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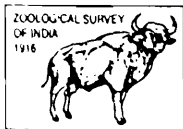
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DESCRIPTION OF A NEW SPECIES OF THE LEECH FAMILY SALIFIDAE (*ODONTOBDELLA KRISHNA* SP. NOV.) FROM THE RIVER GANGA AT PATNA, BIHAR (INDIA)

HASKO NESEMANN AND GOPAL SHARMA*

Centre of Environmental Sciences, Central University of
Bihar, BIT Campus, Patna-800014, Bihar, India

E-mail: hnesemann2000@yahoo.co.in

*Zoological Survey of India, Gangetic Plains Regional Centre
Patna-800016, Bihar, India

E-mail: gprszsipatna@rediffmail.com

INTRODUCTION

The first discovery of large-sized erpobdelliform leeches in the River Ganga in May 2010 has filled a gap within the South-Asian diversity and lead to the following description of a species new to science.

Leeches of the Family Salifidae are benthic predators in freshwaters of Africa, Asia and Australia in tropical, subtropical to warm-temperate zones. Salifidae are forming together with the Holarctic family Erpobdellidae the suborder Erpobdelliformes, having asymmetrically so-called "strepsilaemat" pharynx without true jaws; three pseudognatha are present as small fleshy folds. Salifidae are formally characterized by the presence of three pairs of needle shaped stylets, which distinguish them from their sister group Erpobdellidae (Johansson, 1918). Both families are generally occupying similar ecological niches. The larger species usually reach a body length of > 10-15 cm or more with full extension and they feed on other earthworm-like annelids, insect larvae and even other leeches. Recent works of the Indian Hirudinologists are including all hitherto known aquatic and terrestrial species (Chandra 1983, Mandal 2004a-d, 2009, Bandyopadhyay & Mandal 2004). Till yet any large Erpobdelliformes were unknown from India, but already described from Eastern China (Yang, 1996).

Brief Review of the Family Salifidae

The family Salifidae is comparatively poorly known, generic subdivision appears to be provisional as in Erpobdellidae (Sket & Trontelj, 2008). Although the numerous taxa have been formally described, many of

them are insufficiently known only from the type locality or a few records (Moore 1927, Chandra 1983). At present seven genera with 31 described species and one subspecies (Tab. 1) are worldwide regarded as members of Salifidae (Soós 1966, Sawyer 1986). The uncertain systematic position of two genera *Scaptobdella* and *Dineta* still awaits clarification, since no stylets have been reported by their discovery (Blanchard 1897, Goddard 1908, Oka 1926). Salifidae of the Oriental Region are listed by Sket & Trontelj (2008) with three genera and nine species.

The anatomy of the pharynx and the arrangement of stylets is an important character to distinguish different genera, which have similar external morphology (Hussein, Kinzelbach & El-Shimy 1988). The pharynx, external annulation and genital system of East and South Asian Salifidae were studied (Nesemann 1995, Nesemann, Sharma & Sinha 2004, Nesemann *et al.*, 2007), revealing higher diversity than previously known.

Thorough fieldwork was conducted in Nepal, Japan and India to discover and investigate living leeches and to characterize their habitat specification. Thus Salifidae appear to be as highly diversified as Palearctic Erpobdellidae. Numerous regional species within the large territory of the family still await their discovery and scientific description.

MATERIAL AND METHODS

The leech fauna of the River Ganga was investigated frequently along the right bank in the city of Patna.

Keywords : *Odontobdella*, Salifidae, Hirudinea, India, first description, morphology, taxonomy.

Samples were collected qualitatively by hand or using a hand net. Stones, bricks, shells of living molluscs and valves of empty freshwater mussels were investigated; especially the subsurface near the bottom. During lean season many predatory leeches were found in shallow water in aquatic habitats or amphibious in the littoral zone of riverbank directly above the water's edge. Three specimens were usually relaxed in 15% ethanol and then transferred into 70% ethanol for preservation. One specimen was directly preserved into 96% ethanol for biochemical analysis.

STUDY AREA

The study area is the right (erosion-) bank of River Ganga along the city of Patna. It is located from Mahendrughat in the West (25° 37' 19'' N, 85° 09' 18'' E) downstream to the Ruins of the Old Royal palace in the East (25° 37' 07'' N, 85° 11' 18'' E). The research was conducted from May 30th to 22nd August 2011 including frequent field observations.

SYSTEMATIC ACCOUNTS

Phylum ANNELIDA

Class HIRUDINEA

Order ARHYNCHOBDELLIDA

Suborder ERPOBDELLIFORMES

Family SALIFIDAE

Genus *Odontobdella* Oka, 1926

Species *krishna* sp. nov.

Results :

Odontobdella krishna sp. nov.

(Figs. 1-13)

Material Examined : Holotype (Figs. 9, 11) : India, Bihar, Patna, River Ganga, between Krishnaghat and Gandhighat, 1-vi-2010, leg. Gopal Sharma and Hasko Nesemann (Reg. no. ZSI, GPRC IV-3018, 1 ex.).

Paratypes (Fig. 10) : India, Bihar, Patna, River Ganga, between Krishnaghat and Gandhighat, 1-vi-2010, leg. Gopal Sharma and Hasko Nesemann, (Reg. no. ZSI, GPRC IV-3019, 3exs.).

Additional material : River Gandak floodplain, monsoon pond at the right bank Shanti Bagicha, west of Hajipur (25° 42' 7.56'' N, 85° 11' 12.07'' E), 22-viii-2011, leg. Gopal Sharma and Hasko Nesemann, (Reg. no. ZSI, GPRC IV-3020, 1 ex.).

Type locality (Fig. 14) : India, Bihar, River Ganga at Patna, right bank, between Krishnaghat and Gandhighat, alt.-53 m. (25° 37' 19'' N, 85° 09' 18'' E).

Etymology : *Krishna* for occurrence from Krishnaghat which is famous place for bathing and other religious activities. It refers to the name of Lord Krishna.

Diagnosis : Large, much elongate Salifidae with very firm body consistence. Leech cylindrical interiorly; blunt lateral fringes located in posterior region. Eyes are lacking. The pharynx is strepsilaemat and triangular in cross-section, bearing three small (? probably reduced) stylets-pockets with each one pair of rudimentary styli present in pharynx, arranged in tandem.

Body length of holotype : 77 mm length and 6 mm width; diameter of caudal sucker 5 mm. Three Paratypes : 76 mm length, 7 mm width; diameter of the caudal sucker 4.5 mm, 67 mm length, 7 mm width; diameter of the caudal sucker 5 mm, 53.0 mm length, 9.0 mm width; diameter of the caudal sucker 5.0 mm. Annulation of the mid-body somites is heteronomous with six annuli, five of similar width, one ring is narrower than others: $b1\ H''\ b2\ H''\ a2 = b5 = c11 > c12$. Thus there are five wide rings, followed by one narrow ring on the anterior part of the body. The total number of annuli per segment increases by subdivision of all wider rings in the posterior region of the body. There are eleven annuli present on the dorsal side: $[c1\ H''\ c2] = [c3\ H''\ c4] = [b3\ H''\ b4] = [c9\ H''\ c10] = [d21\ H''\ d22] > c12$. The clitellum's is not well marked in mature specimens, extending from $\times\ b5 - XIII\ a2$. The male genital pore is very large and prominently swollen, situated median on the first annulus of XII $b1$; female pore in XII $c12$ /XIII $b1$. The distance between the genital pores is five and one half annuli ($1/2\ b1, b2, a2, b5, c11, c12$).

The body surface is rough by numerous small papillae arranged in one row per annulus. Colour of dorsum yellow-brown, with numerous irregular dark brown spots on the anterior body. Colour of ventral surface.

Habitat and distribution : The adults of *Odontobdella krishna* sp.n. were found in the semi-aquatic zones of the riverbank very closed to the waterline outside the water.

Morphological observations : The living extended leeches reach a total length of 12-14 cm. The half-grown specimen from the River Gandak North of Patna has 46.0 mm length, 4.5 mm width and the diameter of caudal sucker is 3.5 mm. It was found in a shallow monsoon pond, swimming between submerged macrophytes.

The cocoons are rather flattened and rounded ovate in shape, length 13 mm, width 6.7 mm. They are fixed on stony substrate during the pre-monsoon period together with the leeches. They have been already

found, being erroneously added to *Salifa biharensis* by Neseemann *et al.* (2004 : 180, Figs. 162, 163).

Prey : *Odontobdella krishna* sp. nov. was observed while feeding on half-grown specimens of *Glyphidrilus gangeticus* in the natural habitat.

Differential diagnosis : The described new Indian leeches are more similar to *Odontobdella* species from Japan than to *Sinodontobdella* from China. Thus their generic position into *Odontobdella* is confirmed by their pharynx. *Odontobdella krishna* sp. nov. is distinguished from *Odontobdella blanchardi* and *Odontobdella polaneci* by their reduced and rudimentary stylets of minute size. Although the stylet-pockets are well visible, the function of styli in holding the prey is questionable due to their reduced size. *Odontobdella krishna* sp. nov. differs from other species by the lower degree of annulations in subdividing each segment into only six rings. It differs from other pigmented *Odontobdella* species by the absence of eyes. It shows some similarities to *Odontobdella quadrioculata* Oka, 1921 from Myanmar.

Discussion :

Classification of the species within Salifidae

Among the heteronomous annulated members two similar genera with five described species are named :

Odontobdella Oka 1926, Annotationes Zoologicae Japonenses, Vol. X, Article 24 : 248, Figs 8-13, 15.

Type species : *Scaptobdella blanchardi* Oka 1910

Congenitors : *Trocheta quadrioculata* Oka 1922

Odontobdella polaneci Neseemann 1995

Odontobdella krishna sp. nov.

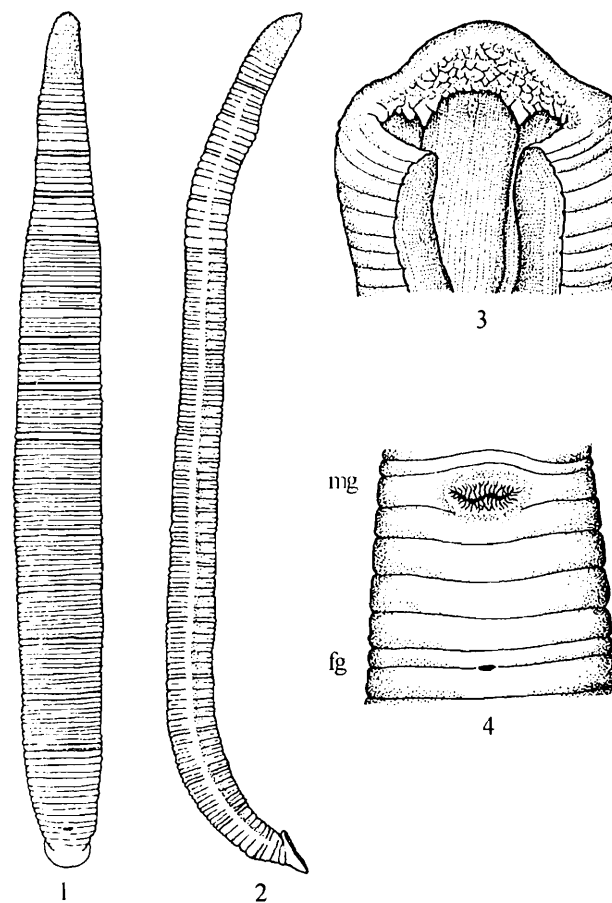
Odontobdella spec.

1995. *Sinobdella* Neseemann, *Acta Zoologica Academiae Scientiarum Hungaricae*, **41** : 180, Figs 52-58, 62.

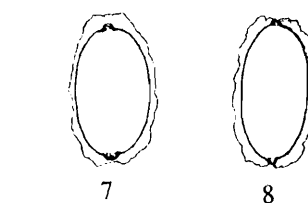
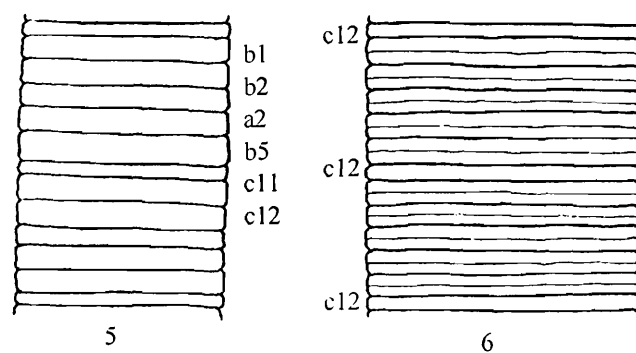
2007. *Sinodontobdella* Neseemann, *Aquatic Invertebrates of the Ganga River System*, Vol. **1** : 196, 5 Figures.

Type species : *Sinobdella kinzelbachi* Neseemann 1995.

Odontobdella was originally described for *Scaptobdella blanchardi* from Japan by Oka (1926) to differentiate leeches with stylets-bearing pharynx from *Mimobdella japonica* which stylets are lacking. The genus *Odontobdella* has been regarded for long times as monotypic by Soós (1966) and Sawyer (1986) unless one further species *Odontobdella polaneci* could be discovered and described. The re-examination of *Odontobdella blanchardi* was based on author's collections of topotypic material from the 'terra typica'



Figs. 1-4. *Odontobdella krishna* nov. sp. Fig. 1 : Habitus dorsal, Fig. 2 : lateral, Fig. 3 : Pharynx with pseudognaths and stylets, Fig. 4 : ventral position of male genital pore (mg) and female pore (fg).



Figs. 5-8. *Odontobdella krishna* nov. sp. Fig. 5 : annulation type of the anterior body, Fig. 6 : annulation type of posterior body, Fig. 7, 8 : Cocoons.

(Nesemann 1995). Although four Japanese islands are mentioned in the original description, Hondô (= Honshu) is the type locality as per subsequent designation because of its first position (Oka 1910).

The Chinese leeches differ markedly in the arrangement and position of stylets from their Japanese allies, that they were removed from *Odontobdella* and placed into a separate genus *Sinodontobdella* Nesemann (2007). This new leech name was given to replace the *Sinobdella* Nesemann, 1995, which has been found pre-occupied by *Sinobdella* Kottelat & Lim, 1994, for a fish (Teleostei : Chaudhuriidae).

Beside the nomenclatural history of the East-Asian Salifidae, the papers of Oka (1910, 1922, 1926) arises several questions about the systematic unity of the Japanese leeches studied by himself. In the original description of *Scaptobdella blanchardi* Oka 1910, the leeches were distinguished by their annulations scheme from *Mimobdella japonica* Blanchard, 1897. Oka (1910) has included four different coloured forms into *blanchardi*, namely white bluish, brownish, dark reddish to nearly black dorsal side from a wide geographical range including Honshu, Shikoku, Kyushu and Okinawa. Later Oka (1926 : 231, Fig. 15) described the presence of 'three to six' large stylets in the pharynx. In the figure one single stylet is shown and arranged in caudal direction. Thus the number of stylets might be incompletely counted since three pairs are generally found in Salifidae. The stylet-position in Oka's figure shows great affinities with findings of Nesemann (1995 : 182, Fig. 62) and Yang (1996: 201, Fig. 115d). It is most likely that Oka's first observations were based on an assemblage of *Odontobdella* and probably *Sinodontobdella*, which have been distinguished later by paying attention to the position and arrangement of the pharyngeal stylets.

New generic position of two East-Asian Salifidae

The presence of two accessory copulatory pores is an external feature of genus *Barbronia* Johansson (1918) or family Barbronidae according to few author's view (El-Shimy, 1998). Therefore two species of the Chinese fauna are being preliminary transferred into genus *Salifa* Blanchard (1897) because the authors (Yang 1996, Yang, Wang & Zhang 1997) do not mention any accessory pores (Table-1).

SUMMARY

A new predatory leech *Odontobdella krishna* sp. nov. is described from the River Ganga and Gandak at Patna. It differs from other hitherto known Salifidae in South-Asia by the large size. The amphibious species has no eyes in adults; the segments are subdivided into six to eleven unequal annuli. Five rings separate the genital pores. The pharynx bears three pairs of minute stylets. The new leech shares many characters with the Japanese *Odontobdella* species and differs markedly from the Chinese allies, e.g. *Sinodontobdella kinzelbachii*. The discovery of *Odontobdella krishna* sp. nov. fills a gap within the radiation of Salifidae.

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Table-1 : List of leech species of Erpobdelliformes (former Erpobdellidae sensu Soós, 1966), which are preliminary added to Salifidae (Sawyer, 1986) with three new combinations. Taxa of uncertain position are marked with asterisk. The Number of pairs of eyes is indicating : 1 labial pair + number of the buccal pairs + number of the lateral pairs).

Sl. No.	Taxon	Author(s) and Year of Description	Description	Measurements of Asian Species (L. × W. in mm)	Number of pair of eyes
1.	<i>Salifa perspicax</i>	Blanchard, 1897	Africa	48 × 4	1 + 6
2.	* <i>Salifa cambouei</i>	Blanchard, 1897	Madagascar, Reunion	–	–
3.	<i>Salifa lateroculata</i>	(Kaburaki, 1921)	Asia, SE to Bali	14 × 3	1 + 4 (–5)
4.	<i>Salifa indica</i>	(Kaburaki, 1921)	NW-India	45 × 4	1 + 5
5.	<i>Salifa heptamerata</i>	(Kaburaki, 1921)	South-India	40 × 5	1
6.	<i>Salifa africana</i>	(Moore, 1939)	Africa, Central to South	33.3 × 6.8	1 (minute)
7.	<i>Salifa elongata</i>	Moore, 1939	Africa, Central to North	75 × 2.9	Not visible
8.	<i>Salifa delicata</i>	(Moore, 1939)	Africa, Tanganyika Lake	14.3 × 1.6	1
9.	<i>Salifa johanssonia</i>	Sawyer, 1986	Africa, White Nile	18 × 3.5	1 + 8
10.	<i>Salifa hainana</i>	Yang, 1996	China	24 × 3.5	1 + 3 (–5)
11.	<i>Salifa zhejiangica</i> nov. comb.	(Yang, 1996)	China	45 × 5	1 + 2 (small)
12.	<i>Salifa yunnanensis</i> nov. comb.	(Yang, Wang & Zhang, 1997)	China	42 × 5.5	1 + 2 (small)
13.	<i>Salifa biharensis</i>	Nesemann, Sharma & Sinha, 2004	North-India: Bihar	50 × 5	1 + 2
14.	<i>Linta be</i>	Westergren & Siddall, 2004	Madagascar	35	1 + 4
15.	<i>Barbronia weberi</i>	(Blanchard, 1897)	Asia to New Zealand	31 × 1.9	1 + 2
16.	<i>Barbronia rouxi</i>	Johansson, 1918	New Caledonia, New Guinea	–	1 + 2
17.	<i>Barbronia weberi formosana</i>	(Oka, 1929)	Japan, Taiwan	33	1 + (1–2)
18.	<i>Barbronia arcana</i>	(Richardson, 1970)	Australia	–	1 + 2
19.	<i>Barbronia assiuti</i>	Hussein & El-Shimy, 1982	Africa, Nile basin	40	1 + 2
20.	<i>Barbronia gwalagwalensis</i>	Westergren & Siddall, 2004	South-Africa	25	1 + 2
21.	<i>Barbronia wuttkei</i>	(Kutschera, 2004)	Germany (aquarium)	19 × 2.5	1 + 2
22.	<i>Barbronia nepalensis</i>	Nesemann & Sharma, 2007	Central Himalaya, Nepal	34 × 5	1 (+ 2)
23.	<i>Barbronia shillongensis</i>	Nesemann, 2007	Kashi Hills, NE-India	30 × 4	1 (+ 2)
24.	<i>Odontobdella blanchardi</i>	(Oka, 1910)	East-Asia	110 × 8	1 (+ 4)
25.	* <i>Odontobdella quadrioculata</i>	(Oka, 1922)	Inle Lake, Myanmar	24	1 + 1
26.	<i>Odontobdella polaneci</i>	Nesemann, 1995	Japan	36	(1 minute)
27.	<i>Odontobdella krishna</i>	nov. spec.	Bihar, North-India	77 × 6	Not visible
28.	<i>Sinodontobdella kinzelbachi</i>	Nesemann, 1995	China	45	1 + 4
29.	* <i>Scaptobdella horsti</i>	Blanchard, 1897	Java, Sumatra, Borneo, China	30 × 3	–
30.	* <i>Scaptobdella sumatrensis</i>	Harding, 1931	Sumatra	–	–
31.	* <i>Dineta cylindrica</i>	Goddard, 1908	Australia	–	1 + 2

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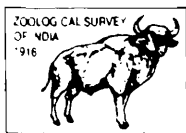
13

Obonotobdella krishna nov. sp. Fig. 9 : lateral view, Fig. 10 : ventral view, Fig. 11 : dorsal view of type specimens.



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Obonotobdella krishna nov. sp. Fig. 12 : Dorsal View of fully extended specimen with two cocoons, Fig. 13 : contracted specimen, Fig. 14 : Habit type, specimen.



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ON A COLLECTION OF EULOPHIDAE (HYMENOPTERA : CHALCIDOIDEA) FROM SUNDERBANS BIOSPHERE RESERVE OF WEST BENGAL, INDIA

P. GIRISH KUMAR, T.C. NARENDRAN* AND S.I. KAZMI

Zoological Survey of India, M-Block, New Alipore, Kolkata-700053, West Bengal, India

E-mail: kpgiris@gmail.com; kazmisi@rediffmail.com

**Systematic Entomology Laboratory, Department of Zoology,*

University of Calicut-673635, Kerala, India

E-mail: drtcnarendran@yahoo.com

INTRODUCTION

The Sunderbans area is composed of a group of Islands from the mouth of the river Hoogly on the west and extending up to the river Meghna in the east, covering North and South 24 Parganas districts of West Bengal in India and Khulna and Barishal districts in Bangladesh. It lies approximately 87°51'-91°30' east longitude and 21°31'-22°30' north latitude. It is considered as the largest single mangrove belt of the world, comprising an area of 9827 sq. km. of which 4264 sq. km. comes under India. In 1989, the Government of India declared the entire Indian Sunderbans (9630 sq. km.; mangrove belt plus nearby villages) as Sunderbans Biosphere Reserve. Due to its unique ecosystem, it has also been declared a World Heritage site in 1989. It is the largest estuary delta in the world with extremely rich diversity of aquatic and terrestrial flora and fauna.

Eulophidae is one of the economically important families of Chalcidoidea (Hymenoptera). Many species of this family are parasitic on insect pests of agricultural crops. In continuation of our explorations of the chalcidoid fauna of Sunderbans (Narendran & Girish Kumar, 2009a & b; Narendran *et al.*, 2010), we are reporting here 20 species of eulophids of which 13 species are new record from Sunderbans Biosphere Reserve and 11 species are new record from West Bengal State.

MATERIAL AND METHODS

The collections were taken from several localities in the Sunderbans Biosphere Reserve. All the identified specimens are deposited in the 'National Zoological Collections' of the Zoological Survey of India, Kolkata.

All the specimens except *Chrysonotomyia postmarginaloides* (Saraswat) and *Leptocybe invasa* Fisher & LaSalle were collected by using sweep net specially made for the purpose. *C. postmarginaloides* and *L. invasa* were reared from the leaf galls of *Mangifera indica* and *Eucalyptus* respectively. The card mounted specimens were studied under Leica MZ 6 stereozoom microscope (Switzerland) and the photographs were made by using Samsung (Model PL 50; 10.2 megapixels and 3x optical zoom) digital camera while specimens kept under the microscope.

Acronyms for museums and depositories : ANIC = Australian National Insect Collection, Canberra, Australia; BMNH = The Natural History Museum, London, England; BPBM = Bernice Pauahi Bishop Museum, Honolulu, Hawaii; NZSI = National Zoological Collections, Zoological Survey of India, Kolkata, India; QMB = Queensland Museum, Brisbane, Australia; SAMA = South Australian Museum, Adelaide, Australia; SEA = School of Entomology, St. John's College, Agra, India; USNM = United States National Museum, Washington DC, USA; ZDAMU = Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India; ZSIK = Western Ghats Regional Centre, Zoological Survey of India, Kozhikode, Kerala, India.

The following abbreviations for terms are used in the text : CC = Costal cell; F1-F3 = Funicular segments 1 to 3; MS = Malar sulcus; MV = Marginal vein; SLG = Sublateral grooves or sulcus or line of scutellum; SMG = Submedian grooves or sulcus or line of scutellum; SMV = Submarginal vein; STV = Stigmal vein; T1-T6 = Gastral tergites 1 to 6.

SYSTEMATIC ACCOUNT

Family EULOPHIDAE

Subfamily ENTEDONINAE

1. *Chrysonotomyia postmarginaloides* (Saraswat) (Image 1)

1975. *Tetrastichus postmarginaloides* Saraswat, 19, Holotype ♀, India : Shencottah Gap (USNM).
1981. *Chrysonotomyia postmarginaloides* (Saraswat) : Khan & Shafee, 351.
1981. *Chrysonotomyia kerrichi* Khan & Shafee, 348, Holotype ♀, India : Aligarh (ZDAMU). Synonymy by Hayat & Perveen, in Hayat *et al.*, 2005 : 7.

Diagnosis : Female : Length 2.34 mm. Body yellow except for dorsomedian metallic coppery-green and green patch on mesonotum and scutellum respectively; head reddish brown; antennae dark brown with scape yellowish brown; eyes dark red; legs pale yellow; T3-T6 with brownish black transverse band; ovipositor sheath brownish black; wings hyaline.

Material examined: 1 ♀ INDIA: West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Chamta, 28.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12555/H3).

Host : The studied specimen reared from the leaf galls of *Mangifera indica* (Family : Anacardiaceae).

Distribution : India : Tamil Nadu, Uttar Pradesh, West Bengal (new record) (Oman).

2. *Pseudosecodes calicuticus* Narendran (Image 2)

2006. *Pseudosecodes calicuticus* Narendran, Narendran *et al.*, 561-563, Holotype ♀, India : Kerala (ZSIK).

Diagnosis : Female : Length 3.2 mm. Dark metallic green reflections with the following parts as follows : eyes pale yellow with a dark tinge; ocelli reflecting pale brownish yellow; tegula pale brownish yellow; legs with coxae concolorous with body; femora concolorous with body except base and apex paler; trochanter yellow; tibiae mostly yellow with weak brownish band in middle; first three tarsal segments yellow, fourth brown; wings hyaline with veins pale brown.

Material examined : 1 ♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Dwarikapur, 24.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. No. 12556/H3).

Distribution : India : Kerala, West Bengal (new record).

Subfamily EULOPHINAE

3. *Elachertus nigrithorax* (Girault) (Image 3)

1913. *Pseudelachertus nigrithorax* Girault, 260, Holotype ♀, Australia : Queensland (QMB).

1988. *Elachertus nigrithorax* (Girault) : Boucek, 642.

2011. *Elachertus nigrithorax* (Girault) : Narendran, 111.

Diagnosis : Female : Length 1.73 mm. Head and thorax black; gaster blackish brown; antenna dark brown except scape and pedicel pale brownish yellow; eyes dark brown; ocelli reflecting yellow; tegula brown; legs pale brownish yellow except all coxa blackish brown; wings hyaline and veins pale brown.

Material examined : 1 ♀ INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Haldibari, 27.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12557/H3); 1 ♀, Netidhopani, 31.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12558/H3); 1 ♀, Jharkhali, 3.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12559/H3).

Distribution : India : Karnataka, West Bengal (new record) (Australia, China).

4. *Elasmus punensis* Mani & Saraswat (Image 4)

1972. *Elasmus punensis* Mani & Saraswat, 479, Holotype ♀, India : Pune (USNM).

2011. *Elasmus punensis* Mani & Saraswat : Narendran, 170.
2009a. *Elasmus punensis* Mani & Saraswat : Narendran and Girish Kumar, 92.

Diagnosis : Female : Length 1.5-2.5 mm. Yellowish brown or pale brownish yellow; middle coxa dark brown or black on basal half; head with ocellar triangle, axillae, propodeum, a spot on base of first gastral tergite on either side, an obscure narrow patch above near base of hind coxa; ovipositor sheath brownish black.

Material examined : 1 ♀ INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Bagabadpur, 25.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. No. 10605/H3); 1 ♀, Murir Jhabri, 30.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12560/H3).

Distribution : India : Andhra Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal (Sri Lanka).

5. *Elasmus anticles* Walker (Image 5)

1846. *Elasmus anticles* walker, 181, Holotype ♀, India : Bombay (BMNH).

2011. *Elasmus anticles* walker : Narendran, 137.

Diagnosis : Female : Length 1.3-2.13 mm. Black with green reflections on head, mesosomal dorsum and on sides of basal T1; tegula dark brown; mesoscutum with a yellow spot on each side near tegula; scutellum black with slight metallic refringence; metanotum yellow at base of posterior hyaline extended part; legs dark brown

with trochanters, apical half of fore femur, apices and middle of hind femur and tibiae of all legs pale yellow. Gaster slightly longer than head and mesosoma combined.

Material examined : 7♀, INDIA: West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Netidhopani, 31.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 12561/H3 to 12567/H3); 1♀, Sudhanyakhal, 1.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12568/H3).

Distribution : India : Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal (new record) (Bangladesh, Philippines).

6. *Hemiptarsenus varicornis* (Girault)

(Image 6)

1913. *Eriglyptoides varicornis* Girault, 154, Holotype ♀, Australia : South Australia (SAMA).

1988. *Hemiptarsenus varicornis* (Girault) : Boucek, 627.

2011. *Hemiptarsenus varicornis* (Girault) : Narendran, 279.

Diagnosis : Female : Length 1.23 mm. Head and mesosoma blackish brown to black; gaster dark brown; antenna dark brown except scape pale brown; eyes dark brown; ocelli reflecting black; tegula dark brown; all coxa concolorous with mesosoma except at apex pale yellow; mid and hind femur yellowish brown; all trochanters and remaining parts of legs pale brownish yellow except at apical tarsal segments brown; wings hyaline and veins pale brown.

Material examined : 2♀ INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Sajnekhali, 1.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 12569/H3 & 12570/H3).

Distribution : India : Karnataka, Kerala, Maharashtra, Uttar Pradesh, Uttarakhand, West Bengal (new record) (Australia, Canary Islands, China, Ethiopia, Fiji, Ghana, Guam, Hawaii, Indonesia, Iran, Japan, Kenya, Madeira, Malaysia, New Caledonia, Pakistan, Peoples' Republic of China, Saudi Arabia, Senegal, Seychelles, Spain, Sri Lanka, Sudan, Taiwan, Tanzania, Turkey, Vanuatu).

7. *Sympiesis striatipes* (Ashmead)

(Image 7)

1904. *Eulophus striatipes* Ashmead, 165, Holotype ♀, Japan (USNM).

1976. *Sympiesis striatipes* (Ashmead) : Kamijo, 486-488.

2011. *Sympiesis striatipes* (Ashmead) : Narendran, 383.

Diagnosis : Female : Length 1.5 mm. Head and thorax black; gaster blackish brown; antenna and eyes dark

brown; ocelli reflecting yellow; tegula brown; legs yellow except all coxae and tips of tarsi dark brown; wings hyaline and veins pale brown.

Material examined: 1♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Gosaba, 26.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12571/H3).

Distribution : India : West Bengal (Japan, Peoples' Republic of China, Sri Lanka, Taiwan, Thailand, United Arab Emirates, Yemen).

Remarks : Earlier Kamijo (1976) reported this species from India without mentioning the state or exact collection locality. Most probably, new record for West Bengal.

Subfamily TETRASTICHINAE

8. *Aprostocetus bangaloricus* Narendran

(Image 8)

2003. *Aprostocetus bangaloricus* Narendran, (in Hayat *et al.*), 323, Holotype ♀, India : Bangalore (ZSIK).

2009a. *Aprostocetus bangaloricus* Narendran : Narendran and Girish Kumar, 91.

Diagnosis : Female : Length 1.22-1.25 mm. Predominantly black with slight metallic reflections on head and mesosoma; flagellum brown; scape, pedicellus, femora, trochanters, tibiae, tarsi and tegulae pale brownish yellow; coxa dark brown; T1 and sides of T2 pale yellowish brown; wings hyaline, veins pale whitish yellow. Mesoscutum with 4 adnotaular setae; pedicellus plus flagellum 0.88x width of mesosoma; MV 3.15x as long as STV; gaster 1.16x as long as mesosoma.

Material examined : 1♀, INDIA : West Bengal; Sunderbans Biosphere Reserve; S-24 Parganas dist.; Dwarikapur, 24.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. No. 10558/H3).

Distribution : India : Karnataka, West Bengal.

9. *Aprostocetus benazeer* Narendran

(Image 9)

2007. *Aprostocetus benazeer* Narendran, 44, Holotype ♀, India : Pattambi (NZSI).

Diagnosis : Female : Length 1.63 mm. Flagellum brownish black; pedicellus and scape yellow, head black; pronotum yellow with median region and posterior part near scapula black; pronotal spiracle pale yellow; mesoscutum and scapula yellow; axilla yellow with brown patch at apex; scutellum black with pale brownish yellow on sides; prepectus and tegula yellow; mesopleuron and metapleuron black with upper part of mesopleuron pale brownish yellow; propodeum black;

legs yellow with basal upper part near propodeum of hind coxa slightly brown and slight brownish tinge on outer and middle femora; all pretarsi dark brown; gaster black with base yellow; wings hyaline. Pedicellus plus flagellum 1.58x width of mesosoma; mesoscutum with 4 adnotaular rows of setae on either side; propodeal spiracle partly covered by callus; MV 4.8x as long as STV.

Material examined : 1 ♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Gosaba, 26.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12572/H3).

Distribution : India : Kerala, West Bengal (new record).

10. *Aprostocetus dala* Narendran (Image 10)

2007. *Aprostocetus dala* Narendran, 51, Holotype ♀, India : Idukki (NZSI).

Diagnosis : Female : Length 2.14 mm. Body yellow with the following markings: ocellar area black, posterior part of pronotum, anterior median part of mesoscutum, a spot on the anterior part of scapula, a spot on anterior part of axilla and scutellum (except on the extreme sides of scutellum behind SLG) blackish brown with metallic green reflections; dorsellum brown with slight metallic green reflections; propodeum with submedian area pale brown and median carina black, gaster with blackish brown markings and with slight metallic green reflections; antenna brown with pedicellus and scape paler; wings hyaline; legs including coxae yellow, pretarsi blackish brown; ovipositor sheath black. Mesoscutum with 3 adnotaular setae on each side; MV 3.73x as long as STV; gaster 2x as long as mesosoma.

Material examined : 1 ♀, INDIA: West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Haldibari, 27.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12573/H3).

Distribution : India : Kerala, Uttarakhand, West Bengal (new record).

11. *Aprostocetus kuriani* (Hussain & Khan) (Image 11)

1954. *Syntomosphyrum israeli* Kurian, *Agra Univ. J. Research (Sci.)*, 3(1) : 131. Male, Female, India : Cuttack (SEA?). Preoccupied by Mani & Kurian (1953).

1986. *Tetrastichus kuriani* Husain & Khan, *Orient. Ins.*, 20 : 239.

2007. *Aprostocetus kuriani* (Husain & Khan) : Narendran, 71.

Diagnosis : Female : Length 1.50 mm. Body reddish brown to black with metallic greenish blue luster; legs yellowish brown with hind coxa dorsally black; antenna with 1 anellus; postocellar line 1.5x ocellocular line; forewing 2.4x as long as broad; MV 3.05x as long as STV; hind femur 1.25x as long as wide; gaster 1.5x as long as mesosoma, laterally compressed; ovipositor long exerted from ventrally far ahead of abdominal tip.

Material examined : 2 ♀ India : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Haldibari, 27.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 12574/H3 & 12575/H3).

Distribution : India : Odisha, Maharashtra, West Bengal (new record).

12. *Aprostocetus rimosus* Narendran (Image 12)

2007. *Aprostocetus rimosus* Narendran, 88, Holotype India : Kottiyoor (NZSI).

2009a. *Aprostocetus rimosus* Narendran: Narendran and Girish Kumar, 91.

Diagnosis : Female : Length 2 mm. Yellow with following exceptions: eye brick red; ocelli reflecting yellow; pedicellus and flagellum dark brown; scape pale yellow with anterior dorsal side slightly darker; space between ocelli, median part of pronotum, a large patch from anterior margin to three-fourth region extending to posterior margin of mesoscutum, a spot on the anterior part of scapula, anterior part of axilla and on scutellum, black. Scutellar spot and mesoscutal spot with slight metallic green reflections; propodeum with median carina and a patch in between spiracle and median carina dark brown. Gaster with dark brown patches on sides dorsally; ovipositor sheath black; wings hyaline. MV 6x as long as STV; mesoscutum with 3 adnotaular setae on either side; pedicellus plus flagellum 1.4x as long as width of mesosoma; rim of spiracle fully exposed.

Material examined : 2 ♀, INDIA : West Bengal; Sunderbans Biosphere Reserve; S-24 Parganas dist.; Dwarikapur, 24.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10559/H3 & 10560/H3).

Distribution : India : Kerala, Odisha, Uttar Pradesh, West Bengal.

13. *Aprostocetus vatiaata* Narendran (Image 13)

2007. *Aprostocetus vatiaata* Narendran, 103, Holotype ♀, India : Aligarh (NZSI).

2009a. *Aprostocetus vatiaata* Narendran : Narendran and Girish Kumar, 91.

Diagnosis : Female : Length 1 mm. Dark brown with lower frons, mesopleura, metapleura, coxae and gastral tergites light brown; antenna pale brownish yellow with scape, pedicellus, anelli, F1 pale yellow; tegula pale yellow; legs except fore coxae pale yellow with fourth tarsal segment and pretarsi brown; wings hyaline. SMV with 3 dorsal setae; MV 2.83x as long as STV.

Material examined : 1 ♀, INDIA : West Bengal; Sunderbans Biosphere Reserve; S-24 Parganas dist.; Dwarikapur, 24.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. No. 10561/H3).

Distribution : India : Kerala, Maharashtra, Uttar Pradesh, West Bengal.

14. *Leptocybe invasa* Fisher & LaSalle

(Image 14)

2004. *Leptocybe invasa* Fisher & LaSalle, (in Mendel *et al.*), 103, Female, Male, Holotype ♀, Israel (ANIC).

2009a. *Leptocybe invasa* Fisher & LaSalle : Narendran and Girish Kumar, 91.

Diagnosis : Female : Length 1.1-1.4 mm. Head and body brown with blue to green metallic refringence; mouth margin light brown to yellow; fore coxa yellow, middle and hind coxa concolorous with body; legs including tarsi yellow except for brown apical part of last tarsal segment; antenna with scape yellow, but darkened apically; funicle and clava light brown; wings hyaline.

Material examined: 31 ♀, INDIA : West Bengal; Sunderbans Biosphere Reserve; S-24 Parganas dist.; Bagabadpur, 25.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10562/H3 to 10592/H3).

Host : Specimens reared from leaf galls of *Eucalyptus*.

Distribution : India : Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, West Bengal (Algeria, Iran, Israel, Italy, Jordan, Kenya, Morocco, Spain, Syria, Turkey and Uganda).

Remarks : This is a serious pest of *Eucalyptus* and has widely affected the *Eucalyptus* plantations in Sunderbans.

15. *Neotrichoporoides curiosus* Narendran &

Girish Kumar

(Image 15)

2006. *Neotrichoporoides curiosus* Narendran & Girish Kumar, in Narendran *et al.*, 12-13, Holotype ♀, India : Muthanga (NZSI).

2009a. *Neotrichoporoides curiosus* Narendran & Girish Kumar: Narendran and Girish Kumar, 92.

Diagnosis : Female : Length 1.77 mm. Dark metallic green with the following parts as follows : antenna

brown with pale scape; mouth slightly pale; legs pale yellow with hind coxa brown and reflecting metallic green; fourth tarsal segment and pretarsus brown; wings hyaline. Eye length 1.06x its maximum width in profile; F1 nearly 2x as long as pedicellus; pedicellus plus flagellum about 1.8x width of mesoscutum; anterior pair of scutellar setae placed a little before middle of scutellum; hind coxa 2x as long as broad; CC 0.74x as long as MV.

Material examined : 1 ♀, INDIA : West Bengal; Sunderbans Biosphere Reserve; S-24 Parganas dist.; Bagabadpur, 25.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. No. 10593/H3).

Distribution : India : Kerala, West Bengal.

16. *Neotrichoporoides galia* Narendran & Santhosh

(Image 16)

2006. *Neotrichoporoides galia* Narendran & Santhosh, in Narendran *et al.*, 40 : 13-15, Holotype ♀, India : Kasaragod (NZSI).

Diagnosis : Female : Length 2.62 mm. Dark metallic green with following parts as follows: antenna blackish brown with scape and ventral side of pedicellus pale brownish yellow; foreleg pale brownish yellow with fourth tarsus and pretarsus blackish brown; midleg similar to foreleg but base of coxa slightly brown; hind leg similar to midleg but hind coxa concolorous with mesosoma with pale apex; wings hyaline; pubescence on body pale white. Scape exceeding level of vertex; midlobe of mesoscutum with 7 adnotaular setae in irregular double rows, posterior pair longer than other pairs; forewing 3.47x as long as its maximum width; tip of hypopygium reaching middle of gaster.

Material examined : 1 ♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Do Banki, 27.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12576/H3); 1 ♀, Murir Dabri, 29.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12577/H3); 1 ♀ Sajnekhali, 1.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12578/H3); 1 ♀, Sudhanyakhali, 1.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12579/H3); 2 ♀, Jharkhali, 3.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10580/H3 & 12581/H3).

Distribution : India : Kerala, Tamil Nadu, West Bengal.

Remarks : This is the new record of this species from Sunderbans Biosphere Reserve.

17. *Neotrichoporoides idukkiensis* (Narendran)

(Image 17)

2005. *Neogaleopsomyia idukkiensis* Narendran, in Narendran *et al.*, 270-273, Holotype ♀, India : Idukki (NZSI).

2007. *Neotrichoporoides idukkiensis* (Narendran) : Narendran, 156,157.

