischnura charpentier*

1. Species with the ground-colour of both sexes bright orange-red; 8th abdominal segment marked with blue. .... *rufostigma mildredae* Fraser

– Species with the ground colour of males and isochrome females blue or pale grass-green 8th abdominal segment marked with azure blue. 2

2. Abdominal segments 3 to 6 citron-yellow; black marking on the dorsum of 6th abdominal segment absent. ..... *aurora aurora* (Brauer)

– Abdominal segments 3 to 6 black on dorsum; black marking on the dorsum of 6th abdominal segment present. ..... *senegalensis* (Rambur)

7. ***Ischnura aurora aurora*** (Brauer)

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

1865. *Agrion aurora*, Brauer, *Verh. zool.-bot. Ges. wien.*, **15** : 510.

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

1949. *Ischnura aurora aurora*, Lieftink, *Nova Guinea* (New Ser.), **5** : 220.

1991. *Ischnura aurora aurora*, Tsuda, *A distributional list of world Odonta* : 34.

Material examined : 8♂♂, Champhai, 29.10.1991, coll. J.K. Jonathan; 1♂, Champhai, 1.10.1993, coll. A.R. Lahiri.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	21.00	12.50	12.00

Distribution : Throughout India.

Elsewhere : Australia, China, Indonesia, Malaysia, Nepal, New Guinea, New Zealand, Papua, Philippines, Pacific Islands and Sri Lanka.

Remarks : It is a smallest species of the genus Pterostigma Kite shaped, rose-red for its prixinal half but hyaline in distal half. 10th abdominal segment with broad quadrate black dorsal spot. There are 7 postnodal nervures in forewing and 6 in hindwing. It is a most common Indian species occurring in marshy areas flying through grasses and weeds. But during rainy seasons it also spread over grassy fields in the neighbourhood of stagnat waterbodies or slow running streams.

8. ***Ischnura rufostigma mildredae*** Fraser

1927. *Ischnura mildredae* Fraser, *Rec. Indian Mus.*, **29** : 87-88.

1933. *Ischnura mildredae*, Fraser, *Fauna Brit. India, Odon.*, **1** : 366-368.

1991. *Ischnura rufostigma mildredae*, Tsuda, *A distributional list of world Odonata*, : 36.

Material examined : 1♂, Champhai, 1.10.1993, coll. A.R. Lahiri.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	23.00	16.00	15.50

Distribution : India : Mizoram and Manipur.

Elsewhere : Myanmar.

Remarks : Agree well with the description of the species. Dorsum of 2nd abdominal segment marked with a large rounded black spot on the basal two-third and a smaller rounded spot on the apical third. A blue dorsal spot also present on 8th abdominal segment.

9. ***Ischnura senegalensis*** (Rambur)

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

1933. *Ischnura senegalensis*, Fraser, *Fauna Brit. India Odon.*, **1** : 348-351.

Material examined : 1♂, Tipaimukha Road, 7 kms. N. E. from Kolasib, 29.9.1989, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	21.50	16.00	15.50

Distribution : Throughout India.

Elsewhere : Africa, Indonesia, Japan, Malaysia, Myanmar, Philippines and Sri Lanka.

Remarks : Pterostigma diamond shaped, black outer angle and costal border narrowly white, covering less than a cell. Dorsum of 2nd abdominal segment marked with metallic blue black. Apical border of 10th abdomen raised into two tubercles. 9 postnodal nervures in forewing and 7 in hindwing.

Genus *Agriocnemis* Selys

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

1933. *Agriocnemis*, Fraser, *Fauna Brit. India, Odon.*, **1** : 379-380.

Diagnostic characters : Small in size; may be whitish, bluish or reddish, marked with black, sometimes pruinosed; postocular colour spots present; female polychromatic, posterior lobe of prothorax usually differing in shape in male and female. Terminal fold of penis ending in a pair of blunt or acuminate, flagella short, vulver spine absent in the female. wings hyaline, 4-12 antenodal nervures in forewing and 3-9 in hindwing. Arc situated widely distal to the level of the distal antenodal nervure, pterostigma small, rectangular, sometimes differing in male and female. Ab arising from inner wing margin much proximal to the point where Ac meets it.

Distribution : Africa, Australia, China, India, Indonesia, Madagascar, Malaysia, Mauritius, Myanmar, Nepal, New Guinea, Pacific Islands, Philippines, Ryukyu, Seychelles, Sri Lanka, Taiwan and Thailand.

Key to the species of the genus *Agriocnemis* Selys

1. Labrum metalic blue. ..... *pygmaea* (Rambur)

– Labrum bluish, yellowish or whitish, non metallic. 2

2. Proximal segments of abdomen white, Abdominal segments 4 to 6 unmarked. .... *lacteola* Selys

– Proximal segment of abdomen not white, Abdominal segments 4 to 6 marked with black, apical rings confluent with a subapical spot shaped like an arrow-head. .... *pieris* Laidlaw

10. *Agriocnemis lacteola* Selys

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

1933. *Agriocnemis lacteola*, Fraser, *Fauna Brit. India, Odon.*, **1** : 381-383.

Material examined : 1♂, Lalan, 1.12.1995, coll. P. Parui and 2♂♂, Vairengti, dist. Aizawl, 10.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	18.00	11.00	10.00

Distribution : India : Mizoram, Assam, Bihar, Meghalaya, Orissa, Sikkim, South India, Tripura and West Bengal.

Remarks : In Mizoram this species is restricted only at lower altitude. Labrum non-metallic, proximal segments of abdomen white, legs white, Anal appendages blue or pale blue.

11. *Agriocnemis pieris* Laidlaw

1919. *Agriocnemis pieris* Laidlaw, *Rec. Indian Mus*, **26** : 179-180.

1933. *Agriocnemis pieris*, Fraser, *Fauna Brit. India, Odon.*, **1** : 384-385.

Material examined : 1♀, Vairengti, dist. Aizawl, 10.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	17.00	12.00	11.00

Distribution : India : Mizoram and South India.

Remarks : Abdominal segments 1-9 broadly marked with black.

12. *Agriocnemis pygmaea* (Rambur)

1842. *Agrion pygmaeum* Rambur, *Ins. Neurop.*, : 278.

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

Material examined : 1 ♀, Buang, 1.10.1993, coll. M. Sil; 1 ♀, Teirei, 11.11.1995, coll. M.S. Shishodia and 1 ♂, Vairengti, Dist. Aizawl, 10.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	17.00	10.50	10.00
Female :	18.00	12.00	11.50

Distribution : Throughout India.

Elsewhere : Afghanistan, Australia, Bangladesh, China, Hong Kong, Indonesia, Japan, Kampuchia, Malaysia, Myanmar, New Guinea, Pacific Islands, Pakistan, Philippines, Seychelles, Singapore, Sri Lanka, Taiwan and Thailand.

Remarks : Agree fairly well with the description of species. It is most common species of the genus and found on grassy lands, rarely inside bushes in the vicinity of slow running streams or stagnant water bodies. It can be differentiated by the other species of genus by its briliant metallic blue labrum and by 7-10 segments of abdomen and anal appendages which are brick-red in the male.

Genus *Mortonagrion* Fraser

1920. *Mortonagrion* Fraser, *J. Bombay nat. Hist. Soc.*, **27** : 148.

1933. *Mortonagrion*, Fraser, *Fauna Brit. India, Odon.*, **1** : 408-409.

Diagnostic characters : Very small sized and slender build damselfly; colour non-metallic, usually black marked with green, blue or palest brown; female isochromatic, Wings hyaline; pterostigma shaped like an orange-pip. 8-10 postnodal nervures in forewing and 7-8 in hindwing; discoidal cell acutely pointed at distal end; Sectors of arc arising from the lower end of arc and divergent from origin; Arc situated well distal to the level of distal antenodal nervure; ab always present and complete and arising well proximal to the level of ac.

Distribution : Throughout India.

Elsewhere : Indonesia and Japan.

The genus has a single species in Mizoram, hence no key is provided.

13. *Mortonagrion aborense* (Laidlaw)

1914. *Agriocnemis aborense* Laidlaw, *Rec. Indian Mus.*, **8** : 347.

1933. *Agriocnemis aborense*, Fraser, *Fauna Brit. India, Odon.*, **1** : 394-395.

1991. *Mortonagrion aborense*, Tsuda, *A distributional list of world Odonata*, : 39.

Distribution : India : Assam, Mizoram and West Bengal.

Elsewhere : Thailand.

Remarks : This species is included here on the basis the literature review. It can be distinguished from other species of the genus by having 2 large black spots on labrum, abdominal segment nine entirely blue.

Family PLATYCNEMIDIDAE

Diagnostic characters : 1A and Cu2 of normal length; no angulation at medio-anal link; no accessory cross vein in the cubito-anal sapce basal to Ac; discoidal cell with costal margin a little shorter than inner one and inner distal angle obtuse.

Distribution : Virtually cosmopolitan except Australia and American countries.

Key to the genera of family PLATYCNEMIDIDAE

1. Costal margin of discoidal cell one-fifth the inner one; tibiae of males not dilated..... 2

– Costal margin of discoidal cell subequal to the inner one; tibiae of males usually dilated. ..... ***Copera*** Kirby

2. Ab arising at the level of Ac; 2-3 postquadrangular antenodal cells present..... ..... ***Coeliccia*** Kirby

– Ab arising proximal to the point where Ac meets it; only 3 postquadrangular antenodal cells present. ..... ***Calicnemia*** Strand

Genus ***Calicnemia*** Strand

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

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

1926. *Calicnemia*, Strand, *Arch. Naturgesch*, **92A** : 46.

Diagnostic characters : Medium sized damsefly; may be red or black, marked with yellow, sometimes pruinosed; posterior lobe of prothorax simple and rounded. Male superior anal appendages as long as or a little longer than segment 10 of abdomen. Terminal fold of penis rather deeply cleft and produced into a pair of curled, moderately long apical flagella. Wing hyaline, pterostigma subquadrate; 14-22 postnodal nervures in forewing and 13-20 in hindwing. Only 3 postquadrangular antenodal cells in both the wings. Ab arising from inner margin proximal to the point where Ac meets it.

Distribution : Bhutan, India, Laos, Malaysia, Myanmar, Nepal, Tibet and Vietnam.

Key to the species of genus *Calicnemia* Strand

1. Head entirely black underneath, abdomen black without markings. 2

– Head yellow underneath, abdomen red..... 3

2. Length of hindwing 25.00 mm. .... *pulverulans* (Selys)

– Length of hindwing 20-22 mm. .... *sudhaae* Mitra

3. Abdomen bright vermilion-red, without markings, thorax with a small but conspicuous upper post-humeral spot, 14-17 postnodal nervures in forewing and 13 in hindwing. ... . *eximia* (Selys)

– Abdomen red, with black markings on 7th to 10th abdominal segments, thorax without upper post humeral spot, 19-20 postnodal nervures in forewing and 17-18 in hindwing. ..... *miniata* (Selys)

14. ***Calicnemia eximia*** (Selys)

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

1933. *Calicnemis eximia*, Fraser, *Fauna Brit. India, Odon.*, **1** : 174-175.

1991. *Calicnemia eximia*, Tsuda, *A distributional list of world Odonata* : 51.

Material examined : 1♂, Kawn Kawn village, dist. Chhimtuipui, 4.4.1994, coll. S.K. Ghosh and M. Prasad; 1♀, Pukpui, dist. Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad and 1♀, Seling, 15.9.1994, coll. I.B. Dutta.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	32.00	23.00	22.50
Female :	28.50	23.00	23.00

Distribution : India : Assam, Arunachal Pradesh, Himachal Pradesh, Mizoram, Meghalaya, Uttar Pradesh and West Bengal.

Elsewhere : Afghanistan, Bangladesh, China, Myanmar, Nepal and Vietnam.

Remarks : Thorax black on dorsum, abdomen bright vermilion red; without any markings. Anal appendages bright yellow of equal length; superior anal appendages with a long ventral subbasal spine. 18 postnodal nervures in forewing and 15 in hindwings of male; while in female 17 postnodal nervures in forewing and 14 in hindwing. This species was observed along the bank of slow running streams, comparatively in open habitats.

15. ***Calicnemia miniata*** (Selys)

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

1933. *Calicnemis miniata*, Fraser, *Fauna Brit. India, Odon.*, **1** : 177-178.

1991. *Calicnemia miniata*, Tsuda, *A distributional list of world Odonata*, : 51.

Material examined : 1♂, Kawn Kawn village, Chhimtuipui, 4.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	31.50	28.00	27.00

Distribution : India : Mizoram, Sikkim and West Bengal.

Elsewhere : Bangladesh, China, Nepal and Tibet.

Remarks : Anal appendages of this species very much similar to *Calicnemia eximia*, but inferiors are much longer sinuous, apices sloping inwards. Pterostigma black and covers 1½ cells. 19 postnodal nervures in forewing and 18 in hindwing.

16. *Calicnemia pulverulans* (Selys)

1886. *Calicnemis pulverulans* Selys, *Mem. Cour.*, **38** : 133.

1933. *Calicnemis pulverulans*, Fraser, *Fauna Brit. India, Odon.*, **1** : 175-177.

1991. *Calicnemia pulverulans*, Tsuda, *A distributional list of world, Odonata*, : 51.

Material examined : 1♂, 1♀, Lawngtlai, 18.9.1993, coll. A.R. Lahiri; 4♂♂, Kolasib, 15.4.94, coll. A.K. Hazra and 1♀, Dampa Sanctuary, 9.11.1995, coll. M.S. Shishodia.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	29.00-30.50	25.00-26.00	25.00
Female :	30.00	25.50	25.00

Distribution : India : Meghalaya, Sikkim, West Bengal and Western Himalaya.

Elsewhere : Bangladesh, Myanmar and Nepal.

Remarks : Labium creamy white; apex of inferior anal appendages yellow; pterostigma brown and covers 1½ cells; 15-18 postnodal nervures in forewing and 18 in hindwing.

17. *Calicnemia sudhaae* Mitra

1994. *Calicnemia sudhaae* Mitra, *Rec. zool. Surv. India, Occ. Pap.*, No. 166 : 28-29.

Distribution : India : Mizoram.

Remarks : This species is included on the basis of literature review. Differs from *Calicnemia pulverulans* in length of hindwing and colour pattern.

Genus *Coeliccia* Kirby

1857. *Trichocnemis* Selys, in Sagra, *Hist. cuba. Ins.*, : 454 (nom. Praeoc).

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

1933. *Coeliccia*, Fraser, *Fauna Brit. India, Odon.*, **1** : 152-153.

Diagnostic characters : Medium sized; black marked with white, bluish or yellowish; posterior lobe of prothorax rounded or trapezoidal. In male superior anal appendages subequal or longer than 10th abdominal segment, narrowed apically or dilated midially, parallel or slightly divergent at apex and with porjections on inner margin; inferior anal appendages longer than superiors, abruptly narrowed from a broad base, sloping upwards with apices often curved inwards or downwards. Terminal fold of penis broad or reduced and usually prolonged into a pair of long curled apical flagella. Wings hyaline; pterostigma subquadrate. 11-13 postnodal nervures in both pairs of wing. Ab arising from inner wing margin proximal to the point where Ac meets it.

Distribution : India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Ryukyu, Taiwan, Tibet and Vietnam.

Key to the species of Genus *Coeliccia* Kirby

1. Anal appendages black, apex tipped with bright yellow. ..... *loogali* Laidlaw

– Anal appendages creamy-white, apex not tipped with bright yellow. 2

2. Dorsum of thorax with a single pair of oval pale blue spots. ..... *bimaculata* Laidlaw

– Dorsum of thorax pale blue for the lower half. ..... *renifera* (Selys)

18. *Coeliccia bimaculata* Laidlaw

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

1933. *Coeliccia bimaculata*, Fraser, *Fauna Brit. India, Odon.*, **1** : 154-155.

Material examined : 1♂, Bilkhawthir, Kolasib, 5.9.1989, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	37.00	24.00	23.00

Distribution : India : Meghalaya and Mizoram.

Remarks : 18 postnodal nervures in forewing and 16 in hindwing.

19. *Coeliccia loogali* Laidlaw

1932. *Coeliccia loogali* Laidlaw, *Rec. Indian Mus.*, **34** : 12, 26-28.

1933. *Coeliccia loogali*, Fraser, *Fauna Brit. India, Odon.*, **1** : 163-165.

Material examined : 1♂, Pukpui, Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	45.00	25.00	35.00

Distribution : India : Mizoram.

Elsewhere : Myanmar and Nepal.

Remarks : Anal appendages black and apex tipped with bright yellow; pterostigma brown and covers 2 cells; 22 postnodal nervures in forewing and 20 in hindwing.

20. *Coeliccia renifera* (Selys)

1886. *Coeliccia renifera* Selys, *Mem. Cour.*, **38** : 119.

1933. *Coeliccia renifera*, Fraser, *Fauna Brit. India, Odon.*, **1** : 156-159.

Material examined : 1♂, Pukpui, Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	37.50	23.00	22.50

Distribution : India : Assam, Himachal Pradesh, Mizoram, Sikkim, Uttar Pradesh and West Bengal.

Remarks : This species has characteristic paired, oval pale blue spots on two sides of mid-dorsal carina. Pterostigma black and covers 1½ cells. 19 postnodal nervures in forewing and 17 in hindwing.

Genus *Copera* Kirby

Diagnostic characters : Medium sized damselfly; whitish, bluish or partly reddish, marked with black or brown; posterior lobe of prothorax simple in either sex and rounded, or deeply notched in females where the inferior lip occassionally visible from above as a narrow plate and provided with a triangular notch or a pair of ungulated processes projecting forward or upwards. Wing hyaline; pterostigma a little longer than broad; 11-15 postnodal nervures in forewing and 9-13 in hindwing; discoidal cell with costal and inner margine subequal.

This species is represented by a single species in Mizoram, hence no key is provided.

Distribution : Bhutan, China, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Taiwan and Thailand.

21. *Copera marginipes* (Rambur)

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

1933. *Copera marginipes*, Fraser, *Fauna Brit. India, Odon.*, **1** : 192-197.

Material examined : 1♂, Zobawk, Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad; 2♂♂, Vairengti, 16.4.1994, coll. A.K. Hazra; 1♀, Vairengti, 18.4.1994, coll. A.K. Hazra; 1♂, 2♀♀, Saihapuikawn, Aizawl, 9.12.1995, coll. R.S. Mirdha and 3♂♂, 2♀♀, Sikha Basti, Aizawl, 29.11.995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	30.00-31.50	19.00-20.00	18.00-19.00
Female :	31.00	21.00	20.00

Distribution : India : Assam, Bihar, Chandigarh, Madhya Pradesh, Maharashtra, Mizoram, Rajasthan, South Andaman Islands, West Bengal, Western Ghats and Western Himalaya.

Elsewhere : China, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Taiwan and Thailand.

Remarks : Tip of inferior anal appendages black and rest creamy-white; Inferior anal appendages at least four times in length of superior, broad at base, tapering but slightly to a rounded obtuse apex. Superior anal appendages vestigial, tiny rounded tubercles, apex pointed hooked strongly inwards. In teneral specimens

legs are cream-yellow in colour. Pterostigma brown and covers more than a cell. 11 postnodal nervures in forewing and 10 in hindwing.

Family PORTONEURIDAE

Diagnostic characters : Nervure 1A usually absent, but when present reduced; no angulation at medioanal link; Cu2 reduced or normal length; no accessory cross vein in the cubitoanal space basal to Ac; discoidal cell with subequal costal and inner margins and with inner distal angle nearly a right angle.

Distribution : Cosmopolitan.

This family is represented, in Mizoram by a single genus and genus again has got a single species in the State, hence no key is provided.

Genus ***Prodasineura*** Cowley

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

1890. *Caconeura*, Kirby, *Sy. cat. Neurop. Odon.*, : 134, (Nom. nov.).

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

Diagnostic characters : Medium sized damselfly; black marked with bright red, orange, blue, whitish or yellow; posterior lobe of prothorax in male simple, usually rounded or sometimes notched in middle; male anal appendages subequal in length and a little longer than segment 10 of abdomen. Terminal fold of penis ending in a pair of short branches on either side. Wings hyaline; pterostigma about one and a half times as long as broad. 12-17 postnodal nervures in forewing and 11-15 in hindwing. Ab usually absent; if present then incomplete and curved to meet hind margin of wing; Cu2 reduced not extending for more than 4 cells beyond discoidal cell.

Distribution : Africa, China, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka and Thailand.

22. ***Prodasineura verticalis burmanensis*** Fraser

1933. *Caconeura verticalis burmanensis* Fraser, *Fauna Brit. India, Odon.*, **1** : 216-218.

1991. *Prodasineura verticalis burmanensis*, Tsuda, *A distributional list of World Odonata*, : 14.

Material examined : 1♂, Zobawk, Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	30.00	21.00	20.00

Distribution : India : Mizoram.

Elsewhere : Myanmar.

Remarks : This species is recently recorded for the first time from India by Prasad (1997) from Mizoram.

Vertex, occiput, face and frons all mat black. Pterostigma black and covers one cell; nervure Ab present incompletely in forewing, absent in hindwing. 14-15 postnodal nervures in forewing and 12 in hindwing.

Superfamily LESTOIDEA

Diagnostic characters : Medium to large sized damselfly; hind margin of posterior lobe of prothorax rounded; males with anterior hamules elongated; wings petiolated; only 2 antenodal nervures present.

Distribution : Cosmopolitan.

Key to the families of superfamily LESTOIDEA

1. Cuii at its origin from discoidal cell strongly arched towards the costa; moderately large species. ..... SYNLESTIDAE

– Cuii at its origin only slightly arched towards the costa; rather small species.... LESTIDAE

Family SYNLESTIDAE

Diagnostic characters : Wings hyaline or those of males sometimes banded with dark or blackish brown; discoidal cell usually strongly arched towards the costal margin. Pterostigma longer than broad.

Distribution : Africa, Australia, Bhutan, China, India, Myanmar, Nepal, Taiwan and Vietnam.

This family is represented by a single genus *Megalestes* Selys in Mizoram, hence no key is provided.

Family : LESTIDAE

Diagnostic characters : Wings hyaline, tinted with yellow or those of males sometimes banded with dark or blackish-brown; discoidal cell well formed and separated from inner wing margin; Cuii on leaving discoidal cell usually not arched towards costal margin; anal vein arising from inner wing margin at the point of Ac; pterostigma usually longer than broad.

Distribution : Cosmopolitan.

This family is represented by a single genus Lestes Leach in Mizoram, hence no key is provided.

Genus ***Lestes*** Leach

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

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

Diagnostic characters : Medium to large sized damselfly; may be blue, green, yellow, or orange marked with brown, black or metallic green, sometimes partly pruinosed; posterior lobe of prothorax rounded or sometimes shallowly tripartite, male superior anal appendages subequal to or one and a half time as long as 10th abdominal segment. It may be blunt or acute, apices curling inwards, outer border bearing a few (3-5) denticles subapically; inferior anal appendages about one third to one half of the length of superior; penis with large, much flattend apical fold. Wings hyaline, sometimes partly enfumed; 9-16 postnodal nervures in both pairs of wings; Ab arising from inner wing margin from or slightly proximal to the point where Ac meet it.

Distribution : Cosmopolitan.

This genus is represented by a single species i.e., Lestes dorothea Fraser in Mizoram, hence no key is provided.

23. ***Lestes dorothea*** Fraser

1923. *Lestes praemorsa dorothea* Fraser, *J. Bombay nat. Hist. Soc.*, **29** : 480.

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

1933. *Lestes dorothea*, Fraser, *Fauna Brit. India, Odon.*, **1** : 35-36.

Material examined : 1♂, Thingdawl, Kolasib, 4.9.1989, coll. Y.N.P. Sinha; 1♂, Champhai, 1.10.1993, coll. M.Sil and 5♂♂, Zobawk, Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	39.00-40.00	24.00-26.00	23.00-25.00

Distribution : India : Mizoram, Assam, Karnataka, Maharashtra and Meghalaya.

Elsewhere : Nepal.

Remarks : The specimens of this species were collected from the bushes present at the sides of small stagnant waterbodies. Pterostigma dull yellow and covers 2 cells. 12-14 postnodal nervures in forewing and 11-14 in hindwing.

Genus ***Megalestes*** Selys

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

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

Diagnostic characters : Large damselfly; metallic green with yellowish mark. superior anal appendages in males as long as or a little longer than 10th abdominal segment; forcipate with a basal subquadrate projection; inferiors about one third as long as superiors, triangular or spherical and either with a variously shaped basal spine or with a diverticate spine at apex. Wings long and narrow; 16-24 postnodal nervures in forewing and 12-18 in hindwing. Arc at the level of distal antenodal nervure; pterostigma elongated, a little more than twice as long as broad, slightly swollen at middle; Ab arising from inner wing margin usually proximal to the point where Ac meets it.

Distribution : Africa, Australia, Bhutan, China, India, Myanmar, Nepal, Taiwan and Vietnam.

Key to the species of the genus *Megalestes* Selys

1. Thorax black beneath not pruinosed, inferior anal appendages not rudimentry, with two long strongly imbricated spine. ..... *irma* Fraser

– Thorax pale yellow beneath or pruinosed white, inferior anal appendages rudimentry, rounded with a moderately robust short spine. ..... *major* Selys

24. *Megalestes irma* Fraser

1926. *Megalestes irma* Fraser, *J. Darjeeling Nat. Hist. Soc.*, **32**, 38.

1933. *Megalestes irma*, Fraser, *Fauna Brit. India, Odon*, **1** : 23-25.

Material examined : 1♂, Pukpui, Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	65.50	38.00	37.00

Distribution : India (Sikkim and West Bengal).

Remarks : Inferior anal appendages with two apical and subapical spine instead of only one as in *M. major*. Pterostigma brownish black and covers about 3 cells. 16-17 postnodal nervures in forewing and 15 in forewing.

25. *Megalestes major* Selys

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

1933. *Megalestes major*, Fraser, *Fauna Brit. India, Odon.*, **1** : 21-23.

Distribution : India : Mizoram, Assam, Himachal Pradesh, Meghalaya, Punjab, Sikkim, Uttar Pradesh and West Bengal (Prasad and Varshney, 1995).

Elsewhere : Bhutan, China, Myanmar, Nepal, Taiwan and Vietnam (Srivastava and Sinha, 1993 and 1995).

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

Superfamily CALOPTEYGOIDEA

Diagnostic characters : Medium to large sized damselfly; hind margin of posterior lobe of prothorax rounded, trapezoidal or shallowly tripartite; anterior hamules of male quadrate; wings usually petiolated, sometimes not petiolated; more than two antenodal nervures present; postnodals not in strict alignment with cross veins beneath.

Distribution : Virtually cosmopolitan.

Key to the families of superfamily CALOPTERYGOIDEA

1. Two primary antenodal cross veins easily distinguishable from the secondaries; Petiolation of wing ending far proximal to the level of arc. ..... CHLOROCYPHIDAE

– Two primary antenodal cross veins not distinguishable from the secondaries. 2

2 1st lateral suture of synthorax incomplete and not traceable upto the spiracle. ..... EPHAEIDAE

– 1st lateral suture of synthorax complete and well developed traceable even beyond spiracle. ..... CALOPTERYGIDAE

Family CALOPTERYGIDAE

Diagnostic characters : Medium to large sized, with usually metallic green ground colour; synthorax with 1st lateral suture complete. wings hyaline or coloured; petiolation absent, sometimes extending slightly proximal to arc; more than 2 antenodals present; primary antenodals not easily distinguishable. Scetors of arc arising from about its middle and either separated at origin or arising from a common point.

Distribution : Virtualy cosmopolitan.

Key to the genera of family CALOPTERYGIDAE

1. 1A fused at base with inner border of wings; discoidal cell about half the length of median space and transversed only once. ..... ***Caliphaea*** Selys

- 1A free from inner border of wings; discoidal cell subequal to median space in length and traversed at least 4 times. 2

2. Arc oblique; median space entire. ..... ***Vestalis*** Selys

- Arc angulated; median space traversed or reticulated. 3

3. Pterostigma present. ..... ***Echo*** Selys

- Perostigma absent if present then traversed by nervures. 4

4. All wings in both sexes opaque. ..... ***Matrona*** Selys

- Forewings in both sexes hyaline. ..... ***Neurobasis*** Selys

Genus ***Caliphaea*** Selys

1859. *Caliphaea* Selys, *Bull. Acad. Belg. Sci.* (2), **7** : 430.

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

Diagnostic characters : Moderately large sized damselfly; metallic green or coppery with yellow and blackish markings, posterior lobe of prothorax with shallowly notched posterior border; male anal appendages subequal to 10th abdominal segment; superior anal appendages farcipate, when viewed from above expanded at base and apex, with dorsal keel originating at base and outer border with few spines subapically. Inferior anal appendages shorter than superior; wings wide, hyaline or uniformly light yellow; 12-17 antenodal and 23-29 postnodal nervures present; pterostigma short, slightly more than twice as long as broad and swollen in the middle. Arc oblique and situated between 4th and 7th antenodal nervures. Sectors of arc arising from little below the level of arc, slightly separated at origin.

Distribution : Bhutan, China, India, Laos, Myanmar, Nepal and Tibet.

26. ***Caliphaea confusa*** Selys

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

1934. *Caliphaea confusa*, Fraser, *Fauna Brit. India, Odon.*, **2** : 149-151.

Material examined : 1♂, Siahtle vill., Saiha, 7.4.1994, coll. A.K. Hazra.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	broken (damaged)	28.50	28.00

Distribution : India : Mizoram, Meghalaya and West Bengal.

Elsewhere : Bhutan, China, Laos, Myanmar, Nepal and Tibet.

Remarks : It is a submontane and montane species known upto an altitude of 2000 meters. Prothorax, thorax and abdominal segments 1st to 7th metallic coppery green. Abdominal segments from 8th to 10th are pruinosed on dorsum. Pterostigma black and covers about 2 cells.

Nodal index. $\frac{22-25}{25-14} / \frac{25-23}{14-22}$

Genus ***Echo*** Selys

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

1934. *Echo*, Fraser, *Fauna Brit. India, Odon.*, **2** : 134-136.

Diagnostic characters : Large sized, metallic green marked with black; male superior anal appendages about one and half times as long as segment 10 of abdomen; forcipate when viewed dorsally, swollen at apex with few spines; inferior anal appendages two-third the length of superior; wings broad, hyaline, or partly opaque; 29-40 antenodal and 55 to 77 postnodals in forewing and 23-30 antenodal and 56-64 postnodals in hindwing; pterostigma short, about tiwce as long as broad, with broadened and rounded inner margin. Arc angulated, situated usually at the level of 5th antenodal nervure. Sectors of arc arising from a little below the level of arc, separated at origin.

Distribution : India, China and Myanmar.

27. ***Echo margarita margarita*** Selys

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

1934. *Echo margarita margarita*, Fraser, *Fauna Brit. India, Odon.*, **2** : 136-137.

Material examined : 1♂, Pukpui, Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	43.00	36.00	35.50

Distribution : India : Mizoram, Manipur, Meghalaya.

Elsewhere : Distribution in China is doubtful (Fraser, 1934).

Remarks : Specimen agree fairly well with the description of the species.

Genus *Matrona* Selys

1853. *Matrona* Selys, *Syn. cat.*, 17.

1934. *Matrona*, Fraser, *Fauna Brit. India, Odon.*, **2** : 144-145.

Diagnostic characters : Large sized metallic green damselfly, marked with blue and black; male superior anal appendages subequal to 10th abdominal segment, forcipate, broadened basally and also on distal half and outer border bearing a few spines. Inferior anal appendages about two third the length of superior anal appendages, narrowing to an acute apex. Wings very broad, opaque blackish or steely blue or partly hyaline apically.40-65 antenodal and 90-150 postnodal bervures in both pairs of wings. Sectors of arc arising from a common point a little below the middle of arc.

Distribution : India, Bangladesh, China, Myanmar, Thailand and Vietnam.

28. *Matrona basilaris nigripectus* Selys

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

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

Distribution : India : Mizoram and Meghalaya.

Elsewhere : Myanmar.

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

Genus *Neurobasis* Selys

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

1934. *Neurobasis*, Fraser, *Fauna Brit. India, Odon.*, **2** : 119-121.

Diagnostic characters : Large sized damselfly, matellic green marked with blue, yellowish and black; male superior anal appendages subequal to segment 10 of abdomen, farcipate, broadened basally and again on distal half and outer border with few spines; inferior anal appendages a little shorter than superior; wings broad and hyaline, but in males forewing partly opaque metallic blue or green; pterostigma absent in males and in forewing of females, but when present in female it is suboval, may or may not be reticulated. Arc angulated, situated at about the level of 10th antenodal nervure.

Distribution : Australia, China, India, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka and Thailand.

29. *Neurobasis chinensis chinensis* (Linnaeus)

1753. *Libellula chinensis* Linnaeus, *Syst. Nat.*, **1** : 545.

1853. *Neurobasis chinensis*, Selys, *Syn. Cal.*, : 18.

1934. *Neurobasis chinensis chinensis*, Fraser, *Fauna Brit. India, Odon.*, **2** : 121-124.

Material examined : 1♂, Seling and around, 8.9.1984, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	44.00	38.00	37.00

Distribution : India : Mizoram, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka and Thailand.

Genus *Vestalis* Selys

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

1934. *Vestalis*, Fraser, *Fauna Brit. India, Odon.*, **2** : 124-125.

Diagnostic characters : Large sized, metallic bronze, blue or green marked with yellow or black, occassionally pruinosed; superior anal appendages of male a little longer than 10th abdominal segment; forcipate, broadened at base and again on distal half, outer border bearing a

few spines; inferior anal appendages about two-third the length of superior; wings moderately broad, hyaline but tinted with yellow or opaque black at apices; 17 to 37 antenodals and 36-85 postnodal nervures in both pairs of wing. Pterostigma absent; arc oblique, situated at about the level of 4th antenodal nervure; sectors of arc arising from a common point on its lower half.

Distribution : India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Tibet and Vietnam.

30. ***Vestalis gracilis gracilis*** (Rambur)

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

1853. *Vestalis gracilis*, Selys, *Syn. Cal.*, : 26.

1934. *Vestalis gracilis gracilis*, Fraser, *Fauna Brit. India, Odon.*, **2** : 126-128.

Material examined : 1♂, Zopui Hills, Lunglei, 14.1.1992, coll. S.J.S. Hattar.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	46.00	34.00	33.00

Distribution : India : Mizoram, Andhra Pradesh, Andaman & Nicobar Islands, Assam, Bihar, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu and West Bengal.

Elsewhere : Malaysia, Myanmar, Thailand and Vietnam.

Remarks : Major part of head, thorax and abdomen metallic green; discoidal cell traversed. Specimens of this species are commonly found along montane and submontane streams.

Family CHLOROCYPHIDAE

Diagnostic characters : Meduim sized damselfly, with ground colour nonmetallic; clypeus markedly projected farming epistome; abdomen shorter than hindwing; synthorax large in comparison to body. Wings often markedly coloured in males, rarely in female; petiolation not reaching the level of arc; more than two antenodal nervures present. Arc angulated or oblique, situated in a line with the distal primary antenodal nervure; sectors of arc arising from above the middle of arc and these either separated right from origin or arising from a common point.

Distribution : Cosmopolitan in old world countries.

Key to the genera of family CHLOROCYPHIDAE

1. Wings (at least hindwings, except in Rhinocypha (Aristocypha). immaculata) coloured in male; 1A not zigzagged at its origin. ..... ***Rhinocypha*** Rambur

– Wings uncoloured in both sexes; 1A zigzagged from its origin. ..... ***Indocypha*** Laidlaw

Genus ***Rhinocypha*** Rambur

1842. *Rhinocypha* Rambur, *Hist. nat. Ins. Neurop.*, : 232.

1934. *Rhinocypha*, Fraser, *Fauna Brit. India, Odon.*, **2** : 5-7.

Diagnostic characters : Medium sized, red or black marked with yellow, green or blue; epistome moderately developed; in male superior anal appendages pincer-like, about twice as long as 10th abdominal segment; inferior anal appendages ungulated and half the length of superior; wings moderately narrow or well dilated, hyaline or partly opaque, opaque portion may be marked with metallic blue, violet, green or coppery, 12-23 antenodal and 20-48 postnodal nervures present in both the pairs of wings. Arc angulated, usually situated at the level of distal primary antenodal nervure, but sometimes either proximal or even distal to that lavel; sectors of arc arising from about its middle, separated at origin.

Distribution : Australia, Bangladesh, China, HongKong, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pacific Islands, Papua, Philippines, Ryukyu, Taiwan, Thailand, Tibet and Vietnam.

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

1. Smaller species with abodmen and hindwing each less than 23.00 mm; apical vitreous spot

moderately large, lying partly proximal to line of pterostigma; midrow of vitreous spots always well separated, costal spot extending much nearer to node than middle spots. ..... *Rhinocypha (Aristocypha) quadrimaculata* Selys

– Large species, with abdomen and hindwing each more than 23.00 mm in length; apical vitreous spot large, lying almost entirely proximal to line of pterostigma, mid-row of vitreous spot more or less confluent..... ..... *Rhinocypha (Aristocypha) spuria* (Selys)

31. ***Rhinocypha (Aristocypha) spuria*** (Selys)

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

1934. *Rhinocypha spuria*, Fraser, *Fauna Brit. India, Odon.*, **2** : 12-14.

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

1991. *Rhinocypha (Aristocypha) spuria*, Tsuda, *A distributional list of World Odonata*, : 77.

Material examined : 1♂, Bilkhawthr, Kolasib, 5.9.1989, coll. Y.N.P. Sinha and 1♂, 3♀♀, Seling, 8.9.1989, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	24.00	24.50	24.00
Female :	21.00	25.50	25.00

Distribution : India : Mizoram, Meghalaya, Nagaland and Utar Pradesh.

Elsewhere : Myanmar.

Remarks : Specimens agree well with the description of the species.

32. ***Rhinocypha (Aristocypha) quadrimaculata*** Selys

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

1934. *Rhinocypha quadrimaculata*, Fraser, *Fauna Brit. India, Odon.*, **2** : 14-17.

1950. *Rhinocypha quadrimaculata*, Laidlaw, *Trans. R. ent. Soc., London*, **101** : 273.

1991. *Rhinocypha (Aristocypha) quadrimaculata*, Tsuda, *A distributional list of world Odona.* : 77.

Material examined : 2♂♂, Kawn Kawn village, Chhimtuipui, 4.4.1994, coll. S.K. Ghosh and M. Prasad; 4♂♂, 1♀, Zobawk, Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad; 1♀, Kolasib, 15.4.1994, coll. A.K. Hazra and 1♂, 1♀, Lalan, Aizawl, 1.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	20.00-22.00	22.00-23.00	21.50-22.50
Female :	18.50-20.00	24.50-26.00	24.00-26.00

Distribution : India : Mizoram, Assam, Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Bangladesh, Myanmar, Nepal and Thailand.

Remarks : Reticulation very close, hindwing border dialated in the middle, apical veterous spot transversely elongate, extending one cell row posterior to IRiii, middle row of spots three in numbers, of these middle one shorter than hinder spot. This is one of the smallest representative of the genus. It has a wide distribution in high as well as low altitude.

Genus ***Indocypha*** Laidlaw

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

1928. *Chlorocypha*, Fraser, *J. Bombay nat. Hist. Soc.*, **32**: 684.

1934. *Chlorocypha*, Fraser, *Fauna Brit. India, Odon.*, **2** : 55-56.

1981. *Indocypha*, Davies, *Soc. Int. Odonatol. rapid. comm.*, : 22.

Diagnostic characters : Moderately robust and similar to the genus *Rhinocypha*; mesothoracic triangle undeveloped abdomen may be brilliantly red, blue or yellow; Wings hyaline, hindwing not noticeably broader than the forewing venation close; petiolation variable.

Distirbution : Africa, Cambodia, India, Laos, Myanmar, Philippines and Vietnam.

This genus is represented in Mizoram by single species, hence no key is provided.

33. ***Indocypha vittata*** (Selys)

1891. *Libellago asiatica* sub sp. *vittata* Selys, *Ann. Mus. Ciu.*, Genova (2), **10** : 490-491.

1994. *Chlorocypha vittata*, Fraser, *Fauna Brit. India, Odon.*, **2** : 56-58.

1991. *Indocypha vittata*, Tsuda, *A distributional list of world Odonata*, : 74.

Distribution : India : Mizoram.

Elsewhere : Myanmar.

Remarks : This species is included here on the basis of literature review. It is smaller in size; petiolation of wings very short; tibiae much more dilated; mesothoracic triangle absent.

Family EUPHAEIDAE

Diagnostic characters : Usually medium to large sized damselfly; ground colour non metallic; Sythorax with 1st lateral suture incomplete; wings often coloured males; petiolation absent or when present very slight; antenodal nervures more than two; sectors of arc arising from about it middle and usually separated or even arising from a common point; discoidal cell short, less than half of the median space.

Distribution : Afghanistan, Bangladesh, Bulgaria, China, Europe, HongKong, India, Indonesia, Israil, Japan, Kampuchea. Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Ryukyu, Sri Lanka, Syria, Taiwan, Thailand, Turkey and Vietnam.

Key to the genera of family EUPHAEIDAE

1. Discoidal cells traversed, segment 10 of abdomen produced apically into a prominent mid-dorsal keel. ..... ***Euphaea*** Selys

– Discoidal cells usually entire, keel on segment 10 of abdomen absent. .... ***Anisopleura*** Selys

Genus ***Anisopleura*** Selys

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

1934. *Anisopleura*, Fraser, *Fauna Brit. India, Odon.*, **2** : 84-85.

Diagnostic characters : Moderately large in size; black marked with green, yellow or white, rarely pruinosed; first lateral suture of synthorax incomplete; no keel on abdominal segment 10 of male; male superior anal appendages a little longer than 10th abdominal segment. Terminal fold of penis produced apically into a moderately long process on either side. Wings hyaline, apices black in male; costal border of hindwings in male with an abrupt outward angulation at a point a little before midway from wing-base to nodus. 14-22 antenodal and 17-22 postnodal nervures present in both pairs of wing. Arc slightly angulated, situated at about the level of third antenodal nervure; sectors of arc arising from about its middle, separated at origin.

Distribution : India, China, Myanmar, Nepal, Thailand and Vietnam.

Since this genus is represented by a single species in Mizoram, no key is provided.

34. ***Anisopleura comes*** Hagen

1880. *Anisopleura comes* Selys, *C.R. Soc. Ent. Belg.*, **23** : 63.

1934. *Anisopleura comes*, Fraser, *Fauna Brit. India, Odon.*, **2** : 87-89.

Material examined : 1♂, Kawn Kawn village, Chhimtuipui, 4.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	37.00	32.00	31.00

Distribution : India : Mizoram, Assam, Sikkim, West Bengal and Western Himalaya.

Elsewhere : Bangladesh, China and Nepal.

Remarks : It is a large sized species; 4 cubital nervures present in both the wings; Humeral strips present; superior anal appendages without spine; apices of forewing marked with black; pterostogma black and covers 4½ cells; 17 antenodals and 18 postnodal nervures in forewing and 15 antenodals and 16 postnodal nervures present in hindwing.

Genus ***Euphaea*** Selys

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

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

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

Diagnostic characters : Moderately large sized; black, often vermilion red, marked with yellow, green, blue or red, sometimes pruinosed; First lateral suture of synthorax incomplete; Tenth abdominal segment with a median prominent keel in male; male superior anal appendages usually subequal to or a little longer than 10th abdominal segment; inferior anal appendages conical, less than half the length of superior. Wings expanded hyaline, enfumed with reddish or green brown, Fore or hindwings or both in male partly or entirely saffronated or opaque brown with metallic lusture; 15-36 antenodal and 27-49 postnodal nervures in both the wings. Pterostigma narrow, about four to six times as long as broad, a little swollen medially. Arc straight or slightly angulated, situated variably between 2nd and 7th antenodal nervures. Sectors of arc arising from about its middle, separated at origin.

Distribution : China, India, Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand and Vietnam.

35. ***Euphaea ochracea ochracea*** Selys

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

1991. *Euphaea ochracea ochracea*, Tsuda, *A distribution list of world Odonata*, : 81.

Material examined : 1♂, Seiling, 8.9.1989, coll. Y.N.P. Sinha.

Distribution : India : Mizoram, Assam and Meghalaya.

Elsewhere : Annam, Indonesia, Thailand and West Malaysia.

Remarks : 3 cubital nervures present in both pairs of wings; 27 antenodals and 39 postnodal nervures in forewing and 25 antenodals and 37 postnodal nervures present in hindwings.

Suborder ANISOPTERA

Diagnostic characters : Head compact, more or less globular; Labium with middle lobe usually smaller than lateral lobes and with or without a median fissure; inner margin of eye never separated by a space greater than their own diameter; male genitalia variable, lamina arched posterior hamules well developed; paired superior and single inferior anal appendages present in male ovipositor in female variable, may be fully developed or aborted. Fore and hindwing dissimilar in venation and out line, anal field of hindwing broader than that of forewing; usually more than 5 antenodal nervurers; discoidal cell differentiated into triangle and hypertriangle.

Distribution : Cosmopolitan.

Key to the superfamilies of suborder ANISOPTERA

1. Labial mask of nymphs of primitive zygopterous type, flattened and without setae; lateral lobes narrow, with a long robust movable hook; gizzard with 4-8 folds, each with numerous small teeth.. AESHNOIDEA

– Labial mask of nymph broad and deeply concave or cupped and with numerous setae; lateral lobes broad, their apposed borders beig more or less deeply incised, crenate or serrate and often bordered with tuft of setae; gizzard with 4 folds, each with a robust tooth, adult males with obsolete anterior hamules of genitalia and females with ovipositor usually inconspicuous. ..... LIBELLULOIDEA

Superfamily AESHNOIDEA

Diagnostic characters : Head nearly globular; inner margins of eyes contiguous or well separated; vesicle not well differentiated; occiput may be large or small; male genitalia with well developed hamules; ovipositor either present or absent.

Distribution : Cosmopolitan.

Key to the families of Superfamily AESHNOIDEA

1. Inner margins of eyes well separated; occipital plate large and trapezoidal, female without ovipositor. ..... GOMPHIDAE

– Inner margins of eyes broadly contiguous on vertex; occipital plate small and triangular; female with well developed ovipositor. .... AESHNIDAE

Family GOMPHIDAE

Diagnostic characters : Head subglobular; labium with middle lobe lacking median incision, broader than lateral lobes; inner margins of eyes well separated, occiput large; male genitalia not covered by second abdominal tergite; ovipositor absent; vulver scale usually present; discoidal cell entire or traversed by cross veins, similar or dissimilar in shape in fore and hindwings.

Distribution : Cosmopolitan.

Genus ***Merogomphus*** Martin

1904. *Merogomphus* Martin, *Mission Pavie, Neurop.*, **3** : 214.

1934. *Merogomphus*, Fraser, *Fauna Brit. India, Odon.*, **2** : 309-310.

Diagnostic characters : Large to medium sized dragonfly; colour mat black marked with bright greenish yellow; wings long and broad; tornus angulated; base of hindwing excavated, oblique; anal triangle 3-celled; arc situated at the second or in between second and third antenodal nervures; anal loop absent; pterostigma braced, may be short; only one cubital nervure in both the wings; subtrigone and hypertrigone in both pairs of wings entire; abdomen broaden at base, then narrow and cylindrical; superior anal appendages curled or lyrate shape, but in some species simple, short structure as in genus *Gomphus*; inferior anal appendages deeply notched and two branches widely divaricated.

Distribution : East Palaearctic and south-east Asia.

36. ***Merogomphus martini*** (Fraser)

1922. *Platygomphus martini* Fraser, *Mem. Dept. Agric. India* (Ent.), **7** : 68-69.

1934. *Merogomphus martini*, Fraser, *Fauna Brit. India, Odon.*, **2** : 313-315.

Material examined : 1♂, Kolasib, 15.4.1994, coll. A.K. Hazra.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	36.00	28.00	27.00

Distribution : India : Mizoram, Assam, Meghalaya and West Bengal.

Elsewhere : Bangladesh and Myanmar.

Remarks : Agree fairly well with the published description of species.

Genus ***Paragomphus*** Cowley

1905. *Mesogomphus* Forster, *Jahrab. Nassau. Ver. Naturk., Wiesb.*, **59** : 323.

1934. *Mesogomphus*, Fraser, *Fauna Brit. India, Odon.*, **2** : 228-230.

1934. *Paragomphus*, Cowley, *Entomologist*, **67** : 201.

Diagnostic characters : Medium sized dragonfly; black marked with greenish-yellow or orange; superior anal appendages of the male about twice of 10th abdominal segment, its basal half flattened, thereafter curled strongly downwards and narrowing towards apex; inferior anal appendages less than half of the superior anal appendages; tornus of the wings in male angulated but in female rounded; 12-16 antenodal nervures in forewings and 9-11 in hindwings and 6-10 postnodal nervures present in both the wings; pterostigma elongated, about 5-6 times as long as broad; discoidal cells entire present at a point which is one cell distal to the level of arc; hypertrigone subequal or longer than the space between nodus and origin of IR_3 in hindwing; only one cubital nervure in both the wings.

Distribution : Africa, China, India, Indonesia, Madagascar, Malaysia, Myanmar, Nepal and Sri Lanka.

37. ***Paragomphus lineatus*** (Selys)

1850. *Gomphus lineatus*, Selys, *Rev. Odon.*, : 386.

1854. *Onychogomphus lineatus*, Selys, *Bull. Acad. Belg. Sci.*, (2), **21** : 36.

1987. *Paragomphus lineatus*, Lahiri, *Rec. zool. Surv. India, Occ. Pap.* No. **99** : 141-142.

Material examined : 1♂, Seling, 8.9.1989, coll. Y.N.P. Sinha.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	32.50	26.00	25.00

Distribution : India : Bihar, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Orissa, Punjab, Sikkim, Tamil Nadu, Tripura and West Bengal.

Elsewhere : Myanmar, Nepal, Sri Lanka and Turkey.

Remarks : This species occurs both lotic and lentic waterbodies, superial anal appendages being yellow and its tips black, inferior anal appendages brown with a spine near base. Discoidal cell entire, petrostigma dark brown and covers more than 4 cells. Anal triangle 4 celled.

Nodal index $\frac{9-14}{9-10}/\frac{15-9}{10-11}$

Genus ***Ictinogomphius*** Cowley

1842. *Ictinus* Rambur, *Ins. Neurop.*, : 171.

1934. *Ictinus*, Fraser, *Fauna Brit. India, Odon.*, **2** : 370-372.

1981. *Ictinogomphus*, Davies, *Soc. int. Odonatol. rapid. comm.*, No. **3** : 34.

Diagnostic characters : Large sized dragonfly; mat black in colour, marked with bright citron-yellow or greenish yellow; head large and triangular; frons strongly angulated; occiput simple but sometimes concave, fringed with short hairs; base of hind wings deeply excavated; anal triangle 5-celled; are present between the first and second antenodal nervures; anal loop present and made up of 4 to 5 cells; pterostigma elongate and narrow, about twice the length of the distance between the node and proximal end of pterostigma; 2 to 4 cubital nervures in forewings, 2 in hindwings; subtrigone in forewings 2 celled, but in hindwings may be entire or rarely 2 celled; hypertrigone 2 celled; superior anal appendages as long as 10th abdominal segment, narrow and pointed at apex; inferior anal appendages very much short and deeply bifid.

Distribution : Africa, Australia, East Palaearctic and South-east Asia.

38. ***Ictinogomphus rapax*** (Rambur)

1842. *Diastatomma rapax* Rambur, *Ins. Neurop.*, : 169.

1934. *Ictinus rapax*, Fraser, *Fauna Brit. India, Odon.*, **2** : 373-376.

1991. *Ictinogomphus rapax*, Tsuda, *A distributional list of world Odonata*, : 99.

Material examined : 1, Kolasib, 15.4.1994, coll. A.K. Hazra.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	52.50	41.00	40.00

Distribution : Throughout India, Malaysia, Myanmar, Nepal and Sri Lanka.

Remarks : Face largely yellow, postclypeus and vertex black. Thorax and abdomen marked variably by yellow, 8th abdominal segment has leaf like expension and marked with broad yellow ring. Bases of both pairs of wing with brown markings, membrane brown, anal triangle 5 celled, 3 cubital cells in forewing and 2 in hindwing. Pterostigma black and covers 6 cells.

Nodal index $\frac{14-32}{18-12}/\frac{22-14}{13-17}$

Family AESHNIDAE

Diagnostic characters : Head globular, labium with middle lobe nearly as wide as lateral lobes and bearing a median incision; inner margin of eyes on vertex very broadly contiguous; occiput small and triangular; male genitalia hidden, a robust complete ovipositor present. Subtrigone not well differentiated; median space entire or traversed.

Genus ***Gynacantha*** Rambur

1842. *Gynacantha* Rambur, *Ins. Neurop.*, : 209.

1936. *Gynacantha*, Fraser, *Fauna Brit. India, Odon.*, **3** : 94-96.

Diagnostic characters : Large sized dragonfly; brown or black marked with mahroon, yellow or green; 3rd abdominal segment in male usually constricted; male superior anal appendages long

and narrow, about 2 to 3 times as long as 10th abdominal segment; inferior anal appendages less than half the length of superior, narrow and triangular; in female anal appendages lanceolate and usually longer in comparison with male superior anal appendages; ovipositor large usually extending to apex of abdomen; wings hyaline, sometimes tinted with yellow or brown; in male base of hindwing obtusely notched, tornus angulated, anal angle 3-celled. 13-42 antenodal and postnodal nervures present. Pterostigma narrow and 4-5 times as long as broad, braced; discoidal cell 5-9 celled and situated 2-3 cells distal to the level of arc; median space entire; hypertrigone and cubital space basal to subtrigone traversed by 4-9 and 6-10 veins respectively; generally 8-17 cells in anal loop; usually one row of cells between Cuii and 1A.

Distribution : Cosmopolitan.

39. ***Gynacantha subinterrupta*** Rambur

1842. *Gynacantha subinterrupta* Rambur, *Ins. Neurop.*, : 212.

1936. *Gynacantha subinterrupta*, Fraser, *Fauna Brit. India, Odon.*, **3** : 100-101.

Distribution : India : Mizoram.

Elsewhere : Indonesia, Malaysia, Myanmar and New Guinea.

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

Superfamily LIBELLULOIDEA

Diagnostic characters : Head globular; inner margins of eyes broadly contiguous; vesicle well defined, occiput small and triangular; Oriellet usually absent; male genitalia with anterior hamules more or less abortive; ovipositor usually inconspicuous. Base of hindwing rounded but in male may be angulated. Costal and subcostal antenodal nervures coinciding; distal antenodal nervure may be complete or incomplete. Sectors of arc fused or separated at origin.

Distribution : Cosmopolitan.

Key to the families of superfamily LIBELLULOIDEA

1. Eyes with a small sinuous projection at middle of the posterior/border; synthorax matallic blue or green tibiae of males with long membraneous keel on flexor surface. .... CORDULIIDAE

– Eyes without a projection at posterior border; thorax rarely metallic colour; tibiae of males without a keel on flexor surface. .... LIBELLULIDAE

Family CORDULLIDAE

Diagnostic characters : Body colour specially of sythorax partly or wholely metallic blue or green; eyes with a small sinuous projection at middle of the posterior border; males with oriellets and a membraneous keel on flexor surface of tibiae present; wings hyalyne, hindwings of males usually be notched at the base; anal triangle well formed.

Distribution : Cosmopolitan.

Genus ***Idionyx*** Hagen

1867. *Idionyx* Hagen, *Verh. Zool.-bot. Ges. Wien.*, **17** : 58.

1936. *Idionyx*, Fraser, *Fauna Brit. India. Odon.*, **3** : 218-220.

Diagnostic characters : Medium sized dragonfly with metallic green or blue, marked with yellow or black; tibiae of males on flexor surface with membraneous keel, a long one on hind tibiae, short, distal on others; tibial claws with arms equal in length; oriellets present. Male anal appendages subequal and either as long as or upto more than twice as long as 10th abdominal segment. Male genitalia with lamina depressed, large hamules bearing a robust strongly curved hook and small rounded lobe bearing a tuft of hairs. Wings hyaline, sometimes specially in females, saffronated at base or deeply enfumed; apices of wings moderately pointed; base of hindwing shallow notched in males rounded in females. 11-17 antenodals in forewing and 7-10 antenodals in hindwing, 5-11 postnodals in both the wings; pterostigma about 3-4 times as long as

broad, not braced; discoidal cell entire, situated a little distal to the level of arc; arc situated at the 2nd or between 2nd and 3rd antenodal nervures; subtrigone entire.

Distribution : China, India, Indonesia, Malaysia, Myanmar, Nepal and Philippines.

40. ***Idionyx imbricata*** Fraser

1926. *Idionyx imbricata* Fraser, *Rec. Indian Mus.*, **28** : 197-198, 205-206.

1936. *Idionyx imbricata*, Fraser, *Fauna Brit. India. Odon.*, **3** : 232-234.

Material examined : 1♀, Kolasib, 15.4.1994, coll. A.K. Hazra.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	32.00	33.50	33.00

Distribution : India : Mizoram and Meghalaya.

Remarks : Base of both pairs of wing marked with deep yellow upto discoidal cell; one cubital nervure present in forewing and two in hindwing; pterostigma black and covers 3 cells. Female with vestigial humeral stripe, combined with a simple vesicle.

Nodal index. $\frac{8-13}{9-9}/\frac{14-8}{9-9}$

Family LIBELLULIDAE

Diagnostic characters : Body colour mostly non metallic, but sometimes metallic; eyes without sinuous projection at middle of the posterior border; in males oreillets and membraneous keel on flexor surface of tibiae absent; Wings hyaline, sometimes markedly coloured; hindwing rounded at the base; anal triangle absent.

Distribution : Cosmopolitan.

Key to the genera of family LIBELLULIDAE

1. Anal loop well formed, with borders meeting the inner margin of wing, apex of loop open. ..... ***Tholymis*** Hagen

– Anal loop absent or rudimentary or well developed; when developed, the borders covering and meeting before inner margin of wing and apex of loop closed. 2

2. Distal antenodal nervure in forewing complete. 3

– Distal antenodal nervure in forewing incomplete. 5

3. Lobe of prothorax large and fringed with long hairs. 4

– Lobe of prothorax small, inconspicuous and usually naked, without fringed with long hairs; and loop very short. ..... ***Amphithemis*** Selys

4. One 6 antenodal nervures in forewing; 1st to 6th abdominal segments conspicuously dilated, 7th to 10th slim and cylindrical. ..... ***Acisoma*** Rambur

– Always 12 or more antenodal nervures in forewing; abdomen variable shape; 1st to 6th abdominal segments not conspicuously dilated. ..... ***Orthetrum*** Newman

5. Lobe of prothorax large and fringed with long haris. 6

– Lobe of prothorax small and usually naked... 8

6. Borders of discoidal field bounded by MA and Cuii converging strongly at wing border. ..... ***Sympetrum*** Newman

– Borders of discoidal field in forewing diverging widely at wing border. 7

7. Eyes contiguous for a short space, discoidal cell in hindwing entire, costal border of forewing straight, frons non-metalic above, discoidal field in forewing begining with two rows of cells. ..... ***Diplacodes*** Kirby

– Eyes more or less contiguous, discoidal cell in forewing traversed, costal border of forewing sinuous near base, frons metallic above, discoidal field beging with 3 rows of cell. ..... ***Palpopleura*** Rambur

8. Discoidal field with borders covering strongly at wing margin. 9

- Discoidal field with borders parallel or widely divergent at wing margin. 10

9. Discoidal cell in forewing very narrow, its costal side only 1/4 or 1/3 the length of basal, a conspicuous supplimentry nervure (IRii) present between Rii and Riii. .... ***Pantala*** Hagen

- Discoidal cell in forewing broader, its costal side about ½ the length of basal, no supplimentry nervure (IRii) present between Rii and Riii. ..... ***Trithemis*** Brauer

10. Discoidal field in forewing adjacent to discoidal cell, only two cells wide. .... ***Indothemis*** Ris

- Discoidal field in forewing adjacent to discoidal cell, 3 or more cells wide. 11

11. Genital hamules very long, hindwing broad at base, pterostigma very short and usually unequal in fore and hindwing. .... ***Tramea*** Hagen

- Genital hamules very small, hindwing not markedly broad at base, pterostigma variable and usually of equal size in fore and hindwing. 12

12. More than one cubital nervure in all wings, close secondary reticulation proximal to node, wing mostly coloured. ..... ***Neurothemis*** Brauer

- Only one cubital nervure in all wings, no secondary reticulation in the wings, wings usually uncoloured or only restricted to small basal yellow markings in the hindwing (except in *Brachythemis* Brauer which has marked with a broad medial fascia). 13

13. Red of ochreous species with basal or medial yellow markings on wings. Usually pruinosed in adult stage. .....***Potamarcha*** Karsch

- Variable coloured, darker species, not pruinosed in adult stage. 14

14. Antenodals in forewing 9½ to 10½, eyes shortly contiguous, wings with basal yellow marking, face and frons red. .... ***Crocothemis*** Brauer

- Antenodals in forewing 6½ to 7½, eyes shortly contiguous, face, frons and abdomen never red, wings with broad reddish-yellow medial fascia. ..... ***Brachythemis*** Brauer

Genus : ***Amphithemis*** Selys

1891. *Amphithemis* Selys, *Ann. Mus. Civ. Genova*, **30** : 454.

1936. *Amphithemis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 254-255.

Diagnostic characters : Rather small sized dragonfly coloured black marked with yellow; basal abdominal segments may be bright red or pulverulent white; head moderately large; eyes shortly contiguous; lobe of prothorax small, slightly rounded; no dilation of 8th abdominal segment. Wings narrow, hindwing slightly broader than forewing; arc situated between second and third antenodal nervures and its sectors fused for a long distance. Only one cubital nervure in forewing and 2 to 3 in hindwing.

Distribution : East Palaearctic and South-east Asia.

This genus has only a single species represented in Mizoram, hence no key is provided.

41. ***Amphithemis curvistyla*** Selys

1891. *Amphithemis curvistyla* Selys, *Ann. Mus. Civ. Genova*, **30** : 457.

1936. *Amphithemis curvistyla*, Fraser, *Fauna Brit. India, Odon.*, **3** : 255-257.

Distribution : India : Mizoram.

Elsewhere : Malaysia and Myanmar.

Remarks : This species is included on the basis of literature review. This can easily be separated from others by the discoidal field which begining with two rows of cells and abdomen ruby-red at base.

Genus ***Orthetrum*** Newman

1833. *Orthetrum* Newman, *Ent. Mag.*, **1** : 511.

1936. *Orthetrum*, Fraser, *Fauna Brit. India, Odon.*, **3** : 291-292.

Diagnostic characters : Small to medium sized dragonflies; coloured white, yellow, green, orange, red or brown, marked with black, sometimes markings obscured by pruinescence; vesicle raised, rounded or notched above; posterior lobe of prothorax large, provided with tuft of hairs. Abdomen sometimes very broad, markedly swollen at base and followed by an abrupt constriction; male genitalia with well developed hood shaped lamina, hamules with variably developed hooks, sometimes forming a ridge below the more developed inner hooks; vulver scale small or inconspicuous, lips of vulver aperture thin or swelled. wings hyaline, sometimes enfumed with brown and marked at base with golden yellow, amber or blackish brown. 11-21 and 8-15 antenodal nervures in fore and hindwing respectively and 8-16 postnodals in both the wings. Sectors of arc forming a common stalk, only one cubital nervures in both the wings.

Distribution : Cosmopolitan.

Key to the species of genus *Orthetrum* Newman

1. Male violaceous red. .... *pruinosum neglectum* (Rambur)

– Male coloured brown, black with yellow markings, often pruinosed. 2

2. Abdomen enormously swollen at base and then abruptly slimmed and compressed laterally to the end. ..... *sabina sabina* (Drury)

– Abdomen variable but never very slim nor compressed laterally. 3

3. Base of hindwings with a large triangular marking. ..... *triangulare triangulare* (Selys)

– Base of hindwing without a black triangulare marking. 4

4. Only a single row of cells between IRiii and Rspl. ..... *anceps* (Schneider)

– Two or more rows of cells between IRiii & Rspl. 5

5. Abdomen short and broad, almost appears white with thick pruinescence, thorax with 2 broad greenish or bluish stripes more or less obscured with pruinescence. .... *japonicum internum* MacLachlan

– Abdomen long and narrow, often blue with pruinescence, thorax with very narrow whitish creamy stripes, membrane black. .... *glaucum* (Brauer)

42. *Orthetrum anceps* (Schneider)

1845. *Libellula anceps* Schneider, *Stett. Ent. Zeit.*, **6** : 111.

1936. *Orthetrum anceps*, Fraser, *Fauna Brit. India, Odon.*, **3** : 295-296.

Distribution : India : Mizoram, Himachal Pradesh and West Bengal.

Elsewhere : Asia Minor, Europe, North African coast, Pakistan and Persia.

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

43. *Orthetrum glaucum* (Brauer)

1865. *Libellula glauca* Brauer, *Verh. Zool.-bot. Ges. Wien.*, **15** : 1012.

1936. *Orthetrum glaucum*, Fraser, *Fauna Brit. India, Odon.*, **3** : 307-309.

Material examined : 2♂♂, Thingdawl, Kolasib, 4.9.1989, coll. Y.N.P. Sinha; 1♂, Lunglei, 10.9.1989, coll. Y.N.P. Sinha; 3♂♂, Zopui Hills, Lunglei, 14.1.1992, coll. S.J.S. Hattar; 2♂♂, Diltlang, Chhimtuipui, 16.1.1992, coll. S.J.S. Hattar; 1♂, Saiha, 18.1.1992, coll. S.J.S. Hattar; 1♂, Tuipui Chhimtuipui, 19.1.1992, coll. S.J.S. Hattar; 1♂, Manpui, 17.9.1993, coll. A.R. Lahiri; 1♂, Champhai, 29.9.1993, coll. R.S. Mirdha; 2♂♂, Kelkang, 29.9.1993, coll. R.S. Mirdha; 1♂,1♀, Saiha, 6.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, 42 kms. from Saiha towards, Blue Mountain, 9.4.1994, coll. A.K. Hazra; 4♂♂, Pukpui, Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, Aizawl, 14.5.1994, coll. T.K. Pal; 1♂, Dampa Sanctuary, 11.11.1995, coll. M.S. Shishodia; 1♂, Kaunpui, 13.11.1995, coll. M.S. Shishodia; 2♀♀, Dampa, Rengpui, Aizawl, 28.11.1995, coll. P. Parui; 1♀, Sikha, 29.11.1995, coll. P. Parui, 1♂,2♀♀, West Pheling, Aizawl, 30.11.1995, coll. P. Parui and 3♂♂, Lalan, 1.12.1995, coll. M. Sil.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	31.00-35.00	37.00-38.00	36.00-37.00
Female :	33.50	35.00	34.00-34.50

Distribution : Throughout India, China, Hong Kong, Indonesia, Japan, Malaya Archipelago, Malaysia, Myanmar, Nepal, New Guinea, Papua, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Remarks : This species is moderately large sized and very common in Mizoram. Face and frons pale yellow or blackish brown; anal appendages black; mid dorsal carina and mid dorsum of thorax brownish yellow; membrane black; pterostigma yellowish brown and covers 3 cells. Discoidal cell 2 celled, subtrigone 3 celled, discoidal field begining with 3 rows of cells; 2 rows of cells in between IRiii & Rspl.

44. ***Orthetrum japonicum internum*** McLachlan

1894. *Orthetrum japonicum internum* McLachlan, *Ann. Mag. nat. hist.*, (6), **13** : 314.

1936. *Orthetrum japonicum internum*, Fraser, *Fauna Brit. India, Odon.*, **3** : 304-305.

Material examined : 1♂, Sairang, aizawl, 11.1.1992, coll. S.J.S. Hattar.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	29.00	33.00	32.00

Distribution : India : Assam, Meghalaya, Nagaland, West Bengal and Western Himalaya.

Elsewhere : Bangladesh, China, Japan, Korea, Myanmar, Nepal, Pakistan, Taiwan, Thailand and Tibet.

Remarks : Base of hindwing marked with brown yellow; membrane blackish-brown; pterostigma yellowish in colour and covers 2 cells.

Nodal index. $\frac{11-11}{10-11} / \frac{14-9}{11-10}$

45. ***Orthetrum pruinosum neglectum*** (Rambur)

1842. *Libellula neglecta* Rambur, *Ins. Neurop.*, : 86.

1936. *Orthetrum pruinosum neglectum*, Fraser, *Fauna Brit. India, Odon.*, **3** : 311-313.

Material examined : 2♂♂, 1♀, Thingdawl, Kolasib, 4.9.1989, coll. Y.N.P. Sinha; 1♂, 1♀, Bilkhawthir, Kolasib, 5.9.1989, coll. Y.N.P. Sinha; 3♂♂, Seling, 8.9.1989, coll. Y.N.P. Sinha; 5♂♂, Zopui Hills, Lunglei, 14.1.1992, coll. S.J.S. Hattar; 1♂, South of Aibawk, 28.3.1994, coll. G.C. Sen; 3♂♂, Lawngtlai, Chhimtuipui, 3.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, Pukpui, Lunglei, 10.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, Aizawl, 14.5.1994, coll. T.K. Pal; 1♂, Aizawl, 10.10.1995, coll. A.K. Sanyal; 1♀, Teirei, 12.11.1995, coll. M.S. Shishodia; 1♂, Kaunpui, 13.11.1995, coll. M.S. Shishodia; 1♂, Dampa, Rengpui, 28.11.1995, coll. P. Parui; 1♂, 1♀, Sikha, 29.11.1995, coll. P. Parui; 2♂♂, West Pheling, 30.11.1995, coll. P. Parui; 1♂, Lalan, 1.12.1995, coll. R.S. Mirdha and 1♂, Vairengti, 10.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	32.00-34.00	35.50-37.00	35.00-36.50
Female :	30.00-31.50	36.00-37.00	35.00-37.00

Distribution : Throughout India.

Elsewhere : Afghanistan, Bangladesh, China, Hong Kong, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Nepal, Singapore, Sri Lanka, Taiwan, Thailand, Tibet and Vietnam.

Remarks : This species is very common in Mizoram, Membrane black; pterostigma black and covers 2½ cells; in few specimens apices of wings are enfumed.

Nodal index. $\frac{9-13}{9-11} / \frac{15-11}{11-10}$ to $\frac{10-14}{9-10} / \frac{15-9}{10-11}$

46. ***Orthetrum sabina sabina*** (Drury)

1770. *Libellula sabina* Drury, *Ill. Exot. Ins.*, **1** : 114.

1936. *Orthetrum sabina*, Fraser, *Fauna Brit. India, Odon.*, **3** : 300-302.

Material examined : 1♀, Bilkhawthlir, Kolasib, 5.9.1989, coll. Y.N.P. Sinha; 1♂, Lawngtlai, Chhimtuipui, 3.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, 1♀, Vairengti, 25.9.1994, coll. I.B. Dutta; 1♂, 2♀♀, Vairangti, 26.9.1994, coll. I. B. Dutta; 1♂, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 1♀, West Pheling, Aizawl, 30.11.1995, coll. R.S. Mirdha; 1♂, Lalan, Aizawl, 1.12.1995,

coll. M. Sil; 1♂, Saihapui Kaun, Aizawl, 9.12.1995, coll. P. Parui and 1♂, 1♀, Vairengti, 9.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	35.50-37.00	32.00-33.00	31.50-32.50
Female :	33.00	34.00	33.00

Distribution : Throughout India.

Elsewhere : Afghanistan, Algeria, Angola, Australia, China, Cyprus, Egypt, Hong Kong, Indonesia, Iran, Iraq. Laos, Malaysia, Micronesia (Oceania), Myanmar, Most of African continent, New Guinea, Nepal, Papua, Philippines, Samoa Island, Singapore, Sri Lanka, Sudan, Thailand, Tunisia, Turkey and Vietnam.

Remarks : It is one of the most common species of the genus. Pterostigma yellow and covers $2^1/_2$ cells; discoidal cell traversed once; discoidal field begins with 3 rows of cells; subtrigone 3 celled; 2 rows of cells in between IRiii & Rspl. Abdomen enormously swollen at base and then abruptly slimmed and compressed laterally to the end.

Nodal index. $\frac{10-11}{10-9} / \frac{11-9}{9-10}$

47. ***Orthetrum triangulare triangulare*** (Selys)

1878. *Libella triangularis* Selys, *Mitt. Mus. Dresden*, : 314.

1936. *Orthetrum triangulare triangulare*, Fraser, *Fauna Brit. India, Odon.*, **3** : 305-307.

Material examined : 1♂, Thingdawl, Kolasib, 4.9.1989, coll. Y.N.P. Sinha; 12♂♂, 2♀♀, Bilkhawthir, Kolasib, 5.9.1989, coll. Y.P. Sinha; 1♂, Champhai, 30.9.1993, coll. A.R. Lahiri; 1♂, Zobawk, Lunglei, 11.4.1994, coll. S.K. ghosh and M. Prasad and 2♂♂, 1♀, Seling, 15.9.1994, coll. I.B. Dutta.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	30.00-32.00	36.00-37.50	35.00-36.00
Female :	29.00-31.00	36.00-38.00	35.00-37.50

Distribution : India : Arunachal Pradesh, Assam, Bihar, Haryana, Karnataka, Kerala, Meghalaya, Mizoram, South Indian Hills, Tamil Nadu, West Bengal and Western Himalaya.

Elsewhere : Afghanistan, China, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Remarks : Broad triangular black mark present at the base of hindwing; pterostigma black and covers 2½ cells; membrane black, discoidal cell in both the wing traversed only once; discoidal field begining with 3 rows of cells; 2 rows of cells present in between IRiii & Rspl. Abdominal segments 7th to 10th are black; anal appendages also black.

Nodal index. $\frac{11-16}{13-12} / \frac{17-10}{11-12}$ to $\frac{12-16}{13-12} / \frac{17-12}{13-11}$

Genus ***Potamarcha*** Karsch

1889. *Potamarcha* Karsch, *Berlin Ent. Zeit.*, **33** : 370.

1936. *Potamarcha*, Fraser, *Fauna Brit. India, Odon.*, **3** : 288-289.

Diagnostic characters : Medium sized dragonfly; may be black or brown, marked with yellow; sometimes obscured by pruinosed; vesicle shallowly bifid; posterior lobe of prothorax not erected as a collar and tuft of hairs absent; male genitalia with a little projected hood shaped and minutely spined lamina, hamules with broad base and slightly projected; in female vulver scale inconspicuous and feebly keeled 9th ventral plate. Wings narrow and hyaline, with apices clouded with brown and costal area tinted with yellow : 13½-14½ and 9-12 antenodal nervures in fore and hindwings respectively and 9-12 postnodal nervures in both the wings; pterostigma 5-6 times as long as broad; arc situated between 2nd and 3rd antenodal nervures; hypertrigone entire, subtrigone 3 celled.

Distribution : Australia, Bangladesh, India, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Taiwan and Thailand.

48. ***Potamarcha congener*** (Rambur)

1842. *Libellula obscura* Rambur, *Hist. nat. Ins. Neurop.*, : 64.

1842. *Libellula congener*, Rambur, *Hist. nat. Ins. Neurop.*, : 70.

1890. *Potamarcha obscura*, Karsch, *Berlin Ent. Zeit.*, **33**: 371.

1891. *Potamarcha congener*. Selys, *Anal. Soc. Esp. Hist. nat.*, **20** : 221.

1971. *Potamarcha congener, Lieftinck, Ent. Scand. suppl.*, **1** : 202.

Material examined : 1♀, Lawngtlai, Chhimtuipui, 3.4.1994, coll. S.K. Ghosh and M. Prasad.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	28.00	35.50	35.00

Distribution : India : Mizoram, Bihar, Himachal Pradesh, Kerala, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Maharashtra, Nagaland, Orissa, South Andaman Islands, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Australia, Bangladesh, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Papua, Philippines, Sri Lanka, Taiwan and Thailand.

Remarks : Prothorax dark brown, thorax black; apices of wing tipped with brown; 2 rows of cells in between IRiii & Rspl; anal appendages black; pterostigma brownish black and covers more than 4 cells; membrane white.

Nodal index. $\frac{10-13\frac{1}{2}}{10-11} \Big/ \frac{13\frac{1}{2}-11}{12-11}$

Genus ***Acisoma*** Rambur

1842. *Acisoma* Rambur, *Hist. nat. Ins. Neurop.*, : 28.

1936. *Acisoma*, Fraser, *Fauna Brit. India, Odon.*, **3** : 329-330.

Diagnostic characters : Small sized dragonflies, black or brown marked with blue or green; vesicle low, rounded above; posterior lobe of prothorax large, emarginate as a color and provided with specialised tuft of hairs, abdomen markedly dilated from segment 1st to 6th and then markedly narowed upto the end; male genitalia small with arched depressed lamina, broad based projected hamules with strongly a curled hooks and narrow lobes with margins subquasrate. Wings hyaline, sometimes marked with golden yellow or blackish brown at base; 6-8½ and 5-6 antenodal nervures in fore and hindwing respectively and 6-8 postnodal nervures in both the wings; pterostigma about 3-4 times as long as broad; arc situated between the 1st and 2nd antenodal nervures; hypetrigone entire, subtrigone entire or 3-4 celled. Only one cubital nervure in both the wing.

Distribution : Africa, China, India, Indonesia, Japan, Madagascar, Malaysia, Myanmar, Philippines, Sri Lanka, Taiwan and Thailand.

49. ***Acisoma panorpoides panorpoides*** Rambur

1842. *Acisoma panorpoides* Rambur, *Hist. nat. Ins. Neurop.*, : 28.

1936. *Acisoma panorpoides panorpoides*, Fraser, *Fauna Brit. India, Odon.*, **3** : 330-331.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Chandigarh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Mahrashtra, Manipur, Meghalaya, Orissa, Punjab, Rajasthan, South India, Uttar Pradesh and West Bengal.

Elsewhere : China, Indnesia, Japan, Malayan Archipelago, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan and Thailand.

Remarks : This species is included on the basis of literature review. Small sized dragonfly, abdomen azure blue and from 1st to 6th abdominal segments swollen, from 7th to 10th slim.

Genus ***Brachythemis*** Brauer

1868. *Brachythemis* Brauer, *Verh, zool.-bot. Ges. wien.*, **18** : 736.

1936. *Brachythemis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 363-364.

Diagnostic characters : Small to medium sized, black, brown or red marked with yellow; vesicle high, notched at apex; male genitalia with depressed, arched lamina, broad basal hamules with strongly curled hooks and large, subquadrate or rounded, projected lobe; wings hyaline, sometimes partly coloured may be reddish, yellow or blackish brown; 6½ to 7½ and 5-6 antenodal nervures in fore and hindwings respectively; 5-6 postnodal nervures in both pair of wings; pterostigma about 4 to 5 times as long as broad,

not braced; arc situated between the 1st and 2nd antenodal nervures; hypertrigone entire; subtrigone 3 celled; only one cubital nervure in both the wings.

Distribution : China, India, Indonesia, Iraq, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan and Thailand.

50. ***Brachythemis contaminata*** (Fabricius)

1793. *Libellula cantaminata* Fabricius, *Ent. syst.*, **2** : 382.

1936. *Brachythemis contaminata*, Fraser, *Fauna Brit. India, Odon.*, **3** : 365-366.

Material examined : 1♂, Tipaimukh road, Kolasib, 2.9.1989, coll. Y.N.P. Sinha and 1♀, Vairengti, 10.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	22.50	25.00	24.00
Female :	19.00	24.50	23.50

Distribution : Throughout India.

Elsewhere : Bangladesh, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Singapore, Sri Lanka, Taiwan and Thailand.

Remarks : Small sized dragonfly; wings with bright orange fascia from base to within 2/3 cells to pterostigma; fascia absent in female.

Genus ***Crocothemis*** Brauer

1868. *Crocothemis, Verh. zool.-bot. Ges. Wien.*, **18** : 367, 736.

1936. *Crocothemis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 343-345.

Diagnostic characters : Medium sized, red or yellow marked with brown or black, vesicle low, rounded; male genitalia with emerginate or depressed arched lamina, broad based, projected hamules evenly narrowed to an acute hook; wings hyaline, sometimes marked with amber at base or enfumed with brown at apex; 10½ to 12½ and 8-9 antenodal nervures in fore and hindwings respectively; 8-9 postnodal nervures in both the pairs of wing; pterostigma about 5 to 6 times as long as broad, not braced; hypertrigone entire; subtrigone 3 celled; only one cubital nervures in both the wings.

Distribution : Africa, Australia, Bangladesh, China, Europe, India, Indonesia, Iran, Iraq, Madagascar, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Taiwan and Thailand.

51. ***Crocothemis servilia servilia*** (Drury)

1770. *Libellula servilia* Drury, *Ill. ex. Ins.*, **1** : 112.

1936. *Crocothemis servilia servilia*, Fraser, *Fauna Brit. India, Odon.*, **3** : 345-347.

Material examined : 1♂, 1♀, Tipaimukh, Kolasib, 2.9.1989, coll. Y.N.P. Sinha; 1♂, Seling, 8.9.1989, coll. Y.N.P. Sinha; 1♀ Zobawk, 9.9.1989, coll. Y.N.P. Sinha, 3♂♂, 1♀, Zopui Hills, Lunglei, 14.1.1992, coll. S.J.S. Hattar, 1♀, Ngenpui, 15.1.1992, coll. S.J.S. Hattar; 1♀ Diltlang, Chhimtuipui, 16.1.1992, coll. S.J.S. Hatter, 1♀, Kalchow, Chhimtuipui, 17.1.1992, coll. S.J.S. Hattar, 2♀♀, Mat river, Lunglei, 20.1.1992, coll. S.J.S. Hattar; 3♀♀, Rengpui, Aizawl, 21.1.1992, coll. S.J.S. Hattar; 1♀ Manpui, 17.9.1993, coll. A.R. Lahiri; 1♂, Thingdan, 19.9.1993, coll. R.S. Mirdha; 1♀, Mual Kawi, 30.9.1993, coll. M. Sil; 1♂, 1♀, Buang, 1.10.1993, coll. A.R. Lahiri; 1♀, Kuik Wak, 8.12.1993, coll. R.S. Burman; 2♂♂, 13♀♀, Bethel, 8.12.1993, coll. R.S. Burman; 1♀, Hanaht laul, 9.12.1993, coll. R.S. Burman; 4♂♂, 6♀♀, Khow Zane, 11.12.1993, coll. R.S. Burman; 1♂, Lawngtlai, 3.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, Zobawk, Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad; 1♂, Aizawl, 13.4.1994, coll. S.K. Ghosh and M. Prasad; 1♀, Champhai, 13.10.1995, coll. A.K. Sanyal; 1♂, 5♀♀, Champhai Tourist Lodge Campus, 13.10.1995, coll. A.K. Sanyal; 1♂, 1♀, Kelkeng, Champhai, 14.10.1995, coll. A.K. Sanyal; 2♂♂, 1♀, Tlangsam, Champhai, 15.10.1995, coll. A.K. Sanyal; 3♀♀, Dampa Sanctuary, 9.11.1995, coll. M.S. Shishodia; 1♂, 3♀♀, Tairei, 12.11.1995, coll. M.S. Shishodia; 1♀, Kawapui, 13.11.1995, coll. M.S. Shishodia; 2♂♂, 3♀♀, Aibawk, 16.11.1995, coll. M.S. Shishodia; 2♀♀, Dampa, Regpui, 28.11.1995, coll. R.S. Mirdha; 1♂, 1♀, Sikha, 29.11.1995, coll. P. Parui and 2♀♀, West Pheling, 30.11.1995, coll. M. Sil.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	25.00-29.00	29.00-32.00	28.00-31.50
Female :	25.00-28.00	29.00-31.00	28.00-30.50

Distribution : Throughout India.

Elsewhere : Bangladesh, China, Indonesia, Iran, Iraq, Japan, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan and Thailand.

Remarks : This species is one of the most common species in Mizoram.

Genus ***Diplacodes*** Kirby

1889. *Diplacodes* Kirby, *Trans. Zool. Soc. Lond.*, **12** : 307.

1936. *Diplacodes*, Fraser, *Fauna Brit. India, Odon.*, **3** : 331-333.

Diagnostic characters : Small to medium sized dragonflies; coloured yellow, brown or red and marked with black, the markings sometimes obscured by pruinescence; vesicle high, rounded or shallowly notched; posterior lobe of prothorax large, subrectangular, emerginate and provided with specialised tuft of hairs; Wings hyaline, sometimes partly marked with yellow, black or blackish brown; 5½-9½ and 5-6 antenodal and 5-7 and 4-6 postnodal nervures present in fore and hindwings respectively; pterostigma 4 to 5 times as long as broad, not braced; hypertrigone entire; subtrigone may be entire or 2-3 celled in forewing; sector of arc forming a common stalk.

Distribution : Africa, Australia, China, India, Indonesia, Iraq, Japan, Madagascar, Malaysia, Mauritius, Myanmar, Nepal, New Guinea, Pacific Islands, Philippines, Ryukyu, Saudi Arabia, Seychelles, Sri Lanka, Taiwan, Thailand and Turkey.

52. ***Diplacodes trivialis*** (Rambur)

1842. *Libellula trivialis* Rambur, *Hist. nat. Ins. Neurop.*, : 115.

1936. *Diplacodes trivialis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 336-338.

Material examined : 1 ♀, Lawngtlai, 15.1.1992, coll. S.J.S. Hattar; 1 ♀, Nagenpui, 15.1.1992, coll. S.J.S. Hattar; 1 ♂, Thingdawl, 18.9.1993, coll. M. Sil; 1 ♀, Maul Kawi, 30.9.1993, coll. R.S. Mirdha; 1 ♀, Aizawl, 5.12.1993, coll. R.S. Burman, 1 ♀, Khow Zane, 11.12.1993, coll. R.S. Burman, 1 ♂, Aibawk, 17.11.1995, coll. M.S. Shishodia; 1 ♂, Dampa, Rengpui, Aizawl, 28.11.1995, coll. M. Sil and 1 ♂, Maubuang, Aizawl, 4.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	20.00	22.00	21.00
Female :	18.00	22.00	21.00

Distribution : Throughout India.

Elsewhere : Australia, China, Fiji, Hong Kong, Indonesia, Iraq, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pacific Islands, Papua, Philippines, Ryukyu, Seychelles, Sri Lanka, Thailand and Vietnam.

Remarks : This species also common in Mizoram. Membrane, brown; pterostigma brown to brownish-yellow and covers more than a cell. One row of cells in between IRiii & Rspl; subtrigone 3 celled; anal triangle 3 celled.

Nodal index. $\frac{6-7\frac{1}{2}}{6-6} \Big/ \frac{7\frac{1}{2}-6}{6-6}$ to $\frac{6-7\frac{1}{2}}{7-6} \Big/ \frac{7\frac{1}{2}-6}{6-6}$

Genus ***Indothemis*** Ris

1909. *Indothemis* Ris, *Cat. Coll. Selys, fasc.*, **9** : 29.

1996. *Indothemis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 338-339.

Diagnostic characters : Small to medium sized dragonflies; coloured black in the adult or black marked with yellow in subadult; vesicle high, slightly notched; prothorax with small posterior lobe; Wings hyaline; arc situated between the first and second antenodal nervures; 8½ to 12½ antenodal nervures in both the wings; only one cubital nervure in both the wings; subtrigone in forewing 3 celled.

Distribution : India, Malacca, Myanmar, Sri Lanka and Thailand (Siam).

53. ***Indothemis limbata limbata*** (Selys)

1891. *Trithemis limbata* Selys, *Ann. Mus. Civ. Genova*, **30** : 463.

1993. *Indothemis limbata limbata*, Fraser, *Fauna Brit. India, Odon.*, **3** : 341-342.

Distribution : India : Mizoram and West Bengal.

Elsewhere : Indonesia, Myanmar and Thailand.

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

Genus ***Neurothemis*** Brauer

1842. *Polyneura* Rambur, *Ins. Neurop.*, : 26.

1867. *Neurothemis*, Brauer, *Verh. zool.-bot. Ges. Wien.*, **17** : 289.

1936. *Neurothemis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 350-352.

Diagnostic characters : Small to medium sized dragonflies, may be black, red or brown, partly marked with yellow or green, vesicle high, rounded or shallowly notched; posterior lobe of prothorax a little emarginate; male genitalia with a little emarginate arched lamina, broad hamules with strongly curved distal hooks and broad or narrow, projecting lobe, wings sometimes with close secondary reticulation, hyaline or partly or wholely coloured with orange, black or opalescent white; usually 10½ to 15½ and 8-12 antenodal nervure in fore and hindwings respectively and 7-12 postnodal nervures; pterostigma about 4-5 times as long as broad, not braced; hypertrigone and cubital space 3-6 celled.

Distribution : Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, New Guinea, Pacific Islands, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Key to the species of genus *Neurothemis* Brauer

1. Wings broadly dark reddish-brown with neuration very close. 2

– Wings tinted with pale or golden-yellow at base; neuration open; a pale brown humeral stripe on thorax. .... *intermedia intermedia* (Rambur)

2. Wings dark reddish-brown from base to about middle of pterostigma; apex of wings also narrowly opaque brown to partly enclose a clear window in each wing at apex. ....*fulvia* (Drury)

– Wings dark reddish-brown from base 1 or 2 cells proximal of inner end of pterostigma or to middle of that organ; margin of dark area in hindwing curving fan-wise towards base of wing; apices of wings clear. ....*fluctuans* (Fabricius)

54. ***Neurothemis fluctuans*** (Fabricius)

1793. *Libellula fluctuans* Fabricius, *Ent. Syst.*, **2** : 379.

1936. *Neurothemis fluctuans*, Fraser, *Fauna Brit. India, Odon.*, **3** : 355-356.

Distribution : India : Mizoram.

Elsewhere : Indonesia, Laos, Myanmar and Thailand.

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

55. ***Neurothemis fulvia*** (Drury)

1773. *Libellula fulvia* Drury, *Ill. Exot. Ins.*, 2 : 84.

1936. *Neurothemis fulvia*, Fraser, *Fauna Brit. India, Odon.*, **3** : 353-354.

Material examined : 1♂, 1♀, Tipaimukh, Kolasib, 2.9.1989, coll. Y.N.P. Sinha; 1♂, Diltlang, Chhimtuipui, 16.1.1992, coll. S.J.S. Hattar and 1♂, Teirei, 9.11.1995, coll. M.S. Shishodia.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	25.00	30.00	29.50
Female :	23.00	29.00	28.00

Distribution : Throughout India.

Elsewhere : Australia, Bangladesh, China, Hong Kong, Indonesia, Iraq, Kampuchia, Laos, Malaysia, Myanmar, Nepal, Philippines, Seychelles, Sri Lanka, Taiwan, Thailand and Vietnam.

Remarks : The clear uncoloured apices of wings will serve to distinguish it from other Indian species of the genus.

56. *Neurothemis intermedia intermedia* (Rambur)

1842. *Libellula intermedia* Rambur, *Hist. nat. Ins. Neurop.*, : 91.

1936. *Neurothemis intermedia intermedia*, Fraser, *Fauna Brit. India, Odon.*, **3** : 357-358.

Material examined : 1♀, Teirei, 10.1.1992, coll. S.J.S. Hattar; 1♂, Lengpui, Aizawl, 21.1.1992, coll. S.J.S. Hattar; 2♂♂, 2♀♀, Teirei, 9.11.1995, coll. M.S. Shishodia; 3♂♂, 2♀♀, Dampa Sanctuary, 9.11 1995, coll. M.S. Shishodia; 1♂, Kauanpui, 13.11.1995, coll. M.S. Shishodia; 1♂, Dampa, Rengpui, 28.11.1995, coll. P. Parui; 1♂, West Pheling, 30.11.1995, coll. P. Parui; 1♂, Lalan, 1.12.1995, coll. M. Sil; 1♂, Chimlunge, Aizawl, 8.12.1995, coll. M. Sil; 5♂♂, 3♀♀, Saihapui kawn, 9.12.1995, coll. P. Parui and 2♂♂, Vairengti, 10.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	22.00-23.50	21.00-23.00	21.00-22.00
Female:	20.00-21.50	20.50-23.00	21.00-22.00

Distribution : Throughout India.

Elsewhere : China and Southeast Asia.

Remarks : Pterostigma deep yellow in colour and covers 1½ cells; 4-5 cubital nervures in forewing and 2 in hindwing; subtrigone in forewing 5 celled; one row of cells in between IRiii and Rspl of forewing and 2 in hindwing.

Genus ***Sympetrum*** Newman

1833. *Sympetrum* Newman, *Ent. Mag.*, **1** : 511.

1936. *Sympetrum*, Fraser, *Fauna Brit. India, Odon.*, **3** : 370-371.

Diagnostic characters : Small to medium sized and coloured black or red marked with green and yellow; vesicle, emerginate as a collar and provided with specialised tuft of hairs; Wings hyaline, sometimes partly marked with yellow, brown or black; 6½ to 11½ and 5-6 antenodal nervures in fore and hindwings respectively; 6-11 postnodal nervures in both the wings; pterostigma about 4-5 times as long as broad, not braced; arc situated between the 1st and 2nd antenodal nervures; hypertrigone entire; subtrigone 3 celled; only one cubital nervures in both the wings, but rarely 2 in hindwings.

Distribution : Vertually cosmopolitan in all over Africa, America, Europe and Asian countries.

57. *Sympetrum hypomelas* (Selys)

1884. *Diplax hypomelas* Selys, *Ann. Soc. Ent. Belg.*, **28** : 37.

1936. *Sympetrum hypomelas*, Fraser, *Fauna Brit. India, Odon.*, **3** : 373-374.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh, West Bengal and Westren Ghats.

Elsewhere : China, Myanmar, Nepal and Tibet.

Remarks : This species is included here on the basis of literature review. It bears a broad black marking on thorax and femora of fore-leg.

Genus ***Trithemis*** Brauer

1868. *Trithemis* Brauer, *Verh. zool.-bot. Ges. Wien.*, **18** : 176.

1936. *Trithemis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 381-382.

Diagnostic characters : Small to medium sized dragonflies; colour black or reddish marked with yellow, green, metallic blue or violet; sometimes partly pruinosed; vesicle depressed; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs; Wings hyaline, sometimes enfumed with brown at apex and usually marked with yellow, brown or black at base for variable extent with reddish or black neuration; 7½ to 18½ and 6-14 antenodal nervures in fore and hindwings respectively; 6-14 postnodal nervures in both the wings; Pterostigma 4-5 times as long as broad, not braced; hypertrigone entire; subtrigone 3 celled, one or rarely two cubital nervures in both the wings; arc situated between 1st and 2nd antenodal nervures.

Distribution : Africa, China, India, Indonesia, Madagascar, Malaysia, Mauritius, Myanmar, Nepal, New Guinea, Pacific Islands, Pakistan,

Philippines, Sri Lanka, Syria, Taiwan, Thailand, Tibet, Turkey and Vietnam.

Key to the species of genus *Trithemis* Brauer

1. Legs very long, hind femora extending to apex of 2nd abdominal segment; pterostigma bicolorus. ..... *pallidinervis* (Kirby)
- Legs not usually long, hind femora extending only upto the end of synthorax; pterostigma unicolorous. 2
2. Base of hindwing with a small reddish-brown spot; neuration crimson. *aurora* (Burmeister)
- Base of hindwing with a small dark brown spot; neuration black. ..... *festiva* (Rambur)

58. *Trithemis aurora* (Burmeister)

1839. *Libellula aurora* Burmeister, *Handb. Ent.*, **2** : 859.
1936. *Trithemis aurora*, Fraser, *Fauna Brit. India, Odon.*, **3** : 383-385.

Material examined : 15♂♂, Tipaimukh, Kolasib, 2.9.1989, coll. Y.N.P. sinha; 1♂, 1♀, Seling, 8.9.1989, coll. Y.N.P. Sinha; 1♀, Zobawk, 9.9.1989, coll. Y.N.P. Sinha; 1♀ Mualkawi, 30.9.1989, coll. A.R. Lahiri; 1♀, Aibawk, 18.3.1993, coll. B.K. Biswas; 1♀, Saiha, Chhimtuipui, 6.4.1994, coll. S.K. Ghosh and M. Prasad; 3♂♂, Zobawk, Lunglei, 11.4.1994, coll. S. K. Ghosh and M. Prasad; 2♀♀, Aizawl, 13.4.1994, coll. S.K. Ghosh and M. Prasad and 2♂♂, 1♀, Champhai, 13.10.1995, coll. A.K. Sanyal.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	24.00-26.00	29.00-31.00	29.00-31.00
Female:	23.00-26.00	28.00-29.50	27.00-29.00

Distribution : Throughout India.

Elsewhere : China, Hong Kong, Indonesia, Japan, Kampuchia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Tibet and Vietnam.

Remarks : It is widely distributed in Mizoram. Vesicle and dorsum of frons metallic violaceous; base of hindwing with a small reddish brown spot; neuration crimson.

59. *Trithemis festiva* (Rambur)

1842. *Libellula festiva* Rambur, *Hist. nat. Ins. Neurop.*, 92.
1936. *Trithemis festiva*, Fraser, *Fauna Brit. India, Odon.*, **3** : 387-389.

Material examined : 2♂♂, Bilkhawthir, Kolasib, 5.9.1989, coll. Y.N.P. Sinha; 1♂, 42 kms. from Saiha towards blue Mountain, 9.4.1994, coll. A.K. Hazra; 2♀♀, Zobawk, Lunglei, 11.4.1994, coll. S.K. Ghosh and M. Prasad; 1♀, Aizawl, 13.4.1994, coll. S.K. Ghosh and M. Prasad and 1♂, Kolasib, 15.4.1994, coll. A.K. Hazra.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	24.00-25.50	28.00-29.50	27.50-29.00
Female:	21.00-22.00	27.50-28.50	27.00-28.50

Distribution : Throughout India.

Elsewhere : Afghanistan, Africa, China, Cyprus, Hong Kong, Indonesia, Iraq, Kampuchia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Papua,Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Turkey and Vietnam.

Remarks : Pterostigma black and covers 2 cells; subtrigone 3 celled; 2 rows of cells in between IRiii and Rspl. Base of hindwing with a small dark brown spot, neuration black.

Nodal index $\frac{7-10\frac{1}{2}}{7-7} \Big/ \frac{10\frac{1}{2}-7}{7-8}$ to $\frac{9-10\frac{1}{2}}{7-8} \Big/ \frac{11\frac{1}{2}-7}{8-7}$

60. *Trithemis pallidinervis* (Kirby)

1889. *Sympetrum pallidinervis* Kirby, *Trans. zool. Soc. Lond.*, **12** : 327.
1936. *Trithemis pallidinervis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 389-391.

Material examined : 1♀, 2 kms. south of Aibawk, 28.3.1994, coll. G.C. Sen.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	29.00	35.50	34.50

Distribution : Throughout India.

Elsewhere : Indonesia, Malaysia, Myanmar, Nepal, Philippines, Singapore, Sri Lanka, Taiwan, Thailand and Tibet.

Remarks : Legs very long, femora extending to the apex of 2nd abdominal segment; pterostigma bicolours and covers 2 cells; membrane brown; base of hindwing marked with yellow upto 1st antenodal nervure and cubital space.

Nodal index $\frac{9-9\frac{1}{2}}{11-6} / \frac{9\frac{1}{2}-9}{6-9}$

Genus ***Palpopleura*** Rambur

1842. *Palpopleura* Rambur, *Hist. nat. Ins. Neurop.*, : 129.

1936. *Palpoleura*, Fraser, *Fauna Brit. India. Odon.*, **3** : 316-317.

Diagnostic characters : Small sized, yellowish marked with brown, black or metallic blue; the markings sometimes obscured by pruinescence; vesicle markedly raised, notched above; posterior lobe of prothorax subquadrate, large, emerginate and provided with tuft of hairs; wings hyaline, sometimes partly yellowish, amber tinted, brown or black; 10½-12½ and 7-9 antenodal nervures in fore and hindwings respectively; 4-9 postnodal nervures in both the wings; pterostigma about 3-5 times as long as broad, not braced; hypertrigone traversed by one to two cross veins in forewing and entire in hindwings; subtrigone 3 celled; only one cubital nervure in both the wings.

Distribution : Africa, Bangladesh, India, Madagascar, Malaysia, Myanmar, Nepal, Sri Lanka, Tibet and Vietnam.

61. ***Palpopleura sexmaculata sexmaculata*** (Fabricius)

1787. *Libeullula sexmaculata* Fabricius, *Mant. Ins.*, **1** : 338.

1936. *Palpopleura sexmaculata sexmaculata*, Fraser, *Fauna Brit. India, Odon.*, **3** : 318-320.

Material examined : 1 ♀, Champhai, 29.9.1993, coll. A.R. Lahiri; 1 ♀, Kaunpui, 13.11.1995, coll. M.S. Shishodia; 1 ♀, West Pheling, 30.11.1995, coll. P. Parui and 1 ♀ Lalan, 1.12.1995, coll. M.Sil.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	13.50	20.50	19.50

Distribution : Throughout India.

Elsewhere : China, Malaysia, Myanmar, Nepal, Sri Lanka, Tibet and Vietnam.

Remarks : Amber yellow markings in hindwing extended beyond petrostigma; blackish brown markings present upto 4th antenodal nervure in subcosta and whole of cubital space in hindwing; in forewing these blackish-brown markings present in between 2nd and 6th antenodal nervures of costa, 2nd to 8th in subcosta, at the node between 1st and 2nd postnodal nervures, upto 6 cells in arch, whole of cubital space, upto 2 cells in subtrigone and some portion of discoidal cell.

Genus ***Pantala*** Hagen

1861. *Pantala* Hagen, *Dyn. Neur. Amer.*, : 141.

1936. *Pantala*, Fraser, *Fauna Brit. India, Odon.*, **3** : 413-414.

Diagnostic characters : Medium sized, yellow or reddish brown with restricted black markings; vesicle moderately high, rounded; posterior lobe of prothorax not erected as a collor, specialised tuft of hairs absent; wings hyaline, sometimes enfumed with brown and marked at base with brown or golden yellow; 12½-15½ and 7-8 antenodal nervures and 6-8 and 8-10 postnodal nervures present in both the wings respectively; pterostigma smaller in hindwing about 3-5 times as long as broad, not braced; arc situated between 1st and 2nd antenodal nervures; hypertrigone entire, subtrigone ill defined and sectors of arc forming a common stalk.

Distribution : Cosmopolitan.

62. ***Pantala flavescens*** (Fabricius)

1798. *Libellula flavescens* Fabricius, *Suppl. Ent. Syst.*, : 285.

1936. *Pantala flavescens*, Fraser, *Fauna Brit. India, Odon.*, **3** : 414-416.

Material examined : 2 ♂♂, Thingdawl, Kolasib, 4.9.1989, coll. Y.N.P. Sinha; 1 ♀, Bilkhawthir, Kolasib, 5.9.1989, coll. Y.N.P. Sinha; 1 ♂, 1 ♀, Seling, 8.9.1989, coll. Y.N.P. Sinha; 1 ♂, 1 ♀, Zobawk, 9.9.1989, coll. Y.N.P. Sinha; 1 ♀, Lunglei, 10.9.1989, coll. Y.N.P. Sinha; 1 ♂, Lawngtlai, Chhimtuipui, 3.4.1994, coll. S.K. Ghosh and M. Prasad; 1 ♂, Circuit House,

Lawngtlai, 3.4.1994. coll. A.K. Hazra; 2♂♂, D.F.O. Office Complex, Lawngtlai, 5.4.1994, coll. A.K. Hazra; 1♂, 1♀, Saihtle Village, Saiha, 7.4.1989, coll. A.K. Hazra; 1♀, Saiha, 8.4.1989. coll. S.K. Ghosh and M. Prasad; 1♀, Far Pak, Blue Mountain, 9.4.1994, coll. A.K. Hazra and 1♂, Vairengti, 16.4.1994, coll. A.K. Hazra.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Male :	31.00-32.50	39.00-41.00	38.00-40.00
Female:	21.00-33.50	39.00-40.50	38.00-39.00

Distribution : Cosmopolitan.

Remarks : It is also one of the most common species in Mizoram.

Genus ***Tramea*** Hagen

1861. *Tramea* Hagen, *Syn. Neur. Amer.*, : 114.

1936. *Tramea*, Fraser, *Fauna Brit. India, Odon.*, **3** : 431-432.

Diagnostic characters : Large sized and robust built dragonflies, variable colour; vesicle high and variable, prothorax with small posterior lobe; wings hyaline, long and very broad at base, rather pointed at apex; base of hindwing marked with irregular opaque spot; arc situated between 1st and 2nd antenodal nervures; sectors of arc with a long fusion at origin; only one cubital nervure in both the wings; pterostigma small unequal in fore and hindwing.

Distribution : Cosmopolitan.

63. ***Tramea virginia*** (Rambur)

1773. *Libellula chinensis* De Geer, *Mem. Ins.*, **3** : 556.

1842. *Libellula virginia*, Rambur, *Ins. Neurop.*, : 33.

1933. *Tramea virginia*, Fraser, *Fauna Brit. India, Odon.*, **3** : 435-436.

Distribution : India : Mizoram, Bihar, Himachal Pradesh, Jammu & Kashmir, Tamil Nadu and Uttar Pradesh.

Elsewhere : Bangladesh, China, Micronesia, Myanmar, Nepal, South Japan, Taiwan, Thailand and Vietnam.

Remarks : This species is included here on the basis of literature review. Large dark reddish brown spot present at the base of hindwing, extending distally to distal end of discoidal cell and involving nearly whole of anal loop.

Genus ***Tholymis*** Hagen

1867. *Tholymis* Hagen, *Ent. Ztg.*, **28** : 221.

1936. *Tholymis*, Fraser, *Fauna Brit. India, Odon.*, **3** : 410-411.

Diagnostic characters : Medium sized dragonflies; reddish, marked with yellow or green; vesicle flat or shallowly rounded; Wings hyaline, marked with golden brown at base in forewing, upto nearly nodus in hindwing, where in males sometimes posses a opalescent white distal band; 9½-11½ and 7 antenodal nervure in fore and hindwing respectively and 7-10 postnodal nervures in both the wings; hypertrigone entire; subtrigone 3-4 celled, only one cubital nervure in both the wings.

Distribution : Africa, Australia, India, Indonesia, Madagascar, Malaysia, Mauritius, Myanmar, North America, Pacific Islands, Philippines, Sri Lanka, South America, Taiwan and Thailand.

64. ***Tholymis tillarga*** (Fabricius)

1798. *Libellula tillarga* Fabricius, *Suppl. Ent. Syst.*, : 285.

1936. *Tholymis tillarga* Fraser, *Fauna Brit. India, Odon.*, *3* : 411-413.

Material examined : 1♀, Tuipui, Chhimtuipui, 19.1.1992, coll. S.J.S. Hattar and 1♀, Lalan, Aizawl, 1.12.1995, coll. P. Parui.

Measurements (in mm) :

	Abdomen	Forewing	Hindwing
Female :	32.00	33.00	32.00

Distribution : Throughout India.

Elsewhere : Africa, Australia, Indonesia, Madagascar, Malaysia, Mauritius, Myanmar, North America, Paciic Islands, Philippines, Sri Lanka, South America, Taiwan and Thailand.

Remarks : Membrane brown; pterostigma yellowish-brown, covers 2 cells, 2 rows of cells in between IRiii and Rspl.

SUMMARY

Odonate fauna of Mizoram in eastern India has been studied comprehensively. Altogether 64 species and subspecies belonging to 41 genera under 12 families and two suborders are recorded from there. Of these, 12 species and subspecies are recorded for the first time from the State. Keys, collection data, distributional range within India and outside, body measurements and notes on the taxonomic importance wherever applicable have been provided and abundant and rare species and subspecies indicated.

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INSECTA : ORTHOPTERA : ACRIDOIDEA

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INTRODUCTION

Superfamily Acridoidea includes short-horned grasshoppers. The average size of thses insects varies from 8 mm to 50 mm. They are highly economically important, as some of the species do considerable damage to the crops, vegetable plants or forest plantations. The well known locust species also belong to this superfamily.

These grasshoppers are found throughout the World, wherever Orthoptera found. Though many species have restricted distribution, but majority of them are tropical and the group is well represented in temperate climate too. They are found from sea-level to very high altitude in Himalayan regions in India. The number of known species of the group from the whole World are about 8,000. Out of these, 355 are known from India.

Notable workers like Boliver (1902, 1905, 1914, 1918), Kirby (1914), Uvarov (1921, 1923a, 1923b, 1925, 1927, 1942), Dirsh (1956), Dirsh & Uvarov (1953), Willemse (1951, 1955, 1957), Banerjee & Kevan (1960), Kevan (1964, 1969a), Hollis (1968, 1971, 1975), Bei-Bienko and Mishchenko (1963, 1964), Shishodia & Hazra (1985), Tandon (1975) and Tandon & Khera (1978) have taxonomically studied Indian Orthoptera, but no body has worked out the Acridoidea fauna of Mizoram.

Present paper deals with 40 species, distributed under 32 genera and 2 families. All the species are new records for Mizoram State. *Gerenia abbreviata* is recorded for the first time not only from Mizoram but also from India. The *Sphingonotus* sp. is peculiar in having reddish basal part of wings, which is found in *S. octofasciatus*. The latter species has not been recorded from India till now. Some of the genera like *Acrida*, *Gastrimargus*, *Oedaleus*, *Gesonula*, *Eyprepocnemis* etc. are very common, but these are not found in Mizoram. The study is based on the material collected by the Survey parties of Zoological Survey of India. Meinodas & Shafee (1990) have described one new species, *Pargiella champhaiensis* from Champhai. We have not studied this species at present.

SYSTEMATIC ACCOUNT

Order : ORTHOPTERA

Superfamily : ACRIDOIDEA

Key to families of ACRIDOIDEA

1. Foveolae of the vertex contiguous, superior and forming the extremity of the fastigium; stridulatory mechanism absent. .... PYRGOMORPHIDAE

– Foveolae of the vertex lateral, or inferior, never forming the tip of the fastigium; stridulatory mechanism present. ..... ACRIDOIDEA

Key to genera of family PYRGOMORPHIDAE

1. Antennae placed infront of the ocelli; body more fusiform and slender. .... ***Atractomorpha*** Saussure

– Antennae placed near or below the ocelli. 2

2. Eyes round in shape; tegmina not reaching beyond the tip of abdomen, apex rounded. .. .. ***Chlorizeina*** Brunner

- Eyes oval or elongated but not as above; tegmina extended beyond the tip of abdomen and acute at apex. 3

3. Body large and robust; lateral lobes of pronotum at posterior margin acute; tegmina with a black spot with yellow tinge nearby.. ..... ***Pseudomorphacris*** Carl

- Body short; lateral lobes of pronotum at posterior margin obtuse; tegmina with a black spot at the base. ..... ***Tagasta*** Bolivar

Genus ***Atractomorpha*** Saussure, 1861

Key to species

1. Body-form comparatively broad, stout and rather short; lateral pronotal lobe always without a membraneous area in metazone. ... . *burri* Bolivar

- Body-form more slender and elongated; lateral pronotal lobe often with a membraneous area near posterior margin. 2

2. General body-form very slender; fastigium of vertex very long; apex of male abdomen rather acute; majority of specimens with a membraneous area near the posterior margin of the lateral pronotal lobe. .... *psittacina* (De Haan)

- Body-form not exceptionally slender; fastigium of vertex comparatively rather shorter; male abdomen with apex more obtuse; lateral pronotal lobe always with a well developed membraneous area near the posterior margin. ..... *crenulata* (Fabricius)

1. *Atractomorpha burri* Bolivar

1905. *Atractomorpha burri* Bolivar, *Bol. Soc. Espan Hist. nat.*, **5** : 197, 203.

1969. *Atractomorpha burri* : Kevan & Chen, *Zool. J. Linn. Soc.*, **48** : 159, 160, 203.

Material examined : 11♂, 9♀, Teirei, Dist. Aizawl, 22,23,24.x.1991, J.K. Jonathan coll; 2♂, Phaileng, Dist. Aizawl, 24.x.1991, J.K. Jonathan coll.; 1♂, 1♀ Teirei, 9.xi.1995, M.S. Shishodia coll.; 1♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.; 1♂, Aibawk, 17.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Body short and robust; head and pronotum relatively short; eyes comparatively long; lateral pronotal lobe without membraneous area in the metazona; hind wings tyrian pink to light mallow purple at base; posterior femora convex and keeled externally.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Orissa and West Bengal. It is also studied from Sikkim (in press).

Elsewhere : Bangladesh; Bhutan; Indo-China; Malayasia; Upper Myanmar; Nepal and Thailand.

2. *Atractomorpha crenulata* (Fabricius)

1793. *Truxalis crenulatus* Fabricius, *Ent. Sys.*, **2** : 228.

1969. *Atractomorpha crenulata* : Kevan & Chen, *Zool. J. Linn. Soc.*, **48** : 187.

Material examined : 1♀, Champhai, 15.x.1995, A.K. Sanyal coll; 1♂, 1♀, Teirei, Dist. Aizawl, 9,11.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Medium in size; lateral pronotal lobe always with a membraneous area in the metazona; lateral margin of pronotal disc well defined, divergent and somewhat convex in metazone; tegmina extending for one-fourth of their length beyond the hind femora, pointed at apex; wings red at base.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Andhra Pradesh, Bihar, Goa, Jammu & Kashmir, Karnataka, Kerala, Lakshadweep Islands, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu and West Bengal.

Elsewhere : Bangladesh; Myanmar; Pakistan; Sri Lanka; South West Sumatra and South Vietnam.

Remarks : Very widely distributed in India.

3. *Atractomorpha psittacina psittacina* (De Haan)

1842. *Acridium (Truxalis) psittacina* De Haan, *Temminck, Verhandel.*, Orth. : 146.

1969. *Atractomorpha psittacina psittacina* : Kevan & Chen, *Zool. J. Linn. Soc.*, **48** : 191.

Material examined : 1♂, Aizawl, 5.xii.1993, R.S. Burman coll.; 1♂, Liaton, Dist. Aizawl,

7.xii.1993, R.S. Burman coll.; 3♂, 9♀, Bethel, 12.xii.1993, R.S. Burman coll.

Diagnostic characters : Body very slender; fastigium of vertex narrower and longer; lateral lobe of pronotum with a membraneous area in metazona; tegmina and hind wings very long, reaching beyond the posterior tibiae; wings either colour-less or tyrian pink to dull magenta at base.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Rajasthan.

Elsewhere : It is distributed in the whole range of South and East Asia except North and West.

Genus ***Tagasta*** Bolivar, 1905

4. ***Tagasta indica*** Bolivar

1905. *Tagasta indica* Bolivar, *Bol. Soc. Espan. Hist. nat.*, **5** : 112, 113.

Material examined : 1♂, 1♀, Teirei, Dist. Aizawl, 23.x.1991, J.K. Jonathan coll; 5♂, 3♀, Teirei, 9.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Oilvaceous in colour; fastigium of vertex equilaterally triangular; antennae inserted near the eyes; pronotum rounded infront and obtusely angulated behind; median carina almost and lateral carinae wholly absent; tegmina as long as hind femora, with a brown spot at the base; hind wings one-fifth shorter than tegmina.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya, Sikkim, West Bengal.

Elsewhere : Bhutan.

Genus ***Chlorizeina*** Brunner, 1893

5. ***Chlorizeina unicolor unicolor*** Brunner von Wattenwyl

1893. *Chlorizeina unicolor* Brunner von Wattenwyl, *Ann. Mus. Stor. nat. Genova*, **33** : 131.

1969a. *Chlorizeina unicolor unicolor* : Kevan, *Trans. Amer. ent. Soc.*, **94** : 369.

Material examined : 1♂, 1♀, Hnahtial, Dist. Lunglei, 9.xii.1993, R.S. Burman coll.; 2♂, 2♀, Teirei, Dist. Aizawl, 9.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Size medium but body robust; colour light green or olive-green; antennae filiform and placed below the ocelli; fastigium of vertex more parabolic and pronotum not so wide posteriorly as in *C. u. roonwali*; tegmina and wings brachypterous, reaching upto the third abdominal segment; hind femora slender and genicular lobes slightly pointed and partly black; hind tibiae dull blue, tipped with black colour; lateral margin of male epiproct usually slightly concave; male cerci less expanded apically.

Distribution : India : Mizoram, Eastern Assam hills, Sikkim and Manipur.

Elsewhere : West Laos; Upper Myanmar and eastern parts of Thailand.

Genus ***Pseudomorphacris*** Carl, 1916

6. ***Pseudomorphacris notata*** (Brunner)

1893. *Mestra notata* Brunner von Wattenwyl, *Ann. Mus. Stor. nat. Genova*, **33** : 130.

1963. *Pseudomorphacris notata* : Kevan, *Ent. Monthly Mag.*, **96** (1962) : 208, 209.

Material examined : 1♀, Tuipang, Chhimtuipui, 6.xii.1981, J.P. Sati coll.; 1♂, Seling, Dist. Aizawl, 13.ix.1994, I.B. Dutta and party coll.

Diagnostic characters : Body-form more slender and stout than *Atractomorpha* Saussure and *Tagasta* Bolivar. Head somewhat narrower at base; tegmina at rest reaching approximately to hind knee, with a black spot with yellow tinge at the base; hind wings distinctly purplish, not falling far short of tegmina when at rest; hind tibiae pink; male cerci, in lateral view, less strongly curved or bent.

Distribution : India : Mizoram, Assam hills and Tripura.

Elsewhere : Bangladesh; Myanmar.

Family ACRIDIDAE

Key to subfamilies of ACRIDIDAE

1. Prosternal process or tubercle usually absent. 2
– Prosternal process or tubercle always present. 4

2. Stridulatory file on inner side of posterior femora absent. 3
- Stridulatory file on inner lower side of posterior femora present in the form of a series of peg-like structure. ... GOMPHOCERINAE (*sensu* Uvarov, 1966)

3. Head elongate and acute in profile; tegmina without intercalary vein (if present, weak, irregular and not serrated even in male). .... ACRIDINAE (*sensu* Uvarov, 1966)
- Head rounded in profile; face almost vertical, rarely oblique; tegmina with an intercalary vein in median area. ..... OEDIPODINAE (*sensu* Uvarov, 1966)

4. Radial area of tegmen with a series of regular, parallel stridulatory veinlets. ....HEMIACRIDINAE (*sensu* Dirsh, 1966)
- Stridulatory veinlets of radial area of tegmen absent. 5

5. Lower external lobe of posterior knee with spine-like apex. ..... OXYINAE (*sensu* Dirsh, 1965)
- Lower external lobe of posterior knee with apex rounded, angular or subacute, but not spine-like. 6

6. Last abdominal tergite in male (in most of the genera) with well developed furcula; supra-anal plate mostly with an attenuate or trilobate apex; subgenital plate with transverse fold. ..... COPTACRIDINAE (*sensu* Dirsh, 1965)
- Last abdominal tergite without well developed furcula; supra-anal plate variable; subgenital plate without transverse fold. 7

7. Mesosternal interspace colsed. .... TROPIDOPOLINAE (*sensu* Dirsh, 1965)
- Mesosternal interspace mostly open. 8

8. Mesosternal lobes rectangular. .... CYRTACANTHACRIDINAE (*sensu* Dirsh, 1966)
- Mesosternal lobes rounded or obtuse-angular or acute-angular, but not rectangular. 9

9. Dorsum of pronotum flate or weakly tectiform, with median and lateral carinae linear (lateral carinae sometimes obliterated); male cercus strongly compressed, lobiform or subacute, apex downcurved...EYPREPOCNEMIDINAE (*sensu* Dirsh, 1965)
- Dorsum of pronotum of variable shape; lateral carinae, if present, not linear; male cercus variable, but not as above. ....CATANTOPINAE (*sensu* Dirsh, 1966)

Subfamily COMPHOCERINAE

Genus ***Mesopsis*** Bolivar, 1906

7. ***Mesopsis cylindricus*** Kirby

1914. *Aswatthamanus cylindricus* Kirby, *Fauna British India*, Orth., : 101.

1971. *Mesopsis cylindricus* : Jago, *Proc. Acad. nat. Sci. Philad.*, **123** (8) : 237.

Material examined : 1♂, Chawngta forest, Lawngtlai, 2.iv.1994, S.K. Ghosh coll.

Diagnostic characters : Fastigium of vertex very long and narrow, apex rounded; antennae ensiform; frontal ridge narrow; eyes large; front and middle legs short, hind leg very long and slender; tegmina long and narrow, apex pointed; hind wings shorter than tegmina; terminal spine of hind tibiae absent.

Distribution : India : Mizoram, Andhra Pradesh, Bihar, Madhya Pradesh and West Bengal.

Subfamily ACRIDINAE

Key to genera of ACRIDINAE

1. Lateral carinae of pronotum absent. .... ***Rammeacris*** Willemse
- Laeral carinae of pronotum present. 2

2. Lateral carinae of pronotum divergent posteriorly. 4
- Lateral carinae of pronotum straight, continuous. 3

3. Body very slender; head a little long; apex of tegmina acutely sharpened. ... ***Gonista*** Bolivar

- Body not very slender; head not as long as in the preceding genus; apex of tegmina obliquely truncate. ..... ***Phlaeoba*** Stål

4. Body large and robust. .... ***Holopercna*** Karsch
- Body medium and normal. ... ***Ceracris*** Walker

Genus ***Rammeacris*** Willemse, 1951

8. ***Rammeacris gracilis*** (Ramme)

1941. *Ceracris gracilis* Ramme, *Mitt. zool. Mus. Berl.*, **25** : 30.

1951. *Rammeacris gracilis* : Willemse, *Publitiës. natuurh. Genoot. Limburg*, **4** : 66.

Material examined : 1♀, Teirei, dist. Aizawl, 24.x.1991, J.K. Jonathan coll; 1♀, Teirei, 9.xi.1995, M.S. Shishodia coll.; 1♂, 3♀, Ḱawnpui, 13.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Size small; general colouration olivaceous brown; head and pronotum finely punctured; basal joints of antennae slightly flattened; pronotum with parallel side, anterior margin truncately rounded, posterior margin obtusely angulate; median carina interrupted by the third sulcus only; lateral carinae absent, sometimes indistinctly appear on the posterior margin; tegmina and wings well developed, reaching upto the tip of hind femora; hind femora yellowish brown, knee black with a pre-apical yellow ring; hind tibiae bluish, the base black, followed by a post basal broad yellow ring.

Distribution : India : Mizoram, Assam, Manipur, Meghalaya and Tripura.

Elsewhere : Myanmar and Thailand.

Remarks : C. Willemse (1951) and Fer Willemse (1967) have recorded this species from Myanmar and Thailand respectively on the basis of male specimens. Shishodia & Tandon have recorded this species of both sexes from Assam, Manipur, Meghalaya and Tripura (in press). The present authors have studied it from Mizoram.

Genus ***Ceracris*** Walker, 1870

Key to species

1. Face and pronotum coarsely punctured; hind femora externally with a narrow, but always distinct, blackish fascia just before the pre-apical pale ring; tegmina brown, with the anal field green or brownish-green. .... *nigricornis* Walker
- Face and pronotum smooth; hind femora without blackish fascia before the pale ring; tegmina with a sharply defined narrow sulphureus stripe in the scapular area..... *striata* Uvarov

9. ***Ceracris nigricornis nigricornis*** Walker

1870. *Ceracris nigricornis* Walker, *Cat. Derm. Salt. Brit. Mus.*, **4** : 791.

1925. *Ceracris nigricornis nigricornis* : Uvarov, *Ent. Mitt. Berl.*, **14** : 13.

Material examined : 2♂, Aizawl, 5.xii.1993, R.S. Burman coll.; 12♂, 2♀, Kawartha, 6.xii.1993, R.S. Burman coll.; 20♂, 5♀, Liaton, 7.xii.1993, R.S. Burman coll.; 1♂, Kuikawk, 8.xii.1993, R.S. Burman coll.; 1♂, 1♀, Hnahthial, Dist. Lunglei, 9.xii.1993, R.S. Burman coll.; 4♂, 3♀, Khawzawl, 11.xii.1993, R.S. Burman coll.; 2♂, Bethel, 12.xii.1993, R.S. Burman coll.; 2♂, 3♀, Champhai, 13.xii.1993, R.S. Burman coll.

Diagnostic characters : Face and pronotum coarsely punctured; a distinct blackish fascia present just before the pre-apical pale ring; tegmina brown and anal field green.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Meghalaya, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Afghanistan and Myanmar.

10. ***Ceracris striata*** Uvarov

1925. *Ceracris striata* Uvarov. *Ent. Mitt. Berl.*, **14** : 16.

Material examined : 1♂, Hnahthial, Dist. Lunglei, 9.xii.1993, R.S. Burman coll.; 1♂, Khawzawl, 11.xii.1993, R.S. Burman coll.

Diagnostic characters : Antennae black; tegmina brownish with a very sharp narrow sulphureus ring in the scapular field, not reaching upto its apex; hind femora without fascia before the pale ring; hind tibiae black below, blackish-blue above with the usual colour pattern near the base.

Measurements (in mm.) : Length of body 30.0; tegmen 18.0; hind femur 17.0; hind tibia 16.0.

Distribution : Myanmar.

Genus ***Gonista*** Bolivar, 1898

11. ***Gonista bicolor*** de Haan

1842. *Acridium (Opsomala) bicolor* de Haan, *Verh. Ned. Over. Bezitt. Orth.*, : 147, 148.

1951. *Gonista bicolor* : Willemse, *Publtiës. natuurh, Genoot. Limburg*, **4** : 108.

Material examined : 1♂, Bung, Aizawl, 26.x.1991, J.K. Jonathan coll.; 1♂, Chownbot, Lawngtlai, 2.ix.1994, S.K. Ghosh coll.

Diagnostic characters : General colouration yellowish-green; antennae reddish-brown, dark at apex; eyes long; lateral postocular fasciae narrow; tegmina brownish or green, along the radial vein with a reddish stripe, acute at apex, extending beyond the apex of abdomen; wings along the radial vein sometimes slightly infumate; hind femora with a dark stripe on the outer area; hind knee not at all produced from above into unequal spines, normal.

Distribution : India : Mizoram, Meghalaya and Tripura.

Elsewhere : Bali; China; Japan; Jawa; Kuala Lumpur; Malacca; Malayasia; Philippines; Singapore; Sumatra and Taiwan.

Genus ***Holopercna*** Karsch, 1891

12. ***Holopercna darjeelingensis*** (Bolivar)

1914. *Sjöestedtia darjeelingensis* Bolivar, *Trab. Mus. cienc. nat. Madr., Madrid*, **20** : 77.

1983. *Holopercna darjeelingensis* : Jago, *Trans. Amer. ent. Soc.*, **109** : 78.

Material examined : 1♂, Champhai, 29.x.1991, J.K. Jonathan coll.; 2♂, Murlen National Park, 17.xii.1993, S.S. Saha coll.; 2♂, Terai, Aizawl, 23.xii.1993, S.S. Saha coll.

Diagnostic characters : Fastigium of vertex concave, foveolae absent; general colouration brown, mottled with dark and yellow spaces and stripes; eyes brownish; wings blue in the middle, followed with broad band, curving on the middle of costa and anal angle; wings without dark spots at apex; hind femora blue below; hind tibiae alternately banded with blue and black.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Sikkim, Uttar Prdesh and West Bengal.

Genus ***Phlaeoba*** Stål, 1860

Key to species

1. Fastigium of vertex longer than broad. .... *assama* Ramme
– Fastigium of vertex as long as broad. 2
2. Subgenital plate of male obtuse at apex. .... *antennata* Brunner
– Subgenital plate of male tapering at apex.... ..... *infumata* Brunner

13. ***Phlaeoba assama*** Ramme

1941. *Phlaeoba assama* Ramme, *Mitt. zool. Mus. Berl.*, **25** (1940) : 9.

Material examined : 1♀, Lawngtlai, 3.iv.1994, A.K. Hazra coll.; 1♀, Saiha, 7.iv.1994, A.K. Hazra coll.; 1♂, Aizawl, 13.iv.1994, S.K. Ghosh and M. Prasad coll.

Diagnostic characters : Fastigium trapeziform, a strong median furrow present between the anterior margin of eyes; antennae about 1/4th longer than head and pronotum together, basal half segments broad, apical segments very narrow; pronotum rectangular, prozona with 4 dark rectangular tubercles, anterior margin transverse and posterior margin obtuse; tegmina reaching upto the posterior knees.

Distribution : India : Mizoram, Arunachal Pradesh, Assam and Sikkim.

14. ***Phlaeoba antannata*** Brunner

1893. *Phlaeoba antennata* Brunner, *Annali Mus. civ. Stor. nat. Giacomo Doria*, **33** : 125.

1914. *Phlaeoba antennata* : Kirby, *Fauna Brit. India, Orth.*, 102.

Material examined : 3♂, Mizoram forest, 19.x.1991, J.K. Jonathan coll.; 1♂, 1♀, Dampa

Wild Life Sanctuary, 22.x.1991, J.K. Jonathan coll.; 1♀, Phaileng, 23.x.1991, J.K. Jonathan coll.; 3♂, 9♀, Teirei, 12.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Antennae black, tipped with yellow; pronotum smooth, with all the three carinae well developed; wings bluish hyaline at base; subgenital plate obtuse at apex.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Kerala, Meghalaya, Rajasthan, Sikkim, Tripura, West Bengal.

Elsewhere : Bangladesh; Borneo; China; Hainan; Isle of Penang; Malaya peninsula; Myanmar; Perak, Tonking and Sumatra.

15. ***Phlaeoba infumata*** Brunner

1893. *Phlaeoba infumata* Brunner, *Annali Mus. civ. Stor. nat. Giacomo Dorio*, **33** : 124.

1914. *Phlaeoba infumata* : Kirby, *Fauna Brit. India, Orth.*,: 103.

Material examined : 1♂, 7♀, Teirei, Aizawl, 24.x.1991, J.K. Jonathan coll.; 2♂, Aibawk, 16.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Fastigium above with a continuous median carina extending along the head and pronotum; tegmina and wings longer than abdomen; wings fusco-hyaline, infuscated towards extremity; hind tarsi reddish; subgenital plate of male tapering at apex.

Distribution : India : Mizoram, Arunachal Pradesh, Bihar, Delhi, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Tripura, West Bengal.

Elsewhere : Bangladesh; South China; Hainan Island; South and North Kuangtung; Kwangsi; Malacca; Myanmar; Tenasserim and Yunnan.

Subfamily OEDIPODINAE

Key to genera

1. Dorsum of pronotum complete or cut by one groove. 2
- Dorsum of pronotum or its carina cut by two grooves. 4
2. Internal spur of posterior tibiae unequal, lower one much longer than other, abruptly hooked at apex, very acute. ..... ***Heteropternis*** Stål
- Internal spur of posterior tibiae equal, normal. 3
3. Head and pronotum granulose, tuberculate medially in front; posterior margin of metazona rectangular with tip rounded off; intercalary vein weakly serrated. .... ***Dittopternis*** Saussure
- Head and pronotum not granulated; posterior margin of metazona obtuse-angular; intercalary vein strongly serrated and extending to its distal apex of medial area. ..... ***Aiolopus*** Fieber
4. Pronotum without very distinct crest. .... ***Sphingonotus*** Fieber
- Pronotum with well-marked crest; median carina of pronotum strongly raised in prozona, forming two toothed-like projections. .... ***Trilophidia*** Stål

Genus ***Dittopternis*** Saussure, 1884

16. ***Dittopternis venusta*** (Walker)

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

1914. *Dittopternis venusta* : Kirby, *Fauna Brit. India, Orth.*, : 140.

Material examined : 1♂, Chhimtuipui, Lawngtlai, 3.iv.1994, S.K. Ghosh coll.; 2♀, Saiha, 6.iv.1994, A.K. Hazra coll.; 1♀, Zebawk, Thumpui, 13.iv.1994, A.K. Hazra coll.

Diagnostic characters : Vertex with four diverging rows of pale granules running backwards from between the eyes; pronotum rugose, granulated and strongly carinated, cut by principal sulcus before the middle, obtusely angulated behind; wings hyaline, yellow at base, with a broad suffused blackish band beyond; hind tibiae black at base, followed by a light band, then blue.

Distribution : India : Mizoram, Karnataka, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu, Tripura, West Bengal.

Elsewhere : Sri Lanka.

Genus ***Heteropternis*** Stål

17. ***Heteropternis respondens*** (Walker)

1859. *Acridium respondens* Walker, *Ann. Mag. nat. Hist.*, 4(3) : 223.

1914. *Heteropternis respondens* : Kirby, *Fauna Brit. India.* Orth., : 141.

Material examined : 4♀, Chawnbot, Lawngtlai, 2.iv.1994, S.K. Ghosh coll.; 1♂, 2♀, Chhimtuipui, 3.iv.1994, S.K. Ghosh coll.; 4♀, Saiha, 6.iv.1994, S.K. Ghosh coll.; 1♂, 1♀, Aibawk, 16,17.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Head smooth; antennae filiform; hind margin of pronotum rectangular, rounded at apex in the middle; basal half of tegmina opaque, transverse veins in apical part erect, the cells square or oblong; wings without well marked fascia; hind tibiae red, with 9-10 small black tipped spines.

Distribution : India : Mizoram, Arunachal Pradesh, Bihar, Karnataka, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : China; Jawa; Malacca; Myanmar; Nepal; Sri Lanka; Sumatra.

Genus ***Aiolopus*** Fieber, 1853

18. ***Aiolopus thalassinus tamulus*** (Fabricius)

1798. *Gryllus tamulus* Fabricius, *Ent. Sys. Suppl.*, : 195.

1968. *Aiolopus thalassinus tamulus* : Hollis, *Bull. Br. Mus. nat. Hist.*(Ent.), **22**(1) : 347.

Material examined : 1♂, Phaileng, 23.x.1991, J.K. Jonathan coll.; 1♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.; 2♀, Aibawk, 17.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Fastigium with anterior angle more acute; foveolae narrowly trapezoid, about twice as long as wide; frontal ridge gradually narrowing and almost angular towards fastigial end, sharply punctured; hind femur unicolorous, without any oblique fascia; posterior tibiae usually with red colouration in apical fourth and broadly separated from black band by a wide bluish grey band.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Bihar, Delhi, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere : Bangladesh; Borneo; China; Hainan; Japan; Jawa; Malaysia; Myanmar; New Guinea; Singapore; Sri Lanka; Sumatra and Taiwan.

Remarks : This species is found in grass fields as well as cultivated fields. It is one of the serious pest of agricultural crops.

Genus ***Sphingonotus*** Fieber, 1852

19. ***Sphingonotus*** sp.

Material examined : 1♀, Lawngtlai, 17.ix.1993, A.R. Lahiri coll.

Diagnostic characters : Frontal ridge narrow; apical part of antennae reddish; tegmina reaching upto the apex of tibiae with distinctly alternately blackish and light bands, without dark speckles; base of wing red, middle part with broad blackish band, apex hyaline; hind femora on inner side yellow, with one or two dark bands; hind tibiae red at base, followed with yellow and red alternately twice.

Distribution : The genus is distributed in North and South Africa, Central America and adjacent countries, middle and lower Asia, India and desert of Mongolia.

Remarks : This species is very nearer to *Sphingonotus octofasciatus*, but the wings have one blackish band only in the middle, whereas in *S. octofasciatus* there is another band near the apical part. *Sphingonotus octofasciatus* is found in North Africa to Algiers; middle Asia, east and south Transcaucasia, Kazakhistan etc.

Genus ***Trilophidia*** Stål, 1873

20. ***Trilophidia annulata*** (Thunberg)

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

1965. *Trilophidia annulata* : Hollis, *Trans. R. ent. Soc. Lond.*, **117**(8) : 251.

Material examined : 2♂, 2♀, Teirei, Aizawl, 24.x.1991, J.K. Jonathan coll.; 4♂, Lawngtlai, 2.iv.1994, S.K. Ghosh coll.; 2♂, Chhimtuipui, 7.iv.1994, S.K. Ghosh coll.; 3♂, 6♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Pronotum rugose, with a high median carina, forming two teeth infront and with lateral carinae; tegmina sometimes with two indistinct brown bands; wings yellow at base and brown or dark-brown beyond; hind tibiae brown with a pale band towards the base and with a slight pale band beyond the middle.

Distribution : India : Mizoram, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Goa, Kerala, Himachal Pradesh, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; Borneo; Hongkong; Japan; Korea; Malaya; Mongolia; Myanmar; Pakistan; Sarawak; Singapore; Sri Lanka; Sumatra and Taiwan.

Remarks : It is a major pest of pasture and also injurious to agricultural crops etc.

Subfamily HEMIACRIDINAE

Genus *Spathosternum* Karsch, 1877

21. *Spathosternum prasiniferum prasiniferum* (Walker)

1871. *Heteracris* (?) *prasinifera* Walker, *Cat. Derm. Salt. Brit. Mus.*, **5** Suppl.; 65.

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

Material examined : 4♂, 4♀, Teirei, 24.x.1991, J.K. Jonathan coll.; 1♂, 2♀, Teirei, 11,12.xi.1995, M.S. Shishodia, coll.; 3♂, 4♀ Kawnpui, 13.xi.1995, M.S. Shishodia coll.; 6♂, 9♀, Aibawk, 16,17.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Broad black or dark-brown stripe runs behind the lower part of eye and below the lateral carinae of pronotum on either side; central area of tegmina with a longitudinal black streak, generally almost obsolete in male and well-developed in female, but very variable, sometimes being entire; tegmina reaching distal end of hind femora or slightly beyond it; wings well developed.

Distribution : It is distributed throughout in India

Elsewhere : S. E. China, Myanmar; Thailand and Vietnam.

Remarks : Generally found on either side of road, in pastures and in and around cultivated fields.

Subfamily OXYINAE

Key to genera

1. Male epiphallus with ancorae; female ovipositor valves evenly toothed. .... ***Caryanda*** Stål

– Male epiphallus without ancorae; female ovipositor valves unevenly spined or evenly serrated. ..... ***Oxya*** Serville

Genus *Caryanda* Stål, 1878

Key to species

1. Lower inner area of hind femora and hind tibiae bright red; tegmina and wings reaching at least upto the middle of abdomen. .... *diminuta* (Walker)

– Lower inner area of hind femora & tibiae not red; tegmina and wings reduced almost to micropterous condition. .... *paravicina* (Willemse)

22. *Caryanda diminuta* (Walker)

1871. *Oxya diminuta* Walker, *Cat. Derm. Salt. Brit. Mus.*, **5** Suppl., : 64.

1975. *Caryanda diminuta* : Hollis, *Bull. Br. Mus. nat. Hist.* (Ent.), **31**(6) : 217.

Material examined : 1♂, Teirei, 24.x.1991, J.K. Jonathan coll.; 1♂, 5♀, Champhai, 28,30.x.1991, J.K. Jonathan coll.; 1♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Reddish-brown colour; wings slightly shorter than tegmina; posterior

margin of subgenital plate triangularly expanded; lower valve of ovipositor with a short tooth; cercus straight, broad at the base and narrow at apex.

Distribution : India : Mizoram, Andaman Islands and North-East India.

Elsewhere : Cambodia; China; Laos; Malaya peninsula; Malacca; Myanmar; Singapore; Sumatra; Thailand and Vietnam.

23. ***Caryanda paravicina*** (Willemse)

1925. *Oxya paravicina* Willemse, *Tidjschr. Ent.*, **68** : 55.

1975. *Carynda paravicina* : Hollis, *Bull. Br. Mus. nat. Hist.* (Ent.), **31**(6) : 218.

Material examined : 1♂, Aibawk, 19.x.1991, J.K. Jonathan coll.; 1♂, Phaileng, 10 kms. from Teirei Forest Rest House, 23.x.1991, J.K. Jonathan coll.; 1♂, Liaton, 7.xii.1993, R.S. Burman coll.; 1♂, 1♀, Seiling, 13.ix.1994, I.B. Dutta coll.; 1♂, Teirei, 9.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Dorsum of pronotum almost cylindrical, with parallel sides; posterior margin of metazona rounded; tegmina strongly reduced, extending to posterior margin of 3rd abdominal tergite, not touching the mid line; hind wings strap-like, slightly shorter than the tegmina; posterior margin of 10th abdominal tergite with a rhomboidal projection on either side of mid line; supra-anal plate trapezoid with rounded triangular posterior projection; cercus conical with dorso-ventral flattening apically; ventral surface of subgenital plate of female flat, with two very widely spaced spines on posterior margin.

Distribution : India : Mizoram, North-East India (Meghalaya, Sikkim).

Genus ***Oxya*** Serville, 1831.

24. ***Oxya hyla hyla*** Serville

1831. *Oxya hyla* Serville, *Ann. Sci. Nat.* (Zool.), **22** : 287.

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

Material examined : 2♂, Aibawk, 19.x.1991, J.K. Jonathan coll.; 2♀, Phaileng, 10 kms. from Teirei Forest Rest House, 23.x.1991, J.K. Jonathan coll.; 1♂, 3♀, Teirei, 24.x.1991, J.K. Jonathan coll.; 1♂, Teirei, 12.xi.1995, M.S. Shishodia coll.; 1♂, 1♀, Aibawk, 15,16.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Supra-anal plate of male with small tubercle on either side; ventral surface of subgenital plate of female with a pair of median spines on posterior margin and with a median longitudinal concavity, bordered by a longitudinal ridge on each side, bearing with short spines.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Afghanistan; Africa; Bangladesh; Iran; Madagascar; Nepal; Pakistan; Sri Lanka.

Subfamily COPTACRIDINAE

Key to genera

1. Antennae nearly three times as long as the head and pronotum together; eyes rather prominent. .....***Apalacria*** Walker

– Antennae less than twice the length of head and pronotum together; eyes not prominent. ..... ***Eucoptacra*** Boliver

Genus ***Apalacris*** Walker, 1870

25. ***Apalacris varicornis*** Walker

1870. *Apalacris varicornis* Walker, *Cat. Derm. Salt. Brit. Mus.*, **4** : 642.

1914. *Apalacris varicornis* : Kirby, *Fauna Brit. India, Orth.* : 238.

Material examined : 1♂, Lawngtlai, 17.ix.1993, M. Sil coll.; 1♂, Hnahthial, Dist. Lunglei, 9.xii.1993, R.S. Burman coll.

Diagnostic characters : Antennae brown, apical segments light coloured; lateral lobe of pronotum with a broad yellow spot along the posterior margin which is reaching upto the

humeral angle; pronotum with median carina only; prosternal tubercle pointed; wings light bluish, apex infumate; hind femur with two oblique transverse black bands, these bands sometimes incomplete; hind tibiae red.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Sikkim, Tripura, West Bengal (mainly found in N.E. India).

Elsewhere : Bangladesh; Borneo; China; Japan; Jawa; Malaysia; Myanmar' Perak; Sumatra; Tonkin; Vietnam and Yunnan.

Genus ***Eucoptacra*** Bolivar, 1902

26. ***Eucoptacra binghami*** Uvarov

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

Material examined : 1♂, 2♀, Teirei, 22.x.1991, J.K. Jonathan coll.; 2♀, Phaileng, 23.x.1991, J.K. Jonathan coll.; 1♂, 1♀, Lawngtlai, 3.iv.1994, S.K. Ghosh coll.; 3♀, Saiha, 8.iv.1994, S.K. Ghosh coll.; 3♂, 1♀, Pukpui, Lawngtlai, 10.iv.1994, A.K. Hazra coll.; 1♂, 2♀, Chhimtuipui, Lawngtlai, 13.iv.1994, A.K. Hazra coll.; 9♂, 10♀, Teirei, 9,11,12.xi.1995, M.S. Shishodia coll.; 1♂, 4♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.; 1♂, 1♀, Aibawk, 16,17.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Frontal ridge flat, between antennae 2-3 times as broad as vertex between eyes; tegmina with an oblique, narrow calbous whitish fascia, formed by irregular veinlets, placed beyond the middle; a black spot present before the middle on the outer face of hind femur; subgenital plate of female with the hind margin slightly, more or less triangularly expanded.

Distribution : India : Mizoram, Meghalaya, Sikkim, Tripura, West Bengal.

Elsewhere : Malaysia; Myanmar; Thailand and Tonkin.

Subfamily TROPIDOPOLINAE

Genus ***Oxyrrhepes*** Stål, 1873

27. ***Oxyrrhepes obtusa*** (De Haan)

1842. *Acridium* (*Oxya*) *obtusum* De Haan, *Verh. Ned. Overz. Bezzit. Orth.*, : 155, 156.

1955. *Oxyrrhepes obtusa* : Willemse, *Publitiës. natuurh. Genoot. Limberg*, **8** : 32, 33.

Material examined : 1♂, Khawzawl, 11.xii.1993, R.S. Burman coll.; 1♀, Kawnpui, 15.xii.1993, R.S. Burman coll.; 2♀, Murlen National Park, Aizawl, 16.xii.1993, S.S. Saha coll.; 1♂, 1♀, Sairep, Lawngtlai, 17.iv.1995, T.P. Bhattacharya coll.; 2♂, Aibawk, 16.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Fastigium of vertex short, sloping, obtuse at tip, front moderately oblique; frontal ridge sulcated; prosternal tubercle prominent, compressed, curved and inclined backwards; male subgenital plate somewhat trilobate; ovipositor with curved valves.

Distribution : India : Mizoram, Arunachal Pradesh, Karnataka, Madhya Pradesh, Meghalaya, Orissa, Rajasthan, Sikkim, Tamil Nadu, West Bengal.

Elsewhere : Bali; Celebes; China; Indo-China; Indonesia; Jawa; Lombok; Myanmar; Sri Lanka; Sumatra and Taiwan.

Subfamily EYPREPOCNEMIDINAE

Key to genera

1. Tegmina and wings abbreviated. .... ***Eucnemidia*** Ramme
– Tegmina and wings well developed. 2
2. Apex of male abdomen inflated; metazona with rounded posterior margin; male supra-anal plate with more or less obtuse-rounded apex; subgenital plate conical with pointed apex. .....***Choroedocus*** Bolivar
– Apex of male abdomen not inflated; metazona with posterior margin slightly excurved; male supra-anal plate with angular apex; subgenital plate subconical with wide apex. .... ***Heteracris*** Walker

Genus ***Choroedocus*** Bolivar, 1914

28. ***Choroedocus*** (?) ***robustus*** (Serville)

1839. *Acridium robustum* Serville, *Ins. Orthopt.*, : 647.

1921. *Choroedocus* (?) *robustus* : Uvarov, *Trans. ent. Soc. Lond.*, : 109.

Material examined : 1♂, Champhai, 29.x.1991, J.K. Jonathan coll.; 1♀, Lunglei, 16.ix.1994, I.B. Dutta coll.; 1♂, 1♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Moderately large in size; fastigium rounded infront; antennae filiform; median carina of pronotum cut by all the three transverse sulci; prosternal tubercle gradually tapering apically, weakly incurved and pubescent; a broad dark-brown stripe runs on either side of body from the tip of fastigium to the end of pronotum; a similar narrow yellow coloured stripe runs parallel to dark-brown stripe from superior margin of eye to middle of tegmina and after uniting with each other run backwards; posterior tibiae red; supra-anal plate tongue-shaped, apex broadly rounded; subgenital plate gradually tapering, apex truncate; cercus wide, thick, strongly compressed, incurved and downcurved.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Sikkim, Tripura, West Bengal.

Elsewhere : Bangladesh.

Genus ***Heteracris*** Walker, 1870

29. ***Heteracris pulchra*** (Bolivar)

1902. *E(uprepocnemis) pulchra* Bolivar, *Annls. Soc. ent. Fr.*, **70** : 630.

1958. *Heteracris pulchra* : Dirsh, *Tijdachr. Ent.*, **101** : 54.

Material examined : 1♀, Seling, 13.ix.1994, I.B. Dutta coll.; 1♀, Viarengte, 26.ix.1994, I.B. Dutta coll.

Diagnostic characters : Front slightly oblique; fastigium of the vertex smooth, slightly sulcated; pronotum with a broad velvety-black stripe on the back, distinctly expanded and paler in the middle, bordered by green; prosternal tubercle subcylindrical, compressed infront; tegmina thickly spotted with brown or green, anal area green; hind tibiae brown at base, with a pale ring, apical half dull red; cerci compressed and curved.

Distribution : India : Mizoram, Tamil Nadu, West Bengal.

Elsewhere : Sri Lanka.

Genus ***Eucnemidia*** Ramme, 1941

30. ***Eucnemidia charlottae*** Ramme

1941. *Eucnemidia charlottae* Ramme, *Mitt. zool. Mus. Berl.*, **25** :

1957. *Eucnemidia charlottae* : Willemse, *Publities. natuurh. Genoot. Limburg*, **10** : 231.

Material examined : 5♂, 1♀, Teirei, 20,22,24.x.1991, J.K. Jonathan coll.; 1♂, 1♀, Pukpui, Lunglei, 10.iv.1994, S.K. Ghosh coll.; 6♂, 1♀, Teirei, 12.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Fastigium rounded; antennae longer than head and pronotum together; prozona longer than metazona; median carina of pronotum prominent; tegmina rudimentary, lateral, reaching upto the posterior margin of second tergite; prosternal tubercle short, bilobed; posterior margin of last tergite widely separated; supra-anal plate triangular; cerci elongated, curved inwards, apex pointed; external face of hind femur provided with three narrow bands; basal part of tibia black, followed by yellow and black colour respectively.

Female larger than male; supra-anal plate triangular with a deep median sulcus; cercus short, not reaching upto supra-anal plate; valves of ovipositor short, thick, margin smooth; subgenital plate longer than broad, hind margin more or less rounded.

Measurements (*in mm.*) : Length of body M 23.0, F 44.0; antenna M 18.0, F 20.0; length of head M 4.0, F 6.0; pronotum M 10.0, F 10.0; tegmen M 4.0, F 8.0; hind femur M 18.0 F 25.0; hind tibia M 16.0, F 23.0.

Distribution : India : Mizoram and Tripura.

Elsewhere : Myanmar.

Subfamily CATANTOPINAE

Key to genera

1. Vertex between eyes wider than frontal ridge; pronotum slightly tectiform; tegmen usually with 1 or 2 black spots. ..... ***Gerenia*** Stål

– Vertex between the eyes narrower than frontal ridge; pronotum flat or subcylindrical; tegmen never with any black spots. 2

2. 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. 3

3. Pronotum constricted; prosternal tubercle conical. ..... ***Xenocatantops*** Dirsh & Uvarov

– Pronotum flattened (not constricted); prosternal tubercle laterally compressed (very slender body-form). ..... ***Stenocatantops*** Dirsh & Uvarov

Genus ***Gerenia*** Stål, 1878

Key to species

1. Black spot of tegmen linear. ..... ***pustulipennis*** (Walker)

– Black spot of tegmen oval. ..... ***abbreviata*** Brunner

31. *Gerenia pustulipennis* (Walker)

1871. *Caloptenus pustulipennis* Walker, *Cat. Derm. Salt. Brit. Mus.* **5** Suppl., : 68.

1914. *Gerenia pustulipennis* : Kirby, *Fauna Brit. India, Orth.*, : 244.

Material examined : 1♂, Teirei, 23.x.1991, J.K. Jonathan coll.

Diagnostic characters : a broad black colour band runs on either side from pronotum to abdomen; supra-anal plate triangular; cerci conical.

Distribution : India : Mizoram, Maharashtra (Mumbai).

32. *Gerenia abbreviata* Brunner

1893. *Gerenia abbreviata* Brunner, *Anali Mus. civ. Stor. nat. Giacomo Doria*, **33** : 162.

1914. *Gerenia abbreviata* : Kirby, *Fauna Brit. India. Orth.*, : 244.

Material examined : 3♀, Teirei, 24.x.1991, J.K. Jonathan coll.; 2♂, 1♀, Teirei, 9.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Tegmina considerably shorter than abdomen; femora smooth, carina slightly denticulated, lower outer area brownish; hind tibiae reddish towards the tip in male, dull fulvous in female; supra-anal plate of male triangular, sulcated; cerci straight and pointed; subgenital plate compressed, short and pointed.

Distribution : Throughout.

Elsewhere : Myanmar and Indo-Malayan region.

Genus ***Catantops*** Schaum, 1853

Key to subspecies

1. Tegmen exceeds the hind knee by about half the length of pronotum; male cercus less upcurved with less broadened apex and less projecting upper apical angle; external disc of hind femur with a black median spot below the upper carinula, reaching the middle of disc. ..... *pinguis pinguis* (Stål)

– Tegmen exceeds the hind knee by more than the length of pronotum; male cercus more upcurved with more broadened apex and more projecting upper apical angle; external disc of hind femur without the black median spot below the upper carinule. (The spot is of different size). ..... *pinguis innotabilis* (Walker)

33. *Catantops pinguis innotabilis* (Walker)

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

1956. *Catantops pinguis innotabilis* : Dirsh, *Publcöes cult. Co. Diam. Angola*, **28** : 105.

Material examined : 1♂, 1♀, Kawn Kawn village, Chhimtuipui, 3,4.iv.1994, S.K. Ghosh coll.

Diagnosis characters : Prosternal tubercle short, subcylindrical, weakly compressed at base, rounded at apex; lateral lobe of pronotum without colour pattern.

Distribution : India : Mizoram, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Jammu & Kashmir, Laccadive Islands, Madhya Pradesh, Meghalaya, Orissa, Sikkim, Tamil Nadu, Utar Pradesh, West Bengal.

Elsewhere : Jawa; Indo-China; Malaysia; Myanmar; New Guinea; Philippines; Sri Lanka; Sumatra; S. Tibet; Thailand and Yunnan.

34. ***Catantops pinguis pinguis*** (Stål)

1860. *Acridium* (*Catantops*) Stål, *Kong. Svens. Fregatt. Eug. Res. Omk. Jorden*, **3** :

1956. *Catantops pinguis pinguis* : Dirsh, *Publcöes cult. Co. Diam. Angola*, **28** : 103.

Material examined : 2♂, 2♀, Lawngtlai, Chhimtuipui, 3.iv.1994, S.K. Ghosh and M. Prasad coll.; 2♂, 1♀, Kawnpui, 13.xi.1994, M.S. Shishodia coll.

Diagnostic characters : Similar to the preceding species except the characters given in the key of subspecies of *Catantops* Schaum.

Distribution : India : Mizoram, Kerala, Manipur, Sikkim and Tamil Nadu.

Elsewhere : China; Hainan; Myanmar and Taiwan.

Genus ***Stenocatantops*** Dirsh & Uvarov, 1953

35. ***Stenocatantops splendens*** (Thunberg)

1815. *Gryllus splendens* Thunberg, *Mem. Acad. Sci. St.-Petersb.*, **5** : 236.

1953. *Stenocatantops splendens* : Dirsh and Uvarov, *Tijdschr. Ent.*, **96**(3) : 237.

Material examined : 1♀, Dampa wild Life Sanctuary, Teirei, 22.x.1991, J.K. Jonathan coll.; 2♂, 1♀, Phaileng, 23.x.1991, J.K. Jonathan coll.; 1♀, Aizawl, 5.xii.1993, R.S. Burman coll.; 1♂, Khawzawl, 11.xii.1993, R.S. Burman coll.; 1♀, Teirei, 9.xi.1995, M.S. Shishodia coll.; 2♂, 2♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.; 9♂, 5♀, Aibawk, 15,17.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Body slender; pronotum slightly narrowing forwards; prosternal tubercle strongly compressed laterally, in profile, apical three quarters strongly broadened and curved backwards; hind femur slender; subgenital plate acutely conical; cercus slightly broadened at base, narrowing and incurved towards apex.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Delhi, Kerala, Maharashtra, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu, Tripura, West Bengal.

Elsewhere : Borneo; Celebes; China; Hainan; Jawa; Korea; Moluccas; Myanmar; Nepal; Philippines; Sumatra; Taiwan and Vietnam.

Genus ***Xenocatantops*** Dirsh and Uvarov, 1953

36. ***Xenocatantops humilis humilis*** (Serville)

1839. *Acridium humile* Serville, *Ins. Orth.*, : 662.

1953. *Xenocatantops humilis humilis* : Dirsh and Uvarov, *Tijdschr. Ent.*, **96**(3) : 237.

Material examined : 1♀, Hnahthial, Lunglei, 9.xii.1993, R.S. Burman coll.; 1♂, 1♀, Thingdam, Aizawl, 13.v.1994, T.K. Pal coll.; 4♂, 3♀, Teirei, 9,11.xi.1995, M.S. Shishodia coll.; 1♀, Kawnpui, 13.xi.1995, M.S. Shishodia coll.; 2♂, 2♀, Aibawk, 16.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Pronotum slightly constricted, metazona divergent posteriorly; prosternal tubercle acutely conical; tegmina projecting hind knee for more than half pronotal length; external disc of hind femur yellowish with two brown fasciae, broadening towards the lower margin and fused with the brown lower margin; male cercus simple with rounded apex.

Distribution : India : Mizoram, Andaman & Nicobar Islands; Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Kerala, Madhya Pradesh, Meghalaya, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; Borneo; Indo-China; Jawa; Kei Island; Lombok; Malaysia; Myanmar; Nepal; New Guinea; Philippines; Sri Lanka; Sumatra; Thailand; S. Tibet; Vietnam and Yunnan.

Subfamily CYRTACANTHACRIDINAE

Key to genera

1. Prosternal tubercle strongly curved backwards at an angle, touching or almost touching mesosternum, inflated in middle with acutely or subacutely concal apex. 2

– Prosternal tubercle straight, vertical or slightly incurved backwards in direction of mesothorax, far from reaching the latter, conical cylindrical or compressed. 3

2. Pronotum strongly tectiform, integument strongly rugose; median carina of pronotum sharp; male cercus incurved at base, about half as wide as its length. ..... ***Chondracris*** Uvarov

– Pronotum moderately tectiform, slightly constricted; inegument fairly rugose or dotted or almost smooth, costal area of tegmina with coarse net-like reticulations; male cercus with subacute apex; wings lemon-yellowish. ..... ***Cyrtacanthacris*** Walker

3. 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 elongate, conical with acuminate apex; male subgenital plate with acuminate apex. ..... ***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. ..... ***Patanga*** Uvarov

Genus ***Cyrtacanthacris*** Walker, 1870

37. ***Cyrtacanthacris tatarica*** (Linnaeus)

1758. *Gryllus Locusta tataricus* Linnaeus, *Syst. Nat.* (10th ed.) : 432.

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

Material examined : 1♂, N. Khawbung, Aizawl, 18.xii.1993, S.S. Saha coll.; 1♂, Saiha, Chhimtuipui, 8.iv.1994, S.K. Ghosh and P. Prasad coll.

Diagnostic characters : Large in size; general colouration yellow with brown and white; occiput mostly with dark colour stripe on each side; pronotum above, on both side, with a broad velvety blackish brown band; tegmina with dense and thick reticulations and with transverse oblique fasciae or irregular spots; wings hyaline at base; hind tarsi red or brown.

Distribution : India : Mizoram, Andhra Pradesh, Aruhachal Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Jammu & Kashmir, Kerala, Orissa, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere : Africa (except N. Africa) and Sahara; Hainan; Madagascar; Philippines; Seychelles; Sri Lanka; Sumatra and Thailand.

Genus ***Chondracris*** Uvarov, 1923

38. ***Chondracris rosea*** (de Geer)

1773. *Acrydium roseum* de Geer, *Mem. Ins.*, **3** : 488.

1923. *Chondracris rosea* : Uvarov, *Bull. ent. Res.*, **14** : 39.

Material examined : 1♂, Aizawl, 26.ix.1994, I.B. Dutta coll., 1♂, Teirei, 9.xi.1995, M.S. Shishodia coll.

Diagnostic characters : Large in size, body robust, coarsely unformly green in colour; median carina of pronotum moderately raised in prozona, straight in metazona; metazona feebly tectiform; tegmina exceeding the hind knee by one fourth of their total length; wings at base rose colour; hind tibiae and tarsi red.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; Bhutan; China; Hainan; Indonesia; Jawa; Korea; Manchuria; Myanmar; Philippines; Taiwan; Thailand and Vietnam.

Genus ***Pachyacris*** Uvarov, 1923

39. ***Pachyacris vinosa*** (Walker)

1870. *Acridium vinosum* Walker, *Cat. Derm. Salt. Brit. Mus.*, **3** : 588.

1923. *Pachyacris vinosa* : Uvarov, *Ann. Mag. nat. Hist.*, **9**(11) : 478.

Material examied : 1♀, Ngengpui, Chhimtuipui, 12.ix.1995, T.P. Bhattacharya coll.; 1♀, Sairep, Lawngtlai, 17.iv.1995, T.P. Bhattacharya coll.

Diagnostic characters : Large in size; fastigium of vertex almost flat; tegmina surpassing the tip of hind femora by a distance distinctly

less than the length of pronotum, with oblique venation in apical part and transverse veins situated obliquely to principal vein; wings infumate, rosy at base; male cercus elongate with acuminate apex.

Distribution : India : Mizoram, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Meghalaya, Orissa, Rajasthan, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : China; Laos; Nepal; Myanmar and Thailand.

Genus ***Patanga*** Uvarov, 1923

40. ***Patanga succincta*** (Johansson)

1763. *Gryllus Locusta succinctus* Johansson, *Centuria Ins. rariorum, Amoen. Academ.*, **6** : 398.

1923. *Patanga succincta* : Uvarov, *Ann. Mag. nat. Hist.*, (9)**12** : 364.

Material examined : 1 ♀, Sairep, Lunglei, 17.iv.1995, T.P. Bhattacharya coll.

Diagnostic characters : 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 upto pronotum; pronotum stouter, shorter, hind margin obtuse to rectangular; prosternal tubercle not bent backwards; cerci, in male, stouter and broader in lateral view, more incrassately compressed.

Distribution : India : Mizoram, Arunachal Pradesh, Delhi, Goa, Himachal Pradesh, Maharashtra, Meghalaya, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : South Arabian Desert; S.E. Asia; Australia; Borneo; Jawa; Myanmar; Pakistan; Sri Lanka and Taiwan.

SUMMARY

Forty species are studied. All the species are new records to Mizoram.

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Table 1. : Showing distributional records of species of Acridoidea in the Districts of Mizoram.

Sl. No.	Name of species	DISTRICTS		
		Aizawl	Lunglei	Chhimtuipui
1.	*Atractomorpha burri*	+	–	–
2.	*Atractomropha crenulata*	+	–	–
3.	*Atractomorpha p. psittacina*	+	–	–
4.	*Tagasta indica*	+	–	–
5.	*Chlorozeina u. unicolor*	+	+	–
6.	*Pseudomorphacris notata*	+	–	–
7.	*Mesopsis cylindricus*	–	–	+
8.	*Rammeacris gracilis*	+	–	–
9.	*Ceracris n. nigricornis*	+	+	–
10.	*Ceracris striata*	+	+	–
11.	*Gonista bicolor*	+	–	+
12.	*Holopercna darjeelingensis*	+	–	–
13.	*Phlaeoba assama*	+	–	+
14.	*Phlaeoba antennata*	+	–	–
15.	*Phlaeoba infumata*	+	–	–
16.	*Dittopternis venusta*	–	+	+
17.	*Heteropternis respondens*	+	–	+
18.	*Aiolopus thalassinus tamulus*	+	–	–
19.	*Sphingonotus* sp.	–	–	+
20.	*Trilophidia annulata*	+	–	+
21.	*Spathosternum p. prasiniferum*	+	–	–
22.	*Caryanda diminuta*	+	–	–
23.	*Caryanda paravicina*	+	–	–
24.	*Oxya h. hyla*	+	–	–
25.	*Apalacris varicornis*	–	+	+
26.	*Eucoptacra binghami*	+	–	+
27.	*Oxyrrhepes obtusa*	+	–	+
28.	*Choroedocus robustus*	+	+	–
29.	*Heteracris pulchra*	+	–	–
30.	*Eucnemidia charlottae*	+	+	–
31.	*Gerenia pustulipennis*	+	–	–
32.	*Gerenia abbreviata*	+	–	–

Table 1. : *(Cont'd.).*

Sl. No.	Name of species	DISTRICTS		
		Aizawl	**Lunglei**	**Chhimtuipui**
33.	*Catantops pinguis innotabilis*	–	–	+
34.	*Catantops pinguis pinguis*	–	–	+
35.	*Stenocatantops splendens*	+	–	–
36.	*Xenocatantops h. humilis*	+	+	–
37.	*Cyrtacanthacris tatarica*	+	–	+
38.	*Chondracris rosea*	+	–	–
39.	*Pachyacris vinosa*	–	–	+
40.	*Patanga succincta*	–	+	–

Zool. Surv. India
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INSECTA : ORTHOPTERA : TETTIGONIIDAE

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INTRODUCTION

Mizoram is situated on the Northeast corner of India. It is bounded by Myanmar in the East and South, Bangladesh in the West, Assam, Manipur and Tripura in the North and North-west. Topographically, Mizoram has mostly hills and precipitous terrains with deep gorges in between. The ranges have an average height of 900m. and run in the north-south direction. The eastern and southern regions are higher than that of western and northern regions. There are innumerable rivers, streams, waterfalls which flow to the brim in the monsoon. The State is basically an agrarian one, jhum system being the method of cultivation. The land is covered with beautiful forests of gigantic dimensions. The fauna and flora are very rich in the state.

Tettigoniidae includes long-horned grasshoppers, commonly known as bush or leaf-katydids. These insects are characterised by long antennae, four segmented tarsi, fore tibiae usually with basal auditory organs, male tegmina with stridulatory organs at basal part, male subgenital plate almost with a pair of styles and ovipositor always long and sword- sickle- or dagger-like.

Tettigoniids of Mizoram is very little known. Ingrisch and Shishodia (1997 and 1998) recorded and described 12 species from there, for the first time. The present paper deals with 24 species. Out of these species, 12 species are recorded for the first time from Mizoram(*), including 2 species (**) which are reported for the first time from India. This study is based on the available collection in Zoological Survey of India, Calcutta, and eastern Regional Station, Zoological Survey of India, Shillong. It is hoped that there are more species in the State, yet to be collected and reported.

SYSTEMATIC ACCOUNT

Order ORTHOPTERA

Suborder ENSIFERA

Superfamily TETTIGONIOIDEA

Family TETTIGONIIDAE

Key to subfamilies

1. Head globose, not usually slanted or frontally flattened; prosternum unarmed; ovipositor usually short and upturned, flattened laterally, margins usually crenulated. ..... PHANEROPTERINAE

– without above combination of characters. 2

2. Antennal sockets strongly margined, produced especially on internal dorsal margins; thoracic auditory spiracle small, not hidden by pronotum. ..... PSEUDOPHYLLINAE

– Antennal sockets not strongly margined and especially not on the internal margins; thoracic spiracle large, often wholly or partially concealed by pronotum. 3

3. Tibial auditory structure typically open; prosternum armed with a pair of distinct spike-like processes. ..... MECOPODINAE

– Tibial auditory structure with foramina either open or closed) directed distinctly dorsally in

relation to position on tibia; if open, the opening of nearly uniform width. 4

4. Fore tibiae usually bearing 5-7 long, movable outwardly directed spines; fastigium of vertex narrow, strongly laterally compressed. .... LISTROSCELIDINAE

– Fore tibiae in most of the cases with spines not usually lengthened, and not as long as in above case; fastigium of vertex variable in width and not sulcate. ....CONOCEPHALINAE

Subfamily PHANEROPTERINAE

Genus ***Letana*** Walker, 1869

1. ****Letana rubascens*** (Stål)

1861. *Phaneroptera rubescens* Stål, *Kong. Svens. Freg. Resa Omk. Jorden*, **3** : 319.

1906. *Letana rubescens* : Kirby, *Syn. Cat. Orth.*, **2** : 400.

Material examined : 1 ♀, Seling, Dist. Aizawl, 12.i.1992, coll. S.J.S. Hattar; 1 ♀, Lawngtlai, 15.i.1992, coll. S.J.S. Hattar.

Diagnostic characters : Size medium; body and legs with black and reddish dots; a longitudinal reddish-brown band runs on occiput; antennae black, annulated with pale or reverse; tegmina green, maculated with reddish-brown, surpassing apex of posterior femora, R. forked or not; ovipositor short, dorsal and ventral margin dentate at apex.

Distribution : India : Mizoram.

Elsewhere : Widely distributed in Indo-China subregion (Hongkong, S. China, Laos, Thailand, Yunnan and Vietnam).

2. ****Letana linearis*** Walker

1869. *Letana linearis* Walker, *Cat. Derm. Salt. Brit. Mus.*, **2** : 278.

1990. *Letana linearis* : Ingrisch, *Ent. Scand.*, **21**(3) : 267.

Material examined : 1 ♂, 1 ♀, Champhai, 2.iv.1994, coll. G.C. Sen; 2 ♀ Chhimtuipui, 8.iv.1994, coll. S.K. Ghosh; 1 ♀, Teirei, 12.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Size medium; antennae black, annulated with white; pronotum black with a large ivory-white sopt on dorso median area of paranota; meso and metasternum black; stridulatory field 1.9 times longer than broad; supra-anal plate of male with shallow depression in middle, and of female small, with apex rounded; cerci of male long, arcuate, while of female with subobtuse apex; ovipositor long, sickle-shaped, dorsal and ventral margin serrulate apically.

Distribution : India : Mizoram, Manipur, Sikkim and Uttar Pradesh.

Elsewhere : Nepal.

3. ***Letana gracilis*** Ingrisch

1990. *Letana gracilis* Ingrisch, *Ent. Scand.*, **21**(3) : 272.

Material examined : 1 ♂, Teirei, Dist. Mamit, 12.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Antennae annulated with black on basal part, sparse white annulation on apical part; tegmina surpassing hind knees, radial sector forked; stridulatory field longer than broad; supra-anal plate with shallow groove; cerci arcuate; subgenital plate with rounded apex; phallus sclerite large, black, apical part spathulate with numerous teeth on cranio-dorsal surface, apico-ventral surface with large longitudinal crest.

Distribution : India : Mizoram, Assam and Manipur.

Genus ***Phaneroptera*** Serville, 1831

4. ****Phaneroptera myllocerca*** Ragge

1956. *Phaneroptera myllocerca* Ragge, *Proc. zool. Soc. Lond.*, **127** : 254.

Material examined : 1 ♂, Aizawl, 13.iv.1994, coll. S.K. Ghosh; 1 ♂, Aibawk, 17.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Pronotum without lateral carinae; hind femora usually extending upto the apex of tegmina; hind tibiae with 7-10

external spines, including three apical spurs; cerci terminating upwardly directed spine with minute recurved apex; subgenital plate with almost contiguous lobes; supra-anal plate quadrate.

Distribution : India : Mizoram, Arunachal Pradesh, Jammu & Kashmir, Sikkim, Tamil Nadu and Uttar Pradesh.

Elsewhere : China and Myanmar.

5. **Phaneroptera gracilis* Burmeister

1838. *Phaneroptera gracilis* Burmeister, *Handb. Entomol.*, : 69.

1956. *Phaneroptera gracilis* : Ragge, *Proc. zool. Soc. Lond.*, **127** : 250.

Material examined : 1♂, Kuikawk, 8.xii.1993, coll. R.S. Burman; 1♂, Mibawk, 23.iii.1994, coll. G.C. Sen.

Diagnostic characters : Lateral pronotal lobes longer than deep; tegmina more than 13 mm. in length; hind wings extending beyond tegmina; hind femora very slender; hind tibiae with 3 apical spines on each margin; supra-anal plate quadrate; cerci very long, widening subapically before sudden tapering to point; subgenital plate slender with almost contiguous lobes.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Maldive Island, Orissa, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Annam; Australia; China; Indo-china; Malaysia; Myanmar; Sumatra etc.

Genus *Elimaea* Stål, 1874

Subgenus *Orthelimaea* Karny, 1926

6. **Elimaea (Orthelimaea) securigera* Brunner

1891. *Elimaea securigera* Brunner, *Verh. Zool. bot. Ges. Wien*, **40** : 47.

1990. *Elimaea (Orthelimaea) securigera* : Ingrisch, *Spixiana*, **13**(2) : 157.

Material examined : 1♀, Liton, 7.xii.1993, coll. R.S. Burman; 1♂, Aizawl, 13.iv.1994, coll. S.K. Ghosh; 1♀, Thinka, 18.ix.1993, coll. A.R. Lahiri; 3♂, 2♀, Teirei, Dist. Mamit, 11,12.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Pronotum not constricted in middle; anterior femora in basal area compressed; tibial tympanum covered by conchate fold of integument on both sides; tegmina with radius sector branching before middle of tegmen; cerci securiform; lobes of subgenital plate widely separated in the middle; ovipositor sickle-shaped, flat, curved upwards, crenulated at apex.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Andhra Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Orissa, Rajasthan, Sikkim, Tripura and West Bengal.

Elsewhere : Australia; Indonesia; Nepal; Philippines; Sri Lanka and Sunda Islands.

7. *Elimaea (Elimaea) subcarinata* (Stål)

1861. *Phaneroptera subcarinata* Stål, *Kong. Svens. Freg. Eug. Res. Omk. Jorden*, **2**; *Zool. Ins. Stockholm*, **3** : 319.

1998. *Elimaea (Elimaea) subcarinata* : Ingrisch, *Tijdschr. Ent.*, **141** : 83.

Material examined : 1♂, Champhai, 30.x.1991, coll. J.K. Jonatha; 1♂, 1♀, Teirei, Dist. Mamit, 9,13.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Fastigium of vertex narrow, apex sub-acute; stridulatory teeth on left tegmen low and widely spaced; supra-anal plate tongue-shaped, apex obtuse; cerci strongly curved, apex subacuta on dorso-cranial side; subgenital plate moderately curved dorsally, split into two obtuse lobes; supra-anal plate of female triangular, apex obtuse; subgenital of female acute-triangular, apex angularly excised.

Distribution : India : Mizoram and West Bengal.

Elsewhere : Hongkong and Thailand.

8. **Elimaea (Orthelimaea) insignis* (Walker)

1869. *Phaneroptera insignis* Walker, *Cat. Derm. Salt. Brit. Mus.*, **2** : 344.

1990. *Elimaea (Orthelimaea) insignis* : Ingrisch, *Spixiana*, **13**(2) : 157.

Material examined : 1♂, Aizawl, 2.viii.1999, coll. S.N. Ramanujam.

Diagnostic characters : Antennae black with white rings; tegmina with stridulatory field moderately produced, file suddenly narrowing towards posterior end; cerci with apex excavated, dorsal apex with a long, pointed appendages.

Distribution : India : Mizoram, Assam, Manipur and Meghalaya.

Elsewhere : Bangladesh; China and Nepal.

Genus ***Holochlora*** Stål, 1873

9. ***Holochlora nigrotympana*** Ingrisch

1990. *Holochlora nigrotympana* Ingrisch, *Senckenbergiana biol.*, **70**(1/3) : 105.

Material examined : 1♀, Circuit House Campus, Aizawl, 12.iv.1994, coll. A.K. Hazra.

Diagnostic characters : Size larger; ovipositor short; rest of the characters similar with description provided by Ingrisch (1990).

Distribution : India : Andaman & Nicobar Island and Mizoram.

Elsewhere : Bhutan and Central Thailand.

Genus ***Ducetia*** Stål, 1874

10. ***Ducetia japonica*** (Thunberg)

1815. *Locusta japonica* Thunberg, *Mem. Acad. Sci. St.-Petersb.*, **5** : 282.

1961. *Ducetia japonica* : Ragge, *Bull. Br. Mus. nat. Hist. (Ent.)*, **10**(5) : 182.

Material examined : 1♂, Teirei, Dist. Mamit, 24.x.1991, coll. J.K. Jonathan; 1♂, Mat river bed, Dist. Lunglai, 19.i.1992, coll. S.J.S. Hattar; 1♂, Tuirial, Dist. Aizawl, 20.i.1992, coll. S.J.S. Hattar; 1♂, Kawartha, 6.xii.1993, coll. R.S. Burman; 3♂, 2♀, Dampa Wild Life Sanctuary, Teirei, Dist. Mamit, 9.xi.1995, coll. M.S. Shishodia; 1♂, Aibawk, 17.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Tegmina and hind wings well developed; R. of male tegmina with 4-6 closely paralled posterior branches; cerci with interno-ventral ridge at apex; subgenital plate deeply bifurcat with contiguous lobes and without apical teeth; ovipositor curved upwards.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Karnataka, Sikkim, Tamil Nadu and West Bengal.

Elsewhere : Australia; Bangladesh; Borneo; China; Hainan; Indo-china; Japan; Java; Korea; Kuala Lumpur; Malaysia; Myanmar; Nepal; New Guinea; Papua; Selangor; Solomon Islands; Sri Lanka; Sumatra; Taiwan; Thailand and Tibet.

Genus ***Khaoyaiana*** Ingrisch, 1990

11. ***Khaoyaiana nitens*** Ingrisch

1990. *Khaoyaiana nitens* Ingrisch, *Senckenbergiana biol.*, **70**(1/3) : 107.

Material examined : 1♂, Saiha, 800m., 6.vi.1994, coll. A.K. Hazra.

Diagnostic characters : Fastigium of vertex a little narrower than the scape of antenna; eyes rounded; tympana open on both sides; media of tegmina not joining the first branch of radial sector; fore tibiae with dorsal furrow, with one median and one apical spine on the upper-outer side; metatarsal lobes rounded; mesosternal lobes flat; supra-anal plate long, tongue-shaped; cerci long, strongly curved inwards in the middle and outwards near apex.

Subfamily CONOCEPHALINAE

Genus ***Conocephalus*** Thunberg, 1815

12. ***Conocephalus maculatus*** (Le Guillou)

1841. *Xiphidion maculatum* Le Guillou, *Rev. zool.*, : 294.

1980. *Conocephalus maculatus* : Pitkin, *Bull. Br. Mus. nat. Hist. (Ent.)*, **41**(5) : 344.

Material examined: 2♂, Lengpui, Dist. Aizawl, 21.i.1992, coll. S.J.S. Hattar; 1♂, Aibawk, 27.iii.1994, coll. G.C. Sen; 1♂, Sericulture Rest House Campus, Champhai, 2.iv.1994, coll. G.C. Sen; 1♂, Aibawk, 17.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Prosternum bispinose; tegmina usually with large dark spots, no markings on the costal or precostal areas; hind femore unarmed ventrally; male cerci with one internal spine; subgenital plate with one style on either side apically.

Distribution : India : Mizoram, Himachal Pradesh, Sikkim and Tripura. It is also studied from Arunachal Pradesh, Jammu & Kashmir, Kerala, Tamil Nadu and West Bengal in India.

Elsewhere : Australia; Ethiopion region; Hong Kong; Indonesia; Java; Malaysia; Melagasian region; Nepal and Philippines.

13. ***Conocephalus melaenus*** (De Haan)

1842. *L. [ocusta] (Xiphidium) melaena* De Haan, *Verh. Nat. Geschied. Nederl. Oversee. bezitt., Zool., Ins.*, : 189.

1926. *Conocephalus melaenus* : Karny, *Treubia*, **9** : 181.

Material examined : 1♂, Teirei, Dist. Mamit, 24.x.1991, coll. J.K. Jonathan; 1♂, D.W.L. Sanctuary, Teirei, Dist. Mamit, 9.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Antennae blackish at basal segments, annulated with yellowish beyond the middle; occiput with blackish band on the middle; pronotum with two dark-brown band on each side, broadly rounded on posterior margin; stridulatory field longer than broad; tarsal segments of fore and middle legs blackish; hind knee black; hind tibiae also black at base, both margins with numerous small spines dorsally; tegmina with blackish band on costal and precostal area, upper area light-brown; cerci with one spine; subgenital plate with titillator at apex.

Distribution : India : Mizoram. It is also studied from Tripura in India.

Elsewhere : Borneo; Japan and Singapore.

Genus ***Euconocephalus*** Karny, 1907

14. ***Euconocephalus indicus*** (Redtenbacher)

1891. *Conocephalus indicus* Redtenbacher, *Verh. Zool.-bot. Gas. Wien*, **41** : 408.

1922. *Euconocephalus indicus* : Hebard, *Proc. Acad. nat. Sci. Philad.*, **74** : 208.

Material examined : 2♀, Teirei, Dist. Mamit, 22,24.x.1991, coll. J.K. Jonathan; 1♂, Chawnhu, Lunglai, 2.iv.1994, coll. A.K. Hazra and party; 2♂, 1♀, W. Phaileng, Dist. Mamit, 9,11.x.1998, coll. M.S. Shishodia.

Diagnostic characters : Head broader than the first antennal segment; pronotum transverse at anterior margin, broadly rounded at posterior margin, mid and lateral carinae absent, transverse sulcus placed before the middle of pronotum; tegmina and hind wings reach upto the middle of hind tibiae; tegmina with acattered dark-brown spots; cerci widened from base to apex with two spines apically, directed inwards.

Distribution : India : Mizoram and Orissa. It is also studied from Arunachal Pradesh in India.

Elsewhere : Australia; Borneo; China; Java; Myanmar and Sumatra.

15. ****Euconocephalus nasutus*** (Thunberg)

1815. *C. [onocephalus] nasutus* Thunberg, *Mem. Acad. Sci.-Petarsb.*, **5** : 273.

1922. *Euconocephalus nasutus* : Hebard, *Proc. Acad. nat. Sci. Philad.*, **74** : 240.

Material examined : 1♀, W. Phaileng, Dist. Mamit, 11.x.1998, coll. M.S. Shishodia.

Diagnostic characters : Very similar to *E. pallidus*, except the fastigium of vertex, which is a little shorter and thick; anterior margin of pronotum rounded, posterior margin broadly triangular; ovipositor slender, straight, a little shorter than *E. pallidus*.

Distribution : India : Mizoram. It is recorded here for the first time from India.

Elsewhere : Borneo; Philippines and Singapore.

16. ****Euconocephalus pallidus*** (Redtenbacher)

1891. *Conocephalus pallidus* Redtenbacher, *Verh. Zool.-bot. Ges. Wien*, **41** : 414.

1922. *Euconocephalus pallidus* : Hebard, *Proc. Acad. nat. Sci. Philad.*, **74** : 239.

Material examined : 1♀, Kolasib, 15.xii.1993, coll. R.S. Burman; 1♀, Chungtlang, 18.ix.1993, coll. A.R. Lahiri; 1♀, Kawnpui, 13.xi.1995, coll. M.S. Shishodia; 2♀, Aibawk; 16,17.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : Fastigium of vertex broadly triangular and extending 3 mm. infront of eyes; pronotum broadly rounded infront and nearly transverse posteriorly; mid and lateral carinae absent; tegmina and hind wings extending beyond the middle of hind tibiae, pointed at apex; ovipositor slender, straight and a little shorter than tegmina.

Distribution : India : Mizoram, Andaman & Nicobar islands, Assam, Himachal Pradesh, Meghalaya, Tamil Nadu, Uttar Pradesh and West Bengal. It is also studied from Kerala in India.

Elsewhere : Bangladesh; Borneo; Java; Myanmar; Penang; Philippines; Singapore; Sri Lanka and Tonkin.

Genus ***Pseudorhychus*** Serville, 1831

17. ***Pseudorhynchus crassiceps*** (De Haan)

1842. *Locusta crassiceps* De Haan, *In Temminck, Verh. Nederl. Bezitt., Orthopt.* : 212.

1912. *Pseudorhynchus crassiceps* : Karny, *Genera Ins.*, **2**(139) : 24.

Material examined : 1♀, Chungtlang, 18.ix.1993, coll. A.R. Lahiri.

Diagnostic characters : Fastigium of vertex bearing ventral tooth or tubercle at base, extended beyond Ist antennal segment infront, obtuse at apex; pronotum without median carina; anterior margin of pronotum broadly rounded, posterior margin transverse; prosternum with two well developed spines; tegmina with rounded tip; ovipositor very long, straight, apex not crenulated, extended beyond tegmina and hind wings.

Distribution : India : Mizoram and West Bengal.

Elsewhere : Japan; Java; Myanmar and Sumatra.

18. ***Pseudorhynchus acuminatus*** Redtenbacher

1891. *Pseudorhynchus acuminatus* Redtenbacher, *Verh. Zool.-bot. Ges. Wien*, **41** : 371.

Material examined : 1♀, Teirei, Dist. Mamit, 23.x.1991, coll. J.K. Jonathan.

Diagnostic characters : Fastigium of vertex bearing ventral tooth at base, long, sharply pointed at apex, extended beyond the Ist antennal segment infront; median carina absent; tegmina truncate at apex; cerciflattened, with short, curved spine at apex; subgenital plate concave at apex with long style on each side.

Distribution : India : Mizoram.

Elsewhere : Oriental Region.

Genus ***Pseudosubria*** Karny, 1925

19. ***Pseudosubria hastata*** Ingrisch & Shishodia

1997. *Pseudosubria hastata* Ingrisch & Shishodia, *Entomol. Z.*, **107**(12) : 510-512.

Material examined : 1♂, Chhimtuipui, Saiha, 6.iv.1994, coll. S.K. Ghosh. (Holotype)

Diagnostic characters : Apical segment of labial palpi widened; fastigium of vertex conical, faintly furrowed, apex obtuse; anterior and posterior margin of pronotum broadly rounded; transverse sulcus weak, broadly interrupted in middle; cerci forked at internal surface, ventral branch not visible in lateral view; supra-anal plate rounded, bulging on both sides; subgenital plate with one medial and two lateral rounded carinae; titillators completely fused, elongated and folded in middle.

Distribution : India : Mizoram.

Subfamily LISTROSCELIDINAE

Genus ***Hexacentrus*** Serville, 1831

20. ***Hexacentrus unicolor*** Serville

1831. *H. [exacentrus] unicolor* Serville, *Annls. Sci. Nat.*, **22** : 146.

1922. *Hexacentrus unicolor* : Hebard, *Proc. Acad. nat. Sci. Philad.*, **74** : 269.

Material examined : 1♂, Teirei, Dist. Mamit, 24.x.1991, coll. J.K. Jonathan; 1♀, Turial, Dist. Aizawl, 10.i.1992, coll. S.J.S. Hattar; 1♀, Thinka, 18.ix.1993, coll. A.R. Lahiri; 1♀, Kawnpui, 13.xi.1995, coll. M.S. Shishodia.

Diagnostic characters : General colour yellowish-brown; anterior femora with 5 spines on each margin; pronotum longer than broad; a dark-brown colour band covers the pronotum dorsally; ovipositor straight, broad at base and pointed at apex.

Distribution : In India, it is recorded from Andaman & Nicobar Islands, Manipur, Mizoram and Nagaland.

Elsewhere : Oriental Region.

Subfamily MECOPODINAE

Genus ***Mecopoda*** Serville, 1831

21. ****Mecopoda elongata*** (Linnaeus)

1758. *Gryllus Tettigonia elongatus* Linnaeus, *Syst. Nat.* (10th ed.), **1** : 429.

1906. *Mecopoda elongata* : Kirby, *Syn. Cat. Orthopt.*, **2** : 364.

Material examined : 1♂, 1♀, Teirei, Dist. Mamit, 22,24.x.1991, coll. J.K. Jonathan; 1♀, Champhai, 29.x.1991, coll. J.K. Jonathan; 1♂, Chungtlang, 18.ix.1993, coll. A.R. Lahiri; 1♂, 1♀, Champhai, 15.x.1995, coll. A.K. Sanyal; 2♂, 2♀, W. Phaileng, Dist. Mamit, 9,11.x.1998, coll. M.S. Shishodia.

Diagnostic characters : Fastigium dark-brown infront; lateral pronotal lobe dark-brown; cerci thick with 1-2 small spines at apex; subgenital plate long and bilobed with short style at apex; tegmina of female generally with 4-6 black patch in middle; ovipositor long, stout and straight.

Distribution : India : Mizoram, Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Australia; Celebes; China; Indonesia; Japan; Malacce; Malaysia; Moluccas; New Guinea; Philippines; Sunda Island; Thailand and Tonking.

Subfamily PSEUDOPHYLLINAE

Genus ***Onomarchus*** Stål, 1874

22. ***Onomarchus bisulcatus*** Ingrisch & Shishodia

1998. *Onomarchus bisulcatus* Ingrisch & Shishodia, *Mitt. schweiz. Ent. Ges.*, **71** : 365-367.

Material examined : 1♂, Holotype, Chunglang, 18.ix.1993, coll. A.R. Lahiri.

Diagnostic characters : Small for the genua; fastigium of vertex a little surpassing the margin of antennal scrobae; pronotum smooth with few, scattered tubercles and with two transverse furrows in anterior half; anterior margin of pronotum broadly rounded, posterior margin angular; tegmina broad but narrow for the genus; stridulatory vein shorter; style shorter; metasternum wider than long; supra-anal plate tongue-shaped; cerci short and straight, apex obtuse with a spinule at internal side; subgenital plate setose.

Distribution : Ingrisch & Shishodia (1998) described this species from Mizoram.

Genus ***Sathrophyllia*** Stål, 1874

23. ****Sathrophyllia femorata*** (Fabricius)

1787. *Locusta femorata* Fabricius, *Mantiss. Ins.*, **1** : 233.

1874. *Sathrophyllia Femorata* : Stål, *Rec. Orthopt.*, **2** : 72.

Material examined : 1♀, Kalchu, 20.ix.1993, coll. A.R. Lahiri.

Diagnostic characters : Body colour light brownish; head without any wrinkle or hump; pronotum without any hump, broadly rounded posterioly; tegmina 3.5 times longer than broad, sparsely spotted with dark-brown marks; hind

wings with transverse cross veins and dark-brown patches; fore femora faintly or not undulated; fore tibiae ventrally spined on outside; middle and hind femore undulated ventrally; ovipositor long, wide at base, directed upwards beyond the middle.

Measurements (in mm.) : Body length 32; head 6; pronotum 7; hind femur 19 and ovipositor 17.

Distribution : India : Mizoram, Karnataka, Sikkim and West Bengal.

Elsewhere : Cambodia; Indonesia; Malaysia and Myanmar.

Genus ***Chloracris*** Pictet & Saussure

24. ****Chloracris brunneri*** Beier

1954. *Chloracris brunneri* Beier, *Revis. Pseudophyll.*, **64** : fig. 31.

Material examined : 1 ♀, Aizawl, 2.viii.1999, coll. S.N. Ramanujam.

Diagnostic characters : All transverse veins of tegmina slightly curved, but not angled; hind margin of pronotum smooth; metasternum strongly transverse, anterior margin 2.5 times and posterior margin 1.5 times longer than the width; subgenital a little notched at apex; ovipositor a little longer than hind femora.

Distribution : India : Sikkim.

Elsewhere : Bangladesh (Silhet); Tonkin and Yunnan. It is also studied from Meghalaya (Williamnagar) in India.

SUMMARY

A total of 24 species are reported here from Mizoram. Out of these, 12 species are recorded for the first time from the area, including 2 species, which are reported for the first time from India.

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INSECTA : ORTHOPTERA : TETRIGIDAE

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INTRODUCTION

The members of the family Tetrigidae are commonly Known as "Grouse-locusts" They are small to moderate sized orthopterans of variable colour, but generally are dark-brown, brown or grey. These are commonly found to occur in meadows or swamps or on wet rocks along the sides of streams and pools or on damp walls infested with algae type of vegetation, while a few are found on or around crops. Most of the species of this group are phototropic and polymorphic. Perusal of the literature shows that not a single species of tetrigid has been recorded from Mizoram. The present study is based on the collection brought by different survey parties of Zoological Survey of India, from most of the districts of Mizoram during 1991-1998. The present study deals with 27 species under 15 genera. All the species are recorded for the first time from the State. The genera *Phaesticus* Uvarov and *Bidentatettix* Zheng have been recorded for the first time from India.

SYSTEMATIC ACCOUNT

Order ORTHOPTERA

Family TETRIGIDAE

The antennae are, generally, filiform, but in the subfamily Tripetalocerinae and Discotettiginae, these are narrow at basal two-third, flattened apically. The frontal costa may or may not be divergent widely. The inter-ocular distance vary from narrow to wide. The pronotum extends backwards and conceals the hind wings. The tegmina are reduced to small lateral scales, while the hind wings, generally, well developed. Many species exhibit polymorphism in the development of 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.

Key to subfamilies of TETRIGIDAE

1. Anterior femora more or less compressed and carinated above; pronotum, generally, not produced over the head infront. 2
- Anterior femora sulcated above; pronotum produced over the head infront, forming a beak-like structure. ..... BATRACHIDEINAE
2. Antennae filiform. 3
- Antennae not filiform; several anteapical segments compresso-dilated. ..... DISCOTETTIGINAE
3. Frontal costa widely forked between the ocelli, the rami strongly divergent, forming a frontal scutellum, its width wider than the basal segment of antenna. ..... CLADONOTINAE
- Frontal costa moderately forked between the ocelli, its width narrower than the basal segment of antenna. 4
4. Posterior angles of lateral lobes of pronotum acutely produced outwards and generally spined; first segment of posterior tarsi usually longer than the third. ..... SCELIMENINAE
- Posterior angles of lateral lobes of pronotum rarely acutely spined; first segment of posterior tarsi generally not longer than the third. 5

5. Posterior angles of lateral lobes of pronotum a little produced outwards, obliquely truncated behind, very rarely acutely spined; first and third posterior tarsal segments nearly equal in length. ..... METRODORINAE
- Posterior angles of lateral lobes of pronotum turned downwards, more or less rounded; first and third tarsal segments unequal in length. ..... TETRIGINAE

Subfamily CLADONOTINAE

Genus ***Epitettix*** Hancock, 1907

1. ***Epitettix tamilus*** Günther

1939. *Epitettix tamilus* Günther, *Abh. Ber. Mus. Tierk. Völk. Dresden,* **20** (A) ***Zool.*** (N. F.) BD I : 307.

Material examined : 1♂, 52 kms. from Saiha towards Blue Mountain, 8.4.1994, coll. A.K. Hazra.

Diagnostic characters : Antennae situated below the lower margin of eyes; frontal scutellum wide below the root of antennae; lateral ocelli situated below lower margin of eyes; vertex wide than an eye, extend beyond eyes in front; middle carnulae prominent in front, diminish in the middle of vertex; lateral carinulae raised upto the level of eyes, diminish before the middle of eyes; pronotum roof-shaped; prozonal carinae convergent behind; middle carina sufficiently raised in front of shoulders but depressed in front, a little raised behind shoulders; a hump present on the middle of shoulders, bounded by oblique carinae; pronotum extend upto the middle of hind femur, roundly produced at apex with a notch in middle; dorsum fairly granulated; lateral lobes of pronotum turned downwards, broadly rounded at apex; front four femora broad, lobate, margins fine; hind femoral margin finely crenulated; first tarsal segment large; all the pulvilli large.

Distribution : India (Kerala-forest tramway, Tamil Nadu-Topslip).

*Remarks :*This species is recorded here for the first time from north-eastern India. Previously it was recorded from S. India. It appears that this species shows discontinuous distribution, leaving a vast gap in between two extreme corners of India.

Subfamily DISCOTETTIGINAE

Genus ***Phaesticus*** Uvarov, 1940

2. ***Phaesticus*** sp.

1887. *Phaestus* Bolivar, *Annls. Soc. ent. Belg.,* **31** : 309.

1940. *Phaesticus* : Uvarov, *Ann. Mag. nat. Hist.,* (11) **6** : 115.

Material examined : 1♀, W. Phaileng, District Mamit, 23.10.1991, coll. J.K. Jonathan.

Diagnostic characters : Frontal costa rounded, strongly raised between antennae; antennae located below the inferior margin of eyes, filiform upto basal two-third, 3 anteapical segment compresso-dilated, the last segment very narrow and thread-like. The colour of the flattened segments are dark-brown, whereas the last apical segment is light-brown; eyes globular, large, raised above the level of vertex; vertex narrower than an eye, fossulated on either side; pronotum angular anteriorly, extend beyond hind femora posteriorly, a little shorter than hind wings; 3rd segment of posterior tarsi longer than the Ist; all the pulvilli of hind tarsi are equal in length.

Distribution : It is recorded here for the first time from India.

Elsewhere : The genus is distributed in Borneo, China, Java and Sumatra.

Remarks : Due to lack of sufficient material and literature, the present specimen is identified upto the generic level only.

Subfamily SCELIMENINAE

Key to the genera

1. Lateral margin of pronotum, behind the shoulders, from lateral view, distinctly angulated upwards and from dorsal view bent inwards, wider between shoulders; generally brachypterous with strong sculptures. ..... ***Thoradonta*** Hancock

- Lateral margin of pronotum, behind the shoulders, not compressed and elevated. 2

2. Anterior margin of vertex with two sharp teeth infront ..... ***Bidentatettix*** Zheng
- Anterior margin of vertex without sharp teeth infront 3

3. Vertex distinctly narrower than an eye, and more narrower towards front; apex of posterior angles of lateral lobes of pronotum provided with spine at anterior margin or truncate. .... ***Hebarditettix*** Günther
- Vertex slightly narrower than an eye. 4

4. Generally medium to large in size; posterior angles of lateral lobes of promotum acute or produced into a spine at anterior margin which is more or less transverse or obliquely directed forwards ..... ***Ecuriotettix*** Hebard
- Generally small to medium in size; posterior angles of lateral of pronotum slightly or not prominent, subspiniform or oblique and obtuse but without forming a lateral spine. .... ***Loxilobus*** Hancock

Genus ***Thoradonta*** Hancock, 1908

3. ***Thoradonta nodulosa*** (Stål)

1860. *Tetrix nodulosa* Stål, *Eugenies Resa Orth.*, : 346.

1915. *Thoradonta nodulosa :* Hancock, *Rec. Indian Mus.*, **11** : 82.

Material examined : 3♂, Teirei, District Mamit, 23, 24.10.1991, coll. J.K. Jonathan; 2♂, Aibawk, 9.12.1993, coll. S.S. Saha; 1♀, Lawngtlai, 3.4.1994, coll. A.K. Hazra; 1♂, 1♀, On Saiha road, Lawngtlai, 4.4.1994, coll. A.K. Hazra; 5♂, 1♀, Teirei, District Mamit, 11, 12.11.1995, coll. M.S. Shishodia; 3♂, 3♀, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 1♂, 1♀, W. Phaileng, District, 10.10.1998, coll. M.S. Shishodia.

Diagnostic characters : Size medium (6.5-7.5 mm); vertex narrow (0.64-0.75) : upper lobes of posterior angles of lateral lobes of pronotum with small or medium size spines, directed posteriorly, front margin not constricted; posterior femora stout, crassate and with a series of nodules on the outer surface.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Maharashtra, Manipur, Meghalya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Elsewhere : Borneo, Hainan, Java, Singapore, Sri Lanka and Sumatra.

Genus ***Bidentatettix*** Zheng, 1992

4. ***Bidentatettix yunnanensis*** Zheng

1992. *Bidentatettix yunnanensis* Zheng, *Entomotaxonomia* **14** (no. 2) : 7.

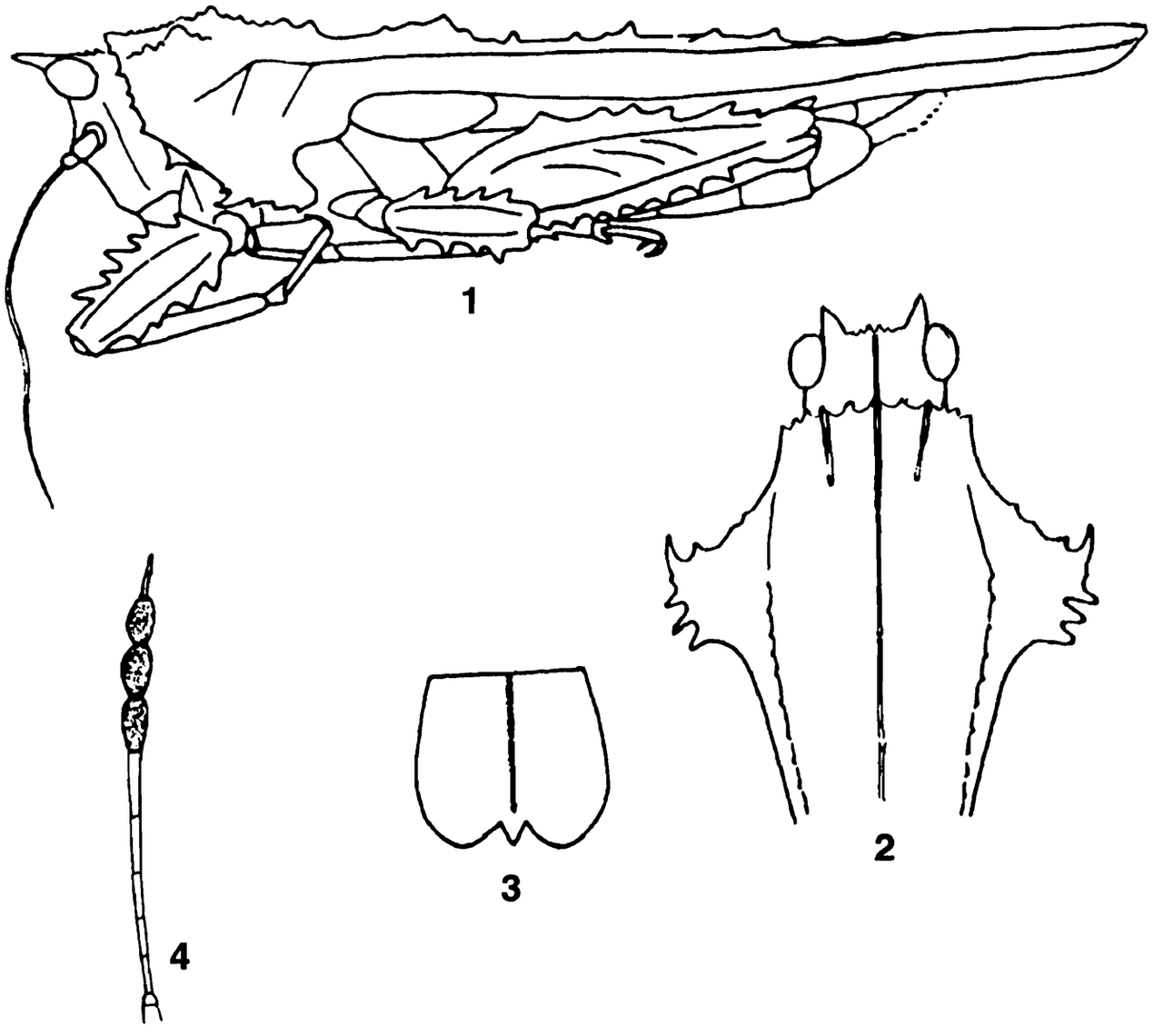
Material examined : 1♂, Teirei, Dist. Mamit, 13.10.1998, coll. M.S. Shishodia and also 2♂, Nagaland, Mukokchung, 28.9.1981, coll. K.P. Singh.

Diagnostic characters : Frontal costa widely forked between antennae; antennae filiform, located below the eyes; eyes globulose; vertex wider than an eye, and with one horn on either side which are elevated above the eye level; pronotum extended beyond the apex of hind legs; dorsum rough, with irregular rugulae; median carina elevated infront of shoulders; lateral carinae serrated with a small tubercle on either side of shoulders; prozona with distinct elevated median and lateral carinae, with a small tubercle on their anterior margin; hind wings reach upto the apex of pronotum; lateral lobes of pronotum flattened and laminated with 5 teeth, the second one long and curved forwards; all the femora flattened and with a row of sharp teeth; first segment of hind tarsi longer than the 2nd and 3rd segments together; subgenital plate notched on the middle.

Measurments (in mm) : Body length 12.0; pronotum 19.0; hind femur 7.0.

Distribution : It is recorded here for the first time from India.

Elsewhere : China.



Figs. 1-4. : Lateral view of the body of *Bidentatettix yunnanensis*; 2. Dorsal view of head and thorax of *B. yunnanensis*; 3. Female subgenital plate of *B. yunnanensis* (After Zheng, 1992); 4. Antenna of *Phaesticus* sp. (After Zheng, 1998)

Genus ***Eucriotettix*** Hebard, 1929

Key to species

1. Head exserted; posterior angles of lateral lobes of pronotum expanded, apex truncate or slightly rounded with or without angulate anterior margin..... 2
- Head slightly exserted; posterior angles of lateral lobes of pronotum expanded, apex produced into an obliquely acute or a triangular sharp spine. ..... *grandis* (Hancock)
2. Posterior angles of lateral lobes of pronotum triangulate at anterior margin. ....*pallidus* (Hancock)
- Posterior angles of lateral lobes of pronotum trruncate or slightly rounded at apex, notched in the middle.....*dohertyi* (Hancock)

5. ***Eucriotettix Pallidus*** (Hancock)

1915. *Criotettix pallidus* Hancock, *Rec. Indian Mus.*,**11** : 85-86.

1938. *Eucriotettix pallidus* : Günther, *stettin. ent. ztg.*, **99** : 170.

Material examined : 1♂, 5♀, W. Phaileng, District Mamit, 8, 10.10.1998, coll. M.S. Shishodia.

Diagnostic characters : Vertex more narrowed infront; frontal costa bifurcated between the paired

ocelli, compresso-elevated between the antennae; antennae located on the inferior margin of eyes; pronotum extended beyond the apices of posterior femora; dorsum granulose, convex between shoulders; first segment of posterior tarsi longer than third; all the pulvilli equal in length and acute.

Distribution : India : Mizoram, Manipur and West Bengal.

Elsewhere : Myanmar.

6. ***Eucriotettix dohertyi*** (Hancock)

1915. *Criotettix dohertyi* Hancock, *Rec. Indian Mus.*, **11** : 86.

Material examined : 1♂, 1♀, Teirei, Dist. Mamit, 24.10.1991, Coll. J.K. Jonathan; 1♀, 52 kms. from Saiha towards Blue Mountain, 950 m, 8.4.1994, coll. A.K. Hazra.

Diagnostic characters : Size of body normal (8-11 mm); vertex narrower than an eye, a little more narrowed infront; pronotum extends beyond the apex of posterior femora; dorsum granulose and rugulose; posterior angles of lateral lobes of pronotum expanded, truncated or slightly rounded at apex, may or may not notched in the middle; wings extended upto the apex of pronotum; third pulvilli of posterior tarsi of first segment slightly longer than the second, the first two pulvilli acutely spinose.

Distribution : India : Mizoram, Assam, Manipur, Meghalya and West Bengal.

Elsewhere : China.

7. ***Eucriotettix grandis*** (Hancock)

1912. *Criotettix grandis :* Hancock, *Mem. Dept. Agric. India Ser. (Ent.)*, **4** : 134.

1929. *Eucriotettix grandis* : Hebard, *Revue suisse Zool.*, **36** : 573.

Material examined : 2♂, Tuikui duty post, Murlan National Park, 17.12.1993, coll. S.S. Saha; 1♀, Lawngtlai, Chhimtuipui, 3.4.1994, coll. S.K. Ghosh; 1♂, 52 kms. from Saiha towards Blue Mountain, 950m., 8.4.1994, coll. A.K. Hazra; 1♂, 1♀, Pakpui, Lunglai, 10.4.1994, coll. S.K. Ghosh; 15♂, 14♀, Teirei, Dist. Mamit, 11, 12.11.1995, coll. M.S. Shishodia; 2♂, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 5♂, 4♀, W. Phaileng, Dist. Mamit, 9, 10, 11.10.1998, coll. M.S. Shishodia.

Diagnostic characters : Body size large (17-22); vertex narrower or equal to an eye; posterior angles of lateral lobes of pronotum expanded, apex produced into an obliquely acute or a triangular sharp spine; pronotum extends beyond the apices of hind femora; dorsum granulose and rugulose; first pulvilli of first tarsal segment acute and smaller, second also acute and a little longer than the first, third either equal to or slightly longer than second, but not acute.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Elsewhere : S.E. China; Myanmar and Nepal.

Genus ***Loxilobus*** Hancock, 1904

8. ***Loxilobus striatus*** Hancock

1915. *Loxilobus striatus* Hancock, *Rec. Indian Mus.*, **11** : 91.

Material examined : 1♀, Teirei, Dist. Mamit, 22.10.1991, coll. J.K. Jonathan; 1♂, Aibawk, 9.12.1993, coll. S.S. Saha; 1♂, Aibawk, 26.3.1994, coll. G.C. Sen.

Diagnostic characters : Body size medium (6.5-9 mm); vertex wider than an eye and narrowed forward; frontal costa arcuate produced between eyes; antennae inserted between the lower fourth of eyes; pronotum granose, interspersed with small tubercles; posterior angles of lateral lobes of pronotum obliquely truncate, the apex rounded truncate; wings extend slightly beyond the pronotal apex; 1st and 2nd pulvilli of the first joint of posterior tarsi spinose, the third as long as the first and 2nd pulvilli together.

Distribution : India : Mizoram and West Bengal.

Elsewhere : Myanmar.

Genus ***Hebarditettix*** Günther, 1938

Key to species

1. Pronotum short (10-13 mm). .... *lobatus* (Hancock)
- Pronotum longer (13-14 mm). .... *quadratus* (Hancock)

9. ***Hebarditettix lobatus*** (Hancock)

1912. *Systolederus lobatus* Hancock, *Mem. Dept. Agric. India Ser.(Ent.),* **4** : 143.

1938. *Hebarditettix lobatus* : Günther, *Stettin. ent. Ztg.*, **99** : 202.

Material examined : 2♀, Teirei, Dist. Mamit, 12.11.1995, coll. M.S. Shishodia, 1♀, Kawnpui, 13.11.1995, M.S. Shishodia.

Diagnostic characters : Posterior angles of lateral lobes of pronotum obliquely truncate, the angles subacute; first and third segment of posterior tarsi equal in length; all the pulvilli of first segment of hind tarsi acute and subequal.

Distribution : India : Mizoram, Manipur and West Bengal.

10. ***Hebarditettix quadratus*** (Hancock)

1915. *Bolotettix quadratus* Hancock, *Rec. Indian Mus.*, **11** : 70.

1938. *Hebarditettix quadratus* : Günther, *Stettin. ent. Ztg.*, **99** : 202.

Material examined : 5♂, 3♀, Teirei, Dist. Mamit, 20,22,24.10.1991, coll. J.K. Jonathan; 3♂, 2♀, Teirei, 11,12.11.1995, coll. M.S. Shishodia; 1♂, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 1♂, W. Phaileng, 9.10.1998, coll. M.S. Shishodia.

Diagnostic characters : Size medium (8-12 mm); head exserted; vertex more narrowed forwards; frontal costa narrowly sulcated between the paired ocelli; antennae located below the eyes; pronotum extended beyond the apices of hind femora; dorsum granulose and rugulose; posterior angles of lateral lobes of pronotum subquadrate, truncate, apex rounded; all the pulvilli of first segment of posterior tarsi equal in length.

Distribution : India : Arunachal Pradesh, Manipur, Sikkim and West Bengal.

Subfamily METRODORINAE

Key to genera

1. Vertex drawn out infront of eyes; flight organs always present. ..... ***Spadotettix*** Hancock
- Vertex not drawn out infront of eyes; flight organs may or may not be present. .... ***Bolivaritettix*** Günther

Genus ***Spadotettix*** Hancock, 1910

11. ***Spadotettix subansiriensis*** Shishodia

1991. *Spadotettix subansiriensis* Shishodia, *Rec. zool. Surv. India, Occ. Paper No.* **140** : 124.

Material examined : 1♂, Lawngtlai, 800m., 3.4.1994, coll. A.K. Hazra; 1♀, D. F. O. Office complex, Lawngtlai, 3.4.1994, coll. A.K. Hazra.

Diagnostic characters : Head not exserted above the pronotal surface; vertex distinctly wider than an eye, not narrowed infront, broadly expanded towards anterior and a little produced beyond the eyes infront; frontal costa bifurcate behind the paired ocelli, sulcus very narrow between antennae, broader around middle ocellus; antennae short, filiform, located on the inferior margin of eyes; paired ocelli placed below the middle of eyes; eyes widely separated.

Pronotum subangulate anteriorly, extended posteriorly beyond the apex of hind femora; posterior angles of lateral lobes of pronotum widely rounded at apex; wings extended upto the pronotal apex; first segment of hind tarsi longer than the third; 3rd pulvillus of first segment of hind tarsi longer and obtuse.

Measurements (in mm) : Body length ♂ 13.0, ♀ 15.0; pronotum ♂ 12.0, ♀ 14.0, hind femur ♂ 8.0, ♀ 9.0; hind tibia ♂ 7.0, ♀ 7.0; vertex width ♂ 1.8, ♀ 2.0.

Distribution : India : Mizoram and Arunachal Pradesh.

Genus ***Bolivaritettix*** Günther, 1939

Key to species

1. Dorsum of pronotum, behind the shoulders, with deep seated fossulae. .... *sculptus* (Bolivar)
- Dorsum of pronotum, behind the shoulders, with less deep seated fossulae. .... *roonwali* Shishodia

12. ***Bolivaritettix roonwali*** Shishodia

1991. *Bolivaritettix roonwali* Shishodia, *Rec. zool. Surv. India, Occ. Paper* No. **140** : 90.

Material examined : 1♂, Banhlahnmum, Saiha, 6.4.1994, coll. S.K. Ghosh; 1♂, 52 kms. from Saiha Blue Mountain, 950m., coll. A.K. Hazra.

Diagnostic characters : Size medium (11-11.5 mm); eyes raised above the vertex; vertex fossulated on either side of mid line, not narrowed infront; median carinulae distinct anteriorly, obsolute posteriorly; paired ocelli located on the middle of eyes; antennae placed on the lower magin of eyes; frontal costa bifurcated behind the paired ocelli, gently arched between antennae; pronotum extended beyond the apex of hind femora; prozonal carinae distinct, a little convergent behind; abbreviated carinae of right side broken posteriorly, left side carinae raised throughout; dorsum granulose, a little depressed infront and behind the shoulders, hind process of pronotum with 4-5 oblique rugulae on either side of middle carina; posterior abgles of lateral lobes of pronotum turned downwards, moderately wide, truncate, anterior angle a little prominent.

Measurements (in mm) : Body length 11-11.5; pronotum 14.0; hind femur 6.5; hind tibia 6.0 and shoulders width 3.3.

Distribution : India : Mizoram, Manipur and Sikkim.

13. ***Bolivaritettix sculptus*** (Bolivar)

1887. *Mazarredia sculpta* Bolivar, *Annls. Soc. ent. Belg.*, **31** : 238.

1939. *Bolivaritettix sculptus* : Günther, *Abh. Ber, Mus. Tierk. Völkerk. Dresden*, **20** (A) Zool. (N. F.) BD 1 : 59.

Material examined : 1♀, Teirei, Dist. Mamit, 12.10.1998, coll. M.S. Shishodia.

Diagnostic characters : Larger than *roonwali*; vertex somewhat narrowed infront; frontal costa strongly arched between the antennae, moderately sulcate between the paired ocelli, which gradually widen infront; antennae on the inferior margin of eyes; pronotum extended beyond the apex of hind femora; dorsum granulose, tubercles linear; fossulae prominent behind the shoulders; posterior angles of lateral lobes of pronotum turned downwards, dilated, apex truncate.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Tripura and West Bengal.

Elsewhere : China and Myanmar.

Subfamily TETRIGINAE

Key to genera

1. Vertex and eyes obviously raised above the level of pronotum; antennae inserted between the lower margin of eyes. 4
- Vertex and eyes very little or not at all raised above the level of pronotum; antennae scarcely located below the middle of eyes. 2
2. Body generally smooth or a little granulose; vertex equal to or a little narrower than an eye, generally expanded, transverse or triangularly carinated infront; abbreviated carinae distinctly present; median carina of pronotum percurrent, not interrupted. .... ***Hedotettix*** Bolivar
- Body generally granulose or tuberculose; vertex not expanded in front; abbreviated carinae indistinctly present; median carina of pronotum not percurrent. 3
3. Vertex narrower and more narrowed in front; frontal carinulae interrupted internally or recurved; dorsum of pronotum a little rugulose often bearing round or abbreviated lineate tubercles; median carina very fine and it may be 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 of mid line; median carina a little raised but not wavy. .... ***Paratettix*** Bolivar

4. Vertex narrower than an eye and truncate; frontal costa arcuately produced between the middle of eyes; antennae inserted below the middle of eyes; median carina of pronotum not undulated; posterior femora with less conspicuous nodosities on the external surface. ..... ***Euparatettix*** Hancock

– Vertex still more 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 external surface. ..... ***Ergatettix*** Kirby

Genus ***Hedotettix*** Bolivar, 1887

Key to species

1. 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. ..... *gracilis* (Haan)

– Frontal costa not widely sulcated, the rami not widened between antennae; median carina of pronotum a little compressed, low arcuate forward. ..... *attenuatus* Hancock

14. ***Hedotettix gracilis*** (Haan)

1842. *Acridium (Tetrix) gracile* Haan, *Temminck. Verhandel., Orthopt.*, : 167, 169.

1914. *Hedotettix gracilis* : Kirby, *Fauna Brit. India, Orthopt.*, : 72.

Material examined : 1 ♀ (nymph), Teirei, Dist. Mamit, 24.10.1991, coll. J.K. Jonathan; 1 ♂, 1 ♀, Aibawk, 26,28.3.1994, coll. G.C. Sen; 1 ♂, 2 ♀, Casa, Aibawk, 29.3.1994, coll. G.C. Sen; 1 ♀, 42 kms. towards Blue Mountain, 950m, 9.4.1994, coll. A.K. Hazra; 15 ♂, 9 ♀, Aibawk, 16,17.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Head not exserted above the pronotum; frontal costa widely sulcated; pronotum and wings extended upto or beyond the posterior margin of femora.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tripura and West Bengal.

Elsewhere : Celebes, China, Java, Myanmar, Pakistan, Sri Lanka, Sumatra, Taiwan, Thailand and Vietnam.

Remarks : Both macro and micro forms are available. The median carina of pronotum compressed and raised in micropterous females. The nymphs also have raised median carina. This species has variations in colour of dorsum. The black dots marked on either side of median carina on shoulder region. These spots are of variable in shapes, from triangular to semicircular and sometimes meet with the other of the same side, or indistinct.

15. ***Hedotettix attenuatus*** Hancock

1904. *Hedotettix attenuatus* Hancock, *Spolia zeylan.*, **2** : 108, 149, 151.

Material examined : 1 ♀, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 1 ♂, 1 ♀, Aibawk, 16.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Body size medium (8-10.5 mm); vertex narrow than an eye, frontal margin subtransverse, meet the lateral carinulae roundly; frontal costa roundly arched, frontal sulcus gently wide anteriorly; paired ocelli placed above the middle of eyes; pronotum extended upto the apex of hind femora or beyond it.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Manipur, Meghalaya, Orissa, Sikkim, Tripura and West Bengal.

Elsewhere : Sri Lanka.

Genus ***Coptotettix*** Bolivar, 1887

Key to species

1. Size medium; pronotum short (7.4-10.5 mm). 2

- Size large; pronotum large (9.5-14 mm)..... ..... *conspersus* Hancock

2. Dorsum of pronotum heavily granulose or tuberculose. 3

- Dorsum of pronotum not heavily granulose or tuberculose. ..... *annandalei* Hancock

3. Lateral lobes of pronotum narrowly rounded. ..... *rugosus* (Hancock)

- Lateral lobes of pronotum with truncate apex. ..... *tuberculatus* Bolivar

16. *Coptotettix annandalei* Hancock

1915. *Coptotettix annandalei* Hancock, *Rec. Indian Mus.*, **11** : 119.

Material examined : 1♀, Aibawk forest, 40 kms south from Aizawl town, 17.10.1991, coll. J.K. Jonathan; 1♀, Aibawk, 9.12.1993, coll. S.S. Saha; 2♀, Casa, Aibawk, 29.3.1994, coll. G.C. Sen; 1♂, Lawngtlai, 29.3.1994, coll. A.K. Hazra; 1♂, Champhai, 2.4.1994, coll. A.K. Hazra; 2♀, On Saiha road, Lawngtlai, 4.4.1994, coll. A.K. Hazra; 1♂, Kuan Kuan road side hill stream, 800m., 4.4.1994, coll. A.K. Hazra.

Diagnostic characters : Size medium (7.5-10.5 mm); head not exserted above the pronotum; vertex narrower than an eye; paired ocelli placed between the middle of eyes; antennae located at the base of eyes; pronotum truncate anteriorly, extended upto the last abdominal segment or rarely beyond it, acute at apex; dorsum flattened with fine small granules on pronotal process; posterior angles of lateral lobes of pronotum wide, roundly truncate at apex; wings extended upto the pronotal apex or shorter, but never beyond; first joint of hind tarsi longer than third; first and second pulvilli acute, third longer than second and not pointed.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Karnataka, Manipur, Sikkim, Tripura and West Bengal.

Elsewhere : Myanmar and Nepal.

17. *Coptotettix conspersus* Hancock

1915. *Coptotettix conspersus* Hancock, *Rec. Indian Mus.*, **11** : 119.

Material examined : 2♂, Aibawk, 23.3.1994, coll. G.C. Sen; 1♀, Casa, Aibawk, 29.3.1994, coll. G.C. Sen; 1♂, 1♀, Chawnhu forest, Lawngtlai, 2.4.1994, coll. S.K. Ghosh; 2♂, 1♀, Champhai, 3.4.1994, coll. G.C. Sen; 1♂, Kwan Kwan, 4.4.1994, coll. A.K. Hazra; 1♂, 1♀, Banhlahnmum, Saiha, 800m. 6.4.1994, coll. S.K. Ghosh; 1♂, New Saiha, Chhimtuipui, 7.4.1994, coll. S.K. Ghosh; 1♀, Kelking, Champhai, 14.10.1995, coll. A.K. Sanyal; 1♀, Teirei, Dampa Wild Life Sanctuary, 9.11.1995, coll. M.S. Shishodia; 1♂, Aibawk, 16.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Size medium (8-12 mm); vertex with fossulae; frontal costa wide between antennae; pronotum and wings extended beyond the hind femoral apices; dorsum convex with abbreviated curved carinae which may be broken in some cases, finely rugulose on forwards and with thick granules backwards; median carina gently undulate behind shoulders; lateral lobes of pronotum with truncated or roundly truncated apex; third pulvilli longer or equal to second but distinctly longer than the first.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Manipur, Meghalaya, Orissa, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Sri Lanka.

18. *Coptotettix rugosus* (Hancock)

1904. *Loxilobus rugosus* Hancock, *Spolia zevlan.*, **2** : 135.

1992. *Coptotettix rugosus* : Blackith, *Cat. of S. E. Asian Tetrigidae* : 31.

Material examined : 1♀, Lawngtlai, 800m., 3.4.1994, coll. A.K. Hazra; 1♀, Banhlahnmum, Saiha, 800m., 6.4.1994, coll. A.K. Hazra; 1♀, 52 kms. towards Blue Mountain, 950m., 9.4.1994, coll. A.K. Hazra.

Diagnostic characters : Vertex rarely elevated above the eyes; dorsum of pronotum rugose,

tuberculose; median carina of pronotum distinctly situated; posterior angles of lateral lobes of pronotum rounded; wings extended upto the apex of posterior femora.

Distribution : India : Mizoram and Maharashtra.

Elsewhere : Pakistan and Sri Lanka.

19. ***Coptotettix tuberculatus*** Bolivar

1887. *Coptotettix tuberculatus* Bolivar, *Annls. ent. Soc. Belg.*, **31** : 291.

1991. *Coptotettix tuberculatus* : Shishodia, *Rec. zool. Surv. India, Occ. Paper* No. **140** : 168.

Material examined : 1♀, Aibawk, 9.12.1993, coll. S.S. Saha; 1♂, D. F. O. Office complex, Lawngtlai, 3.4.1994, coll. A.K. Hazra; 1♂, Banhlahnmum, Saiha, 800m., 6.4.1994, coll. A.K. Hazra.

Diagnostic characters : Vertex not extended above the surface of pronotum; pronotum reach upto the last abdominal segment or hind femoral apices; dorsum of pronotum strongly granulose or tuberculose; median carina of pronotum represented by linear thick lines with inter breaks; lateral lobes of pronotum with truncate apex.

Distribution : India : Mizoram, Arunachal Pradesh and Manipur.

Elsewhere : Borneo.

Remarks : *Coptotettix rugosus* and *C. tuberculatus* more or less are similar to each other except in lateral lobes of pronotum.

Genus ***Paratettix*** Bolivar, 1887

Key to species

1. Tegmina minute; wings abbreviated or absent. ..... *hancockus* (Shishodia & Varshney)
- Tegmina medium; wings not abbreviated but extended upto or beyond the pronotal apex. 2
2. Pronotum not extended beyond the apex of posterior femoral apices; median carina of pronotum not compressed and raised. .... *curtipennis* (Hancock)
- Pronotum extended beyond the apex of posterior femoral apices; median carina of pronotum compressed and raised. 3
3. Vertex equal or a little broader than an eye, not narrowed forward. .... *cingalensis* (Walker)
- Vertex narrower than an eye, more narrowed forward. ..... *tricarinatus* Bolivar

20. ***Paratettix cingalensis*** (Walker)

1871. *Tettix cingalensis* Walker, *Cat. Derm. Salt. Brit. Mus.*, **5** : 827.

1914. *Paratettix cingalensis* : Kirby, *Fauna Brit. India, Orth.*, : 63.

Material examined : 1♀, Teirei, Dist. Mamit, 24.10.1991, coll. J.K. Jonathan; 1♀, Lawngtlai, 29.3.1994, coll. A.K. Hazra; 1♀, Champhai, 13.10.1995, coll. A.K. Sanyal; 1♂, Aibawk, 16.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Body medium (7.5-9.5 mm); head a little exserted; vertex equal to or a little wider than an eye, little elevated infront; frontal costa bifurcated before the paired ocelli, gradually diverge in front, a little wide between antennae; eyes globular and raised; paired ocelli placed between the eyes; pronotum extended beyond the posterior femoral apices; dorsum granulated, median carina compressed and raised throughout; wings extended beyond the pronotal apex.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim and Tamil Nadu.

Elsewhere : Borneo, Hainan, Java, Malaysia, Mindanao, Myanmar, Sri Lanka, Sumatra and Taiwan.

21. ***Paratettix curtipennis*** (Hancock)

1912. *Coptotettix curtipennis* Hancock, *Mem. Dept. Agric. India Ser. (Ent.)*, **4** : 146.

1915. *Paratettix curtipennis* : Hancock, *Rec. Indian Mus.*, **11** : 113.

Material examined : 1 ♀, Champhai, 5.4.1994, coll. G.C. Sen.

Diagnostic characters : Body robust; size medium (9.00 mm); vertex produced in front as far as eyes, front margin transverse; frontal costa widely sulate; pronotum extended upto the apex of abdomen or shorter; dorsum convex, wide and deplanate between shoulders, granulose and rugulose; posterior angles of lateral lobes of pronotum wide, rounded at apex; wings extend upto or a little surpass the pronotum; posterior femora stout, crassate margins, with angular lobe before the knees.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Elsewhere : China (South), Laos, Myanmar, Nepal, Taiwan and Vietnam.

22. ***Paratettix hancockus*** (Shishodia & Varshney)

1912. *Coptotettix parvulus* Hancock, *Mem. Dept. Agric. India Ser. (Ent.)*, **4** : 145. (preoccupied by *C. parvulus* Hancock, 1908).

1987. *Coptotettix hancockus* Shishodia & Varshney, *J. Bombay nat. Hist. Soc.*, **84**(1) : 167.

1987. *Paratettix hancockus* : Shishodia, *Bull. zool. Surv. India*, **8**(1-3) : 131.

Material examined : 3♂, 7♀, Teirei, Dist. Mamit, 22,24.10.1991, coll. J.K. Jonathan; 1♂, 2♀, Aibawk, 26,28.3.1994, coll. G.C. Sen; 2♂, Casa, Aibawk, 29.3.1994, coll. G.C. Sen; 2♂, 2♀, Kwan Kwan, Lungtlai, 4.4.1994, coll. A.K. Hazra; 9♂, 4♀, Teirei, Dist. Mamit, 9,11,12.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Size small (6.5-8.5); head a little or not exserted above the pronotum; vertex as broad as or slightly narrow than one of the eyes; frontal costa narrow between paired ocelli; paired ocelli located between the middle of eyes; antennae inserted at base of eyes; pronotum extended upto the middle of hind femora, widely rounded at apex; median carina of pronotum compressed, a little arcuate forward; posterior angles of lateral lobes of pronotum wide and roundly produced; first and second pulvilli of hind tarsi acute and small, third longer.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Sikkim, Tripura and West Bengal.

Elsewhere : Bangladesh and China.

23. ***Paratettix tricarinatus*** Bolivar

1887. *Paratettix tricarinatus* Bolivar, *Annls. Soc. ent. Belg.*, **31** : 282.

Material examined : 1♂, 1♀, Aibawk, Aizwal, 23.4.1998, coll. P.H. Roy.

Diagnostic characters : Head a little or not at all exserted; vertex narrower than eye, more narrowed infront; frontal costa bifurcated behind the paired ocelli; paired ocelli placed before the middle of eyes; lateral carinulae raised upto the level of eyes and extend upto the one-fourth distance of eyes; middle carinula distinct and extend behind upto the end of fossulae; median carina compressed and raised before the shoulders low behind the shoulders; posterior angles of lateral lobes of pronotum wide, apex narrowly rounded.

Distribution : India : Mizoram, Meghalaya, Orissa, Tripura and West Bengal.

Elsewhere : Celebes, Malaysia; Mindanao; Papua; Philippines; Sumatra and Taiwan.

Genus ***Eupartettix*** Hancock, 1904

24. ***Euparatettix personatus*** (Bolivar)

1887. *Paratettix parsonatus* Bolivar, *Annls. Soc. ent. Belg.*, **31** : 278.

1904. *Euparatettix personatus* : Hancock, *Spolia zeylan.*, **2** : 145.

Material examined : 3, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 1♂, 2♀, Aibawk, 15,16.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Size medium (6-9 mm); vertex subequal to an eye, narrower forward; frontal costa narrowly sulcate; paired ocelli placed between the middle of eyes; antennae filliform, located on the lower border of eyes pronotum extended beyond the apices of hind femora; wings extended beyond the pronotal apex; hind tibiae distinctly and clearly dense black with one or two white annulations just behind knees and another one at the apical third; posterior tarsi with first segment a little longer than the third.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Tamil Nadu, Tripura and West Bengal.

Elsewhere : Bangladesh, Java, Myanmar, Pakistan, Philippines, Sri Lanka and Taiwan.

Genus ***Ergatettix*** Kirby, 1914

Key to species

1. Median carina of pronotum not distinctly undulate; lateral carinae without dilated lobes on the hind process of pronotum; middle femora less flattened, margins a little lobate; hind femora with less tubercles on external surface. ..... *dorsiferus* (Walker)

– Median carina of pronotum distinctly undulate; lateral carinae with small dilated lobes on the process of pronotum; middle femora sufficiently flattened, margins lobate; hind femora strongly tuberculated on external surface. ..... *güntheri* Steinmann

25. ***Ergatettix dorsiferus*** (Walker)

1871. *Tettix dorsifera* Walker, *Cat. Derm. Salt. Brit. Mus.*, **5** : 825.

1951. *Ergatettix dorsiferus* : Bienko & Mishchenko, *Locusts and Grasshoppers of U.S.S.R. and adjacent countries*, **1** : 107.

Material examined : 1♀, Vairengta, 26.3.1994, coll. I.B. Dutta; 7♂, 5♀ Teirei, Dist. Mamit, 11,12.11.1995, coll. M.S. Shishodia; 3♂, 2♀, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 3♂, 8♀, Aibawk, 16,17.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Size medium (6-9 mm); head distinctly exarted above the pronotal surface; vertex narrower than an eye; antennae situated below the inferior margin of eyes; pronotum and hind wings extended beyond the apex of hind femora; dorsum rugulose; median carina undulate behind the shoulders; lateral carinae wavy; posterior femora with tubercules on external surface.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Central Asia; Bangladesh; South China; Indonesia(Sumba); Iran; Java; Greater Sunda Islands; Myanmar; Sri Lanka; Sumatra and Taiwan.

26. ***Ergatettix güntheri*** Steinmann

1912. *Euparatettix nodulosus* Hancock, *Mem. Dept. Agric. India Ser. (Ent.)*, **4** : 155.

1970. *Ergatettix güntheri* Steinmann, *Acta zool. hung.*, **16**(1-2) : 234. (new name for nodulosus Hanc.)

Material examined : 1♀, Kawnpui, 13.11.1995, coll. M.S. Shishodia; 1♂,1♀, Aibawk, 16.11.1995, coll. M.S. Shishodia.

Diagnostic characters : Similar to the preceding species except the characters mentioned in the key.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Bangladesh; Nepal and Sri Lanka.

Subfamily BATRACHIDEINAE

Genus ***Saussurella*** Bolivar, 1887

27. ***Saussurella cornuta*** (De Haan)

1842. *Acridium (Tetrix) cornutum* De Haan, *Temminck, Verhandel., Orth.*, : 166, 167.

1887. *Saussurella cornuta* : Bolivar, *Annls. Soc. ent. Belg.*, **31** : 829.

Material examined : 5♂, 5♀, W. Phaileng, Dist. Mamit, 9,11.10.1998, coll. M.S. Shishodia.

Diagnostic characters : Vertex wider than an eye; frontal costa bifurcated behind the paired ocelli; paired ocelli located between the middle of eyes; antennae filiform, inserted on the inferior margin of eyes; pronotum produced over the head infront as a narrow strong beak-like process and extended behind beyond the apex of hind femora; dorsum granulose; posterior angles of lateral lobes of pronotum turned downwards, widely rounded; hind wings extended upto the apices of pronotal process; 1st segment of posterior tarsi longer than the third; subgenital plate of male more or less truncate, in female it is trilobate.

Distribution : India : Mizoram and Tripura.

Elsewhere : China; Java and S. Vietnam.

SUMMARY

Twenty-seven species are reported here. The genera *Phaesticus* and *Bidentatettix* are new to India. All the species are recorded here for the first time from Mizoram.

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INSECTA : DERMAPTERA

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INTRODUCTION

In the present paper 15 species (excluding 1 identified up to generic level since represented by female only) belonging to 11 genera are recorded. In addition Sakai (1997) recorded two species, viz., *Epicramopygia eximia* (Dohrn) on nymphs and *Forcipula decolyi* Bormans, on a female, are doubtful and not included in the text.

A key to various taxa represented from the area is given.–

Since the area geographically forms part of NE India most of the species occur in other NE States also. The record of *Nala basalis* Bey Bienko is of interest since it is so far recorded from Afghanistan, Pakistan and Thailand. Besides *Forcipula borellii* Chopard is distributed in the Hills of NE India.

Key to various taxa (on males) known from Mizoram

1(18). Male genitalia with paired distal lobes (figs. 2, 5, 9 & 14).

2(5). Male genitalia, if virga present, thin tabular (without dilation at base and sinous inner tube), with denticulated chitinous pads (Figs. 2 & 5) ..... ANISOLABIDIDAE

3(4). Apterous; paramere without a distinct inner apical concavity (figs. 1-2) .... *Euborellia annulipes* (Lucas)

4(3). Elytra present as narrow lateral ovate flaps; parameres with a distinct inner apical concavity (figs. 3-5) .... *Euborellia annulata* (Fabricius)

5(2). Male genitalia with a distinct virga, dilated as base with a distinct inner sinous tube (figs. 14 & 23). ..... LABIDURIDAE

6(11). Size small (*ca* 15 mm or less), elytra with a sharp ridge along the costal margin, legs relatively short. ..... NALINAE

7(8). Forceps in basal half dilated (Fig. 8) .... *Nala nepalensis* (Burr)

8(7). Forceps long and cylindrical, in basal half not dilated, inner margin with small or large teeth.

9(10). Penultimate sternite narrowed posteriorly with margin in middle faintly emarginate; parameres apically acute (Fig. 6). .... *Nala lividipes* (Dufour)

10(9). Penultmate sternite strongly narrowed posteriorly, obtusely projecting in middle with margin subtruncate; parameres apically acuminate (Fig. 11 & 15) .... *Nala basalis* Bey-Bienko

11(6). Size larger (*ca* 12 to 26 mm); elytra without any shapr ridge along the costal margin; legs longer..... LABIDURINAE

12(13). Sides of abdominal segments without spines and parameres with a short epimerite apically (Figs. 16-17). .... (*Labidura* Leach) ..... *L. riparia* (Pallas)

13(12). Sides of abdominal segments in normal males with spines; parameres with a long epimerite apically (Figs. 19, 21 & 23). ..... *Forcipula* Bolivar

14(15). Sides of abdominal segments 3-5 with a pair of spines (Figs. 18-19). .... *F. clavata* Liu

15(14). Sides of abdominal segments 3-5 with a single spine.

16(17). Body covered with dense, long and short pubesence; elytra and wings well developed; forceps with a sharp spine in middle of basal remote part; paramere with tip acute (figs. 20-21). .... *F. trispinosa* (Dohrn)

17(16). Body covered with comparatively sparse and fine pubescence; elytra abbreviated, wings absent; forcep in the middle of basal remote part with a sharp hooked tooth followed by a tubercle; paramere with tip obtuse (figs. 22-23). ...*F. borellii* Chopard

18(1). Male genitalia with single median distal lobe (Figs. 26, 28 & 33).

19(24). Second tarsal segment simple (neither lobed nor projecting below 3rd tarsal segment). ..... SPONGIPHORIDAE

20(21). Second tarsal segment longer than broad (hind second tarsal segment, in profile, almost of uniform width, only scarcely narrowed basally and slightly shorter than third; first segment only slightly longer than the combined length of last two segments) (Figs. 27-28). ..... HOMOTAGINAE

21(20). Second tarsal segment broader than long or about as long as broad.

22(23). Hind tarsi long and slender, first segment five times longer than its width; elytra smooth, coastal margin with a row of small tubercles, each with a thick seta (figs. 24-26). ..... IRDEXINAE ..... *Irdex nitidipennis* (Bormans)

23(22). Hinds tarsi comparatively short and thick; first segment only three to four times longer than its width; elytra along the costal margin without tubercles (fig. 29). ..... LABIINAE .... *Circolabia curvicauda* (Motscliulsky)

24(19). Second tarsal segment produced below the third or lobed.

25(30). Second tarsal segment produced as narrow lobe below the third segment. .... CHELISOCHIDAH

26(29). Male genitalia with parameres four to five times longer than broad; gently dilated in middle.

27(28). Build slender; colour generally lighter; antennal segments slender, 3rd almost equal to 4th but slightly shorter than 5th (Fig. 30). .....*Proreus* Burr ..... *P. weisi* (Burr)

28(27). Build stout; colour generally dark; antennal segments thick, 3rd longer than 4th and 5th (fig. 31). ..... *Chelisoches* Scudder ..... *C. brevipennis* Borelli

29(26). Male genitalia with parameres twice as long as broad, greatly dilated in middle, externally. ..... *Hamaxas* Burr ..... *Hamaxas* sp.

30(25). Second tarsal segment dilated, forming a rounded lobe. ..... FORFICULIDAE

31(32). Antennal joints long and slender, 4th longer than 3rd of almost equal, both of similar in build i.e. slender (Figs. 32-33). ..... OPISTHOCOSMIINAE ..... *Eparchm insignis* (Haan)

32(31). Antennal joints shorter and stouter, occasionally apical ones long and slender, 4th shorter or almost equal to 3rd but 4th always stouter (Fig. 34). ..... FORFICULINAE .....*Forficula lucens* Brindle

SYSTEMATIC ACCOUNT

ANISOLABOIDEA

ANISOLABIDIDAE

ABISOLABIDINAE

Euborellia annulipes (Lucas)

1847. *Forficesila annulipes* Lucas, *Annls. Soc. Ent. Fr.*, (2)5 : 84 (Sex?; Jardine des Plantes, Paris; introduced).

Material examined : India : Mizoram : Aizwal dist. Dampa, Teirei vill., 1 Male, 2 Females, 26.1.1995; Dampa, 5 Females, 6 nymphs, 230 m., 27.1.1995 (T.K. Pal Coll.); Lunglei dist, Sailakaun, 1 Male, 21.3.1979 (P.T. Cherian coll.); Chhimtuipui dist., Chhimtuipui, 1 Male, 3.4.1994 (S.K. Ghosh and M. Prasad coll.).

Distribution : Mizoram : Aizwal dist., Dampa, Teirei village; Lunglei dist., Sailakaun and Chhimtuipui dist.

Distributed world wide, more common in warmer parts.

Euborellia annulata (Fabricius)

Material examined : India : Mizoram : Aizwal dist., Champai, 2 Females, 2 nymphs, 15.3.1979 (P.T. Cherian coll.)

Distribution : Mizoram : Aizwal dist., Champai), West Bengal, Madhya Pradesh, Tamil Nadu, Karnataka and Rajasthan.

Widely distributed in Oriental and Ethiopian Regions.

Remarks : Only females are represented which are referred to this species after comparison with other specimens including both sexes.

LABIDURIDAE

NALINAE

Nala lividipes (Dufour)

(Fig. 6)

1828. *Nala pallipes* Dufour, *Ann. Gener. Des. Phys Bruxelles,* **4** : 316. pl. 116, fig. 7. 7a and 7b (Male, Female Lower Catalonia. Spain).

1829. *Forficula lividipes* Dufour. *Ann. Set. Nat.,* **13** : 340 (New name proposed).

Material examined : India : Mizoram : Aizwal dist., North Champai, 4 Female, 7.3.1979 (P.T. Cherian coll.).

Distribution : Mizoram : Aizwal dist., North Champai.

Widely distributed all over India and throughout the world.

Nala nepalensis (Burr)

(Figs. 7-10)

1907. *Labidura nepalensis* Burr,. *Rec. Indian Mus.,* **1** : 208 (Male. Female; Nepal : Soondrijal and Pharping).

Material examined : India : Mizoram : Aizwal dist, Sezchipp, I Male, 5.2.1976 (K.R. Rao coll.) Aizwal, I Females, 12.3.1979 (P.T. Cherian coll.).

Distribution : India : Mizoram (as above), Jammu and Kashmir, Uttar Pradesh (Himalaya), Himachal Pradesh, West Bengal (Himalaya), Sikkim, Arunachal Pradesh, Meghalaya and Manipur.

Also recorded from the mountain region in Nepal, Bhutan, Pakistan, Malaya and Indo-China.

Nala basalis Bey-Bienko

(Figs. 11-15)

1970. *Nala basalis* Bey-Bienko. *Zool. Zshurn.,* **49** : 1814, fig. 9-12 (Holotype Male, Paratypes 2 Females : West Pakistan, 25 km N. of Rawalpindi. 600-700 m (Zool. Samm. Munehen); Fast Afghanistan. Asmar, Kunar Tal. 900 m (Mus. Budapest).

1984. *Nala basalis:* Srivastava, *Rec. zool. Surv. India,* **5**(2 & 3) : 11 (1 Male. 1 Female; Thailand).

Material examined : India : Mizoram : Chhimtuipui dist., Tapui River bank, 2 Males (1 Male with genitalia mounted between two coverslips and attached to the pin of specimen), 2 Females, 1000 ft., 23.3.1979 (P.T. Cherian coll.)

Distribution : India : Mizoram (first record).

Also reported from Pakistan, East Afghanistan and Thailand.

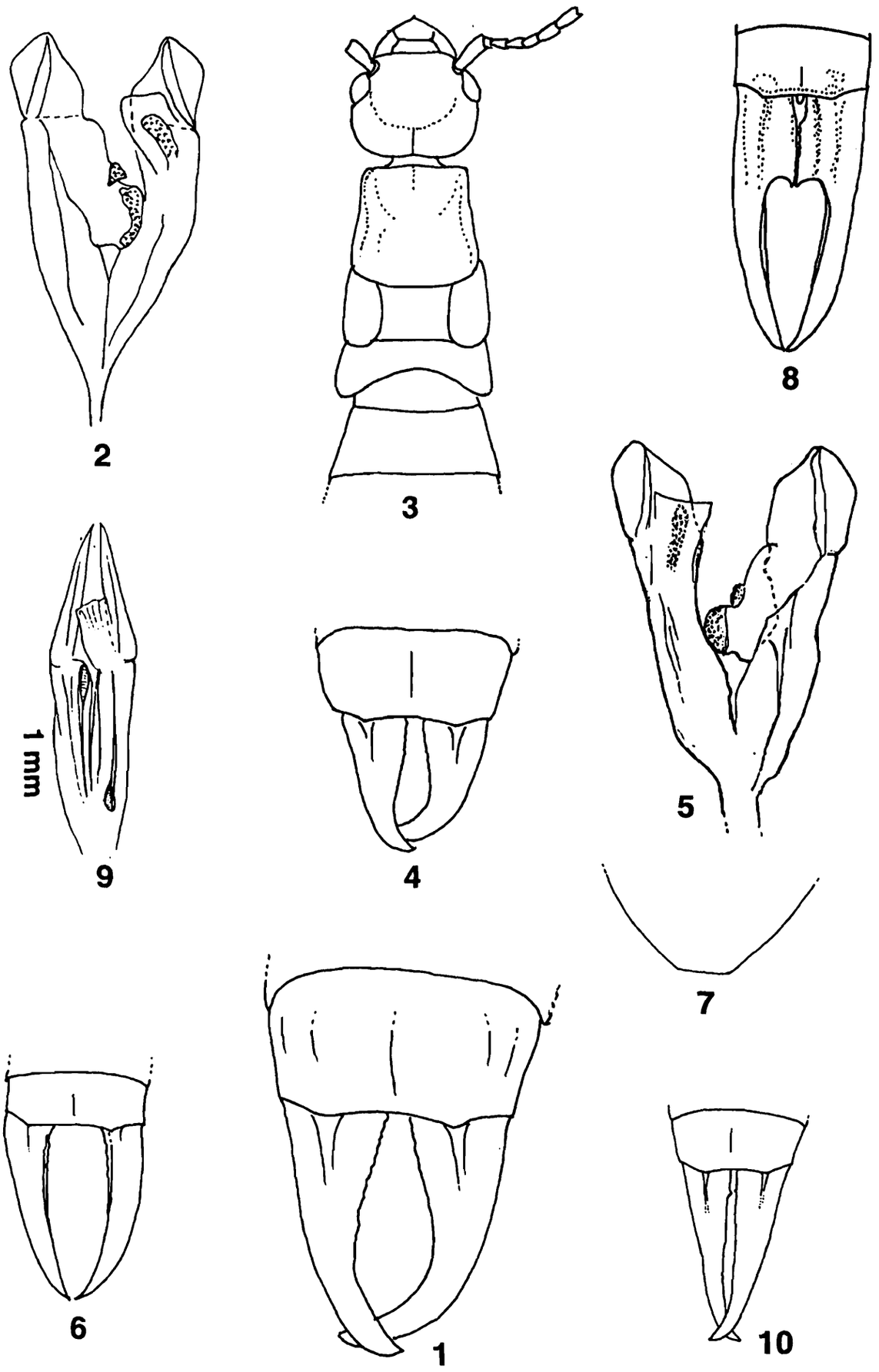
LABIDURINAE

Labidura riparia (Pallas)

(Figs. 16-17)

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

Material examined : India : Mizoram : Chhimtuipui dist., Ngenpui River bank, 1 Male (macropterous), 15.1.1992 (S.J.S. Hattar coll.); Saiha, 1 nymph, at light, 8.4.1994 (S.K. Ghosh and M. Prasad coll.).



Figs. 1-10. : *Euborellia annulipes* (Lucas), Male, 1. Ultimate tergite and forceps, 2. Genitalia; ***Euborellia annulata*** (Fabricius), Male, 3. Anterior portion of body, 4. Ultimate tergite and forceps, 5. Genitalia; *Nala lividipes* (Dufour), Male, 6. Ultimate tergite and forceps; *Nala nepalensis* (Burr), Male, 7. Posterior half of penultimate sternite, 8. Ultimate tergite and forceps, 9. Genitalia, Female, 10. Ultimate tergite and forceps.

Distribution : India : Mizoram (Chhimtuipui dist., Ngenpui river bank and Saiha) and throughout India.

It is distributed all over the world, more common in tropical parts.

Forcipula clavata Liu
(Figs. 18-19)

1946. *Forcipula clavata* Liu, *J. W. China Border Res. Soc.*, **16** : 22, pi. 2, fig. 8 (Male. Female; China : Pan-Chi, Peh-Chi in Chunking).

Material examined : India : Mizoram : Aizwal dist., Aizwal, 3 Males, 2 Females and 8 nymphs, 12.3.1979 (P.T. Cherian coll.).

Distribution : India : Mizoram (Aizwal dist., Aizwal), Meghalaya and Arunachal Pradesh. Also reported from China, Chunking.

Remarks : This species is quite common under the stones on dried river bed and edge of streams in the North Indian Mountains.

Forcipula trispinosa (Dohrn)
(Figs. 20-21)

1863. *Labidura trispinosa* Dohrn. *Stettin. ent. Ztg.*, **24** : 310 (Male: India Orientali).

1891. *Labidura (?) pugnax* Kirby. *J. Linn. Soc. (zool.)*, **25** : 510. pl. 12, fig. 1 (Male, Female; North India).

1980. *Forcipula afghana* Steinmann. *Acta. Zool. Hung.*, **26** (1-3) : 243 (Male; Afghanistan : Hindukush and Nuristan).

Material examined : India : Mizoram : Chhimtuipui dist., bank of Siachunglui river, 1 Female, 2 nymphs, 17.1.1987, Blue Mountain Expedition (S.K. Ghosh coll.).

Distribution : India : Mizoram (as above); West Bengal, Meghalaya, Arunachal Pradesh, Himachal Pradesh and Uttar Pradesh.

Also reported from Bhutan, Nepal, My an mar Pakistan and Afghanistan.

This is a mountain dwelling species occurring all through the Himalayas in India, Bhutan and Nepal along the bank of rivers and streams.

Remarks : Presence of fine pubescence all over the body especially elytra and wings suggests that above specimens are correctly determined. However, in the absence of male the identification should be treated with reserve.

Forcipula borellii Chopard
(Figs. 22-23)

1924. *Forcipula borellii* Chopard, *Rec. Indian Museum*, **26**(1) : 90, pl. 5, figs. 35-41 (Male. Female: Siju Cave. Garo Hills).

1997. *Forcipula borelli* Sakai, *Bull, Biogeogr. Soc. Japan*, **52**(2) : 48 (Male, Female; India : Assam, tkencalong 840 m, Syndai. 235 in, Laitiyngkot, 673 m - 1514 m, Singbeng. 1655 m; Sikkim Ramtang, 1944 m, Mi, 1413-1849 m).

Material examined : India : Mizoram(S) : Chhimtuipui dist, Vambuk, 1 Male, 21.1.1987 (H.C. Ghosh coll. - Blue Mountain Expedition); Aizwal dist., Kolasib, Halehairia tuikhvah, ICAR campus, 1 Female, 1.2.1976 (K.R. Rao coll.); Lunglei dist, Lunglei, 1 Male, 14.1.1992 (S.J.S. Hattar coll.); Thingdwal, I Male, 1 nymph, 5.3.1979 (P.T. Cherian coll.).

Distribution : India : Mizoram (Aizwal, Lunglei and Chhimtuipui dists), Meghalaya, Assam and Sikkim. Records from Assam and Sikkim are after Sakai (1997).

Remarks : General colour is blackish brown. The species, on the basis of above records, appears to be distributed only in the Hills of N.E. India.

FORFICULOIDEA

SPONGIPIIORIDAE

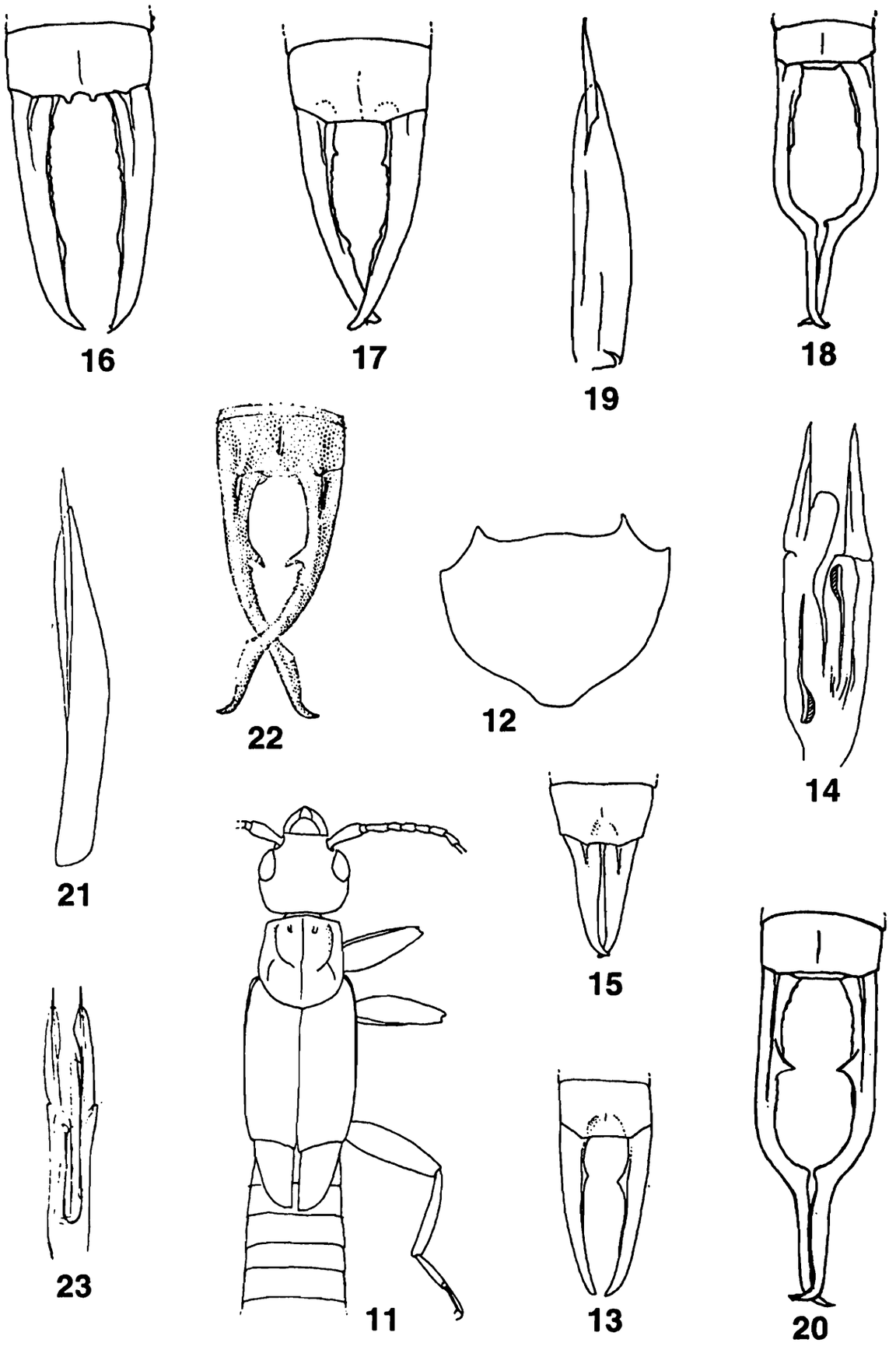
1RDEXINAE

Irdex nitidipennis (Bormans)
(Figs. 24-26)

1894. *Spongophora nitidipennis* Bormans, *Annali Mus. civ. Star. nat. Giacomo Dorsa*, (2)**14** : 382 (1 Male: Burma).

1992. *Spongovostox nitidipennis;* Srivastava, *Rec. zool. Surv. India.* **91**(1) : 78, figs. 37, 38 (Male. Female; India : Arunachal Pradesh : Changlong dist. (earlier Tirap dist.) : Gibbons Land, 16 km E of Miao; Gandhigram 135 km from Miao-all Namdapha National Park).

Material examined : India : Mizoram : Chhimtuipui dist., Vambuk, 4 Males (all



Figs. 11-23. : ***Nala basalis*** Bey-Bienko, Male, 11. Anterior portion of body, 12. Penultimate sternite, 13. Ultimate tergite and forceps, 14. Genitalia, Female 15, Ultimate tergite and forceps; ***Labidura riperia*** (Pallas), Male, 16-17. Ultimate tergite and forceps; ***Forcipula*** *clavata* Liu, Male, 18. Ultimate tergite and forceps, 19. Paramere; ***Forcipula trispinosa*** (Dohrn), Male, 20. Ultimate tergite and forceps, 21. Paramere; *Forcipttla borellii* Chopard, Male, 22. Ultimate tergite and forceps, 23. Genitalia.

brachypterous), 1 nymph (hind portion missing), 20.1.1987, ex rotten log near stranded water on way to Firchange village (H.C. Ghosh coll. -Blue Mountain Expedition); Aizwal dist., Laiton, 2 Males, 1 Female (all macropterous except 1 Male), 6 nymphs, 7.12.1993 (R.S. Burman coll.)

Distribution : India : Mizoram (Chhimtuipui and Aizwal dists.), Meghalaya, West Bengal (Darjeeling dists.), Assam & Arunachal Pradesh. Also recorded from Bhutan, Myanmar, Vietnam, Sumatra, Java and Hainan Is.

Remarks : The status of this species was redefined by Srivastava (1985), after examining the 'Hololype male'

HOMOTAGINAE

Homotages feae (Bormans)
(Figs. 27-28)

1888. *Anechura feae* Bormans, *Annali Mus. civ. Stor. nat. Giacomo Doria.* **6**(2) : 445 (Male; Burma).

Material examined : India : Mizoram : Chhimtuipui dist., Fwepak, 1 Female, 27.1.1987 (H.C. Ghosh coll. - Blue Mountain Expedition).

Distribution : India : Mizoram (Chhimtuipui dist.), West Bengal, Sikkim, Arunachal Pradesh, Himachal Pradesh and Uttar Pradesh.

Also recorded from Myanmar, Nepal and China.

Remarks : This is a typical mountain dwelling species; occurs all along the Himalayas and other Hills in N.E. India.

Although a female is represented it is referred here with certainty.

LABIINAE

Circolabia curvicauda (Motschulsky)
(Fig. 29)

1863. *Forficesila curvicauda* Motschulsky, *Bull. Soc. Imp. Moscou.*, **36** : 2, pi. 2, fig. 1 (Male, Female; Nura Fllia Mountain, Ceylon).

1995. *Circolabia curvicauda;* Srivastava, *Rec. zool. Surv. India,* **95**(1-2) : 102.

Material examined : India : Mizoram, Aizwal dist., Liaton, 1 Female, 7.12.1993 (R.S. Burman coll.)

Distribution : India : Mizoram (Aizwal dist.); occurs throughout India.

It is practically distributed all over the world, mostly dominant in warmer parts.

CHELISOCHIDAE

CHELISOCHINAE

Proreus weisi (Burr)
(Figs. 30)

1904. *Mecomera weisi* Burr, *Trans. R. ent. Soc. Lond.,* **1904** : 302 (Male; Tonkin, Central environs dc Tuyen-Quan).

1911. *Proreus weisi;* Burr, *Genera Insect.,* **122** : 64.

1985. *Proreus weisi;* Srivastava, *Rec. zool. Sun'. India,* **82**(1-4) : 46, figs. 7-13 (Male, Female; India : Arunachal Pradesh, Tirap dist., Hornbill, Namdapha National Park).

Material examined : India : Mizoram, Aizwal dist., Dampa, Teirei vill., 2 Females, 200 m. 26.1.1995 (T.K. Pal coll.).

Distribution : India : Mizoram (Aizwal dist.), Arunachal Pradesh (Changlong dist.).

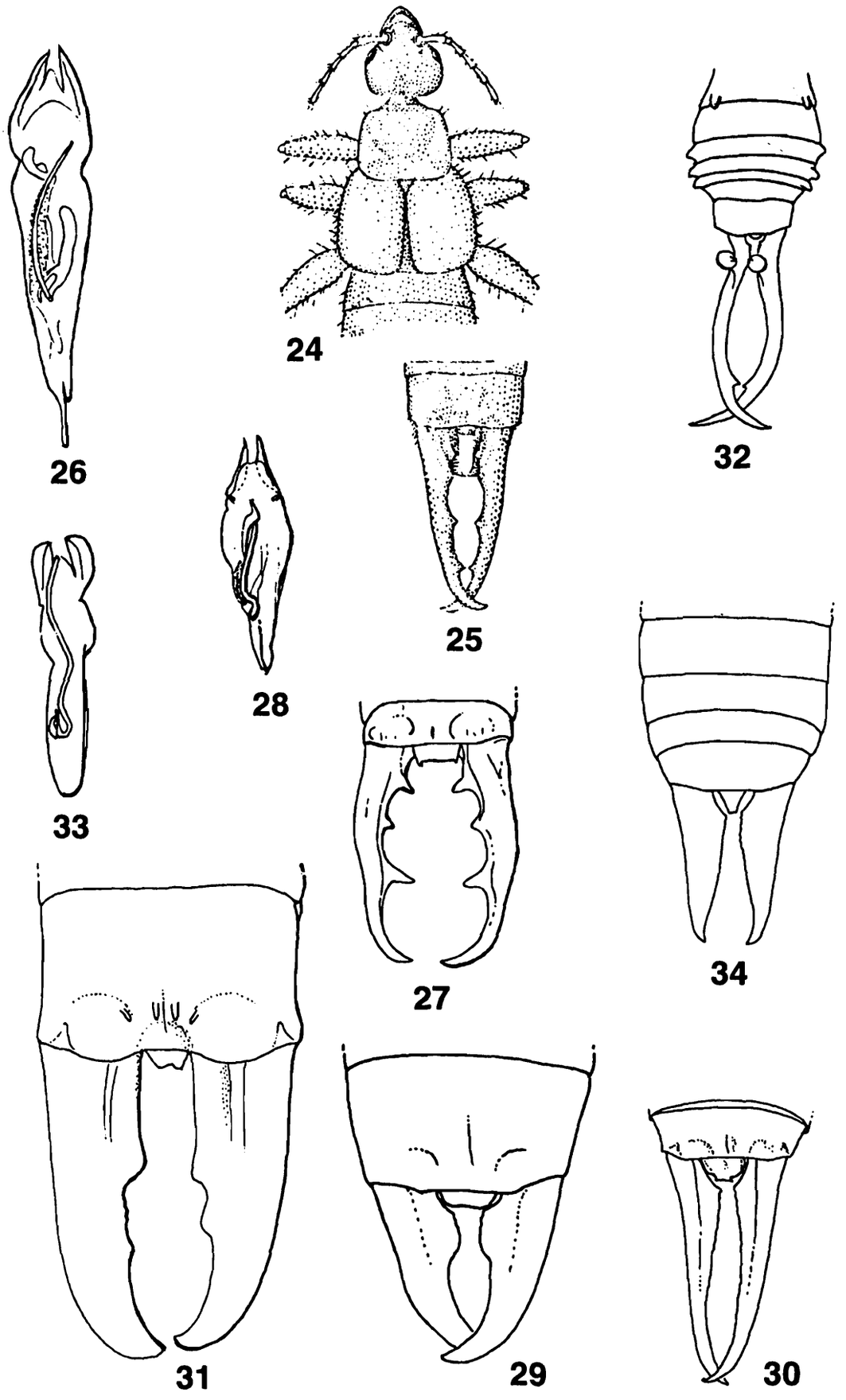
It is reported from Vietnam, South China and a doubtful record from Philippines.

Remarks : These specimens are conspecific with specimens referred to this species by Srivastava (1985a) from Namdapha area in Arunachal Pradesh. However, in the absence of males, this identification should be treated with reserve.

Chelisoches brevipennis Borelli
(Fig. 31)

1923. *Chelisoches brevipennis* Borelli, *Bull. Musei zool. Anat. Camp. If. Univ. Torino,* **8**(13) : 132 (Male, Female; Philippine Isls., N. Palawan, Binalaun).

1977. *Chelisoches brevipennis;* Srivastava, *Newsl. Zool. Surv. India,* **3**(3) : 134 (Male. Female; Sumatra & India).



Figs. 24-34. : *Irdex nitidipennis* (Bormans), Male, 24. Anterior portion of body, 25. Ultimate tergite and forceps, 26. Genitalia, *Homolages feae* (Bormans), Male, 27. Ultimate tergite and forceps, 28. Genitalia; *Cireolabia curvicauda* (Motschulsky), Male, 29. Ultimate tergite and forceps, *Prorens weisi* (Burr), Female, 30. Ultimate tergite and forceps; *Chelisoches brevipennis* (Borelli), Male, 31. Ultimate tergite and forceps; *Eparchus insignis* (Haan), Male, 32. Ultimate tergite and forceps, 33. Genitalia; *Forficula hicens* Brindle, Female, 34. Hind portion of body.

1985. *Chelisoches brevipennis;* Srivastava. *Rec. zool. Surv. India.* **91**(1) : 79, figs. 46-47 (Male, Female; India : Arunachal Pradesh : Tirap dist., Miao-Vijainagar Road).

1995. *Chelisoches brevipennis;* Srivastava. *State Fauna Series* **4** : *Fauna of Meghalaya,* pt. **3** : 332, fig. 102 (Male, Female & Nymphs; India : Meghalaya).

Material examined : India : Mizoram : Lunglei dist., Hanohtheal, 2 Males, 2 Females & 1 nymph, 24.3.1979 (P.T. Cherian coll.).

Distribution : India : Mizoram (Lunglei dist.), Meghalaya, Arunachal Pradesh and West Bengal.

Also recorded from Sumatra and Philippine Islands.

Hamaxas sp.

Material examined : India : Mizoram, Aizwal dist., Dampa, 1 Female, 230 m, 27.1.1995 (T.K. Pal coll.).

Remarks : This species comes very close to *H. melanocephalus* (Dohrn) and *H. Sakaii* Srivastava (in press) on the basis of general body size and colour. Since both the said species are separable on males, it is not possible to identify the present specimens up to specific level.

FORFICULIDAE

OPISTHOCOSMIINAE

Eparchus insignis (Haan)

(Figs. 32-33)

1842. *Forficula insignis* Haan, *Verh. Nat. Gas. Nederl. Overz. Bezitt. :* 243, fig. 15 not fig. 14 as mentioned in the text (Male, female; Java).

Material examined : India : Mizoram : Chhimtuipui dist., Fwepak, 1 Male, 26.1.1987 (H.C. Ghosh coll. - Blue Mountain Expedition); Aizwal dist., Aizwal, 10 km North, 1 Male, 1000 m, 23.1.1995 (T.K. Pal coll.), Aizwal Lunglei Road, 1 Male, 1 Female, 10.3.1979 (P.T. Cherian coll.).

Distribution : India : Mizoram (as above), Tamil Nadu, Uttar Pradesh, Sikkim, Assam, Meghalaya and Arunachal Pradesh.

Widely distributed in the Oriental Region.

FORFICULINAE

Forficula lucens Brindle

(Fig. 34)

1975. *Forficula lucens* Brindle, *tint. Basiliensia.* **1** : 46, figs 56-57 (Male, Female; Bhutan : Tongsa, 2150 m; Dechhi Paka, 3300 m; Nobding. km 41 O Wangidiphodrang, 2800 in).

1982. *Forficula lucens;* Srivastava, *hint. Basiliensia,* **7** : 69, fig. 7 (Male, Female; India : West Bengal : Darjeeling dist., Jhepi, 1300-1400m).

1993. *Forficula lucens;* Srivastava. *State Fauna Series* **3** : Fauna of West Bengal, Pt. 4 : 438, figs. 233-235 (India and Bhutan).

Material examined: India : Chhimtuipui dist., Fwepak, 15 Females, ex forest litter, 27.1.1987; Sangao, 1 Female, 2.2.1987 (H.C. Ghosh coll. - Blue Mountain Expedition).

Distribution : India : Mizoram (as above); West Bengal (Darjeeling dist.). Also reported from Bhutan.

Remarks : The length of body varies between 8.0 and 9.5mm and forceps between 0.2 and 0.4 mm.

SUMMARY

On the basis of general body colour and size and concealed wings the above specimens are referred to this species. However, in the absence of a males, this identification should be treated with reserve.

ACKNOWLEDGEMENTS

I am thankful, to the Director, Zoological Survey of India, Calcutta for providing necessary facilities for this study.

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SRIVASTAVA, G.K. 1985a. Insecta : Dermaptera : In Fauna of Namdapha : Arunachal Pradesh. A proposed Biosphere Reserve. *Rec. zool. Surv. India*, **82**(1-4) : 41-52.

SRIVASTAVA, G.K. 2000. Insecta : Dermaptera. *Fauna of Tripura, State Fauna Series,* **7**(Part-2) :

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 241-248, 2007

INSECTA : ISOPTERA

P. K. MAITY*, N. SAHA AND P. H. ROY
Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053

INTRODUCTION

The State of Mizoram is one of the eastern-most States, Sandwiched between Myanmar in the east and south, Bangladesh in the west, and Tripura, Assam and Manipur together in the north with an area of about 21,081 sq. kms. Unlike most other mountain ranges in the country which runs almost from east to west, the green and blue hills of Lushai in Mizoram stretch from north to south. The satellite imaginery of the State of Mizoram shows a forest cover of 65% of the total area consisting of evergreen forest in the plains and temparate forest in the high altitudes of hills.

The termite fauna of Mizoram is extremely poorly known so far. Two species, namely, *Macrotermes khajuriai* Roonwal and Chhotani and *Ancistrotermes pakistanicus* Ahmad have been reported by Chhotani (1997). Very recently, three more species, namely *Indotermes rongrensis* Roonwal and Chhotani, *Odontotermes feae* (Wasmann) and *Microtermes obesi* Holmgren have been reported by Bose (1999) from the area.

However, a fairly good collection has been accumulated in the Isoptera Section made mostly by different survey parties of Z.S.I. This collection was further augmented by some good collection made by Sri P.H. Roy and party (1994-1996), on which the present study is based.

The study reveals the occurrence of 15 species under 10 genus and 3 families from the area, of which 10 species are recorded for the first time form the State.

**Emeritus Scientist, Z. S. I., Kolkata*

SYSTEMATIC ACCOUNTS

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 "Fauna of India" including the characters of taxonomic importance. Identification of termite species is mostly based on these characteristic features of soldier caste. In addition, the measurements of 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 defined in numerous papers, these are not incorporated here just to avoid repetition.

Best method of collection of soil termites is done with the help of a shovel pushing it into the soil and put the material on a tray and ultimately picking them up with the help of a scissor. 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.

List of species already known from the State

Family INDOTERMITIDAE

Genus ***Indotermes*** Roonwal and Sen-Sarma

1. ***Indotermes rongrensis*** (Roonwal and Chhotani)

Family TERMITIDAE

Subfamily MACROTERMITINAE

Genus ***Macrotermes*** Holmgren

2. ***Macrotermes khajuriai*** Roonwal and Chhotani

Genus ***Odontotermes*** Holmgren

3. ***Odontotermes feae*** (Wasmann)

Genus ***Ancistrotermes*** Silvestri

4. ***Ancistrotermes pakistanicus*** (Ahmed)

Genus ***Microtermes*** Wasmann

5. ***Microtermes obesi*** Holmgren

List of species recorded for the first time

Family RHINOTERMITIDAE

Subfamily COPTOTERMITINAE

Genus ***Coptotermes*** Wasmann

1. ***Coptotermes traviens*** Haviland

Subfamily HETEROTERMITINAE

Genus ***Reticulitermes***

2. ***Reticulitermes assamensis*** Gardner

Family TERMITIDAE

Subfamily MACROTERMITINAE

Genus ***Macrotermes***

3. ***Macrotermes hopini*** Roonwal and Sen-Sarma

Genus ***Odontotermes*** Holmgren

4. ***Odontotermes bovini*** Thakur
5. ***O. horni*** (Wasmann)
6. ***O. redemanni*** (Wasmann)

Genus ***Hypotermes*** Holmgren

7. ***Hypotermes obscuriceps*** (Wasmann)

Subfamily NASUTITERMITINAE

Genus ***Bulbitermes*** Emerson

8. ***Bulbitermes parapusillus*** Ahmad

Genus ***Nasutitermes*** Bank

9. ***Nasutitermes gardneri*** Snyder
10. ***N. jalpaiguriensis*** Prased and Sen-Sarma

Key to the families of ISOPTERA

(Soldiers)

1. Tarsi 3-jointed ..... INDOTERMITIDAE
– Tarsi 4-jointed 2
2. Pronotum flat ..... RHINOTERMITIDAE
– Pronotum saddle-shaped .....TERMITIDAE

Key to the genera of RHINOTERMITIDAE

(Soldiers)

1. Head oval, gradually narrowing infront; frontanelle large, placed far infront ..... ***Coptotermes***
– Head subrectangular, parallel sided; frontanelle small, circular and lying a little infront of middle of head dorsum ..... ***Reticulitarmes***

Key to genera of TERMITIDAE

(Soldiers)

1. Head projected infront into a long nasus; mandibles degenerated and non-functional 2
– Head not projected infront into a nasus; mandibles well developed and functional.... 3
2. Head constricted behind the antennae ..... ***Bulbitermes***
– Head not constricted behind the antennae ..... ***Nasutitermes***
3. Dimorphic; labrum with a hyaline tip; meso- and meta-notum laterally expanded ..... ***Macrotermes***
– Monomorphic; labrum without hyaline tip; meso- and meta-notum not laterally expanded 4

4. Small and delicate species; right mandible without any tooth or crenulation; left mandible sometimes with a faint tooth 5
- Larger species; left mandible with a tooth on inner margin or crenulations in basal half; right mandible generally without any tooth 6
5. Head broadly subround or squarish; mandibles strongly incurved anteriorly ... ***Ancistrotermes***
- Head oval, converging in front; mandibles weakly incurved anteriorly ..... ***Microtermes***
6. Left mandible without any tooth, but with 3-5 crenulations at basal half ..... ***Hypotermes***
- Left mandible with a tooth placed at different positions on its inner margin, but without any crenulation ..... ***Odontotermes***

Taxonomic accounts of species

Family RHINOTERMITIDAE

Subfamily COPTOTERMITINAE

Genus ***Coptotermes*** Wasmann

1. ***Coptotermes travians*** Haviland

1896. *Termes (Coptotermes) travians* Haviland, *J. Linn. Soc. (Zool.)*, **26** : 169, S, Im and W. *Type-locality :* Singapore and Sarawak (Malaysia).

1962. *Coptotermes travians*, Roonwal and Chhotani, *Indian species of the Termite Genus Coptotermes.* New Delhi *(Eng. Monogr. Indian Coun. agric. Res.* No. 2) : 61-69.

1989. *Coptotermes travians*, Roonwal and Chhotani, *Fauna of India, Isoptera (Termites)*, **1** : 461-467.

Material studied : 2S and sev. W, Hnathial, Dist. Lunglei, Coll. *P.H. Roy and party,* 13.xi.1995, ex. "under a log"

Distribution : India : Mizoram : Lungbi Dist. : Hnathial; Assam, West Bengal, Orissa, Andaman and Nicobar Isls. and Sikkim.

Elsewhere : Bangladesh, Myanmar, Malaysia and Indonesia.

Remarks : The species is almost inseparable fromits most allied one, *C. heimi* (Wasmann) in morphological characters. It occurs predominently in the eastern Oriental territories with its western limits upto Orissa, while *C. heimi* is predominent in the Indian subregion. The species nests in the underground part of the wood and extends its galleries in the exposed wooden structure causing considerable damage.

Subfamily HETEROTERMITINAE

Genus ***Reticulitermes*** Holmgren

2. ***Reticulitermes assamensis*** Gardner

1944. *Reticulitermes assamensis* Gardner, *Indian J. Ent.*, **6** : 105-106. *Type locality :* Sadiya, Assam.

1989. *Reticulitermes assamensis*, Roonwal and Chhotani, *Fauna of India, Isoptera (Termites)*, **1** : 498-501.

1999. *Reticulitermes assamensis*, Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171** : 47-48.

Material studied : 3S and sev. W, Chhing, Chhip, Coll. *P.H. Roy and party,* 9.xi.1995.

Distribution : India : Mizoram : Aizwal dist. : Chhing Chhip; Assam, Arunachal Pradesh, Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : Bhutan.

Remarks : This subterranean species in first time recorded from the State, although it is quite common in the dead wood and roots of some live trees in the warm temparate hilly areas of the eastern India including China and Bhutan. It is not known to cause any significant damage to wood-works.

Family INDOTERMITIDAE

Genus ***Indotermes*** Roonwal and Sen-Sarma

3. ***Indotermes rongrensis*** (Roonwal and Chhotani)

1962. *Speculitermes cyclops rongrensis* Roonwal and Chhotani, *Proc. natn. Inst. Sci. India,* (B) **28** (4) : 314, W. *Type-locality :* Rongrengiri (Garo Hills, Meghalaya).

1986. *Indotermes rongrensis*, Roonwal and Chhotani, *Rec. zool. Surv. India,* **83** (3 & 4) : 155-162.

1989. *Indotermes rongrensis*, Roonwal and Chhotani, *Fauna of India, Isoptera (Termites)*, **1** :

1999. *Indotermes rongrensis,* Bose, *Rec. zool. Surv. India, Occ. Paper,* No. **171** : 59-61.

Material studied : Sev. S and W, Aizwal (Zoological Garden), Coll. *G. Bose*, 27.v.1990 ex. "soil galleries and pockets in embankment" (*det. G. Bose*).

Distribution : India : Mizoram, Aizwal; Assam, Arunchal Pradesh, Meghalaya.

Elsewhere : Bhutan, Bangladesh and Tahilana.

Remarks : Roonwal and Chhotani (1962) described this species as a subspecies, Speculitermes cyclopes rongrensis based on the workers only from Meghalaya. The discovery of images from Thailand (Morimoto, 1973) and from Bhutan (Roonwal and Chhotani, 1977), has made it possible to include under the rare genus Indotermes. However, this soil inhabiting species was already known from the State and yet its soldier caste is unknown.

Family TERMITIDAE

Subfamily MACROTERMITINAE

Genus ***Macrotermes*** Holmgren

Key to the species of *Macrotermes*

(Soldier Major)

1. Meso- and meta-nota concave at postero-lateral margins, larger species, head-length, 4.30–4.35 mm .... *M. hopini* Roonwal and Sen Sarma
- Meso- and meta-nota concave, rather substraight at postero-lateral margins, smaller species, haed length, 3.50–3.60 mm. .... *M. khajuriae* Roonwal and Chhotani

4. ***Macrotermes hopini*** Roonwal and Sen Sarma

1956. *Macrotermes serrulatus hopini* Roonwal and Sen Sarma, *Indian J. agric. Sci.*, **26** (1) : 15-21, S maj., *Type-locality* : Hopin, Mytkyina Dist. Myanmar.

1997. *Macrotermes hopini*, Chhotani, *Fauna of India, Isoptera* (Termites) **2** : 418-421.

Distribution : India : Mizoram; Manipur and Tripura.

Elsewhere : Myanmar.

5. ***Macrotermes khajuriai*** Roonwal and Chhotani

1962. *Macrotermes khajuriai* Roonwal and Chhotani, *Proc. natn. Inst. Sci. India,* (B) **28**(4) : 329-334.

1997. *Macrotermes khajuriai*, Chhotani, *Fauna of India, Isoptera (Termites)* **2** :

1999. *Macrotermes khajuriai*, Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171** : 77–80.

Material studied : (i) 2S (Major) and sev. workers, Chhing Chhip, Coll. *P.H. Roy and party*, 18.xi.1995, ex. 'under a log'; (ii) 5S (major and minor) and sev. workers, Thaizawl, Coll. *P.H. Roy and party*, 22.xi.1996, ex. 'under soil'; (iii) 4S (major and minor), Kolasib, Coll. *P.H. Roy and party*, 18.xi.1995.

Distribution : India : Mizoram : Chhing Chhip, Thaizawl, Kolasib; Arunachal Pradesh, Meghalaya.

Elsewhere : Bhutan.

Remarks : The species is frequently found in the north-eastern India only inhabiting in the soil.

Genus ***Odontotermes*** Holmgren

Key to the species of *Odontotermes*

(Soldiers)

1. Smaller species, head length to base of mandibles, 1.30-1.50; maximum width of head 1.15-1.30; tooth on leftz mandible placed at anterior one-third (Mandibular teeth index 0.31-0.37) 2
- Larger species, head length to base of mandibles, 2.15-2.67 mm; maximum width of head 2.60-2.95; tooth on left mandible placed at distal half (Mandibular teeth index 0.50-0.52) 3
2. Antennae uniformly coloured; head broadly oval, weakly narrowing anteriorly .... *G. bovini* Thakur

- Antennae not uniformly coloured, distal segments distinctly darker than proximal segments; head narrowly oval, distinctly gradually narrowing anteriorly. .... *O. redemanni* (Wasmann)

3. Labrun tongue-shaped, rounded at anterior margin and with a short point or tip sometimes; head sides straighter, widest medially and less convergent anteriorly (head length 2.47-3.00 mm, maximum head width 1.80-2.30 mm). .. .. *horni* (Wasmann)

- Labrum triangular, with a sharp tip; head sides widest near posterior margin and more convergent anteriorly (head length 2.25-3.10, maximum head-width 1.80-2.50 mm). .... *feae* (Wasmann)

6. ***Odontotermes boveni*** Thakur

1976. *Odontotermes boveni* Thakur, *Indian Forester*, **102** (8) : 500, 502 (nom. nov.).

1981. *Odontotermes boveni* Thakur, *Indian Forest Rec. (N. S.) Ent.*, **14**(2) : 4, 12, 30-33, S and W, *Type-locality* : Gwaldam, Garhwal, Uttar Pradesh, India.

2001. *Odontotermes boveni*, Maiti, *et al.*, *Fauna of Sikkim, State Fauna Series*, **9** (Part-3).

Material studied : (i) 2S and 5W, Chhing Chhip, Coll. *P.H. Roy and party*, 9.xi.1995; (ii) 3S and sev. W, Seling, Coll. *P.H. Roy and party*, 26.xi.1996, ex. "under log"; (iii) 2S and sev W, Tlumgvel, Coll. *P.H. Roy and party*, 7.ii.1995.

Distribution : India : Mizoram : Aizwal dist. : Chhing Chhip, Seling and Thumgvel; Madhya Pradesh, Sikkim, Uttar Pradesh.

Elsewhere : Nepal.

Remarks : Although this soil inhabiting species is fairly common in India, it is recorded for the first from Mizoram.

7. ***Odontotermes feae*** (Wasmann)

1896. *Termes feae* Wasmann, *Ann. Mus. Stor. nat. Genova*, (2)**16** : 625-626, *Type locality* : Korim Cheba, Myanmar.

1985. *Odontotermes feae* : Chhotani and Bose, *Rec. zool. Surv. India*, **82** : 58.

1999. *Odontotermes feae* : Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171** : 84-86.

Material studied : (i) 2S and sev. W, Vairangte, Coll. *P.H. Roy and party*, 01.xii.1996, ex. "under bank" (ii) 1S and 3W, Vairangte, Coll. *P.H. Roy and party*, 2.xii.1996; (iii) 3S and sev. W, Chhishtlong, Coll. *P.H. Roy and party*, 10.xi.1995; (iv) 5S and sev. W, Kolasib, Coll. *P.H. Roy and party*, 17.xi.1995.

Distribution : India : Mizoram : Aizwal Dist. : Vairangte and Kolasib; Champhai Dist. : Chhistlong. Manipur, Assam, Arunachal Pradesh, Bihar, Karnataka, Nagaland, Tripura, West Bengal.

Elsewhere : Bhutan, Bangladesh, Myanmar, Nepal and Thailand.

Remarks : This is one of the largest common species in the Orient.

8. ***Odontotermes horni*** Wasmann

1949. *Odontotermes (O.) horni* : Snyder, *Smits. misc. Coll.*, **112** : 229.

1983. *Odontotermes horni* Maiti, *Rec. zool. Surv. India, Occ. Pap.* No. **42** : 2, 19, 26, 102-106.

1992. *Termes horni* Wasmann, *Zool. Jb.*, **17**(1) : 111, S and W. *Type-locality* : Nalanda, Sri Lanka.

1997. *Odontotermes horni* : Chhotani, *Fauna of India, Isoptera (Termites)*, **2** : 498-502.

Material studied : (i) 5S and sev. W, Seling, Coll. *P.H. Roy and party*, 8.xi.1995, ex. 'under a log'

Distribution : India : Mizoram : Aizwal Dist. : Seling. Manipur, Meghalaya, Tripura, West Bengal, South India.

Elsewhere : Bhutan, Sri Lanka, Vietnam and Cambodia.

9. ***Odontotermes redemanni*** (Wasmann)

1893. *Termes redemanni* Wasmann, *Wien. Ent. Zeitg.*, **12** (7) : 239, 1m S, W. *Type-locatily* : Sri Lanka.

1913. *Odontotermes redemanni*, Holmgren, *K. Svensk, Vetensl. Akad. Handl.*, **50** (2) : 110.

1949. *Odontotermes redemanni* : Synder, *Smiths. misc. Colls.*, **112** : 238.

1997. *Odontotermes redemanni* : Chhotani, *Fauna of India,* Isoptera (*Termites*), **2** : 539-542.

Material studied : (i) Seling, Coll. *P.H. Roy and party*, 08.xi.1995, ex. 'under a log'

Distribution : India : Mizoram : Aizwal Dist.: Seling. Tamil Nadu, Kerala, Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, eastern Bihar and West Bengal.

Genus ***Microtermes*** Wasmann

10. ***Microtermes obesi*** Wasmann

1912. *Microtermes obesi* Holmgren, *J. Bombay nat. Hist. Soc.*, **21**(1) : 787-788, Im. *Type-locality* : Khandala, Maharashtra.

1997. *Microtermes obesi* Chhotani, *Fauna of India, Isoptera (Termites)*, **2** : 583-587, Fig. 286-287.

1999. *Microtermes obesi* Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171**.

Material studied : A. Following places from different areas of Aizwal dist. and collected by *P.H. Roy and party*. (i) 5 vials (Sev. S and W) Vairangti, 1-2/xi.1996, ex. "under teak log", "fencing post" and "under log" etc.; (ii) 2 vials (9S and 5W) Seling; 26-27.xi.1996, ex. "under log"; (iii) 3 vials, Kolasib, different dates between 16-19.xi.1993, ex. "under log"; (iv) 8S and 7W, Aibawk, 23.iv.1998, ex. "gallery in a log"; (v) 8S and 6W, Thumgvel, 7.xi.1995. B. 8S and 6W, Hnahthial, Lunglei dist., Coll. *P.H. Roy and party*, 12.xi.1995, ex. "under a log"

Distribution : India : Mizoram : Aizawl Dist.: Vairengti, Seling, Kolasib, Aibawk, Thumgvel, Lunglei dist., Hnahthial; Assam, Bihar, Meghalaya, Arunachal Pradesh, Nagaland, Orissa, Tripura, Karnataka, Maharashtra.

Elsewhere : Bangladesh, Thailand, Sri Lanka and Pakistan.

Genus ***Ancistrotermes*** Silvestri

11. ***Ancistrotermes pakistanicus*** (Ahmad)

1955. *Microtermes pakistanicus* Ahmad, *Biologia*, **1** (1) : 25-27, S, *Type-locality* : Mainimukh, Chittagong Hills, Bangladesh.

1980. *Ancistrotermes pakistanicus*, Akhtar and Hussain, *Sociobiology*, **5** : 261-271.

1997. *Ancistrotermes pakistanicus*, Chhotani, *Fauna of India, Isoptera* (Termites), **2** : 593-597.

1999. *Ancistrotermes pakistanicus*, Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171** : 117-119.

Material studied : (i) 1 vial (8S and 7W) Champai, Champai Dist., Coll. *R.S. Burman and party*, 13.xii.1992; (ii) 10 vials (sev. S and W) from Lunglei Dist., Hnathial (near college and adjoining forest areas), Coll. *P.H. Roy and party*, 12-14.xii.1995, ex. "under soil", "under logs" and "under barks"; (iii) 4 vials (sev. S and W), Seling, Aizawl Dist., Coll. *P.H. Roy and party*, 26-28.xii.1995 and 2.xii.1996; (iv) 3 vials (sev. S and W), Vairengti, Aizawl Dist., Coll. *P.H. Roy and party*, 1.xii.1996, ex. "under teak log"

Distribution : India : Mizoram : Champhai dist. : Champhai; Lunglei dist. : Hnathial; Aizawl dist. : Seiling and Vairengti; Assam, Meghalaya, Tripura, Arunachal Pradesh and Nagaland.

Elsewhere : Bangladesh, Myanmar, Malaysia and Indonesia.

Genus ***Hypotermes*** Holmgren

12. ***Hypotermes obscuriceps*** (Wasmann)

1902. *Termes obscuriceps* Wasmann, *Zool. Jb. Syst.*, **17** : 113-114, S and W., *Type-locality* : Thincomalee, Sri Lanka.

1956. *Hypotermes obscuriceps*, Roonwal and Sen-Sarma, *Indian J. agric. Sci.*, **26** (1) : 25.

1997. *Hypotermes obscuriceps*, Chhotani, *Fauna of India, Isoptere (Termites)*, **2** : 557-561, fig. 273-274.

Material studied : (1) 10S and 7W from Champai, Champai dist., Coll. *R.S. Burman and party*, 13.xi.1993. (2) Following places from different areas of Aizawl district, collected by *P.H. Roy and party* : (i) 10S and 9W Aibawk, 25.i.1994; (ii) Sev. S and W, Thumgvel, 9.xii.1995, ex. "under a piece of bamboo"; (iii) 7S and sev. W, Thingsul, 9.xii.1995; (iv) Sev. S and W, Kolasib, ex. "gallary in a log"; (v) Sev. S and W, Seling (35 km from Aizawl), 28.xi.1996; (vi) 8S and sev. W, Vairengti, 1.xii.1996, ex. "living teak

plant"; (vii) 4S and sev. W, Vairengte, 1.xii.1996, ex. "under a log"

Distribution : India : Mizoram : Champai dist. : Champai; Aizawl dist. : Aibawk, Kolasib, Seling, Thumgvel, Thingsul, Vairangti; Meghalaya, Tamil Nadu, Tripura, Sikkim and West Bengal.

Elsewhere : Sri Lanka and Vietnum.

Genus ***Bulbitermes*** Emersoni

13. ***Bulbitermes parapusillus*** Ahmad

1965. *Bulbitermes parapusillus* Ahmad, *Bull. Am. Mus. nat. Hist.*, **131** : 85-88, Im and S, *Type-locality* : Prew; Thailand.

1997. *Bulbitermes parapusillus*, Chhotani, *Fauna of India, Isoptera (Termites)*, **2** :

1999. *Bulbitermes parapusillus*, Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171** : 138-139.

Material studied : (i) Sev. S and W, Pukpui, Lunglei dist., Coll. *P.H. Roy and party*, 23.xi.1996; (ii) 6S and sev. W, Seling, Aizawl dist., Coll. *P.H. Roy and party*, 28.xi.1996.

Distribution : India : Mizoram : Lunglei dist.: Pukpui and Aizawl dist. : Seling; Meghalaya.

Elsewhere : Bangladesh and Thailand.

Remarks : This is the first record of the species from the study area, although it is already known from the eastern India including Bangladesh and Thiland.

Subfamily NASUTITERMITINAE

Genus *Nasutitermes* Bank

14. ***Nasutitermes gardneri*** Snyder

1933. *Nasutitermes (Subulitermes) gardneri* Snyder, *Proc. U. S. natn. Mus.*, **82** (Art 16) : 12.

1997. *Nasutitermes gardneri*, Chhotani, *Fauna of India, Isoptera (Tarmites)*, **2** : 639-642.

1999. *Nasutitermes gardneri*, Bose, *Rec. zool. Surv. India, Occ. Paper* No. **171** : 125-128.

Material studied : (i) 8S and sev. W, Seling, Aizawl dist., Coll. *P.H. Roy and party*, 27.xi.1996, (ii) 6S and sev. W, Pukpui, Coll. *P.H. Roy and party*, 23.xi.1996.

Distribution : India : Mizoram : Aizawl dist.: Seling and Lunglei dist. : Pukpui; Arunachal Pradesh, Assam, Manipur and West Bengal.

Elsewhere : Bhutan.

15. ***Nasutitermes jalpaiguriensis*** Prasad and Sen Sarma

1959. *Nasutitermes jalpaiguriensis* Prasad and Sen Sarma, *Indian Counc. Agric. Res. (Ent. Monogr.)*, Code No. 10-23, pp. 39-43, S and W, *Type-locality* : Teesta Division, Jalpaiguri, West Bengal.

1997. *Nasutitermes jalpaiguriensis* Chhotani, *Fauna of India, Isoptera (Termites)*, **2** : 650-652.

2001. *Nasutitermes jalpaiguriensis* Maiti, *et al., Fauna of Sikkim, State Fauna Series*, **9** Part :

Material studied : (i) 3 vials (Sev. S and W), Kolasib and adjoining areas, Coll. *P.H. Roy and party*, 19.xi.1995, ex. "gallery under log", (ii) 5S and Sev. W, Seling, Aizawl Dist., Coll. *P.H. Roy and party*, 27.xi.1996, ex. "under log"

Distribution : India : Mizoram : Aizawl dist.: Kolasib and Seling; Arunachal Pradesh, Tripura, Sikkim and West Bengal.

Elsewhere : Bangladesh.

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MAITI, P.K., SAHA, N. AND ROY, P.H. 1999. Insecta : Isoptera. In : *Fauna of Tripura, State Fauna Series,* **7**(Part-2) : 295-308. *Zool. Surv. India.*

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SYNDER, T.E. 1949. Catalogue of the termites (Isoptera) of the World. *Smiths. misc. Coll.,* **112** : 2-409.

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 249-260, 2007

INSECTA : HEMIPTERA : WATER-BUGS

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INTRODUCTION

The hemipteran insects which are dwelling under the water as well as on the surface of water, on the shore line of water among vegetation, are commonly known as "Water-bugs" The present paper has been prepared on Water-bugs from the state of Mizoram, with the taxonomic studies of 7 families, namely Ochteridae, Nepidae, Belostomatidae, Naucoridae, Hydrometridae, Gerridae and Veliidae. The former four families are under the Series-Hydrocorisae while last three families are of the Series-Amphibicorisae (Classificationn is based upon Richards & Davies-1977). The present study has the objective to bring out a faunistic-cum-taxonomic account of water-bugs of Mizoram. The work is entirely based upon the recent collections made by various survey parties of the Zoological Survey of India, since no named as well as unnamed earlier collections of water-bugs from Mizoram was available for the present study.

Distant (1902, 1906, 1910) had no record of water-bug from the localities of Mizoram which was the then State of Assam, in his fauna of British India, Rhynchota volumes. No other published contribution on the water-bug fauna of Mizoram was found for the present study. Therefore, it may be considered that the present study is a comprehensive taxonomic work, first of its kind from the state, by precisely presenting the keys for different taxa, diagnostic characters of each species, distribution in Mizoram and in other states of India as well as countrywise in the world.

The present paper has recorded 19 species under 15 genera of the concerned 7 families from the State of Mizoram and all the species are being recorded for the first time from the State, and one species *Perittopus breddini* Kirk. is recorded for the first time from India. The studied materials are kept in the National Zoological Collection, Calcutta.

MATERIALS AND METHOD

The water-bugs are of two major divisions on the basis of their habitat—the aquatic and semi-acquatic. The aquatic bugs, except the shore dwelling bugs, live under the water and belong to othe Series-Hydrocorisae. The Semi-aquatic bugs dwell on the surface of water and also among the emerged aquatic vegetations, belonging to the Series-Amphibicorisae. The specimens which have been studied for the present work, were collected from different aquatic and semi-aquatic habitats, localities of Mizoram. No named or unnamed collections of old surveys were available for the present studies.

The long handled water-nets had been used to collect the samples of water-bugs from different water-bodies. The collected materials in the field were preserved in 70% Ethyl alcohol. In the laboratory the specimens were studied under Stereoscopic Binocular Microscope. The studied materials have been kept as wet collections after preserving them in the freshly changed 70% Ethyl alcohol. Each specimen is labelled properly for its taxonomic identity and collection data.

SYSTEMATIC ACCOUNT

Following is the list of species included in the present study and their systematic account regarding the water-bug fauna from the State of Mizoram.

Series HYDROCORISAE

Family I. OCHTERIDAE

Genus 1. ***Ochterus*** Latrelle

1. ***Ochterus marginatus*** (Latreille)

Family II. NEPIDAE

Genus 2. ***Laccotrephes*** Stal

2. ***Laccotrephes griseus*** (Guerin)

Genus 3. ***Ranatra*** Fabricius

3. ***Ranatra gracilis*** Dallas
4. ***Ranatra filiformis*** Fabricius

Genus 4. ***Cercotmetus*** Amyot & Serville

5. ***Cercotmetus pilipes*** (Dallas)
6. ***Cercotmetus fumosus*** Distant

Family III. BELOSTOMATIDAE

Subfamily LETHOCERINAE

Genus 5. ***Lethocerus*** Mayr

7. ***Lethocerus indicus*** (Lep. & Serv.)

Subfamily BELOSTOMATINAE

Genus 6. ***Diplonychus*** Laporte

8. ***Diplonychus rusticus*** (Fabricius)

Family IV. NAUCORIDAE

Genus 7. ***Heleocoris*** Stal

9. ***Heleocoris breviceps*** Montandon
10. ***Heleocoris obliquatus*** (Spinola)

Series AMPHIBICORISAE

Family V. HYDROMETRIDAE

Genus 8. ***Hydrometra*** Latreille

11. ***Hydrometra greeni*** Kirkaldy

Family VI. GERRIDAE

Subfamily PTILOMERINAE

Genus 9. ***Ptilomera*** Amyot & Serville

12. ***Ptilomera (Ptilomera) assamensis*** Hung. & Mat.

Subfamily EOTRECHINAE

Genus 10. ***Amemboa*** Esaki

13. ***Amemboa (Amemboa) lyra*** (Paiva)

Subfamily GERRINAE

Genus 11. ***Gerris*** Fabricius

14. ***Gerris spinolae*** Leth. & Seve.

Genus 12. ***Neogerris*** Matsumura

15. ***Neogerris parvula*** (Stal)

Genus 13. ***Limnogonus*** Stal

16. ***Limnogonus (Limnogonus) nitidus*** (Mayr)

Family VII. VELIIDAE

Genus 14. ***Perittopus*** Fieber

17. ***Perittopus maculatus*** Paiva
18. ***Perittopus breddini*** Kirkaldy

Genus 15. ***Rhagovelia*** Mayr

19. ***Rhagovelia ceylanica*** Lundblad

Key to families

1. Antennae shorter than head and concealed in cavities beneath eyes, not visible from above (except Ochteridae)..... Series-Hydrocorisae 2

– Antennae as long as or longer than head and not concealed, clearly visible from above .... Series-Amphibicorisae 5

2. Ocelli present; middle and hind legs without fringe of swimming hairs; antennae small and exposed, can be seen from above; front legs similar to middle legs.....OCHTERIDAE

– Ocelli absent; middle and hind legs provided with more or less extensive fringe of long

swimming hairs; antennae concealed, not seen from above; front legs raptorial with broad and grooved femora 3

3. Abdomen with a pair of long, slender posterior appendages; hind coxae short, free and rotatory ..... NEPIDAE

– Abdomen without paired long slender posterior appendages but may have otherwise; hind coxae broadly jointed to the thoracic pleura 4

4. Membrane of hemelytra with reticulate veins; abdomen with a pair of short, flat, retractile posterior appendages; head nearly triangular at the anterior margin ..... BELOSTOMATIDAE

– Membrane of hemelytra without reticulate veins; abdomen without any straplike appendages; head strongly curved posteriorly at the anterior margin ..... NAUCORIDAE

5. Claws apical; apex of last tarsal segment entire; head long, as long as entire thorax; body considerably slender and cylindrical; antennae and legs filiform ..... HYDROMETRIDAE

– Claws of at least front tarsi pre-apical; apex of last tarsal segment with cleft or bifid, body otherwise; antennae and legs not filiform 6

6. Hind femora long, surpassing the end of abdomen; middle legs inserted closer to hind legs than to fore legs; head without central groove ..... GERRIDAE

– Hind femora short, scarcely surpassing the end of abdomen; middle legs inserted about mid way between front and hind legs; head with a central groove ..... VELIIDAE

Series HYDROCORISAE

Family I OCHTERIDAE

Genus 1. *Ochterus* Latreille

1807. *Ochterus* Latreille, *Ges. Crust. Ins.*, **3** : 142.

1. *Ochterus marginatus* (Latreille)

1804. *Acanthia marginatus* Latreille, *Hist. Ins.*, **12** : 242.

1807. *Ochterus marginatus* Latreille, *Ges. Crust. Ins.*, **3** : 143.

1906. *Pelogonus marginatus* : Distant, *Fauna Brit. India, Rhynchota*, **3** : 14.

1999. *Ochterus marginatus* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 436.

Material examined : 1 F, Dampha Wildlife Sanctuary, Aizawl Dist., 22.x.1991, J. K. Jonathan coll.

Diagnosis : Adult insects may be 4-6 mm. in legnth; body moderately depressed; antennae short and 4 jointed inserted beneath the eyes; pronotum transverse and hexangular, lateral margins laminately ampliate and moderately rounded; yellowish spots to the margins of the abdomen; hemelytra fully covering the abdomen.

Distribution : India : Mizoram (Aizawl); Bihar, Meghalaya; Maharashtra; Orissa; Tripura; Uttar Pradesh; West Bengal.

Elsewhere : Myanmar, Nepal, Sri Lanka.

Family II NEPIDAE

Key to genera of the family NEPIDAE

1. Body elongately suboval and flattened; pronotum about as long as or little shorter than broad; hind coxae widely separated from each other; anterior femora incrassate and longitudinally grooved below; anterior coxae very short ..... *Laccotrephes*

– Body very long, narrow and thin; pronotum slender and much longer than broad; hind coxae very close; anterior femora incrassate without any groove below; anterior coxae otherwise 2

2. Anterior femora about as long as pronotum; coxae considerably long ..... *Ranatra*

– Anterior femora considerably shorter than pronotum; coxae short ..... *Cercotmetus*

Genus 2. *Laccotrephes* Stal

1865. *Laccotrephes* Stal, *Hem. Afric.*, **3** : 186.

2. *Laccotrephes griseus* (Guerin)

1829. *Nepa griseus* Guerin, *Iconogr. Regne Anim. Ins.*, : 352.

1910. *Laccotrephes griseus* : Montandon, *Annali Mus. Zool. Napoli,* **3** (10) : 3.

1947. *Laccotrephes griseus* : Hafiz & Pradhan, *Rec. Indian Mus.,* **45** : 364.

1999. *Laccotrephes griseus* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-4) : 442.

Material examined : 1 F, Ngney Puidil, Chhimtuipui Dist., 29.iii.1997, Srikumar Chattopadhyay and party coll.

Diagnosis : Adults never attain a length more than 15-20 mm; abdomen above with light bluish tinge; prosternum provided with a strong acute spine like structure; abdominal appendages shorter than body length.

Distribution : India : Mizoram (Chhimtuipui); Meghalaya; Pondicherry; Tamil Nadu; Tripura; West Bengal.

Elsewhere : Malacca, Myanmar, Seychelles, Sri Lanka, Thailand.

Genus 3. ***Ranatra*** Fabricius

1790. *Ranatra* Fabricius, *Skr. nat. Selsk.,* **1**(1) : 227.

Key to species of the genus *Ranatra*

1. Abdominal appendages very short, nearly ¼th of the body length; head with an acute tubercle between the eyes (vertex); anterior femur with six minute teeth arranged linearly beneath the basal half and two large teeth at the middle *gracilis*
– Abdominal appendages a little shorter than the body length; head with a non-acute tubercle between the eyes; anterior femur with two large spinulose teeth at the middle ..... *filiformis*

3. ***Ranatra gracilis*** Dallas

1849. *Ranatra gracilis* Dallas, *Trans. ent. Soc. London,* : 10.

1906. *Ranatra gracilis* : Distant, *Fauna Brit. India, Rhynchota,* **3** : 22.

1934. *Ranatra gracilis* : Lundblad. *Arch. Hydrobiol. Suppl.,* **12** : 29.

1999. *Ranatra gracilis* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-4) 440.

Material examined : 1 M, Dampha Wildlife Sanctuary, Teirei, Aizawl Dist., 27.xii.1993, S. S. Saha and party coll.

Diagnosis : Adult insects may be upto 34 mm in length. Other diagnostic characters are as in key.

Distribution : India : Mizoram (Aizawl); Meghalaya.

Elsewhere : Bhutan.

4. ***Ranatra filiformis*** Fabricius

1790. *Ranatra filiformis* Fabricius, *Skr. nat. Selsk.,* **1**(1) : 288.

1906. *Ranatra filiformis* : Distant, *Fauna Brit. India, Rhynchota,* **3** : 21.

1972. *Ranatra filiformis* : Lansbury, *Trans. R. ent. Soc. London,* **124** : 320.

1996. *Ranatra filiformis* : Bal & Basu, *Fauna of Delhi, State Fauna Series,* **6** : 266.

Material examined : 2 MM, 3 FF; Ngeng Puidil, Chhimtuipui Dist., 29.iii.1997, Srikumar Chattopadhyay & party coll.

Diagnosis : Adults attain a length of about 27 mm, other diagnostic characters are as in key.

Distribution : India : Mizoram (Chhimtuipui); Assam; Delhi; Kerala; Maharashtra; Orissa; Pondicherry; Punjab; Tamil Nadu; Uttar Pradesh; West Bengal.

Elsewhere : Nepal, Pakistan, Philippines; Sri Lanka.

Genus 4. ***Cercotmetus*** Amyot & Serville

1843. *Cercotmetus* Amyot & Serville, *Hem.,* : 441.

Key to species of the genus *Cercotmetus*

1. Body length 42 mm, abdominal appendages of only 9 mm in length; vertex with indistinct tubercle; metasternal process with distinct median keel; middle and hind tibiae with longer set of haris ..... *pilipes*
– Body length 49 mm, abdominal appendages of about 12 mm in length; vertex with very distinct and acute tubercle; metasternal process with indistinct median keel; middle and hind tibiae with smaller set of hairs ..... *fumosus*

5. *Cercotmetus pilipes* (Dallas)

1849. *Ranatra pilipes* Dallas, *Trans. ent. Soc. London* : 2.

1906. *Cercotmetus pilipes* : Distant, *Fauna Brit. India, Rhynchota*, **3** : 23.

1918. *Cercotmetus pilipes* : Paiva, *Rec. Indian Mus.*, **14** : 26.

1996. *Cercotmetus pilipes* : Bal and Basu, *Fauna of Delhi, State Fauna Series*, **6** : 267.

Material examined : 1 M, Furpak, Blue Mountain Expedition 1987, Chhimtuipui Dist., 26.i.1987, H. C. Ghosh and party coll.

Diagnosis : As in key.

Distribution : India : Mizoram (Chhimtuipui); Delhi.

Elsewhere : Bhutan.

6. *Cercotmetus fumosus* Distant

1906. *Cercotmetus fumosus* Distant, *Fauna Brit. India, Rhynchota*, **3** : 23.

1947. *Cercotmetus fumosus* : Hafiz and Pradhan, *Rec. Indian Mus.*, **45** : 361.

Material examined : 1 F, Turial River, 25 km. East from Aizwal, Aizwal Dist., 8.xi.1989, Y. P. Sinha and party coll.

Diagnosis : As in key.

Distribution : India : Mizoram (Aizwal); Orissa.

Elsewhere : Sri Lanka.

Family III BELOSTOMATIDAE

Key to subfamilies and genera of the family BELOSTOMATIDAE

1. abdominal sternite V and VI subdivided laterally by suture like folds; spiracles located on or adjacent to mesal margins of ventral laterotergites; front tarsus three segmented and armed with only one well developed claw; body length from 40-110 mm subfamily Lethocerinae ..... and genus *Lethocerus*

– Abdominal sternites not subdivided by any suture like folds; spiracles located near center of ventral latero-tergites; front tarsus one or two segmented and armed with two equal claws; body length not more than 30 mm ....subfamily Belostomatinae and genus *Diplonychus*

Subfamily LETHOCERINAE

Genus 5. *Lethocerus* Mayr

1853. *Lethocerus* Mayr, *Verh. zool. -bot. Ver. Wien.*, **2** (1852) : 17

7. *Lethocerus indicus* (Lepeletier & Serville)

1825. *Belostoma indica* Lepeletier & Serville, *Encycl. Meth*, : 272.

1909. *Lethocerus indicus* : Montandon, *Bull. Soc. Sci. Bue.*, **17** : 138.

1999. *Lethocerus indicus* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 444.

Material examined : 1 M, Champhai Tourist Lodge, Aizawl Dist., 29.x.1991, J. K. Jonathan coll.

Diagnosis : This giant Indian water-bug may reach upto 62-85 mm in body length; head between eyes with parallel sides; pronotum with a transverse fasciae at the basal end and a fine midlongitudinal carination; hemelytra with distinct membrane provided with longitudinal veins; posterior tibiae and tarsi completely compressed; intermediate and posterior legs provided with thick sets of swimming hairs on the ventral side.

Distribution : India : Mizoram (Aizawl); Assam; Bihar; Delhi; Kerala; Maharashtra; Meghalaya; Orissa; Uttar Pradesh; West Bengal.

Elsewhere : Myanmar, China, Java, Malay Peninsula, Pakistan, Philippines, Sri Lanka, Sumatra.

Subfamily BELOSTOMATINAE

Genus 6. *Diplomychus* Laporte

1833. *Diplonychus* Laporte, *Guerin's Mag. Zool.*, **2** : 18.

8. *Diplonychus rusticus* (Fabr.)

1803. *Nepa rustica* Fabricius, *Syst. Rhyngo.* : 106.

1906. *Sphaerodema rusticum* : Distant, *Fauna Brit. India, Rhynchota*, **3** : 36.

1979. *Diplonychus rusticus* : Polhemus, *Bull. Fish Res. Stn.*, Sri Lanka, **29** : 91.

1996. *Diplonychus rusticus* : Bal & Basu, *Fauna of Delhi, State Fauna Series,* **6** : 270.

Material examined : 3 MM, 3 FF, Champhai Tourist Lodge, Aizawl Dist., 29.x.1991, J. K. Jonathan coll.

Diagnosis : Body length of adult varying from 15-17 mm; anterior tarsal claws very minute; ventro-lateral stripe of fine hairs on the abdomen narrower.

Distribution : India : Mizoram (Aizawl); Delhi, Jammu & Kashmir; Kerala; Orissa; Maharashtra; West Bengal.

Elsewhere : Australia, Myanmar, China, Taiwan, Japan, Java, Malay Peninsula, Philippines, Sri Lanka, Sumatra, Thailand, New Zealand.

Family IV NAUCORIDAE

Genus 7. ***Helecoris*** Stal

1876. *Heleocoris* Stal, *K. svenska Vet. Akad. Handl.*, **16** : 142, 146.

Key to species of the genus *Heleocoris*

1. Anterior margin of pronotum almost straight; posterior angles of pronotum not terminating obliquely; hemelytra not entirely cover the abdominal dorsum ..... *breviceps*
- Anterior margin of pronotum more or less concave; posterior angles of pronotum terminating obliquely; hemelytra entirely cover the abdominal dorsum ..... *obliquatus*

9. ***Heleocoris breviceps*** Montandon

1897. *Heleocoris breviceps* Montandon, *Ann. Soc. Belgique,* **41** : 55.

1906. *Heleocoris breviceps* : Distant, *Fauna Brit. India, Rhynchota.*

1934. *Heleocoris breviceps* : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 633.

1989. *Heleocoris breviceps* : Thirumalai, *Rec. zool. Surv. India, Occa. Paper,* **188** : 33.

Material examined : 1 F, Ngeng Pui River, Chhimtuipui Dist., 5.iv.1997, Srikumar Chottopadhyay & party coll.

Diagnosis : Adult insect may reach upto 9.5 mm in length. Other diagnostic characters are as in key.

Distribution : India : Mizoram (Chhimtuipui); Maharashtra; Tamil Nadu.

10. ***Heleocoris obliquatus*** (Spinola)

1837. *Heleocoris obliquatus* Spinola, *Ess. Ins. Hemipt.*, : 57.

1906. *Heleocoris obliquatus* : Distant, *Fauna Brit. India, Rhynchota,* **3** : 31.

1919. *Heleocoris obliquatus* : Paiva, *Rec. Indian Mus.*, **16** : 155.

1999. *Heleocoris obliquatus* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-4) : 446.

Material examined : 1 M, Ngeng Pui River, Chhimtuipui Dist., 5.iv.1997, Srikumar Chottopadhyay and partyy coll.

Diagnosis : Adult insects attain a length about 10.5 mm. Other diagnostic characters are as in key.

Distribution : India : Mizoram (Chhimtuipui); Bihar; Maharashtra; Meghalaya.

Elsewhere : Myanmar.

Series AMPHIBICORISAE

Family V HYDROMETRIDAE

Genus 8. ***Hydrometra*** Latreille

1796. *Hydrometra* Latreille, *Precisdes caract, gen. des. Ins.*, : 86.

11. ***Hydrometra greeni*** Kirkaldy

1898. *Hydrometra greeni* Kirkaldy, *Entomologist,* **30** : 2.

1902. *Hydrometra vittata* : Distant, *Fauna Brit. India, Rhynchota,* **2** : 170.

1943. *Hydrometra greeni* : Hungerford & Evans, *Ann. Mus. Nat. Hung.*, **28** : 79.

1989. *Hydrometra greeni* : Thirumalai, *Rec. zool. Surv. India, Occ. Paper,* **118** : 38.

Material examined : 1 F, Ngen Pui Dil, Chhimtuipui Dist., 29.iii.1997, Srikumar Chottopadhyay and party coll.

Diagnosis : Adult insect may reach upto a length of 11-12 mm. The hemelytra extend upto the 5th abdominal segment in both the sexes. A transverse depression on the 6th ventral abdominal segment, the dorsal margin of the 6th segment fringed with short erect hairs in males. Filamentous body with much elongated head.

Distribution : India : Mizoram (Chhimtuipui); Orissa; Maharashtra; Tamil Nadu; Uttar Pradesh; West Bengal.

Elsewhere : Japan, Malaya, Myanmar, Philippines, Sri Lanka.

Family VI GERRIDAE

Key to subfamilies and genera of the family GERRIDAE

1. Metacetabular groove dorsally reaching anterior end of first abdominal tergum; fore tarsi very long, at least one-half the length of tibia. Middle and hind femora longer than the whole legnth of the body; middle femora of male well developed with fringe of long hairs ..... subfamily-Ptilomerinae and genus *Ptilomera*
- Metacetabular groove not reaching anterior end of first abdominal tergum; fore tarsi shorter; middle and hind femora otherwise; middle femora of male normal and not provided with fringe of long haris 2
2. Pronotal lobe always reduced in apterous form; pretarsal arolia present; lateral suture between meso- and metathorax distinct. Hind legs distinctly shorter than the middle legs; adults not beyond 6 mm in body length ..... Subfamily Eotrechinae and genus *Amemboa*
- Pronotal lobe usually not reduced in apterous forms; pretarsal arolia absent; lateral suture between meso- and metathorax indistinct; hind legs otherwise; adults from 3.5 to 36 mm. in body length Subfamily Gerrinae 3
3. Metathoracic spiracle located only a little more than its own length from the base of fore wing; dorsal surface of head almost uniformly dark; second and third antennal segments together subequal to or shorter than first segment .... *Gerris*
- Metathoracic spiracle located much more than its own length from base of fore wing; dorsal surface of head light coloured or dark with longitudinal light stripes or elongate spots; second and third antennal segments otherwise 4
4. Claws absent on middle legs; pronotal lobe more or less reduced in apterous forms; pronotal lobe not provided with light coloured median longitudinal stripe but a large light spot anteriorly ..... *Neogerris*
- Claws present on middle legs; pronotal lobe not reduced in apterous forms; pronotal lobe provided with light coloured median longitudinal stripe ..... *Limnogonus*

Subfamily PTILOMERINAE

Genus 9. *Ptilomera* Amyot & Serville

1843. *Ptilomera* Amyot & Serville, *Hemipteres,* : 413.

12. *Ptilomera (Ptilomera) assamensis* Hung. & Mat.

1965. *Ptilomera (Ptilomera) assamensis* Hung. & Mat., *Kans. Univ. Sc. Bull.,* **45**(5) : 421.

Material examined : 9 MM, 20 FF (all Apterous), Dampha Wildlife Sanctuary, Teirei, Aizawal Dist., 23.xii.1993, S. S. Saha and party coll.

Diagnosis : Males may go upto 14 mm in length while females a little more. In males suranal plate with median lobe broad but as long as or longer than the distal width of a lateral wing and more clearly surpassing the lateral wings caudally; front and rear margins of lateral wings not parallel; pygofer relatively short with roundly pointed tip. In females the base of connexival spine arising from beneath the base of 7th connexivum as a swelling.

Distribution : India : Mizoram (Aizawl); Assam.

Subfamily EOTRECHINAE

Genus 10. *Amemboa* Esaki

1925. *Amemboa* Esaki, *Philipp. J. Sci.,* **26** : 62.

13. ***Amemboa (Amemboa) lyra*** (Paiva)

1918. *Onychotrechus lyra* Paiva, *Rec. Indian Mus.*, **14** : 24.

1984. *Amemboa (Amemboa) lyra* : Polhemus & Andersen, *Steenstrupia*, **10** (3) : 90.

Material examined : 2 MM, 1 F (all apterous), Ngeng Pui River, Chhimtuipui Dist., 29.iii.1997, Srikumar Chottopadhyay and party coll.; 1 M, 4 FF (all apterous), Kawrawng Lui, Chhimtuipui Dist., 5.iv.1997, Srikumar Chottopadhyay and party coll.; 1 F (apterous), Ngeng Pui River, Chhimtuipui Dist., 5.iv.1997, Srikumar Chottopadhyay and party coll.; 1 F (apterous), Ngeng Pui River, Chhimtuipui Dist., 5.iv.1997, Srikumar Chottopadhyay and party coll.

Diagnosis : Male specimen is good for specific identification, provided with anterior femur moderately incrassate, dorsal side distinctly arched, ventral side modified with an elongate crest of dark haris in basal half, a tuft of long hairs arising from a low tubercle about middle, and a large tubercle before apex furnished with dark hairs.

Distribution : India : Mizoram (Chhimtuipui).

Elsewhere : Myanmar (Type locality).

Subfamily GERRINAE

Genus 11. ***Gerris*** Fabricius

1794. *Gerris* Fabricius, *Ent. Syst.*, **4** : 187.

14. ***Gerris spinolae*** Lethierry & Severin

1896. *Gerris spinolae* Lethierry & Severin, *Cat. Gen. Hem.*, **3** : 63.

1902. *Gerris spinolae* : Distant, *Fauna Brit. India, Rhynchota*, **2** : 180.

1918. *Gerris spinolae* : Paiva, *Rec. Indian Mus.*, **14** : 24.

1994. *Gerris spinolae* : Bal & Basu, *Fauna of West Bengal, State Fauna Series*, **3** (Part-5) : 527.

Material examined : 1 F (Macropterous), Tlawng (Dhaleswari) River at Sairang, 20 km. West of Aizawl, Aizawl Dist., 16.iii.1994, A. K. Karmakar & party coll.

Diagnosis : Body length may be from 11.0-12.5 mm. in adults; antennal 1st segment is nearly as long as the remaining three segments together, antennal 3rd segment much shorter than 2nd segment, a black distinct carina on the posterior lobe of pronotum; posterior femur distinctly longer than the body length.

Distribution : India : Mizoram (Aizawl); U.P.; West Bengal.

Elsewhere : Myanmar.

Genus 12. ***Neogerris*** Matsumura

1913. *Neogerris* Matsumura, *Thousand Insects of Japan, Additamenta*, **1** : 100.

15. ***Neogerris parvula*** (Stal)

1859. *Gerris parvula* Stal, *K. svenska Eug. zool.*, **4** : 265.

1899. *Gerris tristan* : Kirkaldy, *Rev. d'Ent.*, **18** : 88.

1934. *Limnogonus parvulus* : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 384.

1989. *Neogerris parvula* : Thirumalai, *Rec. zool. Surv. India, Occ. Paper*, **118** : 42.

Material examined : 1 F (Apterous), Sowoa, Ngeng Pui River, Chhimtuipui Dist., 1.iv.1997, Srikumar Chottopadhyay and party coll.

Diagnosis : Adults may be 6.0-6.5 mm. in body length; antennal 1st segment longest and as long as or little longer than the second and third segments together; mid longitudinal carination on pronotum indistinct; anterior lobe of pronotum with a large roundish yellow spot; posterior lobe of pronotum convexly curved; in male pygophore hind margin straight while in female the hind margin of 7th abdominal segment bisinuate.

Distribution : India : Mizoram (Chhimtuipui); Assam; Bihar; Himachal Pradesh; Kerala; Meghalaya; Orissa; Sikkim; Tamil Nadu; U.P.; West Bengal.

Elsewhere : Bangladesh, China, Iran, Java, Malay Peninsula, Muscat, New Cuinea, Oman, Pakistan, Solomon Island, Sri Lanka, Thailand, Myanmar, Vietnam.

Genus 13. ***Limnogonus*** Stal

1868. *Limnogonus* Stal, *K. Svenska Vet.-Akad. Handl.*, **7** : 132.

16. *Limnogonus (Limnogonus) nitidus* (Mayr)

1865. *Hydrometra nitida* Mayr, *Verh. zool.-bot. Ges. Wien.*, **15** : 443.

1902. *Gerris nitida* : Distant, *Fauna Brit. India, Rhynchota*, **2** : 178.

1939. *Limnogonus nitidus* : Hafiz & Rebeiro, *Rec. Indian Mus.*, **41** : 427.

1960. *Limnogonus (Limnogonus) nitidus* : Matsuda, *Kars. Univ. Sci. Bull.*, **41** : 198.

1999. *Limnogonus nitidus* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 451.

Material examined : 2 FF (Macropterous), Forest Rest House, Ngeng Pui River, Chhimuipui Dist., 5.iv.1997, Srikumar Chottopadhyay and party coll.

Diagnosis : Body length may be 6.0-8.0 mm. 1st antennal segment slightly longer than the fourth segment or they are subequal in length while 2nd and 3rd segments shortest and subequal in length; anterior part of pronotum with a pair of linear, small yellowish patches; posterior margin of dorsal vesicle plate is remarkably angular; 7th abdominal segment provided with fairly prominent connexival spines in both the sexes.

Distribution : India : Mizoram (Chhimtuipui); Assam; Bihar; Himachal Pradesh; Kerala; Meghalaya; Sikkim; Tamil Nadu; U.P.; West Bengal.

Elsewhere : Borneo, Celebes, Combodia, China, Java, Maldive, Malaya, Myanmar, Nepal, Sri Lanka, Sumatra, Thailand, Vietnam.

Family VII VELIIDAE

Key to genera of the family VELIIDAE

1. Body short, subovate; antennae moderately short and stout ..... ***Perittopus***
- Body elongate; antennae long with 3rd and 4th segments moderately slender..... ***Rhagovelia***

Genus 14. *Perittopus* Fieber

1861. *Perittopus* Fieber, *Eur. Hem.*, **1860** : 33.

Key to species of the genus *Perittopus*

1. 2nd and 4th segments of antennae subequal in length; while 1st segment is longest; pronotum with a distinct black patch on each of the anterior lateral area ..... *maculatus*
- 2nd and 3rd segments of antennae subequal in length while 4th segment is longest; pronotum with no black patches on the anterior lateral sides ..... *breddini*

17. *Perittopus maculatus* Paiva

1991. *Perittopus maculatus* Paiva, *Rec. Indian Mus.*, **16** : 363.

1934. *Perittopus maculatus* : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 285.

1999. *Perittopus maculatus* : Bal & Basu, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 454.

Material examined : 45 MM (42 exs. Apterous, 3 exs. Macropterous), 48 FF (43 exs. Apterous, 5 exs., Macropterous); Champai, 10 km. west of Aizawl Rd., Aizawl Dist., 30.x.1991, J. K. Jonathan and party coll.

Diagnosis : Adults bright reddish yellow in colour and may grow upto 2.0 mm in length. Other diagnostic characters are as in key.

Distribution : India : Mizoram (Aizawl); Meghalaya.

18. *Perittopus breddini* Kirkaldy

1861. *Perittopus rufus* Fieber, *Eur. Hem.*, : 33.

1901. *Perittopus breddini* Kirkaldy, *Entomologist*, : 286.

1902. *Perittopus rufus* : Distant, *Fauna Brit. India, Rhynchota*, **2** : 175.

1918. *Perittopus breddini* : Paiva, *Rec. Indian Mus.*, **14** : 22.

1934. *Perittopus breddini* : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 297.

Material examined : 16 MM, 22 FF (all Apterous), Tierei, Dampha Wildlife Sanctuary, Aizawl Dist., 25.xii.1993, S. S. Saha and party coll.

Diagnosis : Adults may be upto 2.5 mm in length. Other diagnostic characters are as in key.

Distribution : India : Mizoram (Aizawl).

Elsewhere : Java, Myanmar.

Remarks : This species is recorded for the first time from India in the present study. Previously it was recorded from Java and Myanmar (Paiva 1918, Distant 1902).

Genus 15. ***Rhagovelia*** Mayr

1865. *Rhagovelia* Mayr, *Vest. zool.-bot. Wein,* **15** : 445.

19. ***Rhagovelia ceylanica*** Lundblad

1936. *Rhagovelia ceylanica* Lundblad, *Arkiv. For Zoologi,* **28** : 32.

1979. *Rhagovelia ceylanica* ; Polhemus *Bull. Fish Res. Stn. Sri Lanka,* **29** : 97.

1994. *Rhagovelia (Rhogovelia) ceylanica* : Thirumalai, *Rec. zool. Surv. India,* **94**(2-4) : 386.

Material examined : 1 M (Brachypterous), Sowoa, Ngeng Pui River, Chhimtuipui Dist., 1.iv.1997, Srikumar Chottopadhyay and party coll.

Diagnosis : Adult insects may be 3-5 mm in length. Body colour dull black all over; head with a mid-longitudinal carination upto middle of vertex; pronotum (in apterous forms) about 1.3 times wider than long, longer than head on middle line; genital segments in males cylindrical and hariy, parameres symmetrical; 1st antennal segment longest, curved and other segments are slender, IInd segment shortest while IIIrd & IVth are subequal in length; hind femur in male stout, armed with spines from middle to apex of the ventral side.

Distribution : India : Mizoram (Chhimtuipui); Tamil Nadu.

Elsewhere : Sri Lanka.

SUMMARY

The present paper is based upon the collections made by different survey parties of the Zoological Survey of India. It has dealt with 19 species under 15 genera belonging to seven families of water-bugs from Mizoram. All the species are recorded for the first time from the state since no previously published faunistic account on water-bugs from the state is found. One species-*Perittopus breddini* Kirkaldy, is recorded for the first time from India while it was reported earlier from Java and Myanmar. Taxonomic keys for families, subfamilies, genera and species of water-bugs recorded in this paper, have been prepared. Synonomic references, distribution in the state, other states and elsewhere in the world for each species have been incorporated in this paper.

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INSECTA : HEMIPTERA : HETEROPTERA : PENTATOMOIDEA

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INTRODUCTION

The Pentatomids are commonly known as 'Shield-bugs' and they belong to the Superfamily Pentatomoidea under the Suborder—Heteroptera of the Order—Hemiptera. The Superfamily Pentatomoidea comprises 12 families in India. These insects are terrestrial, and mostly are phytophagus with exception of the family Asopidae, the members of which are predaceous on lepidopteran larvae. The pentatomids are remarkable for its beautiful coloration and also for an obnoxius odour emitted by them. They are prominent and large in body size in general and usually provided with triangular scutellum which may go upto the apex of clavus and in some forms the scutellum is so large that it may cover almost entire of the dorsum of abdomen and hemelytra. Antennae are 5 segmented in the adults.

Pentatomid bugs are abundant in the tropical countries and also spread over the temperate zones. A perusal of literatures on these insects reveals that a little more than 550 species of pentatomids are, so far, known from the Indian subcontinent while about 5000 species are known in the world (Distant 1902, 1908, 1918; Datta *et al.* 1985; Durai 1987; Chakraborty *et al.* 1994, 1998, 2000; Hedge 1995).

Our knowledge of pentatomid fauna from the state of Mizoram is meagre. There was no previously published taxonomic account on the pentatomids from Mizoram. The present study is based upon the collected specimens dealing with 15 species under 13 genera and distributed over 5 families. All the species are recorded for the first time from the State of Mizoram. Three species could not be identified beyond the generic level because of non-availability of relevant scientific literatures as well as due to lack of suitable number of specimens. Diagnostic characters of each species, taxonomic references and distribution in India as well as elsewhere in the world, and the taxonomic keys to different taxa have been provided in the paper. The present study may be considered as the first comprehensive systematic account on pentatomids from the state of Mizoram.

The classification is based upon Ahmad and Kamaluddin (1982). The studied materials are to be deposited in the repository of the National Zoological Collection of Zoological Survey of India, Calcutta.

MATERIAL AND METHODS

The pentatomid bugs can be collected by sweeping the insect net among the vegetation in the crop fields and bushes. Beating the branches of host plant with a strong stick over a white sheet of cloth or rexine also produce a good number of collected specimens of pentatomids along with other insects. Picking up of individual specimen from leaves, stems, twings with the help of forceps also practiced to collect pentatomid bugs.

After collection, the living specimens are killed in a killing jar using liquid benzene or chloroform or carbon-tetrachloride as killing agent. The dead

specimens are kept in insect envelopes each of which is provided with collection data i.e., locality, name of collector, date of collection, altitude etc. The envelopes with dead specimens are kept in cardboard boxes and paradichlorobenzene is used as preservative in the field.

In the laboratory, setting and pinning are done for each specimen. After identification and other studies the identified specimen is provided with its name label as well as collection data label written permanently with Indian ink. These specimens of pentatomid bug are preserved dry with naphthalene powder and paradichlorobenzene in the insect drawer inside an Insect Cabinet. Carbolic cotton ball is provided to each insect drawer as an antifungal agent.

SYSTEMATIC ACCOUNT

Following is the systematic list of pentatomid bugs of Mizoram. All the 15 species are being recorded for the first time in the present paper from the state of Mizoram. Three different species have been identified upto generic level, and could not go upto specific level due to lack of relevant scientific literatures.

Order HEMIPTERA
Suborder HETEROPTERA
Superfamily PENTATOMOIDEA
Family I. PENTATOMIDAE
Division I. EURYDEMARIA

Genus 1. ***Agonoscelis*** Spinola

1. ***Agonoscelis femoralis*** Walker

Genus 2. ***Cinxia*** Stal

2. ***Cinxia limbata*** (Stal)

Genus 3. ***Eurydema*** Laporte

3. ***Eurydema pulchrum*** (Westwood)

Division II. EUSARCOCORIARIA

Genus 4. ***Eysarcoris*** Hahn.

4. ***Eysarcoris guttiger*** (Thunberg)
5. ***Eysarcoris ventralis*** (Westwood)

Division III. HALYARIA

Genus 5. ***Dalpada*** Amyot & Serville

6. ***Dalpada oculata*** (Fabricius)
7. ***Dalpada versicolor*** (Herr.-Schaff.)

Genus 6. ***Erthesina*** Spinola

8. ***Erthesina fullo*** (Thunberg)

Division IV. NEZARIA

Genus 7. ***Zangis*** Stal

9. ***Zangis*** sp.

Division V. SCIOCORARIA

Genus 8. ***Sciocoris*** Follen

10. ***Sciocoris*** sp.

Family II. SCUTELLERIDAE

Genus 9. ***Poecilocoris*** Dallas

11. ***Poecilocoris hardwickii*** (Westwood)

Family III. DINIDORIDAE

Genus 10. ***Coridius*** Illiger

12. ***Coridius sanguinolentus*** (Westwood)
13. ***Coridius*** sp.

Genus 11. ***Megymenum*** Laporte

14. ***Megymenum brevicorne*** (Fabricius)

Family IV. CYDNIDAE

Genus 12. ***Adrisa*** Amyot & Serville

15. ***Adrisa magna*** (Uhler)

Family V. PHYLLOCEPHALIDAE

Genus 13. ***Megarhynchus*** Laporte

16. ***Megarhynchus rostratus*** (Fabricius)
17. ***Megarhynchus truncatus*** Westwood
18. ***Megarhynchus limatus*** Herr.-Schaff.

SYSTEMATIC ACCOUNT

Key to families of the super family PENTATOMOIDEA

1. Scutellum covering the whole of the hemelytra, excepting extreme of outer margin; without frena .... SCUTELLERIDAE

– Scutellum not as above; frena present..... 2

2. Membrane very large; scutellum never extending beyond middle of abdomen ..... DINIDORIDAE
– Membrane rather small; scutellum usually extends beyond middle of abdomen 3
3. First abdominal segment almost completely covered by the metasternum ..... CYDNIDAE
– First abdominal segment normal 4
4. Rostrum long, always passing anterior coxae; basal joint of antennae usually upto apex of head and beyond; lateral lobes of head rarely longer than central lobe ..... PENTATOMIDAE
– Rostrum short usually not passing anterior coxae; basal joint of antennae not reaching apex of head; lateral lobes of head much longer than central lobe ..... PHYLLOCEPHALIDAE

Family I. PENTATOMIDAE

Key to Divisions

1. Scutellum triangular; lateral lobes of head often meet infront of central lobe 2
– Scutellum broad; lateral lobes of head never meet infront of central lobe ..... EUSARCOCORIARIA
2. Abdomen armed at base 3
– Abdomen unarmed at base 4
3. Lateral pronotal angle usually rounded ..... NEZARIA
– Lateral pronotal margin serrate or dentate ..... HALYARIA
4. Head clypeated; ampliated before collum ..... SCIOCORARIA
– Head obovate; not ampliated ..... EURYDEMARIA

Division I. EURYDEMARIA

Key to genera

1. Body elongately ovate; remotely pilose ... ***Agonoscelis***
– Body otherwise; not pilose 2
2. Body ovate, eyes sessile; basal joint of antennae not reaching apex of head ..... ***Eurydema***
– Body elongately oval, eyes stylate, basal joints of antennae extending beyond apex of head ..... ***Cinxia***

Genus 1. *Agonoscelis* Spinola, 1837

1837. *Agonoscelis* Spinola, *Ess.*, : 327.

Type-species : *Agonoscelis nubila* (Fabricius).

1. *Agonoscelis femoralis* Walker

1868. *Agonoscelis femoralis* Walker, *Cat. Het.*, **3** : 545.
1904. *Agonoscelis femoralis* Distant, *Fauna Brit. India, Rhyn.*, **1** : 190.

Material examined : 3 exs., Champhai, 3.iv.1994, coll. G. C. Sen & party.

Diagnostic characters : Body yellow-brown covered with black punctures; a continuous central fascia through pronotum and scutellum, third joint of antennae distinctly a little longer than second, pronotum less coarsely punctate, apical margin of corium greyish, membrane piceous, its margin pale hyaline.

Length : 12 mm.

Distribution : India : Mizoram; Meghalaya.

Genus 2. *Cinxia* Stal, 1862

1862. *Cinxia* Stal, *Stett. ent. Zeit.*, **23** : 105.

Type-species : *Cimex limbata* (Fabr.)

2. *Cinxia linbata* (Stal)

1803. *Cimox limbata* Fabr., *Syst. Rhyng.*, : 176.
1868. *Cinxia limbata* (Stal), *Hem. Fabr.*, **1** : 30.
1904. *Cinxia limbata* Distant, *Fauna Brit. India, Rhym.* **1** : 195.

Material examined : 3 exs., Aizawl (Lalan), 1.xii.1995, coll. *P. Parui and party.*

Diagnostic characters : Indigo-black; head, pronotal margins, a central longitudinal fascia and a transverse fascia across anterior disk ochraceous; body beneath ochraceous with a

double central and submarginal series of indico-black spots, a large spot of the same color at base of apical segment; legs black, femora streaked with ochraceous; antennae black.

Length : 13 to 16 mm.

Distribution : India : Mizoram; Assam; Nagaland.

Elsewhere : Myanmar, Java, Malay Peninsula and Sumatra.

Genus 3. ***Eurydema*** Laporte, 1832

1832. *Eurydema* Laporte, *Ess. Hem.*, : 61.

Type-species : *Eurydema oleraceum (Linnaeus).*

3. ***Eurydema pulchrum*** (Westwood)

1837. *Pentatoma pulchrum* Westwood, *Hope Cat.*, **1** : 34.

1904. *Eurydema pulchrum* (Westwood), Distant, *Fauna Brit. India, Rhyn.*, **1** : 190-191.

1998. *Eurydema pulchrum* (Westwood), Chakraborty & Ghosh, *Fauna of Meghalaya, State Fauna Series,* **4** : 400.

Material examined : 48 exs., Lunglei (Zabauk), 11.iv.1994, coll. *S. K. Ghosh and party;* 9 exs., Aizawl (Phaibuk), 12.i.1994, coll. *S. K. Saha and party;* 4 exs., Aizawl (Teiri), 28.xii.1993, coll. *S. S. Saha and party;* 1 ex., Siaha Hills, Siahatia Vill., 1.iv.1994, coll. *A. K. Hazra and party;* 2 exs., Aizawl, 12.iv.1994, coll. *A. K. Hazra and party.*

Diagnostic characters : Body above reddish ochraceous finely punctate; spotted with black; head black with margins ochraceous; pronotum with six black spots—two anterior and transverse, four discal; scutellum with a large spot at base and two marginal subapical spots black; membrang black, its apical margin greyish; body beneath and legs luteous; lateral margin of sternum and abdomen orange-yellow and both with lateral and central series of transverse black spots; antennae, rostrum, tibiae, tarsi and apices of femora more or less black.

Length : 8 to 9 mm.

Distribution : India : Mizoram; Assam; Meghalaya; Nagaland.

Elsewhere : Myanmar, China, Sumatra and Queensland.

Division II. EUSARCOCORIARIA

Genus 4. ***Eysarcoris*** Hahn, 1834

1834. *Eysarcoris* Hahn., *Wanz,* **11** : 66.

Type-species : *Eysarcoris aeneus* (Scopoli).

Key to species of the genus *Eysarcoris*

1. Anteriar area of pronotum normal without any spot; apical joint of antennae shining black; lateral angles of pronotum obtusely prominent ..... *guttiger*

– Anterior area of pronotum with two large brassy-black spots; pronotal angles simple ..... *ventralis*

4. ***Eysarcoris guttiger*** (Thunberg)

1783. *Cimex guttiger* Thunberg, *Nov. Ins. sp.*, **2** : 32.

1857. *Eysarcoris guttiger* (Thunberg), Dallas, *List. Hem.*, **1** : 288.

1989. *Eysarcoris guttiger* (Thunb.); Ghosh, Biswas, Chakraborty & Sen, *Fauna of Orissa, State Fauna Series,* **1** : 204.

1998. *Eysarcoris guttiger* (Thunb.), Chakraborty & Ghosh, *Fauna of Meghalaya; State Fauna Series* **4** : 402.

Material examined : 1 ex., Lunglei, 10.iv.1994, coll. *S. K. Ghosh and M. Prasad;* 1 ex., Buang, 1.x.1993, coll. *A. R. Lahiri and party.*

Diagnostic characters : Body above obscure luteous, thickly punctured with bronzy-black; extreme lateral margins of the pronotum, a somewhat large spot near each basal angle of the scutellum luteous; antennae ochraceous, apical joint (excluding base) piceous; central area of sternum black, opaque; abdomen (excluding lateral and apical margins) shining black. Lateral angles of the pronotum obtusely prominent.

Length : 5.25 to 5.5 mm.

Distribution : India : Mizoram; Maharashtra; Meghalaya; Nagaland; Orissa; Sikkim; South India; West Bengal.

Elsewhere : Sri Lanka.

5. *Eysarcoris ventralis* (Westwood)

1837. *Pentatoma ventralis* Westwood, *Hope Cat.*, **1** : 36.

1904. *Eysarcoris ventralis* (Westwood), Distant., *Fauna Brit. India Rhyn.*, **1** : 167.

1998. *Eysarcoris ventralis* (Westwood), Chakraborty & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** : 402.

Material examined : 2 exs., Lunghei (Zabawk); 11.iv.1994, coll. *S. K. Ghosh and party.*

Diagnostic characters : Body brownish ochraceous, thickly darkly punctate; anterior pronotal area luteous with two large transverse brassy-black spots; head brassy-black; lateral margin of pronotum and a somewhat large rounded spot near each basal angle of the scutellum levigate, luteous; central disc of abdomen brassy-black.

Length : 5.5-6.5 mm.

Distribution : India : Mizoram; Arunachal Pradesh; Bihar; Karnataka; Maharashtra; Meghalaya; West Bengal.

Elsewhere : Myanmar, Malay Peninsula.

Division III. HALYARIA

Key to genera

1. Both anterior and posterior tibiae dilated; head normal ..... ***Erthesina***
– Anterior tibiae rarely dilated, posterior tibiae always normal; lateral margins of head toothed near apex ..... ***Dalpada***

Genus 5. *Dalpada* Amyot & Serville, 1843

1843. *Dalpada* Amyot & Serville, *Hem.* : 105.

Type-species : *Dalpada aspera* Amyot & Serville.

Key to species of the Genus *Dalpada*

1. Anterior tibiae prominently dilated; rostrum just passing the posterior coxae; pronotal angles nodulose ..... *oculata*
– Anterior tibiae normal; rostrum more elongate, reaching the fourth abdominal segment; lateral pronotal angle subacute ..... *versicolor*

6. *Dalpada oculata* (Fabricius)

1775. *Cimex oculata* Fabricius, *Syst. Ent.*, : 703.

1904. *Dalpada oculata* (Fabricius), Distant, *Fauna Brit. India Rhyn.*, **1** : 110-111.

1998. *Dalpada oculata* (Fabricius), Chakraborty & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** : 403.

Material examined : 2 exs., Aizawl (Dampa), 22.x.1991, coll. *J. K. Jonathan.*

Diagnostic characters : Ochraceous, mottled with dark olivaceous-green; antennae brownish with base of 4th and 5th segments ochraceous; connexivum alternately dark-green and ochraceous; lateral pronotal angles nodulose with inwardly broadly distinctly furrowed. Rostrum rarely passing the posterior coxiae.

Length : 15 to 18 mm.

Distribution : India : Mizoram; Meghalaya; Sikkim; West Bengal.

Elsewhere : Myanmar, Malay Peninsula.

7. *Dalpada versicolor* (Herr.-Schaff.)

1839. *Halys versicolor* Herr-Sch., *Wans. Ins.*, **5** : 76.

1904. *Dalpada versicolor* (Herr.-Sch.), Distant, *Fauna Brit. India Rhyn.*, **1** : 114.

Material examined : 1 ex., Aibawk, Casa, 29.iii.1994, coll. *G. C. Sen & party.*

Diagnostic characters : Body above ochraceous variegated with browny or dark green markings; central lobe of head longer than lateral lobes; antennae fuscus with base of 5th segment luteous; pronotal lateral margins serrated anteriorly and lateral angles subacute; body beneath and

legs ochraceous. Rostrum touching the apex of the 4th abdomental segment.

Length : 15 to 18 mm.

Distribution : India : Mizoram, Tamil Nadu.

Elsewhere : Java.

Genus 5. ***Erthesina*** Spinola, 1837

1837. *Erthesina* Spinola, *Ess.*, : 291.

Type-species : *Erthesina fullo* (Thunberg).

8. ***Erthesina fullo*** (Thunb.)

1783. *Cimex fullo* Thunberg, *Nov. Ins. Spec.*, **11** : 420.

1837. *Erthesina fullo* Spinola, *Ess* : 291.

1904. *Erthesina fullo* (Thunb.), Distant, *Fauna Brit. India Rhyn.*, **1** : 117.

1998. *Erthesina fullo* (Thunb.), Chakraborty & Ghosh, *Fauna of Meghalaya, State Fauna Series* **4** : 403-404.

Material examined : 1 ex., Aizawl (Bung); 26.x.1991, coll. *J. K. Jonathan.*

Diagnostic characters : Head black excepting a medial longitudinal line, lateral and inner margins of eyes and ocelli ochraceous; antennae piceous with base of apical joint ochraceous; a central line and anterior and lateral margins of pronotum ochraceous; body beneath pale ochraceous; 4 longitudinal lines to head beneath, sternal and abdominal incirsures; marginal and subapical spot to abdomen black; 2nd joint of antennae prominently longer than third; rostrum reaching the 3rd abdominal segment.

Length : 20-25 mm.

Distribution : India : Mizoram; Andhra Pradesh; Assam; Kerala; Meghalaya; West Bengal.

Elsewhere : Bangladesh, China, Japan and Sri Lanka.

Division IV. NEZARIA

Genus 7. ***Zangis*** Stal, 1867

1867. *Zangis* Stal, *Ofv. Vet.-AK. Forh.* : 514.

Type-species : *Zangis beryllus* Fabricius.

9. ***Zangis*** sp.

Material examined : 2 exs., Aizawl (Bilkathla); 2.i.1993, coll. *S. S. Saha.*

Remarks : Due to non-availability of recent literature the material could not be identified upto species level.

Division V. SCIOCORARIA

Genus 8. ***Sciocoris*** Fallen, 1829

1829. *Sciocoris* Fallen, *Hem. Suec.* : 20.

Type-species : *Sciocoris terreus* Schrank.

10. ***Sciocoris*** sp.

Material examined : 1 ex., Circuit House Campus, Aizwal 12.iv.1994, coll. *A. K. Hazra & party.*

Remarks : Due to paucity of material, could not be identified upto speices level.

Genus 9. ***Poecilocoris*** Dallas, 1848

1848. *Poecilocoris* Dallas, *Trans. Ent. Soc.*, **5** : 100.

Type-species : *Poecilocoris druuraei* (Linnaeus).

11. ***Poecilocoris hardwickii*** (Westwood)

1837. *Tectocoris hardwickii* Westwood, *Hope Cat.*, **1** : 13.

1904. *Poecilocoris hardwickii* (Westwood), Distant, *Fauna Brit. India Rhyn.*, **1** : 45.

1998. *Poecilocoris hardwickii* (Westwood), Chakraborty & Ghosh, *Fauna of Meghalaya, State Fauna Series,* **4** : 409.

Material examined : 1 ex., Lunglei (Sainap); 28.iv.1995, coll. *T. P. Bhattacharya.*

Diagnostic characters : Body above dark reddish ochraceous excepting head; anterior margin and two large basal spots to pronotum black; usually there are eleven black spots to scutellum, situate three at base, of which the central one is longest and closely followed by two smaller ones, four in transverse series beyond middle of which the two central are largest and two smaller subapical ones; body beneath, legs, rostrum and antennae black or violet black.

Length : 19 to 22 mm.

Distribution : India : Mizoram; Assam; Meghalaya and Nagaland.

Elsewhere : Bhutan, Myanmar, Hong Kong, West China.

Family III. DINIDORIDAE

Key to genera

1. Head small; lateral lobes rarely longer than central lobe; pronotum normal; antennae 5 segmented ..... ***Coridius***
- Head large with lateral lobes much longer than central lobe; pronotum tumescent; antennae 4 segmented ..... ***Megymenum***

Genus 10. *Coridius* Illiger, 1807

1807. *Coridius* Illiger, *Fauna Etrusca*, 2(2) : 361.

Type-species : *Coridius janus* (Fabricius).

12. *Coridius sanguinolentus* (Westwood)

1837. *Aspongopus sanguinolentus* Westwood, *Hope Cat.*, 1 : 26.

1987. *Coridius sanguinolentus* (Westwood), Durai, *Oriental Ins.*, 21 : 197.

Material examined : 7 exs., Aizawl (Murien Hunt Park); 17.xii.1993, coll. S. S. Saha; 1 ex., Siahatia Vill., 7.ix.1994, coll. *A. K. Hazra & party.*

Diagnostic characters : Body above and beneath and legs brassy-black with a cupreous tinge; lateral sternal and abdominal margins reddish ochraceous; antennae black, 2nd and 3rd segments almost equal in length or 2nd a little longer than 3rd; 4th and 5th segments longest, 4th distinctly thickened and furrowed; posterior tibiae not dilated.

Length : 15 to 16 mm.

Distribution : India : Mizoram; Assam; Meghalaya.

Elsewhere : Java, Mayanmar.

13. *Coridius* sp.

Material examined : 8 exs., Murien Hunt Park, Aizawl; 17.xii.1993, coll. *S. S. Saha.*

Remarks : Identification upto specific level could not possible due to paucity of relevent literatures.

Genus 11. *Megymenum* Laporte

1832. *Megmenum* Laporte, *Ess. Hem.*, 52.

Type-species : *Megymenum dentatum* Boisd.

14. *Megymenum brevicorne* (Fabr.)

1787. *Cimex brevicorne* Fabr. *Mant. Ins.*, 2 : 294.

1904. *Megymenum brevicorne* Distant, *Fauna Brit. India Rhyn.*, 1 : 286.

Material examined : 1 ex., Chimtuipui (Towngkalowng), 16.ii.1987, coll. *H. C. Ghosh.*

Diagnostic characters : Ovate, somewhat elongate; anterior pronotal area tuberculate, lateral anterior pronotal margins concave, more prominently angulated at centre; lateral margins of abdomen a little more prominently and broadly tuberculate at the incisures.

Length : 13-14 mm.

Distribution : India : Mizoram; Meghalaya; West Bengal.

Elsewhere : Myanmar, China.

Family IV. CYDNIDAE

Genus 12. *Adrisa* Amyot & Serville, 1843

1843. *Adrisa* Amyot & Serville, *Hem.* : 89.

Type-species : *Adrisa nigra* Amyot & Serville.

15. *Adrisa magna* (Uhler)

1860. *Acatalectus magna* Uhler, *Proc. Ac. N. S. Phil.*, : 222.

1881. *Adrisa magna* Sign. *Ann. Soc. Ent. Fr.*, 1(6) : 206.

1904. *Adrisa magna* Distant, *Fauna Brit. India, Rhynch.*, 1 : 89.

Material examined : 1 ex., Sciha Hills, Siahatie Vill., 7.iv.1994, coll. *A. K. Hazra & party.*

Diagnostic characters : Above, black, shining, much punctured; head rounded infornt, the lateral margins strongly and rugosely punctate; pronotum subquadrate, the anterior angles rounded, anterior area of pronotum smooth, impunctate; scutellum rugosely punctate with a more or less distinct central carinate line, corium subopaque, membrane fuliginous.

Length : 13-19 mm.

Distribution : India : Mizoram; Nagaland.

Elsewhere : Myanmar, Hong Kong.

Family V. PHYLLOCEPHALIDAE

Genus 13. *Megarhynchus* Laporte

1832. *Megarhynchus* Laporte, *Ess. Hem.*, : 65.

Key to species of the genus *Megarhynchus*

1. Head longer than pronotum ..... *rostratus*
– Head shorter than pronotum 2
2. Pronotum more or less convex, faintly rugolose ..... *truncatus*
– Pronotum normal, not rugolose .... *limatus*

16. *Megarhynchus rostratus* (Fabricius)

1903. *Aelia rostratus* Fabricius, *Syst. Rhyng.*, : 18.
1851. *Megarhynchus elongatus* Laporte, *Ess. Hem.*, : 65.
1904. *Megarhynchus rostratus*, Distant, *Fauna Brit. India Rhyn.*, **1** : 302.

Material examined : 1 ex., Banhlahnman Vill., 6.iv.1994, coll. *A. K. Hazra and party.*

Diagnostic characters : Ochraceous; lateral margins of the head and pronotum and the corium purplish red; extreme lateral margins of pronotum and corium luteous; membrane pale hyaline. Abdomen with a stigmatal series of small black spots; scutellum longitudinally rugulose; corium thickly and finely punctate.

Length : 18-24 mm.

Distribution : India : Mizoram; Assam; Sikkim.

Elsewhere : Myanmar, China, Malaysia.

17. *Megarhynchus truncatus* Westwood

1837. *Megarhynchus truncatus* Westwood, *Hope Cat.*, **1** : 20.
1904. *Megarhynchus truncatus*, Distant, *Fauna Brit. India, Rhyn.*, **1** : 302.

Material examined : 1 ex., Lawnlai, 19.ix.1993, coll. *A. R. Lahiri & Party.*

Diagnostic characters : Above dull ochraceous, punctured with purplish; body beneath and legs ochraceous; anterior tibiae and tarsi and the antenna purplish red; membrane hyaline. It is more robust and broader than *M. rostratus.*

Length : 21-25 mm.

Distribution : India : Mizoram; Assam; Meghalaya; Nagaland.

Elsewhere : Myanmar, China, Malay Archipelago and Malay Peninsula.

18. *Megarhynchus limatus* Herr.-Schaff.

1853. *Megarhynchus limatus* Herr.-Sch., *Wanz. Ins.*, **9** : 303.
1904. *Megarhynchus limatus*, Distant, *Fauna Brit. India Rhyn.*, **1** : 302.

Material examined : 1 ex., Casa, 29.iii.1994, coll. *G. C. Sen and party.*

Diagnostic characters : Dull ochraceous with strongly punctate; the lateral pronotal margins are not luteous and are more strongly serrate; the lateral pronotal angles more obtusely prominent.

Length : 20-22 mm.

Distribution : India : Assam.

Elsewhere : Myanmar.

SUMMARY

The paper incorporates the account of 15 species belonging to 13 genera distributed in 5 families of the superfamily Pentatomoidea from Mizoram. All the species are of new records from the State of Mizoram. For each species the original reference, subsequent reference(s) have been given. Distributional records in India and elsewhere, and keys to various taxa are provided.

The study is based on the survey materials of different survey parties from the Zoological Survey of India.

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INSECTA : HEMIPTERA : HETEROPTERA : REDUVIIDAE

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INTRODUCTION

The Reduviids are exclusively predaceous or blood sucking heteropterous insects. Some of these species are even pathogenic. These insects are generally characterised by antennae often with intercalary segments; rostrum pointed, 3 segmented, capable of friction against stridulatory groove of prosternum; fore legs not raptorial but their tibiae often provided with a fissula spongiosa for adhesion; tarsi usually 3 segmented.

This family is represented by more than 3000 species belonging to 29 subfamilies in the world (Richard and Davis 1977). A little over 450 species belonging to 129 genera of 14 subfamilies are so far known from the Indian subregion.

The present contribution is an attempt to provide an account of 13 species under 12 genera of the family Reduviidae from the State of Mizoram for the first time. The account deals with, keys to the taxa, geographical distribution of each species, literature and references. All the species are recorded for the first time from the State.

SYSTEMATIC ACCOUNT

Family I. REDUVIIDAE

Subfamily I. TRIBELOCEPHALINAE

Genus 1. ***Tribelocephala*** Stal

1. ***Tribelocephala indica*** (Walker)

Subfamily II. SALYVATINAE

Genus 2. ***Lisarda*** Stal

2. ***Lisarda annulosa*** Stal

Subfamily III. ACANTHASPIDINAE

Genus 3. ***Acanthaspis*** Amy. & Serv.

3. ***Acanthaspis quinquespinosa*** (Fabr.)

Subfamily IV. ECTRICHODIINAE

Genus 4. ***Haematorrhophus***

4. ***Haematorrhophus nigroviolaceous*** (Reut.)

Subfamily V. HARPACTORINAE

Division I. HARPACTORARIA

Genus 5. ***Rhinocoris*** Hohn

5. ***Rhinocoris marginellus*** (Fabr.)

Genus 6. ***Sphedanolestes*** Stal

6. ***Sphedanolestes bowringi*** Distant
7. ***Sphedanolestes mendicus*** (Stal)
8. ***Sphedanolestes pubinotum*** Reuter

Division II. VELINARIA

Genus 7. ***Velinus*** Stal

9. ***Velinus annulatus*** Distant

Division III. SYCANARIA

Genus 8. ***Sycanus*** Amy. & Serv.

10. ***Sycanus croceovittatus*** Dohrn

Genus 9. ***Agriosphodrus*** Stal

11. ***Agriosphodrus dohrni*** (Sign.)

Division IV. EUAGORASARIA

Genus 9. ***Euagoras*** Burm.

11. ***Euagoras plagiatus*** Burm.

Genus 10. ***Endochus*** Stal

12. ***Endochus nigricornis*** Stal

Division V. POLIDIDUSARIA

Genus 10. ***Polididus*** Stal

12. ***Polididus armatissimus*** Stal

Key to the subfamilies of the family REDUVIIDAE

1(2) Ocelli absent, antennieferous tubercles laterally and obliquely prominent; first joint of antennae incrassate; body tomentose ... . TRIBELOCEPHALINAE

2(1) Ocelli present 3

3(4) Hemelytra with a quadrangular cell at interior area of corium near base of membrane; first joint of rostrum rarely very short, generally elongate; space between the eyes transverse ..... HARPACTORINAE

4(3) Hemelytra without a quadrangular cell at interior area of corium, near base of membrane 5

5(6) Hemelytra with somewhat sexangular, discoidal cell, touching base of membrane, or largely triangular ..... STENOPODINAE

6(5) Hemelytra without a discoidal cell 7

7(8) Scutellum with its apex broad and two or three spined ..... ECTRICHODIINAE

8(7) Scutellum with its apex triangular or subtriangular 9

9(10) Anterior tarsi two jointed ..... Salyavatinae

10(9) Anterior tarsi three jointed .... ACANTHASPIDINAE

Subfamily I. TRIBELOCEPHALINAE

Genus 1. ***Tribelocephala*** Stal

1853. *Tribelocephala* Stal, *Ofv. Vet.-AK. Forh.*, : 263.

1. ***Tribelocephala indica*** (Walker)

1873. *Ophistoplatys indica* Walker, *Cat. Het.*, **8** : 20.

1902. *Tribelocephala indica* : Distant, *Fauna Brit. India*, **2** : 220.

Material examined : 1 ex., Chhimtuipui, 2.iv.1994, coll. S. K. Ghosh and party; 1 ex., Saika, Saiha 3.iv.1994, coll. S. K. Ghosh and party.

Diagnostic characters : Densely tomentose chocolate brown to piceous in colour; veins on the membrane darker; head a little longer than pronotum; body beneath, rostrum and legs a little paler; head and pronotum granulate.

Length : 11 to 13 mm.

Distribution : India : Mizoram (Chhim tui pui, Saiha), North Bengal.

Elsewhere : Sri Lanka.

Subfamily II. SALYVATINAE

Genus 2. ***Lisarda*** Stal

1859. *Lisarda* Stal, *Ofv. Vet.-AK. Forh.*, : 192.

2. ***Lisarda annulosa*** Stal

1874. *Lisarda annulosa* Stal, *En. Hem.*, **4** : 83.

1902. *Lisarda annulosa* : Distant, *Fauna Brit. India*, **2** : 237.

Material examined : 1 ex., Teirei, Aizwal, 9.vi.1995, coll. M. S. Shishodia and party; 1 ex., Dampha, Aizwal, 9.xi.1995, coll. M. S. Shishodia.

Diagnostic characters : Brownish ochraceous with the base and annulation to the second joint of antennae, connexivum, legs, mottling to hemelytra and abdomen luteous, tibiae and femora annulated with fuscous, anterior femora medially spined beneath and also with obscure spine near apex; apical spine to scutellum short obtusely robust.

Length : 11 mm.

Distribution : India : Mizoram (Aizwal).

Elsewhere : Bangladesh, Mayanmar, Sri Lanka.

Subfamily III. ACANTHASPIDINAE

Genus 3. ***Acanthaspis*** Amy. & Serv.

1843. *Acanthaspis* Amy. & Serv., *Hem.*, : 336.

3. ***Acanthaspis quinquespinosa*** (Fabr.)

1781. *Reduvius quinquespinosa* Fabr., *Spec. Ins.*, **2** : 382.

1902. *Acanthaspis quinquespinosa* : Distant, *Fauna Brit. India*, **2** : 257.

Material examined : 1 ex., Champai, Aizwal Dt., 14.v.1995, coll. A. K. Sanyal and party.

Diagnostic characters : Body black, pronotum with four luteous posterior spines, two lateral, two discal, corium with a basal and a transverse discal spots and spots to connexivum above and beneath luteous; basal joint of antennae about as long as head; pronotum with the anterior lobe strongly sculptured, posterior lobe rugose, scutellar spine long obliquely ascending, first and second joint of rostrum subequal in length.

Length : 15.5 to 19 mm.

Distribution : India : Mizoram (Aizwal), Assam, Bihar, Maharashtra, Meghalaya, West Bengal.

Elsewhere : Mayanmar, Sri Lanka.

Subfamily IV. ECTRICHODIINAE

Genus 4. *Haematorrhophus* Stal

1874. *Haematorrhophus* Stal, *En. Hem.*, **4** : 49 & 50.

4. *Haematorrhophus nigroviolaceous* (Reut.)

1881. *Physorhynchus nigroviolaceous* Reut., *Act. Soc. Sc. Fenn.*, **12** : 302.

1977. *Haematorrhopus nigroviolaceous* : Cook, Oriental Insects, **11**(1) : 79.

Material examined : 1 ex., Saiha, Saiha, 3.iv.1994, coll. S. K. Ghosh and party, 1 ex., Lung hai, Lunglai, 26.iii.1994, coll. B. K. Biswas and party.

Diagnostic characters : Shining violaceous black; antennae black, opaque with first and second joint equally long; hemelytra very rudinentary in male and absent in female, last two joints of antennae, tibiae above tarsi brownish piceous.

Length : ♂, 23 mm, ♀ 23-29 mm.

Distribution : India : Mizoram (Saiha, Lunglai), Karnataka, Tamil Nadu.

Subfamily V. HARPACTORINAE

Key to the division of the Subfamily HARPACTORINAE

1(2) Head armed with a spine or tubercle behind each antennae ..... EUAGOSARARIA

2(1) Head without any spine or tubercle 3

3(4) Anterior femora nodulose or spinous 5

4(3) Anterior femora not nodulose or spinous 7

5(6) Legs and body spinous ..... POLIDIDUSARIA

6(5) Legs and body not spinous; lateral margins of the fourth and fifth abdominal segments dialated ..... VELINARIA

7(8) Postocular and anteocular area almost subequal in length; abdominal segments lobately dialated; head almost as long as pronotum; body oblong & subelongate .... HARPACTORARIA

8(7) Postocular area longer than anteocular area; abodomen on each side much dialated: head long & slender ..... SYCANARIA

Division I. HARPACTORARIA

Key to the genera of the Division HARPACTORARIA

1(2) Posterior lobe or pronotum longitudinally impressed ..... ***Sphedanolestes***

2(1) Posterior lobe of pronotum neither longitudinally impressed nor elevated .... ***Rhinocoris***

Genus 5. *Rhinocoris* Hahn

1834. *Rhinocoris* Hahn, *Wanz. Ins.*, **8** : 20.

5. *Rhinocoris marginellus* (Fabricius)

1803. *Reduvius marginellus* Fabr., *Syst. Rhyng.*, : 271.

1994. *Rhinocoris marginellus* : Biswas, Sen and Ghosh, *Fauna of West Bengal, State Fauna Series*, **3** (Part-5) : 392.

Material examined : 2 exs., Teirei (Dampa Wildlife Sanctuary), Aizwal, 24.x.1991, coll. J. K. Jonathan and party.

Diagnostic characters : Black, pronotum with the anterior lobe obscurely sculptured, posteriorly centrally impressed, posterior lobe sericeous, ante and postocular area of head about equal in length; head as long as pronotum; first joint of rostrum about euqal in length to anterior femora.

Length : 12-15 mm.

Distribution : India : Mizoram (Aizwal), Assam, Sikkim, Meghalaya, West Bengal.

Genus 6. ***Sphedanolestes*** Stal

1866. *Sphedanolestes* Stal, *Ofv. Vet.-AK. Forh.*, : 284 & 288.

Key to the species of the genus *Sphedanolestes*

1(2) Pronotum unicolorous, or palely pubescent 3

2(1) Pronotum bicoloured anterior lobe and posterior margins sanguineous, rest black; head with a large spot behind eyes black; pronotum distinctly impressed on posterior lobe ..... *mendicus*

3(4) Pronotum sanguineous, first joint of rostrum, a large spot on each side of head a small spot on each side of eyes pale luteous ..... *bowringi*

4(3) Pronotum black, head with the postocular area a little longer than the anteocular area, femora not nodulose; body black .... *pubinotum*

6. ***Sphedanolestes bowringi*** Distant

1909. *Sphedanolestes bowringi* Distant, *Ann. Soc. Ent. Belg.* **3** : 369.

1910. *Sphedanolestes bowringi* : Distant, *Fauna Brit. India,* **5** : 205.

Material examined : 1 ex., Marlen National Park, Aizwal, 17.xii.1993, coll. S. S. Saha and party.

Diagnostic characters : Black, sternum; pronotum and scutellum coral red; two spots on posterior area of connexivum; fessellate markings on each lateral area of abdomen beneath and abdominal apex, black; first joint of rostrum a small spot on each side of head behind eyes, a large spot on each side of head behind eyes and infront of ocelli pale luteous, femora nodulose, membrane considerably passing abdominal apex.

Length : 9 mm.

Distribution : India : Mizoram (Aizwal), Assam, Meghalaya, Tripura.

Elsewhere : Mayanmar, Malay Peninsula.

7. ***Sphedanolestes mendicus*** (Stal)

1866. *Reduvius mendicus* Stal, *Ofv. Vet.-AK. Forh.*, 286.

1902. *Sphedanolestes mendicus* : Distant, *Fauna Brit. India,* **2** : 341.

Material examined : 1 ex., 1 km. east of Aizwal, F. R. H., Aizwal, 26.iii.1994, coll. G. C. Sen and party.

Diagnostic characters : Black, head sanguineous with a large spot behind eyes black; prnotum impressed on posterior lobe which is sanguineous; head as long as pronotum; first joint of rostrum slightly longer than anteocular portion of head which is subequal to postocular area.

Length : 11-14 mm.

Distribution : India : Mizoram (Aizwal), Assam, Meghalaya.

Elsewhere : Mayanmar, Malay Peninsula.

8. ***Sphedanolestes pubinotum*** Reuter

1881. *Sphedanolestes pubinotum* Reut., *Act. Soc. Sc. Fenn.*, **12** : 289.

1902. *Sphedanolestes pubinotum* : Distant, *Fauna Brit. India,* **2** : 339.

Material examined : 1 ex., Umchi, Chhimtuipui, 21.ix.1993, coll. R. S. Mirdha and party; 1 ex., Maat, Lung Lai, 23.ix.1993, coll. A. R. Lahiri and party; 1 ex., Kelkemg, Aizwal 29.ix.1993, coll. R. S. Mirdha and party.

Diagnostic characters : Black, abdomen sanguineous; head with postocular a little longer than anteocular area; first joint of rostrum much

shorter than second joint and a little longer than anteocular portion, central impression to pronotum continued to about middle of posterior lobe; membrane passing abdominal apex.

Length : 115-16.5 mm.

Distribution : India : Mizoram (Aizwal, Chhimtuipui, Lung Lai), Assam, Meghalaya, Sikkim, West Bengal.

Elsewhere : Mayanmar.

Division II. VELINARIA

Genus 7. *Velinus* Stal

1865. *Velinus* Stal, *Hem. Afr.*, **3** : 52.

9. *Velinus annulatus* Dist.

1879. *Velinus annulatus* Distant, *A. M. H. N.*, (5) **3** : 313.

1902. *Velinus annulatus* : Distant, *Fauna Brit. India*, **2** : 347.

Material examined : 1 ex., Saiha Puikawa, Chhimtuipui, 10.xii.1995, coll. P. Parui and party.

Diagnostic characters : Luteous, antennae, scutellum, annulations to femora, head above, apices of the tibiae and tarsi black; first joint of antennae twice the length of head; corium purplish red; membrane bronzy black; first joint of rostrum about twice the length of the head, anterior lobe of pronotum medially impressed, medial linear lines to both areas of head, annulations to basal joint of antennae and apex of scutellum luteous.

Length : 15-16 mm.

Distribution : India : Mizoram (Chhimtuipui), Assam, Meghalaya.

Elsewhere : Mayanmar.

Division III. SYCANARIA

Genus 8. *Sycanus* Amy. & Serv.

1843. *Sycanus* Amy. & Serv., *Hem.*, : 360.

10. *Sycanus croceovittatus* Dohrn

1859. *Sycanus croceovittatus* Dohrn, *Stett. ent. Zeit.*, **20** : 97.

Material examined : 1 ex., Phalong, Aizwal, 26.x.1991, coll. J. K. Jonathan and party; 1 ex., Teirei, Aizwal, 22.x.1991, coll. J. K. Jonathan and party.

Diagnostic characters : Body black, apical half of corium and basal margin of membrane golden yellow; head about as long as pronotum and scutellum together; scutellar spine long, obliquely erect, bifid, abdomen strongly dialated at third and fourth segments, basal margin of membrane and apical half of corium stramineous.

Length : 22-25 mm.

Distribution : India : Mizoram (Aizwal).

Elsewhere : China, Mayanmar.

Division IV. EUAGORASARIA

Genus 9. *Euagoras* Burm.

1835. *Euagoras* Burm., *Handb.*, **2** : 226.

11. *Euagoras plagiatus* (Burm.)

1834. *Zelus plagiatus* Burm., *Nov. Acat. Ac. Nat. Cur., 14*, Suppl. **1** : 303.

1902. *Euagoras plagiatus* Distant, *Fauna Brit. India*, **2** : 363.

Material examined : 1 ex., Teirei, Aizwal, 24.x.1991, coll. J. K. Jonathan and party.

Diagnostic characters : Head, pronotum, scutellum reddish ochraceous; a central longitudinal spot on posterior pronotal lobe; hemelytra black with lateral margins luteous; abdomen with a black fascia on each lateral area; femora streak with a black line; rostrum luteous, its apex black; posterior spine to pronotum curved and reflexed.

Length : 13-14 mm.

Distribution : India : Mizoram (Aizwal), Andaman islands, Assam, Meghalaya.

Elsewhere : Java, Mayanmar, Phillippines.

Division V. POLIDIDUSARIA

Genus 10. *Polididus* Stal

1858. *Polididus* Stal, *Ofv. Vet.-AK. Forh.*, : 448.

12. *Polididus armatissimus* Stal

1859. *Polididus armatissimus* Stal, *Ofv. Vet.-AK. Forh.*, : 376.

1994. *Polididus armatissimus* : Biswas, Sen and Ghosh, *State fauna series 3 : Fauna of West Bengal, part 5* : 402.

Material examined : 1 ex., 1 km. North of S. C. R. H. Champhai, Aizwal, 4.iv.1994, coll. G. C. Sen and party.

Diagnostic characters : General hue of the specimen is pale brownish-ochraceous, head having a long spine behind the base of each antenna and with a number of small discal spines; pronotum spinous, the longest spines are two erect on anterior lobe and the lateral spines to posterior lobe; abdomen beneath with a piceous sublateral fascia on each side; anterior pronotal lobe with greyish narrow vittae; anterior, intermediate and posterior tibiae and femora spinous.

Length : 10 mm.

Distribution : India : Mizoram (Aizwal), Maharashtra, Manipur, Sikkim, West Bengal.

Elsewhere : China, Japan, Mayanmar, Philippines.

SUMMARY

This paper provides a first time account of 12 species under 10 genera distributed over 5 subfamilies of the family Reduviidae from the state of Mizoram. Key to taxa, geographical distribution of each species from India and elsewhere, literature references and districtwise distributions are also provided.

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INSECTA : HEMIPTERA : CICADELLOIDEA

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INTRODUCTION

The Cicadellide are commonly known as 'leafhopper and they are dwelling in huge numbers among the plants. They cause considerable damage by sucking the sap as well as by transmitting different viral diseases to the infected plants. Therefore these insects are considered as one of the most economically important insects from agricultural point of view. Some species are serious pests to a number of agricultural crops in India. The Cicadellids are belonging to the superfamily Cicadelloidea under the series—Auchenorrhyncha of the Suborder—Homoptera under the Order—Hemiptera.

Because of their immense agricultural important serious taxonomical founestic researches on Cicadellids insects have been carried out in India and abroad for a pretty long period, which has recorded, so far, more than 15,000 species in the world, while India has 680 species. The present study has the aim to bring out a faunestic as well as taxonomic account of Cicadellids of Mizoram. The work is based upon the collections received from various survey parties of the Zoological Survey of India.

Among pioneer workers on Cicadellids of India Distant (1908, 1916, 1918) and Pruthi (1930, 1934, 1936, 1940) made major contribution to focus on the systematics of this group. Afterwards Ghauri (1963, 1975), Bindra and Joginder (1970), Datta (1969, 1973, 1988), Datta *et al.* (1979, 1984), Virktamath (1976, 1979, 1980, 1981, 1982, 1983), Ghosh and Ghosh (1994, 1999) have been done excellent systematic as well as taxonomic studies to enrich the Indian fauna of Cicadellids. Since there is no previously published taxonomic account on the Cicadellid fauna of Mizoram, the present study may be considered as first of its kind to have a comprehensine taxonomic work from the State of Mizoram.

The present paper has included 22 species under 16 genera, distributed in 6 families of the superfamily Cicadelloidea. All the species are bring recorded for the first time from the state. The present study deals with taxonomic key to different texa, diagnostic characters of each species with distribution in Mizoram and other state of India as well as in other countries.

MATERIALS AND METHODS

Cicadellid insects feed on almost all kinds of vegetation trees, shrubs, herbs, grasses and crops, and suck the sap from the leaves, flower stalks and tender shoots of the plant. Therefore, these insects can be collected by sweeping through the vegetation with the help of an insect net. By other means they may be collected by beating the bushes with any strong stick over a spreading malmal cloth beneath the bush to hold the dislodged insects which are fallen over it. Since most cicadellids are having flight capabilities these insects are often collected by the light trap at night.

After collection of live specimens, they are killed in a killing Jar (Kielner Jar) by using either liquid Benzene or Chloroform or Carbon-

tetrachloride as killing agent. The dead insect specimens are transferred into the insect envelopes, each of which is provided with a collection data lebel mentioning the collection locality, name of the collector, date of collection etc. These envelopes containing insect specimens, are preserved dry with Para-dichlorobenzene and Naphthalene.

In the Laboratory, cicadellid specimens are generally mounted on cartidge paper triangle with the help of gum as adhesive for easy handling and studies are carried out under the Stereoscopic Binocular Microscope during the process of identification.

SYSTEMATIC ACCOUNT

Super Family CICCADELLOIDEA

Family I. KRISNIDAE

Genus 1. ***Krisna*** Kirkadly

1. ***Krisna striata*** Kirkadly

Family II. CICADELLIDAE

Genus 2. ***Kolla*** Distant

2. ***Kolla tigrina*** Distant
3. ***Kolla insignis*** Distant

Genus 3. ***Cofana*** Melichar

4. ***Cofana spectra*** (Distant)
5. ***Cofana mimica*** (Distant)

Genus 4. ***Tettigella*** China & Fennah

6. ***Tettigella subvirescens*** Stal

Genus 5. ***Bothrogonia*** Melichar

7. ***Bothrogonia ferruginea*** Fabricius
8. ***Bothrogonia indistincta*** (Walker)

Family III. LEDRIDAE

Genus 6. ***Ezrana*** Distant

9. ***Ezrana pygmaea*** Distant

Family IV. ULOPIDAE

Genus 7. ***Moonia*** Distant

10. ***Moonia sancita*** Distant

Family V. HECALIDAE

Genus 8. ***Parabolocratus*** Fieber

11. ***Parabolocralus albomaculatus*** Distant
12. ***Parabolocratus rusticus*** Distant

Family VI. DELTOCEPHALIDAE

Genus 9. ***Scaphoideus*** Uhler

13. ***Scaphoideus festivus*** Matsumura
14. ***Scaphoideus stigmatus*** Distant

Genus 10. ***Deltocephalus*** Burmeistar

15. ***Deltocephalus nigrifacialis*** Distant

Genus 11. ***Arya*** Distant

16. ***Arya rubrolineata*** Distant
17. ***Arya rotunda*** Pruthi

Genus 12. ***Exitianus*** Ball

18. ***Exitianus indicus*** Distant

Genus 13. ***Goniagnathus*** Fieber

19. ***Goniagnathus punctifer*** Walker

Genus 14. ***Paramesus*** Fieber

20. ***Paramesus lineaticollis*** Distant

Genus 15. ***Thomsoniella*** Signoret

21. ***Thomsoniella porrecta*** Walker

Genus 16. ***Nephotettix*** Matsummura

22. ***Nephotettix nigropicta*** Stal

Key to the families of the superfamily CICADELLOIDEA

1. Lateral margin of pronotum long, carinate; hind wings with submarginal vein extending jugam ..... KRISNIDAE
- Lateral margin of pronotum short and not carinate 2
2. Ocelli on crown, if submarginal frontoclypeus not medially carinate 3
- Ocelli on margin of head anterior to eye, if submarginal frontoclypeus with median carinae 4

3. Head not produced; lateral facial sutures extending over margin, lateral margin of pronotum rounded with a weak kell, face tumid ..... CICADELLIDAE

– Head usually produced forward, lateral pronotal sutures not extending on to crown; hind tibial setae short, fine widely spaced; Ocelli nearer to hind margin of head ..... LEDRIDAE

4. Proepisterna exposed; body with circular pits ..... ULOPIDAE

– Proepisterna concealed 5

5. Body dorsoventrally flattened; lateral margin of pronotum carinate; margin of gena usually incised ..... HECALIDAE

– Body not dirsoventrally flattened; lateral margin of pronotum usually not carinate; margin of gena not incised or strongly sinuate ..... DELTOCEPHALIDAE

Family I. KRISNIDAE

Genus 1. *Krisna* Kirkadly

1900. *Krisna* Kirkadly, *Entomologist*, **34** : 39.

1. *Krisna striata* Kirkadly

1901. *Krisna striata* Kirkadly, *Entomologist*, **34** : 39.

1988. *Krisna striata* : Datta, B., *Rec. zool. Surv. India, Occa. Paper*, 90 : 220.

Material examined : 1 ex., Mizoram; Circuit House compound, Chawnhu; Chhimtuipui Dist.; 2.IV.1994; A. K. Hazra and party coll.

Diagnosis : Body greenish yellow; front black; vertex semi circular with reddish apicad; pronotum strongly transversely striated; scutellum also transversely striated and strongly arcuate impression at apical area; tegmina strongly wrinkled and punctate, its apical-third retecious; legs black, abdomen yellowish.

Length : 11 mm.

Distribution : India : Mizoram (Chhimtuipui);

Elsewhere : Phillippines; Sri Lanka.

Family II. CICADELLIDAE

Key to the genera of the family CICADELLIDAE

1. Face flattened, medially smooth and distinctly transversely striated 2

– Face elongate and moderately globose, not transversely striated 3

2. Vertex strongly produced, anterior margin subcarinate ..... ***Kolla***

– Vertex not strongly produced, anterior margin rounded ..... ***Cofana***

3. Lateral margin of vertex in a line with inner margin of the eyes ..... ***Tettigella***

– Lateral margin of vertex not in a line with inner margin of eyes ..... ***Bothrogonia***

Genus 2. *Kolla* Distant

1908. *Kolla* Distant, *Fauna Brit. India, Rhyncheta*, **4** : 22.

Key to the species of the genus *Kolla*

1. Tegmina brownish yellow, with longitudinal black fasciae, one in clavus, another in claval margin ..... *tigrina*

– Tegmina not brownish yellow, bronzy black, without longitudinal black fasciae, the costal area brownish ..... *insignis*

2. *Kolla tigrina* Distant

1918. *Kolla tigrina* Distant, *Fauna Brit. India, Rynchota*, **6** : 9.

1965. *Kolla tigrina* : Metcalf, *General catalouge of Homoptera*, I : 445.

Material examined : 2 exs.; Chawnhu, Chhimtuipui Dist., 2.IV.1994; 2 exs.; Aizawl, Aizawl Dist., 17.X.1995; S. S. Saha and party coll.; 1 ex.; Aibawk, Aizawl Dist., 29.III.1994, G. C. Sen and Party coll.

Diagnosis : Body brownish yellow in colour, three black spots on vertex, one at apex and other two between eyes, a black small spot at anterior margin of pronotum and a submarginal black fascia centrally produced; face brownish yellow, a black spot at apex which continued to vertex, scutellum with a black spot at its each basal angle

and a strongly depressed at base; tegmina reddish yellow, with black longitudinal fasciae, one in claval area and another in claval margin; Legs brownish yellow; abdomen black.

Length : 5.5 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui); Tamil Nadu.

3. ***Kolla insignis*** Distant

1908. *Kolla insignis* Distant, *Fauna Brit. India, Rhynchota*, **4** : 22.

1999. *Kolla insignis* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 9.

Material examined : 14 exs.; Blue Mountain, Aizawl, Aizawl Dist.; 9.IV.1994; A. K. Hazra and party coll.; 6 exs.; Chawnhu Forest, Chhimtuipui Dist., 2.IV.1994; A. K. Hazra and party coll.; 6 exs.; Champai, Aizawl Dist.; 24.III.1994; G. C. Sen and party coll.

Diagnosis : Body bronzy black in colour, at the anterior margin of the vertex with two large black spots united anteriorly, at the central portion of vertex with three black angulated spots connected by an oblique line; on each eye a transverse black spot present; pronotum near its anterior a transverse waved brownished fascia; scutellum brownish yellow in colour, with a large black spot at each basal angle, face at anterior margin a transverse black fascia; tegmina bronzy black its costal area brownish yellow. Legs pale brownish; abdomen brownish.

Length : 5.5 mm.

Distribution : India : Mizoram (Aizawl and Chhimtuipui); Assam; Manipur; Meghalaya; Uttar Pradesh; West Bengal.

Elsewhere : Nepal.

Genus 3. ***Cofana*** Melichar

1926. *Cofana* Melichar, *Ann. Mus. Nat. Hist.*, **23** : 345.

Key to the genera of the genus *Cofana*

1. Vertex angularly produced; lateral margin of vertex are in a line with outer margin of the eyes ..... *spectra*

– Vertex rounded; lateral margin of vertex are not in a line with outer margin of the eyes ..... *mimica*

4. ***Cofana spectra*** (Distant)

1910. *Cicadella spectra* Distant, *Insect. Trans.*, **10** : 234.

1990. *Cofana spectra* : Partact, *Cicadomorpha*, **3** : 76.

Material examined : 2 exs.; Champai, Aizawl Dist.; 29.III.1994; G.C. Sen and party coll.

Diagnosis : Body light whitish yellow, vertex with four black spots, two at central and one at base and one at apex; face with two black spots at lateral margin of its basal angle; and a black central line and transverse striation; pronotum with central dark line; tegmina with its vein brownish and unspotted; Legs and abdomen light whitish yellow.

Length : 9 mm.

Distribution : India : Mizoram (Aizawl); Assam; Bihar; Karnataka; Maharastra; Madhya Pradesh; Manipur; Meghalaya; Orissa; Sikkim; West Bengal.

Elsewhere: Australia; Bangladesh; Nepal; Sri Lanka.

Remarks : The species is commonly found on paddy during winter period. It is also feed on wild grasses.

5. ***Cofana mimica*** (Distant)

1908. *Kolla mimica* Distant, *Fauna Brit. India, Rhynchota*, **4** : 225.

1999. *Cofana mimica* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 8.

Material examined : 2 exs. : Chawnhu forest, Chhimtuipui Dist.; 2.IV. 1994; A. K. Hazra and party coll.

Diagnosis : Body cover with greenish white pubescens, vertex with three black spots in transverse series, one at central, and other two identical spots close to ocelli, pronotum with fine transverse impression, scutellum yellowish, with distinct dark longitudinal line, face centrally smooth and flattened and laterally black striation; tegmina greenish white, its veins dark gray brown;

wings semihyaline; Legs greenish; abdomen greenish white.

Length : 5.5 mm.

Distribution : India : Mizoram (Chhimtuipui); Bihar, Manipur; Meghalaya; Sikkim; Uttar Pradesh; West Bengal.

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

Genus 4. *Tettigella* China & Fennah

1945. *Tettigella* China & Fennah, *Ann. Mag. Nat. Hist.*, **12** (11) : 711.

6. *Tettigella subvirescens* Stal

1870. *Tettigoniella subvirescens* Stal, *Ofv. vet. Ak. Forh.*; 734.

1965. *Tettigella subvirescens* : Metcalf, *General catalogue of Homoptera* I : 146.

Material examined : 1 ex.; Champhai, Chhimtuipui Dist.; G. C. Sen and party coll.; 1 ex.; Aizawl, Aizawl Dist.; 22.III.1994; G. C. Sen and party coll.

Diagnosis : Body brownish yellow; at base of head with greyish streaked, at the middle of its a elongate black spot and three black marginal spots, one at apical and others in front of eyes; pronotum greenish, on pronotum, anterior area shaded brownish yellow; tegmina bright greenish, its claval area hyaline; wings smoky brown in colour; abdomen brownish yellow.

Length : 9.5 mm.

Distribution : India : Mizoram (Chhimtuipui and Aizawl); Assam; West Bengal.

Elsewhere : Myitta; Philippines.

Genus 5. *Bothrogonia* Melichar

1926. *Bothrogonia* Melichar, *Ann. Mus. Nat. Hist. Hung.*, **23** : 341.

Key to the species of the genus *Bothrogonia*

1. Tegmina darker, purplish red; a black spot at base and the apex rather broadly break .... *ferruginea*

– Tegmina brownish yellow not red; without black spot at base, and the apex sometimes reddish black ..... *indistincta*

7. *Bothrogonia ferruginea* (Fabricius)

1794. *Tettigoniella ferruginea* Fabricius, *Entomologia Syst.*, **1** : 32.

1999. *Bothrogonia ferruginia* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 5.

Material examined : 4 exs.; Chhimtuipui, Chhimtuipui Dist.; 3.IV.1994; S. K. Ghosh and party coll.; 11 exs.; Chawnhu forest, Chhimtuipui Dist.; 2.IV.1994; A. K. Hazra and party coll.

Diagnosis : Body brownish yellow in colour; vertex with two black spots one at base between the ocelli and another at apex; face with a black spot; pronotum with three black spots one at central near anterior margin and other two at base; scutellum with centrally black spot; tegmina purplish red, a black spot at base and claval suture with black patches, its apex rather broadly black; Legs black and abdomen black.

Length : 15 mm.

Distribution : India : Mizoram (Chhimtuipui); Manipur; Meghalaya; Tripura; Uttar Pradesh.

Elsewhere : Borneo; Japan; Java; Korea; Myanmar; Nepal; Philippines; Singapore; Sri Lanka; Sumatra.

Remarks : It is reported to be injurious to apple. It is suspected in spreading spike disease of Sandal by *Halictophagus serratus* Boh.

8. *Bothrogonia indistincta* (Walker)

1851. *Tettigoniella indistincta* Walker, *List. Hom. B.M.*, : 739.

1999. *Bothrogonia indistincta* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 6.

Material examined : 2 exs.; Chawnhu forest, Chhimtuipui Dist.; 2.IV.1994; A. K. Hazra and party coll.

Diagnosis : Body brownish in colour; two black spots on vertex, one at base another at apex; pronotum with two black spot, one at base and another at middle of anterior area; scutellum

with one black subapical spot; face with longitudinal central black fascia; tegmina brownish yellow, its apex reddish black; wings black; Legs black, spotted; abdomen black.

Length : 14.5 mm.

Distribution : India : Mizoram (Chhimtuipui); Assam; Manipur; Uttar Pradesh.

Elsewhere : Borneo; China; Java; Myanmar; Phillippines; Sri Lanka.

Family III. LEDRIDAE

Genus 6. ***Ezrana*** Distant

1908. *Ezrana* Distant, *Fauna of Brit. India, Rhynchota,* **4** : 177.

9. ***Ezrana pygmaea*** Distant

1908. *Ezrana pygmaea* Distant, *Fauna of Brit. India, Rhynchota,* **4** : 177.

1962. *Ezrana pygmaea* : Metcalf, *General Catalogue of Homoptera,* **6** : 84.

Material examined : 1 ex.; Chhimtuipui, Chhimtuipui Dist., 8.IV.1994; S. K. Ghosh and party coll.

Diagnosis : Body brownish yellow in colour; eyes reddish; vertex with minutely tuberculate; head beneath pale yellowish white, its anterior area pale greenish; pronotum with a large irregular spot on its each basal angle and a basal marginal fascia; mesonotum with two oblique brownish spots; tegmina pale greyish, its basal half opaque and rest area tale like, with reticulate venation; Legs brownish.

Length : 10 mm.

Distribution : India : Mizoram (Chhimtuipui); Bombay.

Family IV. ULOPIDAE

Genus 7. ***Moonia*** Distant

1908. *Moonia* Distant, *Fauna Brit. India, Rhynchota,* **4** : 197.

10. ***Moonia sancita*** Distant

1908. *Moonia sancita* Distant, *Fauna Brit. India, Rhynchota,* **4** : 197.

1999. *Moonia sancita* : Ghosh & Ghosh, *State Fauna Series 4 : Fauna of Meghalaya,* Part **4** : 13.

Material examined : 1 ex.; Champhai, Aizawl Dist.; 5.IV.1994; G. C. Sen and party coll.

Diagnosis : Body brownish in colour; vertex roughly, scatterly punctate; face with two dark black spot under the ocelli; eyes black; pronotum wrinkled punctate and with a fine longitudinal carina at central and lateral area foveate; scutellum with a transverse ridge at base; tegmina brownish, its veins stout or thickened with dark brown spotted and at middle and an indistinct greyish white fascia; wings smoky brown; Legs brownish; abdomen black.

Length : 4.5 mm.

Distribution : India : Mizoram (Aizawl); North India; Uttar Pradesh.

Family V. HECALIDAE

Genus 8. ***Parabolocratus*** Fieber

1866. *Parabolocratus* Fieber, *Zool. bot. Gesell Wien. Verhandl.,* **16** : 32.

Key to the species of the genus *Parabolocratus*

1. Apical area of tegmina brownish with white spot ..... *albomaculatus*
– Apical area of tegmina not brownish with white, tawny grey transversed by darker vein ..... *rusticus*

11. ***Parabolocratus albomaculatus*** (Distant)

1908. *Thomsoniella albomaculatus* Distant, *Fauna Brit. India,* Rhynchota, **4** : 280.

1999. *Parabolocratus albomaculatus* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-4) : 15.

Material examined : 4 exs.; Blue Mountain Alt. 2000 M., Aizawl, Aizawl Dist.; 9.IV.1994; A. K. Hazra and party coll.

Diagnosis : Body greenish brown in colour; apical area and lateral margin of head strongly reflexed; extream apical portion reddish; pronotum with finely transversely striate; scutellum with a

dark spot on each basal angle and angulate line before apical area; tegmina greenish brown, its apical area with brownish spots; Legs brownish; abdomen black.

Length : 4.5 mm.

Distribution : India : Mizoram (Aizawl); Assam; Meghalaya; Orissa; Sikkim; Tamil Nadu; West Bengal.

Elsewhere : Bengian Congo; Luzon; Phillippines sland; Sri Lanka.

12. *Parabolocratus rusticus* Distant

1908. *Thomsoniella viridis Distant, Fauna Brit. India, Rhynchota,* **4** : 280.

1966. *Parabolocratus rusticus* : Metcalf, *General Catalogue of Homoptera,* **5** : 43.

Material examined : 2 exs.; Murlen North Park, Aizawl, Aizawl Dist.; 17.XII.1997; S. S. Saha and party coll.

Diagnosis : Body dark green in colour; vertex at its apical margin strongly reflexed; pronotum distinctly transversely striate; scutellum with finely line; tegmina pale brownish yellow in colour, its vein very distinct and dark; wings hyaline; Legs brownish yellow; absomen brownish.

Length : 6 mm.

Distribution : India : Mizoram (Aizawl); East Bengal.

Family VI. DELTOCEPHALIDAE

Key to the genera of the family DELTOCEPHALIDAE

1. Head flat, triangulorly produced; vertex as long as broad 2
- Head blunt, not triangularly produced; vertex shorter than long 4
2. Tegmina moderately narrow, curved, valvet; costal areola long narrow; four apical cells; scutellum large as long as orlittle longer than pronotum ..... ***Scaphoideus***
- Tegmina more than three times longer than broad; not curved, three apical cells 3
3. Pronotum wider than long, broad at base; face symetrically hexagonal ..... ***Deltocephalus***
- Pronotum about half as long as broad at base; face very long ..... ***Arya***
4. Head shorter than pronotum; pronotum stripped or winkled 5
- Head wider than pronotum; pronotum carinate or striated; Vertex with a black curved transverse fascia between the eyes; apices of tegmina rectangular ..... ***Exitianus***
5. Tegmina usually punctate; clypeus rectangular at base somewhat narrower .... ***Goniagnathus***
- Tegmina usually not punctate; clypeus otherwise 6
6. Clypeus quadrangular, broader at base; jugal extending beyond the margin of check, flatly curved 7
- Clypeus somewhat long gradually widened to apex, almost spatulate; jugal extending to the margin of check, almost round .... ***Paramesus***
7. Vertex with some obscure longitudinal orange red fascia ..... ***Thomsoniella***
- Vertex without such fasia ..... ***Nephotettix***

Genus 9. *Scaphoideus* Uhler

1888. *Scaphoideus* Uhler, *Trans. Maryl. Ac. Sci.* : 33.

1. Vertex of head creamy white; with a transverse castaneous fascia between anterior margin of the eyes ..... *festivus*
- Vertex of head not creamy white, brownish with longitudinal black lines between anterior margin of the eyes ..... *stigmaticus*

13. *Scaphoideus festivus* Matsumura

1902. *Scaphoideus festivus* Matsumura, *Termesz. Fiizetek,* **25** : 384.

1967. *Scaphoideus festivus* : Metcalf, *General Catalogue of Homoptera,* **X** : 2123.

Material examined : 1 ex.; 2 km. South of Aibawk, F.R.H., Aizawl Dist.; 29.III.1994; G. C. Sen and party coll.

Diagnosis : Body off white colour; vertex creamish colour and its lateral margin reddish; a transverse reddish brown fascia on vertex between anterior margin of eyes; face with its anterior margin three black lines; pronotum greyish colour

and with reddish brown fascia present and with a transverse, white fascia behind apex and also a longitunial reddish line at base; tegmina reddish brown with some slanting reddish spots and a series of greyish most prominent spots arranged in pair of each claval suture; on its apical area a reddish spot present; Legs creamish brown; abdomen creamy white.

Length : 5.5 mm.

Distribution : India : Mizoram (Aizawl); Madras; Mysore.

14. ***Scaphoideus stigmaticus*** Distant

1918. *Scaphoideus stigmaticus* Distant, *Fauna Brit. India, Rhynchota,* **4** : 67.

1967. *Scaphoideus stigmaticus* : Metcalf, *General Catalogue of Homoptera,* **X** : 2148.

Material examined : 3 exs.; 1 km. East of S.C.R.H., Champhai, Aizawl Dist., 3.IV.1994; G. C. Sen and party coll.

Diagnosis : Body brownish in colour, vertex brown and its apex brownish yellow; vertex with black longitudinal lines and a black spot at its extream apex; face pale brownish yellow; pronotum reddish brown, pronotum with three carinate lines at central position; scutellum reddish brown, with also three pale brown carinate lines and a dark large spot at each basal angle, tegmina brownish, claval area reddish brown, vein dark reddish brown; a elongate large violaceous blue spot at its costal area and some small greyish spots at apical area of tegmina; Legs brownish yellow with black spots; abdomen brownish yellow.

Length : 6.5 mm.

Distribution : India : Mizoram (Aizawl); North Bengal.

Genus 10. ***Deltocephalus*** Burmeistar

1838. *Deltocephalus* Burmeistar, *Genera Insectorum,* **1** : 15.

15. ***Deltocephalus nigrifascialis*** Distant

1918. *Deltocephalus nigrifascialis* Distant, *Fauna Brit. India, Rhynchota,* **7** : 81.

1988. *Deltocephalus nigrifascialis* : Datta, B., *Rec. Zool. Surv. India, Occ. Paper No.* **90** : 119.

Material examined : 1 ex.; Champhai, Aizawl Dist.; 2.IV.1994; G. C. Sen and party coll.

Diagnosis : Body pale brownish in colour, vertex with two large dark brownish spots between eyes and a pale greyish narrow fascia at marginal area with two dark spots; pronotum with four longitudinal brownish fasciae; scutellum at each basal angle with a dark spot and at apex with a single spot; tegmina brownish yellow with darker spots, apical area greyish with darker spots; Legs brownish; abdomen brown.

Length : 3.5 mm.

Distribution : India : Mizoram (Aizawl); North Bengal.

Genus 11. ***Arya*** Distant

1908. *Arya* Distant, *Fauna Brit. India, Rhynchota,* **4** : 337.

Key to the species of the genus *Arya*

1. Anterior margin of the vertex subconical in shape ..... *rubrolineata*
– Anterior margin of the vertex not sub-conical, rounded ..... *rotunda*

16. ***Arya rubrolineata*** Distant

1908. *Arya rubrolineata* Distant, *Fauna Brit. India, Rhynchota,* **4** : 338.

1967. *Arya rubrolineata* : Metcalf, *General Catalogue of Homoptera,* **X** : 1895.

Material examined : 3 exs.; Champhai, Aizwal Dist., 2.IV.1994; G. C. Sen and party coll.

Diagnosis : Body pale greenish yellow in colour; vertex with two red colour facia before eyes, which are interrupted midially, and with two oblique black spots near its base, and a dark line midially; pronotum light greenish in colour, pronotum with three pale indistinct line; scutellum pale greenish, with a transverse discal line united medially with base; tegmina pale brownish, its veins greyish white; Legs pale yellowish grey; abdomen bright orange yellow in colour which reflect the tegmina.

Length : 4.5 mm.

Distribution : India : Mizoram (Aizawl); West Bengal.

17. *Arya rotunds* Pruthi

1930. *Arya rotunda* Pruthi, *Mem. Ind. Mus.*, **2** : 40.

1988. *Arya rotunda* : Datta, *Rec. zool. Surv. India*, Occ. Paper No. **90** : 91.

Material examined : 1 ex.; Champai, Aizawl Dist.; 2.IV.1994; G. C. Sen and party coll.

Diagnosis : Body castaneous in colour; vertex longer than breadth between eyes; vertex with two oblique dark reddish brown linear impression; near base; face as long as broad, with reddish brown striae in lateral area; pronotum slightly longer than vertex; with finely transversely striated, a pair of dark linear impression near the anterior margin; scutellum with transversely impression in the middle; tegmina reddish brown, its vein dark brown; Legs castaneous; abdomen black.

Length : 4 mm.

Distribution : India : Mizoram (Aizawl); Madhya Pradesh; Meghalaya; West Bengal.

Genus 12. *Exitianus* Ball

1929. *Exitianus* Ball, *Trans. Amer. Ent. Soc.*, **55** : 5.

18. *Exitianus indicus* (Distant)

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

1988. *Exitianus indicus* : Datta, *Rec. zool. Surv. India, Occ. Paper No.* **90** : 134.

Material examined : 3 exs.; Murlen National Park, Aizawl Dist.; 17.XII.1993; S. S. Saha and party coll.

Diagnosis : Body brownish yellow in colour, vertex with a transverse distinct black fascia between eyes; and a indistinct a central longitudinal black line at base; pronotum brownish yellow with a series of distinct brownish dots at anterior margin at its posterior margin a dark bow like impressed line; scutellum brownish slightly granules face with brownish transverse striae on each lateral margin; tegmina greyish, subhyaline, veins pale brownish; Legs with brownish longitudinal streaks; abdomen brownish yellow.

Length : 4.5 mm.

Distribution : India : Mizoram (Aizawl); Assam; Madras; Manipur; Meghalaya; North India; Orissa; Punjab; Sikkim; Tripura; Uttar Pradesh, West Bengal.

Elsewhere : Australia; China; Philippines.

Genus 13. *Goniagnathus* Fieber

1866. *Goniagnathus* Fieber, *Verh. Z-b-Ges Wien*, **16** : 506.

19. *Goniagnathus punctifer* Walker

1858. *Bythoscopus punctifer* Walker, *Insecta saundersiam* : 108.

1999. *Goniagnathus punctifer* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-4) : 19.

Material examined : 4 exs.; 1 km. North of Aibawk, Aizawl Dist.; 29.III.1994; G. C. Sen and party coll.; 2 exs.; Murten North Park, Aizawl, Aizawl Dist.; 17.XII.1993; S. S. Saha and party coll.

Diagnosis : Body brownish in colour; vertex with dark obscure spots; face with transverse striation interrupted by a pale longitudinal line, pronotum brownish with finely transversely striation; tegmina pale brownish, costal area and veins finely brown spotted; wings smoky, with grey white streak; Legs custaneous brownish; abdomen black.

Length : 6.5 mm.

Distribution : India : Mizoram (Aizawl); Bihar; Maharastra; Manipur; Meghalaya; Sikkim; Tripura; Uttar Pradesh.

Elsewhere : Burma; Maldive; Malagasy; Sri Lanka.

Genus 14. *Paramesus* Fieber

1866. *Paramesus* Fieber, *Verh. Z. b. Ges. Wien*, **16** : 506.

20. *Paramesus lineaticollis* Distant

1908. *Paramesus lineaticollis* Distant, *Fauna Brit. India, Rhynchota*, **4** : 294.

1967. *Paramesus lineaticollis* : Metcalf, *General Catalogue of Homoptera,* **10** : 2066.

Material examined : 5 exs.; Champhai, Aizawl Dist.; 5.IV.1994; G. C. Sen and party coll.; 3 exs.; Tualpai, Aizawl Dist.; 17.XII.1993; S. S. Saha and party coll.; 2 exs.; Aibawk, Aizawl Dist.; 23.III.1994; G. C. Sen and party coll.

Diagnosis : Body brownish in colour; vertex with bow-like black fascia between the eyes and a dark short black line behind the fascia the line extending to the base; pronotum with five longitudinal brownish narrow fasciae, of these the central one most prominent; other paler; face with transversely brownish striae and a medially longitudinally line; tegmina pale brownish vein darker and central prominent dark brown spots; Legs brownish and spoted; abdomen dark brown and series spots.

Length : 5.5 mm.

Distribution : India : Mizoram (Aizawl); Bihar; Uttar Pradesh; West Bengal.

Elsewhere : Basilan; Formosa.

Genus 15. ***Thomsoniella*** Signoret

1879. *Thomsoniella* Signoret, *An. Soc. Ent. de France,* **9**(5) : 51.

21. ***Thomsoniella porrecta*** (Walker)

1858. *Acocephalus porrecta* Walker, *List. Hom. Brit. Mus.* : 362.

1999. *Thomsoniella porrecta* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-4) : 22.

Material examined : 3 exs.; Champhai, Aizawl Dist.; 2.IV.1994; G. C. Sen and party coll.

Diagnosis : Body greenish yellow; vertex with some longitudinal orange-red faciae and its anterior margin blackish; Ocelli ingroove very near to the eyes; pronotum with six orange red fasciae and scutellum also three fascial present; tegmina greenish yellow and with a small spot at apex of clavus and at middle of apical cell; Legs yellowish.

Length : 5 mm.

Distribution : India : Mizoram (Aizawl); Assam; Manipur; Meghalaya; Orissa; Sikkim; Tripura; West Bengal.

Elsewhere : Australia; Formosa; Philippines.

Genus 16. ***Nephotettix*** Matsummura

1902. *Nephotellix* Matsummura, *Term Fuzetok,* **25** : 356.

22. ***Nephotellix nigropicta*** Stål

1870. *Thomnotettix nigropicta* Stål, *Ofv.-vet. A. K. Forh* : 74.

1999. *Nephotettix nigropicta* : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-4) : 20.

Material examined : 3 exs.; Champhai, Aizawl Dist.; 2.IV.1994; G. C. Sen and party coll.

Diagnosis : Body greenish yellow smooth and shinning; anterior margin of vertex with a subimpressed line between two eyes; pronotum and scutellum smoky colour; tegmina greenish; claval area black, tegmina with an oblique broad stripe extending mediad to claval suture; Legs black; abdomen black.

Length : 4.5 mm.

Distribution : India : Mizoram (Aizawl); Assam; Manipur; Meghalaya; Orissa; Sikkim; West Bengal.

Elsewhere : East Africa; East Asia; Japan; Luzon; Malay Penisula; Sri Lanka.

SUMMARY

The present work consists of Cicadelloidea belonging to six families of the Order-Hemiptera from Mizoram. They are Krisnidae, Cicadellidae, Ledridae, Ulopidae, Hecalidae and Deltocephalidae. A total number of 22 species and 16 genera belonging to the above mentioned six families have been included in the study. All the species are being recorded in this paper for the first time from the State of Mizoram. Necessary taxonomic keys for families, genera

and species of leaf hopper have been constructed in present work. Beside reference to original literature, notes on economic importance whereever possible, general diagnosis, geographical distribution of each species are incorporated. The paper is based on the collection made by various Survey parties of Zoological Survey of India.

ACKNOWLEDGEMENT

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DISTANT, W.L. 1916. *Fauna Brit. India,* Rhynchota (Homoptera). **6** : 217-240.

DISTANT, W.L. 1918. *Fauna Brit. India,* Rhynchota (Homoptera) **7** : 1-109.

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COLEOPTERA : SCARABAEIDAE

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INTRODUCTION

Scarabaeidae is one of the largest families of Coleoptera, belonging to the superfamily Scaraboidea (Lamellicornia). They are commonly known as 'dung beetles' and can easily be separated by their characteristic lamellate antennae and heavily build stout body.

The beetles are important to mankind as some of them are serious pest of agriculture, forest and fruit trees. Some others feed on dung and decaying vegetative or animal matters. As a result they act as natures's scavengers. Larvae of some Melolonthinae are root feeders. Majority of these beetles are nocturnal in habit.

They are found all over the world but are very common in tropics than in temperate region.

The knowledge of the Indian Scarabaeidae is based mainly on the valuable contribution of Brenske (1898), Arrow (1910, 1917, 1931), W. Junk (1912–1913) and Balthasar (1963–1964). In recent time Biswas & Chatterjee, Chatterjee & Biswas worked on the scarabaeids of Silent Valley (Kerala), Orissa (1991), West Bengal (1995) and Meghalaya (2000).

There is however, no report of scarabaeids from the State of Mizoram as yet, the present work is based on some recent collections by different survey parties of ZSI in Mizoram. The paper deals with 14 species under 14 genera belonging to 4 subfamilies. All are first time recorded from the State.

Key to the subfamilies of Scarabaeidae known from Mizoram

1. Posterior spiracles situated in the dorsal part of the chitinous ventral segments 2
— Posterior spiracles situated in the membrane between dorsal and ventral segments .... *Coprinae*

2(1) Labrum membranous, not visible externally 3
— Labrum well developed, visible externally. 4

3(2) Mandibles visible externally, front coxae transverse ..... *Dynastinae*

4(2) Claws unequal, separately movable, the shorter one always undivided ..... *Rutelinae*
— Claws equal and not separately movable... ..... *Melolonthinae*

SYSTEMATIC ACCOUNT

List of the species recorded from Mizoram.

Family SCARABAEIDAE

Subfamily I. COPRINAE

Genus 1. ***Synapsis*** Bates

1. ***S. tridens*** Sharp

Genus 2. ***Catharsius*** Hope

2. ***C. molossus*** (Linnaeus)

Genus 3. ***Copris*** Geoffroy

3. ***C. magicus*** Harold

Genus 4. ***Onthophagus*** Latreille

4. ***O. anguliceps*** Boucamont

Genus 5. ***Onitis*** Fabricius

5. ***O. feae*** Felsche

Subfamily II. DYNASTINAE

Genus 6. ***Xylotrupes*** Hope

6. ***X. gideon*** (Linnaeus)

Genus 7. ***Chalcosoma*** Hope

7. ***C. atlas*** (Linnaeus)

Genus 8. ***Blabephorus*** Fairmaire

8. ***B. pinguis*** Fairmaire

Subfamily III. RUTELINAE

Genus 9. ***Mimela*** Kirby

9. ***M. schneideri*** Ohaus

Genus 10. ***Anomala*** Samouelle

10. ***A. variivestis*** Arrow

Subfamily IV. MELOLONTHINAE

Genus 11. ***Autoserica*** Brenske

11. ***A. mutabilis*** Olivier

Genus 12. ***Apogonia*** Kirby

12. ***A. blanchardi*** Ritsema

Genus 13. ***Lepidiota*** Hope

13. ***L. bimaculata*** Saund

Genus 14. ***Holotrichia*** Hope

14. ***H. serrata*** Fabricius

Genus ***Synapsis*** Bates

1868. *Synapsis* Bates, *Col. Hefte*, **4** : 89.

1931. *Synapsis*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 80.

1963. *Synapsis*, Balthasar, *Monogr. Scarab. Aphod. Palacarkt. Orient.*, **1** : 288.

Synapsis tridens Sharp

1881. *Synapsis tridens* Sharp, *C. R. Soc. ent. Belg.*, **25** : 92.

1931. *Synapsis tridens*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 81-82.

1963. *Synapsis tridens*, Balthasar, *Monogr. Scarab. Aphod. Palacarkt. Orient.*, **1** : 294.

2000. *Synapsis tridens*, Biswas & Ghosh, *Fauna of Meghalaya, State Fauna Ser.*, 4(5) : 541.

Material examined: 1 ex., Mizoram, Champhai, 4.IV.1994, Coll. G.C. Sen & Party.

Distribution : India : Mizoram, Manipur and Orissa.

Elsewhere : Mayanmar.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Catharsius*** Hope

1837. *Catharsius* Hope, *Col. Man.*, **1** : 21.

1931. *Catharsius*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 92.

Catharsius molossus (Linnaeus)

1758. *Scarabaeus molossus* Linnaeus, *Syst. Nat. ed.*, **10** : 347.

1801. *Copris ursus* Fabricius, *Syst. Eleuth.*, **1** : 43.

1931. *Catharsius molossus*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 94-95.

1963. *Catharsius (S. Str.) molossus*, Balthasar, *Monogr. Scarab. Aphod. Palacarkt. Orient.*, **1** : 307.

2000. *Catharsius molossus*, Biswas & Ghosh, *Fauna of Meghalaya, State Fauna Ser.*, 4(5) : 545.

Material examined : 2 exs., 1 ex., Mizoram, Aizowal North Khaulbung, 16.XII.1993, Coll. S.S. Saha; 1 ex., Mizoram, Tehrei, 13.XI.1995, Coll. M.S. Shishodia.

Distribution : India : Mizoram, Meghalaya, Orissa, Kerala, Karnataka, Maharashtra, Uttaranchal, Himachal Pradesh, Bihar, West Bengal and Andaman Island.

Elsewhere : Sri Lanka.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Copris*** Geoffroy

1762. *Copris* Geoffroy, *Ins. des. Env. de Paris*, p. 87.

1931. *Copris*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 102.

Copris magicus Harold

1881. *Copris magicus* Harold, *Mitth. Munch. ent. Ver.*, **5** : 88.

1931. *Copris magicus*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 112-113.

Material examined : 3 exs., 2 exs., Mizoram, Aizowal, North Khaulbung, 15.XII.1993, Coll. S.S. Saha; 1 ex., Mizoram, S.C. R.H. (at light), 05.IV.1994, Coll. G.C. Sen & Party.

Distribution : India : Mizoram, Manipur, Nagaland and Sikkim.

Elsewhere : Mayanmar, Vietnam & China.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Onthophagus*** Latreille

1802. *Onthophagus* Latreille, *Hist. Nat. Crust. et. Ins.*, **3** : 141.

1931. *Onthophagus*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 159.

1963. *Onthophagus*, Balthasar, *Monogr. Scarab. Aphod. Palacarkt. Orient.*, **2** : 153.

Onthophagus anguliceps Boucomont

1914. *Onthophagus anguliceps* Boucomont, *Ann. Mus. Civ. Genova*, **46** : 210.

1914. *Onthophagus blumei* Boucomont, *Ann. Soc. ent. Fr.*, P. 267.

1931. *Onthophagus anguliceps*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 178-179.

Material examined : 1 ex., Mizoram, Aizowal, N. Khawoung, 16.XII.1993, Coll. S.S. Saha.

Distribution : India : Mizoram, Meghalaya and Arunachal Pradesh.

Elsewhere : Mayanmar and Malaysia.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Onitis*** Fabricius

1798. *Onitis* Fabricius, *Suppl. ent. Syst.*, P. 2.

1931. *Onitis*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 386-387.

1963. *Onitis*, Balthasar, *Monogr. Scarab. Aphod. Palacarkt. Orient.*, **2** : 26.

2000. *Onitis*, Biswas & Ghosh, *Fauna of Meghalaya, State Fauna Ser.*, **4**(5) : 554.

Onitis feae Felsche

1907. *Onitis feae* Felsche, *Deutsche ent. Zeits.*, P. 293.

1931. *Onitis feae*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **3** : 397.

1963. *Onitis feae*, Balthasar, *Monogr. Scarab. Aphod. Palacarkt. Orient.*, **2** : 46.

2000. *Onitis feae*, Biswas & Ghosh, *Fauna of Meghalaya, State Fauna Ser.*, **4**(5) : 557.

Material examined : 1 ex., Mizoram, Aizowal, North Khaulbung, 15.XII.1993, Coll. S.S. Saha.

Distribution : India : Mizoram, Meghalaya, Assam and Arunachal Pradesh.

Elsewhere : Mayanmar and Indo-China.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Xylotrupes*** Hope

1837. *Xylotrupes* Hope, *Coleopterist's Manual*, **1** : 19.

1910. *Xylotrupes*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **1** : 262.

Xylotrupes gideon (Linnaeous)

1767. *Scarabaeus gideon* Lin.n.aeous, *Syst. Nat. 12th ed.*, **1**(2) : 541.

1859. *Xylotrupes mniszechi* Thomson, *Arcana Nat.*, P. 18.

1910. *Xylotrupes gideon*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **1** : 262-265.

Material examined : 9 exs., 2 exs., Mizoram, Laungtlai, 20.IX.1993; 2 exs., Laungtlai, 22.IX.1993; 1 ex., Kalehu, 20.IX.1993; 1 ex., zoburala, 22.IX.1993; 1 ex., Tuipui, 20.IX.1993, all collections made by A.R. Lahiri & Party; 1 ex., Aizawl, Bilkathkir, 2.VI.1994, Coll. S.S.

Saha; 1 ex., Teirei, 13.IX.1995, Coll. M.S. Shishodia.

Distribution : India : Mizoram, Minipur, Assam, Meghalaya, West Bengal, Kerala and Maharashtra.

Elsewhere : Sri Lanka.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Chalcosoma*** Hope

1837. *Chalcosoma* Hope, *Coleopt. Manual*, **1** : 86.
1856. *Chalcosoma* Lacordaire, *Gen. Coleopt.*, **3** : 448.
1910. *Chalcosoma*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **1** : 265-266.

Chalcosoma atlas (Linnaeus)

1858. *Scarabaeus atlas* Linnaeus, *Syst. Nat.*, **1** : 345.
1910. *Chalcosoma atlas*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **1** : 266-268.

Material examined : 1 ex., Mizoram, Bilkathlir, Aijal, 02.I.1994, Coll. S.S. Saha.

Distribution : India : Mizoram.

Elsewhere : Mayanmar, Malaysia, Philippines and Indonesia.

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

Genus ***Blabephorus*** Fairmaire

1898. *Blabephorus* Fairmaire, *Ann. Soc. ent. France*, P. 382.
1910. *Blabephorus*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **1** : 286.

Blabephorus pinguis Fairmaire

1898. *Blabephorus pinguis* Fairmaire, *Ann. Soc. ent. France*, P. 383.

Material examined : 1 ex., Mizoram, Sairep, 21.IV.1995, Coll. T.P. Bhattacharyya & Party.

Distribution : India : Mizoram, Assam.

Elsewhere : Bangladesh and Mayanmar.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Mimela*** Kirby

1825. *Mimela* Kirby, *Trans. Linn. Soc.*, **14** : 101.
1839. *Paracrusis* Newman, *Mag. Nat. Hist.*, **3** : 366.
1917. *Mimela*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **2** : 102-103.

Mimela schneideri Ohaus

1905. *Mimela schneideri* Ohaus, *Deutsche Ent. Zeits.*, P. 89.
1917. *Mimela schneideri*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **2** : 108-109.

Material examined : 3 exs.; 1 ex., Mizoram, Saiha, Chhimtuipui, 08.IV.1994, Coll. S.K. Ghosh; 2 exs., Mizoram, Sairep, Lunglea, 17.IV.1995, Coll. T.P. Bhattacharyya.

Distribution : India : Mizoram, Manipur and Nagaland.

Elsewhere : Mayanmar.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Anomala*** Samouelle

1819. *Anomala* Samoulle, *The Entomologist's Useful Companion*, P. 191.
1892. *Hadropopilia* Kraatz, *Deutsche Ent. Zeits.*
1917. *Anomala*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **2** : 126-127.

Anomala variivestis Arrow

1917. *Anomala variivestis*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), **2** : 156.
2000. *Anomala variivestes*, Chatterjee & Biswas, *Fauna of Meghalaya, State Fauna Ser.*, **4**(5) : 190.

Material examined : 1 ex., Mizoram, Saiha, Chhintuipui, 08.IV.1994, Coll. S.K. Ghosh.

Distribution : India : Mizoram and Manipur.

Elsewhere : Mayanmar.

Remarks : Eletra of the specimen partly damaged. The species is recorded for the first time from Mizoram.

Genus ***Autoserica*** Brenske

1897. *Autoserica* Brenske, *Berl. Ent. Zeitschr.*, **42** : 356-377.

Autoserica mutabilis Olivier

1789. *Autoserica mutabilis* Olivier, *Entom.*, **1** : 51.

1817. *Autoserica immutabilis* Schonh, *Syn. Ins.*, **1** : 181.

1898. *Autoserica mutabilis* Brenske, *Berl. Ent. Zeitschr.*, **43** : 227.

1912-13. *Autoserica mutabilis*, Junk, *Coleopterorum catalogus, Pars.*, **45** : 24.

Material examined : 1 ex., India, Mizoram, Saiha, Chhimtupui, 08.IV.1994, Coll. S.K. Ghosh.

Distribution : India : Mizoram.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Apogonia*** Kirby

1818. *Apogonia* Kirby, *Trans. Linn. Soc. London*, **12** : 401.

1856. *Apogonia* Lacord, *Gen. Col.*, **3** : 276.

1912-13. *Apogonia*, Junk, *Coleopterorum Catalogus, Pars.*, **49** : 135-136.

Apogonia blanchardi Ritsema

1898. *Apogonia blanchardi* Ritsema, *Notes Leyden Mus.*, **20** : 30.

1912-13. *Apogonia blanchardi*, Junk, *Coleopterorum Catalogus, Pars.*, **49** : 136.

Material examined : 2 exs., India, Mizoram, Saiha, Chhintuipui, 08.IV.1994, Coll. S.K. Ghosh.

Distribution : India : Mizoram.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Lepidiota*** Hope

1837. *Lepidiota* Hope, *Col. Man.*, **1** : 98.

1850. *Lepidiota* Blanchard, *Cat. Coll. Ent.*, **1** : 156.

1892. *Lepidiota* Brenske, *Berl. Ent. Zeitschr.*, **32** : 33-62.

Lepidiota bimaculata Saund

1839. *Lepidiota bimaculata* Saund, *Trans. Ent. Soc. London*, **2** : 176.

1892. *Lepidiota bimaculata* Brenske, *Berl. Ent. Zeitschr.*, **32** : 39.

Material examined : 1 ex., India, Mizoram, Aizowal, Chhingehnip, 09.IV.1995, Coll. P.H. Roy & Party.

Distribution : India : Mizoram, Assam.

Elsewhere : Mayanmar, China.

Remarks : The species is recorded for the first time from Mizoram.

Genus ***Holotrichia*** Hope

1837. *Holotrichia* Hope, *Col. Man.*, **1** : 100.

1912-13. *Holotrichia*, Junk, *Coleopterorum catalogus, Pars.*, **49** : 200.

Holotrichia serrata Fabricius

1787. *Holotrichia serrata* Fabricius, *Spec. Ins.*, **1** : 35.

1855. *Holotrichia serrata* Burmeister, *Handb. Ent.*, **4** : 2 : 310.

1912-13. *Holotrichia serrata*, Junk, *Coleoptrorum catalogus, Pars.*, **49** : 206.

Material examined : 2 exs.; 1 ex., India, Mizoram, Lauegttai North, 18.IX.1993, Coll. A.R. Lahiri; 1 ex., Lawngttai, Chhimtuipui, 03.IV.1994, Coll. S.K. Ghosh.

Distribution : India : Mizoram, West Bengal (Calcutta, Maldah).

Elsewhere : Sri Lanka.

Remarks : The species is recorded for the first time from Mizoram.

SUMMARY

The present paper deals with 14 species under 14 genera belonging to 4 subfamilies, namely Coprinae, Dynastinae, Rutelinae and Melolonthinae. It forms the first report of Scarabocidae from the Indian State of Mizoram.