Diagnosis : Female : Length 1.7 mm. Body metallic green; antenna brown with basal part of scape slightly paler; fore and mid coxae brown; hind coxa concolorous with mesosoma and other parts of legs yellowish white; tegula pale yellowish white; pubescence on body white; Wings hyaline. Scape exceeding a little above level of vertex; mesoscutum with 3 pairs of adnotaular setae.

Material examined : 2 ♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Murir Jhabri, 29.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10582/H3 & 12583/H3); 1 ♀, Sajnekhali, 1.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12584/H3).

Distribution : India : Kerala, West Bengal (new record).

18. *Neotrichoporoides viridimaculatus* (Fullaway)
(Image 18)

1955. *Burksia viridimaculata* Fullaway, 410. Holotype ♀, Hawaii : Honolulu (BPBM).

1987. *Neotrichoporoides viridimaculatus* (Fullaway) : Graham, 67.

Diagnosis : Female : Length 1.93 mm. Yellow with characteristic pattern of black or metallic green markings; antenna with scape as long as or a little longer than eye; SMG of scutellum absent or faintly indicated in part; surface relatively smooth and shiny with fine engraved reticulations; gaster slightly longer than head plus mesosoma, 2.3-3x as long as broad.

Material examined : 1 ♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Chamta, 28.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12585/H3); 3 ♀, Burir Dabri, 29.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10586/H3 to 12588/H3); 6 ♀, Jharkhali, 3.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10589/H3 to 12594/H3).

Distribution : India : Kerala, Tamil Nadu, West Bengal (new record) (Widely distributed in Old world and New world).

19. *Tetrastichus dulciculus* Narendran
(Image 19)

2007. *Tetrastichus dulciculus* Narendran, 255, Female, India: Nanminda (ZSIK).

2009a. *Tetrastichus dulciculus* Narendran: Narendran and Girish Kumar, 92.

Diagnosis : Female : Length 1.86 mm. Black with metallic green reflections. Antenna dark brown with pedicellus and scape pale brownish yellow; tegula

brown; all coxae concolorous with mesosoma, remaining segments yellow with a slight reddish tint on 0.85 part of its length from base; apical 0.15 part yellow; pretarsi brown; wings hyaline. Eye height 2.14x MS; fore wing about 2.87x its width; gaster 1.26x as long as mesosoma.

Material examined : 10 ♀ INDIA : West Bengal; Sunderbans Biosphere Reserve; S-24 Parganas dist.; Dwarikapur, 24.xi.2007, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10594/H3 to 10603/H3); 1 ♀ Bagabadpur, 25.xi.2007, Coll. P. Girish Kumar, Regd. No. 10604/H3 (NZSI).

Distribution : India : Kerala, West Bengal.

20. *Tetrastichus epilachnae* (Giard)
(Image 20)

1896. *Lygellus epilachnae* Giard, 839. Syntypes, France : Saint-Roch, near Valenciennes (Narendran, 2007 stated that types are not located).

1940. *Tetrastichus jablonowskii* Szelenyi, 86. Holotype ♀, Hungary : Budapest, Harmashatarhegy, 11.vi. 1934 (Synonymised with *epilachnae* by Domenichini 1966, 92.

2007. *Tetrastichus epilachnae* (Giard) : Narendran, 256.

Diagnosis : Female : Length 1.3- 2 mm. Body black with weak bluish or greenish tinge; antenna with 1 anellus; F2 1.4-1.43x as long as broad; clava about as long as F2 and F3 combined; mesoscutum with distinct median line; SMV with single dorsal seta; CC of forewing very narrow, more than 10x as long as broad.

Material examined : 1 ♀, INDIA : West Bengal, Sunderbans Biosphere Reserve, S-24 Parganas dist., Burir Dabri, 29.iii.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12595/H3); 1 ♀, Sajnekhali, 1.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. No. 12596/H3); 3 ♀, Jharkhali, 3.iv.2008, Coll. P. Girish Kumar (NZSI, Regd. Nos. 10597/H3 to 12599/H3).

Distribution : India : Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu, West Bengal (Bulgaria, Croatia, Europe, France, Hungary, Iran, Italy, Macedonia, Morocco, Netherlands, Pakistan, Slovakia, Sweden, USSR, Yugoslavia).

Remarks : New record for Sunderbans Biosphere Reserve.

SUMMARY

Twenty species of Eulophidae were identified from Sunderbans Biosphere Reserve of which 13 species are reported here for the first time from Sunderbans Biosphere Reserve of which 11 species are new record for West Bengal state.

ACKNOWLEDGEMENTS

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PLATE I



Fig. 1. *Chrysonotomyia postmarginaloides* (Saraswat). Female.



Fig. 2. *Pseudosecodes calicuticus* Narendran. Female.



Fig. 3. *Elachertus nigrithorax* (Girault). Female.



Fig. 4. *Elasmus punensis* Mani & Saraswat. Female.



Fig. 5. *Elasmus anticles* Walker. Female.



Fig. 6. *Hemiptarsenus varicornis* (Girault). Female.



Fig. 7. *Sympiesis striatipes* (Ashmead). Female.



Fig. 8. *Aprostocetus bangaloricus* Narendran. Female.

PLATE II

Fig. 9. *Aprostocetus benazeer* Narendran. Female.Fig. 10. *Aprostocetus dala* Narendran. Female.Fig. 11. *Aprostocetus kuriani* (Hussain & Khan). Female.Fig. 12. *Aprostocetus ricosus* Narendran. Female.Fig. 13. *Aprostocetus variata* Narendran. Female.Fig. 14. *Leptocybe invasa* Fisher & LaSalle. Female.Fig. 15. *Neotrichoporoides curiosus* Narendran & Girish Kumar. Female.Fig. 16. *Neotrichoporoides galia* Narendran & Santhosh. Female.

PLATE III



Fig. 17. *Neotrichoporoides idukkiensis* (Narendran). Female.



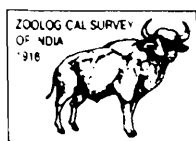
Fig. 18. *Neotrichoporoides viridimaculatus* (Fullaway). Female.



Fig. 19. *Tetrastichus dulciculus* Narendran. Female.



Fig. 20. *Tetrastichus epilachnae* (Giard). Female.



Rec. zool. Surv. India : 111(Part-3) : 21-25, 2012

STATUS SURVEY OF THE KHASI HILLS ROCK TOAD (*BUFOIDES* *MEGHALAYANA*) AT CHERRAPUNJEE, MEGHALAYA

KAUSHIK DEUTI, SUKUMAR RAY AND SWAPAN KUMAR DEY

Zoological Survey of India,
27, Jawaharlal Nehru Road, Kolkata-700016

INTRODUCTION AND BRIEF HISTORY

The Khasi Hills Rock Toad (*Bufoides meghalayana*) was first collected on 17th April, 1970 amongst the leaf axils of Screw Pine trees (*Pandanus furcatus*) from the plateau of a large hill at Mawblang, about 5 km south-east of Cherrapunjee town in East Khasi Hills district of Meghalaya State, Northeastern India by G.M. Yazdani and S.K. Chanda. The collectors described the species as *Ansonia meghalayana* assuming its relationship with *Ghatophryne ornata* of Brahmagiri hills in Coorg, Karnataka due to “absence of parotoid glands” but thought it distinct from it by presence of cranial ridges and the hidden tympanum (Yazdani and Chanda, 1971). The describers observed the species breeding in the leaf axils of screw pines where they also collected egg capsules measuring 91-122 mm with 23-40 eggs in them, each measuring about 4 mm in diameter. They presumed that these tiny toads migrated to the screw pine trees from elsewhere for breeding purpose and bred in the rain water accumulated in the leaf axils due to non-availability of suitable water bodies on the Mawblang plateau and also to secure better protection for their brood.

Later Pillai and Yazdani (1973) again surveyed the Mawblang area of Cherrapunjee where they found these toads breeding only in elevated pot-holes on boulders, half a meter above the ground. These pot-holes were 12-25 cm in diameter and 25-40 cm in depth, contained only 1-3 liters of water and sheltered up to 400 metamorphosed toadlets but no eggs or dead tadpoles. These authors concluded that the tadpoles of this species fed on eggs and dead tadpoles in the pot-holes or resorted to cannibalism. The small size of the tadpoles and comparatively short larval duration supported their conclusion. Due to absence of sucker-like oral discs in tadpoles and as the adults do not

breed in running water of streams like *Ghatophryne*, led these authors to accommodate the species in a new genus *Bufoides*.

Das *et al.* (2009) re-discovered the species from the deep horizontal cleft of a sandstone boulder along a dry rocky stream about 100 meters from Mawblang village. The toads exhibited “unken” reflex and both sexes were found to possess parotoid glands.

Specimens reported earlier as *Bufoides meghalayana* from Ngengpui Wildlife Sanctuary and Dampa Tiger Reserve in Mizoram by Pawar and Birand (2001) and the one collected from Tura in Garo hills of Meghalaya by Firoz Ahmed were examined and found to be undescribed species of the genus *Bufoides* which is endemic to India and currently considered monotypic (Das *et al.*, 2009).

METHODOLOGY

To determine the population status of the Khasi Hills Rock Toad (*Bufoides meghalayana*) in and around Cherrapunjee, Meghalaya, a status survey tour was conducted for 16 days from 25th June to 11th July, 2010 in the above mentioned areas of the East Khasi Hills. The three-member survey team conducted day and night surveys in all places likely to harbour this Rock Toad. This included the plateau of Mawblang, rocky ravines around Mawsmal caves, Eco-park and Thangkharang Park, hill streams near Saitsohen (Lower Sohra), areas around Mawmluh Cement Factory and the areas with screw pine vegetation atop Nohkhalikhai and Dainthlein Waterfalls. These areas were first visited during the daytime and possible habitats of the Rock Toad were earmarked which were visited during the evening with powerful torch lights to locate these unique anurans. GPS readings were taken at all these sites to determine the exact localities

of occurrence of these amphibians using a Garmin C-12 Global Positioning System. Air temperatures inside the rock crevices where these toads were located were also taken with a digital thermometer.

OBSERVATIONS AND RESULTS

The Khasi Hills Rock Toad (*Bufoides meghalayana*) was located at only three sites among all the areas surveyed in and around Cherrapunjee town of the East Khasi Hills, Meghalaya. The names, geographical coordinates and altitude of these three sites are given below :

1) Rock-crevices inside sandstone boulders in the wet stream on the eastern side of Mawblang plateau :
25.13893-25.13898 N
91.44018-91.44020 E

Between the altitudes of 1084-1093 meters above mean sea level.

2) Crevices among boulders in the nearby hill-stream with water on the southern side of Mawblang plateau :
25.13857 N
91.43916 E
altitude: 1113 m

3) Forested rocky ravine near Mawsmi Cave area :
25.14586 N
91.43477 E
altitude : 1192 m

The three sites where the species were located were all within 1.5 kilometer of each other. The descriptions of the three sites are given below :

First Stream :

The first was a wet stream (25.13893-25.13898 N, 91.44018-91.44020 E, altitude: 1084-1093 meters above mean sea level) on the eastern side of the Mawblang plateau, within 100 meters of Mawblang village. There was no running water in the stream during June-July but the stream-bed was wet due to heavy rains. The surfaces of rocks and sandstone boulders were covered with moss and were consequently very slippery. This stream was well-shaded by canopy cover provided by several screw pine (*Pandanus furcatus*) trees. A few pot-holes were located on boulders down-stream. These were 30-50 cm in diameter but only 15-20 cm in depth. They contained water to the brim and sheltered several tadpoles of the Twin-spotted Tree Frog (*Rhacophorus bipunctatus*) which is a species very common around Cherrapunjee. None of the pot-holes contained any tadpoles of the Rock Toad (*Bufoides meghalayana*).

The adult Rock Toads were found hiding inside several clefts of sandstone boulders in the stream. However, the total population in this stream was definitely less than 50.

Second Stream :

Another stream on the southern side of the Mawblang plateau (25.13857 N, 91.43916 E and altitude : 1113 meters above mean sea level) also sheltered a few Rock Toads (*Bufoides meghalayana*). This stream was less steep and less rocky with few sandstone boulders. However this stream was more shaded with screw pine trees. There was more water in the stream than the previous one although the stream did not have running water in June-July. Most of the water was restricted to huge rock-pools on the stream-bed and they all contained hundreds of tadpoles of the Twin-spotted Tree Frog (*Rhacophorus bipunctatus*). None of the rock-pools had any tadpoles of the Rock Toad (*Bufoides meghalayana*). Very few adult Rock Toads were found hiding inside the crevices of the sandstone boulders on the side of the stream. Their population here was definitely less than 30.

Third Stream :

As we could not find any other hill-streams on or near the Mawblang plateau which was strewn with huge boulders and covered at several places with Screw Pine (*Pandanus furcatus*) trees, we searched for the Rock toads among crevices of the boulders on the plateau itself and among the leaf axils of the Screw Pine trees but could not locate any. We therefore continued our survey in other localities in and around Cherrapunjee. Opposite to the Mawblang plateau is the seven cascades of the Nohsngithiang waterfalls on the top of which is another flat plateau which is called as the Eco-park. This area unlike the Mawblang plateau has no vegetation and is totally exposed to the scorching sun. Although like the Mawblang plateau this area too had a number of rocky pot-holes, no tadpoles of any anurans were found in them.

We continued our survey in the sacred grove forested area near the Mawsmi cave about a kilometer from the Eco-park. This is the largest sacred grove in and around Cherrapunjee. This area has some good mixed forest with canopy cover. On the way to this sacred forest we found two streams but both had sandy banks with no boulders and hence no Rock Toads. Finally while surveying inside the sacred forest at Mawsmi cave area we located a very narrow hill-stream passing through a rocky ravine (25.14586 N, 91.43477 E and altitude : 1192 m) just opposite to the entrance

area of the Mawsmmai cave but deep inside the forest. This hill-stream had very small rocks and boulders but was completely shaded and covered by a canopy of mixed deciduous trees. There were some screw pine trees in the vicinity of the stream too. While overturning the rocks on the stream-side we located eggs of *Xenophrys* sp in the afternoon. Later in the evening we heard *Xenophrys parva* calling and saw some *Amolops gerbillus* on the stream-side. Among the clefts of the rocks on the stream-side of this rocky ravine we suddenly located a single Rock Toad (*Bufoides meghalayana*). This stream being narrow with little water and very few small rocks on the sides sheltered a very small population of the Rock Toad which was estimated to be less than 20.

The air temperatures inside the rock clefts and crevices in the three streams where the Rock Toad was found varied from 21.5°C-24.5°C at around 8 pm. Considering the rarity of the species, only five specimens were collected (3 males and 2 females) from the three hill-streams mentioned above. The snout to vent lengths of the males varied from 38.4-39.1 mm (n = 3) and the females from 38.8-39.6 mm (n = 2) thus showing no significant differences in size. However, the males had bright yellow marblings on the lower flanks near the hind legs and in the inguinal region which was absent in the females.

Both sexes exhibited “unken” reflex on capturing, a response widespread in anurans with noxious dermal secretions. The thickness of the fleshy dermal pads on the palm and sole seemed to be similar in both sexes and they could both climb vertical surfaces just like geckos. Both sexes also possessed parotoid glands.

Data on annual rainfall at Cherrapunjee from 1973-2009 was gathered from the Meteorological Station of the India Meteorological Department at Saitsophen, Lower Cherrapunjee. The data showed no decrease or significant fluctuations in rainfall at Cherrapunjee over the last 37 years.

Many other areas in and around Cherrapunjee like the exposed and vegetation-less streams near the Fire Service Station at Saitsophen (Lower Sohra); the small but exposed streams near Mawmluh Cement Factory, Mawmluh; the areas having *Pandanus* trees atop the Nohkhalikhai and Dainthlein Waterfalls in Upper Sohra were thoroughly surveyed but none harboured any Rock Toads (*Bufoides meghalayana*).

Extensive rock-blasting and stone-quarrying activities were observed in and around Cherrapunjee and all over the Khasi hills. Large portions of the hills

were being blasted with dynamite. Even the plateau at Mawblang and the hill near Saitsophen (Lower Cherrapunjee) were being blasted everyday. Stones were being quarried by large number of labourers using bull-dozers and these were being carried away to Shillong in huge trucks throughout the night.

DISCUSSION

This survey revealed that this highly saxicolous and extremely flattened rock toad (*Bufoides meghalayana*) was specialized and adapted to live inside clefts and crevices of boulders in three rocky hill-stream beds on the Mawblang plateau and near the Mawsmmai cave area of Cherrapunjee, East Khasi hills of Meghalaya, Northeastern India. Air temperatures inside these rocky clefts and crevices varied from 21.5 – 24.5 °C. It was noticed that canopy-covered rocky streams had a better chance to harbour these Rock Toads. The total lengths and the thickness of the fleshy dermal pads on the palm and sole did not vary between sexes and cannot be used to identify males and females as claimed by Pillai and Yazdani (1973). However, males had bright yellow marblings on the lower flanks near the hind legs and in the inguinal region which was absent in the females. Both sexes possessed parotoid glands, exhibited unken reflex and could climb vertical rock surfaces with ease.

Data on annual rainfall at Cherrapunjee from 1973-2009 gathered from the Meteorological Station of the India Meteorological Department at Saitsophen, Lower Cherrapunjee revealed no significant fluctuations in rainfall at Cherrapunjee over the last 37 years except for some lower rainfall in certain years like 2005, 2006 and 2009.

RAINFALL CHART OF CHERRAPUNJEE

Year	Rainfall (in mm)
1973	10910.1
1974	24555.3
1975	11961.4
1976	9019.4
1977	12109.7
1978	6950.3
1979	12094.8
1980	9132.9
1981	9417.5
1982	10380.8
1983	9764.0
1984	16760.7
1985	11816.3
1986	8139.5

Year	Rainfall (in mm)
1987	13153.3
1988	17930.4
1989	13460.0
1990	11597.7
1991	13505.9
1992	8536.5
1993	12801.3
1994	11204.8
1995	14209.8
1996	12896.6
1997	8993.6
1998	14536.9
1999	12502.8
2000	12262.2
2001	8971.5
2002	12262.0
2003	10498.8
2004	14970.8
2005	9758.0
2006	8734.1
2007	12646.8
2008	11414.6
2009	9069.9

Extensive rock-blasting and stone-quarrying activities in and around Cherrapunjee and also in the Mawlang plateau area, the type locality and only known area of occurrence of the Rock Toad is definitely affecting the population of the species and is a cause of serious concern for the future survival of *Bufoides meghalayana*.

The Khasi Hills Rock Toad (*Bufoides meghalayana*) could be located in only three sites, all rocky hill-stream beds with good canopy cover, although all possible localities were thoroughly searched in and around Cherrapunjee of the East Khasi hills. These small but

extremely flattened toads were found to hide inside rocky clefts and crevices of boulders in these three sites merely 1.5 kilometer apart and surrounding the type locality of the species. Their total population in the three hill-streams seemed to be less than 100 individuals. The IUCN currently considers the Khasi Hills Rock Toad (*Bufoides meghalayana*) as Endangered. Considering their highly specialized saxicolous habit and extremely small distribution range so far known, we propose that this species be considered as Critically Endangered (CR) as it meets the following criteria set by IUCN (B2biiiC2ai):

B. Geographical Range

2. Area of occupancy estimated to be less than 10 sq km.

b. Continuing decline observed in

iii. Area, extent and quality of habitat.

C. Population size estimated to number fewer than 250 mature individuals.

2. A continuing decline observed in number of mature individuals.

a. Population structure in the form of the following

i. No subpopulation estimated to contain more than 50 mature individuals.

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We are grateful to the Director, Zoological Survey of India, Kolkata for granting us the project on the Status Survey of the Khasi Hills Rock Toad at Cherrapunjee, Meghalaya. We are also grateful to Prof. Indraneil Das, Universiti Malaysia, Sarawak, Malaysia for going through the manuscript. We thank Mr. Anthony Nongrum, Senior Observer, India Meteorological Department, Meteorological Office, Cherrapunjee, Meghalaya for the rainfall data of Cherrapunjee for the last 37 years.

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Fig. 1. Rocky plateau at Mawblang with Screw Pines

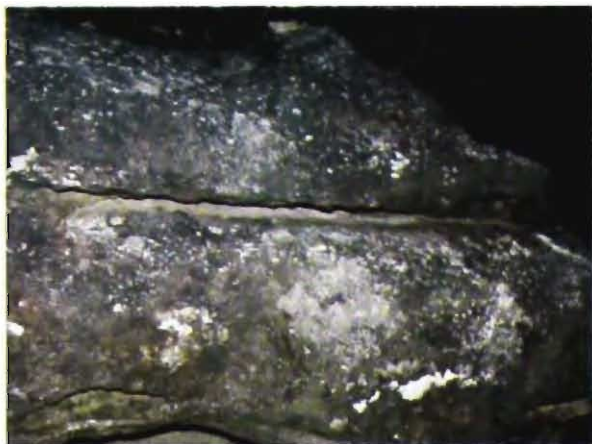


Fig. 2. Horizontal rock cleft on boulder inside which Rock Toad resides



Fig. 3. Searching for Rock Toad inside cleft of boulder.



Fig. 4. Wet stream at Mawblang with boulders & canopy cover.



Fig. 5. Male of Khasi Hill Rock Toad (*Bufo* *meghalayana*)



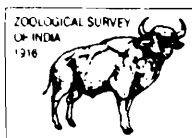
Fig. 6. Male and female Rock Toads



Fig. 7. Rock Toad showing unken reflex.



Fig. 8. Extensive stone-quarrying in the Khasi hills



Rec. zool. Surv. India : 111(Part-3) : 27-30, 2012

POPULATION FLUCTUATION OF GRASSHOPPER FAUNA IN A FIELD NEAR KAKDWIP, SUNDERBANS, WEST BENGAL

NARENDER SHARMA

Zoological Survey of India, Northern Regional Centre, 218 Kaulagarh Road, Dehradun-248 195

Email : narender@scientist.com

INTRODUCTION

Kakdwip having 251.10. sq km area is one of the business towns and port of South 24 Parganas bordering by Sagar Island on west, Pathar Pratima in the east, Mathurapur in the north and south covered by Bay of Bengal. On the basis of salinity, Kakdwip is coming under medium saline zone. The rivers are the live matrix of deltaic complex, on which the unique spectrum of biological diversity is embedded. Saptamukhi, Hugli and Muriganga are the three rivers which flow near Kakdwip town.

Workers like Katiyar (1956), Uvarov (1967), Phipps (1970) and Parihar (1974) have studied the biology and ecology of some grasshoppers in India and abroad. Tandon and Khera (1978) presented a brief account of the climate, vegetation, habitat and seasonal abundance of the species belonging to 23 genera under 3 families from Arunachal Pradesh. According to them, the species varies in color during different seasons. Hazra *et. al* (1981) worked on the ecology of grasshoppers in a grassland and presented the impact of some physical factors. Bhowmik and Halder (1984) worked on ecology and seasonal abundance of Acridids. The present work is a part of long term bioecological study in a grassland ecosystem near Kakdwip.

MATERIALS AND METHODS

The grassfield is located near Centre of Brackish Water Aquaculture and is two Kms from Kakdwip, Sunderbans in the district of South 24 Parganas. Site area which was situated for the estimation of population of grasshoppers and their seasonal abundance was about 150m × 100m. The entire site was subdivided into 5 sq. m. sub-plots. The grasshoppers were collected by catch-count method (Andrewartha, 1970) by using standard net of conventional size of 36 cm in diameter.

Temperature and relative humidity data were also recorded at sampling time. The grassfield mainly comprised grasses like *Cynodon dactylon* Pers., *Dichanthium annulatum* (Forsk), *Digitaria marginata* Linn., *Chrysopogon aciculatus* Trin., *Eragrostis pilosa* Beauv., *E. brachyphylla* Beauv., *Digitaria royleana* Prain and *Arundinella* sp.

OBSERVATIONS AND RESULT

During the course of present studies, the total number of species observed were ten under nine genera and two families. When total population of all the species is considered, it is observed that the maximum population of all the species are associated with moderate temperature and relatively high atmospheric humidity i.e., 29° C and 94% respectively, seems to be suitable for these species. The maximum number of species were observed when the temperature and the relative humidity was 27° C and 93% respectively (Table-1, 2; Chart-1, 2)

The rise and fall in the population of different species appear independent to each other. Fluctuations occur due to choice of the host in relation to season. With the growth of rice crops and other vegetable crops, the individuals of different species migrate towards the rice and other vegetable fields from the nearby wild vegetations, in particular the adjoining grasses.

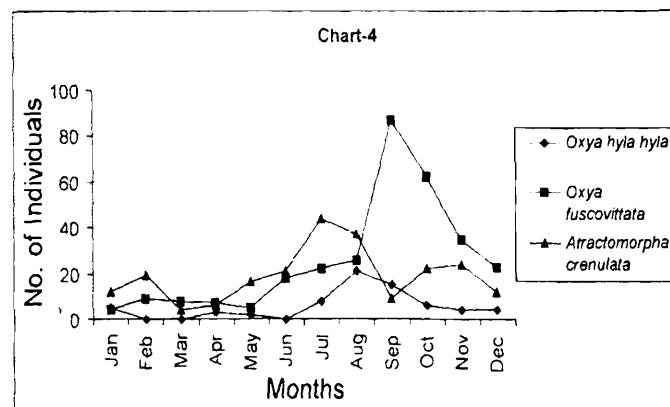
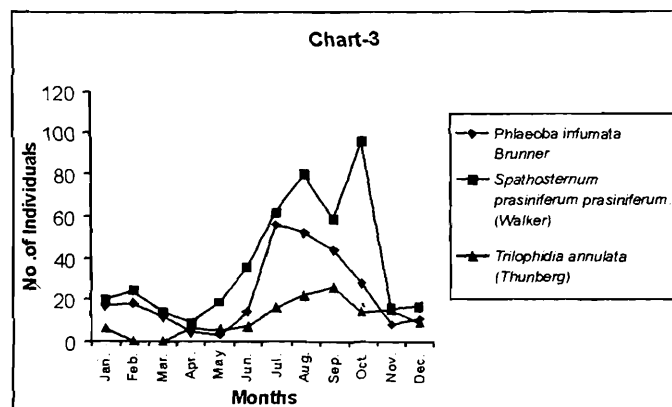
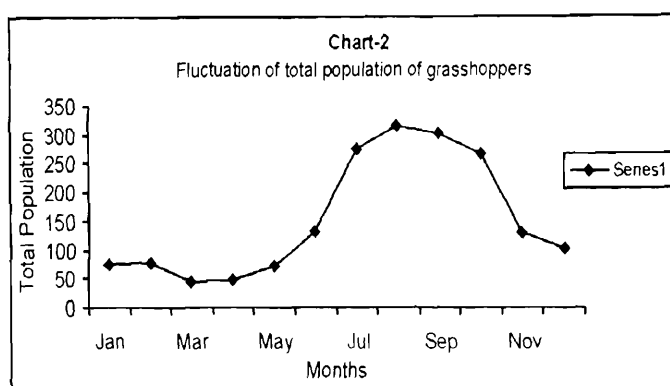
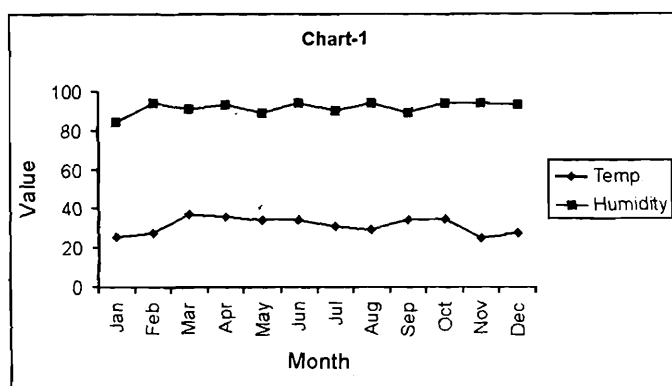
Maximum population of grasshoppers was observed during July to October (Chart-3,4,5) and their abundance may be related to the maximum vegetative growth of the grass species in the field during this period. This agrees with the findings of Dwivedi (1977), Tandon and Khera (1978) and Hazra (1984). The number of adults were lesser during June but increased very soon in the month of July. Consequently, the nymphs increased first and then became less in number.

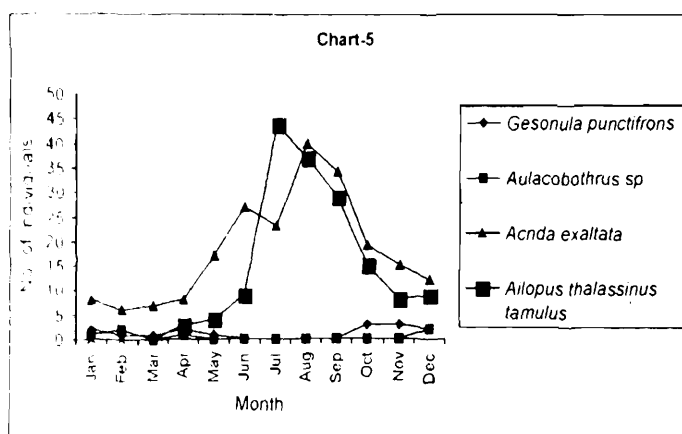
Table-1. Maximum temperature and relative humidity in different months during collections at Kakdwip.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Temperature	25.5	27.6	37.3	36.0	34.0	34.4	30.8	29	34	34.6	25.1	27.6
Relative Humidity	84	94	91	93	89	94	90	94	89	94	94	93

Table-2. Monthly population fluctuations of predominant Acridid species.

Name of the species	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
<i>Phlaeoba infumata</i> Brunner	17	18	12	4	3	14	56	52	44	28	8	11
<i>Spathosternum prasiniferum</i> <i>prasiniferum</i> (Walker)	20	24	14	9	19	36	62	80	59	96	16	17
<i>Trilophidia annulata</i> (Thunberg)	6	—	—	6	5	7	16	22	26	14	15	9
<i>Oxya hyla hyla</i> Serville	5	—	—	3	2	—	8	21	15	6	4	5
<i>Oxya fuscovittata</i> (Marschall)	4	9	8	7	5	18	22	26	87	62	35	23
<i>Atractomorpha crenulata</i> (Fabr.)	12	19	4	6	16	21	44	37	9	22	24	12
<i>Gesonula punctifrons</i> (Stål)	2	1	1	2	1	—	—	—	—	3	3	2
<i>Aulacobothrus</i> sp.	1	2	—	1	—	—	—	—	—	—	—	2
<i>Acrida exaltata</i> (walker)	8	6	7	8	17	27	23	40	34	19	15	12
<i>Ailopus thalassinus tamulus</i> (Fabr.)	—	—	—	3	4	9	44	37	29	15	8	9
Total	75	79	46	49	72	132	275	315	303	265	128	102





Interspecific fluctuation : Five species viz., *Phlaeoba infumata* Brunner, *Spathosternum prasiniferum prasiniferum* (Walker), *Oxya fuscovittata* (Marschall), *Atractomorpha crenulata* (Fabr.) and *Acrida exaltata* (Walker) were predominant throughout the year and such a year round occurrence with different nymphal stages suggests of polyvoltine cycle in these species as reported earlier by Uvarov (1977). The lowest frequency was found in two species i.e., *Gesonula punctifrons* (Stål) and *Aulacobothrus* species.

The population of *Phlaeoba infumata* Brunner was found very low during April (1.4%) and May (1.12%), whereas, the species showed two clear peaks during the monsoon period i.e., in the months of July (20.97%) and August (19.47%). The population of *Spathosternum prasiniferum prasiniferum* (Walker) was found maximum in the month of October (postmonsoon period) when the maximum temperature was 34.6° C and relative humidity was 94%. The species *Trilophidia annulata* (Thunberg) was found absent during February and March, whereas the species, *Oxya hyla hyla* Serville was found absent during February, March and June, however their population show increase in the monsoon period (August and September). The population of *Oxya fuscovittata* (Marschall) was less in the months of January (1.30%) and May (1.63%) and showed the highest peak in the month of September (28.43%). The peak abundance of *Atractomorpha crenulata* (Fabr.) was occurred during July (19.46%) and August (16.37%) and this falls suddenly in the month of September (3.98%) and again rise in the month of October and November. The species, *Gesonula punctifrons* (Stål) and *Aulacobothrus* species, were found absent during June, July, August, September, and March, May, June,

July, August, September, October and November respectively. Out of ten species, the lowest population was observed in *Aulacobothrus* species. The species, *Acrida exaltata* (Walker) showed maximum peak during monsoon period (July) and with minimum fluctuation from January to April. *Ailopus thalassinus tamulus* (Fabr.) was not found during January to March, whereas, after June the population of species becomes suddenly high in the monsoon period. Therefore, different species have different temperature tolerance range.

The temperature showed direct influence on the population structure of grasshoppers but failed to show any significant correlation in this field. This is in perfect agreement with the findings of Hazra (1984) according to whom temperature alone is of little importance in governing the abundance and distribution pattern of grasshoppers. The relative humidity content of the surface soil was positively correlated with the grasshoppers population. In the monsoon months, higher content of relative humidity enhanced the growth rate of vegetation. This observation also agrees with that of Hazra (1984).

It may be concluded from the present study that the vegetation in conjunction with other physical factors considered this study collectively influence the population fluctuation of grasshoppers at Kakdwip.

SUMMARY

Population fluctuation of ten species of nine genera under two families of short horned grasshoppers were studied in a grassland at Centre of Brackish Water Aquaculture which is two kms from Kakdwip town, Sunderbans in the district of South 24 Parganas. Monthwise analysis shows that the maximum population was during monsoon period and minimum was during pre-monsoon period. The impact of temperature and humidity was also studied on the population fluctuation of short horned grasshoppers.

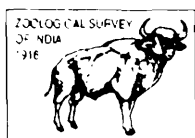
ACKNOWLEDGEMENTS

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Rec. zool. Surv. India : 111(Part-3) : 31-34, 2012

WING MACULATION AND GENITALIC VARIATIONS IN *YPTHIMA INICA* (LEPIDOPTERA : SATYRIDAE)

NARENDER SHARMA

Zoological Survey of India, Northern Regional Centre,
218 Kaulagarh Road, Dehradun-248195

Email : narender@scientist.com

INTRODUCTION

The scrutiny of relevant literature shows that the wing maculation variations in the species *Ypthima inica* Hewitson have not been adequately discussed by earlier workers (vide Marshall & de Niveville, 1883; Moore, 1892; Elwes & Edwards, 1893; Evans, 1932; Talbot, 1947; Shirozu & Shima, 1979). The ocelli/eye-like spots are variable in the species. The species is included in the Obscura group of the genus *Ypthima* Hübner (Shirozu & Shima, 1979). Dry-seasons forms (DSF) and wet-season forms (WSF) are found in this species. The dry-season forms are characterized by more angulate wings, the cryptic pattern of underside and the reduced submarginal ocelli, whereas, in wet-season forms the submarginal ocelli on the underside of the wings are well developed. During the course of present studies, besides making detailed observations on the wing maculation variation, the account of the male genitalia which shows unique variation has been updated.

OBSERVATIONS

The author has examined the wing maculation in, as many as, forty-eight individuals collected from certain habitats of India. In view of the earlier drawbacks, the updated diagnosis of the species is as follows:

Ypthima inica Hewitson

Common name : The Lesser Threering.

- 1865. *Ypthima inica* Hewitson, *Trans. ent. Soc. Lond.* 2(3) : 284.
- 1874. *Ypthima ariaspa* Moore, *Proc. zool. Soc. Lond.* : 586.
- 1883. *Ypthima rara* Butler, *Proc. zool. Soc. Lond.* : 145.
- 1886. *Ypthima daedalia* Swinhoe, *Proc. zool. Soc. Lond.* : 422.
- 1886. *Ypthima alkibie* Swinhoe, *Proc. zool. Soc. Lond.* : 424.

- 1886. *Ypthima complexiva* Swinhoe, *Proc. zool. Soc. Lond.* : 424.

Adult (male) : Head with frontoclypeal region beset with fulvous and black, hair and scales, lateral rows of white scales and hair; eyes medium sized, dark brown, glabrous; labial palpi three segmented, distal segment slightly longer than proximal segment, middle segment longer, densely clothed with white scales and hair; antenna 11.0 mm, slightly less than half of the wing, club slender, ochraceous, segment longer than broad, nudum extend to the base of flagellum, the latter distal end ochraceous black, incomplete white ring at base of each segment; thorax dorsally dressed with fuscous hair and scales, ventrally with white hair and scales; foreleg with trochanter and tibia subequal, femur less than coxa, tarsus absent, densely studded with black and white scales and hair, meso and meta legs covered with white scales, tibia and tarsi spinose, tarsus clawed; dry season form: upper side dark brown; forewing with small black, bipupilled, yellow-ringed subapical ocellus, submarginal and discal fasciae indistinct, ocelli variable (Table-1), underside whitish grey with brown striations, ocellus as on upperside of forewing, ring more prominent, ocelli variable (Table-1); hindwing upperside with black, yellow-ringed, single pupilled ocellus in Cula, size variable (Table-1), underside brown, striated with white, ocelli absent; wet season form: upperside similar to dry season form except slightly more darker; underside densely striated with greyish white; forewing with subapical, black, bipupilled, broadly ringed with yellow, ocellus, marginal and submarginal fasciae obscure, hindwing with three, black, single pupilled, yellow-ringed ocelli in Rs, Cula, Culb, ocellus in Rs largest, marginal and submarginal fasciae indistinct.

Androconia parallel sided, sharply tapering distally.

Venation (Figs. 7-8) : Cell of forewing less than half the length of wing, vein R_1 arising before the upper angle of cell, vein M_2 equidistant between vein M_1 and M_3 , udc minute, oblique, mdc incurved, ldc slightly excurved; hindwing with cell more than half the length of wing, vein Cula well before lower angle of cell, h vein T-shaped.

Abdomen above dark brown, furnished with brown scales, below clad with dusky scales.

Adult (Female) : Dry season form : Foreleg developed with tarsus segmented, subapical ocellus on upperside of forewing larger; otherwise as in male; wet season form : foreleg with segmented tarsus, subapical ocellus larger than male; otherwise as in male.

Male genitalia (Figs. 1-6) : Uncus subequal to tegumen, weakly curved ventrally, distal end slightly pointed, clothed with sparse setae; tegumen long and broad; fenestrula small, oval, membranous; appendices angulares small, hook-like; vinculum longer than tegumen; saccus small, tubular with rounded distal end; valva with proximal half broader, distal half sharply narrowed, pilose, costa long, sacculus long and narrow, distal end trilobed, ampulla variable (figs. 2, 3); juxta V-shaped; aedeagus long, tubular, narrow at middle in dorsal view, subzone smaller than suprazone, ductus entering dorsad.

Material examined : Uttar Pradesh : Aligarh, Kasimpur, 6 ♂, 2 ♀ WSF, 7.ix.2005, (Reg. No. 22913-22920), Coll. N. Sharma; Agra, Bird Sanctuary Keetham, 1 ♂, 1 ♀ WSF, 4.ix.2005, (Reg. No. 22921, 22922), Coll. N. Sharma; Muzaffarnagar, Sukartal, 2 ♂ WSF, 13.ix.2005 (Reg. No. 22924, 22925), coll. N. Sharma; Faizabad, 1 ♂ WSF, 23. ix.1883 (Reg. No. 6666), Coll. de Niceville). Madhya Pradesh : Mhow, Inow, 2 ♂ WSF, 6.v.1882 (Reg. No. 6653-6654) Coll. de Niceville; Mhow, 1 ♂ WSF, 6.x.1881 (Reg. No. 6655), 2 ♀ DSF, xi.1881 (Reg. No. 6656, 6657), 2 ♂ DSF, 6.i.82 (Reg. No. 6658, 6661), 2 ♂ DSF, xii.1881 (Reg. No. 6659, 6660), Coll. de Niceville; Indore, Sagor, 1 ♂ DSF, 12.vii.1886 (Reg. No. 6691), coll. de Niceville. West Bengal : Bholahat, 1 ♀ WSF, 6.iii.1889 (Reg. No. 6662), Coll. W.H. Irvine; 4 ♂ DSF, 25 ♂ WSF, 1.iv.1886 (Reg. No. 6687 to 6690), Coll. de Niceville & W.H. Irvine.

Remarks : During the course of present studies, a sample comprising forty-two males and six females (9 ♂, 2 ♀ DSF, 33 ♂, 4 ♀ WSF) have been studied to record variations in wing maculation in the Dry-Season and Wet-Season populations. In view of variations in the dry and wet populations, eight males and three females (3 ♂, 1 ♀ DSF, 5 ♂, 2 ♀ WSF) have been

dissected out and found to agree with each other in every respect except one male genitalia of the specimen collected from Sur Sarovar Bird Sanctuary, Keetham, Agra in which ampulla of the valva is not rounded rather straight in structure (Figs. 2, 3). In fact, in the male genitalia, the valva is quite unique in the entire genus *Ypthima* Hübner, as has been reported by Elwes and Edwards (1893), who however, did not mention anything else about the other constituent parts of the male genitalia. On the basis of present studies it is being suggested that the structure of ampulla be cautiously used taxonomically for providing conspecificity of different individuals of this biological species. Such type of variation has not been seen in any of the fifty-five satyrid species, presently examined. However, Evans (1955) has recorded some variations in the male genitalia of Lycaenid species, *Tarucus nara* (Kollar). Smiles (1982) has remarked that the male and the female genitalia find little assistance in the taxonomy of the Nymphaid genus *Polyura* Billberg. David (1993) has stated that the genitalia are extremely useful taxonomic characters though they diverge rapidly during speciation in some cases. According to him, the most variable portions of the male genitalia are the distal and dorsal margins of the valvae, as has been observed in the satyrid species, *Maniola jurtina* (Linnaeus). Rose and Sidhu (1996) have also reported variations in the valva of lycaenid species, *Aricia agestis* (Denis and Schiffermuller). The species, under reference, also show such type of variation.