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ARROW, G.J. 1917. The Fauna of British India, including Ceylon and Burma, Coleoptera, Lamellicornia (Rutelinae, Desmonycinae and Euchirinae), **2** : i+387 Pl. v. (Taylor and Francis) London.

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BISWAS, S. AND CHATTERJEE, S.K. 1991. Insecta : Coleoptera : Scarabaeidae. *Fauna of Orissa, State Fauna Series,* **1** (Part-3) : 243-262.

BRENSKE, E. 1898. Die Serica Arten der Erde. Berliner Entomol. Zeitschr, **43** : 205-404.

CHATTERJEE, S.K. AND BISWAS, S. 1995. Insecta : Coleoptera : Scarabaeidae : Cetoniinae : Dynastinae : Rutelinae. *Fauna of West Bengal, State Fauna Series,* **3** (Part-6A) : 363-447. *Zool. Surv. India.*

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VON DALLA TORRE, K.W 1912-13, In Junk's Coleopterorum Catalogus (Scarabaeidae : Melolonthinae I), S. Schenkling, Pars **45** : 24, Pars **49** : 136, Pars **49** : 206.

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 295-306, 2007

INSECTA : COLEOPTERA : SILVANIDAE

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INTRODUCTION

The Silvanidae are a moderately large family of the section Clavicornia of the superfamily Cucujoidea. The silvanids are usually small (1.3-4.5 mm.), reddish-brown and occasionally with dorsal spots. They are largely associated with litter or vegetable debris and a good number of species are subcorticolous by habit. A few species cause considerable damage to stored food products of vegetable origin. The Silvanidae seen to be more diversely represented in the tropical and subtropical climates than in the temperate zones. The representatives of the family occur in all the main continental areas of the world, but so far a few species only have been recorded from New Zealand and the oceanic islands. Subsequent to Grouvelle (1908, 1912) the works of Pal and Sengupta (197, 1979, 1984); Pal (1981, 1985); Pal, Sengupta and Crowson (1984); and Sengupta and Pal (1996) have contributed to the knowledge of the Silvanidae of India. Later on, Pal and Halstead (1998) recorded *Acathartus* Grouvelle from Mizoram: India with a new species. The present work is based on the collection made by the author from Mizoram in 1995. These represent 12 species under 6 genera.

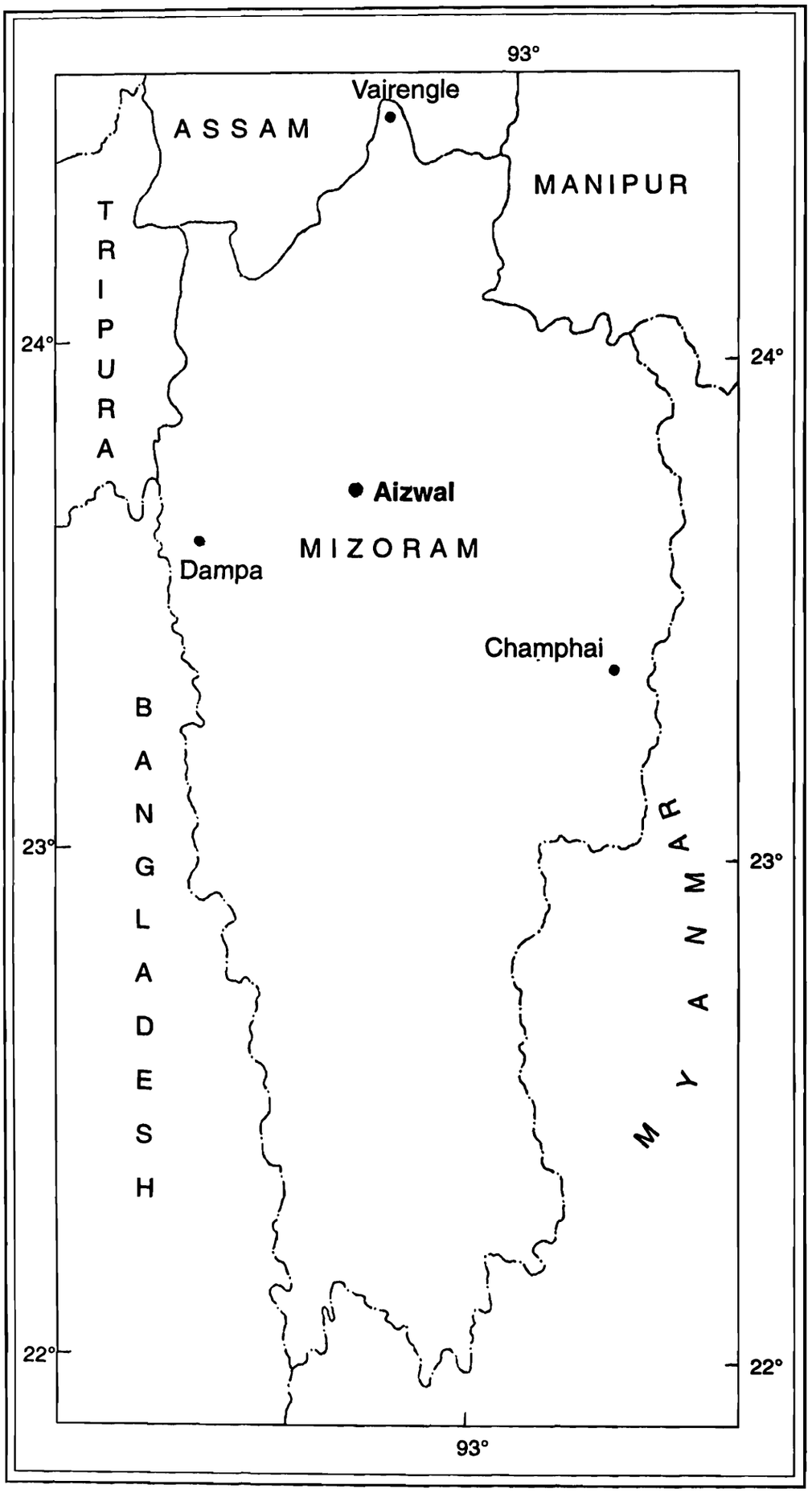
CHARACTER OF THE FAMILY

Body small to moderately large (1.3-11.5 mm.), usually parallel-sided and somewhat flattened or sometimes ovoid and subconvex, elytral punctation in rows.

Head usually little elongate, sometimes transverse, usually with a transverse impressed line on vertex behind eyes, fronto-clypeal suture present or absent, antennal insertions hidden or exposed but never distinctly dorsal; gular sutures well separated, anterior part of gular region without longitudinal grooves, genal process normal; antenna 11-segmented, often with 3-sgmented club and sometimes without club; mandible with two or three apical teeth, well developed mola, sometimes with a large cavity on dorsal side, otherwise cavity reduced to a vestige and without dorsal tubercle; maxilla with distinct lacinia and galea, lacinia narrow and with or without apical spine, galea broad and its apex densely hairy, palpi with apical segment rarely securiform; labium with mentum transverse; palpi with apical segment rarely securiform or transverse or distinctly smaller than segment 2.

Prothorax usually elongate and sometimes transverse, side margins often serrated and sometimes with distinct teeth, pronotum without distinct prebasal impression, prosternum moderately broad with apical margin almost straight, front coxae usually closely and rarely widely situated, trochantins hidden; coxal cavities somewhat rounded, usually externally closed behind and rarely open.

Elytra punctured in regular rows and usually with 9 rows of punctures, rarely with scutellary striole, epipleura usually complete. Wing usually with single anal vein, sometimes with three or five anal veins; devoid of radial cell, R-m cross vein and subcubital fleck.



MAP OF MIZORAM

Mesocoxae often closely situated, sternal fitting between mesocoxae usually in a straight line and sometimes with a narrow projection from metasternum, mesocoxal cavities broadly opened outwardly; hind coxae transverse and moderately widely separated; metendosternite often reduced and without lateral plates, sometimes well developed with anterior tendons.

Legs moderately long, trochanters short and simple, femora swollen towards middle, tibiae slightly broadened at apex and usually with two spurs, tarsal formula 5-5-5 in both sexes, tarsal segments 1-3 usually simple or slightly lobed below.

Abdomen covered by elytra, all ventrites freely articulated, ventrite 1 longest and ventrites 2-5 more or less equal in length, ventrite 1 sometimes with open femoral lines, intercoxal process variable. Aedeagus inverted cucujoid-type, median lobe usually broadly elongated and with a median strut, articulated parameres well developed. Ovipositor well developed with separate paraprocts, valvifers, coxites and styli.

LIST OF TAXA

Family SILVANIDAE

Subfamily SILVANINAE

1. *Silvanus difficilis* Halstead
2. *Silvanoprus scuticollis* (Walker)
3. *Silvanoprus indicus* Pal and Sengupta
4. *Silvanoprus longicollis* (Reitter)
5. *Silvanoprus cephalotes* (Reitter)
6. *Silvanoprus angusticollis* (Reitter)
7. *Silvanoprus palnicus* Sengupta and Pal
8. *Protosilvanus lateritius* (Reitter)
9. *Acathartus mizoramensis* Pal and Halstead
10. *Monanus concinnulus* (Walker)

Subfamily PSAMMOECINAE

11. *Psammoecus lepidus* Grouvelle
12. *Psammoecus trimaculatus* Motschulsky

Family SILVANIDAE

Subfamily SILVANINAE

Genus ***Silvanus*** Latreille

1804. *Silvanus* Latreille, *Histoire Naturelle, générale et particuliére, des crustaces et des insectes,* **11** : 158 [Type species: *Ips unidentata* Olivier].

Diagnosis : Head devoid of fronto-clypeal suture, eyes moderately large and coarsely facetted, temple often flattened beneath eye, transverse impressed line on vertex behind eyes, 11-segmented antenna with 3-segmented club, antennal insertions hidden under projection of frons, mandible with 3 apical teeth, apical segments of maxillary and labial palpi fusiform; prothorax usually elongate, side margins finely serrated, front coxal cavities closed and prosternal process broad at apex, mesocoxae narrowly separated; wing with single aral vein; each elytron with 9 rows of strial punctures, tarsi of legs simple; intercoxal process of first abdominal ventrite broad and its apical margin broadly pointed, femoral lines closed.

1. *Silvanus difficilis* Halstead

1973. *Silvanus difficilis* Halstead, *Bull. Br. Mus. Nat. Hist. (Ent.)* **29**(2) : 73.

1977. *Silvanus difficilis*: Pal and Sengupta, *Oriental Ins.*, **11**(2) : 279.

Diagnosis : Reddish brown and covered with short pubescence; eyes slightly shorter than half of length of head, temple about as long as 1.5 to 2 eye facets with broad outer apical angle, puncturation on vertex coarse and dense; elongated prothorax, anterior spine about half as long as eye with slightly blunt tip, well developed lateral depressions on pronotal disc, puncturation on pronotum coarse and dense and almost similar to that of vertex of head; elytra little more than twice as long as broad, side margins little wavy, punctures deep and large.

Length : 2.20-2.50 mm.

Material : 2 ex., India : Mizoram, Aizawl District, Dampa, 230 m., 27.1.1995, T. K. Pal, *ex.* under bark.

Distribution : India : Arunachal Pradesh, Assam, Meghalaya, Mizoram (New record), Sikkim, West Bengal, Himachal Pradesh, Uttar Pradesh, Madhya Pradesh, Maharastra, Karnataka, Kerala, Tamil Nadu, Andaman Island.

Elsewhere : Sri Lanka, Myanmar, Vietnam; Taiwan; Malaysia; Singapore; Indonesia; Philippines; Moluccas; I. Delcas; Solomon Is.; Samoa Is.; Australia; New Ireland; West Africa.

Genus ***Silvanoprus*** Reitter

1911. *Silvanoprus* Reitter, *Fauna Germanica* **3** : 45 [Type species: *Silvanus fagi* Guérin –Méneville].

Diagnosis : Head devoid of fronto-clypeal suture, eyes moderately large and coarsely facetted, temple usually flattened beneath eye, vertex with a transverse impressed line behind eyes, 11-segmented antenna with 3-segmented club, antennal insertions hidden under projection of frons, mandible with well developed mola and 3 apical teeth, apical segments of maxillary and labial palpi fusiform; prothorax usually elongate and rarely transverse, side margins finely serrated, front angles with more or less prominent spines, front coxal cavities closed and prosternal process broad at apex, mesocoxae closely situated; wing with single anal vein; each elytron with 9 rows of strial punctures; tarsal segment 3 of legs strongly lobed below; intercoxal process of first abdominal ventrite broad but narrowed towards apex and slightly pointed, femoral lines closed and usually narrowly separated from posterior margins of hind coxal cavities.

2. ***Silvanoprus scuticollis*** (Walker)

1859. *Silvanus scuticollis* Walker, *Ann. Mag. Nat. Hist.*, (3)**3** : 53.

1876. *Silvanus triangulus* Reitter, *Col. Hefle*, **15** : 60.

1908. *Silvanus scuticollis* Grouvelle, *Annls. Soc. ent. Fr.*, **77** : 491.

1912. *Silvanoprus scuticollis* Grouvelle, *Annls. Soc. ent. Fr.*, **81** : 342.

1979. *Silvanoprus scuticollis*: Pal and Sengupta, *Entomologica Basiliensia*, **4** : 70.

Diagnosis : Yellowish to reddish-brown and covered with short pubescence; eyes slightly shorter than half of length of head, temple about as long as one eye facet and its outer apical angle slightly pointed, puncturation on vertex coarse and dense; prothorax broader than long and distinctly narrowed posteriorly, widest across anterior spines, anterior spine about two-thirds as long as eye, lateral depressions on pronotum slightly developed, puncturation on pronotum almost similar to that of vertex of head; elytra slightly less than twice as long as broad, side margins little wavy, punctures deep and large. Length- 2.15-2.55 mm.

Material : 46 ex., India : Mizoram, Aizawl District, Aizawl, 1000 m., 1 ex., 20.i.1995, T.K.Pal, *ex. d*ried vegetation; Teirei vill., Dampa, 200 m., 10 ex., 26.i.1995, T.K. Pal, *ex.* haystack; Dampa, 230 m., 32 ex., 27.i.1995, T.K. Pal, *ex* haystack; New Champhai, 1325 m., 1 ex., 31.i.1995, T.K. Pal, *ex.* haystack; Vairengte, 120 m., 2 ex., 5.ii.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Assam, Meghalaya, Mizoram (New record), Sikkim, West Bengal, Bihar, Uttar Pradesh, Tamil Nadu.

Elsewhere : Sri Lanka; Malaysia; Indonesia; Japan; East Africa; Madagascar; France; Guyana; West Indies.

3. ***Silvanoprus indicus*** Pal and Sengupta

1979. *Silvanoprus indicus* Pal and Sengupta, *Entomologica Basiliensia*, **4** : 71.

Diagnosis : Yellowish to reddish-brown and covered with short pubescence; eyes less than half of length of head, temple about as long as 2 to 3 eye facets and its outer apical margin broad, temple not flattened beneath eye, puncturation on vertex coarse and dense; prothorax elongate, slightly narrowed posteriorly, anterior spine short and its tip broadly pointed, side margins curved and sinuate near extremities, lateral depression on pronotum slightly developed, puncturation on pronotum almost similar to that of vertex of head; elytra about twice as long as broad, side margins little wavy, punctures deep and large.

Length : 2.29-2.33 mm.

Material : 48 ex., India : Mizoram, Aizawl District, Teirei vill., Dampa, 200 m., 38 ex., 26.i.1995, T.K.Pal, *ex.* haystack; Dampa, 200 m., 10 ex., 27.i.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Assam, Meghalaya, Mizoram (New record), Sikkim.

Elsewhere : Bhutan.

4. *Silvanoprus longicollis* (Reitter)

1876. *Silvanus longicollis* Reitter, *Col. Hefle,* **15** : 60.

1908. *Silvanus longicollis* Grouvelle (nec. Reitter), *Annls. Soc. ent. Fr.,* **77** : 491.

1912. *Silvanoprus longicollis* Grouvelle (nec. Reitter), *Annls. Soc. ent. Fr.,* **81** : 341.

1984. *Silvanoprus longicollis* : Pal, *Rec. zool. Surv. India,* **81**(3-4) : 339.

Diagnosis : Yellowish to blackish-brown and covered with short pubescence; eyes short, temple long, slightly longer than length of eye and its outer margin slightly rounded, antennal scape large and about twice as long as broad, antennal segments 2-8 narrow-elongate, puncturation on vertex coarse and ocellate; prothorax elongate and almost parallel-sided, anterior spine small, about half as long as eye and projected forward, puncturation on pronotum almost similar to that of vertex of head and little finer anteriorly, lateral depressions on pronotum indistinct; elytra about twice as long as broad, side margins little wavy, punctures deep and large.

Length : 2.20-2.28mm.

Material : 45 ex., India : Mizoram, Aizawl District, Teirei vill., Dampa, 200 m., 26.i.1995, T.K. Pal; *ex.* haystack.

Distribution : India : Assam, Meghalaya, Mizoram (New record), Sikkim, West Bengal, Uttar Pradesh, Tamil Nadu.

Elsewhere : Sri Lanka; Malaysia; Indonesia; China; Japan; Madagascar; East Africa.

5. *Silvanoprus palnicus* Sengupta & Pal

1996. *Silvanoprus palnicus* Sengupta & Pal, *Fauna of India, Coleoptera, Silvanidae* : 92.

Diagnosis : Yellowish-brown and covered with short pubescence; eyes short, temple extended beneath eye, shorter than length of eye, outer margin nearly straight or little concave; puncturation on vertex coarse and dense, tubercles coarser than eye facets and becoming gradually finer on frons and clypeus; antennal scape moderately large and elongate, segments 2-8 narrower than scape and elongate; prothorax elongate, broadest across anterior spines and narrowed posteriorly, anterior spine about half as long as eye with broad tip, projecting antero-laterally, side margin sinuate on either side of middle, puncturation on pronotum almost similar to that of vertex of head; elytra little more than twice as long as broad, sides slightly sinuate, punctures moderately large and deep; metatibia in male little more bent than in female.

Length : 2.46-2.50 mm.

Material : 4 ex., India : Mizoram, Aizawl District, Dampa w.l.s, 200 m., 25.i.1995, T.K. Pal, *ex.* forest litter.

Distribution : India : Tamil Nadu, Mizoram (New record).

6. *Silvanoprus cephalotes* (Reitter)

1876. *Silvanus cephalotes* Reitter, *Col. Hefle,* **15** : 62.

1908. *Silvanus longicollis*: Grouvelle (nec. Reitter), *Annls. Soc. ent. Fr.,* **77** : 492.

1912. *Silvanoprus longicollis* : Grouvelle (nec. Reitter), *Annls. Soc. ent. Fr.,* **81** : 342.

1979. *Silvanoprus cephalotes* : Pal & Sengupta, *Entomologica Basiliensia,* **4** : 70.

1984. *Silvanoprus cephalotes*: Pal, *Rec. zool. Surv. India,* **81**(3-4) : 339.

Diagnosis : Yellowish to reddish-brown and covered with pubescence; eyes slightly shorter than half as long as head, temple about as long as one eye facet and its outer apical angle slightly

pointed, temple flattened beneath eye, puncturation on vertex coarse and dense and not ocellate-type; elongated prothorax widest near middle, anterior spine small, about one-fourth as long as eye or shorter and projected forward, lateral depressions on pronotum slightly developed, puncturation on pronotum almost similar to that of vertex of head; elytra more than twice as long as broad, side margins little wavy, punctures deep and large.

Length : 2.20-2.40 mm.

Material : 210 ex., India : Mizoram, Aizawl District, Zemabawk, 1000 m., 6 ex., 21.i.1995, T.K.Pal, *ex.* vegetation debris; 10 km. N. 0-Aizawl, 1000 m., 4 ex., 23.i.1995, T.K.Pal, *ex.* vegetation debris; Teirei vill., Dampa, 200 m., 83 ex., 26.i.1995, T.K. Pal, *ex.* haystack; Dampa, 230 m., 117 ex., 27.i.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Assam Meghalaya, Mizoram (New Record), Sikkim, West Bengal, Bihar, Uttar Pradesh, Delhi, Karnataka, Tamil Nadu.

Elsewhere : Bhutan; Nepal; Sri Lanka; Indonesia; Japan; China.

7. ***Silvanoprus angusticollis*** (Reitter)

1876. *Silvanus angusticollis* Reitter,*Col. Hefle,* **15** : 59.

1912. *Silvanoprus angusticollis*: Grouvelle, *Annls. Soc. ent. Fr.,* **81** : 341.

1979. *Silvanoprus angusticollis* : Pal and Sengupta, *Entomologica Basiliensia,* **4** : 71.

Diagnosis : Reddish-brown and covered with short pubescence; eyes slightly shorter than half as long as head, temple shorter than one eye facet and its outer apical angle pointed, temple flattened beneath eye, puncturation on vertex coarse and dense; elongated prothorax widest across anterior spines, slightly narrowed posteriorly behind middle, anterior spine moderately long, slightly shorter than half as long as eye and projected antero-laterally, lateral depressions on pronotum slightly developed, puncturation on pronotun almost similar to that of vertex of head; elytra about twice as long as broad, side margins little wavy, punctures deep and large.

Length : 2.55-2.75 mm.

Material : 4 ex., India : Mizoram, Aizawl District, Dampa, 230 m., 1 ex., 27.i.195; Zemabawk, 1000 m., 1 ex., 21.i.1995; *ex.* vegetation debris; Seling, 900 m., 2 ex., 29.i.1995, T.K. Pal, *ex.* dried vegetation.

Distribution : India : Meghalaya, Mizoram (New record), Sikkim, West Bengal (Darjeeling District), Uttar Pradesh, Kashmir, Tamil Nadu.

Elsewhere : Bhutan; Nepal; Japan.

Genus ***Protosilvanus*** Grouvelle

1912. *Silvanus(Protosilvanus)* Grouvelle, *Annls. Soc. ent. Fr.,* **81**: 336.

1973. *Protosilvanus* Grouvelle: Halstead, *Bull. Br. Mus. Nat. Hist. (Ent.)* **29**(2) : 89 [Type species: *Silvanus lateritius* Reitter].

Diagnosis : Elongated, parallel-sided, head devoid of fronto-clypeal suture, eyes large and coarsely facetted, temple flattened beneath eye and shelf-like, vertex with a distinct transverse impressed line behind eyes, 11-segmented antenna with 3-segmented club, antennal insertions hidden under projection of frons, mandible with well developed mola and 3 apical teeth, maxillary lacinia without apical spines, segments 2 of both maxillary and labial palpi longer than apical segments; prothorax elongated, front angles with prominent spines, side margins finely denticulate, front coxae widely separated and coxal cavities closed behind, sterno-pleural suture extending to lateral margin, mesocoxae widely separated; wing with single anal vein; each elytron with 9 rows of strial punctures, interstice 7 more or less carinate; tarsi of legs simple; intercoxal process of first abdominal ventrite broad and broadly pointed at apex, femoral lines closed.

8. ***Protosilvanus lateritius*** (Reitter)

1878. *Silvanus lateritius* Reitter, *Verh. zool. bot. Ges. Wien,* **28** : 194.

1908. *Silvanus lateritius*: Grouvelle, *Annls. Soc. ent. Fr.,* **77**: 490.

1912. *Silvanus (Protosilvanus) lateritius* : Grouvelle, *Annls. Soc ent. Fr.*, **81** : 336.

1973. *Protosilvanus lateritius* : Halstead, *Bull. Br. Mus. nat. Hiist., (Ent.)*, **29**(2) : 96.

1984. *Protosilvanus lateritius* : Pal & Sengupta. *Oriental Ins.*, **18** : 237.

Diagnosis : Dorsally flattened, reddish-brown and covered with short pubescence; eyes about half as long as head, temple shorter than width of an eye facet and sloped downward, antennal segments 9 and 10 with apical spines, puncturation on vertex coarse and dense; elongated prothorax slightly narrowed behind middle, widest across anterior spines, lateral depressions on pronotum rather well developed, puncturation on pronotum almost similar to that of vertex of head; elytra more than twice as long as broad, almost parallel-sided with side margins slightly wavy, punctures deep and large, interstice 7 strongly carinate and extending slightly more than anterior three-fourths.

Material : 1 ex., India : Mizoram, Aizawl District, Dampa, 230 m., 27.i.195, T.K.Pal, ex., Under bark.

Distribution : India : Arunachal Pradesh, Assam, Meghalaya, Mizoram (New record), Sikkim, West Bengal, Bihar, Uttar Pradesh, Himachal Pradesh, Kerala, Tamil Nadu, Andaman Island.

Elsewhere : Nepal; Bangaladesh; Myanmar; Sri Lanka; Thailand; Vietnam; Malaysia; Singapore; Indonesia; Philippines; Taiwan; China; Japan.

Genus *Acathartus* Grouvelle

1912. *Acathartus* Grouvelle, *Annls. Soc. ent. Fr.*, **81** : 315. [Type species : *Silvanus insignis* Grouvelle].

1998. *Acathartus* : Pal & Halstead, *Annales Zoologici*, **48**(1/2) : 45.

Diagnosis : Elongated, subparallel; head devoid of fronto-clypeal suture, eyes small and prominent, head sloped to back of eye but not forming a distinct temple, back of head with well marked impressed line, 11-segmented antenna with 2-segmented or indistinctly 3-segmented club, antennal insertion hidden under projection of frons, submentum in male with a large median pit bearing a few setae, mandible with apex bifid, maxillary palpi with segments 2 and 3 subequal, apical segment longest and narrowed apically, apical segment of labial palpi longer than segment 2 and narrowed apically; prothorax elongated, pronotum with anterior margin raised along median part, anterior angles laterally produced and broadly rounded, sides straight or weakly undulating and serrated, front coxae moderately widely separated, sterno-pleural suture markedly impressed and extending to side margin near base of anterior angle; elytra subparallel, each elytron with 9 rows strial punctures, alternate interstices slightly raised but not carinate; tarsal segment 3 produced apically to form a lobe on which small 4th segment articulated; intercoxal process of first abdominal ventrite narrowly pointed, femoral lines inconspicuous.

9. *Acathartus mizoramensis* Pal & Halstead

1998. *Acathartus mizoramensis* : Pal & Halstead, *Annales Zoologici*, **48**(1/2) : 47.

Diagnosis : Dorsum subdepressed, somewhat shiny, reddish-brown, punctate-pubescent, head (excluding eyes) slightly longer than broad, slightly depressed above antennal insertions, eyes about 1/5th as long as head, temple sloped to back of eye and pointed where it meets eye, puncturation on vertex moderately coarse and dense; antenna moderately slender, about 1.6 times as long as head, club appears to be 2-segmented, segment 10 broader than apical segment; elongated prothorax slightly narrowed posteriorly, anterior angles broadly rounded, sides somewhat undulating, pronotal disc depressed with shallow but distinct lateral depressions on basal half, puncturation moderately coarse and dense, coarser laterally than mesally; elytra more than twice as long as broad, subparallel, slightly wider at anterior third, sides slightly sinuate with narrowly explanate margins, punctures moderately large and deep; in male metatibia bent inwards and with row of denticles on apical part of proximal side.

Length : 4.0 mm.

Material : 1 ex., Holotype male; India : Mizoram, Aizawl District, Dampa Wildlife Sanctuary, 200 m., 25.i. 1995, T.K.Pal, *ex.* forest litter.

Distribution : India : Mizoram.

Genus ***Monanus*** Sharp

1879. *Monanus* Sharp, *Trans. Ent. Soc. Lond.*, **2** : 85. [Type species : *Monanus crenatus* Sharp].

1899. *Emporius* Ganglbauer, *Die Käfer von Mitteleuropa*, **3** : 429.

Diagnosis : Head devoid of fronto-clypeal suture, eyes moderately large and coarsely facetted, temple flattened beneath eye, no transverse impressed line on vertex behind eyes, 11-segmented antenna with 3-segmented club, antennal insertions hidden under projection of frons, mandible with well developed mola and three apical teeth, apical segments of maxillary and labial palpi longer than other segments and fusiform, maxillary lacinia without apical spine; prothorax as broad as long, side margins with a few setose denticles, front coxae contiguous and coxal cavities closed behind, sterno-pleural suture extending usually to anterior denticle, mesocoxae contiguous; wing with single anal vein; each elytron with 9 rows of strial punctures, alternate interstices with single and double rows of pubescence; tarsal segments 2 and 3 of legs strongly lobed below; intercoxal process of first abdominal ventrite broad and its apex slightly rounded, femoral lines closed.

10. ***Monanus concinnulus*** (Walker)

1858. *Monotoma concinnulus* Walker, *Ann. Mag. Nat. Hist.*, (3)**2** : 207.

1867. *Silvanus signatus* Frauenfeld, *verh. Zool. Bot. Ges. Wien*, **17** : 438.

1874. *Cryptamorpha fasciatus* Wollaston, *Entomologist's mon. Mag.*, **10** : 169.

1876. *Cryptamorpha concinnula* : Waterhouse, *Entomologist's mon. Mag.*, **13** : 122.

1899. *Emporius signatus* : Ganglbauer, *Die Käfer von Mitteleuropa*, **3** : 586.

1908. *Emporius concinnulus* : Grouvelle, *Annls. Soc. ent. Fr.*, **77** : 489.

1911. *Emporius concinnulus* : *Reitter, Fauna Germanica*, **3** : 48.

1912. *Monanus* (s. str.) *concinnulus* : Grouvelle, *Annls. Soc. ent. Fr.*, **81** : 371.

1981. *Monanus* (s. str.) *concinnulus* : Pal, *Oriental Ins.*, **15**(3) : 247.

Diagnosis : Moderately convex, rather shiny, yellowish to reddish-brown and with black markings on elytra, covered with short pubescence; eyes shorter than one-third as long as head, temple about as long as 1.5 eye facets and its outer apical angle slightly pointed, antenna shorter than head and prothorax together, puncturation on vertex coarse and dense; quadrate prothorax slightly rounded anteriorly, side margin with about ten small and blunt denticles and each denticle bear an anteriorly directed seta, puncturation on pronotum almost similar to that of vertex of head; elytra shorter than twice as long as broad, side margins almost uniformly curved, a transverse black spot near middle and that extends towards apex along suture, punctures large.

Length : 2.00-2.30 mm.

Material : 16 ex., India : Mizoram, Aizawl District, Zemabawk, 1000 m., 1 ex., 21.i.1995, T.K.Pal, *ex.* vegetation debris; Teirei vill., Dampa, 200 m., 2 ex., 26.i.1995, T.K.Pal, *ex.* haystack; Dampa, 230 m., 12 ex., 26.i.1995, T.K.Pal, *ex.* haystack; Vairengte, 120 m., 1 ex., 5 ii. 1995, T.K.Pal, *ex.* haystack.

Distribution : India : Meghalaya, Mizoram (New record), Sikkim, West Bengal, Bihar, Uttar Pradesh, Dehli, Tamil Nadu, Karnataka.

Elsewhere : Outside India this species is widely distributed in both the Old and New Worlds.

Subfamily PSAMMOECINAE

Genus ***Psammoecus*** Latreille

1829. *Psammoechus* Latreille, *In. Cuv. Riegne Anim. Ed. 2*, **5** : 135 [Type species: *Dermestes bipunctatus* (Fabricius)].

1830. *Crypta* Stephen, *Illustration of British Entomology* : *Mandibulata*, **3** : 103.

1846. *Psammoecus* : Erichson, *Naturgeschichte der Insekten Deutschlands* 1, Coleoptera, **3** : 329.

Diagnosis : Elongate, slightly ovoid; head with fronto-clypeal suture, two lateral longitudinal striae on vertex originating near bases of antennae, eyes small to moderately large and coarsely facetted, temple may or may not extend beneath eye, transverse impressed line on vertex behind eyes, 11-segmented antenna with no distinguishable club, antennal insertions somewhat dorso-lateral, mandible with large basal mandibular cavity and three apical teeth, apical segments of both maxillary and labial palpi securiform or transverse, maxillary lacinia without apical spine; prothorax usually transverse, side margins with more or less prominent denticles, front coxae contiguous and coxal cavities closed behind, apical margin of prosternal process little sinuate, sterno-pleural suture extending to lateral margin; wing with single anal vein; each elytron with 10 rows of strial punctures; tarsal segments 1-3 of legs lobed below; intercoxal process of first abdominal ventrite broad and its apical margin broadly pointed, femoral lines almost marginal striae of hind coxal cavities.

11. ***Psammoecus delicatus*** Grouvelle

1908. *Psammoecus delicatus* Grouvelle, *Annls. Soc. ent. Fr.*, **77** : 477.

1985. *Psammoecus delicatus* : Pal, *Misc. Publ. Rec. zool. Surv. India, Occ. Pap. No.*, **71** : 21.

Diagnosis : Elongate-ovoid, moderately convex, slightly shiny, yellowish-brown, blackish spots on elytra, antennal scape, pedicel, apical part of segment 6 and segment 7-9 blackish, segments 10-11 yellowish-white, elytra covered with long and semierect pubescence; eyes shorter than half as long as head, temple short and slightly flattened beneath eye; antenna long and slender, all segments more or less elongate; prothorax transverse, anterior margin sinuate, lateral margin outwardly curved and with nine teeth of variable size, teeth gradually becoming longer towards posterior side and attain its maximum length above penultimate tooth, longest tooth about four times as long as wide, all teeth somewhat blunt at apex, lateral margin of pronotum widely explanate and transverse prebasal impression prominent, puncturation on pronotum coarse and dense, pubescence on disc scanty; elytra more than one and a half times as long as broad, ovoid and widest near middle, strial punctures large and round, interstices about as wide as punctures; two blackish area on elytra, one in anterior half and one at apex , areas connected along suture by longitudinal sutural band

Length : 2.40mm.

Material : 2 ex., India : Mizoram, Aizawl District, Dampa Wildlife Sanctuary, 200 m., 25.i.1995, T.K.Pal, *ex.* forest litter.

Distribution : Indian : Mizoram (New record), Kerala.

Elsewhere : Sri Lanka.

Remarks : Blackish pigmentation of antennal segments (especially scape and pedicel) is found to be slightly lighter than in the material from Kerala and Sri Lanka (studied earlier).

12. ***Psammoecus trimaculatus*** Motschulsky

1858. *Psammoecus trimaculatus* Motschulsky, *Etud. Ent.*, **7** : 45.

1859.? *Cucujus incommodus* Walker, *Ann. Mag. Nat. Hist.*, (3)**3** : 53.

1876. *Psammoecus trimaculatus* : Waterhouse, *Entomologist's mon. Mag.*, **13** : 124.

1876. *Telephanus cruciger* Waterhouse, *Entomologist's mon. Mag.*, **13** : 125.

1879. *Psammoecus trimaculatus*: Reitter, *Verh. Zool. Bot. Ges. Wien*, **29** : 509.

1906. *Psammoecus trimaculatus*: Grouvelle, *Annls. Soc. ent. Fr.*, **75** : 125.

1908. *Psammoecus trimaculatus*: Grouvelle, *Annls. Soc. ent. Fr.*, **77** : 406.

1979. *Psammoecus trimaculatus* : Pal & Sengupta, *Entomologica Basiliensia*, **4** : 75.

1984. *Psammoecus trimaculatus*: Pal, *Rec. zool. Surv. India*, **81**(3-4) : 352.

1985. *Psammoecus trimaculatus*: Pal, *Misc. Publ. Rec. zool. Surv. India, Occ. Pap. No.* **71** : 41.

Diagnosis : Elongate-oval, moderately convex, slightly shiny, yellowish-brown with blackish spots on elytra and antennal segments 7–10 blackish, elytra covered with moderately long pubescence; eyes slightly shorter than half as long as head, temple short and slightly flattened beneath eye, antenna long and slender, scape moderately large and elongate, segments 2-6 shorter, subequal and elongate, segments 7-11 slightly wider than segment 6, segment 7 slightly elongate, segments 8-10 about as broad as long or slightly transverse, segment 11 elongate and acuminate apically; prothorax transverse, anterior margin narrower than head across eyes, front margin and side margins feebly rounded, side margin with six or seven teeth of variable length, longest tooth in posterior half, slightly elongate and blunt apically, puncturation on pronotum coarse and dense, disc setose; elytra shorter than one and a half times as long as broad, widest near middle, punctures moderately large, interstices about as wide as or wider than punctures, a more or less rounded blackish spot on each elytron in posterior half and a longitudinal sutural spot present behind them. Length- 2.5-3.00 mm.

Material : 15 ex., India : Mizoram, Aizawl District, Dampa Wildlife Sanctuary, 200 m. 1 ex., 25.i.1995 , T.K.Pal , *ex.* forest litter; Teirei vill., Dampa, 200 m., 2 ex., 26.i.1995, T.K.Pal, *ex.* haystack; Dampa, 230 m., 7ex., 27.i.1995, T.K.Pal, *ex.* haystack; New Champhai, 1325 m., 1 *ex.*, 31.i.1995, T.K.Pal, *ex.* haystack; Vairengte, 120 m., 4 ex., 5 ii. 1995, T.K.Pal, *ex.* haystack.

Distribution : India : Arunachal Pradesh, Assam, Meghalaya, Mizoram (New record), Sikkim, West Bengal, Bihar, Orissa, Uttar Pradesh, Jammu & Kashmir, Delhi, Karnataka, Tamil Nadu, Kerala; Nepal; Bhutan; Sri Lanka; Myanmar; Malaysia; Japan; Madagascar.

Key to the Subfamilies, Genera and Species of Silvanidae of Mizoram

1. Head without fronto-clypeal suture and devoid of longitudinal groove or striae on vertex; antennal insertions hidden under projection of frons, with distinct antennal club ..... (Silvaninae) ..... 2.

– Head with a distinct fronto-clypeal suture and a pair of longitudinal striae on vertex; antennal insertions more or less exposed and dor so-lateral; no distinguishable antennal club .... (Psammoecinae : *Psammoecus*) ..... 11.

2. Species markedly flattened; sterno-pleural suture of prothorax extending to lateral margin far below anterior spine; front coxae widely separated, much wider than coxal diameter; apical segments of maxillary and labial palpi shorter than segment 2; 7th elytral interstice more or less carinate, antennal segments 9 and 10 with apical spines .... *Protosilvanus lateritius* (Reitter).

– Species moderately to rather well flattened dorsally; sterno-pleural suture of prothorax extending to base of anterior spines; front coxae less widely separated, not wider than coxal diameter; apical segments of maxillary and labial palpi longest; elytral interstices not carinate ..... 3.

3. Species dorsally depressed; eyes less than one-fourth as long as head; anterior margin of pronotum raised along medial part, anterior angles laterally produced and broadly rounded, anterior part of prosternum with transverse striations, side of prothorax shallowly undulating and margin serrulate .... *Acathartus mizoramensis* Pal & Halstead.

– Species moderately flattened; eyes never less than one-third as long as head; anterior margin of pronotum not raised along medial part, anterior angles produced antero-laterally into small spine or denticle, anterior part of prosternum devoid of transverse striations 4

4. Lateral margin of prothorax finely serrated and without large teeth or denticles; tarsi simple or only segment 3 lobed 5

– Lateral margin of prothorax with about ten blunt denticles; tarsal segments 2 and 3 strongly

lobed. Transverse blackish spot near middle of elytra .....*Monanus conncinulus* (Walker).

5. Tarsi simple and not lobed. Temple of head distinct and thick, longer than one eye facet and its outer apical angle broad .... *Silvanus difficilis* Halstead.

– Tarsal segment 3 strongly lobed below..... .....(*Silvanoprus*) 6

6. Prothorax broader than long, width across anterior spines more than 1.5 times as broad as across posterior angles, prothorax distinctly narrowed posteriorly, sides almost straight, shape of prothorax rather triangular..... ..... *Silvanoprus scuticollis* (Walker)

– Prothorax longer than broad, width across anterior spines less than 1.25 times as broad as across posterior angles, prothorax slightly narrowed posteriorly behind middle, sides often sinuate,shapes of prothorax different..... 7

7. Temple of head moderately long and not flattened beneath eye, about as long as 2-3 eye facets and inwardly notched .... *Silvanoprus indicus* Pal & Sengupta.

– Temple of head very short or long and somewhat extended beneath eye; temple either short, thin with outer apical angle pointed, or long with outer margin blunt or round 8

8. Temple of head short, about as long as 1-2 eye facets and its outer apical angle somewhat pointed; puncturation of head and pronotum reticulate-type, coarse and dense 9

– Temple of head long, about as long as eye or longer and its outer margin blunt or rounded; puncturation of head and pronotum ocellate-type, coarse and somewhat globular..... 10

9. Front and middle femora with a distinct spine near middle on inner side; sides of prothorax more or less uniformly curved outwardly; anterior spine of prothorax small, projected in front and about one-fourth as long as eye.... .....*Silvanoprus cephalotes*(Reitter).

– Front and middle femora devoid of any spine; sides of prothorax wavy and sinuate across anterior one-third; anterior spine of prothorax longer, about half as long as eye and projecting somewhat antero-laterally ....*Silvanoprus angusticollis* (Reitter)

10. Antennal scape large, robust and segments 2-8 markedly narrower than scape; anterior spine of prothorax projecting forward and its tip somewhat pointed. Aedeagus: each paramere with single long apical seta .... *Silvanoprus longicillis* (Reitter)

– Antennal scape moderately large, segments 2-8 slightly narrower than scape; anterior spine of prothorax projecting antero-laterally and its tip less pointed. Aedeagus: each paramere with a short pre-apical seta in addition to one long apical seta..... ..... *Silvanoprus palnicus* Sengupta & Pal.

11. Antennal segments10 and 11 yellowish-white; prothorax markedly transverse; pronotum strongly depressed in front of prothoracic base and lateral margin widely explanate; teeth on lateral margin of prothorax narrow, markedly long and a few of them about four times as long as broad.....*Psammoecus delicatus* Grouvelle.

– Antennal segment 10 blackish and segment 11 yellowish-white; prothorax not strongly depressed in front of prothoracic base and lateral margin not widely explanate; teeth on lateral margin of prothorax variable, not markedly long and maximum three times as long as broad .... *Psammoecus trimaculatus* Motschulsky.

SUMMARY

The paper deals with 12 species under 6 genera of 2 subfamilies from the State of Mizoram. All the species are recorded first time from the State as no study of Silvanidae was undertaken from this State earlier. The species are systematically keyed and characterized.

ACKNOWLEDGEMENTS

The authors are indebted to the Director, Zoological survey of India for providing necessary facilities for the work.

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Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 307-312, 2007

INSECTA : COLEOPTERA : COLYDIIDAE

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INTRODUCTION

The Colydiidae are a moderately large family of the superfamily Cucujoidea of the suborder Polyphaga. The family is yet to be sufficiently worked out in both the specific and supraspecific levels. Over the years, the family Colydiidae have been used as a repository of various genera, both Clavicornia and Heteromera, which possessed features like, 4-segmented tarsi and clubbed antennae (Lawrence, 1980). The constitution of the family has changed considerably since the publication of Hetschko's Catalogue in 1930. Crowson (1955) made notable changes in the constitution of the Colydiidae. He transferred Cerylonini, Murmidiinae and Euxestinae to the Clavicorn family Cerylonidae and retained the remaining Colydiids under the Heteromera. In recent past, there was a consideration by some coleopterists dealing with higher taxa (especially J.F. Lawarance) that Colydiidae as delineated by Crowson (1955) to be an assemblage of both clavicorns and heteromerans. The most recent treatment by Pal and Lawrance (1986) has accepted the genera close to *Bothrideres* (Bothriderinae *sensu* Crowson) as a separate family, Bothrideridae under Clavicornia. In the present account however, Crowson's treatment of Colydiidae, as regards the constitution of the family, is followed.

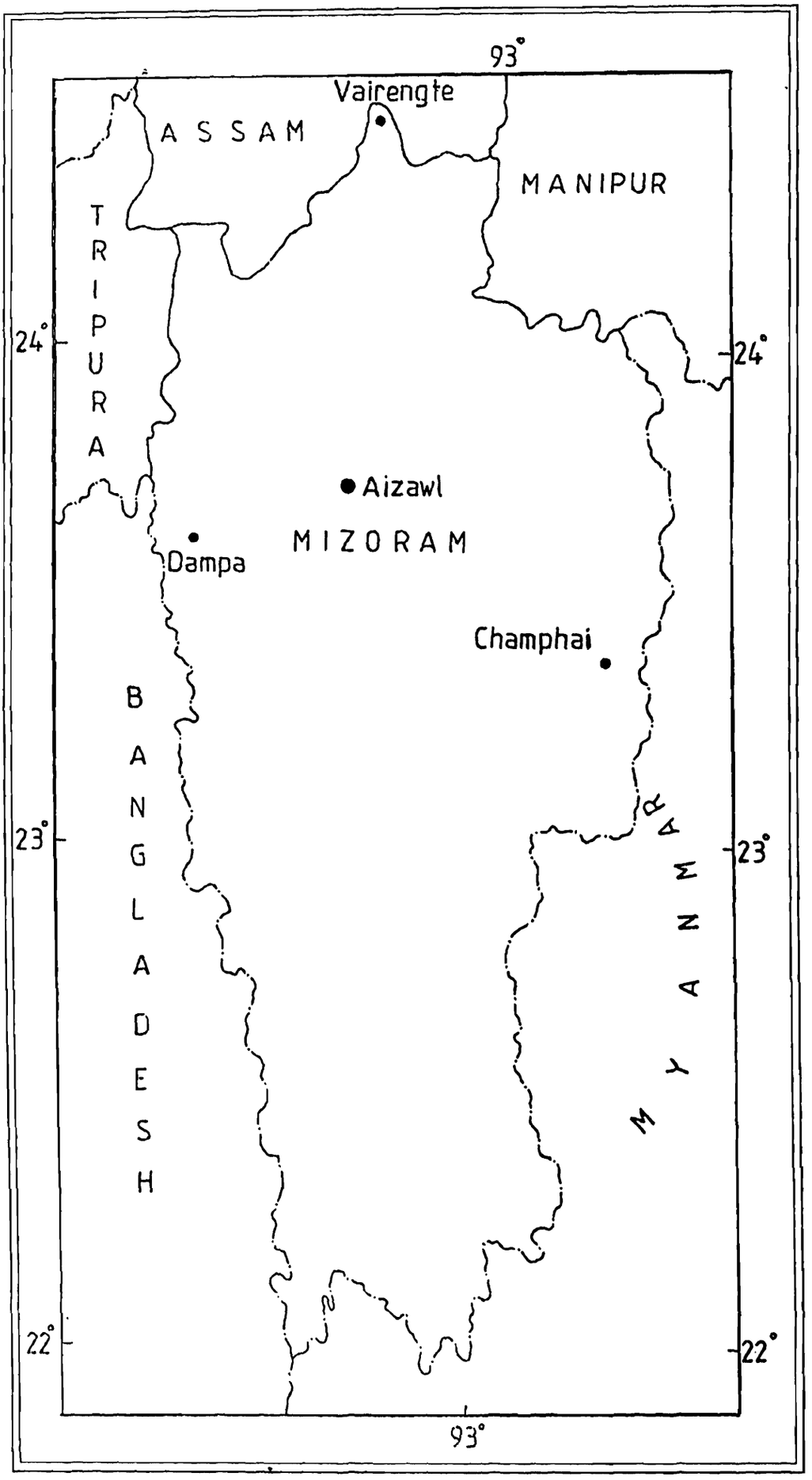
The Colydiids are small to moderately large beetles those occur in both adult and larval stages in dead wood, under barks, leaf litter etc. Several species are predators on wood inhabiting larvae of insects. Since Grouvelle (1908) Pal (1984, 2001) and Pal and Slipinski (1984) described four species from India. The present account is based on a small collection made by the author in Mizoram from where no Colydiid is hitherto recorded.

CHARACTERS OF FAMILY COLYDIIDAE (Sensu lato)

General form elongate-oblong to slender and parallel-sided, markedly flattened to sub-convex or cylindrical, glabrous or rogose, shiny or dull.

Head elongate to transverse, eyes small to large, usually constricted behind eyes, fronto-clypeal suture present or absent, antennal insertions dorso-lateral or hidden under projection of frons, antenna 10- or 11-segmented with 1or 2-segmented club, club occasionally of more segments, gular sutures well separated, with or without antennal grooves on ventral side. Mandible large, with 2 or 3 apical teeth, without dorsal mandibular cavity. Maxilla with well-developed lacinia and galea, lacinia with or without apical spine, apical segment of maxillary palpi elongate. Labium with mentum transverse, apical segment of palpi elongate.

Prothorax strongly elongated to transverse, pronotum with varying grades of sculpture from more less smooth to bearing ridges and furrows, front coxae separated narrowly to moderately widely, trochantins hidden, coxal cavity open or close.



MAP OF MIZORAM

Mesocoxae usually moderately separated, sternal fitting between mesocoxae in straight line or with a knob from metasternum, mesocoxae closed outwardly, metendosternite well developed with anterior tendons well separated, hind coxae moderately to widely separated.

Elytra fully cover abdomen dorsally, puncturation in regular rows, without scutellary striole, epipleura well eveloped. Wing with 3 to 4 anal veins, usually with subcubital fleck.

Legs: trochanters short and simple or may be highly reduced and concealed at base of femora, tibiae usually broadened at apex with a few spurs, tarsal formula 4-4-4, tarsal segments usually simple.

Abdomen: 5 visible ventrites, ventrite 1 usually longer than others, intercoxal process narrow-acuminate to broad truncate, with or without femoral lines, 7 pairs of functional spiracles.

Key to the Subfamilies of Colydiidae (Sensu lato)

1. Antennal insertions hidden under projection of frons when viewed from above .... COLYDIINAE
– Antennal insertions dorsal and exposed .... BOTHRIDERINAE

LIST OF TAXA

Family COLYDIIDAE

Subfamily COLYDIINAE

Tribe SYNCHITINI

1. *Bitoma siccana* (Pascoe)
2. *Lasconotus lushaicus* sp.nov.

Key to the Genera of *Colydiidae*

1. Antennal club composed of two segments; front coxal cavities open posterily ... ***Bitoma*** Herbst
– Antennal club compsed of three segments; front coxal cavitites closed posterirly .... ***Lasconotus*** Erichson

SYSTEMATIC ACCOUNT

Family COLYDIIDAE

Subfamily COLYDIINAE

Tribe SYNCHITINI

Genus ***Bitoma*** Herbst

1793. *Bitoma* Herbst, *Natursystem der Insekten*: Käfer, **5** : 25 (Type species: *Tritoma crenata* Fabricius).
1807. *Ditoma* Illiger, *Magazin für Isektenkunde,* **6** : 320.
1857. *Euditoma* Gistel, *Vacuna,* **2** : 26.
1863. *Coniophaea* Pasco, *J. Ent.,* **2** : 90.
1873. *Synchytodes* Crotch, *Checklist Col. North America* : 45.
1882. *Synchitodes*: Retter, *Best-Tab.eur. Col.,* **6** : 130.

Diagnosis : Elongated, subparallel, almost cylindrical, pronotum and elytra longitudinally carinate and body sparsely pubescent. Head with prominent eyes, 11-segmented antenna with 2-segmented club, antenna inserted under projection of frons, antennal segments 4-9 subequal in length and shorter than preceding segments, ventrally antennal groove short and extending not beyond middle of eye, mandible with 2 apical teeth, apical segments of labial and maxillary palpi elongate and somewhat fusiform. Prothorax subquadrate, side margins crenulate, pronotum convex medially with sides not explanate, two pairs of longitudinal carinae (sublateral and admedian) on pronotum with a pair of short carinae between admendian carinae, front coxae separated not wider than diameter of coxae, front coxal cavities open, mesosternal process little narrower than prosternal apex, metasternum devoid of femoral lines; elytra striate-punctate, alternate interstices feebly carinate, tibiae of legs with two spurs at outer apical angle and with a single one at inner side, tarsal segments 1-3 subequal in length; intercoxal process of first abdominal ventrite narrowed towards apex, no femoral lines.

1. ***Bitoma siccana*** (Pascoe)

1863. *Xuthia siccana* Pascoe, *J. Ent.,* **2** : 128.
1863. *Xuthia rufina* Pascoe, *J. Ent.,* **2** : 128.
1863. *Xuthia maura* Pascoe, *J. Ent.,* **2** : 129.

1867. *Bitoma lyctiformis* Wollaston, *Col. Hesperidum* : 63.
1885. *Xuthia parallela* Sharp, *J. Linn. Soc. Lond.*, **19** : 70.
1892. *Bitoma elongata* Grouvelle, *Annls. Soc. Ent. Fr.*, **59** : 296.
1898. *Bitoma rufipes* Kolbe, *Deutsch. Ost.-Afr.* **4** Käfer : 111.
1908. *Xuthia siccana* : Grouvelle, *Annls. Soc. Ent. Fr.*, **77** : 399.
1930. *Bitoma siccana* : Hetschko, *Col. Cat.*, **107** : 19.
1980. *Bitoma siccana* : Dajoz, *Faune de Madagascar* : 28.
1985. *Bitoma siccana* : Slipinski, *Pol. Pismo Ent.*, **55** : 485.

Diagnosis : Elongated, subcylindrical, reddish-brown to dark brown, not shining and finely setose; head transverse, anterior clypeal margin little emarginate medially, frons and vertex slightly impressed laterally, sides of head behind antennal base raised to form carinae like structure, eyes about half as long as head, rugose granular punctures on dorsal side; quadrate prothorax with anterior margin arcuate medially, two pairs of well developed carinae on pronotum with the additional carinae in anterior half short and rather parallel, side margins finely sinuate and widest in anterior half, puncturation on pronotum almost similar as on vertex of head; elytra little more than twice as long as broad, each elyton with five longitudinal carinae not joined either anteriorly or posteriorly.

Length : 2.5-3.0 mm.

Material : 1 ex. India : Mizoram, Aizawl District, Dampa Wilddlife Sanctuary, 200 m., 25.i.1995, T.K. Pal, *ex.* under bark.

Distribution : India : Mizoram (new record), Sikkim, West Bengal, Tamil Nadu.

Elsewhere : Bhutan; Nepal; Myanmar, Sri Lanka; Japan; Indonesia; Seychelles; Mascarene Is.; New Guinea; New Calendonia; Madagascar; Reunion; Mauritius; Guinea Bissau; South Africa; Saudi Arabia.

Genus ***Lasconotus*** Erichson

1845. *Lasconotus* Erichson, *Natur. Ins. Deutschl., Col.*, (1) **3** : p. 258 nota. (Type species: *Lasconotus complex* Le Conte).
1867. *Lado* Wankowicz, *Ann. Soc. Ent. Fr.*, (4)**7** : 249.
1863. *Illeustus* Pascoe, *J. Ent.*, **2** : 33.
1863. *Ithris* Pascoe, *J. Ent.*, **2** : 134.
1871. *Othismopteryx* J. Sahlberg, *Not. Sallsk. Faun. Flor. Fenn. Forh.*, **11** : 441.
1935. *Lasconotus* : Hinton, *Rev. Ent.*, **5** : 204.
1935. *Chrysopogonius* Hinton, *Rev. Ent.*, **5** : 207.
1997. *Lasconotus* : Slipinki & Lawrence, *Ann. Zool.*, **47** : 392.

Diagnosis : Elongated, nearly parallel-sided, carinate elytral interstices and pronotal disc. Head with large eyes, temple short and not apparent in entire specimen; 11-segmented antenna, club 3-segmented and rather abrupt, antennal segments 4-8 subequal in length and shorter than preceding segments; ventrally antennal groove weak and short, mandible with two apical teeth, apical segments of maxillary and labial palpi elongate and somewhat fusiform. Prothorax subquadrate, lateral portions slightly explanate, margins crenulate, two paris of longitudinal carinae (sublateral and admedian) on pronotum, prosternum, prosternal process medially not raised above front coxae, front coxal cavities externally closed, front coxae separated by space narrower than coxal diameter, mesosternal process little narrower than prosternal apex, metasternum devoid of femoral lines; elytra striate-punctate, alternate interestices carinate, tarsal segments 1-3 subequal in length; intercoxal process of first abdominal ventrite narrowed towards apex, no femoral lines.

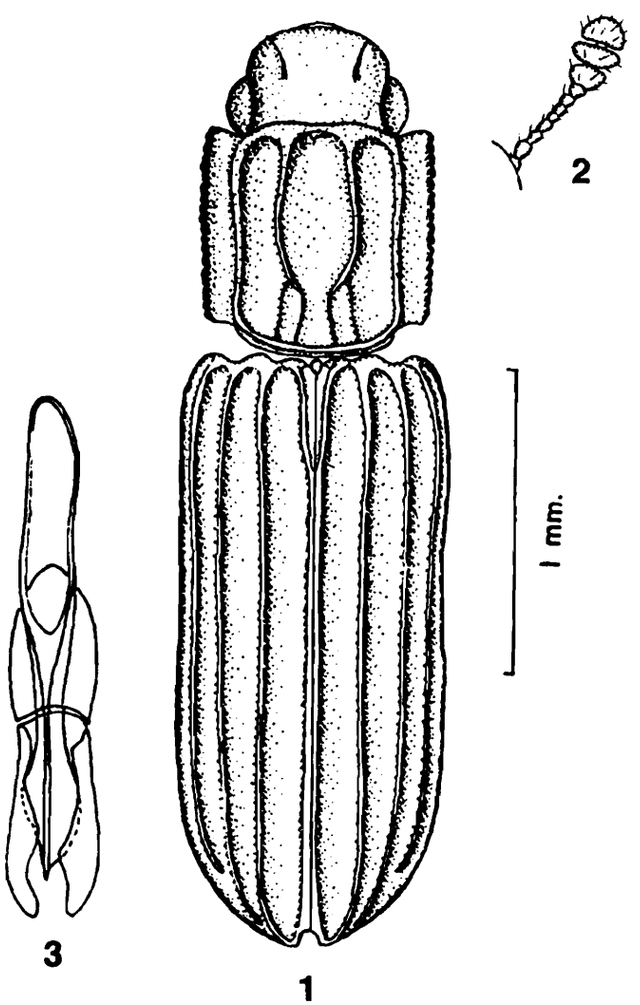
2. ***Lasconotus lushaicus*** sp. nov.

Facies (Text fig. 1) elongate, subcylindrical, costate pronotum and elytra, punctate-pubescent, reddish-brown, dorsum not shiny.

Head broader than long, apical margin of elypeus nearly straight, labrum slightly exposed; eyes large, about half as long as head, coarsely facetted and non-projecting, temple indistinct; sides of vertex raised and carinate, frons slightly depressed above antennal insertions, puncturation on frons and vertex granulose, granules on vertex

larger than eye facets and moderately closely arranged, punctures finer and less rugose anteriorly; anntenna (Text-fig. 2) short, slender, slightly longer than head, scape moderately large and hidden mostly under projection of vertex, pedicel shorter and narrower than scape, segment 3 elongate and narrower than pedicel, segments 4-8 short, subequal, about as broad as long or little transverse, segments of club (9-11) more or less transverse of which segnment 10 slightly broader than 9 and 11.

Prothorax about as broad as long (1.01:1.00), sides feebly arched and serrulate, front margin little indented medially, anterior and posterior angles neither sharp nor produced, anterior angles slightly acute and posterior angles almost right angle; pronotal disc with 4 longitudinal carinae : 2 sublateral and 2 admedian, sublateral carinae stronger and complete from anterior to posterior margin, admedian carinae strongly eleveated in anterior two-thirds and then continued posteriorly as two weaker carinae, the inner one of weaker carinae comparatively more district, intermediate portions of pronotum between carinae more or less sulcate; a transverse prebasal impression on disc, pronotal surface granulose as on vertex of head, pubescent.



Figs. 1-3. : *Lasconotus lushaicus* sp. nov.: 1. Dorsal view; 2. Antenna (right); 3, Aedeagus, Dorsal view.

Scutellum small, rounded, impunctate.

Elytra elongate (2.17 : 1.00), almost parallel-sided, rounded apically with a small notch near suture, carina I raised from base to apex and divergent in basal one-fourth, carinae I, II and V join apically, carinae II and IV terminate little before apex; intervals between two successive carinae with two rows of coarse, deep puntures, puntures of one row almost coalesce with those of other and thereby interstices are not recognizable, decumbent setae present on carinae and between strial punctures.

Legs with tibiae slightly dilated apically and dentate; protibia with a distinct spine.

Aedeagus (Text-fig. 3) somewhat trilobed-type; median lobe long and thin supported along either side by a thin chitinous bar, these project at base as two struts which join distally; tegmen forming a moderately long sheath; ventrally articulated parameres broadened apically.

Measurements of holotype : Total length 2.80 mm., width of head across eyes 0.58 mm., length of antenna 0.52mm., length and width of prothorax 0.79 mm. and 0.76 mm., length and width of elytra 1.93 mm. and 0.90 mm.

Holotype male, India : Mizoram, Lushai Hills, Aizawl District, Ruantlang, 1325 m., 10 km. 0-Champhai, 1. ii 1995, T.K. Pal, *ex. Pinus kesiya* (beneath bark). Aedeagus dissected, mounted on cover slip and pinned with the holotype; *Paratypes*: 3 ex., data same as holotype (Zoological Survey of India, Calcutta).

Etymology : The species-name refers to the hill range of Mizoram State in northeast India, from where the species is described.

Comparative notes : This species shows resemblances with *L. papuanus* Slipinski but can be differentiated by its prothorax not wider anteriorly, anterior angle slightly acute and reach almost up to level of front margin, admedian carinae of pronotum strongly elevated up to anterior two-thirds before it divides into two feeble carinae.This speciesdiffers from *L. nepalensis* Slipinki by the pronotum not having four fully developed carinae from anterior to posterior end, and admedian carinae not dividing in posterior third.

SUMMARY

The paper deals with 2 species under 2 genera of the subfamily Colydiinae of which 1 species is new (*Lasconotus lushaicus*). The family is recorded for the first time from the State of Mizoram as no taxonomic study of this group was carried out earlier from Mizoram. The species are systematically keyed and characterized.

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PAL, T.K. AND SLIPINSKI, S.A. 1984. Notes on *Nematidium* Erichson (Coleoptera : Colydiidae) with description of new species. *Pol. Pismo. Ent.,* **53** : 531-543.

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 313-321, 2007

INSECTA : COLEOPTERA : ENDOMYCHIDAE

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INTRODUCTION

The Endomychidae with about 1300 species are a rather distinct family of the section Clavicornia under the superfamily Cucujoidea. The endomychids are small to large, broadly ovoid to elongate and narrow, strongly convex to moderately flattened, seldom brightly coloured and are commonly called as 'handsome fungus beetles' The Endomychidae have a world-wide distribution but are more diverse in tropical Asia. Endomychids consume mostly softer tissues of various fungi or are sap-feeders. They are often seen beneath bark or in rotten wood, decayed fruit refuse or in leaf litter, in moist woodland areas.

Following the publication of Arrow's 'Fauna' in 1925 not much works have come out from the Indian region on this group. In recent past, Vazirani & Saha (1972) described 1 new species, and Strohecker (1974, 1975, 1982, 1983) described at least 11 new species and recorded a few more species from the Indian territory. But no species of this family is hitherto known from Mizoram. The present account is based on the collection made by the author in Mizoaram in 1995. These represent 7 species under 5 genera.

CHARACTERS OF FAMILY ENDOMYCHIDAE

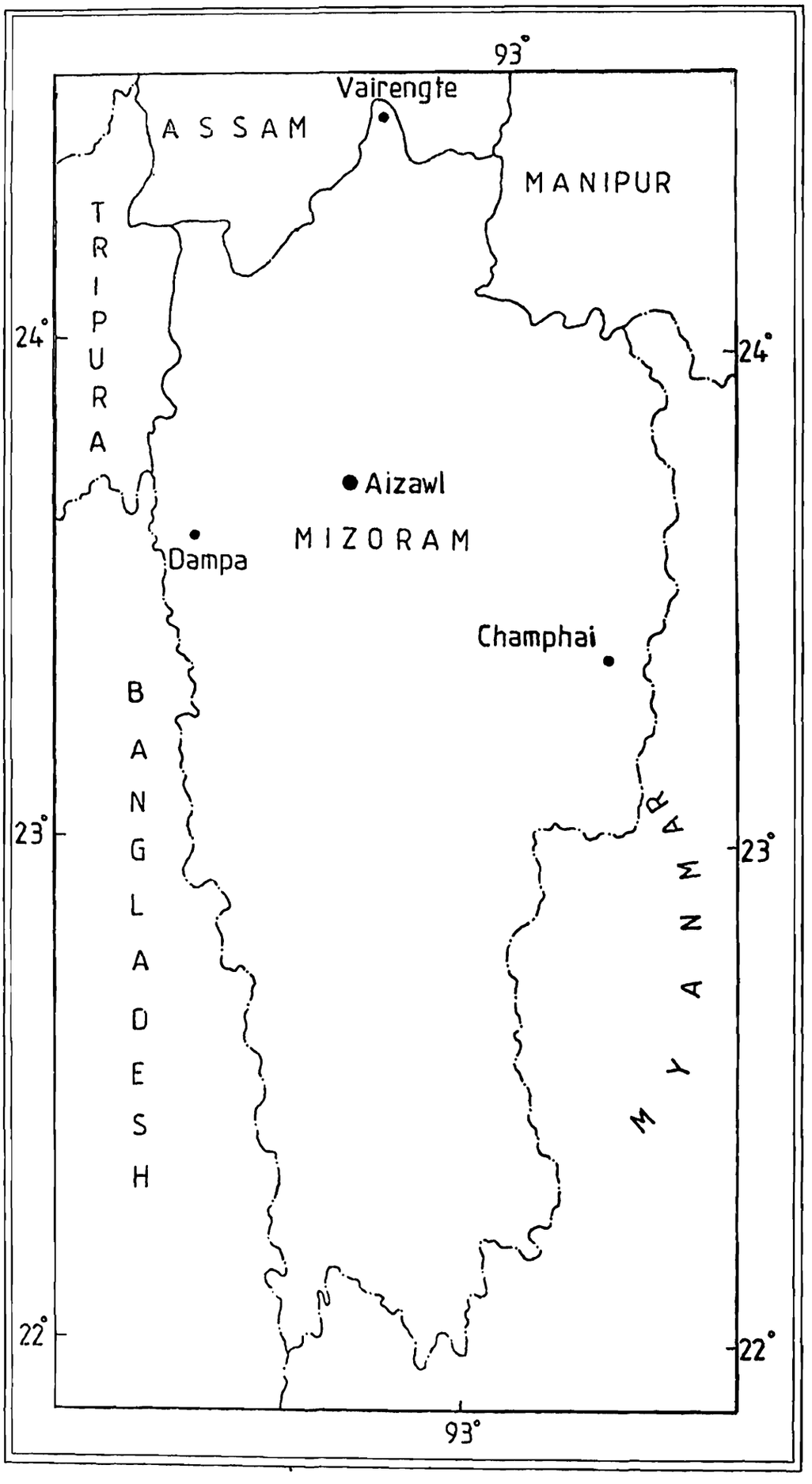
Body broadly ovate to elongate and narrow, strongly convex to moderately flattened, glabrous but occasionally clothed with hairs, and often brightly coloured.

Head with fronto-clypeal suture, eyes moderately large, vertex sometimes bear stridulatory files, antennal insertions lateral or dorso-lateral; antenna 10- or 11-segmented with 3-segmented club, club rarely 4- or 5-segmented; mandible usually well developed, apical teeth three or less in number, mola well developed; maxillary lacinia and galea well developed, lacinia with or without apical spine, apical segment elongated and more or less fusiform; labium is more subject to variation in form, mentum strongly chitinized, apical segment of labial palpi truncate apically.

Prothorax often transverse, side margins usually smooth and rarely serrulate, front edge sometimes with a stridulatory membrane, pronotal disc often with paired basal impressions, grooves or carinae, and a transverse prebasal groove, prosternum moderately long to very short, front coxae subglobular or slightly transverse with hidden trochantins.

Elytra entire, punctation usually confused, epipleura usually incomplete. Wing devoid of radial cell and usually without anal cell, with a trace of subcubital fleck.

Mesosternum sometimes reduced and concealed, anteriorly excavate or bicarinate, mesocoxae narrowly to moderately widely separated, mesocoxal cavities narrowly open outwardly; metasternum transverse, rarely with femoral lines, hind coxae widely separated, metendosternite usually with widely separated anterior tendons.



MAP OF MIZORAM

Legs short to moderately long, trochanters simple or slightly heteromeroid, narrow tibia slightly broadened at apex and without prominent apical spurs, tarsal formula 4-4-4 or 3-3-3, tarsi either simple, or segment 3 reduced with segments 1 and 2 lobed.

Five abdominal ventrites freely articulated, ventrite 1 longer than others and sometimes with femoral lines, often with five pairs of spiracles. Aedeagus with or without articulated parameres, median lobe devoid of strut. Ovipositor with fused valvifers and coxites.

Key to the Subfamilies of Endomychidae*

1. First abdominal ventrite with femoral lines; no prebasal impression on pronotum, front coxae little transverse; apical segment of maxillary palpi broad and securiform; seven pairs of abdominal spiracles ..... SPHAEROSOMINAE
- First abdominal ventrite without femoral lines; pronotum with a trasverse subbasal groove and two longitudinal impressions, front coxae globular; apical segment of maxillary palpi elongate and not securiform; five pairs of abdominal spiracles 2
2. Tarsi pseudotrimerous, penultimate segment minute and almost fused with apical segment, second segment lobed ..... ENDOMYCHINAE
- Tarsi linear, 3-segmented or 4-segmented with penultimate segment exposed 3
3. Antenna 4- or 5-segmented, short and stout. ..... TROCHOIDEINAE
- Antenna 10- or 11-segmented, slender and long ..... MYCETAEINAE

LIST OF TAXA

Family ENDOMYCHIDAE

Subfamily ENDOMYCHINAE

1. *Danae sericea* Arrow
2. *Ancylopus pictus indianus* Strohecker
3. *Ancylopus nigrothoracica* Pal
4. *Dapsa trogositoides* Gorham
5. *Dapsa* sp. A.

Sabfamily TROCHOIDEINAE

6. *Trochoideus desjardnisi* Guérin-Meneville

Subfamily MYCETAEINAE

7. *Asymbius crinipes* Gorham

Subfamily ENDOMYCHINAE

Key to the Genera of *Endomychinae* from Mizoram

1. Front margin of pronofum with a stridulatory membrane 2
- Front margin of pronotum without stridulatory membrane. Tarsal segment 2 dilated. Mesosternum narrow and not exacavated in front ..... ***Danae*** Reiche
2. Elytra distinctly bicoloured; front margin of prothorax deeply emerginate ..... *Ancylopus* Costa
- Elytra yellowish with light brownish spots; front margin of prothorax slightly emerginate ..... ***Dapsa*** Latreille

Genus ***Danae*** Reiche

1847. *Danae* Reiche, *in* Ferret & Galinier, *Voyage en Abyssinie*, **3** : 408 (Type-species: *Danae rufla* Reiche).
1858. *Oediarthrus* Gerstaecker, *Mon. Endom.*, : 344.
1873. *Rhabduchus* Gorham, *Entomologist's mon. Mag.*, **9** : 257.
1873. *Coniopoda* Gorham, *Entomologist's mon. Mag.*, **9** : 205.

Diagnosis : Facies elongate-ovoid and not very convex, with long legs and antennae, body pubescent; head with large eyes, 11-segmented antenna with 3-segmented loose and symmetrical club, mandible with bifid tip, apical segment of maxillary palpi broad and transverse; prothorax transverse with basal margin closely applied to base of elytra, side margins of pronotum raised,

*Subfamilial classification is after Crowson, 1955; Sphaerosominae is at present considered as a separate family, Sphaerosomatidae but not recorded in India.

prosternum produced behind coxae as prominent lobe; meso- and hind coxae moderately widely seperated; tarsal segment 1 elongate, segment 2 lobed and dilated, segment 3 small and segment 4 longest; elytra without dilated margin.

1. ***Danae sericea*** Arrow

1925. *Danae sericea* Arrow, *Fauna Brit. India, Coleoptera, Clavicornia* : 391.

Diagnosis : Facies elongate-ovoid, moderately convex, yellowish-brown, apical part of antennae blackish, densely pubescent, head with eyes widely placed; transverse prothorax with side margins sinuate behind middle, borders of pronotum moderately wide and raised, basal groove terminating on sides in very short lateral fovae, front angles blunt and hind angles acutely produced; elongate elytra rounded at sides and not very broad at shoulders, with irregular fine punctures.

Length : 2.88 mm.

Material : 1 ex. India : Mizoram, Aizawl District, Dampa w.l.s., 200 m., 25.i. 1995, T.K. Pal, *ex.* forest litter.

Distribution : India : Meghalaya, Sikkim, Mizoram (New record).

Genus ***Ancylopus*** Costa

1854. *Ancylopus* Costa, *Fauna del Regno Napoli, Coleotterei,* **1** : 14 (Type species: *Endomychus melanocephalus* Oliv.)

Diagnosis : Facies elongate, moderately broad, rather parallel-sided with moderately long antennae and legs; head with rather prominent eyes, 11-segmented antennae with 3-segmented narrow club, scape to segment 8 elongate, segment 3 about as long as segments 4 and 5 together, mandible with tip produced and bifid (at least for left), maxillary lacinia short, apical segment of maxillary palpi elongate, ligula with two lobes, apical segment of labial palpi broad and transverse, prothorax transverse, emarginate in front, front margin with distinct stridulatory membrane, pronotal base with strongly impressed marginal stria and moderately long lateral foveae, front coxae almost contiguous and prosternal process narrowly pointed at apex, mesocoxae moderately widely separated, hind coxae widely separated and intercoxal process of first abdominal ventrite broad and truncate at apex; elytra moderately long with narrowly deflexed side margins.

3. ***Ancylopus pictus indianus*** Strohecker

1823. *Eumorphus pictus* Wiedemann, *Zool. Mag.,* **2** : 78.

1858. *Ancylopus melanocephalus pictus* : Gerstaecker, *Mon. Endom.,* : 190.

1925. *Ancylopus melanocephalus* (in part) : *sensu* Arrow (nec. Olivier), *Fauna Brit. India, Coleoptera: Clavicornia* : 334.

1972. *Ancylopus pictus indianus* Strohecker, *Pacif. Ins.,* **14**(4) : 706.

Diagnosis : Facies broadly elongate, subdepressed; orange-yellow with head and antennae, basal margin of elytra, its suture except near apex, a rectangular patch on outer margin near middle and an oval patch before apex of each elytron blackish; head with eyes coarsely facetted and separated by little more than three times of the diameter, club little broader than rest of antenna, segments 9 and 11 elongated and segment 10 about as broad as long, dorsal surface moderately coarsely and densely punctate and pubescent; transverse prothorax little narrower behind middle, front angles projecting and not very acute, hind angles nearly right angle, side margins finely raised, in female pronotum with a median longitudinal depression and anterior end of lateral fovea on each side connected with it by a deep curved oblique channel, pronotum more finely punctate than on head; transverse scutellum impunctate; elytra seperately rounded at apex, base of elytra little emarginate, each elytron with a broad oblique depression from behind scutellum to beyond middle, moderately coarsely and densely punctate; in male mesotibial tooth large and sharp, inner edge of metatibia undulate and sharpy serrulate.

Length : 4.8-5.4mm.

Meterial : 3 ex. India : Mizoram, Aizawl Distt., Vairengte, 120m., 1 ex., 5.ii.1995, T.K.Pal, *ex.* haystack; 1 ex., same locality, *ex.* sweeping bush; Teiri Vill., Dampa, 1 ex., 26.i.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Uttaranchal, Bihar, Arunachal Pradesh, Sikkim, Mizoram (New record), Tamil Nadu.

Elsewhere : Afghanisthan.

4. *Ancylopus nigrthoracica* Pal

2001. *Ancylopus nigrothoracica* Pal, *Fauna of Sikkim. State Fauna Series,* **9** : 113.

Diagnosis : Facies broadly elongate, moderately convex, entirely blackish body with four yellow patches on elytra, species little shiny; head with eyes moderately coarsely facetted and separated by about four times of the diameter, antennal club broader than rest of the antenna, segments 9 and 11 little elongate and segment 10 about as broad as long, dorsum of head with fine and moderately dense punctures, pubescent; slightly transverse prothorax widest little above middle, narrowed both anteriorly and posteriorly, front angles projecting and hind angles slightly acute, side margins raised, pronotal base with a deep marginal stria, lateral fovaea narrow and extending up to little below middle, puncturation on pronotum almost similar as on vertex of head, pubescence scanty; transverse scutellum finely puntate-pubescent, broadly elongate elytra little wider than prothorax at base, widest near middle, sides gently rounded, edges narrowly flanked, moderately densely and finely punctate; tarsal claws pectinate. In male protibia with a large tooth on inner side near middle, inner edge of mesotibia bend apically. Length- 5.3-5.8mm.

Material : 8 ex., India : Mizoram, Aizawl District, Zemabawk, 1000 m., 1 ex., 29.i.1995, T.K. Pal, *ex.* vegetation debris; Seling, 900 m., 1 ex., 29.i.1995, T.K.Pal, *ex.* litter; Dampa Wildlife Sanctuary, 200 m., 2 ex., 25.i.1995, T.K. Pal, *ex.* forest litter; Teirei vill., Dampa, 200 m., 1 ex., 26.i.1995, T.K. Pal; Dampa, 230 m., 3 ex., 27.i.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Sikkim, Mizoram (New record).

Genus *Dapsa* Laterille

1829. *Dapsa* Latreille *Cuvier's Régne Anim.*, 2nd. ed., **5** : 159 (Type-species :*Endomychus denticollis* Germ.).

1858. *Dapsa* : Gerstaecker, *Mon. Endom.*, : 196.

1876. *Dapsa* : Chapuis, *Hist. Nat. des Insectes. Gen. Coleopt.*, **12** : 106.

1925. *Dapsa* : Arrow, *Fauna Brit. India. Coleoptera : Clavicornia* : 335.

Diagnosis : Facies elongate, subdepressed with slender legs and antennae, body pubescent. Head with prominent eyes, antennal segments loosely articulated, 3-segmented club slightly dilated; mandible with bifid apex, maxillary lacinia bifid at apex, inner margin setose, palpal segments elongate; ligula truncate apically, segments of palpi elongate; prothorax transverse with front margin slightly emarginate, pronotum finely margined, front coxae almost contiguous, prosternal process narrow spine-like; meso- and hind coxae more widely seperated, intercoxal process of first abdominal ventrite broad and truncate at apex; elytra elaongate, sides slightly curved and apex seprately rounded, epipleura extends up to posterior third, somewhat depressed below humeral angles.

Key to the Species of *Dapsa* Latreille

1 Front angles of prothorax somewhat acute and produced anteriorly, side margin of prothorax sinuate near posterior third; elytra reddish-brown, unicolourous ..... *trogositoides* Gorham

– Front angles of prothorax somewhat blunt and projecting outward, side margin of prothorax bi-sinuate below front angle and near posterior third; paired oblique spots on elytra below middle, sides of elytra also darker than basic elytral colour ..... sp. A

4. ***Dapsa trogositoides*** Gorham

1896. *Dapsa trogoisdes* Gorham. *Ann. Mus. Civ. Genova* **36** : 300.

Diagnosis : Elongate, moderately depressed, reddish-brown, shiny, punctate-pubescent. Eyes less than half as long as head, coarsely facetted, separated by about three times of the diameter; antenna long and segments loosely articulated, segments elongated, club slightly broader than rest of antenna; dorsum of head moderately coarsely and densely punctate, pubescent; prothorax distinctly transverse, broad in front and contracted behind, sides distinctly sinuate in posterior third, basal marginal groove terminating in strongly impressed lateral foveae, puncturation on pronotum slightly sparser than on vertex; transverse scutellum finely punctate-pubescent; elongate elytra wider than prothorax at base, sides gently curved, edges not flanked, density of punctures almost similar to that of pronotum. Length- 4.3 mm.

Material : 1 ex. India : Mizoram, Aizawl District, Teiri vill., Dampa, 200 m., 26.i.1995, T.K.Pal.

Distribution : India : Mizoram (New record).

Elsewhere : Myanmar.

5. ***Dapsa*** sp. A
(Fig. 1-5)

Diagnosis : Elongate, subdepressed, redish-brown, balckish spots on elytra, shiny punctate-pubescent. Eyes large, shorter than half as long as head, coarsely facetted, separated by little more than three times of the diameter; antenna long, segments loosely articulated and elongated, club slightly broader than rest of antenna, dorsum of head moderately coarsely and densely punctate, pubescent; prothorax distinctly transverse, front margin of pronotum with a distinct stridulatory membrane, side margins sinuate below front angles and behind middle, basal marginal groove terminating in strongly impressed lateral foveae, punturation on pronotum slightly sparser than on vertex; transeverse scutellum finely punctate-pubescent; elytra elongate, wider than prothorax at base, sides gently curved, edges not flanked, paired oblique spots on elytra below middle, sides of elytra darker, density of punctures almost similar to that of pronotum.

Length : 6.7 mm.

Material : 2 ex. India : Mizoram, Aizawl District, Aizwal, 1000 m., 20.i.1995, 1 ex., T.K. Pal, *ex.* dried vegetation; seling, 900 m., 1 ex., 29.i.1995; T.K.Pal, *ex.* litter.

Remarks : This species differs from *Dapsa trogositodes* Gorham by the charcters cited in the key. It is also not resembling with other Indian species. It is not named yet for more comparision with similar forms.

Subfamily TROCHOIDEINAE

Genus ***Trochoideus*** Westwood

1833. *Trochoideus* Westwood, *Trans. Linn. Soc. Lond.* **16**: 673 (Type-species: *Paussus cruciatus* Dalm.)

1838. *Trochoideus* : Westwood, *Trans. Ent. Soc. Lond.*, **2**: 95.

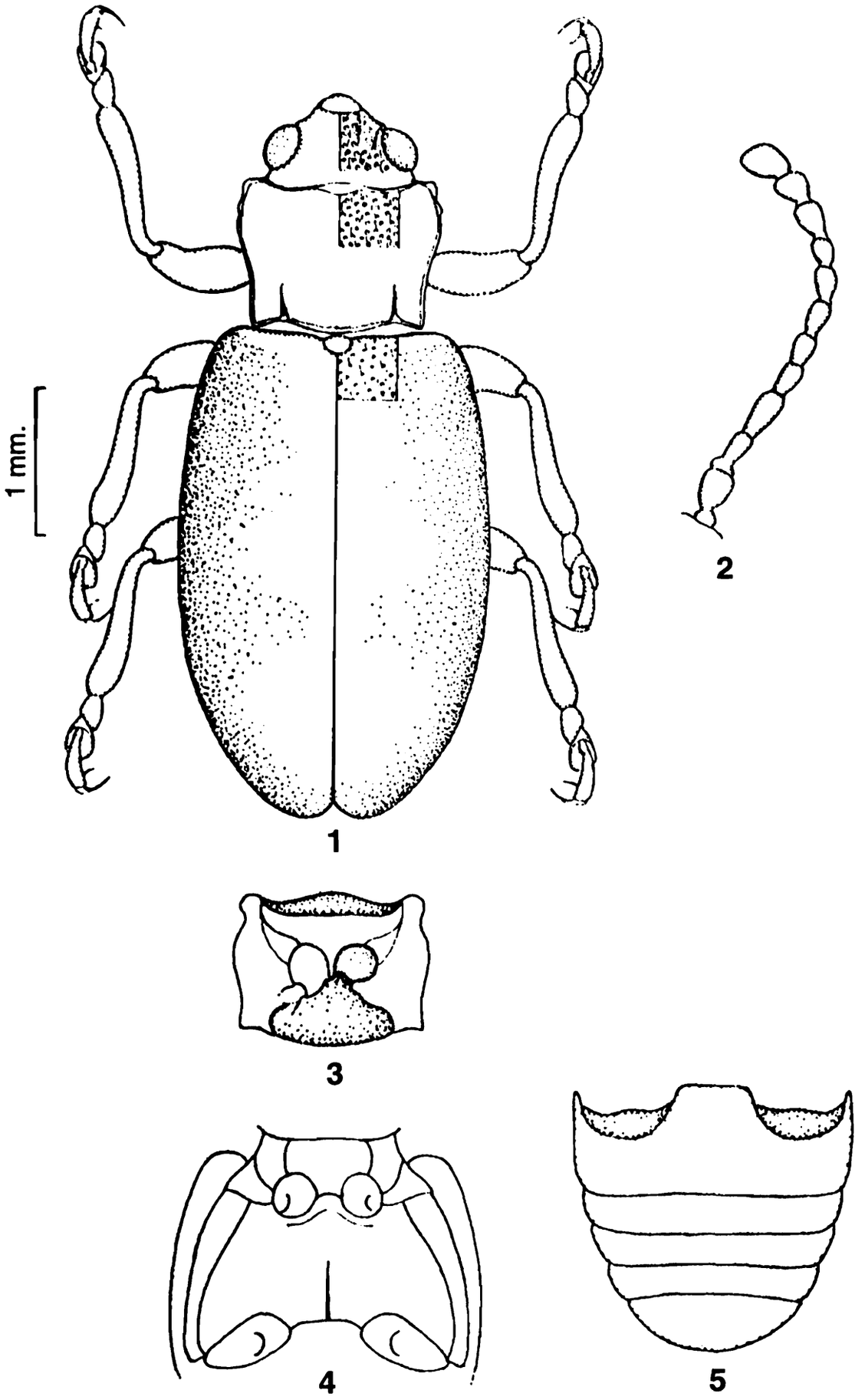
1858. *Trochoideus* : Gerstaecker, *Mon. Endom.*, : 381.

1876. *Trochideus* : Chapuis, *Hist. Nat. des. Insects, Gen. Coleopt.*, **12** : 147.

1916. *Pseudopaussus* Schulze, *Phil. J. Sci.*, **11** : 292.

1925. *Trochoideus* : Arrow, *Fauna Brit. India, Coleoptera* : *Clavicornia* : 402.

Diagnosis : Elongate-ovoid, moderately depressed, with slender legs, 4- or 5-segmented robust antennae, body pubescent. Head with moderately large protuding eyes; antennal scape moderately large, segments 2 and 3 much shorter and narrower, segment 4 large, elongate upon which small 5th segment is fused. Mandible with acutely produced apex, a minute inner tooth below apex; maxillary palpi elongate, apical segment fusiform; mentum triangular, labial palpi large and its apical segment cup-shaped. Prothorax transverse, somewhat caudiform, front margin



Figs. 1-5. : *Dapsa* sp. A: 1. Dorsal view (scale = 1 mm.); 2. Antenna; 3. Prothorax, Ventral view; 4. Meso-metathorax, Ventral view; 5. Abdomen, Ventral view.

slightly emarginate, no stridulatory membrane, narrowly margined at sides and base, no distinct lateral foveae, front coxae very closely situated, prosternal process not visible from above; meso- and hind coxae more widely separated, intercoxal process of first abdominal ventrite broad and truncate, no femoral lines; elytra ovoid, fitting closely with pronotal base, humeral angles slightly raised, sides gently curved and apices separately rounded, epipleura extends beyond middle.

6. *Trochoideus desjardinsi* Guérin Meneville

1838. *Trochoideus desjardinsi* Guérin-Meneville, *Rev. Zool.*, : 38.

1844. *Trochoides amphora* Cantor, *J. Proc. Ent. Soc. Lond.*, : 118.

1916. *Pseudopaussus monstrosus* Schulze, *Philipp. J. Sci.*, **11** : 292.

1919. *Trochoideus termitophilus* Roepke, *Treubia*, **1** : 34.

1922. *Trochoideus rouyeri* Pic, *Mel. Exot.- Entom.*, **35** : 8.

1922. *Trochoideus particularis* Pic, *Mel. Exot.-Entom.*, **35** : 8.

1925. *Trochoideus desjardinsi*: Arrow, *Fauna Brit. India, Coleoptera* : *Clavicornia* : 402.

Diagnosis : Elongate, moderately depressed, reddish-brown with darker elytra, robust antennae, legs and antennae little lighter in colour, shiny, punctate-pubscent. Eyes about half as long as head, coarsely facetted, separated by little more than six times of its diameter, antenna little longer than prothorax, segment 4 much longer and broader than preceding segments, segment 5 small and fused with segment 4 and both the segments together appear a single segment, dorum of head finely and sparsely punctate, pubescent; prothorax distinctly transverse, broader medially and narrowed posteriorly, sides and base of prothorax narrowly margined, basal fovea little impressed, lateral foveae not marked, puncturation on pronotum coarser than on vertex of head; transverse scutellum impunctate; ovoid elytra fitting closely with the base of prothorax, wider than prothorax at base, sides gently curved, edges not flanked, puncturation moderately coarse and dense and almost similar to that of pronotum.

Length : 3.08 mm.

Material : 1 ex., India : Mizoram, Aizawl District, Dampa Wildlife Sanctuary, 200 m., 25.i.1995, T.K. Pal, *ex.* under bark.

Distribution : India : Mizoram (New record), Kerala, Andaman Island.

Elsewhere : Myanmar; Thailand; Malaysia; Indonesia; Samoa; Fiji; Seychelles; Rodriguez Is. : Mauritius; Madagascar.

Subfamily MYCETAEINAE

Genus *Asymbius* Gorham

1896. *Asymbius* Gorham, *Ann. Mus. Civ. Genova*, **36** : 299 (Type-species : *Asymbius crinipes* Gorham).

1925. *Asymbiuus* : Arrow, *Fauna Brit. India, Coleoptera: Clavicornia* : 398.

Diagnosis : Small, braodly ovoid, covered with long setae, with long antennae and legs. Head with moderately large eyes, 11- segmented antenna with 3-segmented elongated club; apical segment of maxillary palpi fusiform; apical segment of labial palpi securiform; prothorax transverse, front margin emarginate, finely margined at sides and base, elongate lateral pits on border, no distinct stridulatory membrane, sides of pronotum foveolate; front coxae moderately widely separated, prosternal process elevated little above coxae, mesocoxae separated little wider than front coxae, hind coxae widely separated, tarsal segments elongate and simple, intercoxal process of first abdominal ventrite broad and truncate at apex; elytra subglose, each elytron with a strongly impressed stria close to suture that touches suture near apex, stria diverging anteriorly and bend towards base in scutellar region.

7. *Asymbius crinipes* Gorham

1896. *Asymbius crinipes* Gorham, *Ann. Mus. Civ. Genova*, **36** : 299.

1925. *Asymbius crinipes* : Arrow, *Fauna Brit. India, Coleoptera* : *Clavicornia* : 399.

Diagnosis : Small, broadly rounded, yellowish- to reddish-brown, shiny, sparsely pubescent, legs

and antennae paler but antennal club darker than preceding segments. Head transverse, eyes moderately large, projecting, moderately coarsely facetted, separated by about 2.5 times of the diameter, antenna longer than head and prothorax together, 11-segmented, scape distinctly elongate, segments 2-8 shorter but more or less elongate and darker than preceding segment, vertex finely and sparsely punctate. Prothorax about twice as wide as long, widest little beyond middle and then narrowed posteriorly, lateral margin with an elongate pit, hind angle sharp and base trisinuate, basal fovea on pronotal disc well marked, lateral foveae narrow and extending up to little below middle, puncturation fine and sparse; triangular scutellum impuncate; slightly elongate elytra about as wide as prothorax near base, sides rounded, edges narrowly flanked, punctation indistinct. Length- 1.44-1.52 mm.

Material : 25 ex., India : Mizoram, Aizwal District, Dampa Wildlife Sanctuary, 200 m., 21 ex., 25.i.1995, T.K. Pal, *ex.* forest litter; Teiri vill., Dampa, 200 m., 4 ex., 26.i.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Mizoram (New reord).

Elsewhere : Myanmar.

SUMMARY

The paper deals with 7 species under 5 genera of 3 subfamilies, of which 1 species appears to be undescribed. Two species are recorded for the first time from India and others are recorded first time from the State as no taxonomic study of this group was carried out earlier from Mizoram. The species are systematically keyed and characterised.

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INSECTA : COLEOPTERA : LANGURIIDAE

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INTRODUCTION

The Languriidae are a moderately large, well defined family of the section Clavicornia under the superfamily Cucujoidea. The languriids are small to large, elongate-oval to narrow–elongate, slightly flattened and often glabrous. They are usually bicoloured or metallic and are commonly called 'lizard beetle' The family with about 900 species have world–wide distribution but are found more commonly in the tropical parts of both the Old and New worlds. Larvae of many species are stem borers and their adults feed on pollen or the foliage of host plants.

Following the publication of Arrow's 'Fauna' in 1925 not much works on this family have come out from the Indian subcontinent. Only recently, Sengupta and Mukherjee (1977, 1979, 1985) have dealt with the languriines of Himalaya and described a new genus from this part. Subsequently, Pal (1992) recorded some species from Arunachal Himalaya.But no species of Languriidae is hitherto know from Mizoram. The present work is based on a collection made by the author in Mizoram in 1995.

CHARACTERS OF FAMILY LANGURIIDAE

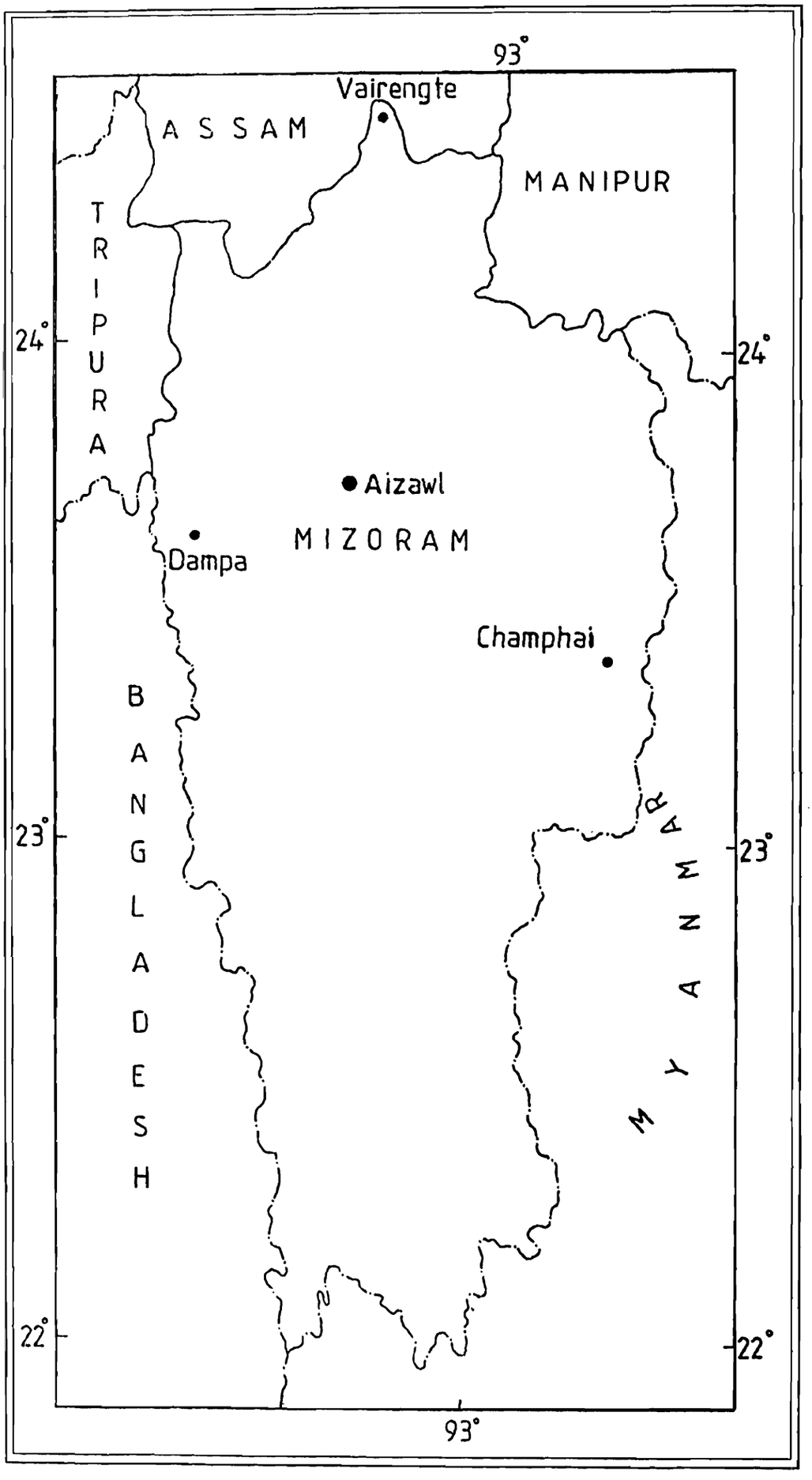
Head usually transverse, rarely with distinct tempora, vertex often with a pair of stridulatory files or occasionally single, often with transverse impressed line on vertex behind eyes, often with fronto-clypeal suture, eyes moderately large, gular sutures well separated, antenna 11-segmented with variable club, antennal insertions somewhat exposed; mandible usually with two apical teeth, mola more or less developed; maxilla with well developed lacinia, galea and palpi, lacinia often bears three apical spines, apical segment of palpi elongate and never securiform; mentum often transverse, ligula often bilobed, apical segment of labial palpi usually with truncate tip and rarely elongate-fusiform.

Prothorax a little elongate to slightly transverse, side margins often smooth, occasionally crenulate, pronotum usually bears prebasal impressions and sometimes a basal transverse groove, front coxae slightly transverse, intercoxal process moderately broad, coxal cavities usually open and occasionally closed.

Elytra striate-punctate, with or without scutellary striole, epipleura complete. Wing often with four anal veins and sometimes less in number, often with anal cell when wing possesses four anal veins, but devoid of anal cell if with less number of anal veins, usually with subcubital fleck.

Mesocoxae moderately to widely separated, mesocoxal cavities closed outwardly by sterna, mesepimeral pockets usually present. Metasternum sometimes with femoral lines, metacoxae rather narrowly to moderately widely separated; metendosternite usually with moderately widely separated anterior tendons.

Legs moderately long, trochanters usually broadly elongate but never heteromeroid, tibiae often little broadened apically and with two normal



MAP OF MIZORAM

spurs, tarsal formula 5-5-5 with segment 4 often reduced.

Abdomen covered by elytra, five ventrites freely articulated and more or less equally long, ventrite 1 often with femoral lines. Ardeagus on one side when retracted, with articulated parameres, median lobe bears long struts. Ovipositor often with apically pointed coxites and with styli attached laterally.

Key to the Subfamilies of LANGURIIDAE

1. Front coxal cavities externally as well as internally closed; elytra without scutellary striole; stridulatory file on head if present, single and median; first anal vein of wing may or may not run into subcubital fleck ..... CRYPTOPHILINAE
- Front coxal cavities externally open behind, if closed then internally open and elytra with scutellary striole; stridulatory file on head if present, double in number; first anal vein not running into subcubital fleck 2
2. Trochanters narrow and distinctly elongate; sternal fitting between mesocoxae with two knobs; scutellary striole of elytra and stridulatory files on head absent; wing with less than four anal veins ..... TORAMINAE*
- Trochanters not very narrow-elongate, sternal fitting between mesocoxae with single knob, rarely in straight line; elytra with scutellary striole and stridulatory files on head present; wing usually with four anal veins 3
5. Antennal club 2-segmented ..... SETARIOLINAE*
- Antennal club with more than two segments 4
6. Antennal club often with more than three segments, antennal insertions dorso-lateral, head with fronto-clypeal suture; maxillary galea short and broad, mandibular mola poorly developed; front coxal cavities internally closed behind ..... LANGURIINAE
- Antennal club 3-segmented, antennal insertions lateral, fronto-clypeal suture absent; maxillary galea narrow-elongate, mandibular mola well developed and projecting; front coxal cavities internally open behind ..... LOBERINAE*

LIST OF TAXA

Subfamily LANGURIINAE

1. *Anadatus filiformis* (Fabricius)
2. *Caenolanguria birmanica* (Harold)

Subfamily CRYPTOPHILINAE

3. *Cryptophilus integer* (Heer)

Key to the Genera of *Languriinae*

1. Eyes finely facetted. Elytral apices not separately rounded ..... ***Anadastus*** Gorham
- Eyes coarsely facetted. Elytral apices separately rounded ..... ***Caenolanguria*** Gorham

Genus ***Anadastus*** Gorham

1887. *Anadastus* Gorham, *Proc. Zool. Soc. Lond.*, 1887 : 362 (Type species: *Languria cambodiae* Crotch).
1887. *Neolanguria* Gorham, *Proc. Zool. Soc. Lond.*, 1887 : 361.
1887. *Stenodastus* Gorham, *Proc. Zool. Soc. Lond.*, 1887 : 362.
1925. *Anadastus* : Arrow, *Fauna Brit. India, Coleoptera* : *Clavicornia* : 206.

Diagnosis : Facies elongated, head not dilated beneath laterally, eyes finely facetted, 11-segmented antena with 3- to 5-segmented club, mandible with a blunt tooth just behind sharp apical tooth, maxillary lacinia with an apical spine, apical segment of maxillary palpi fusiform, apical segment of labial palpi globular; prothorax somewhat quadrate, front coxae not widely separated and prosternal process produced behind coxae; inercoxal process of first abdominal ventrite moderately narrow and its apex not pointed, with a paired (femoral) lines; elytra somwhat parallel, epipleura distinct.

*Subfamilies not recorded from Mizoram.

Anadastus filiformis (Fabricius)

1801. *Trogosita filiformis* Fabricius

1879. *Languria filiformis* Har. *Mitt. Munch. Ent. Ver.,* **3** : 93.

1825. *Languria tesatcea* Macleay, *Annul. Javan.,* : 45.

1860. *Languria rufotestacea* Motschulsky, *Schrenk's Reisen in Amrul,* **2** : 242.

1873. *Languria nigripes* Crotch, *Ent. Mon. Mag.,* **9** : 184.

1887. *Neolanguria filiformis* : Gorham, *Proc. Zool. Soc. Lond.,* 1887 : 361.

1925. *Anadastus filiformis* : Arrow, *Fauna Brit. India, Coleoptera* : 217.

Daignosis : Facies elongated, subparallel, reddish-brown with antennae and legs blackish (except base); head with moderately large finely facetted eyes separated by more than three times of the diameter, antennal club 5-segmented and loosely articulated, club segments little asymetrical, vertex with fine and moderately sparse punctures; prothorax slightly transverse, widest near middle, sides rounded and sinuate at posterior third, front angles blunt depressed near middle, short lateral foveae divergent anteriorly, puncturation on pronotum almost similar to that of vertex of head; elytral shoulder little prominent, with regular rows of coarse punctures, apex slightly darker.

Length : 5.6 mm.

Material : 1 ex. India : Mizoram, Aizawl District, Vairengte, 120 m., 5 ii. 1995, T.K. Pal, *ex.* Sweeping bush.

Distribution : India : Mizoram (New record).

Elsewhere : Myanmar; Thailand; Vietnam; China; Philippines; Indonesia.

Genus *Caenolanguria* Gorham

1887. *Caenolanguria* Gorham, *Proc. Zool. Soc. Lond.,* 1887 : 361 (Type species: *Languria coarctata* Crotch).

Diagnosis : Facies elongated with moderately slender legs and antennae; head without stridulatory files, coarsely facetted prominent eyes, 11-segmentd antenna with 3-segmentd club (rarely 4- to 5-segmented), mandible with bifid tip, maxillary lacinia tridentate, ligula bilobed and apical segment of labial palpi securiform; prothorax contracted towards base, pronotum margined laterally and basally, front coxae not widely separated and prosternal process produced behined coxae; elytra rather parallel in anterior half and then gradually narrowed posteriorly, epipleurae distinct; first abdominal ventrite with acutely pointed intercoxal process.

Caenolanguria birmanica (Harold)

1879. *Languria birmanica* Harold, *Mitt. Munch. Ent. Ver.,* **3** : 74.

1925. *Caenolanguria birmanica* : Arrow, *Fauna Brit. India, Coleoptera* : *Clavicornia* : 241.

Diagnosis : Facies elongated, deep chocolate brown with head and prothorax little paler; head with antennal segments 1-7 little elongate, antenal club 3-segmented and not vey broad, vertex finely and sparsely punctate, eyes moderately large; prothorax slightly transverse, sides rounded and little sinuate before hind angles, pronotal punctures fine and sparse; scutellum about as broad as long; elytral base wider than pronotal base, with rows of small but distinct punctures. Length - 5.9 mm.

Material : 1 ex. India : Mizoram, Aizawl District, Vairengte, 120 m., 5.ii.1995, T.K. Pal, *ex.* sweeping bush.

Distribution : India : Uttar Pradesh, Sikkim, Mizoram (New record).

Elsewhere : Myanmar.

Subfamily CRYPTOPHILINAE

Genus *Cryptophilus* Reitter

1874. *Cryptophilus* Reitter, *Verh. Zool. bot. Ges. Wien.,* **14** : 381 (Type-species: *Cryptophagus integer* Heer).

Diagnosis : Facies elongate, more or less ovoid; head with transverse impressed line on dorsal side behind eyes; stridulatory file single, narrow and median; antennal insertions hidden under projection of frons,11-segmented antenna with

3-segnmented club, mandible bidentate at tip,maxillary lacinia with a bifid apical spine, apical segment of maxillary palpi fusiform, apcial segment of labial palpi elongate; prothorax transverse, front coxal cavities closed, prosternal process broad at apex and apical margin little emarginate; elytral epiplurae distinct, punctures not in regular rows; intercoxal process of first abdominal ventrite broad and its apex rounded.

Cryptophilus integer (Heer)

1838. *Cryptophagus integer* Heer, *Fauna Helvetia,* **1** : 426.

1874. *Cryptophilus integer*: Reitter, *Verh. zool.-bot. Ges. Wien,* **14** : 381.

1971. *Cryptophilus integer*: Sengupta & Crowson, *Mem. zool. Surv. India,* **15**(2) : 24.

Diagnosis : Facies elongate-oval, subdepressed, punctate-pubescent, reddish-brown in colour; head with coarsely facetted moderately large eyes, antennal segments 1-8 almost and segments 9 and 10 weakly transverse and segment 11 about as broad as long, club segments loosely articulated; pronotum finely margined, sides gently rounded, front and hind angles not pronounced; transverse scutellum impunctate; elytral punctures not very coarse and diffused, elytral apex rounded.

Length : 2.2–2.5 mm.

Material : 14 ex. India : Mizoram, Aizawl District, Zemabawk, 1000 m., 10ex., 21.i.1995, T.K. Pal, *ex.* vegetation debris; Aizawl, 1000 m., 4 ex., 20.i.1995, T.K. Pal, *ex.* dried vegetation.

Distribution : Many parts of the world through transport of food grains (Aitken, 1975).

SUMMARY

The paper deals with 3 species under 3 genera of 2 subfamilies which are recorded for the first time from the State of Mizoram. The species are systematically keyed and characterized.

ACKNOWLEDGEMENTS

The author is indebted to the Director, Zoological Survey of India for providing necessary facilities for the work.

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Fauna of Mizoram, State Fauna Series, **14** : 329-334, 2007

INSECTA : COLEOPTERA : DISCOLOMIDAE

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INTRODUCTION

The Discolomidae, otherwise referred to as Notiophygidae, are a moderately large family of Cucujoid beetles comprising about 400 species under 18 genera. Speceis of Discolomidae have been found under bark and on fungi grown upon log. Though the representatives of the family occur in tropical and subtropical parts of both the Old and New worlds but are more diversely represented in the eastern hemisphere. They are known from South America, Africa, South-east Asia, China, Japan, Pacific Islands to Australia, but are yet to be recorded from Europe and New Zealand. Horn (1878) established this family for *Discoloma* Erichson, Matthews (1887) proposed a family, Pseudocorylophidae for *Aphanocephalus* Wollaston to exclude it from Corylophidae. Sharp (1895) included *Holophygus* Sharp, *Notiophygus* Gory with *Discoloma* in Discolominae, thence treated under Colydiidae. Scott (1908) considered *Fallia* Erichson, *Discoloma*, *Notiophygus*, *Holophygus* and and *Aphancoephalus* together in Discolomidae. John (1994) used the family–name 'Notiophygidae' instead of 'Discolomidae for the assemblage. He afterwards (1958 onwards) continued to use the name 'Discolomidae' for the family. John (1959) subdivided the family into five subfamilies. Pal (1992, 1996, 2000) described six species from Arunachal Pradesh, Sikkim and Mizoram. Only one species of *Aphanocephalus* is hitherto recorded from Mizoram by Pal (2000).

CHARACTERS OF FAMILY DISCOLOMIDAE

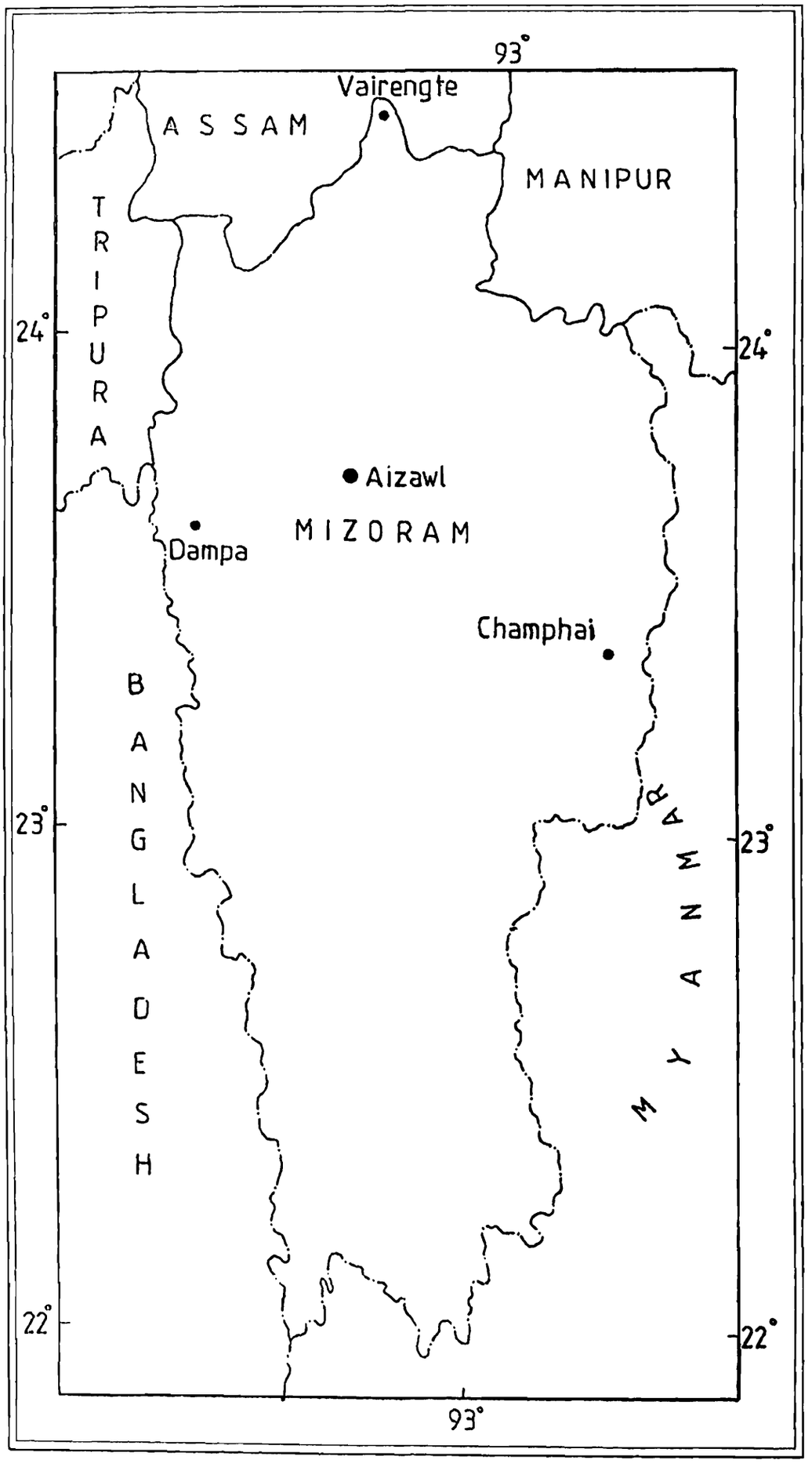
Facies broad, elongate-oblong to oval or rounded; dorsally convex, surface tuberculate or smooth.

Head small in comparison to large prothorax, often inserted under pronotum, eyes small to moderately large, usually with a fronto-clypeal suture, without transverse line on vertex behind eyes, antennal insertions dorso-lateral or dorsal but not wide anteriorly; on ventral side gular sutures widely separated, no antennal cavities; antenna 8 to 10 segmented with 1-segmented large club. Mandible with 3 apical teeth, prostheca and mola well developed; maxillary lacinia without apical spine, segment 2 of maxillary palpi elongate and narrowed towrds apex; mentum of labium normal, ligula broadly triangular, segments 2 and 3 of palpi large and elongate.

Prothorax transverse, narrowed in front, sides smooth or wavy, no prebasal impression on pronotum, front coxae rounded, coxal cavities closed or narrowly open.

Elytra broad, convex, punctures irregular, epipleura broad and complete. Species may be apteraus or winged, no anal vein on wing, cubitus bifurcate at tip.

Mesocoxae widely seprated, mesocoxal cavities closed, sternal fitting between mesocoxae not with knoblike projections, metasternum usually without median impressed line, metendosternite



MAP OF MIZORAM

short and represented by two appophyses. Metacoxae widely separated, rounded, lateral prolongations hidden.

Legs moderately long, trochanters simple or slightly heteromeroid, tarsal frmula 3-3-3 in both sexes, tarsi simple or slightly incrassate.

Abdomen short and braod, ventrites freely articulated, ventrite 1 longest and wihtout femoral lines. Aedeagus in resting condition turned on one side, no distinct parameres.

Key to the Subfamilies of DISCOLOMIDAE

1. Body distinct tuberculate, tubercles often form thick lumps on edges and giving rise to more or less waved contour; edge of pronotum and edge of elytra form an obtused angle when viewed from side ..... NOTIOPHYGINAE*.
- Body smooth or only slightly tuberculate; edge of pronotum and edge elytra form almost a straight line or slightly angulate 2
2. Body contour with almost parallel-sided elytra; hair on body party clubbed or split-lip .... PONDONATINAE*.
- Body contour greatly arched oval with side of elytra rounded; hairs if present not like above 3
3. Body strikinghy coloured with yellow and black; with two hair forms of different lengh ..... CEPHALOPHANINAE*
- Body not strikinghy bicoloured; without hair forms as above 4
4. Body greatly convex with narrow ridge or crest-like edge area; surface almost shining bright, hair pits and pseudopores very minute ..... APHANOCEPHALINAE
- Body flat-convex, with wide edge area as well as a smooth contour; tubercles on body not or litle raised, their gland ducts often visible ... . DISCLOMINAE*

Subfamily APHANOCEPHALINAE

Genus ***Aphanocephalus*** Wollaston

1873. *Aphanocephalus* Wollaston, *Ent. Mon. Mag.*, **9** : 278 (Type species: *Aphanocephalus hemisphaericus* Wollaston).
1887. *Aphanocephalus* : Matthews, *Ann. Mag. Nat. Hist.*, **19**(5) : 114.
1899. *Aphanocephalus* Ganglbauer, *Die Käfer Von Mitteleuropa*, **3** : 845.
1900. *Aphanocephalus* : Dodero, *Ann. Mus. Civ. Genova*, **40** : 560.
1918. *Aphanocephalus* : Grovelle, *Trans. Ent. Soc. London*, 1918 : 48.
1941. *Aphanocephalus* : John, *Zool. Med.*, **42** : 11.
1992. *Aphanocephalus* : Pal, *Hexapoda*, **4**(1) : 46.

Diagnosis : Body broadly ovoid, strongly convex dorsally and flattened ventrally, glabrous vestiture consisting of minute setae not generally visible at lower magnification; transverse head with small eyes, 9-segmented antenna with weakly rounded and smooth lateral sides, front coxae cavities behind, mesocoxal cavities closed and sternal fitting in almost straight line, hind coxae widely separated, femora of legs broadened near middle and devoid of any tooth; abdomen with broad intercoxal process and freely articulated ventrites.

Aphanocephalus maculipennis Pal

2000. *Aphanocephalus maculipennis* Pal, *Entomon.*, **25**(4) : 288.

General appearance (Fig.1) oblong, ovate, about 1.28 times as long as broad, convex dorsally and flattened ventrally, shiny, finely punctate-pubscent; dark brown except paler front and sides of pronotum, border and two ovoid spots of elytra; antenna paler than dorsum.

Head small, exposed part distinctly transverse, almost concealed from above by pronotum, fronto-clypeal suture situated just in front of antennal insertions, clypeus with pubscence denser and more distinct than on pronotum; eyes small, partly

*Subfamilies not recorded from Mizoram

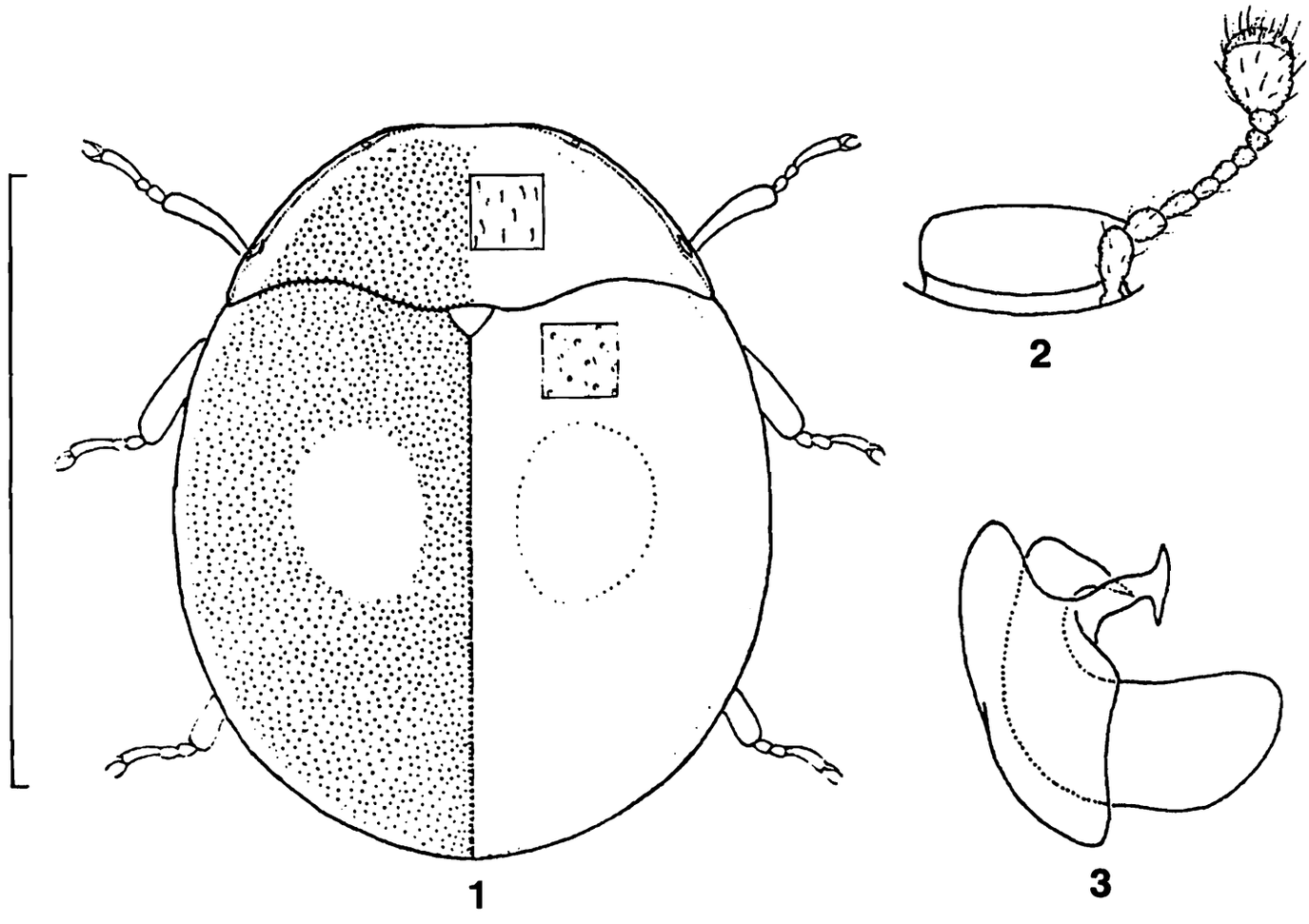
visible from dorsal side; antenna (see Fig. 2) short, shorter than pronotum, scape moderately large, pedicel narrower and little elongate, segments 3-5 more or less elongate, segments 6-7 short and subequal, segment 8 wider than 7, club large, elongate, little more than one-third as long as antenna and with single preapical annulation.

Prothorax strongly transverse (2.08 : 1.00), narrowed in front, front margin slightly emarginate, front angles bluntly rounded, lateral margin feebly rounded and finely bordered, two lateral pits situated close to anterior angle and at posterior third, posterior angles acute, basal margin distinctly sinuate on either side of middle; sides and front margin of pronotum paler than remaining part, punctation fine and sparse, pubescence very short, scanty.

Elytra about as broad as long, more than twice (2.58 : 1.0) as long as prothorax, basal margin emarginate and fitting closely with prothorax, humeral angles blunt, widest near middle; sides evenly rounded, finely bordered and little explanate; a pair of admedian, ovoid, paler spots near middle, edges of which are moderately well defined; punctures simple, point-like impressions on cuticle, sparse, pubescence short and scanty.

Ventral side paler, prosternum indistinctly punctate and finely pubescent; metasternum with fine dense punctures, little weaker mesally, punctation on abdominal ventrites almost similar to that of metasternum; legs yellowish-brown with apical third of femora and tibiae lighter; epipleura flat, broad basally and acute for entire length.

Aedeagus (Fig. 3) on one side, median lobe forming a tube with distal end broad and blunt; tegmen forming a cap-piece enveloping median lobe, its proximal end with an elongate projection, the tip of which broadened.



Figs. 1-3. : *Aphanocephalus maculipennis* Pal : 1, Dorsal view (scale = 1.0 mm.); 2, Exposed part of head and antenna (scale = 0.75 mm.); 3, Aedeagus, Lateral view.

Measurements : Total length 1.54-1.55 mm., lenth of antenna 0.42 mm., length and width of prothorax 0.48 mm. and 1.00 mm., length and with of elytra 1.24 mm. and 1.20mm.

Material : *Holotype* : India : Mizoram, Aizawl District, Ruantlang, 1325 m., 10 km.-O- Champhai 1.ii.1995, T.K. Pal, *ex. Pinus kesiya* (beneath bark). *Paratypes:* 9 ex., same data as holotype (Zoological Survey of India).

Remarks : This species differs from other Indian species of *Aphanocephalus* by having a pale hemispherical spot near middle of each elytron. This species shows certain resemblances with the Australian species, *A. sedlaceki* John in having similar elytral colour pattern and paler margin of pronotum, but *sedlaceki* is more globose in shape with quite different structure of aedeagus. This species resembles also to some extent with the Sikkimese speceis, *A. convexus* Pal in facies and in aedeagal feature. But it differs from *convexus* by the proximal finger-like projection of tegmen widened at tip and shape of meadina lobe different, apart from the dorsal colour pattern.

Key to the Species of *Aphanocephalus* Wollaston

1. Front margin of prothorax rather deeply and widely emarginate, antero-lateral margin of pronotum not paler than remaining part, a pair of lateral marginal pits of pronotum present near humeral angles and those near basal third absent; fronto-clypeal suture situated considerably in front of antennal bases; aedeagus with proximal and distal edge of tegminal cap spatulate and beset with hairs ..... *superbus* Pal

– Front margin of prothorax either unemarginate or slightly emarginate, antero-lateral margin of pronotum paler (reddish-brown) than remaining part (blackish-brown), two paris of lateral marginal pits near humeral angles and near basal third present; fronto-clypeal suture situated just in front of antennal bases; aedeagus with proximal and distal ends of median lobe broad, distal edge of tegminal cap devoid of hairs 2

2. Antennal club segment with single preapical annulation; front margin of prothorax almost unemarginate or indistinctly emarginate 3

– Antennal club segment with two preapical annulations; front margin of prothorax narrowly and slightly emarginate 4

3. Only sides of elytra narrowly paler, remianing part uniformly dark brown; aedeagus with median lobe foot-shaped distally, little constricted above distal margin, proximal end of tegminal cap forming a finger-like projection with reduced tip ..... *convexus* Pal

– A pair of admedian hemispherical paler spots on elytra in addition to marginal pale border; aedeagus with median lobe broadened below middle, slightly rounded distally, proximal end of tegminal cap with an elongate projection and tip of which broadened .....*maculipennis* Pal

4. Antero-lateral pale border of pronotum uninterrupted and continuous throughout its length; aedeagus with distal end of median lobe narrowed and rather broadly pointed ....*johni* Pal

– Antero-lateral border of pronotum interrupted near middle, along front margin; aedeagus with distal end of median lobe broad and blunt... .....*sikkima* Pal

SUMMARY

The paper deals with 1 species under 1 genus of the subfamily Aphanocephalinae which form the first record of Discolomidae from the State of Mizoram. The species is characterised and a key to the Indian species (5 spp.) is appended.

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INSECTA : COLEOPTERA : LATHRIDIIDAE

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INTRODUCTION

The Lathridiidae are a moderately large family of the section Clavicornia of the superfamily Cacujoidea. The lathridiids are usually small (1-3 mm.), reddish-brown, either pubescent or glabrous. They are largely associated with litter or vegetation debris, and a good number of species live in bushy vegetation. Some species live in mouldy stored foods. Hinton (1941) recorded some thirty species of Lathridiidae associated with various stroed products. The Lathridiidae seem to be more diversely represented in the tropical and subtropical climates than in the temperate zones. Champion (1922 a, b) was the first author to describe four species from Western Himalaya. Motschulsky (1866) added one more species from India. Later, Johnson (1970, 1972, 1975, 1977a, 1977b) described a good number Corticarine species from India. Sengupta (1976) dealt with the Lathridiinae of India where he included 10 species under 6 genera. Later, Sengupta (1983) revised *Stephostethus* LeConte from India. But no species of Lathridiidae is hitherto to known from Mizoram. The present work is based on the collection made by the author from Mizoram in 1995. These represent 11 species under 8 genera of two subfamilies.

CHARACTERS OF THE FAMILY LATHRIDIIDAE

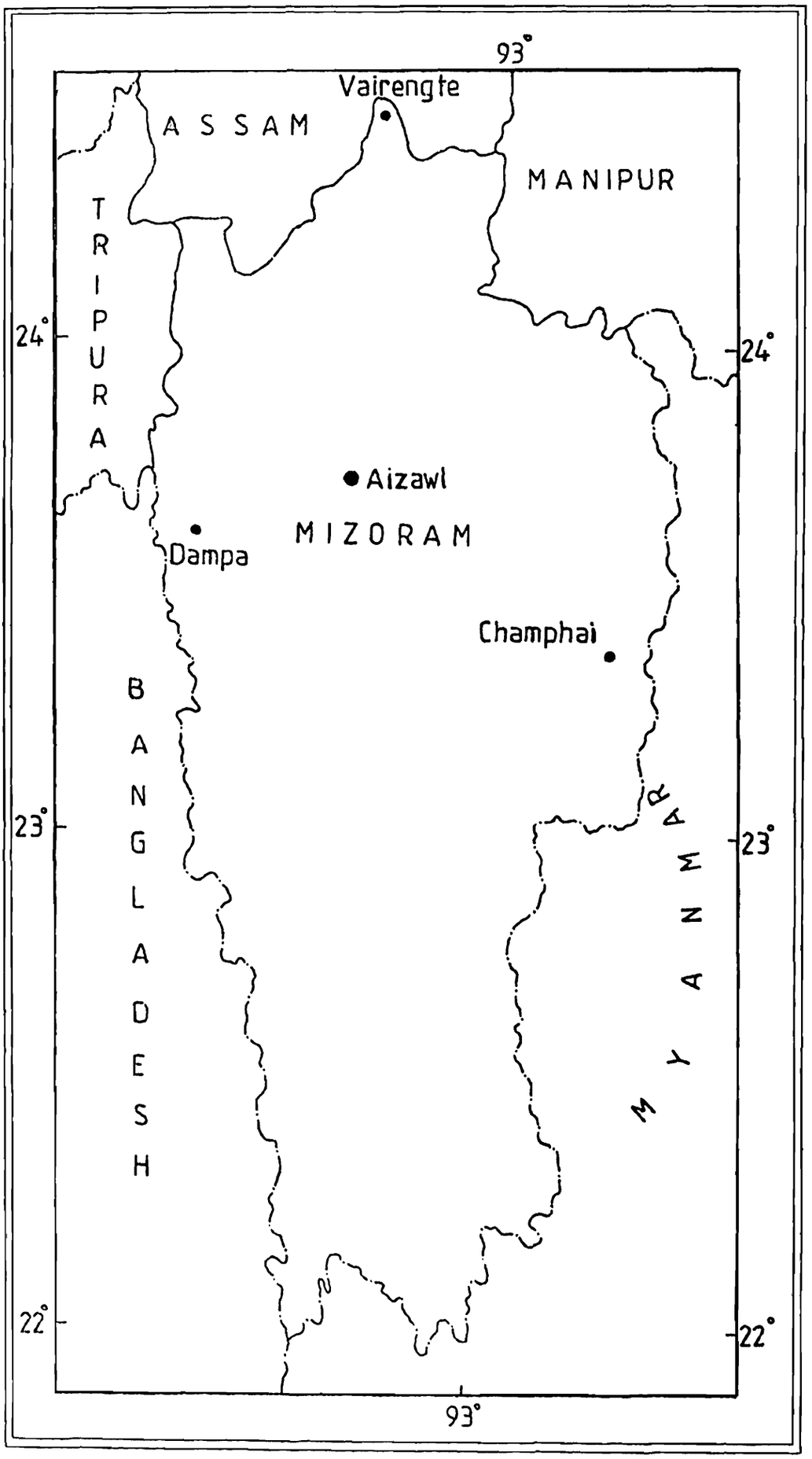
Body small (1.2-2.0 mm.), elongate-oval, somewhat depressed, yellowish to deep brown, elytral punctures in rows, dorsal surface pubescent or glabrous.

Head usually little elongate, sometimes transverse, often with prominent eyes, without stridulatory files on occipital region, transverse line on vertex behind eyes more or less prominent, with fronto-clypeal suture, antennal insertions dorso-lateral or dorsally situated, antenna 10- or 11-segmented with 2- to 3-segmented club; on ventral side gular sutures well separated, without antennal cavities. Mandible usually with well developed mola, 2 or 3 apical teeth with their inner margin often serrated; maxilla with well developed galea, its apex broad and hairy, segments 2 and 3 of palpi enlarged, apical segment usually narrow-elongate; labium with mentum transverse, segment 3 of palpi narrow apically.

Prothorax variously shaped, sides often serrate or dentate, occasionally constricted near middle, pronotum sometimes with ridges or depressions. Front coxae rounded, with hidden trochantins, either contiguous or narrowly separated, coxal cavities closed behind externally, prosternal process narrow, somtimes keeled or elevated.

Elytra with regular rows of punctures, without scutellary striole, epipleura narrow. Wing with reduced anal veins, with subcubital, fleck; without r-m cross vein, radial cell and anal cell.

Mesocoxae closely to moderately widely separated, sternal fitting between mesocoxae with a knob from metasternum or in a stright line, mesocoxal cavities outwardly closed by sterna. Metasternum transverse, metacoxae moderately widely separated; metendosternite reduced with anterior tendons widely separated.



MAP OF MIZORAM

Legs moderately long, trochanters short and simple, femora swollen towards middle, tibiae slender and slightly broadened at apex, tarsal formula 3-3-3 in both sexes.

Abdomen covered by elytra, ventrites freely articulated, ventrite 1 longest and sometimes with femoral lines, ventrites 2-5 more or less equal in length. Aedeagus reduced and simple, without articulated parameres and median strut.

Key to the Subfamilies of LATHRIDIIDAE

1. Dorsal surface glabrous or almost so; fronto-clypeal suture deeply impressed with clypeus on lower plane than frons. Front coxae separated by visible prosternal process; pronotum and elytra costate or carinate ..... LATHRIDIINAE
- Dorsal surface with setae or pubescence; fronto-clypeal suture not deeply impressed with clypeus and frons in same plane. Front coxae contiguous and prosternal process apparently not visible; pronotum and elytra without costae or carinae ..... CORTICARIINAE.

LIST OF SPECIES

Subfamily LATHRIDIINAE

1. *Enicmus histrio* Joy & Tomlin
2. *Cartodere constricta* (Gyllenhal)
3. *Aridius vietnamensis* Rücker.
4. *Aridius latumeris* Rücker
5. *Stephostethus tarunus* Sengupta

Subfamily CORTICARIINAE

6. *Migneauxia orientalis* Reitter
7. *Corticarina hammondi* Johnson
8. *Corticarina* sp. A
9. *Cortinicara gibbosa* Herbst
10. *Melanophthalma angulicollis* Motschulsky
11. *Melanophthalma franzi* Johnson.

Subfamily LATHRIDIINAE

Key to the Genera of LATHRIDIINAE

1. Prosternal intercoxal process parallel-sided, elevated and keeled; prothorax not constricted above base ..... ***Enicmus*** Thomson
- Prosternal intercoxal process pear-shaped and not keeled; prothorax usually deeply indented medially 2
2. Intercoxal process of abdominal ventile 1 with a pair of cavities or pits; sides of prothorax distinctly constricted above base; sternal fitting between mesocoxae with two knobs 3
- Intercoxal process of abdominal ventrite 1 without cavities or pits, sides of prothorax not constricted but somewhat indented medially; sternal fitting between mesocoxae with single knob ..... ***Stephostethus*** Le Conte
3. Antennal club 2–segmented; temples parallel and appearing at least as long as eyes ..... ***Cartodere*** Thomson
- Antennal club 3-segmented; temples somewhat convergent and not appearing as long as eyes ..... ***Aridius*** Motschulsky

Genus ***Enicmus*** Thomson

1859. *Enicmus* Thmson, *Skand. Coleopt.*, **1** : 93 (Type-species : *Ips transversus* Oliver).
1866. *Permidius* Motschulsky, *Bull. Moscou*, **39** : 243.
1875. *Enicmus* : Reitter, *Stettin Ent. Ztg.*, **36** : 299.
1897. *Enicmus* : Belon, *Revue Ent.*, **16** : 114.
1952. *Enicmus* : Walkley, *Proc. ent. Soc. Wash.*, **54** : 218.

Diagnosis : Head (exposed part) broader than long, clypeus broad with apical margin nearly straight, eyes moderately large, temple long; 11-segmented antenna with rather large scape, segments 2-8 narrower and more or less elongate, club 3-segmented. Prothorax transverse; sides not clearly indented near middle, margin serrated; transverse prebasal depression on pronotum; front coxae rounded and closely situated, prosternal process narrow-keeled; metasternum transverse,

glandular pits with radiating lines below mesocoxae; first abdominal ventrite with radiating lines below metacoxae, no pit. Elytra ovoid, striate-punctate, interstices ribbed.

Enicmus histrio Joy & Tomlin

1910. *Enicmus histrio* Joy & Tomlin, *Entomologist's mon., Mag.* **46** : 250.

1967. *Enicmus histrio* : Peez, *in* Freude, Hardy & Lohse, *Käfer Mitteleurop.*, **7** : 179.

Diagnosis : Moderately convex, rather shiny, yellowish- to reddish-brown, head and pronotum dull. Head broader than long, temples almost as long as moderate-sized eyes and nearly parallel-sided; antenna rather slender, scape to segment 4 more or less elongate, segments 5-8 shorter and subequal, club gradually wider anteriorly, segment 9 about as broad as long, segment 10 transverse, apical segment elongate. Prothorax transverse (1.5 : 2.0), broadest at anterior third, sides little rounded in anterior half and then narrowed posteriorly, sides somewhat flanked, a transverse broad depression from side to side above base, surface closely punctured. Elytra elongate (1.5 : 1.0), gently curved at sides, broadest near middle, interstices at least as wide as punctures and top rounded, interstice 6 more elevated than others. Length - 1.40-1.68 mm.

Material : 76 ex. India : Mizoram, Aizawl District, New Champhai, 1325 m., 48 ex., 31.i.1995, T.K. Pal, *ex.* haystack; Teirei vill., Dampa, 200 m., 2 ex., 26.i.1995, T.K. Pal, *ex.* haystack; Dampa, 230 m., 2 ex., 27.i.1995, T.K. Pal, *ex.* haystack; Aizawl, 1000 m., 6 ex., 20.i.1995, T.K. Pal, *ex.* dried vegetation; Seling, 900 m., 17 ex., 29.i.1995, T.K. Pal, *ex.* dried vegetation; Vairengte, 120 m., 1 ex., 5.ii.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Meghalaya, Mizoram (New record), West Bengal, Bihar, Uttar Pradesh, Jammu & Kashmir.

Elsewhere : Nepal; Pakistan; Afghanistan; Azerbaidjan; Europe; Nigeria; Australia.

Genus ***Cartodere*** Thomson

1859. *Cartodere* Thmson, *Skand. Coleopt.*, **1** : 93 (Type-species : *Lathridius constrictus* Gyllenhal).

1952. *Cartodere* Walkley, *Proc. ent. Soc. Wach.*, **54** : 219.

Diagnosis : Head elongate, clypeus broad with apical margin arcuate; eyes moderately large, not projecting; temple long; 11-segmented antenna with rather large scape, segments 2-9 shorter and narrower, club 2-segmented; transverse impressed line on vertex behind eyes well-marked. Prothorax about as broad as long, with deep indentations on sides behind middle, sides not serrated but clearly bordered, a pair of admedain carinae on pronotum, transverse depression on pronotum across narrowed part; front coxae rounded and closely situated, prosternal process narrow but not elevated or keeled, coxal cavities broadly closed behind; mesocoxae more widely separated than front coxae, a large pit on mesosternum between coxae; metasternum transverse, a pair of elongated glandular pits with radiating lines below mesocoxae; first abdominal ventrite with broad intercoxal process, paired pit with radiating lines on the intercoxal process; elytra ovoid, striate-punctate, intestices ribbed.

Cartodere constricta (Gyllenhal)

1827. *Lathridius constrictus* Gyllenhal, *Ins. Suecica*, **4** : 138.

1859. *Cartodere constricta* : Thmson, *Skand. Col.*, **1** : 93.

1863. *Coninomus constrictus* : Thomson. *Skand. Col.*, **5** : 218.

1887. *Coninomus constrictus* : Reitter, *Best.-Tab.*, **3** (ed. 2): 20.

1952. *Cartodere constricta* : Walkley, *Proc. Ent. Soc. Wash.*, **54** : 233.

Diagnosis : Moderately convex, rather shiny, reddish-brown, head and pronotum dull. Elongate head with temple about as along as eye and little diverging posteriorly, narrow-median sulcus on vertex; antenna slender with usual feature as described above, segment 10 transverse and segment 11 a little elongate. Prothorax distinctly constricted below middle, sides of pronotum distinctly bordered, with an elongate medial fovea

which broader anteriorly, paired lateral fovaea prominent in anterior half only, surface closely puntured. Elytra elongate (1.6 : 1.0), gently curved at sides, broadest near middle; interstices narrower than rows of punctures, alternate interstices a little more raised.

Length : 1.6 mm.

Material : 1 ex. India : Mizoram, Aizawl District, Vairengte, 120 m., 5.ii.1995, T.K.Pal, *ex.* haystack.

Distribution : India : Mizoram (New record), West Bengal, Delhi, Jammu & Kashmir, Karnataka.

Elsewhere : Nepal. This speceis has a cosmopolitan distribution and is recorded from alll the Continents.

Genus *Aridius* Motschulsky

1866. *Aridius* Motschulsky, *Bull. Soc. Imp. Nat. Mosc.*, **39**: 260 (Type-species : *Lathridius nodifer* Westwood).

1911. *Aridionomus* Reitter, *Fauna German.*, **3** : 82.

1948. *Aridius* : Walkley, *Proc. ent. Soc. Wash.*, **50** : 150.

Diagnosis : Head about as broad as long or little elongate, clypeus broad with apical margin arcuate; eyes moderately large, not projecting; temple long and little convergent posteriorly; 11-segmented antenna with rather large scape, segments 2-8 shorter and narrower, club 3-segmented; transverse impressed line behind eyes not prominent. Prothorax little elongate to transverse with deep indentations on sides behind middle, sides not serrated but bordered, a pair of admedian carinae on pronotum, transverse depression on pronotum across narrowed part; front coxae rounded and closely situated, prosternal process narrow but not elevated or keeled, coxal cavities broadly closed behind; mesocoxae more widely separated than procoxae, a large pit on metasternum between coxae, a pair of pits below mesocoxae; first abdominal ventrite with broad intercoxal process, paired pits on the process; elytra ovoid, striate-punctate, interstices ribbed.

Key to then Species of *Aridius* Motschulsky

1. Antennal segment 3 clearly elongate; temple longer than eye; elytral interstices 3, 5 and 7 carinate; interstices 3 and 7 unite posteiorly before apex and interstice 5 ends posteriorly before above union ..... *vietnamensis* Rücker

5. Antennal segment 3 hardly as broad as long or broader; temple hardly as long as eye; elytral interstices 3,5 and 7 carinate, interstices 3 and 5 unite posteriorly and interstice 7 ends separately near apex and not united with other carinate interstices ..... *latumeris* Rücker.

Aridius vietnamensis Rücker

1979. *Aridius vietnamensis* Rücker, *Ann. Hist. Nat. Mus. Hung.*, **71** : 161.

Diagnosis : Moderately convex, rather shiny, reddish-brown, head and pronotum dull. Elongate head with temple longer than eye and little converging posteriorly, narrow median sulcus on vertex; antenna slender, segments 3-8 more or less elongate, club gradually wider apically, segment 9 elongate, segment 10 about as broad as long and segment 11 a little elongate. Prothorax distinctly constricted behind middle, with an elongate medial fovea which bordered anteriorly, paried lateral foveae prominent in anterior half, surface closely punctured. Elytra elongate (1.4 : 1.0), gently curved at sides, broadest in anterior third, interstices narrower than rows of punctures,alternate interstices carinate and interstices 3 and 7 unite posteriorly. Length – 1.7 mm.

Material : 2 ex. India : Mizoram, Aizawl District, Vairengte, 120 m., 5.ii.1995, T.K. Pal, *ex.* sweeping bush.

Distribution : India : Mizoram (New record).

Elsewhere : Vietnam.

Aridius latumeris Rücker

1979. *Aridius latumeris* Rücker, *Ann. Hist. Nat. Mag. Hung.*, **71** : 161.

Diagnosis : Moderately convex, rather shiny, reddish-brown, head and pronotum dull. Head about as broad as long, temple about as long as eye and somewhat converging posteriorly, narrow median sulcus on vertex; antenna slender, segments 4-7 more or less elongate, segment 8 about as broad as long, club gradually wider apically, segment 9 about as broad as long, segment 10 little transverse, segment 11 a little elongate. Prothorax a little transverse, distinctly constricted behind middle, with an elongate medial fovea, lateral foveae not well marked, surface closely punctured. Elytra elongate (1.4 : 1.0), gently curved at sides, broadest in anterior third, interstices narrower than rows of punctures, alternate interstices carinate and interstices 3 and 5 unite posteriorly.

Length : 1.7 mm.

Material : 2 ex. India : Mizoram, Aizwal District, Zemabawk, 1000 m., 1 ex., 21.i.1995, T.K. Pal, *ex.* vgetation debris; Dampa w.l.s., 200m., 1 ex., 25.i.1995, T.K. Pal, *ex.* forest litter.

Distribtuion : India : Mizoram (New record).

Elsewhere : Vietnam.

Genus ***Stephostethus*** Le Conte

1874. *Stephostethus* Le Conte, *Proc. Amer. Phil. Soc.*, **17** : 601 (Type speceis : *Lathridius litratus* Le Conte).

1926. *Lathridius* : Hetschko, *Coleopt. Calt.*, **85** : 22.

1952. *Stephostethus* : Walkley, *Proc. Ent. Soc. Wash.*, **54** : 217.

1976. *Stephostethus* : Sengupta, *Orient. Ins.*, **10**(1) : 119.

Diagnosis : Head broader than long, clypeus broad with apical margin arcuate, eyes large, temple moderately long; 11-segmented antenna with rather large scape, segments 2-8 narrower and more or less elongate, club 3-segmented. Prothorax about as broad as long or little transverse, sides little sinuate behind middle, margin serrated, a pair of admedlan carinae on pronotum, transverse depression on pronotum often seen; front coxae rounded and closely situated, prosternal process narrow but not elevated or keeled, coxal cavities broadly closed behind; mesocoxae more widely separated than procoxae; apex of metasternum on lower plane than mesosternum, metasternum transverse, a pair of pits with radiating lines below mesocoxae; first abdominal ventrite with broad intercoxal process, no pit on intercoxal process; elytra ovoid, striate-punctate, interstices ribbed.

Stephostethus tarunus Sengupta

1983. *Stephostethus tarunus* Sengupta, *Ent. Basel.*, **8** : 347.

Diagnosis : Moderately convex, rather shiny, dark reddish-brown, head and pronotum comparatively dull. Head broader than long, temple slightly shorter than eye and almost vertical; antenna slender, scape large and globular, elongate pedicel broader basally, segments 3-8 elongate, subequal, segments 9 and11 elongate and segment 10 about as broad as long. Prothorax slightly transverse, sides slightly sinuate behind middle, with an elongated medial fovea which bordered anteriorly, paried lateral foveae more prominent in posterior half, surface closely punctured. Elytra elongate (1.7 : 1.0), gently curved at sides, broadest little above middle, interstices wider than rows of punctures, 7th interstice carinate and extending up to posteior third. Hind tibia in male with a pair of spines little above apex.

Length : 1.7-1.9 mm.

Material : 44 ex. India : Mizoram, Aizawl District, Aizawl, 1000 m., 3 ex., 20.i.1995, T.K. Pal, *ex.* dried vegetation; Aizawl, Assam Rifle Campus, 1000 m., 2 ex., 3.ii.1995, T.K. Pal, *ex.* litter; Seling, 900 m., 8 ex., 29.i.1995, T.K. Pal, *ex.* vegetation debris; 13 ex., *ex.* dried vegetation; Zemabawk, 1000 m.,8 ex., 21.i.1995, T.K. Pal, *ex.* vegetation debris; 10 km. N-O-Aizwal, 1000m., 9 ex., 23.i. 1995, T.K. Pal, *ex.* vegetation debris; Teiri vill, Dampa, 200 m., 1 ex., T.K. Pal.

Distribution : India : West Bengal (Darjeeling district), Sikkim, Mizoram (New record).

Subfamily CORTICARIINAE

Key to the Genera of CORTICARIINAE

1. Antenna 10-segmented....***Migneauxia*** du Val
- Antenna 11-segmented 2
2. Basal segment of tarsi (especially the hind one) strongly produced ventrally so that its apex almost reaches the apex of second segment; second segment reduced, arising dorsally from the basal segment nearly at the middle. Head generally much narrower than pronotum. Pronotum rather broad, usually strongly curved at sides, with or without a rounded post-median depression ..... ***Corticarina*** Reitter
- Basal segment of tarsi barely produced ventrally; second segment not reduced, about three- fourths the length of basal one and arising dorsally close to its apex. Head slightly narrower than pronotum. Pronotum narrow, weakly curved at sides, with a broad transverse prebasal impression 3
3. Prothorax narrowed behind anterior third, sides finely serrulate; scutellum moderately transverse, not carinate or grooved. No femoral lines on abdominal ventrite 1 ..... ***Cortinicara*** Johnson
- Prothorax narrowed behind anterior one-third, sides distinctly dentate; scutellum strongly transverse, grooved or carinate. Abdominal ventrite 1 with posteriorly diverging femoral lines ..... ***Melanophthalma*** Motschulsky

Genus ***Migneauxia*** Jacq du Val

1857-59. *Migneauxia* Jacq du Val, *Gen. Col. d' Eur.*, **2** : 248 [Type-speceis : *Migneauxia serricolis= Migneauxia crassiuscula* (Aubé)].

1875. *Migneauxia* : Reitter, *Stettin Ent. Zeit.*, **36** : 300.

1989. *Migneauxia* : Rücker, *Entomol. Blätter.*, **85** : 108.

Diagnosis : Head broader than long, clypeus broad with its apical margin arcuate, eyes large, temple short; 10-segmented antenna with moderately large scape, segments 2-7 narrower, club 3-segmented. Prothorax broader than long, sides rounded and margin dentate, pronotum convex and setose; front coxae rounded and closely situated, proseternal process narrow but not elevated, coxal cavities closed behind; mesocoxae more widely separated than procoxae, meso-metasternal fitting in almost straight line, metasternum transverse, devoid of pits, no distinct median impressed line; first abdominal ventrite with broad intercoxal process, devoid of femoral lines; elytra ovoid, stirate-punctate, interstices pubescent but not ribbed.

Migneauxia orientalis Reitter

1877. *Migneauxia orientalis* Reitter, *Mitt. Münch. Ent. Ver.*, **1** : 139.

1966. *Migneauxia orientalis* : Dajoz, *Rev. Ecol. Biol. Sol.*, **3** : 627.

1977. *Migneauxia orientalis* : Johnosn, *Ent. Basel.*, **2** : 329.

Diagnosis : Moderately convex, rather shiny, head and pronotum moderately convex, dorsum pubescent. Head broader than long, temple short, shorter than twice as wide as eye facet and extended beneath eye; antenna slender and moderately long, moderately large scape little elongate, pedicel shorter and narrower, segments 3-5 narrower and more or less elongate, segments 6-7 shorter and subequal, club elongate, segments 8-9 about as broad as long and apical segment elongate. Prothorax transverse (1.00 : 1.66), broadest near middle, sides rounded, margin with about seven teeth which become larger and more prominent posteriorly, a small median depression before pronotal base, pronotal surface moderately coarsely and densely punctate, seate short. Elytra elongate (1.48 : 1.00), gently curved at sides, broadest near middle, interstices narrower than punctures, no interstice ribbed. Length– 1.26-1.38 mm.

Material : 10 ex. India : Mizoram, Aizawl District, Vairengte, 120 m., 5.ii.1995, T.K. Pal, *ex.* haystack.

Distribution : India : Mizoram (New record).

Elsewhere : Bhutan; Sri Lanka; Vietnam; China; Japan; Nigeria; Ethiopia; introduced into Denmark and Colombia through commodities.

Genus *Corticarina* Reitter

1880. *Corticarina* Reitter, *Verh. zool.-bot. Ges. Wien* **30** : 58 (Type-species not designated).

Diagnosis : Head broader than long, clypeus broad with its apical margin arcuate, eyes large, temple short; 11-segmented antenna with moderately large scape, segments 2-8 narrower, club 3-segmented. Prothorax broader than long, considerably broader than head across eyes, sides rounded and margin finely serrated, pronotum convex and setose; front coxae rounded and closely situated, prosternal process narrow but not elevated, coxal cavities closed behind, mesocoxae more widely separated than procoxae, meso-metasernal fitting in a little concave line on metasternal apex, metasternum transverse, median impressed line prominent in posterior half, tarsal segment 1 of legs (especially hind leg) strongly lobed below and the lobe extends almost to the apex of second segment; first abdominal ventrite with broad intercoxal process, devoid of femoral lines; elytra ovoid, striate-punctate, interstices pubescent.

Key to the Species of *Corticarina* Reitter

1. Eyes large, frons little more than thrice as wide as ocular diameter (1.0 : 3.3), transvese impression on vertex behind eyes not very prominent; prothorax slightly transverse (1.0 : 1.25) ..... *hammondi* Johnson
- Eyes comparatively smaller, frons about four times as wide as ocular diameter (1.0 : 4.1), transverse impression on vertex behind eyes rather distinct; prothorax more distinctly transverse (1.0 : 1.33) ..... sp. A

Corticarina hammondi Johnson

1972. *Corticarina hammondi* Johnson, *The Entomologist,* **105** : 102.

1978. *Corticarina hammondi* : Rücker, *Ann. Hist. Nat. Mus. Nat. Hung.,* **70** : 153.

Diagnosis : Moderately convex, rather shiny, reddish-brown with antennae and legs paler, dorsum pubescent. Head broader than long, temple very short, antenna slender and slightly longer than prothorax, moderately large scape little elongate, pedicel shorter and narrower, segments 3-6 narrower and more or less elongate, club moderately broad, segments 9 and 10 about as broad as long, apical segment rather elongate. Prothorax tansverse (1.0 : 1.25), broadest near middle, sides rounded and margin serrated, a samll circular weakly impressed median depression before pronotal base, pronotal surface moderately coarsely and densely punctate, setae short. Elytra elongate (1.42 : 1.00), gently curved at sides, surface shining, interstices wider than punctures and interstices wider basally and narrowed behind middle, elytral pubescence fine. Length–1.34-1.40 mm.

Material : 5 ex. India : Mizoram, Aizawl District, Zemabawk, 1000 m., 2 ex., 21.i.1995, T.K. Pal, *ex.* vegetation debris; Seling, 900 m., 29.i.1995, 1 ex., 29.i.1995, T.K. Pal, *ex.* vegetation debris; 10 km. N.-O-Aizawl, ,1000 m., 1 ex., 23.i.1995, T.K. Pal, *ex.* vegetation debris; Vairengte, 120 m., 1 ex., 5.ii.1995, T.K. Pal, *ex.* vegetation debris.

Distribution : India : Uttranchal, West Bengal (Darjeeling Hills), Mizoram (New Roecord).

Corticarina sp. A

Diagnosis : Moderately convex, rather shiny, colour reddish-brown, legs and antennae paler. Head broader than long, temple short, antenna slender and slightly longer than prothorax, pedicel shorter and narrower, segments 3-7 narrower and more or less elongate, club modeately broad, segment 9 about as broad as long, segment 10 little transverse, apical segment elongate. Prothorax rather transverse (1.00 : 1.33-1.40), broadest around middle, sides strongly rounded and margin serrated, postmedian depression on pronotum weakly impressed and nearly circular, pronotal surface moderately coarsely and densely punctate, discal punctures less than a quarter of a diameter apart, hind angles weakly toothed. Elytra

long oval, 1.43-1.50x as long as broad, broadest more or less around the middle where the edges are somewhat straight, sides rather weakly curved, surface shining, strial punctures moderate and close, interstices basally much wider than striae, elytral pubescence fine and decumbent. Length- 1.44-1.50 mm.

Material : 10 ex. India : Mizoram, Aizawl District, 10 km. N.O.– Aizawl, 1000 m., 4 ex., 23.i.1995, T.K. Pal, *ex.* vegetation debris; Zemabawk, 1000 m., 1 ex., 21.i.1995, T.K. Pal, *ex.* vegetation debris, Seling, 900 m., 4 ex., 29.i.1995, T.K. Pal, *ex.* dried vegetation; New Champhai, 1325 m., 1 ex., 31.i.1995, T.K. Pal, *ex.* haystack.

Remarks : On external characters, *i.e.*, colouration, transverse prothorax and elytral features this spceis is closely related to *C. hammondi* Johnsosn. But the characters in the key above show this speceis as a separate one from *hammondi*, appear to be different from any described Indian *Corticarina* and may be a new species. This species however, is not named here for more examination and comparison.

Genus ***Cortinicara*** Johnson

1975. *Cortinicara* Johnoson, *Ent. Scand.*, **6** : 283 (Type-species : *Lathridius gibbosus* Herbst).

Diagnosis : Head broader than long, slightly narrower than prothorax (1.0 : 1.2), clypeus broad with its apical margin arcuate, eyes large, temple short, transverse impressed line on vertex behind eyes well marked; 11-segmented antenna with moderately large scape, segments 2-8 narrower, club 3-segmented. Prothorax slightly broader than long (1.0 : 1.2), broadest above middle, weakly curved at sides, margin finely serrate, pronotum with a broad transverse impression behind middle which extends across three-fourths of its width, disc setose; front coxae rounded and closely situated, prosternal process narrow but not elevated, coxal cavities closed behind, mesocoxae more widely separated than procoxae, meso-metasternal fitting in a straight line, metasternum transverse, median impresed line prominent in posterior half; tarsal segment 1 of legs not strongly lobed, second segment about three-fourths the length of segment 1; first abdominal ventrite with broad intercoxal process, devoid of femoral lines; elytra ovoid, striate-punctate, interstices with elongate punctures and pubescent.

Cortinicara gibbosa (Herbst)

1793. *Lthridius gibbosus* Herbst, *Käfer,* **V** : 5, t.44, f.2.

1880. *Corticarina gibbosa* : Reitter, *Verh. Nat. Ver. Brunn (Best. Tab. 3)* : 28.

1937. *Corticarina gibbosa* : Strand, *Norsk ent. Tidsskr.*, **5** : 23.

1972. *Corticarina gibbosa* : Johnson, *Entomologist,* **105** : 100.

1975. *Cortinicara gibbosa* : Johnson, *Ent. Scand.*, **6** : 283.

1978. *Cortinicara gibbosa* : Rücker, *Ann. Hist. Nat. Mus. Nat. Hung.*, **70** : 153.

Diagnosis : Moderately convex, not very shiny, yellowish- to reddish-brown with antennae and legs paler, dorsum pubescent. Head broader than long, temple very short, antenna slender and slightly shroter than head and prothorax together, moderately large scape little elongate, pedicel shorter and narrower, segments 3-7 narrower and more or less elongate, segments 9 and 11 elongate and segment 10 about as broad as long. Prothorax transverse (1.0 : 1.2), front margin slightly rounded, broadest near anterior third, sides weakly curved, transverse depression above pronotal base rather well marked, pronotal surface moderately coarsely and densely punctate, discal punctures less than a diameter apart, hind angles rounded. Elytra long oval, about 1.5x as long as braod, broadest more or less around the middle where the edges are somewhat straight, sides rather weakly curved, surface shining, striae moderately large, interstices basally wider than striae, interstices with rows of elongate punctures, pubescence fine and decumbent. Length– 1.22-1.40 mm.

Material : 33 ex. India : Mizoram, Aizawl District, Teiri Vill., Dampa, 200 m., 9 ex., 26.i.1995,

T.K. Pal; Seling, 900 m., 8 ex., 29.i.1995, T.K. Pal, *ex.* vegtation debris; 10 km. N. O-Aizawl, 1000 m., 2 ex., 23.i.1995, T.K. Pal, *ex.* vegetation debris; Thingdam, 1000m., 20 km. O-Aizawl, 1 ex., 22.i.1995, T.K. Pal; Zemabawk, 1000 m., 2 ex., 22.i.1995, T.K. Pal, *ex.* vegetation debris; New Champhai, 1325 m., 1 ex., 31.i.1995, T.K. Pal.

Distribution : India : Kashmir, Uttaranchal, West Bengal (Darjeeling Dist.), Mizoram (New reocrd).

Elsewhere : Nepal; Bhutan; Sri Lanka; Pakistan; Japan; Europe across Asia to eastern Siberia; U.S.A.; Canada.

Genus *Melanophthalma* Motschulky

1866. *Melanophthalma* Motschulsky, *Bull. Soc. Nat. Moscou,* **39** : 269 (Type-species : not designated.)

Diagnosis : Head broader than long, clypeus broad with its apical margin arcuate, eyes considerably large, temple minute; 11-segmented antenna with moderately large scape, segments 2-8 narrower, 3-segmented club. Prothorax broader than long and broader than head across eyes, sides outwardly curved but not uniformly rounded, somewhat angulate at middle, sides with small but conspicuous dentitions behind angulation, pronotum convex and setose; front coxae rounded and closely situated, prosternal process narrow but not elevated, coxal cavities closed behind, mesocoxae more widely separated than front coxae, meso-metasternal fitting in a straight line, metasternum transverse, no distinct median impressed line; tarsal segment 1 of legs slightly lobed and not greatly extended below second segment; first abdominal ventrite with broad intercoxal process, with posteriorly diverging femoral lines; elytra ovoid, striate-punctate; scutellum markedly transverse, with a preapical narrow transverse groove.

Key to the Species of *Melanophthalma* Motschulsky from Mizoram

1. Sides of prothorax slightly angulate at middle, but not produced, so that middle is only a little broader than base; abdominal ventrite 1 with some coarse punctures behind hind coxal margin ..... *franzi* Johnson
- Sides of prothorax angularly produced at middle, so that middle is much broader than base; abdominal ventrite 1impunctate .... *angulicollis* Motschulsky

Melanophthalma franzi Johnson

1972. *Melanophthalma franzi* Johnson, *The Entomologist,* **105** : 109.

1978. *Melanophthalma franzi* : Rücker, *Ann. Hist. Nat. Mus. Nat. Hung.,* **70** : 154.

Diagnosis : Reddish-brown species; temple of head weakly developed and barely visible; antennal segment 9 elongate, segment 10 almost about as broad as long. Prothorax transverse (1.0 : 1.27), broadest a little in front of middle, the sides somewhat angular, being slightly narrowed basally, posterior angle with a weak tooth, base of pronotum a little narrower than maximum pronotal breath, transverse depression above pronotal base rather well marked. Elytra ovoid, widest near middle, with coarsely punctured striae, interstices basally wider than striae, pubescence distinct but somewhat depressed. Abdominal ventrite 1 with some coarse punctures, especially close to base.

Length : 1.52 mm.

Material : 2 ex. India : Mizoram, Aizawl District, Vairengte, 120 m., 1 ex., 5.ii.1995, T.K. Pal, *ex.* sweeping bush; Thingdam, 1000 m., 20 km. O-Aizawl, 1 ex., 22.i.1995, T.K. Pal.

Distribution : India : Uttaranchal, Himachal Pradesh, West Bengal (Darjeeling Dist.) Mizoram (New Record).

Melanophthalma angulicollis Motschulsky

1866. *Melanopthalma angulicollis* Motschulsky, *Bull. Soc. Imp. Nat. Moscou,* **39** : 278.

Diagnosis : Reddish-brown species; temple of head weakly developed; antennae lighter, segment

9 about as broad as long, segment 10 slightly broader than long and apical segment a little elongate. Prothorax rather transverse (1.0 : 1.37), broadest and angularly produced at middle, with a well developed transverse depression behind middle, sides coarsely serrate and narrowed basally behind middle. Elytra broadest about the middle, with coarsely punctured striae, interstrial pubescence a little longer and less depressed than strial pubescence. Abdominal ventrite 1 impunctate.

Material : 1 ex. India : Mizoram, Aizawl District, Zemabawk, 1000 m., 21.i.1995, T.K. Pal, *ex.* vegetation debris.

Distribution : India : Mizoram (New Record).

Elsewhere : Sri Lanka.

SUMMARY

The paper deals with 11 species under 8 genera of 2 subfamilies of which 1 species appears to be undescribed. All these species are recorded for the first time from the State of Mizoram as no taxonomic study of this group was carried out earlier from Mizoram. The species are systematically keyed and characterized.

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Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 347-366, 2007

INSECTA : DIPTERA

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INTRODUCTION

The Diptera fauna of this remote state is practically unknown because of the lack of systematic exploration. Incidentally the first species *Haematopota javana* that belong to the family Tabanidae, was recorded by Ricardo (1921) from Lushai hills, was described by Wiedemann (1821) from Java. After a gap of about 7 decades Nandi (1992) recorded 20 species of Sarcophagidae from this State.

Recently several collection trips were undertaken by this institution in order to take a stock of the fauna of the states. The trips that brought the dipterous materials for study are tabulated below.

AIZAWL : A. R. Lahiri (September-October, 1993), P. Parui (December, 1995-January, 1996).

LUNGLEY : A. R. Lahiri (September-October, 1993), S. S. Saha (May, 1995), T. P. Bhattacharya (September, 1995).

SHAIHA : A. R. Lahiri (September, 1993).

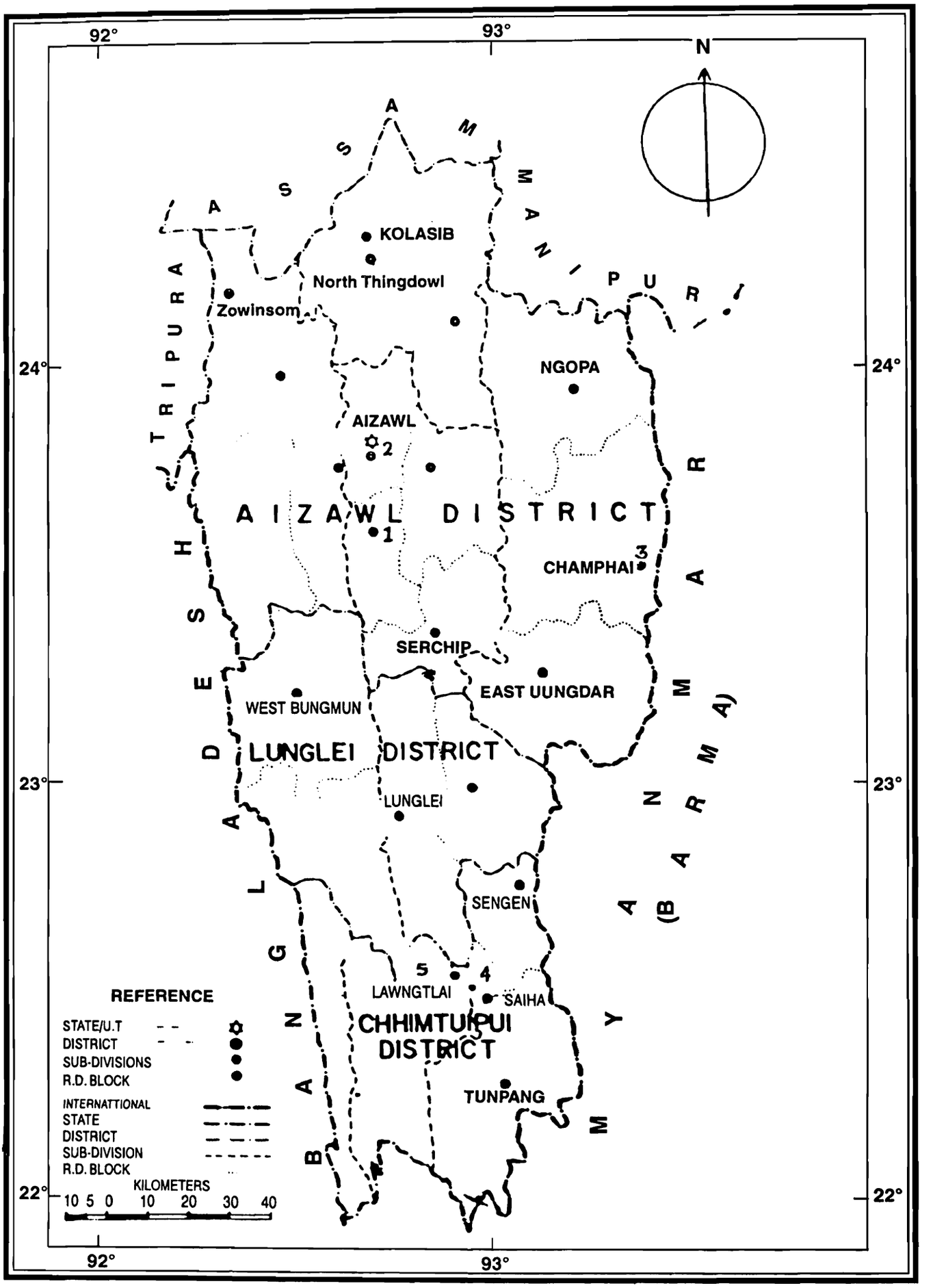
This report embodied the material belonging to the families Tipulidae, Bibionidae, Stratiomyidae, Bombyliidae, Tabanidae, Conopidae, Micropezidae, Tephritidae, Sepsidae, Ephydridae, Calliphoridae and Sarcophagidae. The families, such as, Syrphidae, Muscidae and Tachinidae are however dealt with separately. These families covers 14 subfamilies, 28 genera and 37 species.

Indeed, the species with their families excepting Tabanidae and Sarcophagidae are recorded for the first time from the state and have been marked with asterisk. The species distribution in different districts of Mizoram is also tabulated in table No. I.

MATERIAL AND METHODS

Datta, Parui and Mukherjee (1997) laid down the general method of collecting dipteran specimens from their habitats and of preserving them in proper manner for taxonomic studies. Therefore, we are stressing upon certain specific requirements relating to some family-group undertaken here rather than detailing on the broad range of procedures once again.

Among the families dealt with here specimens of Tipulidae are easy to encounter in the hilly tracts of the north-eastern region. The flies of the family Bombyliidae, Conopidae and Stratiomyidae are predominant flower visitors and could be seen on flowers or nearby herbages and as the members of the first two families favour arid and semi arid environment where they could be traced in abundance. Micropezides having long, stilt like legs, are often seen on decaying woods. Tephritids (fruit flies) frequents commercial fruits, vegetables and ornamental plants. Sepsid flies invariably encounter cow-dung or herbage. Calliphorid and sarcophagid flies frequents decaying organic matters of all kinds inclusive of excrement and around it. They are also sampled by means of various baits—fish, meat, fruits, etc. Collections of all these flies are preserved and kept dry in the manner prescribed by Datta *et al.* (1997).



Map of Mizoram showing collection localities (1, Aibawk, 2, Aizawl, 3, Champhai, 4, Talrai, 5, Lawngtlai)

It should be borne in mind that the best time of collecting is to begin sometimes after the sunrise for the diurnal Diptera and after the sunset for the nocturnal Diptera.

MORPHOLOGY AND TERMINOLOGY

Details of morphology and terminology of Diptera was presented by Datta *et al.* (1997) in order to familarise the reader with their taxonomic characters in general. So, only the significant characters used in the descriptions and keys to the families dealt with here.

The important characters of the families Bibionidae, Stratiomyidae, Bombyliidae, Conopidae, Sepsidae, Calliphoridae and Sarcophagidae have been discussed in details and even upto their predominant species (Datta and Parui, 1998). The remaining families dealt with here are being discussed.

The most important characters of Tipulidae lie with antenna, wing and genitalia. The antenna usually consists of 6-16 joints, only reduced in some genera of the tribe Hexatomini. The first two joints called scape and pedicel, the remaining joints together called flagellum, may be of various shape and size. In the subfamily Tipulinae wing with SC_1 usually atrophied, but present in the remaining two subfamilies Cylindrotominae and Limoniinae.

The Micropezidae commonly called "Stilt legged flies" because of its long and stilt like legs with tarsi much shorter than tibiae. Wing with complete subcosta which meets costa; abdomen elongate.

The Tephritidae commonly called "fruit flies" are medium sized flies, have well developed inferior fronto-orbital bristles, post verticals never cruciate; wings typically marked with patterns, subcostal vein bent sharply upwards nearly at right angle and weakend or evanescent beyond the bend, costa with a break at apex of subcosta and the cubital cell (anal cell) typically lobate at apex.

LIST OF TAXA

Family TIPULIDAE
Subfamily LIMONIINAE

1. ***Teucholabis fenestrata*** Osten Sacken

Family BIBIONIDAE
Subfamily BIBIONIINAE

2. ***Bibio tenebrosus*** Coquillett

Family STRATIOMYIDAE
Subfamily SARGINAE

3. ***Ptecticus australis*** Schiner

Family TABANIDAE
Subfamily TABANINAE

4. ***Haematopota javana*** Wiedemann

Family BOMBYLIIDAE
Subfamily LOMATIINAE

5. ***Petrorossia ceylonica*** (Brunetti)
6. ***Petrorossia intermedia*** (Burnetti)

Family CONOPIDAE
Subfamily CONOPINAE

7. ***Physocephala bicolorata*** Brunetti

Family MICROPEZIDAE
Subfamily TENIAPTERINAE

8. ***Mimegralla albimana*** (Doleschall)

Family TEPHRITIDAE
Subfamily DACINAE

9. ***Dacus (Zeugodacus) tau*** (Walker)

Subfamily TRYPETINAE

10. ***Myoleja fossata*** (Fabricius)

Family SEPSIDAE
Subfamily SEPSINAE

11. ***Decachaetophora aeneipes*** (de Meijere)
12. ***Dicranosepsis bicolor*** (Wiedemann)
13. ***Meroplius fasciculatus*** (Brunetti)

Family EPHYDRIDAE

Subfamily NOTIPHILINAE

14. ***Paralimna hirticornis*** de Meijere

Family CALLIPHORIDAE

Subfamily CHRYSOMYINAE

15. ***Chrysomya megacephala*** (Fabricius)

Subfamily RHINIINAE

16. ***Isomyia nebulosa*** (Townsend)
17. ***Rhynchomya viridaurea*** (Wiedemann)

Family SARCOPHAGIDAE

Subfamily SARCOPHAGINAE

18. ***Blaesoxipha aspinata*** (Senior-White)
19. ***Bercaea cruentata*** Meigen
20. ***Boettcherisca peregrina*** (Robineau-Desvoidy)
21. ***Fengia ostindicae*** (Senior-White)
22. ***Lioproctia (Coonoria) pattoni*** (Senior-White)
23. ***Parasarcophaga (Liopygia) ruficornis*** (Fabricius)
24. ***P. (Liosarcophaga) brevicornis*** (Ho)
25. ***P. (L.) dux*** Thomson
26. ***Parasarcophaga (L.) sarupi*** Nandi
27. ***P. (Curranea) scopariiformis*** Senior-White
28. ***P. (Parasarcophaga) albiceps*** (Meigen)
29. ***P. (P.) sericea*** Walker
30. ***P. (P.) misera*** (Boettcher)
31. ***Robineauella (Jantiella) doleschalli*** (Johnton & Tiegs)
32. ***Sarcorohdondorfia ghaiae*** (Nandi)
33. ***Thyrsocnema (Pseudothyrsocnema) lushaiensis*** Nandi
34. ***Harpagophalla kempi*** (Senior-White)
35. ***Iranihindia futilis*** (Senior-White)
36. ***I. martellata*** (Senior-White)
37. ***Seniorwhitea reciproca*** (Walker)

Key to the families

1. Adult antennae having more than 5 segments which are not fused into a solid structure 2
– Adult antennae either fewer than 5 segments (generally 3) or with segments of flagellum fused into a solid structure, usually surmounted by a style or arista 3
2. Thorax with a V-shaped suture on mesonotum; ocelli absent; second longitudinal vein present ..... TIPULIDAE
– Thorax without V-shaped suture on mesonotum; ocelli present; second longitudinal vein always absent ..... BIBIONIDAE
3. Adults without a ptilinum or frontal lunule ... 4
– Adults usually with a ptilinum or frontal lunule 6
4. Flies with dense bristles; antennal segment 3 simple; legs with or without normal pulvilly but arolium always replaced by rudementary empodium ..... BOMBYLIIDAE
– Flies without dense bristles; antennal segment 3 with annulations; legs with pad-like arolium and pulvelli 5
5. Wing with costa ending at or near wing tip; squamae small; tibiae without spurs ..... STRATIOMYIDAE
– Wings with costa continuing well past wing tip, often around posterior margin; mid tibiae invariably with spur ..... TABANIDAE
6. Antennal segment 2 above without a distinct external groove, squama small or vestigeal; theca not developed at base of proboscis 7
– Antennal segment 2 above with a distinct external groove; squama well developed; theca developed at base of proboscis 11
7. Wing with Cu_2 long and reaching or nearly reaching wing margin ..... CONOPIDAE
– Wing with Cu_2 short, not reaching wing margin or absent 8
8. Costa complete 9
– Costa more or less interrupted either at the end of Sc or R_1 10

9. Vibrissae present; palpi reduced, legs normal ..... SEPSIDAE
- Vibrissae absent; legs long and stilt-like .... MICROPEZIDAE
10. Subcosta (Sc) of normal shape but not ends in costa ..... EPHYDRIDAE
- Subcosta (Sc) turns upwards at right angle and ends in costa ..... TEPHRITIDAE
11. Arista of antenna pubscent or with feathering not extending much beyond middle; body dull black or stripped grey or black .... SARCOPHAGIDAE
- Arista feathered to tip or body entirely metallic blue or green ..... CALLIPHORIDAE

SYSTEMATIC ACCOUNT

Family TIPULIDAE

Subfamily LIMONIINAE

Genus ***Teucholabis*** Osten Sacken

1857. *Teucholabis* Osten Sacken, *Proc. Acad. Nat. sci. philad.*, (1859) 222. Type-species : *T. complexa* Osten Sacken, by monotypy.

Diagnosis : Antenna 16 jointed of moderate length; thorax gibbous with elongate neck; legs robust, conspicuously pubescent; wing with 1 submarginal cell, 4 posterior cells, discal cell present, marginal cross-vein joins first longitudinal vein near the tip of the latter, third longitudinal vein gently curved, posterior cross-vein near base of discal cell and nearly opposite the anterior cross-vein, seventh longitudinal vein gently bisinuate; abdomen robust, genitalia of male resembles like *Dicranomyia* with horny appendages below and ventral plate drawn out posteiorly to a narrow point.

1. ***Teucholabis fenestrata*** Osten-Sacken

1887. *Teucholabis fenestrata* Osten-Sacken, *Berl. Ent. Z.*, **31** : 188.

Material examined : 2♀, Chaltlong, 15.XI.1993, coll. A. R. Lahiri.

Diagnosis : Head and antenna black, thorax reddish with 3 black stripes; legs black; wings subhyaline up to basal half, rest tinged with brown; abdomen dark brown up to tip in male; in female ovipositor reddish-yellow.

Distribution : India : Mizoram (Aizawl district), Arunachal Pradesh, Assam, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Sri Lanka.

Family BIBIONIDAE

Subfamily BIBIONIINAE

Diagnosis : Moderate to comparatively large size with dense pubscence; wing with incomplete costal vein, basal cells 2, fifth longitudinal vein forked, posterior cross-vein present; tarsi with 3 pulvilli.

Genus ***Bibio*** Geoffroy

1762. *Bibio* Geoffroy, *Hist. abreag. Ins. Paris*, **2** : 568. Type-species : *Tipula hortulana* Linnaeus, by designation of Latreille, 1810 : 442.

Diagnosis : Wing with simple radial sector, basal section being equal to or longer than radio-median cross-vein; fore tibia with strong apical spurs.

2. ***Bibio tenebrosus*** Coquillett

1898. *Bibio tenebrosus* Coquillett, *Proc. U. S. natn Mus.*, **21** : 307.

Material examined : 1♂, Liaton, 7.IV.1993, coll. P. H. Ray; 1♂, Liaton, 7.XII.1993, coll. R. S. Barman.

Diagnosis : In male head and eyes covered with dense brown hairs; thorax wholly shining black with humerous slightly reddish brown; legs wholly shining black with dark brown hairs, tarsal joints at bases and tips narrowly reddish brown, spines of fore tibia tipped with dull carmine; wing brownish gray, anteriorly much darker, stigma elongate oval, black; abdomen wholly shining black, tips of claspers with several reddish yellow curved horny claws.

Distribution : India : Mizoram (Aizawl), Himachal Pradesh and West Bengal.

Elsewhere : China, Myanmar, Japan.

Family STRATIOMYIDAE
Subfamily SARGINAE

Diagnosis : Head semicircular; antennae with third joint rounded or rather flattened with a distinct arista; thorax oblong; scutellum usually unspined; legs weak and simple; wing with costa reaching nearly to tip, third vein forked, its branches ends before wing tip, anterior cross-vein joins praefurca instead of second longitudinal vein, discal cell exceptional, forth vein with three terminations, posterior cells 5, abdomen 5-6 segmented, generally of metallic green, blue or violet or brashy shades.

Genus ***Ptecticus*** Loew

1855. *Ptecticus* Loew, *Verh. Zool-bot. Ges. Wien,* **5** : 142. Type-species : *Sargus testaceous* Fabricius.

Diagnosis : Non metallic large yellowish flies with dark markings and usually with yellow wings; third antennal joint short and broad being covered by thumb-like extension of second joint; wing with anterior cross-vein at tip of praefurca.

3. ***Ptecticus australis*** Schiner

1868. *Ptecticus australis* Schiner, *Reise. der. Osterreichischen Fregatte Novara, Dipt.,* **2** : 65.

Material examined : 1♀, Lunglei District : Sairep, 16.IV.1995, coll. S. S. Saha.

Diagnosis : Face, proboscis and palpi orange yellow; antennae orange with black-arista; scutellum and metanotum orange with short pubescence of similar colour; abdomen orange with a transverse blue or violet band just below the anterior margins up to fourth segment, fifth segment black; legs orange yellow with black hind tibia and white hind tarsi; first veinlet of discal cell bend, second vein nearly straight.

Distribution : India : Mizoram (Lunglei), Assam, Bihar, Karnataka, Madhya Pradesh, Nicobar Island, Punjab, Sikkim, Tamil Nadu and West Bengal.

Elsewhere : Sri Lanka, Taiwan and Thailand.

Family TABANIDAE
Subfamily TABANINAE

Diagnosis : Vertex with rudimentary or no ocelli; hind tibia without apical spur.

Genus ***Haematopota*** Meigen

1803. *Haematopota* Meigen, *Magazin Insektkde,* **2** : 67. Type-species : *Tabanus pluvialis* Linnaeus.

Diagnosis : Generally small and slender flies of blackish grey colour; eyes with several undulating bands in life; frons with a velvety black spot on either side just above frontal callus and often a midfrontal spot above these; wing usually dark with a pattern of pale spots; mid tibia and often hind tibia also usually with pale rings.

4. ***Haematopota javana*** Wiedemann

1821. *Haematopota javana* Wiedemann, *Dipt. exot,* **1** : 100.

Diagnosis : Frontal callus yellow; scutum with broad pale band covering subscutellar suture; scutellum distinctly bicoloured, base pale, posterior margin darker; subapical band of wing double; fore coxa usually brown, fore tibia slightly swollen, hind tibia robust.

Distribution : India : Mizoram, Bihar, Kerala, Meghalaya, Tamil Nadu and West Bengal.

Elsewhere : Andalas, Bangladesh, China, Jawa, Lao, Malay, Myanmar, Thailand and Vietnam.

Family BOMBYLIIDAE
Subfamily LOMATIINAE

Diagnosis : Antennae approximate at base; occiput usually puffed out; scutellum large without strong bristles; legs may sometimes with few bristles, only tibia with spicules; wings with second vein and upper branch of third strongly looped, anterior cross-vein situated much beyond the middle of discal cell and slopping submarginal cells 2-3, posterior cells 4.

Genus ***Petrorossia*** Bezzi

1909. *Petrorossia* Bezzi, *Z. syst. Hymenopt. Dipterol,* **8** : 32. Type-species : *Bibio hesperus* Rossi.

Diagnosis : Face rounded; antennal segment 3 broad at base, gradually styliform onwards and usually hairy at end; males with holoptic eye; metapleuron bare; wing membrane wrinkled, origin of vein R_{2+3} distinct from cross-vein about half way between it and base of prefurca, discall cell long, ambient vein complete; pulvilli developed.

Key to the species

1. All femora yellow ..... *ceylonica* (Brunetti)
- Basal half of anterior femur and the other femora blackish grey ..... *intermedia* Brunetti

5. ***Petrorossia ceylonica*** (Brunetti)

1909. *Argyramoeba ceylonica* Brunetti, *Rec. Indian Mus.*, **2** : 471.

Material examined : 2♀, Aizawl district : Chimlung, 8.XII.1995, coll. P. Parui.

Distribution : India : Mizoram (Aizawl), Assam, Bihar, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Sri Lanka.

6. ***Petrorossia intermedia*** (Brunetti)

1920. *Argyramoeba intermedia* Brunetti, *Fauna Br. India, Dipt.*, **1** : 221.

Material examined : 1♂, Aizawl district : Maubung, 4.XII.1995, coll. P. Parui.

Distribution : India : Mizoram (Aizawl), Meghalaya, Orissa and Uttar Pradesh.

Family CONOPIDAE

Subfamily CONOPINAE

Diagnosis : Antennal flagellomere 1 with apical style; ocelli absent; anal cell Cu absent.

Genus ***Physocephala*** Schiner

1861. *Physocephala* Schiner, *Wien. ent. Meschr.*, **5** : 137. Type-species : *Conops rufipes* Fabricius, by original designation.

Diagnosis : The genus is closely allied to *Conops* L. but readily distinguishes from the latter by the sudden and irregular thickness of the femora particularly the hind pair; second antennal joint much longer than the combined length of first and third segments; wing with anterior cross-vein situated beyond the middle of discal cell; second and third abdominal segments much elongate shaping the abdomen looking like wasp.

7. ***Physocephala bicolorata*** Brunetti

1925. *Physocephala bicolorata* Brunetti, *Rec. Indian Mus.*, **27** : 79. (n. name *bicolor* Brunetti, 1923)

Material examined : 1♂, Aizawl district : Champai, 1.X.1993, coll. R. S. Mridha.

Diagnosis : Head colouration yellow to orange with vertex sometimes black, face with a distinct narrow black stripe; antenna black with flagellomere reddish to orange on basal half; mesonotum mainly black, punctate but lateral margins, humeri and scutellum brownish; legs orange brown, hind femur with a broad black median ring; anterior half of wing blackish brown which extends upto posterior side of discal cell, basal half of first posterior cell and only the anterior part of it distally; abdominal segments 2-5 with whitish reflection.

Distribution : India : Mizoram (Aizawl), Himachal Pradesh, Meghalaya, Uttar Pradesh and West Bengal.

Elsewhere : China and Nepal.

Family MICROPEZIDAE

Subfamily TAENIAPTERINAE

Diagnosis : Frons well-marked, parafrons well defined anteriorly and well-differentiated from mesofrons; ocelli situated anteriorly near middle of mesofrons; antennae widely spaced; katepisternum with dense vertical fan of many long and fine bristles; epandrium distinctly compressed, U-shaped in cross-section; no surstyli.

Genus ***Mimegralla*** Rondani

1850. *Mimegralla* Rondani, *Nouvi. Annali. Sci. nat. Ist, Bologna.*, (3)**2** : 180. Type-species : *Calobata coeruleifrons* Macquart.

Diagnosis : Mesofrons more than one-half as wide as total frons; posterior ocelli posterior to posterior parafrontal bristles; frontal bristles just at border of tomentum or surrounded by it; wing with posterior cell sometimes closed.

8. *Mimegralla albimana* (Doleschall)

1856. *Taenioptera albimana* Doleschall, *Natuurk. Tijdschr. Ned. Indie.*, **10** (n, s.7) : 413.

Material examined : 1♀, Chhimtuipui dist; Lawangtli, 17.IX.1993, coll. M. Sil.

Diagnosis : Antenna bright reddish yellow; maxillary palpus entirely yellow; anepisternum (mesopleuron) posteriorly sericeous with silvery to pale brass-yellow shine.

Distribution : India : Mizoram (Chhimtuipui), Assam, Tripura and West Bengal.

Elsewhere : Bangladesh, Myanmar and other parts of Oriental region; Australian region and Japan.

Family TEPHRITIDAE

Key to the subfamilies
(After V. C. Kapoor *et al.*, 1980)

1. Cell M broad, twice wider than cell Cu and usually twice longer than wide; male with well developed stridulatory apparatus and lateral tergal glands on fifth tergum; female with 2 spermathaeca consisting of light set coils resembling a bunch grapes; wings hyaline with brown band along costal margin and a brown streak through cubital area ..... *Dacinae*
- Cell M narrow, equal to width Cu and 4 times longer than wide; lobe of cell Cu short; stridulatory apparatus absent; female with 2-3 spermathacea but never formed of light set coil ..... *Trypetinae*

Subfamily DACINAE

Genus *Dacus* Fabricius

1805. *Dacus* Fabricius, *Syst. Antliat.* : 272. Type-species : *D. armatus* Fabricius, by designation of Hendel, 1927 : 24.

Diagnosis : Antennae short; mesonotum with a presutural yellow mark on each side; scutellum with 4 bristles; cell M rarely twice longer than wide; fifth sternum gently concave on hind margin; posterior lobe of male surstylus long and slender, about 6 times longer than anterior lobe of surstylus.

Subgenus *Zeugodacus* Hendel

1927. *Zeugodacus* Hondel, *in* Lindner, *Fliegen. palaearkt. Reg.*, **49** : 26. Type-species : *caidatus* Fabricius, by original designation.

Diagnosis : Prescutellars present; wing of male with a supernumerary lobe and with a well developed area marked with dark brown and covered with shaggy haris along with Cu_1 and 1st A, along lower margin of cell M4 and through cell Cu.

9. *Dacus (Zeugodacus) tau* (Walker)

1849. *Dasyneura tau* Walker, *List Dipt. Colln Br. Mus.*, **4** : 1074.

Material examined : 1♀, Lunglei district : Lunglei, 21.X.1993, coll. A. R. Lahiri.

Diagnosis : Face with 2 round spots, mesonotum with 3 postsutural yellow vittae; scutellum yellow except for a narrow black band basally; wing with costal band expanded distally forming a large brown spot broadly occupying upper apical portion of cell R5; piercer in female genetalia pointed apically.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh, Bihar, Karnataka, Maharashtra, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : China, Java, Kalinantan, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Sulawasi, Taiwan and other parts of Oriental region.

Subfamily TRYPETINAE

Genus *Myoleja* Rondani

1856. *Myoleja* Rondani, *Dipteral. ital. Prodr.*, **1** : 112. Type-species : *Tephritis lucida* Fallen, by original designation.

Diagnosis : Shining black species; face about equal in length to front, ocellar bristles well developed, 2 pairs of superior front orbitals; pleural hairs black and bristle-like; wing with cross-vein r-m situated distinctly apical of mid point of cell 1st M2.

10. *Myoleja fossata* (Fabricius)

1805. *Tephritis fossata* (Fabricius), *Syst. Antliat.*, : **320.**

Material examined : 1♀, Lunglei district : Lunglei, 21.IX.1993, coll. A. R. Lahiri.

Diagnosis : A black species with yellow head; thorax narrowly reddish at humeri; scutellum dark reddish at hind margin and below; legs black; wing with the brown band along the sixth vein is separated from the black central part by an entirely hyaline streak which is situated in the posterior part of the third posterior cell.

Distribution : India : Mizoram (Lunglei), Kerala.

Elsewhere : Myanmar, Pakistan, Philippines, Ryukyu Islands, Taiwan, Thailand, Vietnam; Japan, Moluccas, New Ireland.

Family SEPSIDAE

Subfamily SEPSINAE

Diagnosis : Medium to small in size, with reddish to black body and at least mesopleuron glossy; inner vertical bristles present; mid femur normal and not bent at middle.

Key to the genera

1. Humeral bristles absent .... ***Decachaetophora*** Duda (1 species only)
- Humeral bristles present 2
2. Fronto-orbital bristles developed .... ***Meroplius*** Rondani (1 species only)
- Fronto-orbital bristles vestigeal; epandrial process bifurcate at tip .... ***Dicranosepsis*** Duda (1 species only)

Genus *Decachaetophora* Duda

1926. *Decachaetophora* Duda, *Annln naturh. Mus. Wien*, 39 (1925) : **27.** Type-species : *Sepsis aeneipes* de Meijere.

11. *Decachaetophora aeneipes* (de Meijere)

1913. *Sepsis aeneipes* de Meijere, *Annls hist. nat. Mus. natn. hung.*, **11** : 119.

Material examined : 4♂, 9♀, Lunglei district : Sairep, 23.IX.1995, coll. T. P. Bhattacharjee.

Diagnosis : Blackish fly with duplicate vibrissae; supraalar and outer vertical bristles present; fore femur in males with complicated setae and fore tibia with ventral emergination beset with a scraper-like tooth in mid-line; abdomen normal and not constricted between segments 2 and 3.

Distribution : India : Mizoram (Lunglei), Assam, Himachal Pradesh, Meghalaya, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : China (Kansa, Szechuen), Nepal, Pakistan, Sri Lanka and Tiawan; Japan and Nearctic region.

Genus *Dicranosepsis* Duda

1926. *Dicranosepsis* Duda, *Annln naturh. Mus. Wien.*, **39** : 43. (As subgenus of *Sepsis* Fallen). Type-species : *Sepsis bicolor* (Wiedemann).

12. *Dicranosepsis bicolor* (Wiedemann)

1830. *Sepsis bicolor* Wiedemann, *Aussereurop. Zweifl. Insekt.*, **2** : 468.

Material examined : 1♂, 1♀, Aizawl district : Haurueng, 23.IX.1993, coll. R. S. Mridha.

Diagnosis : Sternopleuron shining antero-ventrally; fore femur without a postero-ventral seta sub-basally, hind tibia without a distinct osmeterium and metatarsus without antero-ventral setae in males.

Distribution : India : Mizoram (Aizawl), Andhra Pradesh, Arunachal Pradesh, Assam, Maharashtra, Meghalaya, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Other parts of the Oriental Region; Japan and Australian Region.

Genus ***Meroplius*** Rondani

1874. *Meroplius* Rondani, *Bull. Soc. Ent. Ital.*, **6** : 170. Type-species : *Nemopoda stercoraria* Rob.-Desv. *Sepsis minutus* Wied; 1830, by original designation.

13. ***Meroplius fasciculatus*** (Brunetti)

1909. *Sepsis fasciculatus* Brunetti, *Rec. Indian Mus.*, **3** : 365.

Material examined : 2♂, 2♀, Aizawl district : Haurueng, 23.IX.1993, coll. R. S. Mridha.

Diagnosis : Frons black with a pair of additional bristles situated at the edge of frons touching the eyes; thorax blackish, dorsocentrals 4; wing hyaline; legs mainly black, base of middle and hind legs yellow, in male fore leg with 2 ventral spines of which the distal one bend anteriorly; male genitalia with 4th sternite with a pair of hair tufts.

Distribution : India : Mizoram (Aizawl), and West Bengal.

Elsewhere : Borneo, China (Kwantwang), Jawa, Philippines, Sri Lanka; Taiwan and Thailand; New Guinea; Japan.

Family EPHYDRIDAE

Subfamily NOTIPHILINAE

Diagnosis : Head with epistoma and median facial area nonsetulose; antennal segment 2 with at least one anteroclinate; at least one dorsocentral present being as long as or longer than longest facial.

Genus ***Paralimna*** Loew

1862. *Paralimna* Loew, *Smithson. Misc. Collns.*, **6** : 138. Type-species : *appendiculata* Loew.

Diagnosis : Head about as long as high, prementum about as wide as anteclypus in ventral view; ketepisternal and postpronotal present; dorsocentrals 3; fore femur devoid of ventroapical lobe, 3 mid tibial dorsal macrochaeta present.

14. ***Paralimna hirticornis*** de Meijere

1913. *Paralimna hirticornis* de Meijere, *Bijdr. Diark.*, **19** : 65.

Material examined : 4♀, Aizawl district : Lalan, 1.XII.1995, coll. P. Parui.

Diagnosis : Ventral surface of head characteristically white, a velvety black spot present between two antennae, mesonotum with velvety black supraalar spot; fore femur of male with anterior flexor ciliation complete of flattened bristles.

Distribution : India : Mizoram (Aizawl), and West Bengal.

Elsewhere : Pakistan, Philippines, Sri Lanka; Taiwan New Guinea and West Iran.

Family CALLIPHORIDAE

Key to the Subfamilies

1. Thoracic squama bare dorsally; sub costal sclerite with fine pubescence ..... ***Rhiniinae***
– Thoracia squama haired dorsally; subcostal sclerite setulose ..... ***Chrysomyiinae***

Subfamily CHRYSOMYINAE

Genus ***Chrysomya*** Robineau-Desvoidy

1830. *Chrysomya* Robineau-Desvoidy, *Mem. pres. div. Sav. Acad. Sci. Inst. Fr.*, : 44. Type-species : *Chrysomya regalis* Rob.-Desv.

Diagnosis : Generally median sized flies of metallic green, blue or purple colour; eyes large and bare, usually, holoptic and upper facets enlarged in males but dichoptic and with small uniform facets in females; presutural acrostichal bristle absent; propleuron and prosternum hairy; suprasquamosal ridge usually with anterior presquamosal tuft; subcostal sclerite hairy; tergum 5 with fine erect bristles on disc.

15. ***Chrysomya megacephala*** (Fabricius)

1794. *Musca megacephala* Fabricius, *Syst. Ent.*, **4** : 317.

Material examined : 22♂, 1♀, Aizawl district : Sikha Basty, 19.XI.1995, coll. P. Parui.

Diagnosis : Metallic blue, green or purple coloured flies; eyes in male with markedly enlarged facets on upper two-thirds, lower one

third with small facets, in female the facets all uniform; parafacialia and genae yellowish orange, both covered with yellowish-white hairs; antennal segment 3 entirely orange; prostigmatic bristle absent; anterior thoracic spiracle dark brown; first abdominal segment black, second and third segment black banded posteriorly; wing slightly darkened at base, rest hyaline; subcostal sclerite with brown pubescence and a few fine short hairs; upper squama white with dark margin, lower squama brown; legs black.

Distribution : Reported its wide occurence and it is recorded here from Aizawl district.

Subfamily RHINIINAE

Key to the genera

1. Arista bare or atmost microscopically pubescent ..... ***Rhynchomyia*** (1 species only)
– Arista plumose ..... ***Isomyia*** (1 species only)

Genus ***Isomyia*** Walker

1860. *Isomyia* Walker, *J. Proc. Linn. Soc. Lond.; Zool.*, **4** : 134. Type-species : *Musca delectans* Walker (as subgenus of *Musca* L.)

16. ***Isomyia nebulosa*** (Townsend)

1917. *Strongyloneura nebulosa* Townsend, *Rec. Indian Mus.*, **13** : 197.

Material examined : 1♀, Chhimtuipui dist., Lenuntali, 19.IX.1993, coll. A. R. Lahiri.

Diagnosis : Face orange yellow, carina distinct; antenna and palpi deep orange; thorax cupreous purplish, acrostichal 1 : 2, dorsocentral 2 : 4; abdomen concolourous with thorax; squama orange; legs black.

Distribution : Mizoram (Chimtuipui) and Assam.

Elsewhere : Laos, Myanmar.

Genus ***Rhynchomya*** Robineau-Desvoidy

1830. *Rhynchomya* Robineau-Desvoidy, *Myodaires* : 424. Type-species : *Musca rufipes F.*

17. ***Rhynchomya viridaurea*** (Wiedemann)

1824. *Tachina viridaurea* Wiedemann, *Analecta. Ent.*, : 43.

Material examined : 1♀, Chimtuipui district, Ngengpui, 12.IV.1995, coll. T. P. Bhattacharjee.

Diagnosis : In male frons reduced to a line, in female frons three-fifth of eye width; face dull yellowish brown so also the gena; antenna dark brownish yellow, third segment with grey pollen; thorax golden green, pleura with long sparse golden hairs, acrostichal 1 : 2-3; wings with costal margin and two basal cells yellowish; femora metallic, tibiae brown; abdomen golden green with white pile.

Distribution : India : Mizoram (Chimtuipui).

Elsewhere : Borneo, Jawa Philippines.

Family SARCOPHAGIDAE

Subfamily SARCOPHAGINAE

Diagnosis : Grey sarcophagid flies with three longitudinal stripes on thorax and checkered pattern on abdomen; eyes in both sexes separated but wider in female; arista plumose along basal half; hypopleuron with a vertical row of bristles; inner forceps usually much longer than outer forceps and phallosome very large.

Key to the genera

1. Acrostichal bristles absent 2
– Acrostichal bristles present 3
2. Apex of phallosome long, bifurcate at tip and with no lateral process ..... ***Robiniella*** (1 species only)
– Apex of phallosome short, blunt and with a short lateral process ..... ***Bercaea*** (1 species only)
3. 3 postsutural dorsocentrals present ..... ***Blaesoxipha*** (1 species only)
– 4-5 postsutural dorsocentrals present 4
4. 4 postsutural dorsocentrals 5
– 5 postsutural dorsocentrals 6

5. Propleuron hairy; fourth abdominal sternite usually with a patch of spine-like bristles posteriorly; styli never thread-like .... ***Sarcorohdendorfia*** (1 species only)
- Propleuron bare; fourth abdominal sternite without such bristles; styli very long and thread-like ..... ***Fengia*** (1 species only)

6. Propleuron hairy 7
- Propleuron bare 8

7. Presutural acrostichal distinct; posterior dorsocentrals 4; ventralia never globose .... ***Lioproctia*** (1 species only)
- Presutural acrostichal absent; posterior dorsocentrals 5; ventralia globose .... ***Boettcherisca*** (1 species only)

8. Inner forceps with setae or tuft of short subapical pile; fifth sternite with protuberance on inner arm 9
- Inner forceps with setae or tuft of hairs; fifth sternite without protuberance on inner arm 11

9. Inner forceps with tuft of piles; apical plate of paraphallus curved anteriorly 10
- Inner forceps with setae; apical plate of paraphallus curved posteriorly .... ***Iranihindia*** (2 species only)

10. Apical plate of paraphallus with long slender pointed cruciate process .... ***Harpagophalla*** (1 species only)
- Apical plate of paraphallus with short process ..... ***Seniorwhitea*** (1 species only)

11. Apical part of paraphallus always long and broad; ventralia pedunculate .... ***Parasarcophaga*** (8 species only)
- Apical part of paraphallus small and narrow; ventralia almost round .... ***Thyrsocnema*** (1 species only)

Genus ***Blaesoxipha*** Loew

1861. *Blaesoxipha* Loew, *Wien. ent. Mschr.,* **5** : 384; Rohdondorf, 1937. *Fauna USSR,* **19**(1) : 66. Type-species : *Grylloctona* Loew, by monotypy = *Sarcophaga laticornis* Meigen.

18. ***Blaesoxipha aspinata*** (Senior-White)

1924. *Sarcophaga aspinata* Senior-White, *Rec. Indian Mus.,* **26**(3) : 230.

Diagnosis : Frons one-third width of eye with black stripe, frontal bristles diverging; antenna black, third joint as long as second; palpi yellowish; thorax dark grey, acrostichals 1 : 2, posterior dorsocentrals 3; mid femur with only 4-5 small bristles apically, without true comb and fringe, hind femur with a few long bristles in a row, mid and hind tibiae bare; wing with first longitudinal vein bare, costal bristles present, segment iii of costa as long as v or longer; abdominal tergites 2 without marginal bristles.

Distribution : Mizoram (Aizawl) and Tamil Nadu.

Genus ***Bercaea*** Robineau-Desvoidy

1863. *Bercaea* Robineau-Desvoidy, *Hist. Nat. Dipt. Paris,* **2** : 549. Type-species : *Musca haemorrhoidalis* (Fallen).

19. ***Bercaea cruentata*** (Meigen)

1816. *Musca haemorrhoidalis* Fallen, *Vetensk. Akad.Handl.,* 237.

Diagnosis : Antenna and palpus black; propleuron bare, posterior dorsocentrals 6, anterior 4 weak; abdominal segment 2 without marginal bristles; costal segment iii and v equal; mid femur with comb but not basal fringe, hind tibia double fringed; genital tergites orange.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Uttar Pradesh and West Bengal.

Elsewhere : Nepal and Thailand; Africa; America; Europe; Hawaii, Korea and Synchellus.

Genus ***Boettcherisca*** Rohdendorf

1937. *Boettcherisca* Rohdendorf, *Fauna USSR,* **19**(1) : 270. Type-species : *Myophora peregrina* Robineau-Desvoidy.

20. ***Boettcherisca peregrina*** (Robineau-Desvoidy)

1830. *Myophora peregrina* Robineau-Desvoidy, *Mem. pres. Acad. Sci. Inst. Fr.*, **2**(2) : 356.

Diagnosis : In male frons half the width of an eye; lateral vertical absent; costal segment iii longer than v., apical plate of paraphallus with short, curved lateral process.

Distribution : India : Mizoram (Aizawl), and other parts of India.

Elsewhere : Hainan Island, Indonesia, Malaya, Myanmar, Nepal, South China, Sri Lanka, Taiwan and Thailand; Australia, Figi, Gilbert Islands; Hawaii, Japan, Korea, Mariana Island, New Britain, New Guinea, Ogasawara, Samoa Island.

21. ***Fengia ostindicae*** (Senior-White)

1924. *Sarcophaga ostindicae* Senior-White, *Rec. Indian. Mus.*, **26**(3) : 233.

Diagnosis : Frons half of eye width with bristles diverging; antenna black, third joint three and half times of second; thorax blackish, acrostichals 4 : 1, posterior dorsocentrals 4; mid femur with basal fringe and with wide spaced comb, hind femur with lower hind macrochaetal row and fringe, mid tibia bare, hind tibia double fringed; wing with costal bristles very weak, segment iii of costa equal to v.

Distribution : India : Mizoram (Aizawl), Assam and Uttar Pradesh.

Elsewhere : China, Taiwan and Hainan Island.

Genus ***Lioproctia*** Enderlein

1928. *Lioproctia* Enderlein, *Arch. Klass. phyl. Ent.*, **1** : 26. Type-species : *L. aurifrons* Enderlein.

22. ***Lioproctia (Coonoria) pattoni*** (Senior-White)

1924. *Sarcophaga pattoni* Senior-White, *Rec. Indian Mus.*, **26**(3) : 242.

Diagnosis : Frons in male more than twice the width of an eye, parafrontalia with scattered pile and with silvery pollen; antennal scape and pedicel blackish, first flagellomere greyish with silvery pollen; scutum greyish with 3 black longitudinal stripes. Presutural acrostichal and dorsocentrals 5, notopleurals 4, prostigmatic and propleural bristles well developed; vein R_1 bare, R_{4+5} with a row of dorsal setae, costal segment iii greater than v; legs black.

Distribution : India : Mizoram (Aizawl), Andhra Pradesh, Assam, Bihar, Meghalaya, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Genus ***Parasarcophaga*** Johnston and Tiegs

1921. *Parasarcophaga* Johnston and Tiegs, *Proc. R. Soc. Qd*, **33** : 86. Type-species : *Sarcophaga omega* Johnston and Tiegs.

Key to the subgenera

1. Lateral plate of paraphallus in form of an unpaired pedunculate process ..... ***Parasarcophaga*** (3 species only)
– Lateral plate of paraphallus in many forms other than pedunculate process 2
2. Lateral plate of paraphallus in form of narrow stout process extending forward ..... ***Curranea*** (1 species only)
– Lateral plate of paraphallus with a pair of process other than this shape 3
3. Lateral plate of paraphallus in form of rudimentary process, its apical part with 2 lateral processes .... ***Liopygia*** (1 species only)
– Lateral plate of paraphallus with a single pair of lamellate process and apical part with no lateral process ..... ***Liosarcophaga*** (3 species only)

Subgenus ***Liopygia*** Enderlien

1928. *Liopygia* Enderlien, *Arch. Klass. Phyl. Ent.*, **1**(1) : 41. Type-species : *Musca ruficornis* Fabricius.

23. ***Parasarcophaga (Liopygia) ruficornis*** (Fabricius)

1794. *Musca ruficornis* Fabricius, *Ent. Syst.*, **4** : 314.

Diagnosis : Antenna and palpus orange; propleuron bare, only prescutellar acrostichal present, posterior dorsocentrals 5, anterior 4 week; mid femur with comb and a few long basal setae; genital tergites orange.

Distribution : India : Mizoram (Aizawl), Andaman Islands, Bihar, Meghalaya, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Andalas, China, Malaya, Pakistan, Philippines, Ryukyu Islands, Sri Lanka, Taiwan, and Thailand; Africa, Brazil, Hawaii; Japan; Madagascar, Mariana Islands, Moluccas, Samoa and Socotra.

Subgenus ***Liosarcophaga*** Enderlien

1928. *Liosarcophaga* Enderlien, *Arch. Klass. Phyl. Ent.,* **1**(1): 18; Rohdondorf, 1937 *Fauna USSR, Dipt;* **19**(1) : 205. Type-species : *Cynomyia madeirensis* Schiner.

Key to the species

1. Hind tibia fringed 2
– Hind tibia not fringed; post sutural acrostichal 5, ventralia curved ..... *sarupi* Nandi
2. Hind tibia double-fringed; apex of paraphallus pointed with a subapical process having two bifurcated apex ..... *dux* Thomson
– Hind tibia with a single fringed; apical process of paraphallus finger-like with bifurcated tip ..... *brevicornis* Ho

24. ***Parasarcophaga (Liosarcophaga) brevicornis*** (Ho)

1934. *Sarcophaga brevicornis* Ho, *Bull. Fan. Mem. Inst. Biol.* **5** : 23.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Meghalaya, Nagaland, Orissa, Rajasthan, Tamil Nadu, Tripura and West Bengal.

Elsewhere : Hainan Islands, Kalimantan, Malaya, Ryukyu Islands, South China, Sri Lanka, Taiwan and Thailand; Japan and North China.

25. ***Parasarcophaga (Liosarcophaga) dux*** (Thomson)

1868. *Sarcophaga dux* Thomson, *K. Srenska Fregatten. Eugenies Resa, Dipt.,* **2** : 534.

Distribution : India : Mizoram (Aizawl and Lunglei) and other parts of India.

Elsewhere : Bangladesh, China, Hainan Islands, East Malaysia, Jawa, Kalimantan, Ryukyu Islands, Sri Lanka and Taiwan; Australia; Hawaii, Japan, Korea and New Guinea.

26. ***Parasarcophaga (Liosarcophaga) sarupi*** Nandi

1979. *Parasarcophaga (Liosarcophaga) sarupi* Nandi, *Orient. Insects,* **13**(1-2) : 191.

Distribution : India : Mizoram (Aizawl), Meghalaya, Uttar Pradesh.

Subgenus ***Curranea*** Rohdendorf

1937. *Curranea* Rohdendorf, *Fauna USSR, Dipt.,* **19**(1) : 255 : 452. Type-species : *Sarcophaga tibialis* Macquart.

27. ***Parasarcophaga (Curranea) scopariiformis*** (Senior-White)

1927. *Sarcophaga scopariiformis* Senior-White, *Spolia. Zeylan.,* **14** : 82.

Diagnosis : Antenna black; prescutellar acrostichal present; mid femur without fringe, with only widely spaced bristles, hind tibia also without fringe; praeputium of aedeagus ends bifid with lower prong longer and stronger.

Distribution : India : Mizoram (Aizawl), Assam, Manipur, Nagaland, Tripura and West Bengal.

Elsewhere : China; Hainan Islands, Laos and Sri Lanka.

Subgenus ***Parasarcophaga*** Johnston and Tiegs

1921. *Parasarcophaga* Johnston and Tiegs, *Proc. R. Soc. Qd.,* **33** : 86.