ABBREVIATIONS USED

1A + 2A : Fused first and second anal veins, 3A : Third anal vein, AED : Aedeagus, APX.ANG. : Appendix angularis, CO : Costa, Cula : Upper branch of first cubital, Cu 1b : Lower branch of first cubital, D : Discal cell, DU.EJ. : Ductus Ejaculatorius, h : Humeral vein, ldc : Lower discocellular, M_1 : First medial vein, M_2 : Second medial vein, M_3 : Third medial vein, mdc : Middle discocellular, R_1 : First radial vein, R_2 : Second radial vein, R_3 : Third radial vein, R_4 : Fourth radial vein, R_5 : Fifth radial vein, Rs : Radial sector, SA : Saccus, SBZ : Subzonal portion of aedeagus, Sc : Subcosta, Sc + R_1 : Stalk of veins Sc and R_1 , SL : Sacculus, SPZ : Suprazonal portion of aedeagus, TEG : Tegumen, udc : Upper discocellular, UN : Uncus, VIN : Vinculum, VLV : valva.

SUMMARY

The hitherto unrecorded variations in wing maculation of the species, *Ypthima inica* Hewitson have been recorded in considerable details. In the male

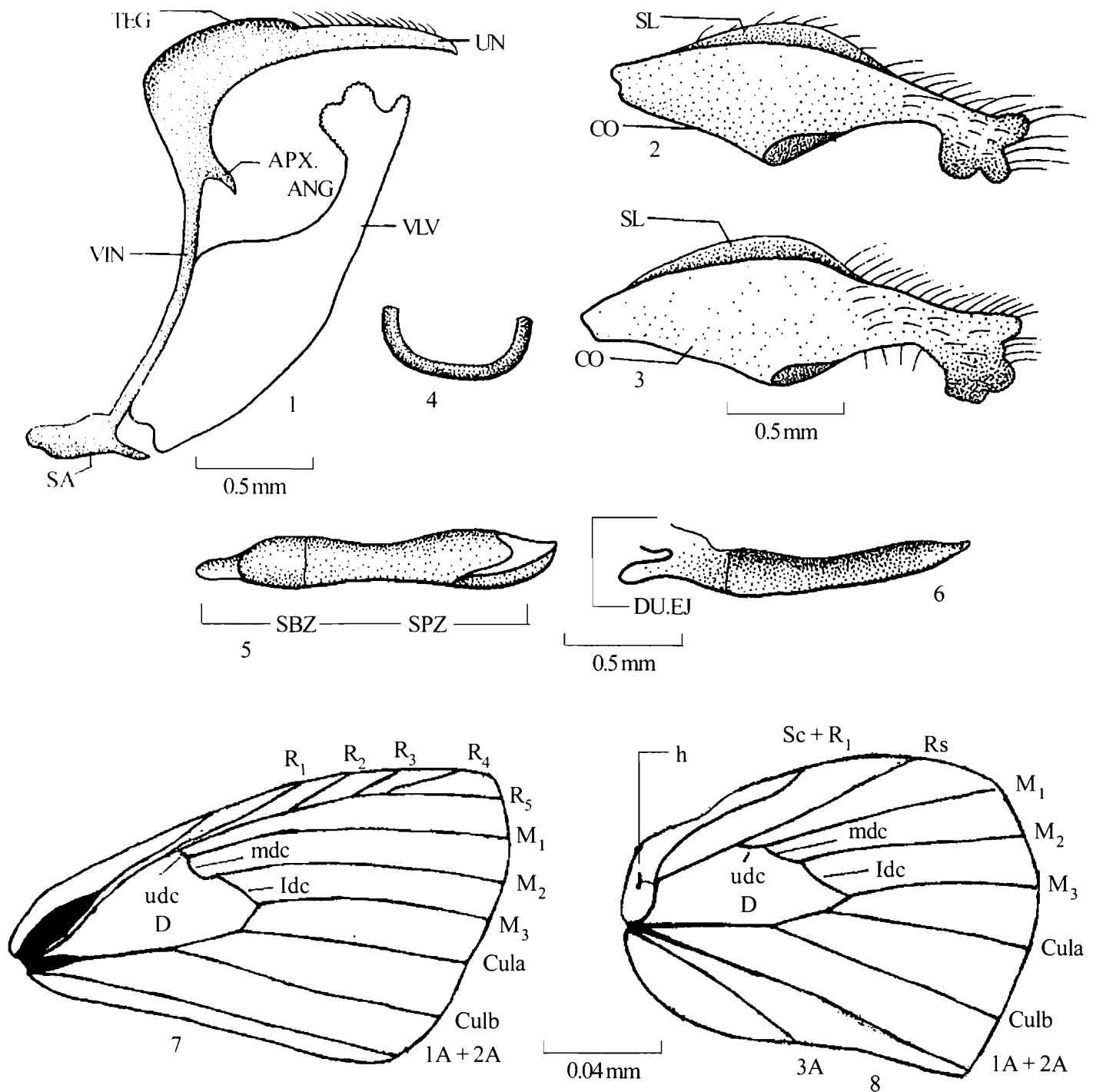


Fig. 1-8 : *Ypthima inica* Hewitson. : 1. Male genitalia (lateral view) 2. Valva (Inner view) 3. Dorsum 4. Juxta (Dorsal view) 5. Aedeagus (dorsal view) 6. Aedeagus (Lateral view) 7. Venation of forewing 8. Venation of hindwing.

genitalia the apex of the valva is variable and inconsistent in this biological species

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Author is thankful to the Director, Zoological Survey of India, Kolkata and Dr. T.K. Pal, Officer

Incharge, Entomology Division 'A' and Field Survey Division, ZSI for all sorts of facilities in connection with this survey. My sincere thanks are also to different government officials of Forest Department of Uttar Pradesh for helping me during survey.

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Table 1. Showing variations in *Ypthima inica* Hewitson

Forewing Upperside (DSF)	a) Subapical ocellus	Rounded (7 specimens)	Oblique (4 specimens)	
	b) Additional Variations	Minute black ocellus present in Cula (1 specimen)	Minute ocellus absent in Cula (10 specimens)	
Hindwing Upperside (DSF)	a) Ocellus in Cula	Moderate in size (8 specimens)	Very small (2 specimens)	Obscure (1 specimen)
Forewing Underside (DSF)	a) Subapical ocellus	Bipupilled (10 specimens)	Tripupilled (1 specimens)	
	b) Additional Variations	Minute ocellus present in Cula in the form of yellow speck (2 specimens)	Minute black ocellus present in Cula (9 specimen)	
Forewing Upperside (WSF)	a) Subapical ocellus	Rounded (27 specimens)	Oblique (10 specimens)	
	b) Yellow ring	Yellow ring surrounding the subapical black ocellus prominent (35 specimens)	Yellow ring surrounding the subapical black ocellus indistinct (2 specimens)	
	c) Subapical ocellus	Bipupilled (36 specimens)	Tripupilled (1 specimen)	
	d) Additional Variations	Minute black ocellus present in Cula (3 specimens)	Minute ocellus absent in Cula (34 specimens)	
Hindwing Upperside (WSF)	a) Ocellus in Cula	Black yellow ringed and single pupilled (35 specimens)	Ocellus in the form of black dot and without pupil (2 specimens)	
	b) Additional Variations	Minute black ocellus present in M ₁ (1 specimen)	Minute black ocellus in M ₁ absent (36 specimen)	
Forewing Underside (WSF)	a) Ocellus in Cula	Small, black, yellow ringed ocellus present (1 specimen)	Ocellus present in the form of small yellow dot (1 specimen)	Absent (37 specimens)

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THE GOATFISHES (FAMILY MULLIDAE) OF ANDAMAN AND NICOBAR ISLANDS

P.T. RAJAN, C.R. SREERAJ AND TITUS IMMANUEL

Zoological Survey of India, Andaman Nicobar Regional Centre

Haddo, Port Blair-744102

rajaptandaman@rediffmail.com

INTRODUCTION

Goatfishes are tropical marine perciform fish of the family Mullidae. Goatfishes are most associated with the reefs. Within the family there are approximately 6 genera and 70 species (Randall 2004, Uiblein and Heemstra 2009). Many species of goatfish are conspicuously coloured; however, they are not popular in aquarium. Rather, goatfish are valued food fish in many countries. The largest species, the dash-and dot goatfish (*Parupeneus barberinus*) grows to 55 centimeters in length; most species are less than half this size. Their bodies are deep and elongate with forked tail fins and widely separated dorsal fins. Goatfish are tireless benthic feeders, using a pair of long chemosensory barbels ("whiskers") protruding from their chins to rifle through the sediments in search of a meal. Like goats, they seek anything edible; worms, crustaceans, molluscs and other small invertebrates are staple food. By day, many goatfish form large schools: these aggregates may contain both conspecifics and heterospecifics. For example, the yellowfin goatfish (*Mulloidichthys vanicolensis*) on the reef of the Andaman and Nicobar Islands is often seen congregating with blue-striped snappers (*Lutjanus kasmira*) (Family : Mullidae) (Fig. 1) and association of goatfish *Parupeneus cyclostomus* with bigeye trevally *Caranx sexfasciatus* (Fig. 5). With such mixed company, the yellowfin goatfishes are shallow water species, going no deeper than about 110 metres.

With common bluestripe snapper, *Lutjanus kasmira* (Forsskal, 1775), in Andaman Islands has resulted in vertical habitat shift in yellowfin goatfish, *Mulloidichthys vanicolensis*, towards staying more in

open water with increased height above the bottom reflecting asymmetrical competition. There is not a single species of goatfish known to enter rivers of these islands. All goatfish have the ability to change their colouration depending on their current activity. One notable example, the diurnal goldsaddle goatfish (*Parupeneus cyclostomus*) changes colour from a lemon-yellow to a pale cream while feeding and to dark phase with the terminal male of *Gomphosus caeruleus* (Family : Labridae) (Fig. 2). Diurnal species also tend to be solitary, but will school as juveniles. Goatfish are pelagic spawners; that is, they release many buoyant eggs into the water which become part of the plankton. The eggs float freely with the currents until hatching. The postlarva floats in surface waters until it reaches around 5 or 6 centimeters in length, when it takes on the adult, bottom-feeding, lifestyle.

METHODOLOGY

Samples of goatfish (Family Mullidae) were collected from the trawl fishery landings in the Andaman Islands in the fishing season during 1990-2010. Samples were separated into the different species (14 species). A total of 65 goatfish specimens were obtained. Specimens were preserved in 10% buffered formaldehyde. SCUBA gears are used for surveying, underwater observation and photography of goatfishes. Morphometric characters were measured with a caliper. Meristic characters that vary among species are referred to in the diagnoses and compared: the number of dorsal fin spines, pectoral fin rays, rudimentary and developed gill rakers on lower and upper limb and lateral line scales are recorded. In order to see the first minute dorsal fin spine in eight spine species a stereomicroscope was

Key words : Goatfishes, systematic, key species, multi-species foraging, fisheries, Andaman and Nicobar Islands.

used. Colour photographs for each species were taken with Nikon D 300 camera. Caudal fin photographs were taken for counts of caudal fin bars, include all bars from the base of each lobe to the lobe tip.

RESULTS

Studies of goatfish occurrence and abundance in natural habitats in Andaman and Nicobar Islands have been documented. Generally they prefer sand-associated bottoms, some species are more restricted to hard bottoms, and others occur in different depths. Fourteen species are recognized under three genera: *Mulloidichthys flavolineatus*, *Mulloidichthys vanicolensis*, *Parupeneus barberinus*, *Parupeneus cyclostomus*, *Parupeneus heptacanthus*, *Parupeneus indicus*, *Parupeneus macronema*, *Parupeneus pleurostigma*, *Parupeneus bifasciatus*, *Upeneus guttatus*, *Upeneus moluccensis*, *Upeneus sulphureus*, *Upeneus tragula* and *Upeneus vittatus*.

Mulloidichthys flavolineatus (Lacepede, 1801)

Yellowstripe goatfish

1801. *Mullus flavolineatus* Lacepede, *Hist. nat. Poiss.*, 3 : 384, 406 (Type locality : Hawaiian Islands).

Material examined : Junglighat fish market (South Andaman), 2 exs., 260 mm, 170 mm, ZSI ANRC 3941; Bidnabad (South Andaman), 1 ex., 205 mm, ZSI ANRC 3822.

Diagnosis : D. VII + I,8; A. I,6; P. 13-14; Gr. 7-8 + 22-25 = 29-33; Ll. 33-35; body depth 4.0-4.5, head depth 3.1-3.4 in SL, snout 2.0-2.5; interorbital 3.5-4.0, barbels 1.5-1.8, caudal peduncle depth 3.3-3.5, caudal peduncle length 1.1-1.3 in head. Body grey to olive on back, whitish on sides and belly; 1 or 2 longitudinal yellow bands; small dark blotch often present below first dorsal fin. Attains 40 cm Standard Length.

Distribution : Indo-Pacific from east coast of Africa to the Hawaiian Islands; French Polynesia and the Pitcairn group of Islands.

Mulloidichthys vanicolensis (Valenciennes, 1831)

Flame goatfish

1831. *Upeneus vanicolensis* Valenciennes, *Hist. nat. Poiss.*, 7 : 521 (type locality : Vanicolo).

Material examined : Nancowry Island (Nicobar Group), 1 ex. 256 mm, ZSI ANRC 2503.

Diagnosis : D. VII + I,8; A. I,6; P. 13-14; Gr. 7-8 + 22-24 = 29-32; Ll. 32-35; body depth 3.8-4.0, head depth 3.2-3.4 SL, snout 2.5-2.8, interorbital 3.3-3.6, barbels 1.3-1.4, caudal peduncle depth 3.0-3.4, caudal peduncle length 1.2-1.4 in head. Body red orange to olive on back and whitish on sides and belly; yellow longitudinal band

often present; no dark blotch on sides under middle of first dorsal fin. Attains 38 cm Standard Length.

Distribution : Indo-Pacific from the east coast of Africa, Red Sea to the Hawaiian, Tuamotu Islands, north to southern Japan, south to Lord Howe Island and Micronesia.

Parupeneus barberinus (Lacepede, 1801)

1801. *Mullus barberinus* Lacepede, *Hist. nat. Poiss.*, 3 : 383, 406. (type locality : Indo-Pacific.)

Parupeneus barberinus : Randall, *Indo-Pacific Fishes*, (36) : 12.

Material examined : Mayabunder (North Andaman), 15.08.1991, 1 ex., 285 mm, ZSI ANRC 1678; Tarmugli Island (South Andaman, 1 ex., 243 mm, ZSI ANRC 2586; North bay (South Andaman), 1 ex., 156 mm, ZSI ANRC 3375.

Diagnosis : D. VIII + I,8; P. 16-18; Gr. 6-7 + 19-23 = 25-30; Ll. 27-29; body depth 3.1-3.5, head depth 2.9-3.2 SL, snout 1.8-2.1, interorbital 3.4-4.4, barbels 1.2-1.5, not reaching to pelvic fin base, caudal peduncle depth 2.8-3.0, caudal peduncle length 1.2-1.4 in head. Body brown to reddish brown, shading to whitish on sides and belly; a dark reddish brown stripe extending from tip of snout through eye across upper end of gill openings, and along upper side extending beneath rear base of second dorsal fin; caudal peduncle with a round dark reddish spot larger than eye diameter; fins without marks. Attains 55 cm Standard Length.

Distribution : Indo-West Pacific, from east coast of Africa, Red Sea to southern Australia and eastward to the line, Marquesan and tuamotu Islands.

Parupeneus cyclostomus (Lacepede, 1801)

Gold-saddle goatfish

1801. *Mullus cyclostomus* Lacepede, *Hist. nat. Poiss.*, 4 : 383, 404 (type locality : Indo-Pacific).

Parupeneus cyclostomus : Randall, *Indo-Pacific Fishes*, (36) : 22.

Material examined : Wandoor (South Andaman), 1 ex., 380 mm, ZSI ANRC 1958; Mayabunder (North Andaman), 1 ex., 250 mm, ZSI ANRC 3379; Bidnabad (South Andaman), 1 ex., 260 mm, ZSI ANRC 3825.

Diagnosis : D. VIII + I,8; P. 16-17; Gr. 6-7 + 21-24 = 27-31; Ll. 27-28; body depth 3.3-3.5, head depth 2.9-3.1 in SL, snout 1.8-2.0, interorbital 3.9-4.1, barbels 1.1-1.2, caudal peduncle depth 2.6-2.9, caudal peduncle length 1.4-1.5 in head. Body red, red-bluish or blue with a yellow saddle behind second dorsal and often with blue streaks on head; occasionally uniform yellow; two colour phases, one yellowish grey with blue markings on scales and a yellow saddle like spot on caudal

peduncle, the other entirely yellow, the yellow peduncular spot brighter yellow. Attains 50 cm Standard Length.

Distribution : Indo-Pacific. Red Sea to the Hawaiian, Marquesan, Tuamotu Islands, North to Ryukyu Island to New Caledonia and Rapa, throughout Micronesia.

***Parupeneus heptacanthus* (Lacepede, 1802)**

Cinnabar goatfish

Sciaena heptacantha Lacepede, *Hist. nat. Poiss.*, 4 : 308, 311 (type locality : not given).

Parupeneus heptacanthus : Randall, *Indo-Pacific Fishes*, (36) : 30.

Material examined : Bambooflat, 1 ex., 187 mm, ZSI ANRC 2194; Tarmugli Island, 2 exs., 210, 267 mm, ZSI ANRC 2749; Mayabunder (North Andaman), 1 ex., 160 mm, ZSI ANRC 3380; Bidnabad (South Andaman), 1 ex., 145 mm, ZSI ANRC 3824.

Diagnosis : D. VIII + I,8; P. 16; Gr. 6-7 + 19-21 = 27-28; Ll. 27-28; body depth 2.9-3.1, head depth 3.3-3.4 in SL, snout 1.8-2.0, interorbital 3.8-4.2, barbels 1.1-1.4, caudal peduncle depth 3.1-3.5, caudal peduncle length 1.2-1.5 in head. Body brownish yellow to red shading to silvery white ventrally; scale margins darker with a blue to pearly spot centrally on the back. A small reddish spot on the 7th and 8th lateral line in adults; attains 30 cm standard length.

Distribution : Indo-West Pacific, Red Sea and east Africa to southern Japan and Lord Howe Island and throughout Micronesia.

***Parupeneus indicus* (Shaw, 1803)**

Indian goatfish

1803. *Mullus indicus* Shaw, *Gen. Zoology*, 4 : 611 (type locality : Vizagapatnam, Andhra Pradesh, India).

Parupeneus indicus : Randall, *Indo-Pacific Fishes*, (36) : 32.

Material examined : Little Andaman, 2 exs., 53, 102 mm, ZSI ANRC 2996; Port Blair (South Andaman), 1 ex., 116 mm, ZSI ANRC 2746; Tarmugli Island (South Andaman), 1 ex., 223 mm, ZSI ANRC 2747; North bay (South Andaman), 1 ex., 255 mm, ZSI ANRC 3376; Bidnabad (South Andaman), 1 ex., 280 mm, ZSI ANRC 3826; Junglighat fish market, 1 ex., 150 mm, ZSI ANRC 4732.

Diagnosis : D. VIII + I,8; P. 16-17; Gr. 6 + 19-21 = 25-27; Ll. 26-29; body depth 3.3-3.5, head depth 3.1-3.3 in SL, snout 1.9-2.2, interorbital 3.7-4.0, barbels 1.3-1.5, caudal peduncle depth 2.6-2.8, caudal peduncle length 1.2-1.4 in head. Body greenish brown to reddish brown shading to whitish or pale pink ventrally; a large elongate yellow spot centered on lateral line below

posterior part of first dorsal fin to anterior part of second dorsal fin; caudal peduncle with a round black spot larger than eye diameter; few blue lines radiating from eye; narrow pale blue bands on second dorsal, anal and caudal fin. Attains 40 cm Standard Length.

Distribution : Indo-Pacific. East coast of Africa to Samoa and Tonga, north to the Philippines, the Ogasawara Island, south to New Caledonia; Palau to Kosrae, Caroline Islands in Micronesia.

***Parupeneus macronemus* (Lacepede, 1801)**

Long-barbel goatfish

1801. *Mullus macronemus* Lacepede, *Hist. nat. Poiss.*, 3 : 383, 404 (type locality : Indo-Pacific).

Parupeneus indicus : Randall, *Indo-Pacific Fishes*, (36) : 38.

Material examined : Mayabunder (North Andaman), 2 exs., 277 mm, ZSI ANRC 1921; Bambooflat (South Andaman), 1 ex., 215 mm, ZSI ANRC 2009; North bay (South Andaman), 1 ex., 205 mm, ZSI ANRC 3377; Bidnabad (South Andaman), 1 ex., 155 mm, ZSI ANRC 3827; Inglis Island (South Andaman), 2 exs., ZSI ANRC 4027.

Diagnosis : D. VIII + I,8; P. 15-16; Gr. 8-9 + 26-29 = 34-38; Ll. 27-28; body depth 2.9-3.2, head depth 2.9-3.2 in SL, snout 1.7-2.0, interorbital 3.6-4.1, barbels 1.1-1.4, caudal peduncle depth 2.5-3.0, caudal peduncle length 1.3-1.5 in head. Last ray of second dorsal fin extending beyond caudal peduncle blotch in adults. Body reddish brown shading to paler ventrally and posteriorly with a dark brown stripe passing from tip of snout, through eye to rear end of second dorsal fin base; a round black spot larger than eye diameter on the caudal peduncle; basal third of second dorsal fin black, with a narrow extension to posterior tip of fin. Attains 35 cm Standard Length.

Distribution : Indo-Pacific : Red sea to Sodwana bay, South Africa extends to east to Indonesia and the Philippines.

***Parupeneus pleurostigma* (Bennett, 1831)**

Blackspot goatfish

1831. *Upeneus pleurostigma* Bennett, *Proc. Zool. Soc., London* : 59 (type locality : Mauritius).

Parupeneus indicus : Randall, *Indo-Pacific Fishes*, (36) : 47.

Material examined : Port Blair (South Andaman), 2 exs., 188, 191 mm, ZSI ANRC 1681; Bambooflat (South Andaman), 1 ex., 187 mm, ZSI ANRC 2194.

Diagnosis : D. VIII + I, 8; P. 15-17; Gr. 6-7 + 22-23 = 28-30; Ll. 27-29; body depth 3.5-3.7, head depth 2.9-3.2 SL, snout 1.9-2.1, interorbital 3.3-3.6, barbels 1.5-1.7,

caudal peduncle depth 3.0-3.3, caudal peduncle length 1.2-1.4 in head. Third and last anal rays longest. Body pinkish dorsally, lighter pink to whitish ventrally; a large round dark spot on the lateral line below the posterior end of spinous dorsal fin; a broad dusky to reddish patch usually present on the dorsal side under rear part of second dorsal fin base; a row of pale blue spots on each scale above lateral line on caudal peduncle; blue spots and lines around eye and on upper part of opercle; base of second dorsal fin dark. Attains 30 cm Standard Length.

Distribution : Indo-Pacific, from east coast of Africa to the Hawaiian Islands and French Polynesia.

***Parupeneus trifasciatus* (Lacepede, 1801)**

Doublebar goatfish

1801. *Mullus trifasciatus* Lacepede, *Hist. nat. Poiss.*, 383, 404 (type locality : Indo-Pacific).

Parupeneus trifasciatus : Randall and Myers, *Zool. Stud.*, 41(4) : 432.

Material examined : Outram Island (Ritchie's Archipelago), 1 ex., 185 mm, ZSI ANRC 2531; Narcondam Island, 1 ex., 185 mm, ZSI ANRC 2523; Mayabunder (North Andaman), 1 ex., 260 mm, ZSI ANRC 3378; Bidnabad (South Andaman), 1 ex., 135 mm, ZSI ANRC 3823.

Diagnosis : D. VIII + I, 8; P. 15-17; Gr. 7-8 + 27-30 = 34-38; Ll. 27-28; body depth 2.9-3.1, head depth 3.3-3.4 SL, snout 1.8-1.9, interorbital 3.1-3.3, barbels 1.7-1.8, caudal peduncle depth 2.2-2.4, caudal peduncle length 1.1-1.2 in head. Body yellowish grey to brownish red shading to whitish ventrally; three broad saddle-like bars, 1st below first dorsal fin, 2nd below second dorsal fin and 3rd one on middle of caudal peduncle; some fish may have only two well defined bars; a dark area generally present surrounding the eye and extending through interorbital space; scales pale at center on dorsal side. Attains 35 cm Standard Length.

Distribution : Indo-West Pacific south to Sodwana Bay.

SPECIES ACCOUNTS

Based on combination of the number of dorsal fin spines, gill rakers, number of pectoral fin rays and bars on caudal fin (Lachner 1954, Thomas 1969, Sainsbury *et al.* 1985, Golani 2001, Randall 2001, Kim and Nakaya 2002), four major species complex can be distinguished.

Species complex 1 : The "*Japonicus* group" : 7 dorsal fin spines distinguish this group clearly from all others; in addition, these species have 21-32 total gill rakers and 13-15 pectoral fin rays; fresh fish of this

group have bar on caudal lobe. This complex includes *Upeneus guttatus* from Andaman and Nicobar Islands.

Species complex 2 : The "*tragula* group" : 8 dorsal fin spines 18-25 total gill rakers and 13-14 pectoral fin rays; species have bar on caudal fin lobe. This complex includes *Upeneus tragula* from Andaman and Nicobar Islands.

Species complex 3 : The "*moluccensis* group" : 8 dorsal fin spines, 26-33 total gill rakers, 15-17 pectoral fin rays, bars on upper caudal fin lobe. This complex includes *Upeneus moluccensis*, *Upeneus sulphureus* from Andaman and Nicobar Islands.

Species complex 4 : The "*vittatus* group" : 8 dorsal fin spines, 26-32 total gill rakers, 15-17 pectoral fin rays and bars on caudal fin lobes in fresh and preserved fish. This complex includes *Upeneus vittatus* from Andaman and Nicobar Islands.

***Upeneus guttatus* (Day, 1868)**

Day's goatfish

1868. *Upeneoides guttatus* Day, *Proc. Zool. Soc., London* : 938 (Type locality : Madras).

Upeneus guttatus : Randall and Kulbicki 2006. *Zoological Studies*, 45 : 301.

Material examined : Junglighat fish market (South Andaman), 1 ex., 180 mm, ZSI ANRC 6762.

Diagnosis : Dorsal fins VII + 9; pectoral fins 13-14; gill rakers 6-8 + 16-18 = 23-25; lateral line scales 28-31; body depth at first dorsal fin origin 22-25% SL; body depth at anus 19-23; caudal peduncle depth 9.3-11; maximum head depth 18-22; head depth through eye 15-19; head length 26-30; orbit length 6.3-8.8; upper jaw length 9.6-12; barbel length 16-19; caudal fin length 25-30; anal fin height 15-19; pelvic fin length 19-23; pectoral fin length 20-22; first dorsal fin height 20-24; second dorsal fin height 14-18% SL; total bars on caudal fin 10-13, upper caudal fin lobe with 5 reddish bars, of similar width or narrower than the pale interspaces between the bars, not retained on preserved fish; no lateral body stripes; first dorsal fin tip pale; barbels yellow or white in fresh fish; body white below lateral line, covered by red pigmentation above lateral line which may also reach down ventrally, forming red patches or blotches; belly white. Attains 20 cm Standard Length.

Distribution : Red Sea to Somalia, Kenya, Mozambique, South Africa, Madagascar, Reunion, Seychelles, India, Sri Lanka, Bay of Bengal, Andaman Sea, Malaysia, Singapore, Northern Australia and Philippines.

Remarks : New record for the Andaman and Nicobar Islands.

***Upeneus moluccensis* (Bleeker 1855)**

Goldband goatfish

1855. *Upeneoides moluccensis* Bleeker, Nat. Tijdschr. Ned-Indie : 409 (type locality : Ambon, Moluccan Islands).

Upeneus moluccensis Randall and Kulbicki 2006. *Zoological Studies*, **45** : 301-302.

Material examined : Port Blair (South Andaman), 1 ex., 185 mm, ZSI ANRC 1888; Chouldari (South Andaman), 2 exs., 154, 178 mm, ZSI ANRC 2998; Mayabunder (North Andaman), 1 ex., 160 mm, ZSI ANRC 3381; Bidnabad (South Andaman), 1 ex., 160 mm, ZSI ANRC 3828; Inglis Island (South Andaman), 1 ex., mm, ZSI ANRC 4053.

Diagnosis : Dorsal fins VIII + 9; pectoral fins 14-16; gill rakers 7-8 + 18-20 = 26-27; lateral line scales 33-35; body depth at first dorsal fin origin 24-26% SL; body depth at anus 21-23; caudal peduncle depth 9.0-10; maximum head depth 20-22; head depth through eye 16-17; head length 27-29; orbit length 7.3-8.9; upper jaw length 11-12; barbel length 15-17; caudal fin length 27-30; anal fin height 13-15; pelvic fin length 17-22; pectoral fin length 25-27; first dorsal fin height 20-23; second dorsal fin height 14-16% SL; 6-8 thin red bars on upper caudal fin lobe, faintly retained on preserved fish; no bars on lower caudal fin lobe, but a broad band covering the entire lower lobe apart from distal, inner margin; most of lower caudal fin lobe pigmentation lost in preserved fish; one conspicuous yellow or gold mid-lateral body stripe from eye to upper caudal fin base, not retained on preserved fish; first dorsal fin tip dark, also in preserved fish; barbells white; body silvery-rose, darkened above lateral stripe. Attains 20 cm Standard Length.

Distribution : Eastern Mediterranean, Red Sea to Mozambique, Arabian Sea, Madagascar, India, Andaman Sea, Indonesia, New Caledonia, Philippines, Taiwan and southern Japan.

***Upeneus sulphureus* Cuvier 1829**

Sulphur goatfish

1829. *Upeneus sulphureus* Cuvier, *Hist. nat. Poiss.* : 450 (type locality : Antjer, western Java).

Upeneus sulphureus Randall and Kulbicki 2006. *Zoological Studies*, **45** : 304.

Material examined : Port Blair (South Andaman), 1 ex., 185 mm, ZSI ANRC 2744; Mayabunder (North Andaman), 1 ex., 180 mm, ZSI ANRC 3382; Bidnabad (South Andaman), 1 ex., 185 mm, ZSI ANRC 3829; Wandoor (South Andaman), 1 ex., 240 mm, ZSI ANRC

3942; Junglighat fish market, 1 ex., 130 mm, ZSI ANRC 4731.

Diagnosis : Dorsal fins VIII + 9; pectoral fins 15-16; gill rakers 7-8 + 19-21 = 27-28; lateral line scales 31-34; body depth at first dorsal fin origin 25-28% SL; body depth at anus 25-27; caudal peduncle depth 11-12; maximum head depth 23-25; head depth through eye 18-20; head length 29-30; orbit length 7.4-8.7; upper jaw length 11-13; barbel length 17-21; caudal fin length 27-30; anal fin height 16-18; pelvic fin length 20-22; pectoral fin length 24-26; first dorsal fin height 23-26; second dorsal fin height 17-18% SL; no bars on caudal fin lobes; lower lobe base yellowish, upper lobe base grey, some of the caudal fin lobe pigmentation retained on preserved fish; two conspicuous yellow body stripes, one mid lateral from operculum to caudal fin base, the other starting behind pectoral fin base and reaching back to caudal fin base; first dorsal fin tip black; barbels white; body ventrally white and dorsally pale brown. Attains 23 cm Standard Length.

Distribution : Red Sea, Persian Gulf, Madagascar, Seychelles, Reunion, Pakistan, India, Sri Lanka, Andaman Sea, Indonesia, New Guinea, Fiji, New Caledonia, Philippines, and southern Japan.

***Upeneus tragula* Richardson, 1846**

Freckled goatfish

1846. *Upeneus tragula* Richardson, *Rep. Br. Ass. Advmt. Sci.*, : 220 (type locality : Gaungzhou, China).

Upeneus tragula Randall and Kulbicki 2006. *Zoological Studies*, **45** : 305-306.

Material examined : Chidiyatapu (South Andaman), 2 exs., 145 mm, ZSI ANRC 2010; Mayabunder (North Andaman), 2 exs., 85, 125 mm, ZSI ANRC 1918; Bambooflat (South Andaman, 2 exs., 220 mm, ZSI ANRC 2140; Tarmugli Island (South Andaman), 1 ex., 226 mm, ZSI ANRC 2750; North bay (South Andaman), 1 ex., 155 mm, ZSI ANRC 3384; Bidnabad (South Andaman), 1 ex., 145 mm, ZSI ANRC 3830; Junglighat fish market, 1 ex., 155 mm, ZSI ANRC 4734.

Diagnosis : Dorsal fins VIII + 9; pectoral fin rays 13-14; gill rakers 5-6 + 14-17 = 19-23; lateral line scales 28-30; body depth at first dorsal fin origin 22-26% SL; body depth at anus 20-22; caudal peduncle depth 9.9-11; maximum head depth 19-23; head depth through eye 15-17; head length 27-31; orbit length 6.1-8.3; upper jaw length 11-14; barbel length 15-18; caudal fin length 28-32; anal fin height 16-19; pelvic fin length 20-24; pectoral fin length 19-21; first dorsal fin height 21-24; second dorsal fin height 18-22% SL; total bars on caudal fin 10-12 or more, upper caudal fin lobe with 4-6 brown,

dark brown or black bars; 4-7 brown, dark brown or black bars on lower lobe; one brown to black mid-lateral body stripe from tip of snout to caudal fin base; body above stripe greenish grey, body below stripe white or beige, also on paired fins; dark mark very close to first and second dorsal fin tips; barbels yellow in fresh fish; most of body and fin pigmentation retained on preserved fish. Attains 30 cm Standard Length.

Distribution : Red Sea to Mozambique, Oman, Persian Gulf, India, Sri Lanka, Myanmar, Indonesia, Cambodia, Thailand, Singapore, Sabah, Vietnam, Philippines, Papua New Guinea, Palau and Southern Japan.

***Upeneus vittatus* (Forsskal 1775)**

Striped goatfish

1775. *Mullus vittatus* Forsskal *Descript. Anim.* : 31 (type locality : Jeddah, Red Sea). 1846. *Rep. Br. Ass. Advmt. Sci.* : 220 (type locality : Gaungzhou, China).

Upeneus tragula Randall and Kulbicki 2006. *Zoological Studies*, **45** : 306.

Material examined : Hut Bay (Little Andaman), 1 ex., 140 mm, ZSI ANRC 1919; Port Blair (South Andaman) 1 ex., 160 mm, ZSI ANRC 1622; Chouldari (South Andaman), 1 ex., 226 mm, ZSI ANRC 2997; Nancowry Island (Nicobar Group), Mayabunder (North Andaman), 1 ex., 280 mm, ZSI ANRC 3383; Bidnabad (South Andaman), 1 ex., 355 mm, ZSI ANRC 3831; Inglis Island (South Andaman), 1 ex., mm, ZSI ANRC 4054; Junglighat fish market, 2 exs., 132 mm, 160 mm, ZSI ANRC 4730 & 4733.

Diagnosis : Dorsal fins VIII + 9; pectoral fin rays 15-16; gill rakers 7-8 + 19-21 = 27-29; lateral line scales 36-38; body depth at first dorsal fin origin 25-29% SL; body depth at anal fin origin 21-24; caudal peduncle depth 9.9-12; maximum head depth 21-26; head depth through eye 18-20; head length 30-31; orbit length 7.0-8.7; upper jaw length 11-13; barbel length 17-21; caudal fin length 26-30; anal fin height 15-16; pelvic fin length 18-21; pectoral fin length 22-24; first dorsal fin height 22-25; second dorsal fin height 14-16% SL; total bars on caudal fin 7-9, upper caudal fin lobe with 4-5 brown or dark brown bars; 3-4 brown or dark brown on lower caudal fin lobe; bars on both caudal fin lobe retained on preserved fish; first dorsal fin tip dark; two yellow or pale brown mid-lateral body stripes, one from eye to caudal fin base, where it joins the proximal upper caudal fin lobe bar, and other stripe below, from pectoral fin base to caudal peduncle, continued by proximal most lower caudal fin lobe bar; two dorsolateral brown or pale brown stripes, the lower one extending from

operculum to behind second dorsal fin, the upper one much shorter, beginning below first dorsal fin origin to second dorsal fin origin; lateral body stripes not retained on preserved fish; barbels white; body white to silvery, dorsally dark reddish-brown, belly white, faint yellowish patches along pelvic and anal fin bases. Attains 28 cm Standard Length.

Distribution : Red Sea to South Africa, Madagascar, Reunion, Mauritius, Indonesia, Thailand, New Guinea, New Caledonia, Palau, southern Japan, Palau, Mariana Islands, Fiji, Samoa Islands, Society Islands, Marquesas Islands and Hawaii.

DISCUSSION

Coastal waters are highly structured, covering a large variety of different bottom types that are inhabited by a diverse assemblage of organisms. Many of these habitats are still insufficiently known and require continued effort to sample, describe and register all species. However, due to increasing signs of human induced local and global impacts there is also a pressing need to study further coastal organisms to understand their ecological role and function and to evaluate their potential use as indicators and/or key species for coastal ecosystem monitoring and management. Some key species act as 'ecosystem engineers' as they physically change the environment, either by themselves or by manipulating distinct habitat features. This study highlights the goatfishes, family Mullidae, as a group of mainly coastal organisms that have a high value for ecosystem monitoring and management, but also require intensified systematic and ecological research. In the last few years, considerable research on coastal fishes has been carried out to examine the effects of both naturally varying factors and human induced modifications on habitat utilization at different scales (Rajan, 2010). Goatfishes occur in a broad range of habitats, mostly close to or near the bottom of the littoral zone. However, some species may be found down to depths of 500 m and surface-dwelling goatfish larvae have sometimes been found drifting in the outer shelf or in oceanic waters (Deudero 2002). Most goatfish species shift to bottom life soon after metamorphosis, coinciding with barbel development (McCormick 1993) and changes in eye structure (Shand 1997). However, some species may remain in the open water as juveniles (McCormick & Milicich 1993) or feed on plankton even during later ontogenetic stages (Krajewski & Bonaldo 2006). Studies on goatfish habitat use have considered depth as well as various bottom types, including hard and soft bottoms, open sandy

areas and those overgrown with vegetation. Clear preferences for distinct habitat types, but also differences among species and size/age classes, have been reported. Goatfishes are most frequently found on sandy bottoms adjacent to hard bottoms, including coral reefs. Apart from daily short-distance movements within and among foraging and resting sites (Holland *et al.* 1993; Meyer *et al.* 2000), they may also show seasonal migrations, in particular during the reproductive period, leading to the formation of spawning aggregations (Colin & Clavijo 1978; Lobel 1978; Thresher 1984; Colin 1996; Machias & Labropoulou 2002; Claydon 2004). Juvenile goatfishes are often encountered on soft bottoms, in seagrass beds or mangroves, and at different depths than adults, reflecting both horizontal and vertical ontogenetic habitat shifts. Serving as recruitment habitats, seagrass habitats may contribute positively to adult goatfish abundance in adjacent areas (Dorenbosch *et al.* 2005). Ontogenetic habitat shifts may also occur during later life history and coincide with changes in foraging mode, social behaviour and the formation of multi-species associations.

Goatfish is a commercially important demersal fish group throughout their distribution around the world and are considered to be one of the most important fishery resources in the Andaman Islands due to their delicacy, the price recently reached about 60 rupees/kg. Goatfish species are relevant to fisheries in Andaman Islands and several species have high economic importance. For instance, in Andaman Islands at least five goatfish species are the target of fisheries, the gold-band mullet and the striped mullet have been favourite food fishes. The term key species has been used in ecology to rule out those taxa that significantly contribute to the formation and sustaining of community structure and interaction among co-occurring species. The absence of key species would lead to a considerable decline in ecosystem coherence and integrity. Due to their very active foraging behaviour with vigorous stirring up of sediments by their barbels and mouths, goatfishes may provide important ecosystem services, including resuspension and the formation of mixed species foraging associations (Fig.3). These and additional characteristics of their resource use may render goatfishes essential components of food webs in sand-associated coastal ecosystems. Many littoral hard bottoms undergo a continuous erosion process due to wave action and diverse mining or scraping organisms that contribute to sedimentation and the formation of sandy areas in the immediate

surroundings. This is particularly evident on coral reefs, which are usually surrounded by sand habitats in the back- and fore-reef areas, as well as in reef canals, crevices and between reef patches. Corals feed themselves on microscopic food organisms that may, to a large extent, derive from currents transporting them towards the reefs, but there may also be a trophic link between sand bottoms and reef-forming corals, one possible mechanism being the looping back of nutrients from bottom sediments into the open water and surrounding areas by resuspension. The resuspension of bottom sediments can be enhanced by currents or wave action, but also by distinct organisms. There may also be important indirect effects on the sediment-dwelling fauna itself (Choat & Kingett 1982) and on other fish species that often follow goatfishes, thus forming mixed-species foraging associations. The formation of multi-species foraging associations (also called mixed-species, heterospecific or interspecific associations or shoals) may arise if food sources occur that can be shared with advantage. The stirring-up of sediments by goatfishes leads to the uplifting of formerly hidden detritus and other organic material into the water column. This activity attracts other species that follow goatfishes and feed on the newly available particles. Goatfishes themselves may profit, because foraging in larger groups reduces the predation risk. Detailed morphological studies of an organism group are the prerequisite for understanding systematics, ecology and diversity. Till today, most species are described based on morphological characters, although genetics is becoming increasingly important. Knowledge of the shape, structure, and relative size of external and internal body characters facilitates the interpretation of a species' capability to adapt to distinct environmental conditions. However, many other morphological traits of goatfishes, such as body size, coloration, head form, otolith form, or the number of countable characters, such as gillrakers, fin rays, or vertebrae, may vary interspecifically (Thomas 1969; Randall 2004) or intraspecifically (Uiblein *et al.* 1998). Currently, 70 species of goatfishes are known and in the last 13 years, eleven new goatfish species have been described. Some genera have been proven to be particularly specious, the most diverse being *Parupeneus*, which consists of 27 species (Uiblein and Heemstra 2010), followed by *Upeneus* with 26 species. From future revisions, more detailed systematic information can be obtained and from further exploration of remote areas, like isolated islands, new discoveries of goatfish species can be expected. All descriptions of goatfish species so far

have been based exclusively on morphological data. In some cases, morphological variation may be higher than differentiation found at the genetic level (Stepien *et al.* 1994).