Key to the species

1. Acrostichals 1 : 1; apical process of paraphallus well curved 2

- Only posterior acrostichals distinct; apical process of paraphallus slightly curved .... *sericea* (Parker)

2. Sternite 5 with uniformly wide arms; mid femur with comb and sparse basal fringe; segment iii of costa longer than v ..... *misera* Boettcher
- Sternite 5 without uniformly wide arms; mid femur with comb and long basal fringe; segment iii of costa twice than v .... *albiceps* (Meigen)

28. *Parasarcophaga (Parasarcophaga) albiceps* (Meigen)

1826. *Sarcophaga albiceps* Meigen, *Syst. Besc. europ. Zweifl. Insekt.*, **5** : 22.

Material examined : 2♂, 1♀, Aizawl dist; Kelsih, 16.IX.1993, coll. A. R. Lahiri; 2♂, Aizawl dist; Lanuntali; 19.IX.1993, coll. R. S. Mridha.

Distribution : India : Mizoram (Aizawl and Lunglei) and other parts in India.

Elsewhere : China, Kalimantan, Malaysia, Nepal, Philippines, Ryukyu Islands, Taiwan and Thailand; Bismark, Archipelago, Europe, Hawaii, Israel, Japan, Korea, New Britain, New Guinea, Solomon Islands and Turkey.

29. *Parasarcophaga (Parasarcophaga) sericea* Walker

1917. *Sarcophaga knabi* Walker, *Proc. U. S. natn. Mus.*, **5** : 66.

Distribution : India : Mizoram (Aizawl) and in other states of India.

Elsewhere : Java, Malay, Nepal, Philippines and Thailand; Australia, Caroline Islands, Korea, Mariana Island, Marshall Island; New Guinea and Society Islands.

30. *Parasarcophaga (Parasarcophaga) misera* (Boettcher)

1913. *Sarcophaga orchidea* Boettcher, *Annls. Hist. nat. Mus. natn. hung.*, **11** : 375.

Distribution : India : Mizoram (Aizawl) and other parts in India.

Elsewhere : Andalas, Bangladesh, China, East Malaysia, Hainan Islands, Jawa, Kalimanan, Myanmar, Philippines, Ryukyu Islands, Sri Lanka, Taiwan and Thailand; Pacific Islands to New Guinea and Australia.

Genus ***Robineauella*** Enderlein

1928. *Robineauella* Enderlein, *Arch. Klass. Phyl. Ent.*, **1**(1) : 23. Type-species : *Sarcophaga scoparia* Pandelle.

Subgenus ***Jantiella*** Rohdendorf

1937. *Jantiella* Rohdendorf, *Fauna. de. l' URSS. Dipt.*, I : **1** : 501. Type-species : *Parasarcophaga ajakonovi* Rohdendorf.

Diagnosis : Apical plate of paraphallus sclerotized and its tip with bifurcated process, lateral plate of paraphallus short and pointed at apex; styli of glans moderately short, genital tergites bare of marginal bristles.

31. *Robineauella (Jantiella) doleschalli* (Johnston and Tiegs)

1921. *Sarcophaga doleschalli* Johnston and Tiegs, *Proc. R. Soc.* Qd., **33**(4) : 73.

Diagnosis : Head with facial ridge black with white pollen and short black hairs; outer verticals not differentiated, inner vertical well developed; antenna, blackish, third segment brownish with silvery pollen; thorax with ac 0 + 0, dc 4 + 4, prostigmatic and propleural bristles along posterodorsal surface; mid femur with a row of bristles on basal half along anterolateral surface, hind femur with 2 rows of bristles along anterodorsal surface, only hind tibia with a row of bristles, other tibia without any row of bristles; wing with costal segment iii equal to segment v; male genitalia with apical plate of paraphallus sclerotized and its tip with bifurcated process, lateral plate of paraphallus short and membranous, styli of glans short, without serration, ventralia short and membranous.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Sikkim and West Bengal.

Elsewhere : Moluccas.

Genus ***Sarcorohdondorfia*** Baranov

1938. *Sarcorohdondorfia* Baranov, *Vet. Arch. Zagreb.*, **8** : 173. Type-species : *S. adiscalis* Baranov, by monotypy = *Notochaeta indusa Curran.*

32. ***Sarcorohdonodorfia ghaiae*** (Nandi)

1979. *Tricholioproctia ghaiae* Nandi, *Orient. Insect.*, **13**(1-2) : 197.

Diagnosis : Width of frons greater than that of eyes, parafrontal and parafacials black with golden pollen; antenna with first and second segments brownish, third black, arista plumose upto basal half; gena black with silver pollen, postgena black with black hairs; thorax black with 3 longitudinal srtipes, ac 1 + 0, dc 5 + 5, prostigmatic and propleural bristles well developed accompanies by short hairs; apicoscutellar and discoscutellar bristles 1 pair each; all femora and tibiae with rows of bristles; wing brownish, vein R_1 bare, R_{4+5} with a row of about 7 short setae, costal segment v twice the length of iii; abdomen black, fifth sternite almost y-shaped with closely placed setae laterally on arms; lateral plate of paraphallus curved, blunt at end, styli of glans elongated.

Distribution : India : Mizoram (Aizawl).

Elsewhere : Bangladesh.

Genus ***Thyrsocnema*** Enderlein

1928. *Thyrsocnema* Enderlein, *Arch. Klass. phyl. Ent.*, **1**(1) : 42. Type-species : *S. striata* Enderlein, by original designation = *Sarcophaga incisilobata* Pandelle.

Genus ***Pseudothyrsocnema*** Rohdendorf

1937. *Pseudothyrsocnema* Rohdendorf, *Fauna. I' URSS. Dipt.*, **19**(7) : 167. Type-species : *Sarcophaga spinosa* Villeneuve, by original designation.

33. ***Thyrsocnema (Pseudothyrsocnema) lushaiensis*** Nandi

1992. *Thyrsocnema (Pseudothyrsocnema) lushaiensis* Nandi, *J. Bengal nat. Hist. Soc.*, (n. s.) **11**(2) : 41.

Diagnosis : Frons about two-thirds wide of eye, frons with black vittae; antenna blackish; thorax grey with 3 black longitudinal stripes, ac 0 + 1, dc 5 + 5, prostigmatic and propleural bristles well developed accompanied with short hairs; legs black, fore femur with 2 rows of bristles along posterodorsal surface, other femora without these 2 rows, fore and mid tibiae without any complete row of bristles, hind tibia with a row of bristles along anterodorsal surface; wing hyaline, R_1 bare, R_{4+5} with a row of 7-8 short bristles, costal section v greater than iii; abdomen black with silvery reflection, fifth sternite v-shaped with spines laterally and short hairs terminally on arms; lateral plate of paraphallus elongated, longer than style, styli of glans short.

Distribution : India : Mizoram (Aizawl) and Manipur.

Genus ***Harpagophalla*** Rohdendorf

1937. *Harpagophalla* Rohdendorf, *Fauna. USSR,* Dipt; **19**(1) : 276. Type-species : *Sarcophaga sera* Rohdendorf, by monotypy = *Sarcophaga kempi* Senior-White.

34. ***Harpagophalla kempi*** (Senior-White)

1924. *Sarcophaga kempi* Senior-White, *Rec. Indian Mus.*, **26** : 247.

Diagnosis : Lateral verticals absent, genals black and whitish; fleagellomere I grey pollinose; prescutellar acrostichal I, posterior dorsocentrals 5; segment iii of costa equal to v; mid femur with comb and basal fringe, hind femur with posteroventral macrochaetal row and fringe, hind tibia double fringed; sterite 5 swollen apically.

Distribution : India : Mizoram (Aizawl, Lunglei), Arunachal Pradesh, Bihar, Meghalaya, Tripura and West Bengal.

Elsewhere : China, Hainan Islands, Jawa, Laos, Myanmar, Sri Lanka and Thailand; New Guinea.

Genus ***Iranihindia*** Rohdendorf

1961. *Iranihindia* Rohdendorf, *Stutt. Beitr. Naturk.*, **58** : 2. Type-species : *Sarcophaga futilis* Senior-White, by original designation.

Key to the species

1. Third abdominal tergite with distinct median marginal bristles; styli of glans long and blunt ..... *futilis* (Senior-White)
- Third abdominal tergite without or with weak marginal bristles; styli of glans short or pointed *martellata* (Senior-White)

35. ***Iranihindia futilis*** (Senior-White)

1924. *Sarcophaga futilis* Senior White, *Rec. Indian Mus.*, **26**(3) : 246.

Distribution : India : Mizoram (Aizawl), Assam, Bihar, Madhya Pradesh, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Myanmar and Sri Lanka.

36. ***Iranihindia martellata*** (Senior-White)

1924. *Sarcophaga martellata* Senior-White, *Rec. Indian Mus.*, **26**(3) : 247.

Distribution : India : Mizoram (Aizawl), Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra.

Elsewhere : Sri Lanka.

Genus ***Seniorwhitea*** Rohdendorf

1937. *Seniorwhitea* Rohdendorf, *Fauna. USSR* Dipt, **19**(1) : 297. Lopes, 1964. *Mem. Inst. Oswarldo. Cruz*, **62** : 162 (rev). Type-species : *Sarcophaga orientaloides* Senior-White, by original designation = *Sarcophaga krameri* Boettcher.

37. ***Seniorwhitea reciproca*** (Walker)

1856. *Sarcophaga reciproca* Walker, *J. Proc. Linn. Soc. Lond.; Zool.*, **1** : 22.

Diagnosis : Lateral verticals weak or absent; antenna black, first flagellomere more than thrice the pedicel; palpi black; acrostichal 0 + 1, dorsocentral 0 + 4 only; tergum 2 with marginals; mid femur with strong comb and basal fringe, hind femur well fringed, mid and hind tibia fringed.

Distribution : India : Mizoram (Aizawl and Lunglei) and most of the states of India.

Elsewhere : Hainan Islands; Laos, Malaya, Singapur, Thailand; Hawaii.

SUMMARY

It may be concluded that Mizoram has so far known to harbour 37 species under the families-Tipulidae, Bibionidae, Stratiomyidae, Bombyliidae, Conopidae, Micropezidae, Tephritidae, Sepsidae, Ephydridae, Calliphoridae and Sarcophagidae of which 6 species are confined to India, 10 species spread only in the boundary of Oriental Region and the majority numering 21 species extends their range of distribution beyond the Orient. Lastly 16 species, barring the members of family Sarcophagidae, are recorded for the first time from Mizoram.

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We express our thanks to the Director, and Dr. A. K. Hazra, Joint Director, Zoological Survey of India, Kolkata, for placing the material at our disposal for study and their constant encouragement.

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Table 1 : District-wise distribution of the Dipteran species of Mizoram.

SPECIES	FAMILY	AIZAWL	LUNGLEY TUIPUI	CHHIM-TUIPUI
Teucholabis fenestrata Osten Sacken	Tipulidae	◆		
Bibio tenebrosus Conquillett	Bibionidae	◆		
Ptecticus australis Schiner	Stratiomyidae		◆	
Haematopota javana Wiedemann	Tabanidae	◆		
Petrorosia ceylonica (Brunetti)	Bombyliidae	◆		
Petrorossia intermedia (Brunetti)	"	◆		
Physocephala bicolorata (Brunetti)	Conopidae	◆		
Mimegralla albimana (Doleschall)	Micropezidae			◆
Dacus (Zeugodacus) tau (Walker)	Tephritidae		◆	
Myoleja fossata (Fabricius)	"		◆	
Decachaetophora aenepes (de Meijere)	Sepsidae		◆	
Dicranosepsis bicolor Wiedemann	"	◆		
Meroplius fasciculatus (Brunetti)	"	◆		
Paralimna hirticornis de Meijere	Ephydridae	◆		
Chrysomya megacephala (Fabricius)	Calliphoridae	◆		
Isomyia nebulosa (Townsend)	"			◆
Rhynchomya viridaurea (Wiedemann)	"			◆
Blaesoxipha aspinata (Senior-White)	Sarcophagidae	◆		
Bercaea cruentata Meigen	"	◆		
Boettcherisca peregrina (R-D)	"	◆		
Boettcherisca peregrina (R-D)	"	◆		
Fengia ostindicae (Senior-White)	"	◆		
Lioproctia (Coonoria) pattoni (Senior-White)	"	◆		
Parasarcophaga (Liopygia) ruficornis (F)	"	◆		
P. (Liosarcophaga) brevicornis (Ho)	"	◆		
P. (L.) dux Thomson	"	◆	◆	
P. (L.) sarupi Nandi	"	◆		
P. (Curranea) scopariiformis Senior-White	"	◆		
P. (P.) albiceps (Meigen)	"	◆	◆	
P. (P.) sericea Walker	"	◆		
P. (P.) misera (Boettcher)	"	◆		
Robineauella (Jantiella) doleschalli (J & T)	"	◆		
Sarcorohdondorfia ghaiae Nandi	"	◆		
Thysocnema (Pseudothyrsocnema) lushaiensis Nandi	"	◆		
Harpagophalla kempi (Senior-White)	"	◆	◆	
Iranihindia futilis (Senior-White)	"	◆		
Iranihindia martellata (Senior-White)	"	◆		
Seniorwhitea reciproca (Walker)	"	◆	◆	

Present : ◆

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 367-373, 2007

DIPTERA : TACHINIDAE

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INTRODUCTION

No record of occurrence of a tachinid species in Mizoram is available in literature, although a number of them have been reported from erstwhile 'Assam' province and neighbouring Bangladesh by Crosskey (1977) and from the neighbouring Manipur and Tripura states by Lahiri (1999, in press).

The present study is based on tachinid material available in the collection of the Zoological Survey of India, Calcutta, procured during faunistic survey of Mizoram state undertaken by the department under the leadership of Dr. M.S. Shishodia (November-December, 1993), Dr. J.K. Jonathan (October, 1991) and Dr. A.R. Lahiri (September-October, 1993).

MATERIAL AND METHOD

Adult tachinid flies were collected, pinned and processed by the method prescribed by Datta, Parui and Mukherjee (1977). A brief account of taxonomically important characters of these insects has been provided by Lahiri (1999).

CLASSIFIED LIST OF SPECIES KNOWN FROM MIZORAM

Subfamily PHASIINAE
Tribe CYLINDROMYIINI

1. ***Hermya beelzebul*** (Wiedemann)

Subfamily TACHININAE
Tribe THELAIRINI

2. ***Thelaira macropus*** Wiedemann

Tribe LESKIINI

3. ***Ocypteromima orientalis*** (Townsend)

Subfamily GONIINAE
Tribe BLONDELIINI

4. ***Compsilura concinnata*** (Meigen)

Tribe EXORISTINI

5. ***Chaetexorista lushaiensis*** sp. nov.

Tribe STURMIINI

6. ***Blepharella lateralis*** MacLachlan

SYSTEMATIC ACCOUNT

Family TACHINIDAE

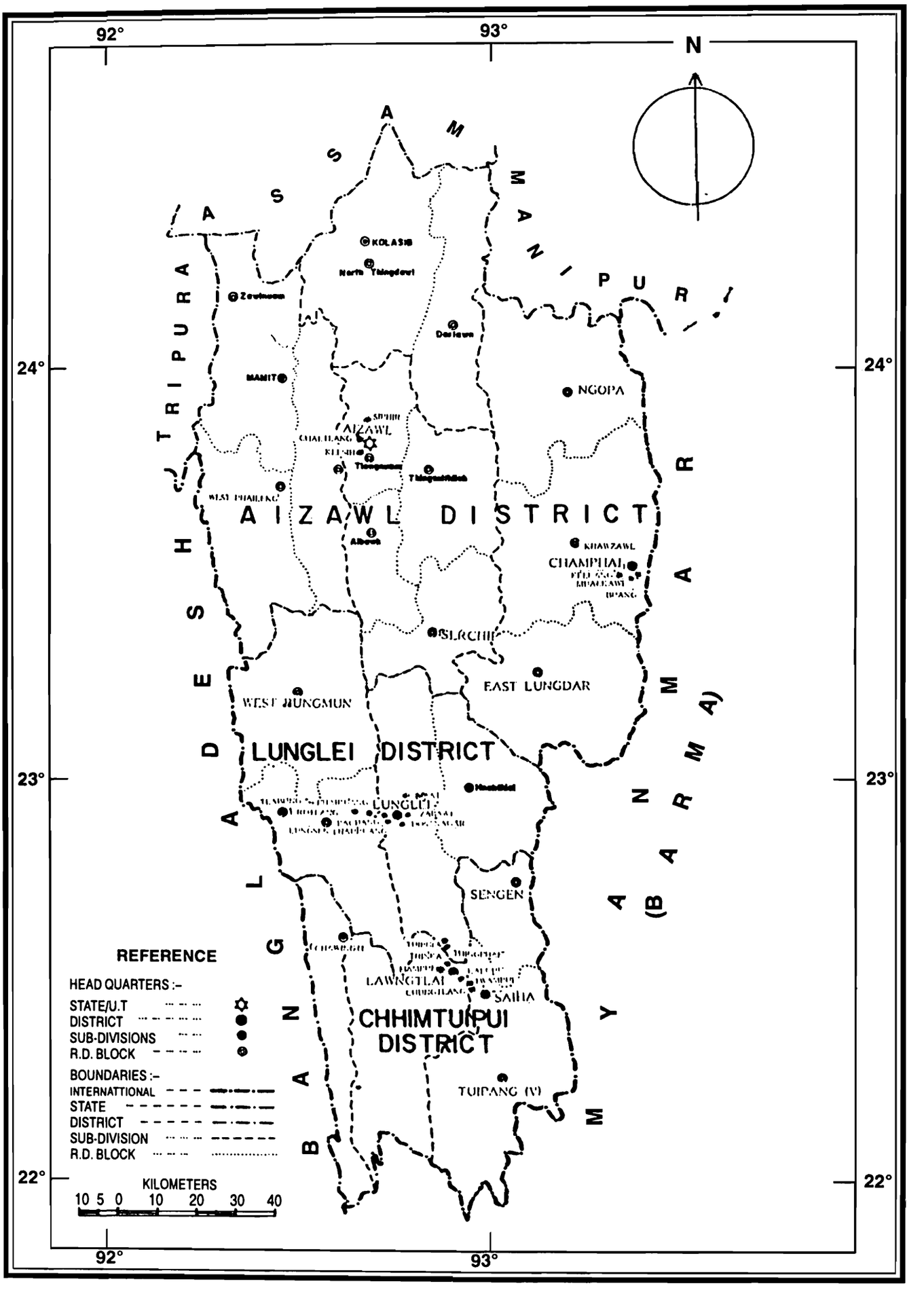
Key to the subfamilies

1. Prosternum setose ..... Goniinae (part)
– Prosternum bare 2
2. Presutural intra-alar setae absent; 0-2 post intra-alar setae ..... Phasiinae
– Presutural intra-alar setae present; 2 or 3 post intra-alar setae 3
3. Facial ridge with few setae around vibrissae ..... Tachininae
– Facial ridge setose on its whole length ..... Goniinae (part)

Subamily PHASIINAE

Tribe **Cylindromyiini**

Diagnostic characters : Head with broad frons and proclinate orbital setae in either sex; facial



Map of Mizoram showing collection localities (1. Aibawk, 2. Aizawl, 3. Champhai, 4.Talrai and 5. Lawngtlai)

carina not developed. Pre-alar and second supra-alar setae usually present; 3 *dc* and 1 or 2 *ia*; 2 or 3 pairs of scutellar marginals; wings not marked with black bands; lower calypter evenly rounded on hind margin; bend of vein *M* sharply and strongly curved; femora without ventral spine combs; hind coxae widely separated from abdominal base. Abdomen variably elongagted, subcylindrical; abdominal sternite 2-4 concealed or partially exposed.

Genus ***Hermya*** Robineau-Desvoidy

1830. *Hermya* Robineau-Desvoidy, *Mem. Pres. div. Sav. Acad. Sci. Inst. Fr.*, **2** : 226.

1976. *Hermya*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 171.

Diagnostic characters : Antenna long with third segment at least five times as long as the second segment; arista long and slender with basal segments neither thickened nor markedly elongated; palpi present; vibrissae weak or hair-like; hind tibiae without submedian or apical *pv* setae and with at most two *ad* and *pd* setae; wings uniformly coloured, not forming a banded pattern; cell R_5 without a petiole. Abdomen subfusiform, quadrisegmented in dorsal view without the postabdomen recurved under preabdomen; abdominal segments T_3, T_4 and T_5 each with a pair of erect, median setae.

Distribution : China, India, Japan, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam.

1. ***Hermya beelzebul*** (Wiedemann)

1830. *Tachina beelzebul* Wiedemann *Aussereuropaische zweiflugelige Insekten*, **2** : 301.

1976. *Hermya beelzebul*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 171.

Material examined : 3 exs., Lawngtlei, 14 and 19.ix.1993, coll. A. R. Lahiri.

Diagnostic characters : Medium size (Length : body 8.00 mm., wing 12.00 mm.). Glossy blackish brown; face, paraface, genae and profrons shiny golden yellow; sides of thorax, flexor surface of femora and abdomen laterally ashy white while front part of thorax and dorsum of abdomen viewed from certain angle, also similar in appearance; wings blackish brown except along pale, almost colourless hind margin; epaulette creamy white. Antennae with third segment more than twice as long as palpi; 2 *pr. cl* orbitals; parafacial bare; 3 humerals situated in a triangle; 3+3 *ac*, 3+3 *dc* and 0+2 *ia*; scutellar marginals total 3, apical longest, corssing. T_{1+2} excavated at hind margin.

Distribution : India : Mizoram (Chimtimpui district), Assam, Himachal Pradesh, Sikkim, Tamil Nadu, Uttar Pradesh.

Outside India : China, Japan, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Vietnam.

Subfamily TACHININAE

Key to the tribes

1. Epistome not very prominent, only just visible in front of vibrissal insertions in profile view of the head; vibrissae inserted at level of epistomal margin. Fore coxa haired on most of inner anterior surface. ..... Thelairini

– Epistome prominent, conspicously visible in front of vibrissal insertions in profile view of the head; vibrissae inserted well above epistomal margin. Fore coxa bare on most of inner anterior surface. ..... Leskiini

Tribe **Thelairini**

Genus ***Thelaira*** Robineau-Desvoidy

1830. *Thelaira* Robineau-Desvoidy, *Mem. Pres. Div. Sav. Acad. Sci. Inst. Fr.*, **2** : 214.

1976. *Thelaira*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Sppl.) : 191.

Diagnostic characters : Face wider than frons with margins parallel or even widening towards epistome; antennae shorter than the horizontal diameter of the eye and with the third segment less than three times as long as the second segment; arista short, plumose; at most two pairs of proclinate orbital setae or not at all; vibrissae situated at about the level of epistomal margin.

Scutellum with a pair of recumbent discal setae and three or more pairs of marginal setae of which the apicals are corssing and the subapicals separated by a distance greater than that between either and its corresponding basal corner of scutellum; second costal sector haired ventrally. Abdominal segment T_{1+2} excavate nearly to its hind margin that is furnished with median marginal setae while segments T_3 and T_4 bears median discal setae.

Distribution : Northern Asia, China, Europe, Indonesia, Japan, Malaysia, Myanmar, New Guinea, Pakistan, Sri Lanka.

2. ***Thelaira macropus*** Wiedemann

1830. *Thelaira macropus* Wiedemann, *Aussereuropaische zweiflugelige Insekten*, **2** : 375.

1936. *Thelaira macropus*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 192.

Material studied : 1 ex., Champhai, 24.ix.1993, coll. A. R. Lahiri.

Diagnostic characters : Medium size (Length : body 11.50-15.00 mm, wing 9.00-16.5 mm). Black, subdorsum and sides of abdomen from near base to middle of T_4 yellow. Proboscis shorter than head height; palpi filliform extending to epistome; parafacial bare; orbitals not differentiated; arista plmose. Scutellar total 3, apicals raised, subapicals little longer than apicals; 3+3 *ac*, 3+3 *dc* and 1+3 *ia*; R_1 for more than half way to apex and R_{4+5} upto r-m setulose. Abdominal segments T_{1+2} and T_3 each with a pair of submedian raised marginals, T_3 and T_4 with a pair of raised discals.

Distribution : India : Mizoram (Aizawl district), Assam, Himachal Pradesh, Kashmir, West Bengal. Outside India : Indonesia, Malaysia, New Guinea, Sri Lanka, Thailand.

Tribe **Leskiini**

Genus ***Ocypteromima*** Townsend

1916. *Ocypteromima* Townsend, *Ann. Mag. Nat. Hist. (8)*, **17** : 175.

1976. *Ocypteromima*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 201.

Diagnostic characters : Palpi reduced and filliform not reaching forwards as far as epistome; eipspome prominent, visible conspicuously in front of vibrissal insertions in profile view of the head; vibrissae inserted well above epistomal margin; proboscis not unusually slender, shorter than head height; male with or without proclinate orbital setae; arista normal, slightly thickened only near base and with second segment not elongated; eyes bare. Humeral callus ususlly with only two strong setae; wing with vein *M* much closer to wing margin than *m-cu*; costal spine undeveloped; both tegula and basicosta blackish-brown; R_{4+5} with setulae extending well beyond the node and usually upto *r-m*; cell R_5 open or just closed at wing margin; last section of Cu_1 conspicuously shorter than *m-cu*; mid tibia with two or more strong *ad* setae. T_{1+2} with a pair of erect median marginal setae; last abdominal tergite at most with some short stubby setulae, without long strong discals.

Distribution : Africa, India, Indonesia, Malaysia, Miwi, Myanmar, Philippines, Sri Lanka, Thailand.

3. ***Ocypteromima orientalis*** (Townsend)

1928. *Orilliopsis orientalis* Townsend, *Philipp. J. Sci.*, **34** : 396.

1976. *Ocypteromima orientalis*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 201.

Material studied : 1 ex., Aizawl, 23.x.1991, coll. J. K. Jonathan; 1 ex., Talrai, 2.x.1993, coll. M. Sil.

Diagnostic characters : Medium size (Length : body : 11.50 mm, wing 10.00 mm). Black, paraface, frons, prescutum and abdominal segments T_3 and T_4 baso-laterally pruinosed white. Oellar setae undifferentiated; 2 proclinate and 1 reclinate orbital setae; humeral callus with 3 setae arranged in a triangle; 3 sternopleural setae; 4+3 *dc* and 1+3 *ia* setae; scutellar setae total 3, apical converging, fine and raised, smaller than diverging subapicals; 3 humerals situated in a curve R_{4+5} setulose upto *r-m*; T_{1+2} excavated nearly upto hind margin; T_{1+2}, T_3 and T_4 with a pair of median setae on apical border, those of T_{1+2} and T_3 erect.

Distribution : India : Mizoram (Aizawl and Chimtimpui districts).

Outside India : Malaysia, Philippines.

Subfamily GONIINAE

Key to the tribes

1. Pre-alar seta short and weak, usually shorter than the first *post ia* seta and much shorter than the first *post dc* seta. 2
- Pre-alar seta moderately or very strong in relation to the size of the other mesonotal setae, much longer than the first *post ia* seta and the first *post dc* seta. ..... Sturmiini
2. Bend of vein *M* evenly rounded, without any trace of M_2 appendix. Subapical scutellar setae widely divergent. ..... Blondeliini
- Bend of vein *M* abrupt with at least a trace of M_2 appendix. Subapical scutellar setae parallel or weakly divergent. ..... Exoristini

Tribe **Blondeliini**

Genus ***Compsilura*** Bouche

1834. *Compsilura* Bouche, *Naturgeschicte der Insekten, besonders in Hinsicht ihrer Zustande als Larven und Pupen*, **1** : 58.

1976. *Compsilura*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 215.

Diagnostic characters : Eyes hairy; facial ridge setose up most of their height; ocellar setae absent. Propleuron bare; three sternopleural setae; fore tibiae usually with two *pv* setae; mid tibiae with a submedian *v* seta; 3+4 *dc* setae; scutellum with lateral setae. Abdominal T_{1+2} excavated to hind margin.

Distribution : Africa, Australia, India, Indonesia, Japan, Malaysia, North America.

4. ***Compsilura concinnata*** (Meigen)

1824. *Tachina concinnata* Meigen, *Systematische Beschreibung der bekannten Europaischen zweiflugeligen Inseken*, **4** : 412.

1976. *Compsilura concinnata*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 215.

Material examined : 1 ex., Aibawk, 15.xi.1995, coll. M. S. Shishodia.

Diagnostic characters : Medium size (Length : body : 9.00 mm; wing 7.00 mm). Black but yellowish and thinly pruinosed on face, paraface, genae, parts of femora, segment T_3 and apical halves of segments T_4 and T_5. Third antennal segment stout, subequal to palpi. 3+3 *Ac*, 3+4 *dc* and 1+2 *ia* setae; 3 pairs of scutellar setae, apicals and subapicals direted a little upwards, the apicals shorter than subapicals.

Distribution : India : Mizoram (Aizawl district), Himachal Pradesh, Uttar Pradesh.

Outside India : Africa, Australia, Indonesia, Japan, Malaysia, North America.

Tribe **Exoristini**

Genus ***Chaetexorista*** Brauer & Bergenstamm

1894. *Chaetexorista* Brauer & Bergenstamm, *Denkschr. Akad. Wiss. Wien.*, **61** : 616.

1976. *Chaetexorista*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 220.

Diagnostic characters : Upper occiput with a row of well developed black setulae behind the postocular row; occipital region of head slightly swollen. Humeral callus with at least four distinct setae with main three situated almost in a line; four *post dc* setae; *m-cu* not unusually oblique or remote from wing margin; last section of vein Cu_1 subequal in length to *m-cu*; cell R_5 open at wing margin.

Distribution : America, China, India, Indonesia, Japan, Malaysia, Nepal, Philippines, Taiwan.

5. ***Chaetexorista lushaiensis*** sp. nov.[1]

Description : Medium in size (Length : body : 13.50 mm; wing : 11.50 mm). Black but face, paraface, parafrons, sides of thorax and basal halves of segments T_3, T_4 and T_5 variably shiny whitish. Eyes hairy; proboscis shorter than head height; palpi filliform, shorter than the thrid

[1] *The species is named after the name of the place of its collection.*

antennal segment; third antennal segment longer than genal height; 2 *pr.cl.* and 1 *re.cl.* orbital setae. Pre alar seta subequal to first *post-ia* seta and shorter than first *post-dc* seta; five humeral setae of which main three are set in a curve; 3+3 *ac*, 3+4 *dc* and 1+2 *ia* setae; 3 *stpl* setae; scutellum with a pair of erect discal and total four marginal setae, the pre-apical being almost as long as the apicl; mid-tibia with one submedian *v* and several *ad* setae; R_{4+5} setulose from base nearly two-third upto *r-m*. T_{1+2} excavated to hind margin; abdomen clothed with black microchaetae.

Material examined : Holotype ♀ Champhai, 24.ix.1973, coll. A. R. Lahiri (Z.S.I. Regd. No. 8471/H6).

Remark : From closely allied species *Chaetexorista lushaiensis* sp. nov. differs in size, body markings and thoracic chaetotaxy.

Distribution : India : Mizoram : Champhai (Aizawl district).

Tribe **Sturmiini**

Genus ***Blepharella*** Macquart

1851. *Blepharella* Macquart, *Mem. Soc. Sci. Agric. Lille*, **1850** : 176.

1976. *Blepharella*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 234.

Diagnostic characters : Head with two or three pairs of reclinate orbital setae; eyes bare; facial ridge with strong downcurved setae on most of their height. Prosternum bare; 2 or 3 *stpl* setae; mid-tibia with one *ad* setae.

Distribution : China, Indonesia, Malaysia, New Guinea, Sri Lanka, Solomons, Taiwan, Vietnam.

6. ***Blepharella lateralis*** Macquart

1851. *Blepharella lateralis* Macquart, *Mem. Soc. Sci. Agric. Lille.*, **1850** : 177.

1976. *Blepharella lateralis*, Crosskey, *Bull. Brit. Mus. (nat. Hist.) Ent.*, **26** (Suppl.) : 234.

Material examined : 1 ex., Lawngtlei, 20.ix.1993, Coll. A. R. Lahiri.

Diagnostic characters : Medium size (Length : body : 12.00 mm, wing : 9.00 mm). Blackish, scutellum ferruginous; face, frons, fine basal rings on T_3 and T_4 and basal half of T_5 pruinosed white. Proboscis shorter than head height; palpi subequal to third antennal segment; antenna with third segment the longest. 4 humeral setae of which main three situated in a line, the fourth one placed a little forward; 3+3 *ac*, 3+4 *dc* and 1+3 *ia* setae; 5 scutellar marginal setae; the apical short, stumpy; subapical much longer, subparallel, their distance being shorter than the distance between one subapical and corresponding base; no scutellar discal setae; cell R_5 open; bend of vein *M* without appendix; setulae on R_{4+5} confined to basal node. T_{1+2} excavated to hind margin.

Distribution : India : Mizoram (Chimtimpui district), Andhra Pradesh, Assam, Karnataka, Kerala, Pondicherry, Sikkim, Tamil Nadu, Uttar Pradesh.

Outside India : As for the genus.

DISCUSSION

A look into the distribution of various species known from Mizoram shows that only one species (*i.e.*, 16% of total 6) is endemic to the state. 3 species (*i.e.*, 50% of total 6) are known also from some other states of eastern India, e.g., erstwhile 'Assam' province and/or Nagaland, Sikkim and West Bengal. 4 species (*i.e.*, 66% of total 6) are also known to occur in other north Indian states and/or Nepal and 2 species (*i.e.*, 33% of total 6) are common to south India and Sri Lanka. Comparison of faunal composition with areas outside India indicates maximum commonness of species composition with Malaysia (5, *i.e.*, approximately 83% of total 6) while 3 species (*i.e.*, 50% of total 6) are common with Indo-Chinese region. 4 species (approximately 66% of total 6) are known from countries beyond Oriental region e.g., China, Japan, New Guinea, Philippines and/or Australia, but only one of these, *Compsilura concinnata* (Meigen) extends to Africa and America as well.

SUMMARY

One new species, viz., *Chaetexorista lushaiensis* has been described from Mizoram state of the Indian union and five other species, viz., *Hermya beelzebul* (Wiedemann), *Thelaira macropus* Wiedemann, *Ocypteromima orientalis* (Townsend), *Compsilura concinnata* (Meigen) and *Blepharella lateralis* Mac-Lachlan have been newly recorded from the area. Keys for identification/diagnostic characters for various taxa and their outline distribution have been provided in the text.

ACKNOWLEDGEMENT

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Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 375-378, 2007

DIPTERA : MUSCIDAE

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INTRODUCTION

The Muscidae or the 'Common true flies' are generally small to medium sized flies, usually black or green, but some of them resemble to Calliphoridae in possessing metallic colouration. The members of this family are closely associated with decaying organic matter, especially dung and also responsible for spreading several diseases of man and animals.

Muscidae are well represented in all Zoogeographical regions and are extremely numerous in the Oriental region, though as yet only a small percentage of the species has been described (Emden, 1965).

The family Muscidae (258 species) is the fifth largest family belonging to the order Diptera in India. Though 89 species belonging to 28 genera under 6 subfamilies are reported from North East India, nothing has been reported from Mizoram so far.

This present communication is based on the collections of the scientist of the Zoological Survey of India, Calcutta. The collections were made by M. Sil (1995), P. Parui (1995) and A. K. Hazra (1994). A total of 8 species belonging to 7 genera under 4 subfamilies have been reported for the first time from this state. The taxonomical keys of subfamilies, genera etc. have been followed after Voekeroth (1972), Shinonaga & Singh (1994). General morphology, materials & methods have been dealt in the "Fauna of Tripura" by B. Mitra (2000).

LIST OF SPECIES

A. Subfamily MUSCINAE

1. ***Musca (Byomya) sorbens*** Wiedemann
2. ***Musca (Musca) domestica*** Linnaeus
3. ***Orthellia indica*** (Robineau-Desvoidy)
4. ***Muscina pascuorum*** (Meigen)

B. Subfamily PHAONINAE

5. ***Dichaetomyia bibax*** (Wiedemann)
6. ***Atherigona (Atherigona) reversura*** Villeneuve

C. Subfamily LIMNOPHORINAE

7. ***Lispe orientalis*** Weidemann

D. Subfamily STOMOXYINAE

8. ***Stomoxys calcitrans*** (Linnaeus)

SYSTEMATIC ACCOUNT

Key to the subfamilies

1. Proboscis elongate strongly sclerotized, adopted for piercing, tapering from a broad base to a slender apex and with atrophied labella; propleuron haired, vein M_{1+2} gradually curved forward apically from about middle of last section ..... STOMOXYINAE

– Proboscis moderately weakly sclerotized, not distinctly tapering to apex and with well developed and often fleshy labella, pteropleuron haired or bare, vein M_{1+2} variable, often straight or sharply curved forward near middle of last section 2

2. Pteropleuron at least with a few fine hairs ... 3
– Pteropleuron bare ..... PHAONIINAE (Atherigona)
3. Pteropleuron with strong hairs along upper margin below base of wing, often with distinct hairs on lower half also; parafacial bare 4
– Pteroplenuron with only a row or tuft of a few fine rather short hairs on posterior part of lower half above posterior stemopleural bristle parafacial usually with fine short hairs throughout its length ... LIMONOPHORINAE
4. Vein M_{1+2} with apical protion curved strongly forward at about middle length; body colour grey to black and often metallic .... MUSCINAE
– Vein M_{1+2} straight with curved only slightly forward, body non-metallic in colour ..... PHAONIINAE (Dichaetomyia)

A. Subfamily MUSCINAE

Key to the genera

1. Suprasquamal ridge with black setulose hairs on posterior part; bend of vein M_{1+2} angular or in a gentle curve ..... *Orthellia* Robineau-Desvoidy
– Suprasquamal ridge bare, bend of vein M_{1+2} subangular 2
2. Mid tibia with pv seta; vein M_{1+2} sharply bending anteriorly ..... *Musca* Linnaeus
– Mid tibia without pv seta; hypopleuron setulose just above coxa and vein M_{1+2} broadly rounded ..... *Muscina* Robineau-Desvoidy

Genus *Musca* Linnaeus

1758. *Musca* Linnaeus, *Syst. Nat. Ed.* **10** : 589. Type-species *domestica* Linnaeus

Key to the sub genera

Propleural depression hairy . *Musca* Linnaeus
Propleural depression bare ..... *Byomya* Robineau-Desvoidy

Subgenus *Byomya* Linnaeus

1830. *Byomya* Robineau-Desvoidy, *Mem. Pres. div. Sav. Acad. Sci. Inst. Fr.*, **2** : 392. Type species : Violacea Robineau-Desvoidy

1. *Musca (Byomya) sorbens* Wiedemann

1830. *Musca sorbens* Wiedemann, *Aussereurop zweifl. Insekt.*, 2 : 418.

Material examined : 3 ♂, Aizawl, 29.xi.1995, coll. M. Sil.

Diagnosis : Thorax shining black, central pollinose stripe well defined, with a broad glossy black vitta on either side, which are more or less bifurcated anteriorly, especially in females, ventrites orange.

Distribution : Mizoram, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : China, Christmas Island, Cocos Island, Flores Island, Jawa, Lombok, Malaya, Maldive Islands, Myanmar, Nepal, Pakistan, Pelo Endeh, Philippines, Ryukyu Islands, Simeulue Island, Sumatera, Sumbawa, Sri Lanka, Taiwan, Talaud Islands, Thailand, Ethiopian, Hawaii, Micronesia, South Palaearctic.

Subgenus *Musca* Linnaeus

1915. *Promusca* Townsend, *J. Wash. Acad. Sci.*, 5 : 434. Type-species : *Musca domestica* Linnaeus

2. *Musca (Musca) domestica* Linnaeus

1758. *Musca domestica* Linnaeus, *Syst. Nat. Ed.* **1** : 596.

Material examined : 3 ♂, 1 ♀, Phawngpui Sanctuary, Saiha, 9.iv.1994, coll. A. K. Hazra; 6 ♂, Chimlung, Aizawl, 7.xii.1995, coll. M. Sil. 1 ♀, Sikha Basti, Aizwal, 29.xii.1995, coll. P. Parui.

Diagnosis : Four black vittae on thorax, inner pair terminating towards posterior end; propleural depression with fine setulose hairs; suprasquamal ridge without black setulae, all post dc strong; mid tibia without av and ad setae.

Distribution : Mizoram, Andaman Islands, Andhra Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Kashmir, Maharashtra, Punjab, Sikkim, Tripura; Cosmopolitan.

Genus ***Orthellia*** Robineau-Desvoidy

1863. *Orthellia* Robineau-Desvoidy, *Hist. nat. Dipt. env. Paris*, **2** : 837. Type-species : *rectinervis* Robineau-Desvoidy.

3. ***Orthellia indica*** (Robineau-Desvoidy)

1830. *Lucilia indica* Robineau-Desvoidy, *Mem. pres. div. Sav. Acad. Sci. Inst. Fr.*, **2** : 453.

Material examined : 1 ♂, 2 ♀, Vairengete, 10.xii.1995, coll. M. Sil.

Diagnosis : Bronze green to bluish green, anterior part at mesonotum almost always with a conspicuous brassy or bronze tinge, second segment of antenna ferruginous, mid tibia with an ad seta between apical fifth and fourth.

Distribution : Mizoram, Andaman Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Jawa, Laos, Malay, Myanmar, Philippines, Ryukyu Island, Sumatera, Sumbawa and Thailand.

Genus ***Muscina*** Robineau-Desvoidy

1830. *Muscina* Robineau-Desvoidy, *Mem. pres. div. sav. Acad. Sci. Inst. Fr.*, 2 : 406. Type-species : *Musca stabulans* Fallen.

4. ***Muscina pascuorum*** (Meigen)

1826. *Musca pascuorum* Meigen, *Syst. Beschr. europ. zweifl.*, **5** : 74.

Material examined : 2 ♂, Pheilung, Aizawl, 30.xi.1995, coll. P. Parui.

Diagnosis : Fuscous-black with apical part of scutellum and in males lateral parts of abodomen dull rufous translucent, thorax with 3+2 acr. 2–3+4 dc., 2 ia, 3 humerals.

Distribution : Mizoram, Assam, West Bengal.

Elsewhere : Pakistan, Holarctic.

B. Subfamily PHAONIINAE

Key to the genera

1. Metathoracic spiracles with strong bristles on anterior margin ..... *Dichaetomia* Malloch
– Metathoracic spiracles without strong bristles ..... *Atherigona* Rondani

Genus ***Dichaetomyia*** Malloch

1921. *Dichaetomyia* Malloch, *Ann. Mag. nat. Hist.*, (9)7 : 163. Type-species : *polita* Malloch.

5. ***Dichaetomyia bibax*** (Wiedemann)

1830. *Anthomyia bibax* Wiedemann, *Aussereurop, zweifl. Insekt*, **2** : 431.

Material examined : 1 ♂, Vairengte, Aizawl, 10.xii.1995, coll. M. Sil.

Diagnosis : Fuscous with largely testaceous legs, shoulders, basal antennal segments and margins and underside of scutellum, abdomen shining, wholly brassy-black, with very fine and thin grey dust, vein m conspicuously upcurved at tip.

Distribution : Mizoram, Assam, Himachal Pradesh, Sikkim, Uttar Pradesh, West Bengal.

Elsewhere : China, Jawa, Malaya, Myanmar, Philippines, Ryukyu Island, Sabah, Sumatera, Taiwan, Japan.

Genus ***Atherigona*** Rondani

1865. *Atherigona* Rondani, *Dipterol. ital. Prodr.*, **1** : 97. Type-species : *Anthomyia varia* Meigen.

6. ***Atherigona (Atherigona) reversura*** Villeneuve

1936. *Atherigona reversura* Villeneuve, *Ark. Zool.*, 27A (36) : 11..

Material examined : 4♂, 5♀, Chimlung, Aizawl, dist. 8.xii.1995, coll. M. Sil.

Diagnosis : Fore tibia yellow only on basal quarter to fifth, fore femur darkened, on apical half, tergite 5 alwasy unmarked, hypopygial prominence with two lateral arms situated on a small knob arising from tergite, and not so broadly separated, trifoliate process with stalk of uniform width,

shoulders well-developed; median piece rather sinuous or angled at apical quarter in lateral view.

Distribution : Mizoram, Andhra Pradesh, Assam, Maharashtra, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Kalimantan, China, Jawa, Lombok, Myanmar, Malaya, Philippines, Sri Lanka, Sumbawa, Hawaii, Japan.

C. Subfamily LIKNOPHORINAE

Genus ***Lispe*** Latreille

1796. *Lispe* Latreille, *Precis caract. gen. Ins.* 169. Type-species : *Musca tentaculata* (De geer).

7. ***Lispe orientalis*** Wiedemann

1824. *Lispe orientalis* Wiedemann, *Analecta Ent.*, : 51.

Material examined : 1 ♀, Chimlung, Aizawl dist., 7.xii.1995, coll. M. Sil. 2♂, Vairengte, Aizawl, 10.xii.1995, coll. P. Parui; 1♀, Saiha, 7.iv.1994, coll. A.K. Hazra; 1♀, Pochang, 26.ix.1993, coll. A.R. Lahri. 4♂, Pheilung, 30.xi.1995. coll. P. Parui; 1♂, Sikha Basti, Aizawl, 29.xi.1995, coll. P. Parui.

Diagnosis : Legs entirely black, femora with long bristle like hair on av and pv surfaces, hind tibia without av and pv seta.

Distribution : Mizoram, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Sikkim, Uttar Pradesh, West Bengal.

Elsewhere : China, Flores Island, Malaya, Myanmar, Pakistan, Sri Lanka, Sumatera, Taiwan, Japan.

D. Subfamily STOMOXYINAE

Genus ***Stomoxys*** Geoffroy

1762. *Stomoxys* Geoffroy, *Hist. abreg. Ins. Paris,* **2** : 449, 538. Type-species : *calcitrans* (Linnaeus)

8. ***Stomoxys calcitrans*** (Linnaeus)

1758. *Conops calcitrans* Linnaeus, *Syst. Nat., Ed.* 10, **1** : 604.

Material examined : 3 ♂, variengte, Aizawl, 10.xii.1995, coll. P. Parui. 1♀, Chimlung, Aizawl, 7.xii.1995, coll. M. Sil.

Diagnosis : Propleural depression and hypopleuron embossed with errect setulose hairs, apex of proboscis slender; stpl 0+1; arista pectinate dorsally.

Distribution : Mizoram, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Kerala, Maharashtra, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Bali, Bangladesh, China, Jawa, Malaya, Myanmar, Nepal, Pakistan, Philippines, Simeule Island, Sri Lanka, Sulawesi, Sumatera, Sumbawa, Taiwan, Thailand, Vietnam; Cosmopolitan.

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Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 379-387, 2007

INSECTA : DIPTERA : SYRPHIDAE

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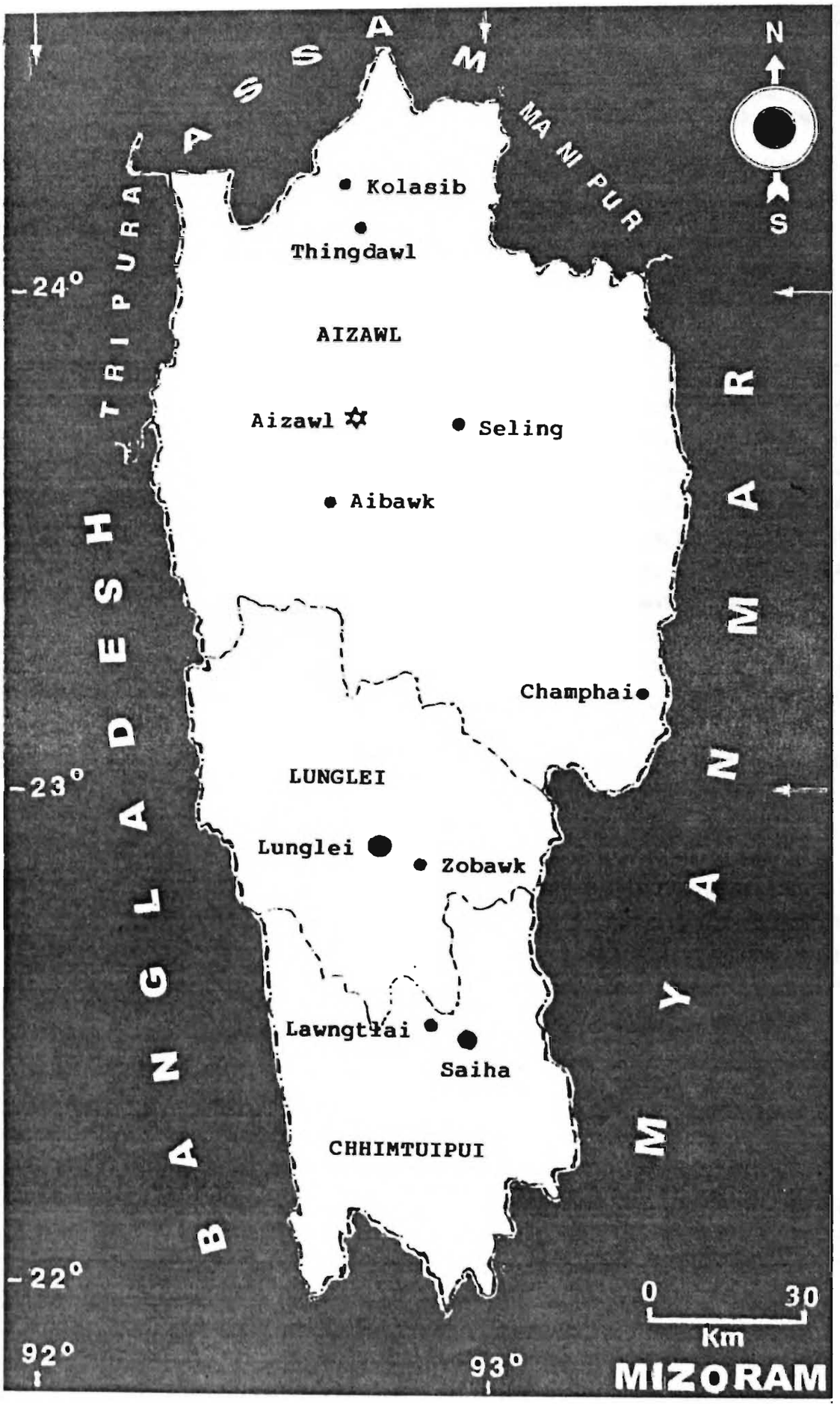
INTRODUCTION

Mizoram (Map 1) lies in the north-east India on its southern edge across the Tropic of Cancer, and is surrounded by the district of Cachar (Assam state) and the state of Manipur in the north, the Chin Hills and the northern Arakan (Myanmar) in the east and the south, and the state of Tripura and the Chittagong hill tracts of Bangladesh in the west. Physiographically, the state is a land of the Lushai Hills that run in ridges from the north to the south with an average elevation of 900 m rising up to 2167 m. in Blue Mountain. Naturally, the climate of the state varies from hot humid and malarial conditions in valleys to cold in higher reaches of hills. The major part of the state abounds in luxuriant vegetation due to profuse rainfall, with variegated flowers all around in valleys to back a rich fauna of flower flies. Indeed, the Himalayan belt all along the northern fringe of India exhibits a pompous fauna that gradually extends down to the so-called Assam Hills in the north-east of the country where Mizoram is located as one of the seven sister-states.

Notwithstanding the faunal richness, our knowledge was absolutely nil, probably for the same reasons as stated while dealing with the Manipuri Syrphidae (*vide* Datta and Mukherjee, 2000). The National Collection held now by the Zoological Survey of India, Calcutta contains a single female specimen of *Eristalis suturalis* collected by somebody on September 31, 1904 from Kolasib (read as Kolasil, mis-spelt in the label), a place in the Aizawl district of Mizoram, adjacent to the state of Assam in which it was once incorporated. However, the species was described by Brunetti (1923) from other specimens collected in Meghalaya. After a long lapse of over seven decades, M. Datta collected a large number of specimens from the state in 1976 and had to leave the collections in the Regional Station at Shillong for its enrichment. Unfortunately, no specimen could be available from there for inclusion in this study.

In a recent drive, some collecting trips were conducted by this institute nearly throughout Mizoram in order to reveal the fauna of the state. Those trips that brought the syrphid material for this study were led by the following personalities : J.K. Jonathan (October, 1991), A.R. Lahiri (September, 1993), A.K. Hazra (April, 1994), T.K. Pal (January, 1995) and P. Parui (November-December, 1995). It has already been mentioned that a lone specimen here-to-fore was the only wealth of the state in the National Zoological Collection and, therefore, the present asset was taken up with the identified material of the other north-eastern states. Indeed, as a result of this study (till December, 2000), 20 species under 13 genera are hitherto known from the state vis-à-vis 264 species and 5 subspecies under 62 genera belonging to 2 subfamilies in India. Hence, all but *Eristalis suturalis* Brunetti (marked with an asterisk) are recorded with the genera to which they belong, for the first time from the state of Mizoram.



Map of Mizoram

MATERIAL AND METHODS

The methods detailed by Datta (1998) and, Datta and Mukherjee (2000) were applied here for collecting, killing and preserving adult syrphid flies in this study.

MORPHOLOGY AND TERMINOLOGY

The reader is referred to Datta (1998) for a comprehenssive knowledge on the morphology and terminology of the Syrphidae dealt with here.

LIST OF TAXA KNOWN FROM MIZORAM

Subfamily SYRPHINAE

Tribe SYRPHINI

1. ***Allograpta javana*** (Wiedemann)
2. ***Asarkina (Asarkina) ericetorum*** (F.)
3. ***Betasyrphus serarius*** (Wiedemann)
4. ***Dideopsis aegrotus*** (F.)
5. ***Episyrphus balteatus*** (De Geer)
6. ***Sphaerophoria indiana*** Bigot
7. ***S. viridaenea*** Brunetti

Tribe BACCHINI

8. ***Baccha (Allobaccha) amphithoe*** Walker

Tribe MELANOSTOMATINI

9. ***Melanostoma orientale*** (Wiedemann)
10. ***M. univittata*** (Wiedemann)

Tribe CHRYSOTOXINI

11. ***Chrysotoxum convexum*** Brunetti

Tribe PARAGINI

12. ***Paragus (Paragus) serratus*** (F.)
13. ***P. (Pandasyophthalmus) rufiventris*** Brunetti
14. ***P. (P.) tibialis*** (Fallén)

Subfamily MILESINAE

Tribe ERISTALINI

15. ***Eristalinus (Eristalinus) arvorum*** (F.)
16. ***E. (Eristalodes) paria*** (Bigot)
17. ***Eristalis (Eristalis) tenax*** (L.)
18. ***E. (Eoseristalis) cerealis*** F.
*19. ***E. (E.) suturalis*** Brunetti
20. ***Phytomia (Phytomia) errans*** (F.)

SYSTEMATIC ACCOUNT

Family SYRPHIDAE

The classification of the family into subfamilies is followed in agreement with Vockeroth (1969) and Thompson (1972) or Datta (1998, 2001), and Datta, Parui and Mukherjee (2000).

Subfamily SYRPHINAE

The tribes and genera *sensu* Vockeroth (1969) and Thompson (1972) are treated here also subsequent to other works by Datta and his co-authors.

Tribe SYRPHINI

Genus ***Allograpta*** Osten Sacken

1875. *Allograpta* Osten Sacken, *Bull. Buffalo Soc. nat. Sci.*, **3** : 49. Type-species : *Scaeva obliqua* Say.

1. ***Allograpta javana*** (Wiedemann)

1824. *Syrphus javanus* Wiedemann, *Analecta ent.* : 34.

Material examined : 1♀, Thingdawl, 1130 m, Aizawl dist., 22.i.1995, Coll. T.K. Pal; 1♀, Dampa, 1150 m, Aizawl dist., 26.i.1995, Coll. T.K. Pal.

Diagnosis : Vide Datta (1998).

Distribution : Mizoram (Aizawl dist.), Andhra Pradesh, Arunachal Pradesh, Assam, Delhi, Karnataka, Manipur, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Elsewhere : China, E. Malaysia, Jawa, Kalimantan, Malay, Philippines, Sri Lanka, Sumatera, Taiwan and Thailand; Australia, Fiji, Guadalcanal, Hawaii, Japan, Korea and New Guinea.

Genus ***Asarkina*** Macquart

1842. *Asarkina* Macquart, *Dipt. exot.*, **2**(2) : 77 (137). Type-species : *Scaeva rostrata* Wiedemann.

Subgenus ***Asarkina*** Macquart

Diagnosis : *Vide* Datta (1998).

2. ***Asarkina (Asarkina) ericetorum*** (Fabricius)

1781. *Syrphus ericetorum* Fabricius, *Spec. Insect.*, **2** : 425.

Material examined : 4♂♂, Aibawk, 1075 m, Aizawl dist., 19.x.1991, Coll. J.K. Jonathan; 1♂, Champhai, 900 m, Aizawl dist., 28.ix.1993, Coll. A.R. Lahiri; 1♂, Aizawl, 1150 m, Aizawl dist., 21.i.1995, Coll. T.K. Pal; 1♀, Dampa, 1150 m, Aizawl dist., 28.xi.1995, Coll. M. Sil. 1♀, Aizawl, 1150 m, Aizawl dist., 30.xi.1995, Coll. R.S. Mridha.

Diagnosis : Vide Datta (1998).

Distribution : Mizoram (Aizawl dist.), Arunachal Pradesh, Assam, Jammu & Kashmir, Manipur, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

Elsewhere : Other parts of the Oriental region; Africa, Australia, Fiji, Maluku, New Guinea and Samoa.

Genus ***Betasyrphus*** Matsumura

1917. *Betasyrphus* Matsumura, *Ent. Mag. Kyoto*, **2** : 143. Type-species : *Syrphus serarius* Wiedemann.

3. ***Betasyrphus serarius*** (Wiedemann)

1830. *Syrphus serarius* Wiedemann, *Aussereurop. zweifl. Insekt.*, **2** : 128.

Material examined : 1♂, Champhai, 950 m, Aizawl dist., 29.ix.1993, Coll. A.R. Lahiri; 1♂, Seling, 875 m, Aizawl dist., 29.i.1995, Coll. T.K. Pal; 2♀♀, Champhai, 900 m, Aizawl dist., 31.i.1995, Coll. T.K. Pal; 1♂, 1♀, Champhai, 1.ii.1995, Coll. T.K. Pal.

Diagnosis : Vide Datta (1998).

Distribution : Mizoram (Aizawl dist.), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Manipur, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Other parts of the SE Asia; Australia, Japan, Korea and New Guinea.

Genus ***Dideopsis*** Matsumura

1917. *Dideopsis* Matsumura, *Ent. Mag. Kyoto*, **2** : 142. Type-species : *Eristalis aegrotus* Fabricius.

4. ***Dideopsis aegrotus*** (Fabricius)

1805. *Eristalis aegrotus* F., *Syst. Antliat.* : 243.

Material examined : 1♂, Dampa, 1150 m, Aizawl dist., 18.xi.1995, Coll. P. Parui; 1♀, Maubuang, 1075 m, Aizawl dist., 4.xii.1995, Coll. M. Sil.

Diagnosis : *Vide* Datta (1998).

Distribution : Mizoram (Aizawl dist.), Assam, Karnataka, Kerala, Manipur, Meghalaya, Sikkim, Tripura and West Bengal; Nepal and other parts of the SE Asia; Australia, Maluku and New Guinea.

Genus ***Episyrphus*** Matsumura & Adachi

1917. *Episyrphus* Matsumura and Adachi, *Ent. Mag. Kyoto*, **2** : 134. Type-species : *Musca balteata* De Geer.

5. ***Episyrphus balteatus*** (De Geer)

1776. *Musca balteata* De Geer, *Mém. pour. serv. Hist. Ins.*, **6** : 116.

Material examined : 1♂, Lawngtlai, 750 m, Chhimtuipui dist., 17.ix.1993, Coll. A.R. Lahiri; 3♀♀, Lawngtlai, 750 m, 18.ix.1993, Coll. N.C. Manna; 4♂♂, Zobawk, 1250 m, Lunglei dist., 22.ix.1993, Coll. M. Sil, 1♂, Zobawk, 1250 m, Lunglei dist., 22.ix.1993, Coll. N.C. Manna; 1♀, Lunglei, 1275 m, Lunglei dist., 23.ix.1993, Coll. R.S. Mridha; 1♂, 3♀♀, Lunglei, 1275 m, Lunglei dist., 27.ix.1993, Coll. M. Sil; 1♂, Champhai, Aizawl dist., 29.ix.1993, Coll. A.R. Lahiri; 2♂♂, 1♀, Champhai, 1.x.1993, Coll. R.S. Mridha; 11♂♂, Lawngtlai, Chhimtuipui dist. 4.iv.1994, Coll. A.K. Hazra; 2♀♀, Seling, 875 m, Aizawl dist. 30.xi.1995; Coll. R.S. Mridha.

Diagnosis : *Vide* Datta (1998).

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.), Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura and West Bengal.

Elsewhere : China, Malay and other parts of the Oriental region; Australia, Bonin Islands and Palaearctic region.

Genus ***Sphaerophoria*** Lep. & Serv.

1828. *Sphaerophoria* Lepeletier and Serville, *Encycl. Méth (Ins.)*, **10** : 513 (as subgenus of *Syrphus* F.). Type-species : *Musca scripta* L.

Key to the species
(*vide* Datta, 2001)

6. ***Sphaerophoria indiana*** Bigot

1884. *Sphaerophoria indiana* Bigot, *Annls Soc. ent. Fr.*, (6) **4** : 99.

1915. *Sphaerophoria nigritarsis* Brunetti, *Rec. Indian Mus.*, **11** : 216 (as form).

Material examined : 1♂, Sihphir, 1350 m, Chhimtuipui dist., 14.ix.1993, Coll. A.R. Lahiri; 1♀, Lawngtlai, 850 m, Chhimtuipui dist., 17.ix.1993, Coll. R.S. Mridha; 2♂♂, 1♀, Twanpui, 1130 m, Lunglei dist., 19.ix.1993, Coll. M. Sil; 1♂, Zobawk, 1250 m, Lunglei dist., 22.ix.1993, Coll. M. Sil; 1♂, Dosanagar, 1150 m, Lunglei dist., 24.ix.1993, Coll. A.R. Lahiri; 1♂, Phairuang, 225 m, Lunglei dist., 25.ix.1993, Coll. M. Sil; 1♀, Lawngtlai, Chhimtuipui dist., 26.ix.1993, Coll. R.S. Mridha; 2♂♂, Aizawl, 1150 m, Aizawl dist., 5.xii.1995, Coll. P. Parui.

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.), Arunachal Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : China and ? Sri Lanka; Korea and eastern part of the erstwhile U.S.S.R.

7. ***Sphaerophoria viridaenea*** Brunetti

1915. *Sphaerophoria viridaenea* Brunetti, *Rec. Indian Mus.*, **11** : 216 (as form).

Material examined : 1♀, Dosanagar, 1150 m, Lunglei dist., 24.ix.1993, Coll. A.R. Lahiri.

Distribution : Mizoram (Lunglei dist.), Himachal Pradesh, Sikkim and West Bengal.

Tribe BACCHINI

Genus ***Baccha*** Fabricius

1805. *Baccha* Fabricius, *Syst. Antliat.* : 199. Type-species : *Syrphus elongatus* Fabricius.

Diagnosis : *Vide* Datta (1998).

Subgenus ***Allobaccha*** Curran

1928. *Allobaccha* Curran, *J. fed. Malay St. Mus.*, **14** : 251 (as subgenus of *Baccha* F.). Type-species : *Baccha rubella* van der Wulp.

Diagnosis : *Vide* Datta (1998).

8. ***Baccha (Allobaccha) amphithoe*** Walker

1849. *Baccha amphithoe* Walker, *List Dipt. : Br. Mus.*, **3** : 549.

1913. *Baccha flavopunctata* Brunetti, *Rec. Indian Mus.*, **8** : 165.

Material examined : 1♂, Aizawl, 1150 m, Aizawl dist., 5.xii.1995, Coll. M. Sil.

Diagnosis : *Vide* Datta (1998).

Distribution : Mizoram (Aizawl dist.), Assam, Meghalaya, Sikkim, Tripura and West Bengal.

Elsewhere : Sri Lanka and Taiwan south to Flores Islands (Indonesia).

Tribe MELANOSTOMATINI

Genus ***Melanostoma*** Schiner

1860. *Melanostoma* Schiner, *Wien. ent. Mschr.*, **4** : 213. Type-species : *Musca melina* L.

Key to the species
(*Vide* Datta, 1998)

9. ***Melanostoma orientale*** (Wiedemann)

1824. *Syrphus orientalis* Wiedemann, *Analecta Ent.* : 36.

Material examined : 1♂, 1♀, Sihphir, 1350 m, Chhimtuipui dist., 14.ix.1993, Coll. R.S. Mridha; 4♂♂, Chhiatlang, 950 m, Chhimtuipui dist., 15.ix.1993, Coll. N.C. Manna; 1♀, Chhiatlang, Chhimtuipui dist., 15.ix.1993, Coll. R.S. Mridha; 2♂♂, 1♀, Zobawk, 1250 m, Lunglei dist., 22.ix.1993, Coll. M. Sil; 1♀, Phairuang, 225 m, Lunglei dist., 24.ix.1993, Coll. A.R. Lahiri; 4♂♂,

3♀♀, Dosanagar, 1150 m, Lunglei dist., 24.ix.1993, Coll. A.R. Lahiri; 1♂, Champhai, 950 m, Aizawl dist., 29.ix.1993, Coll. A.R. Lahiri; 1♂, Dampa, 1100 m, Aizawl dist., 28.xi.1995, Coll. P. Parui.

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.), Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karnataka, Manipur, Meghalaya, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Bhutan, Nepal, Pakistan, Sri Lanka and other parts of the Oriental Region; Palaearctic region.

10. ***Melanostoma univittata*** (Wiedemann)

1824. *Syrphus univittatus* Wiedemann, *Anatecta Ent.*, 36.

Material examined : 1♂, Lawngtlai, 850 m, Chhimtuipui dist., 18.ix.1993, Coll. M. Sil; 3♀♀, Dampa, 1100 m, Aizawl dist., 28.xi.1995, Coll. P. Parui.

Distribution : Mizoram (Aizawl and Chhimtuipui dists.), Assam, Bihar, Karnataka, Kerala, Manipur, Meghalaya, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : E Malaysia, Myanmar, Nepal, Sri Lanka, Sumatera and other parts of the SE Asia; ? Australian and Palaearctic regions.

Tribe CHRYSOTOXINI

Genus ***Chrysotoxum*** Meigen

1803. *Chrysotoxum* Meigen, *Magazin InsektKde*, **2** : 275. Type-species : *Musca bicincta* L.

Diagnosis : *Vide* Datta (1998).

11. ***Chrysotoxum convexum*** Brunetti

1915. *Chrysotoxum convexum* Brunetti, *Rec. Indian Mus.*, **11** : 249.

Material examined : 1♂, Lawngtlai, 750 m, Chhimtuipui dist., 29.ix.1993, Coll. R.S. Mridha; 1♂, Maubuang, 1075 m, Aizawl dist., 4.xii.1995, Coll. M. Sil.

Diagnosis : Antenna black, arista reddish brown basally; face bright yellow, with a broad median black stripe and a black band from eye-corner to mouth-margin; scutellum bright orange-yellow, with somewhat shining black disc; abdominal tergum 2 mainly black, with 2 transverse, elongate yellow median spots, pointed at their inner ends; terga 3 and 4 each with 2 wide, curved spots, widened at their inner ends; tergum 5 predominantly yellowish orange as posterior margins of preceding terga; venter entirely with black hairs.

Distribution : Mizoram (Aizawl and Chhimtuipui dists.) and Uttar Pradesh.

Tribe PARAGINI

Genus ***Paragus*** Latreille

1804. *Paragus* Latreille, *Nouv. Dict. Hist. nat.*, **24**: 94. Type-species : *Syrphus bicotor* F.

Diagnosis : *Vide* Datta (1998).

Key to the subgenera
(*Vide* Datta, 1998)

Subgenus ***Paragus*** Latreille

12. ***Paragus (Paragus) serratus*** (F.)

1805. *Mulio serratus* Fabricius, *Syst. Antliat.* : 186.

Material examined : 1♂, Dampa, 1100 m, Aizawl dist., 28.xi.1995, Coll. P. Parui; 3♂♂, Vairengtei, 460 m, Aizawl dist., 10.xii.1995, Coll. P. Parui.

Diagnosis : *Vide* Datta (1998).

Distribution : Mizoram (Aizawl dist.), Assam, Bihar, Delhi, Goa, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Jakarta, Jawa, E Malaysia, Nepal, Pakistan and Sri Lanka; Africa and Papua.

Subgenus ***Pandasyophthalmus*** Stuckenberg

1954. *Pandasyophthalmus* Stuckenberg, *Revue Zool. Bot. afr.*, **49** : 100. Type-species : *Paragus longiventris* Loew.

Key to the species
(*Vide* Datta, 2001)

13. ***Paragus (Pandasyophthalmus) rufiventris*** Brunetti

1913. *Paragus rufiventris* Brunetti, *Rec. Indian Mus.*, **8** : 157.

1975. *Paragus (Pandasyophthalmus) tibialis rufiventris* Brunetti : Knutson, Thompson and Vockeroth, *A Catalog of Diptera of the Oriental region*, **2** : 328.

1983. *Paragus (Pandasyophthalmus) rufiventris* Brunetti : Datta and Chakraborti, *Rec. Zool. Surv. India*, **81** : 245.

Material examined : 2♂♂, Aizawl, 1150 m, Aizawl dist., 5.xii.1995, Coll. P. Parui.

Distribution : Mizoram (Aizawl dist.), Assam, Bihar, Jammu & Kashmir, Manipur, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Bhutan, Nepal, Pakistan and Sri Lanka.

14. ***Paragus (Pandasyophthalmus) tibialis*** (Fallén)

1817. *Pipiza tibialis* Fallén, *Syrphici Sveciae* : 60.

1983. *Paragus (Pandasyophthalmus) tibialis* (Fallén) : Datta and Chakraborti, *Rec. Zool. Surv. India*, **81** : 244.

Material examined : 1♀, Dampa, 1150 m, Aizawl dist., 5.xii.1995, Coll. P. Parui.

Distribution : Mizoram (Aizawl dist.), Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Manipur, Meghalaya, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Nepal and other parts of the Oriental region; Palaearctic region.

Subfamily MILESINAE

Tribe ERISTALINI

Diagnosis : *Vide* Datta, Parui & Mukherjee (2000).

Key to the genera
(*Vide* Datta & Mukherjee, 2000)

Genus ***Eristalinus*** Rondani

1845. *Eristalinus* Rondani, *Nuovi Annali Sci. nat. Bologna*, 2(2) : 453. Type-species : *Musca sepalchralis* L.

Key to the subgenera
(*Vide* Datta, 2001)

Subgenus ***Eristalinus*** Rondani

15. ***Eristalinus (Eristalinus) arvorum*** (F.)

1787. *Syrphus arvorum* Fabricius, *Mantissa Insect.*, **2** : 335.

Material examined : 1♀, Lunglei, 1275 m, Lunglei dist., 24.ix.1993, Coll. A.R. Lahiri; 1♀, Lawngtlai, 750 m, Chhimtuipui dist., 3.iv.1994, Coll. A.K. Hazra; 1♀, Zemabawk, 1110 m, Aizawl dist., 13.iv.1994, Coll. A.K. Hazra; 4♀♀, Vairengtei, 460 m, Aizawl dist., 16.iv.1994, Coll. A.K. Hazra.

Diagnosis : *Vide* Datta & Mukherjee (2000).

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.), Andaman Is. Arunachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Orissa, Sikkim, Tripura and West Bengal.

Elsewhere : China and other parts of the SE Asia; Australia, Hawaii, Japan and Micronesia.

Subgenus ***Eristalodes*** Mik

1897. *Eristalodes* Mik, *Wien. ent. Ztg.*, **16** : 114. Type-species : *Eristalis taeniops* Wiedemann.

16. ***Eristalinus (Eristalodes) paria*** (Bigot)

1880. *Eristalomyia paria* Bigot, *Annls Soc. ent. Fr.*, (5) **10** : 218.

Material examined : 1♀, Lunglei, 1275 m, Lunglei dist., 21.ix.1993, Coll. A.R. Lahiri; 1♀, Saiha, 700 m, Chhimtuipui dist. 7.iv.1994, Coll. A.K. Hazra; 2♂♂, 1♀, Aizawl, 1150 m, Aizawl dist., 1-5.xii.1995, Coll. P. Parui.

Diagnosis : *Vide* Datta & Mukherjee (2000).

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.), Himachal Pradesh, Jammu & Kashmir, Karnataka, Manipur, Meghalaya, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Jawa, Laos, Malay, Nepal, Sri Lanka and Taiwan; Japan and Maluku.

Genus ***Eristalis*** Latreille

1804. *Eristalis* Latreille, *Nouv. Dict. Hist. nat.*, **24** : 194. Type-species : *Musca tenax* L.

Key to the subgenera

(*Vide* Datta & Mukherjee, 2000)

Subgenus ***Eristalis*** Latreille

17. ***Eristalis (Eristalis) tenax*** (L.)

1758. *Musca tenax* Linnaeus, *Syst. Nat. Ed.*, **10** : 591.

Material examined : 2♂♂, Lunglei, 1275 m, Lunglei dist., 21.ix.1993, Coll. N.C. Manna; 6♂♂, 2♀♀, Banhlahnmun, Chhimtuipui dist., 6.iv.1994, Coll. A.K. Hazra; 1♂, Aizawl, 1150 m, Aizawl dist., 12.iv.1994, Coll. A.K. Hazra; 2♂♂, 2♀♀, Champhai, 950 m, Aizawl dist., 31.i.1995, Coll. T.K. Pal; 2♂♂, 2♀♀, Champhai, 1.ii.1995, Coll. T.K. Pal.

Diagnosis : *Vide* Datta & Mukherjee (2000).

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.); nearly cosmopolitan.

Subgenus ***Eoseristalis*** Kanervo

1938. *Eoseristalis* Kanervo, *Annls Univ. fenn. abo* (A), **6** : 12. Type-species : *Eristalis cerealis* Fabricius.

Key to the species

1. Eyes distinctly pilose; abdominal tergite 3 in males with a triangular or oblong spot on anterior margin, reaching laterally; in females spots smaller and narrower but always on anterior margin; tergite 4 narrowly but distincly yellow or orange-yellow on posterior margin ..... *cerealis* Fabricius

– Eyes practically bare, at most with a little very short indistinct pubescence anteriorly; abdominal tergites 3 and 4 each with an inverted V-mark of velvet-black reaching laterally as well as posteriorly ..... *suturalis* Brunetti

18. ***Eristalis (Eoseristalis) cerealis*** F.

1805. *Eristalis cerealis* Fabricius, *Syst. Antliat.* : 232.

1849. *Eristalis solitus* Walker, *List Dipt. Colln Br. Mus.*, **3** : 619.

Material examined : 1♀, Lunglei, 1275 m, Lunglei dist., 24.ix.1993, Coll. R.S. Mridha; 1♂, Banhlahnmun, Chhimtuipui dist., 6.iv.1994, Coll. A.K. Hazra; 1♂, 1♀, Champhai, 950 m, Aizawl dist., 1.ii.1995, Coll. T.K. Pal.

Distribution : Mizoram (Aizawl, Lunglei and Chhimtuipui dists.), Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : China, Myanmar and other parts of the Oriental region; Japan, Korea and Sakhalin.

*19. ***Eristalis (Eoseristalis) suturalis*** Brunetti

1923. *Eristalis suturalis* Brunetti, *Fauna Br. India, Dipt.*, **3** : 193.

Distribution : Mizoram (Aizawl dist.) and Meghalaya.

Elsewhere : Laos and Vietnam.

Genus ***Phytomia*** Guérin-Méneville

1834. *Phytomia* Guérin-Méneville, *in Belanger, Voyage Ind.-Orient.*, **7** : 509. Type-species : *Eristalis chrysopygus* Wiedemann.

Subgenus ***Phytomia*** Guérin-Méneville

Diagnosis : Vide Datta & Mukherjee (2000).

20. ***Phytomia (Phytomia) errans*** (F.)

1787. *Syrphus errans* Fabricius, *Mantissa Insect.*, **2** : 337.

Material examined : 1♀, Vairenglei, 460 m, Aizawl dist., 10.xii.1995, Coll. P. Parui.

Diagnosis : Vide Datta & Mukherjee (2000).

Distribution : Mizoram (Aizawl dist.), Assam, Bihar, Karnataka, Jammu & Kashmir, Kerala, Manipur, Tamil Nadu, Tripura and West Bengal.

Elsewhere : Other parts of the SE Asia; Japan.

GENERAL REMARKS

The state of the Lushai Hills is so situated as to be orogenically confluent with the rest of the so-called "Assam Hills" on one side and the China Hills on the other. Naturally, the physiography of

the whole area appears all in all alike. It is, therefore, expected to contain a fauna of uniform distribution throughout, with certain odd elements upon local thrust from extra limital-population inflation. Indeed, the fauna of the state of Meghalaya (Datta, 1998) is far and away better known than those of the states of Tripura (Datta, Parui and Mukherjee, 2000) and Manipur (Datta and Mukherjee, 2000) or the state of Mizoram, with only 20 species under 13 genera currently known. Thus, the fauna accounts nearly for 8% of the species India holds (*cf* Brunetti, 1923, Knutson, Thompson and Vockeroth, 1975; Datta, *op. cit.*, Datta, Parui and Mukherjee, *op. cit.*; Datta and Mukherjee, *op. cit.*). However, all but *Sphaerophoria viridaenea* Brunetti and *Chrysotoxum convexum* Brunetti are known to occur in one or other sister states of the north-east India. With this deficient state of knowledge it is better to compare the faunal pictures of these states visually than to discuss this fauna that will yield no conclusion.

To be brief about the fauna as it is, 5 species out of 20 are so far confined to the Oriental region but the remainder extend their range of distribution beyond the Orient.

SUMMARY

We record our sincere thanks to the Director and S. K. Mitra, Scientist 'E' (Retd.) of the Entomology Division, Zoological Survey of India, Calcutta, for kindly placing the material at our disposal and for laboratory facilities during the course of the study. We also duly acknowledge the help rendered by Mr. Anil K. Bhattacharya in finalizing the illustration provided with.

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LEPIDOPTERA : GEOMETRIDAE

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INTRODUCTION

This is a systematic account of geometrid moths from Mizoram. The study based on examination of the recently collected material by different scientists including the author of the Zoological Survey of India. In this paper a total of 24 species belonging to 20 genera under five subfamilies have been recorded from the state. All these species are recorded for the first time from the state. Out of these one species, i.e., *Thalassodes leucospilota* Moore has been recorded for the first time from India (Mizoram). Besides, four species have been found to enjoy a rather endemic status in N.E. India. The fore wing measurement of most of the specimens examined are smaller in size, as compared to that of Hampson (1895). The basic classification has been followed by Hampson 1895 with modification by Prout (1912-15), Burlow 1982 and Inoue 1987.

LIST OF TAXA

Order LEPIDOPTERA
Suborder HETEROCERA
Family GEOMETRIDAE
Subfamily OENOCHROMINAE

I. Genus ***Eumelea*** Duncan

1. ***rosalia*** (Cramer)

Subfamily GEOMETRINAE

II. Genus ***pingasa*** Moore

2. ***ruginaria*** Guenée
3. ***chlora*** Cramer

III. Genus ***Dysphania*** Huebner

4. ***militaris*** (Linnaeus)

IV. Genus ***Gelasma*** Warren

5. ***thetydaria*** (Guenée)

V. Genus ***Thalassodes*** Guenée

6. ***leucospilota*** Moore

Subfamily STERRHINAE

VI. Genus ***Scopula*** Schrank

7. ***remotata*** (Guenée)

Subfamily LARENTIINAE

VII. Genus ***Ecliptoptera*** Warren

8. ***rectilinea*** Warren

Suberfamily ENNOMINAE

VIII. Genus ***Abraxas*** Leach

9. ***sylvata*** Scopuli

IX. Genus ***Zamarada*** Moore

10. ***translucida*** Moore
11. ***cosmiaria*** Swinhoe

X. Genus ***Myrteta*** Walker

12. ***ocernaria*** Swinhoe

XI. Genus ***Krananda*** Moore

13. ***semihyalina*** Moore
14. ***oliveomarginata*** Swinhoe

XII. Genus ***Luxiaria*** Walker

15. ***contigaria*** (Walker)

XIII. Genus ***Macaria*** Curtis

16. ***xanthonora*** Walker

XIV. Genus ***Percnia*** Guenée

17. ***ductaria*** (Walker)

XV. Genus ***Boarmia*** Treitschke

18. ***transcissa*** Walker

XVI. Genus ***Plutodes*** Guenée

19. ***exquisita*** Butler

XVII. Genus ***Hyposidra*** Guenée

20. ***talaca*** (Walker)

21. ***infixaria*** (Walker)

XVIII. Genus ***Dalima*** Moore

22. ***patularia*** (Walker)

XIX. Genus ***Leptomiza*** Warren

23. ***codra*** (Swinhoe)

XX. Genus ***Hypochrosis*** (Guenée)

24. ***hyadaria*** Guenée

SYSTEMATIC ACCOUNT

Order LEPIDOPTERA

Suborder HETEROCERA

Family GEOMETRIDAE

Key to the Subfamilies

1. M_2 present in hind wing 2
- M_2 obsolete in hind wing ..... ENNOMINAE
2. M_2 of hind wing nearer to M_1 than M_3. (Fresh specimens coloured green.) Areole absent)... ..... GEOMETRINAE
- M_2 of hind wing from middle of the cell or nearer to M_3 2
2. Sc + R_1 of hind wing approximated to Rs beyond middle of cell or connected by a bar near base ..... OENOCHROMINAE
- Sc + R_1 of hind wing anastomosing with Rs beyond middle of cell or at base 3
3. Sc + R_1 of hind wing anastomosing with Rs beyond middle of cell, sometimes running closely and connected with each other by a bar beyond middle of cell .... LARENTIINAE
- Sc + R_1 of hind wing bent down touching Rs at base, then radially diverging .. STERRHINAE

Subfamily OENOCHROMINAE

I. Genus ***Eumelea*** Duncan

1841. *Eumelea* Duncan, *Exot. Moths,* : 215.

1. ***Eumelea rosalia*** (Stoll)

1782. *Phalaena (Geometra) rosalia* Stoll in Cramer, *Pap. Exot.,* **4** : 152, pl. 368, fig. F.

1982. *Eumelea rosalia* : Burlow, *Intr. moths S.E. Asia* : 118, pl. 42, fig. 3.

Material examined : One ♂, Teirei, 11.xi.1995 and one ♀, Aibawk, Aizawl Dist., 15.xi.1995 (at light), Coll. *M. S. Shishodia.*

Length of Fore wing : ♂ 26 mm ♀ 28 mm.

Diagnosis : Orange-yellow, irrorated with crimson. Palpi long, antennae long and smooth. Crimson bands on upper sides of wings indistinct, underside these are prominent. Legs long, hind-tibiae of male fringed with hair.

Distribution : Indo-Australian tropics including Mizoram from Sundaland eastwards (Burlow, 1982).

Subfamily GEOMETRINAE

Key to the genera

1. Fovea at the base of fore wing of both sexes ..... ***Dysphania*** Huebner
- No fovea on fore wing 2
2. Outer margin of hind wing rounded [Cu_{1a} of both wings from near angle of cell] .... ***Pingasa*** Moore
- Outer margin of hind wing produced at M_3 3
3. Antennae of male bipectinate. Hind tibiae of male with two pairs of spurs .... ***Gelasma*** Warren
- Antennae of both sexes ciliate. Medial spurs of hind tibiae absent ..... ***Thalassodes*** Guenée

II. Genus ***Pingasa*** Moore

1887. *Pingasa* Moore, *Lep. Ceylon*, **3** : 419.

Key to the species

Wings white, irrorated with fuscous tinged with green, post-medial line sinuous, excurved from M_3 to Cu_{1b}. Basal half of underside of wings yellowish; the submarginal black band broad ..... *ruginaria* (Guenée)

– Wings whiter, outer area not suffused, the post-medial line crenulate, underside without any yellow at base, the submarginal black line is thinner ..... *chlora* (Stoll)

5. ***Pingasa ruginaria*** (Guenée)

1857. *Hypochroma ruginaria* Guenée, *Hist. nat. Ins. Lep.*, **1** : 278.

1982. *Pingasa ruginaria* : Burlow, *Intr. Moths S. E. Asia* : 119.

Material examined : Two exs., ♂, Aibawk, Aizawl dist., 19.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 19-20 mm.

Diagnosis : As per key.

Distribution : From North India (including Mizoram) to Borneo and Bali.

3. ***Pingasa chlora*** (Stoll)

1782. *Phalaena chlora* Stoll in Cramer, *Pap. Exot.*, **4** : 233, pl. 398, fig. C.

1982. *Pingasa chlora* : Burlow, *Intr. Moths, S. E. Asia* : 119, 242.

Material examined : One ex. ♂, Aibawk, 19.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 23 mm.

Diagnosis : As per key.

Distribution : India : Mizoram, Khasi Hills (Swinhoe, 1900).

Elsewhere : Indonesia (Bali, Borneo and Sumatra), Malaya, Solomon Islands, Sri Lanka and Sulawesi to Queensland.

Remarks : The distribution of this species is throughout the Indo-Australian tropics (Holloway, 1976), Burlow (1982) stated *"P. chlora* has had attributed to it a number of subspecies"

III. Genus ***Dysphania*** Huebner

1819. *Dysphania* Huebner, *Verz. bek. Schmett.*, : 175.

4. ***Dysphania militaris*** (Linnaeus)

1758. *Phalaena militaris* Linnaeus, *Syst. Nat.* ed. **10** : 505.

1998. *Dysphania militaris* : Mondal and Ghosh, *Fauna of Meghalaya. State Fauna Series*, **4** : (6) : 432.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 15.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 44 mm.

For other details as per Mondal and Ghosh (1998).

Remarks : The specimen is bigger in compare to Meghalaya specimen dealt by Mondal and Ghosh (1998).

IV. Genus ***Gelasma*** Warren

1893. *Gelasma* Warren, *Proc. zool. Soc. Lond.*, **1893** : 353.

5. ***Gelasma thetydaria*** (Guenée)

1857. *Iodis thethydaria* Guenée, *Hist. nat. Ins. Lep.*, **1** : 358.

1992. *Gelasma thetydaria* Inoue, *Lep. Taiwan*, Checklist, **1**(2) : 121.

Material examined : One ex. ♂, Teirei, Aizawl dist., 13.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 17 mm.

Diagnosis : Silvery white, frons green, Antennae of male bipectinate. Fore wing post medial band oblique, marginal band clear. Hind wing postmedial band angled at Cu_{1a}, marginal band less prominent.

Distribution : India : Mizoram, Assam (Holleway, 1976), C. India (Inoue, 1992), Sikkim (Hamson, 1895).

Elsewhere : Bangladesh (Sylhet), Philippines (Prout, 1913), Taiwan (Inoue, 1992) and W. China (Prout, 1913).

V. Genus ***Thalassodes*** Guenée

1857. *Thalassodes* Guenée, *Hist. nat. Ins. Lep.*, **1** : 360.

6. ***Thalassodes leucospilota*** Moore

1887. *Thalassodes leucospilota* Moore, *Lep. Ceylon*, **3** : 427, t. 194, fig. 4.

1913. *Thalassodes leucospilota* : Prout, *Lep. Cat.*, **14** : 97.

Material examined : One ex. ♀, Aibawk, Aizawl dist., 19.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 21 mm.

Diagnosis : Fresh specimens blue-green in colour. In abdomen series of white spot present dorsally. Costa of fore wing white, an antemedial white spot on inner margin. Series of post medial white specks on both wings, which is straight on fore wing, curved in hind wing.

Distribution : India : Mizoram.

Elsewhere : Pennag, Sri Lanka.

Remarks : Prout, 1913 questioned about the locality, 'Penang'. After the discovery of the species from Sri Lanka Moore, 1887, this species is reported for the first time from India (Mizoram).

Subfamily STERRHINAE

VI. Genus ***Scopula*** Schrank

1802. *Scopula* Schrank, *Fauna Boica*, **2**(2) : 162.

Diagnosis : Oblique straw colour facies, black disconcellular spot. Antennae of male densely ciliate, rarely narrow bipectinate. Hind-tibia with a hair pencil.

Remarks : The genus is virtually cosmopolitan in distribution, extended into Polynesia, with endemic species on the Marquesas (Holloway, 1983), and this is the only genus reported from New Zealand (Dugdale, 1988). Only one species under this genus is reported in this paper.

7. ***Scopula remotata*** (Guenée)

1857. *Acidalia remotata* Guenee, *Hist nat. Ins. Lep.*, **1** : 458.

1998. *Scopula remotata* : Mondal and Ghosh, *State Fauna Series* 4 : *Fauna of Meghalaya* (6) : 440.

Material examined : One ex. ♂, Saiha, Chintuipui dist., 8.iv.1994, coll. *S. K. Ghosh and M. Prasad.*

Length of Fore wing : 12 mm.

Remarks : Other details as per Mondal and Ghosh (1998).

Subfamily LARENTIINAE

VII. Genus ***Ecliptoptera*** Warren

1894. *Ecliptopera* Warren, *Novit. zool.*, **1** : 679.

Diagnostic character : The genus is recongnised by triangulated or compartmented medial zone which is nearer to costa. The antennae of male filiform.

8. ***Ecliptoptera rectilinea*** Warren

1894. *Ecliptoptera rectilinea* Warren, *Novit. zool.*, **1** : 679.

1997. *Ecliptoptera rectilinea* : Holloway, *Malayan Nat. J.*, **51** : 195.

Material examined : One ex. ♂, Lawngtalei, Chimtuipui dist., alt. *ca* 850 m. 1.iv.1994, coll. *S.K. Ghosh and M. Prasad* (specimen collected at light).

Length of Fore wing : 18 mm.

Diagnosis : Fore wing with large brown triangle banded by oblique white bar imersing from costa and running to tornus, at the centre of inner margin one circular compartment pointed towards outer margin. Hind wing with sub-marginal crenulated white lilnes.

Distribution : India : Mizoram; Assam (Holloway, 1976); N.E. Himalaya (Holloway, 1997).

Elsewhere : Indonesia, Bali, Borneo.

Subfamily ENNOMINAE

Key to the genera

1. Smoothly scaled; scaling in head, thorax and abdomen smooth or moderately hairy 2
– Scaling rough and mixed with hair; head, thorax and palpi much hairy. Outer margin of wings crenulated, R_1 and R_2 from the cell ... . ***Boarmia*** Treitschke

2. Palpi porrect, clothed with hair 3
- Palpi with the second joint upturned, the third porrect and naked 12
3. Palpi shorter not reaching beyond the frons and clothed with short hair 4
- Palpi longer, reaching beyond the frons and clothed with longer hairs 6
4. Antennae bipectinate 5
- Antennae uniseriate. R_1 to R_5 stalked, outer margin of wing rounded ..... ***Plutodes*** Guenée
5. Antennae of male bipectinate, branches short; hind tibiae dilated ..... ***Myrteta*** Walker
- Antennae of both sexes bipectinate branches longer in male, hind tibiae not dilated ..... ***Zamarada*** Moore
6. Antennae bipectinate 7
- Antennae ciliate or fasciculate 9
7. R_3 to R_5 stalked 8
- R_2 to R_5 stalked R_1 free, large strongly built moth, male with fovea ..... ***Dalima*** Moore
8. R_1 and R_2 stalked, R_1 connected with Sc by a bar; hind tibiae not dilated ..... ***Hypochrosis*** Guenée
- R_1 and R_2 free, R_1 not connected with Sc; hind tibiae of male dilated ..... ***Percnia*** Guenée
9. No fovea on fore wing; outer margin of hind wing not produced at R_5 or M_3 10
- Fore wing with fovea at the base, outer margin of hind wing produced at R_5 or M_3 11
10. Fore wing somewhat acute at apex, R_1 free, R_2 absent ..... ***Luxiaria*** Walker
- Outer margin of fore wing evenly curved R_1 and R_2 stalked, R_1 becoming coincident with Sc ..... ***Abraxas*** Leach
11. Antennae of male ciliate; outer margin of hind wing sharply angled at M_3, slightly at M_1 ..... ***Macaria*** Curtis
- Antennae of male minutely fasciculate; outer margin of hind wing produced sharply at R_5 ..... ***Krananda*** Moore
12. Male of fore wing with fovea, costa arched towards apex which is much produced, R_1 and R_2 stalked, discocellular angled below M_2 ..... ***Hyposidra*** Guenée
- No fovea of fore wing, costa is not arched or produced, R_1 and R_2 from cell, discocellular not angled, outer margin of wings irregular ..... ***Leptomiza*** Warren

VIII. Genus *Abraxas* Leach

1815. *Abraxas* Leach, *Edinburgh Encycl.*, **9** : 134.

9. *Abraxas sylvata* (Scopuli)

1763. *? sylvata* Scopuli, *Ent. Carn.*, 220.

1915. *Abraxas sylvata* : Prout, *Macrolep. World*, **4** : 311.

Material examined : One ex. ♂, one ex. ♀, Aibawk, Aizawl dist., 19.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : ♂ 19 mm, ♀, 22 mm.

Diagnosis : Black spotted head, thorax and abdomen orange yellow. Wings white. Base of fore wing with fulvous patch, one fulvous patch on inner margin with some silvery marks on it, a grey patch present beyond cell extending towards costa, some grey discontinuous spots below the cell running to inner margin, post medial series of spots and marginal patch expanding at middle. Hind wing with postmedial spots on veins extending at inner margin, where it becomes a large fulvous patch with some silvery marks on them.

Distribution : India : Mizoram, Assam, Nilgiris, N. W. Himalaya, Sikkim.

Elsewhere : Central Europe to Asia.

Remarks : Facis of female is lighter than that of male.

IX. Genus *Zamarada* Moore

1887. *Zamarada* Moore, *Lep. Ceylon*, **3** : 432.

Key to the species

Wings yellow hyaline, broad marginal band purplish grey ..... *translucida* Moore
- Wings green hyaline, marginal band narrower and redish ..... *cosmiaria* Swinhoe

10. *Zamarada translucida* Moore

1887. *Zamarada translucida* Moore, *Lep. Ceylon*, **3** : 432, pl. 197, fig. 2.

1895. *Zamarada translucida* : Hampson, *Fauna Brit. India*, Moths, **3** : 198, fig. 111.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 18.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 15 mm.

Diagnosis : As per key.

Distribution : India : Mizoram, Meghalaya (Khasi Hills), Nagaland, Nilgiris and Orissa (Ganjam).

Elsewhere : Indonesia (Borneo), Malayasia (Perak) and Sri Lanka.

11. *Zamarada cosmiaria* Swinhoe

1893. *Zamarada cosmiaria* Swinhoe, *Ann. Mag. Nat. Hist.*, (6) **12** : 155.

1998. *Zamarada cosmiaria* : Mondal and Ghosh, *Fauna of Meghalaya, State Fauna Series*, **4** (6) : 446.

Material examined : One ex. ♂, Saiha, Chimtuipui dist., 8.iv.1994, coll. *S. K. Ghosh and M. Prasad* (at light).

Length of Fore wing : 12 mm.

For other details refer Mondal and Ghosh (1998).

X. Genus *Myrteta* Walker

1861. *Myrteta* Walker, *Cat. Lep. Het. Brit. Mus.*, **23** : 831.

12. *Myrteta ocernaria* Swinhoe

1893. *Myrteta ocernaria* Swinhoe, *Ann. Mag. nat. Hist.*, (6) **12** : 152.

1895. *Myrteta ocernaria* : Hampson, *Fauna Brit. India* Moth, **3** : 152.

Material examined : One ex. ♀, Teirei, 12.xi.1995, one ex. ♂, Aibawk, 16.xi.1995, coll. *M. S. Shishodia.*

Length of Fore wing : ♂ 16 mm, ♀ 19 mm.

Diagnosis : White; costa of fore wing brown, an oblique line present from apex to middle of inner margin. In hind wing a subbasal and a medial oblique lines, all the lines are diffused.

Distribution : India : Mizoram and Meghalaya.

Elsewhere : Indonesia (Borneo) and Pulo Laut.

Remarks : The specimens are smaller in comparison to that of Hamson, 1895 and the hind wing slightly angled at M_3.

XI. Genus *Krananda* Moore

1867. *Krananda* Moore, *Proc. zool. Soc. Lond.*, **1867** : 648.

Key to the species

Brownish grey; wings with hyaline basal zone, outer margin crenulate both wings with submarginal hyaline spots .... *semihyalina* Moore

– Whitish with olivaceus ochreous tone, less hyaline basal zone, outer margin less crenulate, no submarginal hyaline spots .... *oliveomarginata* Swinhoe

13. *Krananda semihyalina* Moore

1867. *Krananda semihyalina* Moore, *Proc. zool. Soc. Lond.*, **1867** : 648.

1993. *Krananda semihyalina* : Holloway, *Malayan Nat. J.*, **47** : 191.

Material examined : One ex. ♂, and one ex. ♀, Aibawk, Aizawl dist., 9.xi.1995 (at light), coll. *M. S. Shishodia.*

Length of Fore wing : ♂ 23 mm, ♀ 24 mm.

Diagnosis : As per key.

Distribution : India : Mizoram, Himachal Pradesh (Dalhousie), Meghalaya (Khasi Hills), Sikkim and West Bengal.

Elsewhere : Japan, S. Moluccas, Sulawesi and Taiwan.

Remarks : Holloway, 1993 mentioned that most of the specimens are from lower montane zone at about 100 m, but some are reported from lowlands and upper montane zone below 2000 m. But here the specimens were collected from Much lower zone.

14. *Krananda oliveomarginata* Swinhoe

1894. *Krananda oliveomarginata* Swinhoe, *Ann. Mag. nat. Hist.*, (6) **14** : 139.

1993. *Krananda oliveomarginata* : Holloway, *Malayan nat. J.*, **47** : 191.

Material examined : One ex. ♂, Aizawl dist., 19.xi.1995, coll. *M. S. Shishodia* (at light).

Length of Fore wing : 16 mm.

Diagnosis : As per key.

Distribution : India : Mizoram, Meghalaya (Khasi Hills) and West Bengal (Darjiling dist.).

Elsewhere : China, Indonesia (Borneo and Sumatra), N. Vietnam, Peninsular Malaysia, Tiawan and Thailand.

Remarks : The specimen is smaller in size in comparison to Hamson (1895). Fore wing facia differ by one rufous oblique band medially from cell to inner margin, near to apex one white line from costa to M_1, this is by brown at veins.

XII. Genus *Luxiaria* Walker

1860. *Luxiaria* Walker, *Cat. Lep. Het. Brit. Mus.*, **20** : 231.

15. *Luxiaria contigaria* (Walker)

1861. *Acidalia contigaria* Walker, *Cat. Lep. Het. Brit. Mus.*, **22** : 754.

1997. *Luxiaria contigaria* Mondal and Ghosh, *Fauna of West Bengal, State Fauna Series*, **3** (7) : 495.

Material examined : One ex. ♂, Saiha, Chintuipui dist., 8.iv.1994 (at light), coll. *S. K. Ghosh and M. Prasad.*

Length of Fore wing : 16 mm.

Remarks : The specimen is smaller in size as compared to Darjiling specimens (Mondal and Ghosh, 1997). For other details refer Mondal and Ghosh (1997).

XIII. Genus *Macaria* Curtis

1823. *Macaria* Curtis, *Birt. Ent.*, **6** : 132.

16. *Macaria xanthonora* Walker

1861. *Macaria xanthonora* Walker, *Cat. Lep. Het. Birt. Mus.*, **23** : 935.

1900. *Macaria xanthonora* : Swinhoe, *Cat. East. Asutral. Lep. Het.*, **2** : 268.

Material examined : One ex. ♂, Lawngtlai, Chimtuipui dist., 4.iv. 1994 (at light), coll. *S. K. Ghosh and M. Prasad.*

Length of Fore wing : 17 mm.

Diagnosis : Grey; palpi and antennae yellowish, a white medial white band on fore wing, outer part of which suffused with yellow. The band of hind wing orange yellow except its inner edge. Underside of hind wing yellowish.

Distribution : India : Mizoram, Meghalaya (Khasi Hills), Nilgiris, North India and Sikkim.

Elsewhere : Bhutan and Myanmar.

XIV. Genus *Percnia* Guenée

1857. *Percnia* Guenée, *Hist. nat. Ins. Lep.*, **2** : 216.

17. *Percnia ductaria* (Walker)

1862. *Rhyparia ductaria* Walker, *Cat. Lep. Het. Brit. Must.*, **24** : 1111.

1895. *Percnia ductaria* : Hampson, *Fauna Brit. India*, Moths, **3** : 306.

Material examined : One ex. ♂, Lawngtlai, chimtuipui dist., 8.iv.1994, alt. 850 m (at light), coll. *S. K. Ghosh and M. Prasad.*

Length of Fore wing : 28 mm.

Distribution : Grey; head and thorax black spotted; abdomen spotted with black in pair; fore wing with two antemedial, one medial, two pestmedial, one submarginal and series of marginal black spots, one spot at the end of cell.

Distribution : India : Mizoram and Sikkim.

XV. Genus *Boarmia* Treitschke

1825. *Boarmia* Treitschke, *Schmett. Eur.*, **5**(2) : 433.

18. *Boarmia transcissa* Walker

1860. *Boarmia transcissa* Walker, *Cat. Lep. Het. Brit. Mus.*, **21** : 380.

1895. *Boarmia transcissa* : Hampson, *Fauna Brit. India*, Moths, **3** : 271.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 15.xi.1995 (at light), coll. *M. S. Shishodia.*

Length of Fore wing : 18 mm.

Diagnosis : Red brown; fore wing with antemedial, weavy medial and submarginal lines; post medial line of both wings oblique, cell psots smaller in size.

Distribution : India : Mizoram, Assam (Shibsagar), Himachal Pradesh and Nilgiris (Hampson 1895) and Sikkim.

Elsewhere : Bhutan, Indonesia (Java), Myanmar and Sri Lanka (Hampson, 1895).

XVI. Genus ***Plutodes*** Guenée

1857. *Plutodes* Guenée, *Hist. nat. Ins. Lep.*, **2** : 117.

19. ***Plutodes exquisita*** Butler

1880. *Plutodes exquisita* Butler, *Ann. Mag. nat. Hist.* (5) **6** : 223.

1895. *Plutodes exquisita* : Hampson, *Fauna Brit. India,* Moths, **3** : 162.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 18.xi.1995 (at light), coll. *M. S. Shishodia.*

Length of Fore wing : 15 mm.

Diagnosis : Basal patch of fore wings very small, the outer patch forming band with double silvery inner edge, crossed by dentate line. In hind wing basal patch forms a narrow band along with inner areas reaching the broad outer band possesing same silvery inner edge and crossing dentate line.

Distribution : India : Mizoram, Meghalaya (Khasi Hills) and Sikkim.

Remarks : The species reported here after Hampson (1895).

XVII. Genus ***Hyposidra*** Guenée

1857. *Hyposidra* Guenée, *Hist. nat. Ins. Lep.*, **2** : 150.

Key to the Subfamilies

Blackish grey. Both wings with faint medial and crenulate post medial lines, no speck at end of cell ..... *talaca* (Walker)

– Pale yellowish. Both wings without medial line but double post medial lines, cell specks at the end of cell of both wings .... *infixaria* (Walker)

20. ***Hyposidra talaca*** (Walker)

1860. *Lagyra talaca* Walker, *Cat. Lep. Het. Brit. Mus.*, **20** : 59.

1993. *Hyposidra talaca* : Holloway, *Malayan Nat. J.*, **47** : 179.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 19.xi.1995 (at light), coll. *M. S. Shishodia.*

Length of Fore wing : 15 mm.

Diagnosis : As per key.

Distribution : Throughout India including Mizoram.

Elsewhere : N. E. Himalaya to Queensland and Solomons.

Remarks : It is a polyphagous species. The larva often recorded as a defoliator and flower feeder on tree crops and can attain pest status (Holloway, 1993). Sevastopulo (1948) has reported it from castor in Darjiling dist.

21. ***Hyposidra infixaria*** Walker

1860. *Lagyra infixaria* Walker, *Cat. Lep. Het. Brit. Mus.*, **20** : 60.

1993. *Hyposidra infixaria* Holloway, *Malayan Nat. J.*, **47** : 182.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 19.xi.1995 (at light), coll. *M. S. Shishodia.*

Diagnosis : As per key.

Distribution : India : Mizoram and Meghalaya (Khasi Hills).

Elsewhere : Myanmar to Sundaland and Taiwan.

Remarks : Holloway, 1993 stated that this species has been reared from guava (Myrtaceae), and from *Desmos* (Annonaceae), *Buchanania* (Anacardiaceae) and *Punica* (Punicaceae) by Pholboon, 1965.

XVIII. Genus ***Dalima*** Moore

1867. *Dalima* Moore, *Proc. zool. Soc. Lond.*, **1867** : 614.

22. ***Dalima patularia*** (Walker)

1860. *Dalima patularia* Walker, *Cat. Lep. Het. Brit. Mus.*, **20** : 247.

1993. *Dalima patularia* : Holloway, *Malayan Nat. J.*, **47** : 177.

Material examined : One ex. ♂, Aibawk, Aizawl dist., 19.xi.1995, (at light), coll. *M. S. Shishodia.*

Length of Fore wing : 25 mm.

Diagnosis : Reddish brown; fore wing with oblique rufous antemedial and medial lines, medial line black near inner margin where it meeting a thinner line coming from costa near apex, a submarginal line forming by rufous dots. Hind wing with rufous media and postmedial line, the latter slightly curved, the submarginal dots forming a discontinuous line.

Distribution : India : Mizoram, East and N. W. Himalaya, Meghalaya (Khasi Hills).

Elsewhere : Indonesia (Borneo, Sulawesi and Sumatra), N. Thailand and W. China.

Remarks : Holloway (1993) stated that the species is very common in the upper montane zone at Borneo. But here the species is reported from lower montane zone.

XIX. Genus ***Leptomiza*** Warren

1893. *Leptomiza* Warren, *Proc. zool. Soc. Lond.*, **1893** : 406.

23. ***Leptomiza codra*** (Swinhoe)

1891. *Selenia codra* Swinhoe, *Trans. ent. Soc. Lond.*, **1891** : 406.

1895. *Leptomiza codra* : Hampson, *Fauna Brit. India*, Moths, **3** : 229.

Material examined : One ex. ♀, Lawngtlai, Chimtuipui dist., 4.iv.1994 (al light), coll. S. K. Ghosh and M. Prasad.

Length of Fore wing : 17 mm.

Diagnosis : Grey, irrorated with fuscous; in fore wing antemedial line sharply angled to lower angle of cell, postmedial line double, bending between M_3 and costa; hind wing with faint dentate post medial line, submarginal line clear.

Distribution : India : Mizoram and Meghalaya (Khasi Hills).

Remarks : This species was described by Hampson (1895) from Meghalaya. It is second time recorded from Mizoram.

XX. Genus ***Hypochrosis*** Guenée

1857. *Hypochrosis* Guenée, *Hist. nat. Ins. Lep.*, **2** : 536.

24. ***Hypochrosis hyadaria*** Guenée

1857. *Hypochrosis hyadaria* Guenée, *Hist. nat. Ins. Lep.*, **2** : 537.

1993. *Hypochrosis hyadaria* : Holloway, *Malayan Nat. J.*, **47** : 21.

Material examined : Two ex. ♀ (15.xi.1995), one ex. ♀ (19.xi.1995) (at light) Aibawk, Aizawl dist., coll. *M. S. Shishodia.*

Diagnosis : Pale red; fore wing with oblique antemedial and post medial lines, the latter highly angled below apex, where it enclosed a greyish lunule.

Distribution : India : Mizoram, Meghalaya and Nilgiris.

Elsewhere : Borneo and Sri Lanka.

SUMMARY

The paper deals with the systematic account of 24 species of Geometridae moths belonging to 20 genera under five subfamilies from the state of Mizoram. All 24 species constitute new locality records from the state. Out of these *Thalassodes leucospilota* Walker is reported for the first time

from India. Most of the species are wide spread four species are restricted to N. E. India.

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INSECTA : LEPIDOPTERA : PIERIDAE, HESPERIIDAE, HYPSIDAE, CTENUCHIDAE AND ARCTIIDAE

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INTRODUCTION

Formerly Mizoram was Mizo hill district of Assam, it is also called Lushai hills, separated as a Union Territory in 1972, declared full flaged separate state in 1987. The hill ranges of the state are running from north to south. The average height is 900 m. The lowest point is 40 m and heighest peak is 2165 m (Blue mountain). Average rainfall of the state is 254 cms. Jhum or shifting form of cultivation is in practice in the state. Earlier the rotation of the shifting was 10 years, but now it is four years even (Bhatt, 1998). The shifting cultivation will destroy flora and fauna which is glory of the state. Terraced cultivation of a permanent nature should be introduced immediately.

On reviewing literature reveals that earlier report of these five families Pieridae, Hesperiidae, Hypsidae, Ctenuchidae and Arctiidae from North-Eastern states of India were made by Hampson (1892, '94, '98, 1900 and 1901), Talbot (1939), Evans (1949), Arora and Chaudhury (1982), Arora (1983), Ghosh and Chaudhury (1997 and '98) and Majumder (2001). But no report of these families are available from the state.

Keeping this in view a detailed study of 145 examples of these families collected from the state by different survey parties including one of the authors of the Department were made.

In this paper a consolidated account of 39 species belonging to 27 genera under five families are reported from the state.

Keys to subfamilies, genera and species along with distribution are also provided in the text, where single species is dealt with one genus diagnostic characters are provided with the species.

LIST OF TAXA

A consolidated list of five families *viz.* Pieridae, Hesperiidae, Hypsidae, Ctenuchidae and Arctiidae of Lepidoptera known from Mizoram is given below. All species/subspecies dealt with are recorded for the first time from the state of Mizoram.

Order LEPIDOPTERA

Suborder RHOPALOCERA

Family PIERIDAE

Subfamily PIERINAE

I. Genus ***Delias*** Huebner

1. ***agostina agostina*** (Hewitson)
2. ***descombesi descombesi*** (Boisduval)

II. Genus ***Hebomoia*** Huebner

3. ***glaucippe glaucippe*** (Linnaeus)

III. Genus ***Pieris*** Schrank

4. ***napi montana*** Verity
5. ***canidia canis*** Evans
6. ***brassicae nepalensis*** Doubleday

IV. Genus ***Appias*** Huebner

7. ***lyncida eleonora*** (Boisduval)

V. Genus ***Cepora*** Billberg

8. ***nerissa nerissa*** (Fabricius)
9. ***nadina nadina*** (Lucas)

VI. Genus ***Ixias*** Huebner

10. ***pyrene sesia*** (Fabricius)

Subfamily COLIADINAE

VII. Genus ***Catopsilia*** Huebner

11. ***pyranthe pyranthe*** (Linnaeus)
12. ***crocale crocale*** (Cramer)

VIII. Genus ***Eurema*** Huebner

13. ***hecabe contubernalis*** (Moore)
14. ***laeta laeta*** (Boisduval)

Family HESPERIIDAE

Subfamily PYRGINAE

Group CELAENORRHINUS

IX. Genus ***Celaenorrhinus*** Huebner

15. ***leucocera*** Kollar

Group TAGIADES

X. Genus ***Coladenia*** Moore

16. ***dan festa*** Evans

Subfamily HESPERIINAE

Group ANCISTROIDES

XI. Genus ***Notocrypta*** de Niceville

17. ***curvifascia curvifascia*** (Felder)

Group TAGIADES

XII. Genus ***Parnara*** Moore

18. ***naso bada*** (Moore)

XIII. Genus ***Pelopidas*** Walker

19. ***mathias mathias*** (Fabricius)
20. ***sinensis*** (Mabille)

Suborder HETEROCERA

Family HYPSIDAE

XIV. Genus ***Cispia*** Walker

21. ***punctifascia*** Walker

Family CTENUCHIDAE

XV. Genus ***Ceryx*** Wallengren

22. ***godartii*** (Boisduval)

XVI. Genus ***Eressa*** Walker

23. ***confinis*** Walker

Family ARCTIIDAE

Subfamily NYCTEMERIINAE

XVII. Genus ***Nyctemera*** Huebner

24. ***adversata*** (Schaller)

Subfamily CALLIMORPHINAE

XVIII. Genus ***Callimorpha*** Latreille

25. ***plagiata*** (Walker)

Subfamily SPILOSOMINAE

XIX. Genus ***Phissama*** Moore

26. ***transiens*** (Walker)

XX. Genus ***Aloa*** Walker

27. ***lactinea*** (Cramer)

XXI. Genus ***Spilarctia*** Butler

28. ***flavens*** (Moore)

Subfamily LITHOSIINAE

XXII. Genus ***Lithosia*** Fabricius

29. ***quadra*** (Linnaeus)

XXIII. Genus ***Agylla*** Walker

30. ***ramelana*** (Moore)
31. ***alboluteola*** Rothschild

XXIV. Genus ***Cyana*** Walker

32. ***dudgeoni*** Hampson

XXV. Genus ***Miltochrista*** Huebner

33. ***cuneonotata*** (Walker)
34. ***inflexa*** (Moore)

XXVI. Genus ***Asura*** Walker

35. ***dasara*** (Moore)
36. ***strigipennis*** (Herrich-Schaffer)

37. ***euprepioides*** (Walker)

38. ***conjunctana*** (Walker)

Subfamily MICRACTIINAE

XXVII. Genus ***Argina*** Huebner

39. ***argus*** (Kollar)

Family PIERIDAE

Key to the subfamilies

Palpi always with hair. Hind wing well developed, precostal vein curved distally .... *Pierinae*

– Palpi without hair. Hind wing without precostal vein or very short, directed basally .... *Coliadinae*

Subfamily PIERINAE

Key to the genera

1. In fore wing R_4 and R_5 coincident .... ***Delias*** Huebner

– In fore wing R_4 and R_5 not coincident 2

2. In fore wing M_1 arises from the stalk of R_4 + R_5 and R_3 3

– In fore wing M_1 not arises from the stalk of R_4 + R_5 and R_3 ..... ***Hebomoia*** Huebner

3. In fore wing R_3 emitted from R_4 + R_5 and very close to apex, the stalk long .... ***Pieris*** Schrank

– In fore wing R_3 emitted from R_4 + R_5 further from apex, the stalk short 4

4. Male with tufts of hairs arising between 7th and 8th abdominal segments ..... ***Appias*** Huebner

– Male without tuft of hairs 5

5. 3rd segment of palpi as long as 2nd, slender. Apex of fore wing and tornus of hind wing rounded. Antennae about half the length of fore wing ..... ***Cepora*** Billberg

– Palpi with the 3rd segment short and oval. Apex of fore wing blunt and tornus of hind wing oblique. Antennae less than half the length of fore wing ..... ***Ixias*** Huebner

I. Genus ***Delias*** Huebner

1819. *Delias* Huebner, *Verz. bek. Schmett.*, : 91.

Key to species of the genus *Delias* Huebner

Hind wing underside without red marking ... . *agostina* (Hewitson)

– Hind wing underside with broad red marking ..... *descombesi* (Boisduval)

1. ***Delias agostina agostina*** (Hewitson)

1852. *Pieris agostina* Hewitson, *Exot. Bull.*, pl. 1, figs. 1, 2.

1998. *Delias agostina agostina* : Ghosh and Chaudhury, *Fauna of Meghalaya, State Fauna Series,* 4(6) : 247.

Material examined : One ex. Dist. Aizwal Aibwak, 9.xii.1993, coll. *S. S. Saha,* one ex., Mantuang, Aibwak, 4.xii.1995, coll. *P. Parui and R. S. Mirdha.*

Wing expanse : 70 mm.

Distribution : India : Mizoram and Meghalaya.

Elsewhere : Nepal to Lower Myanmar, Thailand and Tongking.

2. ***Delias descombesi descombesi*** (Boisduval)

1836. *Pieris descombesi* Boisduval, *Spec. Gen. Lep.*, **1** : 465.

1998. *Delias descombesi descombesi* : Ghosh and Chaudhury, *Fauna of Meghalaya, State Fauna Series,* 4 (6) : 248.

Material examined : One ex. Circuit House, Saiha, 6.ix.1994, coll. *A. K.-Hazra,* one ex., Chintuipui dist. Puikawn, Saiha, 9.xii.1995, Coll. *R. S. Mirdha & P. Parui.*

Wing expanse : 84 mm.

Distribution : India : Mizoram, Meghalaya, Sikkim and West Bengal.

Elsewhere : Annam, Cochin China, Nepal to Myanmar, Saigan and Thailand.

II. Genus ***Hebomoia*** Huebner

1819. *Hebomoia* Huebner, *Verz. bek. Schmett.*, : 95.

3. ***Hebomoia glaucippe glaucippe*** (Linnaeus)

1758. *Papilia glaucippe* Linnaeus, *Syst. Nat. ed.*, x : 469.

2001. *Hebomoia glaucippe glaucippe* : Majumdar, *State Fauna Series* 9, *Fauna of Sikkim* (3) : 477.

Diagnostic characters : Fore wing white with apical half black, bearing a large orange patch, this orange patch is very variable. It may be absent in specimen of dry areas. Hind wing yellowish with narrow marginal black border.

Material examined : One ex., Hon, 12.xi.1995, coll. *P. H. Roy.*

Wing expanse : 85 mm.

Distribution : India : Mizoram and Sikkim.

Elsewhere : Nepal to Myanmar.

III. Genus *Pieris* Schrank

1801. *Pieris* Schrank, *Fauna Boica.*, : 152.

Key to species of the genus *Pieris*

1. Hind wing underside with well defined black vein ..... *napi* (Linnaeus)
– Hind wing underside with veins not defined with black 2
2. Fore wing upperside with black area dentate at inner edge ..... *canidia* (Sparrman)
– Fore wing upperside with black area not dentate at inner edge .... *brassicae* (Linnaeus)

4. *Pieris napi montana* Verity

1908. *Pieris melete* var. *montana* Verity, *Rhop. Palaearctica* : 141, pl. 31, figs. 20-21.

1998. *Pieris napi montana* : Ghosh and Chaudhury, *Fauna of Meghalaya, State Fauna Series,* 4(6) : 252.

Material examined : Two exs., Burg Kium, 4.xii.1993, coll. *R. S. Burman,* two exs., two kms. south of Aibawk FRH, 28.iii.1994, nine exs., Mizoram, alt 250 m., 18.iv.1994, coll. *A. K. Hazra,* four exs., Zematawk, Aizawl dist., alt. 1000 m, 21.i.1995, one exs., Teirei vill. Dampa, 200 m, 26.i.1995, one ex., Seling, alt. 1000 m, 29.i.1995, coll. *T. K. Pal,* one ex., Pachang, 28.iii.1996, coll. *S. C. Mitra* and one ex., Sherkawn, 27.xi.1996, coll. *A. R. Lahiri,* four exs., Aizawl Dist., Zematown, 1000 m, 21.i.1995, coll. *T. K. Pal,* 2 exs., Burg Kium, 4.xii.1993, coll. *R. S. Barman* and party, 2 exs., 2 km south of Aibwak F.R.H., 28.iii.1994, coll. *G. C. Sen* and party.

Wing expanse : 48-55 mm.

Distribution : India : Mizoram, Manipur, Meghalaya, and Sikkim.

Elsewhere : Perak and Southern Shan States.

5. *Pieris canidia canis* Evans

1912. *Pieris canidia canis* Evans, *J. Bombay nat. Hist. Soc.,* **21** : 559, 976.

2001. *Pieris canidia canis* : Majumdar, *Fauna of Sikkim, State Fauna Series,* 9(3) : 474-475.

Material examined : Two exs., Zebawk, 22.ix.1993, coll. *A. K. Lahiri,* two exs., N. of Aizawl, 5.xii.1993, coll. *R. S. Burman,* four exs., Aibwak, Aizawl dist., 9.xii.1993, coll. *S. S. Saha,* one ex., Lawntalei, 2.iv.1994, Chintuipui dist., three exs., Pukpui, 10.iv.1994, two exs., Zabawk, 11.iv.1994, Lunglei, Aizawl dist., coll. *S. K. Ghosh and M. Prasad,* four exs., Seling, alt. 1000 m, 29.i.1995, one ex., New Champai, 31.i.1995, coll. *T. K. Pal,* two exs., Teirei, 11.xi.1995, three exs., Aibwak, 16.xi.1995, coll. *M. S. Shishodia,* one ex., Moubuang, Aizawl dist., coll. *P. Parui,* two exs., Bulpui, Saiha, 24.xi.1996, five exs., Pachang, 28.xi.1996, coll. *S. C. Mitra.*

Wing expanse : 50-62 mm.

Distribution : India : Mizoram, Manipur, Meghalaya, Nilgiri Hills, Sikkim, South India and West Bengal.

6. *Pieris brassicae nepalensis* Doubleday

1864. *Pieris brassicae* var. *nepalensis* Doubleday, In Gray's *Lep. Ins. Nepal,* : 9, pl. vi, figs. 1-3.

2001. *Pieris brassicae nepalensis* : Majumdar, *Fauna of Sikkim, State Fauna Series,* 9(3) : 475.

Material examined : One ex. South Tuikui, Aizawl, dist. alt. 900 m., 31.iii.1994, coll. *A. K. Hazra,* one ex., Champai, 5.iv.1994, coll. *G. C. Sen.*

Wing expanse : 62 mm.

Distribution : India : Mizoram, Assam, Manipur, Meghalaya, Sikkim, West Bengal and plains adjoining the Himalayas.

Elsewhere : Baluchisthan, Chitral, Tibet and Yunnan.

IV. Genus *Appias* Huebner

1819. *Appias* Huebner, *Verz. bek. Schmett.*, : 91.

7. *Appias lyncida eleonora* (Boisduval)

1836. *Papilio lyncida eleonora* Boisduval, *Spec. Gen. Lep.*, **1** : 481.

2001. *Appias lyncida eleonora* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 475.

Diagnostic characters : Male : Fore wing upperside with white costal area dusted with black, marginal black border dentate, underside with broad apical black area, a subapical yellow oval spot in M_1. Hind wing white with marginal area black, underside yellow except marginal area. Female : upper side blackish brown, fore wing with short white streaks. Hind wing basal half and inner area boradly white.

Material examined : Two exs., Chaunchu forest, Lawntalei, Chinthuipui dist., 2.iv.1994, coll. *S. K. Ghosh and M. Prasad,* one ex., Terei, 11.xi.1995, coll. *M. S. Shishodia,* one ex., Huahthil, 12.xi.1995, coll. *P. H. Roy,* two exs., Khera, Saiha, Chinthuipai dist., 24.xi.1995, coll. *S. C. Mitra.*

Wing expanse : 56 mm.

Distribution : India : Mizoram, Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : Annam, Hainan, Myanmar, Thailand and Tonking.

V. Genus *Cepora* Billberg

1820. *Cepora* Billberg, *Enumeralio Insecta Oram in Museo* Billberg, : 36.

Key to species of the genus *Cepora* Billberg

Fore wing underside with a black spot in the middle area Cu_{1a}, separated from the black border by a white spot .... *nerissa* (Fabricius)

– Fore wing underside without a detached black spot in area Cu_{1a} ..... *nadina* (Lucas)

8. *Cepora nerissa nerissa* (Fabricius)

1775. *Papilio nerissa* Fabricius, *Syst. Ent.*, : 471.

2001. *Cepora nerissa nerissa* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 479.

Material examined : One ex., Lunglei, Aizawl dist., 11.iv.1994, coll. *S. K. Ghosh and M. Prasad.*

Wing expanse : 53 mm.

Distribution : India : Mizoram, Assam to Sikkim and Meghalaya.

9. *Cepora nadina nadina* (Lucas)

1852. *Pieris nadina* Lucas, *Rev. Mag. zool. Seri.* : 2, **4** : 333.

2001. *Cepora nadina nadina* : Majumdar, *State Fauna Series* 9, *Fauna of Sikkim* (3) : 479.

Material examined : One ex., Lunglei, Aizawl dist., 11.iv.1994 (at light), coll. *S. K. Ghosh and M. Prasad.*

Wing expanse : 57 mm.

Distribution : India : Mizoram, Meghalaya and Sikkim.

Elsewhere : Myanmar.

VI. Genus *Ixias* Huebner

1819. *Ixias* Huebner, *Verz. bek. Schmett.*, : 95.

10. *Ixias pyrene sesia* (Fabricius)

1777. *Papilio sesia* Fabricius, *Gen. Insect.*, : 257.

2001. *Ixias pyrene sesia* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 476.

Diagnostic characters : Male : Fore wing black with broad orange band, black area broader and reaching area Cu_{1a}. Hind wing outer black border wider. Female : The band of fore wing yellow some times tinged with orange.

Material examined : One ex., Archang, Chinthuipui dist., coll. *H. C. Ghosh,* one ex., Chawrifie Forest, Lawngtlei, Chinthuipui dist., alt.. 900 m, 9.iv.1999, one ex., Farpok, Blue Mountain, alt 2000 m, 9.iv.1999, coll. *A. K. Hazra.*

Wing expanse : 48 mm.

Distribution : Mizoram, Peninsular India, Sikkim and West Bengal.

Subfamily COLIADINAE

Key to the genera

Hind wing with precostal vein short, male with oval sex patch on upper side of hind wing .. .. ***Catopsilia*** Huebner

– Hind wing with precostal vein absent or obsolete, male without sex patch..... ..... ***Eurema*** Huebner

VII. Genus ***Catopsilia*** Huebner

1819. *Catopsilia* Huebner, *Verz. bek. Schmett.*, : 98.

Key to species of the genus *Catopsilia*

Underside of wings marked with transverse brown striage..... *pyranthe* (Linnaeus)

– Underside of wings without reddish brown striage ..... *crocale* (Cramer)

11. ***Catopsilia pyranthe pyranthe*** (Linnaeus)

1758. *Papilis pyranthe* Linnaeus, *Syst. Nat. ed.*, x, : 469.

1998. *Catopsilia pyranthe pyranthe* : Ghosh and Chaudhury, *Fauna of Meghalaya, State Fauna Series,* **4** (6) : 260.

Material examined : Three exs., E. of Aibwak, 25, 26.iii.1994, coll. *G. C. Sen,* two exs., Thimpui, 30.xi.1996, coll. *S. C. Mitra.*

Wing expanse : 50-65 mm.

Distribution : India : Mizoram, Andaman Is., Meghalaya and West Bengal.

Elsewhere : Hainan, Indonesia, Java, Myanmar, South and East to Borneo, South China, Sri Lanka, Sulawesi, and the Phillippines.

12. ***Catopsilia crocale crocale*** (Cramer)

1775. *Papilio crocale* Cramer, *Pap. Exot.*, **1** : 87, pl. 65, fig. C, D.

1998. *Catopsilia crocale crocale* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 259.

Material examined : One ex., Being, 15 kms. from Aizawl, Aizawl dist., 26.x.1991, coll. *J. K. Jonathan,* one ex., Lawngtalei, Chinthuipui dist., alt. 850 m., 3.iv.1994, coll., *S. K. Ghosh* and *M. Prasad.*

Wing expanse : 60 mm.

Distribution : India : Mizoram, Andaman Is., Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : Indonesia, Myanmar, South China and Sri Lanka.

VII. Genus ***Eurema*** Huebner

1819. *Eurema* Huebner, *Verz. bek. Schmett.*, : 96.

Key to species of the genus *Eurema* Huebner

Upperside of fore wing with black border extending to 1A, underside of both wings with large discocellular ring spots .... *hecabe* (Linnaeus)

– Upperside of fore wing with black border not extending to 1A, underside of both wings without discocellur ring spot..... *laeta* (Boisduval)

13. ***Eurema hecabe contubernalis*** (Moore)

1886. *Terias contubernalis* Moore, *J. Linn. Soc. Lond. Zool.* : 46.

2001. *Eurema hecabe contubernalis* : Majumdar, *Faunan of Sikkim, State Fauna Series,* **9**(3) : 478.

Material examined : One ex., Vowmbuk, Chinthuipui dist., 22.i.1987, coll. *H. C. Ghosh,* one ex., Terei, Dampa Wild Life Sanctuary, 3.x.1991, four exs., Aibawk, Champhei, 10 kms. on Aizawl road, 24.x.1991, coll. *J. K. Jonathan,* one ex., Khawzawl, xii.1993, five exs., Kuik, alt. 100 m, 8.xii.1993, coll. R. S. Burman, two exs., Caga, one km N. of Aibwak, 29.iii.1994, coll. *G. C. Sen,* two exs., Dampa Wild Life Sanctuary, 25.i.1995, coll. *T. K. Pal.*

Wing expanse : 45-50 mm.

Distribution : India : Mizoram, Assam, Gujarat, Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : Malaya, Myanmar and Singapore.

Family HESPERRIDAE

Key to the subfamilies

Fore wing M_2 nearer to M_1 than M_3 at origin of cell. Abdomen shorter than anal margin of hind wing ..... ***Pyrginae***

– Fore wing M_2 near to M_3 than M_1 at origin of cell. Abdomen generally equal to anal margin of hind wing ..... ***Hesperiinae***

Subfamily PYRGINAE

Key to the groups

Palpi 2nd segment erect. Fore wing cell generally long ..... **Celaenorrhinus** group

– Palpi 2nd segment porrect. Fore wing cell generally short ..... **Tagiades** group

Group CELAENORRHINUS

IX. Genus *Celaenorrhinus* Huebner

1819. *Celaenorrhinus* Huebner, *Verz. bek. Schmett.*, : 106.

15. *Celaenorrhinus leucocera* (Kollar)

1848. *Hesperia leucocera* Kollar, *In. Hugel's Kashmir und das Reich der Siek.*, **4** : 45, pl. 18, figs. 3, 4.

2001. *Celaenorrhinus leucocera* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 504-504.

Diagnostic characters : Fore wing dorsum greater than termen, dorsally cell spot continuing above radius. Hind wing cilia outwardly white, basally yellow and with alteration of colours at end of veins.

Material examined : One ex., Burgkoum, 4.xii.1993, coll. *R. S. Burman.*

Wing expanse : 45 mm.

Distribution : Oriental region including India : Mizoram, Andamans, Assam, Madhya Pradesh, Meghalaya, N. W. Himalayas, Sikkim and West Bengal.

Group TAGIADES

X. Genus *Coladenia* Moore

1881. *Coladenia* Moore, *Lep. Ceyl.*, **1** : 180.

16. *Coladenia dan festa* Evans

1949. *Coladenia festa* Evans, *Cat. Hesperiidae from Europe, Asia and Australia in Brit. Mus. (N. H.)* : 113.

2001. *Coladenia dan festa* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 508.

Diagnostic character : Ground colour dull tawny above, upper side central spots are conjoined, pale yellow in male, white in female.

Material examined : One ex., Lawngtalei, Chinthuipui dist., 3.iv.1994, coll. *A. K. Hazra.*

Wing expanse : 45 mm.

Distribution : India : Mizoram, Manipur, Meghalaya, Nagaland and Sikkim.

Elsewhere : Bangladesh, Bhutan and Myanmar.

Subfamily HESPERIINAE

Key to the group

Fore wing M_2 straight at its origin. Hind wing lower end cell usually not upturned, M_2 well marked ..... **Ancistroides** group

– Fore wing M_2 generally decurved at its origin. Hind wing lower end cell usually upturned, M_2 usually untraceable ..... **Gegenes** group

Group ANCISTROIDES

XI. Genus *Notocrypta* de Niceville

1889. *Notocrypta* de Niceville, *J. Bombay nat. Hist. Soc.*, **4** : 188.

17. *Notocrypta curvifascia curvifascia* (Felder)

1862. *Notocrypta curvifascia* Felder, *Wien. ent. Mon.*, **6** : 29.

2001. *Notocrypta curvifascia curvifascia* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 487.

Diagnostic characters : Brown yellow. Fore wing band either not entering or just entering the base of space Cu_{1a} and usually not extended above radius to costa dorsally, M_3 nearer to origin of Cu_{1a} than M_2, both sides with atleast traces of spots in spaces R_4 to M_1 and sometimes also in spaces M_2 to Cu_{1a}, central band ventrally not produced above the radius towards costa.

Material examined : One ex., Terei, Dampa Wild Life Santuary, dist. Aizawl, 24.x.1991, one ex., Champhai, x.1991, coll. *J. K. Jonathan.*

Wing expanse : 42 mm.

Distribution : Palaearctic and Oriental region including India : (Mizoram, Andaman, Assam, Meghalaya, Sikkim, South India and West Bengal).

Group GEGENES

XII. Genus ***Parnara*** Moore

1881. *Parnara* Moore, *Lep. Ceylon,* **1** : 166.

18. ***Parnara naso bada*** (Moore)

1878. *Hesperia bada* Moore, *Proc. zool. Soc. Lond.,* 685.

2001. *Parnara naso bada* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 494.

Diagnostic characters : Upper side of fore wing with spots on Cu_{1a} and Cu_{1b}, spot on Cu_{1b} larger and overlaping the spot in Cu_{1a}, apical spot present. Hind wing generally with spots on ventral side.

Material examined : One ex., Vairengta, 16.iv.1994, coll. *A. K. Hazra.*

Wing expanse : 34 mm.

Distribution : Palaearctic and Oriental region including India : (Mizoram, Central India, Kashmir, Sikkim, South India and West Bengal).

XIII. Genus ***Pelopidas*** Walker

1870. *Pelopidas* Walker, *Ent.,* **5** : 56.

Key to species of the genus *Pelopidas* Walker

Lower end of stigma of fore wing nearer to base and well before origin of Cu_{1a} .... *mathias* (Fabricius)

Lower end of stigma of fore wing not near to base, more or less after origin of Cu_{1a} ....*sinensis* (Mabille)

19. ***Pelopidas mathias mathias*** (Fabricius)

1798. *Hesperia mathias* Fabricius, *Ent. Syst. Suppl.,* : 433.

2001. *Pelopidas mathias mathias* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 495.

Material examined : One ex., Rongpui, Dampa, dist. Aizawl, 28.vi.1995, coll. *P. Parui and M. Sil.*

Wing expanse : 36 mm.

Distribution : Oriental region including India : Mizoram, Central India, Central Nicobars, Himachal Pradesh, Jammu & Kashmir, Orissa, Punjab, Rajasthan, South India, Sikkim, and West Bengal.

Elsewhere : Australia.

20. ***Pelopidas sinensis*** (Mabille)

1877. *Gegenes sinensis* Mobille, *Bull. Soc. zool. Fr.,* : 232.

2001. *Pelopidas sinensis* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 495.

Material examined : One ex., Teirei, 11.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 35 mm.

Distribution : India : Mizoram, Assam, Meghalaya, N. W. Himalaya and Sikkim.

Elsewhere : Myanmar and S. W. China.

Family HYPSIDAE

XIV. Genus ***Cispia*** Walker

1855. *Cispia* Walker, *List Lep. Ins. Brit. Mus.,* **4** : 857.

21. ***Cispia punctifascia*** Walker

1855. *Cispia punctifascia* Walker, *List Lep. Ins. Brit. Mus.,* **4** : 857.

1892. *Cispia punctifascia* : Hampson, *Fauna Brit. India,* Moths, **1** : 492.

Diagnostic characters : Head thorax and abdomen orange, collar, thorax and tegulae spotted with black, legs marked with black. Forewing brownish orange, the veins pale yellow, two subbasal black spots, an orange medial band edged by red brown strigae in the interspaces with pale line on outer side. Hind wing orange, underside

with curved postmedial band from costa to Cu_{1b}. Abdomen with lateral series of black spots.

Material examined : Two exs., Hanthaul, 9.xii.1993, coll. *R. S. Barman.*

Wing expanse : 55 mm.

Distribution : India : Mizoram, Assam, Sikkim and West Bengal.

Elsewhere : Bangladesh, Bhutan and Sri Lanka.

Family CTENUCHIDAE

Key to genera

Hind wing Cu_{1a} absent ..... ***Ceryx*** Wallengren

– Hind wing Cu_{1a} present ..... ***Eressa*** Walker

XV. Genus ***Ceryx*** Wallengren

1863. *Ceryx* Wallengren, *Wien. ent. Mon.*, **7** : 140.

22. ***Ceryx godartii*** (Boisduval)

1829. *Syntomis godartii* Boisduval, *Mon. Zyg.*, 115, pl. 7, fig. 3.

2001. *Cerynx godartii* : Majumder, *Fauna of Sikkim, State Fauna Series*, 9(3) : 458.

Diagnostic characters : Collar yellow, frons dirty white. Fore wing with large hyaline patch, one filling the cell, another nearly the whole interno median inter spaces, one at junction of Cu_{1a} and Cu_{1b}. Hind wing hyaline with narrow black margin. Abdomen with two yellow bands.

Material examined : One ex., *ca* 20 kms N. E. of Vairengte, 16.iv.1994, coll. *A. K. Hazra.*

Wing expanse : 30 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Sikkim, South India and West Bengal.

Elsewhere : Indonesia, Malaya and Myanmar.

XVI. Genus ***Eressa*** Walker

1854. *Eressa* Walker, *List Lep. Ins. Brit. Mus.*, **1** : 149.

23. ***Eressa confinis*** (Walker)

1854. *Glaucopis confinis* Walker, *List Lep. Ins. Brit. Mus.*, **1** : 149.

2001. *Eressa confinis* : Majumdar, *Fauna of Sikkim, State Fauna Series*, 9(3) : 458.

Diagnostic characters : Antennae dull black, tip white. Fore wing with hyaline patch in the interno median interspaces extending to near outer margin. Abdomen with yellow spots on side of each segments.

Material examined : Three exs., Teirei, 11.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 24 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Maharashtra, Meghalaya, N. W. Himalayas, Sikkim, Tamil Nadu and West Bengal.

Elsewhere : Bhutan, Myanmar and Sri Lanka.

Family ARCTIIDAE

Key to the subfamilies

1. Body stoutly built in one or both sexes 2
– Body slenderly built in one or both sexes 4
2. Antennae bipectinate, wings usually white ... . NYCTEMERIINAE
– Antennae variable, wings usually blackish ... 3
3. Fore wing markings in form of band .... CALLIMORPHINAE
– Fore wing marking reduced to dot .... SPILOSOMINAE
4. Head usually broad. Fore wing very long. Hind wing uncommonly large ..... LITHOSIINAE
– Head not so broad. Fore wing and hind wing moderately large ..... MICRARCTIINAE

Subfamily NYCTEMERIINAE

XVII. Genus ***Nyctemera*** Huebner

1820. *Nyctemera* Huebner, *Verz. bek. Schmett.*, : 178.

24. ***Nyctemera adversata*** (Schaller)

1788. *Phalaena (Geometra) adversata* Schaller, *Naturoforscher*, **23** : 52.

2001. *Nyctemera adversata* : Majumder, *Fauna of Sikkim, State Fauna Series*, 9(3) : 559.

Diagnostic characters : Abdomen whitish with dorsal, lateral and subventral black spots and yellowish tip, wings white with discellular spots. Fore wing with three minute white spots on terminal band between veins R_5 and M_2, hind wing with veins R_5 and M_1 stalked.

Material examined : One ex., South Mizoram, one ex., Saiha, Chinthuipui dist., 8.i.1987, one ex., Bulapin, 14.i.1987, coll. *H. C. Ghosh,* two exs., Aibwak Forest 40 kms south of Aizawl, 19.x.1991, one ex., Phaigong, *ca* 10 kms from Teirei, 23.x.1991, one ex., Dampa Wild Life Sanctuary, 24.xi.1991, coll. *J. K. Jonathan,* two exs., Aizawl, 9.xii.1993, coll. *S. S. Saha,* one ex., Hantlaub, 9.xii.1993, coll. *R. S. Burman.*

Wing expanse : 45-55 mm.

Distribution : Throughout India including Mizoram.

Elsewhere : Bangladesh, Hong Kong, Indochina, Indonesia, Japan, Malayasia, South China and Tonkin.

Subfamily CALLIMORPHINAE

XVIII. Genus ***Callimorpha*** Latreille

1809. *Callimorpha* Latreille, *Genera Crusteceorum et Insectorum,* **4** : 200.

25. ***Callimorpha plagiata*** (Walker)

1855. *Hypercampa plagiata* Walker, *List Lep. Het. Brit. Mus.,* **3** : 655.

2001. *Callimorpha plagiata* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 554.

Diagnostic characters : Head, thorax and abdomen orange. Fore wing with yellow spots. Hind wing orange without black streaks on vein.

Material examined : One ex., Aizawl, 20.x.1991, coll. *J. K. Jonathan.*

Wing expanse : 72 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Jammu and Kashmir, Meghalaya, Sikkim and West Bengal.

Subfamily SPILOSOMINAE

Key to the genera

1. Antennae ciliate in both sexes, hind legs with one pair of tibial spurs ..... ***Phissama*** Moore
– Antennae minutely serrate or pectinate in male, hind legs with two pairs of tibial spurs 2
2. Fore tibiae with curved apical claw ..... ***Aloa*** Walker
– Fore tibiae without curved apical claw ..... ***Spilaractia*** Butler

XIX. Genus ***Phissama*** Moore

1859. *Phissama* Moore, *Lep. East India Comp.,* : 362.

26. ***Phissama transiens*** (Walker)

1855. *Spilosoma transiens* Walker, *List Lep. Het. Brit. Mus.,* **3** : 675.

2001. *Phissama transiens* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 555.

Diagnostic characters : Head and thorax dirty white. Tibiae and tarsi ivory white, striped with brown. Palpi and femora orange. Fore wing very pale fuscous, the costa and base of inner margin ivory white, black spots in and just beyond each angle of cell. Hind wings pale fuscous. Abdomen orange above, white below.

Material examined : Four exs., Saiha 8.iv.1994, Chinthuipui dist., S. Mizoram, coll. *S. K. Ghosh and M. Prasad.*

Wing expanse : 40 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : China, Indonesia and Philippines.

XX. Genus ***Aloa*** Walker

1855. *Aloa* Walker, *List Lep. Ins. Brit. Mus.,* **3** : 699.

27. ***Aloa lactinea*** (Cramer)

1777. *Bombyx lactinea* Cramer, *Pap. Exot.,* **2** : 58, 149, p. 133, fig. D.

1998. *Aloa lactinea* : Ghosh and Chaudhury, *Fauna of Meghalaya, State Fauna Series,* **4**(6) : 357.

Diagnostic characters : Palpi crimson with black tips. Fore wing white with crimson fascia on costa. Hind wing white with black discoidal lunule and four subterminal spots, any of which may be absent. Legs with fore and mid tibiae striped with black, tarsi white with segmental black bands.

Material examined : One ex., Saiha, Chinthuipui dist., 8.iv.1994, coll. *S. K. Ghosh and M. Prasad*, one ex., Lawngtlei, Chinthuipui dist., alt. *ca* 850 m, 3.iv.1999, coll. *A. K. Hazra.*

Wing expanse : 54 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Jammu and Kashmir, Kerala, Maharashtra, Meghalaya, Tamil Nadu and West Bengal.

Elsewhere : China, East Asia, Indonesia, Japan and Sri Lanka.

XXI. Genus *Spilarctia* Butler

1875. *Spilarctia* Butler, *Cist. Ent.*, **2** : 39.

28. *Spilarctia flavens* (Moore)

1879. *Spilarctia flavens* Moore, *Lep. Atk.*, : 39.

2001. *Spilarctia flavens* : Majumder, *Fauna of Sikkim, State Fauna Series*, 9(3) : 557.

Diagnostic characters : Fore wing with curved medial series, two discoidal spots, the post medial series excurved from costa to Cu_{1a} and then incurved, Hind wing with discal spot or dot, some subterminal spots present towards tornus.

Material examined : Two exs., Aibwak, 17.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 40 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya and Sikkim.

Subfamily LITHOSIINAE

Key to the genera

1. Hind wing M_1 absent ..... ***Lithosia*** Fabricius
– Hind wing M_2 present 2
2. Fore wing with aerole, R_2 and R_3 stalked ..... ***Agylla*** Walker
– Fore wing without areole, R_2 free 3
3. Fore wing R_3 and R_4 absent in male, R_3 stalked in female ..... ***Cyana*** Walker
– Fore wing R_3 and R_4 stalked in both sexes 4
4. Fore wing R_1 free ..... ***Miltochrista*** Huebner
– Fore wing R_1 anastomosing with Sc ..... ***Asura*** Walker

XXII. Genus *Lithosia* Fabricius

1798. *Lithosia* Fabricius, *Ent. Syst. Suppl.*, : 459.

29. *Lithosia quadra* (Linnaeus)

1758. *Noctua quadra* Linnaeus, *Syst. Nat.*, **1** : 511.

1900. *Lithosia quadra* : Hampson, *Cat. Lep. Phal. Brit. Mus.*, **2** : 220-221.

Diagnostic characters : Antennae, palpi and frons black, vertex of head and thorax orange. Legs deep metallic green except towards base. Fore wing in male grey, the basal area orange, a blackish streak on base of costal area. Hind wing orange yellow. In female forewings orange yellow with metallic green, spot on costa just beyond middle on Cu_{1b} at middle.

Material examined : One ex., Champhai, 29.x.1991, coll. *J. K. Jonathan.*

Wing expanse : 40 mm.

Distribution : India : Mizoram and Sikkim.

Elsewhere : Amur, Armenia, Britain, Central and South Europe, Japan, Russia and Siberia.

XXIII. Genus *Agylla* Walker

1854. *Agylla* Walker, *List Lep. Ins. Brit. Mus.*, **2** : 552.

Key to species

Hind wing whitish ..... *ramelana* (Moore)
— Hind wing yellowish .. *alboluteola* Rothchild

30. *Agylla ramelana* (Moore)

1865. *Lithosia ramelana* Moore, *Proc. zool. Soc. Lond.*, : 798.

2001. *Agylla ramelana* : Majumdar, *Fauna of Sikkim, State Fauna Series,* 9(3) : 567.

Material examined : One ex., Saiha, Chinthuipui dist., 8.iv.1994, coll. *S. K. Ghosh and M. Prasad.*

Wing expanse : 35 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Sikkim and West Bengal.

Elsewhere : Indonesia.

31. Genus ***Agylla alboluteola*** Rothchild

1912. *Agylla alboluteola* Rothschild, *Novit. zool.,* **19** : 226.

2001. *Agylla alboluteola* : Majumdar, *Fauna of Sikkim, State Fauna Series,* 9(3) : 567.

Material examined : One ex., Saiha, Chimthuipui dist., 8.iv.1994, coll. *S. K. Ghosh and M. Prasad.*

Wing expanse : 40 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Manipur and Sikkim.

Elsewhere : Malayasia.

XXIV. Genus ***Cyana*** Walker

1854. *Cyana* Walker, *List Lep. Ins. Brit. Mus.,* **2** : 528.

32. ***Cyana dudgeoni*** Hampson

1895. *Cyana dudgeoni* Hampson, *Trans. ent. Soc. Lond.,* : 293.

2001. *Cyana dudgeoni* : Majumdar, *Fauna of Sikkim, State Fauna Series,* 9(3) : 570.

Diagnostic characters : Palpi yellowish, white at tips, tegulae edged with scarlet, tibiae banded with brown, tarsi with orange. Fore wing with short subbasal scarlet line, ante and post medial rather oblique, terminal lines running just beyond the apex. Hind wing crimson, the costal area and cilia white. Abdomen dorsally tinged with crimson.

Material examined : One ex., Aizawl, 8.xii.1993, coll. *S. S. Saha.*

Wing expanse : 24 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya and Sikkim.

Elsewhere : Bhutan.

XXV. Genus ***Miltochrista*** Huebner

1816. *Miltochrista* Huebner, *Verz. bek. Schmett.,* : 166.

Key to species

Fore wing with prominent streaks beyond postmedial area extending upto terminal margin, costal margin dark fuscous interrupted at medial area ..... *cuneonotata* (Walker)

– Fore wing with faint streaks beyond postmedial area and touching terminal margin, costal margin black and uninterrupted .... *inflexa* (Moore)

33. ***Miltochrista cuneonotata*** (Walker)

1855. *Ammatho cuneonotata* Walker, *List Lep. Ins. Brit. Mus.,* **3** : 759.

2001. *Miltochrista cuneonotata* : Majumdar, *Fauna of Sikkim, State Fauna Series,* 9(3) : 576-577.

Material examined : One ex., Dampa Wild Life Santuary, 22.x.1991, coll. *J. K. Jonathan,* four exs., Aibawk, 15.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 28-33 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, and West Bengal.

Eslewhere : Indonesia, Malayasia, the Philippines and Sri Lanka.

34. ***Miltochrista inflexa*** (Moore)

1878. *Barsine infexa* Moore, *Proc. zool. Soc. Lond.,* : 29, pl. 3, fig. 17.

2001. *Miltochrista inflexa* : Majumder, *Fauna of Sikkim, State Fauna Series,* 9(3) : 577.

Material examined : One ex., Aizawl, 20.x.1991, coll. *J. K. Jonathan.*

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya and West Bengal.

XXVI. Genus *Asura* Walker

1854. *Asura* Walker, *List Lep. Ins. Brit. Mus.*, **2** : 484.

Key to species of the Genus *Asura* Walker

1. Fore wing cell very narrow *dasara* (Moore)
– Fore wing cell normal 2
2. Fore wing with medial line more or less straight ..... *strigipennis* (Herrich-Schaffer)
– Fore wing with medial line not straight 3
3. Fore wing with medial line connected to post medial line by streaks .... *euprepioides* (Walker)
– Fore wing with medial line not connected to post medial line .....*conjunctana* (Walker)

35. *Asura dasara* (Moore)

1859. *Setina dasara* Moore, *Lep. East India Comp.*, : 303.

2001. *Asura dasara* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 573.

Material examined : One ex., Aibawk, 16.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 27 mm.

Distribution : India : Mizoram, Assam, Manipur, Meghalaya, N. W. Himalayas, Sikkim and Tamil Nadu.

Elsewhere : Indonesia (Java and Sumatra).

36. *Asura strigipennis* (Herrich-Schaffer)

1855. *Paidia strigipennis* Herrich-Schaffer, *Ausserens Schmett.*, : 21, pl. 437.

2001. *Asura strigipennis* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 574.

Material examined : Two exs., Aibawk, 16.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 30 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim and West Bengal.

Elsewhere : Bhutan, China, Indonesia and Myanmar.

37. *Asura euprepioides* (Walker)

1862. *Hypropia euprepioides* Walker, *J. Proc. Linn. Soc. Zool.*, **6** : 102.

2001. *Asura euprepioides* : Majumder, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 573.

Material examined : Two exs., Aizawl, 28.x.1991, coll. *J. K. Jonathan,* one ex., Aibawk, (at light), 16.x.1995, coll. *M. S. Shishodia.*

Wing expanse : 30 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Nagaland.

Elsewhere : Indonesia, Malayasia and Myanmar.

38. *Asura conjunctana* (Walker)

1866. *Conchylis conjunctana* (Walker), *List Lep. Ins. Brit. Mus.*, **35** : 1788.

2001. *Asura conjunctana* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 574.

Material examined : One ex., Aibawk, 15.xi.1995, coll. *M. S. Shishodia.*

Wing expanse : 20 mm.

Distribution : India : Mizoram, Arunachal Pradesh, Assam, Meghalaya, Nagaland and West Bengal.

Elsewhere : Bhutan.

XXVII. Genus *Argina* Huebner

1816. *Argina* Huebner, *Verz. bek. Schmett.*, : 167.

39. *Argina argus* (Kollar)

1844. *Euprepia argus* Kollar, *In Hugels Kashmir Und. das Reich der Sieks,* **4** : 467, pl. 21, fig. 3.

2001. *Argina argus* : Majumdar, *Fauna of Sikkim, State Fauna Series,* **9**(3) : 580.

Diagnostic characters : Head, thorax and fore wing bright greyish red, the latter marked with numerous pale rings with black centres, and arranged in rows. Hind wing purple red with black spot on costa, discocelluler, submarginal and anal area. Abdomen greyish red with dorsal lateral and ventral row of black spots.

Material examined : One ex., Aizawl, 20.x.1991, coll. *J. K. Jonathan.*

Wing expanse : 48 mm.

Distribution : India : Throughout India including Mizoram.

Elsewhere : Eastern Asia, Myanmar and Sri Lanka.

SUMMARY

Five families of Lepidoptera. viz. Pieridae, Hesperiidae, Hypsidae, Ctenuchidae and Arctiidae of Mizoram in North-East India have been studied. Altogether 39 species and subspecies belonging to 27 genera, 9 subfamilies are recorded from there. Keys, collection data, distribution within India and outside and measurement of wing expanse have been provided.

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INSECTA : LEPIDOPTERA : PAPILIONIDAE, NYMPHALIDAE (DANAINAE), LASIOCAMPIDAE AND LYMANTRIIDAE

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INTRODUCTION

Of more than 17,000 species of butterflies known from the world, about 1,500 species (8.66%) are recorded from India. Eastern part of India is very rich in butterfly diversity and harbour more than 700 species of butterflies. Presently, 19 species of butterflies of family Papilionidae and Nymphalidae (Danainae) and seven species of moths of two families are treated from the state of Mizoram.

The knowledge on butterflies of India is mainly due to the works of De Niceville (1883, 1886), Bingham (1905, 1907), Evans (1932), Talbot (1939, 1947) and Wynter-Blyth (1957) which include families Papilionidae and Nymphalidae (Danainae).

There is hardly any specific record of species of butterflies and moths from the state of Mizoram.

At present, the studies on the butterflies and moths are based upon on the specimens collected by several scientists of Zoological Survey of India during their surveys of the state of Mizoram. As a result, 26 species representing 12 genera and two families of butterflies (Papilionidae and Nymphalidae) and two families of moths (Lasiocampidae and Lymantriidae) have been dealt with and are first definitive records from the state of Mizoram.

Keys to species and genera of butterflies and moths have been given. Common name, geographical distributions and fore wing length have been provided for each species/subspecies. An appendix of species of butterflies and moths with their district-wise distribution in Mizoram has also been given.

SYSTEMATIC ACCOUNT

Family PAPILIONIDAE

Antennae comparatively short and usually with a distinct club; proboscis well developed; palpi short and apressed to frons (except and projecting in *teinopalpus)*; fore legs fully developed, fore tibia with spur on the innerside, hind tibia with middle spur, claws simple and rarely with toothed, paronychium and pulvillus absent. Cell closed in both sexes. Fore wing with 12 veins, in addition vein 3_A ending on inner margin, a short transverse vein also present near the base of wing between cell and vein 2_A (with few exceptions), veins R_5 and R_4 stalked, vein C_u1_b arising before middle of cell, four veins arising from the outer lower edge of the cell. Hind wing usually with a tail at vein M_3 which may be slender or broad and spatulate, inner margin of hind wing being frequently folded over and within the fold, in male bearing a patch of specialised scales or scent scales (androconia); vein 2_A absent, the basal cell and precostal vein present.

The family includs three subfamilies, *viz.*, Papilioninae, Parssaninae and Baroninae. Only the subfamily Papilioninae is treated from Mizoram.

Subfamily PAPILIONINAE

Antennae, long, scaled or unscaled; legs scaled or unscaled; fore wing with radial venation usually complete, basal spot (Cu-V) present, rarely weak; hind wing with precostal usually forked, precostal cell variable. First and 3rd anal veins absent or rudimentary.

This subfamily is represented in India and includes 162 species and 19 genera of which 9 species and 5 genera are treated from Mizoram.

Key to genara

1. Tibiae and tarsi scaled 2
– Tibiae and tarsi not scaled 3
2. Fore wing with vein R_1 free ..... ***Lamproptera*** Gray
– Fore wing with vein R_1 anastomosed with S_c ..... ***Graphium*** Scopoli
3. Collar behind head red, yellow or white. In male, hind wing dorsum folded over to enclose androconia 4
– Collar not as above, more or less concolourous with thorax. In male, hind wing dorsum not folded over and without androconia ..... ***Atrophaneura*** Reakirt
4. Hind wing usually tailed; vein Rs approximately equidistant between vein S_c + R_1 and M_1; vein S_c + R_1 as long as vein 2_A of fore wing ..... ***Papilio*** Linnaeus
– Hind wing not tailed; vein Rs not equidistant between vein S_c + R_1 and M_1; vein S_c + R_1 a little shorter than vein 2_A of fore wing ..... ***Chilasa*** Moore

1. Genus *Lamproptera* Gray

1832. *Lamproptera* Gray, In : *Griffith's ed. Cuvier, Animal Kingdom.* **15** : 102, fig. 4.

This genus is represented in India by two species, viz., *Lamproptera curius* (Fabricius) and *L. meges* of which the former is treated here.

1. *Lamproptera curius curius* (Fabricius) (White Dragontail)

1787. *Papilio curius* Fabricius, *Mant. Ins.* : 9.

1939. *Lamproptera curius curius* (Fabricius) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **1** : 244.

1992. *Lamproptera curius curius* (Fabricius) : Eliot *et al, Butterflies of Malaya Peninsula* : 396.

Material examined : Aizawl District : 2 exs; Teirei (Dampa) Wild life Sanctuary, 1 ex., 24-x-1991; Phaileng, ca 10 km. from Teirei F.R.H., 1 ex., 1994 *(J. K. Jonathan and Party coll.). Fore wing length* : 40 mm.

Distribution : Mizoram (Aizawl), Arunachal Pradesh, Assam, North-East India and Sikkim.

Elsewhere : China, Myanmar, Malaya Peninsula and Sundaland.

Remarks : Only the nominate subspecies occurs in India.

II. Genus *Graphium* Scopoli

1777. *Graphium* Scopoli, *Intr. Hist. Nat.,* : 433.

Of the eight species occurring in India, two species viz., *Graphium sarpedon* (Linnaeus) and *Graphium agamemnon* (Linnaeus) are dealt with from Mizoram.

Key to species

Fore wing upperside brownish black and with a green band; hind wing with a row of green submarginal lunules and tailless ..... *sarpedon* (Linnaeus)

– Fore wing upperside black brown and with a pair of cell spots; hind wing without submarginal lunules and tailed ..... *agamemnon* (Linnaeus)

2. *Graphium sarpedon luctatius* Fruhstorfer (Common Blue Bottle)

1907. *Graphium sarpedon luctatius* Fruhstorfer, *"Neue Papilio Rassen aus dem Indo-Australischen Gebiet" Ent. Zeit.,* **21**(30) : 182-184.

1932. *Zetides sarpedon sarpedon* (Linnaeus) : *Evans, Identification of India Butterflies, ed.* **2** : 55.

1939. *Graphium sarpedon sarpedon* (Linnaeus) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **1** : 220.

1947. *Graphium sarpedon luctatius* Fruhstorfer : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **2** : 491.

1981. *Graphium (Graphium) sarpedon luctatius* (Fruhstorfer) : Arora & Mondal, *Rec. zool. Surv. India, Occassional paper,* **29** : 8.

1992. *Graphium sarpedon luctatius* (Fruhstorfer) : Eliot et al, *Butterflies of Malaya Peninsula* : 395.

Material examined : Lunglei District : D.F.O. Office Campus, Lawngtlai, alt. 800 m., 1 ex., 3-iv-1994, *(A. K. Hazra and Party coll.). Fore wing length* : 85 mm.

Distribution : Mizoram (Lunglei), Arunachal Pradesh, Assam, East to North-West Himalaya.

Elsewhere : Hanan, Lombok, Myanmar, the Philippines and Tonkin (Tong-king).

Remarks : This subspecies is interesting for showing variations in width of discal band.

3. *Graphium agamemmon agamemnon* (Linnaeus)

(Tailed Jay)

1758. *Papilio agamemnon* Linnaeus, *Syst. Nat.*, ed. **10** : 462.

1932. *Zetides agamemnon agamemnon* (Linnaeus) : *Evans, Identification of India Butterflies, ed.* **2** : 56.

1939. *Graphium agamemnon agamemnon* (Linnaeus) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **I** : 230.

1997. *Graphium (Graphium) agamemnon agamemnon* (Linnaeus) : Mondal & Maulik, *Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 762.

Material examined : Aizawl District : Aibawk Forest, 40 km. South of Aizawl Town, 1 ex., 28-xii-1993, *(S. S. Shishodia and Party coll.). Fore wing length* : 100 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Manipur, Uttar Pradesh and West Bengal.

Elsewhere : Myanmar, the Philippines and South China.

Remarks : Of the five subspecies occurring in India, three are insular and other two i.e., nominate subspecies *G. agamemnon agamemnon* (Linnaeus) and *G. agamemnon menides* (Fruhstorfer) are found on the mainland. This nominate subspecies differs from *menides* (South India and Sri Lanka) by the hind wing always with a shorter tail.

III. Genus *Atrophaneura* Reakirt

1864. *Atrophaneura* Reakirt, *Proc. ent. Soc. Phil.*, **3** : 45.

This genus includes eleven species from India of which one i.e., *Atrophaneura varuna* White is treated from Mizoram.

4. *Atrophaneura varuna astorion* (Westwood)

(Common Batwing)

1842. *Papilio astorion* Westwood, *Ann. Mag. Nat. Hist,* **9** : 37.

1947. *Atrophaneura varuna astorion* (Westwood) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **I** : 73.

1997. *Atrophaneura varuna astorion* (Westwood) : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 764.

Material examined : Aizawl District : Aibawk Forest 40 km. South of Aizawl town, 2 exs. 19.X.1991, Champhai, 10 km from Aizawl, 1 ex, 30.x.1991 *(J. K. Jonathan and Party coll.)*; Aibawk Forest, 40 km South of Aizawl town, 2 ex., 28.xii.1993 *(S. S. Saha and Party Coll.)*, 1 ex., 15.iv.1994 *(A. K. Hazra & Party coll.)*; West Phaileng, 1 ex., 8.x.1998 *(M. S. Shishodia and Party coll.)*. Chhimtuipui District : Kwankwan roadside Hill stream, alt. 800 m, 1 ex., 4.iv.1994 *(A. K. Hazra and Party coll.)*; Circuit House Saiha, alt 800 m. 2 exs., 6.iv.1994; Saihatla Village Hills, 2 exs., 7.iv.1994, *(A. K. Hazra and Party coll.)*. Lunglei District, Hauruang, 1 ex., D.F.O. Campus, 23.ix.1993, *(A. R. Lahiri and Party coll.)*; Lawngtlai, alt 800 m. 1 ex., 3.iv.1994, *(A. K. Hazra and Party coll.); Fore wing length* : 105-140 mm.

Distribution : India : Mizoram (Aizawl, Chhintuipui, Lunglei), Uttar Pradesh and West Bengal.

Elsewhere : Myanmar.

Remarks : Only this subspecies occurs in India.

IV. Genus ***Papilio*** Linnaeus

1758. *Papilio* Linnaeus, *Syst. Nat., ed.* **10** : 458.

Four species of this genus are treated from Mizoram.

Key to species

1. Fore wing upperside with glossy metallic-blue scales or metallic patch or band. Male with wooly-streaks ..... *paris* Linnaeus
- Fore wing upperside black with white spot or band. Hind wing upperside yellowish 2
2. Fore wing upperside of male black with a white transverse or oblique band; Hind wing upperside with white or greenish blue discal band ..... *helenus* (Linnaeus)
- Fore wing upperside of male black with distinct marginal spots; hind wing upperside with discal white band 3
3. Fore wing upperside black with yellow post discal bands and submarginal spots; hind wing with apical blue black and anal red spots .... *demoleus* (Linnaeus)
- Fore wing upperside without discal band; hind wing post discal white band and without anal red spots ..... *polytes* (Linnaeus)

5. ***Papilio paris decorosa*** Fruhstorfer (Paris Peacock)

1909a. *Papilio paris* f. *decorosa* Fruhstorfer, *Ent. Zeit. Stutt.* **22** (41) : 171 (Sikkim).

1939. *Papilio paris paris* Linnaeus : Talbot (1939), *Fauna of British India, India including Ceylon and Burma,* (Butterflies), **1** : 150.

1947. *Papilio paris decorosa* Fruhstorfer : Talbot, *Fauna of British India, India including Ceylon and Burma,* (Butterflies), **2** : 491.

1981. *Papilio paris decorosa* Fruhstorfer, Arora and Mondal, *Rec. zool. Surv. India, Occ. Paper,* **29** : 43.

Material examined : Aizawl District : Seling, 25 km. From Aizawl Town, 1 ex., 8.xi.1995 *(P.H. Roy and Party coll). Fore wing length* : 120 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Manipur, Meghalaya, Orissa, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Myanmar.

Remarks : This subspecies is distinguished from *Papilio paris tamilana* Moore found in Peninisular India by the underside of fore wing bearing discal pale streaks reaching termen.

6. ***Papilio helenus helenus*** Linnaeus (Red Helen)

1758. *Papilio helenus* Linnaeus, *Syst. Nat., ed.* **10** : 459.

1939. *Papilio helenus helenus* Linnaeus : Talbot, *Fauna of British India, including Ceylon and Burma,* (Butterflies), **1** : 167.

1983. *Princeps (Menelaides) helenus* (Linnaeus) : Hancock, *Smithersia,* **2** : 48.

1992. *Papilio (Princeps) helenus* Linnaeus : Eliot *et al.*, *Butterflies of Malaya Peninsula* : 395.

Material examined : Aizawl District : Aibawk Forest, 40 km. South and Aizawl Town, 1 ex., 19.xii.1993; 3 exs., 28.xii.1993 *(S. S. Saha and Party coll.)*; Seling, 1 ex., 16.ix.1994 *(I. B. Dutta and Party coll.)*; Thungvel, 45 km. From Aizawl town, 1 ex., 7.xi.1995, Chhingchhip, 1 ex., 7.xi.1996 *(P. H. Roy and Party coll.)*. Chhimtuipui District : Saihatla village Hills, alt 850. 1 ex., 7.iv.1994 *(A. K. Hazra and Party coll.)*; Kawnpui, 1 ex., 13.xi.1995 *(M. S. Shishodia and Party coll.)*. Lunglei District : D.F.O. Office Complex, Lawngtlai, alt. 800 m. 2 exs., 3.iv.1994, Pangzawl, 1 ex., 13.xi.1995 *(P. H. Roy and Party coll.). Fore wing length* : 100-120 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui, Lunglei), Arunachal Pradesh, East Himalaya, Manipur, Meghalaya, Uttar Pradesh and West Bengal.

Elsewhere : Malaya Peninsular, Myanmar and Thailand.

Remarks : The nominate subspecies differs from the peninsular subspecies *daksha* (Hampson) occurring in South India by the underside of fore wing with pale streaks entering the celland reaching termen.

7. ***Papilio demoleus demoleus*** Linnaeus
(Lime Butterfly)

1758. *Papilio demoleus Linnaeus, Syst. Nat., ed.* **10** : 464.

1939. *Papilio demoleus demoleus* Linnaeus : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies) **1** : 189.

1983. *Princeps (Princeps) demoleus* (Linnaeus) : Hancock, *Smithersia,* **2** : 48.

1992. *Papilio (Princeps) demoleus* Linnaeus : Eliot *et al., Butterflies of Malaya Peninsula* : 395.

1993. *Papilio demoleus* Linnaeus : Varshney, *Oriental Insects,* **27** : 352.

Material examined : Aizawl District : Seling Champhai road, 1 ex., 26.ii.1991 *(P. H. Roy and Party coll.)*; Aibawk F. R. H. Compound, 1 ex., 25.iii.1994, *(G. C. Sen and Party coll.);* Aibawk, 1 ex., 16.xi.1995 *(M. S. Shishodia and Party coll.). Fore wing length :* 72-80 mm.

Distribution : India : Mizoram (Aizawl), widely distributed in India.

Elsewhere : East Palaeartic, Myanmar and Sri Lanka.

Remarks : Only the nominate subspecies is widelyy distributed in India and it is a well-known pest of *Citrus* spp.

8. ***Papilio polytes romulus*** Cramer
(Common Mormon)

1775. *Papilio romulus* Cramer, *Pap. Exot.,* **1** : 67.

1939. *Papilio polytes romulus* Cramer : Talbot, *Fauna of British India, including Ceylon and Burma,* (Butterflies), **1** : 178.

1992. *Papilio (Princeps) polytes romulus* Cramer : Eliot *et al., Butterflies of Malaya Peninsula* : 395.

Material examined : Aizawl District : Aibawk Forest, 40 km. South of Aizawl Town, 3 exs., 19.x.1991, 1 ex., 20.x.1991 *(J. K. Jonathan and Party coll.)*; North of the Aizawl, 1 ex., 5.xii.1993 *(R. S. Barman and Party coll.)*; Aibawk Forest, 40 km. South of Aizawl Town, 2 exs., 28.xii.1993 *(S. S. Saha and Party coll.)*; West Phaileng, 1 ex., 10.x.1998, *(M. S. Shishodia and Party coll.)*. Lunglei District : Pangzawl, 1 ex., 13.xi.1995 *(P. H. Roy and Party coll). Fore wing length* : 95-105 mm.

Distribution : India : Mizoram (Aizawl and Lunglei), Arunachal Pradesh, Assam, Meghalaya, North-East India, widely distributed in India.

Elsewhere : Malaya Peninsula, Myanmar, Sri Lanka, Tonkin and Vietnam.

Remarks : This subspecies differs from *Papilio polytes stichoides* Evans occurring in Andamans and *P. polytes nikobarus* Felder found in Nicobars by the upperside of hind wing in male having discal white band of even width, upperside and underside of hind wing bearing submarginal red lunules; and the female being trimorphic.

V. Genus ***Chilasa*** Moore

1881a. *Chilasa* Moore, *Lep. Ceylon,* **1** : 153.

Only one species *Chilasaclytia* (Linnaeus) of this genus is dealt with from Mizoram.

9. ***Chilasa clytia clytia*** (Linnaeus)
(Common Mime)

1758. *Papilio clytia clytia* Linnaeus, *Syst. Nat., ed.* **10** : 479.

1939. *Chilasa clytia clytia* (linnaeus) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **1** : 116.

1983. *Chilasa (Chilasa) clytia* (Linnaeus) : Hancock, *Smithersia,* **2** : 48.

1992. *Chilasa clytia clytia* (Linnaeus) : Eliot *et al., Butterflies of Malaya Peninsula* : 394.

1998. *Chilasa clytia clytia* (Linnaeus) : Mondal & Maulik, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-6) : 229.

Material examined : Aizawl District, Aibawk Forest, 40 km. South of Aizawl Town, 4 exs., 19.x.1991, *(J. K. Jonathan and Party coll.);* 2 km. South of Aibawk F. R. H., 1 ex., 28.iii.1994, *(G. C. Sen and Party coll.). Fore wing length* : 80-110 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, North-East India, Sikkim and West Bengal.

Elsewhere : Bhutan, Myanmar, Nepal and Sri Lanka.

Remarks : This nominate subspecies differs from *Chilasa clytia flavolimbatus* Oberthuer found

in Andamans by the dark brown wings bearing prominent post discal spots of which the apical one may be prolonged and there may be traces of a discal series.

Family NYMPHALIDAE

Antennae completely or partly scaled. Palpi not more than twice as long as the head except in Libytheinae. Fore wing with all 12 veins present,one vein usually dilaed at base. R_2 arising nearer apex of cell of wing, vein $1_A + 2_A$ may not be bifurcated at base. Hind wing cell closed by a tubular or non-tubular vein, precostal vein present. Fore legs imperfect in both sexes and not used for walking except in the female, fore tarsus always reduced to a single segment clothed with hair like scales resembling a small brush; in female fore tarsus with a variable number of segments.

Subfamily DANAINAE

Antennae not scaled; eyes naked; fore legs imperfect, useless for walking in both sexes; both wings ample and margin not dented or curved, of both wings are closed by tubular vein; fore wing with all veins present, vein 2A bifurcated at base, hind wing with precostal vein present.

This subfamily is represented in India by nine genera and 71 species of which four genera and 11 species are treated from Mizoram.

Key to genera

1. Hind wing precostal vein arising beyond origin of vein $S_c + R_1$ ..... ***Euploea*** Fabricius
– Hind wing precostal vein arising at or very close to origin of vein $S_c + R_1$. 2
2. Upperside of wings fulvous or white and without vitreous spots and stripes ..... ***Danaus*** Kluk
– Upperside of wings pale blue with vitreous spots and stripes 3
3. Fore wing cell closed by a transverse black bar ..... ***Tirumala*** Moore
– Fore wing cell not closed by a transverse black bar ..... ***Parantica*** Moore

VI. Genus *Euploea* Fabricius

1807. *Euploea* Fabricius, *Magazin fur Insekten Kunde (Illiger), Braunschweig,* **6** : 279-289.

Of the eleven species occurring in India, four are dealt with.

Key to species

1. Fore wing without a recurrent vein in the discal cell 2
– Fore wing with recurrent vein in the discal cell 3
2. Fore wing upperside black, with a large white cell-patch reacheing costa .... *radamanthus* (Fabricius)
– Fore wing upperside pale-brown, with white cell-spot and post-cellular spot .... *midamus* (Linnaeus)
3. Hind wing upperside in male covered with dense spatulate scales; hind wing in male with small off-white or light brown alar-patch .... *mulciber* (Cramer)
– Hind wing upperside in male without such alar-patch ..... *core* (Cramer)

10. *Euploea radamanthus radamanthus* (Fabricius)

(Magpie Crow)

1793. *Papilio radamanthus* Fabricius, *Ent. Syst.,* **3** : 42.

1947. *Euploea diocletianus diocletianus* (Fabricius) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies) **2** : 104.

1984. *Euploea radamanthus* (Fabricius) : Ackery and Vane-Wright, *Milkweed Butterflies* : 220.

1992. *Euploea radamanthus radamanthus* (Fabricius) : Eliot *et al., Butterflies of Malaya Peninsula* : 117.

Material examined : Aizawl District, Teirei Dampa Sanctuary, 1 ex., 28.xii.1993, *(S. S. Saha and Party coll.). Fore wing length* : 84 mm.

Distribution : India : Mizoram (Aizawl), North and North-East India.

Elsewhere : Kalimantan (Borneo), Indo-China, Java, Malaya, Myanmar, Nepal, Southern China and Sumatra.

Remarks : This nominate subspecies differs from *Euploea radamanthus dispoliata* Fruhstorfer occurring from Assam (India) to North-Western Myanmar by the presence of a white irregular spot in the apical portion of the cell on upperside of fore wing and from *Euploea radamanthus ramsayi* Moore found from Sikkim to Assam by the upperside of hind wing with the white markings restricted and not entering into base of area 3.

11. ***Euploea midamus rogenhoferi*** C. & R. Felder

(Blue Spoted Crow)

1865. *Euploea rogenhoferi* C. & R. Felder, *Reise Novara,* Lep. 2. (2) : 325-326 (male, "India spet.", recte Assam).

1947. *Euploea midamus rogenhopferi* C. & R. Felder : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), 2 : 92, fig. 36.

1998. *Euploea midamus rogenhoferi* C. & R. Felder : Mondal and Maulik, *Fauna of Meghalaya, State Fauna Series,* 4 (Part-6) : 237.

Material examined : Aizawl District, Aibawk Forest, 40 km. South of Aizawl Town, 1 ex., 19.x.1991, *(J. K. Jonathan and Party coll.). Fore wing length* : 110 mm.

Distribution : India : Mizoram (Aizawl), widely distributed in North and North-East India.

Elsewhere : Flores, Indo-China, Java, Myanmar, Nepal, Sumatra and Sunda Island.

Remarks : This subspecies differs from *E. midamus roepstorffi* (Moore) found in South Andaman Islands by the upperside of fore wing being bright to dark blue and the upperside of hind wing bearing postdiscal and submarginal spots also varying in number and some times may be absent.

12. ***Euploea mulciber mulciber*** (Cramer)

(Striped Blue Crow)

1777. *Papilio mulciber* Cramer, *Pap. Exot.,* 2 : 45, pl. 127, figs. C.D.

1947. *Euploea mulciber mulciber* (Cramer) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), 2 : 83, fig. 31.

1992. *Euploea mulciber mulciber* (Cramer) : Eliot et al, *Butterflies of Malaya Peninsula* : 400.

1997. *Euploea mulciber mulciber* (Cramer) : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series,* 3 (Part-7) : 783.

Material examined : Aizawl, 40 km. South of Aizawl town, 2 exs., 19.x.1991; Bung, ca 15 km. from Aizawl, 1 ex., 26.xi.1991, *(J. K. Jonathan and Party coll.);* Dampa, Rengpui, 1 ex., 28.xi.1995, *(P. Parui and Party coll.);* Kawnpui, 2 exs., 13.xi.1995, *(M. S. Shishodia and Party coll.).* Chhimtuipui District, Kownkown village, 1 ex., 4.iv.1994, *(S. K. Ghosh and Party coll.).* Lunglei District, Circuit House Campus, Lawngtlai, 850 mm. 1 ex., 3.iv.1994, *(A. K. Hazra and Party coll.). Fore wing length* : 90-100 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui and Lunglei), Andaman and Nicobar Island, Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal.

Elsewhere : China, Malaya, Peninsula, Myanmar, Nepal, Sumatra, Sunda Island and Vietnam.

Remarks : The nominate subspecies is distinguished from *E. mulciber kalinga* Doherty occurring from Tamil Nadu to "Bengal" by the upperside of fore wing bearing blue spots in male, and underside of hind wing in female is with narrow white streak in the cell or beyond the cell.

13. ***Euploea core core*** (Cramer)

(Common Indian Crow)

1780. *Papilio core* Cramer, *Pap. Exot.,* 3 : 133, Pl. 266, figs. E, F.

1947. *Euploea core core* (Cramer) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), 2 : 67, fig. 25.

1997. *Euploea core core* (Cramer) : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series,* 3 (Part-7) : 786.

Material examined : Aizawl district, Aibawk Forest, 40 km. South of Aizawl town, 2 exs., 9.x.1991, *(J. K. Jonathan and Party coll.). Fore wing length* : 84-90 mm.

Distribution : India : Mizoram (Aizawl), widely distributed in india.

Elsewhere : Bali, China, Java, Myanmar, Nepal, Pakistan and Sri Lanka.

Remarks : This nominate subspecies differs from all the other seven subspecies mainly by the upperside of fore wing being plain and bearing postdiscal spots and the upperside of hind wing with postdiscal spots larger than some of the marginal bands. This subspecies is mimicked by the female of *Hypolimnias bolina* (Linnaeus) of the subfamily Nymphalinae and *Chilasa* spp. of the family Papilionidae.

VII. Genus ***Danaus*** Kluk

1802. *Danaus* Kluk, *Zwierzat Hist. Nat. poez. Gospod.*, **6** : 84.

This genus is represented in India by four species of which two, *viz., D. chrysippus* (Linnaeus) and *D. genutia* (Cramer) are dealt with from Mizoram.

Key to species

Hind wing with middle discocellular vein slightly bent above the middle and not marked with a black spot; veins marked with black. ..... *genutia* (Cramer)

– Hind wing with middle discocellular vein sharply angulate above the middle and marked by a conspicuous black spot; veins not marked with black ..... *chrysippus* (Linnaeus)

14. ***Danaus genutia genutia*** (Cramer) (Common Tiger)

1779. *Papilio genutia* Cramer, *Pap. Exot.*, **3** : 23.

1947. *Danaus plexippus plexippus* (Linnaeus) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **2** : 67, fig. 25.

1984. *Danaus (Salatura) genutia* (Cramer) : Ackery and Vane-Wright, *Milkweed Butterflies* : 205.

1992. *Danaus genutia genutia* (Cramer) : Eliot *et al.*, *Butterflies of Malaya Peninsula* : 104.

1998. *Danaus genutia genutia* (Cramer) : Mondal and Maulik, *Fauna of Meghalaya, State Fauna Series,* **3** (Part-6) : 236.

Material examined : Aizawl district, Aibawk Forest, 40 km. South of Aizawl Town, 3 exs., 19.x.199 *(J. K. Jonathan and Party coll.);* Teirei, Dampa Sanctuary, 1 ex., 28.xii.1993, *(S. S. Saha and Party coll.);* Teirei Bush, 1 ex., 22.iii.1994, *(B. Biswas and Party coll.);* Rengpui, Dampa, 1 ex., 28.xi.1995, *(P. Parui and Party coll.).* Lunglei District. Panzawl, 1 ex., 13.xi.1995, *(P. H. Roy and Party coll.). Fore wing length* : 75-90 mm.

Distribution : India : Mizoram (Aizawl and Lunglei), widely distributed in India.

Elsewhere : Annam, China, Indo-China, Indonesia, Malayasia, North-West Australia, the Philippines and Taiwan.

Remarks : Only the nominate subspecies occurs in India. It exhibits sexual dimorphism as black veins in hind wing are very much thickened in male.

15. ***Danaus chrysippus chrysippus*** (Linnaeus) (Plain Tiger)

1758. *Papilio chrysippus* Linnaeus, *Syst. Nat., ed.* **10** : 471.

1947. *Danaus chrysippus chrysippus* (Linnaeus) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **2** : 20.

1984. *Danaus (Anosia) chrysippus* (Linnaeus) : Ackery and Vane-Wright, *Milkweed Butterflies* : 209.

1998. *Danaus chrysippus chrysippus* (Linnaeus) : Mondal and Maulik, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-6) : 236.

Material examined : Aizawl district, Bung, ca. 15 km. From Aizawl, 1 ex., 26.x.1991, *(J. K. Jonathan and Party coll.);* Sherkawn, 1 ex., 27.ii.1996.). *(S. C. Mitra and Party coll.). Fore wing length* : 76 mm.

Distribution : India : Mizoram (Aizawl), widely distributed in India.

Elsewhere : Asia Minor, China Japan, Sumatra and the Philippines.

Remarks : Only the nominate subspecies occurs in India

VIII. Genus *Tirumala* Moore

1880. *Tirumala* Moore, *Lep. Ceylon*, **1**(2) : 4.

Of the three species of this genus occurring in India, only *Tirumala septentrionis* (Butler) is treated from Mizoram.

16. *Tirumala septentrionis septentrionis* (Butler)

(Dark Blue Tiger)

1874. *Danais septentrionis* Butler, *Ent. Mon. Mag. London*, **11** : 163.

1947. *Danaus hamata septentrionis* (Butler) : Talbot, *Fauna of British India including Ceylon and Burma*, (Butterflies), **2** : 34.

1984. *Tirumala septentrionis* (Butler) : Ackery and Vane-Wright, *Milkweed Butterflies* : 119.

1998. *Tirumala septentrionis septentrionis* (Butler) : Mondal and Maulik, *Fauna of Meghalaya, State Fauna Series*, **4**(Part-6) : 235.

Material examined : Aizawl district, Aibawk Forest, 40 km. South of Aizawl town, 1 ex., 19.x.1991, *(J. K. Jonathan and Party coll.). Fore wing length* : 114 mm.

Distribution : India : Mizoram (Aizawl), Himlayas, Jammu & Kashmir (Kulu), southern Kashmir, Peninsular India.

Elsewhere : Mainly in Indo-Oriental species extending into Canton (rare), Bhutan, China, Hainan, Java, Kalimantan (Borneo), Malaya Nias, Nepal, Palawan, Sri Lanka, Sumatra, Taiwan, Thailand and Vietnam.

Remarks : This subspecies is variable and includes "*Danaus hamata musikanos* (Fruhstorfer)" treated as subspecies by Talbot (1947). Ackery & Van Wright (1984) mentioned that its occurrence in Afghanistan was erroneously given by Talbot (1947).

IX. Genus *Parantica* Moore

1880. *Parantica* Moore, *Lep. Ceylon*, **1** : 7.

There are five species of this genus occurring in India of which three are dealt with from Mizoram.

Key to species

1. Hind wing upperside in male with a scent-patch on vein C_u1_b near margin and a smaller one underside it on vein 2_A. Smallar species ..... *aglea* Moore
– Hind wing upperside in male with a scent-patch on vein 2_A nearer margin and a smaller one on vein 3_A. Larger species 2
2. Hind wing upperside marginal border bright chesnut, obscurely spotted ..... *sita* (Kollar)
– Hind wing upperside marginal border broad, dark, chocolate, prominently spotted .... *melaneus* (Cramer)

17. *Parantica aglea melanoides* Moore

(Glassy Tiger)

1883. *Parantica melanoides* Moore, *Proc. zool. Soc. London* : 247.

1947. *Danaus aglea melanoides (Moore)* : Talbot, *Fauna of British India including Ceylon and Burma*, (Butterfflies), **2** : 39.

1992. *Parantica aglea melanoides* Moore : Eliot *et al.*, *Butterflies of Malaya Peninsula* : 399.

1997. *Parantica aglea melanoides* Moore : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series*, **3**(Part-7) : 777.

Material examined : Aizawl district, Aibawk Forest, 40 km. South of Aizawl Town, 1 ex., 19.x.1991, *(J. K. Jonathan and Party coll.);* Teirei, Dampa, Sanctuary, 2 exs., 28.xii.1993, *(S. S. Saha and Party coll.);* Seling, 1 ex., 16.ix.1994, *(I. B. Dutta and Party coll.).* Chhimtuipui District, Kawnpui, 1 ex., 13.xi.1995, *(M. S. Shishodia and Party coll.). Fore wing length* : 76-90 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui), Andaman and Nicobar Islands, Jammu & Kashmir, North-East India.

Remarks : This subspecies differs from *P. aglea melanoleuca* Moore found in Andamans and nominate subspecies occurring in South India and Sri Lanka by the upperside of wings with markings more extensive and marginal spots complete.

18. ***Parantica sita sita*** Kollar

(Chestnut Tiger)

1844. *Parantica sita* Kollar, in Huegel, *Kasch. Reich. Sick,* **4** : 424. pl. 6.

1947. *Danaus* sita sita Kollar : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **2** : 45.

1998. *Parantica sita sita* Kollar : Mondal and Maulik, *Fauna of Meghalaya, State Fauna Series,* **4** (Part-6) : 234.

Material examined : Aizawl district, Champhai, 10 km. West of Aizawl I. B., 1 ex., 21.xi.1991, *(J. K. Joanthan and Party coll.). Fore wing length* : 100 mm.

Distribution : India : Mizoram (Aizawl), Assam, Arunachal Pradesh, Kashmir, Manipur, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Afghanistan Bhutan, China, Hainan, Myanmar, South-East Tibet, Yunan and Vietnam.

Remarks : Only the nominate subspecies occurs in India.

19. ***Parantica melaneus plataniston*** (Fruhstorfer)

(Chacolate Tiger)

1910. *Danaida melaneus plataniston* Fruhstorfer, In Seitz, *Macrolep. World,* **9** : 210.

1947. *Danaus melaneus plataniston* (Fruhstorfer) : Talbot, *Fauna of British India including Ceylon and Burma,* (Butterflies), **2** : 44. fig. 14.

1997. *Parantica melaneus plataniston* (Fruhstorfer) : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 777.

Material examined : Aizawl district, Aibawk, 1 ex., 17.xi.1994, *(I. B. Dutta and Party coll.). Fore wing length* : 92 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal and Uttar Pradesh.

Elsewhere : China, Indo-China, Myanmar, Nepal and Thailand.

Remarks : Only this subspecies occurs in India. However, some of the butterflies of the nominate subspecies occur with this subspecies on the boarder of Myanmar.

Family LASIOCAMPIDAE

Antennae bipectinate in both sexes, eyes small, palpi porrect and usually long, proboscis absent; legs usually with short apical pairs of spurs to mid and hind tibiae; fore wing vein 3A not forked with vein 2A, 3A rarely present, cell middle in position, veins M1 and R5 from angle of cell, veins R3 and R2 always stalked and before the apex of the cell; hind wing with two internal veins, M1 and Rs arising very near the base, vein Sc + R1 curved and almost touching Rs or connected with it by a bar thereby forming a precostal cell, acessory costal veinlet usually present; frenulum present.

A single genus and three species are treated from the state of Mizoram.

X. Genus ***Metanastria*** Huebner

1818. *Metanastria* Huebner, *Verz. bek. Schmett.* : 186.

Palpi long and broad. Antennae with branches gradually decreasing to the apex in male, short in female. Mid- and hind tibiae with minute terminal pairs of spurs. Fore wing broad; vein 1c present; 6 and 7, or 6, 7, 8 stalked; the stalk of vein 9 and 10 long. Hind wing with vein 4 and 5 stalked or from cell; 8 almost touching 7; slight accessory costal veinlets present.

Of the ten species of this genus occurring in India, three are treated from Mizoram.

20. ***Metanastria latipennis*** Walker

1856. *Metanastria latipennis* Walker, *Cat. Lep. Het. Brit. Mus.,* **6** : 1457.

1936. *Metanastria latipennis* Walker, Collier, *Lep. Cat.* **73** : 478.

Material examined : Aizawl District, Aibawk F. R. H., 1 ex., (at light), 16.xi.1995, *(M. S. Shishodia and Party coll.). Fore wing length* : 118 mm.

Distribution : India : Mizoram (Aizawl), Sikkim and West Bengal.

Elsewhere : Kalimantan (Borneo), Myanmar and Sri Lanka.

21. ***Metanastria lidderdalii*** Butler

1881. *Metanastria lidderdalii* Butler, *Ill. Typ. Spec. Lep. Het. Brit. Mus.*, **5** : 73, pl. 100, figs. 1, 2.

1997. *Metanastria lidderdalii* Butler : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series*, **3** (Part-7) : 647.

Material examined : Aizawl District, Aibawk (at light), 1 ex., 19.xi.1995, *(M. S. Shishodia and Party coll.). Fore wing length* : 110 mm.

Distribution : India : Mizoram (Aizawl), Sikkim and West Bengal.

Elsewhere : Bhutan.

22. ***Metanastria ampla*** Walker

1855. *Metanastria ampla* Walker, *Cat. Lep. Het. Brit. Mus.*, **6** : 1412.

1936. *Metanastria ampla* Walker : Collier, *Lep. Cat.*, **73** : 298.

Material examined : Aizawl District, Aibawk Forest 40 km. South of Aizawl Town, 2 exs., 19.x.1991, *(J. K. Jonathan and Party coll.). Fore wing length* : 96 mm.

Distribution : India : Mizoram (Aizawl), Sikkim.

Elsewhere : Bangladesh (Sylhet), Java, Myanmar and the Philippines.

Family LYMANTRIIDAE

Proboscis absent; legs hairy; fore wing vein 3_A not anastomosing with 2_A, 3_A absent, M_2 from close to lower angle of cell; hind wing with two internal veins; M_2 from the lower angle of cell, vein $S_c + R_1$ nearly touching at middle of cell and connected with it by a bar, frenulum present.

This family is represented in India by 28 genera and 176 species of which, two genera and four species are treated from the state of Mizoram.

Key to genera

Antennae in male serrate, in female bipectinate. Palpi upturned. Fore wing apex rounded; vein R_2 given off nearer the cell than from the origin of R_5 ..... ***Lymantia*** Huebner

– Antennaae bipectinate in both sexes, branches long in male than in female. Palpi obliquily porrect. Fore wing vein R_2 given off towards the apex than from the origin of R_5 ..... ***Euproctis*** Huebner

XI. Genus ***Lymantria*** Huebner

1818. *Lymantria* Huebner, *Verz. bek. Schmmett.*, : 160.

In male, palpi porrect and hairy; antennae with branches long. Fore wing with veins C_u1_a, M_3, M_2 from close to angle of cell; M_1 from below upper angle; R_5, R_4, R_3 and R_2 stalked, R_5 being given off further from the cell than R_2. Hind wing veins C_u1_a, M_3, M_2 from close to angle of cell; M_1 and R_s from upper angle. In female, antennae serrate; being either fully developed or partially aborted or reduced to scales.

Sixteen species of this genus occur in India of which, two are treated from Mizoram.

23. ***Lymantria rosea*** Hampson

1892. *Lymatria rosea* Hampson. *Ill. Het.*, **9** : ined., pl. 158. Fig. 28.

1934. *Lymantria rosea* Hampson : Bryk, *Lep. Cat.*, **20**(62) : 162.

Material examined : Aizawl District, Aibawk Forest, 40 km. South of Aizawl, 1 ex., 19.x.1991, *(J. K. Jonathan and Party coll.). Fore wing length* : 55 mm.

Distribution : India : Mizoram (Aizawl), Assam.

Elsewhere : Sri Lanka.

XII. Genus ***Euproctis*** Huebner

1818. *Euproctis* Huebner, *Verz. bek. Schmmett*, : 159.

Palpi porrect and long, the 3rd joint short; antennae long and with the branches long; legs with spurs long. Fore wing veins C_u1_a, M_3 and M_2, from near the lower angle of cell; M_1 from below the upper angle; R_5 from angle; R_4, R_3 and R_2 stalked. Hind wing with veins Cu1a and M_3 from angle of cell; M_2 from above angle; M_1 and R_s stalked.

This genus is represented in India by 45 species of which, three are treated from Mizoram.

24. ***Euproctis venosa*** Moore

1870. *Euproctis venosa* Moore, *Descrp. India Lep. Coll. Atkison* **1** : 50. Pl. 2, fig. 5.

1997. *Euproctis venosa* (Moore) : Mondal and Maulik, *Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 674.

Material examined : Aizawl District, West Phaileng (at light), 1 ex., 10.x.1998, *(M. S. Shishodia and Party coll.). Fore wing length* : 22 mm.

Distribution : India : Mizoram (Aizawl), Sikkim and West Bengal.

Elsewhere : South Myanmar.

25. ***Euproctis scintillans*** Walker

1856. *Euproctis scintillans* Walker, *Cat. Lep. Het. Brit. Mus.,* **7** : 1734.

1934. *Euproctis scintillans* Walker : Bryk, *Lep. Cat.,* **20**(62) : 232.

Material examined : Aizawl district, Dampa Wildlife Sanctuary, 1 ex., 22.x.1991, *(J. K. Jonathan and Party coll.). Fore wing legth* : 24 mm.

Distribution : India : Mizoram (Aizawl), Andamans and widely distributed in India.

Elsewhere : Myanmar and Sri Lanka.

26. ***Euproctis atomaria*** (Walker)

1855. *Artaxa atomaria* Walker, *Cat. Lep. Het. Brit. Mus.,* **4** : 777-796.

1934. *Euproctis atomaria* Walker : Bryk, *Lep. Cat.,* **20**(62) : 162.

Material examined : Aizawl District, Teirei, (at light), 1 ex., 10.xi.1995, *(M. S. Shishodia and Party coll.). Fore wing length* : 30 mm.

Distribution : India : Mizoram (Aizawl), North India and Sikkim.

Elsewhere : Myanmar and Sri Lanka.

SUMMARY

Twenty six species in 12 genera and four families are dealt with from Mizoram. The butterflies include 19 species under nine genera and two families, *viz.*, Papilionidae and Nymphalidae (Danainae) and moths represent seven species under three genera and two families— Lasiocampidae and Lymautriidae. All these species are first definitive records from the state of Mizoram. An appendix listing the species with their district-wise distribution in Mizoram has also been provided.

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APPENDIX

(A list of species of butterflies and moths with their District-wise distribution in Mizoram)

Sl. No.	Name of the species / family	Name of the District		
		Aizawl	Chhimtuipui	Lunglei
	Family PAPILIONIDAE			
1	*Lamproptera curius curius* (Fabricius)	+	–	–
2	*Graphium sarpedon luctatius* Fruhstorfer	–	–	+
3	*Graphium agamemnon agamemnon* (Linnaeus)	+	–	–
4	*Atrophaneura varuna astorion* (Westwood)	+	+	+
5	*Papilio paris decorosa* Fruhstorfer	+	–	–
6	*Papilio helenus helenus* Linnaeus	+	+	+
7	*Papilio demoleus demoleus* Linnaeus	+	–	–
8	*Papilio polytes romulus* Cramer	+	–	–
9	*Chilasa clytia clytia* (Linnaeus)	+	–	–
	Family NYMPHALIDAE Subfamily DANAINAE			
10	*Euploea radamanthus radamanthus* (Fabricius)	+	–	–
11	*Euploea mulciber mulciber* (Cramer)	+	–	–
12	*Euploea radamanthus radamanthus* (Fabricius)	+	+	+
13	*Euploea core core* (Cramer)	+	–	–
14	*Danaus genutia genutia* (Gramer)	+	–	–
15	*Danaus chrysippus chrysippus* (Linnaeus)	+	–	–
16	*Tirumala septentrionis septentrionis* (Butler)	+	–	–
17	*Parantica aglea melanoides* Moore	+	+	–
18	*Parantica sita sita* Kollar	+	–	–
19	*Parantica melaneus plataniston* (Fruhstorfer)	+	–	–
	Family LASIOCAMPIDAE			
20	*Metanastria latipennis* Walker	+	–	–
21	*Metanastria lidderdalii* Butler	+	–	–
22	*Metanastria ampla* Walker	+	–	–
	Family LYMANTRIIDAE			
23	*Lymantria rosea* Hampson	+	–	–
24	*Euproctis venosa* Moore	+	–	–
25	*Euproctis scientillans* Walker	+	–	–
26	*Euproctis atomaria* (Walker)	+	–	–

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INSECTA : LEPIDOPTERA
NYMPHALIDAE, LYCAENIDAE AND SATURNIIDAE

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INTRODUCTION

There are more than 17,200 species of butterflies known over the globe. Of these, about 1,500 (8.66%) occur in India. Eastern part of India, affording more than 50% of the species, is very rich in butterfly fauna.

The contributions to the knowledge on butterflies of India are mainly by de Niceville (1886, 1890), Bingham (1905, 1907), Evans (1932), Talbot (1947) and Wynter-Blyth (1957) which include families, viz., Nymphalidae and Lycaenidae. Cantlie (1962) treated Lycaenidae of India except the Arhopala Group. However, the definitive records of species of butterflies are least known from the state of MIzoram.

An attempt has been made to study the butterflies of the families-Nymphalidae and Lycaenidae particularly from Mizoram. The study is based on the material collected by several scientists of the Zoological Survey of India during the period 1987, 1993-1998. Consequently, 56 species of Lepidoptera from Mizoram include 55 species of butterflies under 39 genera and seven subfamilies of two families, *viz.*, Nymphalidae and Lycaenidae and a species of moth *Samia cynthia* (Drury) of the family Saturniidae.

Of these 56 species, a good number of 44 is represented in Aizawl District followed by 17 and 11 in Chhimtipui and Lunglei District respectively. Keys to identification of species and genera have been provided. The common name, fore wing length and geographical distribution of each species/subspecies have been given. An appendix giving district-wise distribution of the species/subspecies treated from Mizoram has also been given.

SYSTEMATIC ACCOUNT

Family NYMPHALIDAE

Antennae completely or partially scaled. Palpi not more than twice as long as the head except in Libytheinae. Fore wing with all the 12 veins present, one vein usually dilated at base, R_2 arising nearer apex of cell of wing, vein 1A + 2A may or may not be bifurcated at base. Hind wing cell closed by a tubular or non-tubular vein, precostal vein present. Fore legs imperfect in both sexes and not used for walking except in the female, fore tarsus always reduced to a single segment clothed with hair like scales resembling a small brush ; in female fore tarsus with a variable number of segments. Corbet and Pendlebury (1992) have been followed for treating subfamilies under the family Nymphalidae. At present, following five subfamilies have been dealt with from Mizoram.

Subfamily SATYRINAE
Subfamily MORPHINAE
Subfamily ACRAEINAE
Subfamily NYMPHALINAE
Subfamily CHARAXINAE

Subfamily SATYRINE

Usually medium sized, body slender. Eyes hairy or smooth, palpi flattened laterally and usually densely hairy ; fore tarsi imperfect and brush like in both sexes, and useless for walking. Wings short and broad, termen often scalloped, dentated or caudate on hind wing. Wings usually dull brown and ornanmented with submarginal occelli. Fore wing with all veins present, veins may be basally thickend. Cells closed by tubular veins except cell open in genus *Ragadia.*

The subfamily is represented in India by 22 genera and about 150 species of which nine species under six genera arè treated from Mizoram.

Key to genara

1. Eyes hairy 2
– Eyes glabrous 3
2. Fore wing with veins *1b* and median swollen; upper angle of cell strongly acute; discocellular viens angled ..... ***Mycalesis*** Huebner
– Fore wing vein *1b* not swollen; median vein more or less swollen ..... ***Lethe*** Huebner
3. Hind wing with a precostal cell present ..... ***Elymnias*** Huebner
– Hind wing without a precostal cell 4
4. Fore wing with median vein swollen 5
– Fore wing without swollen median vein ..... ***Melanites*** Fabricius
5. Fore wing with anterior margin of cell not longer than the lower margin ..... ***Ypthima*** Huebner
– Fore wing with anterior margin of cell markedly longer than the lower margin ..... ***Orsotrioena*** Wallengren

I. Genus ***Mycalesis*** Huebner

1818. *Mycalesis* Huebner, *Zutr. z. Samml. exot. Schmett.* **1** : 17.

Of the 25 species of this genus occurring in India, only one i.e. *Mycalesis perseus* (Fabricius) is dealt with from Mizoram.

1. ***Mycalesis perseus blasius*** (Fabricius)

(Common Bushbrown)

1798. *Papilio blasius* Fabricius, *Ent. Syst., Suppl.* : 426
1932. *Mycalesis perseus blasisus* (Fabricius) : Evans. *Identification of Indian Butterflies* : 98.
1947. *Mycalesis perseus blasius* (Fabricius) : Talbot, *Fauna of British India (Butterflies),* **2** : 132.

Material examined: Aizawl District, Thingdam, alt. 1000 m, 20 km. of Aizawl, 1 ex, 22-i-1995 *(T. K. Pal & Party). Fore wing length*: 24 mm.

Distribution : India : Mizoram (Aizawl) and Himachal Pradesh.

Elsewhere : Myanmar.

Remarks : This subspecies differs from *Mycalesis perseus tabitha* (Fabricius) found in Peninsular India, Madhya Pradesh, Uttaranchal, Uttar Pradesh and Sri Lanka by the upperside of fore wing always with a pupilled ocellus in area 2.

II. Genus ***Lethe*** Huebner

1819. *Lethe* Huebner, *Verz. bekannt. Schmett.* **(4)** : 56

Key to species

1. Hind wing with vein Sc about half as long as vein R_3.
– Hind wing underside without an ocellus in area 7 ..... *bhadra* (Moore)
2. Hind wing with vein Sc nearly as long as vein Rs.
– Hind wing underside with an occellus in area 7 ..... *confusa* Aurivillius

2. ***Lethe bhadra*** (More)

(Tailed Labyrinth)

1857. *Lasiommata bhadra* More, in Horsfield & Moore, *Cat. Lep. Ins. East India Coy.,* **I** : 227.

1932. *Lethe bhadra* (Moore) : Evans, *Identification of Indian Butterflies* : 109.

1947. *Lethe bhadra* (Moore) : Talbot, *Fauna of British India (Butterflies)*, **2** : 236.

Material examined : Aizawl District, Teirei, Dampa Sanctuary, 1 ex., 28-xii-1993 *(S. S. Saha)*. *Fore wing lentgh* : 38 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Sikkim.

Elsewhere : Bhutan, Myanmar and Tonkin.

Remarks : Only the wet season form is represented in India and Bhutan whereas its dry season from occurs in Myanmar.

3. *Lethe confusa confusa* Aurivillus

(Banded Treedrown)

1898. *Lethe confusa* Aurivillus, *Ent. Tidsch.*, **18** : 142.

1932. *Lethe confusa confusa* Aurivillus : Evans, *Identification of Indian Butterflies* : 105.

1947. *Lethe confusa confusa* Aurivillus : Talbot, *Fauna of British India (Butterflies)*, **2** : 205-207.

Material examined : Aizawl District, 2 km. N. East of Aibawk F.R.H., 1 ex., 27-iii-1994 *(G. C. Sen & Party)*; Champhai, 1 km. East of S.C.R.H., 1 ex., 3-iv-1994 *(G. C. Sen & Party)* ; Chhiahtlang, 2 exs., 10-iv-1995 *(P. H. Roy & Party)*. Lunglei District, Chawnhu Forest, near Lawngtlai, 900 m., 4 exs., 2-iv-1994 *(Dr. A. K. Hazra & Party)*. *Fore wing length* : 25-33 mm.

Distribution : India : Mizoram (Aizawl, Lunglei), Arunachal Pradesh, Assam, Nagaland, Kashmir, Sikkim, Uttaranchal (Mussoorie).

Elsewhere : Pakistan (Murree), Myanmar, Tonkin, Siam (Thialand), Malaya, Hainan, South and Western China and South-East Tibet.

Remarks : The male of this species emits a delicious vanilla-like scent.

III Genus *Elymnias* Huebner

1818. *Elymnias* Huebner, *Zutr. z. Samml. exot. Schmett.* **1** : 12.

This genus is represented in India by nine species of which only one species i.e. *Elymnias hypermnestra* Linnaeus is dealt with from Mizoram.

4. *Elymnias hypermnestra undularis* (Drury)

(Common Palmfly)

1773. *Papilio undularis* Drury, *Ill. Exot. Ins.* **3** : pl. 10, figs 1, 2 (male).

1932. *Elymnias hypermnestra undularis* (Drury) : Evans, *Identification of Indian Butterflies* : 128.

1947. *Elymnias hypermnestra undularis* (Drury) : Talbot, *Fauna of British India (Butterflies)*, **2** : 386.

Material examined : Aizawl District, Saikah, 1 ex., 11-xi-1996 *(P. H. Roy & Party)*. *Fore wing length* : 33 mm.

Distribution : India : Mizoram (Aizawl), 'Bengal' and Uttaranchal.

Elsewhere : Northern Myanmar.

Remarks : This subspecies differs from *Elymnias hypermnestra caudata* Butler occurring in South India by having hind wing not long tailed at vein 4.

IV Genus *Melanitis* Fabricius

1807. *Melanitis* Fabricius, *Mag. F. Insektenk. (Illiger)* **6** : 282.

Of the three species of this genus occurring in India only one, i.e. *Melanitis leda* (Linnaeus) is treated from Mizoram.

5. *Melanitis leda ismene* (Cramer)

(Common Evening Brown)

1775. *Papilio ismene* Cramer, *Pap. Exot.*, **1** : 40.

1932. *Melanitis leda ismene* (Cramer) : Evans, *Identification of Indian Butterflies* : 125.

1947. *Melanitis leda ismene* (Cramer) : Talbot, *Fauna of British India (Butterflies)*, **2** : 366.

Material examined : Lunglei District., Thaigal, 1 ex., 27-xi-1996 (on wild flower) *(P. H. Roy & Party)*. *Fore wing length* : 36 mm.

Distribution : India : Mizoram (Lunglei), Andaman & Nicobar Islands, widely distributed in India.

Elsewhere : Japan, Kalimantan (Borneo), Myanmar, Sumatra and Thailand (Formosa).

Remarks : This subspecies occurs in two distinct forms, *viz.*, dry season form (DSF) called *Melanitis leda ismene* f. *ismene* (Cramer) and wet season form (WSF) known as *M. leda ismene* f. *determinata* Butler. The DSF is distinghished from WSF by the apex of fore wing being obtuse and more or less falcate and outer margin below vein 5 straight or sinuous, and hind wing without an ocellus in area 2, put posteriorly replaced by three or four minute white submarginal spots.

V. Genus *Ypthima* Huebner

1818. *Ypthima* Huebner, *Zutr. z. Samml. exot. Schmett.* **1** : 17.

The genus is represented in India by 19 species of which three are dealt with from Mizoram.

Key to species

1. Underside of hind wing with ocelli, the latter often obsolete in dry season form .... *ceylonica* Kirby
- Underside of hind wing with a single apical ocellus in area 6 2
2. Under side of fore wing without discal fascia, submarginal fascia obscure. Male without brand. Underside of hind wing with ocellus in 6 minute ; underside of hind wing without discal fascia. ..... *philomela* (Linnaeus)
- Underside of hind wing with occellus in area 6 more or less prominent, two apical occelli not prominent, discal line obsolete ..... *indecora* Moore

6. *Ypthima ceylonica huebneri* Kirby

(White Fourring)

1871. *Ypthima huebneri* Kirby, *Syn. Cat. diurn. Lep.* : 95.

1932. *Ypthima huebneri huebneri* Kirby : Evans, *Identification of Indian Butterflies* : 122.

1947. *Ypthima ceylonica huebneri* Kirby : Talbot, *Fauna of British India (Butterflies),* **2**: 329.

Material examined : Aizawl District, Mamit, 1 ex., 12-x-1998 *(M. S. Shishodia & Party). Fore wing length* : 16 mm.

Distribution : India : Aizawl District, Mizoram (Aizawl), Assam and Peninsular India.

Elsewhere : Malaya and Myanmar.

Remarks : This subspecies is distinguished from the nominate subspecies occurring from South India to 'Bengal' and Sri Lanka and *Y. ceylonica kasmira* Moore found from Kashmir (J & K) to Kumaon (Uttaranchal) by underside of both wings having all fasciae prominent and upperside of hind wing being without white.

7. *Ypthima philomela peguana* Evans

(Baby Fivering)

1923. *Ypthima philomela peguana* Evans, *J. Bombay nat. Hist. Soc.,* **29** : 786.

1932. *Ypthima philomela peguana* Evans : Evans, *Identification of Indian Butterflies* : 122.

1947. *Ypthima philomela peguana* Evans : Talbot, *Fauna of British India (Butterflies),* **2** : 336.

Material examined : Chhimtuipui District, Blue Mountain Expedition, Lungpher, 1 ex., 9-vii-1987 *(H. C. Ghosh)*; Vairengte, alt. 120 m., 1 ex., 5-ii-1995 *(T. K. Pal & Party)*; Thuam Pui, 1 ex., 30-xi-1996 *(S. C. Mitra & Party).* Aizawl District, West Phaileng, 1 ex., 8-x-1998, Teirei, 1 ex., 12-x-1998 *(M. S. Shishodia & Party). Fore wing length* : 17-18 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui).

Elsewhere : Northern Myanmar.

Remarks : This subspecies differs from *Ypthima philomela tabella* Marshall & De Niceville by the underside of hind wing having always visible discal fascia.

8. *Ypthima indecora* Moore

(Western Fivering)

1882. *Ypthima indecora* Moore, *Proc. zool. Soc. London* : 238, pl. 12, fig. 7 (o), (oo, Kangra).

1932. *Ypthima indecora* Moore : Evans, *Identification of Indian Butterflies* : 122.

1947. *Ypthima indecora* Moore : Talbot, *Fauna of British India (Butterflies),* **2** : 336.

Material examined : Chhimtuipui District, Vairengte, alt. 120 m., 3 exs., 5-ii-12995 *(T. K. Pal & Party). Fore wing length* : 15-16 mm.