CONCLUSIONS

Many knowledge gaps still exist in goatfish ecology and systematics. However, the currently available data suggest that goatfishes may indeed be suitable habitat indicators and may also qualify as key species in coastal sand-associated ecosystems. Because of considerable inter- and intraspecific variations in habitat preferences, food selection, behaviour, and body structure, special attention should be paid to treat species, populations, and size classes separately from each other. Because not all goatfish species are equally well known and even some new ones may be encountered, exploration, monitoring, and management focusing on this group should be co-ordinated worldwide, thus enhancing information exchange and initiating joint research efforts in goatfish ecology and systematics. At the same time, this study may also serve as a model for screening other organisms for their potential as ecosystem indicators. Fresh colouration of head, body and fins is important for species diagnosis. The number and configuration of bars on the caudal fin are also useful to distinguish several species. The fish fauna of Andaman and Nicobar Islands that comprises more than 572 islands, islets and deep water habitats is not well known. The genus *Upeneus* Cuvier 1829 was reviewed from India by Kumaran and Randall 1984 and for the Western Indian Ocean (Uiblein and Heemstra 2010). A particular problem in the taxonomy of Mullidae is the dearth of diagnostic characters. One of the few useful meristic characters is the number of dorsal fin spines, which requires careful examination in order to detect the minute recumbent first spine. Another important character is the number of pectoral fin rays. A third useful character is the number of gill rakers. In this account 65 specimens comprising 14 species were examined from the Andaman and Nicobar Islands from the field collections. One of the goals was to the use of relatively quickly identifiable meristic, morphometric and colour characters. Goat fishes are considered to be one of the most important fishery resources in the Andaman and Nicobar Islands, due to their high prices and marketable power that recently reached about 60 Rs./kg in the local market. In conclusion, the available results suggested that, goatfishes in the Andaman and Nicobar Islands are not overexploited and it is due to effective management regulations such marine reserves

which act as the nursery and spawning grounds and shallow waters which protect the fish during spawning and also protect juveniles and recruits. Detailed studies involving the gear selectivity for the trawl to find the suitable mesh size should be undertaken.

SUMMARY

Currently, 70 species of goatfishes are known, the family occurring widely in tropical, subtropical and temperate habitats from the upper littoral down to the upper slope. Studies of goatfish occurrence and abundance in natural habitats in Andaman and Nicobar Islands have been documented. Generally they prefer sand-associated bottoms, some species are more restricted to hard bottoms, and others occupy various depths. Fourteen species are recognized under three genera: *Mulloidichthys flavolineatus*, *Mulloidichthys vanicolensis*, *Parupeneus barberinus*, *Parupeneus cyclostomus*, *Parupeneus heptacanthus*, *Parupeneus indicus*, *Parupeneus macronema*, *Parupeneus pleurostigma*, *Parupeneus bifasciatus*, *Upeneus guttatus*, *Upeneus moluccensis*, *Upeneus sulphureus*, *Upeneus tragula* and *Upeneus vittatus*. Goatfishes respond to human-induced factors such as fisheries and habitat modification, as reflected by abundance, size, or weight changes, or changes in their distributional range. Goatfishes may act as allochthonous ecosystem engineers through their vigorous foraging behaviour with barbells and mouth, which leads to the stirring-up of sediments and associated detritus particles high into the water column. Goatfishes play a key role in the formation of multi-species foraging associations as a nuclear species that are followed by many other species. There is a considerable lack of basic systematic and taxonomic knowledge, new species still being described and intraspecific morphological variation and genetic differentiation requiring more detailed studies. Goatfishes clearly deserve more attention in future coastal habitat exploration, monitoring and management efforts.

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Fig. 1. Yellowfin goatfish (*Mulloidichthys vanicolensis*) congregating with blue-striped snappers (*Lutjanus kasmira*).



Fig. 2. (*Parupeneus cyclostomus*) dark phase with the terminal male of *Gomphosus caeruleus* (Family : Labridae) (Photo : Sreeraj).



Fig. 3. Goatfish aggregates during feeding (*Upeneus tragula*).



Mulloidichthys flavolineatus (Lacepede) 28 cm SL.



Mulloidichthys vanicolensis (Valenciennes) 26 cm SL.



Parupeneus cyclostomus (Lacepede) 31cm SL.



Parupeneus barberinus (Lacepede) 36 cm SL.



Parupeneus cyclostomus Yellow phase (Photo : Sreeraj).



Parupeneus cyclostomus Dark phase (Photo : Sreeraj).



Parupeneus cyclostomus Blue colour (Photo : Sreeraj).



Parupeneus heptacanthus (Lacepede) 22 cm SL.



Parupeneus indicus (Shaw) 32 cm SL.



Parupeneus macronemus (Lacepede) 22 cm SL.



Parupeneus pleurostigma (Bennett, 1831) 24 cm (Photo : Titus).



Parupeneus trifasciatus (Lacepede) 28 cm SL.



Upeneus guttatus (Day) 18 cm SL.



Upeneus moluccensis (Bleeker) 15 cm SL.



Upeneus sulphureus Cuvier 13 cm SL.



Upeneus vittatus (Forsskal 1775) 21 cm SL.



Upeneus tragula Richardson 26 cm SL.

Caudal fin pattern in *Upeneus* sp.



Upeneus vittatus (7-9 bars).



Upeneus moluccensis (6-8 bars on upper lobe only).



Upeneus guttatus (10-12 bars).



Upeneus sulphureus
(no bar).



140 mm (9-10 bars).



160 mm (11-12).



260 mm (14-15 bars).

Upeneus tragula (in larger specimen the number of caudal bar is more).



Fig. 4. Association of goatfish *Parupeneus macronemus* with parrotfish *Scarus bleekeri* (Initial phase).



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CONTRIBUTION TO THE KNOWLEDGE ON INDIAN MARINE MOLLUSCS : FAMILY TEREBRIDAE

R. VENKITESAN AND A.K. MUKHERJEE

Zoological Survey of India, 'M'-Block, New Alipore, Kolkata-700053

INTRODUCTION

Members of family Terebridae are one of the most spectacular groups of shelled molluscs. Shells of the family Terebridae are very typical in nature. These are commonly known as auger shells. They take their vernacular name from their long, slender and pointed shell, which are often attractively coloured and delicately sculptured. The salient feature of the Terebrid shell, are smooth or with axial sculpture, spiral sculpture or combination of the both. Varices absent, usually with subsutural grooves, outer lip not thickened and without denticles or lirae, columella smooth or with a plait, presence of shallow to deep siphonal notch, with fasciolar band. They have close relationship with some other families like Turritellidae, Cerithidae and Pyramedellidae. Terebridae differs from Pyramedellidae by having no fasciolar band and often have lirae or denticles inside the outer lip, shells of Turritellidae and Cerithidae have no fasciolar band, but Cerithidae often have varices.

Terebrids are sand dwelling animals. In tropics the majority occur inter tidally and in the shallow sub-tidal, down up to about 40 meters. Sub-tidal species down up to about 350 meters, also occur in tropics, constituting more significant component of the fauna in temperate latitudes. All Terebrids are carnivorous, usually burrowing not exceeding the shell length. There are three different types of feeding mechanisms. (a) Radula and without poison apparatus; (b) there is a venom apparatus which injects venom by harpoon. (c) Without radula and venom apparatus in which the animal feeds the slow moving worms, which can be swallowed whole. Globally this family represented by about 265 species, with the greatest concentration of species in the Tropical Indo Pacific region (153 species). About 412 species were reported globally in different

names. Still there is confusion exist in ascertaining the number of species due to polymorphic nature of the family Terebridae in geographical differences among the morphological features in different species. Only 69 species are known from India and 12 species known from literature. Species of this family are predominantly grouped into the genus *Terebra* or *Hastula* with a few species remaining into the genus of *Diplomeriza* and *Impages*, one species remain in the genus *Terenolla*.

Indian Terebrids have been inadequately treated so far. Smith (1899) describes 18 species under 3 genera 2 subgenera from the collections present in the British Museum. Melvill and Sykes (1897, 1899) described about 3 species from Andaman Islands. Smith (1877-1906) described four species and reported about 24 species from Andaman seas. Preston (1908, 1914) described 4 species from Orissa coast. Ray (1948) described 3 species of Terebrids from Orissa coast.

Subba Rao *et al.*, (1991) reported 6 species under two genera from Orissa coast. Surya Rao *et al.* (1992). Subba Rao *et al.* (1992) reported about 3 species under one genera from Digha coast of West Bengal. Subba Rao and Dey (2000) reported about 25 species belongs to 4 genera in their catalogue of marine gastropods from Andaman and Nicobar Islands. Subba Rao (2003) reported 15 species belongs to 4 genera of family *Terebridae* from different locations of Indian coast. Surya Rao (2004) reported about 2 species belongs to 2 genera from Gujarat coast and Ansari *et al.* (2006) reported of 6 species of genus *Terebra* from Andaman.

The objective of this work is to update our knowledge on Terebridae of India. The present account deals with the 52 species inhabiting the Indian seas. It includes the up to date nomenclature, synonymy, distinctive features, affinity and their distribution.

MATERIALS AND METHODS

This work is based on the large collection of Terebridae present in the National Zoological Collection of Zoological Survey of India obtained from the following sources.

i) Shore collections from Indian main land and its adjoining islands by surgeons Naturalists of Indian Marine Survey, Abroad RIMS 'Investigator' during 1887-1939.

ii) Collection brought by faunistic survey parties of Zoological Survey of India from different coastal areas.

PROCEDURAL TECHNIQUES

Morphological examination of the shell was carried out with the help of magnifying glass (10x) or under a binocular microscope.

All the measurements are given in millimeters (mm). For each species, largest and smallest were selected for measurements. Shell measurements are given in terms of maximum dimension along the longitudinal axis (Length) maximum dimension along body whorl (Width) and the maximum length of the aperture (Aperture length). All the measurements were taken with the help of a dial caliper.

In the descriptive part the usual procedure employed by malacologist is followed for the sake of uniformity.

The systematic arrangement of genera and species is mainly based on Vaught's classification (1989).

HISTORY OF CLASSIFICATION

Adanson, (1757) in his voyage to Senegal instituted the genus *Terebra*, to include those Species, which Linnaeus (1857) after wards included in his genus *Buccinum*. It is true that Adanson's genus brought together two distinct form of molluscs; one group belonging to the *Buccinum*, to comprehended within that genus; whilst the other contains species which have been considered by Bruguiere (1789) and Lamarck (1822) as typical of the genus *Terebra* and this genus, so reconstituted, has been recognized of all naturalists.

Not withstanding this unanimity with respect to the genus, an attempt has been made by Schumacher (1817) and supported by Blainville (1825) to make an alteration in its constitution. Schumacher in fact proposes to give the name *Terebra* to the *Bucciniform* species, and call the others by a new generic name reformed by Bruguiere and Lamarck. This change might have been brought about it during the time of Adanson, the genus

Buccinum had not been established by Linnaeus, since which period it has only been necessary to embrace under it the two species erroneously referred to the *Buccinum* of Adanson and this way the genus becomes naturally constituted. The nomenclature of Bruguiere and Lamarck ought therefore to be retained. The inutility of the genus *Subula* of Schumacher is in this manner demonstrated. No one had dreamt of this genus till Adams and Adams attempted to establish in their work instituted "The Genera of Recent Molluscs"

Terebra have the closest relation to *Buccinum*, as conchologist well known, and it fell to Lamarck to introduce two species of the *Buccinum* amongst the *Terebra*. And the reversal has also taken place, for some true *Terebra* have been ranged with *Buccinum*. These facts show how these two genera are related; and so it seems natural to place first the species most nearly allied to *Buccinum* and lastly those with a farthest removed from them.

SYSTEMATIC LIST OF INDIAN SPECIES

Class GASTROPODA

Subclass PROSOBRANCHIA

Order NEOGASTROPODA

Superfamily CONOIDEA

Family TEREBRIDAE

Major Genera :

Genus *Diplomeriza*

Genus *Hastula*

Genus *Impages*

Genus *Terebra*

Genus *Terenolla*

Family TEREBRIDAE

1. Genus *Diplomeriza*

1. *Diplomeriza anomala* (Gray)
2. *Diplomeriza duplicata* (Linnaeus)
3. *Diplomeriza evoluta* Deshayes**
4. *Diplomeriza raphanula* Lamarck
5. *Diplomeriza spectabilis* (Hinds)
6. *Diplomeriza straminea* Gray
7. *Diplomeriza tiurensis* Schepman**
8. *Diplomeriza tricolor* (Sowerby)

2. Genus *Hastula*

1. *Hastula albula* (Menke)
2. *Hastula bacillus* Deshayes
3. *Hastula cinerea* Born
4. *Hastula diverse* Smith
5. *Hastula hastata* Gmelin

6. *Hastula inconstans* Hinds
7. *Hastula inconstans confusa* Smith**
8. *Hastula lanceata* Linnaeus**
9. *Hastula lauta* (Pease)
10. *Hastula matherionana* (Deshayes)
11. *Hastula penicillata* Hinds**
12. *Hastula solida* Deshayes
13. *Hastula strigilata* (Linnaeus)
14. *Hastula stylata* (Hinds)
15. *Hastula tenera* (Hinds)
16. *Hastula traillii* (Deshayes)

3. Genus *Impages*

1. *Impages hectica* Linnaeus

4. Genus *Terebra*

1. *Terebra areolata* (Link)
2. *Terebra affinis* Gray
3. *Terebra alveolata* Hinds
4. *Terebra amanda*. Hinds
5. *Terebra amoena* Deshayes
6. *Terebra anilis* (Roeding)
7. *Terebra babylonica*. Lamarck**
8. *Terebra bifrons* Hinds**
9. *Terebra cerithina* Lamarck
10. *Terebra chlorata* Lamarck
11. *Terebra cingulifera* Lamarck
12. *Terebra columellaris* (Hinds)
13. *Terebra commaculata* (Gmelin)
14. *Terebra crenulata* (Linnaeus)
15. *Terebra crenulata f. fimbriata* Deshayes*
16. *Terebra crenulata f. interlineata* Deshayes*
17. *Terebra decorata* Deshayes**
18. *Terebra deshayesi* Reeve
19. *Terebra dimidiata*. (Linnaeus)
20. *Terebra durgella* Ray
21. *Terebra felina* (Dilwyn)
22. *Terebra fenestrata* Hinds
23. *Terebra funiculata* Hinds
24. *Terebra guttata* (Roeding)
25. *Terebra laevigata* Gray
26. *Terebra maculata* (Linnaeus)
27. *Terebra macandrewii* Smith
28. *Terebra nebulosa* Sowerby
29. *Terebra nodularis* Deshayes**
30. *Terebra pertusa* Born
31. *Terebra polygyrata* (Deshayes)
32. *Terebra punctatostriata* Gray
33. *Terebra quoygaimard* Cernohorsky
34. *Terebra roseata*. Adams & Reeve**
35. *Terebra subulata* (Linnaeus)
36. *Terebra succincta* Gmelin

37. *Terebra succinea* Hinds**
38. *Terebra tessellata* Gray**
39. *Terebra textilis* Deshayes
40. *Terebra tricineta*. Smith
41. *Terebra tricolor* Sowerby**
42. *Terebra triseriata* Gray
43. *Terebra undulata* Gray
44. *Terenolla pygmaea* Hinds**

**Literature only *forms

Class GASTROPODA

Subclass PROSOBRANCHIA

Order NEOGASTROPODA

Superfamily CONOIDEA

Family TEREBRIDAE

Family TEREBRIDAE Moersch

1852. *Terebrina* Moersch, *Cat. Conchyl. Yoldi* 1., p. 741-853.
Acusidae Gray. *Ann. Mag. Nat. Hist. Ser. 2*, 14(62) :
 129 (based on *Acus* Gray, 1847—non Lecepede, 1803).
 1853. *Terebrinae* H & A. Adams, *Gen. Rec. Moll.*, 1 : 224.
 1969. *Pervicaciidae* Rudman, *Veliger*, 12(1) : 63.

Diagnostic Characters : Shell variable in shape, generally fusiform, with a high slender spire. Outer surface with many sculptural patterns composed of spiral or axial to oblique ribs and cords, grooves, nodules or spines. Often present with periostracum. Aperture more or less elongate, siphonal canal well marked, short to long, outer lip thin and sharp. A characteristic slit or notch along the posterior part of the outer lip, which is reflected in the growth line made by the lip.

Key to the Genera

1. Suture distinctly separated, absence of a heavy callous on the parietal wall *Terebra* Bruguiere
 — Suture indistinctly separated, presence of a narrow callous band *Impages* Smith
2. Spiral sculpture absent; siphonal canal with a deep notch *Hastula* Adams & Adams
 — Spiral sculpture present; siphonal canal without a deep notch; axial ribs prominent, spiral grooves deep *Diplomeriza* Dall

Genus *Diplomeriza* Dall 1908

Diplomeriza duplicata Linnaeus, 1758

Diagnostic Characters : Shell solid, glossy, medium in size, aperture small and ovate, sculptured with prominent axial ribs and deep spiral grooves at suture. Interstices narrow and smooth, with stain, pre-sutural band below the suture divides by grooves with folded whorls.

Genus *Diplomeriza*, Dall 1908

Diplomeriza duplicata Linnaeus, 1758

Key to the species under the Genus *Diplomeriza*

1. Columella strongly twisted fasciole with a ridge, suture with sub-sutural band *straminea*
- Columella slightly twisted, fasciole without a ridge, suture without sub-sutural band 2
2. Whorls flatly convex, ornamented with square orange spots *raphanula*
- Whorls straight sided, without any ornamentation 3
3. Earlier whorls expanding, axial ridge above and below on all whorls *spectabilis*
- Earlier whorls expanding, axial ridge above and below on all whorls *spectabilis*
- Earlier whorls not expanding, with out axial ridge 4
4. Shell with a peripheral band; pale spiral band with isolated brown spots *duplicata*
- Shell without a peripheral band; absence of pale spiral band with brown spots 5
5. Whorls flatly convex, smooth with 3 distinct orange red lines *tricolor*
- Whorls folded above, without any colored lines, axial ribs straight not continuous on entire whorl *anomala*

1. *Diplomeriza anomala* Gray

(Pl. 1, Fig. 1)

1834. *Terebra anomala* Gray, *Proc. zool. Soc. Lond.*, p. 62 : (habitat : Singapore).
1844. *Terebra anomala* : Hinds *Thes conch.* p. 180. Pl. 45. figs. 101-102.
1859. *Terebra anomala* : Deshayes *Proc. zool. Soc. Lond.*, 27 p. 291 Sl. No. 81.
1860. *Terebra anomala* : Reeve, *Conch. Icon*, **12**, *Terebra*. Pl. 12; fig. 36.

Material examined : Chennai coast (26 exs).

Measurements (mm) : Length : 15.30-34.00, Width : 3.70-7.00 Aperture length : 2.30-5.40

Description : Shell small in size, up to 34 mm in height, spire pointed, whorls about 12 and folded above; aperture broad and quadrangular, columella straight and little calloused. Suture divided by an impressed punctuate line. Shell smooth polished with a whitish band on the periphery.

Remarks : The chief distinct feature of this species is the wavy spiral groove or impressed line which divides the whorls a little below the suture.

Distribution : India : Tamilnadu, Chennai Coast.

Elsewhere : Philippines, Sandwich Island, Singapore.

2. *Diplomeriza duplicata* (Linnaeus)

(Pl. 1, Fig. 2)

1758. *Buccinum duplicatum* Linnaeus, *Syst. Nat.* **10** : 758, **12** : 1206.
1767. *Diplomeriza duplicata* Linnaeus, *Syst. Nat.*, ed. **12** : 1206.
1839. *Terebra lamarcki* Kiener, *Icon des Coq. Viv.* p. 30, t. 9, fig. 19.
1857. *Terebra reevei* Deshayes, *J. Conchyl.*, **6** : p. 65-102, pl. 35.
1906. *Terebra duplicata* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.
1921. *Terebra duplicata* : Hornell, *Madras Fish. Bull.*, **14** : 141.
1942. *Duplicaria duplicata* : Gravely, *Bull. Madras Govt. Mus. New Ser. (Nat. Hist.)*, **5**(2) : 80.
1952. *Duplicaria duplicata* : Satyamurti, *Bull. Madras Govt. Mus. New Ser. (Nat. Hist.)*, **1**(2) : 214. Pl. 21, fig. 5.
1952. *Terebra duplicata* : Subramanyam, Karandikar and Murti, *J. Univ. Bombay*, **21**(3) : 55. Fig. 171.
1961. *Duplicaria duplicata* : Menon, Datta Gupta and Gupta, *J. Bombay nat. Hist. Soc.*, **58**(2) : 490, Pl. 9, fig. 77.
1986. *Duplicaria duplicata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, *Zool. Surv. India*, p. 173.
1990. *Duplicaria duplicata* : Pinn, *Sea Shells of Pondicherry*, Nehru Science Centre, p. 109, fig. 200.
2000. *Diplomeriza duplicata* : Subba Rao and Dey *Rec. zool. Surv. Ind. Occ. Paper*, **187** : p. 175.
2003. *Duplicaria duplicata* : Subba Rao, *Rec. zool. Surv. Ind. Occ. Paper*, **192** : pl. 87, fig. 2 & 3 and pl. 89, fig. 6-7.
2004. *Diplomeriza duplicata* : Rao, Maitra, Barua and Ramakrishna, *Fauna of Gujarat, State Fauna series*, **8**(2) : 324. *Zool. Surv. India*.
2007. *Diplomeriza duplicata* : Ramkrishna, Dey, Barua and Mukhopadhyaya, *Fauna of Andhra Pradesh, State Fauna series*, **5**(7) : 136, XI, figs. 131 & 132. *Zool. Surv. India*.

Material examined : Andamans (9 exs), Gujarat (2 exs). Tamil Nadu (5 exs).

Measurements (mm) : Length : 47.70-52.50, Width : 8.00-8.30 Aperture length : 8.10-8.80.

Description : Shell of medium size, up to 50 mm in height, narrowly elongate with 15 to 17 whorls. Aperture small and ovate, columella twisted, anterior canal recurved. Sculptured with a deep sutural groove, 25-30 flat and close set of axial ribs, whorl divided by a spiral groove above the middle. Shell glossy, cream or brown coloured with darker rusty brown transpirally elongate markings with a pale band just above suture.

Remarks : It can be differentiated by the presence of deep sutural groove and flat close set of axial rib in transparent in appearance.

Distribution : India : Tamil Nadu : Madras, Gulf of Mannar (Tuticorin, Pamban, Krusadai Islands), Andaman Islands.

Elsewhere : China, Indo-Pacific (common) Madagascar, Malacca's, Singapore, Viti Islands.

3. *Diplomeriza raphanula* Lamarck (Pl. 1, Fig. 3)

1822. *Terebra raphanula* Lamarck, *Anim. Sans. Nat.* **10** : p. 246.
 1839. *Terebra raphnula* : Kiener, *Icon. des Coq. viv.* p. 21, (16); pl. 10, fig. 20.
 1844. *Terebra raphanula* : Hinds. *Thes Conchyl.* P. 159. (23) : pl. 44, fig. 94.
 1898. *Terebra raphanula* : Melvill and Sykes, *Proc. malac. Soc. London*, **3** : 43.
 1986. *Duplicaria raphanula* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands. Zool. Surv. India*, p. 173.
 1990. *Duplicaria raphanula* : Pinn, *Sea Shells of Pondicherry*, Nehru Science Centre, p. 110, fig. 202.

Material examined : Andamans (5 exs), Marine survey (2 exs), Kerala (3 exs), Karnataka (4 exs).

Measurements (mm) : Length : 38.10-46.70, Width : 8.30-8.50 Aperture length : 10.00-10.60.

Description : Shell somewhat cylindrical, up to 46 mm in height, whorls flatly convex gives some what tower like apperance, whorls divided at the upper part by a sharp groove, the folds disappearing on the last whorl, aperture squarish, columella slightly recurved. Ornamented with longitudinally square orange spots and red dotted at the sutural margin.

Remarks : It can be differentiated from other species by its more slender and shiny distinct tessellated ash colour.

Distribution : India : Andaman Islands.

Elsewhere : South Africa, Fiji Island, Philippines.

4. *Diplomeriza spectabilis* Hinds (Pl. 1, Fig. 4)

1844. *Terebra spectabilis* Hinds, *Proc. zool. Soc. Lond.*, pl. 11, p. 153.
 2003. *Terebra spectabilis* : Subba Rao, *Rec. zool. Surv. Ind. Occ. Paper*, **192** : 319, pl. 87.

Material examined : Andamans (8 exs).

Measurements (mm) : Length : 10.50-17.00, Width : 2.90-4.50 Aperture length : 2.70-4.20.

Description : Shell solid, 17 mm in height, glossy, straight sided but earlier whorls expanding more rapidly

than later ones, last whorl roundly keeled at base, suture deep; deep sutural groove has crowded, straight, axial ridges above and below on all whorls, smooth between ridges, siphonal canal strongly recurved, amber with white band above and below suture, columella white.

Remarks : A gracefully colored species, encircled by a marked depression above and below the suture.

Distribution : India : Andaman Islands.

Elsewhere : Guinea, Pakistan, Sumatra, Tasmania.

5. *Diplomeriza straminea* Gray (Pl. 1, Fig. 5)

1843. *Diplomeriza straminea* Gray, *Proc. zool. Soc. London*, **11** : 62.
 1839. *Terebra babylonia* Var. Kiener, *Icon. Decay* **5** : pl. 14, fig. 35a.
 1859. *Terebra approximata* Deshayes, *Proc. zool. Soc. Lond.*, p. 299, sp. no. 125.
 1898. *Terebra straminea* : Melvill and Sykes, *Proc. malac. Soc. London*, **3** : 43.
 1908. *Terebra unicolor* Preston, *Rec. Indian Mus.*, **2** : 190, pl. 17, fig. 65.
 1986. *Duplicaria straminea* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands, Zool. Surv. India*, p. 173.
 2000. *Diplomeriza straminea* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.* **187** : 175.

Material examined : Andaman (4 exs).

Measurements (mm) : Length : 54.60-65.20, Width : 9.00-10.30 Aperture length : 8.60-10.00.

Description : Shell large and slender, up to 65 mm in height, about 21 whorls, whorls convex, spirally and finely ridged, aperture narrowly oval, columella twisted and recurved at the base, outer lip thin. Sculptured with fine axial and spiral lines, suture deep, interstices rather excavated, swollen and turreted suture impressed with orange or brown color.

Remarks : It nearly allied to *T. quoygaimard*. It can be identified by the sculpture of fine incised grooves.

Distribution : India : Andaman Islands and Lakshadweep.

Elsewhere : Philippines, China.

6. *Diplomeriza tricolor* (Sowerby) (Pl. 1, Fig. 6)

1825. *Diplomeriza tricolor* Sowerby, *Cat. Shell Tankerville*, appendix, p. 24.
 1833. *Terebra taeniolata* Quoy & Gaimaird, *Voy. De PAstr.* T ii. p. 466, pl. 36, fig. 25-2.
 1860. *Terebra deshayesii* : Reeve, *Conch. Icon.*, **12**, Fig. 45.
 1898. *Terebra tricolor* : Melvill and Sykes, *Proc. malac. Soc. London*, **3** : 43.
 1906. *Terebra tricolor* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.

1986. *Duplicaria tricolor* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 173.

2000. *Diplomeriza tricolor* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No. 187* : 175.

Material examined : Andamans (9 exs).

Measurements (mm) : Length : 33.70-55.40, Width : 5.80-8.60 Aperture length : 4.80-8.20.

Description : Shell large and slender, up to 56 mm in height, almost straight sided, whorls slightly convex, about 18-21 whorls, early whorls slightly crenulated and later one become smooth; aperture small, columella twisted recurved. Suture impressed, sutural band with creamy white in color, each whorl is covered by 3 distinct red-orange color spiral lines; shell orange fawn in color.

Remarks : It is characterized by a typical state, encircled with 3 distinct orange red lines; it differs very little from *T. cingulifera*.

Distribution : India : Andaman Islands.

Elsewhere : Indonesia, Japan and Tonga Islands.

Genus *Hastula* H. Adams & A. Adams, 1853

Type sp. : *Hastula (Hastula) strigilata* Linnaeus, 1758

Diagnostic Characters : Shell of moderate size, aperture wide, anterior canal very short with a wide deep notch; siphonal fasciole wide, with an indistinct groove, columella with a basal fold, callus curving inner wall, narrow axial ribs, which fade out on anterior part of whorls.

Key to species under genus *Hastula*

1. Axial ribs continue on entire body whorl, presence of a narrow pre-sutural band *inconstans*
— Axial ribs not continue on entire body whorl, absence of a narrow pre-sutural band 2
2. Nuclear whorl with brown color, with blackish brown rhomboidal blotches *strigilata*
— Nuclear whorls without color, without any blotches; body whorl with a color band 3
3. Body whorl with a narrow brown band, purple spot in upper part *cinerea*
— Body whorl with a broad white band, ornamented with short axial streaks 4
4. Shell shining brown, axial streaks forms a narrow band *stylata*
— Shell shining white, axial streaks not forming a band, well defined at suture 5

5. Upper part of suture with continuous plication, and with a sutural groove *albula*
— Upper part of suture without continuous plication and without a sutural groove 6
6. Shell elongate cylindrical, columella arched; suture without band *hastata*
— Shell short not cylindrical, columella twisted, suture with a band 7
7. Suture with red color band below, with interstices concave *tenera*
— Suture variously banded, interstices not concave, coloration on apex 8
8. Suture encircled with a narrow violet band, band becomes broad at base *trailli*
— Suture encircled with a purple band, band becomes narrow at base 9
9. Shell grayish, columella without callous, axial ribs straight *lauta*
— Shell brownish, columella with callous, spot below suture 10
10. Length of aperture more than half of the body whorl, pre-sutural margin with a pit *matherionana*
— Length of aperture less than half of the body whorl, pre-sutural margin without a pit 11
11. Axial ribs narrow and sharp; interstices with peculiar leaden ash colour *bacillum*
— Axial ribs broad and flat; interstices with orange colour *solida*

7. *Hastula albula* (Menke)

(Pl. 1, Fig. 7)

1843. *Terebra (Hastula) albula* Menke, *Moll. Nov. Holl. Spec.* p. 30, No. 163.
1844. *Terebra (Hastula) albula* : Hinds, *Thes conch.* p. 183. (93) Pl. 43, fig. 126.
1859. *Terebra incolor* Deshayes, *Proc. zool. Soc. Lond.*, p. 283.
1898. *Terebra casta* Lamarck : Melvil and Skyes, *Proc. malac. Soc. London*, 3 : 42.
1986. *Duplicaria albula* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 173.
2000. *Hastula albula* : Subba Rao and Dey *Rec. zool. Surv. Indi. Occ. Paper*, 187 : 176.

Material examined : Andamans (6 exs).

Measurements (mm) : Length : 22.00-26.80, Width : 2.30-2.50 : Aperture length : 5.40-6.00.

Description : Shell small and cylindrical, up to 27 mm in height, about 9-11 flattened whorls, undivided,

closely plicated round the upper part plaits produced at the suture, whorls divided by an impressed punctuate line near suture; aperture rather small, and columella rather short, weakly arched. Shell smooth, polished, ornamented with a whitish band on the periphery.

Remarks : This species is widely distributed, varies in slender and sculpture. Variability may occur due its habitats. This species does not have any encircling groove.

Distribution : India : Andaman Islands.

Elsewhere : Australia, Philippine, Straits of Malacca.

8. *Hastula bacillus* (Deshayes)

(Pl. 1, Fig. 8)

1859. *Terebra bacillus* Deshayes, *Proc. zool. Soc. Lond.*, pl. 25, sp. no. 134.

1959. *Terebra lactea* Deshayes, *Proc. zool. Soc. Lond.*, no. 52, p. 285.

1860. *Terebra bacillus* : Reeve, *Conch. Icon.*, 12, *Terebra* sp. 134, pl. 25, fig. a, b, c.

2008. *Hastula bacillum* : Mahapatra, *Fauna of Krishna Estuary, Estuarine Ecosystem series*, 5 : 136, Zool. Surv. India.

Material examined : Orissa (72 exs) Visakhapatnam (56 exs).

Measurements (mm) : Length : 13.15-18.75, Width : 2.85-3.46; Aperture length : 3.20-5.30.

Description : Shell solid, needle like, up to 18 mm in height, whorls slopping flattered, undivided, elongate plicate crenulated round the upper part, aperture small, columella arched and short. Ornamented with banded leaden ash—colour, shining, some times spotted beneath the sutures, apex lead colour.

Remarks : A shining solid shell, of transparent white, variously banded with a peculiar leaden ash colour.

Distribution : India : Orissa, Andhra Pradesh : Visakhapatnam, Bhimlipatnam.

Elsewhere : Red sea; Sandwich Island.

9. *Hastula cinerea* (Born)

(Pl. 1, Fig. 9)

1780. *Terbra cinera* Born, *Test. Mus. Caes. Vindobonesia* p. 267, pl. 10, fig. 11 & 12.

1843. *Terebra luctuosa* Hinds, *Proc. zool. Soc. Lond.*, p. 157.

1850. *Terebra jamaicensis* Adams, *Cont. conch.* p. 58.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 25.00-27.40, Width : 5.20-5.70; Aperture length : 5.40-6.60.

Description : Shell medium in size, up to 27 mm height, with pointed and long spire, whorls about 10-

12 sharply flattened; whorls, longitudinally finely striated; aperture small, columella callous, shining chestnut, straight, somewhat truncated. Ornamented with a dark brown, short axial streaks at suture which gives a narrow band appearance. Sculptured with narrow curved axial ribs which become obsolete in short distance before to the suture; body whorl with a white and brown band.

Remarks : Characterized by a uniform cinereous colored shining chestnut columella, and by the delicate concentric placations of the upper part of the whorls, round which there is only a scarcely perceptible depression in the place of the customary groove.

Distribution : India : Andaman Islands.

Elsewhere : Isles of Mindanao, Japan, Philippines, Polynesia and West Africa.

10. *Hastula hastata* (Gmelin)

(Pl. I, Fig. 10)

1791. *Buccinum hastatum* Gmelin, p. 3502, no. 144.

1828. *Terebra costata* Menke, *Syn. Mus.*, p. 84.

1839. *Terebra hastata*, Kiener, *Icon. Des Coq. Viv.*, 17 : p. 22, pl. 10, fig. 23.

1844. *Terebra hastata* Hinds, *Proc. zool. Soc. Lond.*, p. 162, no. 43.

1859. *Terebra crasula* Deshayes, *Proc. zool. Soc. Lond.*, p. 282, No. 37.

2000. *Hastula hastata* : Rao and Dey. *Rec. zool. Surv. Ind. Occ. Paper*, 187 : 176.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 14.60-26.50, Width : 3.00-6.50; Aperture length : 3.40-7.10.

Description : Shell elongate and cylindrical, keeled at base, whorls about 9-10, flattened, undivided, closely plicated round the upper part plaits produced at the suture, Axial ribs flat and continuous, aperture rather small, columella rather short and arched. Shell creamy white, ornamented with a white band at sutures, interstices smooth filled with dark—orange color. Pre-sutural groove is absent.

Remarks : Widely distributed species varying in slender and define of sculpture along to its habitat. It is one of the species which do not have pre-sutural groove.

Distribution : India : Andaman Islands.

Elsewhere : Australia, Philippines, Sandwich Island, West Indies.

11. *Hastula inconstans* (Hinds)

(Pl. 1, Fig. 11)

1844. *Terebra inconstans* Hinds, *Thes. Conch.*, p. 179, no. 85, pl. 44, fig. 83.

1859. *Terebra inconstans* Deshayes *Proc. zool. Soc. Lond.*, p. 291, no. 80.
 1860. *Terebra aciculina* Reeve, *Conch. Icon.*, **12**, *Terebra* sp. 134, pl. 25, fig. a, b, c.
 2003. *Terebra inconstans* : Subba Rao, *Rec. zool. Surv. Ind. Occ. Paper*, **192** : 338, pl. 89, fig. 1.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 23.80-29.80, Width : 6.30-7.10; Aperture length : 6.50-8.60.

Description : Shell small, up to 30 mm in height, thin, narrow and acicular with about 12 whorls. Aperture short broadly effused at base, columella calloused, very short and straight, keeled at base. Upper part of the whorls sculptured with elongate folded axial ribs. Color shining white, with pale band towards base, sutures white with pale band and brown dots below.

Remarks : This species has much of general character of *T. anomala* but whorls are continuous entire and the shells are more acuminate of the body.

Distribution : India : Andamans; Tamil Nadu : Tranquebar.

Elsewhere : Marques Island, Sandwich Islands.

12. *Hastula lauta* (Pease)

(Pl. I, Fig. 12)

1869. *Terebra lauta*, Pease, *Am. Journ. Conch.*, **5**, p. 66.
 1967. *Hastula lauta* : Cernohorsky, *Marine shells of Pacific*, **1**, p. 210, fig. 404.
 2003. *Terebra lauta* : Subba Rao, *Rec. zool. Surv. India, Occ. Paper No. 192*, p. 339, pl. 89, figs. 8 & 9 (only description not figures).

Material examined : Andaman (2 exs).

Measurements (mm) : Length : 21.50-22.00, Width : 4.50-4.70; Aperture length : 4.30-4.60.

Description : Shell solid, sub-cylindrical in shape up to 22 mm in height with about 12 whorls, aperture small; sculptured with strong longitudinally plicated axial ribs, the placcations are regular, sharp and extending across the whorls, the interstices with a single row of punctuation near the suture; deep spiral groove at suture; leaden gray to orange brown in color, ornamented with polished banded with yellow, bearing a row of chestnut spots at the suture with a pale peripheral band, beneath which the body whorl is chestnut colored.

Remarks : This species is nearly allied to *H. strigilata* but it can be identified by sharp plication and the line of punctuation which indicate a sutural space and no demarcation defined upon the in the ribs.

Distribution : India : Andaman Islands.

13. *Hastula matheroniana* (Deshayes)

(Pl. I, Fig. 13)

1959. *Terebra matheroniana* Deshayes, *Proc. zool. Soc., Lond.* : p. 287, no. 60, pl. 27.
 1860. *Terebra aciculina* Lamarck, Reeve *Proc. zool. Soc., Lond.*, pl. 23, sp. no. 121.
 1869. *Terebra strigillata* Linnaeus, Pease, *Am. J. Conch.*, **4**, p. 123.
 1885. *Terebra lauta* Pease, Tryon, *Man. Conch.* **7** : 33, pl. 10, fig. 91 (figd. Type specimen).
 2000. *Hastula matheroniana* : Subba Rao and Dey, *Rec. zool. Surv. Ind. Occ. Paper No. 187* : 176.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 18.50-21.00, Width : 3.60-4.50; Aperture length : 4.30-4.80.

Description : Shell solid, small up to 21 mm in height, spire long and pointed, whorls about 14, whorls slopping flattened, undivided. Longitudinal placcations are continuous to the base of the whorl, aperture small and narrow, broadly effused at the base, other lip thin, columella very short, callous, and straight keeled at base. Color white or ash, shining, ornamented with pale band towards the base, suture white, encircled with elongated brown dots. Body whorl with a white band.

Remarks : Longitudinal plications are continuous to the base of the whorl, and the aperture is small and narrow and not patulateas. This species varies little in form, except in having the plicated sculpture more or less strongly developed. It is nearly allied to *H. strigilata*.

Distribution : India : Andaman Islands.

Elsewhere : Manila, Singapore, Sandwich Islands.

14. *Hastula solida* (Deshayes)

(Pl. I, Fig. 15)

1859. *Terebra solida* Deshayes *Proc. zool. Soc., Lond.*, p. 282, no. 36.
 1898. *Terebra solida* : Melvill and Skyes, *Proc. malac. Soc., London*, **3** : 42.
 1967. *Hastula solida* : Cernohorsky, *Marine shells of Pacific*, **1**, p. 212, pl. 54, fig. 408.

Material examined : Andamans 1 ex.

Measurements (mm) : Length : 18.50, Width : 4.60; Aperture length : 3.20.

Description : Shell solid, with pointed spire, whorls about 9-12, nuclear whorls light orange in colour aperture broad, columella straight, little callous. Sculptured with 14-18 broad and flat axial ribs; white ornamented with a narrow fawn band; interstices are smooth and often stained with orange.

Remarks : This species can be identified with the aid of axial ribs are flat and broad; stained with orange colour.

Distribution : India : Andaman Islands.

Elsewhere : Tropical Pacific, uncommon (Cernohorsky, 1967).

15. *Hastula strigilata* Linnaeus
(Pl. I, Fig. 14)

1758. *Buccinum strigellatum* Linnaeus, *Syst. Nat.*, ed., **10** : 741 (Type locality : O Asiatic).

1844. *Terebra strigilata* Hinds, *Thes. Conch.* p. 180, pl. 45, figs. 101-102.

1859. *Terebra modesta* Deshayes, *Proc. zool. Soc., Lond.* : p. 288, No. 64.

1967. *Hastula strigilata* : Cernohorsky, *Marine shells of Pacific*, **1**, p. 154, fig. 409.

Material examined : Orissa (12 exs).

Measurements (mm) : Length : 25.60-28.35, Width : 5.60-6.20; Aperture length : 4.20-5.20.

Description : Shell medium in size, with pointed spire, up to 28 mm in height, about 10-15 whorls; Whorls flat sided, aperture small, columella short, slightly twisted; color shining brownish gray, with white bands below suture, blackish brown rhomboidal on a white pre-sutural band. Sculptured with broad and flat axial ribs, interstices narrow and smooth; body whorl with a white peripheral band.

Remarks : White purple band with blackish brown rhomboidal below the suture helps to identify this species.

Distribution : India : Orissa; Tamil Nadu : Madras.

Elsewhere : Australia, Indonesia, Indo Pacific, Philippines, Sandwich Islands, Sri Lanka.

16. *Hastula stylata* (Hinds)
(Pl. I, Fig. 16)

1844. *Terebra stylata* Hinds, *Proc. Zool. Soc. Lond.*, **11** : p. 152.

1967. *Hastula stylata* : Cernohorsky, *Marine shells of Pacific*, **1**, p. 214, fig. 410.

1898. *Terebra confusa* : Melvill and Sykes, *Proc. malac. Soc. London*, **3** : 42.

2000. *Hastula stylata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 177.