Distribution : India : Mizoram (Chhimtuipui), Jammu & Kashmir and Uttaranchal.

Remarks : Talbot (1947) opined it representing as *philomela.*

VI. Genus *Orsotriaena* Wallengren

1858. *Orsotriaena* Wallengreen, *Ofvers. Vetensk. Akad. Forh., Stockh.* **15** : 79.

This genus is represented in India by a single species i.e. *Orsotriaena medus* (Fabricius).

9. *Orsotrioena medus medus* (Fabricius)

(Nigger)

1775. *Papilio medus* Fabricius, *Syst. Ent.* (3), **1** : 448.

1932. *Orsotrioena medus medus* (Fabricius) : Evans, *Identification of Indian Butterflies* : 123.

1947. *Orsotrioena medus* Fabricius : Talbot, *Fauna of British India* (Butterflies), **2** : 349.

Material examined : Aizawl District, Teirei (at night), 1 ex., 10-xi-1995 *(M. S. Shishodia).* Champhai, 1 km. N. of S.C.R.H., 3 exs., 4-iv-1994, 1 km. West of S.C.R.H., 1 ex., 5-iv-1994 *(G. C. Sen & Party). Fore wing length* : 19-22 mm.

Distribution : India : Mizoram (Aizawl), Andaman Island and Sikkim.

Elsewhere : Hainan, Myanmar, Nepal, Tonkin and also extending southwards to Australia and New Guinea.

Remarks : This nominate subspeices is distinguished from *O. medus mandata* (Moore) found in South India and Sri Lanka by underside of with white discal narrow and even may be absent or replaced by a dark line. This subspecies is also distinct from *O. medus nicobarica* Evans found in Nicobars by being paler in colouration and larger in size.

Subfamily MORPHINAE

The subfamily includes very large and showy species. The majority of the species have enormous size of wings as compared to that of the body. The subfamily has three tribes, *viz.*, Morphini, Brassolini and Amathusiini. Only the tribe Amathusiini is represented in the tropics of the Oriental Region (including the Papuan subregion).

Tribe AMATHUSIINI

Eyes smooth; labial palpi usually long, prominent and laterally compressed; termen of wings usually entire, underside of hind wing usually with submarginal ocellus in each of areas Cu_{1b} and M_1; fore legs imperfect in both sexes.

The tribe is represented in India by 24 species and subspecies belonging to eight genera. Of these, Only *Discophora sandaica* Boisduval is treated from Mizoram.

VII. Genus *Discophora* Boisduval

1836. *Discophora* Boisduval, (Roret's Suite a Buffon), *Hist. Nat. Ins. Consid. gen.* **1** *Lepid.* : pl. 4. [= 4a], fig. 12 (larva et pupa) (as *Discophorus*), pl. 12 [= 8b], fig. 3 (as *Discophora*).

This genus is known in India by five species of which one *Discophora sondaica* Boisduval is treated from Mizoram.

10. *Discophora sondaica zal* Westwood

(Common Duffer)

1851. *Discophora sandaica zal* Westwood, *Gen. diurn. Lep.*, **2** : 331.

1932. *Discophora tullia zal* Westwood : Evans, *Identification of Indian Butterflies* : 135.

1947. *Discophora sandaica zal* Westwood : Talbot, *Fauna of British India (Butterflies),* **2** : 348.

2002. *Ariadne ariadne pallidior* (Fruhstorfer), Gupta : *Zool. Surv. India, State Fauna Series* 9, *Fauna of Sikkim Part* **3** : 395.

Material examined : Aizawl District, Aibawk, 1 ex., (at light) 16-xi-1995 *(M. S. Shishodia). Fore wing length* : 41 mm.

Distribution : India : Mizoram (Aizawl), Sikkim.

Elsewhere : Myanmar.

Remarks : This subspecies differs from *Discophora sandaica muscina* Stichel by male upperside of fore wing bearing spots not equally promint and hind wing marked with spots; in both sexes upperside of fore wing bearing bluish white spots and in female a yellow patch is present at end cell.

Subfamily ACRAEINAE

Wing sparsely scaled and spotted; cell of fore wing and hind wing closed by tubular veins; hind wing flat; fore legs imperfect in both sexes.

The subfamily is represented in India by a genus *Acraea* Fabricius.

VIII. Genus ***Acraea*** Fabricius

1807. *Acraea* Fabricius, *Mag. F. Insektenk. (Illiger)* **6** : 284.

This genus is represented in India by two species of which one i.e. *Acraea issoria* Huebner is dealt with from Mizoram.

11. ***Acraea issoria issoria*** (Huebner)

(Yellow Coster)

1818. *Telchinia issoria* Huebner, *Zutr. Z. Samml. exot. Schmett.* **1** : 27.

1932. *Pareba vesta vesta* Fabricius : Evans, *Identification of Indian Butterflies* : 192.

1947. *Acraea issoria issoria* (Huebner) : Talbot, *Fauna of British India (Butterflies),* **2** : 463.

2002. *Acraea issoria issoria* (Huebner) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9**(Part-3) : 397.

Material examined : Aizawl District, West Phaileng, 3 km., 1ex., 9-x-1998 (*M. S. Shishodia & Party).* Chhimtuipui District, Thungdam, 20 km. South of Aizawl, 1 ex., 13-v-1994 (*T. K. Pal & Party). Fore wing length* : 32-33 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui), Assam and Sikkim.

Remarks : This nominate subspecies is distinguished from its counterpart, *Acraea issoria anomala* Kollar found from Himachal Pradesh (Kulu) to Uttaranchal (Kumaon) by having larger wing expanse. The upperside of fore wing bearing broader black margins in female than in male.

Subfamily NYMPHALINAE

Butterflies of medium to large size; antennae always at best partly scaled, with two grooves separated by a central ridge and bordered by two lateral carinae on the ventral surface; wings with terminal margin may be scalloped, crenulate or dentate, hind wing may be caudate; fore tarsi imperfect, brush like and useless for walking in both sexes, although usually longer and several segmented, often spined and rarely clawed in female; male secondary sexual characters not strongly developed in Heliconiini.

These nymphalids have ground colour of wings bright brown or yellowish brown, some with striking or beautiful colour patterns. These are sun lovers and are often seen at flowering plants in the garden and forest. Some larger species are attracted by over ripe fruits, toddy, excreta of animals etc.

The widely accepted arrangement of tribes has been follwed after Corbet and Pandlebury (1992). The following tribes are represented in Mizoram.

Tribe BIBLIDINI
Tribe HELICONIINI
Tribe NYMPHALINI
Tribe LIMENTIDINI
Tribe PSEUDORGOLINI

Tribe BIBLIDINI

The tribe includes two genera., viz., *Ariadne* Horsefild and *Byblia* Huebner from India of which, the former is treated from Mizoram.

IX. Genus ***Ariadne*** Horsfield

1829. *Ariadne* Horsfield, *Descr. Cat. Lepid. Ins. Mus. East India Coy* (2) : [3] (ref. Pl. vi)

This genus is represented in India by two species, viz., *Ariadne ariadne* (Linnaeus) and *A. merione* (Cramer) which are dealt with from Mizoram.

Key to species

Underside of wings with a single discal line just beyond cell, being regular. Outer margin of fore wing concave between Cula and M4 ..... *ariadne* (Linnaeus)

– Underside of wings with a double discal line just beyond cell, being highly irregular. Outer margin of fore wing faintly concave between Cula and M4 ..... *merione* (Cramer)

12. *Ariadne ariadne pallidior* (Fruhstorfer)

(Angled Castor)

1911. *Ergolis pallidior* Fruhstorfer, *Berl. Ent. Zschr.* **44** : 90.

1932. *Ergolis ariadne pallidior* Fruhstorfer : Evans, *Identification of Indian Butterflies* : 191.

2002. *Ariadne ariadne pallidior* (Fruhstorfer), Gupta : *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 398.

Material examined : Chimtuipui District, Lungpher, 1 ex., 10-xii-1987, *(H. C. Ghosh)*; Haptland, 1 ex., 9-xii-1993 *(R. S. Barman & Party).* Aizwal District; Teirei, Dampa Sanctuary, 27-xii-1993, *(S. S. Saha)*; Dampa, Rangpui, 1 ex., 28-xi-1995 *(P. Parui & Party)*; West Phaileng, 1 ex., 8-x-1995, 2 exs. (at light), 11-x-1998 *(M. S. Shishodia & Party)*; Chhingchhip, 1 ex., 7-xi-1995 *(P. H. Roy and Party). Fore wing length* : 23-25 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui), Arunachal Pradesh, Sikkim and Uttar Pradesh.

Elsewhere : Myanmar.

Remarks : This species is distinguished from *A. ariadne indica* (Moore) found from South India to 'Bengal' by its larger wing expanse and the upperside of hind wing with vein M_2 and M_1 not conspicuously white and discal lines run to costa.

13. *Ariadne merione assama* (Evans)

(Common Castor)

1924. *Ergolis merione assama* Evans, *J. Bombay nat. Hist. Soc.,* **30** : 95.

1932. *Ergolis merione assama* Evans : *Identification of Indian Butterflies* : 191.

2002. *Ariadne merione assama* (Fruhstorfer), Gupta, *Zool. Surv. India, State Fauna Series* 9, *Fauna of Sikkim* Part-9 : 398.

Material examined : Lunglei District, Paungzwal, 2 exs., 13-xi-1995 *(P. Parui & Party). Fore wing length* : 26 mm.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : This subspecies differs from nominate subspecies occurring from South India to Maharashtra and *A. merione tapestrina* Moore found from Madhya Pradesh to Orissa and from Jammu & Kashmir to Uttar Pradesh by its larger wing expanse of 55–60 mm and also its dry season form being never much variegated.

Tribe HELICONINI

Labial palpi with second segment inflated. Fore wing vein not dilated at base, R_2 arising from R_5 or cell, apex of cell origin of Cula equidistant from wing base mor former more distant; hind wing precostal vein arising beyond origin of vein.

This tribe is represented in India by eight genera of which five are dealt with from Mizoram.

Key to genera

1. Tarsal claws very long and without appendages ..... *Cethosia* Fabricius

– Tarsal claws normal and with appendages 2

2. Fore wing with lower discocellular vein, if present, ending beyond origin of vein Cula ..... *Argynnis* Fabricius

– Fore wing with lower discocellular vein ending before or only just beyond origin of vein Cu_{1a} 3

3. Fore wing vein R_2 arising from R_5, R_3 ending on costa and R_2 behind a line joining ends of R_5 and M_1 ..... *Phalanta* Horsfield

– Fore wing vein R_2 arising from cell, R_3 ending on apex behind a line joining ends of veins R_4, R_3 and M_1 ..... *Vindula* Hemming

X. Genus *Cethosia* Fabricius

1806. *Cethosia* Fabricius, *Mag. F. Insektenk. (Illiger)* **6** : 280.

Of the three species of this genus occurring in India, two, *viz., Cethosia cyane* (Drury) and *C. biblis* (Drury) are treated from Mizoram.

Key to species

Upperside of fore wing in both sexes marked with a broad oblique discal white or yellowish band ..... *cyane* (Doubleday)

– Upperside of fore wing, in either sex, without a broad discal white or yellowish band .... *biblis* (Drury)

14. *Cethosia cyanae* (Drury)

1770. *Papilio cyane* Drury, *Ill. Exot. Ent.*, **1** : pl. 4, fig. 1.

1932. *Cethosia cyanae* (Drury) : Evans, *Identification of Indian Butterflies* : 190.

2002. *Cethosia cyanae* (Drury) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 399.

Material examined : Aizawl District, Dampa Rangpui, 1 ex., 28-x-1995 *(M. Sil, & Party). Fore wing length* : 36 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Orissa, Uttar Pradesh and West Bengal.

Elsewhere : Myanmar.

Remarks : This species exhibits sexual diamorphism as upperside of wings is tawny in male but upperside of fore wing black and hind wing brownish in female.

15. *Cethosia biblis tisamena* Fruhstorfer (Red Lacewing)

1909. *Cethosia biblis tisamena* Fruhstorfer, In Seitz, *Macrolepidoptera of the World,* **9** : 725.

1932. *Cethosia biblis tisamena* Fruhstorfer : Evans, *Identification of Indian Butterflies* : 190.

2002. *Cethosia biblis tisamena* Fruhstorfer : Gupta : *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 399.

Material examined : Aizawl District, 1 ex., 10-xi-1995 (P. H. Roy & Party). *Fore wing Length* : 43 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Sikkim and West Bengal.

Remarks : This subspecies differs from *Cethosia biblis andamana* Stichel found in Andaman and *Cethosia biblis nicobarica* Felder occurring in Nicobar by its upperside of fore wing having a complete discal row of white horse-shoe shaped markings from area Cu_{1b} or to M_1, male red but female varying from red to moss green.

XI. Genus *Argynnis* Fabricius

1807. *Argynnis* Fabricius, *Mag. F. Insektenk.* (Illiger) **6** : 283.

Of the 14 species of this genus occurring in India only single species, *Argynnis hyperbius* (Linnaeus) is dealt with from Mizoram.

16. *Argynnis hyperibus hyperbius* (Linnaeus) (Indian Fritillary)

1764. *Papilio hyperbius* Linnaeus, *Amoen. Acad.* **6** : 408, female.

1932. *Argynnis hyperbius hyperbius* (Linnaeus) : Evans, *Identification of Indian Butterflies* : 182.

2002. *Argynnis hyperbus hyperbius* (Linnaeus) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 401.

Material examined : Aizawl Dist., Tuikual Duty Post-I, alt. 850 m., 1 ex., 16-xii-1993, *(S. S. Saha). Fore wing length* : 37 mm.

Distribution : India : Mizoram (Aizawl), Sikkim.

Elsewhere : North Myanmar and Pakistan.

Remarks : This nominate subspecies differs from *A. hyperbius cartesi* Oberthuer occurring in Travancore and Palni Hills and *A. hyperbius hybrida* Evans found in Nilgiris by the much produced apex of fore wing in male and termen concave in the middle. Varshney (1994) treated this species under the genus *Argyreus* Scopoli.

XII. Genus ***Phalanta*** Horsfield

1829. ***Phalanta*** Horsfield, *Descr. Cat. Lepid. Ins. Mus. East India* Coy (2) : pl. 7.

This genus is represented two species, *viz.*, ***Phalanta phalantha*** (Drury) and *P. alcippe* (Cramer) of which, the former is treated from Mizoram.

17. ***Phalanta phalantha phalantha*** (Drury)

(Common Leopard)

1770. *Papilio phalantha* Drury, *Exot. Inst.*, **1** : 41, pl. 21, figs. 1, 2.

1932. *Atella phalantha phalantha* (Drury) : Evans, *Identification of Indian Butterflies,* : 187.

2002. *Phalanta phalantha phalantha* (Drury), Gupta : *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 405.

Material examined : Aizawl District, Tuikual Duty Post-I, alt. 800 m., Murten National Park, 1 ex., 16-xii-1993 *(S. S. Saha)*; Sikha Basty, 1 ex., 29-xi-1995 *(R. S. Mridha, P. Parui & Party). Fore wing lenghth* : 24-29 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Madhya Pradesh, Maharastra, Nicobar Islands, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Elsewhere : Myanmar and Pakistan.

Remarks : This nominate subspecies is widely distributed in India.

XIII. Genus ***Vindula*** Hemming

1934. *Vindula* Hemming, *Entomologist,* **67** : 77.

Only a single species *Vindula erota* (Fabricius) occurring in India is dealt with from Mizoram.

18. ***Vindula erota erota*** (Fabricius)

(Cruiser)

1773. *Papilio erota* (Fabricius), *Ent. Syst.*, **3**(1) : 76.

1932. *Cynthia erota erota* (Fabricius) : Evans, *Identification of Indian Butterflies,* : 188.

2002. *Vindula erota erota* (Fabricius), : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 403.

Material examined : Aizwal Dist., Dampa Rangpui, 1 ex., 28-xi-1995 *(P. Parui & Party),* 1 ex., 28-xi-1995 *(R. S. Mridha, P. Parui & Party),* 2 exs., 28-xi-1995 (M. Sil, P. Parui & Party). Lunglei District, District Park 11 km., Lunglei city, 1 ex., 25-xi-1996 *(P. H. Roy & Party). Fore wing length* : 39-43 mm.

Distribution : India : Mizoram (Aizawl, Lunglei), Arunachal Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : This nominate species differs from *Vindula erota salona* Swinhoe occurring in South India and *Vindula erota pallida* Staudinger found in Andamans by its very sharply marked seasonal forms, female hind wing upperside bearing green, discal band running from costal to vein Cu1b, marginal area broad and ochreous brown.

Tribe NYMPHALINI

Forewing termen and dorsum subequal; fore wing vein S_c not dilated at base, R_2 arising from end cell, R_5 equidistant between R_2 and M_1 or only a little closer to M_1, R_4 arising well beyond origin of R_1 and ending at apex or termen. Hind wing precostal vein arising beyond origin of S_c. Female fore tarsus normal and not clawed.

The Tribe is represented in India by 11 genera of which three are dealt with from Mizoram.

Key to genera

1. Eyes hairy ..... ***Symbrenthia*** Huebner
– Eyes naked 2
2. Labial palpi black above, white beneath. Head and thorax black, each with a pair of white dots. Fore wing only slightly falcate ..... ***Hypolimnas*** Huebner
– Labial palpi black above, white beneath. Head and thorax black, each with a pair of white dots. Fore wing only slightly falcate ..... ***Junonia*** Huebner

XIV. Genus *Symbrenthia* Huebner

1819. *Symbrenthia* Huebner, *Verz. bekennt. Schmett.* (3) : 43.

Of the four species of this genus known from India, only a single species, *Symbrenthia lilaea* De Niceville is treated from mizoram.

19. *Symbrenthia lilaea khasiana* Moore

(Common Jester)

1874. *Symbrenthia khasiana* Moore, *Proc. zool. Soc. Lond.*, : 569.

1932. *Symbrenthia hippoclus khasiana* Moore : Evans, *Identification of Indian Butterflies*, : 180.

2002. *Symbrenthia lilaea khasiana* Moore : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 410-411.

Material examined : Chimtuipui District, Blue Mountain Expedition, Vawmbuk, 1 ex., 19-I-1987, 1 ex., 21-I-1987, 1 ex., 8-ii-1987 *(H. C. Ghosh)*. Aizawl District, Kawartha, 1 ex., 6-xii-1993 *(R. S. Barman & Party)*; Lalan, 1 ex., 1-xii-1995 *(M. Sil, P. Parui & Party)*. *Fore wing length* : 19-24 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui), Arunachal Pradesh, Eastern Ghat, Jammu & Kashmir and Sikkim.

Elsewhere : Myanmar.

XV. Genus *Hypolimnas* Huebner

1819. *Hypolimnias* Huebner, *Verz. bekenut. Schmett.* (3) : 45.

Of the three species of this genus occurring in India, *Hypolimnas bolina* (Linnaeus) is dealt with from Mizoram.

20. *Hypolimnas bolina* (Linnaeus)

(Great Eggfly)

1758. *Papilio bolina* Linnaeus, *Syst. Nat.* (ed. 10), 1 : 479.

1932. *Hypolimnas bolina* (Linnaeus) : Evans, *Identification of Indian Butterflies*, : 174.

2002. *Hypolimnas bolina* (Linnaeus) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 407.

Material examined : Aizawl District, Tuirial, 1 ex., (habitat foliage), 11-x-1995 *(Dr. A. K. Sanyal & Party)*. *Fore wing length* : 45 mm.

Distribution : India : Mizoram (Aizawl), Andaman & Nicobar Island, Arunachal Pradesh, Madhya Pradesh, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

Elsewhere : Myanmar, Pakistan and Sri Lanka.

Remarks : In 1981, this species was listed in a publication *'The Rare and Endangered Animals of India'* issued by the Director, Zoological Survey of India.

XVI. Genus *Junonia* Huebner

1816. *Junonia* Huebner, *Verz. bekenut. Schmett.* (3) : 43.

Of the six species occurring in India, five species are treated from Mizoram.

Key to species

1. Upperside of fore wing with a black spot of variegated ocellus in space C_u1_b 2
- Upperside of fore wing without any variegated ocellus in space C_u1_b ..... *iphita* (Cramer)
2. Upperside of hind wing with a black spot in space C_u1_b ..... *hierta* (Fabricius)
- Upperside of hind wing with a variegated ocellus black spot in space C_u1_b 3
3. Upperside of fore wing and hind wing with submarginal ocelli in all spaces .... *atlites* (Linnaeus)
- Upperside of fore wing and hind wing without submarginal ocelli in spaces C_u1_a and M_1 4
4. Upperside of fore wing brown with pale yellow spots ..... *lemonias* (Linnaeus)
- Upperside of fore wing fulvous orange and without pale yellow spots ... *almana* Linnaeus)

21. *Junonia iphita ipthita* (Cramer)

(Chocolate Pansy)

1779. *Papilio ipthita* Cramer, *Pap. Exot.*, **3** : pl. 209, fig. C, D.

1932. *Precis ipthita ipthita* (Cramer) : Evans, *Identification of Indian Butterflies* : 177.

2002. *Junonia iphita ipthita* (Cramer) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 407.

Material examined : Chimtuipui District, Blue Mountain Expedition, Vawmbuk, 1 ex., 19-I-1987, Lungpher, 1 ex., 8-ii-1987 *(H. C. Ghosh). Fore wing length* : 27-28 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : This nominate subspecies is distinguished from *siccata* (Stichel) occurring from Kashmir (Jammu & Kashmir) to Kumaon (Uttaranchal) and *pluviata* (Fruhstorfer) found in Central and South India, Maldives and Sri Lanka by its larger wing expanse, darker colouration and dry season form which may be variegated.

22. *Junonia hierta magna* (Evans)

(Yellow Pansy)

1926. *Precis hierta magna* Evans, *J. Bombay nat. Hist. Soc.*, **31** : 715.

1932. *Precis hierta magna* Evans : Evans, *Identification of Indian Butterflies*, : 176.

2002. *Junonia hierta magna* (Evans) : Gupta, *Zool. surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 408.

Material examined : Aizawl District, Aibawk, F. R. H. compound, 5 exs., 25-iii-1994 *(G. C. Sen & Party)*; Thungvel, 1 ex., no date, *(I. B. Dutta & Party)*. Chhiahtlang, 1 ex., 10-xi-1995 *(P. H. Roy & Party)*. Lunglei District, Lawngtlai, D. F. O. office complex, alt. 800 m., 1 ex., 3-iv-1994 *(A. K. Hazra & Party). Fore wing length* : males 21-22 mm, females 29-30 mm.

Distribution : India : Mizoram (Aizawl, Lunglei), Andaman & Nicobar Island, Arunachal Pradesh, Madhya Pradesh, Meghalaya, Sikkim.

Elsewhere : Myanmar.

Remarks : This subspecies is distinct from the nominate subspecies distributor in having larger wing expanse and brighter colouration.

23. *Junonia atlites atlities* (Linnaeus)

(Grey Pansy)

1763. *Papilio atlites* Linnaeus, *Centur. Aus.* : 24.

1923. *Precis atlites (Linnaeus)* : Evans, *Identification of Indian Butterflies*, : 176.

2002. *Junonia atlites* (Linnaeus) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 408.

Material examined : Aizawl District, W. Phaileng, 1 ex., 30-xi-1995 *(M. Sil, P. Parui & Party)*; Lalan, 1 ex., 1-xii-1995 *(R. S. Mridha & Party). Fore wing length* : 30 mm.

Distribution : India : Mizoram (Aizawl), widely distributed in India.

Elsewhere : Myanmar.

Remarks : Only nominate subspecies occurs in India.

24. *Junonia lemonias lemonias* (Linnaeus)

(Lemon Pansy)

1758. *Papilio lemonias* Linnaeus, *Syst. Nat.* (ed. 10) : 473.

1932. *Precis lemonias lemonias* (Linnaeus) : Evans, *Identification of Indian Butterflies*, : 176.

2002. *Junonia lemonias lemonias* (Linnaeus) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 408.

Material examined : Chhimtuipui District, Blue Mountain Expedition, Vawmbuk, 1 ex., 19-I-1987, 1 ex., 20-I-1987, Lungpher, 1 ex., 10-ii-1987 *(H. C. Ghosh). Fore wing length* : 22-26 mm.

Distribution : India : Mizoram (Chhimtuipui), Arunachal Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : The nominate subspecies is distinguished from *J. lemonias vaisya* Fruhstorfer found in Central, South India and Sri Lanka, and *persicaria* Fruhstorfer occurring from Kashmir (Jammu & Kashmir) to Kumaon (Uttaranchal) by larger wing expanse, very variable dry season form and underside often rosy.

25. *Junonia almana almana* (Linneaus)

(Peacock Pansy)

1758. *Papilio almana* Linneaus, *Syst. Nat.* (ed. 10), 1 : 472.

1932. *Precis almana almana* (Linneaus) : Evans, *Identification of Indian Butterflies*, : 176.

2002. *Junonia almana almana* (Linneaus) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 409.

Material examined: Aizwal District, Vairengte, 1 ex., 10-xii-1995 *(P. Parui & Party).* Lunglei District, Lunglei (Bushes), 1 ex., 26-iii-1994 *(B. K. Biswas & Party). Fore wing length* : 27-29 mm.

Distribution : India : Mizoram (Aizawl, Lunglei), Sikkim, widely distributed in India.

Elsewhere : Myanmar, and Sri Lanka.

Remarks : This nominate subspecies is distinct from *J. almana nicobarensis* (Felder) occurring in Car Nicobar mainly by its larger wing expanse.

Tribe LIMENITIDINI

Fore wing with vein Sc not dilated at base, R_2 arising before end cell, origin of R_4 opposite or beyond end cell of R_1, R_4 ending at apex or on termen, R_5 arising close to M_1 than R_2; termen and dorsum subequal. Hind wing precostal vein arising opposite origin of vein Sc + R_1.

Key to genera

1. Hind wing precostal vein arising at or before of vein S_c 2
- Hind wing precostal vein arising beyond the origin of vein S_c 4
2. Hind wing vein S_c reaching termen in both sexes, ending of veins M_2, M_1, R_5 and Sc more or less equidistant ..... ***Athyma*** Westwood
- Hind wing with vein Sc ending on costa or vein M_1, R_5 and Sc ending close together and M_1 remote from M_2 3
3. Fore wing with vein R_2 arising from vein R_5 ..... ***Pantoporia*** Huebner
- Fore wing with vein R_2 arising from the cell ..... ***Neptis*** Fabricius
4. Thorax relatively slender. Fore wing with veins R_1 and Sc anastomosed in both sexes; in female vein R_3 arising approximately mid-way between apex of cell and origin of R_4 ..... ***Tanaecia*** Butler
- Thorax robust. Fore wing with veins R_1 and Sc free in male; free or anastomosed in female, and with R_3 arising close to cell apex and remote from of R_4 ..... ***Euthalia*** Huebner

XVII. Genus ***Athyma*** Westwood

1850. *Athyma* Westwood, in Doubleday, *Gen. diurn. Lep.* (2) : 272.

This genus is represented in India by 13 species of which three are dealt with from Mizoram.

Key to species

1. Cell closed in fore wing ..... *perius* (Linnaeus)
- Cell closed in fore wing 2
2. Upperside of fore wing with prominent discal spot in interspace C_u1_a. In female, upperside of wings with white or sullied brownish bands ..... *selenophora* (Kollar)
- Upperside of wings without a prominent discal spot in interspace C_u1_a. In female, upperside of wings with broad orange markings normally arranged ..... *nefte* (Cramer)

26. ***Athyma perius*** (Linnaeus)

1758. *Papilio perius* Linnaeus, *Syst. Nat.* **10** : 471.

1932. *Paptoporia perius* (Linnaeus) : Evans, *Identification of Indian Butterflies,* : 164.

2002. *Athyma perius* (Linnaeus) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 428-429.

Material examined : Aizawl District, Aibawk, 1 ex., 9-xii-1993 *(S. S. Saha),* 3 exs., 16-xi-1995 *(M. S. Shishodia & Party),* Khaw zaul, Kuil wak, 1 ex., 8-xii-1993, 3 exs., 11-xii-1993 *(R. S. Barman & Party)*; Chhingchhip, 1 ex., 7-xi-1995 *(P. H. Roy & Party).* Lunglei District, Hnahthial, 1 ex., 12-xi-1995 *(P. H. Roy & Party). Fore wing length* : 28-31 mm.

Distribution : India : Mizoram (Aizawl, Lunglei), Arunachal Pradesh, Himachal Pradesh, Sikkim, South India, West Bengal.

Elsewhere : Myanmar and Nepal.

Remarks : The underside of hind wing bears a prominent row of black spots on the inner edge of the postdical band.

27. *Athyma selenophora selenophora* (Kollar)

1844. *Liminitis selenophora* Kollar, In Huegel's Kashmir, 4(2) : 426, pl. 7, figs. 1, 2.

1932. *Pantoporia selenophora selenophora* (Kollar) : Evans, *Identification of Indian Butterflies*, : 162.

2002. *Athyma selenophora selenophora* (Kollar) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, 9 (Part-3) : 426.

Material examined : Aizawl District, Aibawk, 1 ex., 9-xii-1993 *(S. S. Saha)*. Aibawk, 1 ex., 17-xi-1996 *(M. S. Shishodia)*; Sheskaun, 1 ex., 27-xi-1996 *(S. Datta); Fore wing length* : 28-30 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : This nominate subspecies is distinguished from its counterpart, *Athyma selenophora kanara* Evans occurring in South India by having upperside of darker wing markings and narrow bands in male and broad white markings in female.

28. *Athyma nefte inara* (Doubleday)

1850. *Liminitis inara* Doubleday, In Doubleday : *Gen. diurn. Lep.*, 2 : pl. 34, fig. 30.

1932. *Pantoporia nefte inara* (Doubleday) : Evans, *Identification of Indian Butterflies* : 162.

2002. *Athyma nefte inara* (Doubleday) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, 9 (Part-3) : 427.

Material examined : Aizawl District, Aibawk, 1 ex., 16-xi-1995 *(M. S. Shishodia). Fore wing length* : 29 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Orissa, Sikkim, South India, West Bengal.

Elsewhere : North Myanmar.

Remarks : This subspeices differs from its counterpart *Athyma nefte rufula De* Niceville, found in Andamans by the upperside of fore wing with orange apical markings and also always bearing a small discal spot in interspace 3 and upperside of hind wing bearing a broad postdiscal band.

XVIII. Genus *Pantoporia* Huebner

1819. *Pantoporia* Huebner, *Verz. bekannt. Schmett* (3) : 44.

This genus is represented in India by a single species, *Pantoporia hordonia* (Stoll) which is dealt with from Mizoram.

29. *Pantoporia hordonia hordonia* (Stoll)

(Common Lascar)

1790. *Papilio hordonia* Stoll, *In* Cramer's, *Pap. Exot. Suppl.* : pl. 33, fig. 4, 4D.

1932. *Neptis hordonia hordonia* (Stoll) : Evans, *Identification of Indian Butterflies* : 172.

2002. *Pantoporia hordonia hordonia* (Stoll) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series*, 9 (Part-3) : 417.

Material examined : Lunglei District, Lawngtlai, D. F. O. Complex, alt. 800 m., 1 ex., 3-iv-1994 *(A. K. Hazra & Party). Fore wing length* : 21 mm.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh, Orissa, Sikkim, South India, West Bengal.

Elsewhere : Myanmar, North and South Vietnam and Thailand (Siam).

Remarks : This nominate subspecies is distinguished from *Pantoporia hordonia cnalis* (Hewtson) found in Andamans by the upperside of hind wing bearing a ochraceous orange subbasal band.

XIX. Genus *Neptis* Fabricius

1807. *Neptis* Fabricius, *Mag. F. Insektenk. (Illiger)* 6 : 282.

Of the 30 species of this genus occurring in India, five species are dealt with from Mizoram.

Key to species of Neptis

1. Underside wings with white markings black-edged, fore wing white spot at end cell well separated from white basal streak 2
- Underside wings with white markings not black-edged, fore wing white spot at end cell often joined with white basal streak 3
2. Underside hind wing discal band outlined prominently with black ..... *hylas* (Linnaeus)
- Underside hind wing discal band outlined weakly with black ..... *sappho* (Pallas)
3. Upperside wings with white markings narrow, broken into spots and usually dirty white, discal band narrow and not entering base of interspace 3, or if enters base of interspace 3, then leaving an equivalent dark space at base of interspace 2. Underside of wings dark .... *yerburii* (Huebner)
- Upperside wings with white markings normally distinct, discal band broader, always filling base of interspace 3 and extending up to base of interspace 2 or beyond. Underside of wings brighter brown 4
4. Upperside fore wing with three upper marginal spots shifted in at right angles to costa; hind wing white band expanding to costa. Underside of hind wing with two marginal white lines equally prominent ..... *soma* Moore
- Upperside fore wing with three upper marginal spots not shifted in. Underside of hind wing with two pale marginal lines not equally prominent, the outer one being obscure .... *clinia* Moore

30. *Neptis hylas kamarupa* Moore

(Common Sailer)

1874. *Neptis hylas kamarupa* Moore, *Proc. zool. Soc. Lond.*, 570, O⁺ Assam 2 o. 3⁺ syntypes Oxford.

1932. *Neptis hylas adara* Moore, Evans, *Identification of Indian Butterflies* : 166.

1969. *Neptis hylas kamarupa* Moore : Eliot, *Bull. Br. Mus. Nat. Hist.* (Ent.), Suppl., **15** : 61.

Material examined : Aizawl District, Aibawk, 4 exs., 9.xii.1993 *(S. S. Saha)*; Aibawk, on foliage, 1 ex., 19.iii.1994 *(B. K. Biswas & Party)*; Sikha Basti, 1 ex., 29.xi.1995 *(R. S. Mirdha, P. Parui & Party)*, 1 ex., 29.xi.1995 *(P. Parui & Party)*, Chimlaunge, 1 ex., 7.xii.1995 *(M. Sil, P. Parui & Party)*; West Phaileng, 8 Kms, 1 ex., 10.x.1998 *(M. S. Shishodia & Party)*. Lunglei District, Lawngtlai, D. F. O. Complex, 800 m, 1 ex., 3.iv.1994, Lawngtlai, Circuit House Campus *(A. K. Hazra & Party)*. Chhimtuipui District, Banhlahnmur, Saiha village, 800 m, on banana plantation, 1 ex., 6.iv.1994 *(A. K. Hazra & Party)*. *Fore wing Length* : 24-28 mm.

Distribution : India : Mizoram (Aizawl, Lunglei, Chhimtuipui), Uttaranchal, Uttar Pradesh, Assam.

Elsewhere : Myanmar, Southern and Northern Vietnam, Thailand (Siam) and South Yunnam.

Remarks : This subspecies differs from other Indian subspecies, viz., *varmona* Moore found in peninsular India and Sri Lanka, *andamana* Moore in Andaman Islands and Great Nicobar and *samibilanga* Evans in South Nicobar by the the upperside of wings having narrow and often sullied markings and underside of wings ferruginous brown and without blackened veins.

31. *Neptis sappho astola* Moore

(Common Sailer)

1872. *Neptis astola* Moore, *Proc. zool. Soc. Lond.* : 560.

1932. *Neptis hylas astola* Moore : Evans, *Identification of Indian Butterflies* : 166, pl. 22.

1969. *Neptis sappho astola* Moore : Eliot, *Bull. Br. Mus. Nat. Hist.* (Ent.), Suppl., **15** : 60.

2002. *Neptis sappho astola* Moore : Gupta, *zool. Surv. India, Fauna of Sikkim, State Fauna Series*, **9** (Part-3) : 424.

Material examined : Chhimtuipui District, Blue Mountain Expedition, Lungpher, 2 ex., 8.ii.1987, 1 ex.,1987 *(H. C. Ghosh)*. Aizawl District, Aibawk, 2 exs., 9.xii.1993 *(S. S. Saha)*; 2 km South of Aibawk F. R. H., 1 ex., 28.ii.1994, Champhai SCRH, at light, 1 ex., 2.iv.1994 *(G. C. Sen & Party)*. Lunglei District, Lawngtlai, D. F. O. Office Complex, 1 ex., alt. 800 mn, 3.iv.1994 *(A. K. Hazra & Party)*. *Fore wing Length* : 21-24 mm.

Distribution : India : Mizoram (Chhimtuipui, Aizawl and Lunglei), (throughout Himalayas and in Assam).

Elsewhere : Bangladesh, Myanmar, North and South Vietnam, Pakistan, South China (S. Yunnan), and Thailand (Siam).

Remarks : This subspecies is highly variable regarding white markings on wings and ochreous colour on underside of wings.

32. *Neptis yerburii* Butler
(Yerburii Sailer)

1886. *Neptis yerburii* Butler, *Proc. zool. Soc. Lond.*, 360, *O recte*[+], Moore. Type Br. Mus. nat. Hist.

1932. *Neptis soma soma* Moore : Evans, *Identification of Indian Butterflies* : 166.

1969. *Neptis yerburii yerburii* (Butler) : Eliot, *Bull. Br. Mus. Nat. Hist.* (Ent.), Suppl., **15** : 69.

Material examined : Aizawl District, West Phaileng, 1 ex., 30.i.1995 *(P. Parui & Party)*; 1 ex., 11.x.1998 *(M. S. Shishodia). Fore wing Length* : 23-24 mm.

Distribution : India : Mizoram (Aizawl), Uttaranchal, Uttar Pradesh.

Elsewhere : Myanmar.

Remarks : This nominate subspecies has small wing expanse (50-60 mm) and its upperside of hind wing bears conjoined postdiscal spots.

33. *Neptis soma soma* Moore
(Sullied Sailer)

1858. *Neptis soma* Moore, *Proc. zool. Soc. Lond.*, **9** : Pl. 9, fig 6, Silhet. O type Br. Mus. nat. Hist., Wet season form.

1932. *Neptis yerburi sikkima* Evans, Evans, *Identification of Indian Butterflies* : 167.

1969. *Neptis soma soma* Moore : Eliot, *Bull. Brit. Mus. Nat. Hist.* (Ent.), Suppl., **15** : 71.

Material examined : Aizawl District, Tuikual Duty Post-1, alt. 850 m, Murten National Part, 1 ex., 16.xii.1993 *(S. S. Saha). Fore wing Length* : 25 mm.

Distribution : India : Mizoram (Aizawl), Assam, Meghalaya, Sikkim.

Elsewhere : Bangladesh.

Remarks : This nominate subspecies differs from *N. soma palnica* Eliot found in south India by the upperside of wings with much narrower and usually slightly sullied markings.

34. *Neptis clinia susruta* Moore
(Clear Sailer)

1872. *Neptis susruta* Moore, *Proc. zool. Soc. Lond.*, 563, pl. 32, fig. 4.

1932. *Neptis nandina susruta* Moore : Evans, *Identification of India butterflies* : 167.

1969. *Neptis clinia susruta* Moore : Eliot, *Bull. Brit. Mus. Nat. Hist.* (Ent.), Suppl., **15** : 56.

2002. *Neptis clinia susruta* Moore : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 423.

Material examined : Chhimtuipui District, Saihtla village Hill, Saiha, alt. 850 m, 1 ex., 7.iv.1994 *(A. K. Hazra & Party). Fore wing Length* : 25 mm.

Distribution : India : Mizoram (Chhimtuipui), Assam, North East India, Sikkim.

Elsewhere : Laos, Myanmar, North and South East China (South Yannan, Hainan, Funkien) and Thailand (Siam).

Remarks : This species differs from *Neptis clinia kallaura* Moore found in South India by the upperside of fore wing having usually sullied discal streak, and discal spots in interspaces 2 and 3 being outwardly square or concave.

XX. Genus *Tanaecia* Butler

1869. *Tanaecia* Butler, *Proc. zool. Soc. London,* (3) : 610.

Of the five species of this genus occurring in India, only a single species, *Tanaecia lepidea* (Butler) is treated from Mizoram.

35. *Tanaceia lepidea lepidea* (Butler)
(Grey Count)

1868. *Adolias lepidea lepidea* Butler, *Ann. Mag. nat. Hist. Lond.*, (4) : 71.

1932. *Euthalia lepidea lepidea* (Butler) : Evans, *Identificationof Indian butterflies* : 150.

2002. *Tanaceia lepidea lepidea* (Butler) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 432.

Material examined : Lunglei District, Lawngtlaie, around Circuit House, alt. 850 m., 1 ex., 1-iv-1994 *(A. K. Hazra & Party). Fore wing Length* : 35 mm.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh, Assam, Uttar Pradesh, Sikkim.

Remarks : This nominatae subspecies differs from *Tanaceia lepidea miyana* (Fruhstorfer) occurring in North Kanara and Orissa by its larger wing expanse and light pale grey borders.

XXI. Genus ***Euthalia*** Huebner

1819. *Euthalia* Huebner, *Verz. bekannt. Schmett* (3) : 41.

Of the more than 12 species occurring in India, only *Euthalia alpheda* is dealt with from Mizoram.

36. ***Euthalia alpheda jamida*** Fruhstorfer

(Streak Baron)

1911. *Euthalia jamida* Fruhstorfer, *Ins. Boerse,* **23** : 19.

1932. *Euthalia jama jamida* Fruhstorfer : Evans, *Identification of Indian butterflies* : 154.

Material examined : Aizawl District, Aibawk, 1 ex., 16-xi-1995 *(M. S. Shishodia). Fore wing Length* : 28 mm.

Distribution : India : Mizoram (Aizawl) and Sikkim.

Remarks : This nominatae subspecies differs from the nominate subspecies occurring in Assam and Manipur by having upperside of wings pale and markings narrow.

Tribe PSEUDERGOLINI

Fore wing and hind wing with cells closed. Fore tarsi clawed in females with a few exceptions.

Key to genera PSEUDERGOLINI

Hind wing cell very short, barely one-third length of wing ..... ***Stibochiona*** Butler

— Hind wing cell prominently longer i.e. about half the length of wing ..... *Dichiorragia* Butler

XXII. Genus ***Stibochiona*** Butler

1868. *Stibochiona* Butler, *Proc. zool. Soc. London,* (3) : 614.

This genus is known in India by a single species, *Stibochiona nicea* (Gray).

37. ***Stibochiona nicea nicea*** (Gray)

(Popinjay)

1846. *Adolias nicea* Gray, *Lep. Ins. Nepal* : 13, pl. 12, fig. 1.

1932. *Stibochiona nicea nicea* (Gray) : Evans, *Identification of Indian butterflies* : 150.

2002. *Stibochiona nicea nicea* Gray : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 439.

Material examined : Chhimtuipui District, Blue Mountain, Far Pak, 2000 m, 1 ex., 9-iv-1994 *(A. K. Hazra & Party). Fore wing Length* : 27 mm.

Distribution : India : Mizoram (Chhimtuipui) Arunachal Pradesh, Himachal Pradesh, Sikkim and West Bengal.

Elsewhere : Bangladesh and North Myanmar.

Remarks : Only the nominate subspecies occurs in India.

XXII. Genus ***Dichiorragia*** Butler

1868. *Dichorragia* Butler, *Proc. zool. Soc. London,* (3) : 614.

This genus is represented in India by a single species i.e., *Dichorragia nesimachus* (Boisduval).

38. ***Dichorragia nesimachus*** (Boisduval)

(Constable)

1836. *Adolias nesimachus* (Boisduval), *Cuv. Regne Amin. Ins.,* **2** : pl. 219, bis., fig. 1.

1932. *Dichorragia nesimachus* (Boisduval) : Evans, *Identification of Indian butterflies* : 149.

2002. *Dichorragia nesimachus* (Boisduval) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 439.

Material examined : Chhimtuipui District, Saiha (Circuit House), alt. 800 m, 1 ex., 6.iv.1994, *(A. K. Hazra & Party). Fore wing Length* : 31 mm.

Distribution : India : Mizoram (Chhimtuipui) Arunachal Pradesh, Assam, Himachal Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : The upperside of wings dark green with small whitish spots on fore wing and very prominent zigzag submarginal single line in male but double in female.

Subfamily CHARAXINAE

Large and robust butterflies. Fore wing with cell closed, vein R4 arising nearer to end of cell than to termen. Hind wing with cell open or closed.

XXIV. Genus ***Polyura*** Billberg

1820. *Polyura* Billberg, *Enum. Ins. Mus. Bilb.* : 79.

This genus is represented in India by nine species of which two are treated from Mizoram.

Key to species

Upperside of wings with discal band pale yellow ..... *athamas* (Drury)

– Upperside of wings with discal band pale greenish white ..... *arja* (Felder & Felder)

39. ***Polyura athamas athamas*** (Drury)

(Common Nawab)

1770. *Papilio athamas* (Drury), Ill. *Exot. Ent.*, **1** : 5, pl. 2, fig. 5.

1932. *Eriboea athamas athamas* (Drury) : Evans, *Identification of Indian Butterflies* : 143.

1982. *Polyura athamas athamas* (Drury) : Smiles, *Bull. Br. Mus. Nat. Hist.* (Ent.), **44** : 166.

2002. *Polyura athamas athamas* (Drury) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 447.

Material examined : Aizawl District, Aibawk, 1 ex., 16-xi-1995 *(M. S. Shishodia Party). Fore wing Length* : 32.5 mm.

Distribution : India : Mizoram (Aizawl), Andhra Pradesh, Assam, Bihar, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, North West Himalaya, Orissa, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal.

Elsewhere : Bangladesh, China, Hainan, Hongkong, Laos, Myanmar, Nepal, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, West Malaysia.

Remarks : This nominate subspecies differs from *Polyura athamas andamanica* (Swinhoe) occurring in Andamans by the upperside of fore wing with discal band broader than 4 mm at its narrowest point in male and 7 mm in female.

40. ***Polyura arja*** (Felder & Felder)

(Pallid Nawab)

1867. *Charexes arja* Felder & Felder, *Novara Reise Lep. Rhop.* : 438.

1932. *Eriboea arja* (Felder & Felder) : Evans, *Identification of Indian Butterflies* : 143.

1982. *Polyura arja* (Felder & Felder) : Smiles, *Bull. Br. Mus. Nat. Hist.* (Ent.), **44** : 176.

2002. *Polyura arja* (Felder & Felder) : Gupta, *Zool. Surv. India, Fauna of Sikkim, State Fauna Series,* **9** (Part-3) : 447.

Material examined : Chimtuipui Dist., Saiha, Blue Mountain Expedition, 8-I-1987 *(H. C. Ghosh)*; Nareng, 1 ex., 26-ix-1994 *(P. H. Roy & Party);* Vairengte, alt. 120 m, 1 ex., 5-ii-1995 *(T. K. Pal & Party).* Aizwal District, West Phaileng, 1 ex., 8-x-1995 *(M. S. Shishodia Party);* Tuirial, 1 ex., 11-x-1995 (Habitat Foliage) *(A. K. Sanyal & Party).* Chhiatlang, 1 ex., 11-xi-1995 *(P. H. Roy & Party). Fore wing Length* : 26-28 mm.

Distribution : India : Mizoram (Aizawl), Assam, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal.

Elsewhere : Bangladesh, Bhutan, Myanmar, Thailand (Siam) and Vietnam.

Remarks : Evans (1932) mentioned that this species exhibited three seasonal forms with the width of greenish white discal band on upperside of wings varying considerably with the season.

Family LYCAENIDAE

Face or frons narrow; eyes closely situated and continuous with the antennae, inner periphery of eyes emarginate but very slightly in Riodininae; forelegs longer and functional for walking, foretarsus one segmented but not brushlike except in Riodininae, in few species foretarsus being five segmented and clawed in female, mid- and hind tibiae with or without a pair of terminal spurs; fore wing with veins R_1 and Sc separate or 11 anastmosed with Sc, veins R_5 and R_1 ending at or before apex or on termen just below apex, hind wing precostal vein absent or only weakly or partially developed except in Riodininae, hind wing tailless or with 1-3 tails.

Of the five subfamilies of the family Lycaenidae (Eliot et al 1992), two, *viz.*, Riodininae and Lycaeninae are treated from Mizoram.

Subfamily RIODININAE

In male, fore legs short with brush-like tarsus and useless for walking but fore legs being functional in female; hind wing precostal vein present.

There are seven genera known in India but only single genus *Zemeros* Boisduval is dealt with from Mizoram.

XXV. Genus ***Zemeros*** Boisduval

1836. *Zemeros* Boisduval, [Roret's Suite a Buffon], *Hist. Nat. Ins. Spec. ge'n Lepid.*

This genus is represented in India by a single species, *Zemeros flegyas* Cramer which is dealt with from Mizoram.

41. ***Zemeros flegyas indicus*** Fruhstorfer

1897. *Zemeros flegyas indicus* Fruhstorfer, *Berl. Ent. Zeits.*, **42** : 333.

1932. *Zemeros flegyas indicus* Fruhstorfer : Evans, *Identification of Indian Butterflies* : 194.

1997. *Zemeros flegyas indicus* Fruhstorfer : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Funa Series,* **3** (Part-7).

Material examined : Aizawl District, N. Khawbung, alt. 1500 m, 2 exs., 17-xii-1993 *(S. S. Saha)*; Aibawk, (foliage), 1 ex., 18-ii-1994 *(B. K. Biswas & Party)*; Aibawk, 1 ex., 15-xi-1995 *(M. S. Shishodia & Party)*; Sher Kawn, 1 ex., 27-xi-1996 *(S. C. Mitra)*; Saikah, 1 ex., 1-xii-1996 *(P. H. Roy & Party)*. Chhimtuipui District, Vairengte, 1 ex., 2-xii-1996 *(P. H. Roy & Party)*. *Fore wing Length* : 16-18 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui), Arunachal Pradesh, Uttar Pradesh, Sikkim and West Bengal.

Elsewhere : Myanmar.

Remarks : Only *Zemeros flegyas indicus* Fruhstorfer occurs in India.

Subfamily LYCAENINAE

In male, fore legs longer and used for walking, fore tarsus usually reduced to a single segment but not brush-like, mid- and hind tibiae with a pair of terminal spurs; fore wing with vein R_5 ending at or before the apex in species with R_1 veins (except in tailed females of *Amblypodia* and *Jacoona*), hind wing precostal vein absent or only weakly or partially developed, hind wing with one to three tails.

Key to genera

1. Antennal club flattened and spatulate or hollow beneath 2
– Antennal club gradual and cylinderical 12
2. Fore wing vein 7 from before end cell 3
– Fore wing vein 7 from end cell or beyond end cell ..... ***Heliophorus*** Geyer
3. Underside of wings with dark markings from extreme base of wings; usually a dark streak on fore wing and hind wing and at least a streak along base of vein 8 on hind wing 4
– Underside of wings without dark markings at extreme bases 5

4. Fore wing veins R_1 and Sc anastomosed ..... ***Talicada*** Moore
– Fore wing veins R_1 and Sc free ..... ***Castalius*** Huebner
5. Eyes smooth 6
– Eyes densely hairy 8
6. Fore wing origin of vein Cu opposite origin of vein R_1 or vein 11 nearer base ..... ***Chilades*** Moore
– Fore wing origin of vein Cu nearer base than origin of vein R_1 7
7. Underside of hind wing with jewelled spots along margin or at tornus ..... ***Freyeria*** Courvoisier
– Underside of hind wing without jewelled spots 8
8. Fore wing veins R_1 and Sc shortly anastomosed or touching and then free to the costa ..... ***Zizeeria*** Chapman
– Fore wing veins R_1 and Sc anastomosed to costa ..... ***Zizula*** Chapman
9. Fore wing with veins R_1 and Sc free 10
– Fore wing with veins R_1 and Sc but connected by a short spur ..... ***Jamides*** Huebner
10. Hind wing cilia prolonged so as to form 3 short tails at veins 1, 2, 3 ..... ***Anthene*** Doubleday
– Hind wing with long cilia only at vein 2 11
11. Underside wings with catenulated and some spots ..... ***Catochrysops*** Boisduval
– Underside wings with white lines, on tornal spots on hind wing ..... ***Lampides*** Huebner
12. Fore wing vein R_4 present ..... ***Rapala*** Moore
— Fore wing vein R_4 absent ..... ***Tajuria*** Moore

XXVI. Genus ***Heliophorus*** Geyer

1832. *Heliophorus* Geyer, *In* Huebner, *Zutr. z. Samml. exot. Schmett.* **4** : 40.

Of the ten species of this genus occurring in India, only a single species, *Heliophorus epicles* (Godart) is treated from Mizoram.

42. ***Heliophorus epicles indicus*** (Fruhstorfer) (Purple Sapphire)

1908. *Ilerda indicus* Fruhstorfer, *Ent. Z.*, **22** : 46.
1912. *Ilerda epicles* (Godart) : Evans, *Rec. Ind. Mus.*, **8** : 65.
1932. *Heliophorus epicles indicus* (Fruhstorfer) : Evans, *Identification of Indian Butterflies* : 246.
1962. *Heliophorus epicles indicus* (Fruhstorfer) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 85.
1988. *Heliophorus epicles indicus* (Fruhstorfer) : *Rec. zool. Surv. Insdia, Occ. Paper* No. **109** : 92-93.

Material examined : Chhimtuipui District, Blue Mountain Expedition, Sangam, 1 ex., 30-I-1987 *(H. C. Ghosh)*. Aizawl District, North of Aizawl, 1 ex., 5-xii-1993 *(R. S. Barma & Party)*; 2 kms., South of Aizawl F. R. H., 2 ex., 28-iii-1994 *(G. C. Sen & Party)*; Chawnhu Forest near Lawnrgtlai, alt. 900 m., 1 ex., 2-iv-1994 *(A. K. Hazra & Party)*; Teirei village, Dampa, alt. 200 m., 1 ex., 26-I-1995 *(T. K. Pal & Party)*; Aibawk, 1 ex., 16-xi-1995 *(M. S. Shishodia & Party)*; West Phaileng, 3 kms., 1 ex., 9-x-1998 *(M. S. Shishodia & Party)*. *Fore wing Length* : 13-15 mm.

Distribution : India : Mizoram (Aizawl, Chhimtuipui), Arunachal Pradesh, Uttaranchal, Middle Andaman.

Elsewhere : Myanmar and Nepal.

Remarks : Only this subspecies *Heliophorus epicles indicus* (Fruhstorfer) occurs in India.

XXVII. Genus ***Talicada*** Moore

1881. *Talicada* Moore, *Lep. Ceylon*, **1**(3) : 96.

This genus is represented in India by a single species, *Talicada nyseus* (Guerin) which is treated from Mizoram.

43. ***Talicada nyseus khasiana*** Swinhoe (Red Pierrot)

1894. *Talicada nyseus khasiana* Swinhoe, *Trans. ent. Soc. Lond.* : 394.
1932. *Talicada nyseus khasiana* Swinhoe : Evans, *Identification of Indian Butterflies* : 214.

1962. *Talicada nyseus khasiana* Swinhoe : *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 30.

Material examined : Chhimtuipui District, Tuipui, 1 ex., 20-ix-1993 *(R. S. Mridha, A. R. Lahiri & Party). Fore wing Length* : 13.5 mm.

Distribution : India : Mizoram (Chhimtuipui), Assam.

Elsewhere : North Myanmar.

Remarks : This subspecies differs from the nominate one found in South India and Sri Lanka by the upperside of wings with orange less than one fourth of inch and underside of hind wing bearing large and complete markings.

XXVIII. Genus ***Castalius*** Huebner

1819. *Castalius* Huebner, *Verz. bekannt. Schmett* (5) : 70.

Of the five species of this genus known from India, only a single species, *Castalius rosimon* (Fabricius) is treated from Mizoram.

44. ***Castalius rosimon rosimon*** (Fabricius) (Common Pierot)

1775. *Papilio rosimon* Fabricius, *Syst. Ent.*, : 523.

1932. *Castalius rosimon rosimon* (Fabricius) : Evans, *Identification of Indian Butterflies* : 214.

1962. *Castalius rosimon rosimon* (Fabricius) : *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932 : 31.

1997. *Castalius rosimon rosimon* (Fabricius) : Gupta, *zool. Surv. India, Fauna of West Bengal, State Fauna Series*, **3** (Part-7) : 434.

Material examined : Chhimtuipui District, Vairengte, alt. 120 m., 1 ex., 5-ii-1995 *(T. K. Pal & Party). Fore wing Length* : 14 mm.

Distribution : India : Mizoram (Chhimtuipui), Arunachal Pradesh, West Bengal and widely distributed in India.

Elsewhere : Myanmar, Pakistan and Sri Lanka.

Remarks : This nominate subspecies differs from *Castalius rosimon alarbus* Felder occurring in Andaman and Nicobar islands by several smaller black spots on the white upperside of wings.

XXIX. Genus ***Chilades*** Moore

1881. *Chilades* Moore *Lep. Ceylon*, **1**(2) : 76.

Only a single species i.e., *Chilades lajus* (Cramer) of this genus occurring in India is dealt with from Mizoram.

45. ***Chilades lajus lajus*** (Cramer) (Lime Blue)

1780. *Papilio lajus* Cramer, *Pap. Exot.*, **4** : 62, pl. 319, figs. D. E.

1932. *Chilades laius laius* (Cramer) : Evans, *Identification of Indian Butterflies* : 233.

1962. *Chilades laius laius* (Cramer) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 62.

1997. *Chilades lajus* (Cramer) : Varshney, *Oriental Insects* **28**.

Material examined : Aizawl District, Sikha Basti, 1 ex., 29-xi-1995 *(P. Parui & Party)*; Sher Kawn, 1 ex., 27-xi-1996 *(S. C. Mitra). Fore wing Length* : 9-12 mm.

Distribution : India : Mizoram (Aizawl), Assam, Maharastra, West Bengal and it is fairly distributed in India.

Elsewhere : Northern Myanmar, Nepal and Sri Lanka.

Remarks : Only the nominate subspecies occurs in India.

XXX. Genus ***Freyeria*** Caurvoisier

1920. *Freyeria* Caurvoisier, *Iris.* **34** : 234.

This genus is represented in India by a single species, *Freyeria trochilus* (Kollar).

46. ***Freyeria trochilus putli*** (Kollar) (Ceylon Grass Jewel)

1848. *Lycaena putli* Kollar, In *Huegel's Kashmir*, **4** (2) : 422, No. 8.

1932. *Zizeeria trochilus putli* (Kollar) : Evans, *Identification of Indian Butterflies* : 233.

1962. *Freyeria trochilus putli* (Kollar) : *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 62.

1997. *Freyeria trochilus putli* (Kollar) : Gupta, *Zool. Surv. India, State Fauna Series*, 3 : *Fauna of West Bengal, Part-7* : 443.

Material examined : Aizwal District, Tuiriel River, Dam site, near Maucher village, 1 ex., 3-I-1994 *(S. S. Saha & Party). Fore wing Length* : 12 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh South to North-East India and West Bengal.

Elsewhere : Myanmar.

Remarks : Only this subspecies is known in India.

XXXII. Genus *Zizeeria* Chapman

1910. *Zizeeria* Chapman, *Trans. ent. Soc. Soc. Lond.*, : 480, 482.

Only a single species, *Zizeeria knysna* under this genus is known from India.

47. *Zizeeria knysna karsandra* (Moore)

(Dark Grass Blue)

1865. *Polyommatus karsandra* Moore, *Proc. zool. Soc. Lond.* : 505, no. 106, pl. 31, fig. 7, F.

1907. *Zizera lysimon* Huebner : Bingham, *Fauna of British India (Butterflies)*, 2 : 357.

1932. *Zizeeria lysimon* Huebner : Evans, *Identification of Indian Butterflies* : 234.

1962. *Zizeeria knysna karsandra* (Moore) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932 : 64.

1997. *Zizeeria knysna karsandra* (Moore) : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Fauna Series*, 3 (Part-7) : 445.

Material examined : Aizawl District, Teirei, Dampa Sanctuary, 1 ex., 28-xii-1993 *(S. S. Saha and Party). Fore wing Length* : 10 mm.

Distribution : India : Mizoram (Aizawl), Andaman and Nicobar Islands, Arunachal Pradesh, Madhya Pradesh.

Elsewhere : Myanmar, Pakistan and Sri Lanka.

Remarks : Only this subspecies is known to occur in India. The specimens are mostly small in size and in male upperside wing dark blue with broader markings. On the other hand, females are normally brown but having basal blue suffusion. Underside of wings being grey and bears small and black well-developed spots.

XXXII. Genus *Pseudozizeeria* Kollar

This genus is known in India by a single species, *Pseudozizeeria maha* Kollar and is dealt with from Mizoram.

48. *Pseudozizeeria maha maha* (Kollar)

(Dark Grass Blue)

1848. *Lycaena maha* Kollar, In *Huegel's Kashmir*, 4 : 422.

1907. *Zizera maha* (Kollar) : Bigham, *Fauna of British India* (Butterflies), 2 : 255.

1932. *Zizeeria maha maha* (Kollar) : Evans, *Identification of Indian Butterflies* : 234.

1962. *Heliophorus maha maha* (Kollar) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 64.

1997. *Pseudozizeeria maha (Kollar)* : Varshney, *Oriental Insects*, 31 : 96.

Material examined : Aizawl District, Thingdam, alt. 1000 m, 20 kms, of Aizawl, 4 exs., 22-I-1995 *(T. K. Pal & Party). Fore wing Length* : 11-12 mm.

Distribution : India : Mizoram (Aizawl), Assam, Central to Northern India, West Bengal.

Elsewhere : Bhutan, Kurram, Myanmar, Nepal and Pakistan.

Remarks : This nominate subspecies differs from *Pseudozizeeria maha ossa* (Swinhoe) by underside of wings having always prominent upperside in male usually darker but very variable ground on underside. This variation is often seasonal.

XXXIII. Genus *Zizula* Chapman

1910. *Zizula* Chapman, *Trans. ent. Soc. Lond.*, : 480, 482.

This genus is represented in India by a single species, *Zizula hylax* Fabricius, which is treated from Mizoram.

49. *Zizula hylax* (Fabricius)
(Tiny Grass Blue)

1775. *Papilio hylax* Fabricius, *Syst. Ent.* : 526.

1907. *Zizera gaika* (Trimen) : Bingham, *Fauna of British India* (Butterflies), **2** : 359.

1932. *Zizeeria gaika* (Trimen) : Evans, *Identification of Indian Butterflies* : 234.

1962. *Zizula hylax* (Fabricius) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932 : 65.

1997. *Zizula hylax* (Fabricius) : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Fauna Series*, **3** (Part-7) : 444.

Material examined : Aizawl District, Khaw zaul, 1 ex., 11-xii-1993 *(R. S. Barman & Party). Fore wing Length* : 9 mm.

Distribution : India : Mizoram (Aizawl), Andaman and Nicobar Islands, Madhya Pradesh, West Bengal.

Elsewhere : Myanmar, Pakistan and Sri Lanka.

Remarks : This species is tiniest of the butterflies.

XXXIV. Genus *Jamides* Huebner

1819. *Jamides* Huebner, *Verz. bekannt. Schmett.* (5) : 71.

This genus is represented in India by eight species of which *Jamaides celeno* (Cramer) is treated from Mizoram.

50. *Jamides celeno aelianus* (Fabricius)
(Common Cerulean)

1793. *Hesperia aelianus* Fabricius, *Ent. Syst.* **3**(1) : No. 79.

1932. *Jamides celeno celeno* (Cramer) : Evans, *Identification of Indian Butterflies* : 237.

1962. *Jamides celeno aelianus* (Fabricius) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 71.

Material examined : Aizawl District, Thingdam, alt. 1000 m, 20 km of Aizawl, 22-I-1995 *(T. K. Pal & Party)*; 2 km South of Aibawk F. H., 1 ex., 28-iii-1994 *(G. C. Sen & Party). Fore wing Length* : 15-16 mm.

Distribution : India : Mizoram (Aizawl), Assam, Madhya Pradesh and widely distributed in India.

Elsewhere : Myanmar and Pakistan.

Remarks : This subspecies is distinguished from other subspecies, *viz., blairana* Evans from Andamans, *kinkura* Evans from Car Nicobars and *nicevillei* Evans from South Nicobars by the upperside of wings whiter and hind wing without submarginal spots.

XXXV. Genus *Anthene* Doubleday

1847. *Anthene* Doubleday, *List. Spec. lep. Ins. Brit. Mus.* **2** : 27.

Two species, viz., *Anthene emolus* (Godart) and *A. lycaenoides* (Felder) of this genus occur in India and the former is treated from Mizoram.

51. *Anthene emolus emolus* (Godart)
(Ciliate Blue)

1823. *Polyommatus emolus* Godart, *Ency. Meth.*, **9** : 656.

1932. *Lycaenesthes emolus emolus* (Godart) : Evans, *Identification of Indian Butterflies* : 235.

1962. *Anthene emolus emolus* (Godart) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies*, 1932, : 66.

1997. *Anthene emolus emolus* (Godart) : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Fauna Series*, **3** (Part-7) : 444.

Material examined : Aizawl District, West Phaileng, 1 ex., 8-x-1998 *(M. S. Shishodia & Party). Fore wing Length* : 15 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Bihar, Sikkim, South India and West Bengal.

Elsewhere : Myanmar and Nepal.

Remarks : This nominate subspecies differs from *Anthene emolus andamanicus* Fruhstorfer by the upperside of wings paler and underside with more regular markings.

XXXVI. Genus *Catochrysops* Boisduval

1832. *Catochrysops* Boisduval, in d' Urville, *"Astrolobe" Ent.* **1** (Lep) : 87.

This genus is represented in India by two species, viz., *Catochrysops strabo* Fabricius and *Catochrysops panormus* Elwes of which, the former is dealt with from Mizoram.

52. *Catochrysops strabo strabo* (Fabricius)

(Forget-me-not)

1793. *Hesperia strabo* Fabricius, *Ent. Syst.* **3** : 289.

1932. *Catochrysops strabo* (Fabricius) : Evans, *Identification of Indian Butterflies* : 236.

1962. *Catochrysops strabo riama* Corbet : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies,* 1932, : 68.

1992. *Catochrysops strabo strabo* (Fabricius) : Eliot, *Butterflies of Malay Peninsula,* : 415.

Material examined : Aizawl District, Duty Post-I, alt. 850 m, Murten National Park, 1 ex, 16-xii-1993 *(S. S. Saha). Fore wing Length* : 15 mm.

Distribution : India : Mizoram (Aizawl) Andaman and Nicobar Islands, Assam.

Elsewhere : Malaya, Myanmar and Nepal.

Remarks : This subspecies differs from *asoka* by the male having upperside of wings deeper purple with broader on fore wing, diffused inwardly and increasing towards apex, a larger black tornal spot in area 2 in hind wing, underside markins more distinct; female upperside wings with border deeper black and underside markings slightly broader.

XXXVII. Genus *Lampides* Huebner

1819. *Lampides* Huebner, *Verz. bekenut. Schmett.* (5) : 70.

This genus is known in India by only a single species, *Lampides boeticus* (Linnaeus).

53. *Lampides boeticus* (Linnaeus)

(Pea Blue)

1767. *Papilio boeticus* Linnaeus, *Syst. Nat.,* (ed. 12) : 78.

1932. *Lampides boeticus* (Linnaeus) : Evans, *Identification of Indian Butterflies* : 236.

1962. *Lampides boeticus* (Linnaeus) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies,* 1932 : 69.

1997. *Lampides boeticus* (Linnaeus) : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 448.

Material examined : Aizawl District, Aibawk, F. R. H. Compound, 1 ex., 25-iii-1994 *(G. C. Sen & Party). Fore wing Length* : 13 mm.

Distribution : India : Mizoram (Aizawl) Andaman and Nicobar Islands, Arunachal Pradesh, West Bengal and widely distributed in India.

Elsewhere : Nepal, Pakistan and Sri Lanka.

Remarks : This species is a pest of many leguminous plant species.

XXXVIII. Genus *Tajuria* Moore

1881. *Tajuria* Moore, *Lep. Ceylon* **1**(3) : 108.

Of these 13 species of this genus occurring in India, only *Tajuria jehana* Moore is dealt with from Mizoram.

54. *Tajuria jehana* Moore

(Plains Royal Blue)

1883. *Tajuria jehana* Moore, *Proc. zool. Soc. London,* : 529.

1932. *Tajuria jehana* Moore : Evans, *Identification of Indian Butterflies* : 284.

1997. *Tajuria jehana* Moore : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 448.

Material examined : Aizawl District, Teirei (at night), 1 ex., 12-xi-1995 *(M. S. Shishodia & Party). Fore wing length* : 11.5 mm.

Distribution : India : Mizoram (Aizawl) Himachal Pradesh, Madhya Pradesh, Maharastra, Orissa, South India, Uttar Pradesh and West Bengal.

Elsewhere : Sri Lanka.

Remarks : This species has a male known from Sri Lanka which shows blue on upperside of fore wing, extending above vein 2.

XXXIX. Genus ***Rapala*** Moore

1881. *Rapala* Moore, *Lep. Ceylon* 1(3) : 105.

This genus is represented in India by 17 species, of which only a single species, *Rapala iarbus* (Fabricius) is treated from Mizoram.

55. ***Rapala iarbus iarbus*** (Fabricius)

(Common Red Flash)

1787. *Papilio iarbus* Fabricius, *Mant. Ins.*, **2** : 68. No. 648.

1932. *Rapala jarbus jarbus* (Fabricius) : Evans, *Identification of Indian Butterflies* : 299.

1962. *Rapala iarbus iarbus* (Fabricius) : Cantlie, *The Lycaenidae portion (except the Arhopala Group) of Brigadier Evans' Identification of Indian Butterflies, 1932,* : 150.

1997. *Rapala iarbus iarbus* (Fabricius) : Gupta, *Zool. Surv. India, Fauna of West Bengal, State Fauna Series,* **3** (Part-7) : 480.

Material examined : Aizawl District, Lalan, 1 ex., 1-xii-1995 *(R. S. Mridha, P. Parui & Party). Fore wing length* : 17 mm.

Distribution : India : Mizoram (Aizawl), Sikkim and West Bengal.

Elsewhere : Myanmar and Nepal.

Remarks : This nominate subspecies differs from *Rapala iarbus sorsya* Kollar accurring in India (Uttar Pradesh, Punjab, Orissa, South India and West Bengal), Nepal, (Pakistan-Murre) and Sri Lanka by the prominent black veins on upperside of fore wing in male and female coppery borwn; underside of hind wing with prominent tornal spot in area 2 and orange crowned.

Family SATURNIIDAE

Antennae quadripectinate with the ramii longer in male than in female; ocelli absent; proboscis absent or very short; both fore and hind wings with cells open or closed, fore wing with or without all radials, M_1 arising from upper angle of cell, M_2 absent, M_3 from lower angle of cell, Cu_2 absent, 2nd anal forming a fork with 1st anal; hind without frenulum; fore tibia with long epiphysis, mid and hind tibiae usually with a pair of short terminal spurs (except in *Attacus*), tarsal spines may or may not be present. There are 40 species under 18 genera and two subfamilies, viz., Saturniinae and Salassinae of family Saturniidae known in India. Presently, only a single species-*Samia cynthia* (Drury) of Saturniinae is treated from Mizoram.

XL. Genus ***Samia*** Huebner

1819. *Samia* Huebner, *Verz. bekannt. Schmett.* : 156.

This is genus is represented by only a single species, *Samia cynthia* (Drury) in India.

56. ***Samia cynthia*** (Drury)

(Eri Silkmoth)

1773. *Phalaena attacus cynthia* Drury, *Illust. Nat. Hist. Exot. Ins.*, **2** : 10, pl. 6, fig. 2.

1892. *Attacus cynthia* (Drury) : Hampson, *Fauna of British India (Moths),* 1 :

2000. *Samia cynthia* (Drury) : Gupta, *Zool. Surv. India, Fauna of Meghalaya, State Fauna Series,* **4** (Part-5) : 429.

Material examined : Aizawl District, Seling, 1 ex. (o), 16-ix-1994 *(I. B. Datta & Party);* Chhiahtlang, 1 ex., 10-xi-1995 *(P. H. Roy & Party). Fore wing length* : 56-60 mm.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Meghalaya, Nilgiri Hills, Sikkim, South Andaman and Uttar Pradesh.

Elsewhere : Australia, Bangladesh, China, Indonesia, Myanmar, Sri Lanka and U.K.

Remarks : The cocoon of this silkmoth is a source of erisilk. India ranks first in the yeild of erisilk.

SUMMARY

The studies on the lepidopteran fauna from the state of Mizoram deal with 56 species which include 55 species/subspecies of butterflies

representing 39 genera and seven subfamilies of two families, viz., Nymphalidae and Lycaenidae and also a species of moth, *Samia cynthia* (Drury) of family Saturniidae. Previously, there are least known records of Lepidoptera from Mizoram, therefore, all the 56 species/subspecies of butterflies and a of moth, now dealt with, are definitive records from the state of Mizoram.

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APPENDIX

(Appendix providing District-wise distribution of butterflies and a moth in the state of Mizoram)

Sl. No.	Name of the species	Aizawl	Chhimtuipui	Lunglei
	Family NYMPHALIDAE Subfamily SATYRINAE			
1.	*Mycalesis perseus blasius* (Fabricius)	+	–	–
2.	*Lethe bhadra* (Moore)	+	–	–
3.	*Lethe confusa confusa* Aurivillus	+	–	+
4.	*Elymnias hypermnestra undularis* (Drury)	+	–	–
5.	*Melanitis leda ismene* (Cramer)	–	–	+
6.	*Ypthima ceylonica huebneri* Kirby	+	–	–
7.	*Ypthima philomela peguana* Evans	+	+	–
8.	*Ypthima indecora* Moore	–	+	–
9.	*Orsotrioena medus* (Fabricus)	+	–	–
	Subfamily MORPHINAE			
10.	*Discophora sandaica zal* Westwood	+	–	–
	Subfamily ACRAEINAE			
11.	*Acraea issoria issoria* (Huebner)	+	+	–
	Subfamily NYMPHALINAE			
12.	*Ariadne ariadne pallidior* (Fruhstorfer)	+	+	–
13.	*Ariadne merione assama* (Evans)	–	–	+
14.	*Cethosia cyane* Drury	+	–	–
15.	*Cethosia biblis tisamena* Fruhstorfer	+	–	–
16.	*Argynnis hyperbius* (Linnaeus)	+	–	–
17.	*Phalanta phalantha phalantha* (Drury)	+	–	–
18.	*Vindula erota erota* (Fabricius)	+	–	+
19.	*Symbrenthia lilaea khasiana* Moore	+	+	–
20.	*Hypolimnas bolina* (Linnaeus)	+	–	–
21.	*Junonia iphita iphita* (Cramer)	–	+	–
22.	*Junonia hierta magna* (Evans)	+	–	+
23.	*Junonia altites* (Linnaeus)	+	–	–
24.	*Junonia lemonias lemonias* (Linnaeus)	–	+	–
25.	*Junonia almana almana* (Linnaeus)	+	–	+
26.	*Athyma perius* (Linnaeus)	+	–	+
27.	*Athyma selenophora selenophora* (Kollar)	+	–	–
28.	*Athyma nefte inara* (Doubleday)	+	–	–

Appendix *(Contd.)*

Sl. No.	Name of the species	Aizawl	Chhimtuipui	Lunglei
29.	*Pantoporia hordonia hordonia* (Stoll)	–	–	+
30.	*Neptis hyalas kamarupa* Moore	+	+	+
31.	*Neptis hyalas astola* Moore	+	+	+
32.	*Neptis yerburii* (Butler)	+	–	–
33.	*Neptis soma soma* Moore	+	–	–
34.	*Neptis clinia susruta* Moore	–	+	–
35.	*Tanaecia lepidea lepidea* (Butler)	–	–	+
36.	*Euthalia alpheda jamida* Fruhstorfer	+	–	–
37.	*Stibochiona nicea nicea* (Gray)	–	+	–
38.	*Dichorragia nesimachus* (Boisduval)	–	+	–
	Subfamily CHARAXINAE			
39.	*Polyura athamas athamas* (Drury)	+	–	–
40.	*Polyura arja* (Felder & Felder)	+	+	–
	Family LYCAENIDAE Subfamily RIODININAE			
41.	*Zemeros flegyas indicus* Fruhstorfer	+	+	–
	Subfamily LYCAENINAE			
42.	*Heliophorus epicles indicus* (Fruhstorfer)	+	+	–
43.	*Talicada myseus khasiana* Swinhoe	–	+	–
44.	*Castalius rosimon rosimon* (Fabricius)	–	+	–
45.	*Chilades lajus lajus* (Cramer)	+	–	–
46.	*Freyeri trochilus putli* (Kollar)	+	–	–
47.	*Zizeeria knysna karsandra* (Moore)	+	–	–
48.	*Pseudozizeeria maha maha* (Kollar)	+	–	–
49.	*Zizula hyax* (Fabricius)	+	–	–
50.	*Jamides celeno aelianus* (Fabricius)	+	–	–
51.	*Anthene emolus emolus* (Godart)	+	–	–
52.	*Catochrysops strabo riama* Corbet	+	–	–
53.	*Lampides boeticus* (Linnaeus)	+	–	–
54.	*Tajuria jehana* Moore	+	–	–
55.	*Rapala iarbus iarbus* (Fabricius)	+	–	–
	Family SATURNIIDAE			
56.	*Samia cynthia* (Drury)	+	–	–

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ARANEAE : SPIDERS

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INTRODUCTION

The spider fauna of Mizoram has not yet been studied in a comprehensive manner. The present work was taken up to give an up-to-date information regarding the families : Theraphosidae, Uloboridae, Pholcidae, Salticidae, Ctenidae, Thomisidae, Heteropodidae, Clubionidae, Oxyopidae, Theridiidae, Lycosidae, Tetragnathidae and Araneidae from Mizoram in the light of modern taxonomic concept. It is hoped that this comprehensive account of the spider fauna of Mizoram will prove quit useful to the future workers also. The work is based upon the specimens collected from different parts of Mizoram as well as these present in the National collection of the Zoological Survey of India. Altogether, a total 44 species belonging to 27 genera under 13 families are dealt with here of those, all the families, genera and species form new records for the state. Out of these, 3 species belonging to 3 genera under 3 families are described here as new to science. The entire material is deposited in the National Collection, Zoological Survey of India, Calcutta.

LIST OF TAXA KNOWN FROM MIZORAM

Family I. THERAPHOSIDAE

Genus 1. ***Ischnocolus*** Ausserer

1. ***I. khasiensis*** Tikader

Family II. ULOBORIDAE

Genus 2. ***Miagramopes*** O.P. Cambridge

2. ***M. graveli*** Tikader

Family III. SALTICIDAE

Genus 3. ***Marpissa*** Koch

3. ***M. tigrina*** Tikader
4. ***M. mizoramensis*** sp. nov.

Genus 4. ***Salticus*** Latreille

5. ***S. ranjitus*** Tikader

Family IV. PHOLCIDAE

Genus 5. ***Crossopriza*** Simon

6. ***C. lyoni*** (Blackwall)

Family V. CTENIDAE

Genus 6. ***Ctenus*** Walckenaer

7. ***C. sikkimensis*** Gravely
8. ***C. bomdilaensis*** Tikader & Malhotra

Family VI. THOMISIDAE

Genus 7. ***Camaricus*** Thorell

9. ***C. formosus*** Thorell

Genus 8. ***Xysticus*** Koch

10. ***X. sujatai*** Tikader

Family VII. HETEROPODIDAE

Genus 9. ***Heteropoda*** Latreille

11. ***H. kandiana*** Pocock
12. ***H. sikkimensis*** Gravely

Genus 10. ***Olios*** Walckenaer

13. ***O. kiranae*** Sethi & Tikader

Family VIII. CLUBIONIDAE

Genus 11. ***Cheiracanthium*** Koch, C.L.

14. ***C. aizwalensis*** sp. nov.

Family IX. OXYOPIDAE

Genus 12. ***Oxyopes*** Latreille

15. ***O. ratnae*** Tikader
16. ***O. shweta*** Tikader

Genus 13. ***Peucetia*** Thorell

17. ***P. viridana*** Stoliczka

Family X. THERIDIIDAE

Genus 14. ***Lathrodectus*** Walckenaer

18. ***L. hasseltii*** Thorell

Family XI. LYCOSIDAE

Genus 15. ***Hippasa*** Simon

19. ***H. olivacea*** (Thorell)
20. ***H. partita*** (Cambridge)

Genus 16. ***Pardosa*** Koch

21. ***P. birmanica*** Simon
22. ***P. oakleyi*** Gravely
23. ***P. rhenockensis*** (Tikader)

Genus 17. ***Lycosa*** Latreille

24. ***L. shillongensis*** Tikader & Malhotra

Family XII. TETRAGNATHIDAE

Genus 18. ***Tetragnatha*** Latreille

25. ***T. andamanensis*** Tikader

Family XIII. ARANEIDAE

Genus 19. ***Argiope*** Audouin

26. ***A. aemula*** (Walckenaer)
27. ***A. pulchella*** Thorell

Genus 20. ***Cyclosa*** Menge

28. ***C. confraga*** (Thorell)
29. ***C. spirifera*** Simon

Genus 21. ***Larinia*** Simon

30. ***L. teireae*** sp. nov.

Genus 22. ***Parawixia*** F.O.P. Cambridge

31. ***P. dehanii*** (Doleschall)

Genus 23. ***Neoscona*** Simon

32. ***N. bengalensis*** Tikader
33. ***N. mukerjei*** Tikader
34. ***N. nautica*** (L. Koch)

Genus 24. ***Gasteracantha*** Sundevall

35. ***G. diadesmia*** Thorell
36. ***G. hasseltii*** C.L.Koch
37. ***G. kuhlii*** C.L.Koch
38. ***G. unguifera*** Simon

Genus 25. ***Leucauge*** White

39. ***L. celebesiana*** (Walckenaer)
40. ***L. tessellata*** (Thorell)

Genus 26. **Nephila** Leach

41. ***N. clavata*** L.Koch
42. ***N. kuhlii*** Doleschall
43. ***N. maculata*** (Fabricius)

Genus 27. ***Herennia*** Thorell

44. ***H. ornatissima*** (Doleschall)

I. Family : THERAPHOSIDAE Thorell

1. Genus : *Ischnocolus* Ausserer

1871. *Ischnocolus* Ausserer, *Verh. z-b. Ges. Wien.*, **21** : 184.

1892. *Ischnocolus* : Simon, *Hist. Nat. Araign.*, **1** : 135.

1900. *Ischnocolus* : Pocock, *Fauna of Brit. India*, Arachnida, : 183.

1978. *Ischnocolus* : Tikader, *J. Bombay nat. Hist. Soc.*, **74**(2) : 306.

Diagnosis : Cephalothorax is low, slightly curved. Eyes of anterior line subequal, slightly procurved. Legs are in the typical form, spiny, especially on the tibiae and protarsi of the second and third pairs. Tarsal scopulae of all the legs divided by a band of setae in the adult. No tibial spurs on anterior leg of male is present. In the typical form the tarsus of the palp is long and subcylindrical and overlaps the palpal organ.

Type-species : *Ischnocolus holosericeus* Ausserer

Distribution : Mediterranean district of Palaearctic and Oriental regions.

1. *Ischnocolus khasiensis* Tikader

1978. *Ischnocolus khasiensis* Tikader, *J. Bombay nat. Hist. Soc.*, **74**(2) : 306-319.

Diagnosis : Cephalothorax and legs are reddish brown, abdomen brown. Cephalic region longer than wide, slightly broader in front, low and clothed with fine hair. Middle of cephalothorax provided with a deep, short, straight, transverse fovea. Eyes are eight, pale in colour, situated in a group on a slightly elevated tubercle. Anterior row of eyes slightly procurved and lateral eyes larger than the medians and nearly equally spaced. Ocular area black. Chelicerae strong, clothed with thick hair and rostellum absent. Inner margin of maxillae provided with thick pale scopulae and base provided with small black tooth-like tubercles. Sternum nearly oval, clothed with spine like hair. Legs are long and moderately strong, I and IV pairs longer than others. Abdomen longer than wide, clothed with grey, long hair.

Material examined : 1F, Saiha, Dist. Chhimtuipi, Mizoram, 8.iv.1994, coll. S.K. Ghosh & M. Prasad.

Distribution : India : Mizoram (Dist. Chhimtuipi), New record, Meghalaya.

II. Family : ULOBORIDAE Thorell

2. Genus : ***Miagrammopes*** O.P. Cambridge

1870. *Miagrammopes* O.P. Cambridge, Description and sketches of two new species of Araneidae, with character of a new genus. *J. Linn. Soc., London* (Zoology) **10** : 398-405.

1900. Pocock, R.I. *The fauna of Brit. India*, Arachnida, London.

1969. Tikader, B.K. Two new species of spider of the genus *Uloborus* of the family Uloboridae from India. *Proc. Indian Acad. Sci.*, **69**(6) : 294-298.

1971. Tikader, B.K. Description of some little known spiders from India of the genus Miagrammopes Cambridge, J. Asia, Soc., **13**(1-4) : 172-177.

Diagnosis : Cephalothorax usually longer than broad, low weakly, convex above. Eyes are unequal in size and arranged in two unequal transverse rows; eyes of front minute or obsolate, posterior row recurved, with median eyes widely separated. Clypeus broad, sloping, equal in width. Sternum elongated, divided into two unequal sternites seemingly jointed to cephalothorax between second and third coxae by narrow sclerites. Legs formula is 1423 and end of tarsi provided with three claws. Fourth metatarsus laterally compressed, with ventral comb of short spines; calamistrum occupying most of length of compressed fourth metatarsus and consisting of single row. Abdomen elongated, often tubular. Superficially these spiders look like species of *Tetragnatha* Latreille and *Eucta* Simon (Tetragnathidae). These spiders spin a single line, on which cribellate threads are laid down. This single-line snare is derived as a simplification of the basic orb-structure.

Type-species : *Miagrammopes ferdinandi* Cambridge

Distribution : Asia, Tropical countries of the world.

2. ***Miagrammopes graveli*** Tikader

1971. *Miagrammopes graveli* Tikader, *J. Asia. Soc., Bengal*, **13**(1-4) : 175.

Diagnosis : Cephalothorax brownish green, slightly depressed in the centre, clothed with fine pubescence. Cephalic region provided with longitudinal deep markings. Eyes are four, black and each encircled by black rings in a single transverse slightly recurved row and anterior row absent. Lateral eyes are tuberculate, median eyes close together than the adjucent lateral eyes. Legs are long and strong, clothed with fine hair. I and IV legs are longer than II and III. Metatarsus of the I and IV legs provided with strong *calamistrum.*

Material examined: 1M, Aibawk, Dist. Aizawl, Mizoram, 28.iii.1994, coll. G.C. Sen & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; Kerala.

III. Family : SALTICIDAE Sundevall

Key to the genara of the family SALTICIDAE Sundevall

1. Cephalothorax rectangular in shape not pointed behind. .....***Marpissa***

– Cephalothorax elongated and pointed behind. 2

2. Ocular trapezium is about one third broader than long. ..... ***Salticus***

3. Genus : *Marpissa* Koch

1845. *Marpissa* Koch, die. Arachn., 13 : 56.

1981. *Marpissa* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 93.

1992. *Marpissa* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part 3) : 388.

1995. *Marpissa* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part 2) : 124.

Type-species : *Marpissa muscosa* Clerck

Distribution : Cosmopolitan.

Key to the species of the genus *Marpissa* Koch

1. Ocular area encircled by a U-shaped red-brown broad marking and two arms. ..... *tigrina*

– Ocular area not endircled by a U-shaped red-brown broad marking and two arms. 2

2. Dorsum of abdomen provided with a black line extending from anterior to spinnerets. .... *mizoramensis*

3. *Marpissa tigrina* Tikader

1965. *Marpissa tigrina* Tikader, *Sci. & Cult.*, **31**(5) : 262.

1981. *Marpissa tigrina* : Tikader & Biswas, *Rec. zool. Surv. India,* occ. pap. No. **30**(1) : 97.

1992. *Marpissa tigrina* : Biswas & Biswas, Arancae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part 3) : 393.

Material examined : 1F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party.

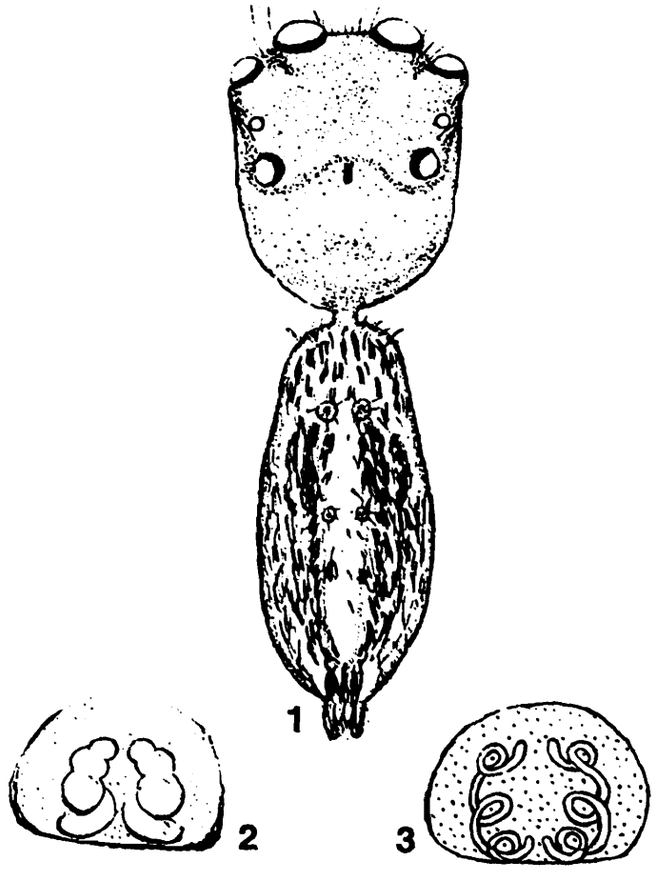
Distribution : India : Mizoram (Dist. Lunglei), New record; West Bengal; Maharashtra; Punjab.

4. *Marpissa mizoramensis* sp. nov.

General : Cephalothorax deep brown, abdomen and legs are light greenish brown in colour. Total length 8.00 mm, Carapace 4.00 mm. long, 2.50 mm. wide; abdomen 4.00 mm. long, 2.50 mm. wide.

Cephalothorax : Longer than wide, cephalic region flat and higher than the rest of the portion, just behind the cephalic high portion on the middle of cephalothorax provided with a small fovea; posterior portion slightly sloping behind. Eyes are black, anterior row slightly recurved and anterior median eyes nearly four times larger than the lateral eyes. Middle row of eyes are very small and situated nearly equidistant from anterior and posterior rows. Ocular trapezium broader than long and slightly high. Posterior and anterior lateral eyes are nearly same size. Chelicerae with one tooth on inner margin and two small teeth on outer margin. Sternum oval, narrow in front and clothed with small hair. Legs are strong and stout with 3412. Tibiae and metatarsi of I provided with three and two pairs of ventral spines respectively.

Abdomen : Longer than wide and narrowing behind, clothed with fine and course black hair. Dorsum provided with a black line extending from anterior to spinnerets and covered with black dots and patches. Epigyne and internal genitalia as in figs. 1-3.



Figs. 1-3. : ***Marpissa mizoae*** sp. nov.

Holotype : F in spirit, deposited in National Collection of Zoological Survey of India, Calcutta, Regd. No. 5480/18.

Type-locality : Lunglei, Dist. Lunglei, Mizoram, India, 25.iii.1994. coll. Bijan Biswas.

Remarks : This species resembles *Marpissa ludhianaensis* Tikader but it is separated as follows : (1) Colour pattern of abdomen is different. (2) Dorsum provided with longitudinal black band extending from anterior to posterior part of abdomen but *M. ludhianaensis* there is no such band. (3) Epigyne and internal genitalia are also structurally different

4. Genus : *Salticus* Latreille

1804. *Salticus* Latreille, *Nouv. Dict. H. N.*, **24** : 135.

1967. *Salticus* : Tikader, *Proc. Indian Acad. Sci.*, **66**(4) : 117.

Type species : *Salticus scenicus* Clerck

Distribution : Cosmopolitan except Australia.

5. *Salticus ranjitus* Tikader

1967. *Salticus ranjitus* Tikader, *Proc. Indian Acad. Sci.*, **66(4)** : 117.

1981. *Salticus ranjitus* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 89.

1992. *Salticus ranjitus* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part 3) : 400.

Material examined : 2F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party.

Distribution : India : Mizoram (Dist. Lunglei), New record; West Bengal; Maharashtra; Punjab; West Sikkim.

IV. Family : PHOLCIDAE C.L. Koch

5. Genus : *Crossopriza* Simon

1893. *Crossopriza* Simon, *Hist. Nat. Arign.*, **1** : 476.

1935. *Crossopriza* : Dyal, *Bull. zool. Punjab Univ.*, **1** : 168.

1981. *Crossopriza* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 18.

Diagnosis : Anterior eyes recurved, narrowly spaced, chelicerae depressed at the inner margin and each provided with an oblique apical tooth. Sternum broadly truncate posteriorly. Abdomen slightly ovate, abruptly declined posteriorly raised much above the spinnerets.

Type-species : *Crossopriza pristina* Simon

Distribution : India, Arabia, Egypt.

6. *Crossopriza lyoni* (Blackwall)

1867. *Pholcus lyoni* Blackwall, *Ann. Mag. Nat. Hist.*, **19**(3) : 302.

1992. *Crossopriza lyoni* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part 3) : 383.

Diagnosis : *Crossopriza lyoni* is a common house spider. It spine an extremely fine irregular cob-web, from which it hangs upside down. It prefers old dark and abandoned houses. No cocoon is made but the eggs are glued together and carried by the chelicerae of the mother till hatching. Crossopriza lyoni is nocturnal in habit.

Material examined : 1M, Champhai, Dist. Aizawl, Mizoram, 30.iii.1993, coll. A.R. Lahiri & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Punjab; Rajasthan; Tamil Nadu; Uttar Pradesh; Sikkim.

Elsewhere : Burma (Myanmar).

V. FAMILY : CTENIDAE Keyserling

6. Genus : *Ctenus* Walckenaer

1805. Ctenus Walckenaer, *Tab. Aran.*, **18** Arachn.

1897. Ctenus : Simon, *Mem. Soc. zool.* Fr., **10** : 252.

1931. Ctenus : Gravely, *Rec. Indian Mus.*, **33**(3) : 211.

Diagnosis : Both the rows of eyes are recurved but anterior row strongly recurved. Anterior lateral eyes are smaller than anterior medians. Tarsai bears two claws. Retromargin of chelicera armed with four or sometimes with five teeth. Labium longer than broad. Trochanter of legs show a notch ventrally.

Type species : *Ctenus dubius* Walckenaer

Distribution : Cosmopolitan and cosmo-tropical.

Key to the species of the genus *Ctenus* Walckenaer

1. Tibial apophysis of male palp stout and with a square shaped lamina. ..... *sikkimensis*
– Tibial apophysis of male not stout and without a square lamina. 2
2. Horns arising from posterior lateral angles of epigyne, much smaller. ..... *bomdildensis*

7. *Ctenus sikkimensis* Gravely

1931. *Ctenus sikkimensis* Gravely, *Rec. Indian Mus.*, **33**(3) : 211.
1981. *Ctenus sikkimensis* : Tikader & Malhotra, *Rec. zool. Surv. India*, **79** : 121.

Material examined : 1F, Kolasib, by the side of Hill stream, Dist. Aizawl, Mizoram, 15.iv.1994, coll. A.K. Hazra & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Assam.

8. *Ctenus bomdilaensis* Tikader & Malhotra

1981. *Ctenus bomdilaensis* Tikader & Malhotra, *Rec. zool. Surv. India*, **79** : 109.

Material examined : 1F, Aizawl Pachhunga University Campus, Dist. Aizawl, Mizoram, 10.x.1995, coll. A.K. Sanyal & party.

Distribution : India : Mizoram (Dist. Aizawl), New record, Arunachal Pradesh.

VI. Family : THOMISIDAE Sundevall

Key to the genera of the family THOMISIDAE Sundevall

1. Cephalic region as wider as thoracic region. ..... ***Camaricus***
– Cephalic region narrower than thoracic region. 2
2. Anterior median eyes closer to the lateral eyes than to each other. ..... ***Xysticus***

7. Genus : *Camaricus* Thorell

1887. *Camaricus* Thorell, *Ann. Mus. Civ. Gen.*, : 261.
1977. *Camaricus* : Tikader, *Rec. zool. Surv. India*, **72**(1-4) : 192.
1981. *Camaricus* : Tikader & Biswas, *Rec. zool. Surv. India*, occ. pap. No. **30**(1) : 83.

Type species : *Camaricus maugei* (Walckenaer)

Distribution : India, Tropical Africa and Malayasia.

9. *Camaricus formosus* Thorell

1887. *Camaricus formosus* Thorell, *Ann. Mus. Civ. Gen.*, : 261.
1980. *Camaricus formosus* : Tikader, *Fauna of India*, Araneae : Spiders, **1**(1) : 175.
1992. *Camaricus formosus* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 404.

Diagnosis : Cephalothorax red, legs light greenish and abdomen are dark brown in colour. Cephalic region high, clothed with black hair, wider in front, anterior portion and the lateral sides of cephalic region provided with conspicuous deep brown or black patches. Centre of the cephalothorax provided with deep brown patch but in male specimen there is no such patch. Eyes are two rows, both rows recurved, posterior row slightly longer than anterior row. Ocular quad longer than wide. Legs are robust, clothed with hair and spines and ornamented with black patches, but in male I and II pair complete dark in colour. Sternum heart-shaped, pointed behind, clothed with black hair, conspicuously decorated longitudinally and laterally by chalk white bands.

Material examined : 2F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 21.iii.1994, coll. B.K. Biswas & party; 1F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party; 1F, Aibawk, Dist. Aizawl, Mizoram, 17.xi.1995, coll. M.S. Shishodia & party; 2F, Teirei (Dampa forest), Dist. Aizawl, Mizoram 9.xi.1995, coll. M.S. Shishodia & party.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei), New record; West Bengal; Karnataka; Maharashtra; Andaman Islands.

8. Genus : *Xysticus* Koch

1853. *Xysticus* Koch, *H. Schaeff. Deutschl. Ins.*, : 35.
1892. *Xysticus* : Simon, *Hist. Nat. Araignees*, **1**(4) : 1035.

1962. *Xysticus* : Tikader, *J. Linn. Soc.*, **44**(300) : 576.

1981. *Xysticus* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 80.

1992. *Xysticus* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 409.

Type-species : *Xysticus cristatus* Clerck

Distribution : Cosmopolitan except Australia.

10. *Xysticus sujatai* Tikader

1962. *Xysticus sujatai* Tikader, *J. Linn. Soc.*, London, **44**(300) : 577.

1980. *Xysticus sujatai* : Tikader, *Fauna of India*, Araneae : Spiders, **1**(1) : 121.

1995. *Xysticus sujatai* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 119.

Diagnosis : Cephalothorax as long as wide; densely and conspicuously spined, the lateral margin with dark brown and two longitudinal broad dark brown bands extending from both the lateral eyes to nearly the base of cephalothorax. Eyes are round, lateral eyes large and nearly contiguous, ringed with dirty white tubercles. Legs are strong and spined with irregular deep brown or black dots and these dots more contiguous on the III and IV legs. Abdomen short, ovate wider behind, clothed with spines, dorsal side with paired transverse white lines, laterally and ventrally, lighter than dorsally. Adult male black, I and II legs are deep black up to end of patella.

Material examined : 1M, Champhai, Dist. Aizawl, Mizoram, 2.iv.1994, coll. G. Sen & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; Meghalaya.

VII. Family : HETEROPODIDAE Thorell

Key to the genera of the family HETEROPODIDAE Thorell

1. Epigynum provided with a pair of lobes usually separated by a median septum. .... ***Heteropoda***
– Epigynum without lobes and not separated by a median septum. 2
2. Posterior lateral eyes sessile, ocular quad squire. ..... ***Olios***

9. Genus : *Heteropoda* Latreille

1804. *Heteropoda* Latreille, *N. Die. hist. nat.*, **24** : 135.

1931. *Heteropoda* : Gravely, *Rec. Indian Mus.*, **33**(3) : 247.

1977. *Heteropoda* : Tikader, *Rec. zool. Surv. India*, **72** : 189.

Type species : *Heteropoda venatoria* (Linn.)

Distribution : From India eastward to Australia.

Key to the species of the genus *Heteropoda* Latreille

1. Abdomen roundish with no markings on the dorsum; median piece almost straight and lateral lobes parallel to each other of epigyne. ..... *kandiana*
– Abdomen oval with a dark brown markings; median piece wider and lateral lobes divergent anteriorly of epigyne. 2
2. Epigynum provided with a horizontal plate; lateral lobes are in contact throughout their length and bent outwardly at the posterior end of epigynum. ..... *sikkimensis*

11. *Heteropoda kandiana* Pocock

1899. *Heteropoda kandiana* Pocock, *J. Bombay nat. Hist. Soc.*, **12** : 752.

1900. *Heteropoda kandiana* : Pocock, *Fauna Brit. India, Arachnida*, : 261.

1931. *Heteropoda kandiana* : Gravely, *Rec. Indian Mus.*, **33**(3) : 249.

1954. *Heteropoda kandiana* : Roewer, *Kat. der Araneae*, **2**(A) : 716.

1988. *Heteropoda kandiana* : Sethi & Tikader, *Rec. zool. Surv. India, Occ. Pap. No.* **93** : 26.

Material examied : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 20.iii.1994, coll. Bijan Biswas; 1F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei), 'New record; West Bengal; Orissa; Assam.

Elsewhere : Sri Lanka.

12. ***Heteropoda sikkimensis*** Gravely

1931. *Heteropoda sikkimensis* Gravely, *Rec. Indian Mus.*, **33**(3) : 255.

1954. *Heteropoda sikkimensis* : Roewer, *Kat. der. Araneae*, **2**(A) : 718.

1988. *Heteropoda sikkimensis* : Sethi & Tikader, *Rec. zool. Surv. India, Occ. Pap. No.* **93** : 27.

Material examined : 1F, Marlen National Park, Dist. Aizwal, Mizoram, 16.xii.1993, coll. S.S. Saha & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Sikkim; Meghalaya.

10. Genus : ***Olios*** Walckenaer

1837. *Olios* Walckenaer, *Hist. Nat. Ins. Apt.*, **1** : 202.

1931. *Olios* : Gravely, *Rec. Indian Mus.*, **33**(3) : 247.

1988. *Olios* : Sethi & Tikader, *Rec. zool. Surv. India, Occ. Pap. No.* **93** : 30.

13. ***Olios kiranae*** Sethi & Tikader

1988. *Olios kiranae* Sethi & Tikader, *Rec. zool. Surv. India, Occ. Pap. No.* **93** : 38.

Diagnosis : Cephalothorax as long as wide, clothed with fine hair; cephalic region distinctly elevated than thoracic region. Anterior row of eyes are straight and posterior row slightly procurved. Anterior medians are largest of all. Ocular quad longer than wide and narrow anteriorly than behind. Chelicerae moderrate, dark brown in colour, armed with two and four teeth on outer and inner margins. Legs are moderately strong, long, clothed with hair. Abdomen is cone shaped, tappering at the posterior end, dorsum provided with two pairs of sigilla. Epigynum provided with paired lateral lobes.

Material examined : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 23.iii.1994, coll. Bijan Biswas.

Distribution : India : Mizoram (Dist. Aizawl), New record; Gujarat.

VIII. Family : CLUBIONIDAE Wagner

11. Genus : ***Cheiracanthium*** Koch, C.L.

1839. *Cheiracanthium* Koch, C.L. *Die. Arach. Sechster Band*, : 9.

1966. *Cheiracanthium* : Dondale, *Aust. J. Zool.*, **14** : 1176.

1981. *Cheiracanthium* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 69.

1992. *Cheiracanthium* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 418.

1995. *Cheiracanthium* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 103.

Diagnosis : Cephalothorax ovoid in shape, longer than wide, convex anteriorly, with no median fovea if present very insconspicuous. Eyes are nearly uniform size, arranged in two transverse series - anterior and posterior. Both the laterals of anterior and posterior row are close to each other. Ocular quadrate relatively narrower anteriorly. Chelicerae longer than wide, moderately strong and stout, dark brown in colour, outer margin provided with two and inner margin with two to three teeth. Abdomen is elongated, oval and pointed posteriorly, dull-yellow or pale green without pattern of scutum. Epigyne with flat or concave plate with copulatory opening situated at the lateral margin of the plate.

Type-species : *Cheiracanthium punctorium* Villers

Distribution : All tropical parts of the world.

14. ***Cheiracanthium aizwalensis*** sp. nov.

General : Cephalothorax and chelicerae are deep brown, legs and abdomen pale yellow in colour. Total length 9.50 mm. Carapace 4.00 mm. long and 3.00 mm. wide; abdomen 5.50 mm. long and 3.50 mm. wide.

Cephalothorax : Longer than wide, wider at the middle, narrower both anterior and posterior, covered with fine pubescence, fovea present posterior to the carapace. Eyes are more or less equal in size and pearly white, arranged in two rows anterior and posterior. The anterior row of eyes slightly recurved, median close to each other; both the laterals anterior and posterior are in contiguous. Ocular quadrate is almost squire. Chelicerae longer than wide, strong and stout, redish brown in colour, inner and outer margin provided with three and two unequal teeth

respectively. Maxillae and labium are redish brown in colour, longer than wide. Maxillae wider anteriorly with slight concavity at its outer side. Legs I and II longer than III and IV. Legs formula is 1243. Femora I and II curved ventrally and III and IV curved dorsally. Tibia and metatarsi of I and II provided with three pairs of ventral spines respectively. Tarsi long, provided with two claws and their claw tufts.

Abdomen : Spindle shaped, covered with fine pubescence. Epigyne as elogated plate. Figs. 4-6.

Type-locality : Holotype : 1F, Regd. No. 5482/18, two km. south of Aibawk forest rest house, Dist. Aizawl, Mizoram, India, 28.iii.1994, coll. *G.C. Sen & party*.

Distribution : Known only from the type locality.

Remarks : This species resembles to *Cheiracanthium jabalpurensis* Majumder & Tikader in general appearance but difers from that due to following particulars (1) Chelicerae inner and outer margin provided with three and two unequal teeth as in *C. jabalpurensis* there is both margin provided with two teeth. (2) Abdomen spindle shaped with two pairs of sigilla where as in *C. jabalpurensis* elogated in front and wider posteriorly and no such sigilla. (3) Epigyne and internal genitalia are also structurally different.

IX. Family : OXYOPIDAE Thorell

Key to the genera of the family OXYOPIDAE Thorell

1. Cephalothorax high and convex; posterior lateral eyes strongly procurved..... ***Oxyopes***
2. Cephalothorax not so high enough or convex; posterior lateral eyes slightly procurved..... ***Peucetia***

12. Genus : *Oxyopes* Latreille

1804. *Oxyopes* Latreille, *Hist. Nat. Arach. France*, **14**(7) : 144.

1900. *Oxyopes* : Pocock, *Fauna of Brit. India Arachn.*, : 255.

1970. *Oxyopes* : Tikader, *Rec. zool. Surv. India*, **64**(1-4) : 70.

Type-species : *Oxyopes heteropthalamus* Latreille

Distribution : Cosmopolitan.

Key to the species of the genus *Oxyopes* Latreille

1. Upper side of the femora of all legs provided with a longitudinal black line..... *ratnae*
– Upper side of the femora of all legs not provided with a longitudinal black line..... 2
2. Cephalothorax narrow in front. ..... *shweta*

15. *Oxyopes ratnae* Tikader

1970. ***Oxyopes ratnae*** Tikader, *Rec. zool. surv. India*, **64**(1-4) : 70.

1981. *Oxiopes ratnae* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 63.

1992. *Oxyopes ratnae* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 433.

1995. *Oxyopes ratnae* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 121.

Material examined : 1F, Champhai Tourist Lodge, Dist. Aizawl, Mizoram, 13.x.1995, coll. A.K. Sanyal & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Sikkim.

16. *Oxyopes shweta* Tikader

1970. *Oxyopes shweta* Tikader, *Rec. zool. Surv.* India, **64**(1-4) : 78.

1981. *Oxyopes shweta* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 61.

1992. *Oxyopes shweta* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 434.

1995. *Oxyopes shweta* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 121.

Material examined : 1F, Champhai, Dist. Aizawl, Mizoram, 21.v.1994, coll. G. Sen & party; 1F, Aibawk, Dist. Aizawl, Mizoram, 28.iii.1994, coll. G. Sen & party; 1F, Vairengte, behind forest rest house, Dist. Aizawl, Mizoram, 16.iv.1994, coll. A.K. Hazra & party; 1F, Teirei (Dampa forest),

Dist. Aizawl, Mizoram, 9.xi.1995, coll. M.S. Shishodia & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Sikkim.

13. Genus : ***Peucetia*** Thorell

1869. *Peucetia* Thorell, *On European Spiders, Uppasala,* **7** : 196.

1964. *Peucetia* : Brady, *Bull. Mus. Comp. Zool.*, Harvard, **131**(13) : 505.

1981. *Peucetia* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 65.

Type-species : *Peucetia viridis* Blackwall.

Distribution : Asia, Africa, America, Europe.

17. ***Peucetia viridana*** Stoliczka

1869. *Peucetia viridana* Stoliczka, *J. Asia. Soc., Bengal,* **38** : 220.

1992. *Peucetia viridana* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 435.

Diagnosis : Cephalothorax and legs are greenish brown, abdomen pale greenish in colour. Cephalothorax longer than wide, moderately high provided with brown spots and cephalic region high and broad clothed with few spines, centre provided with deep fovea. Eyes of anterior row strongly recurved and middle eyes are smallest and lateral largest. Clypeus long and provided with two black lines extending from base of anterior middle eyes. Legs are long and strong clothed with conspicuous black spots and black long spines. Abdomen narrowing behind clothed with fine hair; mid-dorsally with a longitudinal deep brown lines with lateral branches.

Material examined : 1F, Manpui, Dist. Chimtipui, Mizoram, 17.ix.1993, coll. A.R. Lahiri & party; 1F, Lawngtlai, Dist. Chimtipui, Mizoram, 19.ix.1993, coll. A.R. Lahiri & party.

Distribution : India : Mizoram (Dist. Chimtipui), New record, West Bengal; Orissa; Pondichery; Tamil Nadu.

Elsewhere : Sri Lanka.

X. Family : THERIDIIDAE Sundevall

14. Genus : ***Lathrodectus*** Walckenaer

1805. *Lathrodectus* Walckenaer, *Tabl. Aran.*, : 81.

1897. *Lathrodectus* : Simon, *Hist. Nat. Araign.*, **1** : 568.

1900. *Lathrodectus* : Pocock, *Fauna Brit. India, Arachn.*, : 237.

1940. *Lathrodectus* : Comstock, *The Spider Book,* New York, : 372.

1980. *Lathrodectus* : Kaston, *How to know the Spiders,* : 99.

Diagnosis : Cephalothorax normal in form, clypeus is equal in breadth to the ocular area. Lateral eyes are widely separated. Legs are long; superior claws toothed almost to apex. Abdomen is large, globular.

Type-species : *Lathrodectus guttatus* Walckenaer

Distribution : Tropical and sub-tropical countries of world.

18. ***Lathrodectus hasseltii*** Thorell

1870. *Lathrodectus hasseltii* Thorell, *Efv. K. Sv. Vet.-Akad. Forh.*, **27** : 369.

Diagnosis : Cephalothorax blackish in colour, dorseum of abdomen ornamented with a broad longitudinal red band with uneven edges exending throughout the posterior two-thirds of its length; lower side with a small transverse and sometimes on behind the genital lobe. Anterior row of eyes are subequal, median nearer to each other than the laterals.

Material examined : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 21.iii.1994, coll. Bijan Biswas.

Distribution : India : Mizoram (Dist. Aizawl), New record; Gujarat; Maharashtra.

Elsewhere : Pakistan, Burma.

XI. Family : LYCOSIDAE Sundevall

Key to the genera of the family LYCOSIDAE Sundevall

1. Posterior spinnerets distinctly longer than the anterior spinnerets; sternum generally provided with mid-longitudinal dark markings. .... ***Hippasa***

- Posterior spinnerets not distinctly longer than the anterior spinnerets; sternum not provided with mid-longitudinal dark markings. 2
2. Head at the top is wider than at clypeus and the metatarsai IV usually longer than tibia plus patella IV together. ..... ***Pardosa***
- Cephalic region much elevated from the thoracic region. 3
3. The labium is longer than wide and the basal exavation is prominent. ..... ***Lycosa***

15. Genus : ***Hippasa*** Simon

1885. *Hippasa* Simon, *Bull. Soc. Zool. Fr.*, **10** : 31.
1951. *Hippasa* : Sinha, *Rec. Indian Mus.*, **48**(2) : 11.
1981. *Hippasa* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 48.

Type-species : *Hippasa agelenoides* Simon

Distribution : Cosmopolitan except Australia.

Key to the species of the genus *Hippasa* Simon

1. Pit of vulva transversely elliptical. *olivacea*
- Pit of vulva arch shaped anteriorly. 2
2. Plate of vulva slightly invaginated aneriorly; dorsum with three longitudinal dark bands extending to the base of spinnerets. .. *partita*

19. ***Hippasa olivacea*** (Thorell)

1887. *Dipontia olivacea* Thorell, *Ann. Mus. civ. Stor. nat.*, Genova, **5**(2) : 297.
1895. *Hippasa olivacea* : Thorell, *Spiders of Burma*, : 217.
1924. *Hippasa olivacea* : Gravely, *Rec. Indian Mus.*, **26** : 593.
1980. *Hippasa olivacea* : Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 283.

Material examined : 1F, Pangzwal, Dist. Lunglei, Mizoram, 13.xi.1995, coll. P.H. Roy & party, 1F, Seling, Dist. Aizawl, Mizoram, 8.xi.1995, coll. P.H. Roy & party.

Distribution : India : Mizoram (Dists. Aizwal, Lunglei), New record.

Elsewhere : Burma (Type locality).

20. ***Hippasa partita*** (Cambridge)

1876. *Trochosa partita* Cambridge, *Proc. Zool. Soc.*, : 541.
1924. *Hippasa partita* : Gravely, *Rec. Indian Mus.*, **26** : 588.
1980. *Hippasa partita* : Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 291.
1992. *Hippasa partita* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 439.

Material examined : 1F, Champhai, Dist. Aizawl, Mizoram, 3.iv.1994, coll. G. Sen & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal.

Elsewhere : Alexandria, Egypt, Arabia, Central Asia, Pakistan.

16. Genus : ***Pardosa*** Koch

1848. *Pardosa* Koch, *Die. Arachnide*, **14** : 100.
1951. *Pardosa* : Sinha, *Rec. Indian Mus.*, **48**(2) : 45.
1980. *Pardosa* : Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 315.

Type-species : *Pardosa striatipes* Koch

Distribution : Cosmopolitan except Australia.

Key to the species of the genus *Pardosa* Koch

1. Chelicerae uniform in colour; patella not provided with longitudinal streak dorsally. .. .. *birmanica*
- Chelicerae not uniform in colour; patella provided with longitudinally dorsal black streak. 2
2. Abdomen oval in shape; anterior mid-dorsally provided with lance shaped marking. *oakleyi*
- Abdomen not oval; anterior mid-dorsally not provided with lance shaped marking. 3
3. Ventral side of abdomen uniform pale and dorsal side with greenish black and pale patches. ..... *rhenockensis*

21. ***Pardosa birmanica*** Simon

1884. *Pardosa birmanica* Simon, *Ann. Mus. civ. stor. nat.*, Genova, **20** : 333.
1980. *Pardosa birmanica* : Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 329.
1992. *Pardosa birmanica* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 444.

Material examined : 1F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. Bijan Biswas & party.

Distribution : India : Mizoram (Dist. Lunglei), New record; West Bengal; Meghalaya; Bihar; Orissa; Maharashtra; Punjab; Gujarat; Uttar Pradesh; Himachal Pradesh; Madhya Pradesh; Andhra Pradesh; Tamil Nadu.

Elsewhere : Burma, Pakistan.

22. ***Pardosa oakleyi*** Gravely

1924. *Pardosa oakleyi* Gravely, *Rec. Indian Mus.*, **26** : 610.

1935. *Pardosa oakleyi* : Dyal, *Bull. Zool. Punjab Univ.*, **1** : 145.

1980. *Pardosa oakleyi* : Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 337.

1981. *Pardosa oakleyi* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 57.

1992. *Pardosa oakleyi* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 445.

Material examined : 1F, 1M, Marlen National Park, Dist. Aizawl, Mizoram, 23.xii.1993, coll. S.S. Saha & party.

Distribution : India : Mizoram (Dist. Aizawl), New record, West Bengal; Bihar; Punjab; Karnataka; Tamil Nadu.

Elsewhere : Pakistan.

23. ***Pardosa rhenockensis*** (Tikader)

1970. *Lycosa rhenockensis* Tikader, *Rec. zool. Surv. India,* **64**(1-4) : 68.

1980. *Pardosa rhenockensis* : Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 342.

Material examined : 1F, Aibawk, Dist. Aizawl, Mizoram, 9.xii.1993, coll. S.S. Saha & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; Sikkim; Gujarat.

17. Genus : ***Lycosa*** Latreille

1804. *Lycosa* Latreille, *Nouv. Dist. d Hist. Nat.*, **24** : 135.

1970. *Lycosa* : Tikader, *Rec. zool. Surv. India,* **64**(1-4) : 63.

1992. *Lycosa* : Biswas & Biswas, *Fauna of West Bengal,* Part 3, Araneae : Spiders, *State Fauna Series No.* **3** : 440.

Type-species : ***Lycosa taruntula*** Ross

Distribution : Cosmopolitan.

24. ***Lycosa shillongensis*** Tikader & Malhotra

1980. *Lycosa shillongensis* Tikader & Malhotra, *Fauna of India*, Araneae : Spiders, **1**(2) : 403.

1995. *Lycosa shillongensis* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalalya, State Fauna Series,* **4** (Part-2) : 112.

Diagnosis : Cephalothorax longer than wide, tapering anteriorly, convex, clothed with pubescence and hair; centre of the cephalothorax provided with a sharp fovea. Anterior row of eyes straight as wide as second row, anterior median slightly larger than the anterior laterals. Eyes of the second row larger than the others. Spine-like hair pesent on the anterior ocular area and on the lateral sides of the posterior eyes. Labium longer than the wide, proximately black and distal end pale brown in colour. Chelicerae black, strong, hairy and inner margin of fang furrow provided with three prominent teeth. Abdomen longer than wide, heavily colthed with pubescence and spine like hair. Anterior middle end provided with a bunch of white hair.

Materials examined : 1F, Pangzwal, Dist. Lunglei, Mizoram, India, 13.iii.1995, coll. P.H. Roy & party.

Distribution : India : Mizoram (Dist. Lunglei), New record; West Bengal; Meghalaya.

XII. Family : TETRAGNATHIDAE Menge

18. Genus : ***Tetragnatha*** Latreille

1804. *Tetragnatha* Latreille, *Newv. Diet. d Hist. Nat.*, **24** : 135.

1900. *Tetragnatha* : Pocock, *Fauna of Brit.* India Arachn., : 214.

1940. *Tetragnatha* : Comstock, *The Spider Book*, New York, : 423.

1981. *Tetragnatha* : Tikader & Biswas, *Rec. zool. surv. India, Occ. Pap. No.* **30**(1) : 45.

Diagnosis : Cephalothorax longer than wide, eyes are in two rows, lateral eyes nearly contiguous; chelicerae very long, especially in the male. Abdomen long and narrow and bears the spinnerets near its end. These are orb-weaving spiders; they are common on grass and on low plants. The spiders rest by day with their legs stretched before and behind and are only active at night. They spin large orb-webs at sun down among grasses and other foliage usually in the vicinity of water.

Type-species : *Tetragnatha extensa* Linn.

Distribution : Tropical countries of the world.

25. *Tetragnatha andamanensis* Tikader

1977. *Tetragnatha andamanensis* Tikader, *Rec. zool. Surv. India*, **72** : 175.

1992. *Tetragnatha andamanensis* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 448.

Diagnosis : Cephalothorax, legs and abdomen are brownish green to light brown; longer than wide, narrowing in cephalic region and depressed on the centre. Eyes are in two rows, both are recurved but anterior row more recurved. Ocular quad longer than wide and slightly narrower in front than behind. Chelicerae is nearly as long as carapace and strongly divaricate. Outer row of chelicerae provided with ten teeth, first is large, others gradually diminishing in size. Inner margin also provided with ten teeth but first tooth is slightly curved than the others. Legs are very long, clothed with hair and spines. Abdomen is long, nearly parallel sided, clothed with hair and spines. It also decorated with minute silvery white dots.

Material examined : 3F, Kampui Dil, Nagengpui, Dist. Lawntlai, Mizoram, 29.iii.1997, coll. S.K. Chattopadhya & party.

Distribution : India : Mizoram (Dist. Lawntlai), New record; West Bengal; Andaman and Nicobar Islands.

XIII. Family : ARANEIDAE Latreille

Key to the Sub-families of the family ARANEIDAE Latreille

1. Posterior row or eyes are nearly straight or recurved; lateral eyes sub-equal. .... ARANEINAE
– Posterior row of eyes are not straight or recurved; lateral eyes not sub-equal. 2
2. Spinnerets situated on an elevated circular space surrounded by a thick flange in the form of a ring; abdomen hard flattened dosally and provided with conical humps and spines. .... GASTERACANTHINAE
– Spinnerets not surrounded by thick flange in the form of a ring; abdomen not hard and not provided with conical humps and spines. ... 3
3. Epigastric plates not provided with transverse furrow; chelicerae usually having well developed boss. ..... METINAE
4. Labium longer than wide; abdomen two and one half to three times as long as wide; tarsus IV not provided with sustentaculum. .... NEPHILINAE

Sub-family : ARANEINAE

Key to the genera of the Sub-family ARANEINAE

1. Eyes of anterior row not evenly spaced or medians closer to each other than to laterals. ..... ARGIOPE
– Eyes of anterior row evenly spaced or medians not closer to each other than laterals. 2
2. Posterior median eyes close, nearly touching; carapace provided with a U-shaped junction between cephalic and thoracic region. .... CYCLOSA
– Posterior median eyes not very close; carapace not having any U-shaped junction between cephalic and thoracic region. 3
3. Abdomen a little pointed mid-longitudinally over the carapace and no caudal projection; (ventral side of abdomen with a white median longitudinal band framed by black)....LARINIA

– Ventral side of the abdomen not provided with median longitudinal band which framed by black. 4

4. Carapace with cephalic region bulging behind the ocular area, also provided with granules; anterior row of eyes procurved; epigyne with short beak like scape. ..... PARAWIXIA

– Carapace with cephalic region not bulging and no granules; anterior row of eyes recurved; epigyne may or may not provided with scape; when present, not beak like. 5

5. Thoracic groove longitudinal epigyne with unwrinkled scape and provided with one or two, pairs of lateral lobes. ..... NEOSCONA

19. Genus : ***Argiope*** Audouin

1826. *Argiope* Audouin, in Savigny, *Descriptions de l' Egypte*, **1**(2) : 121.

1970. *Argiope* : Tikader, *Rec. zool. Surv. India*, **64**(1-4) : 27.

1982. *Argiope* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 111.

1992. *Argiope* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 452.

Type species : *Argiope* lobata (Thorell)

Distribution : Tropical and temperate countries of the world.

Key to the species of the genus *Argiope* Audouin

1. Abdomen broadly oval and conspicuously truncated anteriorly; dorsum provided with black transverse stripes and forming a net work on the posterior half. ..... *aemula*

– Abdomen elogated oval with no truncated anteriorly, dorsum with no net work of black stripes. 2

2. Maxillae roundish in shape, dark brown at the proximal part. ..... *pulchella*

26. ***Argiope aemula*** (Walckenaer)

1841. *Epeira aemula* Walckenaer, *Hist. Nat. Ins. Apt.*, **2** : 118.

1970. *Argiope aemula* : Tikader, *Rec. zool. Surv. India*, **64**(1-4) : 29.

1982. *Argiope aemula* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 119.

1992. *Argiope aemula* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State fauna Series*, **3** (Part-3) : 453.

Material examined : 1F, Aibawk, Dist. Aizawl, Mizoram, 19.iii.1994, coll. B.K. Biswas & party; 2F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party; 1F, Kolasib, Dist. Aizawl, Mizoram, 3.ix.1989, coll. I.P. Sinha.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei), New record; West Bengal; Andaman and Nicobar Islands; Gujarat; Maharashtra; Tamil Nadu.

Elsewhere : Sri Lanka, Burma, Indo and Austro-Malaysia.

27. ***Argiope pulchella*** Thorell

1881. *Argiope pulchella* Thorell, *Annali. Mus. civ. Genova*, **18** : 74.

1982. *Argiope pulchella* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 129.

1992. *Argiope pulchella* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 455.

1995. *Argiope pulchella* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 94.

Material examined : 1F, Chawnhu forest, Dist. Lunglei, Mizoram, 2.iv.1994, coll. S.K. Ghosh & party; 1F, Champhai Tourist Lodge, Dist. Aizawl, Mizoram, 13.x.1995, coll. A.K. Sanyal & party; 1F, Varenti, Dist. Aizawl, Mizoram, 10.xii.1995, coll. P. Parui & party; 1F, Saihapuikaun, Dist. Aizawl, Mizoram, 9.xii.1995, coll. P. Parui & party; 1F, New Saiha, Dist. Chhimthuipui, Mizoram, 7.iv.1994, coll. S.K. Ghosh & party.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei, Chhimthuipui), New record; West Bengal; Meghalaya; Andaman and Laccadeep Islands; Assam; Maharashtra; Orissa; Madhya Pradesh; Tamil Nadu.

Elsewhere : Burma, Malaya-Peninsula.

20. Genus : *Cyclosa* Menge

1866. *Cyclosa* Menge, Schrift, *Nat. Ges. Danzig* (N.F.), **1** : 73.

1982. *Cyclosa* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 183.

1992. *Cyclosa* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 456.

1995. *Cyclosa* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 101.

Type-species : *Cyclosa conica* (Pallas)

Distribution : Cosmopolitan.

Key to the species of the genus *Cyclosa* Menge

1. Caudal tubercle not bifurcated, one pair less distinct tubercle at the posterior part of abdomen; base of epigyne small and less prominent. ..... *confraga*
– Caudal tubercle bifurcated, base of epigyne long and prominent. 2
2. One pair of distinct tubercles of the base of the caudal tubercle; scape of epigyne with contraction; narrow tip of the scape bent nerly at the right angle to the base. ..... *spirifera*

28. *Cyclosa confrga* (Thorell)

1892. *Epeira confraga* Thorell, *Bull, Soc. ent. Ital.*, **24** : 239.

1909. *Cyclosa confraga* : Simon, *Bull. Scient, Fr. Belg.*, **42** : 104.

1982. *Cyclosa confraga* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 193.

1992. *Cyclosa confraga* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 457.

Material examined : 1F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll.B.K. Biswas & party.

Distribution : India : Mizoram (Dist. Lunglei), New record; West Bengal; Assam; Gujarat; Maharashtra; Karnataka; Sikkim.

Elsewhere : Burma, Malayasia.

29. *Cyclosa spirifera* Simon

1889. *Cyclosa spirifera* Simon, *J. Asiat. Soc. Bengal*, **58** : 337.

1982. *Cyclosa spirifera* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 195.

1992. *Cyclosa spirifera* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 458.

Material examined : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 22.iii.1994, coll. B.K. Biswas & party.

Distribution : India : Mizorăm (Dist. Aizawl), New record; West Bengal.

Elsewhere : Sri Lanka.

21. Genus : *Larinia* Simon

1874. *Larinia* Simon, *Ar. Fr.*, **1** : 115.

1981. *Larinia* : Tikader & Biswas, *Rec. zool. Surv. India*, Occ. Pap. No. **30**(1) : 43.

1982. *Larinia* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 205.

1992. *Larinia* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 462.

Type-species : *Larinia lineata* (Lucas)

Distribution : Tropical and sub-tropical countries of the world.

30. *Larinia teireaensis* sp. nov.

General : Cephalothorax reddish brown, abdomen reddish yellow ochre and legs are yellowish in colour. Total length 13.50 mm. Carapace 6.00 mm. long, 4.00 mm. wide; abdomen 9.00 mm. long, 6.00 mm. wide.

Cephalothorax : One and half times longer than wide, narrowing in front, clothed with brown hair anteriorly, cephalic region high and sharpey distinct from thoracic region. Ocular quad forming a trapezium, wider in front than behind; medians much larger than posterior medians; posterior medians closely situated; laterals subequal, closed and situated on distinct tubercles; both rows of eyes are recurved but posterior row very narrowly

recurved than anterior row. Sternum rather elongated heart shaped, pointed behind, clothed with spine like hair, labium as long as wide, reddish brownish, provided with distinct scopulae. Chelicerae strong and stout blackish brown, inner margin with three and outer margin with two teeth. Legs are long and slender, clothed with hair and spines. Male not reported.

Abdomen : Elongated, slightly more than two times longer than wide, clothed with deep brown round patches. Epigyne having a large scape. Internal genitalia as in figs. 7-9.

Holotype : Female in spirit, deposited at Zoological Survey of India, Calcutta, Regd. No. 5483/18.

Type-locality : Holotype from Teirei (Dampa forest), Dist. Aizawl, Mizoram, India, 21.iii.1994, coll. Bijan Biswas.

This species in general resembles *Larinia jaysankari* Biswas but it is separated as follows : (1) There is no such white spines on the anterior part of cephalic region but it is in *L. jaysankari*. (2) Inner margin of chelicerae provided with three teeth and outer with two but in *L. jayasankari* with five teeth. (3) Dorsum of the abdominal pattern is different from each other. (4) Epigyne and internal genitalia are also structurally different.

22. Genus : ***Parawixia*** F.O.P. Cambridge

1904. *Parawixia* F.O.P. Cambridge, *Biologia cent. am.*, (Zool), **2** : 487.

1936. *Parawixia* : Chamberlin & Ive, *Bull. Univ. Biol.*, **27**(5) : 52.

1982. *Parawixia* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 212.

Type-species : *Parawixia destricta* (O.P. Cambridge).

Distribution : Cosmopolitan except Australia.

31. ***Parawixia dehaanii*** (Doleschall)

1859. *Epeira dehaanii* Doleschall, *Act. Soc. Ind. Neerl.*, **5**(5) : 33.

1970. *Parawixia dehaanii* : Tikader, *Rec. zool. Surv. India*, **64**(1-4) : 30.

1992. *Parawixia dehaanii* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 463.

Diagnosis : Cephalothorax and legs are reddish brown, abdomen dark brown in colour. Cephalothorax longer than wide, narrowing in front, clothed with white pubescence, hair and spines with granular base. Cephalic region much elevated in the middle then forming a ridge behind the ocular area. Thoracic region provided with transverse groove. Ocular quad situated on an elevation, slightly wider in front than behind. Anterior median eyes larger than the posterior medians. Lateral eyes of both rows nearly same size, close and situated on the base of horn-like projection. Anterior row of eyes are procurved and posterior row of eyes recurved. Sternum heart-shaped pointed behind, reddish brown in colour, clothed with pubescence and hair with granular base. Chelicerae strong, reddish brown, provided with moderate base. Abdomen triangular, longer than wide, clothed with pubescence and hair, provided with two conspicuously pointed shoulder humps directed outward and on pointed tail hump at the posterior end. Five pairs of sigilla on the dorsum.

Material examined : 1F, Aibwak, Dist. Aizawl, Mizoram, 18.iii.1994, coll. B.K. Biswas & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Karnataka; Sikkim.

Elsewhere : Burma, Java, Japan, Indo and Austro-Malaysia, Sumatra.

23. Genus : ***Neoscona*** Simon

1864. *Neoscona* Simon, *Hist. nat. des Aragin*, **1** : 261.

1982. *Neoscona* : Tikader, *Fauna of India*. Araneae : Spiders, **2**(1) : 238.

1992. *Neoscona* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 465.

Type-species : *Neoscona anabesca* (Walckenaer)

Distribution : Cosmopolitan.

Key to the species of the genus *Neoscona* Simon

1. Epigynal scape right angle to the base; lateral lobes inconspicuous. ..... *bengalensis*
- Epigynal scape not right angle to the base; lateral lobes conspicuous. 2
2. Cephalic region provided with a conspicuous dark brown "V" shaped patch; epigynal scape with deep constriction. ..... *mukerjei*
- Cephalic region not having any "V" shaped patch; epigynal scape without deep constrition. 3
3. Abdomen triangular; epigynal scape short, broad and triangular. ..... *nautica*

32. ***Neoscona bengalensis*** Tikader

1981. *Neoscona bengalensis* Tikader, *Rec. zool. Surv. India. Occ. Pap. No.* **24** : 15.

1992. *Neoscona bengalensis* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 466.

Material examined : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 2.xii.1995, coll. P. Parui & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal.

33. ***Neoscona mukerjei*** Tikader

1980. *Neoscona mukerjei* Tikader, *Proc. Indian Acad. Sci.,* **89**(3) : 247.

1982. *Neoscona mukerjei* : Tikader, *Fauna of India,* Araneae : Spiders, **2**(1) : 248.

1992. *Neoscona mukerjei* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 467.

1995. *Neoscona mukerjei* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 98.

Material examined : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 22.iii.1994, coll. B.K. Biswas & party; 4F, Saiha, Dist. Chhimtupui, Mizoram, 8.iv.1994, coll. S.K. Ghosh & party; 1F, Thingdam, Dist. Aizawl, Mizoram, 13.v.1994, coll. T.K. Paul & party.

Distribution : India : Mizoram (Dists. Aizwal, Chhimtuipui), New record; West Bengal; Meghalaya; Maharashtra.

34. ***Neoscona nautica*** (L. Koch)

1875. *Epeira nautica* L. Koch, *Aegypt. Abyssin. Arachn. Jickeli,* : 17.

1982. *Neoscona nautica* : Tikader, *Fauna of India,* Araneae : Spiders, **2**(1) : 242.

1992. *Neoscona nautica* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 467.

1995. *Neoscona nautica* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 99.

Material examined : 1F, Sherkhan, Dist. Aizawl, Mizoram, 11.i.1994, coll. S. Saha & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Meghalaya; Gujarat.

Elsewhere : Burma, Pakistan, North America.

Sub-family : GASTERACANTHINAE

24. Genus : ***Gasteracantha*** Sundevall

1833. *Gasteracantha* Sundevall, *Conspectus Arachniden,* : 14.

1981. *Gasteracantha* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 33.

1982. *Gasteracantha* : Tikader, *Fauna of India,* Araneae: Spiders, **2**(1) : 52.

Type-species : *Gasteracantha cancriformis* (Linnaeus)

Distribution : Tropical coutries of the world.

Key to the species of the genus *Gasteracantha* Sundevall

1. Dorsum of abdomen provided with three conspicuous transverse yellowish bars. ..... *diadesmia*
- Dorsum of abdomen not provided with three conspicuous transverse yellowish bars. 2
2. Length of median spines slightly less than half the width of abdomen at the base of anterior spines. ..... *hasseltii*

– Length of median spines greater than width of abdomen of the base of anterior spines..... 3

3. Sternum hert-shaped pointed behind with dark brown horse-shoe shaped chalk white patch. ..... *kuhlii*

– Sternum without a dark brown horse-shoe shaped and chalk white patch. 4

4. Spines provided with conspicuous buldge base and abruptly narrowed at apex..... *unguifera*

35. *Gasteracantha diadesmia* Thorell

1887. *Gasteracantha diadesmia* Thorell, *Ann. Mus. civ. Geniva,* **25** : 225.

1982. *Gasteracantha diadesmia* : Tikader, *Fauna of India,* Araneae : Spiders, **2**(1) : 61.

1992. *Gasteracantha diadesmia* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fuana Series,* **3** (Part-3) : 470.

1995. *Gasteracantha diadesmia* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 96.

Material examined : 1F, Aibawk, Dist. Aizawl, Mizoram, 16.xi.1995, coll. M.S. Shisodia & party; 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 2.xii.1995, coll. P. Parui & party; 1F, Saihapuikawa, Dist. Aizawl, Mizoram, 9.xii.1995, coll. P. Parui & party; 1F, Champhai tourist lodge, Dist. Aizawl, Mizoram, 13.x.1995, coll. A.K. Sanyal & party; 4F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party; 2F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 22.iii.1994, coll. B.K. Biswas & party; 1F, Aizawl, Dist. Aizawl, Mizoram, 15.iii.1994, coll. B.K. Biswas & party; 2F, Lawngtlai, Dist. Chhimtuipui, Mizoram, 3.iv.1994, coll. S.K. Ghosh & party.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei, Chhimptuipui), New record; West Bengal; Meghalaya; Tamil Nadu; Andaman and Nicobar Islands; Sikkim.

Elsewhere : Burma, Thailand.

36. *Gasteracantha hasseltii* C.L. Koch

1838. *Gasteracantha hasseltii* C.L. Koch, *Dis Arachniden,* **4** : 29.

1982. *Gasteracantha hasseltii* : Tikader, *Fauna of India,* Araneae : Spiders, **2**(1) : 61.

1992. *Gasteracantha hasseltii* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 470.

Material examined : 1F, Aizawl, Dist. Aizawl, Mizoram,15.iii.1994, coll. B.K. Biswas & party; 2F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party; 2F, Aibawk, Dist. Aizawl, Mizoram, 7.xi.1995, coll. M.S. Shisodia & party.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei), New record; West Bengal, Andaman and Nicobar Islands; Sikkim.

Elsewhere : Burma.

37. *Gastreracantha kuhlii* C.L. Koch

1838. *Gastreracantha kuhlii* C.L. Koch, *Die. Arachniden* **4** : 20.

1982. *Gastreracantha kuhlii* : Tikader, *Fauna of India,* Araneae : Spiders, **2**(1) : 59.

1992. *Gastreracantha kuhlii* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 471.

1995. *Gastreracantha kuhlii* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 95.

Material examined : 2F, Aizawl, Dist. Aizawl, Mizoram, 15.iii.1994, coll. B.K. Biswas & party; 1F, Chawnhu forest, Dist. Lunglei, Mizoram, 2.iv.1994, coll. S.K. Ghosh & party.

Distribution : India : Mizoram (Dists. Aizwal, Lunglei), New record; West Bengal; Meghalaya; Assam; Andaman and Nicobar Islands; Sikkim.

Elsewhere : Bhutan, Burma, Indo-Malayasia.

38. *Gasteracantha unguifera* Simon

1889. *Gasteracantha unguifera* Simon, *J. Asiat. Soc.,* Bengal, **58** : 336.

1982. *Gasteracantha unguifera* : Tikader, *Fauna of India,* Araneae : Spiders, **2**(1) : 57.

1992. *Gasteracantha unguifera* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 471.

Material examined : 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 22.iii.1994, coll. B.K. Biswas & party; 1F, Aibwak, Dist. Aizawl, Mizoram, 19.iii.1994, coll. B.K. Biswas & party.

Distribution : India : Mizoram (Dist. Aizwal), New record; West Bengal; Sikkim.

Sub-family : METINAE

25. Genus : ***Leucauge*** White

1841. *Leucauge* White, *Ann. Mag. nat. Hist.*, **7**(1) : 463.

1981. *Leucauge* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 39.

1992. *Leucauge* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 471.

1995. *Leucauge* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 99.

Diagnosis : Cephalothorax truncate in front, legs are long and slender, especially the first two pairs; the femora of IV legs with fringe of long hair. Abdomen twice as long as wide, blunt at both ends and ornamented with bands or spots of silvery pigment.

Type-species : *Leucauge hortorum* (Hents)

Distribution : Tropical and sub-tropical countries of the world.

Key to the species of the genus *Leucauge* White

1. Abdomen uniformly silver white and decorated with longitudinal black bands..... *celebesiana*
– Abdomen having some silver white specks and not decorated with longitudinal black bands..... 2
2. Abdomen with two blunt rounded prominences and blunt caudal hump at the posterior end. ..... *tessellata*

39. ***Leucauge celebesiana*** (Walckenaer)

1841. *Tetragnatha celebesiana* Walckenaer, *Hist. Nat. Ins. Apt.*, **2** : 222.

1982. *Leucauge celebesiana* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 83.

1992. *Leucauge celebesiana* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 472.

1995. *Leucauge celebesiana* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 100.

Material examined : 7F, Aibwak, Dist. Aizawl, Mizoram, 9.xii.1993, coll. S.S. Saha & party; 8F, Aibwak, Dist. Aizawl, Mizoram, 19.iii.1994, coll. B.K. Biswas & party; 5F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party; 10F, Aizawl, Dist. Aizawl, Mizoram, 15-16.iii.1994, coll. B.K. Biswas & party; 2F, Aibwak and around, Dist. Aizwal, Mizoram, 17.xi.1995, coll. M.S. Shisodia & party; 3F, Aizawl, Dist. Aizawl, Mizoram, 13.iv.1994, coll. S.K. Ghosh & party; 2F, Chawahu Forest, Dist. Lunglei, Mizoram, 2.iv.1994, coll. A.K. Hazra & party.

Distribution : India : Mizoram, (Dists. Aizawl, Lunglei), New record; West Bengal; Meghalaya; Maharashtra; Assam; Tamil Nadu; Sikkim.

Elsewhere : Burma, China, Sri Lanka.

40. ***Leucauga tessellata*** (Thorell)

1887. *Cellinethis tessellata* Thorell, *Annali. Mus. civ.* Genova, **25** : 135.

1921. *Leucauga tessellata* : Gravely, *Rec. Indian. Mus.*, **22**(4) : 455.

1982. *Leucauga tessellata* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 80.

1992. *Leucauga tessellata* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 473.

1995. *Leucauga tessellata* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 100.

Material examined : 1F, Saikah, Dist. Aizawl, Mizoram, 1.xii.1996, Coll. P.H. Roy & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Meghalaya; Assam; Maharashtra; Gujarat; Karnataka; Kerala; Tamil Nadu; Sikkim.

Elsewhere : Bhutan, Burma, China.

Sub-family : NEPHILINAE

Key to the genera of the Sub-family NEPHILINAE

1. Carapace with cephalic region convex and elevated; abdomen elongated or oval, non-lobate. ..... ***Nephila***
2. Carapace flat; abdomen flat dorsally, lobate laterally. ..... ***Herennia***

26. Genus : ***Nephila*** Leach

1815. *Nephila* Leach, *Zoological Miscellany*, : 133.

1981. *Nephila* : Tikader & Biswas, *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 37.

1992. *Nephila* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 473.

Type-species : *Nephila maculata* (Fabricius)

Distribution : Tropical and rarely sub-tropical countries of the world.

Key to the species of the genus *Nephila* Leach

1. Carapace provided with 'V' shaped yellow patch. ..... *clavata*
– Carapace not provided with 'V' shaped yellow patch. 2
2. Abdomen having single, mid-longitudinal broad yellow bar with dark brown side. .... *kuhlii*
– Abdomen without any mid-longitudinal broad yellow bar with dark brown side. 3
3. Cephalothorax relatively broad in front; a deep groove in the middle, with a pair of sharp tubercles in front. ..... *maculata*

41. ***Nephila clavata*** L. Koch

1878. *Nephila clavata* L. Koch, *Verh. zool. -bot. Ges. Wien.*, **27** : 741.

1992. *Nephila clavata* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 474.

1995. *Nephila clavata* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 96.

Material examined : 1F, Saikh, Dist. Aizawl, Mizoram, 1.xii.1996, coll. P.H. Roy & party; 2F, Marlen National Parks, Dist. Aizawl, Mizoram, 23.xii.1993, coll. S.S. Saha & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal; Meghalaya; Andaman and Nicobar Islands; Laccadive Islands; Sikkim.

Elsewhere : Bhutan, Burma, China, Japan, Baluchistan, Formosa, Pakistan, Thailand.

42. ***Nephila kuhlii*** Doleschall

1859. *Nephila kuhlii* Doleschall, *Acata, Soc. Ind. Neerl.*, **5**(5) : 27.

1992. *Nephila kuhlii* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 474.

Material examined : 1F, Vairenk, Dist. Aizawl, Mizoram, 2.xii.1996, coll. P.H. Roy & party.

Distribution : India : Mizoram (Dist. Aizawl), New record; West Bengal.

Elsewhere : Burma.

43. ***Nephila maculata*** (Fabricius)

1793. *Aranea maculata* Fabricius, Ent. Syst., **2** : 425.

1992. *Nephila maculata* : Biswas & Biswas, Araneae : Spiders. *Fauna of West Bengal, State Fauna Series,* **3** (Part-3) : 474.

1995. *Nephila maculata* : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4** (Part-2) : 97.

Material examined : 1F, Saikah, Dist. Aizawl, Mizoram, 1.xii.1996, coll. P.H. roy & party; 2F, Chhiahtlang, Dist. Aizawl, Mizoram, 10.xi.1995, coll. P.H. roy & party; 1F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 9.xi.1995, coll. M.S. Shisodia & party; 2F, Near Guest House of Vairengte, Dist. Vairengte, Mizoram, 3-4.xii.1996, coll. S.K. Mitra; 2F, Teirei (Dampa forest), Dist. Aizawl, Mizoram, 23.iii.1994, coll. B.K. Biswas & party; 1F, Lunglei, Dist. Lunglei, Mizoram, 25.iii.1994, coll. B.K. Biswas & party.

Distribution : India : Mizoram (Dists. Aizawl, Lunglei, Vairengte), New record; West Bengal; Meghalaya; Assam; Bihar; Orissa; Maharashtra;

Tamil Nadu; Sikkim; Uttar Pradesh; Madhya Pradesh; Himachal Pradesh; Gujarat; Andaman and Nicobar Islands.

Elsewhere : Burma, China, Japan, Australia, Malaysia, New Guinea, Sri Lanka.

27. Genus : ***Herennia*** Thorell

1877. *Herennia* Thorell, *Annli. Mus. civ. Genova*, **10** : 370.

1971. *Herennia* : Chrysanthus, *Zool. Verh. Laiden*, **113** : 41.

1982. *Herennia* : Tikader, *Fauna of India*, Araneae : Spiders, **2**(1) : 106.

Type-species : *Herennia ornatissima* (Doleschall)

Distribution : India, Sri Lanka, Malaysia.

44. ***Herennia ornatissima*** (Doleschall)

1859. *Epeira ornatissima* Doleschall, *Acta, Soc. Ind. Neerl.*, **5** : 32.

1995. Herennia ornatissima : Biswas & Majumder, Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 102.

Material examined : 1F, Lungsen forest colony, Dist. Lunglei, Mizoram, 8.ii.1991, coll. J.P. Seti.

Distribution : India : Mizoram (Dist. Lunglei), New record; Meghalaya; Tamil Nadu; Goa.

Elsewhere : Burma, Australia, Sri Lanka, Malaysia.

SUMMARY

About 500 examples of spider have been studied and identified. A total of 44 species belonging to 27 genera under 13 families are dealt with here. All the species, genera and families are the first time recorded from Mizoram state. Out of these, 3 species 3 genera under 3 families are new to science. Keys to all the taxonomic categories are provided. Distributional data of all the families are followed. All the relevant literatures pertaining to these families are reviewed under history.

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Biswas Bijan and Majumder, S.C. 1995. Araneae : Spiders. *Fauna of Meghalaya, State Fauna Series,* **4**(Part-2) : 93-128.

Biswas Bijan and Biswas Kajal, 1997. Araneae : Spiders. *Fauna of Delhi, State Fauna Series,* **6** : 477-484.

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Tikader, B.K. and Biswas Bijan, 1981. *Rec. zool. Surv. India, Occ. Pap. No.* **30**(1) : 1-149.

Tikader, B.K. 1982. *Fauna of India*, Araneae : Spiders, **2**(1-2) : 1-536.

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 477-496, 2007

PLANT MITES (ACARI)

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INTRODUCTION

Mizoram is one of the new states in India endowed with rich vegetation because of having tropical rain forest and therefore it is apparent that the fauna thereof is also equally rich. Moreover, the forest and the ecosystem here are relatively undisturbed in comparison to many other regions of the northeast India and these also attribute to the richness of the fauna in general and plant mite fauna in particular. Prasad (1974) and Gupta (1985) while giving statewise list of mites mentioned that nothing was known about the acarine fauna of Mizoram. In view of no report of plant mite fauna from Mizoram, it was decided to explore the same and hence a survey was undertaken in Mizoram during December, 1994 and collected a reasonably good material of plant mite fauna from there. The present paper is based on the study of those material. It may be mentioned here that Mizoram is one of the remotest states in India having very poor transport facilities and many areas are still inaccessible. Therefore, out of three districts of Mizoram, viz. Aizol, Lunglei and Chhimtuipui, collection could be made during the present study only from the first two districts and nothing could be made from the last named district because it was inaccessible.

The study of the material reveals the occurrence of 55 species belonging to 22 genera under 10 families and 4 orders of which 2 species were found to be new to science which are described and illustrated here and one is reported for the first time from India. Consequently, all are new reports for the state. Besides describing the new species, the synonymies, collection data, distribution, etc. have been provided for all the species dealt with in this paper. Wherever possible, the interesting biological observations made have also been included. The keys to all the taxa dealt with in this paper have been given. At the end, a general discussion has been made regarding species composition of Mizoram in relation to neighbouring states and importance of species either as pests or predators.

MATERIAL METHODS

The enitre collection was made by the senior author during December, 1994. Mites were collected in the field directly by examining the plant material with a good IOX lens. It was only in a few cases, the plant parts were brought to the laboratory for examining under a stereobinocular microscope. Plants were got identified as far as possible through specialists, wherever needed. The mites thus collected were preserved in 70% alcohol and for mounting and studying the material, the techniques as given in Gupta (1985) were followed. The collection could be made only from two districts of Mizoram *viz.* Aizol and Lunglei while the other district, *viz.* Chhimtuipui could not be covered due to inaccessibility.

SYSTEMATIC ACCOUNT

Key to the Orders and Families of Plant mites of Mizoram

1. With full coxa to ambulatory appendages, pedipalp ambulacra represented by a tined claw near inner basal angle of palp tarsus; stigmata located lateral to coxa II-IV and typically elongate peritreme present; tritosternum with lacinae. .... Order MESOSTIGMATA, 4

– Lacking free coxa to ambulatory appendages, pedipalpal ambulacra completely lost, stigmata never situated lateral to coxa II-IV; 2

2. Pedipalp small and comprising of 2 free podomeres and closely adpressed to sides of hypognathum; chelicera chelate, ambulacra of legs comprising of a median (empodial) claw, with an associated pulvillus or a sucker-like pulvillus situated on elongated pretarsus, stigmata and trachea never present, idiosoma without trichobothria, body never vermiform. ..... Order ASTIGMATA ..... Fam. Acaridae, *Acarus* sp.

– Pedipalp usualy with 3-5 podomeres and conspicuous; if small with fewer podomeres and inconspicuous then idiosoma either vermiform or with overlapping sclerites in female; chelicera chelate or variously modified into piercing stylets or whip-like organ; respiratory system usually present; idiosoma with trichobothria. 3

3. Gnathosoma with conspicuous rutella, chelicera typically chelate-dentate; 1 pair of podosomatic trichobothria almost present and comprising of piliform, barbed or clavate pseodostigmatid organ arising from conical depression, pesudostigmata (bothridia); pedipalp simple, tibia never with distal spurs; tracheal system when present opening to the exterior in acetabular cavities of leg I and III or through pseudostigmata; idiosoma heavily sclerotized in adult stage and with ridges or vein-like expansion of the idiosoma which is never uniform. .... Order CRYPTOSTIGMATA ..... Undet. spp. of oribatids

– Gnathosoma only rarely with rutella, chelicera rarely chelate, dentate; propodosomatic trichobothria when present usually without conspicuous pseudostigmata, tarsus forming thumb-claw complex; trachea while present opening by paired stigmata situated between chelicera or on the dorsal surface of propodosoma and often with associated peritreme; usually weakly sclerotized, never with ridge or vein-like expansion of the idiosoma which may be vermiform or covered dorsally by a number of discrete, overlapping sclerites ..... Order PROSTIGMATA, 5

4. Normally with fewer than 20 pairs of dorsal setae excepting Gnoriminae where there are upto 22 pairs of setae. .... Fam. PHYTOSEIIDAE

– Always with more than 20 pairs of dorsal setae. ..... Fam. ASCIDAE, (*Lasioseius* sp.)

5. Body annulate, usually worm-like and elongate; with 2 pairs of legs. .... Fam. ERIOPHYIDAE

– Body more or less rounded, not elongated worm-like. 6

6. Gnathosoma usually circular with minute palpi lying closely adpressed laterally, chelicera tiny, stylet-like with 4 pairs of legs, empodium of tarsi II-III usually a broad membranous pad, stigmata of female opening on propodosoma behind gnathosomal base, males without stigmata or trachea, leg IV of female without claws and ends with 2 terminal whip-like seta. .... Fam. TARSONEMIDAE

Gnathosoma variously shaped, generally conspicuous and with distinct chelicerae, palpi usually well developed, empodia usually variable, stigmata variable, opens at base of chelicera. 7

7. With distinct palpal thumb-claw process. 10
- Without distinct palpal thumb-claw process. 8
8. Rod-like solenidion on tarsus I usually lying flush with tarsus in a specially membranous depression (Rhagidial organ), anterior propodosoma with tubercle bearing 1 pair of seta. ..... Fam. EUPODIDAE
- Rod-like solenidion on tarsus I erect arising from a small circular membranous base. 9
9. Chelicera whip-like and long, genital aperture transverse. ..... Fam. TENUIPALPIDAE
- Chelicera with stylet or scissors-like; fixed cheliceral digits reduced, movable digit soft and neddle-like; propodosoma with a pair of sensory setae. ..... Fam. TYDEIDAE
10. Chelicera long, recurved and whip-like, arising from a stylophore, genital aperture transverse. ..... Fam. TETRANYCHIDAE
- Chelicera not long and whip-like but rather soft and stylet like, genital aperture longitudinal. ..... Fam. STIGMAEIDAE

I. PHYTOPHAGOUS MITES

Fam. 1. TETRANYCHIDAE Donnadieu

1875. *Tetranychidae* Donnadieu, *Fac. Des. Sciences de Lyon.* p. 9.

Key to the Subfamilies, Tribes, Genera and Species of Tetranychidae known from Mizoram

1. Empodium with tenent hairs, female with 3 pairs of anal setae, male with 5 pairs of anal setae. ..... BRYOBIINAE, 2
- Empodium without tenant hairs or empodium may be absent, female with 1 or 2 pairs of anal setae, male with 2-3 pairs of genitoanal setae. ..... TETRANYCHINAE, 3
2. True claws uncinate or if pad-like prodorsum with well developed setiferous lobes; empodium pad-like. .... BRYOBIINI, *Bryobia praetiosa*
- True claws pad-like, pad rarely with strong hook on midventral surface anteriorly and anterior propodosoma may have 0-3 setiferous lobes, empodium pad-like or uncinate. .... HYSTRICHONYCHINI, *Aplonobia*
3. Tarsus I usually with single pair of usually associated duplex setae, if 2 pairs of closely associated duplex setae present then tarsus I still without closely associated duplex setae, empodium claw-like. .... EURYTETRANYCHINI, ... *Eutetranychus*, 8
- Tarsus I distally with 2 pairs of closely associated duplex setae and tarsus II with 1 pair of duplex setae, empodium claw-like or splits distally. ..... TETRANYCHINI, 4
4. With 2 pairs of preanal setae. 5
- With 1 pair of preanal setae. 7
5. Empodium clawlike. 6
- Empodium ending into tuft of hairs. .... *Eotetranychus*, 6 ..... *Eotetranychus* ..... *Eotetranychus* sp.
6. Empodium with proximoventral hairs, dorsal body seta on tubercles. .... *Panonychus citri*
- Empodium splits into two parts, dorsal body setae not on tubercles, duplex seta approximate to one another. ..... *Schizotetranychus,* ..... *Schizotetranychus cajani*
7. Empodium claw-like with proximoventral hairs. ... *Oligonychus* (*Oligonychus gossypii*)
- Empodium splits distally into 3 pairs of hairs. ..... *Tetranychus* (*Tetranychus urticae*)
8. Propodosomal mediodorsal striae with less developed lobes, 3rd pair of dorsolateral seta tapering, 3rd and 4th dorsocentral hysterosomal seta forming a rectangle pattern. ..... *Eutetranychus phaseoli*
- Propodosomal mediodorsal striae with well developed lobes, 3rd pair of dorsolataral seta similar to other lateral setae; 3rd and 4th dorsocentral hysterosomal setae forming a square. ..... *Eutetranychus orientalis*

Genus 1. ***Bryobia*** Koch

1836. *Bryobia* Koch, *Deutesche Crust, Myriapoda, Arachnida, Fasc.*, **1** : 8.

1. ***Bryobia praetiosa*** Koch

1836. *Bryobia praetiosa* Koch, *Duetesche, Crust. Myriapoda, Arachnida.*, **1** : 1-8.

1968. *Bryobia praetiosa,* Menon & Ghai, *Indian J. Ent.*, **30** : 88.

1985. *Bryobia praetiosa,* Gupta, *Handbk. Plant Mites of India* : 47-48.

1995. *Bryobia praetiosa,* Gupta, *Fauna of Meghalaya, State Fauna Series,* 4(Part-2) : 20.

Material examined : 1 female, Mizoram : Lunglei, ex. undet. plant, 18.xii.1994.

Distribution : India : Mizoram (Lunglei), West Bengal, Meghalaya, Himachal Pradesh, Punjab, Jammu & Kashmir, Delhi.

Elsewhere : Cosmopolitan.

Genus 2. ***Aplonobia*** Womersley

1940. *Aplonobia* Womersley, *Trans, R. Soc. S Aust.*, **64** : 252.

2. ***Aplonobia*** sp.

Material examined : 1 female, Mizoram : Lunglei, Lawngtlai, ex. Baputhanai (local name), 22.xii.1994.

Remarks : So far no species of *Aplonobia* has been reported from India and the present specimen was in badly damaged condition without accompanied with males. Therefore, it was not possible to identify upto the species level.

Genus 3. ***Eutetranychus*** Banks

1917. *Neotetranuchus* (*Eutetranychus*) Banks, *Ent. News.*, **28** : 197.

1950. *Eutetranychus* Banks, McGregor, *Ann. Midl. Nat.*, **44** : 267.

3. ***Eutetranychus orientalis*** (Klein)

1936. *Anychus orientalis* Klein, *Bull. Agric. Res. Sta. Rehovot,* **21** : 3.

1940. *Anychus ricini* Rahman & Sapra, *Proc. Indian Acad. Sci.*, **11** : 134.

1985. *Eutetranychus orientalis,* Gupta, Handbk. *Plant Mites of India* : 66-67.

1995. *Bryobia praetiosa,* Gupta, *Fauna of Meghalaya, State Fauna Series,* 4(Part-2) : 21.

Material examined : 3 females, Mizoram : Lunglei, ex citrus, 25.xii.1994; 4 females, Aizol, Zoo.-Bot. Garden, ex *Calicarpa arborea*, 13.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), cosmopolitan.

Elsewhere : Cosmopolitan.

Remarks : This mite is known to be seriously infesting citrus and several other plants in northern and eastern India but in Mizoram its population was never very high and nor was its infestation common in majority of plants.

4. ***Eutetranychus phaseoli*** Nassar & Ghai

1981. *Eutetranychus phaseoli* Nassar & Ghai, *Oriental Ins.*, **15** : 341-343.

1985. *Eutetranychus phaseoli,* Gupta, *Handbk. Plant Mites of India* : 67-68.

Material examined : 2 females, Mizoram : Aizol, Zoo.-Bot. Garden, ex. *Dendrobium formosum.* 13.xii.1994.

Distribution : India : Mizoram (Aizol), Delhi.

Genus 4. ***Eotetranychus*** Oudemans

1931. *Eotetranychus* Oudemans, *Ent. Ber. Amst.*, **8**(178) : 224.

5. ***Eotetranychus pamelae*** Manson

1963. *Eotetranychus pamelae* Manson, *Acarologia,* **5** : 353-356.

1985. *Eotetranychus pamelae,* Gupta, *Handbk. Plant mites of India* : 76.

Material examined : 1 female, Mizoram : Lunglei, ex citrus, 21.xii.1994.

Distribution : India : Assam, Mizoram (Lunglei).

6. *Eotetranychus* sp.

Material examined : 1 female, Mizoram, Zobawk (Dist. Lunglei), ex citrus, 19.xii.1994.

Remarks : Due to the absence of male specimens, species determination was not possible.

Genus 5 *Panonychus* Yokoyama

1929. *Panonychus* Yokoyama, *Saishin Nipp on Sangyo Gaichu Zensho*, p. 531.

7. *Panonychus* citri (McGregor)

1916. *Tetranychus citri* McGregor, *Ann. ent. Soc. Amer.*, **9** : 284.

1966. *Panonychus citri*, Bindra, *Punjab Hort. J.*, **6** : 111.

1985. *Panonychus citri*, Gupta, *Handbk. Plant Mites of India* : 92-93.

1995. *Bryobia praetiosa*, Gupta, *Fauna of Meghalaya, State Fauna Series*, 4(Part-2) : 22-23.

Material examined : 10 females, Mizoram, Aizol, ex. tiurel (local name), 15.xii.1994; 1 female, Lunglei, Sairep, ex lemon, 17.xii.1994; 4 females, Lawngtlai, ex ornamental plant, 18.xii.1994; 10 females, Lunglei, Zobawk, ex theint (local name), 19.xii.1994; 1 female, Lawngtlai, ex citrus, 20.xii.1994; 3 females, Lawngtlai, ex Paputhanai (local name), 22.xii.1994; 5 females, 1 male, Lawngtlai, *ex Dolichos lablab*, 22.xii.1994; 1 female, Lawngtlai, ex china rose, 23.xii.1994; 3 females, 1 male, Lawngtlai, ex an ornamental plant, 23.xii.1994; 1 female, Lawngtlai, ex citrus, 23.xii.1998.

Distribution : India : Mizoram (Aizol, Lunglei), Meghalaya, Assam, West Bengal, Andaman Nicobar Isl.

Elsewhere : Cosmopolitan.

Remarks : This was one of the most dominant spider mites seen in Mizoram infesting a large variety of plants producing typical damage symptoms of this species.

Genus 6. *Schizotetranychus* Tragardh

1915. *Schizotetranychus* Tragardh, *Meddn. Centanst ForsVas Jordbr Omrad Stockh.*, **54** : 277.

8. *Schizotetranychus cajani* Gupta

1976. *Schizotetranychus cajani* Gupta, *Otiental Ins.*, **10** : 336-337.

1985. *Schizotetranychus cajani*, Gupta, *Handbk. Plant Mites of India* : 98.

1992. *Schizotetranychus cajani*, Gupta, *Fauna of West Bengal, State Fauna Series*, 3(Part-3) : 99.

Material examined : 2 females, Mizoram : Lunglei, Sairup, ex tea, 19.xii.1994.

Distribution : India : Mizoram (dist. Lunglei), West Bengal, Punjab, Andhra Pradesh, Tamil Nadu.

Remarks : This is an important species occurring on pigeonpea in many parts of eastern India causing drying and defoliation of leaves. Its occurrence on tea is merely an accidental one may be due to drifting from the neighbouring tea garden.

9. *Schizotetranychus* sp.

Material examined : 2 females, Mizoram : Aizol, ex *Aporusa dioca*.

Remarks : As there was no male specimen, the species determination was not possible.

Genus 7. *Oligonychus* Berlese

1886. *Oligonychus* Berlese, *Acari dannosi alle Piante Coltivati. Padova* : 24.

10. *Oligonychus gossypii* (Zacher)

1921. *Paratetranychus gossypii* Zacher, *Z. angew, ent.* **7** : 183.

1955. *Oligonychus gossypii*, Pritchard & Baker. *Pacific Coast Ent. Soc. Mem. Ser.* **2** : 508.

1987. *Oligonychus gossypii*. Smith-Meyer, *Ent. Mem. Dept. Agric. Wat. Supply repub. South Africa* **69** : 152.

Material examined : 4 females, 1 male, Mizoram : Aizol. Aibawk, ex rose, 14.xii.1994.

Distribution : India : Mizoram (Aizol).

Elsewhere : Equatorial African Region from places like Togo, Senegal, Nigeria, Cameroon, Zaire and Angola.

Remarks : This forms the forst report of this species from India.

11. ***Oligonychus*** sp.

Material examined : 1 female, Mizoram, Lunglei, ex *Dolichos lablab*. 22.xii.1994.

Remarks : Since this was a damaged specimen and not accompanied with male specimen, the specific determination was not possible.

Genus 8. ***Tetranychus*** Dufour

1832. *Tetranychus* Dufour, *Annls. Sci. Nat.*, **25** : 276.

12. ***Tetranychus urticae*** Koch

1836. *Tetranychus urticae* Koch, *Deutsche. Crust. Myriapoda, Arachnida. Fasc.*, **1** : 10.

1985. *Tetranychus urticae*, Gupta, *Handbk. Plant Mites of India* : 115.

1995. *Tetranychus urticae*, Gupta, *Fauna of Meghalaya, State Fauna Series*, 4(Part-2) : 25.

Material examined : 1 female, Mizoram : Aizol, Zoo.-Bot. Garden, ex *Artocarpus heterophylla*, 13.xii.1994; female, Lunglei, Zohnui. ex citrus, 26.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Cosmopolitan.

Elsewhere : Cosmopolitan.

Remarks : Although this species is very widely distributed and is known to infest a large number of crops but in Mizoram its infestation was never seen to be serious anywhere.

Fam. 2 TENUIPALPIDAE Berlese

1913. *Tenuipalpidae* Berlese, *Acarotheca Italica Firenze, Tipografica di M. Ricci.* : 17.

Genus 9. ***Brevipalpus*** Donnadieu

1875. *Brevipalpus* Donnadieu, *Recherches Pour Servir a l'historie des Tetranyques* : 142-145.

Key to the species of *Brevipalpus* known from Mizoram

1. Hysterosoma with 6 pairs of dorsolaterals. .. .. *cucurbitae*
– Hysterosoma with 5 pairs of dorsolaterals. 2
2. Tarsus II with single sensory rod. 3
– Tarsus II with 2 sensory rods. 4
3. Propodosoma without reticulation on dorsomedian region. ..... *phoenicis*
– Propodosoma with irregular broken striations ..... *rugulosus*
4. Propodosoma evenly reticulate mediodorsally ..... *euphorbiae*
– Propodosoma without reticulations mediodorsally. ..... *obovatus*

13. ***Brevipalpus cucurbitae*** Mohanasundaram

1982. *Brevipalpus cucurbitae* Mohansundaram, *Entomon*, **7** : 427.

1985. *Brevipalpus cucurbitae*, Gupta, *Handbk. Plant Mites of India* : 127.

Material examined : 1 female, Mizoram : Lunglei, ex papaya, 22.xii.1994

Distribution : India : Mizoram (Lunglei), Tamil Nadu.

14. ***Brevipalpus euphorbiae*** Mohansundaram

1982. *Brevipalpus euphorbiae* Mohansundaram, *Entomon*, **7** : 427-429.

1985. *Brevipalpus euphorbiae*, Gupta, *Handbk. Plant Mites of India* : 127.

Material Examined : 2 females, Mizoram : Aizol, Zoo.-Bot. Garden, ex *Calicarpa arborea*, 13.xii.1994.

Distribution : India : Mizoram (Aizol), Tamil Nadu.

15. ***Brevipalpus phoenicis*** (Geijskes)

1939. *Brevipalpus phoenicis* Geijskes, *Meded. Landv. Hoogesch. Wageningen.* **42** : 230.

1974. *Brevipalpus phoenicis*, Das, *Two & Bud.* **8** : 3-4.

1985. *Brevipalpus phoenicis*, Gupta, *Handbk. Plant Mites of India* : 130-131.

1995. *Brevipalpus phoenicis* Gupta, *Fauna of Meghalaya, State Fauna Series*, **4**(Part-2) : 26.

Material examined : 1 female, Mizoram : Lunglei, ex citrus, 20.xii.1994; 3 females, Aizol, Zohunai, ex citrus, 26.xii.1994.

Distribution : India (Aizol, Lunglei) available almost in all parts of India.

Elsewhere : Cosmopolitan.

Remarks : This was found in most of the citrus orchards and found attacking not only leaves but infested fruits as well. The common damage symptoms like production of brownish patches on fruits, yellowing of leaves, defoliation, etc. were seen wherever this mite was collected.

16. ***Brevipalpus rugulosus*** Chaudhri, Akbar & Rasool

1974. *Brevipalpus rugulosus* Chaudhri, Akbar & Rasool : 45-48.

1980. *Brevipalpus rugulosus*, Sadana & Chhabra, *Sci. & Cult.*, **46** : 369-370.

1985. *Brevipalpus rugulosus*, Gupta, *Handbk. Plant Mites of India* : 132.

Material examined : 1 female, Mizoram : Lunglei, Sairep, ex tea, 19.xii.1994; 1 female, Lunglei, ex citrus, 21.xii.1994.

Distribution : India : Mizoram (Lunglei), Punjab.

Elsewhere : Pakistan.

17. ***Brevipalpus obovatus*** Donnadieu

1875. *Brevipalpus obovatus* Donnadieu, *Rescherches. pour. Servir al'Historie. des Tetranyques*, p. 116.

1893. *Brevipalpus obovatus*, Christison, *Darjeeling News* : 116.

1985. *Brevipalpus obovatus*, Gupta, *Handbk. Plant Mites of India* : 129.

1992. *Brevipalpus obovatus*, Gupta, *Fauna of West Bengal, State Fauna Series*, **3**(Part-3) : 93.

Material examined : 1 female, Mizoram : Aizol, Aibawk, ex. rose, 16.xii.1994; 3 females, Lunglei, ex *Dolichos lablab*, 22.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), West Bengal.

Elsewhere : Pakistan, Sri Lanka, Japan, Australia, Iran, Israel, Egypt, France, Spain, Cyprus, Canada, U.S.A., Venezuela, Argentina.

Remarks : This mite was seen to be damaging the leaves producing yellowing and drying and subsequent leaf drop.

Fam. 3. TARSONEMIDAE Kramer

1877. Tarsonemidae Kramer, *Archib. fur. Naturgesch*, **43** : 215.

Genus 10. ***Polyphagotarsonenus*** Beer & Nucitera

1965. *Polyphagotarsonemus* Beer & Nucifora, *Bull. Zool. Agr. Bachic*, **2** : 19-43.

18. ***Polyphagotarsonemus latus*** (Banks)

1904. *Tarsonemus latus* Banks, *Proc. U. S. Nat. Mus.* **32**(1553) : 615.

1958. *Hemitarsonemus latus*, Dutt, *Indian Farm.*, **8** : 10-12.

1985. *Polyphagotarsonemus latus* Gupta, *Handbk. Plant Mites of India* : 292-294.

1992. *Polyphagotarsonemus latus* Gupta, *Fauna of West Bengal, State Fauna Series*, **3**(Part-3) : 116.

Material examined : 4 females, Mizoram : Lunglei, ex ornamental plant, 21.xii.1994.

Distribution : India : Mizoram (Lunglei), West Bengal, Bihar, Uttar Pradesh, Punjab, Maharashtra, Karnataka.

Elsewhere : Cosmopolitan.

Genus 11. ***Tarsonemus*** Canestrini & Fanzago

1876. *Tarsonemus* Canestrini & Fanzago, *Atti Soc. Veneto-Trentina Sci. Nat. Padova*, **5** : 142.

19. ***Tarsonemus*** sp.

Material examined : 2 females, Mizoram, Lunglei, Lawngtlai, ex tea plant, 21.xii.1994.

Fam. 4 ERIOPHYIDAE Nalepa

1898. Eriophyidae Nalepa, *Das Tierreich,* **4** : 5.

Genus 12 ***Phyllocoptruta*** Keifer

1938. *Phyllocoptruta* Keifer, *Bull. Calif. Dept. Agr.*, **27**(2) : 193.

20. ***Phyllocoptruta oleivora*** (Ashmead)

1879. *Typhlodromus oleivorus* Ashmead, *Can. Ent.*, **11** : 160.

1938. *Phyllocoptruta oleivorus.* Keifer, *Bull. Calif. Dept. Agr.* **27** : 192.

1966. *Phyllocoptruta oleivorus* ChannaBasavanna, *Univ. Agric. Sci. Bull.* : 92.

1985. *Phyllocoptruta oleivora*, Gupta, *Handbk. Plant Mites of India* : 244.

1992. *Phyllocoptruta oleivora;* Gupta, *Fauna of West Bengal, State Fauna Series*, **3**(Part-3) : 107.

Material examined : Several exs., Mizoram : Lunglei, ex citrus, 21.xii.1994.

Distribution : India : Mizoram (Lunglei), West Bengal, Tamil Nadu.

Elsewhere : Cosmopolitan.

Remarks : A severe infestation of this mite was seen in a private citrus orchard where a large number of fruits were seen to be damaged by this mite causing development of brownish scar on fruit skin. This caused shrivelling and ultimately fruit drop. The grower reported that this was indeed a serious problem of citrus in that area.

II. PREDATORY MITES

Fam. 5 PHYTOSEIIDAE Bersele

1952. *Phytoseiidae* Baker & Wharton, *An Introduction to Acarole* Macmillan Co., New York, p. 87.

Key to the Subfmilies, Genera and Species of Phytoseiidae known from Mizoram

1. Prolateral setae 4 pairs in all, 6-9 pairs of lateral setae, preanal seta 3 pairs. .... Subfam. AMBLYSEIINAE, 2
– Prolateral setae 5 or more pairs, 9-12 pairs of lateral setae, preanal setae 3-7 pairs. ....Subfam. PHYTOSEIINAE, 15

2. Medapodal plates large, single paired, triangular, genital shield very broad and punctate, ventrianal shield massive, genu III with 6 setae..... ***Paraamblyseius***, 3
– Metapodal plates 2 pairs, slender, elongate, genital and ventrianal shields usually narrow, genu III with 7 setae. ..... ***Amblyseius***, 4

3. Metasternal plate round, J_2 longer than Z_1, Z_4 shorter than distance between Z_4 and Z_5 ..... *mumai*
– Metasternal plate kidney shaped, J_2 subequal to Z_1, Z_4 reaches base of Z_5. .....*fragariae*

4. Dorsal shield with 5 pairs of postlateral seta 6
– Dorsal shield with less than 5 pairs of postlateral seta. ....*Amblyseius* (*Paraphytoseius*), 5

5. z_2 and Z_4 serrate. ..... *sclreroticus*
– z_2 and Z_4 smooth. ..... *multidentatus*

6. Z_5, s_4, Z_4 long and whip-like, longer than distance between their bases, leg IV with macroseta on genu and erect seta of tarsus .....*Amblyseius* (*Amblyseius*), 7
– Z_5 shorter almost as long as distance between their bases, leg I with no macroseta, only one on genu, no erect seta on tarsus. 8

7. Cervix of spermatheca elongate and of parallel diameter. ..... *largoensis*
– Cervix of spermatheca fundibuliform. .... *herbicolus*

8. Sternal shield distinct and straight or concave posteriorly, ventrianal shield approximately shield shaped or pentagonal. ....*A.* (*Typhlodromips*), 9
– Sternal shield indistinct, may be trilobed posteriorly, ventrianal shield elongate, vase shaped or concave laterally..... ..... *A.* (*Euseius*), 12

9. Besides Z_5 and Z_4 other setae being subequal 10
– Besides Z_5 snd Z_4 there are other long setae ..... *crotalariae*

10. Z_4 quite long at least 3 times the length of S4. 11
- Z_4 not so long. ..... *polyantheae*

11. Cervix of spermatheca saucer shaped. .... *syzygii*
- Cervix of spermatheca elongated and vase shaped. ..... *suknaensis*

12. All setae on dorsal shield minute except j_1 and Z_5. 13
- Besides Z_5 and j_1 some other setae also long. 14

13. S_2 and S_5 equal. ..... *ovalis*
- S_2 and S_5 unequal. ..... *rhododendronis*

14. Spermatheca and spermatophoral process as in figures 1 and 2. ..... *pruni*
- Spermatheca and spermatophoral process as in figures 3 and 4. ..... *finlandicus*

15. r_3 on dorsal shield, genu II with 7 setae, genu III with 6 setae. .... ***Phytoseius*** *(Phytoseius)*, 16
- r_3 on lateral integument, genu II with 7 or 8 setae genu III with 6 setae. .... ***Typhlodromus***, 17

16. Seta s_6 almost one and half times as long as s_4. ..... *Phytoseius (Phytoseius) meyerae*
- s_4 and s_6 of similar length. .... *P. (P.) mizoramensis*

17. Z_5 and Z_4 normally serrate and the former usually knobbed. .... ***Typhlodromus*** *(Amblydromella)* ..... *darjeelingensis*
- Z_5 and Z_4 never serrate, Z_5 always smooth ..... *T. (Orientiseius)*, 18

18. Length of j_4, j_6 vary between 8-20 microns. ..... *T. (O.) channabasavannai*
- Length of j_4, j_6 vary between 20-60 microns. ..... *T. (O.) rickeri*

Genus 13. ***Amblyseius*** Berlese

1914. *Amblyseius* Berlese, *Redia*, **10** : 143.

21. ***Amblyseius (Amblyseius) herbicolus*** (Chant)

1959. *Typhlodromus (Amblyseius) herbicolus* Chant, *Can. ent.*, **91** : 84-85.

1986. *Amblyseius (Amblyseius) herbicolus*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 45-47.

1995. *Amblyseius (Amblyseius) herbicolus*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 29-30.

Material examined : 1 female, Mizoram, Lunglei, Zohnuai, ex *Rosa indica*, 13.xii.1994; 1 female, Aizol, ex *Aporusa dioca*, 13.xii.1994; 3 females, Lunglai, Zobawk, ex Theint (local name), 19.xii.1994; 1 female, Lunglei, Zohnuai, ex miscellaneous plant, 26.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Tripura, Arunachal Pradesh, Meghalaya, West Bengal, Punjab, Haryana, Gujarat.

Elsewhere : Taiwan, Thailand, Philippines, Madagascar, Portugal, North America, Mexico, British West Indies, Brazil.

Remarks : This mite is often confused with *A. (A.) largoensis* (Muma) but can be easily distinguished by shape of cervix of spermatheca. This species was all the time associated with *T. urticae* and since the mites collected in the field were having the reddish gut content, in all probality it had preyed upon it.

22. ***Amblyseius (Amblyseius) largoensis*** (Muma)

1955. *Amblyseiopsis largoensis* Muma, *Ann. Ent. Soc. Amer.*, **48** : 266.

1959. *Amblyseius largoensis*, Ehara, *Acarologia*, **1** : 293-294.

1964. *Amblyseius largoensis*, Rao & Rao, *Comm. Inst. Biol. Contr., Tech. Bull.*, **4** : 38-39.

1986. *Amblyseius (Amblyseius) largoensis*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 51-55.

1995. *Amblyseius (Amblyseius) largoensis*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 30.

Material examined : 1 female, Mizoram : Aizol, Aibawk, ex. *Biscophia javanica*, 16.xii.1995; 3 females, Lunglei, Lawngtlai, Zohnuai, ex beans, 26.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Meghalaya, Arunachal Pradesh, Assam, West Bengal, Nagaland, Tripura, Manipur, Bihar, Uttar Pradesh, Himachal Pradesh, Punjab, Gujarat, Orissa, Pondicherry, Tamil Nadu, Karnataka, Kerala.

Elsewhere : Taiwan, Japan, Thailand, Hong Kong, New Zealand, Iran, Israel, Kenya, South Africa, U.S.A., Mexico, Jamaica, Guatemala, Hondurus, Trinidad, Puerto Rico, Costa Rica, Brazil.

23. *Amblyseius (Euseius) finlandicus* (Oudemans)

1915. *Seiulus finlandicus* Oudemans, *Ent. Ber.*, **4** : 183.

1958. *Amblyseius finlandicus*, Athias-Henriot, *Bull. Soc. Hist. Nat. Afr. Nord.*, **49** : 34-36.

1967. *Amblyseius finlandicus*, Ghai & Menon, *Oriental Ins.*, **1** : 70.

1986. *Amblyseius (Euseius) finlandicus*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 86-88.

Material examined : 1 female, Mizoram, Aizol, Aibawk, ex *Ficus racemosus*, 14.xii.1994; 1 female, Lunglei, Lawngtlai, Sairep, ex lemon, 17.xii.1994; 2 females, Lunglei, Zobawk, ex a bushy plant called Theint (local name), 19.xii.1994; 1 female, Lunglei, ex citrus, 20.xii.1994; 1 female, Lawngtlai, ex undet. plant, 21.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Meghalaya, Tripura, Arunachal Pradesh, Sikkim, West Bengal, Uttar Pradesh, Punjab, Jammu & Kashmir.

Elsewhere : Japan, Pakistan, Africa, Europe, Russia, North America, Canada, Hawaii, South America.

24. *Amblyseius (Euseius) pruni* Gupta

1975. *Amblyseius pruni* Gupta, *Internat. J. Acarol.*, **1** : 40-42.

1986. *Amblyseius (Euseius) pruni*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 94-96.

1995. *Amblyseius (Euseius) pruni*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **4**(Part-2) : 33.

Material examined : 3 females, Mizoram : Lunglei, *ex Cynodon dactylon*, 18.xii.1994; 1 female, same locality as before, ex an ornamental plant, same date.

Distribution : India : Mizoram (Lunglei), Meghalaya, Assam, Tripura, West Bengal, Himachal Pradesh, Delhi, Punjab, Jammu & Kashmir, Gujarat.

Remarks : This mite was found to be associated with *Schizotetranychus andropogoni* infesting grass on which this predator was found feeding upon eggs.

25. *Amblyseius (Euseius) ovalis* (Evans)

1953. *Typhlodromus ovalis* Evans, *Ann. Mag. Nat. Hist.*, **6** : 458-461.

1960. *Typhlodromus (Amblyseius) ovalis*, Narayanan & Ghai, *Proc. Nat. Ins. Sci.*, **26B**(6) : 388-389.

1986. *Amblyseius (Euseius) ovalis*, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 92-94.

Material examined : 1 female, India : Mizoram : Aizol, ex Tiurel (local name), 15.xii.1994.

Distribution : India : Mizoram (Aizol), Meghalaya, Tripura, Manipur, Sikkim, West Bengal, Bihar, Gujarat, Maharashtra, Karnataka, Tamil Nadu, Andaman Isls., Pondicherry.

Elsewhere : Indonesia, Philippines, Taiwan, Okinawa Isl., Hong Kong, Malayasia, New Zealand, Hawaii, Mexico.

Remarks : Though this mite is known to be an efficient predator of spider mite, in the present study the population of this predatory mite was never seen to be high enough at any of the places which could warrant its efficiency as a potential predator. Further exploration will be required to ascertain this aspect.

26. *Amblyseius (Euseius) rhododendronis* Gupta

1970. *Amblyseius rhododendronis* Gupta, *Oriental Ins.*, **4** : 187-188.

1986. *Amblyseius (Euseius) rhododendronis*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 96-98.

1992. *Amblyseius (Euseius) rhododendronis*, Gupta, *Fauna of West Bengal, State Fauna Series*, **3**(Part-3) : 160.

Material examined : 1 female, Mizoram : Aizol, ex a shrub locally called Tiurel, 15.xii.1994.

Distribution : India : Mizoram (Aizol), Tripura, West Bengal.

Elsewhere : Thailand.

27. *Amblyseius (Paraphytoseius) multidentatus* (Swirski & Shechter)

1960. *Typhlodromus (Amblyseius) orientalis* Narayanan, Kaur & Ghai, *Proc. Nat. Ins. Sci.*, **28(B)** : 394.

1961. *Paraphytoseius multidentatus* Swirski & Shechter, *Israel J. agric. Res.*, **11**(2) : 114.

1986. *Amblyseius (Paraphytoseius) multidentatus*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 123-126.

1995. *Amblyseius (Paraphytoseius) multidentatus*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **4**(Part-2) : 34-35.

Material examined : 1 female, Mizoram, Lunglei, ex undet. plant, 23.xii.1994.

Distribution : India : Mizoram (Lunglei), Manipur, Tripura, Assam, West Bengal, Bihar, Uttar Pradesh, Punjab, Haryana, Delhi, Maharashtra, Karnataka, Tamil Nadu.

Elsewhere : Hong Kong, Madagascar, Nigeria.

Remarks : Though this mite is known to be an effective predator of spider mites and eriophyids but no such predatory behaviour was seen in the present study.

28. *Amblyseius (Paraphytoseius) scleroticus* Gupta & Ray

1981. *Amblyseius (Paraphytoseius) scleroticus* Gupta & Ray, *Bull. zool. Surv. India*, **4** : 42-43.

1986. *Amblyseius (Paraphytoseius) scleroticus*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 126-127.

Material examined : 5 females, Mizoram, Lunglei, Sairep, ex *Zizyphus* sp., 17.xii.1994.

Distribution : India : Mizoram (Lunglei), Uttar Pradesh.

Remarks : This species was originally described from Uttar Pradesh and not recorded from any other place so far excepting Mizoram. Hence, its occurrence in Mizoram is interesting.

29. *Amblyseius (Typhlodromips) crotalariae* Gupta

1977. *Amblyseius (Typhlodromips) crotalariae* Gupta, *Entomologists' Mon. Mag.*, **112** : 53-55.

1986. *Amblyseius (Typhlodromips) crotalariae*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 162-166.

1995. *Amblyseius (Typhlodromips) crotalariae*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **6** (Part-2) : 44-46.

Material examined : 1 female, Mizoram : Lunglei, ex *Zinia*, 23.xii.1994.

Distribution : India : Mizoram (Lunglei), Meghalaya, Assam, Tripura, West Bengal.

30. *Amblyseius (Typhlodromips) polyantheae* Gupta

1975. *Amblyseius polyantheae* Gupta, *Internat. J. Acarol.*, **1** : 42-43.

1986. *Amblyseius (Typhlodromips) polyantheae*, Gupta, Fauna of India (*Acari : Mesostigmata*) Family Phytoseiidae : 178-179.

1992. *Amblyseius (Typhlodromips) polyantheae*, Gupta, *Fauna of West Bengal. State Fauna Series*, **3**(Part-3) : 167-168.

Material examined : 2 females, Mizoram, Lunglei Zohnuai, ex miscellaneous plant, 26.xii.1995.

Distribution : India : Mizoram (Lunglei), Meghalaya, West Bengal.

31. *Amblyseius (Typhlodromips) suknaensis* Gupta

1970. *Amblyseius suknaensis* Gupta, *Oriental Ins.*, **4** : 185-186.

1986. *Amblyseius (Typhlodromips) suknaensis*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 185-187.

1995. *Amblyseius (Typhlodromips) suknaensis*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 36-37.

Material examined : 2 females, Mizoram (Aizol), ex Tiurel (local name), 15.xii.1994.

Distribution : India : Mizoram (Aizol), Meghalaya, Assam, Tripura, West Bengal, Punjab, Tamil Nadu, Kerala, Andaman Islands.

32. *Amblyseius (Typhlodromips) syzygii* Gupta

1975. *Amblyseius syzygii* Gupta, *Internat. J. Acarol.* **1** : 44-45.

1986. *Amblyseius (Typhlodromips) syzygii* Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 188-190.

Material examined : 1 female, Mizoram : Lunglei, ex citrus, 22.xii.1994.

Distribution : India : Mizoram (Lunglei), Meghalaya, Tripura, West Bengal, Bihar, Uttar Pradesh.

Elsewhere : Thailand.

33. *Amblyseius* sp.

Material examined : 1 nymph, Mizoram, Lunglei, ex *Dolichos lablab*, 14.xii.1994; 1 nymph, Aizol, Aibawk, ex jackfruit, 18.xii.1994; 1 nymph, Lunglei, ex undet. plant, 22.xii.1994.

Remarks : Because the specimens were in juvenile stages, the species identification was not possible.

Genus 14. *Paraamblyseius* Muma

1962. *Paraamblyseius* Muma, *Fla. Ent.*, **45** : 8.

34. *Paraamblyseius fragariae* Gupta

1980. *Paraamblyseius fragariae* Gupta, *Entomologists' Mon. Mag.*, **115** : 215-216.

1986. *Paraamblyseius fragariae*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 205-206.

Material examined : 1 female, Mizoram, Lunglei, ex citrus, 20.xii.1994.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh, Meghalaya, West Bengal.

35. *Paraamblyseius mumai* Gupta

1980. *Paraamblyseius mumai* Gupta, *Entomologists' Mon. Mag.*, **116** : 33-34.

1986. *Paraamblyseius fragariae* Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 206.

Material examined : 1 female, Mizoram, Lunglei, ex undet. plant, 18.xii.1994.

Distribution : India : Mizoram (Lunglei), Meghalaya, West Bengal.

Genus 15. *Phytoseius* Ribaga

1904. *Phytoseius* Ribaga, *Riv. Pat. Veg.*, **10** : 175.

36. *Phytoseius (Phytoseius) meyerae* Gupta

1977. *Phytoseius (Dubininellus) meyerae* Gupta, *Indian J. Acar.*, **2** : 7.

1986. *Phytoseius (Phytoseius) meyerae*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 244.

1995. *Phytoseius (Phytoseius) meyerae*, Gupta, *Fauna of Meghalaya, State Fauna Series*, **4** (Part-2) : 38.

Material examined : 1 female, Mizoram (Aizol), ex *Rosa indica*, 21.xii.1994; 1 female, Lunglei, Lawngtlai, ex bamboo, 21.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Tripura, Meghalaya, Assam, West Bengal.

37. *Phytoseius (Phytoseius) mizoramensis* sp. nov.

Female : Dorsal shield 308 microns long, 180 microns wide, partly reticulated and partly rugose, with 15 pairs of setae of which 5 pairs on dorsal

series, 7 on lateral series, 2 on median series and 1 pair of r3 which also lie on dorsal shield. Measurements of setae : j1-28, j4-j6, J5-6 long each, z5-8, j3-31, z2-17, z3-43, z4-17, s4-107, s6-107, Z5-71, Z4-85, r3-76. Setae z2 and z4 almost of same length while z5 slightly longer than j4 and j6; s4 and s6 almost equal, Z5 slightly shorter than Z4:, j1, j3, z3, s4, s6, Z5, Z4 and r3 long, thick and serrate and all other setae smooth and pointed. Ventrally sternal shield 78 microns long and slightly wider than long with 3 pairs of setae, 4th pair on metasternal plate. All the sternal setae are of similar length, Genital shield 3 59 long, truncated posteriorly, with a pair of setae. Ventrianal shield pitcher shaped, 71 long, 47 wide, with 3 pairs of preanal setae, 1 pair of paraanal and a postanal setae present as usual. 3 pairs of setae present around ventrianal shield of which JV5 55 long (thick and serrate); 1 pair of metapodal plates present. Interscutal membrane in between genital and ventrianal shield have transverse striations. Leg IV with macrosetae on genu- 19, microns long, tibia- 52 microns long, basitarsus- 26 microns long, distitarsus- 30 microns long; macrosetae on genu, tibia and basitarsus with bulging tip but the one on distitarsus is with blunt tip. Leg chaetotactic formula : genu II $2\frac{2}{0}\frac{2}{0}1$, tibia II $1\frac{1}{1}\frac{2}{0}1$, genu III $1\frac{2}{0}\frac{1}{1}1$, tibia III $\frac{1}{1}\frac{1}{0}1$. Spermatheca as illustrated. The position of chelicera does not permit the counting of teeth of movable and fixed digit.

Male : Unknown.

Holotype Female, India : Mizoram, Lunglei, Lawngtlai, ex undet. plant, 21.xii.1994. Paratype : 1 female, data same as for holotype.

Remarks : This new species can be easily distinguished from the related species like P. (P.) *meyerae* Gupta (1977) in having j3 much longer than z2 and also differs from *P. (P.) punjabensis* Gupta in having j3 almost equal to j1.

Genus 16. ***Typhlodromus*** Scheuten

1857. *Typhlodromus* Scheuten, *Arach. Naturges*, **23** : 111.

38. ***Typhlodromus (Amblydromella) darjeelingensis*** Gupta

1986. *Typhlodromus (Amblydromella) darjeelingensis* Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 270-272.

1995. *Typhlodromus (Amblydromella) darjeelingensis*, Gupta, *Fauna of Meghalaya, State Fauna Series*, 4 (Part-2) : 39.

Material examined : 2 females, Mizoram, Aizol, Zoo.-Bot. Garden, Ex *Rosa indica*, 13.xii.1994; 2 females, Lunglei, Lawngtlai, Sairep, ex tea, 19.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Meghalaya, Tripura, West Bengal, Uttar Pradesh, Punjab, Karnataka, Tamil Nadu.

39. ***Typhlodromus (Orientiseius) channabasavannai*** Gupta

1978. *Typhlodromus channabasavannai* Gupta, *Bull Zool. Surv. India*, 1 : 50-52.

1986. *Typhlodromus (Orientiseius) channabasavannai*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 290-300.

Material examined : 1 female, Mizoram, Aizol, ex *Aporusa dioca*, 13.xii.1994; 4 females, Lunglei, Lawngtlai, ex Chrysanthemum, 21.xii.1994; 1 female, Lawngtlai, ex citrus, 21.xii.1994; 2 females, Zohnuai, ex miscellaneous plant, 26.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei). Tamil Nadu, Karnataka.

Remarks : This species appears to be having some predatory importance as it was found in association with *Brevipalpus* spp. and often was found chasing the tenuipalpid mite. Further observations in this regard may prove to be useful.

40. *Typhlodromus (Orientiseius) rickeri* Chant

1960. *Typhlodromus rickeri* Chant, *Can. Ent.*, **92** : 62-64.

1964. *Typhlodromus rickeri*, Rao & Rao, *Comm. Inst. Biol. Control Tech. Bull.*, **4** : 38-39.

1986. *Typhlodromus (Orientiseius) rickeri*, Gupta, *Fauna of India (Acari : Mesostigmata) Family Phytoseiidae* : 307-310.

Material examined : 2 females, Mizoram, Lunglei, Lawngtlai, ex citrus, 26.xii.1994.

Distribution : India : Mizoram (Lunglei), Meghalaya, Nagaland, West Bengal, Uttar Pradesh, Madhya Pradesh, Karnataka.

Elsewhere : Florida.

41. *Typhlodromus* sp.

Material examined : 1 female, Mizoram, Lunglei, ex undet. plant, 21.xii.1994.

Remarks : Because of the damaged condition of the specimen, the specific identification was not possible.

Family 6. ASCIDAE Voigts & Oudemans

1979. *Ascidae* Voigts & Oudemans, In : Evans & till, *Trans. Zool. Soc. Lond.*, **35** : 196.

Genus 17. *Lasioseius* Berlese

1916. *Lasioseius* Berlese, *Redia*, **12** : 34.

42. *Lasioseius* sp.

Material examined : 1 female, 1 male, Mizoram, Aizol, ex Tiurel (local name), 15.xii.1994.

Remarks : Because of inadequate material the species determination was not possible.

Family 7. STIGMAEIDAE Oudemans

1931. *Stigmaeidae* Oudemans, *Ent. Ber.*, **8**(179) : 251-263.

Genus 18. *Agistemus* Summers

1960. *Agistemus* Summers, *Proc. ent. Soc. Wash.*, **62** : 234.

Key to the Genera and Species of Stigmaeidae known from Mizoram

1. Body round or oval, well sclerotized, idiosomal plate indistinct, dorsum with 8 pairs of strong and long setae mostly on tubercles, palp tarsus with trifid sensillum. .... *Ledermuelleria parryorum*
– Body round and oval or elongated, dorsal seta la borne on median plate proper which also carries seta a, b, c. ..... *Agistemus*, 2
2. Ratio ae/ae-ae equal to 1.5 or more. 5
– Ratio ae/ae-ae less than 1.5. 3
3. Ratio ae/ae-ae less than 1. ..... *hyxtrix*
– Ratio ae/ae-ae equal to 1 or more than 1. 4
4. Seta lm around 37 micron long. ..... *terminalis*
– Seta lm almost over 70 micron long. .... *javanicum*
5. All dorsal setae significantly barbed. 6
– Dorsal setae not barbed. ..... *exsertus*
6. Seta le much longer than e. ..... *obscura*
– Seta le much shorter than e. ..... *industani*

43. *Agistemus exsertus* Gonzalez

1963. *Agistemus exsertus* Gonzalez, *Acarologia*, **2** : 343-344.

1991. *Agistemus exsertus*, Gupta, *Rec. zool. Surv. India*, **88** : 214-215.

Material examined : 2 females, Mizoram, Lunglei, Zohnuai, ex *Schema wallachi*, 21.xii.1994.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh, Assam.

Elsewhere : Japan, Taiwan.

44. *Agistemus hystrix* Gupta

1991. *Agistemus hystrix* Gupta *Rec. zool. Surv. India*, **88** : 214.

Material examined: 1 female, India : Mizoram, Aizol, ex citrus, 24.xii.1994.

Distribution : India : Mizoram (Aizol), Manipur.

45. ***Agistemus industani*** Gonzalez-Rodriguez

1965. *Agistemus industani* Gonzalez-Rodriguez, *Univ. Calif. Pub. Ent.*, **41** : 40.

1985. *Agistemus industani*, Gupta, *Handbk. Plant Mites of India* : 303-304.

1991. *Agistemus industani*, Gupta, *Rec. zool. Surv. India*, **88** : 215-217.

Material examined : 1 female, Mizoram, Lunglei, ex citrus, 18.xii.1994; 1 female, Lunglei, ex marigold, 24.xii.1994.

Distribution : India : Mizoram (Lunglei), West Bengal, Tamil Nadu, Manipur.

46. ***Agistemus javanicum*** Gupta

1991. *Agistemus javanicum* Gupta, *Rec. zool. Surv. India*, **88** : 218.

Material examined : 1 female, Mizoram, Aizol, Aibawk, ex miscellaneous plant, 24.xii.1994; 1 female, Lunglei, citrus, 25.xii.1994.

Distribution : India : Mizoram (Aizol, Lunglei), Manipur.

47. ***Agistemus obscura*** Gupta

1991. *Agistemus obscura* Gupta, *Rec. zool. surv. India*, **88** : 210-211.

Material examined : 2 females, Mizoram, Lunglei, Lawngtlai, ex *Dolichos lablab*, 22.xii.1994.

Distribution : India : Mizoram (Lunglei), Manipur.

48. ***Agistemus terminalis*** (Quayle)

1912. *Caligonus terminalis* Quayle, *Univ. Calif. Agric. Exp. Sta. Bull.*, **234** : 499.

1960. *Agistemus terminalis*, Summers, *Proc. Ent. Soc. Wash.*, **62** : 234.

Material examined : 4 females, Mizoram : Lunglei, Sairep, ex undet. plant, 23.xii.1994.

Distribution : India : Mizoram (Lunglei).

Elsewhere : Japan, Hawaii, U.S.A.

Remarks : The occurrence of this species in Mizoram is quite interesting in the sense that this is Palaearctic species and has not been so far reported from other parts of India. However, as per Gonzalez-Rodriguez (1965) this has been intercepted at Philadelphia from orange exported from India.

Genus 19. ***Ledermuelleria*** Oudemans

1923. *Ledermuelleria* Oudemans, *Ent. Ber., Amst.*, **6**(130) : 150.

49. ***Ledermuelleria parryorum*** Gupta

1991. *Ledermuelleria parryorum* Gupta, *Rec. zool. Surv. India*, **88** : 219.

Material examined : 1 female, Mizoram, Lunglei, Sairep, ex tea, 19.xii.1994; 1 nymph, Lunglei, ex tea, 20.xii.1994; 1 female, Lunglei, ex citrus, 21.xii.1994, 2 females, Lunglei, ex citrus, 24.xii.1994.

Distribution : India : Mizoram (Lunglei), Arunachal Pradesh.

50. ***Agistemus*** sp.

Material examined : 1 female, Mizoram, Aizol, ex *Aporusa dioca*, 13.xii.1994.

Fam. 8. TYDEIDAE Krammer

1877. *Tydeidae* Krammer, *Arch. Naturg.*, **43** : 232-246.

Genus 20. ***Tydeus*** Koch

1835. *Tydeus* Koch, *CMA. Fasc.* 4 t II. 12.

Key to Species of Tydeidae known from Mizoram

1. D_3 and D_4 of same length 2
– D_3 much longer (slightly less than double) than D_4. ..... *ornamentalicus*
2. D_4 over 20 microns long. ..... *gossabaensis*
– D_4 less than 10 microns long. ..... *wallachii*

51. ***Tydeus gossabaensis*** Gupta

1992. *Tydeus gossabaensis* Gupta, *Fauna of West Bengal, State Fauna Series*, **3** (Part-3) : 131-133.

Material examined : 1 female, Mizoram, Aizol, Aibawk, ex *Ficus*, 14.xii.1994; 1 female, Aibawk, ex jack fruit, 14.xii.1994.

Distribution : India : Mizoram (Aizol), West Bengal.

52. *Tydeus ornamentalicus* Gupta

1992. *Tydeus ornamentalicus* Gupta, *Fauna of West Bengal, State Fauna Series*, **3**(Part-3) : 131.

Material examined : 3 females, Mizoram, Lunglei, ex ornamental plant, 18.xii.1994.

Distribution : India : Mizoram (Lunglei), West Bengal.

53. *Tydeus wallachii* sp. nov.

Female : Dorsum 201 long, 159 wide (maximum width), prodorsum mostly with longitudinal striation except in the region of prodorsal seta where it is somewhat irregular. The second pair of seta on prodorsum smaller in comparison to other two pairs of setae. The sensory setae fine, pointed and almost one and half times as long as other prodorsal setae. The striation in the median region of hysterosoma is transverse, while it is longitudinal near the margin. the striation at the posteriormost region is roundish. Hysterosoma with a pair of setae. The setae almost of similar length except the posteriormost one which are smaller. The dorsal seta is smooth, pointed and slightly thicker. The measurements of setae being : Pl- 17, P2- 14, P3- 17, S- 24, Dl- 9, D2- 11, D3- 9, D4- 9, D5- 7, L1- 9, L2- 9, L3- 9, L4- 9. Palp three segmented, palp femur with 1 long seta. Genu with 2 setae. Palp tibia with 3 setae. All the three terminal setae of palp of same length. Leg chaetotaxy : chaetotaxy of tibia and tarsus I-IV as illustrated.

Male : Unknown.

HOLOTYPE Female, INDIA : Mizoram, Lunglei, Lawngtlai, Sairep, ex *Schima wallachi*, 17.xii.1994.

Remarks : This new species is very close to *Tydeus gossabaensis* Gupta (1992) but differs from it in having D4 less than 10 microns while it is over 20 microns in case of *gossabaensis*.

Fam. 9. EUPODIDAE Koch

Genus 21. *Eupodes* Koch

54. *Eupodes sigmoidensis* Strandtmann & Goff

1978. *Eupodes sigmoidensis* Strandtmann & Goff, *Pacific Ins.*, **19** : 123-124.

1992. *Eupodes* sp. nr. *sigmoidensis*, Gupta, *Fauna of West Bengal, State Fauna Series*, **3**(Part-3) : 144.

Material examined : 1 female, India : Mizoram, Aizol, Zoo.-Bot. Garden, ex *Rosa indica*, 13.xii.1994.

Distribution : India : Mizoram, (Aizawl), West Bengal.

Elsewhere : Hawaii.

Remarks : This eupodid mite appears to be quite abundant in many parts of India specially in eastern and northeastern India. Interestingly, this species has also been reported to be abundant on different crops in Hawaiian Isls. Records are not available regarding its distribution from other parts of the world. It is rather surprising that the species which is so much abundant in Hawaii is equally abundant in many parts of India also.

Fam. 10. ACARIDAE Ewing & Nesbitt

Genus 22. *Acarus* Griffiths

55. *Acarus* sp.

Material examined : 1 hypopial stage, Mizoram, Lunglei, Lungphei, ex citrus, 7.xii.1994.

Remarks : Because of the specimen in Hypopial stage, further identification to species level was not possible.

ORIBATID SPECIES

Some specimens of oribatids of unknown identities were recorded infesting citrus on upper surface of leaves and fruits. Most probably they were feeding upon fungus with which they were found associated. These specimens were collected at Lunglei, Lawngtlai.

DISCUSSION

The study of the plant mite material from Mizoram reveals a total of 55 species under 22 genera belonging to 10 families and 4 orders. Incidentally, all the species are reported for the first time from Mizoram. Out of these, 20 are phytophagous, 33 are predatory, 1 is a fungus associated one and the other one is of uncertain food habit. The phytophagous mites belong to 4 families *viz.* Tetranychidae having 12 species under it, Tenuipalpidae represented by 5 species under it, while Tarsonemidae and Eriophyidae are represented by 2 and 1 species, respectively.

Among the species of Tetranychidae treated here, the occurrence of the genus *Aplonobia* Womersley and the species *Oligonychus gossypii* (Zacher) are reported here for the first time from India. The rest of the species are quite common in other parts of northeast India as well.

Among the species of Tenuipalpidae, there are 3 species *viz. Brevipalpus cucurbitae* Mohan sundaram, *B. rugulosus* Chaudhri *et al.*, and *B. euphorbiae* Mohan sundaram are reported for first time from the northeastern India. Interestingly, the distribution of the two species, *viz. B. cucurbitae* and *B. euphorbiae* were earlier known from Tamil Nadu while *B. rugulosus* were originally described from Pakistan and thereafter reported in Punjab and this is the second report of the species from India.

Among the 33 species of predatory mites, 21 belong to Phytoseiidae, 8 to Stigmaeidae, 3 to Tydeidae and 1 to Ascidae. Out of the phytoseiid mites, majority were reported from West Bengal as well as other parts of northeast India. But there are certain species which are rather uncommon in the neighbouring states. Those are *Amblyseius* (*E.*) *rhododendronis* and *A.* (*Paraphytoseius*) *scleroticus*. It also includes one species of *Phytoseius* which is being described here as new species.

So far as stigmaeid mites are concerned, out of 8 species, 5 are there which have been reported from other parts of northeast India. Those species are *Agistemus exsertus*, *A. hystrix*, *A. industani*, *A. javanicum* and *Ledermuelleria parryorum*. Among the species of Tydeidae, which are reported here, were described from West Bengal but so far not reported from other parts of northeast India. Interestingly, both the new species being described here are from Lawngtlai.

Among the phytophagous mites, there were infact three species which were found to be seriously infesting the agricultural crops causing noticeable damage. Those are *Panonychus citri*, *Brevipalpus phoenicis* and *Phyllocoptruta oleivora*. Out of these, the first one was found to be damaging a large number of fruit trees, vegetables and ornamental plants while the other two were seen infesting seriously citrus orchard.

As per reports collected from growers, the damage done by *Brevipalpus phoenicis* and *Phyllocoptruta oleivora* often caused tangible economic loss. So far as predatory mites are concerned, no observation regarding predatory behaviour of any of the predators could be recorded except making stray observations regarding feeding upon the preys and the same have been mentioned under "Remarks" given for respective species. However, from Mizoram the species which is attributed to be the fungus associated one is an undetermined species of *Acarus* while the species whose food habit is not known is *Eupodes sigmoidensis*. It may be mentioned in this connection, that *Eupodes sigmoidensis* is a common species occurring in both eastern and northeast India. Further, the latter re-examination of the species reported from Meghalaya as *Eupodes* sp. turned out to be same as *E. sigmoidensis*.

So far as the districtwise distribution of the species from Mizoram is concerned, as has been mentioned earlier, no collection could be made from Chhimtuipui district because of non-accessibility. The other two districts, *viz.* Aizol and Lunglei are represented by 23 and 43 species, respectively. From this result it appears that

apparently Lunglei is relatively richer so far as the plant mite fauna is concerned but in reality it is rarely so. The reason behind reporting a larger number of species from Lunglei is solely because more time and effort were put for collection in this district. The species which were found to be having some promise as predator were *Amblyseius* (*A.*) *herbicolus* and *Typhlodromus* (*A.*) *channabasavannai*. Besides, *Agistemus terminalis* was also seen to have some importance as predator. More thorough investigations about the predatory mites may reveal many more important predatory species.

SUMMARY

This paper reports for the first time the plant mite fauna of Mizoram and records 55 species belonging to 22 genera, under 10 families and 4 orders, of which, 2 species, one each under Phytoseiidae and Tydeidae, are described as new to science and 1 species under Tetranychidae is being reported here for the first time from India. Among these, 20 are phytophagous, 33 are predatory and 1 is a fungus associated one while the other one is of uncertain food habit. This paper provides important synonymies, collection data for all the species, distribution in India and abroad and keys to all taxonomic categories dealt with in this paper. A discussion regarding species composition of Mizoram along with their economic importance and districtwise distribution of all the species are also given.

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Districtwise distribution of plant mite species in Mizoram

	Species	Districts		
		Aizol	Lunglei	Chimtuipui
	Fam. TETRANYCHIDAE			Not surveyed
1.	*Bryobia praetiosa*	–	+	Do
2.	*Aplonobia* sp.	–	+	Do
3.	*Eutetranychus orientalis*	+	+	Do
4.	*E. phaseoli*	+	–	Do
5.	*E. pamelae*	–	+	Do
6.	*Eotetranychus* sp.	–	+	Do
7.	*Panonychus citri*	+	–	Do
8.	*Schizotetranychus cajani*	–	+	Do
9.	*Schizotetranychus* sp.	+	–	Do
10.	*Oligonychus gossypii*	+	–	Do
11.	*Oligonychus* sp.	–	+	Do
12.	*Tetranychus urticae*	+	+	Do
	Fam. TENUIPALPIDAE			
13.	*Brevipalpus cucurbitae*	–	+	Do
14.	*B. euphorbiae*	+	–	Do
15.	*B. phoenicis*	+	+	Do
16.	*B. rugulosus*	–	+	Do
17.	*B. obovatus*	–	+	Do
	Fam. TARSONEMIDAE			
18.	*P. latus*	–	+	Do
19.	*Tarsonemus* sp.	–	+	Do
	Fam. ERIOPHYIDAE			
20.	*P. oleivora*	–	+	Do
	Fam. PHYTOSEIIDAE			
21.	*A.* (*A.*) *herbicolus*	+	+	Do
22.	*A.* (*A.*) *largoensis*	+	+	Do
23.	*A.* (*E.*) *finlandicus*	+	+	Do
24.	*A.* (*E.*) *pruni*	–	+	Do
25.	*A.* (*E.*) *ovalis*	+	–	Do
26.	*A.* (*E.*) *rhododendronis*	+	–	Do
27.	*A.* (*P.*) *multidentatus*	–	+	Do
28.	*A.* (*P.*) *scleroticus*	–	+	Do
29.	*A.* (*P.*) *crotalariae*	–	+	Do
30.	*A.* (*T.*) *polyantheae*	–	+	Do
31.	*A.* (*T.*) *suknaensis*	+	–	Do
32.	*A.* (*T.*) *syzygii*	–	+	Do

	Species	Districts		
		Aizawl	Lunglei	Chimtuipui
				Not Surveyed
33.	*A.* sp.	–	+	Do
34.	*Paraamblyseius fragariae*	–	+	Do
35.	*P. mumai*	–	+	Do
36.	*P.* (*P.*) *meyerae*	+	+	Do
37.	*P.* (*P.*) *mizoramensis*	–	+	Do
38.	*T.* (*A.*) *darjeelingensis*	+	+	Do
39.	*T.* (*O.*) *channabasavannai*	+	+	Do
40.	*T.* (*O.*) *rickeri*	–	+	Do
41.	*T.* sp.	–	+	Do
	Fam. ASCIDAE			
42.	*Lasioseius* sp.	+	–	Do
	Fam. STIGMAEIDAE			
43.	*Agistemus exsertus*	–	+	Do
44.	*A. hystrix*	+	–	Do
45.	*A. industani*	–	+	Do
46.	*A. javanicum*	+	+	Do
47.	*A. obscura*	–	+	Do
48.	*A. terminalis*	–	+	Do
49.	*L. parryorum*	–	+	Do
50.	*Agistemus* sp.	+	–	Do
	Fam. TYDEIDAE			
51.	*Tydeus gossabaensis*	+	–	Do
52.	*T. ornamentalicus*	–	+	Do
53.	*T. wallachii*	–	+	Do
	Fam. EUPODIDAE			
54.	*Eupodes sigmoidensis*	+	–	Do
	Fam. ACARIDAE			
55.	*Acarus* sp.	–	+	Do
	ORIBATIDS	–	+	Do
	TOTAL	**23**	**43**	

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IXODID TICKS (ACARI : IXODIDAE)

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INTRODUCTION

Ixodid or hard body ticks are one of the most important group of arthropods causing disease to man and domestic and wild animals.

The Indian ixodid ticks were first studied by Linnaeus (1758, 1767). Neumann (1897–1911), Stiles and Hassall (1901), Nuttall and Warburton (1908, 1911, 1915), Nuttall (1912, 1913, 1916) and Robinson (1926) described and reported many species from India. Sharif (1928) made an extensive and comprehensive study of Indian ticks and recorded 45 species, 4 subspecies and 6 varieties. This group of ticks in India was also studied by several acarologists (Sanyal and De, 1991, 1995).

Though the ixodid ticks of Indian subcontinent were surveyed and studied by many acarologists but very little work was so far done on ixodids from the state of Mizoram. Miranpuri and Lahkar (1979) first collected several specimens of ixodid ticks from Aizol, Mizoram and identified them as *Boophilus microphus, Haemaphysalis bispinosa, Hyalomma kumari, Rhipicephalus haemaphysaloides*. In addition to these, three more species were identified upto generic level, two belong to genus *Haemaphysalis* collected off goat and dog and one belongs to genus *Dermacentor* collected from wild pig. Since then no other attempt to study the ticks of Mizoram was made.

The present work is based on collections made from Mizoram by the authors and the specimens collected by other survey parties of the Zoological Survey of India, which are available in the National Zoological Collection. The work also includes the species which have not been studied by the authors but are reported from the state by the earlier workers.

A brief account of the surveys undertaken for the study and collection from other surveys is given below :—

1. Mizoram Survey – Sri H. C. Ghosh (January, 1987)
2. Mizoram Survey – Dr. A. R. Lahiri (September, 1993)
3. Mizoram Survey – Sri S. S. Saha (December, 1993 and April, 1997)
4. Mizoram Survey – Sri S. K. De (March, 1994)
5. Mizoram Survey – Dr. A. K. Sanyal (October, 1995)

A complete list of 12 species under 7 genera of ixodid ticks hitherto known from Mizoram has been incorporated in the paper. The original and other important references, diagnostic features, hosts of tick species known from Mizoram, distribution of the species and key to the identification of genera and species known from Mizoram have also been incorporated. The collection and presentation methods for the tick specimens and general morphology of ixodid ticks have also been dealt here in brief. The specimens studied by the present authors are deposited in the National Zoological Collection.

Table 1. : Distribution of Ixodid ticks in different districts of Mizoram.

Name of the species	Aizawl	Chimtuipui	Lunglai	Champhai
Amblyomma testudinarium	+	–	–	+
Boophilus microplus	+	–	+	+
Dermacentor auratus	+	+	–	–
Haemaphysalis aborensis	+	–	–	–
H. anomala	–	–	–	+
H. birmaniae	–	+	–	–
H. bispinosa	+	+	–	–
H. india	+	–	–	–
H. nepalensis	–	+	–	–
Hyalomma kumari	+	–	–	–
Ixodes ovatus	–	–	–	+
Rhipicephalus haemaphysaloides	+	+	+	–

MATERIAL AND METHODS

The ixodid ticks were collected by "Hand picking" and "Flag-dragging" methods. The details have been given in Sanyal and De (1992).

GENERAL MORPHOLOGY AND TERMINOLOGY

The body of ixodid ticks is divided into capitulum or "false head", dorsum and venter. For details of morphological features please consult Sanyal and De (1992).

SYSTEMATIC ACCOUNT
LIST OF TAXA KNOWN

Family IXODIDAE

1. Genus ***Amblyomma*** Koch

1. ***A. testudinarium*** Koch

2. Genus ***Boophilus*** Curtice

2. ***B. microplus*** (Canestrini)

3. Genus ***Dermacentor*** Koch

3. ***D. auratus*** Supino

4. Genus ***Haemaphysalis*** Koch

4. ***H. aborensis*** Warburton
5. ***H. anomala*** Warburton
6. ***H. birmaniae*** Supino
7. ***H. bispinosa*** Neumann
8. ***H. indica*** Warburton
9. ***H. nepalensis*** Hoogstraal

5. Genus ***Hyalomma*** Koch

10. ***H. kumari*** Sharif

6. Genus ***Ixodes*** Latreille

11. ***I. ovatus*** Neumann

7. Genus ***Rhipicephalus*** Koch

12. ***R. haemaphysaloides*** Supino

Key to the genera of IXODID TICKS
Males

1. Anal groove curving anus anteriorly; eyes absent ..... ***Ixodes***
– Anal groove curving anus posteriorly or absent; eyes present or absent 2
2. Eyes present 3
– Eyes absent 7

3. Capitulum long with long narrow palps 4
- Capitulum short with short broad palps 5

4. Ventral shields present in male; scutum usually inornate ..... ***Hyalomma***
- Ventral shields absent in male; scutum usually ornate ..... ***Amblyomma***

5. Basis capitulum rectangular dorsally ..... ***Dermacentor***
- Basis capitulum hexagonal dorsally 6

6. Spiracular plate round or oval; anal groove and festoons absent ..... ***Boophilus***
- Spiracular plate comma-shaped or sub-triangular; anal groove and festoons present ..... ***Rhipicephalus***

7. Palps short, conical; palpal segment 2 salient laterally beyond width of basis capitulum .... ***Haemaphysalis***

Females

1. Anal groove curving anus anteriorly; eyes absent ..... ***Ixodes***
- Anal groove curving anus posteriorly or absent;

2. Eyes present or absent 2
- Anal groove absent; festoons absent ..... ***Boophilus***
- Anal groove curving anus posteriorly; festoons present 3

3. Eyes present 4
- Eyes absent 7

4. Basis capitulum hexagonal or subrectangular; inornate species 5
- Basis capitulum rectangular; ornate species ..... ***Dermacentor***

5. Basis capitulum hexagonal; capitulum short, palps broad ..... ***Rhipicephalus***
- Basis capitulum subrectangular; capitulum long; palps narrow 6

6. Scutum inornate; palpal segment 2 at least twice as long as segment 3 ..... ***Hyalomma***
- Scutum ornate; palpal segment 2 less than twice as long as segment 3 ..... ***Amblyomma***

7. Capitulum short, with lateral salience on palpal article II; blade-like dorsal retroverted spur on trochanter I ..... ***Haemaphysalis***

1. Genus *Amblyomma* Koch

1844. *Amblyomma* Koch, *Arch. Naturgesch*, **10**(1) : 223-231.

1. *Amblyomma testudinarium* Koch

1844. *Amblyomma testudinarium* Koch, *Arch. Naturgesch*, **10**(1) : 226.

1926. *Amblyomma testudinarium*, Rabinson, *Ticks–Mongr., Ixodoidea*, pt-4 (Cambridge Univ. Press) : 257.

1928. *Amblyomma testudinarium*, Sharif, *Rec. Indian Mus.*, **30**(3) : 330.

Diagnosis : Male – Scutum with ornamentation with dark-brown markings on pale ground; falciform stripe large and thick; deep punctations; coxa I with two unequal stout spurs; dentition 4/4.

Female – Scutum triangular with narrow posterior part, ground colour yellowish, punctations numerous; moderately large porose areas; dentition 4/4; coxa I with moderately stout spurs.

Material examined : Aizawl district : 5 nymphs, Teirei, from forest floor, 21.iii.1994, coll. S. K. De. Chimpuitui district : 1 male, Ngengpui, host unknown, 3.iv.1997, coll. S. S. Saha; 6 nymphs, Sowoa, host unknown, 1.iv.1997, coll. S. S. Saha.

Host : Vegetation.

Distribution : India : Mizoram (Aizawl, Chintuipui), Arunachal Pradesh, Assam, Karnataka, Maharashtra, Orissa, Sikkim, West Bengal.

Elsewhere : Bangladesh, Indonesia, Japan, Malaysia, Myanmar, Philippines, Sri Lanka.

Remark : The species is reported for the first time from Mizoram.

2. Genus ***Boophilus*** Curtice

1891. *Boophilus* Curtice, *Journ. Compar. Med. Veter, Arch.*, **12** : 313.

2. ***Boophilus microplus*** (Canestrini)

1887. *Haemaphysalis micropla* Canestrini, *Atti. Soc. Veneto. Trent. Sci. Nat.*, **11** : 104

1890. *Rhipicephalus micropla* Canestrini, Padova, **4** : 493.

1899. *Rhipicephalus australis* Fuller, *Qd. Agric. J.*, **4**(5) : 389-394.

1901. *Boophilus australis* Stiles and Hassal, *Bur. Anim. Ind. U.S. Dept. Agric.*, Washington, D.C. Circ No. **34** : 2-3.

1928. *Boophilus australis*, Sharif, *Rec. Indian Mus.*, **30** (3) : 284-289.

1943. *Boophilus microplus*, Fairchild, *Am. J. Trop. Med.*, **23**(6) : 586.

1956. *Boophilus microplus*, Hoogstraal, *African Ixodoidęa*, **1** : 295-296, 319-320.

1979. *Boophilus microplus*, Miranpuri and Lahkar, *Indian J. Parasit.*, **3**(1) : 57-59.

Diagnosis : Male – Scutum quite hirsute; caudal appendage short, tapering; dentition 4/4; inner margin of basal palpal segment ventrally concave.

Female – Coxa I with deep, inverted 'V'-shaped cleft, inner margin of basal palpal segment ventrally short, deeply concave; dentition 4/4.

Material examined : Lunglai district : 6 females, Lunglai, host unknown, 19.ix.1993, coll. A. R. Lahiri. Champhai district : 1 male, Champhai town, from cow, 13.x.1995, coll. A. K. Sanyal; 1 male, Kalkang, 25 kms south of Champhai, from vegetation, 14.x.1995, coll. A. K. Sanyal.

Hosts : Cow, vegetation.

Distribution : India : Mizoram (Aizawl, Lunglai, Champhai), A & N Islands, Assam, Bihar, Gujarat, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Madhya Pradesh, Meghalaya, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Africa, Australia, Central America, Formosa, Indonesia, Japan, Myanmar, New Guinea, Philippines, South America, Sri Lanka.

Remark : This is the second record of the species from the state. It was first reported from Mizoram by Miranpuri and Lahkar (1979).

3. Genus ***Dermacentor*** Koch

1844. *Dermacentor* Koch, *Arch. Naturgesch*, **10** (1) : 235.

3. ***Dermacentor auratus*** Supino

1897. *Dermacentor auratus* Supino, *Atti. Soc. Veneto. Trent. Sci : Nat.*, **3**(2) : 235.

1928. *Dermacentor auratus*, Sharif, *Rec. Indian Mus.*, **30**(3) : 292.

Diagnosis : Male – Capitulum rectangular, dorsally ornate; palpi large, longer than basis; ventral ridge distinct; dentition 3/3; scutum with variable brown base colour markings in the form of lines; variable brown smaller patches in lateral field; cervical grooves deep, short; all festoons ornate.

Female – Capitulum rectangular, dorsally weakly ornate; palpi longer in comparison to male, palpal article I bears three long curved palpal; dentition 3/3; scutum with brown markings arranged as a longitudinal median strip, all markings devoid of punctations; cervical grooves deep; thick white hairs arise from many large punctations; white hairs separating festoons.

Material examined : Chimtuipui district : 12 nymphs, Siachangh, Bualpui, from barking deer, 17.i.1987, coll. H.C. Ghosh. Aizawal district : 1 nymph, Teirei, Dampa forest, from goat, 21.iii.1994, coll. S.K. De; 1 female, Tuirial, near Aizawl town, from vegetation, 11.x.1995, coll. A.K. Sanyal.

Hosts : Barking deer, goat, vegetation.

Distribution : India : Mizoram (Chimtuipui, Aizawl), A & N Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Meghalaya, Orissa, Uttar Pradesh, West Bengal.

Elesewhere : Indonesia, Myanmar, Sri Lanka.

Remark : Miranpuri and Lahkar (1979) reported the genus Dermacentor collected from wild pig from Aizawl. The species is reported here for the first time from Mizoram.

3. Genus *Haemaphysalis* Koch

1844. *Haemaphysalis* Koch, *Arch. Naturgesch*, **10**(1) : 217-239.

Key to the species of *Haemaphysalis*

Male

1. Palps salient laterally 2
– Palps minutely or not salient laterally 3
2. Coxa IV with small spur ..... *indica* Warburton
– Coxa IV with double, scissor-like, elongated spur ..... *anomala* Warburton
3. Palpal segment 3 with dorsal spur ..... *bispinosa* Neumann
– Palpal segment 3 without dorsal spur 4
4. Hypostome 4/4 5
– Hypostome 5/5 ..... *aborensis* Warburton
5. Coxa I with minute ridge like spur ..... *birmaniae* Supino
– Coxa I with minute ridge like spur ..... *nepalensis* Hoogstraal

Female

1. Palps salient laterally 2
– Palps minutely or not salient laterally 3
2. Palpal segment 3 without dorsal spur but posterior border may protrude ..... *indica* Warburton
– Palpal segment 3 with small dorsal spur ..... *anomala* Warburton
3. Genital operculum elongate, posterior margin rounded ..... *bispinosa* Neumaann
– Genital operculum not elongate, posterior margin not rounded 4
4. Genital operculum broadly rectangular ..... *birmaniae* Supino
– Genital operculum not rectangular 5
5. Genital operculum 'U'-shaped or 'V'-shaped ..... *aborensis* Warburton
– Genital operculum oval with median posterior notch ..... *nepalensis* Hoogstraal

4. *Haemaphysalis aborensis* Warburton

1913. *Haemaphysalis aborensis* Warburton, *Parasitology*, **6** : 121-123.

Diagnosis : Male – Palpi compact, palpal segment I with short pedicle; ventral spur broadly triangular; length of coxal spurs subequal; spur I peg-like, spur II to IV elongately triangular; dentition 4/4.

Female – Palpi compact, palpal segment I with pedicle relatively elongate; dentition 4/4; posterior margon of scutum rounded; cervical pits narrowly elongate; spur I peg-like; spurs II to IV short and triangular.

Material examined : Aizawl district : 1 nymph, Teirei, Dampa forest, from *Tupaia glis*, 27.xii.1993, coll. S.S. Saha; 2 nymphs, Teirei, Dampa forest, from vegetation, 21.ii.1994, coll. S.K. De.

Hosts : *Tupaia glis*, vegetation.

Distribution : India : Mizoram (Aizawl), Arunachal Pradesh, Assam, Meghalaya, West Bental.

Elsewhere : Laos, Mayanmar, Nepal, Thailand, Vietnam.

Remark :.The species is reported for the first time from Mizoram.

5. *Haemaphysalis anomala* Warburton

1913. *Haemaphysalis anomala* Warburton, *Parasitology*, **6**: 128.

1967. *Haemaphysalis anomala*, Hoogstraal and Rack, *J. Med. Ent.*, **4** : 287.

Diagnosis : Male – Basis capituli 1-8 times as long as wide, cornua triangular, pointed; palpi widely salient, segment 2 with posterodorsal margins crenulate, segment 3 lacking dorsal spur, ventral spur pointed sharply; scutum pyriform, 1.5 times as long as wide, lateral grooves long; punctations small, numerous; coxa I with elongate needle-like spur, II and III each with short, widely triangular spur, IV with double spurs, elongate and scissor-like.

Female – Basis capituli 2 times as wide as long, cornua .triangular, pointed, porose areas

elongately ovoid; palpi widely salient, 1.4 times as long as wide, segment 2 with posterodorsal margins crenulate, segment 3 with small median dorsal spur, ventral spur sharply pointed; dentition 4/4; scutum 1.1 times as long as wide; cervical grooves narrow, deep; punctations small, numerous; coxa I with elongate needle-like spur; coxae II to IV each with a short spur.

Material examined : Champhai district : 1 female, Champhai town, from cow, 13.x.1995, coll. A. K. Sanyal.

Host : Cow.

Distribution : India : Mizoram (Champhai), Bihar, Meghalaya, Uttar Pradesh.

Elsewhere : Cambodia, Nepal, Sri Lanka, Thailand, Vietnam.

Remark : The species is reported for the first time from Mizoram.

6. ***Haemaphysalis birmaniae*** Supino

1897. *Haemaphysalis birmaniae* Supino, *Atti. Soc. Veneto. Trent. Sci. Nat., Padova*, **2,5,3**(1) : 251.

1928. *Haemaphysalis birmaniae,* Nuttall and Warburton, *Ticks*, part 3, 415.

Diagnosis : Male – Scutum broadly rounded; cervical pits small; cervical and lateral grooves obsolete; palpi compact, segment 2 longer than segment 3, elongately triangular ventral spur on segment 3; dentition 4/4; coxal spur lanceolate; broadly triangular spur on coxae II and IV.

Female – Scutum as broad as long, margins gradually rounded; cervical grooves short; punctations few, small; palpi as in male except segment 2 which is as long as broad; dentition 4/4.

Material examined : Chimtuipui district : 2 females, 38 males, Vawnbukh, host unknown, 23.i.1987, coll. H. C. Ghosh.

Host : Unknown.

Distribution : India : Mizoram (Chimtuipui), Arunachal Pradesh, Assam, Uttar Pradesh, West Bengal.

Elsewhere : Myanmar, Nepal.

Remark : The species is reported for the first time from Mizoram.

7. ***Haemaphysalis bispinosa*** Neumann

1897. *Haemaphysalis bispinosa* Neumann, *Mem. Soc. Zool. France*, **10** : 341.

1915. *Haemaphysalis bispinosa*, Nutall and Warburton, *Ticks*, part 3 : 426.

1928. *Haemaphysalis bispinosa*, Sharif, *Rec. Indian Mus.*, **30**(3) : 255.

1966. *Haemaphysalis (Kaiseriona) bispinosa*, Hoogstraal and Trapido, *J. Parasit*, **52** : 1188.

1979. *Haemaphysalis bispinosa*, Miranpuri and Lahkar, *Indian J. Parasit.*, **3**(1) : 57-59.

Diagnosis : Male – Scutum elongate-oval in shape; cervical grooves with convergent depressions; lateral grooves long, well marked, ending behind spiracles; festoons twice as long as broad; palps slightly salient, segment 2 and 3 subequal, segment 3 bluntly conical and bears a prominent dorsal retrograde spur in the mid-dorsal line and a similar but larger ventral spur; dentition 4/4; a moderate sharp spur on coxa I; a very light protuburance on coxae II and IV.

Female – Scutum sub-cordiform, punctations little larger than male; basis capituli broader; cornua short; porose areas oval; palpi as in male.

Material examined : Chimtuipui district : 1 female, 3 nymphs, Bualpui, host unknown, 10.i.1987, coll. H.C. Ghosh. Aizawl district : 12 females, 8 males, 7 nymphs, Aibawk, from goat, 18.iii.1994, coll. S.K. De; 4 females, 1 nymph, Teirei, Dampa forest, from pig, 23.iii.1994, coll. S.K. De; 2 females, Teirei, Dampa forest, from dog, 23.iii.1994, coll. S.K. De; 3 females, Teirei, Dampa forest, from buffalo, 23.iii.1994, coll. S.K. De.

Hosts : Goat, pig, dog, buffalo.

Distribution : India : Mizoram (Chimtuipui, Aizawl), A & N Island, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pubjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Australia, China, New Zealand, Pakistan, Sri Lanka, Thailand.

Remark : The species is recorded for the second time from the state of Mizoram. It was first recorded from the state by Miranpuri and Lahkar (1979).

8. ***Haemaphysalis indica*** Warburton

1910. *Haemaphysalis indica* Warburton, *Parasitology*, **3** : 395.

Diagnosis : Male – Scutum 1.5 to 1.7 times as long as broad; posterior margin of basis capituli with short cornua, broadly triangular; palpi broadly salient, segment 2 approximately 2 times as broad as long; coxae each with broadly triangular spur.

Female – The females differ fron the male only in sexual characters. Other characters are more or less similar to male.

Material examined : Aizawl district : 5 nymphs, Teirei, Dampa forest, from *Tupaia glis*, 27.xii.1993, coll. S. S. Saha.

Host : *Tupaia glis.*

Distribution : India : Mizoram (Aizawl), Bihar, Gujarat, Karnataka, Orissa, Uttar Pradesh, West Bengal.

Elsewhere : Nepal, Pakistan, Sri Lanka.

Remark : The species is reported for the first time from Mizoram.

9. ***Haemaphysalis nepalenis*** Hoogstraal

1962. *Haemaphysalis nepalenis* Hoogstraal, *J. Parasit*, **48** : 195-203.

Diagnosis : Male – Basis capituli dorsally 1.5 times as wide as long, cornua widely triangular; lateral grooves very short; cervical grooves short-deep, comma-shaped; punctations fine, small, numerous; genital apron situated between coxae 2, fairly large; legs long, robust.

Female – Basis capituli with straight lateral and posterior margins, twice as wide as long (including cornua); scutum subcircular, porose areas deep, triangular, palpi dorsally with segment 1 visible, segment 2 with basal margins curved, segments 2 and 3 with parallel inner and lateral margins, only 2 setae on the internal margin of segment 2 ventrally, cervical grooves narow, shallow, convergent to scutal mid length; punctations small, numerous; genital apron forming a short, transverse oval with median notch posteriorly; legs like male; coxae each with a very small, triangular spur arising near postero-internal juncture.

Material examined : Chimtuipui district : 1 female, Vawnbukh, host unknown, 23.i.1987, coll. H. C. Ghosh.

Host : Unknown.

Distribution : India : Mizoram (Chimtuipui), Arunachal Pradesh.

Elsewhere : Nepal.

Remark : The species is reported for the first time from Mizoram.

5. Genus ***Hyalomma*** Koch

1844. *Hyalomma* Koch, *Arch. Naturgesch.*, **10** (1) : 220.

10. ***Hyalomma kumari*** Sharif

1928. *Hyalomma kumari* Sharif, *Rec. Indian Mus.*, **30**(3) : 319.

1979. *Hyalomma kumari*, Miranpuri and Lahkar, *Indian J. Parasit.*, **3**(1) : 57-59.

Diagnosis : Male – Basis capituli narrow dorsally, ventrally with anterior lateral projection; scutum pale yellowish to light brown; punctations shallow, medium sized; adanal shields large, broadly rectangular; subanal shields lacking; lateral grooves ill defined; legs yellowish-brown.

Female – Scutum sub-cordiform, somewhat longer than wide; long cervical grooves containing large punctations; dentition 3/3; operculum longitudinally oval and slightly bulging in profile; legs like male.

Host : Goat.

Distribution : India : Mizoram (Aizawl), Assam, Bihar, Delhi, Himachal Pradesh, Kerala, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh.

Elsewhere : Pakistan.

Remark : The species was first reported from the state by Miranpuri and Lahkar (1979). No other report is known.

6. Genus ***Ixodes*** Latreille

1795. *Ixodes* Latreille, *Mag. Encyl. J. Sci. Lett. Arts.*, **4** : 15-20.

11. ***Ixodes ovatus*** Neumann

1899. *Ixodes ovatus* Neumann, *Mem. Soc. Zool. France*, **12** : 116.

Diagnosis : Male – Auriculae absent; dentition 4/4; hypostome not biloped; palpi pointed apically; coxa 1 with slight internal spur, III and IV each with internal spur, lacking membranous expansion; syncoxae present on I and II.

Female – Basis capituli with well developed cornua, porose areas round; coxa I with a short, blunt internal spur; spur absent in coxa II.

Material examined : Champhai district : 1 female, Champhai town, from cattle, 13.x.1995, coll. A. K. Sanyal.

Host : Cattle.

Distribution : India : Mizoram (Champhai), Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttar Pradesh, West Bengal.

Elsewhere : China, Formosa, Japan, Myanmar, Nepal, Taiwan, Thailand.

Remark : The species is reported for the first time from Mizoram.

7. Genus ***Rhipicephalus*** Koch

1844. *Rhipicephalus* Koch, *Acrh. Naturgesch*, **10**(1) : 238.

12. ***Rhipicephalus haemaphysaloides*** Supino

1897. *Rhipicephalus haemaphysaloides* Supino, *Atti. Soc. Veneto. Trent. Sci. Nat.*, **3**(1) : 234.

1928. *Rhipicephalus haemaphysaloides*, Sharif, *Rec. Indian Mus.*, **30**(3) : 280.

1971. *Rhipicephalus haemaphysaloides*, Hoogstraal, Saito, Dhanda and Bhat, *J. Parasit.*, **57**(1) : 182.

1979. *Rhipicephalus haemaphyasaloides*, Miranpuri and Lahkar, *Indian J. Parasit.*, **3**(1) : 57-59.

Diagnosis : Male – Cervical grooves short converging pits; lateral grooves narrow, deep; few punctations of longer and smaller types; basis capituli twice as broad as long; palpi longer than broad; adanal shields sickle-shaped; spiracle comma-shaped; dentition 3/3.

Female – Cervical grooves deep shallow; punctations few, large, finer one hardly visible; spiracle subtriangular with a large mecula; cornua short; blunt palpi twice as long as broad.

Material examined : Aizawl district : 2 females, 2 males, Teirei, Dampa forest, from buffalo, 22.iii.1994, coll. S.K. De. 1 male Pukpui, from vegetation, 10.iv.1994, coll. S.K. Ghosh. Chimtuipui district : 3 females, 2 males, Kawn Kawn village, from vegetation, 4.iv.1994, coll. S.K. Ghosh.

Hosts : Buffalo, dog, vegetation.

Distribution : India : Mizoram (Aizawl, Lunglai, Chimtuipui), Arunachal Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : China, Indonesia, Myanmar, Sri Lanka, Taiwan, Thailand, Vietnam.

Remark : The species was first reported from Mizoram by Miranpuri and Lahkar (1979). This is second report of the species from the state.

SUMMARY

The paper deals with the ixodid tick fauna of Mizoram. Altogether 12 species under 7 genera hitherto known from Mizoram have been recorded. Of these, 2 genera *viz.*, *Amblyomma* and *Ixodes* and 8 species have been reported for the first time from the state. The first and important references, diagnostic features, distribution and hosts of tick species in Mizoram and key to the identification of genera and species have also been incorporated.

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FISHES

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INTRODUCTION

Down at the southern most tip of North-Eastern India, Mizoram thrusts like a promontory between Bangladesh and Myanmar. It was just a part of Assam till 1972 and known as Lushai Hills district. To day it is a new state of Indian Republic bounded clockwise and from the north by Assam, Manipur, Myanmar, Bangladesh and Tripura. There are six to seven parallel ranges of hills from north to south tending to be higher in the middle of the territory. These are steep and riven with deep gorges at the bottom of which the silver rivers glint and sparkle. The mountains are densely wooded with bamboo and wild banana with scattered Mizo villages.

The fish fauna of Mizoram consists of Assamese, endemic and Burmese elements. The Assamese elements are observed in the northern and north-western part while Burmese elements are observed in the eastern and southern part. Further, endemic elements are found in the central part.

No comprehensive work has so far been done on the fish fauna of Mizoram. Sen (1977) recorded 9 species under 7 genera and 2 families out of 33 examples collected by two survey parties led by Dr. T. G. Vazirani (1960) and Shri K. R. Rao (1976). Barman (1988) recorded the King fish, *Semiplotus modestus* Day 1870 (Pisces : Cyprinidae) for the first time from India (Mizoram). Barman (1989) further recorded 17 species comprising 73 examples belonging to 14 genera. 8 families and 5 orders from Teirei river and its tributaries in Mizoram, collected by Dr. S. Biswas (1984).

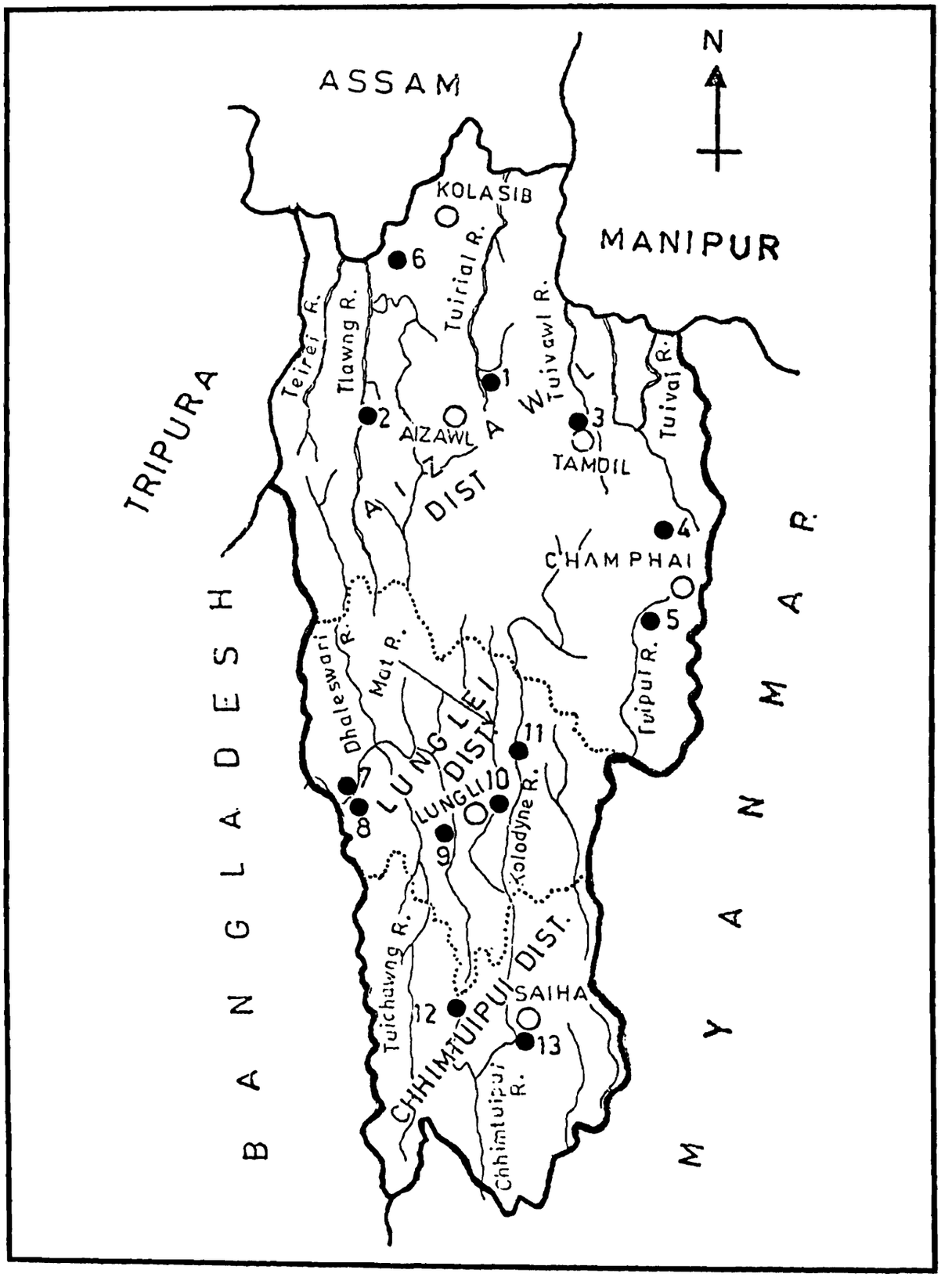
The present work includes a large number of fish collections recently made from extensive field surveys (Shri S. S. Saha and party 1993, Dr. A. K. Karmakar and party 1994 & 1996 and Shri S. Chattopadhyaya and party 1997) by Zoological Survey of India Survey parties. During the preparation of this faunal work, we have also made use of all the earlier informations available in the literature in addition to the study of fish material both in the field and in the laboratory.

The present systematic account of the fishes of Mizoram includes 8 orders 20 families 49 genera and 89 species of which 24 species under 17 genera are recorded for the first time from Mizoram. In addition, 3 species under 3 genera are recorded for the first time from India.

An attempt has been made in this present study to provide an upto date classification, nomenclature, details of material studied, size-ranges, distributionsal pattern, fishery information along with a species identification key under each genera. A detailed map of Mizoram showing drainage system and collecting stations has also been included.

ABBREVIATION USED

(1) A.K.K. - A. K. Karmakar
(2) S.C. S. Chattopadhyaya
(3) S.S.S. S. S. Saha



Map of Mizoram showing drainage pattern and collecting Stations.

1. Tuirial river site, 27 kms north-east of Aizawl; 2. Tlawng (Dhaleswari) river site in and around Sairang, 30 kms west of Aizawl; 3. Tamdil lake, 87 kms east of Aizawl; 4. Tiau river site, 20 kms north of Champai; 5. Tuipui river site, 25 kms south of Champai; 6. Kolasib fish market, 90 kms north of Aizawl; 7. Karnaphuli river at Dimagiri (Tlabung) 95 kms west of Lunglei; 8. Fish farm at Tlabung, 96 kms west of Lunglei; 9. Phairuanglui river at Phairuanglui, 30 kms west of Lunglei; 10. Nat river, 25 kms east of Lunglei; 11. Kolodyne river at Tuipui, 60 kms north-east of Lunglei; 12. Kawrawng Lui (river) near Ngengpui; 13. Ngenpui river at Sowoa.

SYSTEMATIC LIST OF FISHES

Class PISCES
Sub-class TELEOSTOMI
Order CLUPEIFORMES
Family ENGRAULIDAE

1. ***Setipinna phasa*** (Hamilton-Buchanan)

Family CLUPEIDAE

2. ***Gudusia chapra*** (Hamilton-Buchanan)

Order OSTEOGLOSSIFORMES
Family NOTOPTERIDAE

3. ***Notopterus chitala*** (Hamilton-Buchanan)**
4. ***Notopterus notopterus*** (Pallas)**

Order CYPRINIFORMES
Family CYPRINIDAE
Sub-family CULTRINAE

5. ***Chela cachius*** (Hamilton-Buchanan)
6. ***Salmostoma bacaila*** (Hamilton-Buchanan)
7. ***S. phulo phulo*** (Hamilton-Buchanan)
8. ***S. sardinella*** (Valenciennes)
9. ***S. sladoni*** (Day)++

Sub-family RASBORINAE

10. ***Amblypharyngodon mola*** (Hamilton-Buchanan)
11. ***Barilius barila*** (Hamilton-Buchanan)*
12. ***B. barna*** (Hamilton-Buchanan)
13. ***B. bendelisis*** (Hamilton-Buchanan)
14. ***B. dogarsinghi*** Hora+
15. ***B. shacra*** (Hamilton-Buchanan)
16. ***B. vagra*** (Hamilton-Buchanan)
17. ***Brachydanio rerio*** (Hamilton-Buchanan)
18. ***B. Shanensis*** (Hora)++
19. ***Danio aequipinnatus*** (McClelland)
20. ***D. dangila*** (Hamilton-Buchanan)+
21. ***D. naganensis*** Chaudhuri+
22. ***Esomus danricus*** (Hamilton-Buchanan)
23. ***Rasbora daniconius*** (Hamilton-Buchanan)
24. ***R. rasbora*** (Hamilton-Buchanan)+

Sub-family CYPRININAE

25. ***Catla catla*** (Hamilton-Buchanan)**
26. ***Cirrhinus mrigala*** (Hamilton-Buchanan)**
27. ***C. reba*** (Hamilton-Buchanan)
28. ***Cyprinus carpio*** var. ***communis*** Linnaeus**
29. ***Labeo calbasu*** (Hamilton-Buchanan)
30. ***L. gonius*** (Hamilton-Buchanan)**
31. ***L. rohita*** (Hamilton-Buchanan)**
32. ***Neolissochilus hexagonolepis*** (McClelland)*
33. ***Osteobrama cotio cotio*** (Hamilton-Buchanan)+
34. ***O. cotio cunma*** (Day)+
35. ***Puntius chola*** (Hamilton-Buchanan)
36. ***P. conchonius*** (Hamilton-Buchanan)
37. ***P. shalynius*** Yazdani & Talukdar+
38. ***P. sophore*** (Hamilton-Buchanan)**
39. ***P. ticto ticto*** (Hamilton-Buchanan)
40. ***Semiplotus modestus*** (Day)*
41. ***S. semiplotus*** (McClelland)*
42. ***Tor mosal*** (Hamilton-Buchanan)
43. ***T. putitora*** (Hamilton-Buchanan)

Sub-family GARRINAE

44. ***Crossocheilus latius latius*** (Hamilton-Buchanan)
45. ***Garra annandalei*** Hora+
46. ***G. gotyla gotyla*** (Gray)
47. ***G. lamta*** (Hamilton-Buchanan)*
48. ***G. lissorhynchus*** (McClelland)+
49. ***G. naganensis*** Hora+
50. ***G. nasuta*** (McClelland)+

Family PSILORHYNCHIDAE

51. ***Psilorhynchus sucatio*** (Hamilton-Buchanan)

Family HOMALOPTERIDAE
Sub-family HOMALOPTERINAE

52. ***Balitora brucei*** Gray+

Sub-family NOEMACHEILINAE

53. ***Noemacheilus botia*** (Hamilton-Buchanan)
54. ***N. corica*** (Hamilton-Buchanan)

55. ***N. kanjupkhulensis*** Hora[+]
56. ***N. repecola*** (McClelland)[*]
57. ***N. savona*** (Hamilton-Buchanan)[+]

Family COBITIDAE

Sub-family BOTIINAE

58. ***Botia dario*** (Hamilton-Buchanan)[*]

Sub-family COBITINAE

59. ***Lepidocephalus berdmorei*** (Blyth)[+]
60. ***L. guntea*** (Hamilton-Buchanan)[*]

Order SILURIFORMES

Family BAGRIDAE

61. ***Aorichthys aor*** (Hamilton-Buchanan)
62. ***Mystus bleekeri*** (Day)
63. ***M. cavasius*** (Hamilton-Buchanan)

Family HETEROPNEUSTIDAE

64. ***Heteropneustes fossilis*** (Hamilton-Buchanan)[**]

Family SCHILBEIDAE

65. ***Ailia coila*** (Hamilton-Buchanan)
66. ***A. punctata*** (Day)[+]
67. ***Clupisoma montana*** Hora[+]
68. ***Eutropiichthys vacha*** (Hamilton-Buchanan)[+]

Family SILURIDAE

69. ***Ompok bimaculatus*** (Bloch)[**]
70. ***O. pabo*** (Hamilton-Buchanan)
71. ***Wallago attu*** (Schneider)[**]

Family SISORIDAE

72. ***Conta conta*** (Hamilton-Buchanan)[+]
73. ***Gagata cenia*** (Hamilton-Buchanan)[+]
74. ***Glyptothorax cavia*** (Hamilton-Buchanan)[+]
75. ***G. striatus*** (McClelland)[+]
76. ***Pseudecheneis sulcatus*** (McClelland)[*]
77. ***Pseudolaguvia tuberculatus*** (Prashad & Mukherji)[++]

Family OLYRIDAE

78. ***Olyra longicaudata*** McClelland[+]

Order ATHERINIFORMES

Family BELONIDAE

79. ***Xenentodon cancila*** (Hamilton-Buchanan)

Family CYPRINODONTIDAE

80. ***Aplocheilus panchax*** (Hamilton-Buchanan)

Order CHANNIFORMES

Family CHANNIDAE

81. ***Channa orientalis*** Bloch & Schneider
82. ***C. punctatus*** (Bloch)
83. ***C. stewartii*** (Playfair)[+]

Order PERCIFORMES

Family CHANDIDAE

84. ***Chanda nama*** (Hamilton-Buchanan)
85. ***C. ranga*** (Hamilton-Buchanan)

Family NANDIDAE

86. ***Badis badis*** (Hamilton-Buchanan)

Family GOBIIDAE

87. ***Awaous stamineus*** (Valenciennes)
88. ***Glossogobius giuris*** (Hamilton-Buchanan)

Order MASTACEMBELIFORMES

Family MASTACEMBELIDAE

89. ***Mastacembelus armatus*** (Lacepede)

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[*] Listed from literature

[**] Observed in the field, but not collected due to huge size/smoked dried condition.

[+] Recorded for the first time from Mizoram.

[++] Recorded for the first time from India.

SYSTEMATIC ACCOUNT

Class PISCES

Sub-class TELEOSTOMI

Order CLUPEIFORMES

Family ENGRAULIDAE

Genus ***Setipinna*** Swainson, 1839

1839. *Setipinna* Swainson, *Nat. Hist. Anim.*, **2** : 292 (Type-species, *Setipinna megalura* Swainson, *Clupea phasa* Hamilton).

Body elongate, laterally compressed and tapering posteriorly. abdomen serrated, with 15-23 pre-pelvic and 6-12 post-pelvic scutes. Head small, compresed; snout obtuse. Mouth sub-inferior, cleft wide, extending beyond posterior margin of eye. Eyes in anterior part of the head, not visible from ventral surface. Upper pectoral ray prolonged. A free spine present before dorsal fin. Anal fin very long with 48-78 scales. Lateral line absent.

Setipinna phasa (Hamilton-Buchanan)

1822. *Clupea plasa* Hamilton-Buchanan, *Fishes of Ganges*: 240, 382 (Type-locality : brackish rivers of Bengal).

1973. *Setipinna phasa* Whitehead, *J. mar. biol. Ass. India*, **14**(1) : 288, fig. 62.

Material examined : 1 ex., 175 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Ganga river system and Orissa.

Fishery Information : Its large size (28 cm SL) makes it an alternative food-fish. It breeds possibly throughout the year, but with peak in October-November in the Hooghly estuary or March to May in the Ganga at Allahabad (Whitehead *et. al.*, 1988).

Family CLUPEIDAE

Genus ***Gudusia*** Fowler, 1911

1911. *Gudusia* Fowler, *Proc. Acad. nat. Sci. Philad.*, **63** : 207 (Type-species : *Clupanodon chapra* Hamilton-Buchanan).

Body deep and strongly compressed with a keel of scutes along belly. Head small, high and compressed. Mouth slightly upturned, cleft not extending to orbit. Eyes large, lateral, situated in anterior part of head, not visible from ventral surface. Dorsal fin inserted above pelvic origin. Scales small. 75-95 in lateral series. Lateral line absent.

Gudusia chapra (Hamilton-Buchanan)

1822. *Clupanodon chapra* Hamilton-Buchanan, *Fishes of Ganges* : 248, 383 (Type-locality : Ganges river in northern Bihar).

1985. *Gudusia chapra* Whitehead, *FAO Fish. Synop.*, (125) 7(1) : 228, fig.

Material examined : (i) 2 exs., 118-123 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India and Bangladesh affluent to the Bay of Bengal. Also inhabits rivers.

Fishery Information : Contributes to riverine artisanal fisheries. It attains 15 cm in standard length.

Order CYPRINIFORMES

Family CYPRINIDAE

Sub-family CULTRINAE

Genus ***Chela*** Hamilton-Buchanan, 1822

1822. *Chela* Hamilton-Buchanan, *Fishes of Ganges* : 258, 383 (Type-species : *Cyprinus* (*Chela*) *cachius* Hamilton-Buchanan).

Body elongate, strongly compressed, with cutting abdominal edge. Mouth directed obliquely upward, cleft extending to below anterior margin of the eye. Symphysial knob absent on the lower jaw. Dorsal fin with 9 to 11, anal fin with 17 to 25 rays. Outer ray of pelvic fin elongated. Lateral line curved downwards, with 34 to 68 scales.

Chela cachius (Hamilton-Buchanan)

1822. *Cyprinus* (*Chela*) *cachius* Hamilton-Buchanan, *Fishes of Ganges* : 259, 384 (Type-locality : Ganga river about commencement of delta).

1991. *Chela cachius* Talwar and Jhingran, *Inland Fishes of India and adjacent Countries* : 313-314, fig. 111.

Material examined : (i) 2 exs., 130-145 mm, Mat river, 25 kms east of Lunglei, dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India; Pakistan; Bangladesh and Myanmar.

Fishery Information : It attains to a size of about 70 mm and due to its beautiful colouration it is used as an ornamental fish in the aquaria.

Genus *Salmostoma* Swainson, 1839

1839. *Salmostoma* Swainson. *The natural history of fishes*, **2** : 184 (Type-species : *Cyprinus bacaila* Hamilton-Buchanan).

Body elongate and laterally compressed. Abdomen keeled below pectoral fin to vent, keel not hardened. Mouth oblique, its cleft extending to anterior margin of eye or slightly beyond. Lower jaw often with a symphysial knob. Dorsal fin short with 9 to 10 and anal fin with 14 to 20 rays. Lateral line gently curved downward above pectoral fin with 38 to 112 scales.

Key to the species of genus *Salmostoma*

1. Lateral line scales above 70. 2
– Lateral line scales below 70. 3
2. Anal fin with 11 to 13 branched rays. .... *S. bacaila*
– Anal fin with 16 to 18 branched rays. ....*S. phulo phulo*
3. Lateral line with 47-52 scales. Symphysial knob on lower jaw quite rudimentary. .... *S. sardinella*
– Lateral line with 61-64 scales. Symphysial knob on lower jaw normal. .....*S. sladoni*

Salmostoma bacaila (Hamilton-Buchanan)

1822. *Cyprinus bacaila* Hamilton-Buchanan, *Fishes of Ganges* : 265, 384, pl. 8. fig. 76 (Type-locality : freshwater rivers of Gangetic provinces).

1991. *Salmostoma bacaila* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 321-322. fig. 115.

Material examined : (i) 2 exs., 125-135 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : northern India (Ganga-Brahmaputra drainages) to the Mahanadi drainage (Orissa); Bangladesh; Nepal.

Fishery information : It attains a size of about 180 mm and is of little interest to fisheries. It is surface feeder and regarded as a useful larvivorous fish.

Salmostoma phulo phulo (Hamilton-Buchanan)

1822. *Cyprinus phulo* Hamilton-Buchanan, *Fishes of Ganges* : 262, 384 (Type-locality : North-eastern parts of Bengal).

1968. *Salmostoma phulo phulo* Banarescu : *Rev. roum. Biol. (zool.).* **13**(1) : 5, fig. 2.

Material examined: (i) 1 ex., 81 mm, Fish farm at Tlabung, 96 kms west of Lunglei, dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (ii) 1 ex., 72 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (iii) 2 exs., 77-90 mm, Phairuanglui river at Phairuanglui, 30 kms west of Lunglei, dist. Lunglei, Coll. A.K.K. & party, 7.iv.1996.

Distribution : India : Gangetic and Brahmaputra drainages and Bangladesh.

Fishery information : It attains a length of 120 mm and is of no interest to fisheries.

Salmostoma sardinella (Valenciennes)

1842. *Leuciscus sardinella* Valenciennes, *Hist. nat. Poiss.* **17** : 344 (Type-locality : Rangoon, Burma).

1991. *Salmostoma sardinella* : Talwar and Jhingran. *Inland fishes of India and Adjacent Countries* : 327.

Material examined : (i) 3 exs., 84-120 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Ganga-Brahmaputra drainage and Orissa; Bangladesh; Myanmar : Pegu; Rangoon and Moulmein.

Fishery information : This fish attains a length of about 15 cm; of no interest to fisheries.

Salmostoma sladoni (Day)

1869. *Chela sladoni* Day, *Proc. zool. Soc. Lond.* : 622 (Type-locality : Irrawaddi river, Burma).

1968. *Salmostoma sladoni* Banarescu, *Rev. roum. Biol. (zool.)*, **13**(1) : 19. fig. 15.

Material examined : (i) 1 ex., 86 mm, Kolodyne river at Tuipui, 60 kms north east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : Myanmar : Irawaddi drainage. New record from India : Mizoram.

Fishery information : This fish attains a length of 12 cm; of no interest to fisheries.

Sub-family RASBORINAE

Genus ***Amblypharyngodon*** Bleeker, 1860

1860. *Amblypharyngodon* Bleeker, *Natuark. Tijdechr. Med. India*, **20** : 433 (Type-species : *Cyprinus mola* Hamilton-Buchanan).

Body rather elongate and somewhat compressed. Abdomen rounded. Mouth some what superior. Upper lip absent. No barbels. Dorsal fin very short, inserted slightly behind pelvic fin base, with 7 branched rays. Anal fin short, with 5 to 6 branched rays. Lateral line incomplete. 55 to 75 scales in lateral series.

Amblypharyngodon mola (Hamilton-Buchanan)

1822. *Cyprinus mola* Hamilton-Buchanan, *Fishes of Ganges* : 334, 392, pl. 30, fig. 92 (Type-locality : ponds and river of Gangetic provinces).

1991. *Amblypharyngodon mola* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 338.

Material examined : (i) 5 exs., 72-78 mm, Tamdil Lake, 92 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 18.iii.1994 (ii) 29 exs., 42-75 mm, Fish farm at Tlabung, 96 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (iii) 2 exs., 36-58 mm, Karnaphuli river at Dimagiri (Tlabung). 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (iv) 8 exs., 50-76 mm, Serlui river (purchased from market), Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xii.1993.

Distribution : India : throughout the country; Bangladesh; Myanmar; Pakistan.

Fishery information : It attains a length of 100 mm and used as a food fish in some areas specially Eastern India.

Genus ***Barilius*** Hamilton-Buchanan

1822. *Barilus* Hamilton-Buchanan. *Fishes of Ganges* : 266, 384 (Type-species : Cyprinus barila Hamilton-Buchanan).

Body more or less elongated, laterally compressed, with rounded abdomen. Mouth moderate and terminal; maxilla extends to below or slightly beyond anterior margin of eye. Barbels 1 or 2 pairs or absent. Dorsal fin inserted opposite interspace between pelvic and anal fin. Dorsal fin with 9 to 13 and anal fin with 9 to 17 rays. Lateral line concave and complete with 38 to 75 scales. Body usually with dark spots or bands.

Key to the species of genus *Barilius*

1. Barbels present. 2
– Barbels absent. Body with 7-9 vertical bars. ..... *B. barna*
2. Barbels 4. 3
– Barbels 2. 4
3. Lateral line scales 60-70. 12 vertical bars. .. .. *B. shacra*
– Lateral line scales 40-44. 5
4. Lateral line scales 38-39. ..... *B. dogarsinghi*
– Lateral line scales 43-46. ..... *B. barila*
5. Anal fin short with 9-11 rays, each scales with black spot. ..... *B. bendelisis*
– Anal fin long with 13-15 rays, 10 vertical bars. ..... *B. vagra*

Barilius barna (Hamilton-Buchanan)

1822. *Cyprinus (Barilius) barna* Hamilton-Buchanan, *Fishes of Ganges* : 268, 384 (Type-locality : Jamuna river and Brahmaputra river).

1991. *Barilius barna* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 344-345.

Material examined : (i) 2 exs., 34-70 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994 (ii) 6 exs., 35-65 mm, Phairuanglui river at Phairuanglui, 30 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 7.iv.1996 (iii) 2 exs., 103-104 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996. (iv) 1 ex., 58 mm, Nagengpui river, Dist. Chhimtuipui, Coll. S.C. and party, 29.iii.1997.

Distribution : India : Ganga and Brahmaputra river system, Mahanadi; Nepal; Bangladesh; Myanmar.

Fishery information : It attains a length of 80 mm and is of no interest to fisheries.

Barilius bendelisis (Hamilton-Buchanan)

1807. *Cyprinus bendelisis* Hamilton-Buchanan, *Journey in Mysore*, **3** : 345, pl. 32 (Type-locality : Vedawati stream, headwaters of Krishna river near Heriuru, Mysore).

1991. *Barilius bendelisis* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 346-347.

Material examined : (i) 25 exs., 36-93 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 18.iii.1994 (ii) 5 exs., 60-85 mm, Kolasib fish market (Tlwang/Dhaleswari river collection). Kolasib, Dist. Aizawl, Coll. A.K.K. & party, 26.iii.1994 (iii) 4 exs., 85-106 mm, Turial river, 27 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994 (iv) 4 exs., 52-98 mm, Tiau river, 25 kms east of Champai, Aizawl dist., Coll. A.K.K. & party, 21.iii.1994 (v) 7 exs., 27-70 mm, Kolodyne river at Tuipui, 60 kms north east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996 (vi) 1 ex., 128 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India; Pakistan; Nepal; Bangladesh and Sri Lanka.

Fishery information : It attains a length of 160 mm, is one of the principal commercial hill stream fishes.

Barilius dogarsinghi Hora

1921. *Barilius dogarsinghi* Hora, *Rec. Indian Mus.*, **22**(1) : 191, fig. 3 (Type-locality : near Chanderkhong, Manipur).

1991. *Barilius dogarsinghi* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 348.

Material examined : 4 exs., 47-52 mm, Kolodyne river at Tuipui, 60 kms north east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India : Manipur, Mizoram (New record).

Fishery information : It attains a length of about 85 mm, is of no interest to fisheries.

Barilius shacra (Hamilton-Buchanan)

1822. *Cyprinus (Barilius) shacra* Hamilton-Buchanan, *Fishes of Ganges* : 271, 385 (Type-locality : Kosi river, Uttar Pradesh).

1991. *Barilius shacra* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 351.

Material examined : 8 exs., 55-80 mm. Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : Ganga, Yamuna and Brahmaputra drainages; Bangladesh and Nepal.

Fishery Information : This species attains a length of 12.5 cm, is of no interest to fisheries.

Barilius vagra (Hamilton-Buchanan)

1822. *Cyprinus (Barilius) vagra* Hamilton-Buchanan, *Fishes of Ganges* : 269, 385 (Type-locality : Ganges river at Patna).

1991. *Barilius vagra* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 253.

Material examined : 3 exs., 90-92 mm, Turial river, 27 kms east of Aizawl, dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994.

Distribution : India : Himalayan and Sub-Himalayan rivers; Afghanistan; Pakistan; Nepal; Bangladesh and Sri Lanka.

Fishery information : It attains a length 130 mm and is of no interest to fisheries. However, the colour of the fish in living condition with

beautiful combination of different shades, is very attractive.

Genus *Danio* Hamilton-Buchanan, 1822

1822. *Danio* Hamilton-Buchanan, *Fishes of Ganges* : 321, 390 (Type-species : *Cyprinus dangila* Hamilton-Buchanan).

Body more or less elongate and compressed. Mouth anterior, small and directed obliquely upwards. Lower jaw with a symphysial knob. Maxilla extends upto anterior margin of the eye. Barbels 2 pairs, one pair or absent. Dorsal fin with 6 to 17 and anal fin with 11-20 rays. Caudal fin emerginate, lunate or forked. Lateral line complete, incomplete or absent; with 32 to 65 scales.

Key to the species of genus *Danio*

1. Lateral colour bands breaking up anteriorly to form a mottled pattern. Both pair of barbels much longer than eye diameter. ..... *D. dangila*
- Lateral colour bands not breaking up anteriorly to form a mottled pattern. 2
2. Several well marked and uniform lateral bands, lateral line scales 34-36. .... *D. aequipinnatus*
- A single lateral band well marked posteriorly. Lateral line scales 38-40. ..... *D. naganensis*

Danio aequipinnatus (McClelland)

1839. *Perilampus aequipinnatus* McClelland, *Asiat. Res.*, **19**(2) : 393, pl. 60, fig. 1 (Type-locality : Assam).

1991. *Danio aequipinnatus* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 364-365, fig. 128.

Material examined : (i) 3 exs., 85-90 mm, Turial river, 27 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994 (ii) 1 ex., 87 mm, Tiau river, 25 kms east of Champhai, Dist. Aizawl, Coll. A.K.K. & party, 21.iii.1994 (iii) 1 ex., 55 mm, Kawrawng Lui (River); Ngenpui, Dist. Chhimtuipui, Coll. S.C. & party, 1.iv.1997 (iv) 6 exs., 70-82 mm, Serlui river (purchased from market), Kolasib, dist. Aizawl, Coll. S.S.S. & party, 31.12.1993.

Distribution : India : throughout; Nepal; Sri Lanka; Bangladesh; Myanmar and Thailand.

Fishery information : It attains a length of about 150 mm and is widely distributed beautiful fish. This also proves to be peaceful and hardy aquarium fish.

Danio dangila (Hamilton-Buchanan)

1822. *Cyprinus dangila* Hamilton-Buchanan, *Fishes of Ganges* : 321, 390 (Type-locality : mountain streams of Mongher, Bihar).

1991. *Danio dangila* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 366-367.

Material examined : 7 exs., 65-81 mm, Serlui river (purchased from market), Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xii.1993.

Distribution : India : Assam, Meghalaya, Arunachal Pradesh, Manipur, West Bengal, Bihar, Madhya Pradesh, Uttar Pradesh, Mizoram (new record); Bangladesh; Nepal and Myanmar.

Fishery information : It attains a length of about 15 cm. It is a beautiful fish, however, of no interest to fisheries.

Remarks : Among *Danio* this species has the longest pairs of barbels and hence it can easily be separated from other species.

Danio naganensis Chaudhuri

1912. *Danio naganensis* Chaudhuri, *Rec. Indian Mus.*, 7 : 441, pl. 40, fig. 1, 1a & 1b (Type-locality : Lungting river, Naga Hills, Nagaland).

1991. *Danio naganensis* : Talwar and Jhingran, Inland *Fishes of India and Adjacent Countries* : 371.

Material examined : 3 exs., 40-85 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl. Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : Manipur, Nagaland, Mizoram (new record).

Fishery information : This fish attains a length of about 45 mm, is of no interest to fisheries.

Genus ***Brachydanio*** Weber & de Beaufort

1916. *Brachydanio* Weber and de Beaufort, *Fishes Indo-Australian Archipelago.* **3** : 85 (Type-species : *Nuria albolineata* Blyth).

Body elongate and strongly compressed. Mouth small, directed obliquely upwards. Lower jaw with symphysial knob, fitting with a corresponding emargination of the upper jaw. Barbels one or two pairs, or entirely absent. Dorsal fin short, inserted anterior to origin of anal fin with six or seven branched rays. Anal fin with 9 to 14 branched rays. Caudal fin emarginate, lunate or forked. Lateral line in complete or entirely absent.

Key to the species of genus *Brachydanio*

1. Lateral line complete or extending beyond anal fin. 34 scales on the lateral line. .... *B. shanensis*
- Lateral line short, not extending beyond pectoral fin. 28-30 scales on the lateral line. ..... *B. rerio*

Brachydanio shanensis (Hora)

1928. *Danio (Brachydanio) shanensis* Hora, *Rec. Indian Mus.*, **30** : 38, fig. 1 (Type-locality : Namkhan, Kutaki, Lashio and Hsipaw, Northern Shan states, Burma).

1991. *Brachydanio shanensis* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 361. fig. 126.

Material examined : 1 ex., 72 mm, Ngengpui river, Dist. Chhimtuipui, Coll. S.C. & party, 3.iv.1997.

Distribution : Myanmar : Salween drainage; probably Thailand. New record from India : Mizoram.

Fishery information : This fish is common in small ponds and rice fields. It attains a length of about 7-7.5 cm and is of no interest to fisheries.

Genus ***Esomus*** Swainson, 1839

1839. *Esomus* Swainson, *The natural history of fishes*, **2** : 185, 285 (Type-species : *Esomus vittatus* Swainson = *Cyprinus danrica* Hamilton-Buchanan).

Body elongate and slender, strongly compressed. Mouth small, upwardly directed. Symphysial knob on lower jaw absent. Barbels 2 pairs, maxillary barbels very long extending upto anal fin. Dorsal fin inserted almost above anal fin, with 6 branched rays; anal with 5 branched rays. Lateral line when present, strongly arched anteriorly and passes through the lower half of caudal peduncle, with 27 to 34 scales.

Esomus danricus (Hamilton-Buchanan)

1822. *Cyprinus danrica* Hamilton-Buchanan, *Fishes of Ganges* : 325, 390, pl. 16. fig. 88 (Type-locality : ponds and ditches of Bengal).

1991. *Esomus danricus* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 377-378, fig. 139.

Material examined : (i) 8 exs., 58-61 mm, fish farm at Tlabung, 96 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (ii) 16 exs., 45-60 mm, Serlui river (purchased from market), Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xii.1993.

Distribution : India : throughout; Pakistan; Nepal and probably also Sri Lanka and Myanmar.

Fishery information : It attains a length of about 120 mm, surface feeder, very active, equipped with exceptionally wide pectoral fins and is an accomplished jumper.

Genus ***Rasbora*** Bleeker, 1860

1860. *Rasbora* Bleeker, *Acta. Soc. Sci. Indo-Neerl.*, **7** : 435 (Type-species : *Cyprinus rasbora* Hamilton-Buchanan).

Body elongate, moderately deep and laterally compressed. Mouth upwardly directed with a projecting lower jaw. Lower jaw with a symphysial knob. Barbels usually absent. Dorsal fin inserted opposite interspace between pelvic and anal fin, with 9 to 10 soft rays, no spine. Anal fin with 7 to 8 rays. Lateral line concave, complete, 25 to 37 scales in longtudinal series.

Key to the species of genus *Rasbora*

1. Lateral line with 32 to 34 scales. A black lateral stripe along centre of body. ..... *R. daniconius*
– Lateral line with 28 to 31 scales. Caudal fin with well defined blackish hind border. .... *R. rasbora*

Rasbora daniconius (Hamilton-Buchanan)

1822. *Cyprinus daniconius* Hamilton-Buchanan, *fishes of Ganges* : 327, 391. pl. 15, fig. 89 (Type-locality : rivers of southern Bengal).

1981. *Rasbora daniconius daniconius* : Jayaram. *The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka* : 84, fig. 43.

Material examined : (i) 2 exs., 62-71 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (ii) 3 exs., 72-80 mm, Phairuanglui river at Phairuanglui, 30 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 7.iv.1996 (iii) 1 ex., 90 mm, Kowrawng Lui (river), Ngengpui, Dist. Chhimtuipui, Coll. S.C. & party, 5.iv.1997 (iv) 2 exs., 63-67 mm, Ngengpui river, Dist. Chhimtuipui, Coll. S.C. & party, 29.iii.1997 (v) 23 exs., 32-96 mm., Serlui river (purchased from market), Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xii.1993.

Distribution : India : throughout; Pakistan; Sri Lanka; Bangladesh; Myanmar and Mekong.

Fishery information : It attains a length of about 100 mm and is hardy and active; not important from fisheries point of view.

Rasbora rasbora (Hamilton-Buchanan)

1822. *Cyprinus rasbora* Hamilton-Buchanan. *Fishes of Ganges* : 329, 391. pl. 2, fig. 90 (Type-locality : ponds of Bengal).

1991. *Rasbora rasbora* : Talwar and Jhingran. *Inland Fishes of India and Adjacent Countries* : 390, fig. 139.

Material examined : 1 ex., 63 mm. Fish farm at Tlabung, 96 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Gangetic provinces, Assam, Manipur, Mizoram (new record); Pakistan; Bangladesh; Myanmar and Thailand.

Fishery information : This species attains a length of about 130 mm and because of its beauty and hardness, it has established itself as an aquarium fish.

Sub-family CYPRININAE

Genus ***Cirrhinus*** Cuvier, 1817

1817. *Cirrhinus* Oken, *Isis.* : 1823 (on *Les Cirrhinus* Cuvier, 1817. *Regne Animale*, **2** : 193) (Type-species : *Cyprinus cirrhosus* Bloch).

Body elongate, abdomen rounded, snout depressed, often with pores. Mouth wide, lower jaw with a small symphysial knob. Upper lip not continuous with lower lip around corners of mouth. Barbels one or two pairs or absent. Dorsal fin inserted anterior to pelvic fins, with 10 to 19 rays, the last simple ray non-osseous and non-serrated. anal fin with 7 to 8 rays. Lateral line complete with 35 to 45 scales.

Key to the species of genus *Cirrhinus*

1. Dorsal fin with 8 branched rays. Lateral line scales 35-38. ..... *C. reba*
– Dorsal fin with 12-13 branched rays. Lateral line scales 40-45. ..... *C. mrigala*

Cirrhinus reba (Hamilton-Buchanan)

1822. *Cyprinus reba* Hamilton-Buchanan, *Fishes of Ganges* : 280, 386 (Type-locality : rivers and ponds of Bengal and Bihar).

1991. *Cirrhinus reba* : Talwar and Jhingran, *Inland fishes of India and Adjacent Countries* : 173-174.

Material examined : (i) 1 ex. 230 mm. Tamdil Lake, 92 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 18.iii.1994 (ii) 2 exs., 143-183 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : Pakistan : Indus Plain and adjoining hilly areas; India; Nepal; Bangladesh.

Fishery information : It attains a length of about 30 cm in natural waters. Cultivated in ponds in India. A plankton and detritus feeder. It breeds in flooded shallows during June-September.

Genus *Labeo* Cuvier, 1817

1817. *Labeo* Cuvier, *Regne. animale*, **2** (ed. 1) : 194 (Type-species : *Cyprinus niloticus* Forsskal = *Cyprinus rufescens* Hasselquist).

Body cylindrical, elongate, abdomen rounded. Generally overhanging mouth, inferior, transverse and semicircular. Snout broadly rounded or obtusely pointed. Lips thick, covering the jaws, continuous at the angle of mouth. Barbels one or two pairs, or absent; when single pair, always maxillary. Dorsal fin inserted anterior to pelvic fins, with 11 to 26 rays, devoid of spines. Anal fin short with 7 to 8 rays. Lateral line complete, with 36 to 86 scales.

Key to the species of genus *Labeo*

1. Lateral line scales more than 50 (50-85). .. 2
– Lateral line scales less than 50 (38-47)..... 3
2. Lateral line scales 71-84. Scales between lateral line and pelvic fin base 9-13. .... *L. gonius*
3. Lateral line scales 40-42. Branched dorsal rays 12-13. ..... *L. rohita*
– Lateral line scales 40-46. Branched dorsal rays 14-16. ..... *L. calbasu*

Labeo calbasu (Hamilton-Buchanan)

1822. *Cyprinus calbasu* Hamilton-Buchanan, *Fishes of Ganges* : 297, 387. pl. 2, fig. 33 (Type-locality : rivers and ponds of Bengal and in the western provinces).

1991. *Labeo calbasu* Talwar and Jhingran : *Inland Fishes of India and Adjacent Countries* : 203-204.

Material examined : 1 ex., 120 mm, Karnaphuli river at Dimagiri (Tlabung) 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India; Pakistan; Bangladesh; Myanmar; Thailand and South China.

Fishery information : It attains a length of about 90 cm. It is one of the major Indian carps and an important food fish. It thrives better in ponds and lakes than in running waters. It is cultivated alongwith other species, an bottom feeder and does not normally breed in ponds.

Genus ***Osteobrama*** Heckel, 1842

1842. *Osteobrama* Heckel, in *Busseggers Reisen in Europa, Asien and Africa*, etc. 1(1) : 1033 (Type-species : *Cyprinus cotio* Hamilton-Buchanan).

Body deep and strongly compressed. Abdominal edge sharp and trenchant entirely or only from pelvic fin base to vent. Mouth small, somewhat directed upwards. Upper jaw slightly longer. Barbels 2 pairs. 1 pair or absent. Dorsal fin inserted considerably behind pelvic fin, with 11 to 12 soft rays and a strong serrated spine. anal fin with 14 to 36 rays. Lateral line complete with 42 to 80 scales.

Key to the species of genus *Osteobrama*

1. Anal fin with more than 20 branched rays. abdominal edge keeled between pelvic and anal fins. 2
2. Lateral line scales 42 to 58. Predorsal scales 18 to 24. Scales between lateral line and pelvic fin 7½ to 9½. ..... *O. cotio cotio*
– Lateral line scales 57 to 70. Pre-dorsal scales 24 to 28. Scales between lateral line and pelvic fin 10½ to 13. ..... *O. cotio cunma*

Osteobrama cotio cotio (Hamilton-Buchanan)

1822. *Cyprinus cotio* Hamilton-Buchanan, *Fishes of Ganges* : 339, 393. pl. 39, fig. 93 (Type-locality : ponds and ditches of Bengal).

1991. *Osteobrama cotio cotio* : Talwar and Jhingran, *Inland Fishes of India and Adjacent countries* : 228-239.

Material examined : 4 exs., 74-95 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Assam, West Bengal, Bihar, Manipur, Madhya Pradesh, Uttar Pradesh, Punjab, Mizoram (new record); Pakistan and Bangladesh.

Fishery information : It attains a length of about 150 mm and is of no interest to fisheries.

Osteobrama cotio cunma (Day)

1878. *Rohtee cotio* (*nec* Hamilton-Buchanan) Day (partim). *Fishes of India* : 587. pl. 147. fig. 2.

1991. *Rohtee cotio cunma* : Talwar and Jhingran. *Inland Fishes of India and Adjacent Countries* : 239-240, fig. 82.

Material examined : 6 exs., 45-80 mm, Karnaphuli river at dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Manipur valley, Mizoram (new record); Myanmar.

Fishery information : It is the commonest form of *Osteobrama* in Myanmar. It attains a length of about 150 mm and is of no interest to fisheries.

Genus *Puntius* Hamilton-Buchanan

1822. *Puntius* Hamilton-Buchanan. *Fishes of Ganges* : 310, 388 (Type-species : *Cyprinus sophore* Hamilton-Buchanan).

Body short or moderately elongate, often deep and slightly compressed. Abdomen rounded. Mouth terminal to inferior; lips thin, devoid of horny covering. Symphysial knob or tubercle absent. Barbels 2 pairs. 1 pair or absent. dorsal fin short, inserted nearly opposite to pelvic fins with 9 to 13 rays and with or without spine. Spine serrated or non-serrated. Anal fin with 7 to 9 rays. Lateral line complete or incomplete, with 20 to 47 scales in longitudinal series.

Key to the species of genus *Puntius*

1. Barbels present. One pair of barbel. Pre-dorsal scales 10-12. A dark bloch from 23rd to 25th scales of the lateral line. A dark spot along base of 1st to 4th anterior dorsal ray. ..... *P. chola*
- Barbels absent. 2
2. Dorsal spine smooth. Body depth 3.5 to 3.75 in total length. A round black bloch at the root of the caudal fin. ..... *P. sophore*
- Dorsal spine serrated. 3
3. Branched ray in dorsal fin 7-6 or 7 rows of trnasverse scales. A horizontal blue line on body and two spots on tail. ..... *P. shalynius*
- Branched ray in dorsal fin 8. About two rows of transverse scales. No band on body. 4
4. Body depth 2.4 in total length. Predorsal scales 9. Lateral line incomplete. One black spot. ..... *P. conchonius*
- Body depth 3 to 3.5 in total length. Pre-dorsal scales 11. Lateral line incomplete. Two black spots. ..... *P. ticto*

Puntius chola (Hamilton-Buchanan)

1822. *Cyprinus chola* Hamilton-Buchanan, *Fishes of Ganges* : 289, 321 (Type-locality : north eastern parts of Bengal).

1991. *Puntius chola* : Jayaram. Revision of the genus *Puntius* Hamilton from the Indian Region. *Rec. zool. Surv. India, Occ. Paper No.* **135** : 52-56.

Material examined : 1 ex., 80 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : throughout; Pakistan; Nepal; Bangladesh; Myanmar and Sri Lanka.

Fishery information : It attains a length of about 120 mm and is of only little interest to fisheries.

Puntius conchonius (Hamilton-Buchanan)

1822. *Cyprinus conchonius* Hamilton-Buchanan, *Fishes of Ganges*, pp. 317, 389 (Type-locality : ponds of north east Bengal : Kosi river and Ami river).

1991. *Puntius conchonius* : Jayaram, Revision of the genus *Puntius* Hamilton from the Indian Region. *Rec. zool. Surv. India, Occ. Paper No.* **135** : 27-29.

Material examined : (i) 4 exs., 34-55 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (ii) 1 ex., 74 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996 (iii) 13 exs., 13-20 mm, Ngengpui river, Dist. Chhimtuipui, Coll. S.C. & party, 5.iv.1997.

Distribution : India : Ganga, Brahmaputra, Mahanadi and Cauvery river system; Pakistan; Nepal and Bangladesh.

Fishery information : It attains a length of about 100 mm. This is a very beautiful aquarium fish and one of the most important ornamental *Puntius* species.

Puntius shalynius Yazdani & Talukdar

1975. *Puntius shalynius* Yazdani and Talukdar, *J. Bombay nat. Hist. Soc.*, **72**(1) : 218, fig. (Type-locality : Barapani lake near Shillong, Meghalaya).

1991. *Puntius shalynius* : Jayaram, Revision of the genus *Puntius* Hamilton from the Indian region. *Rec. zool. Surv. India, Occ. Paper No.* **135** : 30-32.

Material examined : (i) 2 exs., 45-50 mm, Fish farm at Tlabung, 96 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996 (ii) 1 ex., 55 mm, Kawrawng Lui (River), Ngenpui, Dist. Chhimtuipui, Coll. S.C. & party. 31.iii.1997.

Distribution : India : Meghalaya, Assam, Manipur, Mizoram (new record).

Fishery information : It attains a length of about 70 mm; is one of the common *Puntius* species in the Khasi hill-stream and is of minor fishery value.

Puntius ticto ticto (Hamilton-Buchanan)

1822. *Cyprinus ticto* Hamilton-Buchanan, *Fishes of Ganges* : 314, 398, pl. 8, fig. 87 (Type-locality : south eastern parts of Bengal).

1991. *Puntius ticto* : Jayaram, Revision of the genus *Puntius* Hamilton-Buchanan from the Indian region. *Rec. zool. Surv. India, Occ. Paper No.* **135** : 22-26.

Material examined : (i) 29 exs., 24-67 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994 (ii) 7 exs., 40-60 mm, Kolasib fish market (Dhaleswari river collection), Kolasib, Dist. Aizawl, Coll. A.K.K. & party, 26.iii.1994 (iii) 13 exs., 65-75 mm, Tuirial river, 27 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994 (iv) 1 ex., 50 mm, Phairuanglui river at Phairuanglui, 30 kms west of Lunglei, Coll. A.K.K. & party, 7.iv.1996 (v) 1 ex., 73 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India : throughout; Pakistan; Nepal; Sri Lanka; Bangladesh; Myanmar and Thailand.

Fishery information : It attains a length of about 100 mm, a popular barb in the aquaria.

Genus ***Tor*** Gray, 1834

1834. *Tor* Gray, *Illustrations of Indian Zoology*, **2** : 196 (Type-species : *Cyprinus tor* Hamilton-Buchanan).

Body elongate, deep anteriorly, the trunk and peduncle smoothly tapered. Head small, with a prominent snout. Mouth varying from inferior to subinferior. Upper jaw often protractile. Lips thick and well developed, lower lip with a distinctive medium fleshy lobe below mandibular symphysis. Barbels 2 pairs and well developed. Dorsal fin inserted opposite to pelvic fins, with 12 to 13 rays and a strong smooth spine. Anal fin with 7 to 8 rays. Lateral line complete, with 22 to 37 scales.

Key to the species of genus *Tor*

1. Length of head considerably greater than body depth; lower fin yellowish. ..... *T. putitora*
– Length of head equal to or shorter than body depth; dorsal profile more arched than ventral. ..... *T. mosal*

Tor mosal (Hamilton-Buchanan)

1822. *Cyprinus mosal* Hamilton-Buchanan, *Fishes of Ganges* : 306, 388 (Type-locality : Kosi river, Uttar Pradesh).

1982. *Tor mosal* : Tilak and Sharma, *Game Fishes of India and Angling* : 45, fig. 7.

Material examined : 4 exs., 75-90 mm, Turial river, 27 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994.

Distribution : India : rivers of the Himalaya and Myanmar.

Fishery information : It grows to a weight of about 11 kg. This fish is fairly common in the Ramganga river (Uttar Pradesh).

Tor putitora (Hamilton-Buchanan)

1822. *Cyprinus putitora* Hamilton-Buchanan, *Fishes of Ganges* : 203, 388 (Type-locality : eastern parts of Bengal).

1982. *Tor putitora* : Tilak and Sharma, *Game Fishes of India and Angling* : 39, figs. 4, 5 & 6.

Material examined : 2 exs., 56-68 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : All along the Himalayas including Kashmir, U.P., Punjab, Haryana, Darjeeling dist. of West Bengal, Assam, Western Himalayas and Eastern Himalayas; Nepal; Pakistan; Bangladesh and Afghanistan.

Fishery information : It attains a length of about 270 cm. It is the most common mahaseer of the Himalaya. It has afforded lucrative source of sports for the anglers since long, with excellent food value.

Sub-family GARRINAE

Genus *Crossocheilus Kuhl* et Van Hasselt, 1823

1823. *Crossocheilus Kuhl* et Van Hasselt, *Algemeine Konst. en Letter Bode*, 2(35) : 132 (Type-species : *Crossocheilus oblongus* Kuhl et Van Hasselt).

Body moderately elongate with rounded abdomen. Head rather small, snout obtusely rounded. Mouth inferior; upper lip well developed, lower lip fleshy. Usually 1 pair of rostral barbel. Dorsal fin inserted in advance of pelvic fins. with 10 to 11 soft rays and without a spine. Anal fin with 7 rays. Lateral line complete, with 33 to 46 scales.

Key to species of genus *Crossocheilus*

1. Head length more than 5 times (5.1 to 5.2) in standard length. Lateral line scales 37 to 42. ..... *C. latius*
- Head length less than 5 times (4.3 to 5.0) in standard length. Lateral line scales 35. ..... *C. burmanicus*

Crossocheilus latius latius (Hamilton-Buchanan)

1822. *Cyprinus latius* Hamilton-Buchanan, *Fishes of Ganges* : 345, 393 (Type-locality : Tista river at base of Darjeeling Himalaya).

1991. *Crossocheilus latius latius* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 416.

Material examined : 6 exs., 82-97 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : The Ganga and Brahmaputra in northern India; Mahanadi in Orissa; Western Ghats, head waters of Krishna river.

Fishery information : This species attains a length of about 12.5 cm; of little interest to fisheries.

Genus *Garra* Hamilton-Buchanan, 1822

1822. *Garra* Hamilton-Buchanan, *Fishes of Ganges* : 343. 393 (Type-species : *Cyprinus lamta* Hamilton-Buchanan).

Body elongate and subcylindrical. Under surface of the head and body flattened. Mouth inferior, transverse and semicircular; a suctorial disc present on chin. A proboscis may be present. Barbels 1 to 2 pairs or entirely absent. Dorsal fin inserted in advance of pelvic fins, with 9 to 12 rays and no spine. Paired fins horizontally placed. Anal fin with 6 to 8 rays. Lateral line complete, with 32 to 40 scales.

Key to the species of genus *Garra*

1. Proboscis present. 2
- Proboscis absent. 3
2. Probosis trilobed, 2 pairs of barbels present. ..... *G. nasuta*
- Proboscis single projection; well developed with well defined lateral tubercular area. ..... *G. gotyla gotyla*
3. Lateral line scales 34 or fewer. 4
- Lateral line scales 38-40. vent placed nearer to origin of pelvic fins than to anal fin. ..... *G. naganensis*

4. Tip of the snout marked off by a deep transverse groove. Distance of vent from anal fin base more than 4 times in inter-distance between pelvic fin origin and anal fin base. ..... *G. lamta*

– Tip of the snout not marked off by a deep transverse groove. 5

5. Dorsal and caudal fins without any marking. ..... *G. anandalei*

– Dorsal fin with a light black bar across and caudal fin with broad W-shaped bands. .... *G. lissorhynchus*

Garra annandalei Hora

1877. *Discognathus lamta* (*nec* Hamilton-Buchanan) Day (partim) *Fishes of India* : 527.

1921. *Garra annandalei* Hora, *Rec. Indian Mus.*, **22**(5) : 657 (Type-locality : Mahananda river, below Darjeeling).

Material examined : (i) 5 exs. 42-74 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994 (ii) 2 exs., 92-96 mm, Turial river, 27 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994.

Distribution : India : Northern Bengal, Bihar, Assam, Mizoram (new record); Eastern Nepal, Kosi drainage and Bangladesh.

Fishery information : It attains a length of about 23 cm and is of no interest to fisheries.

Garra gotyla gotyla (Gray)

1832. *Cyprinus gotyla* Gray, *Illustr. Indian Zool.* **1** : pl. 88. figs. 3, 3a (Type-locality : Northern India).

1964. *Garra gotyla gotyla* Menon, *Mem. Indian Mus.*, **14**(4) : 233. pl. 13. figs. 1-4.

Material examined : 1 ex., 127 mm, Phairuanglui river at Phairuanglui, 30 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 7.iv.1996.

Distribution : India : all along Himalayas, Chhota Nagpur Plateau and Vindhya-Satpura mountains of Peninsular India; Bangladesh, Upper Myanmar.

Fishery information : It attains a length of about 14 cm, of minor interest to fisheries. It is found in streams and lakes of Himalaya and is highly valued as food fish.

Garra lissorhynchus (McClelland)

1843. *Platycara lissorhynchus* McClelland, Calcutta *J. nat. Hist.*, **2** : 587, pl. 68, figs. (Type-locality : Khasi Hills, Meghalaya).

1991. *Garra lissorhynchus* : Talwar and Jhingran. *Inland Fishes of India and Adjacent Countries* : 427-428, fig. 150.

Material examined : 1 ex., 99 mm, Tiau river, 25 kms east of Champhai, Dist. Aizawl, Coll. A.K.K. & party, 21.iii.1994.

Distribution : India : Brahmaputra river system, Assam Himalaya, Mizoram (new record).

Fishery information : This species attains a length of about 10 cm and is of no interest to fisheries.

Garra naganensis Hora

1921. *Garra naganensis* Hora, *Rec. Indian Mus.*, **22**(5) : 667, pl. 25, figs. 2, 2a (Type-locality : near Kairong, Naga Hills, Nagaland).

1991. *Garra naganensis* : Talwar and Jhingran, *Inland fishes of India and Adjacent Countries* : 430.

Material examined : 2 exs., 140-150 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India : Naga Hills, Nagaland, Manipur, Mizoram (new record).

Fishery information : It attains a length of about 15 cm and is of no interest to fisheries.

Garra nasuta (McClelland)

1839. *Platycara nasuta* McClelland, *J. Asiat. Soc. Beng.*, **7**(2) : 947, pl. 55, figs. 2, 2a, 2b (Type-locality : Khasi Hills, Meghalaya).

1991. *Garra nasuta* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 430-431.

Material examined : (i) 1 ex., 72 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party,

16.iii.1994 (ii) 3 exs., 77-130 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India : Assam, Meghalaya, Arunachal Pradesh, Miaoram (new record); Myanmar, South China and Vietnam.

Fishery information : It attains a length of about 13 cm and is of no interest to fisheries.

Family PSILORHYNCHIDAE

Genus ***Psilorhynchus*** McClelland, 1839

1839. *Psilorynchus* McClelland, *Asiat. Res.*, **19** : 300, 428 (Type-species : *Cyprinus sucatio* Hamilton-Buchanan).

Mouth small, transverse and vertical; jaws with horny edges, lips fleshy; no barbel. Narrow gill-opening. Pharyngeal bone with one row of teeth, 4 in number. Dorsal fin with 10 to 12 rays in which 7 to 9 are branched. Anal fin with 5 branched rays. Lateral line complete.

Psilorhynchus sucatio (Hamilton-Buchanan)

1822. *Cyprinus sucatio* Hamilton-Buchanan, *Fishes of Ganges* : 347, 393 (Type-locality : rivers of Northern Bengal).

1991. *Psilorhynchus sucatio* : Talwar & Jhingran, *Inland Fishes of India and Adjacent Countries* : 442-443, fig. 155.

Material examined : 3 exs., 50-68 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : Eastern Himalayas, Ganga rivers system in Uttar Pradesh and Bihar and Bangladesh.

Fishery information : This species attains a length of about 7 cm; and of no interest to fisheries.

Family HOMALOPTERIDAE

Sub-family HOMALOPTERINAE

Genus ***Balitora*** Gray, 1830

1830. *Balitora* Gray, *Illustrations of Indian Zoology*. **1** pl. 88, fig. 1 (Type-species : *Bolitora brucei* Gray).

Body much depressed, head and abdomen flattened. Eyes very small, on dorsal side of the head, not visible from ventral side. Mouth inferior, arched, both jaws covered with horny sheaths. Both lips with one or two rows of papillae. Rostral barbel two pairs, arranged in single row; one maxillary at corner of mouth. Gill opening extending to ventral side of head. Paired fins broad and horizontal. Caudal fin forked. Scales small.

Balitora brucei Gray

1830. *Balitora brucei* Gray, *Illustrations of Indian Zoology*, **1** : pl. 88, fig. 1 (Type-locality : Priang river near Cherrapungi, Meghalaya).

1991. *Balitora brucei* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 446-447.

Material examined : 1 ex., 62 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : Eastern Himalayas - Darjeeling, Assam, Meghalaya and Mizoram (new record); Bhutan and Bangladesh.

Fishery information : It attains a standard length of 10.5 cm. and is of no interest to fisheries.

Sub-family NOEMACHEILINAE

Genus ***Noemacheilus*** Bleeker, 1823

1823. *Noemacheilus* Kuhl et van Hasselt, *Algemeine Konst en Letter Bode*, **2**(35) : 133 (Type-species : *Noemacheilus fasciatus* Kuhl et van Hasselt).

Body elongate, almost cylindrical and somewhat depressed. Mouth small and inferior. Eyes minute to small. Pre-orbital spine on head absent. Barbels 2 to 4 pairs. Dorsal fin inserted opposite to pelvic fins, with 8 to 20 soft rays and devoid of any spines. Anal fin with 6 to 8 soft rays. Caudal fin emerginate, truncate or lunate. Scales minute. Lateral line complete or incomplete.

Key to the species of genus *Noemacheilus*

1. Dorsal fin with 9 to 11 branched rays. Lateral line usually complete. Caudal fin slightly emerginate. .....*N. botia*

– Dorsal fin with 6 to 8 branched rays. 2

2. Caudal fin truncate. Nasal barbels prominent. ..... *N. rupecola*

– Caudal fin emerginate or forked. 3

3. Lateral line incomplete. Dorsal fin with 6 or 7 branched rays. Body with 7 to 11 broad black complete bands. ... *N. kangjupkhulensis*

– Lateral line complete. 4

4. Body blotched with 1 or 2 longitudinal series of spots. ..... *N. corica*

– Body with colour bands. Interspace between bands narrow, about half the width of bands or less. ..... *N. savona*

Noemacheilus botia (Hamilton-Buchanan)

1822. *Cobitis botia* Hamilton-Buchanan, *Fishes of Ganges*: 350, 394 (Type-locality : rivers of north-eastern Bengal).

1987. *Noemacheilus botia* : Menon, *Fauna of India*, Pisces (Teleostei : Cobitoidea : Homalopteridae) 4 (part 1) : 141, pl. 5, fig. 5.

Material examined : 2 exs., 80-83 mm, Kolasib fish market (Tlawng/Dhaleswari river collection), Dist.- Aizawl, Coll. A.K.K. & party, 26.iii.1994.

Distribution : India : Northern India, Brahmaputra and Ganga basins; Pakistan; Nepal; Myanmar; Bangladesh and Sri Lanka.

Fishery information : This species attains a length of 90 mm and is of no interest to fisheries.

Noemacheilus corica (Hamilton-Buchanan)

1822. *Cobitis corica* Hamilton-Buchanan, *Fishes of Ganges* : 359, 395 (Type-locality : Kosi river).

1987. *Noemacheilus corica* : Menon, *Fauna of India*, Pisces (Teleostei : Cobitoidea : Homalopteridae) 4 (part 1) : 89, pl. 12, fig. 3.

Material examined : 1 ex., 51 mm, Kawrawng Lui (river) Nagenpui, Dist. Chhimtuipui, Coll. S.C. & party, 1.iv.1997.

Distribution : Sub-Himalayan range, from Darjeeling, through Kumaon, to Himachal Pradesh and Punjab; Nepal and Bangladesh.

Fishery information : This species attains a length of 42 mm in Standard Length and is of no interest to fisheries.

Noemacheilus kangjupkhulensis Hora

1921. *Noemacheilus kangjupkhulensis* Hora, *Rec. Indian Mus.*, **22** : 202, pl. 10, figs. 4, 4a (Type-locality : Manipur valley).

1987. *Noemacheilus kangjupkhulensis* : Menon, *The Fauna of India*, Pisces (Teleostei : Cobitoidea : Homalopteridae) : 4 (part 1) : 115-117, fig.2 & 3, pl. 5.

Material examined : 2 exs., Tiau river, 25 kms east of Champai, Dist. Aizawl, Coll. A.K.K. & party, 21.iii.1994.

Distribution : India : Manipur, Mizoram (new record); Myanmar.

Fishery information : It attains a length of about 52 mm and is of no interest to fisheries.

Noemacheilus savona (Hamilton-Buchanan)

1822. *Cobitis savona* Hamilton-Buchanan, *Fishes of Ganges* : 357, 394 (Type-locality : Kosi river at Nathpur, Uttar Pradesh).

1987. *Noemacheilus savona* : Menon, *Fauna of India*, Pisces, 4 : 91, pl. 13, fig. 1.

Material examined : 1 ex., 50 mm, Turial river 27 km. east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 15.iii.1994.

Distribution : Eastern Himalayas : Tista drainage at Darjeeling, Nepal to Karnali and Kali drainage in Uttar Pradesh, Mizoram (new record).

Fishery information : This species attains a length of 5 cm and is of no interest to fisheries.

Family COBITIDAE

Sub-family COBITINAE

Genus ***Lepidocephalus*** Bleeker, 1858

1858. *Lepidocephalus* Bleeker, *Natuurk. tijdschr. Nederl. Ind.*, **16** : 303 (Type-sepcies : *Cobitis microchir* Bleeker).

Body elongate, slightly compressed. Back not arched. Mouth inferior with 6 barbels. A small erectile, bifid suborbital spine. Dorsal fin inserted

opposite to ventral and placed almost on middle of body. Caudal fin rounded, truncate or emerginate. Scales small, but visible. Sides of head covered with smaller scales in patches. Lateral line absent.

Key to the species of genus *Lepidocephalus*

1a. Pectoral fin with 9 to 10 rays. Body depth 7.0 to 7.7 times in total length. Caudal fin slightly emerginate. ..... *L. berdmorei*

1b. Pectoral fin with 7 to 8 rays. Body depth 5.8 to 6.8 times in total length. Caudal fin rounded or cut square. ..... *L. guntea*

Lepidocephalus berdmorei (Blyth)

1861. *Acanthopsis berdmorei* Blyth, *J. Asiat. Soc. Beng.*, **29** : 168 (Type-locality : Tenasserim province, Burma).

1981. *Lepidocephalus* (*Lepidocephalichthys*) *berdmorei* : Tilak and Hussain, Occ. Paper, *Rec. zool. Surv. India* (32) : **14**, figs. 7 & 8 (Redescrition)

Material examined : 8 exs., 53-80 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : Manipur, Mizoram (new record) and Myanmar.

Fishery information : It attains a length of about 80 mm and is of no interest to fisheries.

Order SILURIFORMES

Family BAGRIDAE

Genus ***Aorichthys*** Wu, 1939

1919. *Aoria* Jordan, *Proc Acad. nat. Sci. Philad.*, **70** : 341 (Type-species : Bagrus lamarii Valenciennes = *Platystoma seenghala* Sykes).

1939. *Aorichthys* Wu, *Sinensia*, **10** : 131.

Body elongate, posteriorly compressed. Head fairly large and depressed anteriorly. A distinct interneural shield present. Eyes large, not visible from underside of head. Mouth terminal and moderately wide. Barbels four pairs, maxillary pair extend to pelvic fins and even beyond caudal fin. Dorsal fin with one weak spine and seven soft rays, adipose dorsal long and low. Each of the pectoral fin with one strong serrated spine and nine to ten soft rays; pelvic fin rays six in number. Caudal fin forked.

Key to the species of genus *Aorichthys*

1a. Snout rounded; maxillary barbels extend to base of caudal fin or beyond; width of mouth less than half of head length; caudal fin rays 17 in number. ..... *A. aor*

1b. Snout spatulate; maxillary barbels extend no further than pelvic fins; width of mouth one third of head length; Caudal fin rays 19 to 21 in number. ..... *A seenghala*

Aorichthys aor (Hamilton-Buchanan)

1822. *Pimelodus aor* Hamilton-Buchanan, *Fishes of Ganges* : 205, 379. pl. 20, fig. 68 (Type-locality : rivers of Bengal and Upper parts of Gangetic estuary).

1991. *Aorichthys aor* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, **2** : 547-548.

Material examined : 1 ex., 230 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : northern India upto the Krishna river system in the south; Pakistan; Nepal; Bangladesh and Myanmar.

Fishery information : It attains a length of about 1.8 m; common size is 1 m. This is a common giant catfish in the Indian region with considerable fishery importance. Mostly riverine in nature; good catches are obtained from the major rivers of northern India. It is generally liked by the people as its flesh contains only a few bones. This fish breeds before the onset of monsoons in the Ganga (Saigal, 1960).

Genus ***Mystus*** Scopoli, 1777

1777. *Mystus* Scopoli, *Introductio ad historiam naturalem* : 451 (Type-species : Bagrus haplepensis Valenciennes = *Silurus pelusius* Solandar).

Body moderately elongate, posteriorly compressed. Head rather depressed and smooth. Eye moderately large, not visible from underside of head. Mouth terminal and moderately wide. 4 pairs of barbels, maxillary barbels extend beyond dorsal fin. Rayed dorsal fin with one serrated spine and 7 soft rays; adipose dorsal low. Anal fin short, with 9 to 16 soft rays. Lateral line complete.

Key to the species of genus *Mystus*

1a. Maxillary barbels reach anal fin. Inter-orbital width less than 3.0 (2.0 to 3.0) in head length. No dark spot at the base of dorsal fin.. .... *M. bleekeri*

1b. Maxillary barbels reach caudal fin base or beyond. Interorbital width more than 3.0 (3.0 to 4.0) in head length. A dark spot at base of dorsal fin. ..... *M. cavasius*

Mystus bleekeri (Day)

1846. *Bagrus keletius* (*nec* Valenciennes) Bleeker, *Nat. Geneesk. Arch. Ned. India*, (2)3 : 135 (Type-locality : Bengal).

1877. *Macrones bleekeri* Day, *Fishes of India* : 451, pl. 101, fig. 1 (Replacement name for *Bagrus keletius* Bleeker, 1846) : Day, 1889, Fauna Br. India, Fishes, 1 : 162.

1991. *Mystus bleekeri* : Talwar and Jhingran, *Inland fishes of India and Adjacent Countries*, 2 : 558-559.

Material examined : 2 exs., 82-95 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : generally confined to northern India, the southern most limit being the Mahanadi headwaters; Pakistan; Bangladesh; Nepal; Myanmar and Sumatra.

Fishery information : It attains a length of about 160 mm. No major fishery exists for this catfish.

Mystus cavasius (Hamilton-Buchanan)

1822. *Pimelodus cavasius* Hamilton-Buchanan, *Fishes of Ganges* : 203, 379, pl. 11, fig. 67 (Type-locality : Gangetic provinces).

1977. *Mystus cavasius* : Jayaram, *Rec. zool. Surv. India Occ. Pap.*, (8) : 29, fig. 21A.

Material examined : 1 ex., 132 mm, Karnaphuli river at Dimagiri (Tlabung). 75 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India; Pakistan; Sri Lanka; Nepal; Bangladesh; Myanmar and Thailand.

Fishery information : It attains a length of about 40 cm. This catfish is a very common foodfish in the Indian region.

Family SCHILBEIDAE

Genus ***Ailia*** Gray, 1831

1831. *Ailia* Gray, *Zool. Miscellany* : 8 (type-species : *Malapterus* (*Sic*) (*Ailia*) *bengalensis* Gray = *Malapterurus coila* (Hamilton-Buchanan).

Body elongate, strongly compressed. Mouth subterminal and fairly wide. Barbels 4 pairs, well developed. Eye small, visible from underside of the head. Rayed dorsal fin absent, adipose dorsal fin small. Anal fin very long, with 58-90 rays. Pectoral fin with 1 spine and 13-16 rays. Lateral line complete.

Key to the species of genus *Ailia*

1a. Pelvic fins present; anal fin with 58 to 75 rays. ..... *A. coila*

1b. Pelvic fins absent; anal fin with 76 to 90 rays (Subgenus Ailichthys). ..... *A. punctata*

Ailia coila (Hamilton-Buchanan)

1822. *Malapterurus coila* Hamilton-Buchanan, *Fishes of Ganges* : 158, 375 (Type-locality : freshwater rivers of Bengal).

1991. *Ailia coila* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 593-594.

Material examined : 4 exs., 130-143 mm, Karnaphuli river at Dimagiri (Tlabung). 75 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : confined to the Jamuna, Ganga, Brahmaputra and Mahanadi; Pakistan; Bangladesh and Nepal.

Fishery information : It attains a length of about 30 cm; much esteemed as food. It lives in shoals and is confined to the large rivers of northern India.

Ailia punctata (Day)

1871. *Ailiichthys punctata* Day *Proc. zool. Soc. Lond.* : 713 (Type-locality : Jamuna river below Delhi).

1991. *Ailia punctata* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 594.

Material examined : 2 exs., 150-157 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Gnaga, Jamuna and Indus River Systems, Manipur, Mizoram (new record); Bangladesh and Pakistan.

Fishery information : It attains a length of 160 mm and is of no interest to fisheries.

Genus *Clupisoma* Swinson, 1839

1839. *Clupisoma* Swainson, *Natural History Animals, Fisches*, **2** : 306 (Type-species : *Pimelodus argentata* Swainson = *Silurus garua* Hamilton-Buchanan).

Body elongate and compressed. Abdominal edge either rounded or keeled (entirely or partly). Eyes moderate, visible from underside at head. Nostrils prominent and closely placed. Mouth moderate, subterminal; its gape not extending to eye. Barbels 4 pairs, all placed at same level. Gill membrane free from isthmus. Dorsal fin inserted considerably in advance of pelvic fins, with 1 spine and 6 to 9 soft rays. A small adipose dorsal usually present. Anal fin long, with 29 to 54 soft rays.

Clupisoma montana Hora

1937. *Clupisoma montana* Hora, *J. Bombay nat. Hist. Soc.*, **39**(4) : 673, figs. 7, 8, (Type-locality : Teesta river, below Darjeeling).

1976. *Clupisoma montana* : Misra, *Fauna of India*. Pisces (2nd ed.), **3** : 162, fig. 29.

Material examined : 2 exs., 160-165 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms. west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Tista river below Darjeeling (West Bengal), Jamuna river (Uttar Pradesh), Sone river (Bihar), Tripura, Mizoram (new record).

Fishery information : It attains a length upto 29 cm and is of very little interest to fisheries.

Genus *Eutropiichthys* Bleeker, 1862

1862. *Eutropiichthys*, *Verh. Akad. Amsterdam.* **14** : 398 (Type-species : *Pimelodus vacha* Hamilton-Buchanan).

Body elongate and laterally compressed. Head moderate sized; snout rather pointed, usually sharp. Mouth wide, its cleft oblique and extends beyond to about posterior edge of orbit. Barbels four pairs, gill-openings wide, gill membranes free from isthmus. Dorsal fin short, with one weak spine and 7 soft rays; adipose fin very small. Anal fin long, with 38 to 54 rays, proctoral fin with one strong spine and 10 to 16 soft rays; pelvic with 6 rays. Caudal deeply forked.

Eutropiichthys vacha (Hamilton-Buchanan)

1822. *Pimelodus vacha* Hamilton-Buchanan, *Fishes of Ganges* : 196, 378, pl. 19, fig. 64 (Type-locality : larger freshwater rivers of Gangetic provinces).

1991. *Eutropiichthys vacha* Talwar and Jhingran, *Inland fishes of India and Adjacent Countries* : 603-604.

Material examined : 1 ex., 310 mm, Tlawng (Dhaleswari) river of Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : north India, Orissa, West Bengal, Bihar, Mizoram (new record); Bangladesh; Myanmar; Pakistan and probably also Thailand.

Fishery information : It grows to about 35 cm in length and 1.35 kg of weight. It is tasty and excellent table-fish. It is surface feeder and voraciously eat other smaller fish and insects. This fish is also of great interest to the angler.

Family SILURIDAE

Genus ***Ompok*** Lacepede, 1803

1803. *Ompok* Lacepede, *Hist. nat. Poiss.*, **5** : 49 (Type-species : *Ompok siluroides* Lacepede = *Silurus bimaculatus* Bloch).

Body laterally compressed, head anteriorly depressed. Mouth oblique, its gape not reaching anterior margin of eye. Lower jaw longer than upper one. No teeth on palate. Eye subcutaneous, visible from underside of head. Two pairs of barbels, mandibular barbels often rudimentary. Dorsal fin very short with 3 to 5 rays; anal fin very long with 52 to 75 rays. Pectoral fin with a spine and 11 to 14 rays. Pelvic fin with 6 to 10 rays. Caudal fin forked, free from anal fin.

Key to the species of genus *Ompok*

1. Maxillary barbels longer than head, extending upto or beyond anal fin. Anal fin with 57-58 rays. ..... *O. bimaculatus*
2. Maxillary barbels shorter than head, not extending upto anal fin. Anal fin with 66-71 rays. ..... *O. pabo*

Ompok pabo (Hamilton-Buchanan)

1822. *Silurus pabo, Fishes of Ganges* : 153, 375, pl. 22, fig. 48 (Type-locality : Brahmaputra river).

1976. *Ompok pabo* : Misra, *Fauna of India*, Pisces (2nd ed.), **3** : 196, fig. 38.

Material examined : 1 ex., 185 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : North-east India; Bangladesh; Myanmar and Pakistan.

Fishery information : This catfish attains a length of about 24 cm, priced as a nourishing food fish specially in Bengal.

Family SISORIDAE

Genus ***Conta*** Hora, 1950

1950. *Conta* Hora, *Rec. Indian Mus*, **47**(2) : 194 (Type-species : *Pimelodus conta* Hamilton-Buchanan).

Body elongated and sub-cylindrical, not flattened ventrally. An longitudinal adhesive pad on ventral surface of body distinct and well developed. Head small, oval shaped and compressed. Eyes small, subcutaneous and dorsolateral. Mouth ventral. Barbels four pairs. Gill openings narrow, separated by a broad isthmus. Dorsal fin short with a strong spine serrated on both sides. Head and body tuberculated.

Conta conta (Hamilton-Buchanan)

1822. *Pimelodus conta* Hamilton-Buchanan, *Fishes of Ganges* : 191, 378 (Type-locality : Mahananda river, North-east Bengal).

1976. *Conta conta* Misra, *Fauna of India*, Pisces (2nd ed.), **3** : 237, pl. 8, figs. 4-6.

Material examined : 2 exs., 81-82 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : base of Himalaya in north Bengal, Assam, Meghalaya, Mizoram (new record) and Uttar Pradesh.

Fishery information : It attains a length of a little more than 8 cm and no interest to fishes. It is a rather rare catfish, inhabits rocky streams at the bases of hills.

Genus ***Gagata*** Bleeker, 1858

1858. *Gagata* Bleeker, *Ichthyol. Archipel. Ind. Prodromus*, **1** : 204 (Type-species : *Gagata typus* Bleeker = *Pimelodus gagata* Hamilton-Buchanan).

Body and head compressed. A distinct median groove on head present. Occipital process not reaching basal bone of dorsal fin. Eyes large, dorsolateral in position. Mouth small and ventral, no teeth on palate. Barbels 4 pairs, maxillary barbels with ossens bases and lying in a groove. Gill membranes confluent with isthmus. Dorsal fin with 1 strong spine and 6 rays, anal fin short with 11 to 16 rays.

Gagata cenia (Hamilton-Buchanan)

1822. *Pimelodus cenia* Hamilton-Buchanan, *Fishes of Ganges* : 174, 376, pl. 31, fig. 57 (Type-locality : rivers of North Bengal).

1991. *Gagata cenia* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 637-638.

Material examined : 1 ex., Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : Punjab, Delhi, Uttar Pradesh, Bihar, West Bengal, Assam, Orissa, Manipur and Mizoram (new record); Pakistan; Bangladesh; Nepal and Myanmar.

Fishery information : It attains a length of about 170 mm, fairly common in the rivers of northern India and also in Assam. This fish is considered as wholesome food.

Genus ***Glyptothorax*** Blyth, 1861

1861. *Glyptothorax* Blyth, *J. Asiat. Soc. Beng.*, **29** : 154 (Type-species : *Glyptothorax trilineatus* Blyth).

Body laterally depressed or cylindrical. Head depressed; eye small, dorsal in position. A prominent thoracic sucking disc present often with central pit. Mouth inferior, transverse and narrow, lips thick and fleshy. Barbels 4 pairs, maxillary barbels with broad base. Gill membranes confluent with skin of isthmus. Rayed dorsal fin with 1 spine and 5 to 7 soft rays. A short adipose dorsal present. A short strong spine denticulated internally. Anal fin with 7 to 14 soft rays. Lateral line complete.

Key to the species of genus *Glyptothorax*

1a. Sucking apparatus appears not only on chest between pectoral fins but also on lower surface of outer rays of paired fins. It is as long as broad. Occipital process distinctly separated from basal bone of dorsal fin..... ..... *G. striatus*

1b. Sucking appearatus present only on chest between pectoral fins. It is longer than broad; with a distinct central pit. Body depth 5.9 to 6.6 times in standard length. ..... *G. cavia*

Glyptothorax cavia (Hamilton-Buchanan)

1822. *Pimelodus cavia* Hamilton-Buchanan, *Fishes of Ganges* : 188, 378 (Type-locality : rivers of North Bengal).

1991. *Glyptothorax cavia* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 649-650.

Material examined : 3 exs., 55-100 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : India : North Bengal, Assam and Mizoram (new record); Pakistan; Nepal; Bangladesh and Myanmar.

Fishery information : This fish attains a length of about 16.5 cm and is of little interest to fisheries in the Indian region.

Glyphthorax striatus (McClelland)

1842. *Glyptothernon striatus* McClelland, Calcutta *J. nat. Hist.*, **2** : 587, pl. 6, fig. 1 (Type-locality : Khasya Hills, Meghalaya).

1991. *Glyptothorax striatus* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 663.

Material examined : 1 ex., 225 mm, Tiau river 25 kms east of Champhai, Dist. Aizawl, Coll. A.K.K. & party, 21.iii.1994.

Distribution : India : Khasi and Garo Hills, Meghalaya, Sikkim and Mizoram (new record).

Fishery information : It attains a length of about 22.5 cm and of minor intrest to fisheries.

Genus ***Pseudolaguvia*** Misra, 1976

1976. *Pseudolaguvia* Misra, *Fauna of India*, Pisces (2nd ed) **3** : 253 (Type-species : *Glyptothorax tuberculatus* Prashad & Mukherji).

Body moderately elongate and sub-cylindrical; head depressed. A prominent longitudinal thoracic adhesive apparatus with distinct central pit present. Eyes small, subcutaneous and dorsolateral in position. Mouth inferior; barbels annulated. Gill opening wide, separated by a narrow isthmus, gill membranes confluent with isthmus. Cubitohumeral and scapular process exposed and conspicuous. Adipose dorsal fin short, contiguous with rayed dorsal fin. Pectoral fins horizontal. Skin rough and tuberculated.

Pseudolaguvia tuberculatus (Prashad & Mukherji)

1929. *Glyptothorax tuberculatus* Prashad & Mukherji, *Rec. Indian Mus.*, **31**(3) : 182, Text fig. 4 and pl. 7, fig. 2 (Type-locality : Sankha stream near Kamaing, Myitkyina dist, Burma).

1976. *Pseudolaguvia tuberculatus* Misra, *Fauna of India*, Pisces (2nd ed.), **3** : 254, fig. 46.

Material examined : 4 exs., 27-33 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Coll. A.K.K. & party, 16.iii.1994.

Distribution : Myanmar : Myitkyiana Dist., Upper Myanmar, New record from India : Mizoram.

Fishery information : It attains a length of 35 mm; of no interest to fisheries; inhabits hill streams.

Family OLYRIDAE

Genus *Olyra* McClelland, 1842

1842. *Olyra* McClelland, *Calcutta Jour. nat. Hist.*, **2** : 588 (Type-species : *Olyra longicaudata* McClelland).

Body slender and long, flattened in front of pelvic fins but compressed behind. Head small and depressed; snout obtusely rounded. Mouth narrow. Gills membranes confluent with each other across isthmus. Adipose dorsal fin often confluent with caudal fin. Pectoral spine serrated on both edges.

Olyra longicaudata McClelland

1842. *Olyra longicaudata* McClelland, *Calcutta Jour. nat. Hist.*, **2** : 588, pl. 21, fig. 1 (type-locality : Khasi Hills, Meghalaya).

1991. *Olyra longicaudata* : Talwar and Jhingran, Inland Fishes of India and Adjacent Countries : 695-696.

Material examined : 6 exs., 95-160 mm, Serlui river (purchased from market). Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xii.1993.

Distribution : India : base of Darjeeling Himalaya, Meghalaya, Assam, Mizoram (new record); and Myanmar.

Fishery information : It attains a length of about 16 cm and of no fishery value.

Order ATHERINIFORMES

Family BELONIDAE

Genus *Xenentodon* Regan, 1911

1911. *Xenentodon* Regan, *Ann. Mag. Nat. Hist.*, (8) **7** : 322 (Type-species : *Esox cancila* Hamilton-Buchanan).

Body very elongate and cylindrical; jaws with large canine teeth and much more numerous conical teeth. Gill rakers absent. Dorsal and anal fin almost equal and nearly opposite to each other. Caudal fin truncate or rounded. Scales extremely small. Lateral line placed very low on the body.

Xenentodon cancila (Hamilton-Buchanan)

1822. *Esox cancila* Hamilton-Buchanan, *Fishes of Ganges* : 213, 380, pl. 27, fig. 70 (Type-locality : Gangetic provinces).

1991. *Xenentodon cancila* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 743-744.

Material examined : (i) 2 exs., 120-195 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994. (ii) 2 exs., 95-110 mm, Kolodyne river at Tuipui, 60 kms north east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996 (iii) 3 exs., 230-270 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei. Coll. A.K.K. & Party 4.iv.1996 (iv) 3 exs., 22-105 mm, Sowoa, Ngenpui river, Dist. Chhimtuipui, Coll. S.C. & party, 31.iii.1997 (v) 1 ex., 120 mm, Kawrawng Lui (river), Ngenpui, Dist. Chhimtuipui, Coll. S.C. & party, 5.iv.1997 (vi) 4 exs., 36-43 mm, Ngenpui river, Dist. Chhimtuipui, Coll. S.C. & party, 29.iii.1997-5.iv.1997.

Distribution : India; Pakistan; Bangladesh; Sri Lanka; Myanmar and Thailand.

Fishery information : It attains a length of about 40 cm, common size being 30 cm. It is an elegant surface living fish, fairly common in the Ganga-Brahmaputra system.

Family CYPRINODONTIDAE

Genus *Aplocheilus* McClelland, 1839

1839. *Aplocheilus* Mcclelland *Asiat. Res.*, **19(2)** : 301 (Type-species : *Esox panchax* Hamilton-Buchanan).

Body moderately elongate, compressed. Head and nape broad and flattened above. Mouth terminal, upper jaw protractile, lower jaw greatly attenuated. Barbels absent. Dorsal fin originates above posterior end of anal fin, with 7 to 9 rays and no spine. Anal fin longer with 15 to 18 rays. Caudal fin rounded. Lateral line absent. Scales on longitudinal series 25 to 31.

Aplocheilus panchax (Hamilton-Buchanan)

1822. *Esox panchax* Hamilton-Buchanan, *Fishes of Ganges*: 211, 380, pl. 3, fig. 69 (Type-locality : Bengal).

1991. *Apolocheilus panchax* : Talwar and Jhingran, *Inland fishes of India and Adjacent Countries* : 752-753.

Material examined : 1 ex., 60 mm, Tamdil Lake, 92 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 18.iii.1994.

Distribution : India : mainly north; Pakistan; Bangladesh; Myanmar and Indo-Malayan Archipelago.

Fishery information : It attains a length of about 80 mm and is a larvivorous fish. Its utility in mosquito control has been established.

Order CHANNIFORMES

Family CHANNIDAE

Genus ***Channa*** Scopoli, 1777

1777. *Channa* Scopoli, *Introd. Hist. Nat.*, : 459 (Type-species : *Channa orientalis* Bloch & Schneider).

Body elongate, almost cylindrical anteriorly and somewhat compressed posteriorly. Head large, with plate-like scales. Cephalic pits present. Mouth fairly large, lower jaw protruding beyond upper jaw. Dorsal and anal fins long based, both spineless and free from caudal fin. Dorsal fin inserted almost above pectoral fin, with 29 to 55 rays. Anal fin with 21-36 rays. Caudal fin rounded.

Key to species of genus *Channa*

1. 4 to 5 scales between orbit and angle of preopercle. Pelvic fin more than half length of pectoral fin. Pectoral fin plain. .... *C. punctatus*

– 4 to 5 scales between orbit and angle of preopercle. Pelvic fin less than half length of pectoral fin spotted in zones, darker and lighter patches. 2

2. Anal fin with 26 rays. Circular black spot present in each scales..... *C. stewartii*

– Anal fin with 21 to 23 rays. No black spots on scales. ..... *C. orientalis*

Channa orientalis Bloch & Schneider

1801. *Channa orientalis* Bloch & Schneider, *Syst. Ichth.* : 496, pl. 90, fig. 2 (Type-locality : India).

1991. *Channa orientalis* : Talwar and Jhingran. *Inland Fishes of India and Adjacent Countries* : 1019-1020, pl. 289.

Material examined : (i) 95 mm, Tiau river, 25 kms east of Champhai, Dist. Aizawl, Coll. A.K.K. & party, 21.iii.1994 (ii) 1 ex., 105 mm, Kawrawng Lui (River) Ngengpui, Dist. Chhimtuipui. Coll. S.C. & party, 31.iii.1997.

Distribution : India : throughout; Afghanistan; Iran; Pakistan; Nepal; Sri Lanka; Bangladesh; Myanmar and East Indies.

Fishery information : It attains a length of about 200 mm and is of minor interest to fisheries in Indian region.

Channa punctatus (Bloch)

1793. *Ophicephalus punctatus* Bloch, *Naturges ansland Fische.* (7) : 139, pl. 358 (Type-locality : rivers and lakes of Coromandal coast).

1991. *Channa punctatus* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 1020-1021, pl. 290.

Material examined : 8 exs., 67-77 mm, Serlui river (purchased from market), Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xii.1993.

Distribution : India : throughout; Afghanistan; Pakistan; Sri Lanka; Nepal; Bangladesh; Myanmar and China.

Fishery information : It attains a length of about 300 mm, very common throughout the plains of India and is of moderate interest to fisheries in Indian region.

Channa stewartii (Playfair)

1867. *Ophicephalus stewartii* Playfair, *Proc. zool. Soc. Lond.* : **14**, pl. 77, fig. 3 (Type-locality : Cachar, Assam).

1991. *Channa stewartii* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 1021-1022.

Material Examined : 1 ex., 28 mm, Ngenpui river at Sowa, Dist. Chhimtuipui, Coll. S.C. & party, 1.iv.1997.

Distribution : India : Assam, Bihar, Meghalaya, Arunachal Pradesh, West Bengal, Manipur and Mizoram (new record).

Fishery information : It attains a length of about 250 mm and is of minor fishery interest in the Eastern Himalayan Region.

Order PERCIFORMES

Family CHANDIDAE

Genus *Chanda* Hamilton-Buchanan, 1822

1822. *Chanda* Hamilton-Buchanan, *Fishes of Ganges* : 103, 270 (Type-species : *Chanda nama* Hamilton-Buchanan)

Body ovate and fairly transparent, with vertebral column and its adjoining elements visible externally. Lower limit of preopercle provided with double serrated edge. Mouth large, with a conspicuous lower jaw. First dorsal fin with 7 spins and second one with 1 spine and 9 to 17 soft rays. Anal fin with 3 spines and 9 to 17 rays. Lateral line complete, incomplete, interrupted or absent.

Key to the species of genus *Chanda*

1. Lateral line indistinct, discontinous or absent. A dark bloch generally present on the upper edge of dorsal fin. ..... *C. nama*
2. Lateral line distinct. No such colour blotch on dorsal fin. A dark shoulder spot present. .... *C. ranga*

Chanda nama Hamilton-Buchanan.

1822. *Chanda nama* Hamilton-Buchanan, *Fishes of Ganges* : 109, 371, pl. 39, fig. 37 (Type-locality : ponds throughout Bengal).

1981. *Chanda nama* : Jayaram, *The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka* : 318.

Material examined : 7 exs., 48-63 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India; Pakistan; Nepal; Bangladesh and Myanmar.

Fishery information : It attains a length of 90 mm and are sold in heaps along with other small fishes as low priced item.

Chanda ranga Hamilton-Buchanan

1822. *Chanda ranga* Hamilton-Buchanan, *Fishes of Ganges* : 113, 371, pl. 16, fig. 38 (Type-locality : freshwaters of all parts of Gangetic provinces).

1981. *Chanda ranga* : Jayaram. *The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka* : 318.

Material examined : 5 exs., 40-58 mm, Karnaphuli river at Dimagiri (Tlabung), 95 kms west of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 6.iv.1996.

Distribution : India : throughout; Pakistan; Nepal; Bangladesh; Myanmar; Thailand and Malaysia.

Fishery information : It attains a length of 75 mm and are sold in the market alongwith other small varieties of fishes. It does fairly well in the aquarium.

Family NANDIDAE

Genus *Badis* Bleeker, 1853

1853. *Badis* Bleeker, *Verh. betay. Genoot. Kunst. Wet.*, **25** : 253 (Type-species : *Badis buchanani* Bleeker = *Labrus badis* Hamilton-Buchanan).

Body fairly elongate and slightly compressed. Mouth small and slightly protrusible. Operculum triangular, its posterodorsal corner with a prominent spine. Dorsal fin large, with 16 to 18 spines and 6 to 8 soft rays. Caudal fin wedge-shaped. Lateral line interrupted or absent, 26 to 33 scales in longitudinal series.

Badis badis (Hamilton-Buchanan)

1822. *Labrus badis* Hamilton-Buchanan, *Fishes of Ganges*: 70, 368, pl. 25, fig. 23 (Type-locality : Gangetic provinces).

1991. *Badis badis* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 882-883.

Material examined : (i) 8 exs, 32-72 mm, Serlui river (purchased from market). Kolasib, Dist. Aizawl, Coll. S.S.S. & party, 31.xiii.1993 (ii) 5 exs., 18-76 mm, Nqenpui river at Sowa, Dist. Chhimtuipui, Coll. S.C. & party, 1.iv.1997.

Distribution : India; Pakistan; Nepal; Bangladesh and Myanmar.

Fishery information : It attains a length of 80 mm and is of no interest to fisheries but established itself as an aquarium fish.

Family GOBIIDAE

Genus ***Awaous*** Valenciennes, 1837

1837. *Awaous* Valenciennes, *Hist. nat. Poiss.*, **12** : 97 (Type-species : *Gobius ocellaris* Valenciennes).

Body elongate. Head long, broader than deep; inter-orbital space broad. Small finger-like flaps on shoulder girdle. Mouth oblique, lips thick, teeth on both the jaws in several rows, the outer row slightly longer; tongue bilobate at tip. Dorsal fin close to each other; pelvic fins form a disc. Scales on body ctenoid.

Awaous stamineus (Valenciennes)

1842. *Gobius stamineus* Valenciennes, *Zool Voy. Bontie* : 179, pl. 5, fig. 5 (Type-locality : Seti (Ceram).

1981. *Awaous stamineus* : Jayaram, *The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka* : 357.

Material examined : (i) 3 exs., 143-178 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996 (ii) 1 ex., 100 mm, Ngengpui river, Dist. Chhimtuipui, Coll. S.C. & party, 29.iii.1997.

Distribution : India and Bangladesh.

Fishery information : This species attains a length of about 18 cm and is of no interest to fisheries.

Genus ***Glossogobius*** Gill, 1862

1862. *Glossogobius* Gill, *Ann. Lye. Nat. Hist.* New York. **7** : 46 (Type-species : *Gobius platycephalus* Peters = *Gobius giuris* Hamilton-Buchanan).

Body elongate, anteriorly cylindrical, posteriorly compressed. Head depressed, pointed. Gill-openings from below rear of preopercle to below eyes. Isthmus narrow. Mouth slightly oblique; lower jaw prominent. First dorsal with 6 spines; second one with 1 spine and 6 to 10 soft rays. Pelvic fin united forming a disc. Caudal fin ablong to rounded. Lateral line scales 28 to 36.

Glossogobius giuris (Hamilton-Buchanan)

1822. *Gobius giuris* Hamilton-Buchanan, *Fishes of Ganges* : 51, pl. 33, fig. 15 (Type-locality : Gangetic provinces).

1991. *Glossogobius giuris* : Talwar and Jhingran, *Inland fishes of India and Adjacent Countries* : 936.

Material examined : 2 exs., 70-76 mm, Tamdil Lake, 92 kms east of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 18.iii.1994.

Distribution : India : throughout; Pakistan; Nepal; Bangladesh; Myanmar; Sri Lanka. It has a wide range of distribution from East coast of Africa to Japan. Also Australia and South Pacific.

Fishery information : It attains a length of 30 cm and forms a minor fishery specially in the Hooghly Estuary, West Bengal.

Order MASTACEMBELIFORMES

Family MASTACEMBELIDAE

Genus ***Mastacembelus*** Scopoli, 1777

1777. *Mastacembelus* Scopoli, *Introductio Historiam Naturalem* : 458 (Type-species : *Ophidium mastacembelus* Solander).

Body elongate, eel-like and compressed. Mouth inferior, cleft narrow. The long fleshy appendage of snout not transversely striated below. Pre-orbital spine present. Dorsal fin inserted above middle of pectoral fin, with 24 to 39 detached spines and 50 to 90 soft rays. Anal fin with 3 spines and 31 to 98 soft rays. Dorsal fins may or may not be confluent with caudal fin, which is rounded. Lateral line present.

Mastacembelus armatus (Lacepede)

1800. *Macrognathus armatus* Lacepede, *Hist. nat. Poiss.* **2** : 286 (Type-locality : not known).

1991. *Mastacembelus armatus* : Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries* : 1031-1032.

Material examined : (i) 2 exs., 80-175 mm, Tlawng (Dhaleswari) river at Sairang, 20 kms west of Aizawl, Dist. Aizawl, Coll. A.K.K. & party, 16.iii.1994 (ii) 2 exs., 140-142 mm, Tiau river, 25 kms east of Champhai, Dist. Aizawl, Coll. A.K.K. & party, 21.iii.1994 (iii) 2 exs., 210-270 mm, Mat river, 25 kms east of Lunglei, Dist. Lunglei, Coll. A.K.K. & party, 4.iv.1996.

Distribution : India : throughout; Pakistan; Srì Lanka; Nepal; Myanmar; through Thailand and Malaya, to Southern China.

Fishery information : It attains a length of 65 cm and is the largest spiny eel. It is a good food fish specially when freshly caught.

SUMMARY

An attempt has been made in this present study to provide an upto date classification, nomenclature including scientific names, details of material studied, size-ranges, distributional records, fishery information along with a species identification key under each genera. During the preparation of this faunal work, we have made use of all the earlier informations available in the literature in addition to study of the fish material collected by four extensive field surveys recently conducted by Zoological Survey of India survey parties. The fish collections shows Assamese, endemic and Burmese elements. The Assamese elements are observed in the northern and north-western part while Burmese elements are observed in the eastern and southern part. Further, endemic elements are found in the central part. In all 89 species belonging to 8 orders, 20 families and 49 genera have been dealt with in detail in this contribution. Out of these 24 species under 17 genera are recorded for the first time from Mizoram and 3 species under 3 genera are recorded for the first time from India. A map showing drainage system and collecting stations has also been included.

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AMPHIBIA

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INTRODUCTION

Amphibia is composed of more than four thousand species known from the world of which, 203 species grouped under 29 genera and nine families occur in varied ecological conditions. Owing to their topography, geographical positions, high rainfall and humidity, the state of Mizoram occupy an interesting place in the study of Indian amphibian fauna. Except a few stray reports by Annandale (1911-1912), Boulenger (1890-1920), Pillai & Chanda (1976), Chanda & Ghosh (1988), Chanda (1990), no consolidated account is available on the amphibian fauna of the above region. However, Chanda (1994) published a comprehensive account on the amphibian fauna of northeast India including Mizoram.

The present work attempts to fill this lacunae and incorporates the results of the study of amphibian collections made in different areas in Mizoram during the period 1976-1981. There are several localities yet to be surveyed and future survey shall undoubtedly reveal many more species. The present study includes 13 species of anurans under eight genera and five families.

LIST OF SPECIES OF AMPHIBIA

Class AMPHIBIA
Order ANURA
Family BUFONIDAE
Genus I. ***Bufo*** Lauranti

1. ***Bufo Melanostictus*** Schneider

Family PELOBATIDAE
Genus II. ***Pedostibes*** Gunther

2. ***Pedostibes kempii*** (Boulenger)

Family HYLIDAE
Genus III. ***Hyla*** Laurenti

3. ***Hyla annectans*** (Jerdon)

Family MICROHYLIDAE
Genus IV. ***Microhyla*** Tschudi

4. ***Microhyla berdmorei*** (Blyth)
5. ***Microhyla ornata*** (Dum & Bibron)

Family RANIDAE
Genus V. ***Amolops*** Cope

6. ***Amolops afghanus*** (Gunther)

Genus VI. ***Rana*** Linn.

7. ***Rana cyanophlyctis*** Schneider
8. ***Rana gerbillus*** Annandale
9. ***Rana erythraea*** (Schl.)
10. ***Rana limnocharis*** Boie.
11. ***Rana tigerina*** Daudin

Family RHACOPHORIDAE
Genus VII. ***Polypedates*** Tschudi

12. ***Polypedates leucosmystax*** Gravenhorst

Genus VIII. ***Rhacophorus*** Kuhl.

13. ***Rhacophorus bipunctatus*** Ahl.

MATERIALS AND METHODS

Amphibians are either aquatic, terriestrial, arboreal or fossorial in habit. Generally the aquatic amphibians are collected by the help of water

net, cast-net as well as by fishing hook. On the other hand both terriestrial and arboreal forms can be collected by hand or long forcep. the burrowing forms are collected by digging the soil. The collected materials are first chloroformed and then put in 5% formaldehyde solution at least for 24 hours for proper fixation. Before putting the material in the formaldehyde solution (for bigger material) a small incision should be given on the belly to penetrate the formaldehyde solution inside the viscera for their proper fixation. After two to three days the materials were taken out from the solution and washed properly in running water and then put in 90% alcohol for permanent preservation for study.

Family BUFONIDAE

Diagnosis : Tongue oval; skin rough and tuberculated; pupil horizontal; vomerine teeth absent; jaws toothless; diapophyses of sacral vertebrae dilated; terminal phalanges of fingers and toes obtuse or T-shaped; vertebrae procoelous.

Genus ***Bufo*** Laurenti, 1768

1768. *Bufo* Laurenti, *synopsis Rept. Vienna* : 25

Diagnosis : Skin rough and tuberculated; tongue elliptic; entire; vomerine teeth absent; pupil horizontal; tympanum distinct; parotoid glands large, prominent; fingers free; toes more or less webbed; diapophyses of sacral vertebrae more or less dilated.

1. ***Bufo melanostictus*** Schneider, 1799.

1799. *Bufo melanostictus* Schneider, *Hist. Amph.* **I**, Jena, : 216.

Material examined : 6 exs. Kolosib, Mizoram, 4.9.1967, Coll. S. Biswas; 8 exs. Aijol, Mizoram. 10.11.1996, Coll. K. R. Rao.

Diagnosis : Dorsally yellowish brown, ventral surface yellowish black; skin rough with spiny warts and tubercles; tympanum very prominent, large, more than two-third diameter of eyes; parotoid glands large and prominent; tibiotarsal articulation reaches eyes; fingers free; toes half webbed; a moderately large inner and a small outer metatarsal tubercle present.

Distribution : Throughout Indian region from plains upto an altitude of 3000 m.; Burma; Sri Lanka; China; Sumatra; Java; Borneo; Malaysia; Indonesia; Philippines; Bangladesh; Pakistan.

Remarks : This species has been found to occur throughout the plains as well as in the hills upto an altitude of 3949 m. in Sikkim Himalayas (Boulenger, 1890). It is generally found to occur near ponds and streams during breeding season. Eggs are laid in a string at the edges or ponds and rivers.

Family PELOBATIDAE

Diagnosis : Upper jaw toothed, lower jaw toothless; Diapophyses of sacral vertebrae strongly dilated; terminal phalanges of fingers and toes free, simple and pointed; omosternum present, but small and cartilagenous; (rarely occified); sternum with or without a bony style; vertebrae procoelous or opisthocoelous; ribs absent.

Genus ***Pedostibes***, Günther, 1875.

Diagnosis : Skin dorsally tuberculated; tongue elliptical, entire and free; vomerine teeth absent; pupil horizontal; tympanum distinct or hidden; paratoid glands present; fingers weebed; toes almost fully webbed; discs present.

2. ***Pedostibes kempii*** (Boulenger)

1919. *Nectophryne kempii* Boulenger, *Rec. Indian Mus.*, **16** : 207.

1985. *Pedostibes kempii* Frost, *Amphibian species of the world* : 72.

Material : 1 ex. Kolosib, Mizoram, 4.9.1967, Coll. S. Biswas.

Diagnosis : Dorsally varying from dark grey to brown; ventral surface almost dark brown; skin rough with irregular tubercles of various shapes and sizes all over the body; ventral surface finely granulated; a large round yellowish spot present

on either side of the breast near the base of arm; head broader than long; paratoid glands prominent; tympanum hidden; fingers free with rudiment of webs and tips dilated into rounded tips; subarticular tubercles of fingers feebly prominent; tibiotarsal articulation reaching shoulder; toes more than half-webbed; subarticular tubercles of toes small but prominent; both inner and outer metatarsal tubercles present.

Distribution : India : Meghalaya (Garo hills), Mizoram.

Remarks : This species was originally recorded from Garo hills, Meghalaya, India (Boulenger, 1919). During the present study it has been recorded for the first time from Mizoram. This is the second report of the species after a span of more than 75 years.

Family HYLIDAE

Diagnosis : Upper jaw toothed, lower jaw usually toothless; diapophyses of sacral vertebrae dilated; terminal phalanges of fingers and toes claw-shaped, swollen at the base; omosternum cartilagenous (rarely ossified); sternum cartilagenous.

Genus ***Hyla*** Laurenti

1768. *Hyla* laurenti, *synopsis Rept.*, Vienna, : 32.

Diagnosis : Skin smooth, sometimes tuberculated; tongue entire, slightly pointed, adherent to some extent or free behind; pupil horizontal; tympanum distinct or hidden; fingers generally free sometimes webbed; toes webbed and tips dilated into prominent discs; omosternum and sternum cartilagenous but sometimes occified in males.

3. ***Hyla annectens*** (Jerdon)

1870. *Polypedates annectens* Jerdon, *Proc. Asiat. Soc. Beng.*, : 84.

1994. *Hyla annectens* Chanda, *Mem. zool. Surv. India.*, **18**(2) : 32.

Material : 1 ex. Ukrul, Mizoram, 6.5.1981, Coll. C. Radhakrishnan.

Diagnosis : Dark grey to slate coloured on the dorsum; a light brownish streak present from eye to nostril; a black lateral streak present upto groin, often terminating in two black spots of different sizes with interconnections; dorsal skin smooth; a strong tuberculated fold extends from eye to shoulder over the tympanum. Tympanum distinct; fingers long, free and claw-shaped with distinctly swollen tips; subarticular tubercles prominent; tibiotarsal articulation reaching anterior corner of eyes; toes clawd with distinct swollen tips, two-third webbed; inner metatarsal tubercle present, outer metatarsal tubercle absent.

Distribution : India : Meghalaya, Assam, Nagaland, Mizoram.

Remarks : This species was originally recorded from Khasi hills, Meghalaya, India. Chanda (1994) recorded the species for the first time from Assam and Nagaland of northeast India. During the present study it has been recorded for the first time from Mizoram of northeast India.

Family MICROHYLIDAE

Diagnosis : Vomerine teeth absent; jaws toothless; pupil vertical and circular; terminal phalanges of fingers and toes simple or T-shaped; omosternum rudimentary or absent; sternum cartilagenous; procoracoides and clavicles absent; vertebrae procoelous or diplasio-coelous; ribs and intercalary phalanges absent; diapophyses of sacral vertebra dilated.

Genus ***Microhyla*** Tschudi

1838. *Microhyla* Tschudi, *Mem. Soc. Sc. nat. Neuchatel*, **2** : 28.

Diagnosis : Skin smooth or with warts; tongue narrow and elliptical, free and entire behind; vomerine teeth absent; pupil vertical and circular; tympanum hidden; paratoid glands absent; fingers free; toes free, webbed to a greater or lesser extent; tips of fingers and toes more or less dilated; outer metatarsal united; omosternum absent; terminal phalanges T-shaped.

Key to the species of *Microhyla*

Tibiotarsal articulation reaching beyond tip of snout; toes fully webbed. ... *berdmorei* (Blyth)

Tibiotarsal articulation reaching slightly infront of shoulder; toes with only rudiment of web. ..... *ornata* (Dum. & Bibron)

4. ***Microhyla berdmorei*** (Blyth)

1856. *Engystoma berdmorei* Blyth, *J. Asiat. Soc. Beng.* **24** : 710.

1994. *Microhyla berdmorei* Chanda, *Mem. zool. Surv. Irdia,* **18**(2) : 36.

Material : 2 exs. Ukrul, Mizoram, 6.5.1981, Coll. C. Radhakrishnan; 1 ex. Serchip, Mizoram, 9.5.1981, Coll. C. Radhakrishnan.

Diagnosis : Dorsally varying from pink to dark brown, sometimes with brownish spots or marbling, scattered on dorsal surface of the body; a chevron-shaped black marking near anus; limbs with faint cross bands; dorsum smooth; skin smooth; ventrally smooth. Tympanum hidden; fingers free with rounded tips; subarticular tubercles large and prominent; tibiotarsal articulation reaching beyond tip of snout; toes fully webbed, tips of toes swollen into rounded tips; both inner and outer metatarsal tubercles present.

Distribution : India : Meghalaya, Assam, Arunachal Pradesh, Mizoram.

Remarks : This species was originally recorded from Burma (Blyth, 1856). This is the second report of the species from northeast India after Chanda (1994).

5. ***Microhyla ornata*** (Dum & Bibron)

1841. *Engystoma ornata* Dum & Bibron, *Erp. Gen.* **8** : 745.

1994. *Microhyla ornata* Chanda, *Mem. zool, Surv. India,* **18**(2) : 38.

Material : 2 exs. Serchip, Mizoram, 7.10.76, Coll. K. R. Rao; 4 exs. Ukrul, Mizoram, 6.5.1981, Coll. C. Radhakrishnan.

Diagnosis : Dorsally varying from olive to greyish brown with dark markings extending from between the eyes backwards and widening posteriorly; limbs with incomplete dark cross bars; ventrally uniform coloured; skin smooth, with small tubercles on the dorsal surface; ventral surface almost smooth. Tympanum hidden; fingers free, tips of fingers dilated into small discs; subarticular tubercles small and prominent; tibiotarsal articulation reaching slightly infront of shoulder; toes with only rudiment of web; tips dilated into very small discs; subarticular tubercles small and prominent; an oval shaped inner metatarsal tubercle present, outer metatarsal tubercle absent.

Distribution : India : (West Bengal, Assam, Meghalaya, Mizoram, Nagaland, Manipur, Tripura, Kerala); Sri Lanka; China; Indo-China; Malaysia.

Remarks : This species was originally recorded from Malabar coast of South India (Dum. & Bibron, 1841). Chanda (1994) recorded the species for the first time from Mizoram. It is the second report of the species from Mizoram after Chanda (1994).

Family RANIDAE

Diagnosis : Upper jaw toothed, lower one nearly always toothless; diapophyses of sacral vertebra cylindrical or slightly dilated; in most cases fingers perfectly free, but the toes more or less completely webbed; one or more metatarsal tubercles may be present which may be blunt, sharp or shovel shaped, adopted for digging; terminal phalanges of fingers and toes are of various shapes and sizes; omosternum or sternum with or without bony style.

Key to the genera of Ranidae

Tips of fingers and toes with circum-marginal groove; tympanum distinct; terminal phalanges with feeble transverse expansion. ..... ***Amolops***

Tips of fingers and toes simple or dilated; tympanum distinct but sometimes hidden; terminal phalanges obtuse or T-shaped. ..... ***Rana***

Genus *Amolops* Cope, 1865

1865. *Amolops* Cope, *Nat. Hist. Rev.*, (N. S.) **5** : 97.

Diagnosis : Skin smooth, sometimes tuberculated; tongue bifid, free; vomerine teeth present; pupil horizontal; tympanum distinct; paratoid glands absent; fingers free; toes more or less webbed; tips of fingers and toes dilated into distinct discs with crescentic or horse-shoe shaped groove; terminal phalanges with feeble transverse expansions.

6. *Amolops afghanus* (Gunther)

1858. *Polypedates afghanus* Gunther, *Cat. Bat. Sal. Brit. Mus., London.*, : 160.

1994. *Amolops afghanus*, Chanda, *Mem. zool. Surv. India*, **18**(2) : 46.

Material : exs. Serchip, Mizoram, 7.10.1976, Coll. K. R. Rao; 1 ex. Ukrul, Mizoram, 6.5.1981, Coll. C. Radhakrishnan.

Diagnosis : Dorsally dark olive to brown, ventrally slightly yellowish; skin almost smooth; belly and hinder parts of thighs granulated; tympanum distinct; fingers free with prominent dermal boarder and with large discs; subarticular tubercles large and prominent; tibiotarsal articulation reaching beyond tip of snout; toes fully webbed, having large discs with prominent well developed grooves separating upper from lower surface; subarticular tubercles large and prominent; inner metatarsal tubercle present, outer metatarsal tubercle absent.

Distribution : India : (Assam, Arunachal Pradesh, Meghalaya, Tripura, West Bengal); Nepal; Myanmar; China.

Remarks : Chanda (1994) recorded the species for the first time from Mizoram. This is the second report of the species from the above area after Chanda (1994).

Genus *Rana* Linnaeus

1758. *Rana* Linnaeus, *Syst Nat. ed.*, **10** Helmiae : 210.

Diagnosis : Skin not smooth; tongue free, deeply notched and bifid behind; vomerine teeth present (rarely absent); pupil horizontal; tympanum distinct, sometimes hidden; parotoid gland absent; fingers free; toes webbed (rarely nearly free); tips of fingers and toes simple or dilated; discs without transverse grooves; outer metatarsal seperated by web; terminal phalanges obtuse or T-shaped; omesternum and sternum with a bony style.

Key to the species of *Rana* L.

1. Head broader than long. 2
– Head as long as broad or longer than broad. 3
2. Tibiotarsal artiuclation reaching between eyes and nostril; inner metatarsal tubercle present, outer metatarsal tubercle absent. ..... *cyanophlyctis*
– Tibiotarsal articulation reaches tip of snout; both inner and outer metatarsal tubercles present. ..... *limnocharis*
3. Toes fully webbed. 4
– Toes two-third webbed; inner metatarsal tubercle present; outer metatarsal tubercle absent. ..... *erythraea*
4. Fingers and toes with horizontally grooved discs. ..... *gerbillus*

   Fingers and toes without grooved discs but with rounded tips. ..... *tigerina*

7. *Rana cyanophlyctis* Schneider

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph.*, **1** : 137.

Material : 12 exs. Serchip, Mizoram, 7.10.1976, Coll. K. R. Rao; 9 exs. Aijal, Mizoram, 7.9.1981, Coll. K. P. Singh.

Diagnosis : Colour greyish to brownish above, spotted or marbled with black or dark markings; ventral surface black or pale yellowish, speckled with blackish dots; dorsum with small tubercles and warts and rows of pores; ventral surface almost smooth; head slightly broader than long; tympanum distinct; fingers free, pointed with minute dermal border; subarticular tubercles small

and prominent; tibiotarsal articulation reaching between eyes and nostril; toes fully webbed; subarticular tubercles small, prominent; a small prominent, pointed, inner metatarsal tubercle present; outer metatarsal tubercle absent.

Distribution : All over India; Pakistan; Afghanistan; South Arabia; Sri Lanka.

Remarks : This species found to occur in Mizoram throughout the year. As it is a staple food of the local people the population of this species is gradually diminishing.

8. ***Rana gerbillus*** Annandale

1912. *Rana gerbillus* Annandale, *Rec. Indian Mus*, **8** : 10.

Material : 2 exs. Serchip, Mizoram, 7.11.1976, Coll. K. R. Rao. 1 ex. Aijal, Mizoram, 7.9.1981, Coll. K. P. Singh.

Diagnosis : Dorsally dark grey, marbled with black; thighs and throat light brown to yellowish; a very faint dorsolateral glandular fold extending from the posterior border of eyes to groin; head as long as broad; tympanum distinct; fingers free with prominent horizontally grooved discs; subarticular tubercles small and prominent; tibiotarsal articulation reaching beyond tip of snout; toes fully webbed; subarticular tubercles prominent; inner metatarsal tubercle present; outer metatarsal tubercle absent.

Distribution : India (Meghalaya, Assam, Arunachal Pradesh, Mizoram).

Remarks : The present species was originally described from Abor foot-hills, Arunachal Pradesh. Pillai & Chanda (1979) recorded the species for the first time from Meghalaya. Chanda (1994) recorded the species from Arunachal Pradesh after a span of more than 70 years. During the present study it has been recorded for the first time from Mizoram.

9. ***Rana erythraea*** (Schlogel)

1837. *Hyla erythraea* Schlogel, *Abbild.*, ; 27.

1994. *Rana erythraea* Chanda, *Mem. zool. Surv. India*, **18**(2) : 66.

Material : 2 exs. Serchip, Mizoram, 7.11.1976, Coll. K. P. Singh.

Diagnosis : Dorsally bright green to dark green; tympanum reddish; limbs yellowish with faint irregular cross bars or dark bands; ventrally almost white; head longer than broad; tympanum distinct fingers free; tips of fingers dilated into small discs with grooves seperating upper from the lower surface; subarticular tubercles moderately large and prominent; tibiotarsal articulation reaching tip of snout; toes two-third webbed; tips of toes dilated into small discs with grooves; inner metatarsal tubercle present; outer metatarsal tubercle absent.

Distribution : India (West Bengal, Assam, Meghalaya, Mizoram); Myanmar; Malaysia; Indo-China; Indonesia.

Remarks : Chanda (1994) recorded the species for the first from Mizoram. This is the second report of the species from Mizoram after Chanda (1994).

10. ***Rana limnocharis*** Boisduval

1835. *Rana limnocharis* Bois. *Neva. Acta. Acad. Leap.*, : 235.

Material : 12 exs. Kolosib, Mizoram, 7.10.1976, Coll. K. R. Rao; 9 exs. Serchip, Mizoram, 7.9.1981, Coll. K. P. Singh; 7 exs. Ukrul, Mizoram, 6.5.1981, Coll. C. Radhakrishnan.

Diagnosis : Light brown to black with distinct or variable markings on the dorsal side; in most cases a mid-dorsal vertebral band present from snout to vent; similar band may also present along the thighs right upto the hills; limbs with complete or incomplete cross bars; dorsal skin rough with longitudinal ridges; head broader than long; tympanum distinct; fingers pointed free; subarticular tubercles small, very prominent; tibiotarsal articulation reaching tip of snout; toes pointed, half -webbed; subarticular tubercles small, prominent; both inner and outer metatarsal tubercles present.

Distribution : All over India; Sri Lanka; China; Malaysia; Indonesia; Philippines.

It is the most common and widely distributed species of Indian frogs and has been recorded from an altitude of 2133 m. in Sikkim (Boulenger). In northeast India, this species exhibits certain intraspecific variations specially in colour pattern with reference to the dorsal vertebral line which may be totally non-existent or sometimes very broad and prominent Chanda (1994).

11. ***Rana tigerina*** Daudin

1805. *Rana tigerina* Daudin, *Hist. Rain. Gren. Crap.*, : 64.

Material : 3 exs. Serchip, Mizoram, 9.11.1976, Coll. K. R. Rao.

Diagnosis : Dorsally yellowish to olive green, marked with large irregular blackish spots which may be disposed in longitudinal series on the back or forming two or three cross bands; ventrally white, without spots or few spots on the throat; dorsal skin covered with longitudinal folds; a strong glandular fold extends from eye to shoulder; ventral surface smooth; head as long as broad; tympanum very distinct; fingers free, long with rounded tips, subarticular tubercles small but very prominent; tibiotarsal articulation reaching beyond tip of snout; toes entirely webbed; tips rounded; subarticular tubercles small, very prominent; inner metatarsal tubercle present, outer metatarsal tubercle absent.

Distribution : All over India including Assam, Manipur, Mizoram, Nagaland, Tripura; Nepal; Myanmar; China; Indo-China.

Remarks : This species occurs throughout the Indian region. Chanda (1994) recorded the species for the first time from Mizoram. This is the second report of the species from Mizoram after Chanda (1994).

Family RHACOPHORIDAE

Diagnosis : Upper jaw toothed; lower jaw toothless; vomerine tooth present or absent; tongue free and deeply notched; tympanum distinct; fingers minutely to fully webbed; toes two-thirds to fully webbed; tips of fingers and toes dilated into prominent discs or rounded tips. Vertebrae procoelous; omosternum and sternum with bony style.

Genus ***Polypedates*** Tschudi

1838. *Polypedates* Tschudi, *Classif. Batr.*, : 34.

Diagnosis : Skin smooth or shagreen; vomerine teeth always present; fingers webbed at the base; semetomes two-third webbed; omosternum slightly forked at the base; distal end of metacarpals distinctly dilated and bony knob on distal metacarpal of third digit large; terminal phalanges of fingers and toes 'Y'-shaped.

12. ***Polypedates leucomystax*** Gravenhorst

1829. *Hyla leucomystax* Gravenhorst, *Syst. Rept.*, : 31.

1994. *Polypedates leucomystax* Chanda, *Mem. zool, Surv. India*, **18**(2) : 113.

Material : 2 exs. Serchip, Mizoram, 7.11.1976, Coll. K. R. Rao; 3 exs. Ukrul, Mizoram, 6.5.1981, Coll. C. Radhakrishnan.

Diagnosis : Dorsally yellowish to grey, sometimes greenish to reddish brown with black spots on the dorsum; limbs with dark cross bands; ventral surface almost white; skin finely granulated; belly and ventral surface of thighs granulated. Head broader than long; tympanum very distinct; fingers with rudimentary web and well developed discs; discs with distinct cutanesous circum-marginal groove; subarticular tubercles small and not well developed; tibiotarsal articulation reaching anterior corner of eyes; toes two-third webbed; tips of toes dilated into well developed circum-marginal grooves which are slightly smaller than finger discs; inner metatarsal tubercle prominent, outer metatarsal tubercle absent.

Distribution : India : West Bengal, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura; Sri Lanka; China; Malaysia; Philippines.

Remarks : This species appears to be rare in northeast India. Pillai & Chanda (1979) recorded it for the first time in Meghalaya. Chanda (1994) recorded it for the first time from Assam, Manipur and Nagaland. During the present study it has

been recorded for the first time from Mizoram, northeast India.

Genus ***Rhacophorus*** Kuhl. & V. Hass.

1822. *Rhacophorus* Kuhl. & V. Hass., *Alg. Konst-en Latter-bede*; 7 : 104.

Diagnosis : Skin smooth or sometimes tuberculated; tongue free and deeply notched behind; vomerine tooth present (rarely absent); pupil horizontal; tympanum generally distinct; fingers free or webbed; toes webbed; tips of fingers and toes dilated into regular discs; outer metatarsals seperated by web; omosternum and sternum with a bony style; terminal phalanges generally bifurcated; an intercalary ossicle present between penultimate and ultimate phalanges.

13. ***Rhacophorus bipunctatus*** Ahl.

1927. *Rhacophorus bipunctatus* Ahl, *Sitz. Ges. Naturf. Freunde* Berlin, : 147.

Material : 3 exs. Ukrul, Mizoram, 6.5.1984, Coll. C. Radhakrishnan.

Diagnosis : Colour variable; dorsum green to olive, leaf green in life; limbs slate coloured on the dorsum; ventrally whitish; characteristic black spots very prominent on flanks, the number of spots are variable, sometimes two large spots occur on the right side with three smaller spots on the left. In some specimens, there are two spots on both sides and in a few, only one spot on each side. Generally the anterior spot is larger than others. Dorsal skin smooth; belly, lateral sides of the body and thighs fully granulated.

Head broader than long; tympanum distinct; fingers moderately long with prominent discs and with distinct circum-marginal groove; fingers webbed to discs except the first; subarticular tubercles moderately large and prominent; tibiotarsal articulation reaching posterior corner of eyes; toes with large discs and with circum-marginal groove, fully and broadly webbed; subarticular tubercles small and prominent; inner metatarsal tubercle present, outer metatarsal tubercle absent.

Distribution : India : (Meghalaya, Assam, Arunachal Pradesh, Manipur, Nagaland, Mizoram, Tripura); Indonesia.

Remarks : This species was recorded for the first time from Arunachal Pradesh and Meghalaya (Annandale, 1912; Pillai & Chanda, 1979). Chanda (1994) recorded the species for the first time from Assam, Manipur, Nagaland and Tripura. During the present study it has been recorded for the first time from Mizoram.

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Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 545-577, 2007

REPTILIA

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INTRODUCTION

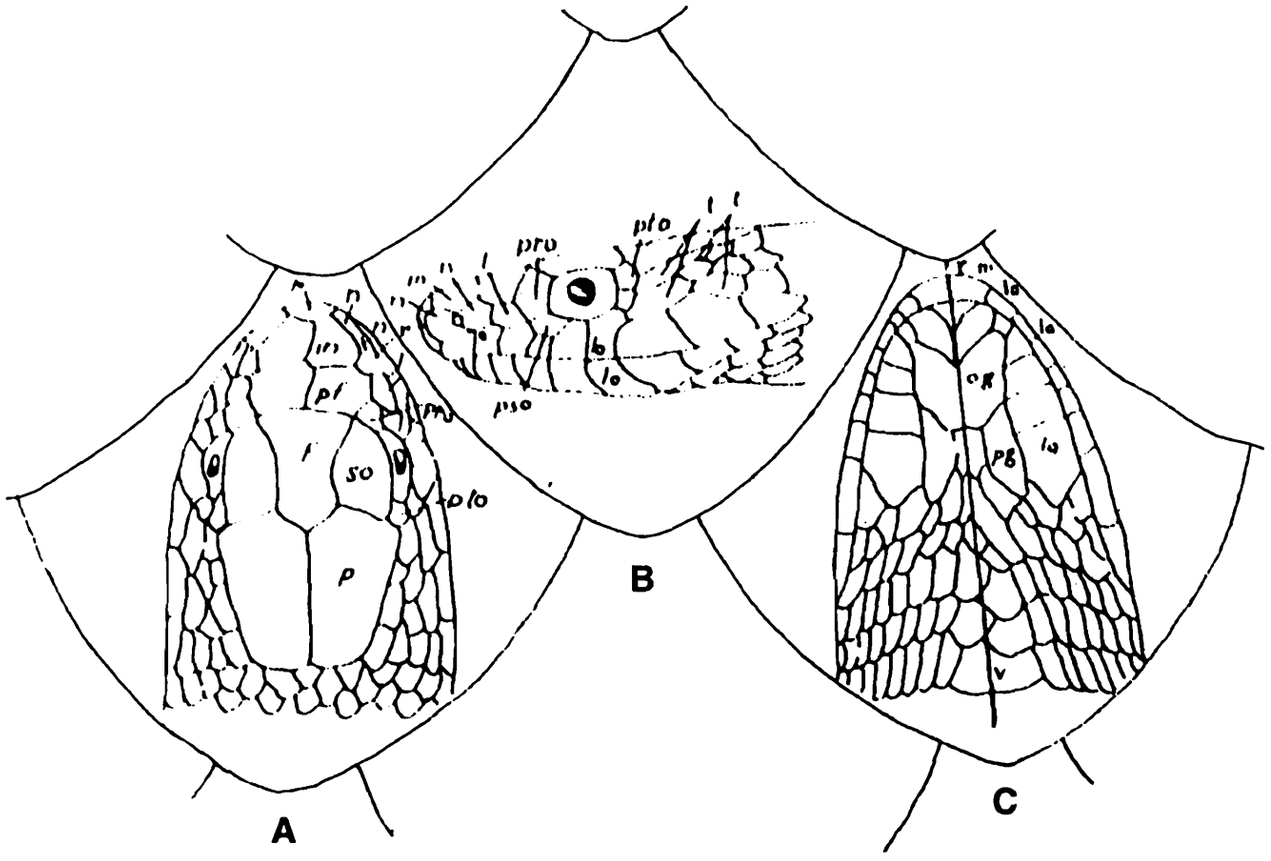
Mizoram lies between 21°57'–24°30' North and 92°15'–93°26' East and is bounded by Assam and Manipur in the north, Myanmar in the east and south and Tripura and Bangladesh in the west (Plate XXVII). The state capital Aizawl is surrounded on the east by Tuirial river, on the north by the Durtlang hills and on the west by Tlawng river. The terrain is hilly and mostly undulating (Plate XXVIII). The average altitude varies from 500 to 800 meters above mean sea level : the highest peak being 2157 meters in the Blue mountains. The climate ranges from moist tropical to moist subtropical. The average annual rainfall ranges from 2,160 mm in Aizawl to 3,500 mm in Lunglei. Winter temperatures varies from 22° C to 24° C and summer temperatures varies from 18° C to 29° C. The Tropic of Cancer passes through the middle of the state. Mizoram has three major forest types; Tropical Wet Evergreen, Tropical Moist Deciduous and Subtropical Pine Forests. The state has introduced plantation crops like Teak, Rubber, Coffee, Tea etc. and one can see vast areas of land under Teak plantation. Mizoram is the first state to pass the Organic farming Act in 2004. Mizoram is rich in wild flora and fauna both in variety and abundance. The state has two National Parks and four Wildlife Sanctuaries. Dampa is a Tiger Reserve.

Reptiles are lung breathing vertebrates originally with two pairs of limbs, each with five clawed fingers and toes. The skull joint to the vertebral column is effected by a single condyle and the pelvic girdle is connected to two or more vertebrate. Body is covered with horny scales and plates and are devoid of feathers and hair. They are Poikilothermous; oviparous or ovoviviparous. As the first true-land animals they reached the peak of their evolutionary development during the Mesozoic era-a period known as the 'Golden Age of Reptiles'

The present day reptiles are grouped under four orders comprising of the snakes, lizards, turtles, crocodiles and a single species of Rhynchocephalian, the tuatara. Being poikilothermic, reptiles tend to concentrate in the tropics. They are found on land and water, in and around human habitations, inside houses and outhouses; under stones and in between crevices of rocks, under piles of logs, on bark, branches of trees and on bushes; in cultivated and non-cultivated land; in fields, thick and thin forests; deserts; ponds; lakes, streams; rivers; sea and almost anywhere.

COLLECTION, PRESERVATION AND IDENTIFICATION

Care should be taken not to mutilate or damage the specimen while collecting since study of many morphological characters (Figs. I, II and III) leads to its identification. The collected material should be accompanied by its collection data mentioning locality, date of collection, name of the collector, altitude, latitude and longitude. It is advisable to note down ecological notes of the specimen. Both



A, B and C. Dorsal, lateral and ventral view of a colubrid head. r. rostral; n. nasal; l. loreal; pro. preocular; pto. post ocular; in. internasal; pf. prefrontal; f. frontal; so. supraocular; p. parietal; pso. pre subn ocular; t. temporal; m. mental; la. labial; v. ventral; ag. anterior genials; p. posterior genials

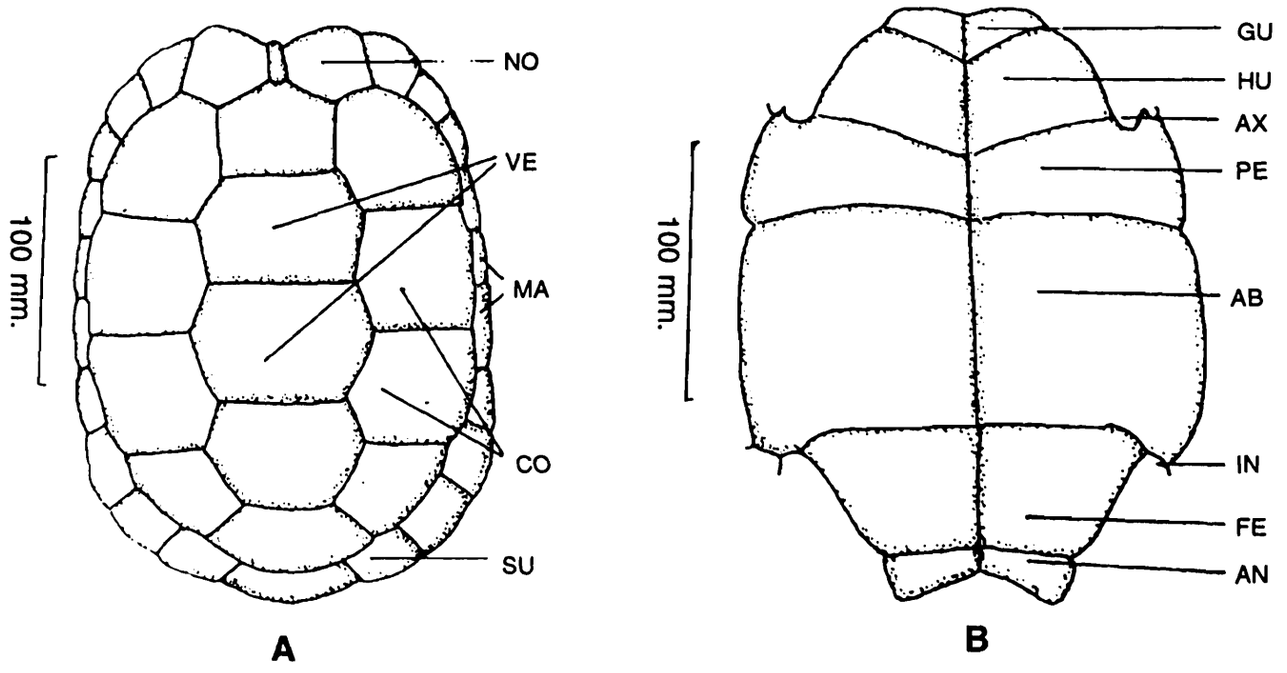
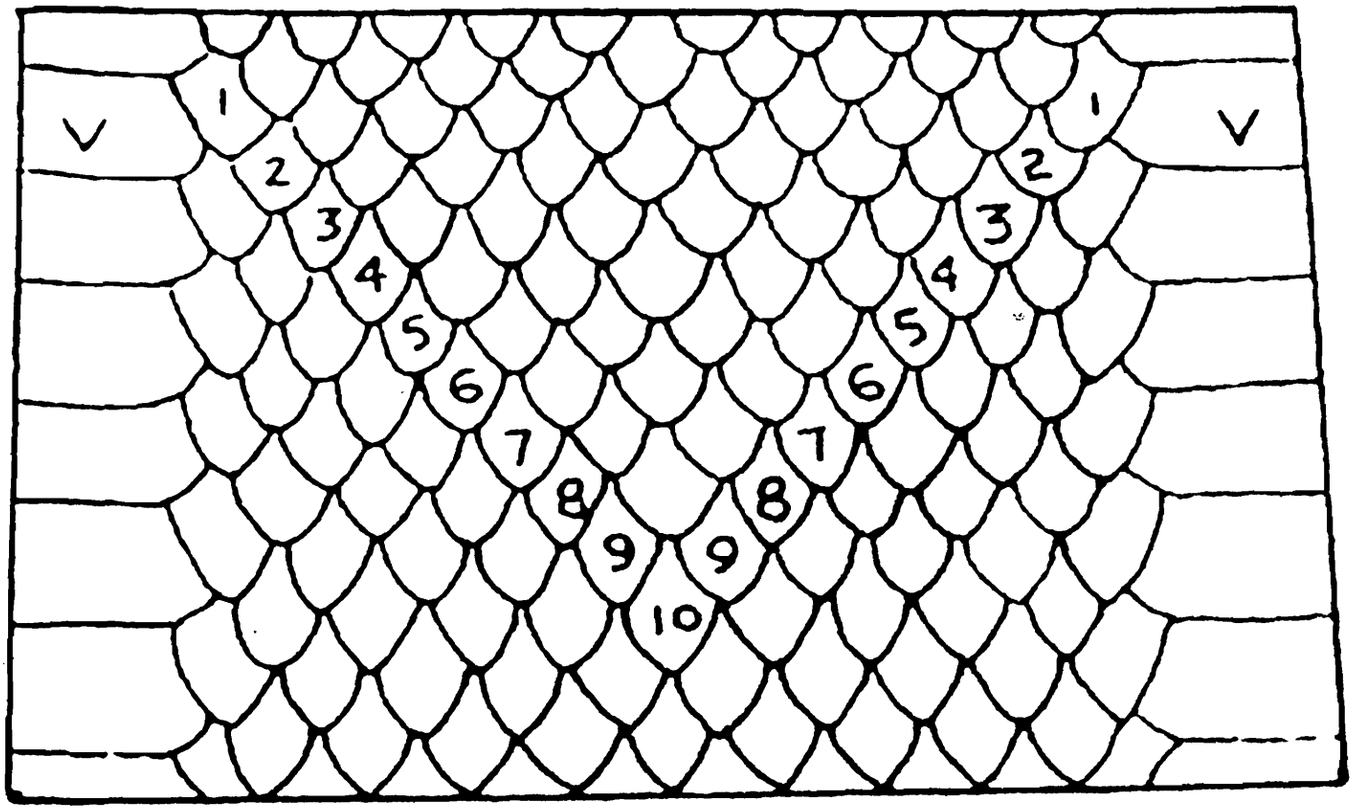


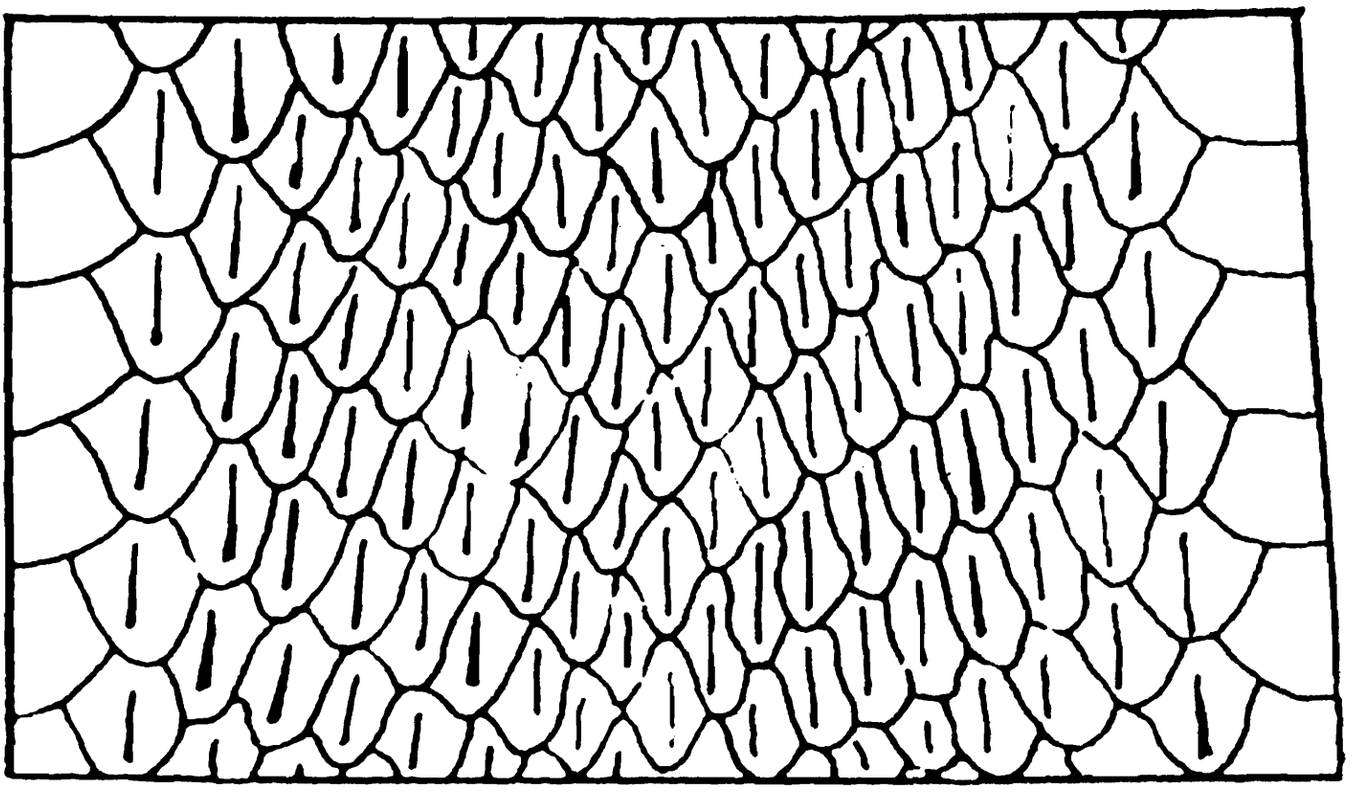
Fig. 1.

A. Carapace : N. Nuchals; VE. Vertebrals; MA. Marginals; CO. Costals; SU. Supracaudal.

B. Plastron : GU. Gular; HU. Humeral; AX. Axillary; PE. Pectoral; AB. Abdominal; IN. Inguinal. FE. Femoral; AN. Anal.

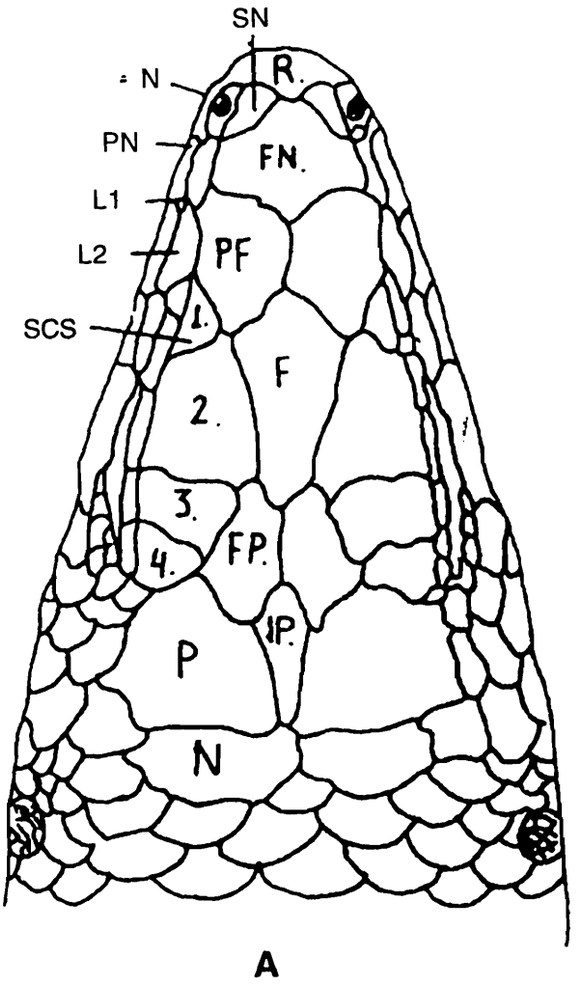


A



B

Fig. 2. : A. Counting scale rows; V. Ventral. B. Keeled dorsal scales.



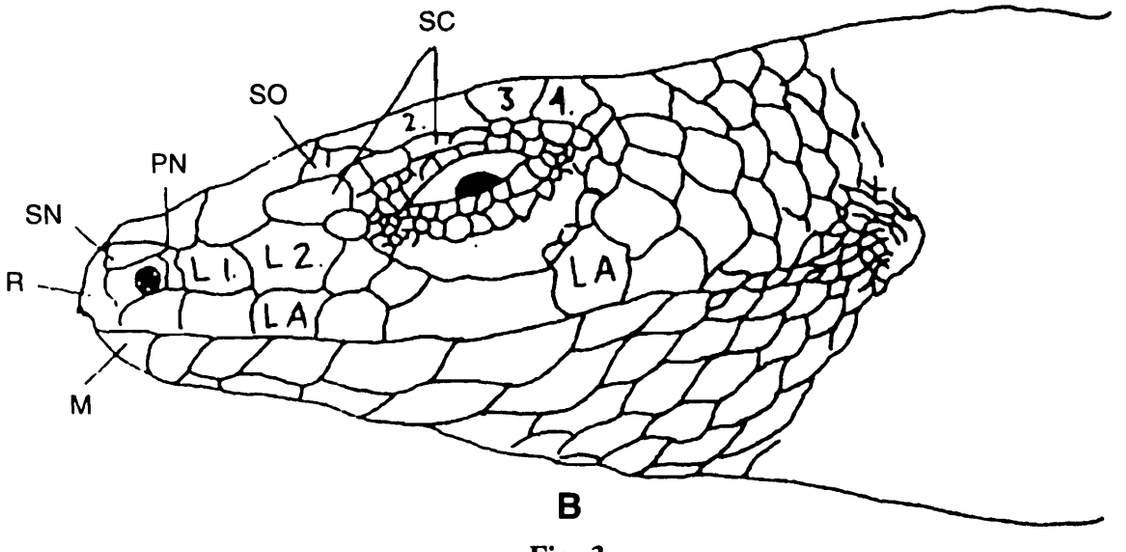


Fig. 3.

A. Dorsal view of a Scincid head.

R. Rostral; SN. Supranasal; N. Nasal; PN. Post nasal; L. 1 and L 2. Loreals; SO. and SCS. Supraoculars; FN. Fronto-nasal; PF. Prefrontal. F. Frontal; FP. Frontoparietal; IP. Interparietal; P. Parietal. N. Nuchal.

B. Lateral view of a Scincid head; SC. Supraciliaries; M. Mental; LA. Upper Labials.

rectified spirit and formalin can be used for preservation. Museum specimens are ideally preserved in alcohol. Depending on the size of the collected material 5–10% formalin may be used for preservation. Larger material can be stuffed and maintained. Identification of Testudines is greatly dependent on the nature and pattern of head and shell and the characters of the limbs. Lizards are identified with reference to their scale characters, body shape and measurements, colour and presence or absence of spines and tubercles. Scale characters especially that of the head count a great deal in the identification of snakes. The structure of hemipenes also helps as a specific character in certain cases.

The present study material is made available by various surveys conducted at random within the state by the scientists of Eastern Regional Station of Zoological Survey of India.

Order TESTUDINES
Turtles and Tortoises

The earliest record of Testudines is from the Triassic. Of about 22 families then, 12 survive today. India has six of the ten families of the sub-order Cryptodira distributed both over the land and the ocean. In general case a turtle has a shell with two halves, the dorsal carapace and the ventral plastron which are covered by horny shields. Generally there are 13 shields on the carapace and 12 on the plastron. On the carapace they are called the vertebrals, costals and marginals and on the plastron there are the paired gulars, humerals, pectorals, abdominals, femorals and anals. The marginals border the shell dorsally. Most turtles are able to withdraw the head and limbs into the shell for protection. All turtles are oviparous and many face a threat to their survival due to the unscrupulous killing for their flesh and consumption of their eggs by man and other animals. Of the 220 species of Testudines found in the world, 32 are distributed in India.

Order SQUAMATA
Lizards and Snakes

The order Squamata contains 2 suborders : Sauria, comprising of the Lizards and Serpentes comprising the snakes. In general case, a lizard has a slender body with two pairs of well developed limbs and tail. The body is covered with scales and unlike snakes they usually have a pair of external ear openings. Most lizards are insectivorous and oviparous. Barring the large sized monitor lizards and the spiny tailed lizards which are killed for flesh and skin, the rest of the group is comparatively safe with man in India.

Snakes are the most popular of the present day reptiles. The lack of limbs, movable eyelids and external ears is characteristic of them. Their ability to adapt themselves to diverse ecological niches available on earth is remarkable.

SYSTEMATIC LIST OF REPTILES REPORTED FROM MIZORAM

Class REPTILIA

Order-1 TESTUDINES

Family-1 TESTUDINIDAE

1. ***Indotestudo elongata*** (Blyth, 1853)
2. ***Manouria emys*** (Schlegel and Muller, 1844)

Family-2 BATAGURIDAE

3. ***Cyclemys dentata*** (Gray, 1831)
4. ***Kachuga dhongoka*** (Gray, 1834)
5. ***Kachuga sylhetensis*** (Jerdon, 1870)
6. ***Kachuga tecta*** (Gray, 1831)
7. ***Kachuga tentoria*** (Gray, 1834)
8. ***Melanochelys tricarinata*** (Blyth, 1856)
9. ***Pyxidea mouhotii*** (Gray, 1862)

Family-3 TRIONYCHIDAE

10. ***Lissemys punctata*** (Lacepede, 1788)
11. ***Pelochelys cantorii*** Gray, 1864

Order-II SQUAMATA

Suborder-(i) SAURIA

Family-4 GEKKONIDAE

12. ***Cosymbotus platyurus*** (Schneider, 1792)
13. ***Cyrtodactylus khasiensis*** (Jerdon, 1870)
14. ***Gekko gecko*** (Linnaeus, 1758)
15. ***Hemidactylus brooki*** (Gray, 1845)
16. ***Hemidactylus frenatus*** (Schlegel, 1836)
17. ***Hemidactylus garnoti*** Dumeril and Bibron, 1836
18. ***Ptychozoon horsfieldi*** Gray, 1827

Family-5 AGAMIDAE

19. ***Calotes emma*** Gray, 1845
20. ***Calotes versicolor*** (Daudin, 1802)
21. ***Calotes jerdoni*** Gunther, 1870
22. ***Draco maculatus*** (Gray, 1845)
23. ***Ptyctolaemus gularis*** Peters, 1864
24. ***Japalura variegata*** Gray, 1853

Family-6 SCINCIDAE

25. ***Sphenomorphus indicus*** (Gray, 1853)
26. ***Spenomorphus maculatus*** (Blyth, 1853)
27. ***Lygosoma punctata*** (Gmelin, 1799)
28. ***Mabuya carinata*** (Schneider, 1801)
29. ***Mabuya macularia*** (Blyth, 1853)
30. ***Mabuya multifasciata*** (Kuhl, 1820)
31. ***Tropidophorus assamensis*** Annandale, 1912

Family-7 LACERTIDAE

32. ***Takydromus sexlineatus*** Daudin, 1802

Family-8 VARANIDAE

33. ***Varanus bengalensis*** (Daudin, 1802)

Suborder-(ii) SERPENTES

Family-9 TYPHLOPIDAE

34. ***Rhamphotyphlops braminus*** (Daudin, 1803)
35. ***Typhlops diardii*** (Schlegel, 1839)

Family-10 BOIDAE

36. ***Python molurus bivittatus*** (Linnaeus, 1758)

Family-11 COLUBRIDAE

37. ***Ahaetulla prasina*** (Boie, 1827)
38. ***Amphiesma stolatum*** (Linnaeus, 1758)
39. ***Amphiesma xenura*** (Wall, 1907)
40. ***Boiga gokool*** (Gray, 1834)
41. ***Boiga multifasiata*** (Blyth, 1861)
42. ***Boiga ochracea*** (Gunther, 1868)
43. ***Boiga trigonata*** (Schneider, 1802)
44. ***Coelognathus radiatus*** (Schlegel, 1837)
45. ***Chrysopelea ornata*** (Shaw, 1802)
46. ***Dendrelaphis pictus*** (Gmelin, 1789)
47. ***Elaphe prasina*** (Blyth, 1854)
48. ***Lycodon aulicus*** (Linnaeus, 1754)
49. ***Lycodon jara*** (Shaw, 1802)
50. ***Lycodon zawi*** Slowinski *et al.*, 2001
51. ***Oligodon albocinctus*** (Cantor, 1839)
52. ***Oligodon cinereus*** (Gunther, 1864)
53. ***Oligodon melanozonotus*** Wall, 1922
54. ***Psammodynastes pulverulentus*** (Boie, 1827)
55. ***Ptyas korros*** (Schlegel, 1837)
56. ***Ptyas mucosus*** (Linnaeus, 1758)
57. ***Rhabdophis himalayanus*** (Gunther, 1864)
58. ***Rhabdophis subminiatus*** (Schlegel, 1837)
59. ***Sibynophis collaris*** (Gray, 1853)
60. ***Trachischium monticolum*** (Cantor, 1839)
61. ***Xenochrophis piscator*** (Schneider, 1799)

Family-12 ELAPIDAE

62. ***Bungarus caeruleus*** (Schneider, 1801)
63. ***Bungarus fasciatus*** (Schneider, 1801)
64. ***Bungarus niger*** Wall, 1908
65. ***Naja kaouthia*** (Linnaeus, 1758)
66. ***Ophiophagus hannah*** (Cantor, 1836)
67. ***Sinomicrurus macclellandi*** (Reinhardt, 1844)

Family-13 CROTALIDAE

68. ***Ovophis monticola*** (Gunther, 1864)
69. ***Trimeresurus albolabris*** Gray, 1842
70. ***Trimeresurus erythrurus*** (Cantor, 1839)

Family-14 VIPERIDAE

71. ***Daboia russelii*** (Shaw, 1797)

SYSTEMATIC ACCOUNTS

Order-1 TESTUDINES

Key to the families of the order TESTUDINES

1. Forelimbs semi paddle shaped, with three claws, carapace covered with smooth skin; edge of carapace flexible ..... TRIONYCHIDAE
- Forelimbs paddle shaped, with more than 3 claws; carapace covered with horny shields....2
2. Digits webbed; hind limbs paddle shaped .... BATAGURIDAE
- Digits not webbed; hind limbs club shaped ..... TESTUDINIDAE

Family-1 TESTUDINIDAE

Key to the genera of TESTUDINIDAE

1. Carapace flattened on the vertebral region; supra caudal single; 23 marginals including the nuchal and supracaudal ..... ***Indotestudo***
- Carapace convex, dome shaped; supracaudals paired; 25 marginals including the nuchal and supra caudal ..... ***Manouria***

Genus *Indotestudo* Lindholm, 1929

1929. *Indotestudo* Lindholm, *Zool. Anz.* lxxxi (11/12), p. 285.

1. *Indotestudo elongata* (Blyth, 1853)

1853. *Testudo elongata* Blyth, *J. Asiat. Soc. Bengal,* xxii, p. 639.

Material examined : Nil.

Diagnostic characters : Head moderate; dorsally with shields; carapace elongate, narrow, flattened on the vertebral portion; vertebrals five, as broad as the costals; costals four, supracaudal single; forelimbs with large pointed scales; heels with large flat scales.

Yellow or greenish yellow above, with black markings.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, Bihar, West Bengal; Cambodia; Laos; Malaysia; Myanmar; Thailand; Vietnam.

Genus *Manouria* Gray, 1852

1852. *Manouria* Gray, *Proc. Zool. Soc.*, p. 133.

2. *Manouria emys* (Schlegel and Muller, 1844)

1844. *Testudo emys* Schlegel and Muller, In : Temminck, *Verh. Nat. Ind. Rept.*, p. 34.

Material examined : Nil.

Diagnostic characters : Head massive, covered with large symmetrical shields; carapace convex and dome shaped, depressed on the vertebral region in juveniles but elevated in adults; five vertebrals, as broad or slightly broader than the costals; costals four; plastron sometimes longer than carapace owing to the extended gular shields; pectoral shields usually wide apart; inguinals large, often divided into two; forelimbs with five and hind limbs with four claws; adults with a greatly enlarged conical scute on the back of the thigh.

Dark brown or black above, head and limbs black.

Distribution : Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura; Bangladesh; Borneo; Malaysia; Myanmar; Sumatra; Thailand.

Family-2 BATAGURIDAE

Key to the genera of BATAGURIDAE

1. Vertebral shield short sided anteriorly .... ***Kachuga***
- Vertebral shield short sided posteriorly 2
2. Plastron united to carapace by suture .... ***Melanochelys***
- Plastron united to carapace by ligaments.... 3
3. Carapace strongly tricarinate, greatly flattened on the vertebral region ..... ***Pyxidea***
- Carapace unicarinate, not flattened on the vertebral region ..... ***Cyclemys***

Genus *Cyclemys* Bell 1834

1834. *Cyclemys* Bell, *Proc. Zool. Soc.*, p. 17.

Dignostic characters : Neural plates hexagonal, posteriorly short-sided; plastron not completely closing the shell, united to the carapace by ligaments; digits fully webbed.

3. *Cyclemys dentata* (Gray, 1831) (Plate I)

1831. *Emys dentata* Gray, *Syn. Rept.*, p. 20.

Material examined : Nil.

Diagnostic characters : Head moderately large; snout shorter than the orbit, slightly projecting beyond the lower jaw; head posteriorly with large shields; carapace depressed and considerably flat; vertebrals narrower than costals; plastron with paired gular, humeral, axillary, pectoral, abdominal, femoral and anal shields; a small inguinal may be present; the median suture between the pectorals the largest; limbs with fully webbed digits and transversely enlarged scales.

Distribution : Assam, Meghalaya; Indonesia; Malaysia; Myanmar; Philippine Islands; Thailand; Vietnam.

Genus *Pyxidea* Gray, 1863

1863. *Pyxidea* Gray, *Proc. Zool. Soc.*, p. 175.

Diagnostic characters : Carapace strongly tricarinate, greatly flattened on the vertebral region; digits half webbed; head without stripes.

4. *Pyxidea mouhotii* (Gray, 1862)

1862. *Cyclemys mouhoti* Gray, *Ann. Mag. Nat. Hist.* (3) x, p. 157.

Material examined : Nil.

Diagnostic characters : Head moderately small; snout shorter than the orbit and truncate; posterior portion of the had with large shields; carapace strongly tricarinate; greatly flattened on the vertebral region; anterior and posterior margins serrated; plastron with or without the axillary shields; limbs with half webbed digits; hind limbs club shaped; fore arm and sole covered with imbricate, pointed, horny shields.

Light brown above, beneath yellowish-brown, with a dark spot on each plastral shield; head brown with dark edged light spots.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Mizorm, Hainan; Laos; Vietnam.

Genus *Kachuga* Gray, 1869

1869. *Kachuga* Gray, *Proc. Zool. Soc.*, pp. 186 and 200.

Diagnostic characters : Neural plates hexagonal, short sided in front; 4th vertebral shield longer than broad, overlapping 4-5 neural bones; posterior portion of head with shields; limbs with fully webbed digits.

Key to the species of *Kachuga* Gray

1. Fourth vertebral shield overlaps four neural bones; 2nd vertebral shield pointed and overlap the 3rd vertebral ..... *dhongoka*
– Fourth vertebral shield overlaps five neural bones 2
2. 24 marginal shields 3
– 26 marginal shields; posterior region of carapace strongly serrated ..... *sylhetensis*
3. 2nd vertebral shield longer than 3rd ..... *tecta*
– 2nd vertebral shield shorter than 3rd ..... *tentoria*

5. *Kachuga dhongoka* (Gray, 1834)

1834. *Emys dhongoka* Gray, *Illus. Ind. Zool.* ii.

Material examined : Nil.

Diagnostic characters : Head moderately long with a pointed snout which projects beyond the lower jaw; posterior portion of the head with shields; carapace smooth, depressed, unicarinate, the keel most prominent up on the 2nd and 3rd vertebral shields; nuchal shield short sided in front; 1st vertebral longer than broad, more or less constricted in the middle, neural plates much longer than broad, more or less constricted in the middle; neural plates much longer than broad; plastron with paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields and is narrower than the opening of the shell; limbs with fully and broadly webbed digits and transversely enlarged scales; fore limbs with five claws.

Olive brown above with a black vertebral stripe; young with two black lateral stripes; yellowish beneath; juveniles with a large reddish

brown patch on the shields of plastron; head with a yellow stripe, starting from the nostrils to above the eye and tympanum.

Distribution : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Bihar, Uttar Pradesh, West Bengal; Nepal.

6. *Kachuga sylhetensis* (Jerdon, 1870)

1870. *Pangshura sylhetensis* Jerdon, *Proc. Asiat. Soc.*, Bengal, p. 69.

Material examined : Nil.

Diagnostic characters : Head moderately small, snout pointed, shorter than the orbit and projecting much beyond the lower jaw; carapace elevated with a prominent vertebral keel which transforms into a backwardly projecting spike at the posterior margin of the 3rd vertebral shield, posterior margin of carapace strongly serrated; 26 marginal shields including the paired supracaudals; plastron with paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral,and anal shields; limbs with fully and broadly webbed digits and with transversely enlarged scales.

Olive brown above; yellow beneath, each plastral shield with a large dark brown spot; head and neck with yellow streaks.

Distribution : Assam, Meghalaya, Mizoram, Nagaland.

7. *Kachuga tecta* (Gray, 1831)
(Plate I)

1831. *Emys tectum* Gray, *Illus. Ind. Zool.* Vol. I, pl. 72.

Material examined : Nil.

Diagnostic characters : Head moderately small, snout pointed, shorter than the orbit; posterior portion of the head with large shields; carapace elevated and rounded; vertebrals with a strong keel which transforms into a spinous process at the posterior margin of the 3rds shield; 5th vertebral broader than the rest; nuchal shield short sided in front; plastron with a pair of gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields; limbs with fully webbed digits and with transversely enlarged scales.

Olive above, with minute black spots and orange or reddish vertebral stripe in the young; markings fade out in the adult; reddish yellow beneath with large black spots; head and neck black with thin yellow longitudinal lines on the neck; limbs with yellow spots.

Distribution : Assam, Meghalaya, Mizoram; the river systems of Ganges, Brahmaputra and Sind of India and Pakistan.

8. *Kachuga tentoria* (Gray, 1834)

1834. *Emys tentoria* Gray, *Proc. Zool. Soc.*, p. 54.

Material examined : Nil.

Diagnostic characters : 2nd vertebral shield usually shorter than the 3rd.

Head dull olive; a conspicuous red patch behind the tympanum; neck olivaceous, the yellow streaks, if present, fewer in number and less distinct; limbs without yellow spots; the dark transverse bars at the back of the thighs more numerous than in *tecta.*

Distribution : Mizoram, Mahanadi and Godavari river systems.

Genus *Melanochelys* Gray, 1869

1869. *Geomyda* Gray, *Proc. Zool. Soc.*, p. 100.

Diagnostic characters : 2nd neural plate octagonal; the succeeding ones broader anteriorly; plastron extensively united to the carapace by suture, with short axillary and inguinal buttresses which reach to the outer margin of the costals

9. *Melanochelys tricarinata* (Blyth, 1856)
(Plate II)

1856. *Geomyda tricarinata* (Blyth, 1856)

Material examined : Nil.

Diagnostic characters : Head moderately small, snout shorter than the orbit; truncate, carapace elongated, with three obtuse keels; vertebrals narrower than costals, plastron generally without the inguinal shields, limbs with half webbed fingers and toes with rudimentary webs.

Dark brown above with light brown keels; yellowish brown beneath; a broad red stripe on either side of the head and another one below the angle of the mouth; lmbs with or without yellow spots.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Mizoram, Bihar, West Bengal.

Family-3 TRIONYCHIDAE

Key to the genera of TRIONYCHIDAE

1. Plastron with soft semicircular flaps to conceal the retracted hind limbs ..... ***Lissemys***
- Plastron without skin flaps to conceal hind limbs; last one or two pairs of neural plates in contact with each other on the mid line; proboscis very short, not more than half the length of the eye opening ..... ***Pelochelys***

Genus ***Lissemys*** Smith, 1933

1809. *Trionyx* Geoffroy, *Ann. Mus. Hist. Nat.* Paris, xiv, p. 1.

Diagnostic characters : Nuchal bone boat shaped; eight pairs of costals; plastron with a cutanous femoral valve which conceal the hind limbs.

10. ***Lissemys punctata*** (Lacepede, 1788)
(Plate II)

1788. La *Tortue chagrinee* Lacepede, *Hist. Quad. Ovip*, i. 171.

Materialexamined : Nil.

Diagnostic characters : Head moderate; snout short and broad, carapace and plastron covered by a continuous sheet of soft skin; plastron with soft semicircular flaps, which conceals completely the retracted hind feet; limbs fully webbed and with three claws.

Olive brown above with irregularly arranged black-edged yellow spots.

Distribution : Assam, Meghalaya, Mizoram, Sikkim, Andaman Islands, the Ganges and Sind river systems, West Bengal; Bangladesh; Myanmar; Nepal; Pakistan; Sri Lanka.

Genus ***Pelochelys*** Gray, 1864

1864. *Pelochelys* Gray, *Pro. Zool. Soc.*, p. 89.

Material examined : Nil.

Diagnostic characters : Seven or eight neural plates forming a continuous series; eight pairs of costal plates, the last one or two pairs in contact in the mid-line.

11. ***Pelochelys cantorii*** Gray, 1864

1864. *Pelochelys cantorii* Gray, *Proc. Zool. Soc.*, p. 90.

Material examined : Nil.

Diagnostic characters : Head rather small, broad; snout short, rounded; proboscis very short.

Olive above, dotted all over with yellow; whitish below.

Order-2 SAURIA

Key to the families of SAURIA

1. Head shields symmetrical 2
- Head shields asymmetrical 3
2. Femoral pores present ..... LACERTIDAE
- Femoral pores absent ..... SCINCIDAE
3. With femoral or preanal pores 4
- Without femoral or preanal pores ..... AGAMIDAE
4. Dorsally with granules or imbricate scales ... GEKKONIDAE
- Dorsally with roundish or oval scales surrounded by rings of granules ..... VARANIDAE

Family-4 GEKKONIDAE

Key to the Genera of GEKKONIDAE

1. Digits dilated 2
- Digits not dilated; angularly bent forming an apical and basal portion; pupil vertical ..... ***Cyrtodactylus***
2. A cutaneous expansion along the lateral side of the body 3
- No cutaneous expansion along the side of the body 4

3. All the digits clawed; subdigital lamellae divided ..... ***Cosymbotus***
- Inner digits clawless; subdigital lamellae undivided ..... ***Ptychozoon***
4. Terminal phalanges of outer four digits free; rising angularly from the expanded portion; inner digit well developed; subdigital lamellae divided ..... ***Hemidactylus***
- Terminal phalanges of outer four digits united with the expanded portion; subdigital lamellae undivided ..... ***Gekko***

Genus *Cosymbotus* Fitzinger, 1843

1836. *Platyurus* Oaken, *Allgem. Naturgesch.* vi. p. 641.

Diagnostic characters : Digits webbed, with divided lamellae beneath; a cutaneous expansion along the side of the body; pupil vertical; males with preanal and femoral pores.

12. *Cosymbotus platyurus* (Schneider, 1792) (Plate III)

1792. *Stellio platyurus* Schneider, *Amphib. Physiol.* ii, p. 30.

Material examined : 2 ex, VR/ERS/ZSI/250, Lunglei district, Lunglei, 2 km from Sainik Rest House, night collection, 21.9.2006, R. Mathew and party.

Diagnostic characters : 11-13 upper labials, 8-10 lower labials; 2 pairs of post mentals, the inner pair larger; a pair of internasals, usually with a scale between them; head covered above with minute granular scales, largest upon the snout, back with uniform small granular scales; belly with smooth, imbricate, round scales; a cutaneous expansion along the sides of the body and hind limb; digits partly webbed; 5-8 pairs of lamellae under the4th toe; tail strongly depressed with sharply denticulated margin, covered above with small scales and below with larger ones and a series of transversely enlarged plates; males with a continuous series of about 13 to 20 preanal and femoral pores.

Gray above, marbled and spotted with darker, a vertebral series of paired spots often present; tail with dark cross bands.

Length : Snout to vent 65 mm, tail 68 mm

Distribution : Arunachal Pradesh, Meghalaya, Mizoram, West Bengal, Sikkim, Formosa, Hong-Kong; Indo-China; Nepal; Sri Lanka.

Remarks : A common species.

Genus *Cyrtodactylus* Gray, 1827

1827. *Cyrtodactylus* Gray, *Phil. Mag* (2) ii, p. 55.

Diagnostic characters : Digits clawed, beneath with a row of distinct transverse plates; eye with vertical pupil; 2 or 3 pairs of post mentals.

13. *Cyrtodactylus khasiensis* (Jerdon, 1870) (Plate III)

1870. *Pentadactylus khasiensis* Jerdon, *P. Asiat. Soc. Beng.* p. 75.

Material examined : 1 ex, VR/ERS/ZSI/251, Lunglei district, Lunglei, 2 km from Sainik Rest House, night collection, 21.9.2006, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/252, Kolasib district, Kolasib Agriculture IB compound, Alt. 456 m, N24°14'38.9" E 92°40' 58.5", 24.9.2005, Coll. R. Mathew.

Diagnostic characters : Snout longer than the distance between the eye and the ear opening; 10 to 12 upper and as many lower labials; body and limbs above with small granular scales intermixed with larger tubercles; a lateral fold of enlarged scales; belly with rounded imbricate scales, 30 to 40 across the middle; tail covered with small flat scales, those on the median line below larger than the others; a dorsal series of enlarged tubercles on the basal part; males with an angular series of 8 to 14 preanal pores.

Light brown or greyish brown above with dark spots or markings more or less regularly arranged; head with brown spots; tail with brown bands belly whitish.

Length : Snout to vent 60 mm, tail 68 mm.

Distribution : Assam, Meghalaya, Mizoram, West Bengal, Myanmar.

Remarks : A common species.

Genus *Gekko* Laurenti, 1768

1768. *Gekko* Laurenti, *Syn. Rept.*, p. 43.

Diagnostic characters : Digits free or partly webbed with undivided transverse lamellae beneath; terminal phalanges of outer four digits slender, compressed, clawed, attached to the dilated portion; inner digit well developed, clawless, dorsal scales small, uniform or intermixed with larger tubercles; males with pre-anal and femoral pores.

14. *Gekko gecko* Linnaeus, 1758
(Plate IV)

1758. *Lacerta gecko* Linnaeus, *Syst. Nat. ed. 10.* p. 205.

Material examined : 1 ex, VI/ERS/ZSI/9283, Tipaimukh, 7 km N.E of Kolasib, 2.9.1989, Coll. Y.P. Sinha and party; 1 ex, VR/ERS/ZSI/265, Lunglei district, Tlabung, Circuit House compound, 8.6.2006, Coll. R. Mathew and party.

Diagnostic characters : 12-14 upper and 10-12 lower labials; 4-5 pairs of postmentals; gular region with small flat granules; head covered above with small polygonal scales, back with small scales intermixed with larger tubercles arranged in about 12 longitudinal series; 20-23 lamellae under the 4th toe; tail covered above with quadrangular smooth scales and regular rows of large conical, tubercles; below with large, flat smooth scales, the median ones of which are larger than the others; males with 10-24 preanal pores.

Violet grey, spotted all over with brick red and whitish grey (in the young these whitish spots form transverse bands); tail with alternating bands of olive-brown and slaty-grey; below whitish with small pinkish spots.

Length : Snout to vent 135 mm, tail 120 mm.

Distribution : Andamans, Bihar, Meghalaya, Mizoram, Tripura, West Bengal, China; Indo-China; East Indian Archipelago; Malay peninsula.

Remarks : This species is found in the open as well as inside human dwellings.

Genus *Hemidactylus* Oken, 1817

1817. *Hemidactylus* Oken, *Isis*, p. 1183.

Diagnostic characters : Digits strongly dilated with transverse, divided lamellae beneath; terminal phalanges compressed, free; inner digit well developed; pupil vertical; males with preanal and femoral pores.

Key to the species of *Hemidactylus* Oken

1. Enlarged dorsal tubercles numerous, strongly keeled, arranged in more or less regular longitudinal series; back with dark spots .... *brooki*
- Enlarged dorsal tubercles when present, rounded, smooth, or feebly keeled, not regularly arranged 2
2. Tail without denticulated lateral edge .... *frenatus*
- Tail strongly depressed, with sharp denticulated lateral edge ..... *garnoti*

15. *Hemidactylus brooki* Gray, 1845

1845. *Hemidactylus brookii* Gray, *Cat. Liz. Brit. Mus.*, p. 153.

Material examined : Nil.

Diagnostic characters : Snout obtusely pointed; 8-10 upper and 7-10 lower labials; 2 pairs of post mentals, the inner pair elongate and larger than the outer; snout covered with small scales, hinder part of head with small granules and larger rounded tubercles; back with small granular scales and conical tubercles arranged in from 16 to 20 more or less regular longitudinal rows; belly with smooth scales; 7-10 lamellae under the 4th toe; tail depressed, covered above with small scales and a series of 6-8 long pointed tubercles, below with imbricate scales and a median series of transversely enlarged plates; males with 7-16 preano-femoral pores on each side, usually interrupted mesially.

Light brown or grayish above, with dark brown spots; a dark streak along the sides of the head.

Length : Snout to vent 58 mm, tail 75 mm.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Mizoram, West Bengal; the whole of India, Sri Lanka.

Remarks : Common.

16. *Hemidactylus frenatus* Schlegel, 1836 (Plate IV)

1836. *Hemidactylus frenatus* Schlegel, in Dum.and Bibr., *Erp. Gen.* iii. P. 366.

Material examined : Nil.

Diagnostic characters : Snout obtusely pointed; 10-12 upper and 8-10 lower labials; 2 pairs of well developed postmentals of nearly equal size; gular region with small granular scales; hinder part of the head covered with small granules, snout with larger ones, back with small granules intermixed with rounded or conical tubercles; these enlarged tubercles vary considerably in number and maybe absent altogether; belly with smooth, rounded, imbricate scales; 9-10 lamellae under the 4th toe; tail covered above with small scales and a series of six enlarged pointed tubercles arranged in regular rows; below with a median series of transversely enlarged scales; males with a continuous series of about 26-36 preano-femoral pores.

Greyish or pinkish brown above, sometimes quite darker, with indistinct darker markings sometimes arranged as longitudinal stripes; a dark line along the side of the head and a light one above it usually present; whitish below; tail sometimes coral red.

Length : Snout to vent 60 mm, tail 65 mm.

Distribution : Assam, Meghalaya, Manipur, Mizoram, Tripura, West Bengal, Southern India; Hainan; Hong-Kong; Indo-China; Malay Peninsula; Sri Lanka; Australia; Africa; St.Helena; Yunnan.

Remarks : Common.

17. *Hemidactylus garnotii* Dumeril & Bibron, 1836

1836. *Hemidactylus garnoti* Dumeril and Bibron, *Erp. Gen.* iii., p. 368.

Material examined : Nil.

Diagnostic characters : 11-13 upper and 9-12 lower labials; mental shield sub triangular, twice as long as the adjacent labials; 2 pairs of post mentals, the outer smaller than the inner pair; hinder part of head covered with minute granules, snout with larger ones; back with small, uniform, granular scales except along the sides, where they may form a single line of larger rounded tubercles; belly with smooth, rounded imbricate scales; digits free or with a rudiment of web, 11-13 lamellae under the 4th toe; a fold of skin along the hinder border of the thigh; tail strongly depressed with sharp, denticulated, lateral edge, feebly segmented above; beneath with a median series of transversely enlarged plates.

Greyish-brown above, speckled or indistinctly marbled with darker; a dark streak along the side of the head; whitish below.

Length : Snout to vent 65 mm, tail 70 mm.

Distribution : Assam, Mizoram, Sikkim, West Bengal; Hainan; Myanmar; Nepal; Philippines; Siam; Thailand; Tonking.

Remarks : Not very common.

Genus *Ptychozoon* Kuhl, 1822

1822. *Ptychozoon* Kuhl, *Isis*, i. p. 475.

Diagnostic characters : Digits webbed, strongly dilated, with undivided transverse lamellae beneath; terminal phalanges of outer four digits slender, clawed; inner digit without free terminal phalange, clawless; dorsal scales small, intermixed with enlarged tubercles; a cutaneous expansion along the side of the body and tail; pupil vertical; males with preanal and femoral pores.

18. *Ptychozoon horsfieldi* Gray, 1827

1827. *Pteropleura* Gray, *Phil. Mag. (n.s.)* ii, p. 56.

Material examined : Nil.

Diagnostic characters : Tail tapering gradually to the tip, the lobes much narrower and directed more or less backwards, no dorsal tubercles; males with preanal and femoral pores.

Distribution : Mizoram; Borneo; Malay Peninsula; Penang; Sumatra.

Remarks : The occurrence of this species in Mizoram needs confirmation.

Family-5 AGAMIDAE

Key to the genera of AGAMIDAE

1. Three parallel longitudinal folds on each side of the throat ..... ***Ptyctolaemus***
- No fold on the side of throat 2
2. Ribs much prolonged, supporting a wing like expansion ..... ***Draco***
- Ribs not prolonged; no wing like expansion 3
3. Dorsal scales equal sized and regularly arranged ..... ***Calotes***
- Dorsal scales unequal, heterogeneous ..... ***Japalura***

Genus *Calotes* Rafinesque, 1815

1815. *Calotes* Rafinesque, *Anal. Nat.* p. 75

Diagnostic characters : Dorsal scales uniform; a dorsal crest more or less developed; tympanum exposed; tail long and slender.

Key to the species of *Calotes* Rafinesque

1. An oblique fold or triangular pit covered with small granular scales present in front of the shoulder 2
- No fold or pit in front of the shoulder, two separate spines above the tympanum, colour brown ..... *versicolor*
2. Two parallel rows of compressed scales above the tympanum, colour green ..... *jerdoni*
- No parallel rows of scales above the tympanum, a post orbital spine present; colour brown ..... *emma*

19. *Calotes emma* Gray, 1845

1845. *Calotes emma* Gray, *Cat. Liz. Brit. Mus.*, p. 244.

Material examined : Nil.

Diagnostic characters : A spine at the end of the superciliary edge and two more on the occiput between tympanum and the nuchal crest; Olive brown above; a white dorsolateral broad line starting from the upper labials to above the forelimb.

Light brown below; limbs and tail with brown/ black transverse bands or stripes; throat brilliant deep peacock blue.

Length : Snout to vent 115 mm, tail 290 mm.

Distribution : Assam, Meghalaya, Manipur, Mizoram, French Indo-China; Malay Peninsula; Myanmar; Pulo Condore; Siam; Yunnan.

Remarks : Not a common species.

20. *Calotes versicolor* (Daudin, 1802) (Plate V)

1802. *Agama versicolor* Daudin, *Hist. Nat. Rept.* iii, p. 395.

Material examined : 1 ex, V1/ERS/ZSI/8133, Saiha district, Chhimtuipui, 9.xii.1981, Coll. J.P. Sati and party;1 ex, VR/ERS/ZSI/16, Saiha district, Chhimtuipui, Kalchaw (Kolodyne river side), 17.1.1992, Coll. S.J.S. Hattar and party; 1 ex, VR/ ERS/ZSI/41, North Vanlaiphai, 13.v.1993, Coll. S.J.S. Hattar and party; 2 ex, VR/ERS/ZSI/253, Kolasib district, Gekdekon village, Alt.890m, N 23°53'41" E 92°40'54", night collection, 25.ix.2005, Coll. R. Mathew and party; 1 ex, VR/ ERS/ZSI/254, Serchhip district, Zawlpai, paddy field, Alt. 432 m, N 23°15'23" E 92°51'33.8", 23.9.2005, Coll. R. Mathew and party; 1 ex, VR/ ERS/ZSI/258, Lunglei district, Lungsen block, Phai Ruangkai, Alt. 978 m, N 22°49'28.7" E 92°38'32.9", 21.9.2005, Coll. R. Mathew and party; 1 ex, VR/ ERS/ZSI/266, Saiha district, Kolodyne river side, 7.6.2006, Coll. R. Mathew and party; 2 exs, VR/ ERS/ZSI/328, Mamit district, Tuidam village, Alt. 722 m, N 23°54'47" E 92°22'37.5", 4.12.2006, Coll. R. Mathew and party.

Diagnostic characters : Two well separated spines on each side of the back of the head above the ear; dorsal scales larger than the ventrals, pointing backwards and upwards; 35-58 round the body.

Light brown or grayish above, uniform or with more or less distinct dark brown transverse spots or bars upon the back and sides; dark streaks

radiating from the eye; young and females often with two light dorsolateral stripes; tail with light and dark annuli.

Length : Snout to vent 105 mm, tail 275 mm.

Distribution : The whole of India; Andamans; Indo-Chinese subregions; Afghanistan; China; Hainan; Hong-Kong; Malay Peninsula; Sri Lanka; Sumatra.

Remarks : A species of common occurrence.

21. *Calotes jerdoni* Gunther, 1870
(Plate VI)

1870. *Calotes jerdoni* Gunther, *Proc. Zool. Soc. Nov.* p. 778.

Material examined : 1 ex, VI/ERS/ZSI/9280, Seling and around, 8.9.1989, Coll. Y.P. Sinha

Diagnostic characters : 45-55 scales round the body; gular scales larger than the ventrals.

Green above with light yellow, orange or brown markings; a light dorsolateral stripe and another from elbow to the hand usually present; body with light vertical bars; limbs and tail with light spots; dark streaks radiating from the eyes; the fold in front of the shoulder black.

Length : Snout to vent 105 mm, tail 290 mm,

Distribution : Meghalaya, Mizoram; Myanmar; Yunnan.

Remarks : Common species.

Genus *Draco* Linnaeus, 1758

1758. *Draco* Linnaeus, *Syst. Nat*, p. 199.

Diagnostic characters : Body with a lateral wing like expansion supported by ribs; a gular appendage and a lateral flap or wattle on either side of the throat.

22. *Draco maculatus* (Gray, 1845)
(Plate V)

1845. *Dracunculus maculatus* Gray, *Cat. Liz. Brit. Mus.*, p. 262.

Material examined : Nil.

Diagnostic characters : Nostril lateral, directed more or less outwards; patagium usually with 5 ribs, spotted; gular appendage of male much longer than head; appendage of females usually not half the length of the head.

Greyish or bronze above, with darker markings; wing membranes orange, reddish-brown, yellowish or greenish above with scattered black spots which are very variable in size and count; pale yellow beneath with or without irregular black spots; inside of the wattles reddish brown or yellow.

Length : Snout to vent 82 mm, tail 125 mm.

Distribution : Arunachal Pradesh, Assam, Mizoram, Nagaland.

Remarks : Not commonly found.

Genus *Ptyctolaemus* Peters, 1864

1864. *Otocryptis (Ptyctolaemus)* Peters, *Mon. Acad. Berlin*, p. 386.

Diagnostic characters : Dorsal scales unequal, keeled; tympanum hidden.

23. *Ptyctolaemus gularis* Peters, 1864
(Plate VII)

1864. *Otocryptis (Ptyctolaemus) gularis* Peters, *Mon. Akad. Berlin*, p. 386.

Material examined : Nil.

Diagnostic characters : Canthus rostralis and supraciliary edge sharp; dorsal scales unequal, the smaller feebly and the larger strongly keeled; ventrals as large as the dorsals, strongly keeled and mucronate.

Olive brown or light yellowish-brown above, with darker transverse bars or spots; two curved dark brown crossbars, separated by a light one, between the eyes; a dark stripe from below the eye to the angle of the mouth; a light yellow stripe starting from behind the head, and continues along the flank to half its length; limbs and tail above with dark cross bars; flanks with pointed, yellowish, tubercles; yellowish white below; the folds on the throat dark blue.

Length : Snout to vent 80 mm, tail 170 mm.

Distribution : Meghalaya; Mizoram; Nagaland.

Remarks : A common species.

Genus ***Japalura*** Gray, 1853

1853. *Japalura* Gray, *Ann. Mag. Nat. Hist.* (2), xii, p. 387.

Diagnostic characters : An oblique fold in front of the shoulder, covered with small scales; tympanum exposed or concealed; dorsal scales unequal.

24. ***Japalura variegata*** Gray,1853

1853. *Japalura variegata* Gray, *Ann. Mag. Nat. Hist.* xii. p. 388.

Material examined : 1 ex., VR/ERS/ZSI/264, Lunglei district, Zebawk, District Park, Alt. 1128 m, N 22°50' E 92°49', 22.9.2005, Coll. R. Mathew and party.

Diagnostic characters : Head with a distinct neck; dorsum of head with unequal scales; a dark band across and anterior to the orbit; tympanum concealed; 10 upper and 11 lower labials; an angular series of five enlarged scales on either side of the head immediately above the neck continued to the body as dorso-lateral ridges which are disrupted halfway through; three enlarged scales below, towards the gular region; enlarged scales forming ridges on head, body and limbs; a white band from lower side of eye to corner of mouth passing through 10th upper labial; limbs long, hind limb reaches to the eye.

Dorsum dark brown, ventrally paler, speckled with black. Snout to vent 32 mm, tail 47 mm

Distribution : The Eastern Himalayas (Sikkim, West Bengal), Mizoram.

Remarks : Mathew (2007) reported this species from Mizoram.