Material examined : Andaman Islands (4 exs) Orissa (2 exs).

Measurements (mm) : Length : 25.60-36.50, Width : 5.60-7.40; Aperture length : 4.20-5.40.

Description : Shell medium in size, with pointed spire, up to 36 mm in height, about 10 whorls; aperture small,

columella callous, shining chestnut, straight, somewhat truncated, color shining brownish gray, Ornamented with dark brown short axial streaks at suture, which tend to form a narrow band. Sculptured with narrow curved axial ribs, which becomes obsolete before suture. Body whorl with a white and brown band.

Remarks : Narrow curved axial ribs which become obsolete a short distance posteriorly to sutures helps to identify this species.

Distribution : India : Andaman Islands, Orissa.

Elsewhere : Tropical Pacific.

17. *Hastula tenera* (Hinds)
(Pl. I, Fig. 17)

1843. *Terebra tenera* Hinds, *Proc. zool. Soc. Lond.*, p. 158.

1940. *Terebra tenera* : Crichton, *J. Bombay nat. Hist. Soc.*, **42** : 335.

1952. *Terebra tenera* : Subramanyam, *J. Univ. Bombay*, **21**(3) : 55, fig. 169.

1992. *Terebra tenera* : Subba Rao, Dey and Barua, *Fauna of West Bengal, State Fauna series*, **3**(9) : 200. *Zool. Surv. India*.

2004. *Terebra tenera* : Surya Rao, *Zool. Surv. India, State Fauna Series 8, Fauna of Gujarat*, p. 324.

Material examined : Andamans (5 exs) Gujarat (3 exs) Karnataka (5 exs).

Measurements (mm) : Length : 8.00-17.50, Width : 1.00-2.20, Aperture length : 1.50-1.90.

Description : Shell small and narrow, up to 17 mm in height, about 6-8 flattened convex whorls; aperture shining, oblong and small, columella little twisted; suture distinct beaded with red, surface almost smooth, polished with darkish spiral bands, ribs transpired, interstices distant concave.

Remarks : This little species, with its distinct varicose ribs has somewhat the appearance of *Mangelia* but, it can be identified with shell small, polished with darkish spiral bands, ribs transpiral.

Distribution : India : Gujarat, Karnataka, Maharashtra, Tamil Nadu, West Bengal.

Elsewhere : Pakistan, Sri Lanka, Straits of Malacca.

18. *Hastula trailii* (Deshayes)
(Pl. I, Fig. 18)

1859. *Terebra trailii* Deshayes, *Proc. zool. Soc. Lond.*, p. 285 no. 53. (Type locality : Viasigapatnam, Ocean Indian (= Visakhapatnam)).

1860. *Hastula trailii* : Reeve, *Conch. Icon.*, **12**, *Terebra* sp. 142, pl. 26, figs. 142a-b.

1991. *Hastula trailii* : Rao, *Zoological Survey of India, State fauna series*, **1. Fauna of Orissa (Part-3)** **148** : p. 90.

2003. *Hastula trailii* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper No.*, **192** : p. 338, pl. 89. fig. 3 & 4.

2007. *Hastula trailli* : Ramkrishna, Dey, Barua and Mukhopadhyaya, *Fauna of Andhra Pradesh, State Fauna series*, 5(7) : 136, XI, figs. 127 & 128. Zool. Surv. India.

Material examined : Orissa (99 exs). Andhra Pradesh (57 exs).

Measurements (mm) : Length : 13.35-25.92, Width : 3.05-4.60, Aperture length : 2.00-2.53.

Description : Shell small, narrow and needle shape, up to 26 mm in height, with flattened slopping whorls; whorls with ash colour spiral bands and indistinct spots below the suture. Aperture small, columella arched and short, ornamented with orange yellow color, encircled with a narrow violet band. Suture indistinct, surface almost smooth, except for elongate plications on the upper part of whorls, axial ribs continued up to the base.

Remarks : This species closely agrees with *H. bacillum* but differs from it in size. Coloration and absence of dark brown patch on the apex, axial ribs not continued to base.

Distribution : India : Andhra Pradesh : Vishakapatnam, Bhimilipatnam, Orissa, Tamil Nadu, Chennai.

Elsewhere : Indian Ocean.

Genus *Impages* Smith, 1873

Type sp : *Impages caerulescens* Lamarck, 1822

Diagnostic Characters : Shell moderate in size, with pointed spire, aperture broad at the base and triangular, columella smooth and stright, whorls entire, sculptured with fine deep grooves. Suture indistinctly separated, with a narrow callus band above it.

19. *Impages hectica* (Linnaeus) (Pl. I, Fig. 19)

1758. *Buccinum hecticum* Linnaeus, *Syst. Nat.* ed. 10; 758 ed 12 : 1206.

1791. *Buccinum niveum* Gmelin, *Linn.*, ed xiii, p. 3504.

1817. *Buccinum bifasciatum* Dillwyn, *cat.*, ii, p. 651, No. 155.

1822. *Terebra caerulescens* Lamarck, *Anim. sansvert.*, x. p. 245.

1828. *Buccinum terebrale* Menke *Syn. Mus.*, p. 84.

1839. *Terebra castanea* Kiener, *Icon. Des Coq. Viv.*, p. 22, No. 17, pl. 9, fig. 23.

1843. *Bullia fuscus* Gray, *Proc. zool. Soc. Lond.*, p. 62.

1844. *Terebra nimbose* Hinds, *Proc. zool. Soc. Lond.*, p. 151.

1898. *Terebra chlorata* Lamarck : Melvil and Skyes, *Proc. malac. Soc.*, London, 3 : 42.

1898. *Terebra caerulescens* : Melvill and Skyes, *Proc. malac. Soc.*, London, 3 : 42.

1995. *Impages hectica* : Bosch *Sea shells of Eastern Arabia.*, p. 170, pl. 761.

2000. *Hastula hectica* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, 187 : 176.

2003. *Impages hectica* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper No.*, 192 : 337, pl. 89, fig. 5.

Material examined : Andamans (17 exs) Andhra Pradesh (4 exs), Tamil Nadu (6 exs).

Measurements (mm) : Length : 15.50-53.60, Width : 3.20-12.70, Aperture length : 3.10-5.00.

Description : Shell solid, glossy, up to 53 mm in height. Suture finely incised, about 10-12 whorls, last whorl gently rounded below, early whorl with weak axial ribs; aperture broad at the base and triangular; columella smooth and almost straight, fasciole with central groove, basal ridge does not reach columella. Surface smooth, callous near suture, ornamented with grayish yellow with white band above suture, purplish brown flames and streaks below them.

Remarks : It is mainly collected for its shell, this species is commercially important on the Coromandel coast of India.

Distribution : India : Andhra Pradesh : Visakhapatnam; Tamil Nadu.

Elsewhere : Wide spread in the Indo Pacific, Africa, Hawaii, Japan Madagascar, Polynesia; Queensland and Red Sea.

Genus *Terebra*, Bruguiere, 1789

1789. *Terebra* Bruguiere, *Encycl. Meth. Hist. Nat. Vers.*, 1 : 15. *Terebra* Bruguiere, *Encycl. Meth. Hist. Nat. Vers.*, 1 : xy, type species by SM (Lamarck, 1799) *Cinum subulatum* Linnaeus, 1767, Recent, Indo Pacific.

Type sp. : *Terebra subulata* Linnaeus

Diagnostic Characters : Shell long and slender, very sharply turreted, profusely colored, and often very elaborately sculptured, sinuate at the base, whorls narrow, very numerous, flatly convex, aperture small, lip simple, never reflected, operculum small, horny. The flaring apex and absence of a heavy callous on the parietal wall are characteristic in the typical *Terebra*.

Terebra subulata Linnaeus, 1758

Key to the Species under the genus *Terebra*

1. Shell sculptured with two spiral cords at suture; whorls with growth lines (2)
- Shell sculptured with row of beads at suture; whorls without growth lines (4)
2. Suture with deep punctuate spiral groove; whorls with shallow spiral line *cingulifera*

- Suture with moderate punctuate spiral groove; whorls with crenulated margin (3)
3. Sutural margin swollen; presence of close set of white nodules at suture *quoygairmardi*
Sutural margin not swollen, absence of close set of white nodules at suture, Shell smooth, suture separated by deep spiral groove *laevigata*
4. Body whorl with colour band; ornamented with colour spots (5)
Body whorl without a colour band, ornamented with blotches (9)
5. A row of brown spots on infra sutural band *alveolata*
A row of reddish purple spots on infra sutural band (6)
6. Suture with alternate white and brown spots, Interstices with reddish purple colour *pertusa*
— Suture with white axial zone, interstices without colour, axial ribs curved (7)
7. Infra sutural band stands out from the shell *amoena*
— Infra sutural band stands equal to the shell, whorls stepped up at suture (8)
8. Spire longer than the body whorl; axial ribs narrow, strong and regular *durgella*
Spire shorter than the body whorl; axial ribs broad, basal ridge continuous with outer lip .. *polygyrata*
9. Interstices filled with colour; axial ribs broad and curved (10)
— Interstices filled with punctuations, axial ribs narrow and round (12)
10. Ornamented with irregular orange red blotches *nebulosa*
— Ornamented with regular orange yellow axial lines and bands (11)
11. Whorls slightly stepped up at suture; axial cords white *cerithina*
— Whorls not stepped up at suture; axial cords yellow with punctuate line *affinis*
12. Interstices with deep groove filled with dark yellow colour *columellaris*
— Interstices with a moderate groove filled with dark brown colour *undulata*
13. Interstices without spiral ridges, with presence of pre-sutural band (14)
- Interstices with spiral ridges, absence of pre-sutural band (19)
14. Beads squarish at suture; spiral groove punctuate, whorls with 3-4 rows of punctures *amanda*
— Beads oblique at suture, spiral groove deep whorls with spiral ridges (15)
15. Interstices without overriding spiral ridges, axial growth line *funiculata*
— Interstices with overriding spiral ridges, axial growth line (16)
16. Suture separated by deep groove; *fenestrata*
— Suture separated by concentric wrinkles (17)
17. Whorls flat and encircled with 3 distinct linear grooves prickled granules *deshayesi*
— Whorls straight sided; crenulated (18)
18. Early whorls slightly crenulated, spirals lining of 3 distinct red-orange colour *tricolor*
— Early whorls not crenulated whorl with 5 low spiral ridges *anilis*
19. Interstices with 8-9 spiral cords and a row of oblique beads at sutures : *textilis*
— Interstices with 4-6 spiral cords and two rows of oblique beads at sutures (20)
20. Interstices with spiral ridges; highly marked sub-sutural groove *succincta*
— Interstices with out spiral ridges; lightly marked sub-sutural groove (21)
21. Spiral groove with granulated sculpture, axial rib weak *triseriata*
— Whorls arranged like a pyramid, radial striae throughout whorls *tricincta*
22. Whorls with axial lines or bands or spots, shell with ornamentation (23)
— Whorls straight sided, whorls divided by spiral platforms or tubercles (28)
23. Early whorls plicated, with a deep groove below the sutures; six rectangular brown blotches bordered by a white ridge with thin brown dashes *commaculata*
— Early whorls not plicated, without a deep groove below the sutures; top of each whorl is well rounded (24)
24. Three rows of blotches on body whorl, two rows of dark brown squarish blotches on spire whorls, ... *subulata*

- Four rows blotches on the body whorl; Three rows of blackish brown square blotches on spire whorls (25)
25. Spiral groove divides the whorls into lower and upper part; blotches above suture are larger *areolata*
- Spiral groove not divides the whorls into lower and upper part; blotches above suture are smaller (26)
26. Presence of purple-brown blotches and wavy lines in whorls; columella not in line with the outer lip *chlorata*
- Absence of purple-brown blotches and wavy lines in whorls; columella very much in line with the outer lip (27)
27. Suture divided by an impressed line, one row of brown spot above the suture; two rows in the last whorl *felina*
- Suture not divided by an impressed line; two rows of dark brown blotches below the suture; five pale tan rectangular blotches on the body whorl *maculata*
28. Whorls with 2 rows of distinct reddish brown dots; presence of sharp white tubercles *crenulata*
- Whorls without reddish brown dots, absence of sharp white tubercles, ... (29)
29. Axial riblets on early whorls; ornamented with, Y' shaped white streaks on the upper part of the whorl *dimidiata*
- Axial riblets absent on early whorls; ornamented with spots (30)
30. Two rows of large white spots, spiral groove minute, suture slightly raised *guttata*
- Absence of large white spots, spiral groove strong, suture deep and whitish *macandrewii*

20. *Terebra areolata* (Link)

(Pl. II, Fig. 20)

1807. *Subula areolata* Link, *Alders Erben, Rostock*, pp. 94-160.
1816. *Terbra subulata*, Lamarck, *Anim. Sans. Vert.* 2 ed. 10, p. 242 (Non-Linnaeus, 1767).
1906. *Terebra muscaria* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.
1952. *Terebra muscaria* : Subramanyam, Karandikar and Murti, *J. Univ. Bombay*, **21**(3) : 55, fig. 173.
1972. *Terebra areolata* : Cernohorsky, *Marine Shells of the Pacific*, **1** : 198, pl. 49, fig. 358.
1986. *Terebra areolata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.

2000. *Terebra areolata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 172.

2003. *Terebra areolata* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper No.*, **192** : p. 335, pl. 88, fig. 1.

Material examined : Andamans (6).

Measurements (mm) : Length : 72.20-118.70, Width : 12.70-19.50, Aperture length : 10.20-11.40.

Description : Shell large, up to 118 mm in height, about 20-21 whorls. Early whorls have vertical ridges which tend to become obsolete on later whorls. Aperture oval, columella straight with a strong fasciole and with a ridge upper half of the outer lip angled. Color shining cream or pale yellowish brown. Surface smooth except for growth striae. Spiral grooves divides the whorl into a smaller (1/3) upper part and a broad (2/3) lower part. Sculptured with spiral rows of blackish brown blotches, blotches just above the suture are larger than others.

Remarks : This species can be identified with its ornamentation of three rows of blackish brown square blotches on spire whorl and four rows on the body whorl; it is mainly collected for its shell.

Distribution : India : Andaman Islands, Lakshadweep.

Elsewhere : East Africa Hawaii, Japan, Madagascar, Polynesia, Queensland, Red Sea, Wide spread in Indo-west Pacific.

21. *Terebra affinis* Gray

(Pl. II, Fig. 21)

1834. *Terebra affinis* Gray, *Proc. zool. Soc.*, London, **1834** : 60.
1839. *Terebra pertusa* var. Kiener, *Icon. des Coq viv*, pl. 11, fig. 24c.
1860. *Terebra affinis* : Reeve, *Conch Icon.* **12** *Terebra.* : pl. 10, fig. 39.
1878. *Terebra affinis* : Smith, *Proc. zool. Soc.*, London, **1878** : 805.
1898. *Terebra affinis* : Melvill and Sykes, *Proc. malac. Soc.*, London, **3** : 41.
1906. *Terebra affinis* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.
1952. *Terebra affinis* : Subramanyam, Karandikar and Murti, *J. Univ. Bombay*, **21**(3) : 55, fig. 174.
1986. *Terebra affinis* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
1991. *Terebra affinis* : Rao and Rao, *Fauna of Lakshadweep, State Fauna series*, **2** : 341. Zool. Surv. India.
2000. *Terebra affinis* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 172.

Material examined : Andamans (15 exs) Marine Survey station. 655. (2 exs).

Measurements (mm) : Length : 9.80-38.80, Width : 3.00-9.50, Aperture length : 2.00-9.00.

Description : Shell medium in size, up to 38 mm in height; spire long and pointed; aperture small; columella strongly twisted. Color creamy white with blotches of brown or yellowish orange, interspaces between the ribs often brownish, body whorl with light tan band, sub-sutural band marked with deep punctuations between ribs, broad axial ribs with punctuate line between interspaces filled with punctuations.

Remarks : It is more allied to *Terebra nebulosa* but smaller and more slender in proportion and grooves are more punctuate.

Distribution : India : Andaman and Nicobar Islands, Lakshadweep, Maharashtra.

Elsewhere : Fiji Island, Maldives, Philippines, Seychelles. Throughout tropical Indo-Pacific.

22. *Terebra alveolata* Hinds

(Pl. II, Fig. 22)

1844. *Terebra alveolata* Hinds, *Proc. Zool. Soc. Lond.*, p. 151.

1860. *Terebra alveolata* : Reeve, *Conch. Icon*, **12** *Terebra* : pl. 19, sp. no. 89.

2000. *Terebra alveolata* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper No.*, **187** : 172.

Material examined : Andaman (9 exs).

Measurements (mm) : Length : 19.50-44.60, Width : 4.50-9.50, Aperture length : 4.30-8.70.

Description : Shell long, medium in size, up to 45 mm in height, spire pointed, with about 16 turreted whorls and flatly convex, aperture small, and columella straight, keeled and recurved at base. Transparent flesh color, streaked with orange brown, encircled at the suture and at the base with small reddish chestnut spots, pricked in the interstices, divided by a groove at the upper part, sutural margin rather swollen.

Remarks : Shell more slender, similarly sculptured; spot on the infra sutural band dark brown; rest of the surface purplish brown; variegated with white patches.

Distribution : India : Andaman and Nicobar Islands.

Elsewhere : Indonesia, Japan, Philippines, Straits of Malacca.

23. *Terebra amanda* Hinds

(Pl. II, Fig. 23)

1844. *Terebra amanda* Hinds, *Proc. zool. Soc. Lond.*, p. 154.

1860. *Terebra amanda* : Reeve, *Conch. Icon*, **12** *Terebra* : pl. 19, sp. no. 89.

1908. *Terebra unicolor* Preston, *Rec. Indian Mus.*, 2(2) : 190, pl. 17, fig. 65.

Material examined : Andaman Island (3 exs).

Measurements (mm) : Length : 35.00-44.20, Width : 6.50-7.25, Aperture length : 2.00-2.50.

Description : Shell medium in size, up to 44 mm in height, long and pointed spire, aperture small; columella recurved, twisted, canal short. Pale brownish orange colour throughout; whorls 14-18; sculptured with a coarse infra sutural spiral crenulated ribs and fine smaller spiral crenulated ribs, and with two white beads of tubercles below the suture, the interstices finely punctuate.

Remarks : It can be distinguished by its much blunt form, lack of white edging to the whorls, coarse ribbing and finer punctuation.

Distribution : India : Andaman Islands.

Elsewhere : Throughout Indo-Pacific.

24. *Terebra amoena* Deshayes

(Pl. II, Fig. 24)

1859. *Terebra amoena* Deshayes, *Proc. zool. Soc. Lond.*, p. 297, no. 113.

1860. *Terebra specillata* Reeve, *Conch. Icon*, **12** *Terebra* : pl. 24, sp. no. 89.

1898. *Terebra andamanica* Melvill and Sykes, *Proc. malac. Soc. Lond.*, **3** : 41, pl. 3, fig. 3.

Material examined : Andaman (2 exs).

Measurements (mm) : Length : 18.00-24.00, Width : 4.50-5.25, Aperture length : 3.00-4.50.

Description : Shell solid, medium in size up to 24 mm in height, glossy, whorls straight sided, whorls about 16, aperture small columella little twisted, convex and longitudinal sculpture more elevated; sutural band alternatively spotted with white and red and the spots are not so regular; Infra sutural band stands more out from the shell. Axial ribs are spirally and linearly grooved.

Remarks : This species is more allied to *T. alveolata* Hinds, but, it differs in form and coarseness of sculpture. In comparison with *T. pertusa* Born, it differs by having broader in proportion to its length.

Distribution : India : Andaman Islands.

Elsewhere : Indian Ocean, Indo-West Pacific.

25. *Terebra anilis* Roeding

(Pl. II, Fig. 25)

1798. *Epitonium anile* Roeding *Mus. Bolten.*, pp. 1-199.

1834. *Dimidacus stramineus* Gray, *Proc. zool. Soc. Lond.*, p. 621.

1850. *Terebra serotina* Adams & Reeve, *Mollusca*, pp. 45-87.

1857. *Terebra circinata* Deshayes, *Proc. zool. Soc. Lond.*, **27** : 270-321.
 1908. *Terebra rubrobrunnea*, Preston, *Rec. Indian Mus.*, **2** : 189, pl. 17, fig. 64.
 1995. *Terebra anilis* Bosch, *Sea shell of Eastern Arabia*, No. 763, p. 170.

Material examined : Andaman. (3 exs) Goa (1 Ex).

Measurements (mm) : Length : 30.00-88.00, Width : 4.60-6.00, Aperture length : 4.20-6.00.

Description : Shell solid, up to 88 mm in height, moderately glossy, whorls narrow concave sided, sutures shallow, base slightly keeled. Each whorl has 5 low, spiral ridges and many more axial ridges giving cancel late effect; above these ridges is a broad, nodular sub-sutural cord with lesser cord below. Siphonal canal slightly twisted, bearing a thin basal ridge continuous with outer lip dark brown fading to amber.

Remarks : Allied to *T. fenestrata*, Hinds, The transverse costae in the present species are however, close together and not too coarse, the spiral striae are also more numerous and not so well defined.

Distribution : India : Andaman Islands.

Elsewhere : Western Pacific; North Queensland.

26. *Terebra cerithina* Lamarck

(Pl. II, Fig. 26)

1822. *Terebra cerithina* Lamarck, *Hist. nat. Anim. Sans. Vert.*, **10** : 247.
 1839. *Terebra cerithina* : Kiener, *Icon. des Coq. viv.*, p. 33 (25), pl. 11, fig. 25.
 1844. *Terebra pulchra*, Hinds *Thes. Conch.*, p. 178. (81) pl. 45, fig. 129.
 1859. *Terebra cerithina* : Deshayes *Proc. zool. Soc. Lond.*, p. 299. No. 124.
 1860. *Terebra cerithina* : Reeve, *Conch. Icon*, **12**, *Terebra*, pl. 9, sp. no. 35.

Material examined : Andaman (2 exs).

Measurements (mm) : Length : 43.80-51.70, Width : 9.80-10.50, Aperture length : 8.30-10.50.

Description : Shell large, up to 52 mm in height, solid, pointed spire, aperture narrow and rectangular. Outer lip thin and constricted posteriorly, columella rather straight, anterior canal curved towards left. About 25 whorls, lightly stepped at suture. Early whorls are divided by a punctuated spiral groove. Suture impressed; Posterior whorls show two rows of nodulation which disappear in the middle portion of the shell. Sculpture of axial rib is very pronounced. Axial and spiral ribs have dark yellow colour the axial cord are white and the groove have cream to orange pale markings.

Remarks : Cylindrical form and orange yellow coloration in the interstice between the ribs, darker spots below the suture help to distinguish it from other species.

Distribution : India : Andaman Islands.

Elsewhere : Philippines, Seychelles.

27. *Terebra chlorata* Lamarck

(Pl. II, Fig. 27)

1822. *Terebra chlorata* Lamarck, *Hist. nat. Anim. Sans. Vert.*, **10** : 246.
 1839. *Terebra chlorata* : Kiener, *Icon. des Coq. viv.*, p. 24, pl. 6, fig. 2.
 2003. *Terebra chlorata* : Subba Rao, *Rec. Zool. Surv. Ind., Occ. Paper No.*, **192** : 335, pl. 88, fig. 2.

Material examined : Andaman (3).

Measurements (mm) : Length : 60.10-67.20, Width : 13.40-15.90, Aperture length : 16.70-17.00.

Description : Shell solid, moderately large, up to 68 mm in height, with about 14 whorls. Aperture small, outer lip thin, lower part of columella not in line with the outer lip. Surface smooth, obsolete plications on the early whorls, a deep groove below the sutures. Color white, ornamented with irregular, purple-brown blotches and wavy lines.

Remarks : The spots which have a milky appearance and the splashed wavy line, the purple brown blotches make this species distinct from others.

Distribution : India : Andaman and Nicobar Islands.

Elsewhere : Maldives, Singapore and Tropical, Indo-Pacific.

28. *Terebra cingulifera* Lamarck

(Pl. II, Fig. 28)

1822. *Terebra cingulifera* Lamarck, *Hist. nat. Anim. Sans. Vert.*, **10** : p. 247.
 1825. *Terebra punctulata* Sowerby, *Tank. Cat. App.*, p. 25.
 1859. *Terebra columnaris*, Deshayes, *Proc. zool. Soc. Lond.*, p. 310.
 1860. *Terebra cingulifera* : Reeve, *Conch. Icon*, **12** *Terebra* : sp. no. 44a and b, pl. 11.
 1898. *Terebra cingulifera* : Melvill and Skyes, *Proc. malac. Soc.*, London, **3** : 42.
 1986. *Terebra cingulifera* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, *Zool. Surv. India*, p. 174.
 1967. *Terebra cingulifera* : Cernohorsky, *Marine Shells of the Pacific*, **1** : 198, pl. 49, fig. 358.
 2000. *Terebra cingulifera* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 172.

Material examined : Andamans (13 exs).

Measurements (mm) : Length : 62.00-80.00, Width : 12.30-13.40, Aperture length : 12.40-12.50.

Description : Shell large, up to 80 mm in height, pointed spire, whorls smooth, about 18-20, Aperture small and oval, outer lip thin, columella straight and slightly recurved at base. Sculptured with a deep groove below suture; sutural band spirally grooved and sutural margin superficially crenulated, each whorl has 3 fine spiral linings, axial ribs finely striated.

Remarks : Shell yellow whitish, encircled with minutely punctured grooved striae and finely, densely crenulated at the sutural margin in an oblique manner. This species has no other specific markings.

Distribution : India : Andamans islands.

Elsewhere : Indo-West Pacific, Mauritius, Tuamotu Archipelago. (Bratcher & Cernohorsky, 1987).

29. *Terebra columellaris* (Gray)

(Pl. II, Fig. 29)

1834. *Terebra columellaris* Gray, *Proc. zool. Soc.*, London, **1834** : 151.

1844. *Decorihastula columellaris* Hinds, *Proc. zool. Soc. Lond.*, p. 151.

1860. *Terebra columellaris*, Reeve, *Conch. Icon.*, **6** : pl. 22, sp. no. 113.

1869. *Terebra propinqua*, Pease, *Amer. J. Conch.*, **5**(2) : 66.

1908. *Terebra carnicolor*, Preston, *Rec. Indian Mus.*, **2**(2) : 189, pl. 17, fig. 63.

2003. *Terebra columellaris* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper No.* **192** : 338, pl. 89, fig. 2.

Material examined : Andaman (4 exs) N. Caledonia (3 exs) Tahiti (9 exs) unknown location (5 exs).

Measurements (mm) : Length : 33.20-39.40, Width : 6.30-7.40, Aperture length : 6.20-7.00.

Description : Shell medium in size, up to 40 mm in height, whorls 18-20. Aperture small, outer lip thin and constricted posteriorly, columella rather straight, anterior canal curved towards left. Color light orange-brown. Sculptured with a row of white beads and punctuate spiral groove at sutures, curved axial ribs with deep groove bearing dark brown colour in the interstices.

Remarks : This species is remarkable from its great similarity to *T. undulata* which itself is a peculiar species. The grounds of distinction are its decidedly cylindrical shape, different distribution of colors, and its short, abrupt, rounded and banded last whorl. This shell has shiner pattern of ivory rectangle at periphery of the body whorl.

Distribution : India : Andaman Islands, not common.

Elsewhere : Tropical Pacific.

30. *Terebra commaculata* Gmelin

(Pl. II, Fig. 30)

1791. *Buccinum strigillatum* Gmelin *Syst. Nat. ed.*, **13**, (Nec. Linn).

1822. *Terebra myuros*, Lamarck, *Hist. nat. Anim. Sans. Vert.*, **10** : 247.

1822. *Terebra scabrella* Lamarck, *Hist. nat. Anim. Sans. Vert.*, **10** : 248.

1834. *Terebra myuros* Gray *Proc. Zool. Soc. Lond. No.*, **60**, p. 163.

1860. *Terebra commaculata*, Reeve, *Conch. Icon.*, **6**, pl. 8, sp. no. 31.

1898. *Terebra myuros* : Melvill and Skyes, *Proc. malac. Soc.*, London, **3** : 42.

1906. *Terebra myuros* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.

1940. *Terebra commaculata* : Crichton, *J. Bombay nat. Hist. Soc.*, **42** : 335, pl. 4, fig. 6.

1986. *Terebra commaculata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.

1990. *Terebra commaculata* : Pinn, *Sea Shells of Pondicherry*, Nehru Science Centre, p. 109, fig. 197.

2003. *Terebra commaculata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 172.

Material examined : Andaman (26 exs).

Measurements (mm) : Length : 62.00-95.00, Width : 8.60-11.40, Aperture length : 7.70-12.50.

Description : Shell large, up to 95 mm in height, about 25 flattened whorls. Aperture small, rectangular with twisted columella. Shell scabrous latticed, with two spiral bands of nodules divided by a groove below the suture, often the nodules fused together to form a single raised band, fine spiral ridges crossed by axial rib lets. Color white ornamented by rather rectangular brown blotches bordered by a white ridge with brown dashes, about six per whorl, blotches extend length-wise.

Remarks : It can be differentiated from other species by its length, breadth and continuity of its brown markings and the early whorls have slightly concave sides.

Distribution : India : Andhra Pradesh : Visakhapatnam; Tamil Nadu : Madras; Pondicherry, Andaman Islands, rare.

Elsewhere : South East Asia.

31. *Terebra crenulata* (Linnaeus)

(Pl. II, Fig. 31)

1758. *Buccinum crenulatum* Linnaeus, *Syst. Nat.*, **10** : 741.

1857. *Terebra fimbriata* Deshayes, *Proc. zool. Soc. Lond.*, p. 276.

1859. *Terebra interlineata* Deshayes, *Proc. zool. Soc. Lond.*, p. 277.
1935. *Terebra crenulata* var. *fimbriata*, Deshayes, *Proc. zool. Soc. Lond.*, p. 276.
1898. *Terebra crenulata* : Melvill and Skyes, *Proc. malac. Soc.*, London, **3** : 42.
1906. *Terebra crenulata* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.
1986. *Terebra crenulata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
2000. *Terebra crenulata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 172.
2003. *Terebra crenulata* : Subba Rao, *Rec. zool. Surv. Ind. Occ. Paper No.*, **192** : 336, pl. 88, fig. 3.

Material examined : Andamans (6 exs) Port Blair, Rangachanga, Nicobar : Car Nicobar Marine Survey station. 628. (2 exs). Marine Survey station. 659. (2 exs). Goa (3 exs).

Measurements (mm) : Length : 64.00-105.50, Width : 15.70-20.00, Aperture length : 15.00-20.40.

Description : Shell large, up to 115 mm in height, solid, with broad body whorl gradually tapering into the apex; about 28 rounded whorls. Aperture broad, columella rather smooth, short but strong fasciole. Sculptured with small nodules just below the suture on each whorl, a small constriction below the nodules; early whorls with axial plicae, only growth lines on the latter whorls. Color yellowish-brown, with white nodules, three or four spiral rows of reddish-brown dots on the body whorl, two on the other whorls, small fine streaks of reddish-brown between the nodules.

Remarks : Color creamy-pink, it possesses sharp white tubercles separated by narrow clear brown axial lines. It has two spiral alignments of brown spots equally distant and very far away from each other. It lives in the shallow water on sand. Variation in the tubercles has given rise to several forms of this species.

Distribution : India : Andaman and Nicobar Islands.

Elsewhere : Tropical, Indo-Pacific, Moderately common.

32. *Terebra deshayesi* Reeve (Pl. II, Fig. 32)

1822. *Terebra babylonia* Lamarck, *Hist. nat. Anim. Sans. Vert.*, **10** : 247.
1860. *Terebra deshayesi*, Reeve, *Conch. Icon*, **12** : Pl. 11; fig. 45.
1898. *Terebra deshayesi* : Melvill and Sykes, *Proc. malac. Soc. London*, **3** : 41.
1986. *Terebra deshayesi* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.

1990. *Terebra babylonia* : Pinn, *Sea Shells of Pondicherry*, Nehru Science Centre, p. 109, fig. 198.
2000. *Terebra deshayesi* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 173.

Material examined : Andamans (1).

Measurements (mm) : Length : 35.00, Width : 6.20, Aperture length : 4.50.

Description : Shell solid, moderate in size up to 37 mm whorls about 14, flat, encircled with thick conspicuously prickled granules. Aperture rather narrow, columella straight, reflected, twisted recurved at the base. Sculptured with fine ribs of inter section. Each whorl is encircled with 3 distinct linear grooves which are prickled throughout, suture with crenulations.

Remarks : Each whorl is encircled with 3 distinct linear grooves which are prickled throughout, sutural margin crenulated.

Distribution : India : Andaman Islands, Pondicherry.

Elsewhere : China, Viti Island.

33. *Terebra dimidiata* Linnaeus (Pl. II, Fig. 33)

1758. *Buccinum dimidiatum* Linneus, *Syst. Nat.*, **10** : 742.
1839. *Terebra dimidiata* : Kiener, *Icon. Des Coq. Viv.* p. 6, No. 3, pl. 2, fig. 2.
1859. *Terebra splendens* var. Deshayes, *Proc. zool. Soc. Lond.*, No. 31, p. 281
1860. *Terebra dimidiata* : Reeve, *Conch. Icon*, **12** : Pl. 7; fig. 27.
1986. *Terebra dimidiata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
2000. *Terebra dimidiata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 173.
2003. *Terebra dimidiata* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper*, **192**; 336, pl. 88, fig. 4.

Material examined : (18), Andamans Carbyn's cove, Long Islands, Port Blair.

Measurements (mm) : Length : 83.00-142.00, Width : 16.40-23.00, Aperture length : 18.80-29.00

Description : Shell very large, up to 142 mm in height, solid with about 20 rounded straight sided whorls. Early whorls have a weak vertical ridge and later ones with growth lines Aperture broadly oval, outer lip a little flared at the base, columella rather straight, with a weak plait, fasciole strong. Surface smooth and shining, a slight constriction below the suture dividing each whorl into a narrow upper one third and a broad lower two third. Color orange-red with wavy white streaks often bifurcating at the top.

Remarks : Each whorl is divided by a spiral platform, lower two thirds of whorl slightly convex, white streaks poorly developed on the upper third.

Distribution : Andaman and Nicobar Islands, Lakshadweep.

Elsewhere : Tropical Indo Pacific-Common.

34. *Terebra durgella* Ray

(Pl. II, Fig. 34)

1968. *Terebra durgella* Ray, *Bull. Indian. Mus.*, 3(1 & 2) : 28, text fig. 26.

1991. *Terebra durgella* : Rao, Rao and Maitra, *Fauna of Orissa State Fauna series*, 1(3) : 89. Zool. Surv. India.

1992. *Terebra durgella* : Subba Rao, Dey and Barua, *Fauna of West Bengal, State Fauna series*, 3(9) : 200. Zool. Surv. India.

Material examined : 4 exs., West Bengal (Digha).

Measurements (mm) : Length : 4.00-7.85, Width : 1.15-2.45, Aperture length : 1.00-2.00.

Description : Shell small up to 7 mm in height, apex narrowly tapering which gives the turreted appearance to the shell. Spire longer than the body whorl. Whorls 9-10 separated from one another by very impressed and oblique sutures. Shell sculptured with narrow, strong, regular longitudinal ribs and as broad as interstices; aperture small and oblong, columella arched above; outer lip thin.

Remarks : This species can be identified with the turreted appearance. Impressed suture and the sculpture with narrow, strong, regular longitudinal ribs and as broad as interstices.

Distribution : India : Orissa, West Bengal : Medinipur.

Elsewhere : Indian Ocean.

35. *Terebra felina* (Dillwyn)

(Pl. II, Fig. 35)

1817. *Buccinum felinum* Dillwyn, *Catalogue of Recent shells* : 644 (Type locality not given).

1844. *Terebra tigrina* Hinds, *Proc. Zool. Soc. Lond. No.*, 12 : 160.

1860. *Terebra tigrina* : Reeve, *Conch. Icon*, 12, *Terebra* sp. no. pl. 3; fig. 8.

1898. *Terebra tigrina* : Melvill and Skyes, *Proc. malac. Soc.*, London, 3 : 43.

1982. *Terebra felina* : Abbot and Dance, *Compendium of sea shells* : p. 273.

1991. *Terebra felina* : Rao and Rao, *Fauna of Lakshadweep, State Fauna series*, 2 : 341. Zool. Surv. India.

Material examined : Andaman (5), Goa (2 exs), Lakshadweep (7 exs), Maharashtra (2 exs), Marine Survey Station. 655. 1 (ex). Marine Survey station. 659. (8 exs).

Measurements (mm) : Length : 41.50-63.10, Width : 10.80-14.20, Aperture length : 9.60-11.00.

Description : Shell solid, up to 65 mm in height, aperture small, columella strong and straight, shell white, with a single row of chestnut spots just above the suture, two rows on the last whorl, of which the lower one near the base is smaller, surface smooth, an unornamented band below the suture is divided by an impressed line, spiral whorls plicate body whorl with additional row of the fine brown spots at its base.

Remarks : It can be recognized by the presence of a single row of brown spots on lower part of each whorl just above the suture help to easily separate this species from the others; shell smooth and narrower than that of *T. maculata*.

Distribution : India : Lakshadweep, Andaman Islands.

Elsewhere : West Indies, Sri Lanka, Singapore, Seychelles. Sandwich Island, Central Polynesia throughout Indo-Pacific (Cernohorsky, 1967).

36. *Terebra fenestrata* Hinds

(Pl. II, Fig. 36)

1843. *Terebra fenestrata* Hinds, *Proc. zool. Soc. Lond.*, No. 12, p. 153.

1850. *Terebra caelata* Adams & Reeve, *Voy. De. Samarang*, 3 : 30, pl. 10, fig. 22.

1850. *Terebra torquata* Adams & Reeve, *Voy. De. Samarang*, 6 : 30, pl. 10, fig. 13.

Material examined : Andamans (5).

Measurements (mm) : Length : 8.90-11.30, Width : 2.00-2.50, Aperture length : 1.70-2.20.

Description : Shell long and slender, up to 12 mm in height, shell cream to light fawn in color, aperture small, columella constricted, keeled, twisted recurved, ornamented with axial streaks; whorls number about 17-19. Sculptured with about 22 axial ribs and two rows of beads at suture which are separated by a deep groove; whorls concavely flattened, interstices with 3-4 overriding spiral ridges. Sutural margin crenulated.

Remarks : Very elaborately latticed shell, semi transparent yellow or fulvous purple subsuture, elongate turreted throughout.

Distribution : Andaman and Nicobar Islands, Lakshadweep.

Elsewhere : Tropical, Indo-Pacific common.

37. *Terebra funiculata*. Hinds

(Pl. II, Fig. 37)

1844. *Terebra funiculata* Hinds, *Proc. zool. Soc. Lond.*, No. 12 : p. 153.

1859. *Terebra archimides* Deshayes, var *Proc. zool. Soc. Lond.*, p. 314, No. 218.
 1921. *Terebra langfordi* Pilsbry, *Proc. Acad. Nat. Sci. Phila.*, **72** : 296-326.

Material examined : Andamans (5 exs), Mauritius (8 exs), Sri Lanka (4 exs), Seychelles (6 exs), Bay of Bengal (3 exs).

Measurements (mm) : Length : 27.10-59.10, Width : 5.00-8.00, Aperture length : 6.40-7.30.

Description : Shell large and solid, up to 59 mm in height, aperture small, outer lip thin, columella short and strongly twisted; about 17 whorls, whorls are spirally ribbed, the deeply incised suture gives the spire a slightly turreted appearance, interstices deeply excavated, the upper part of the whorl is slightly broader than the lower, and a spiral groove divide them into lower small and upper broader part.

Remarks : This species can be identified with its screw like succession of strong and arched ribs, the interstices between the ribs are finely pricked. The ribs are frequently smooth and shining strong out in conspicuous relief.

Distribution : India : Andaman Islands.

Elsewhere : Japan, Marquises Island, Mauritius, Seychelles, Sri Lanka.

38. *Terebra guttata* (Roeding)

(Pl. II, Fig. 38)

1798. *Cymbium guttata* Roeding, *Mus. Bolten.*, p. 152.
 1817. *Buccinum oculatum*, Dilwyn : *John and Arthur Arch.* Vol. **1** & **2**, pp. 1-1090.
 1834. *Terebra lavéis*, Gray, *Proc. zool. Soc. Lond.*, p. 61.
 1859. *Terebra loroisi* Deshayes, *Proc. zool. Soc. Lond.*, p. 307, no. 173.
 1860. *Terebra oculata* Lamarck : Reeve in *Conch. Icon*, **12**, *Terebra*, pl. 5 sp. no. 18.
 1906. *Terebra oculata* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.
 1967. *Terebra guttata* : Cernohorsky, *Marine Shells of the Pacific*, **1** : 202, pl. 50, fig. 3790.
 2000. *Terebra guttata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper No.*, **187** : 173.
 2003. *Terebra guttata* : Subba Rao, *Rec. zool. Surv. India, Occ. Paper*, **192** : 337, pl. 88, fig. 6.

Material examined : Andamans (5 exs), Maldives (3 exs), Marine survey (2 exs).

Measurements (mm) : Length : 92.00-115.40, Width : 18.20-21.80, Aperture length : 17.40-20.15.

Description : Shell large, up to 115 mm in height, about 21 whorls. Aperture small and rectangular, outer lip thin and columella straight, fasciole rather weak

anterior canal broad and recurved to the left. Sculptured with obsolete growth lines, area below the suture slightly raised. Color orange-brown ornamented with one row of large white spots just below the suture on the raised surface of spire whorls, and two rows on the body whorl.

Remarks : It can be differentiated from other speices by its ornage brown color, with one row of large white spots below the suture on the raised surface on spire whorls and two rows on body whorl.

Distribution : India : Andaman Islands.

Elsewhere : Tropical, Indo-Pacific common.

39. *Terebra laevigata* Gray

(Pl. II, Fig. 39)

1834. *Terebra laevigata* Gray, *Proc. zool. Soc. Lond.*, **2** : 62. (Type locality Ceylon).
 1967. *Terebra laevigata* : Cernohorsky, *Marine Shells of the Pacific*, **1** : 202, pl. 51, fig. 373.
 1986. *Terebra laevigata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, *Zool. Surv. Idnai*, p. 174.
 2000. *Terebra laevigata* : Subba Rao and Dey, *Rec. zool. Surv. India, Occ. Paper*, **187** : p. 173.