Family-6 SCINCIDAE

Key to the Genera of SCINCIDAE

1. Supranasals present, ... 2
– Supranasls absent; 3
2. Limbs well developed ..... ***Mabuya***
– Limbs short or vestigial ..... ***Lygosoma***
3. Tympanum distinct, more or less sunk .... ***Sphenomporphus***
– Tympanum distinct, exposed and superficial .. .. ***Tropidophorus***

Genus ***Sphenomorphus*** Fitzinger, 1827

1827. *Lygosoma* Hardwicke and Gray, *Zool. Journ.* iij, p. 228.

Diagnostic characters : Head shields distinct; no supranasals; ear opening distinct.

Key o the species of *Sphenomorphus* Fitzinger

1. Rostral shield convex ..... *indicus*
– Rostral shield concave ..... *maculatus*

25. ***Sphenomorphus indicus*** (Gray, 1853) (Plate VII)

1853. *Hinulia indica* Gray, *Ann. Mag. Nat. Hist, (2)* xii, p. 388.

Material examined : Nil.

Diagnostic characters : Snout short, obtuse; rostral convex in broad contact with frontonasal; prefrontals separated from one another; no nuchals; 4 large supraoculars followed by 2 very small ones; 8-10 supraciliaries; an anterior and posterior loreals; ear opening oval, without any projecting lobules; tympanum deeply sunk; 7 upper labials; 30-38 scales round the body; tail tapering to a point; limbs moderate; digits long; 16-22 keeled lamellae beneath the 4th toe; palmar and plantar surfaces of hands and feet covered with conical tubercles.

Brown above, uniform or with brown or black spots usually arranged in longitudinal lines; a dark brown or black stripe along the sides of the head, body and tail, clearly defind above where it is edged with whitish; the lower edge may be broken into spots; labials usually with dark vertical bars; lower parts whitish.

Length : Snout to vent 92 mm, tail 107 mm.

Distribution : Assam, Meghalaya, Mizoram, Eastern Himalayas, Sikkim, West Bengal; the whole of Indo-China; Hainan; China; the Malaya Peninsula.

Remarks : A common species.

26. ***Sphenomorphus maculatus*** (Blyth, 1853) (Plate VIII)

1853. *Lissonota maculata* Blyth, *J. Asiat. Soc. .Beng. xxii,* p. 653.

Material examined : 1 ex, VI/ERS/ZSI/9288, Seling and around, 8.9.1989, Coll. Y.P. Sinha and party; 1 ex, VI/ERS/ZSI/9289, Thingdawl and around, 10 km south of Kolasib on Aizawl road, 4.9.1989, Coll. Y.P. Sinha and party; 1 ex, VR/ERS/ZSI/43, Blue mountain, 10.5.1993, Coll. S.J.S. Hattar and party; 2 ex, VR/ERS/ZSI/44, Khawng-lung wildlife sanctuary, 14.5.1993, Coll. S.J.S. Hattar and party; 1 ex, VR/ERS/ZSI/244, Lunglei district, Lungpuizawl village, Alt. 1142 m N22°50'55.6" E92°42'9.9", 22.9.2005, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/247, Serchhip district, Sailam, Dernai stream side, Alt. 854 m, N23°17'33" E92°51'46.3", 28.9.2005, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/271, Lunglei district, Zebawk, District Park, 15 km ahead of Lunglei, Alt. 1128 m, N22°50' E92°49', 4.6.2006, Coll. R. Mathew and party.

Diagnostic characters : Snout short; rostral flat or concave, in contact with fronto-nasal, which is much broader than long; prefrontals small, separated from one another; frontal as long as or longer than the fronto-parietals and interparietals together, the latter not separating the parietals behind; no nuchals; tympanum not deeply sunk; 7 upper labials; 38-42 scales round the body; a pair of large preanal; tail twice or nearly twice the length of body and tail, the median series of scales beneath transversely enlarged.

Bronzy or brown above, uniform or with small indistinct light spots, and two median series of small black spots; a dark brown or black lateral band, more or less spotted with white and usually edged below with white, extends from nose to the tail; lower parts of flanks more or less thickly speckled with black and white; whitish below.

Length : Snout to vent 65 mm, tail 107 mm.

Distribution : Assam; Meghalaya; Mizoram; Nagaland; Sikkim; West Bengal; Andaman and Nicobar Islands; Annam; Cambodia; Myanmar; Siam; Yunnan.

Remarks : Common species.

Genus ***Lygosoma*** Hardwicke and Gray, 1827

1827. *Lygosoma* Hardwicke and Gray, *Zool. Journ. iii*, p. 228.

27. ***Lygosoma punctata*** (Gmelin, 1799) (Plate VIII)

1799. *Scincus punctatus* Gmelin, *Hist. Amphib.* p. 197.

Material examined : Nil.

Diagnostic characters : Lower eyelid with a semitransparent undivided disc; supranasals in contact with one another behind the rostral; an enlarged temporal scale borders the outer margin of the parietal; ear opening with one or two minute lobules anteriorly; 7 upper labials; 24-26, rarely 28 scales round the body, 62-76 down the middle of the back; the adpressed limbs fail to meet; 11-14 lamellae under the 4th toe.

Brown above and on the sides, each scale with a dark basal spot.

Length : Snout to vent 85 mm.

Distribution : Mizoram, widely distributed in India; Bangladesh; Nepal; Pakistan; Sri Lanka.

Remarks : Not a very common species.

Genus ***Mabuya*** Fitzinger, 1826.

1826. *Mabuya* Fitzinger, *Class. Rept.* pp. 23 & 52.

Diagnostic characters : Eyelids movable, the lower with or without a more or less transparent disc; tympanum more or less deeply sunk.

Key to the species of *Mabuya* Fitzinger

1. A post nasal present 2
– Post nasal absent ..... *carinata*
2. 28–30 scales round the body; dorsals with 5, 7, or 9 keels; 12 to 17 lamellae under the 4th toe ..... *macularia*
– 30–34 scales round the body, dorsals with 3 or 5 keels; 17–23 lamellae under the 4th toe ..... *multifasciata*

28. ***Mabuya carinata*** (Schneider, 1801) (Plate IX)

1801. *Scincus carinatus* Schneider, *Hist. Amphib*, ii, p. 183.

Material examined : 2 ex, VI/ERS/ZSI/9279, Seling and around, 8.9.1989, Coll. Y.P. Sinha and party.

Diagnostic characters : Supranasals separated or just touching one another; prefrontals usually in contact with one another; a pair of nuchals; ear opening subcircular, with short pointed lobules anteriorly; 14-18 lamellae under the 4th toe.

Brown or bronzy above, uniform or with dark brown or black spots or longitudinal streaks along the lateral margin of the scales; sides darker with or without light spots; a light dorso-lateral line starting from above the eye and continued to the base of the tail usually distinct; a second white line starting from the upper lip and passing along the side of the flank to the groin present or absent.

Length : Snout to vent 125 mm, tail 165 mm.

Distribution : Meghalaya; Mizoram; West Bengal; Indian Peninsula; Sri Lanka.

Remark : Not a very common species.

29. ***Mabuya macularia*** (Blyth, 1853)

1853. *Euprepes macularius* Blyth, *J. Asiat. Soc. Beng.* xxii, p. 652.

Material examined : 1 ex, VR/ERS/ZSI/255, Serchhip district, Zawlpai, paddy field, Alt. 432 m, N23°15'23.4" E92°51'33.8", 23.9.2005, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/329, Mamit district, Bawngva village, Alt. 887 m, N23°54' 42.3" E92°25'37.5", 4.12.2006, Coll. R. Mathew and party.

Diagnostic characters : Supranasals separated from one another; pre-frontals separated from one another or just touching; a pair of nuchals and post nasals may or may not be present; 28-30 scales round the body; dorsals with 7 or 9 distinct keels.

Brown above, with a broad, dark brown vertebral stripe, edged on either side with black, or the stripe may be broken up into a series of elongate spots; flanks dark brown, usually spotted with white.

Distribution : Assam, Meghalaya, Mizoram, Bihar, Orissa, Uttar Pradesh, West Bengal; Annam; Cambodia; Malay Peninsula; Myanmar; Siam.

Remarks : Not a very common species.

30. ***Mabuya multifasciata*** (Kuhl, 1820) (Plate IX)

1820. *Scincus multifasciatus* Kuhl, *Beitr. Zool. Vergl. Anat.*, p. 126.

Material examined : Nil.

Diagnostic characters : Supranasals separated from or just touching one another; prefrontals usually in contact with on another; a pair of nuchal, and post nasal present; ear opening subcircular with small pointed lobules anteriorly; 30-34 scales round the middle of the body; dorsals with 3-5 keels.

Brown or olive brown above, uniform or with dark brown or black longitudinal spots or streaks along the lateral margins of the scales; flanks dark brown or black, with or without white black edged spots; a pale dorso-lateral line often present; upper head scales often margined with black; whitish below.

Length : Snout to vent 116 mm, tail 220 mm.

Distribution : Assam, Meghalaya, Manipur, Mizoram, Nagaland, Nicobar Islands, West Bengal; East Indies; Hainan; Malay Peninsula; New Guinea; Pulo Condore; Tongking; Yunnan.

Remarks : Somewhat commonly available species.

Genus ***Tropidophorus*** Dumeril and Bibron, 1839

1839. *Tropidophorus* Dumeril and Bibron., *Erp. Gen.* v, p. 554.

Diagnostic characters : Tympanum large, superficial; eyelids well developed, the lower scaly; supranasals absent; limbs well developed; digits cylindrical with transverse lamellae beneath.

31. *Tropidophorus assamensis* Annandale, 1912 (Plate X)

1912. *Tropidophorus assamensis* Annandale, *Rec. Ind. Mus.* viii, p.58

Material examined : 1 ex, VR/ERS/ZSI/241, Lunglei district, Lungsen block, Phai Ruangkai, Alt. 978 m, N22°49'28.7" E92°38'32.9", 21.9.2005, Coll. R. Mathew and party.

Diagnostic characters : Snout sharply pointed, narrow; rostrum convex; nasal single; tympanum large; lower eyelid scaly; frontonasal concave; two prefrontal in contact with one another; frontal large; five upper and as many lower labials; no supranasals; four supra oculars; three scales form a border for each parietal; mental large; three submaxillary scales on either side; upper head scales strongly ridged; 30 scales round the body, strongly keeled and sinuously produced; two large preanal plates; ninety five caudal plates; legs when stretched scarcely reach the wrist.

Dark brown above, obscurely marbled with yellow; three cross bars of latter colour, one across hind limbs, another across forelimbs and a third, less distinct than these two, across the back of neck; yellow spots on limbs; four or five of the broken bands of the same colour between forelimbs and hind limbs; tail obscurely banded; lips bordered with black; ventral surface yellowish..

Snout to vent 45 mm, tail 56 mm.

Distribution : Assam, Mizoram.

Remarks : After Annandale (1912), Mathew (2006) re-discovered it from Mizoram.

Family-7 LACERTIDAE

Genus *Takydromus* Daudin, 1802.

1802. *Takydromus* Daudin, *Hist. Nat. Rept.* iii, p. 251.

Diagnostic characters : Body dorsally with large, strongly keeled plates which form continuous lines; ventral plates large, imbricate, the outer always keeled; three pairs of submaxillary shields, the first two pairs in contact with their fellows.

32. *Takydromus sexlineatus* Daudin, 1802

1802. *Takydromus sexlineatus* Daudin, *Hist. Nat. Rept.* iii, p. 256.

Material examined : Nil.

Diagnostic characters : Snout acute; nasals touching each other behind the rostral; fronto-nasal single, as long as broad; prefrontals in contact with one another; supraoculars three in contact with the supraciliaries; interparietal half the size of the frontoparietal; three pairs of submaxillary shields; collar indistinct; temporals strongly keeled.

Length : Snout to vent 60 mm, tail 300 mm.

Distribution : Meghalaya, Mizoram; Borneo; Java; Myanmar; Sumatra.

Remarks : Not a very common species.

Family-8 VARANIDAE

Genus *Varanus* Merrem, 1820

1820. *Varanus* Merrem, *Tant. Syst.* Amphib., p. 58.

Diagnostic characters : Head covered with small, juxtaposed scales; back with roundish or oval scales, surrounded by rings of granules; ventral scales arranged in transverse series; a pair of preanal pores.

33. *Varanus bengalensis* (Daudin, 1802) (Plate X)

1802. *Tupinambis bengalensis* Daudin, *Hist. Nat. Rept.*, iii. p. 67.

Material examined : Nil.

Diagnostic characters : Scales on the crown of the head larger than the nuchal scales; supraocular scales small, subequal; abdominal scales smooth, in 90-110 transverse rows; tail strongly compressed with a low double toothed crest above; lateral caudal scales keeled.

Young dark olive, with numerous light spots or ocelli more or less transversely arranged and often alternating with dark spots or bar; top of head with light spots; lower parts whitish with

narrow dark transverse bars which may be broken up into spots. Adults brownish or olive above, usually with blackish dots; lower parts yellowish, uniform or mottled with black.

Length : Snout to vent 750 mm, tail 1000 mm.

Distribution : Meghalaya, Mizoram, the whole of India, Myanmar; Nepal; Pakistan; Persia; Sri Lanka.

Remarks : While driving through Mizoram one may come across this species crossing the road or basking in the sun.

Order SQUAMATA

Suborder SERPENTES

Key to the Families of SERPENTES

1. Eyes vestigial, covered by scales; body worm like ..... TYPHLOPIDAE
– Eyes developed, exposed; body not worm like 2
2. Vestiges of hind limbs present ..... BOIDAE
– Vestiges of hind limbs absent 3
3. Venom fangs absent in the front of the mouth ..... COLUBRIDAE
– Venom fangs present in the front of the mouth 4
4. Head shields symmetrical ..... ELAPIDAE
– Head shields asymmetrical 5
5. A deep pit between the preocular and loreal shields ..... CROTALIDAE
– No pit between the preocular and loreal shields ..... VIPERIDAE

Family TYPHLOPIDAE

Key to the genera of *Typhlopidae*

1. Suture of the nasal shield touching the preocular instead of the 2nd labial ..... ***Ramphotyphlops***
– Suture of the nasal shield touching the 2nd labial ..... ***Typhlops***

Genus ***Ramphotyphlops*** Fitzinger, 1843

1843. ***Ramphotyphlops*** Fitzinger, Stimson, 1977, *Bull. zool. Nomencl.* 33, (3/4), 204-207.

34. ***Ramphotyphlops braminus*** (Daudin, 1803)

1803. *Eryx braminus* Daudin, *Hist. Nat. Rept.* vii. p. 27.

Material examined : Nil.

Diagnostic characters : Snout rounded and strongly projecting; rostral 1/3rd to 1/4th the breadth of the head; 20 rows of scales round the body; 290-320 transverse rows of scales.

Brown or blackish above, lighter below; snout, anal region and end of tail whitish.

Total length : 146 mm.

Distribution : Mizoram, the whole of India; Arabia; China; Hainan; Indo-China; Malaya Peninsula; Persia; Sri Lanka.

Remarks : Maximum length recorded is 170 mm.

Genus ***Typhlops*** Oppel, 1811

1811. *Typhlops* Oppel, *Ordn. Rept.* p. 54.

Diagnostic characters : Head not distinct from neck; eyes vestigial; mouth inferior; tail short; worm like appearance.

35. ***Typhlops diardi*** Schlegel, 1839

1839. *Typhlops diardi* Schlegel, *Abbild. Amphib.*, p. 39.

Material examined : Nil.

Diagnostic characters : Snout rounded, strongly projecting; rostral 1/2 to 3/5th the breadth of the head; prefrontals in contact with the rostral; 24-26 or 28 scales round the body; 260-300 transverse rows of scales.

Brown to blackish above, paler below.

Total length : 500 mm.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, West Bengal, 1525m in western Himalayas up to Dehra Dun; Bangladesh, French Indo-China; Malay Peninsula and Archipelago; Myanmar; Nepal; Siam.

Remarks : It is a common species.

Family BOIDAE

Genus *Python* Daudin, 1803

1803. *Python* Daudin, *Mag. Encycl. An. 8*, p. 434.

Diagnostic characters : Head distinct from neck; rostral, anterior upper labials and lower labials pitted; pupil vertical; scales in 60-75 rows; ventrals narrow; caudals paired.

36. *Python molurus bivittatus* (Linnaeus, 1758) (Plate XI)

1758. *Coluber molurus* Linnaeus, *Syst. Nat.* 19th ed., p. 225.

Material examined : Nil.

Diagnostic characters : Rostral with a deep pit on either side; 2 pairs of prefrontal, the posterior pair smaller and often broken up; 2 pre- and 3-4 post oculars; 11-13 upper labials, the first two deeply pitted; scales in 60-75 rows; ventrals 245-270; caudals 58-73, paired; Anal 1.

Brownish above, with a dorsal series of large, elongate, more or less subquadrangular dark grey, black edged, irregular spots; flanks with smaller, rounded or irregularly shaped spots of the same colour; a lance-shaped mark on the top of the head extending on to the nape; lower parts yellowish, with a border of dark spots on the outer most row of scales; tail below marbled with yellow and black.

Total length : 1.2 meters.

Distribution : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland; Tripura, Sikkim, Uttaranchal; The whole of Indo-Chinese subregion; Southern China; Hong-Kong; Hainan; Bangladesh; Laos; Vietnam; Thailand; Cambodia; Indonesia; Nepal.

Remarks : A beautiful snake.

Family COLUBRIDAE

Key to the genera of COLUBRIDAE

1. All the teeth solid, not grooved 2
– Last 2 or 3 maxillary teeth grooved 10
2. Hypapophyses absent on the posterior dorsal vertebrae, the lower surface of which is smooth or with a low keel 3
– Hypapophyses present throughout the vertebral column 4
3. Maxillary teeth sub equal, pupil round 5
– Maxillary teeth unequal 6
5. Dorsals in 19-27 rows with apical pits ..... ***Elaphe***
– Dorsals in 13-15 rows ..... ***Dendrelaphis***
6. Postrerior maxillary teeth longest; pupil round 7
– Anterior maxillary teeth enlarged and fang like; pupil vertically elliptic, scales in 17 rows ..... ***Lycodon***
7. Maxillary teeth gradually enlarged forming a continuous series; scales in 15 or 17 rows ..... ***Ptyas***
– Posterior maxillary teeth strongly enlarged and compressed; scales in 13-21 rows ... ***Oligodon***
4. Dentary bone attached loosely to the apex of the articular and freely movable on it; 30-50 teeth, equal in size; scales smooth in 17 rows ..... ***Sibynophis***
– Dentary bone not but slightly movable on the articular; usually less than 30 teeth 8
8. Maxillary teeth equal; scales in 19 rows, strongly keeled ..... ***Xenochrophis***
– Maxillary teeth unequal 9
9. Maxillary teeth subequal; head not distinct from neck; scales in 13-15 rows ..... ***Trachischium***
– Posterior maxillary teeth longest; dorsal scales in 15-19 rows 12
12. Sulcus spermaticus forked ..... ***Rhabdophis***
– Sulcus spermaticus simple ..... ***Amphiesma***
10. Pupil round; scales in 17 rows; ventrals and caudals with a suture-like lateral keel and a notch on each side corresponding to the keel ..... ***Chrysopelea***
– Pupil not round 1
11. Pupil horizontal; scales in 15 rows ..... ***Ahaetulla***
– Pupil vertical 13
13. Vertebral row of dorsals enlarged; scales in 19-29 rows ..... ***Boiga***
– Vertebral row of scales not enlarged; scales in 17 rows ..... ***Psammodynastes***

Genus ***Ahaetulla*** Meise and Henning, 1932

1932. *Ahaetulla* Meise & Henning, *Zool. Anz.* Leipzig, xcix, 11/12, p. 296.

Diagnostic characters : Head elongate; eyes large, transversely oval with horizontal pupil; nostril in the posterior part of an elongated nasal; frontal narrow, elongate, bell shaped; scales in 15 rows, the vertebral row slightly enlarged.

37. ***Ahaetulla prasina*** (Boie, 1827)
(Plate XI)

1827. *Dryophis prasinus* Boie, *Isis*, p. 545.

Material examined : 1 ex, VR/ERS/ZSI/226, Thiltlang, Lunglei District, 24.9.05, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/227, Lungdai, Kolasib District, 24.9.05, Coll. R. Mathew and party.

Diagnostic characters : Snout without a dermal appendage; nasals in contact with the labials; prefrontals separated from them by 2 or 3 loreals; 1 preocular in contact with the frontal; 2 post oculars; temporals 2 + 2 or 2 + 3; 9 upper labials; anterior genials much shorter than the posterior; the scales of the sacral region strongly keeled in males often forming tubercles; ventrals 194-235; caudals 151-187, paired; Anal 2.

Green above, the interstitial skin black and white forming oblique lines; a white or yellow line along the outer margin of the ventrals.

Total length : 1970 mm, tail 670 mm.

Distribution : Arunachal Pradesh; Meghalaya, Mizoram, Sikkim, West Bengal; the Eastern Himalayas; the whole of Indo-Chinese region; Bangladesh; much of southeast Asia; Indo-Australian Archipelago.

Remarks : Mathew (2007) reported it for the first time from Mizoram.

Genus ***Amphiesma*** Dumeril and Bibron, 1854

1854. *Amphiesma* Dumeril and Bibron, *Erp. Gen.* vii, p. 724.

Diagnostic characters : Internasals broad anteriorly; nostril lateral; scales in 19 rows.

Key to the species of *Amphiesma* Dumeril and Bibron

1. Brownish above with 2 dorso-lateral buff stripes, stripes best marked on the posterior part of the body; caudals paired ..... *stolatum*
– Dark brown above with series of white spots; caudals single ..... *xenura*

38. ***Amphiesma stolatum*** (Linnaeus, 1758)
(Plate XII)

1758. *Coluber stolatus* Linnaeus, *Syst. Nat.* 10th ed. p. 219.

Material examined : Nil.

Diagnostic characters : Nostril placed dorso-laterally; internasals much narrowed anteriorly; frontal constricted in the middle; 1 preocular; temporals 1 + 1 or 1 + 2; 8 upper labials; scales in 19 rows; ventrals 118-158; caudals 50-89; Anal 2.

Brown above with black spots and 2 dorso-lateral buff stripes; the stripes best marked on the posterior part of the body where the black spots are least evident; lower parts with or without a spot on the ventral shield; labials yellowish may or may not be black edged.

Total length : 505 mm, tail 145 mm.

Distribution : Meghalaya, Mizoram; the whole of India; Bangladesh, Bhutan, China; Hainan; Indo-China; Nepal; Pakistan; Sri Lanka.

Remarks : Not uncommon.

39. ***Amphiesma xenura*** (Wall, 1907)
(Plate XII)

1907. *Tropidonotus xenura* Wall, *J. Bombay. N. H. S.* xvii, p. 616.

Material examined : 1 ex, VR/ERS/ZSI/230, Sailam Dernam Stream, Serchhip District, 23.9.05, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/267, Lunglei district, District Park, Zebawk, ca 15 km ahead of Lunglei, 4.6.2006, Coll. R. Mathew and party.

Diagnostic characters : Scales in 19 rows; 1 pre ocular; 2 post oculars; 9 upper labials; temporals 2+3; 1 loreal; 2 nasals; ventrals 158-165; caudals 82-105; Anal 2.

Dark olive-brown above with indistinct narrow black cross bars or series of spots; whitish below with dark brown squarish spots at the outer margin of the ventrals; tail more thickly spotted; labials black edged; a white streak from behind the angle of the mouth on to the neck.

Distribution : Meghalaya, Mizoram, Nagaland.

Remarks : Both the specimens were collected near the stream. This species is endemic to India and is reported from Meghalaya (Mathew, 1995), Mizoram and Nagaland (Whitaker & Captain, 2004).

Genus ***Boiga*** Fitzinger, 1826.

1826. *Boiga* Fitzinger, *Neue. Class, Rept.* p. 29.

Diagnostic characters : Head very distinct from neck; eye large with vertical pupil; scales in 19 to 29 rows, the vertebral row enlarged.

Key to the species of *Boiga* Fitzinger

1. Preocular not reaching the upper surface of the head 2
– Preocular reaching the upper surface of the head; scales in 21 rows; back with narrow black cross bars and whitish vertebral spots .... *multifasciata*
2. Body uniform brown above; dorsal in 21 rows ..... *ochracea*
– Body with a dorso-lateral series of branched spots 4
4. Vertebrals feebly enlarged, their posterior margins rounded or obtusely pointed .... *trigonata*
– Vertebrals strongly enlarged, their posterior margins truncate or concave ..... *gokool*

40. ***Boiga gokool*** (Gray, 1834)
(Plate XIII)

1834. *Dipsas gokool* Gray, Ill. *Ind. Zool.* ii. pl. 83.

Material examined : Nil.

Diagnostic characters : Scales in 21 rows, vertebrals strongly enlarged; 1 or 2 preoculars, not reaching the upper surface of the head; ventrals 219-231; caudals 87-103; Anal 1.

Yellowish brown above, with a series of vertical γ-shaped markings on each side of the back, separated from one another by a light vertebral line; top of head with a large, arrow shaped, black edged, longitudinally bisected mark; a black stripe from eye to the angle of the mouth; lower parts whitish, with an almost continuous series of brown or black spots on each side of the ventrals.

Total length : 870 mm, tail 175 mm.

Distribution : Arunachal Pradesh, Assam, Manipur, Mizoram, Nagaland, West Bengal; Eastern Himalayas, Bangladesh.

41. ***Boiga multifasciata*** (Blyth, 1861)

1861. *Dipsas multifasciata* Blyth, *J. A. S. Bengal*, xxix, p. 114.

Material examined : Nil.

Diagnostic characters : Scales in 21 rows; 1 or 2 preoculars, reaching the upper surface of the head; temporals 1 + 2 or 2 + 3; ventrals 223-250; caudals 100-115; Anal 1.

Greyish-brown above, finely speckled with black, and with narrow, black, transverse or oblique bars; a black longitudinal stripe on the nape and two more on the top of the head; another from eye to the angle of the mouth; lower parts whitish, thickly spotted and speckled with black.

Total length : 880 mm, tail 185 mm.

Distribution : Mizoram, Eastern and western Himalayas; Jammu and Kashmir; Uttaranchal; West Bengal; Sikkim; Nepal.

Remarks : Not a common species.

42. ***Boiga ochracea*** (Gunther, 1868)

1868. *Dipsas ochraceus* Gunther, *Ann. Mag. Nat. Hist.* (4) 1, p. 425.

Material examined : Nil.

Diagnostic characters : Scales in 21 rows, vertebrals strongly enlarged; 1 preocular, not reaching the upper surface of the head; 2 or 3 post oculars; 8 upper labials; temporals 2+2 or 2+3; ventrals 221-252; caudals 89-119, paired; Anal 1.

Greyish, reddish, or yellowish brown above, paler below.

Total length : 1100 mm, tail 235 mm.

Distribution : Assam, Mizoram, Eastern Himalayas, Sikkim, West Bengal; Andaman and Nicobar Islands; Bangladesh, Bhutan, Myanmar, Nepal.

Remarks : Not of common occurrence.

43. ***Boiga trigonata*** (Schneider, 1802)

1802. *Coluber trigonatus* (Schneider) in *Bechst. transl. Lacep.* iv. p. 256.

Material examined : Nil.

Diagnostic characters : Scales in 21 rows, vertebrals feebly enlarged; 1 preocular, not reaching the upper surface of the head; temporals 2+3; posterior genials separated from one another by small scales; ventrals 206-256; caudals 75-105, paired; Anal 1.

Light yellowish brown above, with a vertebral series of large, light, black edged, angular or γ-shaped spots; belly uniform or with small black spots on the outer margins of the ventrals; head with light symmetrical markings; a light stripe from above the eye to the angle of the jaw.

Total length : 990 mm, tail 180 mm.

Distribution : Meghalaya, Mizoram; throughout India : Pakistan; Sri Lanka.

Remarks : Fairly common.

Genus ***Coelognathus*** Helfenberger, 2001

44. ***Coelognathus radiatus*** (Schlegel, 1837) (Plate XIII)

1837. *Coluber radiatus* Schlegel, *Phys. Serp.* ii. p. 135.

Material examined : 1 ex, VR/ERS/ZSI/330, Mamit district, Tuidam village, (road kill) 5.12.2006, Coll. R.Mathew and party.

Diagnostic characters : Scales in 21 rows; 1 preocular, 2 post oculars; 2+3 temporals; ventrals 222-250; caudals 82-108, paired; Anal 1.

Reddish-brown above with four black stripes in the anterior half or two thirds of the body, commencing a short distance behind the neck; the upper pair on either side of the vertebral line broader; the outer pair narrower, usually broken up into a series of elongated spots on the anterior part of the body; a black bar across the occiput and three black streaks radiating from below the eye; the young are brightly patterned.

Total length : 1870 mm, tail 400 mm.

Distribution : Meghalaya, Manipur, Mizoram; the Eastern Himalayas; Indo-Chinese sub region; Chhatisgarh, Madhya Pradesh, Orissa, West Bengal, Sikkim; Bangladesh; Malay Archipelago; Nepal.

Remarks : A common species.

Genus ***Chrysopelea*** Boie

1826. *Chrysopelea* Boie in Feruss, *Bull. Sci. Nat.* ix, p. 237.

Diagnostic characters : Scales in 17 rows, with apical pits; ventrals with a suture like lateral keel and a notch on each side corresponding to the keel; caudals paired.

45. ***Chrysopelea ornata*** (Shaw, 1802) (Plate XIV)

1802. *Coluber ornatus* Shaw, *Gen. Zool.* iii, p. 477.

Material examined : Nil.

Diagnostic characters : Frontal shield bell shaped; loreal elongate; 1 large preocular; 2 post oculars; 2+2 temporals; 9 upper labials; ventrals 213-234; caudals 110-138, paired; Anal 2.

Greenish yellow above; each scale edged and mesially streaked with black, with more or less distinct black cross bars and a series of large coral red spots on every alternate yellow band; ventral yellow with a small black spot on either side.

Total length : 1100 mm, tail 300 mm.

Distribution : Meghalaya, Mizoraam, Bihar, Orissa, West Bengal; Western Ghats, Southern China; the whole of Indo-Chinese region; Myanmar, Sri Lanka, Tong-King.

Remarks : An uncommon species.

Genus *Dendrelaphis* Boulenger, 1890

1890. *Dendrelaphis* Boulenger, *FBI.*, p. 339.

Diagnostic characters : Head distinct from neck; loreal region concave; pupil round; scales in 13-15 rows; ventral with a suture like lateral keel; caudals paired, keeled.

46. *Dendrelaphis pictus* (Gmelin, 1789) (Plate XV)

1789. *Coluber pictus* Gmelin, *Syst. Nat*, i, p. 1116.

Material examined : Nil.

Diagnostic characters : Scales in 15 rows, the vertebrals enlarged; ventrals 167-200; caudals 127-164; Anal 1 or 2.

Bronze-brown above; a yellow or cream coloured flank stripe along scale rows 1and 2, bordered below by a dark usually black stripe; lower parts creamy white or yellowish; a black stripe along the side of the head, strong on the temple and passing onto the neck where it breaks up into oblique bars.

Total length : 1200 mm, tail 400 mm.

Distribution : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram; Nagaland, Tripura, the whole of the Indo-Chinese region, West Bengal, Eastern Himalayas to southern China; Bangladesh; Cambodia; Indonesia; Laos; Malaysia; Philippines; Thailand; Vietnam.

Remarks : An elegant species.

Genus *Elaphe* Fitzinger, 1828

1828. *Gonyosoma* Wagler, *Icon. Amphib.* pl. ix.

Diagnostic characters : Scales in 19-27 rows, with paired apical pits.

47. *Elaphe prasina* (Blyth, 1854)

1854. *Coluber prasinus* Blyth, *J. A.* S. Bengal. xxiii. p. 291.

Material examined : Nil.

Diagnostic characters : Scales in 19 rows; 9 upper labials; 1 preocular; 2 post oculars; temporals 2 + 2 or 2 + 3; ventrals 191-209; caudals 91-111, paired.

Uniform green, the interstitial skin with black and white reticulations.

Total length : 1100 mm, tail 250 mm.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Mizoram, West Bengal; Malay Peninsula, Myanmar, Teng-King; Yunnan.

Remarks : Not a very common species.

Genus *Lycodon* Boie, 1826

1826. *Lycodon* Boie, in Ferussac's *Bull. Sci. Nat.* ix, p. 238.

Diagnostic characters : Scales in 17 rows; 2 post oculars.

Key to the species of *Lycodon* Boie

1. Body with distinct transverse bands 2
– Body without transverse bands, purplish above, each dorsal with two small yellow spots ..... *jara*
2. Body with distinct white transverse bands, which expand laterally; purplish brown above; a white mark on nape ..... *aulicus*
– Body with thin transverse bands, which do not expand laterally; colour brownish-black ... *zawi*

48. *Lycodon aulicus* (Linnaeus, 1754) (Plate XV)

1754. *Coluber aulicus* Linnaeus, *Mus. Adolph.* Frider. i, p. 29.

Material examined : Nil.

Diagnostic characters : Scales in 17 rows; 1 preocular; 2 post oculars; temporals 2+3; ventrals 172-214; caudals 57-80, paired.

Purplish brown or grayish above with from 12-19 white cross bars enclosing triangular patches.

Total length : 700 mm, tail 145 mm.

Distribution : Assam, Meghalaya; the whole of India; Bangladesh, Celebes, China; Indo-China; Hong-Kong; Maldives; Malay Peninsula and Archipelago; Myanmar, Nepal; Sri Lanka.

Remarks : Not an uncommon species.

49. *Lycodon jara* (Shaw, 1802)
(Plate XVI)

1802. *Coluber jara* Shaw, *Gen. Zool*, iii. p. 525.

Material examined : 1 ex : VR/ERS/ZSI/231, 2 km from Sainik Rest House towards Lungsen, Lunglei District, 21.9.05, Coll. R. Mathew and party.

Diagnostic characters : Scales in 17 rows; loreal in contact with the internasal, not touching the eye; 1 preocular; temporals 1+2 or 2+3; ventrals 167-188; caudals 52-74, paired; Anal 2.

Purplish or brownish black above, stippled all over with yellow.

Total length : 550 mm, tail 105 mm.

Distribution : Assam, Meghalaya, Orissa, Tamil Nadu and West Bengal; Bangladesh, Nepal.

Remarks : Mathew (2007), reported it for the first time from Mizoram.

50. *Lycodon zawi* Slowinski, Pawar, Win, Thin, Tun, Gyi, Oo and Tun, 2001

Material examined : Nil.

Diagnostic characters : Scales in 17 rows; 1 preocular; 1 or 2 post oculars; temporals usually 2+3; 8 or 9 upper labials; ventrals 179-207; caudals 45-75, paired; Anal 2.

Glossy brownish-black above with thin, distinct, narrow white cross-bands that fade towards hind body; back of head without well defined bands; belly cream with darker outer edges.

Distribution : Assam, Meghalaya, Mizoram; Myanmar.

Remarks : An uncommon species.

Genus *Oligodon* Boie, 1827

1827. *Oligodon* Boie, *Isis*, p. 519.

Diagnostic characters : Head not distinct from neck; eyes with round pupil; rostral large, partly separating the internasals, visible from above; 1 pre and 2 post oculars; 3 or 4 lower labials in contact with the anterior genials; a typical *Oligodon* pattern on head with slight modification is observed throughout the genus.

Key to the species of *Oligodon* Boie

1. Scales in 19-21 rows; head shields complete; 7 upper labials; anal single ..... *albocinctus*
– Scales in 17 rows 2
2. Loreal absent; anal divided; 6 upper labials; ventrals 171-173; caudals 42-45 .... *melanozonatus*
– Loreal present; anal single; 8 upper labials; ventrals 157-185; caudals 29-42 ..... *cinereus*

51. *Oligodon albocinctus* (Cantor, 1839)
(Plate XVI, XVII)

1839. *Coronella albocincta* Cantor, *P. Z. S.*, p. 50.

Material examined : 1 ex : V1/ERS/ZSI/9281, Aibak Road, Aizawl District, 7.9.89, Coll. Y.P. Sinha and party.

Diagnostic characters : Scales in 19 rows; 7 upper labials;1 preocular; 2 post oculars; temporals 1+2; ventrals 177-208; caudals 40-69; Anal 1.

Brown above (pinkish in life) with white, yellow or fawn coloured black edged cross bars (19-28 on the body and 4-8 on the tail); belly whitish with large black squarish spots at the outer margins of the ventrals; head with typical *Oligodon* pattern.

Total length : 710 mm, tail 170 mm.

Distribution : Assam, Meghalaya, Mizoram, Sikkim, West Bengal; Bangladesh; Myanmar.

Remarks : Mathew (2007) reported it for the first time from Mizoram.

52. *Oligodon cinereus* (Gunther, 1864)
(Plate XVII)

1864. *Simotes cinereus* Gunther, *Rept. Brit.* Ind. p. 215.

Material examined : Nil.

Diagnostic characters : Scales in 17 rows; 8 upper labials ventrals 157-185; caudals 29-42, paired; Anal 1.

Reddish brown above with very distinct black cross bars alternating with one or two indistinct ones in between; lower portion heavily marked with squarish spots at the outer margins of the ventrals; head with a chevron mark and two other dark transverse bars anterior to it; a black bar across the snout.

Total length : 500 mm, tail 70 mm.

Distribution : Assam, Meghalaya, Mizoram, West Bengal; Cambodia; Cochin China; French Indo-China; Hainan; Hongkong; Myanmar; Siam; Tenasserim; Thua Lun; Tong-King.

Remarks : A colourful species.

53. *Oligodon melanozonotus* Wall, 1922

1922. *Oligodon melanozonotus* Wall, *Rec. Ind. Mus.* xxiv, p. 29.

Material examined : Nil.

Diagnostic characters : Scales in 17 rows; the prefrontal in contact with the 2nd labial; 6 upper labials; 1 anterior temporal; ventrals 171-173; caudals 42-45, Anal 2.

Light brown above with a series of whitish black edged cross –bars, which in the adults are entirely black; whitish below with squarish black spots which sometimes occupy the whole of the ventral shield; head light brown above with the typical markings edged with black.

Total length : 520 mm, tail 85 mm.

Distribution : Arunachal Pradesh, Mizoram.

Remarks : A very rare species. The report of this species from Mizoram needs confirmation.

Genus *Psammodynastes* Gunther, 1858

1858. *Psammodynastes* Gunther, *Cat. Col. Sn. Brit. Mus.*, p. 140.

Diagnostic characters : Head distinct from neck; eyes large with vertically elliptic pupil; scales in 17 rows at mid body.

54. *Psammodynastes pulverulentus* (Boie, 1827) (Plate XVIII)

1827. *Psammophis pulverulentus* Boie, *Isis*, p. 547.

Material examined : 2 ex : 1 ex. VR/ERS/ZSI/232, Lungpuizawl village, Lunglei, 22.9.05, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/229, Pachanglut (river), Lumglei, 21.9.05, Coll. R. Mathew and party; 1 ex, Lunglei district, Lungpuizawl village, 22.9.2005, Coll. R. Mathew and party.

Diagnostic characters : Snout truncate and slightly turned up; frontal narrow and elongated, more or less bell shaped; loreal may or may not be transversely divided; 1 or 2 preoculars; 2 or 4 post oculars; temporls 2 + 3; 8 upper labials; 3 pairs of genials, the anterior most pair broadest; ventrals 146-175; caudals 44-71, paired; Anal 1.

Total length : 510 mm, tail 170 mm.

Light brown above with small black streaks; a series of yellow spots on either side of the vertebral line; lower parts mottled with brown; head with symmetrical markings.

Distribution : Arunachal Pradesh, Meghalaya, Mizoram, West Bengal; the whole of Indo-Chinese region; China; Hainan; Malay Archipelago; Nepal.

Remarks : Mathew (2007) reported it for the first time from Mizoram.

Genus *Ptyas* Fitzinger, 1843

1843. *Ptyas* Fitzinger, *Syst. Rept.* p. 26.

Diagnostic characters : Scales in 15 rows; 2 or 3 loreals; a pre subocular.

Key to the species of *Ptyas* Fitzinger

1. Scales in 15 rows at mid body; ventrals 160-187 ..... *korros*
– Scales in 17 or 16 rows at mid body; ventrals 190-213 ..... *mucosus*

55. *Ptyas korros* (Schlegel, 1837) (Plate XIX)

1837. *Coluber korros* Schlegel, *Phys. Serp.* ii. p. 139.

Material examined : Nil.

Diagnostic characters : Scales in 15 rows; ventrals 160-187; caudals 120-147, paired; Anal 2.

Greyish-brown above, yellowish below; the scales on the posterior part of the body edged with black; the young ones olive green with narrow white cross bars.

Total length : 2000 mm, tail 680 mm.

Distribution : Assam, Meghalaya, Mizoram; China, Hainan; Malaysia; Myanmar.

Remarks : Not an uncommon species.

56. ***Ptyas mucosus*** (Linnaeus, 1758)

1758. *Coluber mucosus* Linnaeus, *Mus. Ad. Frid.* i. p. 37.

Material examined : Nil.

Diagnostic characters : Scales in 17 or 16 rows, the vertebrals may or may not be slightly enlarged; ventrals 190-213; caudals 100-146; Anal 2.

Olive-green, brown, yellowish or grayish above, with irregular, but strongly marked black cross bars on the posterior half of the body; yellowish white below; the ventrals and caudals edged with black; lips and throat whitish, the scales edged with black.

Total length : 2250 mm, tail 550 mm.

Distribution : The whole of India to Baluchistan; Afghanistan; Turkestan and Chitral in the north-west; Kashmir and the Himalayas; the whole of Indo-China as far as north as the Abor country; Yunnan and Southern Chin; Hainan; the Andaman Islands.

Remarks : A common species.

Genus ***Rhabdophis*** Fitzinger, 1843

1843. *Rhabdophis* Fitzinger, *Syst. Rept.* p. 27.

Diagnostic characters : Scales in 19 rows; internasals broad anteriorly; nostrils lateral.

Key to the species of *Rhabdophis* Fitzinge

1. A dorso-lateral series of yellow spots on the body; a white/yellow collar.....*himalayanus*
– Dorso-lateral series of yellow spots absent on the body; neck red; collar absent..... .....*subminiatus*

57. ***Rhabdophis himalayanus*** (Gunther, 1864) (Plate XIX)

1864. *Tropidonotus himalayanus*, Gunther, *Rept. Brit. Ind.* p. 265.

Material examined : 2 ex : 1 ex, VR/ERS/ZSI/ 233, Phairuanokai, Lungsen block, Lunglei, 21.9.05, Coll. R. Mathew and party; 1 ex, VR/ ERS/ZSI/268, Saiha district, Kolodyne riverside, collected dead, 7.6.2006, Coll. R. Mathew and party.

Diagnostic characters : Scales in 19 rows; 1 preocular; 3 post oculars; temporals 2 + 2 or 2 + 3; 8-9 upper labials; ventrals 151-176; caudals 79-95; Anal 2

Olive above with small black spots and two dorso-lateral series of small yellow spots; lower parts yellowish, uniform or speckled with brown; a yellow or orange collar; labials bordered with black; 2 black cross bars, one below and the other behind the eye.

Total length : 850 mm, tail 200 mm.

Distribution : Meghalaya, Manipur, Mizoram, Nagaland, Eastern Himalayas, Myanmar.

Remarks : The first specimen was caught alive and photographed inside the polythene packet. It was later found to regurgitate a partly digested frog.

58. ***Rhabdophis subminiatus*** (Schlegel 1837) (Plate XX)

1837. *Tropidonotus subminiatus* Schlegel, *Phys. Serp.*, ii, p. 313.

Material examined : 4 ex : 1 ex, V1/ERS/ZSI, 9282, Aibak road, 7.9.1989, Coll. Y.P. Sinha and party; 1 ex, VR/ERS/ZSI/14, Aizawl district, Seling, 12.1 1992, Coll. S.J.S. Hattar and party; 1 ex, VR/ERS/ZSI/15, Aizawl district, Lengpui, 24.1.1992, Coll. S.J.S. Hattar and party; 1 ex, VR/ERS/ZSI/234, Near Horticulture Division Road, Kolasib, 19.9.2005, Coll. R. Mathew and party.

Diagnostic characters : Scales in 19 rows; upper labials 8; 1 pre ocular; 3 post oculars;

temporals 2 + 3; ventrals 163-190; caudals 88-100, paired; Anal 2.

Olive-brown or greenish above, almost uniform or with black and yellow reticulations, the colour being confined to the interstitial skin and the edges of the scales; an oblique black bar below the eye; belly yellowish, sometimes with a black dot on the outer end of each ventral shield; neck in life tinged with vermillion.

Total length : 870 mm, tail 240 mm.

Distribution : Assam, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, Tripura, Eastern Himalayas; Indo-Chinese region; China; Hainan; Hongkong; Malay Peninsula and Archipelago.

Remarks : A common species.

Genus ***Sibynophis*** Fitzinger, 1843.

1843. *Sibynophis* Fitzinger, *Syst. Rept*, p. 26.

Diagnostic characters : Scales in 17 rows; caudals paired; 1 pre and 2 post oculars; anterior genials larger, in contact with four lower labials; anal divided.

59. ***Sibynophis collaris*** (Gray, 1853)
(Plate XX)

1853. *Psammophis collaris* Gray, *Ann. Mus. Nat. Hist.*(2) xii, p. 390.

Material examined : 1 ex, VR/ERS/ZSI/42, North Vanlaiphai, 13.5.1993, Coll. S.J.S. Hattar and party.

Diagnostic characters : Scales in 17 rows; 1 pre ocular; 2 post oculars; 1 anterior temporal in contact with the 8th labial; 10 upper labials; Ventrals 155-190; caudals 100-125; Anal 2.

Light brown above with a vertebral series of black spots; head with small black spots or vermiculations and two black transverse bars, one behind the eyes, the other across the occiput; nape black, bordered with yellow behind; upper lip white or yellow, spotted and bordered above with black; ventrals with a black spot and an additional median pair of black dots anteriorly, which vary greatly.

Total length : 550 mm, tail 250 mm.

Distribution : Meghalaya, Mizoram; Hainan; South China; Tong-King.

Remarks : Mathew (2007) reported it for the first time from Mizoram.

Genus ***Trachischium*** Gunther, 1858

1858. *Trachischium* Gunther, *Cat. Col. Sn. Brit. Mus.* p. 30.

Diagnostic characters : Scales in 15 rows; 6 upper labials; 1 pre ocular; 1 anterior temporal; caudals paired.

60. ***Trachischium monticolum*** (Cantor, 1839)

1839. *Calamaria monticola* Cantor, *P. Z. S.* p. 50.

Material examined : Nil.

Diagnostic characters : Scales in 15 rows; 2 prefrontals; 2 post oculars; temporals 1 + 1; ventrals 113-130; caudals 26-40; Anal 1.

Light brown with blackish longitudinal lines and two more or less distinct dosolateral stripes; yellowish below, with or without a yellow spot on either side of the neck.

Total length : 225 mm, tail 30 mm.

Distribution : Meghalaya, Mizoram.

Remarks : A common species.

Genus ***Xenochrophis*** Gunther, 1864.

1864. *Xenochrophis* Gunther, *Rept. Brit. Ind.* p. 273.

Diagnostic characters : Scales in 19 rows, strongly keeled; caudals paired.

61. ***Xenochrophis piscator*** (Schneider, 1799)
(Plate XXI)

1799. *Hydrus piscator* Schneider, *Hist. Amphib.* i. p. 247.

Material examined : Nil.

Diagnostic characters : Scales in 19 rows; ventrals 122-158; caudals 70-97, paired; Anal 2; 1 preocular; 2 or 3 post oculars; temporals 2 + 2 or 2 + 3; 9 upper labials; frontal shield much constricted in the middle.

Olive grey above with black spots quincuncially arranged; belly whitish, the ventrals edged with black.

Total length : 1200 mm, tail 340 mm.

Distribution : Meghalaya, Mizoram, the whole of India; China; Hainan; Hong-Kong; Laos; Myanmar; Pakistan, Sri Lanka.

Remarks : A very common species.

Family ELAPIDAE

Key to the genera of ELAPIDAE

1. Vertebral series of dorsals enlarged ..... ***Bungarus***
– Vertebral series of dorsals not enlarged 2
2. Scales in 13 rows ..... ***Sinomicrurus***
– Scales in more than 13 rows 3
2. Scales in 15 rows at mid body; a pair of large occipital scales present ..... ***Ophiophagus***
– Scales in 19-25 rows; no occipital shields ... ***Naja***

Genus *Bungarus* Daudin, 1803

1803. *Bungarus* Daudin, *Mag. Encycl., An. 8, v, March,* p. 434.

Diagnostic characters : Loreal absent; eyes with round pupil; vertebral row of dorsals enlarged; caudals single or some of them paired.

Key to the species of *Bungarus* Daudin

1. Dorsal vertebrae forming a ridge down the back; tail end bluntly; body with alternate black and yellow annuli ..... ***fasciatus***
– Dorsal vertebrae not forming a ridge down the back; tail end in a point 2
2. Body uniform black; belly uniform white; caudals 49-56 ..... ***niger***
– Back with white cross bars ..... ***caeruleus***

62. *Bungarus caeruleus* (Schneider, 1801) (Plate XXI)

1801. *Pseudoboa caeruleus* Schneider, *Hist. Amphib.* ii, p. 284.

Material examined : Nil.

Diagnostic characters : Scales in 15 or 17 rows; ventrals 194-234; caudals 42-52.

Black or bluish black above with narrow white cross bars, usually arranged more or less distinctly in pairs; they are least distinct on the anterior part of the body and may be entirely absent there in the young the bands are complete.

Total length : 1200 mm, tail 150 mm.

Distribution : Mizoram, Nagaland, Tripura, West Bengal, Peninsular India, Sri Lanka.

Remarks : Not very common.

63. *Bungarus fasciatus* (Schneider, 1801) (Plate XXII)

1801. *Pseudoboa fasciata* Schneider, *Hist. Amph.* ii. p. 234.

Material examined : Nil.

Diagnostic characters : Scales in 15 rows; ventrals 200-234; caudals 23-39; Anal 1.

Alternately banded with black and yellow or buff; a large black mark on the nape; a prominent ridge down the back; tail end bluntly.

Total length : 1800 mm, tail 150 mm.

Distribution : Assam, Meghalaya, Mizoram, Andhra Pradesh, Bihar, Orissa, Uttar Pradesh, West Bengal; the whole of Indo-Chinese region; China; Malaya Peninsula and Archipelgo; Myanmar.

Remarks : There is no mistaking this species as to its identity.

64. *Bungarus niger* Wall, 1908

1908. *Bungarus niger* Wall, *J. Bombay N.H.S,* xviii, p. 715.

Material examined : 1 ex, VR/ERS/ZSI/270, Saiha district, 13 km ahead of Saiha town, (road kill), 7.6.2006, Coll. R. Mathew and party.

Diagnostic characters : Scales in 15 rows; 1 preocular; 2 post oculars; temporals 1 + 2; ventrals 216-235; Caudals 49-56, single; Anal 1.

Uniform bluish-black or black above, white below, with more or less distinct dark mottling at the base of the ventrals and caudal shields.

Total length : 1200 mm, tail 135 mm.

Distribution : Assam, Meghalaya, Mizoram, the Eastern Himalayas.

Remarks : Fairly common species.

Genus ***Naja*** Laurenti, 1768

1768. *Naja* Laurenti, *Syn. Rept.*, p. 90.

Diagnostic characters : Dilatable neck; eye moderate with round pupil; no loreal; scales in 13-25 rows; caudals paired.

65. ***Naja kaouthia*** (Linnaeus, 1758)
(Plate XXIII)

1758. *Coluber naja* Linnaeus, *Syst. Nat.* 10th ed. p. 221.

Material examined : Nil.

Diagnostic characters : 1 pre and 3 post oculars; 7 upper labials; temporals 2 + 3; a cuneate scale in between the 4th and 5th lower labials; scales in 21 rows; hood with a monocellate mark; ventrals 164-196; caudal 43-58.

Olivaceous or brownish to black above, with a yellow or orange-colured monocellate mark on the hood; a black spot on the lower surface of the hood on either side, and one or two broad black cross-bars on the belly behind it.

Total length : 1500 mm, tail 230 mm.

Genus ***Ophiophagus*** Gunther, 1864

1864. *Ophiophagus* Gunther, *Rept. Brit. Ind.* p. 341.

Diagnostic characters : A pair of large occipital shields; scales in 15 rows at mid body; ventrals 240-254; caudals 84-104, anterior ones single.

66. ***Ophiophagus hannah*** (Cantor, 1836)
(Plate XXIV)

1836. *Hamadryas hannah* Cantor, *Asiat. Research*, xix. p. 187.

Material examined : 1 ex, VR/ERS/ZSI/235, Kawnpui Kanan, Kolasib District, 19.9.05, Coll. R. Mathew and party (Plate).

Diagnostic characters : Scales in 15 rows; a pair of large occipital shields; temporals 2 + 2; no cuneate scale; ventrals 240-254; caudals 84-104.

Head with four bars; Brown above with narrow, white, buff or yellow angularly transverse bars; in the young these bars including the 4 bars on the head are very distinct.

Total length : 2010 mm, tail 405 mm.

Distribution : Assam, Meghalaya, Mizoram, Bihar, Orissa, West Bengal; Western Ghats; the whole of Indo-Chinese region; China; Malaya Peninsula and Archipelago; Myanmar; Philippines : Siam and French Indo-China.

Remarks : Not an uncommon species.

Genus ***Sinomicrurus*** (Gray, 1834)

1834. *Callophis* Gray, *Ill. Ind. Zool.* ii.

Diagnostic characters : Dorsal scales in 13 rows; no loreal.

67. ***Sinomicrurus macclellandi*** (Reinhardt, 1844)
(Plate XXII)

1844. *Elaps macclellandi* Reinhardt, *Calcutta J. Nat. Hist. iv*, p. 532.

Diagnostic characters : Scales in 13 rows, smooth; ventrals 182-244; caudals 25-36, paired; Anal 2; 1 preocular, in contact with the posterior nasal; 2 post oculars; temporals 1 + 1; 7 upper labials.

Reddish brown above with regular narrow, black transverse bars which may or may not reach the ventrals; head black except for the broad, white, transverse bar; yellow beneath with large black spots or cross bars.

Total length : 780 mm, tail 70 mm.

Distribution : Assam, Meghalaya, Mizoram, Nagaland, West Bengal, Eastern Himalayas; Annam; China; Formosa; Hainan; Tong-King; Myanmar.

Remarks : A fairly common species.

Family CROTALIDAE

Genus ***Trimeresurus*** Lacepede, 1804

1804. ***Trimeresurus*** Lacepede, *Ann. Mus. Paris*, iv. P. 209.

Diagnostic characters : Head covered above with small scales; a loreal pit present; scales in 17-23 rows; caudals paired.

Key to the species of *Trimeresurus*, Lacepede

1. Dorsal scales in 23 rows; head and body uniform green; tail reddish..... *erythrurus*
– Dorsal scales in 21 rows, head,body and tail uniform green..... *albolabris*

68. ***Trimeresurus albolabris*** Gray, 1842

1842. *Trimeresurus albolabris* Gray, *Zool. Misc.*, p. 48.

Material examined : 1 ex, V1/ERS/ZSI/9287, Bilkhawthlir approximately 20 km north of Kolasib, 5.9.89, Coll. Y.P. Sinha and party.

Diagnostic characters : Scales in 21 rows; 8-12 scales between the supra oculars; 1-2 rows of scales between the labials and the elongate subocular; ventrals 152-176; caudals 36-72; Anal 1.

Green above, yellowish or whitish below; a light stripe on scale row 1 starting from neck and extending to the base of the tail distinct in males; tail prehensile.

Total length : 750 mm, tail 90 mm.

Distribution : Meghalaya, Mizoram, Eastern Himalayas, the whole of Indo-Chinese subregion; Formosa; Hainan; Hong-Kong; Java; Malay Peninsula; Myanmar; Siam; Sumatra.

Remarks : Mathew (2007) reported this species for the first time from Mizoram.

69. ***Trimeresurus erythrurus*** (Cantor, 1839)
(Plate XXV, XXVI)

1839. *Trigonocephalus erythrurus* Cantor, *P.Z.S.* p. 31.

Material examined : 1 ex, VR/ERS/ZSI/228, Kolasib district, 10C Veng, Vairangte, 19.9.2005, Coll. R. Mathew and party; 1 ex, VR/ERS/ZSI/269, Lunglei district, Tlabung, ca 7 km from Tlabung town, Mirchakata stream side, found coiled at the base of shrub.

Diagnostic characters : Scales in 23 rows; 11-14 scales between the supraoculars; 9-13 upper labaials1-2 rows of scales between the labials and the elongate subocular; ventrals 151-180; caudals 49-79; Anal 1.

Green above, yellowish below; a light stripe on scale row 1 distinct in males; tail usually mottled with brown, prehensile.

Total length : 1045 mm, tail 165 mm.

Distribution : Assam, Meghalaya; Mizoram; Nagaland; the Eastern Himalayas; West Bengal.

Remarks : Mathew (1995) and Harit & Ramanujam (2002) reported it from Meghalaya and Mizoram respectively.

Genus ***Ovophis*** Gunther, 1864

1864. *Trimeresurus monticola* Gunther, *Rept. Brit. Ind.*

Diagnostic characters : Head subtriangular; body stout; tail not prehensile; colour brown.

70. ***Ovophis monticola*** (Gunther), 1864
(Plate XXV)

1864. *Trimeresurus monticola* Gunther, *Rept. Brit. Ind.* p. 388.

Material examined : Nil.

Diagnostic characters : Scales in 23 rows; 5-9 scales between supraoculars; internasals usually separated by 1 or 2 scales; 7-10 upper labials; 2-4 series of small scales between the eye and the labials; ventrals 137-176; caudals 36-62, paired; Anal 1.

Light to dark brown above, with large, squarish irregularly placed dark brown spots or markings upon the back and smaller ones on the sides; head dark brown above; usually a light streak from the eye to the angle of the jaw; lips pale yellowish; lower parts whitish, spotted or powdered with brown.

Total length : 1100 mm, tail 150 mm.

Distribution : Arunachal Pradesh, Assam, Meghalaya, Mizoram, West Bengal; Eastern Himalayas, the whole of Indo-Chinese region; Annam; China; Formosa; Malay Peninsula; Nepal; Siam; Tibet; Tong-King; Yunnan.

Remarks : A common species.

Family VIPERIDAE

Genus ***Daboia*** Gray, 1842

1842. *Daboia* Gray, *Zool. Misc.* p. 69.

Diagnostic characters : Head distinct from neck, covered with small scales; eye with vertical pupil; scales in straight series of 19-33 round the body; tail short.

71. ***Daboia russelli*** (Shaw, 1797)

1797. *Coluber russelli* Shaw, *Nat. Misc. viii*, 291.

Material examined : Nil.

Diagnostic characters : Snout obtuse; nostril very large; scales on top of the head small, imbricate, strongly keeled, 2 or 3 on a line across the tip of the snout; 6-9 between the supraoculars, which are very narrow; 2 scales between the nasal and the eye; 10-15 small scales round the eye; 10-12 upper labials, 3-4 rows of small scales between them and the eye.

Light brown above, with three longitudinal series of large rounded or oval spots; yellowish white below, uniform or with semilunar black spots; head with large symmetrical dark brown markings and two light streaks which unite at the tip of the snout and diverge behind to reach the angle of the jaw.

Total length : 1270 mm, tail 210 mm.

Distribution : The whole of India.

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I am grateful to Dr. Ramakrishna, Director in Charge, Zoological Survey of India, Kolkata and to Dr. N. Sen, Officer-in-Charge, Eastern Regional Station, Zoological Survey of India, Shillong for this assignment and for facilities related to this work. I would like to thank Dr. J.R.B. Alfred, former Director, Zoological Survey of India, Kolkata for his encouragement and guidance. I am indebted to Dr. Christopher Zomuana Lawlor of Government College, Kolasib for valuable information on the fauna of Mizoram.

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PLATE I

Kachuga tecta

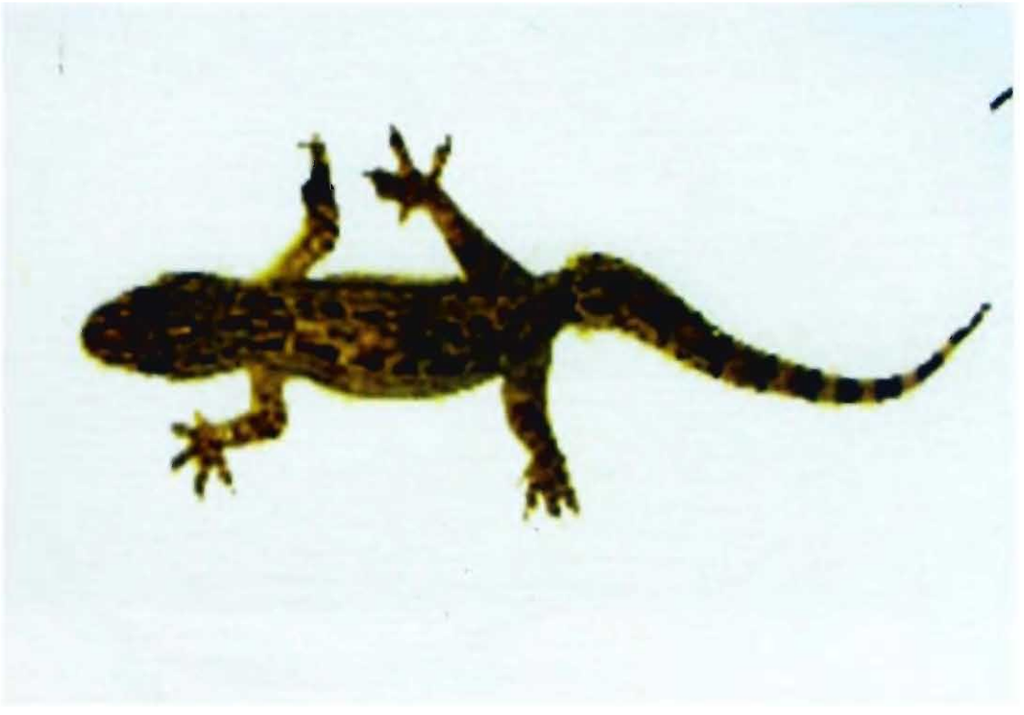
Cyclemys dentata

PLATE II

Melanochelys tricarinata

Lissemys punctata

PLATE III



Cosymbotus platyurus

Cyrtodactylus khasiensis

PLATE IV

Gekko gecko

Hemidactylus frenatus

PLATE V

Calotes versicolor

Draco maculatus

PLATE VI

Calotes jerdoni

Close view of ***Calotes jerdoni***

PLATE VII

Ptyctolaemus gularis

Sphenomorphus indicus

PLATE VIII

Sphenomorphus maculatus

Lygosoma punctata

PLATE IX

Mabuya carinata

Mabuya multifasciata

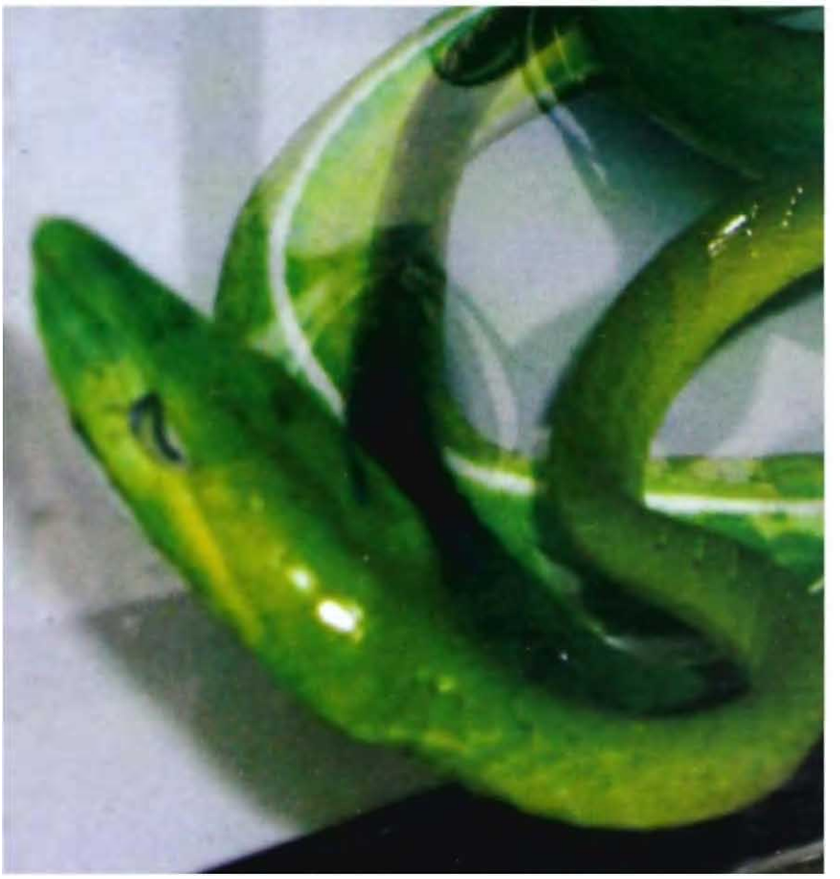
PLATE X

Tropidophorus assamensis

Varanus bengalensis

PLATE XI

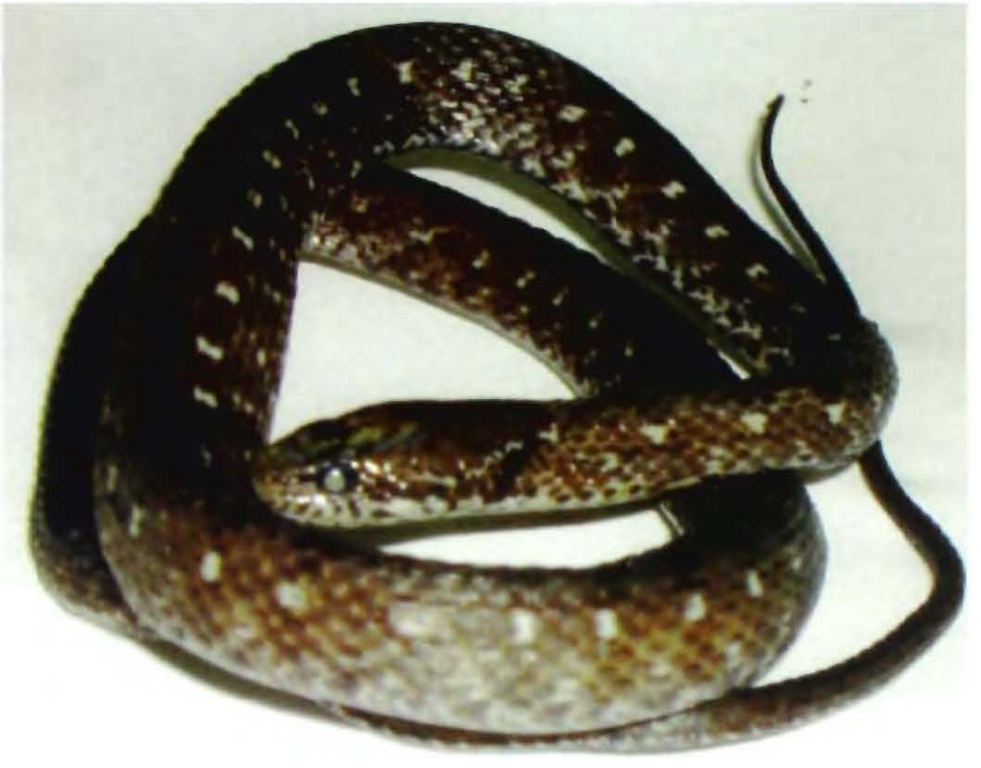
Python molurus bivittatus



Ahaetulla prasina

PLATE XII

Amphiesma stolatum



Amphiesma xenura

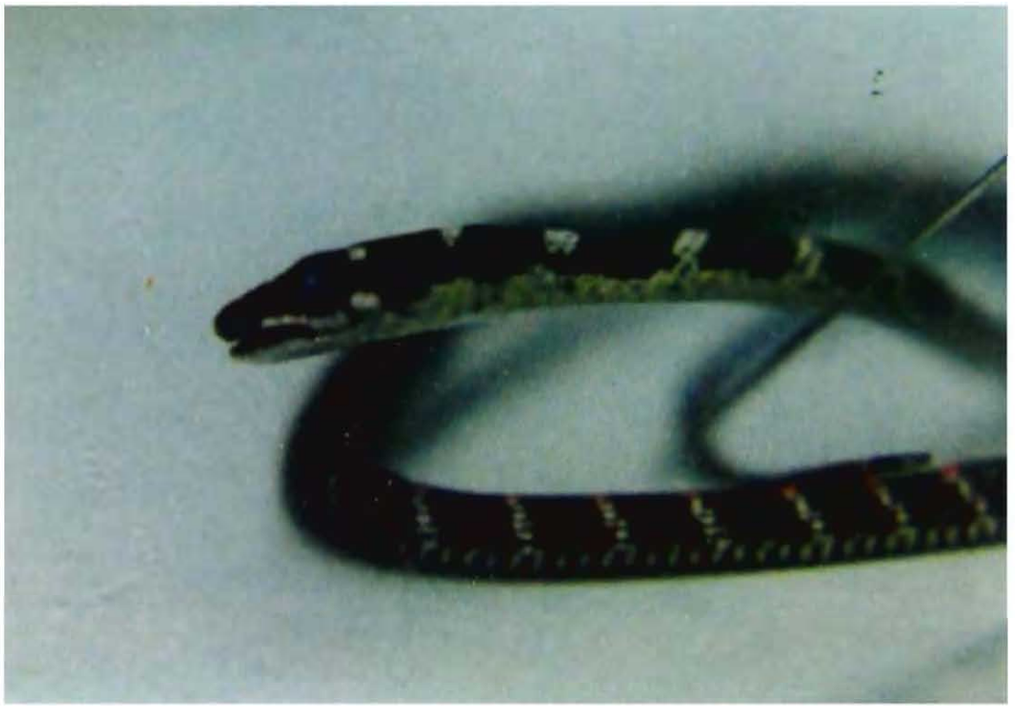
PLATE XIII

Boiga gokool

Coelognathus radiatus

PLATE XIV

Chrysopelea ornata



Close view of ***Chrysopelea ornata***

PLATE XV

Dendrelaphis pictus

Lycodon aulicus

PLATE XVI

Lycodon jara

Oligodon albocinctus

PLATE XVII

Oligodon albocinctus

Oligodon cinereus

PLATE XVIII

Psammodynastes pulverulentus

PLATE XIX

Ptyas korros

Rhabdophis himalayanus
after swallowing a frog

PLATE XX

Rhabdophis subminiatus

Sibynophis collaris

PLATE XXI

Xenochrophis piscator

Bungarus caeruleus

PLATE XXII

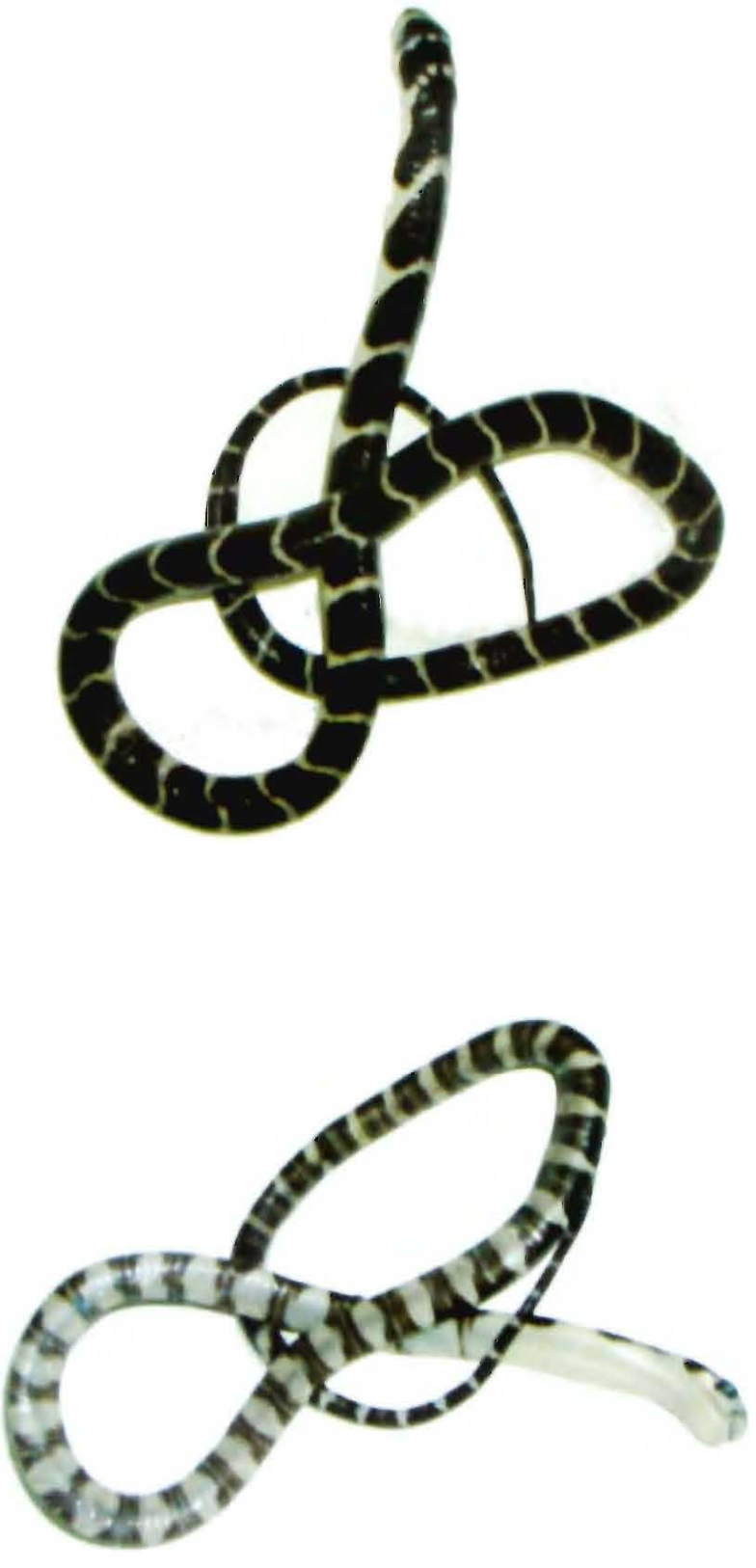
Bungarus fasciatus

Sinomicrurus macclellandi

PLATE XXIII

Naja kaouthia : Monocellate mark on hood

PLATE XXIV



Ophiophagus hannah
dorsal and ventral view

PLATE XXV

Ovophis monticola

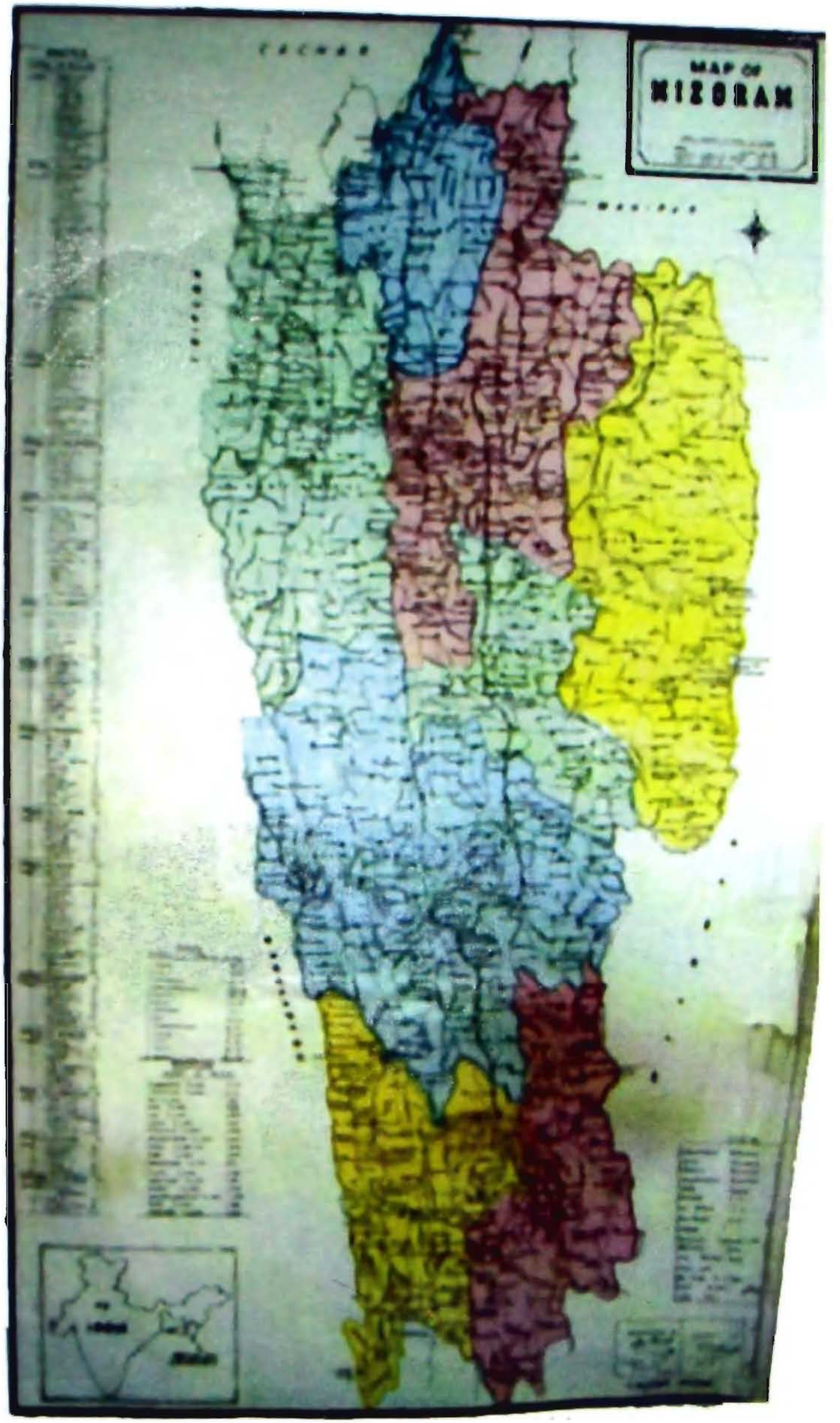
Trimeresurus erythrurs in its natural habitat Tlabung, Mizoram

PLATE XXVI

Trimeresurus erythrurus
whole body and close up of head

Close view of ***Trimeresurus erythrurus***

PLATE XXVII



Map of Mizoram

PLATE XXVIII

Panoramic view of the hills

Kolodyne river

Zool. Surv. India
Fauna of Mizoram, State Fauna Series, **14** : 579-607, 2007

AVES

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INTRODUCTION

Mizoram is the extreme southeastern state among the seven sisters states of Northeast India. A cartographic area of 21081 Km^2, is bounded within the limits of 92°20′ to 93°29′ East longitudes corresponding to 20°20′ to 24°27′ North longitudes. The Tropic of Cancer divides the state into two halves. The state is wedged between two other nations, viz. Bangladesh in the Southwest and Myanmer in the Southeast and eastern sections. Mizoram attained state hood in February 1987 being upgraded from the status of the Union Territory since 1972. Prior to that it was known as the Mizo district of unsplitted Assam. Historically it was also known as the *Lushai Hill district* of Assam and the British India Government put this under the category of 'Excluded Area'

The *Mizo Hills*, earstwhile the *Lushai Hills* mountain range is the part of the mountain arc abridging the *Arakan Yama* and the *Naga Hill* range which, in turn, is extended further to meet with the Great Himalayan arc in the north. Several sub-parallel ridges constitute the hill range. The country has the undulating hilly and precipitous terrain with deep gorges in between. The ridges have the average height of 900 metres. The lowest place is at *Bhairabi* located at north having the altitude of 40 metres, above the Mean Sea level while the heighest peak is the *Phawngpui*, better known as the Blue Mountain located in Southeastern part attaining the height of 2157 metres. Alternate ridge and deep gorge is the characteristics of the terrain of the state. Innumerable streams and rivulets form the drainage system of which two distinct types of rivers emmerging, one north flowing and the other south flowing rivers, all arising from the mid central highland.

Due to its geographical location as well as for the topographic characteristic it has the moderate climate yet, there are great differences between that of the valleys and ridge tops. The northern and most part of northeastern has the influence of Tropical Wet Evergreen Forest succeeded by Tropical Seme-evergreen and Tropical Moist-Deciduous Forests towards South and Southeastern part. Besides chunks of Montane Sub-tropical prevail in the middle section of the eastern part and also in the Southeastern part. Incidentally with the ages, the traditional practice of Slush and burn agricultural method have left but Secondary growth in most part of the country. However, proclamation of conservation areas and aforestation programmes as well have targeted to achieve restoration as well as preservation of forest habitats and their inmates.

List of birds said to occur in Mizoram from logical inference, collection, reliable sight record and distributional point of view as referred in Ali & Ripley's Handbook of the birds of India and Pakistan, Vol. 1–10 (1968–1974) incorporated here.

Some birds said to occur in the adjoining states, viz., Assam, Manipur, Tripura, Meghalaya etc., and

countries, *viz.*, Bangladesh and Mayanmer, with all possibilities are supposed to occur in Mizoram. These birds are given in parenthesis.

Number given against each name is the number of Ali & Ripley (1968–1974).

SYSTEMATIC LIST

Family PODICIPIDIDAE

[1]. ***Podiceps cristatus cristatus*** (Linnaeus). Great Crested Grebe (3).

[2]. ***Tachybaptus ruficollis capensis*** Salvadori. Little Grebe (5).

Family ARDEIDAE

3. ***Ardeola grayii grayii*** (Sykes). Indian Pond Heron (42-42a).

4. ***Bubulcus ibis coromandus*** (Boddaert). Cattle Egret (44).

5. ***Ardea alba modesta*** J. E. Gray. Eastern Large Egret (46).

6. ***Mesophoyx intermedia intermedia*** (Wagler) Median Egret (47, 48).

7. ***Egretta garzetta garzetta*** (Linnaeus). Little Egret (49).

8. ***Nycticorax nycticorax nycticorax*** (Linnaeus). Black-crowned Night Heron (52).

[9]. ***Gorsachius melanolophus melanolophus*** (Raffles). Malayan Night Heron (53)

[10]. ***Dupetor flavicollis flavicollis*** (Latham). Black Bittern (58).

Family ANATIDAE

11. ***Dendrocygna javanica*** (Horsfield). Lesser Whistling Teal (88).

12. ***Anas acuta*** Linnaeus. Pintail (93).

13. ***Anas crecca crecca*** Linnaeus. Common Teal (94).

14. ***Anas strepera strepera*** Linnaeus. Gadwall (101).

[15]. ***Anas penelope*** Linnaeus. Wigeon (103).

16. ***Anas querquedula*** Linnaeus. Garganey (104).

[17]. ***Aythya ferina*** (Linnaeus). Common Pochard (108).

[18]. ***Aythya fuligula*** (Linnaeus). Tufted Pochard (111).

19. ***Nettapus coromandelianus*** (Gmelin). Cotton Teal (114).

Family ACCIPITRIDAE

[20]. ***Elanus caeruleus vociferus*** (Latham). Black-shouldered kite (124).

21. ***Milvus migrans govinda*** Sykes. Pariah kite (133).

22. ***Haliastur indus indus*** (Boddaert). Brahminy kite (135).

23. ***Accipiter badius dussumieri*** (Temminch). Indian Shikra (138).

24. ***Accipiter nisus nisosimilis*** (Tickell). Eurasian Sparrowhawk (147).

25. ***Butastur teesa*** (Franklin). White-eyed Buzzard-Eagle (157).

[26]. ***Spizaetus nipalensis nipalensis*** (Hodgson). Mountain Hawk-Eagle (158).

[27]. ***Hieraaetus kienerii kienerii*** (E. Geoffroy). Rufous-bellied Eagle (165).

[28]. ***Aquila clanga*** Pallas. Greater Spotted Eagle (170).

29. ***Sarcogyps calvus*** (Scopoli). Red-headed Vulture (178).

[30]. ***Gypaetus barbatus*** (Linnaeus). Bearded Vulture (188).

31. ***Circus macrourus*** (S. G. Gmelin). Pale Harrier (190).

[32]. ***Circus melanoleucos*** (Pennant). Pied Harrier (192).

[33]. ***Circus aeruginosus spilonotus*** Kaup. Striped Harrier (194).

[35]. ***Spilornis cheela burmanicus*** Swann. Burmese Crested Serpent Eagle (199).

Family PANDIONIDAE

[36]. ***Pandion haliaetus*** (Linnaeus). Osprey (203).

Family FALONIDAE

[36]. ***Microhierax melanoleucos*** (Blyth). Pied Falconet (205).

37. ***Falco biarmicus jugger*** J. E. Gray. Lagger Falcon (208).

38. ***Falco peregrinus japonensis*** Gmelin. Eastern Peregrine Falcon (209).

[39]. ***Falco severus severus*** Horsfield. Burmese Hobby (215).

[40]. ***Falco amurensis*** Radde. Amur Falcon (220).

[41]. ***Falco tinnunculus interstinctus*** McClelland. East Himalayan Kestret (223).

Family PHASIANIDAE

[42]. ***Francolinus francolinus melanonotus*** Hume. Assam Black Partridge (239).

[43]. ***Francolinus pintadeanus phayrei*** (Blyth). Burmese Francolin (243).

[44]. ***Coturnis japonica*** Temminck & Schlegel. Japanese Quail (251).

[45]. ***Perdicula manipurensis manipurensis*** Hume. Manipur Bush Quail (265).

[46]. ***Arborophila torqueola interstincta*** Ripley. Assam Hill Partridge (268).

47. ***Arborophila rufogularis intermedia*** (Blyth). Arakan Hill Partridge (271).

48. ***Arborophila atrogularis*** (Blyth). Whitecheeked Hill Partridge (272).

49. ***Bambusicola fytchii*** Anderson. Mountain Bamboo-Partridge (274).

50. ***Tragopan blythii blythii*** (Jerdon). Greybellied Tragopan (288).

[51]. ***Lophura leucomelana lathami*** (J. E. Gray). Blackbreasted Kaleej Pheasant (296).

52. ***Lophura leucomelana williamsi*** (Oates). Williams's Kaleej Pheasant (297).

53. ***Syrmaticus humiae humiae*** (Hume). Mrs. Hume's Pheasant (308).

[54]. ***Polyplectron bicalcaratum*** (Linnaeus). Grey Peacock-Pheasant (309).

55. ***Pavo cristatus*** Linnaeus. Indian Peafowl (311).

56. ***Pavo muticus*** Linnaeus. Green Peafowl (312).

Family TURNICIDAE

[58]. ***Turnix sylvatica*** (Desfontaines). Small Buttonquail (313).

59. ***Turnix tanki blanfordii*** Blyth. Burmese Yellowlegged Button Quail (315).

[60]. ***Turnix suscitator plumbipes*** (Hodgson). Northern Button Quail (316).

[61]. ***Porzana bicolor*** (Walden). Elwes's Crake (341).

[62]. ***Porphyrio porphyrio poliocephalus*** (Latham). Indian Purple Moorhen (349).

Family OTIDIDAE

[63]. ***Houbaropsis bengalensis*** (Gmelin). Bengal Florican (356).

Family JACANIDAE

64. ***Hydrophasianus chirurgus*** (Scopoli). Pheasant-tailed Jacana (358).

65. ***Metopidius indicus*** (Latham). Bronze-winged Jacana (359).

Family CHARADRIIDAE

[66]. ***Vanellus vanellus*** (Linnaeus). Northern Lapwing (364).

[67]. ***Vanellus cinereus*** (Linnaeus). Grey-headed Lapwing (365).

69. ***Vanellus indicus atronuchalis*** (Jerdon). Burmese Redwattled Lapwing (368).

[70]. ***Pluviatilis fulva*** (Gmelin). Pacific Golden-Plover (373).

Family SCOLOPACIDAE

71. ***Tringa totanus eurhinus*** (Oberholser). Eastern Redshank (394).

72. ***Tringa stagnatilis*** (Bechztein). Marsh Sanspiper (395).

73. ***Tringa nebularia*** (Gunner). Common Greenshank (396).

74. ***Tringa ochropus*** Linnaeus. Green Sandpiper (397).

75. ***Tringa glareola*** Linnaeus. Wood Sandpiper (398).

76. ***Actitis hypoleucos*** Linnaeus. Common Sandpiper (401).

77. ***Gallinago stenura*** (Bonaparte). Pintail Snipe (406).

78. ***Gallinago gallinago*** (Linnaeus). Common Snipe (409).

[79]. ***Scolopax rusticola*** Linnaeus. Eurasian Woodcock (411).

80. ***Calidris temminckii*** (Leisler). Temminck's Stint (417).

[81]. ***Philomachus pugnax*** (Linnaeus). Ruff (426).

82. ***Rostratula benghalensis benghalensis*** (Linnaeus). Painted Snipe (429).

Family COLUMBIDAE

83. ***Treron apicauda apicauda*** Blyth. Pintailed Green-Pigeon (493).

84. ***Treron curvirostra nipalensis*** (Hodgson). Thickbilled Green-Pigeon (495).

[85]. ***Treron pompadora phayrei*** (Blyth). Pompadour Green-Pigeon (499).

86. ***Ducula badia griseicapilla*** Walden. Mountain Imperial-Pigeon (512).

87. ***Columba livia intermedia*** Strickland. Indian Blue Rock-Pigeon (517).

88. ***Columba hodgsonii*** Vigors. Speckled Wood-Pigeon (520).

[89]. ***Columba pulchricollis*** Blyth. Ashy Wood-Pigeon (523).

[90]. ***Columba punicea*** Blyth. Purple Wood-Pigeon (524).

[91]. ***Macropygia unchall tusalia*** (Blyth). Barred Cuckoo-Dove (526).

92. ***Streptopelia orientalis agricola*** (Tickell). Oriental Turtle-Dove (532).

93. ***Streptopelia decaocto decaocto*** (Frivaldszky). Indian Ring Dove (534).

[94]. ***Streptopelia tranquebarica humilis*** (Temminck). Burmese Red Turtle-Dove (536).

95. ***Streptopelia chinensis tigrina*** (Temminck). Burmese Spotted-Dove (538).

[96]. ***Psittacula eupatria avensis*** (Kloss). Burmese Alexandrine Parakeet (547).

[97]. ***Psittacula alexondri fasciata*** (P. L. S. Müller). Indian Red-breasted Parakeet (551).

98. ***Psittacula finschii*** (Hume). Grey-headed Parakeet (563).

[99]. ***Loriculus vernalis*** (Sparrman). Indian Hanging-Parrot (566-567).

Family CUCULIDAE

100. ***Clamator coromandus*** (Linnaeus). Red-winged Crested Cuckoo (569).

[101]. ***Clamator jacobinus serratus*** (Sparrman). Pied Crested Cuckoo (570).

[102]. ***Hierococcyx sparverioides sparverioides*** (Vigors). Large Hawk Cuckoo (572).

[103]. ***Hierococcyx fugax*** (Horsfield). Hodgson's Hawk Cuckoo (575).

104. ***Cuculus canorus bakeri*** Hartert. Common Cuckoo (579).

[105]. ***Cacomantis merulinus querulus*** Heine. Rufous-bellied Burmese Plaintive Cuckoo (585).

[106]. ***Chrysococcyx maculatus*** (Gmelin). Asian Emerald Cuckoo (586).

[107]. ***Chrysococcyx xanthorhynchus*** (Horsfield). Violet Cuckoo (587).

[108]. ***Surniculus lugubris dicruroides*** (Hodgson). Indian Drongo-Cuckoo (588).

[109]. ***Eudynamys scolopacea malayana*** Cabanis & Heine. Malay Koel (591).

[110]. ***Phaenicophaeus tritis tritis*** (Lesson). Large Greenbilled Malkoha (593).

[111]. ***Centropus sinensis intermedius*** (Hume). Greater Coucal (601).

Family TYTONIDAE

112. ***Tyto alba*** (Scopoli). Barn Owl (606).

[113]. ***Tyto capensis*** (A. Smith). Grass Owl (608).

[114]. ***Phodilus badius saturatus*** Robinson. Oriental Bay-Owl (609).

Family STRIGIDAE

[115]. ***Otus spilocephalus spilocephalus*** (Blyth). Eastern Spotted Scops Owl (612).

116. ***Otus bakkamoena lettia*** (Hodgson). Burmese Collared Scops Owl (624).

[117]. ***Bubo bubo bengalensis*** (Franklin). Eurasian Eagle-Owl (627).

[118]. ***Bubo nipalensis nipalensis*** Hodgson. Forest Eagle-Owl (628).

[119]. ***Bubo coromandus*** (Latham). Dusky Eagle-Owl (630).

[120]. ***Bubo zeylonensis leschenault*** (Temminck). Brown Fish-Owl (631).

121. ***Ketupa flavipes*** (Hodgson). Tawny Fish-Owl (633).

122. ***Glaucidium brodiei*** (Burton). Collared Owlet (635).

123. ***Glaucidium cuculoides rufescens*** Baker. Asian Barred Owlet (641).

124. ***Ninox scutulata burmanica*** Hume. Burmese Brown Hawk-Owl (643).

125. ***Athene brama indica*** (Franklin). Spotted Owlet (650).

126. ***Strix leptogrammica newarensis*** (Hodgson). Himalayan Brown Wood Owl (658).

127. ***Strix aluco nivicola*** (Blyth). Towny Wood-Owl (662).

Family PODARGIDAE

[128]. ***Batrachostomus hodgsoni hodgsoni*** (G. R. Gray). Hodgson's Frogmouth (667).

Family CAPRIMULGIDAE

129. ***Eurostopodus macrotis cerviniceps*** (Gould). Burmese Great Eared Nightjar (668).

130. ***Caprimulgus indicus hazarae*** Whistler & Kinnear. Indian Jungle Nightjar (670).

131. ***Caprimulgus macrurus ambiguus*** Hartert. Burmese Long tailed Nightjar (678).

132. ***Caprimulgus affinis*** Horsfield. Franklin's Nightjar (682).

Family APODIDAE

133. ***Collocalia brevirostris brevirostris*** (Horsfield). Himalayan Swiftlet (683).

134. ***Hirundapus cochinchinensis*** (Oustalet). Silver-backed Needletail-Swift (690).

135. ***Hirundapus giganteus*** (Temminck). Brown-backed Needle tail-Swift (691).

136. ***Apus acuticauda*** (Jerdon). Khasi Hills Swift (698).

[137]. ***Apus pacificus pacificus*** (Latham). Pacific Swift (699).

[138]. ***Apus affinis subfurcatus*** (Blyth). Malay House Swift (706).

139. ***Cypsiurus balasinensis*** (J. E. Gray). Asian Palm Swift (708).

Family TROGONIDAE

140. ***Harpactes erythrocephalus erythrocephalus*** (Gould). Red-headed Trogon (715).

Family ALCEDINIDAE

[141]. ***Megaceryle lugubris guttulata*** Stejneger. East Himalayan Greater Pied Kingfisher (718).

[142]. ***Alcedo hercules*** Laubmann. Blyth's Kingfisher (721).

[143]. ***Alcedo athis bengalensis*** Gmelin. Indian Small Blue kingfisher (723).

[144]. ***Aleedo meninting coltarti*** Baker. Assam Blue-eared Kingfisher (725).

145. ***Ceyx erithacus erithacus*** (Linnaeus). Oriental Dwarf Kingfisher (727).

[146]. ***Halcyon capensis capensis*** (Linnaeus). Stork-billed Kingfisher (730).

[147]. ***Halcyon coromanda coromanda*** (Latham). Indian Ruddy Kingfisher (733).

[148]. ***Halcyon smyrensis perpulchra*** Madarasz. Eastern White-breasted Kingfisher (737).

Family MEROPIDAE

[149]. ***Merops leschenaulti*** Vieillot. Chestnut-headed Bee-eater (744).

150. ***Nyctyornis athertoni*** (Jardine & Selby). Blue-bearded Bee-eater (753).

Family CORACIIDAE

[151]. ***Coracias benghalensis affinis*** Horsfield. Burmese Roller (757).

[152]. ***Eurystomus orientalis*** (Linnaeus). Oriental Broad-billed Roller (758).

Family UPUPIDAE

153. ***Upupa epops*** Linnaeus. Common Hoopoe (766).

Family BUCEROTIDAE

154. ***Aceros nipalensis*** (Hodgson). Rufousnecked Hornbill (771).

155. ***Aceros undulatus*** (Shaw). Wreathed Hornbill (772).

156. ***Buceros bicornis*** Linnaeus. Great Pied Hornbill (776).

Family CAPITONIDAE

[157]. ***Megalaima virens magnifica*** Baker. Assam Great Barbet (778).

[158]. ***Megalaima lineata hodgsoni*** Bonaparte. Assam Lineated Barbet (784).

159. ***Megalaima asiatica*** (Latham). Blue-throated Barbet (788).

[160]. ***Megalaima australis*** (Horsfield). Blue-eared Barbet (789).

161. ***Megalaima haemacephala*** (P. L. S. Müller). Coppersmith Barbet (792).

Family INDICATORIDAE

[162]. ***Indicator xanthonotus fulvus*** Ripley. Nagaland Yellow-rumped Honeyguide (795).

Family PICIDAE

163. ***Jynx torquilla*** Linnaeus. Eurasian Wryneck (796).

164. ***Sasia ochracea reichenowi*** Hesse. Burmese Rufous Piculet (801).

165. ***Celeus brachyurus phaioceps*** Blyth. Eastern Rufous Woodpecker (803).

166. ***Picus canus gyldenstolpei*** Baker. Assam Black-naped Green Woodpecker (810).

167. ***Picus flavinucha flavinucha*** Gould. Large Yellow-naped Woodpecker (813).

[168]. ***Picus chlorolophus chlorolophus*** Vicillot. East Himalayan Small Yellow naped Woodpecker (815).

[169]. ***Dinopium shorii*** (Vigors). Himalayan Golden-backed Woodpecker (824).

[170]. ***Dinopium javanense*** (Ljungh). Common Golden-backed Woodpecker (826).

[171]. ***Mulleripicus pulverulentus harterti*** Hesse. Assam Great Slaty Woodpecker (829).

172. ***Dendrocopos hyperythrus hyperythrus*** (Vigors). Eastern Rufousbelliod Pied Woodpecker (833).

[173]. ***Dendrocopos major*** (Linnaeus). Great Pied Woodpecker (834).

174. ***Dendrocopos darjellensis*** (Blyth). Darjeeling Pied Woodpecker (838-839).

175. ***Dendrocopos cathpharius pyrrhothorax*** (Hume). Manipur Crimson breasted Pied Woodpecker (841).

176. ***Dendrocopos atratus*** (Blyth). Stripe-breasted Pied Woodpecker (844).

177. ***Dendrocopos macei macei*** (Vieillot). Indian Fulvous breasted Pied Woodpecker (845).

178. ***Dendrocopos canicapillus canicapillus*** (Blyth). Burmese Grey-capped Pygmy Woodpecker (850).

179. ***Blythipicus pyrrhotis*** (Hodgson). Bay Woodpecker (857).

180. ***Chrysocolaptes lucidus guttacristatus*** (Tickell). Eastern Greater Golden-backed Woodpecker (861).

Family EURYLAIMIDAE

181. ***Serilophus lunatus*** (Gould). Hodgson's Broadbill (864).

182. ***Psarisomus dalhousiae*** (Jameson). Long-tailed Broadbill (865).

Family PITTIDAE

183. ***Pitta nipalensis*** (Hodgson). Blue-naped Pitta (866).

184. ***Pitta sordida cucullata*** Hartlaub. Hooded Pitta (869).

185. ***Pitta cyanea*** Blyth. Blue Pitta (871).

Family HIRUNDINIDAE

186. ***Hirundo rustica*** Linnaeus. Common Swallow (917).

187. ***Hirundo striolata*** (Schlegel). Striated Swallow (929).

188. ***Delichon nipalensis nipalensis*** Horsfield & Moore. Nepal House-Martin (932).

Family MOTACILLIDAE

189. ***Dendronanthus indicus*** (Gmelin). Forest Wagtail (1874).

190. ***Motacilla maderaspatensis*** Gmelin. Large Pied Wagtail (1891).

191. ***Motacilla flava thunbergi*** Billberg. Yellow Wagtail (1875).

[192]. ***Motacilla citreola*** Pallas. Citrine Wagtail (1881).

[193]. ***Motacilla cinerea*** Tunstall. Grey Wagtail (1884).

[194]. ***Motacilla alba*** Linnaeus. White Wagtail (1888).

[195]. ***Anthus hodgsoni*** Richmond. Oriental Tree Pipit (1852).

Family CAMPEPHAGIDAE

[196]. ***Hemipus picatus capitalis*** (McClelland). Pied Flycatcher-Shrike (1064).

[197]. ***Tephrodornis gularis*** (Raffles). Large Woodshrike (1067).

[198]. ***Pericrocotus brevirostris*** (Vigors). Short-billed Minivet (1084).

199. ***Pericrocotus ethologus mariae*** Ripley. Long-tailed Minivet (1087).

Family PYCNONOTIDAE

[200]. ***Spizixos canifrons*** Blyth. Crested Finchbill (1111).

[201]. ***Pycnonotus atriceps cinereoventris*** (Blyth). Black-headed Bulbul (1212).

[202]. ***Pycnonotus melanicterus flaviventris*** (Tickell). Black-crested Bulbul (1115).

203. ***Pycnonotus cafer stanfordi*** Deignan. Red-vented Bulbul (1132).

[204]. ***Pycnonotus striatus striatus*** (Blyth). Striated Bulbul (1133).

[205]. ***Pycnonotus flavescens*** Blyth. Blyth's Bulbul (1137).

[206]. ***Alophoixus flaveolus*** (Gould). White-throated Bulbul (1140).

[207]. ***Iole virescens*** Blyth. Olive Bulbul (1141).

[208]. ***Hemixos flavala*** Blyth. Brown-eared Bulbul (1147).

[209]. ***Hypsipetes leucocephalus nigrescens*** Baker. Black Bulbul (1151).

Family IRENIDAE

[210]. ***Chloropsis hardwickii*** Jardine & Selby. Orange-bellied Chloropsis (1106).

Family LANIIDAE

[211]. ***Lanius tephronotus tephronotus*** (Vigors). Grey-backed Shrike (945).

[212]. ***Lanius schach tricolor*** (Hodgson). Rufous-backed Shrike (948).

[213]. ***Lanius cristatus*** Linnaeus. Brown Shrike (949).

Family CINCLIDAE

[214]. ***Cinclus pallasii*** Temminck. Brown Dipper (1776).

Family TURDINAE

[215]. ***Monticola cinclorhynchus*** (Vigors). Blue-headed Rock-Thrush (1723).

[216]. ***Monticola rufiventris*** (Jardine & Selby). Chestnut-bellied Rock-Thrush (1724).

[217]. ***Monticola solitarius pandoo*** (Sykes). Blue Rock-Thrush (1726).

218. ***Myiophonus caeruleus temminckii*** (Vigors). Blue Whistling Thrush (1729).

[219]. ***Zoothera wardii*** (Blyth). Pied Thrush (1731).

[220]. ***Zoothera citrina citrina*** (Latham). Orange-headed Thrush (1733).

[221]. ***Zoothera mollissima mollissima*** (Blyth). Plain-backed Thrush (1739).

[222]. ***Zoothera dixoni*** (Seebohm). Long-tailed Thrush (1740).

[223]. ***Zoothera dauma dauma*** (Latham). Scaly Thrush (1741).

224. ***Zoothera monticola*** Vigors. Greater Long-billed Thrush (1745).

225. ***Zoothera marginata*** Blyth. Lesser Long-billed Thrush (1746).

226. ***Turdus dissimilis*** Blyth. Black-breasted Thrush (1747).

[227]. ***Turdus albocinctus*** Royle. White-collared Blackbird (1749).

[228]. ***Turdus boulboul*** (Latham). Grey-winged Blackbird (1750).

[229]. ***Turdus feae*** (Salvadori). Fea's Thrush (1761).

[230]. ***Turdus ruficollis ruficollis*** Pallas. Dark-throated Thrush (1764).

[231]. ***Turdus naumanni*** Temminck. Dusky Thrush (1765).

[232]. ***Saxicola jerdoni*** (Blyth). Jerdon's Bushchat (1704).

[233]. ***Saxicola ferrea*** Gray. Grey Bushchat (1705).

[234]. ***Myiomela leucura*** (Hodgson). White-tailed Robin (1681).

[235]. ***Enicurus scouleri*** Vigors. Little Forktail (1684).

[236]. ***Enicurus immaculatus*** (Hodgson). Black-backed Forktail (1685).

[237]. ***Enicurus schistaceus*** (Hodgson). Slaty-backed Forktail (1686).

[238]. ***Enicurus leschenaulti*** (Vicillot). Leschenault's Forktail (1687).

[239]. ***Cochoa purpurea*** Hodgson. Purple Cochoa (1690).

[240]. ***Cochoa viridis*** Hodgson. Green Cochoa (1691).

[241]. ***Saxicola torquata indica*** (Blyth). Common Stonechat (1697).

[232]. ***Saxicola leucura*** (Blyth). White-tailed Stonechat (1699).

Family TIMALIINAE

[233]. ***Pellorneum ruficeps chamelum*** Deignan. Spotted Babbler (1156).

[234]. ***Pellorneum palustre*** Gould. Marsh Babbler (1160).

[235]. ***Pellorneum albiventre albiventre*** (Godwin-Austen). Spot-throated Babbler (1164).

[236]. ***Malacocincla abbotti*** Blyth. Abbott's Babbler (1167).

[237]. ***Pomatorhinus schisticeps*** Hodgson. Hodgson's Scimitar-Babbler (1169).

238. ***Pomatorhinus ruficollis bakeri*** Harrington. Rufous-necked Scimitar-Babbler (1180).

239. ***Pomatorhinus erythrogenys macclellandi*** Godwin-Austeen. Rusty-cheeked Scimitar-Babbler (1184).

240. ***Pomatorhinus ferruginosus phayrei*** Blyth. Coral-billed Scimitar Babbler (1188).

[241]. ***Pomatorhinus ochraceiceps austeni*** Hume. Lloyd's Scimiter Babbler (1190).

242. ***Xiphirhynchus superciliaris intextus*** Ripley. Slender-billed Scimitar-Babbler (1192).

[243]. ***Rimator malacoptilus*** Blyth. Long-billed Wren-Babbler (1193).

[244]. ***Napothera brevicaudata*** (Blyth). Streaked Wren-Babbler (1194).

[245]. ***Napothera epilepidota roberti*** (Godwin-Austen & Walden). Eyebrowed Wren-Babbler (1195).

[246]. ***Pnoepyga albiventer albiventer*** (Hodgson). Greater Scaly-breasted Wren-Babbler (1198).

[247]. ***Pnoepyga pusilla*** Hodgson. Lesser Scaly-breasted Wren-Babbler (1199).

[248]. ***Spelaeornis longicaudatus*** (Moore). Tawny-breasted Wren-Babbler (1202).

249. ***Spelaeornic chocolatinus oatesi*** (Rippon). Long-tailed Wren-Babbler (1204).

250. ***Spelaeornis formosus*** (Walden). Spotted Wren-Babbler (1206).

[251]. ***Sphenocicla humei roberti*** Godwin-Austen & Walden. Wedge-billed Wren-Babbler (1208).

[252]. ***Stachyris rufifrons*** Hume. Rufous-frunted Babbler (1209).

[253]. ***Stachyris ruficeps*** Blyth. Rufous-capped Babbler (1210).

254. ***Stachyris chrysaea binghami*** Rippon. Gold-headed Babbler (1213).

255. ***Stachyris nigriceps spadix*** Ripley. Grey-Throated Babbler (1216).

[256]. ***Timalia pileata*** Horsfield. Red-capped Babbler (1229).

[257]. ***Turdoides longirostris*** (Moore). Slender-billed Babbler (1257).

258. ***Babax lanceolatus*** (Verreaux). Chinese Babax (1270).

[259]. ***Garrulax monileger monileger*** (Hodgson). Lesser Necklaced Langhingthrush (1275).

[260]. ***Garrulax pectoralis melanotis*** Blyth. Greater Necklaced Langhingthrush (1278).

[261]. ***Garrulax striatus brahmaputra*** Hachisuka. Striated Langhingthresh (1282).

[262]. ***Garrulax lencolophus patkaicus*** Reichenow. White-crested Longhingthrush (1284).

[263]. ***Garrulax nuchalis*** Godwin-Austen. Chestnut-backed Longhingthrush (1285).

264. ***Garrulax galbanus*** Godwin-Austen. Yellow-throated Langhingthrush (1286).

265. ***Garrulax gularis*** (McClelland). Rufous-vented Langhingthrush (1288).

[266]. ***Garrulax cineraceus*** (Godwin-Austen). Ashy Longhingthrush (1291).

[267]. ***Garrulax rufogularis assamensis*** (Hartert). Rufous-chinned Langhingthrush (1296).

[268]. ***Garrulax ruficollis*** (Jardine & Selby). Rufous-necked Langhingthrush (1303).

[269]. ***Garrulax sannio*** Swinhoe. White-browed Langhingthrush (1306).

270. ***Garrulax virgatus*** (Godwin-Austen). Striped Langhingthrush (1317).

271. ***Garrulax austeni*** (Godwin-Austen). Brown-capped Langhingthrush (1318).

272. ***Garrulax erythrocephalus erythrolaema*** (Hume). Red-headed Langhingthrush (1330).

273. ***Liocichla phoenicea bakeri*** (Hartert). Red-faced Liocichla (1332).

274. ***Leiothrix lutea*** (Scopoli). Red-billed Leiothrix (1337).

275. ***Cutia nipalensis*** Hodgson. Cutia (1339).

276. ***Pteruthius rufiventer*** Blyth. Rufous-bellied Shrike-Babbler (1340).

277. ***Pteruthius xanthochlorus hybrida*** Harrinton. Green Shrike-Babbler (1344).

[278]. ***Pteruthius melanotis*** Hodgson. Chestnut-throated Shrike-Babbler (1345).

279. ***Actinodura egertoni ripponi*** Ogilvie-Grant. Rusty-fronted Barwing (1351).

280. ***Actinodura waldeni poliotis*** (Rippon). Austen's Barwing (1356).

[281]. ***Minla ignotincta*** Hodgson. Red-tailed Minla (1357).

282. ***Yuhina castaniceps castaniceps*** (Moore). Striated Yuhina (1365).

[283]. ***Yuhina bakeri*** Rothschild. White-capped Yuhina (1366).

[284]. ***Yuhina flavicollis rouxi*** (Oustalet). Yellow-naped Yuhina (1370).

285. ***Yuhina nigrimenta*** Hodgson. Black-chinned Yuhina (1374).

[286]. ***Yuhina zantholeuca*** (Hodgson). White-bellied Yuhina (1375).

[287]. ***Alcippe cinerea*** (Blyth). White-throated Tit-Babbler (1378).

[288]. ***Alcippe castaneceps*** (Hodgson). Rufous-winged Tit-Babbler (1379).

Family PANURINAE

289. ***Paradoxornis nipalensis patriciae*** (Koelz). Black-throated Parrot bill (1244).

290. ***Paradoxornis ruficeps bakeri*** (Hartert). Greater Rufous-throated Parrot bill (1248).

[291]. ***Parodoxornis gularis transfluvialis*** (Hartert). Grey-headed Parrot bill (1250).

Family SYLVIINAE

[292]. ***Phylloscopus pulcher pulcher*** Blyth. Orange-barred Leaf-warbler (1589).

[293]. ***Phylloscopus chloronotus*** (G. R. Gray & J. E. Gray). Lemon-rumped Warbler (1596).

[294]. ***Phylloscopus coronatus*** (Temminck & Schlegel). Eastern Crowned Warbler (1607).

[295]. ***Phylloscopus reguloides*** (Blyth). Blyth's Leaf-Warbler (1611).

[296]. ***Seicercus affinis*** (Moore). White-spectacled Flycatcher-Warbler (1613).

297. ***Seicercus xanthosehistos tephrodiras*** Sick. Grey-headed Flycatcher-Warbler (1619).

[298]. ***Seicercus castaniceps*** (Blyth). Chestnut-crowned Flycatcher-Warbler (1621).

299. ***Abroscopus superciliaris albigularis*** (Blyth). Yellow-bellied Flycatcher-Warbler (1622).

[300]. ***Abroscopus albogularis*** (Moore). Rufous-faced Flycatcher-Warbler (1626).

[301]. ***Tickellia hodgsoni*** (Moore). Broad-billed Flycatcher-Warbler (1627).

Family MUSCICAPINAE

[302]. ***Muscicapa muttui*** (Layard). Brown-breasted Flycatcher (1408).

[303]. ***Muscicapa ferruginea*** (Hodgson). Ferruginous Flycatcher (1410).

[304]. ***Ficedula parva albicilla*** Pallas. Red-throated Flycatcher (1412).

[305]. ***Ficedula monileger leucops*** (Sharpe). White-gorgeted Flycatcher (1416).

[306]. ***Ficedula strophiata*** (Hodgson). Orange-gorgeted Flycatcher (1414).

[307]. ***Ficedula hyperythra*** (Blyth). Rufous-breasted Blue Flycatcher (1417).

[308]. ***Ficedula tricolor cerviniventris*** (Sharpe). Slaty-blue Flycatcher (1425).

[309]. ***Ficedula sapphira*** (Blyth). Sapphire Flycatcher (1426).

310. ***Niltava grandis*** (Blyth). Large Niltava (1428).

[311]. ***Niltava macgrigoriae signata*** Horsfield. Small Niltava (1430).

[312]. ***Niltava sundara sundara*** (Hodgson). Rufous-bellied Niltava (1432).

[313]. ***Cyornis poliogenys cachariensis*** (Madarasz). Brooks's Flycatcher (1437).

[314]. ***Cyornis unicolor*** Blyth. Pale Blue-Flycatcher (1439).

[315]. ***Cyornis rubeculoides*** (Vigors). Blue-throated Flycatcher (1440).

[316]. ***Eumylas thalassina*** (Swainson). Verditer Flycatcher (1445).

Family MONARCHINAE

[317]. ***Terpsiphone paradisi*** (Linnaeus). Asian Paradise-Flycatcher (1463).

Family AEGITHALIDAE

318. ***Aegithalos concinnus manipurensis*** (Hume). Red-headed Tit (1820).

Family PARIDAE

[319]. ***Melanochlora sultanea*** (Hodgson). Sultan Tit (1789).

[320]. ***Parus major nipalensis*** Hodgson. Great Tit (1793).

[321]. ***Parus spilonotus*** Bonaparte. Black-spotted Yellow Tit (1812a).

[322]. ***Sylviparus modestus modestus*** (Burton). Yellow-browed Tit (1814).

Family SITTIDAE

323. ***Sitta formosa*** Blyth. Beautiful Nuthach (1837).

324. ***Sitta himalayensis australis*** Koelz. White-tailed Nuthach (1835).

325. ***Sitta europaea nagaensis*** Godwin-Austen. Eurasian Nuthach (1826).

326. ***Sitta castanea cinnamoventris*** Blyth. Chestnut-Bellied Nuthach (1828).

Family CERTHIIDAE

327. ***Certhia discolor manipurensis*** Hume. Brown-throated Tree-Creeper (1850).

Family DICAEIDAE

[328]. ***Dicaeum chrysorrheum*** Temminck. Yellow-vented Flowerpecker (1845).

329. ***Dicaeum ignipectus*** Blyth. Fire-breasted Flowerpecker (1905).

Family NECTARINIIDAE

[330]. ***Nectarinia sperata*** (Linnaeus). Van Hasselt's Sunbird (1910).

331. ***Aethopyga gouldiae isolata*** Baker. Mrs. Gould's Sunbird (1920).

[332]. ***Aethopyga nipalensis koelzi*** Ripley. Green-tailed Sunbird (1924).

[333]. ***Aethopyga siparaja labecule*** (Horsfield). Crimson Sunbrid (1928).

[334]. ***Aethopyga ignicauda*** (Hodgson). Fire-tailed Sunbrid (1930).

[335]. ***Arachnothera longirostra*** (Latham). Little Spiderhunter (1931).

[336]. ***Arachnothera magna*** (Hodgson). Streaked Spiderhunter (1932).

Family ZOSTEROPIDAE

[337]. ***Zosterops palpebrosus palpebrosus*** (Temminck). Oriental White-eye (1933).

Family EMBERIZINAE

[338]. ***Melophus lathami*** (Gray). Crested Bunting (2060).

[339]. ***Emberiza aureola*** Pallas. Yellow-breasted Bunting (2046).

[340]. ***Emberiza spodocephala*** Pallas. Black-faced Bunting (2047).

[341]. ***Emberiza pusilla*** Pallas. Little Bunting (2056).

Family FRINGILLIDAE

[342]. ***Propyrrhula subhimachala*** (Hodgson). Crimson-browed Finch (2033).

343. ***Haematospiza sipahi*** (Hodgson). Scarlet Finch (2034).

344. ***Mycerobas melanozanthos*** Hodgson. Spotted-winged Grosbeak (1986).

345. ***Carduelis spinoides heinrichi*** Stresemann. Yellow-breasted Green Finch (1992).

Family ESTRILDIDAE

346. ***Lonchura malabarica*** (Linnaeus). White-throated Munia (1966).

347. ***Lonchura punctulata subundulata*** (Godwin-Austen). Spotted Munia (1975).

Family PASSERINAE

[346]. ***Passer montanus malaccensis*** Dubois. Eurasian Tree Sparrow (1942).

347. ***Passer rutilans intensior*** Rothschild. Cinnamon Tree Sparrow (1947).

Family STURNIDAE

348. ***Aplonis panayensis*** (Scopoli). Asian Glossy Starlong (985).

349. ***Sturnus malabaricus nemoricola*** (Jerdon). Grey-heated Starling (989).

350. ***Sturnus contra superciliaris*** (Blyth). Asian Pied Starling (1004).

351. ***Acridotheres tristis tristis*** (Linnaeus). Common Myna (1006).

352. ***Acridotheres fuscus fumidus*** Repley. Jungle Myna (1011).

353. ***Acridotheres grandis*** Moore. Great-tufted Myna (1012).

[354]. ***Acridotheres albocicinctus*** Godwin-Austen & Walden. Collared Myna (1013).

[355]. ***Ampeliceps coronatus*** (Blyth). Gold-crested Myna (1014).

[356]. ***Gracula religiosa intermedia*** A. Hay. Common Hill-Myna (1015).

Family ORIOLIDAE

357. ***Oridus chinensis tenuirostris*** Blyth. Black-naped Oriole (955).

[358]. ***Driolus traillii*** (Vigors). Maroon Oride (961).

Family DICRURIDAE

359. ***Dicrurus macrocercus albirictus*** (Hodgson). Black Drongo (962).

360. ***Dicrurus leucophaeus hopwoodi*** Baker. Ashy Drongo (966).

361. ***Dicrurus annectans*** (Hodgson). Crow-billed Drongo (970).

362. ***Dicrurus aeneus*** Vieillot. Bronzed Drongo (971).

363. ***Dicrurus remifer*** (Temminck). Lesser Racket-tailed Drongo (972).

[364]. ***Dicrurus paradiseus grandis*** (Gould). Greater Racket-tailed Drongo (976).

Family CORVIDAE

[365]. ***Garrulax glandarius interstinctus*** Hartert. Eurasian Jay (1021).

[366]. ***Urocissa erythrorhyncha magnirostris*** (Blyth). Red-billed Blue Magpie (1028).

367. ***Dendrocitta vagabunda vagabunda*** (Latham). Indian Treepie (1032).

368. ***Dendrocitta forntalis*** Horsfield. Black-browed Treepie (1035).

369. ***Corvus splendens splendens*** Vieillot. House Crow.

370. ***Corvus macrorhynchos levaillanti*** Lesson. Jungle Crow.

HISTORY OF ORNITHOLOGICAL EXPLORATION

Ornithological quests in the Lushai Hills began in the 70's of the nineteenth century when one of the pioneers of the Indian ornithology, A. O. Hume was posted as a member of the Imperial Civil Service in the Cachar district of the then Bengal Province (including Assam). Ornithology of the entire northeastern part of India was builded up with the contributions of planters, Govt. officials and Civil servants. However, being an 'Excluded area' Mizoram did not catch much attention. The first series of Fauna of British India authored by Blandford and Oates mentioned this area mostly with the help of informations gathered from adjacent lacalities/countries, particularly that from Arakan, Cachar, Manipur and Naga Hills being lying in the immediate vicinity. During the second decade of the twentieth century H. Stevens made actual field exploration in part of the Lushai Hills and collected some Ornithological materials. All those information and others gathered had been incorporated by E. C. S. Baker in his second series of Fauna of British India. Since then Mizoram had been kept outside the ambit of Ornithological studies till Koelz in his exhaustive field surveys in the subcontinent during 1947–1954. Which was also included Lushai Hills and actually collected substantially rich Ornithological materials from the area.

FIELD WORK

The present work is based on a collection from Blue Mountain multi disciplinary expedition in 1987, consisting of 100 examples comprising of 66 species and sub-species. And under the research head, 'State Fauna of Mizoram-Aves', the Zoological Survey of India undertook a number of field surveys from 1992 to 1997 to cover the state at length and to touch upon various representative locations of typical habitats of the state to procure study material.

ORNITHOLOGICAL ACCOUNT

The number preceeding the names of the birds in this chapter are given in accordance with the sequence used in Ali and Ripley's, 'Handbook of the birds of India and Pakistan', Vols. 1–10 (1968–1974).

Birds listed here, are based on actual collection made by Zoological Survey of India survey parties and also from published account by Walter Koelz.

Birds said to occur from the references of published accounts of *Oates & Blandford* (1889–98)., *Walter Koelz* (1952–54) and *Ali & Ripley* (1983), have their accounts given in square brackets ¼[ ].

Birds said to occur in Mizoram from logical in reference, such as from distributional point of view, and not based on actual collection or reliable sight records have their accounts in Annexure.

SYSTEMATIC LIST

Family ACCIPITRIDAE

150. *Accipiter virgatus affinis* Hodgson. East Himalayan Besra Sparrow-Hawk.

Occasionally seen, singly or in Pairs, in forest and edge of the forest from the foot hills up to C. 2000 in.

Measurements : 1 ♀ Wing 171, tail 130, bill 19.

223. *Falco tinnunculus interstinctus* McClelland. East Himalayan Kestrel.

Saiha, Mizo Hills. 1 ♀ (9 Feb 1987).

A scarce bird. Very occasionally seen in grassland, and hills upto C. 1500 M.

Measurements : 1 ♀ Wing 260, tail 179, bill 22.

[271. *Arborophila rufogularis intermedia* (Blyth). Arakan Hill Partridge. Lushai Hills.]

[272. *Arborophila atrogularis* (Blyth). Whitecheeked Hill Partridge. Lushai Hills.]

274. *Bambusicola fytchii hopkinsoni* Godwin-Austen. Assam Bamboo Partridge.

Bhawmbawk, Saiha dist. 1 ♀ (23 Jan 1987).

Koelz (1954) collected specimen from Sangau, Lushai Hills. Rarely seen in evergreen bamboo forest from foothills up to C. 2000 m.

Measurements : 1 ♀ Wing 155, tail 110, bill 19.

288. *Tragopan blythii blythii* (Jerdon). Grey bellied Tragopan. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

299. *Gallus gallus murghi* Robinson & Kloss. Indian Red Jungle fowl.

Blue Mountain, Lushai Hills 2 ♂, 1 ♀ (9 Feb, 1987).

Measurements :	Wing	Tail	Bill
2 ♂	225	325–331	18–22
1 ♀	126	165	19

[308. *Syrmaticus humiae humiae* (Hume). Mrs. Hume's Barredback Pheasent. Lushai Hills.]

[311. *Pavo cristatus* Linnaeus. Indian Peafowl. Lushai Hills.]

[312. *Pavo muticus spicifer* Shaw & Nodder. Green Peafowl. Lushai Hills.]

[315. *Turnix tanki blanfordi* Blyth. Burmese Yellow legged Button Quail. Lushai Hills.]

[411. *Scolopax rusticola rusticola* Linnaeus. Woodcock. Koelz's (1954) collection from Sangau, Lushai Hills.]

[493. *Treron apicauda apicauda* Blyth. Pintailed Green Pigeon. Mizo Hills.]

[495. *Treron curvirostra nipalensis* (Hodgson). Thick billed Green Pigeon. Mizo Hills.]

[520. *Columba hodgsonii* Vigors. Speckeld Wood Pigeon. Mizo Hills.]

526. *Macropygia unchall tusalia* (Blyth). Bartailed Cuckoo-Dove.

Blue Mountain, Lushai Hills 1 ♀ (11 Feb, 1987).

Sparsely seen in evergreen forest from C. 400 to 2500 m.

Measurements : 1 ♀ Wing 198, tail 205, bill 14.

532. ***Streptopelia orientalis agricola*** (Tickell). Eastern Turtle-Dove.

Siachanghi, Blue Mountain 1 ♂, 1 ♀ (17 Jan, 1987).

Koelz (1954) collected specimen from Sangau, Lushai Hills.

Measurements : 1 ♀ Wing 171, tail 130, bill 19.

Measurements :	Wing	Tail	Bill
1 ♂	186	135	22
1 ♀	184	112	n22

539. ***Streptopelia chinensis tigrina*** (Temminck), Burmese Spotted Dove Siachanghi.

Blue Mountain lunsexed (17 Jan, 1987).

Measurements : Lunsexed Wing 142, tail 140, bill 21.

542. *Chalcophaps indica indica* (Linnaeus). Indian Emerld Dove.

Teirei (C. 150 m) 3 ♀ 2 ♂ (23–25 Dec, 1993). Sairep (C. 1500 m) 2 ♀ 1 ♂ (14–19 Jan, 1997).

Commonly found from the foothills upto C. 1500 m.

Measurements :	Wing	Tail	Bill
5 ♀	140–146	91–92	21–25
3 ♂	147–152	92–93	22–25

563. *Psittacula finschii* (Hume). Eastern Staty headed Parakeet.

Saiha, Blue Mountain 1 ♀ (21 Jan, 1987).

Occasionally seen in forest and cultivation from the foothills upto C. 2100 m.

Measurements : 1 ♀ Wing 141, tail 213, bill–.

[569. *Clamator coromandus* (Linnaeus). Redwinged. Crested Cuckoo. Mizo.]

[579. *Cuculus canorus bakeri* Hartert. Khasi Hills Cuckoo. Mizo Hills.]

593. *Rhopodytes tristis tristis* (Lesson). Large Green billed Molkoha.

Saiha Blue Mountain 1 ♀ (9 Jan, 1987).

Occasionally seen in dense thicket in evergreen jungle.

Measurements : 1 ♀ Wing 167, tail 370, bill 37.

616. *Otus scops sunia* (Hodgson). North Indian Scops Owl.

North khawnglung (1500 m) 1 ♂ (17 Dec, 1993). Chhimtaipui 1 ♀ (12 Jan, 1987).

Measurements :	Wing	Tail	Bill
1 ♂	138	62	17
1 ♀	135	61	17

624. *Otus bakkamoena lettia* (Hodgson). Burmese Collared Scops Owl.

Chhimtuipui 1 ♂, 1 ♀ lunsexed (18 Jan., 14 Feb., 1987). Sairep (1500 m) 1 ♂ (11 Jan, 1992), Lungsen (650 m) 1 ♂, 3 ♀ (23–26 Jan, 1992), Teirei (150 m) 1 ♀ (24 Dec, 1993), Ngengpui (190 m) 1 ♂ (10 Apr, 1995).

Koelz (1954) collected specimen from Himuntha, Lushai Hills.

Measurements :	Wing	Tail	Bill
5 ♂	157–169	75–85	24–25
3 ♀	158–180	82–89	24–25
1 –	160	84	25

[633. *Bubo flavipes* (Hodgson). Tawny Fish Owl. Mizo Hills.]

635. *Glaucidium brodiei brodiei* (Burton). Collared Pygmy Owlet.

North Khowbung (1500 m) 1 ♀ (19 Dec, 1993).

Occasionally seen from the foothills up to C. 3200 m.

Measurements : 1 ♀ Wing 98, tail 62, bill 15.

641. *Glaucidium cuculoides rufescens* Baker. Burmese Barred Owlet.

Saiha, Blue Mountain 1 ♀ (19 Jan, 1987), Sairep (1500 m) 1 ♀ (15 Jan, 1987), Ngengpui (190 m) 1 ♂ (9 Apr, 1995).

Measurements :	Wing	Tail	Bill
2♀	146–147	80(2)	20(2)
1♂	149	84	21

[643. *Ninox scutulata burmanica* Hume. Burmese Brown Hawk-Owl. Mizo Hills.]

659. *Strix leptogrammica indranee* Sykes. Brown Wood Owl.

Sairep (1500 m) 1 ♀ (28 Apr. 1995).

Rarely found in the deep forest from C. 750 to 2450 m.

Measurements: 1 ♀ Wing 387, tail 235, bill 50.

[662. *Strix aluco nivicola* (Blyth). Himalayan Wood Owl. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

[668. *Eurostopodus macrotis cerviniceps* (Gould). Burmese Great Eared Nightigar. Mizo Hills.]

[670. *Caprimulgus indicus hazarae* Whistler & Kinnear. Himalayan Jungle Nightijar. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

678. *Caprimulgus macrurus ambiguus* Hartert. Burmese Long tailed Nightijar.

Saiha, Blue Mountain 2 ♂ (7 Jan, 12 Feb, 1987).

Sporadically found in scrub jungle, cultivation up to C. 2400 m.

Measurements : 2♂ Wing 210, tail 178, bill 9(2).

[682. *Caprlmulgus affinis monticola* Franklin. Allied Nightijar. Mizo Hills.]

[683. *Collocalia brevirostris brevirostris* (Horsfield). Himalayan Swiftlet. Mizo Hills.]

[690. *Chaetura (Caudacuta) cochinchinensis* Oustalet. Cochinchine Spinetail Swift. Mizo Hills.]

[691. *Chaetura gigantea indica* Hume. Brownthroated Spinetail Swift. Mizo Hills.]

[698. *Apus acuticaudus* (Jerdon). Khasi Hills Swift. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

[700. *Apus pacificus leuconyx* (Blyth). Himalayan White rumped Swift. Mizo Hills.]

[708. *Cypsiurus parvus infumatus* (Sclater). Eastern Palm Swift. Mizo Hills.]

715. *Harpactes erythrocephalus erythrocephalus* (Gould). East Pakistan (now Bangladesh) Redheaded Trogon.

Saiha, Blue Mountain 1 ♂, 1 ♀ (21 Jan, 1987).

Occasionally seen in moist evergreen forest from the foothills to C. 1800 m.

Measurements : 1♂, 1♀ Wing 144, tail 178, bill 21(2).

[727. *Ceyx erithacus erithacus* (Linnaeus). Indian Threetoed Forest Kightisher. Mizo Hills.]

[753. *Nyctyornis athertoni athertoni* (Jardine & Selby). Bluebeared Bee-oater, Koelz's (1954) collection from Keitum, Lushai Hills.]

[771. *Aceros nipalensis* (Hodgson). Rufous necked Hornbill. Mizo Hills.]

[772. *Rhyticeros undulatus ticehursti* Deignan. Assam Wreathed Hornbill. Mizo Hills.]

774. *Anthracoceros malabaricus malabaricus* (Gmelin). Indian Pied Hornbill.

Chhimtuipui, Blue Mountain 1 ♀ (14 Feb, 1987)

Measurements : 1♀ Wing 285, tail 260, bill 137.

[776. *Buceros bicornis homrai* Hodgson. Great Pied Hornbill. Mizo Hills.]

778. *Megalaima virens magnifica* Baker. Assam Great Barbet.

Saiha 1 ♂ (23 Jan, 1987), Farpak, Blue Mountain 1 ♀ (27 Jan, 1987).

Measurements : 1♂, 1♀ Wing 141, 142, tail 93, 94, bill 39(2).

[787. *Megalaima franklinii franklinii* (Blyth). Golden throated Barbet. Mizo Hills.]

788. *Megalaima asiatica asiatica* Latham). Blue throated Barbet.

Saiha, Blue Mountain 1 ♂, 1 ♀ (21, 23 Jan, 1987), Farpak, Blue Mountain 1 ♂ (30 Jan, 1987), Sairep (1500 m) 1 ♀ (Jan, 1992), Ngengpui (190 m) 3 ♂ (10, 26 Apr, 1995).

Measurements : 5♂ Wing 103–110, tail 61–67, bill 26–28.

797. *Jynx torquilla chinnensis* Hesse. Chinese Wryneck.

Sairep (1500 m) 1 ♀ (21 Apr, 1995).

Measurements : 1♀ Wing 85, tail 67, bill 15.

799. *Picumnus innominatus malayorum* Hartert. Southern Speckled Piculet.

Saiha, Blue Mountain 1 ♀ (10 Feb, 1987).

Measurements : 1♀ Wing 58, tail 91, bill 11.

[801. *Sasia ochracea reichenwi* Hesse. Burmese Rufous Piculet. Mizo dist.]

[810. *Picus canus gyldenstolpei* Baker. Assam Black naped Green Woodpuxeo. Mizo Hills.]

[813. *Picus flavinucha flavinucha* Gould. Eastern Large Yellow naped Woodpecker. Mizo Hills.]

815. *Picus chlorophus chlorophus* Vieillot. East Himalayan Small Yellow naped Woodpecker.

Saiha, Blue Mountain 1 ♀ (21 Jan, 1987).

Measurements : 1♀ Wing 126, tail 73, bill 21.

827. *Gecinulus grantia grantia* (Horsfield). Paleheaded Woodpecker.

Saiha, Blue Mountain 1 (17 Jan, 1987).

Koelz (1954) collected specimen from Hmuntha, Lushai Hills.

Measurements : 1♂ Wing 124, tail 79, bill 24.

[833. *Hypopicus hyperythrus hyperythrus* (Vigors). Eastern Rufous bellied Woodpecker. Mizo dist.]

[839. *Dendrocopos darjellensis darjellensis* (Blyth). Darjeeling Pied Woodpecker. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

[841. *Pecoides cathpharius pyrrhothorax* (Hume). Manipur Crimson-breasted Pied Woodpecker. Koelz's (1954) collection from Sangav, Lushai Hills.]

[845. *Pecoides macei macei* (Vieillet). Indian Fulvousbreasted Pied Woodpecker. Mizo Hills.]

850. *Picoides canicapillus canicapillus* (Blyth). Burmese Grey crowned Pygmy Woodpecker.

Saiha, Blue Mountain, 1 ♀ (19 Jan, 1987).

Measurements : 1♀ Wing 87, tail 39, bill 15.

857. *Blythipicus pyrrhotis pyrrhotis* (Hodgson). Redoared Bay Woodpecker.

Saiha, Blue Mountain 1 ♂ (9 Feb, 1987).

Measurements : 1♂ Wing 147, tail 83, bill 48.

861. *Chrysocolaptes lucidus guttacristatus* (Tickell). Eastern Larger Golden backed Woodpecker.

Saiha, Blue Mountain, 1 ♂ (23 Jan, 1987).

Measurements : 1♂ Wing 167, tail 91, bill 49.

[864. *Serilophus lunatus rubropygius* (Hodgson). Nepal Collared Broadbill. Mizo dist.]

865. *Psarisomus dalhousiae dalhousiae* (Jameson). Longtailed Broadbill.

Sairep, Blue Mountain 1 ♂ (17 Jan, 1987).

Occasionally seen in flocks in riverain jungle with bamboo from the foot hills upto C. 2000 m.

Measurements : 1 ♂ Wing 107, tail 119, bill 22.

[866. *Pitta nipalensis nipalensis* (Hodgson). Blue naped Pitta. Mizo Hills.]

[869. *Pitta sordida cucullata* Hartlaub. Greenbreasted Pitta. Mizo Hills.]

[871. *Pitta cyanea cyanea* Blyth. Blue Pitta. Mizo Hills.]

[932. *Delichon nipalensis nipalensis* Horsfield & Moore. Nepal House Martin. Koelz's (1952) collection from Hmuntha, Lushai Hills.]

945. *Lanius tephronotus tephronotus* (Vigros). Eastern Tibet Grey backed Shrike.

Vumbuk, Blue Mountain 1 ♂ (22 Jan, 1987), Sairep (1500 m) 1 ♂, 1 ♀ (15 Jan, 1992, 24 Apr, 1995).

Measurements :	Wing	Tail	Bill
2 ♂	102, 103	120, 121	23(2)
1 ♀	95	109	22

948. *Lanius schach tricolor* (Hodgson). Black headed shrike.

Vumbuk 1 ♂ (23 Jan, 1987).

Measurements : 1 ♂ Wing, tail, bill.

961. *Oriolus traillii traillii* (Vigors). Indian Maroon Oriole.

Saiha, Blue Mountain 1 ♀, Lungphur 1 ♂ (12 Jan, 1987). Seen singley or in pair in the foothills.

Measurements : 1 ♂, 1 ♀ Wing, tail, bill.

966. *Dicrurus leucophaeus hopwoodi* Baker. Assam Grey Drongo.

Bualpui, Siachangpui, Blue Mountain 2 ♀ (17 Jan, 1987).

Measurements : 2 ♀ Wing, tail, bill.

971. *Dicrurus aeneus aeneus* Vieillot. Bronzed Drongo.

Vumbuk, Blue Mountain 1 ♂ (21 Jan, 1987), Teirei (1500 m) 1 ♀, Lungsen (650 m) 1 ♀ (21 Jan, 1992).

Measurements :	Wing	Tail	Bill
2 ♀	118, 119	108(2)	22(2)
1 ♂	118	108	22

972. *Dicrurus remifer tectirostris* (Hodgson). Lesser Racket-tailed.

Sairep (1500 m) 2 ♀ (26 Apr, 1995).

Measurements : 2 ♀ Wing 132, 133, tail 119, 120, bill 28(2).

976. *Dicrurus paradiseus grandis* (Gould). Northern Large Racket-tailed Drongo.

Farpak 1 ♀ (26 Jan, 1982).

Measurements : 1 ♀ Wing, tail, bill.

[1012. *Acridotheres javanicus infuscatus* (Baker). Orangebilled Jungle Myna. Mizo Hills.]

1015. *Gracula religiosa intermedia* A. Hay. Northern Hill Myna.

Saiha, Blue Mountain 1 ♀ (10 Jan, 1987).

Measurements : 1 ♀ Wing, tail, bill.

1023. *Cissa chinensis chinensis* (Boddaert). Green Magpie.

Sairep (1500 m) 2 ♂ (13 Jan, 1992, 26 Apr, 1995).

Occasionally seen singley or in pair in evergreen forest from the foothills upto C. 1600 m.

Measurements : 2 ♂ Wing 147, 151, tail 198, 203, bill 40, 43.

1028. *Cissa erythrorhyncha mangnirostris* (Blyth). Burmese Red billed Blue Magpie.

Tuikual (850 m) 1 ♂ (18 Dec, 1993).

Measurements : 1 ♂ Wing 194, tail 455, bill 40.

1038-39. *Dendrocitta formosa himalayensis* Blyth. East Himalayan Tree Pie.

Vumbum 1 ♂ (21 Jan, 1987).

Measurements : 1 ♂ Wing 205, tail 461, bill 42.

1064. *Hemipus picatus capitalis* (Horsfield). Brownbacked Pied Rlycatcher-Shrike.

North Khowbung (1500 m) 2 ♂ (17, 18 Dec, 1993).

Seen in bush, scrub in evergreen forest up C. 1800 m.

Measurements : 2 ♂ Wing 62.5, 65, tail 61, 62, bill 16(2).

1073. *Coracina novaehollandiae nipalensis* (Hodgson). Himalayan Large Cuckoo-Shrike.

Lungsen (650 m) 1 ♀ (24 Jan., 1997).

Koelz's (1954) collected specimen from Sangau, Lushai Hills. Seen in open wooded scrub jungle.

Measurements : 1 ♀ Wing 170, tail 131, bill 32.

1077. *Coracina melaschistos melaschistos* (Hodgson). Dark Grey Cuckoo-Shrike.

Saiha 1 ♂, 1 ♀ (9, 23 Jan, 1987).

Measurements : 1 ♂, 1 ♀ Wing, tail, bill.

1082. *Pericrocotus flammeus fraterculus* Swinhoe. Burmese Scarlet Minivet.

Saiha 1 ♂ (10 Jan, 1987), Bualpui 1 ♂ (15 Jan, 1987), North Khowbung (1500 m) 3 ♂ (19 Dec, 1993), Sairep 1 ♀ (17 Jan, 1997).

Keeps a small party of 3–5 in number on theedge of the forest upto C. 1800 m.

Measurements :	Wing	Tail	Bill
5 ♂	86–98	100–102	15–16
1 ♀	94	100	15

1084. *Pericrocotus brevirostris brevirostris* (Vigors). Short billed Minivet.

Sairep (1500 m) 1 ♀ (21 Jan, 1987).

Measurements : 1 ♀ Wing 87, tail 102, bill 16.

[1087. *Pericrocotus ethologus mariae* Ripley. Nagaland Longtailed Minivet. Koelz's (1952) collection from Hmuntha, Lushai Hills.]

1103. *Chloropsis aurifrons aurifrons* (Temminck). Northern Gold fronted Chloropsis.

Teirei (150 m) 1 ♂ (23 Dec, 1993), Ngengpui (190 m) 3 ♀ 1 ♂ (8 Apr, 1995).

Measurements :	Wing	Tail	Bill
2 ♂	87.5, 95	63(2)	23, 24
3 ♀	82–83	55–60	22–24

1106. *Chloropsis hardwickii hardwickii* Jardine & Selby. Orange bellied Chloropsis.

Farpak 1 ♀ (5 Feb, 1987).

Measurements : 1 ♀ Wing, tail, bill.

1109-10. *Irena puella puella* (Latham). Fairy Blue bird.

Ngengpui (190 m) 1 ♀ (8 Apr, 1995).

Occasionally seen singly on the canopy of lofty trees in evergreen forest.

Measurements : 1 ♀ Wing, tail, bill.

1111. *Spizixos canifrons canifrons* Blyth. Finchbilled Bulbul.

Sairep (1500 m) 4 ♀, 3 ♂ (18–20 Apr, 1995).

Measurements :	Wing	Tail	Bill
4 ♀	91–92	81–89	19–20
3 ♂	95–96	89–92	19–20

1115. *Pycnonotus melanicterus flaviventris* (Tickell). Blackerested Yellow Bulbul.

Tumsuipui 1 ♂, 1 ♀ (13 Jan, 1987), Bualpui 1 ♂ (15 Jan, 1987), Teirei 1 ♀ (23 Oct, 1991), Ngengpui (190 m) 1 ♂ (9 Apr, 1995), Sairep 1 ♂, 1 ♀ (18 Jan, 1997).

Measurements :	Wing	Tail	Bill
4 ♂	88–91	83–85	16–17
3 ♀	82–86	78–81	16–17

1132. *Pycnonotus cafer stanfordi* Deignan. Burmese Red vented Bulbul.

Siachangpui 1 ♂, 1 ♀ (17 Jan, 1987), North Khawbung (1500 m) 1 ♀ (15 Dec, 1993), Ngengpui (190 m) 1 ♀ (8 Apr, 1995), Sairep 4 ♀, 1 ♂ (19–21 Apr, 1995).

Measurements :	Wing	Tail	Bill
7 ♀	83–92.5	83–92.5	21–22
2 ♂	100, 98	95(2)	24(2)

1137. *Pychonotus flavescens flavescens* Blyth. Blyth's Bulbul.

Sairep 5 ♀, 2 ♂ (11–20 Apr, 1995, 17–18 Jan, 1997).

Measurements :	Wing	Tail	Bill
5 ♀	80–84	82–93	18–20
2 ♂	84, 86	93, 94	17, 19

1140. *Criniger flaveolus falveolus* (Gould). White throated Bulbul.

Lungphur 1 ♂, 1 ♀ (10 Fab, 1987).

Koelz (1954) collected from Sangan, Lushai Hills.

Measurements : 1 ♂, 1 ♀ Wing 105, 99, tail 101, 94, bill 23, 21.

1146. *Hypsipetes mcclellandi mcclellandi* Horsfield. Rufous bellied Bulbul.

Sairep (1500 m) 4 ♂, 4 ♀ (19 Apr, 1995, 16, 17 Jan, 1997).

Measurements :	Wing	Tail	Bill
4 ♂	107–116	105–108	26–28
4 ♀	100–105	96–98	25–26

1147. *Hypsipetes flavalus flavalus* (Blyth). Browneared Bulbul.

Saiha 1 ♀ (12 Jan, 1987), Teirei (150 m) 1 ♀ (23 Dec, 1998).

Measurements : 2 ♀ Wing 93.5, 94, tail 82(2), bill 21(2).

1151. *Hypsipetes madagascariensis nigrescens* Baker. Assam Black Bulbul.

Bualpui 1 ♀ (15 Jan, 1987).

Measurements : 1 ♀ Wing, tail, bill.

1156. *Pellorneum ruficeps chamelum* Deignan. Assam Spotted Babbler.

Teirei 2 ♀, 2 ♂ (10, 11 Apr, 1995), Lungsen 1 ♂ (26 Jan, 1997).

Keeps in a small party in dense evegreen forest.

Measurements :	Wing	Tail	Bill
3 ♂	70–73	64, 65	19(3)
2 ♀	67, 69	62(2)	18(2)

1167. *Trichastoma abbotti abbotti* (Blyth). Abbott's Babbler.

Palak Dil 1 ♀ (14 Feb, 1987), Ngengpui (190 m) 2 ♀, 1 ♂ (10, 11 Apr, 1995).

Measurements :	Wing	Tail	Bill
3 ♀	71–75	48–50	22(3)
1 ♂	72	46	22

1169. *Pomatorhinus schisticeps schisticeps* Hodgson. East Himalayan Slaty headed Scimitar Babbler.

Teirei (150 m) 1 ♂ (23 Dec, 1993).

Keeps to dense bushes in pairs or in a small party up to C. 1500 m.

Measurements : 1 ♂ Wing 105, tail 110, bill 42.5.

1190. *Pomatorhinus ruficollis bakeri* Harrington. Cachar Rufous necked Scimitar Babbler.

North Khowbung (1500 m) 1 ♀ (17 Dec, 1993), Sairep (1500 m) 1 ♂, 1 ♀ (18 Jan, 1997).

Koelz (1954) collected specimen from Blue Mountain, Lushai Hills.

Measurements :	Wing	Tail	Bill
2 ♀	74(2)	81, 82	23(2)
1 ♂	80	90	25

1184. *Pomatorhinus erythrogenys mcclellandi* Godwin-Austen. Assam Rusty checked Scimitar Babbler.

Vumbuk 1 ♂ (22 Jan, 1987).

Measurements : 1 ♂ Wing, tail, bill.

1185. *Pomatorhinus hypoleucos hyloleucos* (Blyth). Large Scimitar Babbler.

Palak Die 1 ♂ (14 Feb, 1987).

Measurements : 1 ♂ Wing, tail, bill.

1187. *Pomatorhinus ferruginosus formosus* Koelz. Assam Coral billed Scimitar Babbler.

Sairep (1500 m) 1 ♀, 1 ♂ (26 Apr, 1995, 18 Jan, 1997).

Measurements : 1 ♀, 1 ♂ Wing 87, 92, tail 97, 103, bill 31, 29.

[1188. *Pomatorhinus ferruginosus phayrei* Blyth. Mizo Coral billed Scimitar Babbler. Lushai Hills.]

[1192. *Xiphirhynchus superciliaris intextus* Ripley. Assam Slenderbilled Scimitar Babbler. Eoelz's (1954) collection from Blue Mountain, Lushai Hills.]

[1193. *Rimator malacoptilus* Blyth. Longbilled Wren-Babbler. Mizo Hills.]

[1194. *Napothera brevicaudata striata* (Blyth). Streaked Wren-Babbler. Koelz (1954) collection from Sangau, Lushai Hills.]

[1204. *Spelaeornis chocolatinus oatesi* (Rippon). Chin Hills Longtailed Wren-Babbler. Lushai Hills.]

[1206. *Spelaeornis formosus* (Walden). Spotted Shorttailed Wren-Babbler. Mizo Hills.]

1209. *Stachyris rufifrons ambigua* (Harrington). Assam Red fronted Babbler.

Teirei (150 m) 1 ♀ (23 Dec, 1993), Lungsen 1 ♂ (24 Jan, 1997).

Measurements : 1 ♀, 1 ♂ Wing 50(2), tail 43, 48, bill 13.5, 15.

1213. *Stachyris chrysaes binghami* Rippon. Chin Hills Golden headed Babbler.

Sairep (1500 m) 1 ♀ (4 May, 1995), Vumbak 1 ♂ (21 Jan, 1987).

Koelz's (1954) collection from Sangan, Lushai Hills.

Measurements : 1 ♀, 1 ♂ Wing 49, 51, tail 41, 43, bill 14(2).

1216. *Stachyris nigriceps spadix* Ripley. Assam Black threated Babbler.

Teirei (150 m) 2 ♂, 2 ♀ (23–26 Dec, 1993), Nagengpui (190 m) 1 ♀, 1 ♂ (8 Apr, 1995), Sairep (1800 m) 1 ♂ (19 Apr, 1995), Lungsen (650 m) 1 ♂ (24 Jan, 1997).

Koelz (1954) collected specimen from Sangau, Lushai Hills.

Measurements :	Wing	Tail	Bill
5 ♂	57–62	50–55	17–19
3 ♀	53–58	45–50	15–17

1228. *Macronous gularis rubricapilla* (Tickell). Yellow breasted Babbler.

Teirei (150 m) 1 ♀, 1 ♂ (23, 25 Dec, 1998).

Measurements : 1 ♀, 1 ♂ Wing 54, 55, tail 48, 50, bill 13, 15.

[1244. *Paradoxornis nipalensis patriciae* (Koelz). Koelz (1954) collected specimen from Blue Mountain. Lushai Hills.]

1246. *Paradoxornis atrosuperciliaris atrosuperciliaris* (Godwin-Austen). Black browed Parrotbill.

Lungpher 1 ♀ (10 Feb, 1987).

Occasionally seen in small parties is high grass and scrab jungle from the foot hill upto 1500 m.

Measurements : 1 ♀ Wing, tail, bill.

1248. *Paradoxornis ruficeps bakeri* (Hartert). Assam Red headed Parrot bill.

Vwumbak 1 ♀, Siachanghui 1 ♀ (17, 20 Jan, 1987).

Koelz (1954) collected specimen from Sangan, Lushai Hills.

Measurements : 2 ♀ Wing 90, 91, tail 81, 83, bill 15(2).

1252. *Paradoxornis guttaticollis* David. White throated Parrot bill.

Sairep (1500 m) 1 ♀ (25 Apr, 1995).

Measurements : 1 ♀ Wing 82, tail 98, bill 18.5.

[1270. *Babax lanceolatus woodi* Finn. Chinese Babax. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

[1286. *Garrulax galbanus galbanus* Godwin & Austin. Yellow throated Laughins Thrush. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

[1303. *Garrulax ruficollis* (Jardine & Selby). Fufous necked Laughing Thrunsh. Mizo Hills.]

[1304. *Garrulax merulinus merulinus* Blyth. Assam Spotted breasted Langhing Thrush. Lushai Hills.]

[1317. *Garrulax virgatus* (Godwin-Austen). Manipur Streaked Laughing Thrnsh. Koelz's (1952) collection from Hmuntha, Lushai Hills.]

[1318. *Garrulax austeni austeni* (Godwin-Austen). Brown capped Laushing Thrnsh. Mizo Hills.]

1319. *Garrulax squamatus* (Gould). Blue winged Laughing Thrnsh.

Sairep (1500 m) 1 ♂, 1 ♀ (18 Jan, 1997).

Uncommonly seen in pair or small parties in dense humid forest from 1300 to 2200 m.

Measurements : 1 ♂, 1 ♀ Wing 42, 43, tail 100, 105, bill 25(2).

1330. *Garoulax erythrocephalus erythrolaema* (Hume). Manipur Red headed Laughing Thrnsh.

Farpak, Blue Mountain 1 ♀ (26 Jan, 1987), Sairep (1500 m) 2 ♂, 1 ♀ (12 Jan, 1992, 26 Apr, 1995).

Measurements :	Wing	Tail	Bill
2♂	100, 102	113, 120	25, 26
2♀	102, 103	110, 111	25(2)

[1332. *Garrulax phoenicurus bakeri* (Hartert). Assam Crimson winged Laughing Thrnish. Mizo Hills.]

1333a. *Leiothrix argentauris aureigularis* (Koelz). Assam Silver eared Mesia.

Siachangpui 1 ♂ (11 Feb, 1987), Sairep 4 ♀ (20–23 Apr, 1995).

Measurements :	Wing	Tail	Bill
4♀	70–75	63–68	16–19
1♂	77	69	18

[1339. *Cutia nipalensis nipalensis* Hodgson. Nepal Cutia. Mizo Hills.]

1341. *Pteruthius flaviscapis validirostris* Koelz. Red winged Shrike-Babbler.

Sairep (1500 m) 1 ♀ (12 Jan, 1997). Koelz (1954) collected specimens from Sangau, Lushai Hills.

Occasionally seen in dense humid ever green forest between 1200 and 2000 m.

Measurements : 1 ♀ Wing 81, tail 62, bill 20.

[1344. *Pteruthius xanthochlorus hybridus* Harrington. Chin Hills Geeen Shrike-Babbler. Mizo Hills.]

1351. *Actinodura egertoni ripponi* Ogilvie-Grant. Mizo Barwing.

Sairep (1500 m) 4 ♀, 3 – (13–18 Jan, 1997).

Uncommonly seen in small parties in dense, shady, primeval forest between 1200 and 2500 m.

Measurements :	Wing	Tail	Bill
4♀	80–85	104–107	19(4)
3–	81–86	102–110	20(3)

1361. *Minla strigula cinereigenae* (Ripley). Assam Barthroated Siva.

Vwumbak, Blue Mountain 1♂ (24 Jan, 1987).

Measurements : 1♂ Wing 68, tail, bill 12.

1362. *Minla cyanouroptera cyanouroptera* (Hodgson). Blue winged Siva.

Sairep (1800 m) 4♀, 2♂ (18–22 Apr, 1995).

Seen in small parties in dense bushes in evergreen forest between 1200 and 2200 m.

Measurements :	Wing	Tail	Bill
4♀	58–62	60–65	15–16
2♂	58, 61	61, 65	16(2)

1365. *Yuhina castaniceps castaniceps* (Moore). Chestnut-headed Yuhina.

Sairep (1800 m) 2♂, 1♀ (18–20 Apr, 1995).

Measurements :	Wing	Tail	Bill
2♂	56, 57	54, 56	12(2)
1♀	58	55	11

1370. *Yuhina flavicollis rouxi* (Oustalet). Assam Yellow naped Yuhina.

Sairep (1500 m) 6♂, 2♀ (20–27 Apr, 1995), 1♀ (14 Jan, 1997).

Commonly seen in parties from the foot hill upto C. 2600 m.

Measurements :	Wing	Tail	Bill
6♂	60–63	50–52	14–15
3♀	60–61	46–50	13–14

1391. *Alcippe poiociphala fusca*Godwin-Austen. Assam Quaker Babbler.

Teirei (150 m) 1♂ (23 Oct, 1991), 4♂, 3♀ (23–25 Dec, 1993), Lungsen (650 m) 1♂, 2♀ (25–26 Jan, 1997).

Commonly seen in parties from the foot hills upto C. 190 m in deep ever green forest.

Measurements :	Wing	Tail	Bill
6♂	67–71	59–67	17–18
5♀	66–67	62–65	17–18

1394. *Alcippe nipalensis stanfordi* Ticehurst. Chin Hills Quaker Babbler.

North Khawbung (1500 m) 1♀ (17 Dec, 1993), Sairep (1500 m) 2♂, 1♀ (19 Apr, 1995, 14 Jan, 1997).

Measurements :	Wing	Tail	Bill
2♂	58, 59	56, 58	14(2)
2♀	57, 59	56(2)	13–14

[1395. *Heterophasia annectens annectens* (Blyth). Chestnut backed Sibia. Mizo Hills.]

1399. *Heterophasia gracilis* (McClelland). Grey Sibia.

Farpak, Blue Mountain 5♀ (21–26 Jan, 1987), Sairep (1500 m) 4♀, 3♂ (18–19 Apr, 1995), 3♀ (11–18 Jan, 1997).

Commonly seen in small parties in ever green primeval forest from 1200 to 2500 m.

Measurements :	Wing	Tail	Bill
12♀	83–86	96–100	24–25
3♂	86–95	93–100	24–25

[1408. *Muscicapa muttui muttui* (Layard). Brown breasted Flycatcher. Koelz's (1954) collection from Aijab, Lushai Hills.]

[1410. *Muscicapa ferruginea* (Hodgson). Ferruginons Flycatcher. Mizo Hills.]

1412. *Muscipape parva albicilla* Pallas. Eastern Red breated Flycatcher.

Sairep (1500 m) 2♂ (16, 22 Apr, 1995).

Measurements : 2♂ Wing 66, 68, tail 47, 51, bill 13, 14.

1414. *Muscicaga strophiata strophiata* (Hodgson). Orange gorgated Flycatcher.

Sairep (1500 m) 1♂ (17 Jan, 1992).

Measurements : 1♂ Wing 76, tail 63, bill 13.

1416. *Muscicapa monileger leucops* (Sharpe). Assam White gorgeted Flycatcher.

North Khowbung (1500 m) 2♂ (15, 17 Dec, 1993), Sairep (1500 m) 1♂ (14 Jan, 1997).

Measurements : 3♂ Wing 61–63, tail 46–49, bill 13–14.

1417. *Muscicapa hyperythra hyperythra* Blyth. Rufous breasted Blue Flycatcher.

Teirei (150 m) 2♂ (25 Dec, 1993).

Measurements : 2♂ Wing 59, 61, tail 41(2), bill 12, 13.

1418. *Muscicapa hodgsonii* (Verreaux). Rusty breasted Blue Fly catcher.

Lungphur, Blue Mountain 1♂ (7 Feb, 1987).

Measurements : 1♂ Wing 69, tail 57, bill 12.

1428. *Muscicapa grandis grandis* (Blyth). Large Niltava.

Sairep (1500 m) 1♀, 2♂ (17–24 Apr, 1995), 1♀ (13 Jan, 1997).

Koelz's (1954) collection from Sangan, Lushai Hills.

Measurements :	Wing	Tail	Bill
2♀	98, 103	85, 88	21–22
2♂	100, 107	92(2)	20–22

1430. *Muscicapa macgrigoriae signata* (Horsfield). Eastern Small Niltava.

Lungphar, Blue Mountain 1♂ (11 Feb, 1987), North Khawbung (1500 m) 1♂ (17 Dec, 1993), Sairep (1500 m) 2♀, 1♀ (25, 26 Apr, 1995).

Measurements :	Wing	Tail	Bill
2♂	63, 64	50(2)	13(2)
2♀	62(2)	50(2)	13(2)

1432. *Muscicapa sundara sundara* (Hodgson). Eastern Rufows bellied Niltava.

Bualpuii 1♂ (13 Jan, 1987), Teirei (150 m) 1♂ (24 Dec, 1993), Sairep (1500 m) 1♂ (26 Apr, 1995), 1♂, 1♀ (13, 15 Jan, 1997).

Measurements :	Wing	Tail	Bill
4♂	79–83	62–70	16, 17
1♀	81	69	16

1434. *Muscicapa concreta cyanea* (Hume). White tailed Blue Flycatcher.

Teirei (150 m) 1♀ (23 Oct, 1991).

Measurements : 1♀ Wing 88, tail 66, bill 18.

1436. *Muscicapa poliogenys poligenys* (Brooks). Wastern Brooks Flycatcher.

Lungsen (650 m) 1♀ (25 Jan, 1992).

Measurements : 1♀ Wing 67, tail 54, bill 16.

1445. *Muscicapa thalassina thalassina* Swainson, Verditen Flycatcher.

North Khowbung (1500 m) 1♂ (18 Dec, 1993), Sairep (1500 m) 1♀ (18 Apr, 1995).

Measurements : 1♂, 1♀ Wing 85, 77, tail 71, 62, bill 13, 15.

1448. *Culicicapa ceylonensis calochrysea* Oberholser. Northern Grey headed Flycatcher.

Teirei (150 m) 1♀ (23 Dec, 1993).

Measurements : 1♀ Wing 62, tail 49, bill 12.

1456. *Rhipidura albicollis stanleyi* Baker. NEFA White Throated Fantail Flycatcher.

Sairep (1500 m) 2♀, 1♂ (16–18 Apr, 1995).

Measurements :	Wing	Tail	Bill
2♀	72(2)	95(2)	14(2)
1♂	78	102	16

1465. *Monarcha azurea styani* (Hartlaub). Indian Black naped Monarch Flycatcher.

Teirei (150 m) 2♂ (24, 27 Dec, 1993).

Measurements : 2♂ Wing 67, 69, tail 67, 70, bill 16(2).

1471. *Tesia cyoniventer* Hodgson. Yellow browed Ground Warbler.

Sairep (1500 m) 1 ♀ (21 Apr, 1995).

Very uncommonly seen singly in dense shady forest near small streams upto 2000 m.

Measurements : 1 ♀ Wing 43, tail 15, bill 16.

1473. *Tesia castaneocoronata castanercoronata* (Burton). Chestnut-headed Ground Warbler.

Farpak, Blue Mountain 1 ♂ (26 Jan, 1987).

Koelz (1954) collected specimen from Blue Mountain, Lushai Hills.

Measurements : 1 ♂ Wing 48, tail 28, bill 12.

[1478. *Cettia fortipes fortipes* (Hodgson). Strong footed Bush Warbler. Koelz's (1954) collection from Sangan, Lushai Hills.]

[1483. *Cettia flavolivacea alexanderi* Ripley. Manipur Aberrrant Bush Warbler. Mizo Hills.]

1501. *Prinia rafescens rufescens* Blyth. Rufous Wren-Warbler.

Lungsen (650 m) 1 ♂ (23 Jan, 1997).

Measurements : 1 ♂ Wing 44, tail 57, bill 14.

1588-89. *Phylloscopus pulcher pulcher* Blyth. Eastern Orange barred Leaf Warbler.

Sairep (1500 m) 4 ♂, 4 ♀ (16–24 Apr, 1995).

Koelz (1954) collected specimen from Blue Mountain, Lushai Hills.

Measurements :	Wing	Tail	Bill
4 ♂	55–56	37–40	12–15
4 ♀	83–54	35–40	11–12

1592. *Phylloscopus inornatus inornatus* (Blyth). Siberian Yellow browed Leaf Warbler.

North Khowbung (1500 m) 2 ♂ (15, 16 Dec, 1993), Sairep 1 ♀ (21 Apr, 1995), Saiha 2 ♀ (9, 10 Jan, 1987).

Measurements :	Wing	Tail	Bill
2 ♂	58, 60	44, 45	10–12
3 ♀	50–52	38–42	11(3)

1591. *Phylloscopus inornatus mandellil* (Brooks). Mandelli's Yellow browed Leaf Warbler.

North Khowbung (1500 m) 1 ♂ (18 Dec, 1993), Sairep (1500 m) 2 ♂, 1 ♀ (13–19 Jan, 1997).

Measurements :	Wing	Tail	Bill
3 ♂	54–55	39–40	11–12
1 ♀	53	33	12

[1607. *Phylloscopus occipitalis coronatus* (Temminck & Schlegel). Eastern Crowned Leaf Warbler. Mizo Hills.]

[1610. *Phylloscopus reguloides assamensis* Hartert. Assam Crowned Leaf Warbler. Koelz's (1954) collection from Blue Mountain, Lushai Hills.]

1615. *Seicercus burkii burkii* (Burton). Eastern Black browed Flycatcher-Warbler.

Sairep (1500 m) 3 ♀ (18–23 Apr, 1995).

Koelz (1954) collected from Sangan, Lushai Hills.

Occasionally seen singly or in pair in ever green and deciduous forest upto C. 2100 m.

Measurements : 3 ♀ Wing 53–55, tail 45–48, bill 13–14.

1619. *Seicercus xanthoschistos tephrodiras* Sick. Assam Grey headed Flycatcher-Warbler.

North Khawbung (1500 m) 2 ♂ (17, 19 Dec, 1993), Sairep (1500 m) 3 ♂ (18–27 Apr, 1995).

Measurements : 5 ♂ Wing 48–52, tail 37–41, bill 11(5).

[1626. *Abroscopus albogularis albogularis* (Horsfield & Moore). White throated Flycatcher-Warbler. Mizoram.]

1639. *Brachypteryx leucophrys nipalensis* Moore. Lesser Shortwing.

Sairep (1500 m) 6♂, 2♀ (16–26 Apr, 1995).

Uncommonly seen singly or in pairs in dense undergrowth in humid forest upto C. 2500 m.

Measurements :	Wing	Tail	Bill
6♂	58–60	31–33	16–17
2♀	59(2)	30, 31	15(2)

1650-51. *Erithacus brunneus* (Hodgson). Indian Blue Chat.

Sairep (1500 m) 1♂ (26 Apr, 1995).

Measurements : 1♂ Wing 73, tail 48, bill 15.

1655. *Erithacus cyanurus rufilatus* (Hodgson). Eastern Red flanked Bush Robin.

Sairep (1500 m) 2♂ (12, 16 Jan, 1997).

Measurements : 2♂ Wing 80, 83, tail 59, 64, bill 15(2).

1675. *Phoenicurus frontalis* (Vigors). Blue fronted Resestart.

Farpak, Blue Mountain 1♂ (2 Feb, 1987), North Khawbung (1500 m) 1♀ (18 Dec, 1993), Sairep (1500 m) 2♀ (11, 18 Jan, 1997).

Measurements :	Wing	Tail	Bill
3♀	81–83	64–68	15(3)
1♂	85	69	16

1681. *Cinclidium leucurum* (Hodgson). White tailed Blue Robin.

Sairep (1500 m) 6♂, 3♀ (16–26 Apr, 1995).

Occasionally seen singly in shady forest near streems upto C. 2500 m.

Measurements :	Wing	Tail	Bill
6♂	90–96	69–80	13–19
3♀	87–89	61–62	18–19

1685. *Enicurus immaculatus* (Hodgson). Black backed Forktail.

Ngengpui (190 m) 1♂ (28 Apr, 1995).

Measurements : 1♂ Wing 106, tail 152, bill 52.

1686. *Enicurus schistaceus* (Hodgson). Staty beaded Forktail.

Tuikual (850 m) 2♀, 1♂ (17, 18 Dec, 1993).

Occasionally seen solitaryor in pairs in rocky torrerds in dark dense forest upto C. 1800 m.

Measurements :	Wing	Tail	Bill
2♀	90, 94	120, 122	12,23
1♂	99	133	22

[1689. *Enicurus maculatus guttatus* Gould. Eastern Spotted Forktail. Mizo Hills.]

1691. *Cochoa viridis* Hodgson. Green Cochoa.

Sairep (1500 m) 1♂ (11 Jan, 1987).

Rarely seen singly or in pairs in dense shady ever green forest watered by small streams up to C. 2000 m.

Measurements : 1♂ Wing 140, tail 116, bill 25.

[1701. *Saxicola caprata burmanica* Baker. Burmese Pied Bush Chat. Mizoram.]

[1704. *Saxicola jerdoni* (Blyth). Jerdon's Bush Chat. Mizoram.]

1705. *Saxicola ferrea haroingtoni* (Hartert). Harrington's Dark-Grey Bush Chat.

North Khawbung (1500 m) 2♂ (15 Dec, 1993), Sairep (1500 m) 1♂ (24 Apr, 1995).

Measurements : 3♂ Wing 66–69, tail 62–64, bill 16(3).

1724. *Monticolarufiventris* (Jardine & Selby). Chestnut-billed Rock Thrush.

Farpak 1♀ (27 Jan, 1987).

Measurements : 1♀ Wing 119, tail 98, bill 27.

1726. *Monticola solitarius pandoo* (Sykes). Indian Blue Rock Thrush.

Saiha 1 ♀ (8 Jan, 1987).

Measurements : 1 ♀ Wing 115, tail 78, bill 27.

1729. *Myiophonus caeruleus temminckii* (Vigors). Himalayan Whistling Thrush.

Tuikual (850 m) 1 ♂ (17 Dec, 1993), Teirei (150 m) 1 ♀ (23 Dec, 1993).

Commonly seen solitary or two in heavy forest, gorges and roadside upto C. 2400 m.

Measurements : 1 ♂, 1 ♀ Wing 174, 177, tail 124, 128, bill 33(2).

1733. *Zoothera citrina citrina* (Latham). Orange headed Ground Thrush.

Ngengpui (190 m) 1 ♂ (9 Apr, 1995).

Measurements : 1 ♂ Wing 121, tail 73, bill 24.

[1745. *Zoothera monticola monticola* Vigors. Large Brown Thrush. Koelz's (1954) collection from Sangav, Lushai Hills.]

1746. *Zoothera marginata* Blyth. Lesser Brown Thrush.

Sairep (1500 m) 1 ♂ (26 Apr, 1995).

Rarely seen singly in damp forest along small water sources up to C. 2100 m.

Measurements : 1 ♂ Wing 128, tail 78, bill 35.

1762. *Turdus obscurus* Gmelin. Dark Thrush.

Farpak 1 ♀ (25 Jan, 1987), North Khawbung (1500) 1 ♀ (18 Dec, 1993).

Measurements : 2 ♀ Wing 117, 119, tail 85, 87, bill 22(2).

1789. *Melanochlora sultanea sultanea* (Hodgson). Sultan Tit.

Siachangpui 1 ♂ (17 Jau, 1987), Vuramback 1 ♀ (23 Jan, 1987).

Occasionally seen in small parties in light forest from the foot hills up to C. 1900 m.

Measurements : 1 ♂, 1 ♀ Wing 97(2), tail 86, 87, bill 15(2).

1799. *Parus monticolus monticolus* Vigors. Green backed Tit.

North Kawbung (1500 m) 4 ♂, 3 ♀ (16–17 Dec, 1993).

Measurements :	Wing	Tail	Bill
4 ♂	65–66	54–55	13(4)
3 ♀	64–65	53–54	12(3)

[1812. *Parus spilonotus subviridis* Blyth. Burmese Black-Spotted Yellow Tit. Mizo Hills.]

[1820. *Aegithalos concinnus manipurensis* (Hume). Manipur Red headed Tit. Mizo Hills.]

[1828. *Sitta castanea cinnamoventris* Blyth. Eastern Chestnut bellied Nuthatch. Mizo Hills.]

[1835. *Sitta himalayensis australis* Koelz. Assam White-tailed Nuthatch. Koelz's (1952) collection from Hmuntha, Lushai Hills.]

[1838. *Sitta frontalis frontalis* Swainson. Velvet fronted Nuthatch. Mizoram.]

1853. *Anthus hodgsoni yunnanensis* Uchida & Kuroda. Siberian Tree Pipit.

North Khawbung (1500 m) 2 ♂ (16, 17 Dec, 1993), Sairep (1500 m) 1 ♀, 1 ♂ (17 Apr, 1995), 2 ♀ (14 Jan, 1997), Lungsen (650 m) 1 ♀ (24 Jan, 1997).

Commonly seen in flocks near cultivation and plonghed fields up to C. 2000 m.

Measurements :	Wing	Tail	Bill
5 ♀	80–81	55–60	15–16
2 ♂	83	56, 63	14(2)

1887. *Motacilla alba alboides* (Hodgson). Hodgson's Pied Wagtail.

Saichangpui 1 ♂ (17 Jan, 1987).

Measurements : 1 ♂ Wing 96, tail 91, bill 18.

[1895. *Dicaeum chrysorrheum chrysochlore* Blyth. Yellow vented Flowoer pecker. Koelz's (1954) collection from Lushai Hills.]

1901. *Dicaeum concolor olivaceum* Walden. Plain coloured Flower pecker.

Ngengpui (190 m) 1 ♂ (28 Apr, 1995).

Measurements : 1 ♂ Wing 48, tail 20, bill 11.

[1905. *Dicaeum ignipectus ignipectus* (Blyth). Fire breasted Flower pecker. Koelz's (1954) collection from Sangau, Lushai Hills.]

1920. *Aethopyga gouldiae isolata* Baker. Manipur Yellow backed Sunbird.

Farpak 1 ♀ (26 Jan, 1987).

Koelz (1954) collection from Blue Mountain, Lushai Hills.

Measurements : 1 ♀ Wing 48, tail 61, bill 19.

1923. *Aethopyga nipalensis nipalensis* (Hodgson). Nepal Yellow backed Sunbird.

Furpack 3 ♂, 1 ♀ (25–26 Jan, 1987).

Measurements :	Wing	Tail	Bill
3 ♂	53–56	58–63	25–26
1 ♀	50	41	24

1928. *Aethopyga siparaja labecula* (Horsfield). Assam Yellow backed Sunbird.

Farpak 2 ♂ (25 Jan, 1987), Teirei (150 m) 3 ♂, 1 ♀ (23–27 Dec, 1993).

Measurements :	Wing	Tail	Bill
5 ♂	49–54	57–60	21–23
1 ♀	53	57	21

1931. *Arachnothera longirostris longirostris* (Latham). Little Spider hunter.

Teirei (150 m) 1 ♀, 3 ♂ (24–25 Dec, 1993), Ngengpui (190 m) 2 ♂ , 3 ♀ (8–9 Apr, 1995), Lungsen (650 m) 2 ♀ (22, 25 Jan, 1997), Saiha 1 ♀ (8 Jan, 1987).

Occasionally seen singly or in pairs in dense forest from the foot hills upto C. 1500 m.

Measurements :	Wing	Tail	Bill
7 ♀	61–65	36–42	34–38
5 ♂	64–67	42–43	34–37

1932. *Arachnothera magna magna* (Hodgson). Streaked Spider hunter.

Sairep (1500 m) 1 ♀, 3 ♂ (10–24 Apr, 1995), Lungsen (650 m) 2 ♀ (26 Jan, 1997).

Measurements :	Wing	Tail	Bill
3 ♂	85–86	41–46	46(3)
3 ♀	86	46	46

1933. *Zosterops pulpebrosa pulpebrosa* (Temminck). Indian White eye.

Vumbak 1 ♀ (23 Jan, 1987), Teirei (150 m) 1 ♀ (24 Dec, 1993).

Measurements : 2 ♀ Wing 50(2), tail 33, 34, bill 12(2).

[1947. *Passer rutilans intensier* Rothschild. Yunan Cinnamon Tree Sparrow. Koelz's (1952) collection from Lushai Hills.]

1967. *Lonchura striata acuticauda* (Hodgson). White backed Munia.

Teirei (150 m) 1 ♂ (26 Dec, 1993); Lungeen (650 m) 3 ♂ (21–26 Jan, 1997).

Measurements : 4 ♂ Wing 47–50, tail 40–45, bill 13–15.

[1986. *Mycerobas melanozanthos* (Hodgson). Spotted winged Grosbeak. Koelz's (1954) collection from Sangan, Lushai Hills.]

2011. *Carpodacus erythrinusroseatus* (Blyth). Indian Resefinch.

Saiha 1 ♂, 4 ♀ (10–12 Jan, 1987), North Khawbung (1500 m) 1 ♂ (17 Dec, 1993).

Measurements :	Wing	Tail	Bill
2 ♂	84–88	55–60	13–15
4 ♀	80–84	50–58	13–15

2045. ***Emberiza rutila*** Pallas. Chestnut Bunting.

North Khawbung (1500 m) 1 ♂ (19 Dec, 1993), Tuikual (850 m) 1 ♀ (18 Dec, 1993).

Measurements : 1 ♀, 1 ♂ Wing 73, 78, tail 56, 58, bill 14, 15.

2060. ***Melophus lathami*** (Gray). Crested Bunting.

Tuikual (850 m) 1 ♂ (18 Dec, 1993).

Rarely seen in small loose flocks in scrubbed hill sides and charred grasslands upto C. 1500 m.

Measurements : 1 ♂ Wing 81, tail 65, bill 17.

SUMMARY

This paper is dealt with the collection now preserved in the National Zoological Collection. Altogether 370 species and subspecies of birds vide Annexure I & II are listed in this paper and out of which 215 species and subspecies of birds are dealt with in 'Ornithnological Account'

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MAMMALS

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INTRODUCTION

Out of a total 4,629 species of mammals known from the world, 393 species occur in the Indian Union (Wilson and Reeder 1993, Corbet and Hill 1992). Of these, 84 species and subspecies are being reported from Mizoram.

Our knowledge about the mammalian fauna of Mizoram is rather patchy. Unfortunately, the Mammal Survey of India, Burma and Ceylon, conducted by the Bombay Natural History Society during the year 1911 to 1930, which surveyed the major part of the then British India, could not touch Mizoram. Hence, the state remained unsurveyed.

After the Eastern Regional Station of the Zoological Survey of India was established at Shillong in 1959, Dr. T. Z. Vazirani of that Regional Station collected some small mammalian specimens from Mizoram in 1960. Scientists from the Headquarters of the Zoological Survey of India, Calcutta in the years 1984, 1987 and 1991 have collected a few specimens of medium-sized mammlian specimens from Mizoram.

Under the programme of faunistic survey of the Indian states, the Zoological Survey of India initiated the project on the fauna of Mizoram. Scientists from Mammal and Osteology Section of the Zoological Survey of India surveyed different parts of Mizoram from December 1993 to January 1994, April–May 1995 and November 1997 for the study to Mammalian fauna of Mizoram.

Pending a full report, some interesting observations on the small mammals were published (Mandal *et al.*, 1994, 1995, 1998, 1999, 2000) from recent collection. Earlier publication include Blyth (1863) who listed all specimens of mammals present in the Museum of the Asiatic Society, including that state, Jerdon (1867) provided a preliminary descriptive account of mammals of India, which also included those from Mizoram. Dobson (1876) published his monumental work on the Asiatic Chiroptera in which description, distribution, etc., of all the bats known from Mizoram up to that time were provided. The first complete faunal account on Indian mammals was authored by Blanford (1888, 1891). During this period, Anderson (1891) published catalogues of mammalian specimens present in the Indian Museum, which naturally included those from the present state of Mizoram. Later, Pocock's Fauna of British India on Primates and Carnivora (1939, 1941), Ellerman's Fauna of India on Rodentia (1961) and Ellerman and Morrison-Scott's Checklist (1951, 1966), all included faunal accounts of mammals from Mizoram. Besides, some publications were made on Rodents of Mizoram, of which, the worth-mentioning are Ghose (1966), Agrawal (1980), Chauhan and Saxena (1982, 1983, 1985 and 1989), Sankar Raman (1995). Very recently, Sinha (1999) in his publication 'Contribution to the knowledge of Bats (Mammalia : Chiroptera) of North East Hills, India' has mentioned the bats available from Mizoram.

The present mammalian faunal account of the state is based mainly on the collection of mammal brought by the surveys, as mentioned above, from different parts of Mizoram, as also on earlier specimens already present in the National Zoological Collection of India from that State, and partly on published literature.

Complete synonymies have not been given, as these are available in Blyth (1863), Jerdon (1867), Dobson (1876), Anderson (1881), Blanford (1888, 1891), Sclater (1891), Pocock (1939, 1941), Ellerman & Morrison-Scott (1966) and Ellerman (1961).

Measuements have been expressed in millimetre (except where stated otherwise) and have been taken after Pocock (1939, 1941) for Primates and Carnivora, Khajuria (1953) for Chiroptera and Ellerman (1961) for Rodentia.

Following, is a list of abbreviations used for various measurements :

apf = length of anterior palatal foramina;
b = length of bulla;
$c'-c'$ = distance between cingula of upper canines;
cb = condylobasal length;
ccl = condylocanine length;
$c-m_3$ = length of lower tooth-row;
cr = cranial rostrum;
cw = cranial width;
d = length of diastema;
E = length of ear;
Fa = length of forearm;
F & Cl = length of foot and claw;
H & B = length of head and body;
Hf = length of hindfoot;
iw = least interorbital width;
l = greatest length of skull;
m^1-m^1 = distance between outer surfaces of first upper molars;
m_1 = length of first lower molar;
m^3-m^3 = distance between outer surfaces of third upper molars;
ml = mandibular length;
mtr = length of maxillary tooth-row;
mw = maxillary width;
n = nasal length;
on = occipitonasal length;
orb = length of orbit;
pl = palatal length;
pm^4 = length of fourth upper premolar;
pow = postorbital width;
Tb = length of tibia;
Tl = length of tail;
Tr = length of tragus;
zw = zygomatic width.

SYSTEMATIC LIST OF MAMMALS OF MIZORAM

Order SCANDENTIA

Family TUPAIIDAE

1. ***Tupaia belangeri assamensis*** Wroughton

Order INSECTIVORA

Family TALPIDAE

2. ***Talpa micrura*** Hodgson

Family SORICIDAE

3. ***Suncus murinus griffithi*** (Horsfield)
4. ***Crocidura attenuata rubricosa*** Anderson
5. ***Anourosorex squamipes*** Milne-Edwards

Order CHIROPTERA

Suborder MEGACHIROPTERA

Family PTEROPODIDAE

6. ***Rousettus leschenaulti leschenaulti*** (Desmarest)
7. ***Pteropus giganteus giganteus*** (Brünnich)
8. ***Cynopterus sphinx sphinx*** (Vahl)
9. ***Cynopterus brachyotis*** (Müller)
10. ***Megaerops niphanae*** Yenbutra & Felten
11. ***Sphaerias blanfordi*** (Thomas)
12. ***Eonycteris spelaea*** (Dobson)
13. ***Macroglossus sobrinus sobrinus*** Andersen

Suborder MICROCHIROPTERA

Family RHINOLOPHIDAE

Subfamily RHINOLOPHINAE

14. ***Rhinolophus rouxi rouxi*** Temminck
15. ***Rhinolophus lepidus lepidus*** Blyth
16. ***Rhinolophus yunanensis*** Dobson
17. ***Rhinolophus pearsoni*** Horsfield

Subfamily HIPPOSIDERINAE

18. ***Hipposideros lankadiva*** Kelaart
19. ***Hipposideros cineraceus*** Blyth

Family VESPERTILIONIDAE

Subfamily VESPERTILIONINAE

20. ***Myotis formosus formosus*** (Hodgson)
21. ***Myotis montivagus montivagus*** (Dobson)
22. ***Myotis muricola*** (Gray)
23. ***Eptesicus pachyotis*** (Dobson)
24. ***Pipistrellus circumdatus*** (Temminck)
25. ***Scotozous dormeri*** Dobson
26. ***Tylonycteris pachypus fulvida*** (Blyth)
27. ***Barbastella leucomelas darjelingensis*** (Hodgson)

Subfamily MURININAE

28. ***Murina tubinaris*** (Scully)
29. ***Murina cyclotis cyclotis*** Dobson
30. ***Harpiocephalus mordex*** Thomas
31. ***Harpiola grisea*** Peters

Order PRIMATES

Family LORISIDAE

32. ***Nycticebus coucang bengalensis*** (Lacepéde)

Family CERCOPITHECIDAE

33. ***Macaca arctoides*** (I. Geoffroy)
34. ***Macaca assamensis assamensis*** (M'Clelland)
35. ***Macaca mulatta mulatta*** (Zimmermann)
36. ***Trachypithecus pileatus pileatus*** (Blyth)
37. ***Trachypithecus phayrei phayrei*** (Blyth)

Family HYLOBATIDAE

38. ***Hylobates hoolock*** (Harlan)

Order PHOLIDOTA

Family MANIDAE

39. ***Manis pentadactyla aurita*** Hodgson

Order CARNIVORA

Family CANIDAE

40. ***Canis lupus pallipes*** Sykes
41. ***Canis aureus indicus*** Hodgson
42. ***Vulpes bengalensis*** Shaw

Family FELIDAE

43. ***Felis chaus*** Güldenstaedt
44. ***Felis bengalensis bengalensis*** Kerr
45. ***Panthera pardus fusca*** (Meyer)
46. ***Panthera tigris tigris*** (Linnaeus)
47. ***Neofelis nebulosa*** (Griffith)

Family HERPESTIDAE

48. ***Herpestes urva*** (Hodgson)
49. ***Herpestes auropunctatus*** (Hodgson)

Family MUSTELIDAE

50. ***Mustela kathiah*** Hodgson
51. ***Aonyx cinerea concolor*** (Rafinesque)
52. ***Martes flavigula flavigula*** (Boddaert)

Family URSIDAE

53. ***Selenarctos thibetanus*** (G. Cuvier)
54. ***Helarctos malayanus*** (Raffles)

Family VIVERRIDAE

55. ***Paguma larvata neglecta*** Pocock
56. ***Viverricula indica indica*** (Desmarest)

Order PROBOSCIDEA

Family ELEPHANTIDAE

57. ***Elephas maximus indicus*** G. Cuvier

Order ARTIODACTYLA

Family SUIDAE

58. ***Sus scrofa cristatus*** Wagner

Family CERVIDAE

59. ***Muntiacus muntjak vaginalis*** (Boddaert)
60. ***Cervus unicolor*** Kerr
61. ***Axis porcinus porcinus*** (Zimmermann)

Family BOVIDAE

62. ***Bos gaurus*** Smith
63. ***Capricornis sumatraensis*** (Bechstein)

Order LAGOMORPHA

Family LEPORIDAE

64. ***Lepus nigricollis*** Cuvier

Order RODENTIA

Family SCIURIDAE

65. ***Belomys pearsoni trichotis*** Thomas
66. ***Callosciurus erythraeus erythrogaster*** (Blyth)
67. ***Callosciurus pygerythrus janetta*** (Thomas)
68. ***Tamiops macclellandi macclellandi*** (Horsfield)
69. ***Dremomys lokriah*** (Hodgson)
70. ***Ratufa bicolor gigantea*** (M'Clelland)

Family HYSTRICIDAE

71. ***Hystrix brachyura subcristata*** Swinhoe

Family RHIZOMYIDAE

72. ***Rhizomys pruinosus pruinosus*** Blyth
73. ***Cannomys badius badius*** (Hodgson)

Family MURIDAE

74. ***Vandeleuria oleracea dumeticola*** (Hodgson)
75. ***Rattus rattus brunneusculus*** (Hodgson)
76. ***Rattus rattus bullocki*** Roonwal
77. ***Rattus rattus khyensis*** Hinton
78. ***Rattus mackenziei*** (Thomas)
79. ***Rattus nitidus obsoletus*** Hinton
80. ***Niviventer niviventer mentosus*** (Thomas)
81. ***Mus musculus*** Linnaeus
82. ***Mus pahari pahari*** Thomas
83. ***Bandicota bengalensis bengalensis*** (Gray)
84. ***Bandicota indica nemorivaga*** (Hodgson)

SYSTEMATIC ACCOUNT

Order SCANDENTIA

Squirrel-like in appeanance with long snout; whiskers absent.

The order Scandentia comprises of a single family Tupaiidae.

Family TUPAIIDAE

Only one genus *Tupaia* of the family Tupaiidae occurs in Mizoram.

Genus ***Tupaia*** Raffles, 1821

The genus *Tupaia* is represented in Mizoram by a single species and subspecies.

1. ***Tupaia belangeri assamensis*** Wroughton

1921. *Tupaia belangeri assamensis* Wroughton, *J. Bombay nat. Hist. Soc.*, **27** : 599 (Mokokchung, *c* 1524 m, Nagaland, India).

Common names : Northern Tree Shrew (Eng.), Chepa (Mizo).

Material examined : Aizawl district : 1♂, 3♀, Teirei (Dampa) (*c* 250 m), coll. A. K. Mondal, 24-27.xii.1993; 1♀, coll. S. S. Saha, 24.x.1991.

Measurements : External : 1♂ : H & B 178.0; T*l* 167.0; Hf 42.5; E 14.0. 2♀ : H & B 175.0, 181.0; T*l* 155.0, 136.0; Hf 43.0, 41.0; E 17.0, 16.0; Cranial : 1♂ : *l* 47.3; *cb* 44.9; *cw*18.7; *zw* 25.0; *iw* 13.2; *pl* 24.8; *mtr* 17.1; *b* 9.3; *ml* 32.4. 2♀ : *l* 46.0, 46.2; *cb* 44.9, 44.9; *cw* 19.0, 19.5; *zw* 23.9, 25.5; *iw* 13.3, 13.1; *pl* 25.1, 25.1; *mtr* 17.0, 17.1; *b* 9.0, 9.3; *ml* 31.2, 31.5.

Diagnosis : Tail shorter than head and body; colour grizzled yellowish-brown on the back, ventral colour yellowish buff or organge buff; fur long, soft and thick, with long dark brown hairs.

Distribution : India : Mizoram : Aizawl District; Arunachal Pradesh; Assam; Manipur; Nagaland; Tripura.

Remarks : This is the first record of this species from Mizoram.

Order INSECTIVORA

Animals usually small in size. Snout pointed and projecting far beyond the lower jaw. Body covered with short closely-set fur. Eyes and ears small. Orbits open posteriorly. Limbs short and five-toed. Zygomatic arch may be present or absent.

This order is represented in Mizoram by two families, namely, Talpidae and Soricidae.

Key to the families of the order Insectivora

– Zygomatic arches present, bulla ossified .... TALPIDAE

– Zygometic arches absent, bulla imperfect .... SORICIDAE

Family TALPIDAE

One genus of the family Talpidae occurs in Mizoram.

Genus *Talpa* Linnaeus, 1758

Body covered with very short velvety fur; eyes minute; pinna absent; forepaws broad, with outwardly directed heavy claws; small tail, scantily haried.

One species of the genus *Talpa* occurs in Mizoram.

2. *Talpa micrura* Hodgson

1841. *Talpa micrura* Hodgson, *Calcutta J. nat. Hist.*, **2** : 221 (Nepal).

Common names : Eastern Mole, Short-tailed Mole (Eng.), Buikelek (Mizo).

Material examined : None.

Measurements : Nil.

Diagnosis : Animals with a very small tail, almost concealed by fur; colour steely black or brown; snout and feet flesh-coloured; premolars 4/4 in number.

Distribution : India : Mizoram : Lunglei district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; Sikkim; West Bengal. Also Nepal and Bangladesh.

Remarks : During field trips one dead (head and forelimb eaten) decomposed specimen was seen near a water source at Sairep (Lunglei district).

Family SORICIDAE

Mouse-like small animals with velvety fur; muzzle elongated and narrow; eyes very small; ear-conch small; limbs short; zygomatic arches absent; auditory bones of annular shape.

Three genera of the family Soricidae occur in Mizoram.

Key to the genera of the family SORICIDAE

1. Ear-conch small; tail very short .... ***Anourosorex***

– Ear-conch and tail well developed 2

2. 18 teeth in upper jaw ..... ***Suncus***

– 16 teeth in upper jaw ..... ***Crocidura***

Genus *Suncus* Ehrenberg, 1833

The genus *Suncus* is represented by a single species and subspecies in Mizoram.

3. *Suncus murinus griffithi* (Horsfield)

1851. *Sorex griffithi* Horsfield, *Cat. Mammalia Mus. Hon. East-India Co.*, : 134 (Assam, India).

Common names : House shrew (Eng.), Chhimtir (Mizo).

Material examined : Aizawl district : 1♂, Bilkhawthlir (*c* 500 m), coll. A. K. Mandal, 3.i.1994. Lunglei district : 1♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 21.iv.1995.

Measurements : External : 1♂, 1♀ : H & B 140.0, 105.0; *Tl* 86.0, 82.0; Hf 21.0, 20.0; E 14.0, 11.0. Cranial : 1♂, 1♀ : *l* 35.5, 31.1; *cb* 34.4, 29.4; *pl* 15.6, 15.0; *cw* 15.7, 12.4.

Diagnosis : Dorsal colour brown with rusty wash, ventral colour lighter; hair thick and long, more than 8.0 mm.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; West Bengal. Also Bhutan and Bangladesh.

Genus *Crocidura* Wegler, 1832

One species and subspecies of the genus *Crocidura* is found in Mizoram.

4. *Crocidura attenuata rubricosa* Anderson

1877. *Crocidura rubricosa* Anderson, *J. Asiat. Soc. Beng.*, **46**(2) : 280 (Sibsagar, Sibsagar district, Assam, India).

Common names : Grey Shrew (Eng.), Chhimtir (Mizo).

Material examined : Aizawl District : 1♀, North Khawbung (*c* 1500 m), coll. A. K. Mandal, 16.xii.1993. Lunglei district : 1♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 23.iv.1995.

Measurements : External : 1♂, 1♀ : H & B 83.5, 87.0; T*l* 61.0, 60.0; Hf 20.0, 15.0; E 9.0, 8.0. Cranial 1♂, 1♀ : *l* 21.3, 21.0; *cb* 21.1, 20.8; *pl* 9.0, 8.6; *cw* 9.4, 9.5; *iw* 4.6, 4.9.

Diagnosis : Dorsal colour dark or reddish brown, ventral colour grey-brown, with silvery sheen; tail more or less tetragonal, not swollen at base; snout well-clad with hairs; ear sparsely clad with hairs; condylobasal length less than 21.6 mm.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Jammu & Kashmir; Manipur; Meghalaya; Punjab; Uttar Pradesh; West Bengal. Also Bhutan.

Genus ***Anourosorex*** Milne-Edwards, 1872

The genus *Anourosorex* is monotypic.

5. ***Anourosorex squamipes*** Milne-Edwards

1872. *Anourosorex squamipes* Milne-Edwards, *Rech. Hist. nat. Mammal* : 264 (probably Moupin, Szechuan, China).

Common names : Szechuan Burrowing Shrw (Eng.), Chhimtir (Mizo).

Material examined : Aizawl district : 1♂, 1♀, North Khawbung (*c* 1500 m), coll. A. K. Mandal, 17, 19.xii.1993.

Measurements : External : 1♂, 1♀ : H & B 83.0, 91.0; *Tl* 15.0, 12.0; Hf 16.5, 14.0; E 7.5, 9.0. Cranial : 1♂, 1♀ : *l* 26.4, 26.3; *cb* 25.5, 25.6; *pl* 12.0, 12.2; *mtr* 11.7, 12.2.

Diagnosis : Seminude snout; feet naked; tail small, naked and scaly.

Distribution : India : Mizoram : Aizawl district; Arunachal Pradesh; Assam; Manipur; Meghalaya. Bhutan, Myanmar, Southern China, Taiwan, Thailand, Vietnam.

Remarks : This species was recorded for the first time from Mizoram (Mandal *et al.*, 1995).

Order CHROPTERA

Chiroptera is the only order of mammals which has wings and is capable of true flight.

The order Chiroptera is divided into two suborders, both of which are represented in Mizoram.

Suborder MEGACHIROPTERA

Bats of this suborder are characterised by the absence of nose-leaf and tragus; tail reduced, rod-like and often absent. Second finger bears a claw (except *Eonycteris*) and more or less independent of third finger; crown of molar teeth with longitudinal furrow.

The shuborder Megachiroptera consists of a single family Pteropodidae.

Family PTEROPODIDAE

Seven genera of the family Pteropodidae occur in Mizoram. Each of the genera is represented by a single species and subspecies except *Cynopterus* which is represented by two species and subspecies.

Key to the genera, species and subsepeices of the family PTEROPODIDAE

1. Tongue moderate, usually the tip does not protrude out of the mouth in dead specimen; inner margin of nostril projecting; a claw present on second forefinger 2
– Tongue long, usually a portion of the tip protrudes out of the mouth in dead specimen; forearm more than 70 mm; no projecting margin of nostril; no claw on second forefinger ..... *Eonycteris spelaea*
2. Upper part of body of one colour throughout 3
– Hind neck and shoulders paler than back ..... *Pteropus giganteus giganteus*
3. Five upper and six lower cheek-teeth ..... *Rousettus leschenaulti leschenaulti*
– Four upper and five lower cheek-teeth 4
4. Calcar absent ..... *Sphaerias blanfordi*
– Calcar present 5

5. One pair of lower incisors .... *Megaerops niphanae*

– Two paris of lower incisors 6

6. A small fruit-bat, forearm less than 45 mm; tongue long with feathery tip .... *Macroglossus sobrinus sobrinus*

– Larger fruit-bat, forearm more than 60 mm; tongue normal and tip not feathery 7

7. Forearm under 66 mm .... *Cynopterus brachyotis*

– Forearm above 66 mm .... *Cynopterus sphinx sphinx*

Genus ***Rousettus*** Gray, 1821

Only one species and subspecies of the genus *Rousettus* occurs in Mizoram.

6. ***Rousettus leschenautti leschenaulti*** (Desmarest)

1820. *Pteropus leschenaulti* Desmarest, *Encycl. Meth. Mammal.*, **1** : 110 (Environments of Pondicherry, India).

Common names : Indian Fulvous Fruit Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 1♂, Aibawk (*c* 800 m), 9.xii.1993, 4♂, 2♀, North Khawbung (*c* 1500 m), 15-18.xii.1993, 1♂, Teirei (Dampa) (*c* 250 m), 26.xii.1993, coll. A. K. Mandal.

Measurements : External : 2♂, : Fa 86.0, 84.3; E 19.0, 19.0; Tb 41.7, 38.3; F & Cl 16.5, 17.0. 2♀ : Fa 80.0, 75.5; E 19.0, 20; Tb 40.0, 32.5; F & Cl 17.0, 21.0. Cranial : 2♂ : *l* 39.7, 36.8; *cr* 13.0, 12.1; *mtr* 14.0, 13.7; $c^1 - c^1$ 8.3, 7.7; *iw* 8.1, 6.7; *cw* 15.6, 15.2; *zw* 24.3, 22.8; $m^3 - m^3$ 11.6, 10.7; *ml* 30.7, 29.2. 2♀ : *l* 36.2, 36.7; *cr* 12.0, 11.7; *mtr* 13.6, 13.7; $c^1 - c^1$ 7.1, 6.9; *iw* 7.7, 7.1; *cw* 15.2, 15.7; *zw* 22.3, 20.3; $m^3 - m^3$ 10.8, 10.4; *ml* 29.1, 29.0.

Diagnosis : Medium-sized fruit-bat with 6 lower cheek-teeth; elliptical last lower molar. Dorsal colour light brown with a rufescent tone, ventral colour of lighter shade; back of neck and shoulders sparsely haired.

Distribution : India : Mizoram : Aizawl district; widely distributed in the Indian mainland, east to Arunachal Pradesh, North to Jammu & Kashmir and South to Kerala. Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, Thailand, Hongkong, Vietnam, Laos, Southern China, including Tibet.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus ***Pteropus*** Brisson, 1762

Only one species and subspecies of the genus *Pteropus* occurs in Mizoram.

7. ***Pteropus giganteus giganteus*** (Brünnich)

1782. *Pteropus giganteus* Brünnich, *Dyrenes Historie*, **1** : 45 (Bengal = West Bengal, India).

Common names : Indian Flying Fox (Eng.), Bak (Mizo).

Material examined : None.

Measurements : Nil.

Diagnosis : Largest bat of Mizoram; rufous-brown around head and neck; a conspicuous orange or honey-coloured band across upper back; lower back blackish brown; ventral parts dark chestnut brown; ears and muzzle jet black; no external tail; a narrow flap of skin inside each leg.

Distribution : India : Mizoram : Aizawl district; widely distributed throughout the Indian Union, including Andaman Islands (Mason 1908). Pakistan (Blanford 1891), Nepal, Sri Lanka, Bangladesh (Blyth 1863a) and Myanmar.

Remarks : During our survey tour in Mizoram, the Indian Flying Foxes were seen to come to the hills for feeding at night at Dampa and North Khawbung of Aizawl district.

Genus ***Cynopterus*** F. Cuvier, 1824

Two species and subspecies of the genus *Cynopterus* occur in Mizoram.

8. ***Cynopterus sphinx sphinx*** (Vahl)

1970. *Vespertilio sphinx* Vahl, *Skr. Nat. Selsk. Copenhagen*, **4**(1) : 123 (Tranquebar, Thanjavur district, Tamil Nadu, India).

Common names : Greater Short-nosed Fruit Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 6♂, 2♀, Aibawk (*c* 800 m), 9.xii.1993, 2♀, North Khawbung (*c* 1500 m), 16.xii1993, 1♂, 3♀, Teirei (Dampa) (*c* 250 m), 24.xii.1993, coll. A.K Mandal; 3♂, 3♀, Teirei (Dampa) (*c* 250 m), coll. A. Gupta, 10-11.v.1995. Chimtuipui district : 3♂, 4♀, Ngengpui (*c* 200 m), coll. T. P. Bhattacharyya, 8, 9, 10.iv.1995, Lunglei district : 1♀, Sairep (*c* 1500 m), 26.iv.1995, 1♂, 1♀, Sairep (*c* 1500 m), 12.i.1997, coll. T. P. Bhattacharyya.

Measurements : External : 2♂ : Fa 72.2, 72.0; E 22.0, 20.0; Tb 27.0, 27.0; F & Cl 13.0, 13.5. 2♀: Fa 73.4, 72.2; E 21.5, 22.3; Tb 27.3, 28.9; F & Cl 13.0, 13.4. Cranial : 2♂ : *l* 31.0, 32.3; *cr* 8.3, 9.1; *mtr* 10.5, 10.2; c^1–c^1 6.9, 6.9; *iw* 5.7, 5.8; *cw* 13.2, 13.5; *zw* 20.4, 19.7; m^3–m^3 9.4, 9.6; *ml* 24.3, 24.2; 2♀: *l* 32.2, 32.4; *cr* 8.6, 8.5; *mtr* 10.6, 10.4; c^1–c^1 6.6, 6.3; *iw* 6.0, 6.0; *cw* 13.1, 13.1; *zw* 19.5, 20.0; m^3–m^3 9.3, 9.5; *ml* 24.3, 24.2.

Diagnosis : Medium-sized fruit bat, with white margin to ears; metacarpals and phalanges whitish; nostrils divergent with deep inter-narial groove; dorsal colour grey or greyish brown, paler ventrally (often with a broad rufescent or chestnut coloured area around shoulders and throat); tail reduced and rod like.

Distribution : India : Mizoram : Aizawl; district, Chimtuipui district, Lunglei district; widely distributed throughout the mainland of Indian Union. Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka.

9. ***Cynopterus brachyotis*** (Müller)

1838. *Pachysema brachyotis* Müller, *Tijdschr. Natuur. Gesch.* 5, 1 : 146 (Borneo).

Common names : Smaller Short-nosed Fruit Bat (Eng.), Bak (Mizo).

Material examined : Chimtuipui district : 5♂, 2♀; Ngengpni (*c* 200 m), coll. T. P. Bhattacharrya, 8-10.iv.1995.

Measurements : External : 2♂ : Fa 64.7, 64.4; E 17.5, 18.0; Tb 24.0, 24.2; F & Cl 13.1, 12.5. 2♀: Fa 64.3, 62.9; E 17.0, 16.6; Tb 25.0, 25.0; F & Cl 11.2, 12.5. Cranial : 2♂ : *l* 31.0, 31.1; *cr* 8.7, 8.8; *mtr* 10.7, 10.3; c^1–c^1 7.0. 6.6; *iw* 6.0, 5.7; *cw* 13.2, 13.5; *zw* 19.0, 18.4; m^3–m^3 9.1, 9.0; *ml* 23.7, 23.8; 2♀: *l* 30.9, 30.0; *cr* 8.5, 8.3; *mtr* 10.0, 9.8; c^1–c^1 6.5, 6.3; *iw* 5.7, 5.8; *cw* 13.4, 13.3; *zw* 18.9, m^3–m^3 9.2, 8.5; *ml* 23.3, 22.8.

Diagnosis : Medium-sized fruit bat, white margin of ear absent or very faint, forearm under 66 mm and ear under 20 mm.

Distribution : India : Mizoram : Chimtuipui district; Andaman and Nicobar Islands; Arunachal Pradesh; Assam; Bihar; Nagaland (Sinha 1995); Kerala (Das 1986). Borneo, Cambodia, Celebes, Java, Malayasia, Myanmar, Nepal, Pakistan, Phillippine Islands, Southern China, Sri Lanka, Thailand and Vietnam.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus ***Megaerops*** Peters, 1865

The genus *Megaerops* is represented by one species in Mizoram.

10. ***Megaerops niphanae*** Yenbutra & Felten

1983. *Megaerops niphanae* Yenbutra, & Felten, *Senckenberg. biol.* **64** : 2 (Sankaert Environmental Research Station (14°30' N–101°56' E), Amphoe Pak Thong Chai, Prov. Nakhon Ratchasima, Thailand).

Common names : Niphan's Fruit Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 4♂, 5♀; North Khawbung (*c* 1500 m), coll. A. K. Mandal, 16–19.xii.1993. Lunglei district : 13♂, 2♀ Sairep (*c* 1500 m), coll. T. P. Bhattacyaryya, 17-26.iv.1995; 2♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 12-18.i.1997; 1 ♀Sairep (*c* 1500 m), coll. A. Gupta, 5.v.1995.

Measurements : External : 2♂ : Fa 58.0, 61.1; E 17.5, 18.5; Tb 23.0, 24.3; F & Cl 13.0, 12.5. 2♀: Fa 62.3, 65.0; E 17.8, 18.0; Tb 25.4, 24.5; F & Cl 12.0, 13.5. Cranial : 2♂ : *l* 27.9, 28.1; *cr* 6.3, 6.5; *mtr* 8.3, 8.8; c^1–c^1 5.1, 5.5; *iw* 5.5, 5.7; *cw* 11.8, 12.1; *zw* 18.3, 17.3; m^3–m^3 8.5, 8.6; *ml* 20.2, 21.2; 2♀: *l* 28.0, 27.7; *cr* 6.5, 6.4;

mtr 8.6, 9.1; c^1–c^1 5.7, 5.6; *iw* 5.5, 5.4; *cw* 11.9, 11.5; *zw* 17.9, 18.1; m^3–m^3 8.4, 9.0; *ml* 20.5, 20.9.

Diagnosis : Much like short-nosed Fruit Bat, but nostrils are more subtubular, no external tail; ears without white edges; wing membranes attached to second phalanx of first toe; colour dusky brown above, light greyish brown below.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Manipur; West Bengal. Thailand and Vietnam.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus ***Sphaerias*** Miller, 1906

The genus *Sphaerias* is represented in Mizoram by a single species.

11. ***Sphaerias blanfordi*** (Thomas)

1891. *Cynopterus blanfordi* Thomas, *Ann. Mus. Civ. Stor. nat. Genova*; **2, 10** : 884. 921-922, pl. xi. figs. 1-2. (Leito, Cheba, Karen Hills, 1000 m, Burma).

Common names : Blanford's Fruit Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 1♀, Tuikual Duty Post I, (*c* 850 m), Murlen National Park, coll. S. S. Saha, 18.xii.1993. Lunglei district: 9♂, 7♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 23-27.iv.1995.

Measurements : External : 2♂ : Fa 51.1, 54.7; E 17.5, 16.6; Tb 19.7, 20.6; F & Cl 11.9, 10.7. 2♀ : Fa 51.7, 51.9; E 17.5, 17.8; Tb 19.0, 20.6; F & Cl 10.0, 11.9. Cranial : 2♂ : *l* 27.1, 27.8; *cr* 7.1, 7.0; *mtr* 8.0, 8.2; c^1–c^1 6.3, 6.5; *iw* 5.2, 5.0; *cw* 12.3, 12.8; *zw* 17.4, 17.7; m^3–m^3 8.1, 7.9; *ml* 20.2, 20.8; 2♀: *l* 27.4, 27.0; *cr* 7.3, 6.1; *mtr* 8.5, 7.8; c^1–c^1 6.5, 6.2; *iw* 4.9, 5.4; *cw* 11.5, 12.0; *zw* 16.4, 16.7; m^3–m^3 7.5, 8.0; *ml* 20.4, 20.1.

Diagnosis : A small (forearm slightly above 50.0 mm) fruit bat without external tail and calcar; interior margin of ears white; dull greyish brown above, a shade paler below; interfemoral membrane covered with soft, fine, dense hairs and extends along femur and upper part of tibia, as a narrow stripe.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Uttar Pradesh; West Bengal. Bhutan, Myanmar, Nepal, Thailand, Tibet and Southwestern China.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus ***Eonycteris*** Dobson, 1873

The genus *Eoncteris* is monotypic.

12. ***Eonycteris spelaea*** (Dobson)

1871. *Macroglossus spelaeus* Dobson, *Proc. Asiat. Soc. Beng.* : 105, 106 (Farm Caves, Moulmein, Tenasserim, Myanmar).

Common names : Dobson's Long-tongued Fruit Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 8♂, 3♀, Teirei (Dampa) (*c* 250 m), coll. A. K. Mandal, 26.xii.1993. Lunglei district : 1♂, 4♀, Lungsen (*c* 650 m), coll. T. P. Bhattacharyya, 22-26.i.1997.

Measurements : External : 2♂ : Fa 74.0, 72.0; E 21.0, 19.5; Tb 33.0, 33.5; F & Cl 19.0. 2♀ : Fa 68.2, 67.5; E 19.5, 20.0; Tb 31.2, 32.7; F & Cl 19.5, 20.0. Cranial : 2♂ : *l* 37.0, 36.0; *cr* 12.0, 11.2; *mtr* 13.1, 12.6; c^1–c^1 7.5, 7.4; *iw* 7.2, 7.6; *cw* 15.4, 14.9; *zw* 20.2, 21.7; m^3–m^3 8.8, 9.4; *ml* 27.0, 27.7; 2♀ : *l* 34.4, 35.0; *cr* 10.0, 10.2; *mtr* 12.3, 12.5; c^1–c^1 6.4, 6.5; *iw* 6.2, 6.4; *cw* 14.4, 14.0; *zw* 18.5, 18.4; m^3–m^3 8.5, 8.8; *ml* 26.2, 25.5.

Diagnosis : Very much like the Indian Fulvons Fruit Bat, but second finger lacks a claw; small reniform perianal gland present on either side of anus; fur short and scanty; back brownish,ventral surface rather greyish; adult males with yellowish red buff on neck.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Andaman Islands; Andhra Pradesh; Arunachal Pradesh; Assam; Karnataka; Manipur; Meghalaya; Sikkim; Uttar Pradesh; West Bengal. Southern China, Myanmar, Thailand, Loas, Veitnam, Cambodia, Malaysia, Indonesia and the Phillipines.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus ***Macroglossus*** F. Cuvier, 1824

Only one species and subspecies of the genus *Macroglossus* occurs in Mizoram.