Material examined : Andamans (14 exs).

Measurements (mm) : Length : 45.00-53.50, Width : 5.30-6.50, Aperture length : 6.00-6.50.

Description : Shell large and slender, up to 53 mm in height, with pointed spire; Aperture small, outer lip thin, columella short and strongly twisted. Whorls about 19-26, concave and flattened, smooth divided at the upper part by a groove. Shell light yellowish in colour. Sculptured with two spiral cords at sutures, separated by a deep spiral groove. 3-8 fine spiral and axial growth lines on whorls.

Remarks : Very slender shell with light yellowish in colour. It can be identified by presence of two spiral cord separated by the deep spiral groove.

Distribution : India : Andaman Islands.

Elsewhere : South Africa, Fiji, uncommon.

40. *Terebra macandrewii* Smith

(Pl. IV, Fig. 40)

1877. *Terebra macandrewii* Smith, *Ann. Mag. Nat. Hist. (ser. 4)*, **19** : 224.
 1995. *Terebra macandrewii* Smith : Bosch, *Sea shell of Eastern Arabia No.*, **770**, p. 171.

Material examined : Andaman (7 exs).

Measurements (mm) : Length : 10.20-15.30, Width : 4.70-5.50, Aperture length : 4.70-5.50.

Description : Shell solid, moderately glossy, up to 15 mm in height, about 10 rounded whorls, slightly convex, last whorl gradually rounded below; Aperture wide, columella smooth and strong. Suture deep, sculptured with sharp, axial, slightly sinuous ribs, indented below suture, fine spiral striae between the ribs. The basal ridge reaches the columella. Whitish below suture. Whorls ornamented with two reddish brown spiral bands.

Remarks : The pretty shell can be identified with the aid of well marked axial ribs and reddish brown spiral bands on whorls.

Distribution : Andaman and Nicobar Islands.

Elsewhere : Pakistan.

41. *Terebra maculata* (Linnaeus)

(Pl. IV, Fig. 41)

1758. *Oxymoris maculata* Linnaeus, *Syst. Nat.*, ed. 10 : 741, sp. 415, (Type locality : O'Africse' asiae).
 1822. *Terebra maculate* Lamarck : *Hist. Des Animaux. Sans. Vert.*, Vol. 7 : p. 283.
 1844. *Terebra maculata* : Hinds *Proc. zool. Soc. Lond.*, sp. no. 1; p. 159.
 1906. *Terebra maculata* : Comber, *J. Bombay nat. Hist. Soc.*, 17 : 212.
 1967. *Terebra maculata* : Cernohorsky, *Marine shells of the Pacific*, 1 : 204, pl. 51, fig. 376.
 1986. *Terebra maculata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
 1991. *Terebra maculata* : Rao and Rao, *Fauna of Lakshadweep, State Fauna series*, 2 : 342. Zool. Surv. India.
 1995. *Terebra maculata* Bosch *et al.*, *Sea shell of Eastern Arabia*, No. 771, p. 171.
 2000. *Terebra maculata* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper*, 187 : p. 174.
 2003. *Terebra maculata* : Subba Rao, *Rec. zool. Surv. Ind. Occ. Paper*, 192 : 337, pl. 88, fig. 5.
 2007. *Terebra maculata* : Ramkrishna, Dey, Barua and Mukhopadhyaya, *Fauna of Andhra Pradesh, State Fauna series*, 5(7) : 134, Zool. Surv. India.

Material examined : Andaman (9 exs), Lakshadweep (9 exs), Karnataka (4 exs).

Measurements (mm) : Length : 48.05-137.80, Width : 15.38-36.05, Aperture length : 10.50-15.30.

Description : Largest shell of the genus, up to 140 mm in height, stout and heavy with about 18 rounded whorls, broader than other species. Aperture rather wide, columella smooth except for a weak parietal fold, fasciole small but strong with a central groove. Surface smooth except for weak axial plications on the early

whorls and growth lines on the latter whorls. Color very distinct, white, ornamented with two spiral rows of irregular purple brown blotches on each whorl and on the upper part of the body whorl, the latter with about five pale tan rectangular blotches on the body whorl.

Remarks : It is one of the largest species of the genus and can be distinguished by its ornamentation, two rows of dark brown blotches/maculation below the suture and another on the lower part of the whorl just above suture, earlier one broader than the latter; body whorl with three brown transverse bands; earlier whorls plicated axially.

Distribution : Andaman and Nicobar, Lakshadweep Islands.

Elsewhere : Maldives, Singapore, throughout tropical Indo-Pacific.

42. *Terebra nebulosa* Sowerby

(Pl. IV, Fig. 42)

1825. *Terebra nebulosa* Sowerby, *Tank. Cat. App.*, p. 25.
 1844. *Terebra nebulosa* : Hinds *Thes. Conch.* p. 162. No. 33, pl. 43, fig. 51.
 1858. *Terebra nebulosa* Lorois, (Nec. Sow. Nec. Kiener) *Journ. De Conch.*, p. 90-91, fig. 4.
 1986. *Terebra nebulosa* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
 1995. *Terebra nebulosa* : Bosch., *Sea shell of Eastern Arabia*, No., 773, p. 172.
 2000. *Terebra nebulosa* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper*, 187 : p. 174.
 2003. *Terebra nebulosa* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper*, 192 : 337, pl. 88, fig. 8.

Material examined : Andamans (10 exs).

Measurements (mm) : Length : 24.50-71.60, Width : 6.50-12.10, Aperture length : 5.00-6.50.

Description : Shell large, up to 75 mm in height, about 20 whorls. Aperture small and rectangular with almost straight outer lip constricted at the upper end, columella in line with the lip at the base. Sculptured with 18-25 broad, close set and curved axial ribs with the spiral grooves in interstices and minutely pitted spiral groove at the suture, Color white, ornamented with large, irregular, orange-red blotches, and band of same color at the base of the body whorl.

Remarks : Shell bears some resemblance to that of *T. undulata* but can be differentiated by color pattern.

Distribution : India : Andaman Islands.

Elsewhere : Tropical Indo-Pacific.

43. *Terebra pertusa* (Born)

(Pl. IV, Fig. 43)

1778. *Buccinum pertusa* Born. *Ind. Test. Mus. Cae. Vindob.*, 1 : 162.
 1844. *Terebra pertusa* : Hinds *Proc. zool. Soc. Lond.*, (1844) 9 : 162.
 1898. *Terebra andamanica* Melvill and Sykes, *Proc. malac. Soc.*, London, 3 : 41, pl. 3, fig. 3.
 1967. *Terebra pertusa* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 205, pl. 52, fig. 384.
 1986. *Terebra andamanica* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
 2000. *Terebra petrusa* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper*, 187 : p. 174.

Material examined : Andamans (1 ex).*Measurements* (mm) : Length : 37.00, Width : 7.20, Aperture length : 5.60

Description : Shell moderate in size, 37 mm in length, whorls about 17, whorls flatly convex; aperture small and rectangular with almost straight outer lip constricted at the upper end, columella straight. Sculptured with 25-30 close set of axial ribs with interstices minutely pitted and pricked throughout. Orange-amber in colour. Ornamented with reddish purple spotted next the suture.

Remarks : Shell with delicate orange amber colour, painted next the suture in a very characteristic manner in the interstices between the folds with reddish purple.

Distribution : India : Andaman Islands, Lakshadweep.

Elsewhere : Australia, Jukes Draney Island; Andaman to Hawaiian Island. Rare.

44. *Terebra polygyrata* Deshayes

(Pl. IV, Fig. 44)

1859. *Terebra polygyrata*, Deshayes, *Proc. zool. Soc. Lond.*, p. 301, sp. no. 138.
 1860. *Terebra polygyrata* : Reeve, *Conch. Icon*, 12 : *Terebra* sp. no. 146, pl. 7.
 1898. *Terebra polygyrata* : Melvill and Skyes, *Proc. malac. Soc.*, London, 3 : 42.
 1995. *Terebra ambrosia* : Bosch *et al.*, *Sea shell of Eastern Arabia* No. 774, p. 172.

Material examined : Chennai coast (1 exs), Malabar coast (10 exs).

Measurements (mm) : Length : 16.00-20.70, Width : 2.30-4.10, Aperture length : 2.50-4.40.

Description : Shell solid, up to 20 mm in height, about 11 slightly convex whorls, stepped at sutures, base gently rounded; Purplish brown to golden brown

color; aperture very small, columella constricted and twisted. Sculptured with prominent sub-sutural groove cuts through sharp, slightly curved axial ribs, coarse spiral threads between ribs; thin basal ridge continuous with outer lip.

Remarks : An elegantly convoluted species in which the whorls are numerous and rounded their upper and lower divisions are marked by a striking contrast of dark orange and white.

Distribution : India : Tamil Nadu : Chennai coast, West coast of India.

Elsewhere : Pakistan, Philippines, Japan.

45. *Terebra punctostriata* Gray

(Pl. IV, Fig. 45)

1834. *Terebra punctatostrata* Gray, *Proc. zool. Soc. Lond.*, p. 61.
 1857. *Terebra (Perirhoe) pallida* Deshayes, *Proc. zool. Soc. Lond.*, p. 310.

Material examined : Andamans (13 exs).

Measurements (mm) : Length : 58.00-69.20, Width : 8.80-11.00, Aperture length : 8.20-10.60.

Description : Shell long and slender, up to 69 mm in height, light yellowish in colour, whorls smooth, spirally superficially groove striated, striae finely punctuated, sutural margin closely obliquely crenulated, aperture small columella straight, a little recurved at the base.

Remarks : A plain yellow whitish shell, encircled with minutely punctured grooved striae and finely, densely crenulated at the sutural margin in an oblique manner.

Distribution : India : Andaman Islands.

Elsewhere : Mauritius, Seychellec, Tuamotu Archipelago.

46. *Terebra quoygaimardi* Cernohorsky

(Pl. IV, Fig. 46)

1833. *Terebra monile* Quoy & Gaimard, *Voy, L'Astrolabe*, Zool, 2; 467, pl. 36, fig. 21, 22.
 1834. 1838, Kuester, *Syst. Conch. Cab*, ed, 2, 5(2) : 29, pl. 6, fig. 10 (Non *Buccinum monile* Linnaeus, 1771 = *Terebra*).
 1844. *Terbra monilis* Quoy & Gaimard, Hinds, *Proc. zool. Soc. Lond.* pt. 11 : 163; 1844 Hinds in Sowerby, *Thes. Conchyl* 1 : 168 pl. 43, fig. 65, 66; 1844. Deshayes & Edwards, *His. Nat., anim. S. vert.*, Ed. 2. 10 : 258.
 1859. *Terbra monilis* Deshayes, *Proc. zool. Soc. Lond.*, Pt. 27 : 312. 1860 Reeve, *Conch. Icon*, 12 : pl. 11, fig. 42 a : 1885 Tryon, *Man. Conch*, 7 : 28, pl. 8, fig. 47, 48 (In synonymy of *T. straminea* Gray); 1967 Cernohorsky, *marine shells, Pacific* 1 : 204, pl. 51, fig. 377.

1964. *Terebra* (*Cinguloterebra*) *monilis* Quoy & Gaimard, *Shikama, select. Shells world* col. 2: pl. 69, fig. 19.
 1966. *Cinguloterebra monilis* (Quoy & Gaimard), Habe & Kosuge, *shell world* col. 2 : 99, pl. 39, fig. 14.
 1967. *Dimidacus monilis* (Quoy & Gaimard), Habe & Kosuge, *Stand. Book, Jap. Shell* col. 3 : 102, pl. 40, fig. 17.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 50.50-53.00, Width : 7.30-8.20, Aperture length : 6.40-7.70.

Description : Shell large, slender with pointed spire, up to 53 mm in height, aperture small, columella reflected and twisted, recurved. Dark orange in colour, whorls flattened, divided at the upper part by a groove, crenulated at the margin, ornamented with, close set of white nodules at suture, interstices with white tubercles.

Remarks : It is characterized by a coronation of white tubercles on a dark orange ground. The tubercles become indistinct in the case of *T. cingulifera*.

Distribution : India : Andaman Island.

Elsewhere : Marquesas Island.

47. *Terebra subulata* (Linnaeus) (Pl. IV, Fig. 47)

1767. *Buccinum subulatum* Linnaeus, *Syst. Nat.* Ed. 12 : 176.
 1839. *Buccinum subulatum* : Kiener *Icon des q.*, p. 10. (6) fig. 6. (Ocean Indien, Madagascar, Iles de la sea).
 1906. *Terebra subulata* : Comber, *J. Bombay nat. Hist. Soc.*, 17 : 212.
 1952. *Terebra subulata* : Satyamurti, *Bull. Madras Govt. Mus. New Ser. (Nat. Hist.)*, 1(2) : 215, pl. 21, fig. 4.
 1992. *Terebra subulata* : Dance, *Shells Eye witness hand book*, p. 195.
 2000. *Terebra subulata* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper*, 187 : p. 174.
 2003. *Terebra subulata* : Subba Rao, *Rec. zool. Surv. Ind., Occ. Paper*, 192 : 337, pl. 88, fig. 7.

Material examined : Andamans (9 exs).

Measurements (mm) : Length : 94.00-115.00, Width : 13.20-16.20, Aperture length : 13.60-16.30.

Description : Shell large, up to 115 mm in height, slender with about 25 whorls and pointed spire. Aperture very small, outer lip thin and columella twisted, fasciole small, anterior canal truncated and curved. Sculptured with fine axial threads and irregular weak spiral grooves, the area below the suture raised into a spiral band. Color very distinct, cream ornamented with two rows of dark brown square blotches on the early whorls and three rows on the body whorl.

Remarks : Body whorl has three rows of blotches, where as the spire whorls have two rows of blotches and the top of each whorl is well rounded.

Distribution : India : Lakshadweep, Tamil Nadu : Madras, Gulf of Mannar (Krusadai Islands), Andamans, moderately common.

Elsewhere : Indo-Pacific.

48. *Terebra succincta* Boss (Pl. IV, Fig. 48)

1801. *Terebra succincta* Boss, *Deterville ed Buffon Moll.*, 4 : 17.
 1833. *Terebra cancellata* Quoy and Gaimard, *Voy. De P Astr.* T ii p. 471, pl. 36, fig. 27-28.
 1859. *Terebra undatella* Deshayes. *Proc. zool. Soc. Lond.* p. 307, No. 157.
 1898. *Terebra succinata* : Melvill and Skyes, *Proc. Malac. Soc.*, London, 3 : 42.
 1899. *Terebra cancellata* Quoy and Gaimard : Melvill and Sykes. *Proc. Malac. Soc. Lond.*, 3 : 42.
 1967. *Terebra succincta* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 206, pl. 52, fig. 387.
 1986. *Terebra succinata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, Zool. Surv. India, p. 174.
 2000. *Terebra succincta* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper*, 187 : p. 175.
 2007. *Terebra succinata* : Ramkrishna, Dey, Barua and Mukhopadhyaya, *Fauna of Andhra Pradesh, State Fauna series*, 5(7) : 135. Zool. Surv. India.

Material examined : Andamans (1 ex).

Measurements (mm) : Length : 19.00-28.00, Width : 2.10-4.40, Aperture length : 3.00-4.50.

Description : Shell sharply turreted, dark grey in colour, whorls 14-17, flatly convex, divided by a groove at the upper part, closely regularly sculptured with obliquely crenulated ribs. Crenulated at the margin, interstices cancellated with fine raised lines, aperture small, columella nearly straight.

Remarks : Presence of a curved axial ribs sculpture does not look like any other species. The suture is characterized by a band of compact clear nodules and a highly marked sub-sutural groove. Subba Rao and Dey (2000) mentioned about this species but efforts were made to identify this species from NZC which went futile. It may be *T. textilis* which is creamy white in colour, sculptured with 16-22 curved axial ribs.

Distribution : India : Andamans Islands.

Elsewhere : Tropical Pacific.

49. *Terebra textilis* Hinds (Pl. IV, Fig. 49)

1844. *Terebra textilis* Hinds, *Proc. zool. Soc. Lond.*, p. 156.
 1850. *Terebra roseata* Adams & Reeve, *Voy, de, Samarang*, p. 30(1), pl. 10, f. 24.

1859. *Terebra texilis* Deshayes, *Proc. zool. Soc. Lond.*, pl. 5, fig. 89.
1873. *Myurella macgillivrayi* Smith, *Ann. Mag. Nat. Hist. Lond.*, xi, p. 267.
1879. *Terebra subtextilis* Smith, *Proc. zool. Soc. Lond.*, p. 185, t. 19, fig. 3.
1967. *Terebra textilis* : Cernohorsky, *Marine Shells of the Pacific*, **1** : p. 206, pl. 52, fig. 388.
2000. *Terebra exigua* : Subba Rao and Dey, *Rec. zool. Surv. Ind., Occ. Paper*, **187** : p. 173.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 26.80-33.90, Width : 5.00-6.00, Aperture length : 1.90-2.70.

Description : Shell acicular, turreted, up to 40 mm in height, whorls about 12-18 convexly flattened, divided and punctuate at the upper part of a groove, aperture small, some what obliquely contracted, columella twisted and recurved. Sculptured with 20-23 curved axial ribs, interstices with 8-9 spiral cords and a row of oblique beads at sutures : pre-sutural groove is prominent; Shell light brown in colour throughout.

Remarks : A small livid brown or chestnut shell of varying regular growth closely latticed throughout.

Distribution : India : Andaman Islands.

Elsewhere : New Guinea, Fiji. Rare.

50. *Terebra tricineta* Smith

(Pl. IV, Fig. 50)

1877. *Terebra tricineta* Smith, *Ann. Mag. Nat. Hist. Mus.*, (4) 19 : 225.
1968. *Terebra (Strioterebrum) tricineta* : Ray, *Bull. Indian Mus.*, **3**(1 & 2) : 27, text fig. 25.
1991. *Terebra (Strioterebrum) tricineta* : Rao, Rao and Maitra, *Fauna of Orissa, State Fauna series*, **1**(3) : 89. *Zool. Surv. India*.
1992. *Terebra tricineta* : Subba Rao, Dey and Barua, *Fauna of West Bengal, State Fauna series*, **3**(9) : 201. *Zool. Surv. India*.

Material examined : Digha (3 exs).

Measurements (mm) : Length : 4.80-6.10, Width : 1.30-1.50, Aperture length : 0.80-0.90.

Description : Shell small, up to 6 mm in height, slender, spire pointed, with about 9-12 whorls, arranged like a pyramid; whorls medially constricted deep; sculptured with node like radial fine lines, these are very prominent and strong throughout the whorls.

Distribution : India : West Bengal : Medinipur; Maharastra, Orissa, Tamil Nadu.

Elsewhere : Persian Gulf, Pakistan coast, Singapore, Indonesia.

51. *Terebra triseriata* Gray

(Pl. IV, Fig. 51)

1834. *Terebra triseriata* Gray, *Proc. zool. Soc. Lond.*, p. 61.
1940. *Terebra triseriata* : Crichton, *J. Bombay nat. Hist. Soc.*, **42** : 335.
1844. *Terebra triseriata* : Hinds, *Thes. Conch. P.* 171(59); pl. 45, fig. 119.
1859. *Terebra praelonga* Deshayes, *Proc. zool. Soc. Lond.*, p. 315.
1990. *Terebra triseriata* : Pinn, *Sea Shells of Pondicherry*; Nehru Science Centre, p. 109, fig. 199.
1995. *Terebra triseriata* : Bosch, *Sea shell of Eastern Arabia* No. 774 p. 172.

Material examined : Andamans (5 exs).

Measurements (mm) : Length : 45.00-76.00, Width : 13.40-15.60, Aperture length : 4.70-5.60.

Description : Shell solid, moderately glossy, up to 76 mm in height; very long and narrow with about 32-41 straight sided whorls, early whorls broken, deep suture, small aperture with strongly twisted and recurved columella; Sculptured with two rows of beads at sutures, separated by a smooth spiral groove. Whorls bear 4-6 spiral cords and curved growth lines and weak axial ribs, last whorl more or less angled at the base.

Remarks : More delicate and slender in growth, more concavely flattened, with granulated sculpture.

Distribution : India : Andaman Islands.

Elsewhere : Isles of Ticao, Philippines Port Curtis, Australia.

52. *Terebra undulata* Gray

(Pl. IV, Fig. 52)

1834. *Terebra undulata* Gray, *Proc. zool. Soc. Lond.*, (1834) 11 : 60.
1859. *Terebra approximata* Deshayes, *Proc. zool. Soc. Lond.*, (1859) p. 299.
1906. *Terebra undulata* : Comber, *J. Bombay nat. Hist. Soc.*, **17** : 212.
1908. *Terebra cornicolor* Preston. *Rec. Indian Mus.*, **2** : 189, pl. 17, fig. 63.
1967. *Terebra undulata* : Cernohorsky, *Marine Shells of the Pacific*, **1** : 208, pl. 52, fig. 391.
1986. *Terebra undulata* : Tikader, Daniel and Subba Rao, *Sea shore animals of Andaman and Nicobar Islands*, *Zool. Surv. India*, p. 174.
2000. *Terebra undulata* : Subba Rao & Dey, *Rec. zool. Surv. Ind., Occ. Paper*, **187** : p. 175.

Material examined : Andamans (8 exs).

Measurements (mm) : Length : 30.00-46.30, Width : 6.10-7.70, Aperture length : 4.30-7.40.

Description : Shell cylindrically elongated, apex of the shell terminates in a point, polished, shining light

orange brown in colour. About 12-18 whorls, Aperture small, narrow; columella descending rather obliquely; outer lip simple; sculptured with close set longitudinal ribs crossed near the upper end by a slight spiral groove, thus forming an infra sutural crenulated band, the interstices between the ribs spirally and minutely pitted, the punctuation of the upper row being coarse than the rest. Base of shell marked with three minutely pitted grooves.

Remarks : Shell marked with three revolving punctuates grooves.

Distribution : India : Andamans Islands.

Elsewhere : Philippines, Singapore, Tropical Pacific, Viti Island.

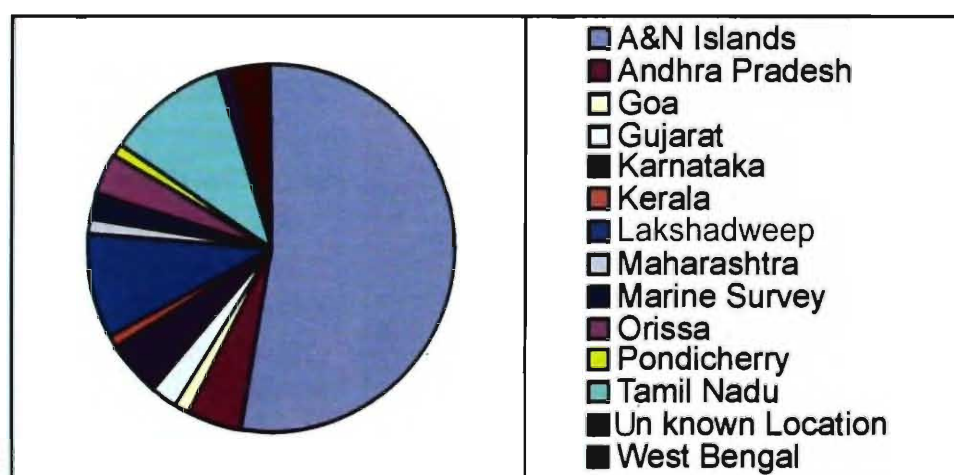
SUMMARY AND DISCUSSION

When we enumerate the number of species of *Terebra* in the last century, we are astonished at the smaller number. In the 12th edition of the "*Systema Nature*" Linnaeus (1758) had put together only 10 species in the 7th section of his genus *Buccinum*, which includes only *Terebra*. Martini and Chemnitz (1788) in their great work added few species, Schroeter having observed in the old plates a considerable number of figures that had been over looked, separated them carefully from each other, and placed them in the genus after Linnaeus species. The number of species was considerably increased as many as 43 by Gmelin in the

13th edition of '*Systema Nature*' Lamarck has doubled the number of the species of Linnaeus in his *Histoire Naturelle des Animaux Sans Vertebres*'

Quoy and Gaimard (1836) contributed a few of them collected during the voyage of the 'Astrolabe' Kiener (1839-40) added some other in thier '*Species generales at Iconographic des Coquilles vivantes*' and carried up to 35 of the number figures and described. Shortly afterwards Gray described summering in Proceedings of Zoological Society London in 1834, twenty new species among which some of them are doubtful. At last Hinds (1843) described about 50 new species coming almost all from Cuming Ian collection, gave a complete monograph of the genus, and rose to other number of species known to 109. This way considerable number was still further augmented by Adams and Reeve (1850), who described 10 more species.

The species of the Genus *Terebra* were ably monographed by Hinds (1846), but many new ones having been accumulated since that period, the genus was again monographed by at Cuming's suggestion by Deshayes (1857-59), indeed to undertake the investigation of the genus under circumstances hardly favourable to the proper discrimination of the species. Again in 1860 Reeve reviewed the monograph of Deshayes and reported that out of 221 species cited by Deshayes, Reeve could get 214 original Types and series of types, and he reduced the number in to 149



Distribution species recorded among states of India of Family Terebridae

rejecting about 65 species as synonyms and he himself described about 6 species making the total into 155 species. In this manner the genus *Terebra* under went for addition or deletion of species. Till date there are about 412 species of Terebrids reported globally, but the authentication of the number and species name is still doubtful. The number of species may come hardly about 270 globally. In Indo Pacific region about 90 species were reported under five genera, viz., *Terebra*, *Diplomeriza*, *Hastula*, *Imphuges* and *Subula*.

The family Terebridae is widely distributed in Indo Pacific region, about 68 species of Terebrids were reported from Indian water by different authors, but we could find out only 52 species present in NZC, which were dealt comprehensively. The genus *Torenella* reported from Indo Pacific region by Hinds could not be ascertained due to lack of representative collection from Indian waters.

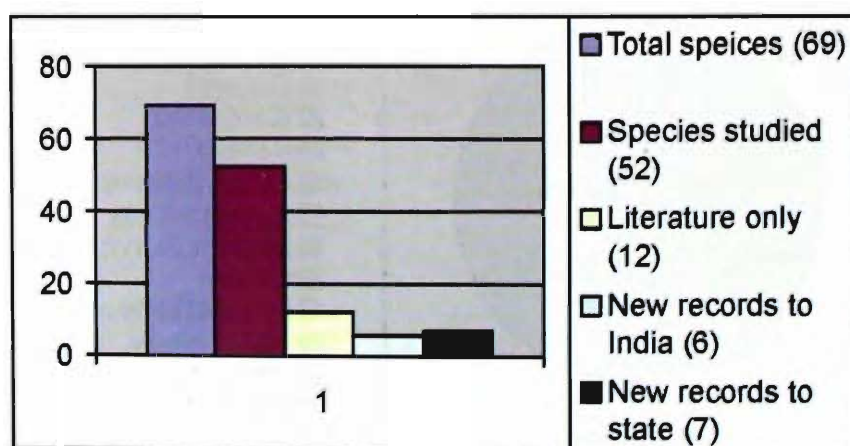
Out of 52 species reported in the present work *Terebra amoena*, *Terebra amanda*, *Terebra anilis*, *Terebra macandrewii*, *Terebra quoygaimardi* and *Hastula solida* which is a uncommon species from Tropical pacific are reported for the first time from India. Of the species reported, majority of species from Andaman Islands only. *Hastula tenera*, *Terbra maculata*, from Karnataka, *Diplomeriza. raphanula* from Kerala and Karnataka, *Terebra crenulata*, *Terebra*

anilis from Goa, *T. felina* from Goa and Maharastra; *Dipomeriza duplicata* from Tamil Nadu are also recorded for the first time as new distributional records.

The taxonomy of the family Terebridae is remain unsatisfactory, due to the fact that it is mainly hurdle is non-availability of operculum and protoconch of the shell which may through some light on distinguishing the species as well other anatomical parts are essential to strengthen the taxonomic characters for classification. The polymorphic nature of the family Terebridae is due to geographical differences among the morphological features in different species. Since the study is based upon only the dry shell collected from various sources, still its collection methods are not so clear, and they might be collected through beach wash ups apart from some dredged materials. From the present study it is evident that only few species are reported apart from Andaman Islands, therefore efforts could be made to collect these species from other coastal areas.

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Status of species studied of Family Terebridae

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PLATE I



Fig. 1 Ventral View of *Diplomeriza anomala*; Fig. 2 *D. duplicata*; Fig. 3 *D. raphanula*; Fig. 4 *D. speciabilis*; Fig. 5 *D. straminea*; Fig. 6 *D. tricolor*; Fig. 7 *Hastula albula*; Fig. 8 *H. hacillus*; Fig. 9 *H. cinerea*; Fig. 10 *H. hastata*; Fig. 11 *H. inconstans*; Fig. 12 *H. lauta*; Fig. 13 *H. matherionana*; Fig. 14 *H. strigilata*; Fig. 15 *H. solida*; Fig. 16 *H. stylata*; Fig. 17 *H. tenera*; Fig. 18 *H. trailii*; Fig. 19 *Impages hectica*.

PLATE II

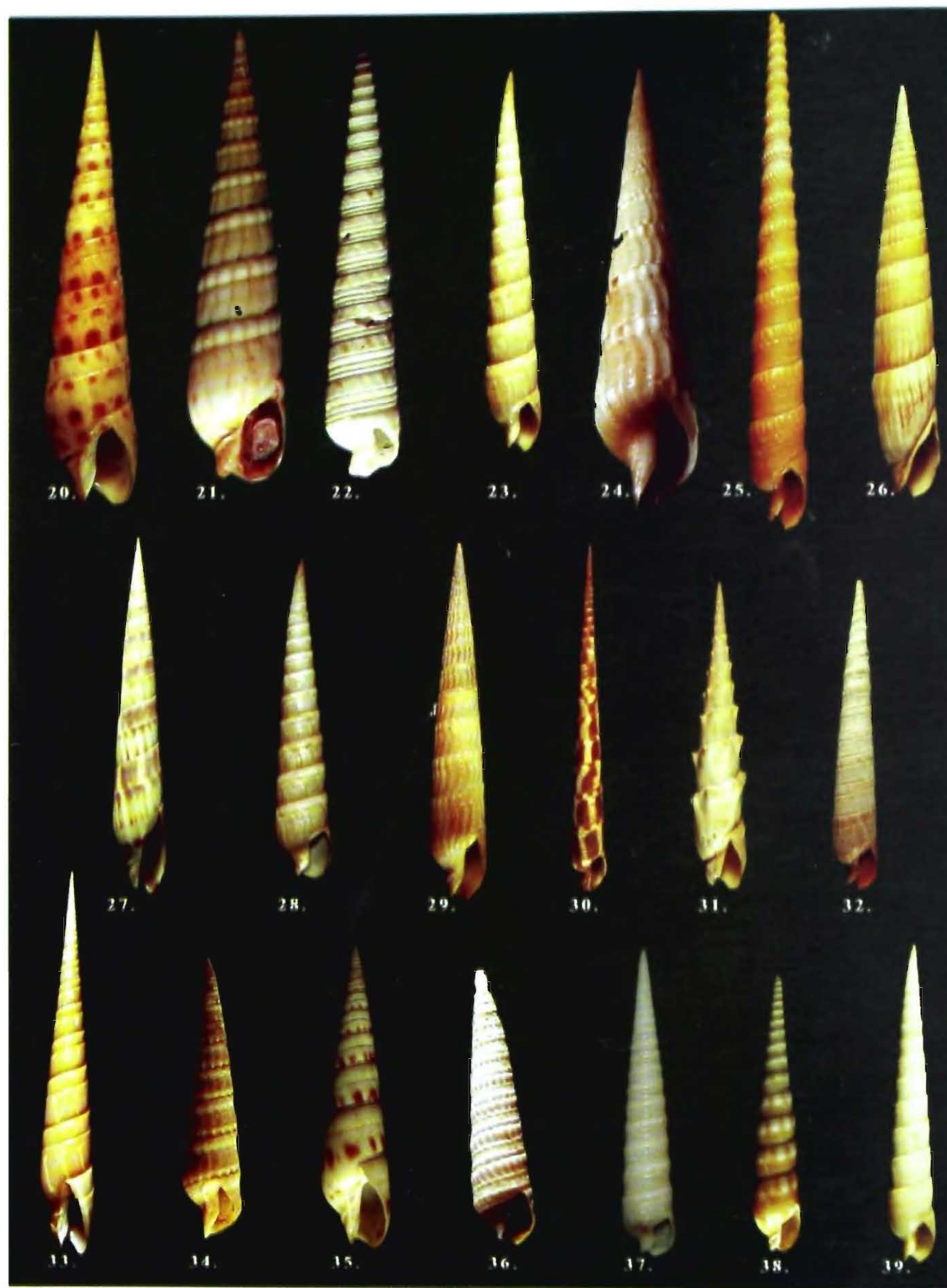


Fig. 20 *Terebra aerolata*; Fig. 21 *T. affinis*; Fig. 22 *T. alveolata*; Fig. 23 *T. amanda*; Fig. 24 *T. amoena*; Fig. 25 *T. anilist*; Fig. 26 *T. cerithina*; Fig. 27 *T. chlorata*; Fig. 28 *T. cingulifera*; Fig. 29 *T. Columellaris*; Fig. 30 *T. commaculata*; Fig. 31 *T. creulata*; Fig. 32 *T. deshayesi*; Fig. 33 *T. dimidata*; Fig. 34 *T. durgella*; Fig. 35 *T. felina*; Fig. 36 *T. fenestrata*; Fig. 37 *T. funiculata*; Fig. 38 *T. guttata*; Fig. 39 *T. laevigata*

PLATE III

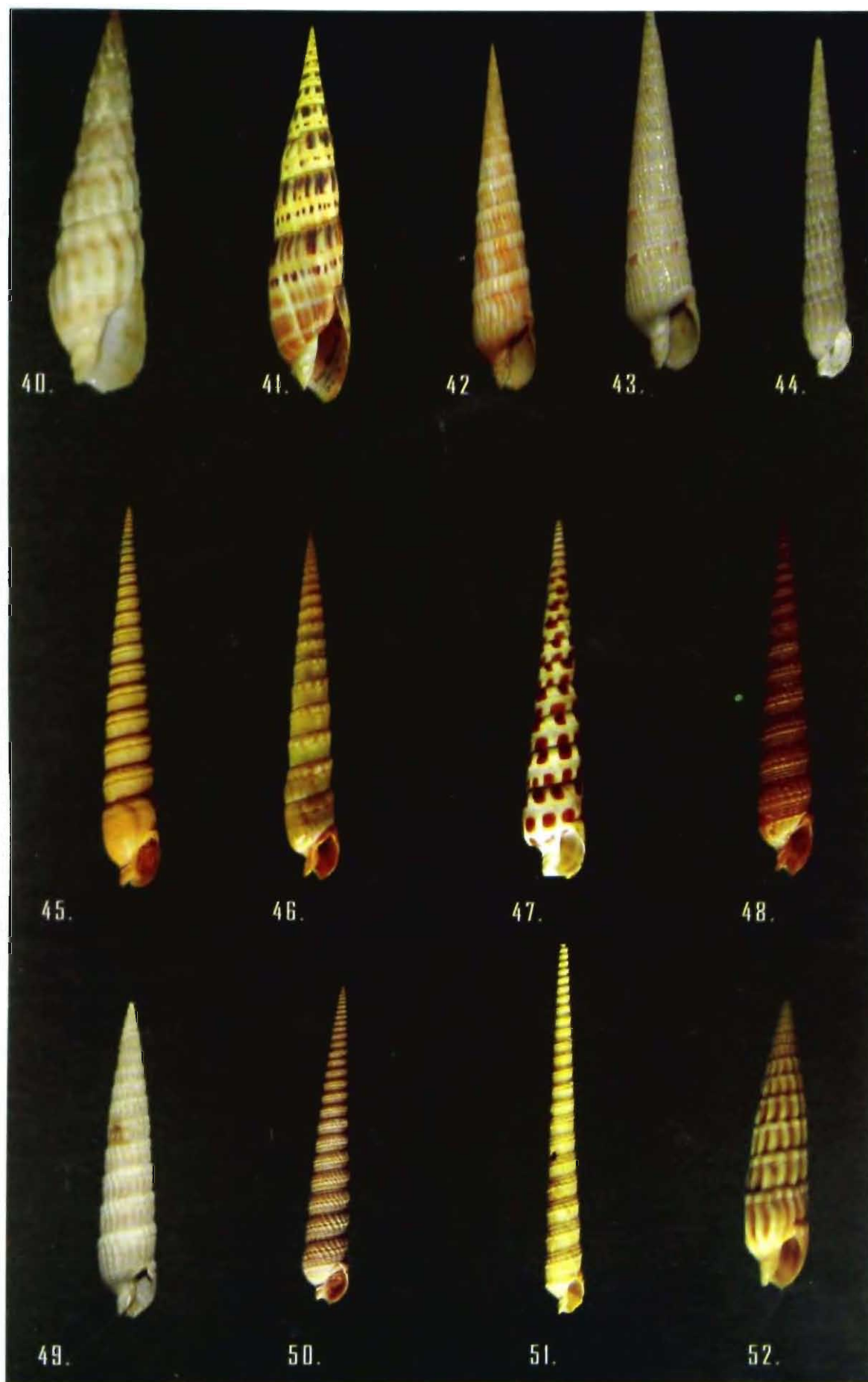
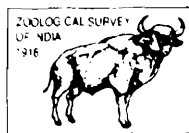


Fig. 40 *Terebra macandrewae*; Fig. 41 *Terebra nebulosa*; Fig. 42 *Terebra pertusa*; Fig. 43 *Terebra polygyrata*; Fig. 44 *Terebra punctatostriata*; Fig. 45 *Terebra quoygaimard*; Fig. 46 *Terebra roseata*; Fig. 47 *Terebra subulata*; Fig. 48 *Terebra succincta*; Fig. 49 *Terebra lextiles*; Fig. 50 *Terebra tricineta*; Fig. 51 *Terebra triseriata*; Fig. 52 *Terebra undulata*.



Rec. zool. Surv. India : **111**(Part-3) : 79-101, 2012

A CHECKLIST OF NOCTUIDAE (INSECTA : LEPIDOPTERA : NOCTUOIDEA) OF INDIA

K. SIVASANKARAN, S. IGNACIMUTHU*, M. GABRIEL PAULRAJ AND S. PRABAKARAN

*Entomology Research Institute
Loyola College, Chennai-600034*

*Corresponding author

E-mail: entolc@hotmail.com

INTRODUCTION

The family Noctuidae commonly known as Owlet moths is one of the largest families in the order Lepidoptera which comprises more than 35,000 known species placed in 29 sub-families and 4,200 genera. The noctuid moths can be easily recognized from other lepidopterans by their prominent eyes and comparatively robust structure. The noctuids mostly have drab forewings, although some have brightly coloured hind wings. The overwhelming majority of noctuids fly at night and is almost invariably strongly attracted to light. Noctuid are well represented in all important zoogeographic regions and occur in lower montane to upper montane, sandy ocean beaches, dunes, river basins deserts and a wide variety of habitats. Noctuids are a prominent group of terrestrial insect fauna and food web, including innumerable ecological and economically important species. Several species have larvae that live in the soil and agricultural or horticultural pests. Majority of species will prove to be polyphagous but restricted to herbaceous vegetation in distributed habitats in the tropics, a category which includes agricultural crops. Noctuidae reported so far from India (before partition) are accommodated under 218 genera and 1431 species (Hampson, 1894-95; Moore, 1879-88; Walker, 1854-66; Holloway, 1985, 1989; Park, 2001). The checklist of the genera and species of Noctuidae from India presented here, lists a total of 1374 species under 351 genera.

List of Sub-families :

1. NOCTUINAE
2. HADENINAE
3. HELIOTHINAE
4. ACRONICTINAE

5. AMPHIPYRINAE
6. HERMINIINAE
7. HYPENINAE
8. EUSTROTIINAE
9. AGANAINAE

10. AGARISTINAE
11. BAGISARINAE
12. CONDICINAE
13. EREBINAE
14. GONOPTERINAE
15. OPHIDERINAE
16. ACONTIINAE
17. PLUSIINAE
18. PALINDIINAE
19. SARROTHRIPINAE
20. STICTOPTERINAE
21. CATOCALINAE
22. EUTELLIINAE
23. EARIADINAE
24. FOCILLINAE
25. STREPSIMANNINAE

List of genera

1. *Agrotis*
2. *Aletia*
3. *Peridroma*
4. *Protexarnis*
5. *Axylia*
6. *Ochropleura*
7. *Diarsia*
8. *Xestia*
9. *Hadena*
10. *Mythimna*
11. *Tiracola*
12. *Polytela*
13. *Euplexia*
14. *Apamea*
15. *Aeologramma*
16. *Antha*
17. *Apsarasa*

18. *Athetis*
19. *Callyna*
20. *Dyptergina*
21. *Elusa*
22. *Feliniopsia*
23. *Nonagria*
24. *Trachea*
25. *Xylostola*
26. *Helicoverpa*
27. *Heliothis*
28. *Xanthia*
29. *Glottula*
30. *Elwesia*
31. *Pyrria*
32. *Adisura*
33. *Chariclea*
34. *Raghuva*
35. *Epilecta*
36. *Aucha*
37. *Hypernaenia*
38. *Semiophora*
39. *Bombycia*
40. *Ancara*
41. *Eurois*
42. *Polia*
43. *Dipterygia*
44. *Euscotia*
45. *Cuculia*
46. *Acronycta*
47. *Toxocampa*
48. *Calogramma*
49. *Amyna*
50. *Berresa*
51. *Elusia*

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|---------------------------|----------------------------|---------------------------|----------------------------|
| 52. <i>Arboricornus</i> | 101. <i>Goniocraspedum</i> | 150. <i>Schistorhynx</i> | 199. <i>Homaea</i> |
| 53. <i>Caradrina</i> | 102. <i>Mecistoptera</i> | 151. <i>Ericeia</i> | 200. <i>Miniodes</i> |
| 54. <i>Tathoryhynchus</i> | 103. <i>Bertula</i> | 152. <i>Hypopyra</i> | 201. <i>Phyllodes</i> |
| 55. <i>Acrapex</i> | 104. <i>Popyogon</i> | 153. <i>Artena</i> | 202. <i>Ophideres</i> |
| 56. <i>Acutipenna</i> | 105. <i>Achaea</i> | 154. <i>Bastilla</i> | 203. <i>Calpe</i> |
| 57. <i>Auchmis</i> | 106. <i>Cosmophila</i> | 155. <i>Dysgonia</i> | 204. <i>Pseudocalpe</i> |
| 58. <i>Callopistria</i> | 107. <i>Ercheia</i> | 156. <i>Macaldenia</i> | 205. <i>Lophathrum</i> |
| 59. <i>Taxophleps</i> | 108. <i>Grammodes</i> | 157. <i>Trigonodes</i> | 206. <i>Abrostola</i> |
| 60. <i>Leocyma</i> | 109. <i>Chalciope</i> | 158. <i>Platyja</i> | 207. <i>Hyperlopha</i> |
| 61. <i>Craniophora</i> | 110. <i>Thyas</i> | 159. <i>Sympis</i> | 208. <i>Goniocraspidum</i> |
| 62. <i>Mudaria</i> | 111. <i>Entomogramma</i> | 160. <i>Bocula</i> | 209. <i>Barasa</i> |
| 63. <i>Sphetta</i> | 112. <i>Batracharta</i> | 161. <i>Pangrapta</i> | 210. <i>Hypocala</i> |
| 64. <i>Tyracrona</i> | 113. <i>Cyclodes</i> | 162. <i>Saroba</i> | 211. <i>Anomis</i> |
| 65. <i>Bryophilina</i> | 114. <i>Melipotis</i> | 163. <i>Sarobides</i> | 212. <i>Oxyodes</i> |
| 66. <i>Acronicta</i> | 115. <i>Crithote</i> | 164. <i>Tamba</i> | 213. <i>Mosara</i> |
| 67. <i>Actinotia</i> | 116. <i>Plecoptera</i> | 165. <i>Dinumma</i> | 214. <i>Mithila</i> |
| 68. <i>Sasunaga</i> | 117. <i>Diomea</i> | 166. <i>Falana</i> | 215. <i>Coarica</i> |
| 69. <i>Conservula</i> | 118. <i>Calesia</i> | 167. <i>Gonitis</i> | 216. <i>Polydesma</i> |
| 70. <i>Spodoptera</i> | 119. <i>Calyptra</i> | 168. <i>Daddala</i> | 217. <i>Homoptera</i> |
| 71. <i>Amphipyra</i> | 120. <i>Eudocima</i> | 169. <i>Hypersynoides</i> | 218. <i>Ommatophora</i> |
| 72. <i>Cosmia</i> | 121. <i>Oraesia</i> | 170. <i>Tinolius</i> | 219. <i>Chrysopera</i> |
| 73. <i>Hypena</i> | 122. <i>Plusiodonta</i> | 171. <i>Pantylia</i> | 220. <i>Serodes</i> |
| 74. <i>Catada</i> | 123. <i>Olulis</i> | 172. <i>Moma</i> | 221. <i>Hulodes</i> |
| 75. <i>Acidon</i> | 124. <i>Aedia</i> | 173. <i>Trisuloides</i> | 222. <i>Thermesia</i> |
| 76. <i>Lysimelia</i> | 125. <i>Athyrimina</i> | 174. <i>Trisula</i> | 223. <i>Spiredonia</i> |
| 77. <i>Sarobela</i> | 126. <i>Erebus</i> | 175. <i>Phorica</i> | 224. <i>Amphigonia</i> |
| 78. <i>Adrapsa</i> | 127. <i>Bamra</i> | 176. <i>Lycimna</i> | 225. <i>Ulotrichopus</i> |
| 79. <i>Heteromala</i> | 128. <i>Erygia</i> | 177. <i>Sypna</i> | 226. <i>Asticta</i> |
| 80. <i>Pseudoglossa</i> | 129. <i>Ischyja</i> | 178. <i>Anisoneura</i> | 227. <i>Annua</i> |
| 81. <i>Bleptina</i> | 130. <i>Ophiusa</i> | 179. <i>Agonista</i> | 228. <i>Arcte</i> |
| 82. <i>Alelimma</i> | 131. <i>Catocala</i> | 180. <i>Panilla</i> | 229. <i>Bamara</i> |
| 83. <i>Mastigophorus</i> | 132. <i>Mocis</i> | 181. <i>Gnamptogyia</i> | 230. <i>Dierna</i> |
| 84. <i>Bracharthrum</i> | 133. <i>Ugia</i> | 182. <i>Lyncestis</i> | 231. <i>Egnasia</i> |
| 85. <i>Falcimala</i> | 134. <i>Hypospila</i> | 183. <i>Gnamptonyx</i> | 232. <i>Elygea</i> |
| 86. <i>Nagadeba</i> | 135. <i>Chilkasa</i> | 184. <i>Pseudophia</i> | 233. <i>Episparis</i> |
| 87. <i>Hydrillodes</i> | 136. <i>Thalatta</i> | 185. <i>Catephia</i> | 234. <i>Fodina</i> |
| 88. <i>Simplicia</i> | 137. <i>Throana</i> | 186. <i>Pandesma</i> | 235. <i>Hamodes</i> |
| 89. <i>Nodaria</i> | 138. <i>Mecodina</i> | 187. <i>Condote</i> | 236. <i>Blasticorhinus</i> |
| 90. <i>Talapa</i> | 139. <i>Buzara</i> | 188. <i>Lagoptera</i> | 237. <i>Koptoplax</i> |
| 91. <i>Singara</i> | 140. <i>Anticarsia</i> | 189. <i>Dordura</i> | 238. <i>Orthaga</i> |
| 92. <i>Camptochilus</i> | 141. <i>Arsacia</i> | 190. <i>Delgamma</i> | 239. <i>Sphingomorpha</i> |
| 93. <i>Latirostrum</i> | 142. <i>Gesonja</i> | 191. <i>Pantura</i> | 240. <i>Spirama</i> |
| 94. <i>Corcobara</i> | 143. <i>Goniocraspedon</i> | 192. <i>Baniana</i> | 241. <i>Metaemene</i> |
| 95. <i>Anoratha</i> | 144. <i>Hepatica</i> | 193. <i>Borsippa</i> | 242. <i>Erastris</i> |
| 96. <i>Dichroma</i> | 145. <i>Loxioda</i> | 194. <i>Acantholipes</i> | 243. <i>Toxophleps</i> |
| 97. <i>Rhynchina</i> | 146. <i>Marapana</i> | 195. <i>Remigia</i> | 244. <i>Micraeschus</i> |
| 98. <i>Orthozona</i> | 147. <i>Pseudosphetta</i> | 196. <i>Harmetelia</i> | 245. <i>Zurobata</i> |
| 99. <i>Chusaris</i> | 148. <i>Rema</i> | 197. <i>Pleurona</i> | 246. <i>Corgatha</i> |
| 100. <i>Arrade</i> | 149. <i>Rhesala</i> | 198. <i>Lycima</i> | 247. <i>Oruza</i> |

248. *Catoblemma*
 249. *Eustrotia*
 250. *Hyperstrotia*
 251. *Lithacodia*
 252. *Maliattha*
 253. *Diphthera*
 254. *Perciana*
 255. *Bryophila*
 256. *Erastoides*
 257. *Hyelopsis*
 258. *Hyela*
 259. *Micardia*
 260. *Megalodes*
 261. *Pachylepis*
 262. *Troctoptera*
 263. *Lophoruza*
 264. *Marimatha*
 265. *Swinhoea*
 266. *Metachrostis*
 267. *Naranga*
 268. *Rivula*
 269. *Pachylepis*
 270. *Zagira*
 271. *Agrapha*
 272. *Autoba*
 273. *Sclerogenia*
 274. *Zonoplusia*
 275. *Thysanoplusia*
 276. *Anadevidia*
 277. *Chrysodeixis*
 278. *Trichoplusia*
 279. *Autographa*
 280. *Ramadasa*
 281. *Westermannia*
 282. *Nagasena*
 283. *Brevipecten*
 284. *Doranaga*
 285. *Pterogonia*
 286. *Tarache*
 287. *Xanthoptera*
 288. *Acontia*
 289. *Labanda*
 290. *Chlumetia*
 291. *Blenina*
 292. *Argyrothripa*
 293. *Clettharra*
 294. *Sarrothripa*
 295. *Gadirtha*
 296. *Neothripa*
297. *Ingura*
 298. *Anuga*
 299. *Eutelia*
 300. *Paectes*
 301. *Risoba*
 302. *Odontodes*
 303. *Stictoptera*
 304. *Sadarsa*
 305. *Grytona*
 306. *Lophoptera*
 307. *Cymatophoropsis*
 308. *Asota*
 309. *Neochera*
 310. *Episteme*
 311. *Exsula*
 312. *Sarbanissa*
 313. *Bagisara*
 314. *Homodes*
 315. *Plotheia*
 316. *Hyblaea*
 317. *Bagada*
 318. *Condica*
 319. *Perigea*
 320. *Earias*
 321. *Luceria*
 322. *Capotena*
 323. *Pseudelydna*
 324. *Tympanistes*
 325. *Carea*
 326. *Tortriciforma*
 327. *Gelastocera*
 328. *Beara*
 329. *Pseudogonitis*
 330. *Tinosoma*
 331. *Sphragifera*
 332. *Xanthodes*
 333. *Ossonoba*
 334. *Oxygonitis*
 335. *Clethrophora*
 336. *Churia*
 337. *Hyposemansis*
 338. *Clethrophora*
 339. *Psimada*
 340. *Zethes*
 341. *Avitta*
 342. *Capnodes*
 343. *Raparna*
 344. *Cephena*
 345. *Hermonassa*

SPECIES CHECKLIST

- Order LEPIDOPTERA
 Suborder DITRYSLA
 Superfamily NOCTUOIDEA
 Family NOCTUIDAE LATREILLE, 1809
 Subfamily NOCTUINAE LATREILLE, 1809
 Tribe AGROTINI RAMBUR, 1848
 Subtribe AGROTINA RAMBUR, 1848
 Genus 1. *Agrotis* Ochsenheimer, 1816
1. *Agrotis biconica* Kollar, 1844
 2. *Agrotis renalis* Moore, 1881
 3. *Agrotis accipiter* Felder, 1864
 4. *Agrotis brevirami* Hampson, 1894
 5. *Agrotis c-nigrum* Linnaeus, 1775
 6. *Agrotis cerastoides* Moore, 1867
 7. *Agrotis cęrvina* Moore, 1867
 8. *Agrotis clavis* Hufnagel, 1766
 9. *Agrotis corticea* Schiffermuller, 1776
 10. *Agrotis cuprea* Moore, 1867
 11. *Agrotis albipennis* (Grote, 1876)
 12. *Agrotis niveisparsa* Butler, 1889
 13. *Agrotis modesta* Moore, 1881
 14. *Agrotis junctura* Moore, 1881
 15. *Agrotis pronuba* Linnaeus, 1766
 16. *Agrotis curviplena* Walker, 1865
 17. *Agrotis descripta* Bremer, 1864
 18. *Agrotis dispalata* Swinhoe, 1891
 19. *Agrotis ditrapezium* Borkhausen, 1788
 20. *Agrotis flammatra* Fabricius, 1787
 21. *Agrotis ipsilon* Hufnagel, 1766
 22. *Agrotis olivascens* Hampson, 1894
 23. *Agrotis orchracea* Walker, 1864
 24. *Agrotis plecta* Linnaeus, 1766
 25. *Agrotis ravida* Schiffermuller, 1776
 26. *Agrotis segetum* ([Denis & Schiffermuller], 1775)
 27. *Agrotis sikkema* Moore, 1867
 28. *Agrotis tenuis* Butler, 1889
 29. *Agrotis triangularis* Moore, 1867
 30. *Agrotis griseivena* Hampson, 1894
- Genus 2. *Protexarnis* McDunnough, 1929
31. *Protexarnis photophila* (Guenée, 1852)
 Subtribe AUSTRANDESIINA ANGULO & OLIVARES, 1960
- Genus 3. *Peridroma* Hübner, 1821
32. *Peridroma saucia* Hübner, 1808
 Tribe NOCTUINI LATREILLE, 1809
- Genus 4. *Axylia* Hübner, 1821
33. *Axylia putris* Linnaeus, 1761

Genus 5. *Ochropleura* Hübner, 1821

34. *Ochropleura plecta* Linnaeus, 1761

Genus 6. *Diarsia* Hübner, 1821

35. *Diarsia canescens* Butler, 1878

Genus 7. *Xestia* Hübner, 1818

36. *Xestia c-nigrum* Linnaeus, 1758

37. *Xestia dilata* (Butler, 1879)

38. *Xestia efflorescens* Butler, 1879

Subfamily HADENINAE GUENEE, 1852

Genus 8. *Hadena* Schrank, 1802

39. *Hadena perdentata* Hampson, 1894

40. *Hadena nigrocuprea* Moore, 1867

41. *Hadena hastata* Moore, 1879

42. *Hadena elwesi* Hampson, 1894

43. *Hadena dissecta* Walker, 1864

44. *Hadena costigera* Moore, 1881

45. *Hadena simillima* Moore, 1881

46. *Hadena ferrispara* Hampson, 1894

47. *Hadena nagaensis* Hampson, 1894

48. *Hadena polio stigma* Hampson, 1894

49. *Hadena brassicae* Linnaeus, 1766

50. *Hadena cuprina* Moore, 1881

51. *Hadena nigerrima* Warren, 1888

52. *Hadena scotochlorea* Kollar, 1844

53. *Hadena indica* Moore, 1867

54. *Hadena flavala* Moore, 1867

55. *Hadena knyveti* Hampson, 1894

56. *Hadena albiceps* Hampson, 1894

57. *Hadena fasciculata* Hampson, 1894

58. *Hadena pannosa* Moore, 1881

59. *Hadena incisa* Moore, 1881

60. *Hadena ferrisparsa* Hampson, 1894

61. *Hadena repetita* Butler, 1889

62. *Hadena mamestrina* Butler, 1889

63. *Hadena culta* Moore, 1881

Genus 9. *Aletia* Hübner, 1821

64. *Aletia consanguis* Guenee, 1842

Tribe LEUCANIINI GUENEE, 1841

Genus 10. *Mythimna* Ochsenheimer, 1816

65. *Mythimna compta* (Moore, 1881)

66. *Mythimna irregularis* Walker, 1857

67. *Mythimna unipuncta* Hawker, 1803

68. *Mythimna curvilinea* Hampson, 1894

69. *Mythimna loreyi* Duponchel, 1827

70. *Mythimna reversa* Moore, 1884

71. *Mythimna separata* (Walker, 1865)

72. *Mythimna vittata* Hampson, 1894

73. *Mythimna byssina* Swinhoe, 1886

74. *Mythimna fasciata* (Moore, 1881)

75. *Mythimna formosana* Butler, 1880

76. *Mythimna Moorei* (Swinhoe, 1902)

77. *Mythimna pallidicosta* (Hampson, 1894)

78. *Mythimna snelleni* Hreblay, 1996

79. *Mythimna yu* Guenée, 1852

80. *Mythimna tangala* Felder & Rogenhofer, 1874

81. *Mythimna decisissima* Walker, 1865

82. *Mythimna hamifera* Walker, 1865

83. *Mythimna rufistrigosa* Moore, 1881

84. *Mythimna l-album* Hübner, 1818

85. *Mythimna vana* Swinhoe, 1885

86. *Mythimna howra* Moore, 1881

87. *Mythimna subsignata* Moore, 1881

88. *Mythimna abdominalis* Moore, 1881

89. *Mythimna sinuosa* Moore, 1882

90. *Mythimna exempta* Walker, 1857

91. *Mythimna v-album* Hampson, 1891

92. *Mythimna nainica* Moore, 1881

93. *Mythimna semiusta* Hampson, 1891

94. *Mythimna modesta* Moore, 1881

95. *Mythimna fragilis* Butler, 1883

96. *Mythimna albivitta* Hampson, 1891

97. *Mythimna rufipennis* Hampson, 1894

98. *Mythimna chinnamomea* Moore, 1881

99. *Mythimna nigrorenalis* Hampson, 1894

100. *Mythimna distincta* Moore, 1881

101. *Mythimna obscura* Moore, 1879

102. *Mythimna corrugata* Hampson, 1894

103. *Mythimna rufula* Hampson, 1894

104. *Mythimna nigrofasciata* Hampson, 1894

105. *Mythimna albicosta* Moore, 1881

106. *Mythimna venalba* Moore, 1867

107. *Mythimna polemusa* Swinhoe, 1885

108. *Mythimna tangala* Felder, 1864

109. *Mythimna irrorata* Moore, 1881

110. *Mythimna proleuca* Hampson, 1891

111. *Mythimna fraterna* Moore, 1888

Genus 11. *Tiracola* Moore, 1881

112. *Tiracola aureata* Holloway, 1984

113. *Tiracola plagiata* Walker, 1857

Genus 12. *Polytela* Guenee, 1852

114. *Polytela gloriqsa* Fabricius, 1781

115. *Polytela florigera* Guenee, 1818

Genus 13. *Euplexia* Stephens, 1829

116. *Euplexia nubilata* Hampson, 1894

117. *Euplexia indistans* Guenee, 1852

118. *Euplexia niveiplaga* Walker, 1857

119. *Euplexia flavistigma* Moore, 1867

120. *Euplexia opposita* Walker, 1865
 121. *Euplexia lignea* Butler, 1889
 122. *Euplexia albiflexura* Walker, 1857
 123. *Euplexia conducta* Walker, 1856
 124. *Euplexia albomaculata* Moore, 1867
 125. *Euplexia leucopila* Walker, 1857
 126. *Euplexia albirena* Moore, 1867
 127. *Euplexia semifascia* Walker, 1865
 128. *Euplexia metallica* Walker, 1865
 129. *Euplexia discisignata* Moore, 1867
 130. *Euplexia chalybeata* Moore, 1867
 131. *Euplexia stoliczkaa* Felder, 1864
 132. *Euplexia melanospila* Kollar, 1844
 133. *Euplexia aurigera* Walker, 1858
 134. *Euplexia albinota* Moore, 1867
 135. *Euplexia auroviridis* Moore, 1867
 136. *Euplexia literata* Moore, 1879
 137. *Euplexia calmistrata* Moore, 1879
 138. *Euplexia aurantiaca* Hampson, 1894
 139. *Euplexia stellifera* Moore, 1879
 140. *Euplexia lagenifera* Moore, 1879
 141. *Euplexia plumbeola* Hampson, 1894
 142. *Euplexia gemmifera* Walker, 1857
 143. *Euplexia albovittata* Moore, 1867
 144. *Euplexia distorta* Moore, 1881
 145. *Euplexia indica* Moore, 1881
 146. *Euplexia confecta* Walker, 1862
 147. *Euplexia pulcherrima* Moore, 1867
 148. *Euplexia atrovirens* Moore, 1867
 149. *Euplexia pardaria* Moore, 1879
 150. *Euplexia venosa* Moore, 1879
 151. *Euplexia confluens* Moore, 1881
 152. *Euplexia mucronata* Moore, 1881
 153. *Euplexia leterocampoides* Hampson, 1894
 154. *Euplexia costalis* Moore, 1879
 155. *Euplexia icamba* Swinhoe, 1892
 156. *Euplexia cyanelinea* Hampson, 1894
 157. *Euplexia pectinata* Warren, 1888
 158. *Euplexia partita* Moore, 1879
 159. *Euplexia lageniformis* Hampson, 1894
 160. *Euplexia heterocampa* Moore, 1879
 161. *Euplexia adjuncta* Moore, 1881
 162. *Euplexia didyma* Esper, 1779
 163. *Euplexia stoliczkae*, Felder, 1864
 164. *Euplexia inepta* Butler, 1881
 Genus 14. *Apamea* Ochsenheimer, 1816
 165. *Apamea sodalis* (Butler, 1878)
 Genus 15. *Aeologramma* Strand, 1910
 166. *Aeologramma albiscripta* (Hampson, 1897)
 Genus 16. *Antha* Staudinger, 1892
 167. *Antha rotunda* (Hampson, 1895)
 Subfamily HELIOTHINAE BOISDUVAL, 1828
 Genus 17. *Helicoverpa* Hardwick, 1965
 168. *Helicoverpa armigera* (Hübner, [1809])
 169. *Helicoverpa assulta* (Guenee, 1852)
 Genus 18. *Heliothis* Ochsenheimer, 1816
 170. *Heliothis maritima* Graslin, 1855
 171. *Heliothis cruentata* (Moore, 1881)
 172. *Heliothis irrorata* (Moore, 1881)
 173. *Heliothis nubigera* Herrich-Schaeffer, 1851
 174. *Heliothis scutosa* Schiffermuller, 1776
 Genus 19. *Pyrrhia* Hübner, 1821
 175. *Pyrrhia umbra* (Hufnagel, 1766)
 Subfamily ACRONICTINAE HEINSMANN, 1859
 Genus 20. *Glottula* Guenee, 1837
 176. *Glottula dominica* Cramer, 1780
 177. *Glottula orientalis* Hampson, 1894
 Genus 21. *Xanthia* Ochsenheimer, 1816
 178. *Xanthia melonina* Butler, 1889
 179. *Xanthia basalipunctata* Graeser, 1888
 180. *Xanthia givago* Esper, 1801
 181. *Xanthia rectilineata* Hampson, 1894
 Genus 22. *Elwesia* Hampson, 1894
 182. *Elwesia diplostigma* Hampson, 1894
 Genus 23. *Adisura* Moore, 1881
 183. *Adisura atkinsoni* Moore, 1881
 Genus 24. *Chariclea* Curtis, 1825
 184. *Chariclea marginalis* Walker, 1857
 185. *Chariclea lanceolata* Walker, 1865
 186. *Chariclea decorata* Moore, 1881
 187. *Chariclea bivittata* Walker, 1856
 188. *Chariclea sinuata* Moore, 1881
 189. *Chariclea beatrix* Moore, 1881
 190. *Chariclea aureola* Walker, 1856
 191. *Chariclea uncta* Swinhoe, 1885
 192. *Chariclea irrorata* Moore, 1881
 193. *Chariclea bimaculata* Moore, 1888
 194. *Chariclea artaxoides* Moore, 1881
 195. *Chariclea dora* Swinhoe, 1891
 Genus 25. *Raghuva* Moore, 1891
 196. *Raghuva confertissima* Walker, 1865
 Genus 26. *Epilecta* Hubner, 1818
 197. *Epilecta semiherbida* Walker, 1856
 Genus 27. *Aucha* Walker, 1857
 198. *Aucha nectans* Walker, 1858

Genus 28. *Hypernaenia* Hampson, 1894

- 199. *Hypernaenia denticulata* Warren, 1888
- 200. *Hypernaenia atrovirens* Walker, 1865
- 201. *Hypernaenia nigroviridis* Walker, 1865
- 202. *Hypernaenia renalba* Moore, 1879
- 203. *Hypernaenia violacea* Butler, 1889
- 204. *Hypernaenia flavicaudata* Warren, 1888

Genus 29. *Hermonassa* Walker, 1865

- 205. *Hermonassa consignata* Moore, 1879
- 206. *Hermonassa spilota* Moore, 1867
- 207. *Hermonassa incisa* Moore, 1879
- 208. *Hermonassa chalybeata* Moore, 1881
- 209. *Hermonassa lanceola* Moore, 1867
- 210. *Hermonassa sinuata* Moore, 1881

Genus 30. *Semiophora* Stephens, 1829

- 211. *Semiophora orthosioides* Butler, 1889
- 212. *Semiophora ferrosticta* Hampson, 1894
- 213. *Semiophora cataneipennis* Hampson, 1894

Genus 31. *Bombycia* Stephens, 1829

- 214. *Bombycia leococera* Hampson, 1894
- 215. *Bombycia rubida* Hampson, 1894
- 216. *Bombycia persimilis* Butler, 1889

Genus 32. *Ancara* Walker, 1858

- 217. *Ancara obliterans* Walker, 1858
- 218. *Ancara leucostigma* Moore, 1867
- 219. *Ancara nigrogrisea* Moore, 1867
- 220. *Ancara harfordi* Hampson, 1894
- 221. *Ancara rubra* Hampson, 1894
- 222. *Ancara thalophiloides* Walker, 1857
- 223. *Ancara calopistrioides* Moore, 1881
- 224. *Ancara glaucochlorea* Hampson, 1894

Genus 33. *Eurois* Hubner, 1818

- 225. *Eurois retrahens* Walker, 1856
- 226. *Eurois luteifrons* Walker, 1856
- 227. *Eurois decorata* Moore, 1879
- 228. *Eurois separata* Moore, 1879
- 229. *Eurois simulata* Moore, 1881
- 230. *Eurois albicostata* Hampson, 1894
- 231. *Eurois lubrica* Butler, 1889
- 232. *Eurois leucosticta* Moore, 1879
- 233. *Eurois flavipicta* Hampson, 1894
- 234. *Eurois fortissima* Moore, 1867
- 235. *Eurois chalybeata* Walker, 1865
- 236. *Eurois virens* Butler, 1878
- 237. *Eurois griseimarginata* Hampson, 1894

Genus 34. *Polia* Ochsenheimer, 1816

- 238. *Polia herchatra* Swinhoe, 1838
- 239. *Polia sikkimensis* Moore, 1881

240. *Polia canosparsa* Hampson, 1894

- 241. *Polia transversa* Moore, 1879
- 242. *Polia endroma* Swinhoe, 1838
- 243. *Polia dentata* Hampson, 1894
- 244. *Polia castanea* Moore, 1879
- 245. *Polia microsticta* Hampson, 1894
- 246. *Polia griseirufa* Hampson, 1894
- 247. *Polia khasiana* Moore, 1881
- 248. *Polia junctura* Hampson, 1894
- 249. *Polia sinuata* Moore, 1879
- 250. *Polia virescens* Hampson, 1894
- 251. *Polia grisea* Moore, 1879
- 252. *Polia mediana* Moore, 1881

Genus 35. *Dipterygia* Stephen, 1829

- 253. *Dipterygia nocturna* Hampson, 1891
- 254. *Dipterygia sikkima* Moore, 1879
- 255. *Dipterygia grata* Butler, 1881
- 256. *Dipterygia indica* Walker, 1865
- 257. *Dipterygia umbrifera* Butler, 1881

Genus 36. *Euscotia* Butler, 1889

- 258. *Euscotia inextricata* Moore, 1881

Genus 37. *Cuculia* Schrank 1802

- 259. *Cuculia albescens* Moore, 1881
- 260. *Cuculia albipennis* Hampson 1894
- 261. *Cuculia brevipennis* Hampson, 1894
- 262. *Cuculia pullata* Moore, 1881

Genus 38. *Acronycta* Ochsenheimer, 1816

- 263. *Acronycta anaedina* Butler, 1881
- 264. *Acronycta paucinotata* Hampson, 1894
- 265. *Acronycta sinens* Walker, 1857
- 266. *Acronycta nigrivitta* Hampson, 1891
- 267. *Acronycta obliqua* Moore, 1879
- 268. *Acronycta denticulate* Moore, 1888
- 269. *Acronycta bicolor* Moore, 1881
- 270. *Acronycta fasciata* Moore, 1881

Genus 39. *Toxocampa* Guenee, 1841

- 271. *Toxocampa dorsigera* Walker, 1865

Genus 40. *Calogramma* Guenee, 1852

- 272. *Calogramma festiva* Donovan, 1805

Genus 41. *Amyna* Guenee in Boisduval & Guenee, 1852

- 273. *Amyna selenampha* Guenee, 1852
- 274. *Amyna octo* Guenee, 1852
- 275. *Amyna monilis* Moore, 1881
- 276. *Amyna punctum* (Fabricius, 1794)

Genus 42. *Elusia* Walker, 1858

- 277. *Elusia bipars* Moore, 1881
- 278. *Elusia cyathicornis* Walker, 1857
- 279. *Elusia antennata* Moore, 1879

- Genus 43. *Arboricornus* Hampson, 1894
 280. *Arboricornus ruber* Hampson, 1894
- Genus 44. *Caradrina* Ochsenheimer, 1816
 281. *Caradrina cognata* Moore, 1879
 282. *Caradrina exigua* Hubner, 1805
 283. *Caradrina bremusa* Swinhoe, 1885
 284. *Caradrina quadripunctata* Fabricius, 1775
 285. *Caradrina delecta* Moore, 1881
 286. *Caradrina obtusa* Hampson, 1891
 287. *Caradrina sincera* Swinhoe, 1889
 288. *Caradrina intaminata* Walker, 1865
 289. *Caradrina bicornis* Hampson, 1891
 290. *Caradrina transversa* Moore, 1879
 291. *Caradrina ochreipuncta* Hampson, 1894
 292. *Caradrina furtiva* Swinhoe, 1885
 293. *Caradrina picta* Swinhoe, 1885
 294. *Caradrina ochreimargo* Hampson, 1894
 295. *Caradrina pectinata* Hampson, 1894
 296. *Caradrina reclusa* Walker, 1857
 297. *Caradrina externa* Walker, 1865
 298. *Caradrina lineosa* Moore, 1881
 299. *Caradrina renalis* Moore, 1882
 300. *Caradrina divisa* Moore, 1879
 301. *Caradrina cervina* Moore, 1881
 302. *Caradrina castaneipars* Moore, 1879
 303. *Caradrina melanosticta* Hampson, 1891
 304. *Caradrina fasciata* Moore, 1867
 305. *Caradrina mus* Hampson, 1891
 306. *Caradrina indistincta* Moore, 1879
 307. *Caradrina variana* Swinhoe, 1886
- Genus 45. *Tathoryhynchus* Hampson, 1894
 308. *Tathoryhynchus vinctate* Walker, 1865
- Genus 46. *Auchmis* Hubner, 1818
 309. *Auchmis intermedia* Bremer, 1864
 310. *Auchmis cashmirensis* Moore, 1881
- Genus 47. *Nonagria* Ochsenheimer, 1816
 311. *Nonagria inferens* Walker, 1856
 312. *Nonagria robusta* Hampson, 1894
 313. *Nonagria submarginalis* Hampson, 1891
 314. *Nonagria fuscovirens* Hampson, 1894
 315. *Nonagria chloroptera* Hampson, 1894
 316. *Nonagria conspersa* Moore, 1881
- Genus 48. *Acrapex* Hampson, 1894
 317. *Acrapex leucophlebia* Hampson, 1894
- Genus 49. *Acutipenna* Hampson, 1894
 318. *Acutipenna acuminata* Hampson, 1894
- Genus 50. *Leocyma* Guenee, 1852
 319. *Leocyma cygnus* Walker, 1856
320. *Leocyma judicata* Walker, 1858
 321. *Leocyma biplaga* Walker, 1857
- Genus 51. *Apsarasa* Moore, 1867
 322. *Apsarasa radians* West wood, 1848
- Genus 52. *Craniophora* Snellen, 1867
 323. *Craniophora fasciata* (Moore, 1887)
- Genus 53. *Mudaria* Moore, 1892
 324. *Mudaria leprocticta* Hampson, 1894
 325. *Mudaria cornifrons* Moore, 1892
- Genus 54. *Sphetta* Walker, 1865
 326. *Sphetta apicalis* Walker, 1865
- Genus 55. *Tycracrona* Kitching & Rawlins, 1995
 327. *Tycracrona obliqua* Moore, 1882
- Genus 56. *Bryophilina* Staudinger, 1892
 328. *Bryophilina mollicula* (Graeser, 1888 [1889])
- Genus 57. *Acronicta* Ochsenheimer, 1816
 329. *Acronicta pruinosa* (Guenee, 1852)
- Subfamily AMPHIPYRINAE GUENEE, 1838
 Tribe ACTINOTIINI BECK, 1996
- Genus 58. *Actinotia* Hubner, 1821
 330. *Actinotia polyodon* Clerck, 1759
- Genus 59. *Callopietria* Walker, 1818
 331. *Callopietria rivularis* Walker, 1856
 332. *Callopietria recurvata* Moore, 1879
 333. *Callopietria repleta* Walker, [1858]1857
 334. *Callopietria latreillei* Hübner, 1824
 335. *Callopietria minuta* Butler, 1889
 336. *Callopietria minor* Hampson, 1891
 337. *Callopietria yerburii* Butler, 1884
 338. *Callopietria placoidoides* Guenee, 1851
 339. *Callopietria aethiops* Butler, 1879
 340. *Callopietria indica* Butler, 1879
 341. *Callopietria strigilineata* Hampson, 1894
 342. *Callopietria pulchrillinea* Walker, 1856
 343. *Callopietria gutturalis* Hampson, 1906
 344. *Callopietria juvenina* (Stoll, 1782)
- Genus 60. *Sasunaga* Holloway, 1985
 345. *Sasunaga tenebrosa* (Moore, 1867)
 346. *Sasunaga longiplaga* Warren, 1912
 347. *Sasunaga leucorina* Hampson, 1894
- Genus 61. *Conservula* Grote, 1874
 348. *Conservula indica*, Moore, 1867
 349. *Conservula V- brunneum* Guenee, 1852
- Genus 62. *Athetis* Moore, 1882
 350. *Athetis probrenalis* Moore, 1882

351. *Athetis renalis* Moore, 1882
 352. *Athetis sincera* Swinhoe, 1889
 353. *Athetis dissimilis* Hampson, 1909
 354. *Athetis stellata* Moore, 1882
 Genus 63. *Spodoptera* Guenee, 1852
 355. *Spodoptera littoralis* Boisduval, 1833
 356. *Spodoptera litura* (Fabricius, 1775)
 357. *Spodoptera mauritia* (Boisduval, 1833)
 Genus 64. *Amphipyra* Ochsenheimer, 1816
 358. *Amphipyra monolitha* Guenee, 1852
 359. *Amphipyra magna* Walker, 1864
 360. *Amphipyra cupreipennis* Moore, 1879
 361. *Amphipyra spectrum* Esper, 1777
 362. *Amphipyra albicilia* Hampson, 1894
 363. *Amphipyra himalayica* Hampson, 1894
 Genus 65. *Cosmia* Ochsenheimer, 1816
 364. *Cosmia restituta* Walker, 1857
 365. *Cosmia affinis* Linnaeus, 1776
 Division QUADRIFINAE
 Subfamily HYPENINAE HERRICH
 SCHAFFER, 1845
 Genus 66. *Hypena* Schrank, 1802
 366. *Hypena abducalis* (Walker, 1859)
 367. *Hypena abyssinialis* Guenee, 1854
 368. *Hypena albisigna* Moore, 1882
 369. *Hypena uncipennis* Swinhoe, 1891
 370. *Hypena amica* (Butler, 1878)
 371. *Hypena assimilis* Hampson, 1891
 372. *Hypena biplagiata* Butler, 1889
 373. *Hypena castanealis*, Moore, 1867
 374. *Hypena ciaridoides* Moore, 1882
 375. *Hypena cognata* Moore, 1882
 376. *Hypena daria* Swinhoe, 1891
 377. *Hypena rhynchalis* Snellen, 1858
 378. *Hypena castaneipalpis* Swinhoe, 1891
 379. *Hypena umbripennis* Moore, 1879
 380. *Hypena colombana* Moore, 1879
 381. *Hypena triangularis* Moore, 1879
 382. *Hypena dentilneata* Moore, 1879
 383. *Hypena divaricata* Moore, 1879
 384. *Hypena divisalis* Moore, 1867
 385. *Hypena duplicilinea* Hampson 1894
 386. *Hypena educatalis* Hampson, 1895
 387. *Hypena elongalis* Fabricius, 1794
 388. *Hypena extensa* Walker, 1865
 389. *Hypena glaucescens* Hampson, 1895
 390. *Hypena griseapex* Hampson, 1891
 391. *Hypena griseipennis* Moore, 1879
 392. *Hypena griseivitta* Hampson, 1891
 393. *Hypena iconicalis* Walker, 1858
 394. *Hypena indicatalis* Walker, [1859] 1858
 395. *Hypena ineffectalis* Walker, 1858
 396. *Hypena labatalis* Walker, [1859] 1858
 397. *Hypena labatalis* Walker, 1858
 398. *Hypena laceratalis* Walker, [1859] 1858
 399. *Hypena lacessalis* Walker, 1858
 400. *Hypena lativitta* Moore, 1879
 401. *Hypena lividalis* Hübner, 1796
 402. *Hypena longipennis* Walker, 1865
 403. *Hypena acutalis* Hampson, 1894
 404. *Hypena mandatalis* Walker, 1858
 405. *Hypena masurialis* Guenee, 1854
 406. *Hypena mediana* Moore, 1879
 407. *Hypena mimicalis* Swinhoe, 1885
 408. *Hypena minor* Hampson, 1891
 409. *Hypena mistacalis* Guenee, 1854
 410. *Hypena modesta* Moore, 1879
 411. *Hypena molpusalis* Walker, 1859
 412. *Hypena narratalis* Walker, 1858
 413. *Hypena nigrescens* Moore, 1881
 414. *Hypena nilgirica* Hampson, 1891
 415. *Hypena nocturnalis* Swinhoe, 1896
 416. *Hypena obductalis* Walker, 1858
 417. *Hypena obstupidalis* Swinhoe, 1885
 418. *Hypena occata* Moore, 1882
 419. *Hypena occatus* Hampson, 1882
 420. *Hypena olivacea* Hampson, 1891
 421. *Hypena proboscidalis* Linnaeus, 1758
 422. *Hypena quadralis* Walker, 1865
 423. *Hypena rectilinea* Moore, 1879
 424. *Hypena hamata* Hampson, 1894
 425. *Hypena rectivittalis* Moore, 1867
 426. *Hypena rhombalis* Guenee, 1854
 427. *Hypena rufirena* Hampson, 1895
 428. *Hypena strigifascia* Moore, 1879
 429. *Hypena strigosa*, Hampson, 1891
 430. *Hypena symethusalis* Walker, 1858
 431. *Hypena tenebralis* Moore, 1867
 432. *Hypena tenuipalpis* Hampson, 1891
 433. *Hypena thermesialis* Walker, 1865
 434. *Hypena trigonalis* Guenee, 1852
 435. *Hypena triplicalis* Walker, 1865
 436. *Hypena uniformis* Hampson, 1891
 437. *Hypena varialis* Walker, 1865
 Genus 67. *Acidon* Hampson, 1896
 438. *Acidon evae* Lödl, 1998
 Genus 68. *Lysimelia* Walker, [1859]
 439. *Lysimelia neleusalis* Walker, [1859] 1858
 Genus 69. *Sarobela* Turner, 1936
 440. *Sarobela litterata* (Pagenstecher, 1888)

Subfamily HERMINIINAE HERRICH –
SCHAFFER, 1845

Genus 70. *Adrapsa* Walker, 1857

- 441. *Adrapsa ereboides* Walker, 1857
- 442. *Adrapsa despecta* Walker, 1865
- 443. *Adrapsa albirenalis* Moore, 1867
- 444. *Adrapsa abnormalis* Swinhoe, 1892
- 445. *Adrapsa manifestalis* Walker, 1858
- 446. *Adrapsa scopigera* Moore, 1882
- 447. *Adrapsa silenusalis* Walker, 1858

Genus 71. *Heteromala* Hampson, 1895

- 448. *Heteromala thyrophora* Hampson, 1895

Genus 72. *Pseudoglossa* Grote, 1874

- 449. *Pseudoglossa fulvipicta* Butler, 1889
- 450. *Pseudoglossa quadrinotata* Walker, 1865

Genus 73. *Bleptina* Guenee, 1854

- 451. *Bleptina hadenalis* Moore, 1867
- 452. *Bleptina apidanusalis* Walker, 1858
- 453. *Bleptina ochracealis* Moore, 1867
- 454. *Bleptina abjudicalis* Walker 1858
- 455. *Bleptina partita* Hampson, 1891
- 456. *Bleptina dentilinea* Hampson, 1895
- 457. *Bleptina hisbonalis*, Walker, 1858
- 458. *Bleptina triangulifera* Hampson, 1891
- 459. *Bleptina vialis* Moore, 1882
- 460. *Bleptina latifasciata* Hampson, 1894
- 461. *Bleptina perfusca* Swinhoe, 1892
- 462. *Bleptina maculifascia* Hampson, 1894

Genus 74. *Alelimma* Hampson, 1895

- 463. *Alelimma pallidifusca* Hampson, 1895
- 464. *Alelimma deletaria* Hampson, 1895

Genus 75. *Mastigophorus* Poey, 1832

- 465. *Mastigophorus brontesalis* Walker, 1858
- 466. *Mastigophorus duplicifascia* Hampson, 1895
- 467. *Mastigophorus brevivittalis* Moore, 1867
- 468. *Mastigophorus chalybealis* Moore, 1867
- 469. *Mastigophorus stigmatalis* Moore, 1867
- 470. *Mastigophorus vialis* Moore, 1879
- 471. *Mastigophorus dubius* Butler, 1889
- 472. *Mastigophorus megaspila* Walker, 1865

Genus 76. *Bracharthrurum* Hampson, 1891

- 473. *Bracharthrurum maculapex* Hampson, 1891

Genus 77. *Falcimala* Hampson, 1895

- 474. *Falcimala atrata* Butler, 1889

Genus 78. *Nagadeba* Walker, 1866

- 475. *Nagadeba indecoralis* Walker, 1865
- 476. *Nagadeba castanealis* Hampson, 1895

- 477. *Nagadeba cinerea* Hampson, 1895

Genus 79. *Hydrillodes* Guenee, 1854

- 478. *Hydrillodes lentalis* Guenee, 1854
- 479. *Hydrillodes torsivena* Hampson, 1895
- 480. *Hydrillodes truncata* Moore, 1867
- 481. *Hydrillodes gravatalis* Walker, 1858
- 482. *Hydrillodes nilgiralis* Hampson, 1895
- 483. *Hydrillodes abavalis* (Walker, [1859] 1858)
- 484. *Hydrillodes hemusalis* (Walker, [1859] 1858)
- 485. *Hydrillodes transversalis* Moore, 1877