13. ***Macroglossus sobrinus sobrinus*** Andersen

1911. *Macroglossus minimus sobrinus* Andersen, *Ann. Mag. nat. Hist.*, 7 : 642 (Gonong Igari, 2000' = c 610 m, Perak, Peninsular Malaysia).

Common names : Greater Long-tongued Fruit Bat (Eng.), Bak (Mizo).

Material examined : Chimtuipui district : 1♂, 2♀, Ngengpui (c 200 m), coll. T. P. Bhattacharyya, 8-12.iv.1995.

Measurements : External : 1♂, 1♀ : Fa 41.7, 41.7; E 15.6, 15.8; Tb 19.0, 18.2; F & Cl 11.8, 11.2. Cranial : 1♂, 1♀ : *l* 29.5, 29.1; *cr* 10.6, 10.5; *mtr* 9.4, 9.4; c^1–c^1 5.6, 5.3; *cw* 12.1, 11.8; *iw* 5.3, 5.0; *zw* 16.3, 14.0; m^1–m^1 6.5, 6.3; *ml* 22.6, 22.5.

Diagnosis : A small fruit bat with very long head; pelage longish and light reddish brown, chest more brown; tail rod-like and short; interfemoral membrane narrow; muzzle long and cylindrical; nostrils upward-pointing and separated by an ill-defined groove; tongue quite long with feathery tip.

Distribution : India : Mizoram : Chimtuipui district; Arunachal Pradesh; Meghalaya; Tripura; West Bengal. Myanmar, Thailand to Sumatra, Nias Island, Krakatoa Island and Java.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 1997).

Suborder MICROCHIROPTERA

Second finger without a claw; margin of ears not forming a complete ring. Angular process of mandible long and narrow. Crown of molar teeth with transverse furrow. Bony palate not extending behind the last molars.

The suborder Microchiroptera is represented by two families, in Mizoram.

Key to the families of the suborder Microchiroptera.

Tail entirely enclosed in interfemoral membrane.

A. A nose-leaf but no tragus present. .... Rhinolophidae

B. No nose-leaf but a tragus present. .... Vespertilionidae

Family RHINOLOPHIDAE

Nose-leaf well developed and most complicated; ears large; tragus absent; eyes small; tail almost entirely enclosed in the inter-femoral membrane (except *Coelops*). The noseleaf consists of three main portions *viz.*, (i) anterior horizontal portion (ii) median perpendicular portion and (iii) posterior erect portion.

The family Rhinolophidae has been divided into two subfamilies. *viz.*, Rhinolophinae and Hipposiderinae.

Subfamily RHINOLOPHINAE

The anterior portion of the noseleaf is a horse shoe shaped disc of naked skin with an deep median notch on its lower margin which covers the muzzel is called the horseshoe. The nostrils lie on the middle of this. The median portion of the noseleaf, an upright thickened structure, is called the sella. Behind the sella and between the eyes lies a narrow triangular structure whose distal part bends slightly forward is the third portion of the noseleaf called the lancet. The base of the lancet is divided into cells by horizontal septa. A posterodorsal connecting process connects the sella with the lancet; basal portion of outer margin of ear deeply notched to form a distinct antitragus.

The subfamily Rhinolophinae consists of the genus *Rhinolophus* only.

Genus ***Rhinolophus*** Lacepéde, 1799

Four species and subspecies of the genus *Rhinolophus* occur in Mizoram.

Key to the species and subspecies of the genus *Rhinolophus*.

1. Connecting process beneath top of sella..... 2

– Connecting process as high as or higher than top of sella 3

2. Forearm more than 55.0 mm. .... *Rhinolophus yunnanensis*
- Forearm less than 55.0 mm. .... *Rhinolophus pearsoni*

3. Connecting process level with top of sella forming a shallow notch between them .... *Rhinolophus rouxi rouxi*
- Connecting process higher than top of sella forming a deep notch between them ....*Rhinolophus lepidus lepidus*

14. ***Rhinolophus rouxi rouxi*** Temminck

1835. *Rhinolophus rouxi* Temminck, *Monogr. Mammal*, **2** : 30b (Pondicherry and Calcutta, India).

Common names : Rufous Horse-Shoe Bat (Eng.), Bak (Mizo.).

Material examined : Aizawl district : 5♂, 7♀, Teirei (Dampa) (*c* 250 m), coll. A. K. Mandal, 27.xii.1993. Lunglei district : 5♂, 1♀, Lungsen (*c* 650 m), coll. T. P. Bhattacharyya, 26.27.i.1997.

Measurements : External : 2♂ : Fa 47.8, 47.8; *Tl* 24.0, 28.0; E 17.5, 17.8; Tb 23.0, 24.0; F & Cl 11.0, 10.5. 2♀ : Fa 51.0, 49.0; *Tl* 27.0, 26.0; E 24.0, 19.0; Tb 25.0, 23.8; F & Cl 11.5, 11.2. Cranial : 2♂ : *l* 21.5, 22.0; *ccl* 18.7, 19.0; *mtr* 8.5, 8.8; c^1–c^1 5.6, 5.9; *zw* 10.5, 10.9; *iw* 2.0, 2.4; *cw* 9.5, 10.0; m^3–m^3 7.8, 8.1; *ml* 14.4, 14.7. 2♀ : *l* 22.5, 21.5; *ccl* 19.5, 18.8; *mtr* 8.6, 8.4; c^1–c^1 6.0, 5.8; *zw* 10.9, 10.6; *iw* 2.7, 2.5; *cw* 10.0, 9.3; m^3–m^3 8.2, 8.1; *ml* 15.2, 14.3.

Diagnosis : Medium sized horse shoe bat, forearm may reach upto 55.0 mm; margins of horizontal base of sella straight; colour varies from brown to orange-yellow.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Andhra Pradesh; Arunachal Pradesh; Goa; Himachal Pradesh; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Orissa; Pondicherry; Tamil Nadu; Uttar Pradesh; West Bengal. Nepal, Sri Lanka, Myanmar.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

15. ***Rhinolophus lepidus lepidus*** Blyth

1844. *Rhinolophus lepidus* Blyth, *J. Asiat. Soc. Beng.*, **13** : 486 (Vicinity of Calcutta, Calcutta district, West Bengal, India).

Common names : Little Indian Horse-shoe Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 3♂, Teirei (Dampa) (*c* 250 m), coll. A. K. Mandal, 27.xii.1993; 1♀, Lunglei district : Lungsen (*c* 650 m), coll. T. P. Bhattacharyya, 26.i.1997.

Measurements : External : 3♂ : Fa 37.7, 38.7, 38.7; E 13.5, 13.7, 13.4; Tb 15.5, 16.4, 15.7; F & Cl 7.3, 7.5, 7.7. 1♀ : Fa 38.7; *Tl* 23.4; E 14.9; Tb 15.5; F & Cl 6.8. Cranial : 2♂ : *l* 15.9, 16.0; *ccl* 13.9, 13.9; *mtr* 5.8, 6.0; c^1–c^1 3.9, 3.9; *iw* 2.1, 2.2; *cw* 6.6, 6.7; m^3–m^3 5.2, 5.1; *zw* (1) 7.7; *ml* 9.9, 9.9. 1♀ : *l* 16.1; *ccl* 14.0; *mtr* 6.0; c^1–c^1 4.0; *iw* 2.3; *cw* 6.8; m^3–m^3 5.7; *zw* 8.0; *ml* 10.2.

Diagnosis : Small (forearm around 40.0 mm) horse-shoe bat with horizontal base of sella arched and equal in width to vertical part; connecting process triangular in lateral view.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Andhra Pradesh; Bihar; Delhi; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Meghalaya; Orissa; Rajasthan; Tamil Nadu; Uttar Pradesh; West Bengal. Nepal, Thailand.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

16. ***Rhinolophus yunanensis*** Dobson

1872. *Rhinolophus yunanensis* Dobson, *J. Asiat. Soc. Bengal*, **41**(2) : 336-338 (Hotha, Yunnan, China)

Common names : Horse-shoe Bat (Eng.), Bak (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Externally much like *Rhinolophus pearsoni* but larger; skull larger, more massive, with heavier teeth; condylocanine length more than 22 mm; zygomatic width more than 12 mm.

Distribution : India : Mizoram : Aizawl district (Hill, 1986). Northern Myanmar, Southeastern China, Thailand.

17. ***Rhinolophus pearsoni*** Horsfield

1851. *Rhinolophus pearsoni* Horsfield, *Cat. Mammal. Mus. Hon. East India Co.* : 33 (Darjiling, Darjiling district, West Bengal, India).

Common names : Pearson's horseshoe Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1 ♂, 2 ♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 17,26.iv.1995, 19.i.1997.

Measurements : External : 1 ♂ : Fa 52.7; *Tl* 31.7; E 20.8; Tb 26.6; F & Cl 10.2. 2 ♀ : Fa 50.4, 50.6; *Tl* 33.6, 35.1; E 19.2, 19.0; Tb 21.1, 24.7; F & Cl 9.4, 11.7. Cranial : 1 ♂ : *l* 22.9; *ccl* 19.9; *mtr* 8.9; c^1–c^1 5.9; *iw* 2.6; *cw* 9.4; m^3–m^3 7.7; *zw* 10.9; *ml* 15.4. 1 ♀ : *l* 21.0; *ccl* 18.2; *mtr* 7.8; c^1–c^1 5.0; *iw* 2.7; *cw* 8.6; m^3–m^3 7.8; *zw* 11.0; *ml* 13.9.

Diagnosis : A medium sized (forearm 50.0 to 55.0 mm) horseshoe bat, with broad horseshoe completely covering the muzzle; sella not trifoliate; base of sella broader than vertical part; lower lip with single mental groove.

Distribution : India : Mizoram : Lunglei district; Meghalaya; Sikkim; Uttar Pradesh; West Bengal. Nepal, Bhutan, Myanmar, Southern China including Tibet, Vietnum, Thailand, Malaya.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Subfamily HIPPOSIDERINAE

The noseleaf is more or less an oblong naked pad. Anterior portion is not deeply notched in the middle (except *Coelops*). Median portion with prominent transverse bar behind the nostrils. Posterior portion is low and rounded, and is divided into cells by vertical septa. No distinct antitragus present.

In Mizoram, the subfamily Hipoosiderinae is represented by the genus *Hipposideros*.

Genus ***Hipposideros*** Gray, 1831

Two species of the genus *Hipposideros* is found in Mizoram.

Key to the species of the genus *Hipposideros*

- Size large, forearm above 82.0 mm. .... *Hipposideros lankadiva*
- Size small, forearm below 38.0 mm. ....*Hipposideros cineraceus*

18. ***Hipposideros lankadiva*** Kelaart

1850. *Hipposideros lankadiva* Kelaart, *J. Ceylon Brch. R. Asiat. Soc.*, **2** : 216 (Kandy, Ceylon = Sri Lanka).

Common names : Sri Lanka Gigantic Leaf-nosed Bat or Kelaart's Leaf-nosed Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 1 ♂, Teirei (Dampa) (c 250 m), coll. Arun Gupta, 10.v.1995.

Measurements : External : 1 ♂ : Fa 91.9; E 26.3; Tb 38.8; F & Cl 18.7. Cranial : 1 ♂ : *ccl* 30.0; *mtr* 14.3; c^1–c^1 8.6; *iw* 3.8; *cw* 14.2; *zw* 21.2; m^3–m^3 13.0; *ml* 25.5.

Diagnosis : Ears large, acutely pointed, posterior margins slightly concave behind tip; nose-leaf with four supplementary leaflets, fourth much reduced, often absent; posterior nose-leaf high and broad, upper margin semicircular and supported by three septa.

Distribution : India : Mizoram : Aizawl district; Andhra Pradesh; Karnataka; Madhya Pradesh; Maharashtra; Manipur; Meghalaya; Orissa; Tripura; West Bengal. Sri Lanka, northern Myanmar.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 1997).

19. ***Hipposideros cineraceus*** Blyth

1853. *Hipposideros cineraceus* Blyth, *J. Asiat. Soc. Beng.*, **22** : 410 (Bhera, near Pind Dadan Khan, Punjab Salt Range = Bhera, *c* 32 Km SW of Pind Dadan Khan, Salt Range, The Punjab, Pakistan).

Common names : Least Leaf-nosed Bat or Blyth's Leaf-nosed Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 1 ♂, Tehri (Dampa) (*c* 250 m), coll. A. K. Mandal, 25.xii.1993; Lunglei district : 1 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 18.iv.1995.

Measurements : External : 2♂ : Fa 34.3, 34.5; E 14.5, 15.3; Tb 16.5, 16.0; F & Cl 5.5, 5.9. Cranial : 2♂ : *l* 15.8, 15.2; *ccl* 13.4, 13.0; *mtr* 5.0, 5.9; c^1–c^1 2.6, 2.5; *iw* 2.4, 2.6; *cw* 6.8, 7.1; *zw* 7.0, 7.2; m^3–m^3 4.8, 4.8; *ml* 8.9, 8.7.

Diagnosis : Dorsal colour dusky grey, basal three fourth of hairs greyish-white; ventral colour greyish-white; internarial septum parallel-sided and inflated; zygomatic arch narrow; anterior upper premolar small, compressed between canine and posterior upper premolar, not extruded from tooth-row.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Haryana; Meghalaya; Uttar Pradesh; West Bengal. Pakistan, Nepal, Myanmar, Vietnum, Laos, Thailand, Malaya Peninsula, Rhio Archipelago, Anamba Islands, Borneo, Phillipine Islands.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 1997).

Family VESPERTILIONIDAE

Bats of this family have well developed tragus; nose leaf absent; tail long, enclosed in the interfemoral membrane from base to tip or to penultimate joint.

Two subfamilies of the family Vespertilionidae are found in Mizoram.

Key to the subfamily of the family VESPERTILIONIDAE

– Nostrils laterally elongated and tubular..... ..... MURININAE

– Nostrils not elongated... VESPERTILIONINAE

Subfamily VESPERTILIONINAE

Key to the genera of sub-family VESPERTITIONINAE

1. Cheek-teeth six on each side of upper and lower jaw. ..... ***Myotis***

– Cheek-teeth less than six on each side of upper and lower jaw. 2

2. Upper premolar 2-2. 3

– Upper premolar 1-1. 5

3. Outer upper incisor not extending beyond cingulum of inner. ..... ***Scotozous***

– Outer upper incisor extending distinctly beyond cingulum of inner. 4

4. Ears joined. ..... ***Barbastella***

– Ears separate. ..... ***Pipistrellus***

5. Skull noticeably flattened; soles of feet expanded into fleshy pads. ..... ***Tylonycteris***

– Skull not noticeably flattened; soles of feet normal. ..... ***Eptesicus***

Genus *Myotis* Kaup, 1829

Three species and subspecies of the Genus *Myotis* occur in Mizoram.

Key to the species and subspecies of the genus *Myotis*

– Forearm more than 50.0 mm. .... *Myotis formosus formosus*

– Forearm more than 40.0 mm but less than 50.0 mm. ..... *Myotis montinagus montivagus*

– Forearm less than 40.0 mm. .... *Myotis muricola*

20. *Myotis formosus formosus* (Hodgson)

1835. *Vespertilio formosa* Hodgson, *J. Asiat. Soc. Beng.*, 4 : 700 (Nepal).

Common names : Hodgson's Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1 ♂, 1 ♀ Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 17,25.iv.1995.

Measurements : External : 1 ♂ : Fa 45.8; *Tl* 45.1; E 14.3; Tr 6.9; Tb 20.7; F & Cl 9.7. 1 ♀ : Fa 44.4; *Tl* 39.2; E 15.3; Tr 7.3; Tb 17.1; F & Cl 8.5. Cranial : 1 ♂ : *l* 17.3; *ccl* 16.4; *mtr* 8.3; c^1–c^1 4.8; *zw* 11.1; *iw* 4.2; *cw* 7.9; m^3–m^3 7.3; *ml* 13.2. 1 ♀ : *l* 17.4; *ccl* 16.6; *mtr* 7.0; c^1–c^1 4.9; *zw* 11.4; *iw* 3.9; *cw* 8.2; m^3–m^3 7.1; *ml* 13.3.

Diagnosis : A large *Myotis*; forearem may reach upto 53.0 mm; fur wooly and thick; dorsal colour fawn to golden brown, tinged often with rusty red; ventral colour slightly paler; wing from base of toes; wing membrane variegated with orange and blackish brown.

Distribution : India : Mizoram : Lunglei district; Assam; Bihar; Himachal Pradesh; Jammu & Kashmir; Maharashtra; Meghalaya; Punjab; Sikkim; Uttar Pradesh; West Bengal. Eastern Afganistan, Nepal, Possibly Bangladesh.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

21. *Myotis montivagus montivagus* (Dobson)

1874. *Vespertilio montivagus* Dobson, *J. Asiat. Soc. Beng.*, **43** (2) : 237 (Hotha, Yunnan, China).

Common names : Burmese Whiskered Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 2 ♂, 2 ♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 26.iv.1995.

Measurements : External : 2 ♂ : Fa 41.7, 40.6; *Tl* 40.5, 40.5; E 13.5, 13.3; Tr 6.3, 6.1; Tb 17.1, 17.0; F & Cl 7.9, 7.6. 2 ♀ : Fa 40.7, 40.6; *Tl* 39.8, 40.1; E 13.2, 13.5; Tr 5.9, 6.2; Tb 16.9, 16.7; F & Cl 7.3, 7.6. Cranial : 2 ♂ : *l* 15.7, 15.4; *mtr* 6.3, 6.1; c^1–c^1 4.2, 4.3; *zw* 10.5, 10.8; *iw* 3.9, 3.9; *cw* 7.0, 7.6; m^3–m^3 6.7, 6.7; *ml* 11.5, 11.4. 1 ♀ : *l* 15.8; *mtr* 6.1; c^1–c^1 4.3; *zw* 10.6; *iw* 3.8; *cw* 7.3; m^3–m^3 6.8; *ml* 11.7.

Diagnosis : Dorsal colour dark blackish brown, extreme tips paler and shining; ventral colour similar with extreme tips ashy; tail wholly contained in the inter-femoral membrane; feet small; wing membrane from base of toes.

Distribution : India : Mizoram : Lunglei district. Myanmar, southern China, Thailand, Malaysia, Sumatra, Borneo.

Remarks : The present specimens constitute the first record of *Myotis montivagus montivagus* for India, from Mizoram (Mandal *et al.*, 2000).

22. *Myotis muricola* (Gray)

1846. *Vespertilio muricola* Gray, *Cat. Hodgson Coll. Br. Mus.*, : 4 (Nepal).

Common names : Whiskered Myotis (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1 ♂, 1 ♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 16.iv.1995, 14.i.1997; 1 ♀, Lungsen (*c* 650 m), coll. T. P. Bhattacharyya, 26.i.1997.

Measurements : External : 1 ♂ : Fa 36.6; *Tl* 38.4; E 11.8; Tr 5.4; Tb 17.7; F & Cl 6.4. 2 ♀ : Fa 36.0, 37.8; *Tl* 42.0, 43.7; E 11.0, 12.8; Tr 5.4, 5.8; Tb 17.4, 17.8; F & Cl 6.5, 6.4. Cranial : 1 ♂ : *l* 13.9; *ccl* 12.7; *mtr* 5.3; c^1–c^1 3.6; zw *8.7*; *iw* 3.3; *cw* 6.6; m^3–m^3 5.7; *ml* 9.9. 2 ♀ : *l* 13.9, 14.2; *ccl* 12.4, 12.4; *mtr* 5.4, 5.4; c^1–c^1 3.7, 3.7; *zw* 9.2, 8.7; *iw* 3.2, 3.1; *cw* 6.7, 6.9; m^3–m^3 6.0, 5.8; *ml* 10.1, 10.3.

Diagnosis : A small *Myotis*; forearm hardly reaching 40.0 mm; dorsal colour brown to grey with dark bases, ventral colour lighter with buffy-white to pale grey tips; wing membrane attached at the base of toes.

Distribution : India : Mizoram : Lunglei district. Myanmar, Thailand, Peninsular Malaysia, erstwhile Indo China, Phillipines, Indonesia through to New Guinea.

Remarks : These specimen constitute the basis for the first authentic record of *Myotis muricola* proper for India, from Mizoram (Mandal *et al.*, 2000).

Genus *Eptesicus* Rafinesque, 1820

One species of the genus *Eptesicus* occurs in Mizoram.

23. *Eptesicus pachyotis* (Dobson)

1871. *Vesperugo (Vesperus) pachyotis* Dobson, *Proc. Asiat. Soc. Beng.*, : 211 (Khasi Hills, Meghalaya, India).

Common names : Thick-eared Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 16.iv.1995.

Measurements : External : 1♂ : Fa 39.2; E 14.1; *Tl* 16.5; Tr 4.9; F & Cl 6.9; *Tl* 40.2. Cranial : 1♂ : *l* 15.3; *mtr* 5.2; c^1–c^1 5.3; *cw* 8.0; *zw* 11.0; *iw* 4.5; m^3–m^3 7.1; *c*–m_3 5.5; *ml* 10.9.

Diagnosis : A medium-sized (forearm around 41.0 mm) vespertilionine bat; dark brown above, lighter brown below; ears triangular, tips rounded, outer margins straight, lower halves very thick and fleshy; wings from base of toes; inner incisors bifid, larger and longer than outer ones.

Distribution : India : Mizoram : Lunglei district; Meghalaya. Bangladesh, Myanmar, Tibet, Thailand.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus *Pipistrellus* Kaup, 1829

One species of the genus *Pipistrellus* occurs in Mizoram.

24. *Pipistrellus circumdatus* (Temminck)

1840. *Vespertilio circumdatus* Temminck, *Monogr. Mammal.*, **2** : 214 (Tapos, Java).

Common names : Large Black Pipistrelle (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 25.iv.1995.

Measurements : External : 1♀ : H & B 51.6; *Tl* 41.4; F & Cl 8.4; E 13.5; Tr 5.4; Fa 40.6; Tb 17.1. Cranial : 1♀ : *l* 16.0; *mtr* 5.9; c^1–c^1 5.0; *iw* 4.5; *zw* 16.2; m^3–m^3 7.2; *c*–m_3 6.3; *cw* 8.7; *ccl* 14.8; *ml* 11.4.

Diagnosis : Upper parts deep black, hairs tipped bright ferrugineous; underparts dull black, hairs tipped greyish; anterior upper premolar minute, displaced inwardly from tooth-row; posterior upper premolar and canine touch each other.

Distribution : India : Mizoram : Lunglei district; Meghalaya. Myanmar, southwestern China, Malaya, Java.

Remarks : Nothing is known about the breeding of this bat. However, the present specimen contained one foetus (measuring 15.0 mm) in the left horn.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus *Scotozous* Dobson, 1875

The genus *Scotozous* is represented by a single species.

25. *Scotozous dormeri* Dobson

1875. *Scotozous dormeri* Dobson, *Proc. zool. Soc. Lond.*, 373 (Bellary Hills, Bellary district, Karnataka, India).

Common names : Dormer's Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1♂, 1♀, Lungsen (*c* 650 m), coll. T. P. Bhattacharyya, 28.i.1997.

Measurements : External : 1♂ : Fa 34.1; E 10.3; Tb 15.5; Tr 4.6; F & Cl 7.5; *Tl* 39.1. 1♀ : Fa 33.8; E 11.0; Tb 14.9; Tr 5.2; F & Cl 5.2; *Tl* 43.1. Cranial : 1♂ : *l* 12.7; *mtr* 4.7; c^1–c^1 4.0; *cw* 8.8; *zw* 8.8; *iw* 3.7; m^3–m^3 5.8; *c*–m^3 5.1; *ml* 9.0. 1♀ : *l* 12.9; *mtr* 4.6; c^1–c^1 4.0; *cw* 6.6; *zw* 8.6; *iw* 3.5; m^3–m^3 5.7; *c*–m_3 5.1; *ml* 9.0.

Diagnosis : Very small, similar to Kelaart's Pipistrelle, but second upper incisor very small, not extending beyond cingulum of inner incisor; underparts whitish, often lemen-yellow in live and freshly killed specimens.

Distribution : India : Mizoram : Lunglei district; widely distributed in the Indian mainland. Pakistan (Roberts 1977).

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus ***Tylonycteris*** Peters, 1872

One species and subspecies of the genus *Tylonycteris* occurs in Mizoram.

26. ***Tylonycteris pachypus fulvida*** (Blyth)

1859. *Scotophilus fulvidus* Blyth, *J. Asiat. Soc. Beng.*, **28** : 293 (Schwegyin, Sittang River, Southeastern Myanmar).

Common names : Club-footed Bat (Eng.), Bak (Mizo).

Material examined : Aizawl district : 1 ♀, Teirei (Dampa) (*c* 250 m), coll. A. K. Mandal, 24.xii.1993.

Measurements : External : 1 ♀: Fa 34.2; E 12.5; Tb 17.4; F & Cl 6.5. Cranial : 1 ♀: *l* 14.5; *ccl* 12.6; *mtr* 5.5; c^1–c^1 3.6; *iw* 3.1; *cw* 7.1; *zw* 8.3; m^3–m^3 5.7; *ml* 9.7.

Diagnosis : Colour reddish brown above and below; ear shorter, tip rounded; tragus short and rounded at tip; fleshy pads at junction of thumb and second finger, and on sloes; skull dorso-ventrally flattened, brain case and rostrum at same lavel.

Distribution : India : Mizoram : Aizawl district; Andaman Islands; Manipur; Meghalaya; Sikkim; Tripura; West Bengal. Bangladesh, Myanmar, southern China, Vietnam, Laos, Thailand.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 1997).

Genus ***Barbastella*** Gray, 1821

One species and subspecies of the genus *Barbastella* occurs in Mizoram.

27. ***Barbastella leucomelas darjelingensis*** (Hodgson)

1855. *Plecotus darjelingensis* Hodgson, *In* Horsfield, *Ann. Mag. Nat. Hist.*, **2**(16) : 103 (Darjeeling = Darjiling, Darjiling district, West Bengal, India).

Common names : Eastern Barbastelle (Eng.), Bak (Mizo).

Material examined : Lunglei district : 2 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 16,17.iv.1995.

Measurements : External : 2♂ : Fa 38.0, 38.4; *Tl* 44.1, 45.3; E 16.9, 17.2; Tr 7.5, 7.7; Tb 17.7, 18.6; F & Cl 6.2, 7.6. Cranial : 2♂ : *l* 15.0, 15.4; *mtr* 4.7, 4.7; *cw* 8.3, 8.2; c^1–c^1 3.2, 3.7; m^3–m^3 5.2, 5.3; *zw* 6.7, 6.8; *iw* 3.8, 4.0; *cr* 4.3, 4.4; *ml* 8.9, 9.3.

Diagnosis : A medium-sized bat; ears large, joined across forehead; tragus half the length of ear and triangular; interfemoral membrane with two dark lines from heel to base of pelvis; dorsal fur long, silky, base blackish, tips pale golden brown; underparts paler, greyish brown.

Distribution : India : Mizoram : Lunglei district; Himachal Pradesh; Jammu & Kashmir; Meghalaya; Rajasthan; Sikkim; Uttar Pradesh; West Bengal. Southern Russia, Afganishthan, Pakistan, Western China, Nepal, possibly erstwhile Indo-China, Japan.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 1997).

Subfamily MURININAE

Three genera of the subfamily Murininae occur in Mizoram.

Key to the genera of the subfamily MURININAE

1. Wing membrane attached to the base of the digit. ..... ***Harpiola***
– Wing membrane attached to the claw bearing phalanx. 2
2. Last upper molar normal. ..... ***Murina***
– Last upper molar much reduced, often deciduous. ..... ***Harpiocephalus***

Genus ***Murina*** Gray, 1842

Two species and subspecies of the genus *Murina* occur in Mizoram.

Key to the species and subspecies of the genus *Murina*

– Upper half of outer margin of ear concave. ..... ***Murina tubinaris***
– Upper half of outer margin of ear convex.... ..... ***Murina cyclotis cyclotis***

28. *Murina tubinaris* (Scully)

1881. *Harpiocephalus tubinaris* Scully, *Proc. zool. Soc. Lond.*, : 200, fig. 1 (Gilgit, Gilgit district, Jammu & Kashmir, India).

Common names : Scully's Tube-nosed Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 4 ♂, 12 ♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 17-26.iv.1995.

Measurements : External : 2♂ : Fa 31.2, 32.6; *Tl* 34.4, 36.0; E 14.1, 15.0; Tr 6.3, 6.5; Tb 17.2, 17.5; F & Cl 7.4, 7.5. 2♀ : Fa 34.4, 34.6; *Tl* 39.6, 33.3; E 15.7, 14.2; Tr 6.3, 6.3; Tb 17.7, 17.5; F & Cl 8.0, 7.5. Cranial : 2♂ : *l* 16.4, 16.6; *mtr* 5.3, 5.1; c^1–c^1 3.9, 3.8; m^3–m^3 5.4, 5.4; *zw* 8.7, 8.5; *cw* 7.2, 7.2; *ml* 10.4, 10.1. 2♀ : *l* 16.3, 16.7; *mtr* 5.2, 5.0; c^1–c^1 3.8, 4.0; m^3–m^3 5.6, 5.9; *zw* 8.8, 9.2; *cw* 7.2, 7.7; *ml* 10.7, 11.0.

Diagnosis : Ears rounded, small lobe at base of anterior margin, a slight emargination in the posterior margin; dorsal colour grey, ventral colour greyish white, pelage dark brown at base; anterior upper and lower premolar reduced.

Distribution : India : Mizoram : Lunglei district; Arunachal Pradesh; Himachal Pradesh; Jammu & Kashmir; Meghalaya; Sikkim; West Bengal. Pakistan, Myanmar, Thailand, Vietnam, Laos.

Remarks : Three females were found to have two foetuses, one in each horn; while three other females were found to have one foetus in the left horn. Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

29. *Murina cyclotis cyclotis* Dobson

1872. *Murina cyclotis* Dobson, *Proc. Asiat. Soc. Beng.*, : 210 (Darjeeling = Darjiling, Darjiling district, West Bengal, India).

Common names : Round-eared Tube-nosed Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 5 ♂, 1 ♀, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 16-23.iv.1995.

Measurements : External : 2♂ : Fa 28.7, 30.4; *Tl* 32.1, 33.9; E 12.8, 12.8; Tr 5.8, 6.0; Tb 16.6, 17.1; F & Cl 6.6, 7.4. 1♀ : Fa 30.6; *Tl* 34.5; E 13.5; Tr 6.9; Tb 17.4; F & Cl 7.4. Cranial : 2♂ : *l* 15.5, 16.1; *mtr* 4.9, 5.2; c^1–c^1 3.8, 3.8; m^3–m^3 5.5, 5.5; *zw* 8.5, 8.9; *cw* 7.3, 7.7; *ml* 9.9, 10.3. 1 ♀: *l* 16.1; *mtr* 5.2; c^1–c^1 4.0; m^3–m^3 5.6; *zw* 9.0; *cw* 7.7; *ml* 10.4.

Diagnosis : Ears broad, rounded, small lobe at base of anterior margin, posterior margin without emargination; dorsal colour rufous brown to ferrugenous, ventral colour greyish white with brownish tinge; anterior upper and lower premolars less reduced.

Distribution : India : Mizoram : Lunglei district; Andhra Pradesh; Meghalaya; Sikkim; West Bengal. Nepal, Myanmar, southern China including Hainan Island, Vietnam, Laos, Thailand, Philippine Island.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 2000).

Genus *Harpiocephalus* Gray, 1842

One species of the genus *Harpiocephalus* occurs in Mizoram.

30. *Harpiocephalus mordax* Thomas

1923. *Harpiocephalus mordax* Thomas, *J. Bombay nat. Hist. Soc.*, **29** : 88 (Mogok, northern Myanmar).

Common names : Broad-skulled Hairy-winged Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 25.iv.1995.

Measurements : External : 1♂ : Fa 50.5; *Tl* 52.4; E 17.7; Tr 9.2; Tb 24.4; F & Cl 11.4. Cranial : 1♂ : *l* 23.0; *ccl* 19.9; *mtr* 6.7; c^1–c^1 6.6; m^3–m^3 7.4; *zw* 13.8; *iw* 5.6; *cw* 9.0; *ml* 16.7.

Diagnosis : Much like a tube-nosed bat, but larger; fur thick, woolly, extends to legs, feet, interfemoral membrane and tail; wings haired on both surfaces; dorsal colour bright rufous or bright rusty, ventral colour greyish buff; cranial rostrum well developed; incisors, canines and premolars much enlarged.

Distribution : India : Mizoram : Lunglei district; Meghalaya; Sikkim; West Bengal. Myanmar, Thailand, Borneo.

Remarks : Recorded for the first time from Mizoram (Mandal *et al.*, 1997).

Genus ***Harpiola*** Thomas, 1915

The genus *Harpiola* is represented by a single species.

31. ***Harpiola grisea*** Peters

1872. *Murina grisea* Peters, *Monatsh. K. Preuss. Akad. Wiss. Berlin* : 258 [Jeripanee (*c* 1676 m), Mussooree district, Uttar Pradesh, India]

Common names : Peters Tube-nosed Bat (Eng.), Bak (Mizo).

Material examined : Lunglei district : 1 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 18.iv.1995.

Measurements : External : 1 ♂ : Fa 32.4; *Tl* 27.5; E 12.1; Tr 6.0; Tb 14.8; F & Cl 8.2. Cranial : 1 ♂ : *l* 16.4; *ccl* 14.8; *mtr* 5.3; c^1–c^1 3.7; *zw* 9.4; *iw* 4.3; m^3–m^3 5.5; *cw* 8.0; *c*-m_3 5.9; *ml* 10.6.

Diagnosis : Ears well erected, terminal half triangular; wing from base of phalange of the outer claw; dorsal colour clove brown at base, terminal two third shining golden yellow; hairs on the claws shining golden brown; incisor big, reaching canine in hight, canine reduced, first premolar long nearing canine in hight, second premolar less than first in basal diameter.

Distribution : India : Mizoram : Lunglei district; Uttar Pradesh.

Remarks : Bhattacharyya (in press) treated *Harpiola* Thomas, 1915 as a valid genus and recorded *H. grisea* for the first time from Mizoram.

Order PRIMATES

Primates, evolved from arboreal ancestors, hence retain this characteristic in prehensile hands and feet, the thumb and big toe opposable to other digits; each digits tipped with a flat nail. Other characters include an increase in the size and complexity of brain; complete bony rim around orbits; reduced dentition; complete set of collar bones; well developed brain.

Three families of the order Primates occur in Mizoram.

Key to the families of the order PRIMATES

1. Forelimbs much longer than hind, tail absent. ..... HYLOBATIDAE
– Forelimbs not longer than hind, tail present. 2
2. All digits with nails .... CERCOPITHECIDAE
– Second digit of hind limb with small claw .. .. LORISIDAE

Family LORISIDAE

One genus of the family Lorisidae occurs in Mizoram.

Genus ***Nycticebus*** E. Geoffroy, 1812

One species and subspecies of the genus *Nycticebus* occurs in Mizoram.

32. ***Nycticebus coucang bengalensis*** (Lacepéde)

1800. *Loris bengalensis* Lacepéde, *Seances des Écoles normales*, **8** : 68 (Bengal).

Common names : Slow Loris (Eng.) Sahuai (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : About the size of a half-grown cat; with short ears and stumpy tail almost hidden in thick fur, which varies in colour; brown ring round the eyes; brown streak on crown and back.

Distribution : India : Mizoram : Aizawl district, Chimtuipui district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; Tripura. Also found in Bangladesh, Myanmar and Thailand.

Remarks : Slow Loris was seen at Aizawl and Ngengpui during survey trips there.

Family CERCOPITHECIDAE

In Mizoram, the family Cercopithecidae is represented by two genera.

Key to the genera of the family CERCOPTHECIDAE

– Cheek-pouch present; tail variable but generally smaller than head and body; face reddesh.... ..... ***Macaca***

– Cheek-pouch absent; tail always longer than head and body; face blackish.... ***Trachypithecus***

Genus *Macaca* Lacepéde, 1799

Three species of the genus *Macaca* occur in Mizoram.

Key to the species of the genus *Macaca*

1. Tail inconspicuous, reduced to a stump and seldom longer than 30.0 mm. ... *M. acrtoides*

– Tail conspicuous, generally about half the length of head and body..... 2

2. Hindquarter of the body brighter (of orange-red hue) than the forequarter; buttocks naked around ischial callosities. ..... *M. mulatta*

– Hindquarter of body not more brightly coloured than the forequater; buttocks clad up to the edge of callosities. ..... *M. assamensis*

33. *Macaca arctoides* (I. Geoffroy)

1831. *Macaca arctoides* I. Geoffroy *Voyage aux Indes Orientales*, Mammiferes : 61 (Indochina).

Common names : Stump-tailed Macaque (Eng.), Zawng (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Tail stump-like, almost naked, not more than 50.0 mm in length; colour of body dark brown with bare red face.

Distribution : India : Mizoram : Aizawl district, Chimtuipui district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland. Bangladesh, Myanmar, Southern China, erstwhile Indochina, northern Malay Peninsula.

Remarks : During survey trip, stump-tailed Macaque was seen at Champhai and Lungsen.

Macaca assamensis (M'Clelland)

The nominate subspecies of *Macaca assamensis* occurs in Mizoram.

34. *Macaca assamensis assemensis* (M'Clelland)

1839. *Macaca assamensis* M'Clelland, in Horsfield, *Proc. zool. Soc. Lond.*, 148 (Assam).

Common names : Assamese Macaque (Eng.), Zawng (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Almost like the Rhesus Macaque, but distinguished by absence of orange-red hue on loins and rump.

Distribution : India : Mizoram : Aizawl district, Chimtuipui district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland. Bangladesh, Myanmar, east to Vietnam, southern China.

Remarks : During survey trip at Teirei (*c* 250 m), Dampa Sanctuary, a troop of about twenty monkeys of this species was observed near our camp feeding in the bamboo thickets and a troop of ten individuals were observed inside the forest at Lungsen.

Macaca mulatta (Zimmermann)

The nominate subspecies of *Macaca mulatta* occurs in Mizoram.

35. *Macaca mulatta mulatta* (Zimmermann)

1780. *Cercopithecus mulatta* Zimmermann, *Geogr. Gesch. Meusch.*, **2** : 195 (India).

Common names : Rhesus Macaque (Eng.), Zawng (Mizo).

Material examined : None.

Measurements : Nil.

Diagnosis : Medium-sized monkey with tail about half of head and body length; hair on head lying straight back; fur on loins and rump orange-red coloured; face flesh coloured.

Distribution : India : Mizoram : Aizawl district; Andhra Pradesh; Arunachal Pradesh; Assam; Bihar; Delhi; Gujarat; Himachal Pradesh; Jammu & Kashmir; Madhya Pradesh; Manipur; Meghalaya; Orissa; Punjab; Rajasthan; Sikkim; Tripura; Uttar Pradesh; West Bengal. Bhutan, Bangladesh, Myanmar, China, Thailand and Vietnam.

Remarks : The Rhesus Macaque, though common in other parts of India, is rather uncommon in Mizoram as noticed during survey trips. Only a few specimens were observed at North Khawbung.

Genus ***Trachypithecus*** Reichenbach, 1862

The genus *Trachypithecus* separated from *Presbytis* by Hooijer (1962) and Groves (1989) and mentioned by Wilson & Reeder (1993).

Two species of the genus *Trachypithecus* occur in Mizoram.

Key to the species and subspecies of the genus *Tachypithecus*

- Hairs on crown directed backwards to from a distinct cap. ..... *T. pileatus*
- Hairs on crown not forming a distinct cap... ..... *T. phayrei*

36. ***Trachypithecus pileatus pileatus*** (Blyth)

1843. *Semnopithecus pileatus* Blyth, *J. Asiat. Soc. Beng.*, **12** : 174 (Locality unknown).

Common names : Capped Langur (Eng.), Ngau (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Slender-build monkey with a crown of erect, long hairs directed backwards from forehead; colour dark grey on back and limbs, yellowish white on cheeks and underparts.

Distribution : India : Mizoram : Aizawl district; Assam; Manipur; Meghalaya; Nagaland. Bangladesh, Myanmar, China.

Remarks : According to the information available from the Forest Department of Mizoram, Capped Langur is found in the Murlen National Park of Mizoram.

37. ***Trachypithecus phayrei phayrei*** (Blyth)

1847. *Presbytis phayrei* Blyth, *J. Asiat. Soc. Bengal,* **16** : 733 (Arakan, Myanmar).

Common names : Phayre's leaf Monkey (Eng.), Ngau (Mizo).

Material examined : None.

Measurements : Nil.

Diagnosis : The Phayre's Leaf Monkey is a dark ashy brown langur. It is darker on the head, extremities and the tail tip. Its back from shoulders to loin is silvery. The underparts are whitish. The face is black except the lips and the area around the mouth and eyes which are white.

Distribution : India : Mizoram : Aizawl district; Tripura; Assam. Bangladesh, Myanmar.

Remarks : A troop of 8 individual were seen at Teirei (Dampa Sanctuary) while feeding on bamboo thickets.

Family HYLOBATIDAE

The family Hylobatidae consists of the lone genus *Hylobates*. It is the only ape found in India.

Genus ***Hylobates*** Illiger, 1811

Only one species of the genus *Hylobates* occurs in Mizoram.

38. ***Hylobates hoolock*** (Harlan)

1834. *Simia hoolock* Harlan, *Trans. Am. Phil. Soc.*, **4** : 52 (Garo Hills, Meghalaya, India).

Common names : Hoolock Gibbon (Eng.), **Hauhuk** (Mizo.).

Material examined : Nil.

Measurements : None.

Diagnosis : Body devoid of a tail; head and body length about 600 mm; arms longer than the legs; males and young females black, adult females yellowish-grey; eye-brows white.

Distribution : India : Mizoram : Aizawl district; Assam; Manipur; Meghalaya; Tripura. Also occurs in Bangladesh, Myanmar and China.

Remarks : The Hoolock Gibbon is not common in Mizoram. During our survey trip it was seen near Tuirial Hydel Project area (Aizawl district).

Order PHOLIDOTA

Elongated, tapering body; dorsal area of head, body and tail covered with large overlapping scales; ventral surface covered with coarse, bristly hairs; limbs short; toes with powerful claws; jaws devoid of teeth; vermiform tongue, highly protrusible.

Order Pholidota consists of a single family Manidae.

Family MANIDAE

The family Manidae consists of only one genus, ***Manis***.

Genus ***Manis*** Linnaeus, 1758

One species and subspecies of the genus *Manis* occurs in Mizoram.

39. ***Manis pentadactyla aurita*** Hodgson

1836. *Manis auritus* Hodgson, *J. Asiat. Soc. Beng.*, **5** : 234 (Lower and central Nepal).

Common names : Chinese Pangolin (Eng.), Saphu (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Body covered with 15–18 rows of longitudinal overlapping scales; dark brown in colour; bare skin of ventral surface flesh-coloured.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland. Nepal, Myanmar and southern China.

Remarks : The Chinese Pangolin was observed at night in the hilly jungles of North Khawbung, Teirei (Dampa Sanctuary) and Sairep during survey trips.

Order CARNIVORA

Six small, equal-sized incisors; a pair of large conical canines; last upper premolar and first lower molar, having sharp edged lobes, developed into carnassial (flesh-cutting) teeth.

Six families of the order Carnivora occur in Mizoram.

Key to the families of the order CARNIVORA

1. Bulla much dilated, rounded, but not divided into chambers by a septum ..... CANIDAE
– Bulla much dilated, rounded, but divided into chambers by a septum 2
– Bulla not rounded but inflated, and not divided by a septum 4
2. 3-4 teeth in upper molar series of each jaw; toes 5-4; claws curved, sharp and retractile, head short and some what roundish, with shortened muzzle ..... FELIDAE
– 6 teeth in molar series of each jaw (except *Prionodon*); toes usually 5-5; claws variable; head elongated 3
3. Ears elongated in size, with well-developed bursa; auditory bulla oval or subconical; no bony tube to auditory orifice; claws curved and more or less retractile; pre-scrotal gland generally present ..... VIVERRIDAE
– Ears small and rounded, with vestigeal bursa; auditory bulla somewhat pear-shaped; a well-

developed body tube to the auditory orifice; claws lengthened, exserted, non-retractile; pre-scrotal gland absent ..... HERPESTIDAE

4. True molars 1-1 in upper jaw, 2-2 in lowar jaw .....MUSTELIDAE

– True molars 2-2 in upper jaw, 3-3 in lower jaw ..... URSIDE

Family CANIDAE

Family Canidae is represented by two genera in Mizoram.

Key to the genera of the family CANIDAE

1. A frontal sinus present; post-orbital process smooth and convex above; tail less than half the length of head and body ..... ***Canis***

– No frontal sinus; postorbital process concave above; tail more than one-half the length of head and body ..... ***Vulpes***

Genus *Canis* Linnaeus, 1758

Two species of the genus *Canis* occur in Mizoram, each represented by one subspecies.

Key to the species and subspecies of the genus *Canis*

– Large-sized, males 65-76 cm high at the shoulders; greatest length of skull 18-24 cm; first upper molar with indistinct outer cingulum ..... *Canis lupus pallipes*

– Medium-sized, males 38-43 cm high at the shoulders; greatest length of skull 13.0-16.5 cm; first upper molar with a promonent outer cingulum ..... *Canis aureus indicus*

40. *Canis lupus pallipes* Sykes

1758. *Canis pallipes* Sykes, *Proc. zool. Soc. Lond,* **101** (Deccan, India).

Common names : Wolf (Eng.), Chinghnia (Mizo).

Material examined : Nil.

Measurements : Nil.

Diagnosis : About the size of an Alsatian dog. Dorsum greyish fulvous or reddish, with a brownish tinge, sometimes mixed with black. Face and limbs reddish. Forehead elevated and brows arched.

Distribution : India : Mizoram : Lunglei district, Chimtuipui district; Andhra Pradesh; Assam; Bihar; Gujarat; Karnataka; Madhya pradesh; Maharashtra; Rajasthan; Uttar Pradesh; West Bengal. Arabian Peninsula, Iran and Pakistan.

Remarks : During our survey trips we heard the call of this species at Sairep and Lungsen of Lunglei district and Ngengpui of Chimtuipui district.

41. *Canis aureus indicus* Hodgson

1833. *Canis aureus indicus* Hodgson, *Asiat. Res.*, **18,** 2 : 237 (Nepal).

Common names : Asiatic Jackal (Eng.), Sihal (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Smaller than the wolf; lacks the arching brows and elevated forehead. Dorsal colour typically a mixture of black and white, washed with buff at the shoulders, ears and legs.

Distribution : India : Mizoram : Aizawl district, Lunglei district, Chimtuipui district; Arunachal Pradesh; Assam; Bihar; Manipur; Meghalaya; Nagaland; Sikkim; Tripura; West Bengal. Bhutan, Myanmar and Thailand.

Remarks : Asiatic Jackals were seen at Aizawl, Lunglei and Chimtuipui districts during survey trips there.

Genus *Vulpes* Oken, 1816.

One species of the genus *Vulpes* occurs in Mizoram.

42. *Vulpes bengalensis* (Shaw)

1800. *Canis bengalensis* Shaw, *Gen. Zool.*, **1**(2) : 330 (Bengal).

Common names : Bengal Fox (Eng.), Sihal (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : A slender-limbed animal of about 45-60 cm in head and body length. Coat colour grey; back of ears sandy brown; tail tip black.

Distribution : India : Mizoram : Aizawl district, Lunglei district, Chimtuipui district; occurs throughout India. Also in Pakistan, Nepal and Bangladesh.

Remarks : This species were seen at Aizawl, Lunglei and Chimtuipui districts during survey trips.

Family FELIDAE

Three genera of the family Felidae occur in Mizoram.

Key to the genera of the family FELIDAE

1. Large-sized animals; hyoidean apparatus modified by the conversion of median part of suspensor into a long Elastic tendon ..... ***Panthera***
- Small to medium-sized animals; hyoidean apparatus of normal mammalian type; the suspensor consisting of a chain of bones, jointed end to end 2
2. Skull long and low, with short, blunt, widely separated frontal and zygomatic-postorbital processes; canines long and post-canine space large ..... ***Neofelis***
- Skull having long and well-developed postorbital processes; canines relatively short and post-canine space normal ..... ***Felis***

Genus *Felis* Linnaeus, 1758

Two species of the genus *Felis* occur in Mizoram.

Key to the species of the genus *Felis*

- Outer chamber of bulla relatively large, partition arising from some distance of orifice; tip of postorbital process about the middle of skull ..... *Felis chaus*
- Outer chamber of bulla small, partition arising close to orifice; tip of postorbital process in front of the middle of skull .... *Felis bengalensis*

43. ***Felis chaus*** Güldenstaedt

1776. *Felis chaus* Güldenstaedt, *Nov. Com. Acad. Petrop.*, **20** : 483 (Terak river, north of Caucasus).

Common names : Jungle Cat (Eng.), Sanghar (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Medium-sized, head and body 60-75 cm in length; tail shorter, tipped black; general colour light reddish-grey, unspotted except on lower flanks and elbow; black horizontal stripes present on linner side of fore-legs; ears reddish chestnut with rudimentary hair tuft.

Distribution : India : Mizoram : Aizawl district; Lunglei district; Arunachal Pradesh; Assam; Himachal pradesh; Jammu & Kashmir; Manipur; Meghalaya; Nagaland; Sikkim; Tripura; Uttar Pradesh; West Bengal. Also found in Nepal.

Remarks : Jungle cat was seen near Saipum at 6.30 P.M. on 3.1.94 during our journey from Saipum to Bilkhawthlir, Aizawl district.

44. ***Felis bengalensis bengalensis*** Kerr

1792. Felis bengalensis Kerr, *Anim. Kingd.*, 151 (Southern Bengal).

Common names : Leopard Cat (Eng.), Sanghar (Mizo).

Material examined : Lunglei district : 1 ♀ Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 26.iv.1995.

Measurements : External : 1 ♀ : H & B 480.0; *Tl* 260.0; Hf 105.0; E 45.0. Cranial : 1 ♀ : *l* 88.4; *cb* 81.0; m_1 5.5; *zw* 57.7; *pow* 31.0; *iw* 13.0.

Diagnosis : Colour variable, pelage ornamented with blackish brown spots; back of ears black, with a whitish round spot in the centre; four longitudinal black bands run from forehead to the neck, break up into short bands or elongated spots on shoulders; tail spotted above.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Andhra Pradesh; Arunachal Pradesh; Assam; Karnataka; Kerala; Maharashtra; Manipur; Meghalaya; Nagaland; Orissa; Tamil Nadu; Tripura; West Bengal. Also in Bangladesh, Myanmar, Thailand, Yunan and erstwhile Indo-China.

Remarks : Leopard Cat was also seen during night at Murlen National Park (North Khawbung), Aizawl district during survey trip there.

Genus ***Panthera*** Oken, 1816

Two species and subspecies of the genus *Panthera* occur in Mizoram.

Key to the species and subspecies of the genus *Panthera*

- Ground colour of body orange-tawny, with vertical black stripes ..... *P. tigris tigris*
- Ground colour of body yellow, with distrinct black spots arranged in rosettes .... *P. pardus fusca*

45. ***Panthera pardus fusca*** (Meyer)

1794. *Felis fusca* Meyer, *Zool. Ann.*, **1** : 394 (Bengal).

Common names : Leopard (Eng.), Kawlsa (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : A sleek, short-haired animal; colour pale fulvous yellow, with clearly defined black spots in rosettes.

Distribution : India : Mizoram : Aizawl district, Lunglei district; throughout India in suitable habitats. Sri Lanka, Bangladesh, Myanmar, China.

Remarks : It was heard from forest personel that this species is present in Mizoram (Aizawl district—Murlen National Park, Teirei (Dampa) Wildlife Sanctuary; Lunglei district–Sairep).

46. ***Panthera tigris tigris*** (Linnaeus)

1758. *Felis tigris* Linnaeus, *Syst. Nat.*, 10th edn., **1** : 41 (Bengal).

Common names : Tiger (Eng.), Keipui (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : A large, heavy-bodied animal with short, close hairs, colour varies from pale yellow ochre to burnt sienna, with black stripes arranged irregularly.

Distribution : India : Mizoram : Aizawl district, Lunglei district; throughout India except in deserts of Rajasthan; Punjab and Gujarat. Nepal, Bangladesh and Myanmar.

Remarks : Forest personel reported that this species is present in Murlen National Park, Dampa Wildlife Sanctuary and Sairep of Mizoram.

Genus ***Neofelis*** Gray, 1867

The genus *Neofelis* is represented in Mizoram by one species.

47. ***Neofelis nebulosa*** (Griffith)

1821. *Felis nebulosa* Griffith, *Descr. Anim.* (*Carn.*), 37, pl. (Canton, Kwantung, Southern China).

Common names : Clouded Leopard (Eng.), Kelral (Mizo).

Material examined : Aizawl district : 1 ♂, Dintharveng, West Phaileng, coll. Forest Dept., W. Phaileng, 28.xii.1993.

Measurements : External : 1 ♂ : H & B 940.0; *Tl* 770.0; Hf 170.0; E 72.0. Height at shoulder 420.0; Round the chest 410.0. Cranial : Nil.

Diagnosis : Large-sized Cat, 66.0–117.0 cm in head and body length, tail long; fur close and sleek, and with a distinct pattern of large patches placed close together and edged behind with black; ground colour grey or buff, the patches darker. Head and limbs with black spots, tail black-ringed.

Distribution : India : Mizoram : Aizawl district; Arunachal Pradesh; Assam; Meghalaya. Nepal, Bhutan, Myanmar.

Remarks : We have examined and took external measurements of an specimen at Dintharveng, West Phaileng, Aizawl district, during the survey trip at Mizoram.

Family HERPESTIDAE

The family Herpestidae is represented in Mizoram by a single genus *Herpestes*.

Genus *Herpestes* Illiger, 1811

The genus *Herpestes* is characterised by its elongated body and short, rounded ears, mostly concealed by hairs; contour hairs banded with pale and darken annulations, giving a speckled appearance; post-dental part of palate extending to back side halfway over the mesopterygoid fossa.

Two species of the genus *Herpestes* occur in Mizoram.

Key to the species of the genus *Herpestes*

- A conspicuous white stripe present on the sides of the neck ..... *H. urva*
- Absence of any stripe on sides of neck; muzzle dark brown ..... *H. auropunctatus*

48. *Herpestes urva* (Hodgson)

1836. *Gulo urva* Hodgson, *J. Asiat. Soc. Beng.*, **5** : 238 (Nepal).

Common names : Crab-eating Mongoose (Eng.), Sarivaithun (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : A white stripe present on each side of the neck running upto shoulders; fur coarse, ragged, dusky iron-grey in colour; under fur woolly, dark brown at base, brownish yellow at tips.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; Tripura; West Bengal. Also in Bangladesh, Myanmar, Thailand, China, Taiwan and Vietnam.

Remarks : Rare.

49. *Herpestes auropunctatus* (Hodgson)

1836. *Mangusta auropunctatus* Hodgson, *J. Asiat. Soc. Beng.*, **5** : 235 (Nepal).

Common names : Small Indian Mongoose (Eng.), Sarivaithun (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Sleek in appearance; about 250 cm in head and body length; tail shorter than head and body; fur soft, silky, olive-brown to golden in colour.

Distribution : India : Mizoram : Aizawl district, Lunglei district, Chimtuipui district; Assam; Bihar; Gujarat; Madhya Pradesh; Manipur; Meghalaya; Nagaland; Orissa; Sikkim; Uttar Pradesh; West Bengal. Also in Nepal, Bhutan and Bangladesh.

Remarks : Small Indian Mongoose was observed during survey trips in Mizoram.

Family MUSTELIDAE

Three genera of the family Mustelidae occur in Mizoram.

Key to the genera of the family MUSTELIDAE

1. Adapted to semiaquatic life; tail thick and muscular, hindfoot wider than forefoot; vibrissae thick ..... ***Aonyx***
- Adapted to terrestrial life, without the above mentioned modifications 2

2. Muzzle, limbs and tail relatively longer; body less elongated and cylindrical; ears larger .... ***Martes***

– Muzzle, limbs and tail shorter; body more elongated and cylindrical; ears smaller ....***Mustela***

Genus ***Mustela*** Linnaeus, 1758

The genus *Mustela* is represented in Mizoram by one species.

50. ***Mustela kathiah*** Hodgson

1835. *Mustela (Putorius) Kathiah* Hodgson, *J. Asiat. Soc. Beng.*, **4** : 702 (The Kachar, northern region of Nepal).

Common names : Yellow-bellied Weasel (Eng.).

Material examined : Nil.

Measurements : None.

Diagnosis : Small, about 28 cm in head and body length. Coat dark chocolate-brown above, yellow below. Tail not bushy.

Distribution : India : Mizoram : Lunglei district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; Sikkim; Uttar Pradesh; West Bengal. Bhutan, Myanmar and China.

Remarks : During our faunistic survey, this species was seen at Sairep in Lunglei district.

Genus ***Aonyx*** Lesson, 1827

The genus *Aonyx* is represented in Mizoram by one species and subspecies.

51. ***Aonyx cinerea concolor*** (Rafinesque)

1832. *Amblonyx concolor* Rafinesque, *Atlantic J.*, **1** : 60 (Garo Hills, Meghalaya, India).

Common names : Oriental Small-clawed otter (Eng.)., Sahram (Mizo).

Material examined : Chimtuipui district : 1 ♂, Bualpui, coll. S. Chattopadhyay, 17.i.1987.

Measurements : External : 1♂ : H & B 440.0; *Tl* 272.0; Hf 73.0; E 16.0. Cranial : 1♂ : *l* 85.0; *cb* 82.0; *pow* 34.0; m_1 12.6; *iw* 16.7.

Diagnosis : Small-sized otter of about 60.0 cm in head and body length. Two middle toes of feet noticeably longer than others. Colour, dark brown above, paler below; white underparts limited to neck and shades into brown on chest.

Distribution : India : Mizoram : Chimtuipui district; Arunachal Pradesh; Assam; Himachal Pradesh; Meghalaya; Nagaland; Sikkim; Uttar Pradesh; West Bengal. China.

Genus ***Martes*** Pinel, 1792

The genus *Martes* is represented by one species and subspecies in Mizoram.

52. ***Martes flavigula flavigula*** (Boddaert)

1785. *Mustela flavigula* Boddaert, *Elench. Anim.*, 88 (Locality unknown, traditionally fixed as Nepal).

Common names : Yellow-throated Martin (Eng.).

Material examined : Nil.

Measurements : None.

Diagnosis : Head and body length 40–45 cm, with equally long bushy tail; colour variegated; the crown, nape and extremities black; throat and cheeks white; chest yellow; rest of the coat light brown.

Distribution : India : Mizoram : Lunglei district; Arunachal Pradesh; Assam; Himachal Pradesh; Jammu and Kashmir; Manipur; Meghalaya; Nagaland; Sikkim; Uttar Pradesh; West Bengal. Afghanistan, Pakistan, Nepal, Bhutan, Myanmar and China.

Remarks : Yellow-throated Marten was seen at Sairep and at Lungsen, Lunglei district during survey trips.

Family URSIDAE

Two genera of the family Ursidae occur in Mizoram.

Key to the genera of the family URSIDAE

– Larger, length usually over 150 cm; coat long; a white or buff V-shaped mark from the upper breast to both shoulders; claws black .... ***Selenarctos***

– **Smaller, length usually under 130 cm or so; coat very short; a white, U-shaped mark from uper breast to throat; claws pale horny, sometimes dusky ..... *Helarctos***

Genus ***Selenarctos*** Heude, 1901

The genus *Selenarctos* is represented in Mizoram by one species.

53. ***Selenarctos thibetanus*** (G. Cuvier)

1823. *Ursus thibetanus* G. Cuvier, *Ossements Foss.*, **4** : 325 (Sylhet, Bangladesh).

Common names : Asiatic Black Bear (Eng.), Savawm (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Large-sized bear, 140–190 cm in head and body length; coat short, smooth and black; claws black; a white or buff coloured V-shaped breast patch present.

Distribution : India : Mizoram : Aizawl district; Jammu & Kashmir; Manipur; Meghalaya; Sikkim; Uttar Pradesh; West Bengal. Also Pakistan and Bangladesh.

Remarks : According to forest official of Murlean National Park, it is found there.

Genus ***Helarctos*** Horsfield, 1825

The genus *Helarctos* is represented in Mizoram by one species.

54. ***Helarctos malayanus*** (Raffles)

1821. *Ursus malayanus* Raffles, *Trans. Linn. Soc. London*, **13** : 254 (Bencoolen, Sumatra).

Common names : Malayan Sun Bear (Eng.), Samang (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : The smallest of bears, about 125 cm in head and body length. Coat, short and close, black in colour; muzzel grey; white or yellow crescent on the chest. Claws large, white in colour.

Distribution : India : Mizoram : Chimtuipui district, Lunglei district; Assam; Meghalaya. Myanmar, Thailand, Malaysia, Sumatra and Borneo.

Remarks : During the survey of Mizoram in 1987, the scientist of the Zoological Survey of India, Calcutta encountered the Malayan Sun Bear on two occasions at Chimtuipui and Lunglei districts.

Family VIVERRIDAE

Two genera of the family Viverridae occur in Mizoram.

Key to the genera of the family VIVERRIDAE

– Feet terrestrial and digitigrade; carpal pad single; metacarpal pads absent; scent glands opening into highly specialised pouches ..... ***Viverricula***

– Feet scansorial and semi-plantigrade; carpal and metacarpal pads double; glandular pouches less specialised ..... ***Paguma***

Genus ***Paguma*** Gray, 1831

The genus *Paguma* is represented in Mizoram by one species and subspecies.

55. ***Paguma larvata neglecta*** Pocock

1934. *Paguma larvata neglecta* Pocock, *J. Bombay nat. Hist. Soc.*, **37** : 334 (Mokokchung, *c* 1372 m, Naga Hills, Nagaland, India).

Common names : Himalayan Palm Civet (Eng.), Sazaw (Mizo).

Material examined : Aizawl district : 1 ♂, Darlak, *c* 50 km, NNW of Aizawl, coll. S. S. Saha, 26.ii.1984.

Measurements : External : 1 ♂ : H & B 600.0; *Tl* 620.0; Hf 110.0; E 68.0. Cranial : 1 ♂ : *l* 117.4; *cb* 115.8; *mw* 39.2; *iw* 20.8; *pow* 38.5; c^1–c^1 19.5; *cw* 39.6; pm^4 6.7; *ml* 84.5; *zw* 59.5.

Diagnosis : Absence of spots or stripes on body and presence of white whiskers distinguises it from other Indian Civets. Coat colour grey to

tawny; underparts white. Underwool brownish or grey. A white band on forehead, nose and beneath ears, and a blotch below eyes.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Assam; Manipur; Maghalaya; Nagaland; Sikkim. Myanmar.

Remarks : During our survey trips, this species was encountered at Sairep in Lunglei district.

Genus ***Viverricula*** Hodgson, 1838

One species and subspecies of the genus *Viverricula* occurs in Mizoram.

56. ***Viverricula indica indica*** (Desmarest)

1817. *Viverra indica* Desmarest, *Nouv. Dict. nat. Hist.*, 7 : 170 (India).

Common names : Small Indian Civet (Eng.), Tlumtherh (Mizo).

Material examined : None.

Measurements : Nil.

Diagnosis : Body pattern consists of small spots on the fore-quarters, larger spots tending to run into longitudinal lines on the flanks, and form six to eight stripes down the back; tail ringed with black and white; muzzle short and weak; no dorsal crest of long hairs on back; claws unprotected by sheaths of skin.

Distribution : India : Mizoram : Lunglei district; Andhra Pradesh; Arunachal Pradesh; Assam; Bihar; Goa; Gujarat; Himachal Pradesh; Jammu & Kashmir; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Manipur; Meghalaya; Orissa; Sikkim; Tamil Nadu; Tripura; Uttar Pradesh; West Bengal. Sri Lanka, Bhutan and Bangladesh.

Remarks : A specimen killed by a villager was seen during the recent survey at Sairep, Lunglei district.

Order PROBOSCIDEA

Massive build, with long, flexible proboscis; generally males possess large tusks which are nothing but enlarged incisor theeth; molars large and transversely ridged.

The order Proboscidea contains a single family Elephantidae.

Family ELEPHANTIDAE

In India, this family is represented by a single genus, *viz.*, *Elephas*.

Genus ***Elephas*** Linnaeus, 1758

Only one species and subspecies of the genus *Elephas* occurs in Mizoram.

57. ***Elephas maximus indicus*** G. Cuvier

1797. *Elephas indicus* G. Cuvier, *Tabl. Elem. Hist. nat.*, 148 (India).

Common names : Indian Elephant (Eng.), Sai (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Largest of land animals of India; well-known by its trunk, at the end of which nostrils are placed; lower lip small, pointed and spout-like; body blackish grey throughout, tail thin, long with coarse bristles at end; eyes very small, ears large and flat.

Distribution : India : Mizoram : Chimtuipui district; Arunachal Pradesh; Assam; Bihar; Karnataka; Kerala; Meghalaya; Nagaland; Orissa; Tamil Nadu; Tripura; Uttar Pradesh; West Bengal. Bangladesh, Bhutan, Myanmar, Thailand, Vietnam, Malaysia, Sumatra and Borneo.

Remarks : Recently, the survey team from our department has seen elephant herds composed of more than 20 elephants at Ngengpui (*c* 200 m), Chimtuipui district.

Order ARTIODACTYLA

Animals belonging to this order are even-toed; axis of foot passes between third and fourth toes; enclosed in horny hooves of approximately equal size and gives the appearence of a single hoof, split down in the middle.

The order Artiodactyla is represented by three families in Mizoram.

Key to the families of the order ARTIODACTYLA

1. Upper incisors absent; horns or antlers present, at least in males 2
– Upper incisors present; animals devoid of horns or antlers ..... SUIDAE
2. Horns consist of a hollow outer sheath and an inner bony core, unbranched and permanent ..... BOVIDAE
– Antlers solid, branched, ornamented with knots and ridges, and periodically shed .... CERVIDAE

Family SUIDAE

The family Suidae is represented in Mizoram by a single genus, species, subspecies.

58. *Sus scrofa cristatus* Wagner

1839. *Sus cristatus* Wagner, *Munch. Gelehrt. Anz.*, **9** : 435 (Probably Malabar Coast, India).

Common names : Wild Boar (Eng.), Sanghal (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : 76–102 cm height at shoulder; coat coarse, a crest of black bristles from nape to back; tail long, thin, fringed at tip, barely reaching hocks; first coat of pig dark brown, striped lengthways with buff.

Distribution : India : Mizoram : Aizawl district, Lunglei district, Chimtuipui district; throughout India, in forested tracts. Pakistan, Sri Lanka, Nepal, Bangladesh, Myanmar, Indonesia, Malaysia, Vietnam.

Remarks : Wild Boar is now rare in Mizoram. The main reason of its decline is poaching for flesh.

Family CERVIDAE

Three genera of the family Cervidae occur in Mizoram.

Key to the genera of the family CERVIDAE

1. Upper canines tusk-like, in males; antlers short, consisting of a short brow-tine and an unbranched beam ..... ***Muntiacus***
– Upper canines, when present, not tusk-like; antlers long and branched; bony phalanges present in lateral digits 2
2. Body, in adults, distinctly spotted; brow-tine set at right angles to the beam of antlers ..... ***Axis***
– Body unspotted; brow-tine form an acute angle with the beam of antlers ..... ***Cervus***

Genus *Muntiacus* Rafinesque, 1815

The genus *Muntiacus* is represented in Mizoram by one species and subspecies.

59. *Muntiacus muntjak vaginalis* (Boddaert)

1785. *Cervus vaginalis* Boddaert, *Elench. Anim.*, **1** : 136 (Bengal).

Common names : Barking Deer (Eng.), Sakhi (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Antler small, consisting of a short brow-tine and an unbranched beam, set on bony hair-covered pedicel, extending down on each side of face as bony ridges. Coat-colour deep chestnut, becoming darker on the back, and paler and duller below.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Bihar; Meghalaya; Sikkim; Uttar Pradesh; West Bengal. Bhutan, Bangladesh, northern Myanmar, Yunan and northern Vietnam.

Remarks : This species was seen at Aizawl and Lunglei districts during the survey trips.

Genus *Cervus* Linnaeus, 175

One species of the genus *Cervus* occurs in Mizoram.

60. *Cervus unicolor* Kerr

1792. *Cervus axis unicolor* Kerr, *Anim. Kingd.*, 300. Ceylon (as restricted by Hamilton Smith).

Common names : Sambar (Eng.), Sazuk (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Largest Indian deer; coat coarse and shaggy; a mane present, in stag, about neck and throat; general colour brown with yellowish or greyish tinge; old stag very dark, almost black; underparts paler; females lighter in tone. Antler stout and rugged, brow-tine forming acute angle with main beam which forks at summit into two equal tines.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Arunachal Pradesh; Assam; Meghalaya; West Bengal. Myanmar, Thailand, China, Malaysia, Sumatra, erstwhile Indo-China.

Remarks : Forest personel of Murlen National Park (North Khawbung) reported that this species is present.

Genus *Axix* Smith, 1827

One species and subspecies of the genus *Axix* occurs in Mizoram.

61. *Axix porcinus procinus* (Zimmermann)

1777. *Cervus porcinus* Zimmermann, *Spec. Zool. Geogr.* : 532 (Bengal).

Common names : Hog Deer (Eng.), Sakhi (Mizo).

Material examined : Nil.

Measurements : Nil.

Diagnosis : Squat, pig-like in movement. Colour of body brown to dark brown with yellowish or reddish tinge. Tip of individual hairs white, giving the coat a speckled appearance. Adults not spotted with white, except sometimes in summer. Beam of antlers after giving a short browtine almost straight, till divides into a longer fore and a shorter hind tine.

Distribution : India : Mizoram : Aizawl district; Arunachal Pradesh; Assam; Bihar; Meghalaya; Punjab; Tripura; Uttar Pradesh; West Bengal. Nepal, Sri Lanka (introduced), Myanmar, Indo-China, Thailand.

Remarks : Honacki *et al.*, (1982) kept this species under the genus *Cervus*.

This species was seen in the Murlen National Park.

Family BOVIDAE

Two genera of the family Bovidae occur in Mizoram.

Key to the genera of the family BOVIDAE

- Horns oval in cross-section and smooth .... ***Bos***
- Horns conical, backwardly curved and ringed ..... ***Capricornis***

Genus *Bos* Linnaeus, 1758

One species of the genus *Bos* occurs in Mizoram.

62. *Bos gaurus* Smith

1827. *Bos gaurus Smith*, Griffith's *Cuvier Anim. Kingd.*, 4 : 399 (Mainpat, Sarguja, Madhya Pradesh, India).

Common names : Indian Bison (Eng.), Ramsial (Mizo).

Material examined : Nil.

Measurements : Nil.

Diagnosis : Height at shoulders, in males, 175–196 cm, females a little smaller. A muscular ridge present on the shoulders which slopes down to the middle of the back where it ends in an abrupt dip. General colour of coffee or reddish brown, jet black in old bulls; ashy forehead; yellowish or white stockings.

Distribution : India : Mizoram : Aizawl district, Lunglei district; Andhra Pradesh; Arunachal Pradesh; Assam; Bihar; Goa; Karnataka; Kerala; Madhya Pradesh; Maharashtra;

Meghalaya; Nagaland; Orissa; Rajasthan; Tamil **Nadu**; Uttar Pradesh; West Bengal. Nepal and **Bangladesh.**

Remarks : Forest personel reported that this **species is present** in Aizawl and Lunglei districts.

Genus ***Capricornis*** Ogilby, 1837

The genus *Capricornis* is represented by one species in Mizoram.

63. ***Capricornis sumatraensis*** (Bechstein)

1799. *Antilope sumatraensis* Bechstein, *Übers. vierf. Thiere.*, **1** : 98 (Sumatra).

Common names : Serow (Eng.), Sathar (Mizo).

Material examined : Nil.

Measurements : Nil.

Diagnosis : Males 100–110 cm height at shoulders, with large head, thick neck; ears like those of donkeys. Coat coarse, grizzled black on the back, rusty red on shoulders, flanks and thigh; limbs chestnut above; dirty white below.

Distribution : India : Mizoram : Aizawl district; Arunachal Pradesh; Assam; Meghalaya; West Bengal. Nepal, Myanmar, Thailand, Indo-China, Malay States, Sumatra and Southern China.

Remarks : Present in Aizawl district of Mizoram but rare.

Order LAGOMORPHA

Two pairs of incisors in the upper jaw, placed one behind the other; cheek-teeth adapted for grinding fibrous food, and separated from incisors by a wide diastema. Tail very short or absent. Ears short or very long.

Only one family, namely, Leporidae, occurs in Mizoram.

Family LEORIDAE

Only one genus, namely, *Lepus* occurs in Mizoram.

Genus ***Lepus*** Linnaeus, 1758

One species of the genus *Lepus* occurs in Mizoram.

64. ***Lepus nigricollis*** Cuvier

1823. *Lepus nigricollis* F. Cuvier, *Diet. Sci. Nat.* **26** : 307 (Madras).

Common names : Black-naped Hare (Eng.), Sazupui (Mizo).

Material examined : Nil.

Measurements : Nil.

Diagnosis : Head and body 40–50 cm in length; ears longer than the tail, fur coarse, reddish-brown mixed with black above; throat, belly and under side of tail white; upper side of tail brown; a grey patch on the nape.

Distribution : India : Mizoram : Aizawl district; Assam; Madhya Pradesh; Meghalaya; Nagaland; Orissa; Rajasthan; Sikkim; Tripura; Uttar Pradesh; West Bengal. Nepal and Bangladesh.

Remarks : This species was seen at night in the Murlen National Park during survey trip there.

Order RODENTIA

Rodents are worldwide in distribution. They are characterised by the presence of a pair of chiselshaped incisors in each jaw and a distinct diastema between incisors and cheekteeth. In Mizoram they are represented by four families, namely, Sciuridae, Muridae, Rhizomyidae and Hystricidae.

Key to the families of the order RODENTIA

1. Fur modified into quills or long stiff hairs; Cheek teeth 4/4 in number..... HYSTRICIDAE
– Fur not modified into quills 2
2. Skull with distinct postorbital process; premolars two on each side in upper jaw, except in the genus *Ratufa*, only one in the lower ..... SCIURIDAE

- Skull with no postorbital process; premolars absent 3

3. Slender in form; tail long, scaly and clothed with short hairs ..... MURIDAE
- Form heavy, cylindrical, mole-like; tail short or rudimentary, almost naked and not scaly; limbs short ..... RHIZOMYIDAE

Family SCIURIDAE

Five genera of the family Sciuridae occur in Mizoram.

Key to the genera of the family SCIURIDAE

1. Flying membrane present on both sides of the body ..... ***Belomys***
- Flying membrane absent 2

2. Size large, over 280 mm in head and body length; maxillary teeth 4 in number ..... ***Ratufa***
- Size small, less than 280 mm in head and body length; maxillary teeth 5 in number 3

3. Dorsal surface of the body prominently striped, stripes more than one in number; median stripes of body black ..... ***Tamiops***
- Dorsal surface of body unstripe or with a faint black stripe 4

4. Length of nasal exceeds interorbital width of skull ..... ***Dremomys***
- Length of nasal does not exceed interorbital width of skull ..... ***Callosciurus***

Genus ***Belomys*** Thomas, 1905

One species of the genus *Belomys* occurs in Mizoram.

65. ***Belomys pearsoni trichotis*** Thomas

1908. *Belomys trichotis* Thomas, *Ann. Mat. Nat. Hist.*, **1** : 7 (Machi, Manipur, India).

Common names : Hairy-footed Flying Squirrel (Eng.), Vahluk (Mizo).

Material examined : Chimtuipui district : 1 ♂, Ngengpui (*c* 200 m), coll. T. P. Bhattacharyya, 12.iv.1995.

Measurements : External : 1 ♂ : H & B 205.0; *Tl* 165.0; Hf 33.0; E 24.0. Cranial : 1 ♂ : *on* 42.1; *cb* 39.9; *n* 13.7; *p* 20.8; *mtr* 9.0; *b* 8.7; *zw* 25.5; *iw* 7.2; *orb* 16.4; *ml* 24.5.

Diagnosis : Dorsal colour dark brown to reddish brown, grizzled, with profuse white tipped hairs; underside, including the chest, white; tuft of long hairs at base of each ear-conch; upper cheek-tooth row 9 mm or less.

Distribution : India : Mizoram : Chimtuipui district; Manipur. Myanmar, and erstwhile northern Indo-China.

Remarks : Reported for the first time from Mizoram (Mandal *et al.*, 1999).

Genus ***Callosciurus*** Gray, 1867

Two species and subspecies of the genus *Callosciurus* occur in Mizoram.

Key to the species amd subspecies of the genus *Callosciurus*

1. Frontal width usually approximates to one-third of the occipitonasal length or less ..... *C. pygerythrus janetta*
- Frontal width clearly more than one-third of the occipitonasal length ..... *C. erythraeus erythrogaster*

66. ***Callosciurus erythraeus erythrogaster*** (Blyth)

1842. *Sciurus erythrogaster* Blyth, *J. Asiat. Soc. Beng.*, **11** : 970 (Manipur).

Common names : Pallas's Squirrel (Eng.), Hlei Kap Sen (Mizo).

Material examined: Lunglei district: 1 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 20.iv.1995.

Measurements : External : 1 ♂ : H & B 247.0; *Tl* 225.0; Hf 53.0; E 18.0. Cranial : 1 ♂ : *on* 50.5; *cb* 50.1; *n* 17.2; *p* 26.4; *iw* 18.8; *mtr* 11.0; *b* 11.0; *orb* 16.9; *ml* 30.7.

Diagnosis : Dorsal surface of body unstriped or with a faint black stripe. Frontal width clearly more than one-third of the occipitonasal length.

Distribution : India : Mizoram : Lunglei district; Assam; Manipur; Meghalaya; Nagaland. Also from Bangladesh & Myanmar.

Remarks : Reported for the first time from Mizoram (Mandal *et al.*, 2000).

67. *Callosciurus pygerythrus janetta* (Thomas)

1914. *Sciurus pygerythrus janetta* Thomas, *J. Bombay nat. Hist. Soc.*, **23** : 203 (Mandalay, 200 ft., Myanmar).

Common names : Irrawaddy Squirrel (Eng.), Hlei Kap Sen (Mizo).

Material examined : Lunglei district : 1 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 22.iv.1995.

Measurements : External : 1 ♂ : H & B 140.0; *Tl* 113.0; Hf 43.0; E 17.5. Cranial : 1 ♂ : *on* 41.5; *cb* 35.7; *n* 11.5; *p* 20.0; *mtr* 8.2; *b* 7.9; *iw* 12.5; *orb* 13.2; *ml* 24.0.

Diagnosis : Underparts tend to be paler, more whitish and the feet are as a rule paler.

Distribution : India : Mizoram : Lunglei district, Chimtuipui district. Myanmar.

Remarks : Reported for the first time from Mizoram (Mandal *et al.*, 2000).

This species was seen during our survey trip at Ngengpui, Chimtuipui district.

Genus *Tamiops* J. Allen, 1906

One species of the genus *Tamiops* occurs in Mizoram which is represented by nominate subspecies.

68. *Tamiops maccelellandi maccelellandi* (Horsfield)

1839. *Sciurus macclellandi* Horsfield, *Proc. zool. Soc. Long.* : 152 (Assam, India).

Common names : Himalayan Striped Squirrel (Eng.), Hlei Mual Rang (Mizo).

Material examined : Lunglei district : 1 ♂, Sairep (*c* 1500 m), coll. T. P. Bhattacharyya, 20.iv.1995.

Measurements : External : 1 ♀ : H & B 121.0; *Tl* 99.0; Hf 25.5; E 12.0. Cranial : 1 ♀ : *on* 32.1; *cl* 28.4; *n* 9.5; *p* 14.5; *mtr* 5.5; *b* 5.9; *zw* 20.0; *iw* 11.7; *orb* 10.0; *ml* 17.7.

Diagnosis : Dorsal surface of body varies from greyish to brownish and striped, median stripe being black; ventral surface greyish white; ear tufts black, with conspicuous white tip.

Distribution : India : Mizoram : Lunglei district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; Sikkim; West Bengal. Also in Bhutan, Myanmar, Nepal.

Remarks : Reported for the first time from Mizoram (Mandal *et al.*, 2000).

Genus *Dremomys* Heude, 1898

One species of the genus *Dremomys* occurs in Mizoram.

69. *Dremomys lokriah* (Hodgson)

1836. *Sciurus lokriah* Hodgson, *J. Asiat. Soc. Beng.*, **5** : 232.

Common names : The Orange-bellied Himalayan Squirrel (Eng.), Hleikapsen (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Much paler and more yellowish ventral pelage color. Lacking black middorsal stripe on the back and also the anal colour patch. Dorsally, from rostrum to tail, pelage about brownish olive. Dorsal tail hairs with two black bands, ventral ones with three.

Distribution : India : Mizoram : Chimtuipui district (Sankar Raman *et al.*, 1995); Assam; Manipur; Meghalaya; Nagaland. Myanmar.

Genus *Ratufa* Gray, 1867

One species and subspecies of the genus *Ratufa* occur in Mizoram.

70. *Ratufa bicolor gigantea* (M'Clelland)

1839. *Sciurus giganteus* M'Clelland, *Proc. zool. Soc. Lond.* : 150 (Assam, India).

Common names : Malayan Giant Squirrel (Eng.), Awrrang (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : A large-sized diurnal squirrel; dorsal colour varies from brown to black; venter buff.

Distribution : India : Mizoram : Aizawl district (Sankar Raman *et al.*, 1995); Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland; Sikkim; Tripura; West Bengal. Also Bhutan, Myanmar and China.

Family HYSTRICIDAE

Fur more or less modified into long spines or quills; angular portion of mandible arises from the bony socket of lower incisor.

Two genera, namely, *Hystrix* and *Atherurus* occur in India, of which only the former genus is known to occur in Mizoram.

Genus ***Hystrix*** Linnaeus, 1758

One species and subspecies of the genus *Hystrix* occurs in Mizoram.

71. ***Hystrix brachyura subcristata*** Swinhoe

1870. *Hystrix subcristata* Swinhoe, *Proc. zool. Soc. Lond.*, 638 (Foochow, Fukien, southeastern China).

Common names : Crestless Himalayan Porcupine or Chinese Porcupine (Eng.), Sakuh (Mizo).

Material examined : Aizawl district : One skull (without lower jaw), 5 km N of Khawbung, coll. S. S. Saha, 17.xii.1993. No specimen, only skull without lower jaw.

Measurements : Cranial : *on* 126.6; *cb* 123.7; *n* 68.0; *p* 65.0; *mtr* 25.8; *b* 17.3; *apf* 5.5; *zw* 66.8; *iw* 43.7; *d* 35.0.

Diagnosis : Anterior end of body covered with flat flexible spines and posterior with quills. Quills bearing only one brown ring, rest white. Crest on crown very small but distinct; size large, occipitonasal length more than 125 mm.

Distribution : India : Mizoram : Aizawl district; Manipur; Nagaland. Myanmar, Thailand, erstwhile Indo-China and China.

Remarks : Reported for the first time from Mizoram (Mandal *et al.*, 2000).

This species was encountered on the road during our journey at night by Jeep from Saipum to Bilkhawthlir, Aizawl district.

Family RHIZOMYIDAE*

This family is represented by two genera in India and both of them occur in Mizoram. Both of the genera, *Rhizomys* and *Cannomys*, are adapted to subterranean mode of life. They have large prodont incisors, small eyes and ears, short limbs armed with strong claws.

Key to the genera of the family RHIZOMYIDAE

- Size large, condylobasal length of skull is not less than 57.0 mm; sole of feet granulated; mammae 10; M_1 is larger than M_2 ..... ***Rhizomys***
- Size small, condylobasal length of skull is less than 55.0; sole of feet not granulated; mammae 8; M_1 is often smaller than M_2 ..... ***Cannomys***

Genus ***Rhizomys*** Gray, 1831

One species of the genus *Rhizomys* occurs in Mizoram.

72. ***Rhizomys pruinosus pruinosus*** Blyth

1851. *Rhizomys pruinosus* Blyth, *J. Asiat. Soc. Beng.*, **20** : 519 (Cherrapunji, Meghalaya, India).

Common names : Hoary Bamboo Rat (Eng.), Zubui (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Much larger than any other rodent, head and body length 20 to 30 cm or more; colour

*Wilson and Reeder (1993) treated this Family Rhizomyidae as Subfamily Rhizomyinae under Family Muridae.

dark brown, grizzled; tail about 10 cm or so; palatal length 32.2 mm.

Distribution : India : Mizoram : Aizawl district; Assam; Manipur; Meghalaya; Nagaland. Myanmar, Thailand, erstwhile Indo-China and China.

Remarks : During our survey trip at Teirei (Dampa) (*c* 250 m) in Aizawl district, we heard from the Forest Department personel that this large-sized Bamboo Rat is available there.

Genus ***Cannomys*** Thomas, 1915

One species of the genus *Cannomys* occurs in Mizoram.

73. ***Cannomys badius badius*** (Hodgson)

1841. *Rhizomys badius* Hodgson, *Calcutta J. Nat. Hist.*, **2**: 410 (Nepal).

Common names : Bay Bamboo Rat (Eng.), Zubui (Mizo).

Material examined : Aizawl district : 1 ♂, 1 ♀, Teirei (*c* 250 m), Dampa, coll. A. K. Mandal, 27, 28.xii.1993.

Measurements : External : 1 ♂, 1 ♀ : H & B 199.0, 181.0; *Tl* 75.0, 64.0; Hf 32.0, 30.0; E 9.0, 10.0. Cranial : 1 ♂, 1 ♀ : *on* 41.5, 38.3; *cb* 47.2, 42.0; *n* 16.4, 14.5; *pl* 29.2, 25.7; *mtr* 9.9, 8.8; *b* 10.2, 8.5; *apf* 3.8, 3.5; *zw* 32.8, 30.0; *d* 17.5, 15.5; *ml* 33.7, 28.0.

Diagnosis : Smaller then *Rhizomys*; head and body 19 to 20 cm; colour chestnut bay or ashy brown, not grizzled; tail about 7 cm or so.

Distribution : India : Mizoram : Aizawl district; Arunachal Pradesh; Assam; Manipur; Meghalaya; Nagaland. Nepal, Bhutan, Bangladesh, Myanmar, China, Thailand, Combodia.

Remarks : Reported for the first time from Mizoram (Mandal *et al.*, 1994).

Family MURIDAE

In Mizoram, the family Muridae is represented by five genera.

Key to the genera of the family MURIDAE

1. Hallux opposable; hallux and fifth toe having a flat nail ..... ***Vandeleuria***
– Hallux not opposable; hallus and fifth toe provided with a claw 2
2. Condylobasal length exceeds or equal to occipitenasal length; anterior palatal foramina more than 7 mm in length ..... ***Bandicota***
– Condylobasal length less than occipitonasal length; anterior palatal foramina less than 7 mm 3
3. First upper molar more than half the length of cheektooth row, and is antero-internal cusp distorted inwards to reach the level of second lamina; third molar extremely reduced .... ***Mus***
– First upper molar less than half the length of cheektooth row, and its antero-internal cusp not distorted inwards to reach the second lamina; third molar not so reduced 4
4. Palate short, less than one-half of occipitonasal length; anterior palatal foramina less than one-fifth of occipitonasal length ..... ***Niviventer***
– Palate long, more than one-half of occipitonasal length ..... ***Rattus***

Genus ***Vandeleuria*** Gray, 1842

One species of the genus *Vandeleuria* occurs in Mizoram.

74. ***Vandeleuria oleracea dumeticola*** (Hodgson)

1845. *Mus dumeticola* Hodgson, *Ann. Mag. Nat. Hist.*, **15**: 268 (Nepal).

Common name : Indian Long-tailed Tree Mouse (Eng.).

Material examined : Nil.

Measurements : None.

Diagnosis : Occipitonasal length less than 23.0 mm; tail more than 150% of head and body length; colour bright red on back, white ventrally.

Distribution : India : Mizoram : Aizawl and lunglei districts (Chauhan and Saxena 1982);

Arunachal Pradesh; Assam; Bihar; Manipur; Meghalaya; Nagaland; Orissa; Sikkim; Uttar Pradesh; West Bengal. Nepal and Myanmar.

Genus ***Rattus*** Fischer, 1803

Three species of the genus *Rattus* occurs in Mizoram.

Key to the species of the genus *Rattus*

1. Tail unicolour 2
- Tail bicolour ..... *R. mackenziei*
2. Nasal long, usually exceeding 38% of occipitonasal length ..... *R. nitidus*
- Nasal short, usually less than 38% of occipitonasal length ..... *R. rattus*

Rattus rattus (Linnaeus, 1758)

Rattus rattus is represented in Mizoram by three subspecies.

Key to the subspecies of *Rattus rattus*

1. Tail length short, being 100% of head and body length ..... *R. r. bullocki*
- Tail length large, being more than 100% of head and body length 2
2. Tail usually less than 120% of head and body length ..... *R. r. khyensis*
- Tail usually exceeds 120% of head and body length ..... *R. r. brunneusculus*

75. ***Rattus rattus brunneusculus*** (Hodgson)

1845. *Mus brunneusculus* Hodgson, *Ann. Mag. Nat. Hist.*, **15** : 276 (Nepal).

Common name : House Rat (Eng.), Sazu (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Size smaller; head and body length below 160 mm; tail larger, being 123-131% of head and body length.

Distribution : India : Mizoram : Aizawl and Lunglei districts (Chauhan and Saxena, 1982); Arunachal Pradesh; Assam; Jammu & Kashmir (Chakraborty, 1983); Manipur; Meghalaya; Nagaland; Sikkim; West Bengal. Also Nepal and Bhutan.

76. ***Rattus rattus bullocki*** Roonwal

1948. *Rattus rattus bullocki* Roonwal, *Proc. nation. Inst. Sci. India*, **14** : 385 [*c* 16 miles north of Imphal on Dimapur Road (*c* 1070 m), Manipur].

Common name : The common Manipur White-bellied Rat (Eng.), Sazu (Mizo).

Material examined : Aizawl district : 1 ♂, 3 ♀, North Khawbung (*c* 1500 m), 15-19.xii.1993; 3 ♂, 1 ♀, Teirei (Dampa) (*c* 250 m), 26, 27.xii.1993; 1 ♀, Bilkhawthlir (*c* 500 m), 3.i.1994; coll. A.K. Mandal. 1 ♂, Tuijual Duty Post 1 (*c* 850 m), Murlen National Park, coll. S. S. Saha, 18.xii.1993. Chimtuipui district : Ngengpui (*c* 200 m), coll. T.P. Bhattacharyya, iv. 1995. Lunglei district : 1 ♂, 2 ♀, Sairep (*c* 1500 m), 12-17.i.1997; 1 ♂, Lungsen (*c* 650 m), 26.i.1997; coll. T. P. Bhattacharyya.

Measurements : External : 2 ♂ : H & B 150.0, 197; *Tl* 160.0, 203.0; Hf 32.0, 33.5; E 22.5, 24.0. 2 ♀ : H & B 161.0, 165.0; *Tl* 181.0, 198.0; Hf 32.0, 31.5; E 21.2, 22.7. Cranial : 2 ♂, : *on* 38.9, 44.7; *cb* 37.3, 43.7; *n* 14.4, 17.1; *pl* 21.0, 25.6; *mtr* 6.7, 6.8; *bl* 6.8, 7.1; *apf* 6.7, 8.2; *zw* 18.1, 21.9; *d* 8.8, 12.8; *ml* 21.1, 25.0. 2 ♀ : *on* 40.2, 39.3; *cb* 39.0, 37.8; *n* 15.0, 14.4; *pl* 21.8, 21.5; *mtr* 6.8, 7.0; *b* 7.0, 6.8; *apf* 6.7, 6.9; *zw* 20.2, 19.3; *d* 11.2, 10.3; *ml* 21.8, 21.7.

Diagnosis : Dorsal colour of body dark grey to ochraceous tawny, ground colour more grey than tawny; ventral colour pure to ivory white, with hoary buff or pale yellow streaks or patches.

Distribution : India : Mizoram : Aizawl district, Chimtuipui district, Lunglei district; Manipur (Roonwal, 1950).

77. ***Rattus rattus khyensis*** Hinton

1919. *Rattus rattus khyensis* Hinton, *J. Bombay nat. Hist. Soc.*, **26** : 398 (40 km W of Kindat, *c* 182 m, Chiu Hills, western Burma).

Common name : House Rat (Eng.), Sazu (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Underparts of body white or dirty white. Maxillary tooth row usually more than 6.6 mm in length or more than 16% of occipitonasal length. Tail usually less than 120% of head and body length.

Distribution : India : Mizoram : Aizawl district (Ghose 1965); West Bengal. Myanmar.

Remarks : Ghose (1965) described *R. r. khyensis* for the first time from Mizoram in India. But his identification was based only on the external measurements and colouration of subadult specimens.

78. *Rattus mackenziei* (Thomas)

1916. *Epimys mackenziei* Thomas, *J. Bombay nat. Hist. Soc.*, **24** : 410 (Haingyan, 50 miles W of Kindat, Chin Hills, Myanmar).

Common name : Mackenziei's Rat (Eng.), Sazu (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : A giant size rat, hind foot about 50 mm in length; opisthodont incisors; small bullae; 3 + 2 mammae.

Distribution : India : Mizoram : Aizawl and Lunglei districts (Chauhan and Saxena 1982); Assam; Manipur, Meghalaya; Nagaland. Myanmar.

Remarks : Agrawal (2000) mentioned this species under genus *Berylmys* Thomas. Ellerman (1961) mentioned it under genus *Rattus* and subgenus *Berymys* which has been followed here.

The species *R. nitidus* is represented in Mizoram by a subspecies.

79. *Rattus nitidus obsoletus* Hinton

1919. *Rattus nitidus obsoletus* Hinton, *J. Bombay nat. Hist. Soc.*, **26** : 415 (50 miles W of Kindat, alt. 1524 m, Chin Hills, Myanmar).

Common names : Himalayan Rat (Eng.), Sazu (Mizo).

Material examined : Aizawl district : 2 ♂, Aizawl Circuit House, coll. A. K. Mandal, 8.xii.1993. Chimtuipui district : 1 ♂ : Ngengpui (*c* 200 m), coll. T.P. Bhattacharyya, 12.iv.1995. Lunglei district : 1 ♂ : 3 km SW of Zobawk, coll. T.P. Bhattacharyya, 20.i.1997.

Measurements : External : 2 ♂ : H & B 150.0, 178.0; *Tl* 120.0, 65.0; Hf 31.5, 35.0; E 19.0, 19.0. Cranial : 2 ♂ : *on* 39.2, 42.5; *cb* 36.4, 40.2; *n* 16.0, 17.0; *pl* 21.1, 23.3; *mtr* 6.5, 6.8; *b* 5.8, 6.6; *apf* 6.5, 7.6; *zw* 18.0, 18.7; *d* 20.0, 12.0; *ml* 10.0, 21.4.

Diagnosis : Harsher-furred rat; tail subequal to head and body.

Distribution : India : Mizoram : Aizawl district, Chimtuipui district, Lunglei district; Manipur (Roonwal 1950). Myanmar.

Remarks : Agrawal (2000) has merged *obsoletus* with *nitidus*. But in the above two adult male specimens from Aizawl, the tail is smaller than head and body and the undersurface is grey with rusty tinge which are the characteristics of *obsoletus*.

It was reported for the first time from Mizoram (Mandal *et al.*, 2000).

Genus *Niviventer* Marshall, 1976

One species of the genus *Niviventer* occurs in Mizoram.

80. *Niviventer niviventer mentosus* (Thomas)

1916. *Rattus mentosus* Thomas, *J. Bombay nat. Hist. Soc.*, **24** : 643 (Hkamti, c 152 m, Upper Chindwin, Myanmar).

Common names : White-bellied Rat (Eng.), Sazu (Mizo).

Material examined : Chimtuipui district : 2 ♂, 1 ♀ Ngengpui (*c* 200 m), coll. T. P. Bhattacharyya, 8-11.iv.1995.

Measurements : External : 1 ♂, 1 ♀ : H & B 155.0, 148.0; *Tl* 195.0, 169.0; Hf 32.0, 28.5; E 22.0, 21.5. Cranial : 1 ♂, 1 ♀ : *on* 44.5, 39.2; *cb* 37.7, 36.8;

n 15.9, 15.5; *pl* 19.9, 19.0; *mtr* 6.0, 5.8; *b* 5.0, 5.1; *apf* 7.0, 6.6; *zw* 17.3, 17.4; *d* 10.7, 10.2; *ml* 20.5, 17.7.

Diagnosis : Larger race; occipitonasal length varying between 35.3 and 42.5 mm; bullae most often below 13% of occipitonasal length.

Distribution : India : Mizoram : Chimtuipui district; Assam; Arunachal Pradesh; Manipur (Roonwal 1950); Meghalaya. Myanmar.

Remarks : Reported from the first time from Mizoram (Mandal *et al.*, 2000).

The genus *Niviventer* was mentioned by Marshall in 1976 by excluding some species from subgenus *Maxomys* of the genus *Rattus*, which has been followed here.

Genus ***Mus*** Linnaeus, 1775

Two species of the genus *Mus* occur in Mizoram.

Key to the species of the genus *Mus*

1. Tail unicoloured and longer than head and body ..... *Mus musculus*

– Tail bicoloured (pale below) and equal to or larger than head and body ..... *Mus pahari*

81. ***Mus musculus*** Linnaeus

1758. *Mus musculus* Linnaeus, *Syst. Nat.*, 10th ed., **1** : 62 (Upsala Sweden).

Common names : House Mouse (Eng.), Chaichim (Mizo).

Material examined : Nil.

Measurements : None.

Diagnosis : Tail unicoloured and longer than head and body. Underparts dark, brown or dull.

Distribution : India : Mizoram : Aizawl and Lunglei districts (Chauhan and Saxena 1982); Andhra Pradesh; Assam; Bihar; Delhi; Gujarat; Jammu & Kashmir; Karnataka; Kerala; Manipur; Meghalaya; Nagaland; Orissa; West Bengal. Africa, China, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand.

The species *Mus pahari* is represented in Mizoram by the nominate subspecies.

82. ***Mus pahari pahari*** Thomas

1916. *Mus pahari* Thomas, *J. Bombay nat. Hist. Soc.*, **24** : 415 (Batasia, Sikkim, 6000 ft., India).

Common names : Sikkim Mouse (Eng.), Chaichim (Mizo).

Material examined : Aizawl district : 1♂, Tuikual Duty Post (*c* 850 m), c 10 km N of North Khawbung, coll. S. S. Saha, 17.xii.1993. Lunglei district : 1♂, 3♀ : Sairep (*c* 1500 m), 15,16.i.1997; 1♀, Lungsen (*c* 650 m), 22.i.1997, coll. T. P. Bhattacharya.

Measurements : External : 2♂ : H & B 102.0, 89.0; *Tl* 92.0, 88.0; Hf 20.0, 20.0; E 15.0, 15.0. 2♀ : H & B 93.0; 94.0; *Tl* 92.0; 101.0; Hf 19.0, 20.0; E 15.0, 15.5. Cranial : 2♂ : *on* 26.0, 25.4; *cb* 24.3, 24.1; *n* 10.0, 9.4; *p* 13.4, 12.9; *mtr* 4.1, 4.1; *b* 3.8, 4.0; *apf* 4.9, 4.7; *zw* 13.3, 11.9; *d* 7.5, 7.2; *ml* 14.6, 14.1. 2♀ : *on* 25.8, 25.9; *cb* 24.8, 24.5; *n* 10.0, 10.0; *pl* 13.2, 12.5; *mtr* 4.4, 3.6; *bl* 3.9, 4.0; *apf* 5.1, 4.9; *zw* 12.5, 12.3; *d* 7.2, 7.0; *ml* 14.3, 13.7.

Diagnosis : The head and body length not generally reaching 105 mm. Tail most often is longer than the head and body and it usually dark above, pale below.

Distribution : India : Mizoram : Aizawl district, Chimtuipui district; Assam; Meghalaya; Nagaland; Sikkim; West Bengal. Myanmar.

Remarks : Recorded for the first time form Mizoram (Mandal *et al.*, 2000).

Genus ***Bandicota*** Gray, 1873

Two species of the genus *Bandicota* occur in Mizoram.

Key to the species of the genus *Bandicota*

– Size large, head and body length more than 220 mm; anterior palatal foramina equally broad at both ends; nasals more than one third of occipitonasal length ..... *B. indica*

– **Size small**, head and body length less than **220 mm**; anterior palatal foramina narrower **posteriorly**; nasals short, less than one-third of **occipitonasal** length ..... *B. bengalensis*

The species *B. bengalensis* is represented in Mizoram by the nominate subspecies.

83. *Bandicota bengalensis bengalensis* (Gray)

1835. *Arvicola bengalensis* Gray, *Illustr. Ind. Zool.*, **2** : pl. 21 (Bengal).

Common names : Lesser Bandicoot Rat (Eng.).

Material examined : Nil.

Measurements : None.

Diagnosis : As given in the key above.

Distribution : India : Mizoram : Aizawl and Lunglei district (Chauhan and Saxena 1982); throughout India. Bhutan, Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka.

Remarks : Most predominant rodent species. Found in the fields as well as godowns, causing considerable damage to grains. Breeds throughout the year.

The species *B. indica* is represented in Mizoram by a subspecies.

84. *Bandicota indica nemorivaga* (Hodgson)

1836. *Mus* (*Rattus*) *nemorivagus* Hodgson, *J. Asiat. Soc. Beng.*, **5** : 234 (Nepal).

Common names : Large Bandicoot Rat (Eng.).

Material examined : Nil.

Measurements : None.

Diagnosis : As given in the key.

Distribution : India : Mizoram : Aizawl and Lunglei districts (Chauhan and Saxena 1982); Assam; Bihar; Manipur; Meghalaya; Sikkim; West Bengal. Also found in Bangladesh, Formosa, Nepal and Thailand.

Remarks : Specimens were seen at Dampa Wildlife Sanctuary during our recent survey trip.

SUMMARY

An account of the mammalian fauna of Mizoram, based mainly on the old and recent collections present in the Zoological Survey of India as well as those recorded in the literature, has been provided. Altogether 84 species and subspecies belonging to 61 genera, 25 families and 10 orders have been reported.

Keys and diagnostic characters for identification of all the species and subspecies have been given.

Detailed district-wise distribution in Mizoram, along with distributional range in India and outside for each described form have also been included.

Anourosorex squamipes squamipes, Rousettus leschenaulti leschenaulti, Cynopterus brachyotis, Megaerops niphanae, Sphaerias blanfordi, Eonycteris spelaea, Macroglossus sobrinus sobrinus, Rhinolophus lepidus lepidus, Rhinolophus pearsoni, Rhinolophus rouxi rouxi, Hipposideros lankadiva, Hipposideros cineraceus, Myotis formosus formosus, Myotis montivagus montivagus, Myotis muricola, Eptesicus pachyotis, Pipistrellus circumdatus, Scotozous dormeri, Murina tubinaris, Murina cyclotis cyclotis, Tylonycteris pachypus fulvida, Barbastella leucomelas darjelingensis, Harpiocephalus mordax, Harpida grisea, Belomys pearsoni trichotis, Callosciurus erythraeus erythrogaster, Callosciurus pygerythrus janetta, Tamiops macclellandi macclellandi, Hystrix brachyura subcristata, Cannomys badius badius, Niviventer niviventer mentosus, Rattus nitidus obsoletus, Mus pahari have been reported for the first time from Mizoram. Taxonomic comments and other remarks on some of the described species have been given.

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ANIMAL FOSSILS

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INTRODUCTION

Formerly called MIZO District under the State of Assam, Mizoram is among the young States of India having atttained Statehood in 1987, after being a Union territory since 1972. It is situated in the eastern frontier region of India. Topographically, Mizoram has mostly hilly and precipitous terrain with deep gorges in between. Geomorphologically the area represents transition from first order topography prevailing to its west and complete morphogenic inversion occurring to its east. A number of fossil beds are exposed along the length and breadth of the territory. The exploration and updating of records of animal fossils from the area were a part of the programme of preparation of an exhaustive faunal atlas of the State by the ZSI.

PHYSIOGRAPHIC SETTING

Situation and greater surroundings

Mizoram is situated in the northeastern corner of the country between 20°20′ to 24°27′ N latitudes and 92°20′ to 93°29′ E longitude and covers an area of about 21,087 sq. km. The State has international borders on three sides : Myanmar in the east and south and Bangladesh in the west. The north-east, north and north-west sides are bounded by the Indian States of Manipur, Assam and Tripura respectively.

Topographic characteristics

The Mizo hills forming part of the Naga-Arakan Yoma represents the eastern extremity of the tectonic domain of Surma Valley. The region was a part of the Tethys Sea in the Archaean period. During the Palaeozoic and much of the Mesozoic eras the sea continued to receive sedimentary deposits in the form of conglomerates, shales, sandstones and limestones eroded from the Archaean rocks. The successive periods witnessed repeated orogenic movements accompanied by extensive igneous intrusions. A final orogenic phase in the early Pleistocene age raised the upland to its present status. At places, folding has been so intense that the rock beds stand up vertically resulting in virtually bare hill slopes. The region is still very much unstable and falls into an important seismic zone of the world. The regional trend of the ridges is north-south. The synclinal valley steadily becomes narrower towards east and around central part of the State the structural identity of individual ridges are often insignificant. The average altitude of the hill ranges is about 900 metres. The eastern and southern regions are higher compared to the western and northern regions. The highest peak is 'Phawngpui' or Blue Mountain in the south which is 2157 metres high and the lowest place is Bairabi in the north which is 40 metres above msl.

Natural drainage

The typical topography of Mizoram is traversed by numerous streams and rivers. In consonance with the trend of ranges and spurs, the courses of water bodies are generally aligned in a north-south direction. The most typical and undisturbed pattern of parallel drainage may be observed in the State

of Mizoram. The rivers have cut the hill ranges at points almost at right angles resulting into barbed patterns. The important rivers are Tuk, Tlawng, Turial, Tuichang, Mengpui, Chhimtuipui etc.

Climatic condition :

The region enjoys a typical monsoonal climate with variants ranging from tropical to temperate conditions. The rapid changes in topography result in climatic changes within short distance. The foot hill plains, sheltered valleys and the ranges are marked with climatic contrasts. The climate exhibits a strong seasonal rhythm, the year being divided into four characteristic seasons : (I) Winter (December to February), (ii) Premonsoon (March to April), (iii)Monsoon (May to September) and (iv) Retreating monsoon (October and November).

GEOLOGY AND STRATIGRAPHY

Geology of Mizoram, especially of its eastern part was described by different workers who mapped out a few isolated portions of the area. Nandy *et al.*, (1972) identified the undifferentiated Palaeogene Barail group of rocks from eastern Mizoram while Ganju (1975) and Ganguly (1975) did not recognise Barail and even lower Bhuban rocks in the area.

A two-fold lithostratigraphic classification was presented for northern Mizoram by Sundara Moorthy *et al.*, (1987) and Jaggi *et al.*, (1987) based mainly on the proportions of argillaceous and arenaceous components of the lithological assemblages. The other parameters were nature/ composition of sandstones (quartzitic, arkosic, felspathic etc.), bedding characters, degree of cementation/induration, colour and type of weathering.

In recent years the Geological Survey of India undertook geological mapping of the hitherto unmapped terrain of Mizoram, and lithostratigraphy and structure of the area were worked out. Bhasker *et al.*, (1990), Purushothaman and Vidyasagar (1990) and Koshy John *et al.*, (1990) prepared geological maps of the unmapped terrain of Aizawl, Lunglei and Chhimtuipui Districts respectively. The following District-wise account is drawn mainly from the above works.

A. Aizawl District : The area exposes a sequence of interbedded and interlaminated shale and sandstone, with minor amount of siltstone and conglomerate belonging to Middle and Upper Bhuban Formations. This sequence is overlain by soft sandstone and shale of Bokabil Formation. Lithostratigraphic succession of rocks of the area is presented in Table-1.

The Middle Bhuban Formation comprises a thick pile of greenish yellow to dark grey shales interlaminated with siltstone and fine grained well bedded sandstone. At places coal streaks, vegetal imprints as well as fossil impressions of bivalves are found. The Upper Bhuban Formation consists mainly of thick, well bedded massive or flaggy sandstones with interlaminations of shales. The Bokabil sandstone beds show considerable variations in thickness ranging from 3 m. to 10 m. The sandstone is massive, thickly bedded, and cross bedded at places. It is less compact, soft, friable yellowish brown to grey in colour. Fossil wood fragments and impressions are found in places. Prominent conglomerate beds showing NNE-SSW direction are traced between the Middle and Upper Bhubans in certain zones. The rocks are compact and are dark grey to dark brown in colour. The pebble-matrix ratio is usually 4:1. The Middle Bhuban Formation occupies the core of the low plunging anticlines and is flanked by moderate to steeply dipping Upper Bhuban Formation. It is followed conformably by low dipping Bokabil rocks which occupy the synclinal parts of the regional asymmetric folds. The axial planes of the folds are subvertical to vertical with very low southerly plunge. Several mesoscopic folds including drag folds and chevron, disharmonic folds are particularly developed along the axial zone of regional anticline. A few transverse and longitudinal faults are present in certain areas.

Table-1. Lithostratigraphic succession of rocks in parts of Aizawl District (after Bhasker *et al.*, 1990).

SURMA GROUP	**Bokabil Formation**	Soft sandy shale massive sandstone and interlaminated shale and siltstone. Large scale current bedding, longitudinal ripples, Varve, flaser bedding and animal burrows are characteristics sedimentary structures.
	Transitional contact	
	Upper Bhuban Formation	Well bedded sandstone, shale interlaminations and interbeds of massive sandstone. Intraformation breccia, clay balls, coal streaks and leaf of vegatal imprints. Flaser bedding, current bedding, longitudinal linguiode marks, lenticular bedding, current and convolute laminations, parting lineations, flam structures, tool marks, load cast, burrows (rarely sinuous burrows) etc., are characteristic sedimentary structures.
	Chert-pebble conglomerate (Disconformity?)	
	Middle Bhuban Formation	Interlaminated thick shale and siltstone and well bedded sandstone; at places fossiliferous with coal streaks, vegetal and shell impressions. Concretions, boxwork marks, dessication cracks, worm track and trails, rain prints, ripple marks (mainly linguoid type), bounce marks, sour and fill, flute, skip and roll marks, chevron marks, synereous cracks and vertical burrows are characteristic sedimentry structures.
	Base not exposed	

The primary sedimentary structures associated with the Bhuban reflect intertidal to tidal flat palaeoenvironment of deposition; lesser transport with constant fluctuations in the energy conditions are evident from the occurrence of herringbone current laminations in siltstone, shale and sandstone sequence. Worm burrow tracks indicate calm and slow sedimentation towards the beginning of Middlde Bhuban sedimentation. Occurrence of rain prints, foam marks, dessication cracks indicate subaerial exposure of sediments druing later stage of Middle Bhuban sedimentation. The nature of chert conglomerate reflects marine regression followed by a fluvial influx of sediments in the early stage of Upper Bhuban Formation. The presence of leaf impression, carbonised vegetal matters and stringers of coal at several places indicate derivation of sediments from nearby land.

B. Lunglei District : Based on the predominance of argillaceous and arenaceous components the rocks of the area have been grouped into Middle and Upper Bhuban Formations of the Surma Group. Lithostratigraphic succession of rocks is presented in Table-2.

The Middle Bhuban Formation comprises mainly argillaceous sediments like shale, siltstone etc. with lesser amount of sandstone. They form a generally subdued topography with occasional steep slopes formed by the sandstone interbeds. The shales are grey to dark grey in colour but on weathering become brownish or khaki. Splintery nature and thin banding give them a characteristic look on weathering. The siltstone is yellowish white or flesh red in colour and is massive in nature. It occurs as thin beds within the shales but banding within the silty bands is poor. The siltstone is well exposed near Pukpui and Vanhne

Table-2. Lithostratigraphic succession of rocks in parts of Lunglei District (after Purushothaman and Vidyasagar, 1990).

SURMA GROUP	**Upper Bhuban Formation**	Predominantly an arenaceous unit comprising grey to dark grey, yellow medium grained, thick bedded massive sand stone, with subordinate amount of thin bedded/ splintery shale, siltstone and sandy shale. Well-preserved lamellibranchs occasionally present.
	Gradational contact	
	Middle Bhuban Formation	Predominantly argillaceous unit comprising grey to dark grey or khaki coloured splintery shale with yellowish white or flesh red, crudely bedded siltstone and thick bedded sandy shale, sandstone, occasionally ferruginous.

villages. The sandy shale occurring as bands, up to 5 metre, is an intermixture of fine grained sandstone and shale.

The Upper Bhuban Formation, which gradationally overlies the Middle Bhuban rocks, constitutes an arenaceous dominant unit. It contains sandstones with lesser amount of shale, siltstone and sandy shales. The sandstones being hard and more resistant to weathering, stands out more prominently and form the ridge tops.The sandstone is grey to dark grey, massive and generally medium grained. It is well exposed along the old Lunglei-Aizwal Road. The argillaceous rocks include shale, siltstone and sandy shale.

The sediments of the middle and Upper Bhuban Formations display a variety of primary structures like bedding, ripple marks, micro cross bedding and sandstone pillows; worm burrows and trails of biogenic origin are also common. The secondary structures include roughly N-S trending longitudinal folds, transverse faults and bedding joints. Composition, sedimentary structures and fossil content of the Formations suggest their deposition in miogeosynclinal basin.

C. Chhimtuipui District : Sharp, rugged hills and narrow V-shaped valleys, covered with lush green vegetation are the first order geomorphological features of this young terrain. Geologically the area forms a part of the Tripura-Mizoram mio-geosynclinal basin which constitutes a part of the broad Surma basin where rocks belonging to Middle and Upper Bhuban Formations are exposed. Much of the area is occupied by the Upper Bhuban Formation, and the remaining part exposed the underlying Middle Bhuban Formation. The contact between the two Formations is gradational. Lithostratigraphic succesion of rocks in the area is presented in Table-3.

Exposures of Middle Bhuban Formation which dominantly comprise softer argillites have very limited aerial extent. Thick soil cover and subdued topography are usual surface expression of the Middle Bhuban rocks. Khaki and buff coloured silstone and dull brown mudstone constitute the major rock types of this Formation.

The Upper Bhuban Formation as a whole is arenite dominant. The ratio of sandstone, siltstone, shale bands in the lower part of this Formation is about 40:40:20, and towards top the number of sandstone bands gradually increases. In the upper part, this Formation consists of sandstone bands varying in thickness from a few centimetre to as much as 12 metre, interbedded with thin bands of shale and siltstone. The Upper Bhuban sandstone is medium to fine grained, light grey, greenish grey or light pink to red in colour. It is moderately hard and compact and in general, thickly bedded. Some of the hard sandstone bands are calcareous.

Table-3. Lithostratigraphic succession of rocks in parts of Chhimtuipui District (after Koshy John *et al.*, 1990)

SURMA GROUP	BHUBAN SUBGROUP	**Soil alluvium**	
		Upper Bhuban Formation	Sandstone dominant unit, moderate to thick bedded.
		Gradational contact	
		Middle Bhuban Formation	Predominantly siltstone/ shale formation with interbeds of sandstone thinly bedded and/or thinly laminated. *Base not exposed*

The red ferruginous Formation is greenish grey or brownish yellow in colour and is fine grained, soft and friable. The shale bands in this unit are thin and show colours varying from dark grey to light grey, which on weathering attain a green or brown hue. A number of bivalve fossils were noted from different horizons of the Upper Bhuban Formations.

Current and wave ripple marks, lenticular cross bedding, ball and pillow structure, load casts, flute casts and rain prints constitute the primary sedimentary structure in the area.

The sediments have undergone a single phase of major deformation resulting in the NNW-SSE to nearly N-S trending anticlines and synclines. A few major synclines and corresponding anticlines and a number of minor folds have been noticed in the area. Co-axial minor folds have also been developed on the limbs of the major folds. Erratic attitude of bedding in some outcrops can be attributed to faults. The hard sandstone bands of the Upper Bhuban Formation have well developed joint patterns with the E-W trending joint plane being the most pronounced.

Gradual reduction in grain size of sediments towards south clearly indicate deepening of basin in that part and also the movement of sediments from north to south. Similarity of composition of the different rock units show that the source for these rocks remains the same during the course of sedimentation. Deepening of depositional basin along with sedimentation is indicated by very large thickness of the accumulated sediments.Change in flow regime is the main cause for the occurrence of repeated monotonous successions of sandstone, shale and siltstone of variable thickness within a short distance. High percentage of feldspar in the sandstone suggests proximity of the provenance and its high relief, the weathering, erosion, transportation and deposition took place within a short period. Thin lamination, rhythmic alterations of sandstone, shale, siltstone and slump structures point to a flysch type of deposit. Flat topped ripples in the Upper Bhuban Formation is indicating tidal flat deposition.

HISTORICAL BACKGROUND OF PALAEONTOLOGICAL STUDY

The first record of the fossil occurrence in Mizoram was of *Schizaster* sp. from Lunglei by La Touche (1891). After this discovery no Palaeontological studies seem to have been carried out in Mizo hills till the seventies of twentieth century. The Geological Survey of India (GSI) took initiative of sending a few teams for exploration of fossils from the area. Nandy *et al.*, (1972) recorded a few Foraminifera (*viz., Ammonia cf. beecari, A. cf. papillosa, Globigerina* sp.) and Ostracoda (*viz., Leguminocytheris* sp.)

from about 4.5 km. west of Aizawl. The assemblage was assigned the Miocene age.

Saxena and Mukherjee (1973) have recorded molluscs, echinoids, shark tooth etc. from the shell conglomerate along Lunglei-Demagiri Road.

Banerjee *et al.*, (1977) have reported Foraminifera, Ostracoda and Mollusca from Aizawl District and designated Miocene age of the rocks. The rich fauana of Pelecypoda and Gastropoda explored by Banerjee and Dasgupta (1983) show a close similarity with the fauna of Kama stage of Myanmar.

Satsangi (1983) identified carcharhinid fish tooth (*Hemipristis* sp.) in calcareous sandstone near Kolasib. The pedacious shark, *Hemipristis*, that survived a long geologiocal period from Eocene to Recent is recorded mainly from the Miocene sediments of east and west coast of India, Sri Lanka and Myanmar. On the basis of associated molluscan fossil the horizon was assigned the Miocene age. Later, Satsangi and Mehrotra (1983) reported a number of fish fossils from Kolasib area, and Sinha and Mehrotra (1984) reported a few pelecypods and fishes from around Aizawl. These indicate a lower Miocene age of the rocks of Upper Bhuban Formation. Mehrotra (1986) recorded an assemblage of Foraminifera, Pelecypoda in samples of shale limestone of Upper Bhuban Formation near Aizawl; and, he subsequently (1987) presented a detailed report on the Palaeontological studies of the Surma Group of sediments in Aizawl District.

Chakrabarti *et al.*, (1988) was the pioneer in undertaking Palaeontological studies around Saiha, Blue Mountain and Palak Dil areas of Chhimtuipui District. They reported a number of Pelecypoda, Gastropoda, Echinoidea, Crustacea and Foraminifera from the area. Most of the fossils were recorded from the thinly bedded sandstone with intercalations of siltstones and shales occurring below the upper massive sandstone, and they suggested a Lower Miocene age of these fauna.

Tiwari and Satsangi (1988) described a Portunoid Crab from a place near Lunglei Town. Later, Satsangi and Patil (1988) recorded a broken specimen of *Callianassa* sp. Tiwari *et al.*, (1997) subsequently recorded five species of Crabs under four genera.

More recently, Tiwari *et al.*, (1998) recorded a number of fossil fish teeth from places of Aizawl and Lunglei Districts which were assigned the Lower Miocene age.

SYSTEMATIC PALAEONTOLOGY

LIST OF TAXA

Phylum PROTOZOA

Subfamily SARCODINA

Class RHIZOPODA

Order FORAMINIFERIDA

Family ROTALIDAE

1. *Ammonia* sp.

Family LITUOLIDAE

2. *Ammobaculites* sp.

Family AMPHISTEGINIDAE

3. *Amphistegina* sp.

Family ALVEOLINIDAE

4. *Alveolinella* sp.

Family SORITIDAE

5. *Archaias* sp.

Family MILIOLIDAE

6. *Miliola* sp.
7. *Austrotrillina* sp.

Family BOLIVINITIDAE

8. *Bolivina* sp.

Family CIBICIDIDAE

9. *Cibicides* sp.

Family DISCORBIDAE

10. *Discorbis* sp.

Family EPONIDIDAE

11. *Eponides* sp.

Family GLOBOGERINIDAE

12. *Globogerina* sp.
13. *Globogerinoides* sp.

Family GLOBOROTALIDAE

14. *Globorotalia* sp.

Family LEPIDOCYCLINIDAE

15. *Lepidocyclina* sp.

Family MIOGYPSINIDAE

16. *Miogypsina* sp.
17. *Miogypsinoides* sp.

Family NUMMULITIDAE

18. *Nummulites* sp.

Family PLEUROSTOMELLIDAE

19. *Nodosarella* sp.

Phylum BRYOZOA
Subphylum ENTOPROCTA
Order CYCLOSTOMATA
Suborder TUBULOPORINA
Family ENTALOPHORIDAE

20. *Entalophora* sp.

Phylum ANNELIDA

21. *Skolithos* Haldeman (Trace fossil)

Phylum ARTHROPODA
Class CRUSTACEA
Subclass OSTRACODA
Order PODOCAPIDA
Family BAIRDIIDAE

22. *Bairdia* sp.

Family LEGUNINOCYTHEREIDAE

23. *Leguminocythereis* sp.

Subclass MALACOSTRACA
Order DECAPODA
Infraorder ANOMURA
Superfamily THALLASSINOIDEA
Family CALLIANASSIDAE

24. *Callianassa* sp.

Superfamily PORTUNOIDEA
Family PORTUNIDAE

25. *Portunus* sp.

Superfamily CALAPPOIDEA
Family CALAPPIDAE

26. *Calappa protopustulosa* Noetling

Family LEUCOSIIDAE

27. *Ebalia tuberculata* Noetling
28. *Ebalia spinosa* Tiwari, Barman & Satsangi
29. *Typilobus granulosus* Stoliczka

Superfamily XANTHOIDEA
Family XANTHIDAE

30. *Xantho* sp.

Phylum MOLLUSCA
Class BIVALVIA
Order ARCOIDA
Family ARCIDAE

31. *Arca* sp.
32. *Anadara* sp.
33. *Anadara (Lunarca)* sp.
34. *Anadara articulata* Mukherjee
35. *Anadara garoensis* Mukherjee
36. *Barbatia* sp.
37. *Trisidos* sp.
38. *Scapharca (Cunearca)* sp.

Family NOETIIDAE

39. *Noetia (Incanopsis)* sp.
40. *Noetiopsis* sp.
41. *Arginopsis* sp.

Family CUCULLAEIDAE

42. *Cucullaea* sp.

Family PARALLELODONTIDAE

43. *Gramatodon (Nordenskyoeldia)* sp.

Order PTERIOIDA
Family PECTINIDAE

44. *Pecten* sp.
45. *Pecten (Pecten)* sp.
46. *Pecten (Flabellipecten)* sp.
47. *Chlamys* sp.
48. *Chlamys (Argopecten)* sp.
49. *Chlamys (Chlamys)* sp.
50. *Chlamys (Vertipecten)* sp.
51. *Pseudopecten* sp.
52. *Decatopecten (Anguipecten)* sp.

Family LIMIDAE

53. *Pseudolimea* sp.
54. *Antiquilama* sp.

Family OXYTOMIDAE

55. *Oxytoma (Hypoxytoma)* sp.

Order VENEROIDA

Family VENERIDAE

56. *Callista (Macrocallista)* sp.
57. *Dosinia* sp.
58. *Meretrix* sp.
59. *Pitar* sp.
60. *Paphia* sp.
61. *Timoclea* sp.

Family TELLINIDAE

62. *Apolymetis* sp.
63. *Tellina* sp.
64. *Tellina (Gastronopsis)* sp.
65. *Tellina (Macaliopsis)* sp.
66. *Tellina (Scissula)* sp.
67. *Hercodon* sp.
68. *Macoma (Bendemacoma)* sp.
69. *Macoma (Macoploma)* sp.

Family CARDIIDAE

70. *Cardium* sp.
71. *Cardium (Bucardium)* sp.
72. *Jurassicardium* sp.
73. *Loxocardium* sp.
74. *Vepricardium (Hedecardium)* sp.

Family CARDITIDAE

75. *Xenocardita* sp.
76. *Venericardita* sp.

Family CULTELLIDAE

77. *Cultellus* sp.

Family DONACIDAE

78. *Donax* sp.

Family ERYCINIDAE

79. *Erycina* sp.

Order MYTILOIDA

Family PINNIDAE

80. *Atrina* sp.
81. *Pinna* sp.
82. *Pinna (Pinna)* sp.

Order NUCULOIDA

Family NUCULIDAE

83. *Nucula* sp.

Family NUCULANIDAE

84. *Yoldia* sp.

Family PRAENUCULIDAE

85. *Similidonta* sp.

Order MYOIDA

Family CORBULIDAE

86. *Corbula* sp.
87. *Corbula (Varicorbula)* sp.

Family TEREDINIDAE

88. *Spathoteredo* sp.

Order PRAECARDIOIDA

Family ANTIPLEURIDAE

89. *Antipleura* sp.

Order HIPPURITOIDA

Family MEGALODONTIDAE

90. *Pterocardia* sp.

Order ANYSOMYARIA

Family OSTREIDAE

91. *Ostrea* sp.

Class GASTROPODA

Order ARCHAEOGASTROPODA

Family TROCHIDAE

92. *Solariella* sp.

Family COCCULINIDAE

93. *Coculina (Cocculina)* sp.

Order MESOGASTROPODA

Family POTAMIDIDAE

94. *Cerethidea* sp.

Family NATICIDAE

95. *Natica* sp.

Family FICIDAE

96. *Ficus* sp.

Family STROMBIDAE

97. *Rimella* sp.

Order NEOGASTROPODA

Family CONIDAE

98. *Conus* sp.

Family OLIVIDAE

99. *Oliva* sp.

100. *Olivella* sp.

Family TURRIDAE

101. *Turris* sp.

Family BUCCINIDAE

102. *Siphonalia* sp.

Order CAENOGASTROPODA

Family TURITELLIDAE

103. *Turritella* sp.

Phylum ECHINODERMATA

Subphylum ECHINOZOA

Class ECHINOIDEA

Order SPATANGOIDA

Family LOVENIDAE

104. *Lovenia (Vasoconster) sulcatus* Haime

Family SPATANGIDAE

105. *Spatangus* sp.

106. *Schizaster* sp.

Phylum CHORDATA

Subphylum VERTEBRATA

Class CHONDRICHTHYES

Order SELACHI

Family CARCHARINIDAE

107. *Carcharius gangeticus* Muller & Henle

108. *Hemipristis serra* Agassiz

109. *Negaprion* sp.

Family ISURIDAE

110. *Isurus spallanzani* Bonaparte

111. *Carcharodon carcharius* Linnaeus

Family ALOPIIDAE

112. *Alopias* sp.

Family SPHYRNIDAE

113. *Sphyrna zygaena* Linnaeus

Family DASYATIDAE

114. *Dasyatis* sp.

Family CARCHARIDAE

115. *Carcharias (Odontaspis)* sp.

Family PRISTIOPHORIDAE

116. *Pristiophorus suevicus* Jaekel

Family MYLIOBATIDAE

117. *Myliobatis* sp.

Class OSTEICHTHYES

Order ACTINOPTERYGII

Family DENTICIDAE

118. *Dentex* sp.

SYSTEMATIC ACCOUNT

Phylum PROTOZOA

Subphylum SARCODINA

Class PHIZOPODA

Order FORMINIFERIDA

Family ROTALIDAE

Genus ***Ammonia*** Brunnich

1772. *Ammonia* Brunnich, *Brunnich Zoologiae fundamenta* (Hifniae et Lipsiae) : 183.

Ammonia sp.

Diagnosis : Test free, biconvex, low trochospiral coil of 3 to 4 volutions, sutures slightly curved, thickened, depressed on umiblical side, septa primarily double; wall finely perforate, radial in structure, calacareous; umbilical surface with irregular granules along suture and over umblical region; umblicus with open umblical

fissures and plug in younger forms, which is broken up into numerous fused pillars and bosses in matured specimens, umbilical plug extending inward to proloculus. devoid of umbilical canals; aperture interio-marginal. The present species resembles *Ammonia beccaaarii* (Linnaeus).

Locality : Mizoram : 4.5 km. west of Aizawl on Aizawl–Sairang Road; nr. Turiel nala, on Aizawl–Seling Road.

Geological horizon : Miocene to Recent.

Distribution : Cosmopolitan.

Family LITUOLIDAE

Genus ***Ammobaculites*** Cushman

1910. *Ammobaculites* Cushman, *Bull. U.S. natl Mus.* Vol. **71**, pt. 1 : 114.

Ammobaculites sp.

Diagnosis : Test free, early portion close coiled, later uncoiled and rectilinear, rounded in section; wall agglutinated, interior simple; aperture terminal, rounded. The present species resembles *Ammobaculties agglutinans* (d'Orbigny).

Locality : Mizoram : Aizawl town, Damlui.

Geological horizon : Carboniferous to Recent.

Distribution : Cosmopolitan.

Family AMPHISTEGINIDAE

Genus ***Amphistegina*** d'Orbigny

1826. *Amphistegina* d'Orbigny, *Ann. Sci. Nat. Paris,* series 1, Vol. **7** : 304.

Amphistegina sp.

Diagnosis : Test free, calcareous, lenticular, generally unequally biconvex, with low turbinoid spire; multichambered, chambers equitant, with alar prolongations (v-shaped cavities); dorsal septa simple, radiate, falciform, and may undulate near umbo; ventral septa divided by deep, commonly imbricate constrictions forming secondary lobes that have appearance of secondary chamberlets in rosette around umbo; walls thick, laminated and traversed by pores.

Locality : Mizoram : Chhimtuipui District, south of Tawng kalawng.

Geological horizon : Upper Cretaceous, Eocene to Recent.

Distribution : Cosmopolitan.

Family ALVEOLINIDAE

Genus ***Alveolinella*** Douville

1907. *Alveolinella* Douville, *Bull. Soc. Geol. Fr.* Series 4, Vol. **6**, pt. 7 : 585.

Alveolinella sp.

Diagnosis : Wall porcelaneous, imperforate. Test free, usually large, coiled about elongate axis, very elongate, fosiform, septa continuously arranged, with several layers of chamberlets, preseptal passages on floors of chambers; last whorls bear small secondary preseptal passages; apertures in several rows with attics at top of uppermost ones.

Locality : Mizoram : South Hilman, nr. Aizawl; nr. Turiel nala, on Aizawl-Seling Road.

Geological horizon : Miocene to Recent.

Distribution : Countries in Indo-Pacific zone.

Family SORITIDAE

Genus ***Aachaias*** de Montfort,

1808. *Archaias* de Montfort,. *Conchyliologie systematique et classification methodique des coquilles* : 190.

Archaias sp.

Diagnosis : Test compressed, early stage planispiral; chambers divided into rectangular chamberlets which do not alternate regularly with those of adjacent chambers; aperture commonly double row of pores on peripheral face of last chamber.

Locality : Mizoram : 4.5 km. west of Aizawl on Aizawl–Sairang Road; Aizawl town, Luangmal.

Geological horizon : Mid-Eocene to Recent.

Distribution : Cosmopolitan.

Family MILIOLIDAE

Genus ***Miliola*** Lamarck

1804. *Miliola* Lamarck, *Annls. Mus. Nat. Hist. Paris.* **5** : 349.

Miliola sp.

Diagnosis : Test free, with quinqueloculine chamber arrangement; with cribrate aperture (trematophore).

Locality : Mizoram : nr. Turiel Nala, on Aizawl-Seling Road.

Geological horizon : Eocene.

Distribution : India, Europe, North America.

Genus ***Austrotrillina*** Parr

1942. *Austrotrillina* Parr, *Mining & Geol. J.*, **2**(5) : 361.

Austrotrillina sp.

Diagnosis : Test free, with chambers each one-half coil in length, early chambers at least in microspheric generation in quinqueloculine arrangement, later triloculine, new chambers adding layers against previous ones as well as new chamber wall; wall thick, new outer portion alveolar, that against previous chambers thin and simple in structure; chamber cavity undivided; aperature terminal, with trematophore.

Locality : Mizoram : Narrow gorge of Nongrim lui and Sur lui, south of the bridge on Aizawl-Seling Road.

Geological horizon : Eocene to Miocene.

Distribution : Pacific Islands, Australia, Mid Asia, India, East Africa.

Family BOLIVINITIDAE

Genus ***Bolivina*** d'Orbigyny

1839. *Bolivina* d'Orbigny, *Voyage dans l'Amerique Meridionale–Foraminiferes;* Vol. **5**, part 5 : 60.

Bolivina sp.

Diagnosis : Test elongate, rather compressed; chambers broad, low, biserially arranged throughout, basal margins of chambers with retral processes or backward directed chamber overlaps; wall calcareous perforate, radial in structure,smooth striate, or costate with marginal keel; aperture a narrow, elongate loop up chamber face, one margin ending blindly or bent upward as collar, opposite border attached to one side of doubly folded internal tooth plate (u-shaped in section), attached half of tooth plate projecting inward coalesce with free half of tooth plate of previous foramen, free half of tooth plate projecting through aperature at one extremity and biseceting it, narrowing rapidly inward, toothplate eventually trough-shaped structure with concave portion alternately turning from one side to opposite in successive chambers.

Locality : Mizoram; Aizawl town, Chandmari veng.

Geological horizon : Cretaceous to Recent.

Distribution : Cosmopolitan.

Family CIBICIDIDAE

Genus ***Cibicides*** de Montfort

1808. *Cibicides* de Montfort, *Conchyliologie Systematique et classification methodique des coquilles*; Vol. **1** : 122.

Cibicides sp.

Diagnosis : Test attached; plano-convex, trochospiral, spiral side flat to excavated, evolute, umbilical side strongly convex, involute, apertural face sharply angled, distinct from umbilical side, periphery angular, with nonporous keel; wall calcareous, radial in microstructure, bilamellar, coarsely perforate on spiral side, large pores of earlier chambers may be closed by lamellar thickening of wall, finely perforate on umbilical side, apertural face nonporous; aperture a low interio-marginal opening with narrow lip, also extend along spiral suture on spiral side.

Locality : Mizoram; Aizawl town, Luangmal.

Geological horizon : Cretaceous to Recent.

Distribution : Cosmopolitan.

Family DISCORBIDAE

Genus ***Discorbis*** Lamarck

1804. *Discorbis* Lamarck, *Annls. Mus. Nat. Hist. Nat. Paris,* **5** : 182.

Discorbis sp.

Diagnosis : Test free, trochospiral, plano-convex, flattened on umbilical side, periphery angled; all chambers visible on umbonate spiral side, only chambers of final whorl visible on umbilical side, with a flap extending from basal portion of each chamber toward umbilical region, opening extending along proximal side of each radial umbilical flap, connecting through cavity beneath flaps to interior of chambers themselves; primary aperture an interiomarginal, extra umbilical arch, secondary sutural opening at opposite side of chamber flap remaining open as later chambers are formed.

Locality : Mizoram; Aizawl town, Chandmari veng, Luangmal; near Turiel nala, on Aizawl-Seling Road.

Geological horizon : Eocene to Recent.

Distribution : North America, Europe, India, Pacific Islands, Australia, New Zealand, Islands on Atlantic ocean.

Family EPONIDIDAE

Genus ***Eponides*** de Montfort

1808. *Eponides* de Montfort, *Conchyliologie systematique et classification methodique des coquilles;* Vol. **1** : 127.

Eponides sp.

Diagnosis : Test free, trochospiral, biconvex, periphery angled to distinctly carinate with narrow to broad depression in umbilical region, septa double, with intraseptal passages, sutures curved on spiral side, nearly radial to curved or sigmoid on umbilical side; wall calcareous, finely perforate, radial in structure, bilamellar with septa primarily doubled, surface may have secondarily formed pustules or ridges formed on previous whorl below aperture; primary aperture an interiomarginal arch without internal tooth plate, intercameral foramen somewhat restricted and aeri in position.

Locality : Mizoram : Narrow gorge of Nongrim lui and Sur lui, south of the bridge on Aizawl-Seling Road.

Geological horizon : Eocene to Recent.

Distribution : Cosmopolitan.

Family GLOBIGERINIDAE

Genus ***Globigerina*** d'Orbigny

1826. *Globigerina,* d'Orbigny, *Ann. Sci. Nat. Paris,* series 1, Vol. **7** : 277.

Globigerina sp.

Diagnosis : Test free, trochospiral, chambers spherical to ovate; wall calcareous, perforate, radial in structure, surface smooth or hispid; aperture interiomarginal, umbilical, often tend to slightly extraumbilical position, previous apertures remaining open into umbilicus.

Locality : Mizoram; 4.5 km. west of Aizawl on Aizawl-Sairang Road.

Geological horizon : Palaeocene to Recent.

Distribution : Cosmopolitan.

Genus ***Globigerinoides*** Cushman

1927. *Globigerinoides* Cushman, *An outline of a reclassification of the Foraminifera* : Cushman Lab. Foram. Research, Contrib., Vol. **2**, part 1 : 87.

Globigerinoides sp.

Diagnosis : Test free trochospiral, chambers spherical or ovate; wall calcareous, perforate radial in structure, surface smooth or hispid; apparently resembles *Globigerina* but with secondary sutural apertures on spiral side.

Locality : Mizoram : Chhimtuipui District, South of Tawngkalawng.

Geological horizon : Lower Eocene to Recent.

Distribution : Cosmopolitan.

Family GLOBOROTALIDAE

Genus *Globorotalia* Cushman

1927. *Globorotalia* Cushman, *An outline of a reclassification of the Foraminifera* : Cushman Lab. Foram-Research, Contrib., Vol. **2**, part 1 : 91.

Globorotalia sp.

Diagnosis : Test free, trchospiral, periphery carinate, chambers rhomboid or angular-conical, sutures generally thickened and elevated; wall calcareons, finely perforate, but with nonporous keel or peripheral band, surface smooth or hispid; aperture interiomarginal, an extraumbilical-umbilical arch bordered by lip, varying from narrow rim to broad spatulate.

Locality : Mizoram : Narrow gorge of Nongrim lui and Sur lui, south of the bridge on Aizawl-Seling Road; Aizawl town, Chandmari Veng, opposite Mizoram Cotton Mill; Aizawl town, Mission Veng; Aizawl town, Luangmal, Tuikhan lui; nr. Turiel nala, on Aizawl-Seling Road.

Geological horizon : Palaeocene to Recent.

Distribution : Cosmopolitan.

Family LEPIDOCYCLINIDAE

Genus *Lepidocyclina* Gumbel

1870. *Lepidocydina* Gumbel, *Beitrage zur Foraminiferen-fauna der nordalpinen*

1871. *Eocangebilde* : K. Bayer. Akad. Wiss, Abhandl., Cl. II, Vol. **10**, part 2 : 689.

Lepidocyclina sp.

Diagnosis : Embryonic chambers bilocular, equal or subequal, separated by straight wall; equatorial chambers arcuate, hexagonal or spatulate, with 6 or 8 stolon system.

Locality : Mizoram : Narrow gorge of Nongrim lui and Sur lui, south of the bridge on Aizawl-Seling Road; South Hilman, nr. Aizawl town; Aizawl town, Luangmal; Chimtuipui District, South of Tawng kalawng.

Geological horizon : Oligocene to Lower Miocene.

Distribution : India, North and South America.

Family MIOGYPSINIDAE

Genus *Miogypsina* Sacco

1893. *Miogypsina* Sacco, *Soc. Belge. Geol. & Paleont. Hydr.*, Vol. **7** : 205.

Miogypsina sp.

Diagnosis : Test suborbicular, evenly lenticular, composed of equatorial layer either with well developed chambers or with appressed laminae on each side; megalospheric generation with bilocular embryonic chambers, megalospheric embryonic apparatus apically situated, without equatorial chambers between it and marginal fringe.

Locality : Mizoram : South Hilman, nr. Aizawl town; nr. Turiel nala, on Aizawl-Seling Road; Chhimtuipui District, South of Tawngkalawng.

Geological horizon : Upper Oligocene to Lower Miocene.

Distribution : Indo-Pacific Region, Europe, North and South America.

Genus *Miogypsinoides* Yabe & Hanzawa

1928. *Migypsinoides* Yabe & Hanzawa, *Proc. Imper. Acad. Japan*, Vol. **4** : 535.

Miogypsinoides sp.

Diagnosis : Test suborbicular, lateral chambers absent, equatorial layer being covered on each side by zones of appressed laminae.

Locality : Mizoram : South Hilman, nr. Aizawl town.

Geological horizon : Middle Oligocene to Lower Miocene.

Distribution : Indo-Pacific Region, Europe, North America.

Family NUMMULITIDAE

Genus *Nummulites* Lamarck

1801. Nummulites Lamarck, *Systeme des animaux sans vertebres* : 101.

Nummulites sp.

Diagnosis : Median chambers numerous, simple; test involute to evolute, spiral sheet often

with vacuoles. The present species resembles *Nummulites complanatus* (Defrance).

Locality : Mizoram : Chandmari Veng, Aizawl town.

Geological horizon : Palaeocene to Recent.

Distribution : Cosmopolitan.

Family PLEUROSTOMELLIDAE

Genus ***Nodosarella*** Rzehak

1893. *Nodosarella* Rzehak, *Ann. Naturhist. Hofmuseum, wien*, Vol. **10** : 219.

Nodosarella sp.

Diagnosis : Test free, uniserial; chambers inflated; sutures horizontal and constricted; wall calcareous, very finely perforate; aperture terminal, slit-like or fainty arcuate, bordered on each side by faint lip. The present species resembles *Nodosarella rotundata* (d'Orbigny).

Locality : Mizoram : Chandmari Veng, Aizawl town.

Geological horizon : Palaeocene to Recent.

Distribution : Cosmopolitan.

Phylum BRYOZOA

Subphylum ENTOPROCTA

Order CYCLOSTOMATA

Suborder TUBULOPORINA

Family ENTALOPHORIDAE

Genus **Entalophora** Lamouroux, 1821

Entalophora sp.

Diagnosis: Colonies are branching growths which have somewhat widely spaced, circular apertures projecting distinctly above the general surface of the colony. Transverse section show that the colony consist of very simple grouping of long autopore tubes, neither mesopores nor diaphragms present and no other special type of cell is observed. Zoarium slender, cylindrical ramous symmetrical, ovicell with transverse oeceostome.

Locality : Mizoram : Aizawl District, Near Junction of two roads coming to Luangmal Complex from Aizawl town.

Geological horizon: Jurassic to Recent.

Distribution: Cosmopolitan.

TRACE FOSSIL

Phylum ANNELIDA ?

Scolithos Haldeman

1840. *Scolithos* Haldeman, *Supplement to number one of A monograph of the Limniades, and other fresh water univalve shells of "North America" containing descriptions of apparently new animals indifferent classes and the names and characters of the subgenera in paludina and Ancestor.* (Philadelphia) : 3.

Diagnosis : Tubes or tube-filling standing vertically in sand stones, diameter about 0.2 to 1 cm., usually straight, not branched commonly, closely crowded, rarely with fine annulation; made by worms or phoronids.

Locality : Mizoram: Aizawl District, Aizawl, Mission Veng; Kolashib-Bilkhathalu Section; Bilkhathalu –Varingte Road.

Geological horizon : Cambrian to Ordovician.

Distribution : Cosmopolitan.

Phylum ARTHROPODA

Class CRUSTACEA

Subclass OSTRACODA

Order PODOCAPIDA

Family BAIRDIIDAE

Genus ***Bairdia*** McCoy

1844. *Bairdia* McCoy, *A synopsis of the characters of the carboniferous limestone fossils of Ireland.* Dublin : 207.

Bairdia sp.

Diagnosis : Carapace mostly elongate fusiform in laternal view, with broadly arched dorsum that becomes concave terminally. Venter centrally straight but curved upward terminally so that extremities are nearly at mid height, anterior end

generally higher and better rounded than the posterior, which generally is acuminate. L V larger than RV, mostly overreaching it around entire margin and overlapping it. Contact margin complex with wide duplicature, vestibule and associated structures.

Locality : Mizoram : In and around Tuipang (Bhuban rock).

Geological horizon : Miocene.

Family LEGUMINOCYTHERIDAE

Genus ***Leguminocythereis*** Howe

1936. *Leguminocythereis* Howe, *Louisina Geol. Survey, Geol. Bull.*, no. 7 : 96.

Leguminocythereis sp.

Diagnosis : Carapace bean shaped, with dorsum and venter subparallel and rounded anterior broadest, greatest thickness behind middle; surface reticulate, with vertical element in upper half. Hinge holamphidont with sharp anterior tooth in right valve behind which is a triangular socket, furrow and oblique rounded posterior tooth; marginal areas regular with small anterior vestibule, normal cannal large spaced.

Locality : Mizoram: Aizawl District, 4.5 km west of Aizawl on the Aizawl-Seling Road; In and around Tuipang (Bhuban rock).

Geological horizon : Eocene to Miocene.

Order DECAPODA

Infraaorder ANOMURA

Sperfamily THALLASSINOIDA

Family CALLIANASSIDAE

Subfamily CALLIANASSINAE

Genus **Callianassa** Leach

1815. *Calianassa,* Leach, *Trans. Linn. Soc. London*, **11** : 335, 342.

Callianassa sp.

Diagnosis : Carapace with cervical groove extended far back medially; 1st pereiopods strongly heterochelous, carpus very narrow proximally, widened abruptly to equal propodus, which is rectangular; fingers short, curved; abdominal pleura rudimentary.

Locality and horizon : Mizoram: Aizawl District, nr. Aizawl town; Upper Bhuban Formation (Lower Miocene).

Remarks : Satsangi and Patil(1988) recorded a chela of *Callianassa* and other unspecified crab fossils from Mizoram.

Superfamily PORTUNOIDEA

Family PORTUNIDAE

Subfamily PORTUNINAE

Genus **Portunus** Weber, 1795

Portunus sp.

1985. Tiwari & Satsangi, *Curr. Sci.*, **57**(17) : 956-958.

Diagnosis : Carapace transversely ovate, width (40 mm.) almost double the length (19 mm.); surface of carapace covered with fine granules; orbito-frontal margin slightly rounded with four small depressed spines and occupied about two-fifths of carapace width. Orbits large, ovate and directed foward. Antero-lateral borders almost semicircular and lined with seven even–sized spines which continued from the orbit and ended at antero-lateral angle where a prominent lateral spine is present. Thinly ridged postero-lateral borders slightly concave, sinuous and converged rapidly to join the straight posterior margin which is about as wide as orbitofrontal border. Epibranchial ridge feebly developed near lateral spine but becomes prominent anterior to mesobranchial lobe, around which it takes broad curve terminating near groove posterior to gastric lobe. Cervical groove shallow forming a U-shaped curve in crossing midline between gastric and cardiac lobes. Meso- and metagasric lobes confluent forming a median shield-like elevated platform with a thin ridge at posterior margin. Anterior process of mesogastric extend forward and end up at base of small and ovate epigastric lobes. Protogastric lobes large and ovoid with a

transverse ridge across middle of each lobe. Cardiac region tumid and shaped like an elongated pentagon with a median furrow separating two ovoid cardiac lobes. Intestinal region narrow, extending round metabranchial lobe to join base of the cardiac. Mesobranchial lobe prominently developed and marked maximum elevation of carapace.

Locality and horizon : Mizoram : Lunglei District, 3 km. 0-Lunglei Jail on Lunglei-Vanhe Road; in silty sandstone of Upper Bhuban Formation (approximately Lower Miocene by age).

Remarks : Tiwari and Satsangi (1988) stated that *Portunus* has a geological age range from Eocene to Recent, and most of the records of portunid crabs from the Indian subcontinent are from Miocene beds.

Superfamily CALAPPOIDEA

Family CALAPPIDAE

Subfamily CALAPPINAE

Genus ***Calappa***, Weber, 1795

Calappa protopustulosa Noetling

1901. *Calappa protopustulosa* Noetling, *Pal. Ind.* (N.S.) **1** (3): 369.

1997. *Calappa protopustulosa* : Tiwari, Barman & Satsangi; *J. Pal. Soc Ind.*, **42** : 128.

Diagnosis : Carapace strongly convex, expanded to maximum width postero-laterally, front and orbits small, chelipeds very large, fitting front of carapace, dactylus of one hand with strong curved basal tooth. Length and width of carapace 3.00 mm. and 21.00 mm. respectively.

Locality and horizon : Mizoram : Lunglei District, 9.5 km. north of Lunglei town on the left cutting wall of the road under construction between Lunglei and Aizawl; crab bearing beds in the Upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1997) recovered a partially preserved carapace in which nearly half of anterior portion was missing. The specimen was identical with *Calappa protopustulosa* from ?Miocene bed of Thayetmyo, Myanmer. However, little post-depositional deformation was notified in the specimen from Lunglei.

Family LEUCOSIIDAE

Genus ***Ebalia*** Leach

1817-18. *Ebalia* Leach, *A general notice of the animals taken by Mr. John Cranch, during the expedition to explore the source of the River Zaire.* John Murray publ., : 407-419.

Ebalia tuberculata Noetling

1901. *Ebalia tuberculata* Noetling, *Pal. Indica* (N.S.) **1** (3) : 370.

1997. *Ebalia tuberculata*: Tiwari, Barman and Satsangi, *J. Pal. Soc. Ind.*, **42** : 128.

Diagnosis : Carapace convex, rhomboidal to hexagonal, with tumid regions, nodose, granulate; front narrow, truncate; chelipeds moderately developed. Length and width of carapce 10.00 mm. and 14.00 mm. respectively.

Locality and horizon : Mizoram : Aizawl District, 7.5 km. west of Aizawl town on the Aizawl-Lungmual complex Road Section; crab bearing bed in the Upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1997) recovered a carapace from the carb bearing bed near Aizawl Town. The specimen though of small in size, resembled *Ebalia tuberculata* from ? Miocene bed of Thayetmo, Myanmer, in overall configuration, surface sculpture and in the characters of gastric and cardiac region.

Ebalia spinsosa Tiwari, Barman and Satsangi

1997. *Ebalia spinosa* Tiwari, Barman and Satsangi, *J. Pal. Soc. Ind.*, **42** : 128.

Diagnosis : Carapace ovoid, slightly wider than long. Strongly convex longitudinally and moderately so transversely; upper surface of carapace nodose and covered with small, isolated tubercles. Frontal margin narrow, almost straight and about one-third of width of carapace; orbits small, deep and closely spaced. Antero-lateral border semicircular, dentate with four spines and

relatively longer than distance between outer angles of orbits; postero-lateral borders straight with four very prominent well separated spines which converge towards posterior margin making an obtuse angle. Gastric and cardiac regions well marked by a deep furrow on either side and separated from each other by a transverse furrow; metagastric and strongly convex cardiac region bear a prominent tubercle.

Locality and horizon : Mizoram : Aizawl District, 7.5 km. west of Aizawl Town on the Aizawl-Luangmual Complex Road section; crab bearing bed in the Upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1997) recovered three carapaces from the above bed. These specimens differ from *Ebalia tuberculata* Noetling, the only other known fossil species of *Ebalia* from the Indian subcontinent in having four prominent well separated spines on the postero-lateral border and more tuberculate nature of upper surface of carapace.

Genus ***Typilobus*** Stoliczka

1873. *Typilobus* Stoliczka, *Pal. Ind.* (7,14) **1**(1) : 15-16.

Typilobus granulosus Stoliczka

1870. *Typilobus granulosus* Stolizcka, *Pal, Ind.* (7,14) **1** (1) : 15.

1997. *Typilobus granulosus*: Tiwari, Barman and Satsangi, *J. Pal. Soc. India,* **42** : 130.

Diagnosis : Carapace small, ovoid, rostrum pointed; gastric, cardiac, hepatic and branchial regions well marked by grooves; in female abdomen not greatly expanded. Length and width of Carapace 8.00 mm. and 10.00 mm. respectively.

Locality and horizon : Mizoram: Lunglei District, 9.5 km. north of Lunglei Town on the left cutting wall of the road under construction between Lunglei and Aizawl; crab bearing bed in the upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1997) recovered single well preserved carapace from the above bed. The carapace was small; its frontal region and a part of the middle portion was weathered out. The specimen closely resembles *Typilobus granulosus* from ferruginous clay bed, apparently of Nummulitic age, in Sind and from conglomeratic sandstrones of Sahind Hill, West of Egera in Kachchh (Sastri and Mathur, 1970). The specimen from Mizoram has however, more granulose surface of carapace than the western Indian representatives.

Superfamily XANTHOIDEA

Family XANTHIDAE

Genus ***Xantho*** Leach

1815. *Xantho* Leach, *Trans. Linn. Soc. London,* **11** : 320.

Xantho sp.

1997. *Xantho* sp., Tiwari, Barman and Satsangi, *J. Pal. Soc. Ind.*, **42** : 130.

Diagnosis : Carapace hexagonal, broader than long, moderately convex longitudinally and nearly flat transversely; frontal wide, slightly curved and about half of width of carapace; orbits small and widely separated; antero-lateral margin smooth; postero-lateral margin about two-thirds of maximum width of carapace. Protohyphen and metagastric regions well developed, branchial region bears prominent transverse ridge.

Locality and horizon : Mizoram : Aizawl District, 7.5 km. west of Aizawl Town on the Aizawl – Luangmual Complex Road Section; crab bearing bed in the Upper Bhuban Formation.

Remarks : Twari *et al.*, (1997) recovered two carapace from the above bed and they have assigned the specimens tentatively to *Xantho* Leach. No other record of fossil species of *Xantho* is apparently available from India.

Phylum MOLLUSCA

Class BIVALVIA (PELECYPODA)

Order ARCOIDA

Family ARCIDAE

Genus ***Arca*** Linnaeus

1758. *Arca* Linnaeus, *Systema Naturae per regna tria naturae*: 827.

Arca sp.

Diagnosis : Shell elongate, subtrapezoidal, very inequilateral, commonly expanded or articulate posteriorly, posterior umbonal carina prominent, cardinal area broad covered throughout by ligament, dental series long and nearly straight. Surface sculpture radial and fine.

Locality : Mizoram : Lunglei District, Zotlung, nr. Lunglei town, coll. T.K. Pal, U. Saha and S.K. Ray, 6.5.94.

Geological horizon : Middle Jurrassic to Recent.

Distribution : Cosmopolitan.

Genus ***Anadara*** Gray

1847. *Anadara* Gray, *Zool. Soc. London, Proc.*, **15** : 129-219.

Anadara sp.

Diagnosis : Shell moderately heavy, ornamented with strong costae; dental series continuous, consisting of similar and uniformly graded teeth.

Locality : Mizoram : Aizawl District, around Lungzarhtum and Bualpur; west of Khwachete; Bilkhathalu-Varingte Road, Dhalaswari river Suspension bridge, Reik Road; Lunglei District, Pukpui, nr. Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Distribution : Cosmopolitan.

Subgenus ***Lunarca*** Gray

1857. *Anadara (Lunarca)* Gray, *Guide to the systematic distribution of Mollusca in the British Museum;* pt. 1, (London).

Anadara (Lunarca) sp.
(Pl. I, Fig. 1)

Diagnosis : Shell elongate, ovoid, cardinal area placed entirely behind beak; teeth divided into two series, anterior being short and irregular as compared to posterior series.

Locality : Mizoram. Lunglei District, Zotlung; nr. Lunglei town, 6.5.1994. coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene to Recent.

Distribution : Cosmopolitan.

Anadara articulata Mukherjee

1939. *Anadara articulata* Mukherjee, *Pal. Ind.* (n.s) **28** (1) : 101.

Diagnosis : Shell ovoid, moderately heavy, strongly costate, costae correspond to interlocking crenulations.

Locality : Mizoram : Aizawl Town, Mission Veng.

Geological horizon : Lower miocene.

Anadara garoensis Mukherjee

1939. *Anadara garoensis*, Mukherjee, *Pal. Ind.* (n.s.) **28**(1) : 101.

Diagnosis : Shell ovoid, equivalve in shape and sculpture; cardinal area narrow, elongate; dental series arched.

Locality : Mizoram : Aizawl town, Mission Veng; Dhaleswari river Suspension Bridge, Reik Road; Rilthu (Tlang); Kolasib-Bhairabi Road Section.

Geological horizon : Lower Miocene.

Genus ***Barbatia*** Gray

1842. *Barbatia* Gray, *Syst. Cont. Brit. Mus.*, ed. 44, pt. Mollusca.

Barbatia sp.

Diagnosis : Shell small elongate, ovoid, inequilateral, generally equivalve, but rarely right valve is slightly smaller than left valve; termination rounded or subangular and slightly expanded, ornamentation costellate, commonly fine.

Locality : Mizoram : Aizawl District, Dhaleswari river suspension Bridge, Reik road; west of Khwachete.

Geological horizon : Jurrassic to Recent.

Distribution : Cosmopolitan.

Genus ***Trisidos*** Röding

1798. ***Trisidos*** Röding, *Museum Bolteniarum rive catalogue cimeliorum e tribus regnis naturae quaeolim collegerat joa.* (Humburg).

Trisidos sp.
(Pl. I, Figs. 3 & 4)

Diagnosis : Shell elongate, subtrapezoidal, teeth small and numerous, transverse across middle of shell, becoming longer and convergent terminally, narrow cardinal area and exhibiting marked torsion around hinge axis.

Locality : Mizoram : Lunglei District, Zotlung, nr. Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene to Recent.

Distribution : Indo-Pacific Zones.

Genus ***Scapharca*** Gray

1847. *Scapharca* Gray, *Zool. Soc. London, Proc.*, **15** : 129.

Subgenus ***Cunearca Dall***

1898. *Scapharca (Cunearca)* Dall, *Acad. Nat. Sci. Philadelphia, Proc.*, **50** : 57-62.

Scapharca (Cunearca) sp.
(Pl. I, Fig. 2)

Diagnosis : Shell subtriangular, inflated with full umbones and small, submedial beaks over light triangular cardinal area covered completely by amphidetic ligament, sculpture discrepant, costae of left valve being larger.

Locality : Mizoram : Lunglei District, Zotlung, nr. Lunglei town, 6.5.94, coll.T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Oligocene to Recent.

Distribution : Cosmopolitan.

Family NOETIIDAE

Genus ***Noetia*** Gray

1857. *Noetia* Gray, *Guide to the systematic distribution of Mollusca in the British Museum;* pt. 1.

Subgenus ***Incanopsis*** Olsson, 1944

Noetia (Incanopsis) sp.
(Pl. I, Figs. 3 & 4)

Diagnosis : Shell subtrapezoidal to ovoid, equivalve, umbonal ridge carinate, radial ribs numerous, fine, not bifurcate posterior margin, obliquely truncate.

Locality: Mizoram : Lunglei District, nr. Pachang, 25 km. from Lunglei town; Zotlung, nr. Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Cretaceous.

Distribution : Cosmopolitan.

Genus ***Noetiopsis*** Mac Neil, 1938

Noetiopsos sp.

Diagnosis : Shell rhomboidal, subcarinate, ornamented with subequal costae, inner margin crenulated postero-ventrally with prosogyre beaks situated well forward of mid point of hinge; ligament opisthodetic.

Locality : Mizoram : Lunglei District, Pachang, 25 km. from Lunglei Town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene.

Distribution : Cosmopolitan.

Genus ***Arginopsis*** Mac Neil

1937. *Arginopsis* Mac Neil, *Washington Acad. Sci. Jour.*, **27** : 452-458.

Arginopsis sp.
(Pl. I, Fig. 6)

Diagnosis : Shell subovate in lateral profile, evenly inflated umbonal ridge rounded obscure; beaks strongly prosogyre situated anteriorly; ornamented with many regular costae; Ligament opisthodetie, completely covering posterior part of cardinal area, interior series of teeth short, chevron shaped.

Locality : Mizoram :Lunglei District, Pachang, 25 km. from Lunglei town, 6.5.94, coll. T. K. Pal, U. Saha and S.K. Ray.

Geological horizon : Upper Eocene.

Distribution : Cosmopolitan.

Family CUCULLAEIDAE

Genus ***Cucullaea*** Lamarck

1801. *Cucullaea* Lamarck *Systeme des animaux sans vertebres* : 432 (Paris).

Cucullaea sp.

Diagnosis : Shell subtrigonal, with rounded posterior unbonal carina, ornamented with strong costae; posterior margin obliquely truncated, surface radially ornamented with strong costae. Middle series of teeth and crenulations of inner shell margin becoming obsolete.

Locality : Mizoram : Pachang, 25 km. from Lunglei town, 6.5.94, coll. T. K. Pal, U, Saha and S. K. Ray.

Geological horizon : Jurassic to Recent.

Distribution : Indo-Pacific zones.

Family PARALLELODONTIDAE

Genus ***Gramatodon*** Meek and Hayden

1865. *Gramatodon* Meek and Hayden, Palaeontology of the upper Missouri: Invertebrates. *Smithsonian Contrib. Knowledge*, Vol. **14** : 172.

Subgenus ***Nordenskjoeldia*** Wilkenes, 1910

Gramatodon (Nordenskjoeldia) sp.

Diagnosis : Shell ovoid with low closely spaced costae, umbonal carina sharp, teeth not serrate, hinge plate narrow; anterior teeth straight, oblique, becoming anteriorly parallel with a antero-dorsal margin.

Locality : Mizoram : Lunglei District, Zotlung, nr. Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Upper Cretaceous.

Distribution : India, Madagascar.

Family PECTINIDAE

Genus ***Pecten*** Muller, 1776

Pecten sp.

Diagnosis : Shell orbicular, valves convex, umbone central on either side of which are triangular auricle. Radial ribs well developed and on right valve wider than interspaces, radially striate grooved, hinge with cardinal crura extending from each side of ligamental pit.

Locality : Mizoram : Around Lungzarhtum and Bualpur; Dhaleswari river suspension bridge, Reik Road.

Geological horizon : Miocene.

Distribution : Cosmopolitan.

Subgenus ***Pecten***

Pecten (Pecten) sp.

Diagnosis : Shell orbicular, valves convex, centrally placed umbones. Radial ribs well developed, usually flat topped. Commonly radially striated or grooved; concavety present in shells.

Locality : Mizoram; Aizawl District, Mission Veng; west of Khwachete; Rilthu (Tlang).

Geological horizon : Miocene.

Distribution : Cosmopolitan.

Subgenus ***Flabellipecten*** Sacco

1897-98. *Pecten (Flabellipecten)* Sacco, *Molluschi dei terreni terziarii del Piemonte e della Liguria* (a) pt. 24 (1897), Pectinidae : 1-116.

Pecten (Flabellipecten) sp.

Diagnosis : Shell elongate orbicular, flattish, convex umbonal area of left valve, gently arched right valve, usually depressed radial ribs and smaller auricles.

Locality : Mizoram : Aizawl District, Dhaleswari river suspension bridge, Reik Road.

Geological horizon : Lower and Middle Miocene.

Distribution : Cosmopolitan.

Genus ***Chlamys*** Röding

1798. ***Chlamys*** Röding, *P.F. Museum Boltenianum sive catalogues cimeliorum e tribus regnis naturae quae olim collegerat joa.* Fried, Boltey, M.D. p.d., pars Seeunda; VIII + 119 p., Types johan christi Trapii (Humburg).

Chlamys sp.

Diagnosis : Shell oval. Both valves convex, left valve usually more than right valve, auricles clearly delimited, usually large, byssal notch large; sculpture of radial and concentric elements with scale like spines. Margin usually scalloped.

Locality : Mizoram : Around Saiha; Around Lungzarhtum and Bualpur; south of Tawngkalawng.

Geological horizon : Tiassic to Recent.

Distribution : Cosmopolitan.

Subgenus ***Argopecten*** Monterosato, 1899

Chlamys (Argopecten) sp.

Diagnosis : Shell small, thin interior without radial riblets. Both valves convex. Left valve usually more than right valve, equally inflated valves lacking secondary radial riblets and with larger auricles; concentric sculpture in looped lamellae.

Locality : Mizoram : Around Aizawl, Mission Veng, west of Khwachete; Tuikhan Lui.

Geological horizon : Miocene.

Distribution : Cosmopolitan.

Subgenus ***Chlamys*** Leach, 1815

Chlamys (Chlamys) sp.

Diagnosis : Shell rounded, commonly somewhat oblique, anterior auricle longer than posterior, sculpture of numerous generally grooved or striated and spinose radial ribs; inner margin commonly with rounded, grooved weak riblets, cardinal crura weak.

Locality : Mizoram : South Hliman,near Aizawl; Dhaleswari river suspension bridge, Reik road, west of Khwachetec, Turial nala (About 1 km. south west from the Turial river suspension bridge on Aizawl-Seling road); Kolasib – Bhairabi road section.

Geological horizon : Miocene.

Distribution : Cosmopolitan.

Subgenus ***Vertipecten*** Grant & Gale

1931. *Chlamys (Vertipecten)* Grant & Gale, *San Diego Soc. Nat. History, Mem.*, v. 1, 1036 p.

Chlamys (Vertipecten) sp.

Diagnosis : Shell large, valves convex, large byssal notch below anterior ear, sculpture or radial elements fine to coarse. Right valve with low rounded radial ribs and the ribs of left valve are not paired and every 3rd one is elevated above others.

Locality : Mizoram; west of Khwachete.

Geological horizon : Lower Oligocene to Lower Miocene.

Genus ***Pseudopecten*** Bayle

1878. *Pseudopecten* Bayle, *Fossils pricipaux des terrains : Explie carte geol. France*, v. 4, atlos, pt. 1, pl. 1-158 andpl. Expl. [*France, service carte geol*] [Text was never published.]

Pseudopecten sp.

Diagnosis : Shell nearly equivalve; about fifteen or sixteen radial ribs which are nearly smooth spines on right valve.

Locality : Mizoram : Lunglei District, Eden Park, 13 km. from Lunglei town, Zotlung, nr. Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Middle Jurassic to Recent.

Genus ***Decatopecten*** Ruppel, 1839

Subgenus ***Anguipecten*** Dall, Bartsch & Rehder, 1938

Decatopecten (Anguipecten) sp.

Diagnosis : Shell elongated, right valve more convex than left valve with finer ribs; hinge short.

Locality : Mizoram; Lunglei District, Pachang, 25 km. from Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Miocene to Recent.

Family LIMIDAE

Genus ***Pseudolimea*** Arkell

1932. *Pseudolimea* Arkell, *A monograph of British corallian Lamellibranchia*. Palaeontograph. Soc. London, pt. 4 : 133-180 pp.

Pseudolimea sp.

Diagnosis : Shell small, gibbose, obliquely ovate, anterior umbonal ridge ill-defined, ligament pit broad, hinge commonly with slightly oblique teeth occupying dorsal angles; ornament of angular ribs commonly with thread in each interval.

Locality : Mizoram; Lunglei District, Zotlung, nr. Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Triassic to Upper Cretaceous.

Genus ***Antiquilama*** Cox

1943. *Antiquilama*, Cox, The English upper lias and Interior Oolite species of Lima : *Malacol. Soc. Lond. Proc.*, **25**(5-6) : 151-157.

Antiquilama sp.

Diagnosis : Shell obliquely ovate, rather compressed, anterior umbonal ridge absent except near umbo, anterior auricle large and devoid of well differentiated teeth.

Locality : Mizoram : Lunglei District, Pachang, 25 km. from Lunglei town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Jurassic to Miocene.

Distribution : Cosmopolitan.

Family OXYTOMIDAE

Genus ***Oxytoma*** Meek

1864. *Oxytoma* Meek, Check listof the invertebrate fossils of North America. Cretaceous and Jurassic : *Smithsonian Misc. Colln*, no. **177** : 40.

Subgenus ***Hypoxitoma*** Ichikawa

1958. *Oxytoma* (Hypoxitona) Ichikawa, *Zur Taxonomia und phylogenicder triadschen.* "Pteriidae" (Lamelli branch) Palaeontographica, Vol. 3, part A : 131.

Oxytoma (Hypoxitoma) sp.

Diagnosis : Shell subcircular; small left valve with closely spaced, subequal ribs, right valve smooth.

Locality : Mizoram : Lunglei District, Zotlung, nr. Lunglei Town, 6.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Late Cretaceous to Miocene.

Distribution : Cosmopolitan.

Order VENEROIDA

Family VENERIDAE

Genus ***Callista*** Poli

1791. *Callista* Poli, *Testacea utriusque Siliciae eorumque historia anatomic tabulis aeneis illustrata* : [In latin, with Itaslian and frensh plate explanations] V.I.

Subgenus ***Macrocallista*** Meek

1876. *Callista (Macrocallista)* Meek. A report on the invertebrate cretaceous and Tertiary fossils of the upper Missouri country : *U.S. Geol. Survey of the Territories.*, Vol. **9** : 629.

Callista (Macrocallista) sp.

Diagnosis : Shell elongate-ovate, with anetrior cardinal teeth not tending to radiate, anterior laterals well developed.

Locality : Mizoram : Aizawl District, Rilthu (Tlang); Vivakawn; Dhaleswari river suspension bridge, Reik road, west of Khwachete.

Geological horizon : Eocene to Recent.

Genus ***Dossinia*** Scopoli

1777. *Dossinia* Scopoli, *Introductio ad historiam naturalem sistentes genera lapidum, plan tarum et animum, hactenusdetecta. Caracterilaus essentialibus donata, in tribes divisa subindiad leges naturae* : 586.

Dossinia sp.

Diagnosis : Shell equivalve, lenticular, concentrically striate, hinge strong, compressed nearly orbicular, lunule well defined.

Locality : Mizoram : Aizawl District, Around Lungzarhtum andBualpur; Dhalaswari river suspension bridge, Reik Road, Kolasib-Bilkathlu section.

Geological horizon : Lower Eocene to Recent.

Distribution : Cosmopolitan.

Genus ***Meretrix*** Lamarck

1799. *Meretrix* Lamarck, *Prodrome d'une mouvelle classification des coquilles, comprenant umeredaction approprii des caractenes generiquies, et. 'l' establishment d'un grand nombre de genres nonveaus : Soc. Histoire Nat. Paris Mem.* Vol. **1** : 63-91.

Meretrix sp.

Diagnosis : Shell large, trigonal, smooth, hinge with cardinal teeth, pallial sinus broad.

Locality : Mizoram : In and around Tuipang;

Geological horizon : Upper Miocene to Recent.

Genus ***Pitar*** Romer, 1857

Pitar sp.

Diagnosis : Shell inequilateral subtriangular, smooth, finely concentrically lamellate; lunule susperficial, escutcheon not defined, triangular hinge. Pallial sinus deep and pointed.

Locality : Mizoram : South Hilman, near Aizawl; Mission veng.

Geological horizon : Eocene to Recent.

Distribution : Cosmopolitan.

Genus ***Paphia*** Röding

1978. *Paphia* Röding, *Museum Boltenianum five catalogus cimeliorum e tribus regnis naturae quae olim collegerat joa. Fried; Bolten, M.D.pd., pars Secunda* : 119.

Paphia sp.

Diagnosis : Shell elongate-ovate, compressed polished shell surface, hinge plate narrow with cardinal.

Localaity : Mizoram : Muthi

Geological horizon : Oligocene to Recent.

Genus ***Timoclea*** Brown, 1827

Timoclea sp.

Diagnosis : Shell small, ovate triangular, inequilateral compressed, sculpture predominantly radial, escutcheon smooth.

Locality : Mizoram : Bilkhathalu-Varingte Road.

Geological horizon : Upper Oligocene to Recent.

Family TELLINIDAE

Genus ***Apolymetis*** Salisbury, 1929

Apolymetis sp.

Diagnosis : Shell subcircular, compressed, flexure and median furrow pronounced, ligament long, embedded; sculpture of spaced concentric ribs.

Locality : Mizoram : Turial nala (About 1 km. s.w. from the Turial river suspension bridge on Aizawal-Seling road; Kolasib-Bilkathalu Section.

Geological horizon : Miocene to Recent.

Genus ***Tellina*** Linnaeus

1758. *Tellina* Linnaeus. *Systema Naturae per regna tria naturae*, 827 p. edit. Decina (Holmiae).

Tellina sp.

Diagnosis : Shell elongate, ligament internal, valves more or less unequal, cardinal hinge teeth two in either valve. Valves more or less unequal.

Locality : Mizoram : Around Lungzarhtam and Bualpur; South of Tawngkalawng; Saiha.

Geological horizon : Lower Cretaceous to Recent.

Distribution : Cosmopolitan.

Subgenus ***Gastranopsis*** Cossmann & Pissaro

1906. *Tellina (Gastranopsis)* Cosmann & Pissarro, *Iconographic complete des co-quilles fossiles de l' Eocene des environs de paris* : Vol. I.

Tellina (Gastranopsis) sp.

Diagnosis : Shell oblique, thin surface with irregular concentric lamellae, pallial sinus rounded, lateral teeth in right valve.

Locality : Mizoram : Lunglei District, Zotlung, nr. Lunglei town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene.

Subgenus ***Macaliopsis*** Cossmann

1887. *Tellina (Macaliopsis)* Cossmann, *Catalogue illustri des coquilles fossils de des environs de paris : Soc. Royale Belgique, Ann.*, V. 49.

Tellina (Macaliopsis) sp.

Diagnosis : Shell rounded, trapezoidal, posterior end trancate, sculpture of spaced concentric ridges, cardinal and laterals strong, pallial sinus narrow, only slightly confluent.

Localaity : Mizoram : Rilthu (Tlang)

Geological horizon : Lower Miocene.

Subgenus ***Scissula*** Dall

1900. *Tellina (Scissula)* Dall, Pelecypoda : in K.A.Von zifted, Text book of Palaeontology (transl. and revised by C.R. Eastman) : 346-429, Macmillan & Co. (London & New York).

Tellina (Scissula) sp.

Diagnosis : Shell ovate, surface of both valves with fine oblique grooving not in harmony with incremental line.

Locality : Mizoram : Lunglei District, Eden Park, 13 km from Lunglei, and 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Pliocene to Recent.

Genus ***Hercodon*** Conrad, 1875

Hercodon sp.

Diagnosis : Shell elliptical, surface with irregular growth lines and numerous fine radials; hinge with angular linear pit for resilium deeply impressed, pallial sinus broad, rounded.

Locality : Mizoram : Lunglei District, Eden Park, 13 km. from Lunglei, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Miocene.

Genus ***Macoma*** Leach, 1819

Subgenus ***Bendimacoma*** Eames, 1957

Macoma (Bendimacoma) sp.

Diagnosis : Shell large, solid oblique, hinge without lateral teeth, grooved pallial sinus tongue shaped, narrow confluent for half its length.

Locality : Mizoram : Lunglei District, Pukpui, nr. Lunglei Town 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene to Recent.

Subgenus ***Macoploma*** Pilsbry & Olsson, 1941

Macoma (Macoploma) sp.

Diagnosis : Shell thin, inequilateral, twisted slightly at posterior end, pallial sinus tending to be discrepant, area of posterior slope near dorsal margin granulated.

Locality : Mizoram : Lunglei District, Pukpui, nr. Lunglei Town 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene to Recent.

Family CARDIIDAE

Genus ***Cardium*** Linnaeus 1758

1758. *Cardium* Linnaeus, *Systema Naturae per regna tria naturae* : 827 edit. Decina (Holmiae).

Cardium sp.

Diagnosis : Shell semicircular, adductor scars subequal. Hinge with two nonbifid elevated cardinal teeth in either valve. Ribs keeled.

Locality : Mizoram : Dhaleswari river suspension bridge, Reik Road.

Geological horizon : Miocene.

Subgenus ***Bucardium*** Gray

1853. *Cardium (Bucardium)* Gray, *Ann. Mag. Nat. Hist.* (2) **2** : 2, VII : 124-133 (London).

Cardium (Bucardium) sp.

Diagnosis : Shell quadrangular, adductor scars subequal. Hinge with two nonbifid cardinal teeth in either valve, lateral teeth present, one anterior and one posterior in left valve, two anterior and one posterior in right valve. Posterior ribs strongly digitate, no posterior gape.

Locality : Mizoram : Upper Bhuban Formation, South hilman, near Aizawl.

Geological horizon : Lower Miocene to Recent.

Genus ***Jurassicardium*** Cossman, 1906

Jurassicardium sp.

Diagnosis : Shell rounded, beaks nearly central, well defined umbonal ridge, entire pallial line, posterior dorsal margin rectangular; posterior ribs not spinose, other radial riblet indistinct.

Locality : Mizoram : Lunglei District, Zotlung, near Lunglei Town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Triassic to Recent.

Genus ***Loxocardium*** Cossmann, 1886

Loxocardium sp.

Diagnosis : Shell nearly equilateral, posterior margin slightly truncate, posterior ribs notched, rib sculpture of fine looped cross threads, hinge relatively short.

Localaity : Mizoram : Lunglei District, Pachang, 25 km. from Lunglei Town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene to Miocene.

Genus ***Vepricardium*** Iredale

1929. *Vepricardium* Iredale, *British Museum (Nat. History) Sci. Repts.*, V. 5, No. 6 (Mollusca, pt.1).

Subgenus ***Hedicardium*** Marwick

1944. *Vepricardium (Hedicardium)* Marwick, *New Zealand fossil and Recent Cardiidae (Mollussca)* :. Vol. 74, pt. 3 : 255-272.

Vepricardium (Hedicardium) sp.

Diagnosis : Shell semicircular. Hinge with two non hyphen bifid cardinal teeth in either valve, cruciform in arrangement, lateral teeth present, one anterior and one posterior in left valve, two anterior and one posterior in right valve. Ribs smooth, finer on posterior area, interspaces linear.

Locality : Mizoram : Bhuban Formation, South Hilman, near Aizawl.

Geological horizon : Lower Miocene.

Family CARDITIDAE

Genus ***Xenocardita*** Vokes

1946. *Xenocardita* Vokes, *Contribution to the palaeontology of the Lebanon mountains, Republic of Lebanon* : part 3 : *The pelecypod fauna of the "Olive locality" (Aptain) at Abeih; Am. Museum Nat. History, Bull.*, V. 87, art. 3 : 139-216.

Xenocardita sp.
(Pl. I, Fig. 7)

Diagnosis : Shell subtrapezoidal with broad anal truncature, ribs spinose, posterior ones lamellose; lunule small with sinuous anterior margin, anterior ridge in both valves independent of cardinals bearing obsolete laterals.

Locality : Mizoram : Lunglei Distric, Zotlung, nr. Lunglei Town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological haorizon : Miocene.

Genus ***Venericardia*** Lamarck

1801. *Venericardia* Lamarck. *Systeme des animaux sans vertebres* : VIII + 432 p. (Paris).

Venericardia sp.

Diagnosis : Shell rounded trigonal, inequilateral, thick shelled with numerous radial ribs evenly elevated. Hinge compressed.

Locality : Mizoram : Around Lungzarhtam and Bualpur; in and around Tuipang.

Geological horizon : Lower Miocene.

Family CULTELLIDAE

Genus ***Cultellus*** Schumacher

1817. *Cultellus* Schumacher, *Essaid'un nouvean systeme des habitations des vers testaces*; 287 p., (Copenhagen).

Cutltellus sp.

Diagnosis : Shell obong, end rounded, valve wider and compressed, hinge with one to three cardinal teeth, one in right valve, two in left valve, pallial sinus small.

Locality : Mizoram : around Lungrarhtum and Bualpur.

Geological horizon : Miocene.

Family DONACIDAE

Genus ***Donax*** Linnaeus, 1758

1758. *Donax* Linnaeus, *Systema Naturae per regna tria naturae* : 824.

Dona sp.

Diagnosis : Shell trigonal, inequilateral, opisthogyrate, hinge with two cardinals and well developed lateral, pallial sinus present, radial sculpture present.

Locality : Mizoram : Vivakawn; Dhaleswari river suspension bridge, Reik Road; west of Khwachete; Rilthu (Tlang).

Geological horizon : Lower Eocene to Recent.

Distribution : Cosmopolitan.

Family ERYCINIDAE

Genus ***Erycina*** Lamarck, 1805

Erycina sp.

Diagnosis : Shell transversely elliptical, externally smooth with faint radial striae. Anterior right valve cardinal faintly developed, other ones trigonal, elongated lateral. Ligament extended backward.

Locality : Mizoram : Dhaleswari river suspension bridge Reik Road.

Geological horizon : Paleocene to Pliocene.

Order MYTILOIDA

Family PINNIDAE

Genus ***Atrina*** Gray

1842. *Atrina* Gray, *Syn. Cont. Brit. Mus.*, ed. 44. Moll.

Atrina sp.

Diagnosis : Shell equivalve, ham-shaped, posterior end rounded, no median ridge, smooth radial rows of ribs, internal nacre not divided into two lobes.

Locality : Mizoram : Kolasib, Bilkathalu section.

Geological horizon : Lower Miocene.

Distribution : Cosmopolitan.

Genus ***Pinna*** Linnaeus

1758. *Pinna* Linnaeus, *Systema Naturae per regna tria naturae* : 824.

Pinna sp.

Diagnosis : Shell equivalve, ham shaped; umbones at extreme anterior end, valves carinate medially, mostly with radial ribs growth undulation on ventral region, nacre of interior devided medially into two lobes.

Locvality : Mizoram : South of Tawngkalawng; around Saiha.

Geological horizon : Lower Miocene.

Distribution : Cosmopolitan.

Subgenus ***Pinna*** Poli

1791. *Pinna (Pinna)* Poli, *Testacea utrinsque Siliciae eorumque historia et. anatomic tabulis aeneis illustrata*; Vol. 1.

Pinna (Pinna) sp.

Diagnosis : Shell wedge hyphen shape, ventral margin straight to concave; median ridge well defined. Sculpture of radial ribs or rows of scales.

Locality : Mizoram : Kolasib, Bilkathlu Section, Bilkathalu-Vairengte Road, Kolasib-Bhairabi Road Section.

Geological horizon : Lower Miocene.

Distribution : Cosmopolitan.

Order MYOIDA

Family CORBULIDAE

Genus ***Corbula*** Bruguiere

1797. *Corbula* Bruguiere, *Tablean encyclopedique et methodique destrois regnes de la naturae; Vers testacees a coquilles bivalves* : Vol. 1.

Corbula sp.

Diagnosis : Shell moderately sized, inflated, smooth to concentrically ribbed, valves inequilateral, left valve slightly smaller than right valve, resilifer in one valve.

Locality : Mizoram : Aizawl District, west of Khwachete, Rilthu (Tlang).

Geological horizon : Cretaceous to Recent.

Subgenus ***Varicorbula*** Grant & Gale

1931. *Corbula (Varicorbula)* Grant & Gale, *Catalogue of the marine Pliocene and Pleistocene Mollusca of Californnia : San Diego Soc. Nat. History, Mem.* Vol. **1** : 1036.

Corbula (Varicorbula) sp.

Diagnosis : Shell small, sculpture discrepant, resilifer in one valve, valves inequilateral. Right valve with concentric ribbing, left valve with faint radials and concentric growth striae, pallial sinus small.

Locality : Mizoram : North Aizawl town.

Geological haorizon : Lower Eocene to Recent.

Family TEREDINIDAE

Genus ***Spathoteredo*** Moll, 1928

Spathoteredo sp.

Diagnosis : Shell blade of pallets more or less rectangular in outline, truncated at anterior end and sheathing stalk; stalk extending well upto blade which is thick at anterior end and tapers posteriorly.

Locality : Mizoram : Lunglei District, near Pachang, 25 km from Lunglei town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Miocene to Recent.

Order NUCULOIDA

Family NUCULIDAE

Genus ***Nucula*** Lamarck

1799. *Nucula* Lamarck, *Prodrome d'une nouvelle classification des coquilles, comprenant uneredaction appropriee des caracters generiques et establishment d'un grand nombre de genres nonveaux : Soc. Histoire Nat. Paris, Mem.* V. 1 : 63-91.

Nucula sp.

Diagnosis : Shell ovate, normally with polished periostracum, beaks opisthogyrate, resilifer present.

Locality : Mizoram : around Saiha, around Lungzarhtum and Bualpur; south of Tawngkalawng.

Geological horizon : Cretaceous to Recent.

Distribution : Cosmopolitan.

Family NUCULANIDAE

Genus ***Yoldia*** Moller

1842. *Yoldia* Moller, *Index molluscorum groenlandiae : Naturhist. Tidsskr.*, V. 4, No. **1** : 76-97.

Yoldia sp.

Diagnosis : Shell elognate, ovate, thin walled, hinge series subequal; resilium pit large; pallial sinus dep and wide.

Locality : Mizoram : Rilthu.

Geological horizon : Cretaceous to Recent.

Distribution : Cosmopolitan.

Family PRAENUCULIDAE

Genus ***Similodonta*** Soot-Ryen 1964

Similodonta sp.

(Pl. I, Fig. 8)

Diagnosis : Shell rounded, large; anterior and posterior teeth similar in size and number. Resilifer absent, stronger adductor muscle scars.

Locality : Mizoram : Lunglei District, Zotlung, near Lunglei town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Upper Ordovician to Recent.

Order PRAECARDIOIDA

Family ANTIPLEURIDAE

Genus ***Antipleura*** Barrande

1881. *Antipleura* Barrande, *Joachim Systeme silurien du centre de la Boheme, premiere partie recherches paleontologique, volume 6, classe des mollusques, order des accephales* : XXIV + 342 p., 48 pl. (quarto edit) published by the author and editor (Prague and paris).

Antipleura sp.

Diagnosis : Shell inequivalve, inflated, subcircular, beaks prosogyre, posterior part of shell commonly set off by uniform costellae.

Locality : Mizoram : Bawngkawn, near Aizawl town, 11.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Middle Silurian to Miocene.

Order HIPPURITOIDA

Family MEGALODONTIDAE

Genus ***Pterocardia*** Bayan, 1874

Pterocardia sp.

Diagnosis : Shell thick, large, subrectangular, higher than long, inequilateral, posteriorly sublobate; umbones prominent, beaks anterior to median, hinge plate massive and moderately broad, left valve with stoutly triangular anteriorly placed cardinal, short anterior lateral close to it, and more elongate and distant posterior lateral, right valve with two obliquely aligned cardinals.

Locality : Mizoram : Lungle District, Pachang 25 kms. from Lunglei town, 6.5.94, T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Upper Jurassic to Miocene.

Orders ANYSOMYARIA

Family OSTREIDAE

Genus ***Ostrea*** Linnaeus

1758. *Ostrea* Linnaeus, *Systema Naturae per regna tria naturae* : 824, edit, Decima (Holmiae).

Ostrea sp.

Diagnosis : Shell irregular in shape, undulated margin, left valve thick, larger, right valve comparatively smaller, shallow lid, margin of the valve thrown into a series of folds; single large adductor impression in the centre of the valve.

Locality : Mizoram : west of Khwachete

Geological horizon : Cretaceous to Recent.

Distribution : Cosmopolitan.

Class GASTROPODA

Order ARCHAEOGASTROPODA

Family TROCHIDAE

Genus ***Solariella*** Wood, 1842

Solariella sp.

Diagnosis : Shell orbicular, small umbilicus deep wide. Last whorl rounded or with obsolete keel.

Locality : Mizoram : Saiha.

Geological horizon : Miocene to Rercent.

Family COCULINIDAE

Genus ***Coculina*** Dall

1882. *Cocculina* Dall, *U.S. Nat. Mus., Proc.*, V. **4** (1881) : 279-291 (Washington).

Cocculina (Cocculina) sp.

Diagnosis : Shell small, conical to cup-shaped, colourless with radiating and concentric sculpture, apex nearly central.

Locality : Mizoram : Aizawl District, Rilthu (Tlang).

Geological horizon : Lower Miocene.

Order MESOGASTROPODA

Family POTAMIDIDAE

Genus ***Cerithidea*** Swainson

1840. *Cerithidea* Swainson. *A Treatise on malacology or shells and shell fish* : The cabinate cyclopedia, Nat. Histtory : 420.

Cerethide sp.

Diagnosis : Shell small, not more than 50 mm in height, elongate whorls ten or less, aperture extending anteriorly with straight canal.

Locality : Mizoram : Aizawl District, Kolasib-Bilkathalu section.

Geological horizon : Miocene.

Family NATICIDAE

Genus *Natica* Scopoli

1777. *Natica* Scopoli, *Introduction and historium Naturalem sistentes genera lapridum, plantarum et aninum, hactenus detecta, caracteribus essentialibus donata, intribus divisa, subinde-ad leges naturae* : 506.

Natica sp.

Diagnosis : Shell medium, turbinate, subglobose, spire short, collumeller callus present, reflected over umblical opening, operculum with one or two marginal ribs; funicle developed, sculpture with or without axial growth striae and radial ribs at the suture.

Locality : Mizoram : Aizawl District, Dhaleswari river suspension bridge, Reik Road.

Geological horizon : Miocene.

Distribution : Cosmopolitan.

Family FICIDAE

Genus ***Ficus*** Röding

1798. *Ficus* Röding, *Museum Boltenianum sive Catalogus cimeliorum e tribus regnis naturae qyaeolim collegerat joa. Fried. Bolten, pars Secunda* : 119.

Ficus sp.

Diagnosis : Shell slender, spire depressed bulbous at the shoulder, siphonal canal curved left; surface sculptured with close set spiral ridges and crossed by less developed longitudinal lirae and ornamented.

Locality : Mizoram : Aizawl, Mission Veng; Rilthu (Tlang)

Geological horizon : Miocene.

Family STROMBIDAE

Genus ***Rimella*** Agassiz

1842. *Rimella* Agassiz, *Memoire sur les moules des mollusques vivants et fossils : Soc. Sci. Nat. Neuchatel, Mem.*, **22**(4) : 48.

Rimella sp.

Diagnosis : Shell thick rounded, strong whorls, outer lip extended into a ring hyphen like structure with a notch towards anterior part, siphonal canal drawn to a narrow elongate canal.

Locality : Mizoram : Aizawl, Vivakawn; near Saiha.

Geological horizon : Lower Miocene.

Order NOTOGASTROPODA

Family CONIDAE

Genus ***Conus*** Linnaeus

1758. *Conus* Linnaeus, *Systema Naturae per regna tria naturae* : 824.

Conus sp.

Diagnosis : Shell cone-shaped, apex not tapering; aperture wide, columella curved, lips not parallel.

Locality : Mizoram : nr. Saiha.

Geological horizon : Miocene.

Family OLIVIDAE

Genus ***Oliva*** Bruguiere

1789. *Oliva* Bruguiere, *Encyclopedie methodique; histoire naturalle des vers*; Vol. **1** (1) : 344.

Oliva sp.

Diagnosis : Shell thick, suture enamelled, columella slightly twisted, aperture moderately wide.

Locality : Mizoram : Aizawl District, Tuikhan Lui.

Geological horizon : Lower Miocene.

Genus ***Oliviella*** Swainson, 1831

Oliviella sp.

Diagnosis : Shell thick, cylindrical, columella folded, suture enamelled, aperture wide.

Locality : Mizoram : Aizawl District, Rilthu (Tlang).

Geological horizon : Lower Miocene.

Family TURRIDAE

Genus ***Turris*** Röding

1798. *Turris* Röding, *Museum Bolteniarum sive calalogas cimeliorum e tribus regnis naturae quaeolim Collegeratejoa; Humburg* : 119.

Turris sp.

Diagnosis : Shell thick walled, outer margin with a notch on outer part, siphonal canal shorter than spire.

Locality : Mizoram : nr. Saiha.

Geological horizon : Lower Miocene.

Family BUCCINIDAE

Genus ***Siphonalia*** Adams, 1863

Siphonalia sp.

Diagnosis : Shell narrow elongate, spire short, whorl ovate, umbilicus present, outer lip not thickened.

Locality : Mizoram : nr. Saiha.

Geological horizon : Lower Miocene.

Order CAENOGASTROPODA

Family TURRITELLIDAE

Genus ***Turritella*** Lamarck

1800. *Turritella* Lamarck, *Soc. Histoire Nat. Paris Mem.* Vol. **1** : 63-91.

Turritella sp.

Diagnosis : Shell moderately large, slender, whorl convex, primary spirals starting in the order abapical-medial-adapical; outer lip arcuate, lateral sinus shallow, oblique; no basal sinus.

Locality : Mizoram : nr. Saiha.

Geological horizon : Oligocene to Recent.

Distribution : Southeast Asia; Japan.

Phylum ECHINODERMATA

Subphylum ECHINOZOA

Class ECHINOIDEA

Order SPATANGOIDA

Family LOVENIIDAE

Genus ***Lovenia*** Desor, 1847

Subgenus ***Vasconaster*** Lambert

1915. *Lovenia (Vasconaster)* Lambert, *Description des Echinides neo genes du Bassin du Rhone; Soc. Paleont. Suisse, mem.* Vol. **41** : 155-240.

Lovenia **(Vasconster)** ***sulcatus*** (Haime), 1853
(Pl. I, Fig. 9)

Diagnosis : Test low oval to heart shaped, petal not forming transverse crescent; primary tubercles not recessed in ampullae.

Locality : Mizoram : Aizawal District, Bawngkawn, near Aizawl town, 11.5.94, T.K.Pal, U.Saha and S.K.Ray; 12 km south of Aizawl on Aizawl-Seling Road. 12.5.94.

Geological horizon : Eocene to Recent.

Distribution : Cosmopolitan.

Family SPATANGIDAE

Genus ***Spatangus*** Gray

1825. *Spatangus* Gray, *An attempt to divide the Echinida or seaeggs into natural families. Ann. Philos., new ser.* Vol. **10** : 423-431.

Spatangus sp.

Diagnosis : Heart shaped, right side normally projecting slightly beyond left, ambulacre of normal shape and structure.

Locality : Mizoram : Aizawl District, Kolasib-Bilkathalu Section.

Geological horizon : Eocene to Recent.

Distribution : Cosmopolitan.

Genus ***Schizaster*** L. Agassiz

1836. *Schizaster* L. Agassiz, *Soc. Neuchatel Sci. Nat., Mem.* **1** : 168-199.

Schizaster sp.

Diagnosis : Test high, sloping anteriorly from posterior vertex, beaked over periproct; ambulacra sunken, frontal one deeply depressed; posterior petals 0.3 to 0.5x as long as anterior pair; apical system ethmolytic with gonopores.

Locality : Mizoram : Aizawl district, Bawngkawn, nr. Aizawl town, 11.5.94, coll. T.K. Pal, U. Saha and S.K. Ray.

Geological horizon : Eocene to Recent.

Distribution : Cosmopolitan.

Phylum CHORDATA
Subphylum VERTEBRATA
Class CHONDRICHTHYES
Order SELACHII
Family CARCHARINIDAE

Genus ***Carcharius*** Blainville

1816. *Carcharinus* Blainville, *Bull. Soc. Philom. Paris,* **8** : 105-124.

Carcharinus gangeticus Muller & Henle

1838-41. *Carcharinus gangeticus* Muller & Henle, *Systematische Beschretiberg der Plagiostomen,* Berlin : 200.

Diagnosis : Height and breadth of tooth equal, crown triangular, uniform serrations on both edges; external surface of crown flat while internal surface convex; anterior margin of crown longer than posterior margin with a slightly concave base. Roof short, thick and broad, convex on internal surface with a slight bifurcation, external surface flat. Height of crown and roof almost similar.

Locality and horizon : Mizoram : Aizawl District, Upper Bhuban Formation of Sairang area.

Remarks : Tiwari *et al.,* (1998) recorded this species from Mizoram. Noetling (1901) reported this species from Myanmar. Stuart (1910) considered it as the synonym of *Sphyrna prisca.* Mehrotra *et al.,* (1973) recorded this species from Lower Miocee limestone bed of Baripada, Orissa.

Genus ***Hemipristis*** Agassiz

1843. *Hemipristis* Agassiz, *Biblioth. Univers. Geneve,* **43** : 353-369.

Hemipristis Serra Agassiz

1843. *Hemipristis serra* Agassiz, *Biblioth. Univers Geneve,* **43** : 353-369.

Diagnosis : Teeth large, erect, with apex directed posterioty, higher than broad. Crown distinctly higher than roof, lanceolate, thicker at base, thinning towards apex. External surface only a little convex, internal surface is convex towards base and flattening towards apex. Both edges sharp bearing serrations, smaller at base and larger towards apex, ending abruptly a little below apex. Inner edge concave, outer edge eonvex. Roof rather small, swollen at the middle forming a distinct bilobed structure on internal side.

Locality and horizon : Mizoram : Aizawl District, Calcareous sandstone of Kolasib area (Bhuban Formation).

Remarks : Satsangi and Mehrotra (1983) and Mehrotra(1984) recorded this species from Mizoram. Earlier, Mehrotra *et al.,* (1973) recorded this species from Lower Miocene shales of Matanumadh and Lakhpat of Kachchh, Gujarat.

Genus ***Negaprion*** Whitley

1950. *Negaprion,* Whitley, *Proc. R. zool. Soc.* N.S.W. 1950. 44.

Negaprion sp.

Diagnosis : Tooth small, erect, internal surface concave, external surface nearly flat. Cusp smooth, apex acute. Crown edges sharp and devoid of serration. External surface with a small groove in middle of the crown extending towards base. Root small, convex on internal side.

Locality and horizon : Mizoram : Lunglei District, 4.8 km north of Lunglei town near Zotlung. Conglomeratic horizon in Upper Bhuban Formation.

Remarks : Tiwari *et al.,* (1998) recorded this species from Mizoram. But they did not assign any specific identification of the material as the base of the tooth was broken and incomplete. Earlier Sahni and Mehrotra (1981) recorded teeth of *Negaprion brevirostris* from the Miocene beds of Baripada, Orissa and Kachchh, Gujarat.

Family ISURIDAE

Genus ***Isurus*** Rafinesque-Schmaltz

1810. *Isurus* Rafinesque – Schmaltz, *Caratteri dialcuni nuovi genere e nuove specie di animali (principalmente di pesci) e piante della Sicilia, convarie asservazioni sopra I medisim; Palermo* : 105.

Isurus spallanzani Bonaparte

1839. *Isurus spallanzani* Bouaparte, *Mem. Soc. Sci. Nat. Neuchatel,* **2** : 1-2.

Diagnosis : Teeth slender, higher than broad; crown short, thick and lanceolate; crown surface smooth. Root well developed, thick, highly convex towards inner side, deeply bifurcated with lateral branches.

Locality and Horizon : Mizoram : Aizawl District, Upper Bhuban Formation of Sairang area.

Remarks : Satsangi and Mehrotra (1983) and Mehrotra (1984) recorded *Isurus* sp. from clacareous sandstone of Kolasib area of Mizoram, but they did not assign any specific identification. Tiwari (1992) recorded *Isurus spallanzani* from Upper Bhuban Formation of Sairang area. Mehrotra *et al.,* (1973) recorded this species from the Lower Miocene limestones of Baripada, Orissa, Matanumadh of Kachchh, and Miocene limestones lying below ossiferous conglomerate of Piram Island (Gujarat).

Genus ***Carcharoddon*** Muller & Henle

1838-41. *Carcharodon* Mluller & Henle, *Systematische Beschreibung der Plagiostomen,* Berlin : 200.

Carcharodon carcharias Linnaeus

Diagnosis : Teeth large, subtriangular, erect or very slightly oblique. Crown higher than roof, edges sharp, coarsely and regularly serrated, both margins slightly concave but little convex on basal part. Inner margin with a notch. The cusp is thicker in middle and thinner towards edges; devoid of denticles. Root broader than height, anterior and posterior margins of root concave. External surface flat, internal little convex, no groove on internal side.

Locality and hirozon : Mizoram : Aizawl District, Calcareous sandstone of Kolasib area (Bhuban Formation).

Remarks : Satsangi and Mehrotra (1983) and Mehrotra (1984) recorded this species from Mizoram. Earlier, Mehrotra *et al.,* (1973) recorded this species from Lower Miocenes of Baripada, Orissa, and Lower Miocene shales of Matanumadh and Lakhpat, Kachchh, Gujarat.

Family ALOPIIDAE

Genus ***Alopias*** Rafinesque-Schmaltz

1810. *Alopias* Rafinesque-Schmaltz, *Caratteri di alcuni nuovi genere e nuove specie di animali (principalmente di pesci) e piante della sicilia, convarie osservazioni sopra: medisimi. Palermo* : 105.

Alopias sp.

Diagnosis : Teeth similar in both jaws, small and blade like. Crown compressed, edge sharp and devoid of serrations. Both external and internal surfaces convex.

Locality and horizon : Mizoram : Aizawl District, Calcareous sandstone of Kolasib area (Upper Bhuban Formation).

Remarks : Satsangi and Mehrotra (1983) and Mehrotra (1984) recorded this species from Mizoram.

Family SPHYRNIDAE

Genus ***Sphyrna*** Rafinesque-Schmaltz

1810. *Sphyrna* Rafinesque-Schmaltz, *Caratteri di alcuni nuovi genere e nuove specie di animali (principalmente di pesci) e piante della sicilia, convarie osservazioni sopra; medisimi.* Palermo : 105.

Sphyrna zygaena Linnaeus

Diagnosis : Apical most part of crown obtuse; corwn erect, one edge of crown nearly straight, other egdge slightly convex, convex side shows faint striations upto base. Base of crown goes all along over the root. Root low but broad.

Locality and horizon : Mizoram : Lunglei District, about 4.8 km. north of Lunglei town near Zotlang; Silty sandstone horizon in the upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1998) recorded this species from Mizoram. The specimens examined by them show similarity with the lower lateral anterior tooth of *Sphyrna zygaena* from Miocene of Portugal, reported by Antunnes and Jonet (1970).

Family DASYATIDAE

Genus ***Dasyatis*** Rafinesque-Schmaltz

1810. *Dasyatis* Rafinesque-Schmaltz, *Caratteri di alcuni nuovi genere e nuove specie di animali (Prinklcipalmente di pesci) e piante della Sicilia, convarie osservazioni sopra I medisimi.* Palermo : 105.

Dasyatis sp.

Diagnosis : Tooth small, crown subovate, lingual part cuspidate, a groove is present in the middle. Surface of the crown designed with fine pits, root short with subround lobes.

Locality and horizon : Mizoram : Lunglei District, about 4.8 km. north of Lunglei twon near Zotlang; Conglomeratic horizon in the Upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1998) reocrded this species from Mizoram. Mehrotra (1985) reported several species of *Dasyatis* from Miocene beds of Baripada, Orissa. For want of further material and detail Tiwari *et al.*, (loc. cit) did not assign their mateiral to any particular species, recorded so far.

Family CARCHARIDAE

Genus ***Carcharias*** Rafinesque-Schmaltz

1810. *Carcharias* Rafinesque-Schmaltz, *Caratteri di alcuni neovi genere e neove specie di animali (Principalmente di pesci) e piante della sicilia, convarie osservazioni sopra i medisimi.* Palermo : 105.

Subgenus ***Odontaspis*** Agassiz

1843. *Odontaspis* Agassiz, *Biblioth. Univers. Geneve* **43** : 353-369.

Carcharias (Odontaspis) sp.

Diagnosis : The sand sharks with large, awl-shaped teeth.

Locality and horizon : Mizoram : Aizawl District, Calcareous sandstone of Kolasib area (Bhuban Formation).

Remarks : Satsangi and Mehrotra (1983) and Mehrotra (1984) recorded '*Odontaspis cuspidata*' from Mizoram, without furnishing any description or illustration. They (loc. cit.) might have referred the material to *Carcharias tricuspidata*, so far known from the lower Miocene of Kachchh, and Baripada in orissa, by Mehrotra *et al.*, (1973) and Mishra (1985).

Family PRISTIOPHORIDAE

Genus ***Pristiophorus*** Muller & Henle

1838-41. *Pristiophorus* Muller & Henle, *Systematische Beschreibung der Plagiostromen*, Berlin : 200.

Pristiophorus suevicus Jaekel

1890. *Pristiophorus suevicus* Jaekel, *Sitzber. Ges. Naturf. Freunde* Berlin 1890 : 117-131.

Diagnosis : Crown of tooth erect, without crenulations on the edges; apex obtuse, root low. Only external surface of crown becomes visible as the tooth remains embedded in the matrix from internal side.

Locality and horizon : Mizoram : Lunglei District, about 4.8 km. north of Lunglei town near Zotlang; silty sandstone horizon in Upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1998) recorded this species from Mizoram. They (loc. cit.) observed that the tooth from Mizoram resembles closely with that of *Pristiophorus suevieus* recorded from Miocene bed of Portugal by Antunnes and Jonet (1970).

Family MYLIOBATIDAE

Genus ***Myliobatis*** Cuvier

1817. *Myliobatis* Cuvier, *Le regne animal distribue d' apres son organisation, pour servir de base a l' histoire naturelle des animaux et d' introduction a' l'anatomie comparee.* Vols. 1-4, Paris.

Myliobatis sp.

Diagnosis : Dental plate small, consisting of rows of median teeth along with rows of lateral teeth on either side. Crowns of teeth thin. Median teeth hexagonal.

Locality and horizon : Mizoram : Aizawl District, south Hilman, near Aizawl town; Shell limestone of Upper Bhuban Formation.

Remarks : Mehrotra (1986) recorded *Myliobatis* sp. from Mizoram.

Class OSTEICHTHYES

Order ACTINOPTERYGII

Family DENTICIDAE

Genus ***Dentex*** Cuvier

1817. *Dentex* Cuvier, *Le regne animal distribue d'apres son organisation, pour servir de base a' l'histoire naturelle des annimanx et d' introduction a' l' anatomie compare'e.* Vols. 1-4, Paris.

Dentex sp.

Diagnosis : Teeth cylindrico-conical. Crown curved towards inner margin, surface of crown fractured, basalmost part of crown on internal side shows small sized vertical striations.

Locality and horizon : Mizoram : Lunglei District, about 4.8 km. north of Lunglei town near Zotlang; silty sandstone horizon in upper Bhuban Formation.

Remarks : Tiwari *et al.*, (1998) recorded *Dentex* sp. from Mizoram, but they did not assign the material to any particular species due to incomplete structure.

DISCUSSION

Our own exploration was concentrated mainly around Lunglei area and to a certain extent around Aizawl township. The Middle and Upper Bhuban sediments exposed in and around Lunglei was rich with an interesting assemblage of fauna comprising Pelecypods, Gastropods, Ichnofossils etc. A large number of smaller and larger Foraminifera are present in the sediments which are yet to be critically studied.

Thick bands of calcareous sandstone and shell limestone have been recorded in both the Middle and Upper Bhuban Formations. The presence of fossiliferous horizon is more frequent and perhaps better represented in the Upper Bhuban sediments than in the Middle Bhuban. These calcareous sandstone and shell limestone bands which occur as part of compact, grey sandstone were dominated by various Palecypods and Gastropods. The fossil assemblage shows dominance of Pelelcylpoda followed by Gastropoda, and occasionally by Echinoidea. The concentration of the invertebrate shells, at places become very high and has been termed as shell limestone. The faunal assemblage of shell limestone horizons in both the Upper and Middle Bhuban Formations do not show striking difference as well. It is therefore, invonvenient to ascertain specific ages for these horizons on the basis of fossils recovered, only except they may be assigned Lower Miocene age.

Other fossiliferous horizons in the Upper Bhuban Formations in Aizawl District have yielded a range of molluscan fossils in which Pelelcypods constitute at least 70 per cent (Mehrotra, 1987). The occurrence of *Apolymetis grimesi, Macrocallista erycina, Chlyamys jamviensis, Ficus conditus, Miogypsina* sp., *Anadara* sp. etc. suggest the Lower Miocene age for the fossiliferous horizon. Mehrotra (loc. cit.) noted that the Pectinids, Veneroids etc. in the horizon were of larger size and thereby indicating favourable habitat and palaeoenvironmental conditions for their growth. The large sized shells are suggestive of the onset of Miocene epoch.

The lithological and biostratigraphic studies of Upper Bhuban sediments in Aizawl and Kolasib areas reveal that the Kolasib Formation (Nagaraja

Rao, 1984) is coeval to the Upper Bhuban Formation while the Bhairabi Formation is coeval to the Bokabil Formation.

The Lower Miocene fauna of Mizoram shows considerable resemblances with the Tertiary fauna of Garo Hills (Mukherjee, 1939) and Western India (Vrendenburg, 1925, 1928). Close affinity of this fauna is also traced with the Malu member of Sri Lanka (Devaniyajala, 1969) and Miocene beds of Myanmar (Noetling, 1901).

The presence of identical species of crabs from western India, north eastern India and adjoining Myanmar indicate their wide distribution during Miocene. Further, the faunal assemblage indicates a shallow marine environment of deposition.

By and large, the fossil fauna of Mizoram which is a component of the Indo-Pacific fauna demonstrate a close resemblances with the fossil fauna of Mediterranean zone. The similarity of fauna of these two regions are indicative of continuity marine habitat between Europe, Asia a Africa in the Aquitanian age (Davies, 1975).

SUMMARY

The state of Mizoram is situated in the north eastern corner of the country covering an area of about 21,087 sq. km. The Mizo hills forming part of the Naga-Arakan Yoma reprersent the eastern extremity of the tectonic domain of Surma Valley. The region was a part of the Tethys sea in Archaean period. During the Palaeozoic and much of the Mesozoic eras the sea continued to receive sedimentary deposits. Repeated orogenic movements accompanied by extensive igneous intrusions occurred in the successive periods. A final orogenic phase in the early Pleistocene age raised the upland to its present status. A two fold lithostratigraphic rock classification, comprised of Upper and Middle Bhuban Formations for most part of Mizoram, is presented by many of the geological investigators, while a few investigators have recognised additional Barail group of rocks in eastern Mizoram. A number of fossil beds are exposed along the length and breadth of the territory. The exploration and updating of records of animal fossils from this area were conducted as a part of the programme of preparation of exhaustive faunal account of the State of Mizoram by the ZSI.

Altogether, 117 species of animal fossils and 1 trace fossil have been recorded *viz.*, 19 species of Protozoa : Foraminifera, 1 species of Bryozoa, 9 species of Arthropoda : Crustacea, 61 species of Mollusca : Bivalvia and 7 species of Mollusca : Gastropoda, 3 species of Echinodermata, 12 species of Pisces and 1 Ichnofossil (Trace fossil). The assemblage of the fossil fauna assigned Lower Miocene age, which show recemblances with the Tertiary fauna of Garo-hills and Miocene fauna of Myanmar.

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