Genus 80. *Simplicia* Guenee, 1854

- 486. *Simplicia butesalis* Walker, 1858
- 487. *Simplicia robustalis* Guenee, 1854
- 488. *Simplicia marginata* Moore, 1879
- 489. *Simplicia niphona* Butler, 1878
- 490. *Simplicia mistacalis* (Guenée, 1854)

Genus 81. *Nodaria* Guenee, 1854

- 491. *Nodaria externalis* Guenee, 1854
- 492. *Nodaria innocens* AButler, 1878
- 493. *Nodaria erecta* Moore, 1867
- 494. *Nodaria relata* Hampson, 1891
- 495. *Nodaria palumbina* Butler, 1878
- 496. *Nodaria fractalis* Guenee 1854
- 497. *Nodaria duplicinota* Hampson, 1895
- 498. *Nodaria discisigna* Moore, 1883
- 499. *Nodaria duplexa* Moore, 1867
- 500. *Nodaria saccharivora* Butler, 1854
- 501. *Nodaria cidarioides* Hampson, 1895
- 502. *Nodaria maculifera* Butler, 1854
- 503. *Nodaria nigripes* Hampson, 1895
- 504. *Nodaria plana* Swinhoe, 1890
- 505. *Nodaria fusca* Hampson, 1895
- 506. *Nodaria simplex* Hampson, 1898
- 507. *Nodaria flavifusca* Hampson, 1894
- 508. *Nodaria albapex* Hampson, 1894

Genus 82. *Catada* Walker, 1858

- 509. *Catada prominens* Hampson, 1895
- 510. *Catada suffuscalis* Swinhoe, 1886
- 511. *Catada nigrisigna* Hampson, 1895
- 512. *Catada vagalis* Walker, 1858
- 513. *Catada albolineata* Hampson, 1895
- 514. *Catada rasalis* Warren, 1891
- 515. *Catada canaliferalis* Moore, 1877
- 516. *Catada renalis* Moore, 1887
- 517. *Catada picta* Moore, 1887
- 518. *Catada bipartita* Moore, 1887
- 519. *Catada nigribasis* Swinhoe, 1892

Genus 83. *Olulis* Walker, 1863

- 520. *Olulis puncticinctalis* Walker, 1863

- Genus 84. *Talapa* Moore, 1867
521. *Talapa caliginosa* Walker, 1865
522. *Talapa griseifusa* Hampson, 1865
523. *Talapa rufilineata* Hampson, 1894
524. *Talapa albigutta* Swinhoe, 1892
- Genus 85. *Singara* Walker, 1865
525. *Singara diversalis* Walker, 1865
- Genus 86. *Camptochilus* Hampson, 1895
526. *Camptochilus viola* Hampson, 1895
- Genus 87. *Latirostrum* Hampson, 1895
527. *Latirostrum bisacutum* Hampson, 1895
- Genus 88. *Corcobara* Moore, 1882
528. *Corcobara angulipennis* Moore, 1867
- Genus 89. *Anoratha* Moore, 1867
529. *Anoratha costalis* Moore, 1867
530. *Anoratha paritalis* Walker, 1858
- Genus 90. *Rhynchina* Guenee 1854
531. *Rhynchina curvilinea* Hampson, 1895
532. *Rhynchina abducalis* Walker, 1865
533. *Rhynchina striga* Felder, 1864
534. *Rhynchina pervulgaris* Swinhoe, 1885
535. *Rhynchina pionealis* Guenee, 1854
536. *Rhynchina angulata* Walker, 1894
537. *Rhynchina undualis* Walker, 1865
538. *Rhynchina sigillata* Butler, 1889
- Genus 91. *Orthozona* Hampson, 1895
539. *Orthozona quadrilineata* Moore, 1879
- Genus 92. *Chusaris* Walker, 1858
540. *Chusaris eurrhipoides* Hampson, 1893
541. *Chusaris opiliusalis* Walker, 1865
542. *Chusaris ideoides* Hampson, 1895
543. *Chusaris oculalis* Moore, 1877
544. *Chusaris puncticilia* Hampson, 1893
- Genus 93. *Arrade* Walker, 1863
545. *Arrade massalis* Swinhoe, 1885
- Genus 94. *Goniocraspedum* Hampson, 1893
546. *Goniocraspedum mistura* Swinhoe, 1891
- Genus 95. *Mecistoptera* Hampson, 1893
547. *Mecistoptera duplicilinea* Hampson, 1895
548. *Mecistoptera velifera* Swinhoe, 1885
549. *Mecistoptera variegata* Hampson, 1895
- Genus 96. *Bertula* Walker, 1859
550. *Bertula partita* Hampson, 1891
- Genus 97. *Popyogon* Doubleday, 1850
551. *Popyogon fractalis* (Guenée, 1854)
- Genus 98. *Rhaesena* Walker, 1866
552. *Rhaesena transcissa* Walker, 1866
- Subfamily CATOCALINAE GUENEE, 1837
- Tribe OPHIUSINI GUENEE, 1837
- Subtribe ACHAEINI WILTSHIRE, 1977
- Genus 99. *Achaea* Hübner, 1823
553. *Achaea janata* (Linnaeus, 1758)
554. *Achaea mercatoria* Fabricius, 1775
555. *Achaea serva* (Fabricius, 1775)
556. *Achaea mezentia* (Stoll, 1780)
- Tribe OPHIUSII GUENEE, 1837
- Genus 100. *Ophiusa* Hübner, 1806
557. *Ophiusa gravata* Guenee, 1852
558. *Ophiusa submira* Walker, 1858
559. *Ophiusa adjusta* Moore, 1879
560. *Ophiusa cuprea* Moore, 1867
561. *Ophiusa disjungens* (Walker, 1858)
562. *Ophiusa mejanesi* Guenee, 1852
563. *Ophiusa absentimacula* Guenee, 1852
564. *Ophiusa duplex* Moore, 1883
565. *Ophiusa maturescens* Walker, 1858
566. *Ophiusa arcuata* Moore, 1877
567. *Ophiusa maturata* Walker, 1858
568. *Ophiusa renalis* Hampson, 1894
569. *Ophiusa algira* Linnaeus, 1766
570. *Ophiusa arctotaenia* Guenee, 1852
571. *Ophiusa conficiens* Walker, 1858
572. *Ophiusa analis* Guenee, 1852
573. *Ophiusa onelia* Guenee, 1852
574. *Ophiusa coronata* Fabricius, 1775
575. *Ophiusa tirrhaca* Cramer, 1783
576. *Ophiusa honesta* Hübner, 1806
577. *Ophiusa fulvotaenia* Guenee, 1852
578. *Ophiusa trapezium* (Guenee, 1852)
579. *Ophiusa olista* (Swinhoe, 1893)
580. *Ophiusa indistincta* (Moore, 1882)
581. *Ophiusa triphaenoides* (Walker, 1858)
- Genus 101. *Isoura* Hampson, 1894
582. *Isoura fuscicollis* Butler, 1879
- Genus 102. *Catocala* Schrank, 1802
583. *Catocala nivea* Butler, 1877
584. *Catocala nupta* (Linnaeus, 1767)
585. *Catocala rama* Moore, 1887
586. *Catocala flavescens* Hampson, 1894
587. *Catocala nymphaea* Esper, 1777
588. *Catocala prolifica* Walker, 1855
589. *Catocala patala* Felder, 1864
590. *Catocala distorta* Butler, 1879
591. *Catocala concubia* Walker, 1857

- Genus 103. *Ulotrichopus* Wallengren, 1860
 592. *Ulotrichopus macula* (Hampson, 1891)
 Tribe EUCLIDIINI GUENEE, 1852
 Subtribe MOCISINI BERIO, 1992
 Genus 104. *Mocis* Hübner, 1823
 593. *Mocis frugalis* Fabricius, 1775
 594. *Mocis undata* Fabricius, 1775
 Subtribe DYSGONIIDAE MOORE, 1885
 Genus 105. *Dysgonia* Hübner, 1823
 595. *Dysgonia maturata* Walker, 1858
 596. *Dysgonia stuposa* Fabricius, 1775
 597. *Dysgonia rigidistria* (Guenée, 1952)
 598. *Dysgonia crameri* (Moore, [1885]1884-1887)
 599. *Dysgonia joviana* (Stoll, 1782)
 600. *Dysgonia amygdalis* Moore, [1885] 1884-1887
 601. *Dysgonia arcuata* Moore, 1877
 602. *Dysgonia illibata* (Fabricius, 1775)
 Tribe ERCHEIINI BERIO, 1992
 Genus 106. *Ercheia* Walker, 1857
 603. *Ercheia cyllaria* (Cramer, 1779)
 604. *Ercheia niveostrigata* Warren, 1913
 605. *Ercheia umbrosa* Butler, 1881
 Genus 107. *Grammodes* Guenee, 1852
 606. *Grammodes geometrica* (Fabricius, 1775)
 607. *Grammodes stolidia* Fabricius, 1780
 Genus 108. *Chalciope* Hubner, 1806
 608. *Chalciope hyppasia* Cramer, 1780
 609. *Chalciope mygdon* (Cramer, 1777)
 Genus 109. *Thyas* Hubner, 1806
 610. *Thyas coronata* (Fabricius, 1775)
 611. *Thyas honesta* Hübner, 1816
 612. *Thyas junio* (Dalman, 1823)
 Genus 110. *Entomogramma* Guenee, 1852
 613. *Entomogramma fautrrix* Guenee, 1852
 614. *Entomogramma mediocre* Walker, 1865
 615. *Entomogramma tortum* Guenee, 1852
 Genus 111. *Batracharta* Walker, 1862
 616. *Batracharta variegata* Hampson, 1891
 617. *Batracharta obliqua* Walker, 1862
 618. *Batracharta irrorata* Hampson, 1894
 Genus 112. *Cyclodes* Guenee, 1852
 619. *Cyclodes omma* Van der Hoeven, 1834
 Genus 113. *Melipotis* Hubner, 1806
 620. *Melipotis cashmirensis* Hampson, 1894
 621. *Melipotis astrosognata* Walker, 1862
 622. *Melipotis fulviceps* Hampson, 1894
 Genus 114. *Crithote* Walker (1864)
 623. *Crithote horridipes* Walker, 1864
 Genus 115. *Diomea* Walker, 1858
 624. *Diomea rotundata* Walker, [1858] 1857
 625. *Diomea cremata* Butler, 1878
 Genus 116. *Calyptra* Ochsenheimer, 1816
 626. *Calyptra minuticornis* (Guenée, 1852)
 Genus 117. *Oraesia* Guenee in Boisduval & Guenee, 1852
 627. *Oraesia emarginata* (Fabricius, 1794)
 628. *Oraesia excavata* (Butler, 1878)
 Genus 118. *Plusiodonta* Guenee, 1852
 629. *Plusiodonta coelonota* (Kollar, 1844)
 Genus 119. *Aedia* Hubner, 1823
 630. *Aedia leucomelas* (Linnaeus, 1758)
 Genus 120. *Athyrimina* Hampson, 1926
 631. *Athyrimina birthana* (Swinhoe, 1905)
 Genus 121. *Bamra* Moore, 1852
 632. *Bamra mundata* (Walker, 1858)
 Genus 122. *Platyja* Hubner, 1818
 633. *Platyja ciacula* Swinhoe, 1893
 634. *Platyja umminea* (Cramer, 1780)
 635. *Platyja exviola* Hampson, 1891
 636. *Platyja torsilinea* Guenee, 1852
 Genus 123. *Sympis* Guenee in Boisduval & Guenee, 1852
 637. *Sympis rufibasis* Guenée, 1852
 Genus 124. *Bocula* Guenee, 1852
 638. *Bocula caradrinoides* Guenée, 1852
 639. *Bocula diffisa* (Swinhoe, 1890)
 640. *Bocula marginata* (Moore, 1882)
 Genus 125. *Ugia* Walker, 1858
 641. *Ugia insuspecta* Galsworthy, 1997
 642. *Ugia mediorufa* (Hampson, 1894)
 Genus 126. *Hypospila* Guenee in Boisduval & Guenee, 1852
 643. *Hypospila bolinoides* Guenée, 1852
 Genus 127. *Chilkasa* Swinhoe, 1885
 644. *Chilkasa perhamata* (Hampson, 1894)
 Genus 128. *Thalatta* Walker, 1858
 645. *Thalatta fasciosa* Moore, 1882
 Genus 129. *Throana* Walker, [1859]
 646. *Throana pectinifer* (Hampson, 1898)
 Genus 130. *Psimada* Walker, 1858
 647. *Psimada quadripennis* Walker, 1858

- Genus 131. *Anticarsia* Hubner, 1818
 648. *Anticarsia irrorata* (Fabricius, 1781)
 Genus 132. *Gesonia* Walker, [1859]
 649. *Gesonia obeiditalis* Walker, [1859] 1858
 Genus 133. *Goniocraspedon* Hampson, 1893
 650. *Goniocraspedon mistura* (Swinhoe, 1891)
 Genus 134. *Hepatica* Staudinger, 1892
 651. *Hepatica irrorata* (Wileman & South, 1917)
 Genus 135. *Loxioda* Warren, 1913
 652. *Loxioda similis* (Moore, 1882)
 Genus 136. *Marapana* Moore, 1885
 653. *Marapana pulverata* (Guenée, 1852)
 654. *Marapana plagifera* Walker, 1857
 Genus 137. *Pseudosphetta* Hampson, 1926
 655. *Pseudosphetta Moorei* (Cotes & Swinhoe, 1885)
 Genus 138. *Rema* Guenee, 1852
 656. *Rema costimacula* (Guenée, 1852)
 Genus 139. *Rhesala* Walker, 1858
 657. *Rhesala imparata* Walker, 1858
 Genus 140. *Schistorhynx* Hampson, 1898
 658. *Schistorhynx argentistriga* Hampson, 1898
 Genus 141. *Ericeia* [Walker, 1858]
 659. *Ericeia eriophora* (Guenée, 1852)
 660. *Ericeia inangulata* (Guenée, 1852)
 661. *Ericeia pertendens* (Walker, 1858)
 Genus 142. *Hypopyra* Guenee, 1852
 662. *Hypopyra ossigera* Guenée, 1852
 663. *Hypopyra vespertilio* (Fabricius, 1787)
 Genus 143. *Artena* Walker, 1858
 664. *Artena dotata* (Fabricius, 1794)
 665. *Artena inversa* (Walker, 1858)
 Genus 144. *Bastilla* Swinhoe, 1918
 666. *Bastilla absentimacula* (Guenée, 1852)
 667. *Bastilla analis* (Guenée, 1852)
 668. *Bastilla fulvotaenia* (Guenée, 1852)
 669. *Bastilla maturescens* (Walker, 1858)
 670. *Bastilla praetermissa* (Warren, 1913)
 671. *Bastilla simillima* (Guenée, 1852)
 Genus 145. *Buzara* Walker, 1865
 672. *Buzara onelia* (Guenée, 1852)
 Genus 146. *Macaldenia* Moore, 1885
 673. *Macaldenia palumba* (Guenée, 1852)
 Genus 147. *Trigonodes* Guenee in Boisduval & Guenee, 1852
 674. *Trigonodes hyppasia* (Cramer, 1779)
 675. *Trigonodes disjuncta* Moore, 1879
 676. *Trigonodes regalis* Moore, 1872
 677. *Trigonodes ino* Drury, 1782
 Genus 148. *Pandesma* Guenee in Boisduval & Guenee, 1852
 678. *Pandesma anysa* Guenée, 1852
 679. *Pandesma quenavadi* Guenée, 1852
 Genus 149. *Condate* Walker, 1862
 680. *Condate angulina* (Guenée, 1852)
 Genus 150. *Lopharthrum* Hampson, 1894
 681. *Lopharthrum comprimens* (Walker, 1858)
 Genus 151. *Pangrapta* Hubner, 1818
 682. *Pangrapta albistigma* (Hampson, 1898)
 Genus 152. *Saroba* Walker, 1865
 683. *Saroba pustulifera* Walker, 1865
 Genus 153. *Sarobides* Hampson, 1926
 684. *Sarobides inconclusa* (Walker, [1863] 1864)
 Genus 154. *Tamba* Walker, 1869
 685. *Tamba apicata* (Hampson, 1902)
 Genus 155. *Dinumma* Walker, 1858
 686. *Dinumma deponens* Walker, 1858
 687. *Dinumma placens* Walker, 1858
 Genus 156. *Falana* Moore, 1882
 688. *Falana sordida* Moore, 1882
 Genus 157. *Gonitis* Guenee, 1852
 689. *Gonitis involuta* Walker, [1858] 1857
 690. *Gonitis mesogona* Walker, [1858] 1857
 Genus 158. *Blasticorhinus* Butler, 1893
 691. *Blasticorhinus rivulosa* (Walker, 1865)
 Genus 159. *Daddala* Walker, 1865
 692. *Daddala lucilla* (Butler, 1881)
 Genus 160. *Hypersynpnoides* Berio, 1954
 693. *Hypersynpnoides submarginata* (Walker, 1865)
 Genus 161. *Pantydia* Guenee in Boisduval & Guenee, 1852
 694. *Pantydia metaspila* (Walker, [1858] 1857)
 Subfamily OPHIDERINAE
 Genus 162. *Trisuloides* Butler, 1881
 695. *Trisuloides infausta* Walker, 1856
 696. *Trisuloides variegata* Moore, 1879
 697. *Trisuloides sericea* Butler, 1879
 698. *Trisuloides luteifascia* Swinhoe, 1889
 699. *Trisuloides caerulea* Butler, 1879
 Genus 163. *Trisula* Moore, 1858
 700. *Trisula variegata* Moore, 1857

701. *Trisula boarmoides* Walker, 1865
Genus 164. *Phorica* Walker, 1858
702. *Phorica phasipennis* Walker, 1858
Genus 165. *Erygia* Guenee, 1852
703. *Erygia apicalis* Guenee, 1852
704. *Erygia reflatifascia* Hampson, 1891
Genus 166. *Sypna* Guenee, 1852
705. *Sypna omicronigera* Guenee, 1852
706. *Sypna caelisparva* Walker, 1858
707. *Sypna tenebrosa* Butler, 1881
708. *Sypna punctosa* Walker, 1865
709. *Sypna marginalis* Hampson, 1894
710. *Sypna caliginosa* Walker, 1865
711. *Sypna cynanivitta* Moore, 1867
712. *Sypna curvilinea* Moore, 1867
713. *Sypna rectilinea* Moore, 1867
714. *Sypna pulchra* Butler, 1881
715. *Sypna catocaloides* Moore, 1867
716. *Sypna replicata* Felder, 1864
717. *Sypna panosa* Moore, 1879
Genus 167. *Anisoneura* Guenee, 1852
718. *Anisoneura hypocyanea* Guenee, 1852
719. *Anisoneura salebrosa* Guenee, 1852
720. *Anisoneura aluco* (Fabricius, 1775)
Genus 168. *Agonista* Rogenhoff, 1864
721. *Agonista hypoleuca* Guenee, 1852
722. *Agonista reducens* Walker, 1857
Genus 169. *Panilla* Moore, 1884
723. *Panilla dispila* Walker, 1865
724. *Panilla albopunctata* Walker, 1857
Genus 170. *Gnamptogyia* Hampson, 1894
725. *Gnamptogyia multilineata* Hampson, 1894
Genus 171. *Lyncestis* Walker, 1857
726. *Lyncestis amphix* Cramer, 1780
727. *Lyncestis unilinea* Swinhoe, 1885
Genus 172. *Gnamptonyx* Hampson, 1894
728. *Gnamptonyx vilis* Walker, 1865
Genus 173. *Pseudophia* Guenee, 1852
729. *Pseudophia infrequens* Swinhoe, 1884
Genus 174. *Catephia* Ochsenheimer, 1816
730. *Catephia linteola* Guenee, 1852
731. *Catephia flavescens* Butler, 1881
732. *Catephia acronyctoides* Guenee, 1852
733. *Catephia dulcistriga* Walker, 1858
734. *Catephia perdicipennis* Moore, 1879
735. *Catephia inquieta* Walker, 1856
736. *Catephia dentifera* Moore, 1879
Genus 175. *Nagia* Walker, 1858
737. *Nagia linteola* (Guenee, 1852)
Genus 176. *Mosara* Walker, 1855
738. *Mosara apicalis* Walker, 1865
Genus 177. *Mithila* Moore, 1882
739. *Mithila lichenosa* Moore, 1882
Genus 178. *Coarica* Moore, 1882
740. *Coarica fasciata* Moore, 1879
Genus 179. *Lagoptera* Guenee, 1852
741. *Lagoptera junio* Dalman, 1825
Genus 180. *Hypaetra* Guenee, 1852
742. *Hypaetra includens* Walker, 1857
743. *Hypaetra curvifera* Walker, 1858
744. *Hypaetra bubo* Hubner, 1818-23
745. *Hypaetra remigioides* Guenee, 1852
746. *Hypaetra apicalis* Moore, 1879
747. *Hypaetra complens* Walker, 1858
Genus 181. *Dordura* Moore, 1882
748. *Dordura aliena* Walker, 1865
Genus 182. *Delgamma* Moore, 1885
749. *Delgamma pangonia* Guenee, 1852
Genus 183. *Baniana* Walker, 1858
750. *Baniana semilugens* Walker, 1857
751. *Baniana conjugata* Walker, 1881
752. *Baniana polypspila* Walker, 1865
753. *Baniana divulsa* Walker, 1865
754. *Baniana intorta* Swinhoe, 1891
755. *Baniana lunifera* Hampson, 1894
Genus 184. *Borsippa* Walker, 1858
756. *Borsippa quadrilineata* Walker, 1858
757. *Borsippa pallens* Moore, 1879
758. *Borsippa sejuncta* Walker, 1856
759. *Borsippa hypenoides* Moore, 1881
760. *Borsippa megastigmata* Hampson, 1894
Genus 185. *Acantholipes* Lederer, 1857
761. *Acantholipes circumdatus* Walker, 1858
762. *Acantholipes trajectory* Walker, 1865
763. *Acantholipes hypenoides* Moore, 1881
764. *Acantholipes fasciatus* Hampson, 1891
765. *Acantholipes similis* Moore, 1879
766. *Acantholipes notatus* Hampson, 1891
767. *Acantholipes inscitius* Swinhoe, 1885
768. *Acantholipes miser* Butler, 1883
769. *Acantholipes fasciosus* Moore, 1879
770. *Acantholipes trifasciatus* Moore, 1877

771. *Acantholipes obediatalis* Walker, 1858
 772. *Acantholipes gemma* Swinhoe, 1885
 773. *Acantholipes plumipars* Hampson, 1891
 774. *Acantholipes pansalis* Walker, 1858
 775. *Acantholipes fuscicosta* Hampson, 1891
 776. *Acantholipes bilineatus* Hampson, 1894
 777. *Acantholipes lagusalis* Walker, 1858
 Genus 186. *Remigia* Guenee, 1852
 778. *Remigia laxa* Walker, 858
 779. *Remigia archesia* Cramer, 1779
 780. *Remigia frugalis* Fabricius, 1777
 781. *Remigia discios* Kollar, 1844
 Genus 187. *Harmetelia* Moore, 1882
 782. *Harmetelia basalis* Moore, 1882
 Genus 188. *Pleurona* Walker, 1866
 783. *Pleurona perhamata* Swinhoe, 1885
 784. *Pleurona falcata* Walker, 1866
 Genus 189. *Lycima* Walker, 1860
 785. *Lycima polymesata* Walker, 1860
 Genus 190. *Homaea* Guenee, 1852
 786. *Homaea clathrum* Guenee, 1852
 Genus 191. *Miniodes* Guenee, 1852
 787. *Miniodes ornata* Moore, 1879
 Genus 192. *Phyllodes* Boisduval, 1832
 788. *Phyllodes ustulata* Westwood, 1842
 789. *Phyllodes consobrina* Westwood, 1842
 790. *Phyllodes eyndhovii* Vollenhoven, 1858
 Genus 193. *Eudocima* Boisduval, 1833
 791. *Eudocima aurantia* Moore, 1877
 792. *Eudocima discrepans* Walker, 1857
 793. *Eudocima cocalus* Cramer, 1780
 794. *Eudocima homaena* (Hubner, [1823] 1816)
 795. *Eudocima hypermnestra* (Stoll, 1780)
 796. *Eudocima materna* (Linnaeus, 1767)
 797. *Eudocima phalonia* (Linnaeus, 1766)
 798. *Eudocima salaminia* (Cramer, 1777)
 799. *Eudocima sikhimensis* (Butler, 1895)
 800. *Eudocima tyrannus* (Guenée, 1852)
 Genus 194. *Calpe* Treitschke, 1825
 801. *Calpe fasciata* Moore, 1879
 802. *Calpe orthograptia* Butler, 1886
 803. *Calpe rectistria* Guenee, 1852
 804. *Calpe provocans* Walker, 1857
 805. *Calpe minuticornis* Guenee, 1852
 806. *Calpe indecisa* Moore, 1881
 807. *Calpe ophideroides* Guenee, 1852
 808. *Calpe emarginata* Fabricius, 1775

- Genus 195. *Pseudocalpe* Hampson, 1894
 809. *Pseudocalpe angulifera* Moore, 1881
 Genus 196. *Arsacia* Walker, 1865
 810. *Arsacia saturatalis* Walker, 1865
 811. *Arsacia rectalis* (Walker, 1863)
 Genus 197. *Pantura* Moore, 1885
 812. *Pantura rufifrons* (Moore, 1887)
 Genus 198. *Abrostola* Ochseneimer, 1816
 813. *Abrostola anophioides* Moore, 1879
 Genus 199. *Tinolius* Walker, 1855
 814. *Tinolius eburneigutta* Walker, 1855
 815. *Tinolius quadrimaculatus* Walker, 1865
 816. *Tinolius hypsana* Swinhoe, 1889
 Genus 200. *Calesia* Guenee, 1852
 817. *Calesia haemorrhoea* Guenee, 1852
 818. *Calesia rufipalpis* Walker, 1858
 819. *Calesia phaeosoma* Hampson, 1891
 820. *Calesia satellitia* Moore, 1887
 821. *Calesia roseiceps* Hampson, 1894
 822. *Calesia dasyptera* Kollar, 1844
 823. *Calesia fuscicorpus* Hampson, 1891
 824. *Calesia fasciculosa* Walker, 1858
 825. *Calesia gastropachoides* Guenee, 1852
 Tribe HYPOCALINI GUENEE, 1852
 Genus 201. *Hypocala* Guenee, 1852
 826. *Hypocala deflorata* Fabricius, 1793
 827. *Hypocala moorei* Butler, 1892
 828. *Hypocala biarcuata* Walker, 1816
 829. *Hypocala guttiventris* (Walker, [1858]1857)
 830. *Hypocala rostrata* Fabricius, 1794
 831. *Hypocala violacea* Butler, 1879
 832. *Hypocala bolinoides* Guenee, 1852
 833. *Hypocala subsatura* Guenee, 1852
 Tribe ANOMINI GROTE, 1882
 Genus 202. *Anomis* Hubner, [1821]
 834. *Anomis mesogona* (Walker, [1858]1857)
 835. *Anomis privata* (Walker, 1865)
 836. *Anomis* (Fabricius, 1775)
 837. *Anomis involuta* (Walker, [1858]1857)
 838. *Anomis figlina* Guenee, 1852
 839. *Anomis fulvida* Guenee, 1852
 840. *Anomis sabulifera* Guenee 1852
 Genus 203. *Oxyodes* Guenee, 1852
 841. *Oxyodes scrobiculata* Fabricius, 1775
 Genus 204. *Lacera* Guenee, 1852
 842. *Lacera alope* Cramer, 1781

843. *Lacera noctilio* (Fabricius, 1794)
 844. *Lacera procellosa* Butler, 1879
 Genus 205. *Spirama* Guenee, 1852
 845. *Spirama retorta* Cramer, 1780
 846. *Spirama vespertilio* Fabricius, 1787
 847. *Spirama unistrigata* Guenee, 1852
 848. *Spirama pudens* Walker, 1858
 849. *Spirama helicina* Hampson, 1894
 Subfamily EREBINAE LEACH, [1815]
 Genus 206. *Erebus* Hübner, 1818
 850. *Erebus macrops* (Linnaeus, 1770)
 851. *Erebus hieroglyphica* (Drury, 1773)
 852. *Erebus ephesperis* (Hübner, 1827)
 853. *Erebus caprimulgus* Fabricius, 1781
 854. *Erebus strigipennis* Moore, 1883
 855. *Erebus crepuscularis* Linnaeus, 1766
 856. *Erebus albicinata* Kollar, 1844
 Genus 207. *Lygniodes* Guenee, 1890
 857. *Lygniodes schoenbergeri* Pagenstecher, 1890
 Genus 208. *Polydesma* Boisduval, 1833
 858. *Polydesma albicola* Walker, 1858
 859. *Polydesma turbata* Walker, 1858
 860. *Polydesma sublimis* Felder, 1864
 861. *Polydesma fasciata* Moore, 1879
 862. *Polydesma umbricola* Boisduval, 1833
 863. *Polydesma otiosa* Guenee, 1852
 864. *Polydesma spissa* Guenee, 1852
 865. *Polydesma praece-dens* Walker, 1857
 866. *Polydesma metaspila* Walker, 1857
 867. *Polydesma rectivitta* Moore, 1881
 868. *Polydesma inangulata* Guenee, 1852
 869. *Polydesma tetraspila* Walker, 1865
 870. *Polydesma biformis* Walker, 1858
 871. *Polydesma eurychlora* Walker, 1858
 872. *Polydesma catocalina* Moore, 1879
 873. *Polydesma ornata* Moore, 1883
 874. *Polydesma thoracica* Moore, 1879
 875. *Polydesma striatovirens* Moore, 1883
 876. *Polydesma relinquenda* Walker, 1858
 877. *Polydesma commutanda* Hampson, 1891
 878. *Polydesma boarmoides* Guenée, 1852
 879. *Polydesma mundata* Walker, 1858
 880. *Polydesma catenata* Moore, 1879
 881. *Polydesma vetusta* Walker, 1865
 882. *Polydesma capacitor* Walker, 1855
 883. *Polydesma lichenoides* Hampson, 1894
 884. *Polydesma terminigera* Walker, 1855
 Genus 209. *Ortopla* Walker, 1859
 885. *Ortopla lindsayi* (Hampson, 1891)
 Genus 210. *Homoptera* Boisduval, 1829
 886. *Homoptera umbrina* Guenee, 1852
 887. *Homoptera glaucinans* Guenee, 1852
 888. *Homoptera albidens* Walker, 1865
 889. *Homoptera vinosa* Hampson, 1894
 Genus 211. *Sphingomorpha* Guenee, 1852
 890. *Sphingomorpha chlorea* Cramer, 1780
 Genus 212. *Ommatophora* Guenee, 1852
 891. *Ommatophora luminosa* Cramer, 1780
 Genus 213. *Chrysopera* Hampson, 1894
 892. *Chrysopera combinans* Walker, 1858
 Genus 214. *Cosmophila* Boisduval, 1833
 893. *Cosmophila flava* (Fabricius, 1775)
 Genus 215. *Serrododes* Guenee, 1852
 894. *Serrododes inara* Cramer, 1780
 895. *Serrododes campana* Guenée, 1852
 Genus 216. *Hulodes* Guenee, 1858
 896. *Hulodes monostriata* Guenee, 1852
 897. *Hulodes caranea* Cramer, 1780
 898. *Hulodes drylla* Guenee, 1852
 Genus 217. *Thermesia* Hübner, 1818
 899. *Thermesia rubricans* Boisduval, 1833
 900. *Thermesia melanocephala* Hampson, 1891
 901. *Thermesia rivulosa* Walker, 1865
 902. *Thermesia bolinoidens* Guenee, 1852
 903. *Thermesia oblita* Moore, 1882
 904. *Thermesia arefacta* Swinhoe, 1884
 905. *Thermesia obliqua* Moore, 1867
 906. *Thermesia mediorufa* Hampson, 1894
 907. *Thermesia creberrima* Walker, 1858
 908. *Thermesia otophora* Hampson, 1894
 Genus 218. *Spiredonia* Hübner, 1818
 909. *Spiredonia retorta* Clerck, 1794
 910. *Spiredonia mutabilis* (Fabricius, 1794)
 911. *Spiredonia alix* Guenee, 1852
 912. *Spiredonia feducia* Stoll, 1787-91
 913. *Spiredonia suffusoma* Guenee, 1852
 Genus 219. *Amphigonia* Guenee, 1852
 914. *Amphigonia hepatizans* Guenee, 1852
 Genus 220. *Asticta* Walker, 1865
 915. *Asticta sanjualiensis* Walker, 1865
 Genus 221. *Annua* Fabricius, 1775
 916. *Annua coronata* Fabricius, 1775
 Genus 222. *Arcte* Kollar, 1844
 917. *Arcte modesta* Hoeven, 1834
 918. *Arcte polygrapha* Kollar, 1844

919. *Arcte taprobana* Moore, 1887
 920. *Arcte coerulea* (Guenee, 1852)
 Genus 223. *Lycima* Walker, 1860
 921. *Lycimna polymesata* Walker, 1860
 Genus 224. *Bamara* Walker, 1857
 922. *Bamara mundata* Walker, 1858
 Genus 225. *Elygea* Linnaeus, 1767
 923. *Elygea materna* Linnaeus, 1767
 Genus 226. *Cetola* Walker, 1855
 924. *Cetola dentata* Walker, 1855
 Genus 227. *Episparis* Walker, 1856
 925. *Episparis tortuosalis* Moore, 1867
 926. *Episparis varialis* Walker, 1858
 927. *Episparis sora* Swinhoe, 1889
 Genus 228. *Fodina* Guenee, 1852
 928. *Fodina oriolus* Guenee, 1852
 929. *Fodina pallula* Guenee, 1852
 930. *Fodina stola* Guenee, 1852
 931. *Fodina cuneigera* Butler, 1889
 932. *Fodina juncta* Hampson, 1894
 Genus 229. *Bematha* Walker, 1865
 933. *Bematha extensa* Walker, 1865
 Genus 230. *Hamodes* Guenee, 1858
 934. *Hamodes aurantiacea* Guenee, 1852
 935. *Hamodes ochracea* Swinhoe, 1891
 Genus 231. *Ischyja* Hübner, 1818
 936. *Ischyja inferna* Hübner 1818
 937. *Ischyja manlia* Cramer, 1776
 938. *Ischyja schlegelii* Snellen, 1886
 939. *Ischyja ferrifracta* (Walker, [1863] 1864)
 Genus 232. *Harmatelia* Moore, 1882
 940. *Harmatelia basalis* Moore, 1882
 Genus 233. *Koptoplax* Hampson, 1891
 941. *Koptoplax lindsayi* Hampson, 1891
 Genus 234. *Orthaga* Walker, 1856
 942. *Orthaga exvinacea* Walker, 1856
 Genus 235. *Plecoptera* Guenee, 1852
 943. *Plecoptera reflexa* Guenee, 1852
 944. *Plecoptera luteiceps* (Walker, 1865)
 945. *Plecoptera recta* (Pagenstacher, 1886)
 946. *Plecoptera resistens* Walker, 1858
 947. *Plecoptera erica* Swinhoe, 1891
 Subfamily EUSTROTIINAE
 Genus 236. *Eublemma* Hübner, 1818
 948. *Eublemma bulla* Swinhoe, 1884
 949. *Eublemma virginea* Guenee, 1852
 950. *Eublemma acontioides* Moore, 1879
 951. *Eublemma rosita* Guenee, 1852
 952. *Eublemma roseana* Moore, 1881
 953. *Eublemma rivula* Moore, 1879
 954. *Eublemma parva* Hübner, 1805
 955. *Eublemma albida* Moore, 1881
 956. *Eublemma bifasciata* Moore, 1881
 957. *Eublemma divisa* Moore, 1881
 958. *Eublemma olivacea* Walker, 1857
 959. *Eublemma obscura* Moore, 1879
 960. *Eublemma abrupta* Walker, 1865
 961. *Eublemma quadrapex* Hampson, 1891
 962. *Eublemma amabilis* Walker, 1857
 963. *Eublemma scitula* Rambur, 1858
 964. *Eublemma dimidialis* Fabricius, 1775
 965. *Eublemma anachoresis* (Wallengren, 1863)
 966. *Eublemma baccalix* (Swinhoe, 1886)
 967. *Eublemma cochylioides* (Guenee, 1852)
 968. *Eublemma ragusana* (Freyer, 1845)
 969. *Eublemma duplexa* Moore, 1877
 970. *Eublemma pulchra* Swinhoe, 1886
 971. *Eublemma polygramma* Duponchel, 1821
 972. *Eublemma trifasciata* Moore, 1881
 Subfamily ACONTIINAE
 Genus 237. *Cretonia* Walker, 1866
 973. *Cretonia vegetus* (Swinhoe, 1885)
 Genus 238. *Lophoruza* Hampson, 1910
 974. *Lophoruza lunifera* (Moore, [1885] 1884-1887)
 Genus 239. *Metaemene* Hampson, 1910
 975. *Metaemene atriguttata* (Walker, 1862)
 Genus 240. *Erastria* Ochsenheimer, 1816
 976. *Erastria stygia* Butler, 1879
 977. *Erastria larentiformis* Moore, 1879
 978. *Erastria aurata* Moore, 1879
 979. *Erastria cidarioides* Moore, 1879
 980. *Erastria decorata* Moore, 1879
 981. *Erastria glaucopis* Hampson, 1894
 982. *Erastria marginata* Moore, 1881
 983. *Erastria melanostigma* Hampson, 1894
 Genus 241. *Toxophleps* Hampson, 1893
 984. *Toxophleps trilatalis* Walker, 1865
 Genus 242. *Pachylepis* Felder, 1864
 985. *Pachylepis dilectissima* Walker, 1858
 986. *Pachylepis dicycla* Walker, 1866
 Genus 243. *Troctoptera* Hampson, 1893
 987. *Troctoptera erubescens* Hampson, 1893

- Genus 244. *Micraeschus* Butler, 1878
 988. *Micraeschus ustipennis* Hampson, 1894
 Genus 245. *Zurobata* Walker, 1866
 989. *Zurobata vacillans* (Walker, 1864)
 Genus 246. *Corgatha* Walker, 1858
 990. *Corgatha rubra* Hampson, 1891
 991. *Corgatha costinotalis* Moore, 1867
 992. *Corgatha excisa* Hampson, 1894
 993. *Corgatha falcatalis* Hampson, 1894
 994. *Corgatha semipari* Walker, 1858
 Genus 247. *Oruza* Walker, 1862
 995. *Oruza semilux* Walker, 1862
 996. *Oruza vacillans* Walker, 1862
 997. *Oruza ruptifascia* Moore, 1867
 998. *Oruza fratercula* Moore, 1867
 999. *Oruza fasciosa* Moore, 1867
 1000. *Oruza costata* Walker, 1862
 1001. *Oruza pallescens* Hampson, 1894
 1002. *Oruza divisa* (Walker, 1862)
 1003. *Ozarba brunnea* (Leech, 1900)
 1004. *Ozarba punctigera* Walker, 1865
 Genus 248. *Autoba* Walker, [1863]
 1005. *Autoba abrupta* (Walker, 1865)
 1006. *Autoba rubra* (Hampson, 1902)
 Genus 249. *Catoblemma* Hampson, 1910
 1007. *Catoblemma semialba* (Hampson, 1902)
 Genus 250. *Eustrotia* Hubner, 1821
 1008. *Eustrotia marginata* (Walker, 1866)
 Genus 251. *Hyperstrotia* Hampson, 1910
 1009. *Hyperstrotia molybdota* Hampson, 1910
 Genus 252. *Lithacodia* Hubner, 1818
 1010. *Lithacodia crotopha* (Swinhoe, 1905)
 Genus 253. *Maliattha* Walker, 1863
 1011. *Maliattha quadripartita* (Walker, 1865)
 1012. *Maliattha separata* Walker, 1863
 1013. *Maliattha signifera* (Walker, [1858] 1857)
 Genus 254. *Diphthera* Ochsenheimer, 1816
 1014. *Diphthera pulchripicta* Walker, 1865
 1015. *Diphthera malachitis* Oberthur, 1876
 1016. *Diphthera prasinaria* Walker, 1865
 1017. *Diphthera vigens* Walker, 1865
 1018. *Diphthera pallida* Moore, 1867
 1019. *Diphthera discibrunnea* Moore, 1867
 Genus 255. *Perciana* Walker, 1865
 1020. *Perciana marmorea* Walker, 1865
 1021. *Perciana flavifusa* Hampson, 1894
 1022. *Perciana viridinotata* Hampson, 1894
 Genus 256. *Bryophila* Treitschke, 1825
 1023. *Bryophila modesta* Moore, 1881
 1024. *Bryophila lichenea* Hampson 1891
 1025. *Bryophila niligiria* Moore, 1881
 1026. *Bryophila muscosa* Hampson, 1891
 1027. *Bryophila nadgani* Hampson, 1891
 1028. *Bryophila albistigma* Moore, 1867
 1029. *Bryophila pallidisca* Moore, 1881
 1030. *Bryophila albipuncta* Hampson, 1894
 1031. *Bryophila khasiana* Hampson, 1894
 1032. *Bryophila glaucescens* Butler, 1881
 Genus 257. *Erastoides* Hampson, 1893
 1033. *Erastoides carvifascia* Hampson, 1891
 Genus 258. *Hyelopsis* Hampson, 1894
 1034. *Hyelopsis vialis* Moore, 1879
 1035. *Hyelopsis signifera* Walker, 1857
 1036. *Hyelopsis renalis* Moore 1879
 1037. *Hyelopsis lativitta* Moore 1881
 1038. *Hyelopsis picata* Butler, 1889
 1039. *Hyelopsis plumbata* Butler, 1889
 1040. *Hyelopsis umbrina* Hampson 1891
 1041. *Hyelopsis frausa* Swinhoe, 1886
 1042. *Hyelopsis herbaria* Swinhoe, 1886
 Genus 259. *Hyela* Stephens, 1850
 1043. *Hyela oblique* Moore, 1879
 1044. *Hyela erecta* Moore, 1881
 1045. *Hyela ruptifascia* Hampson, 1891
 1046. *Hyela quadripartita* Walker, 1865
 1047. *Hyela tegulata* Butler, 1889
 Genus 260. *Micardia* Butler, 1878
 1048. *Micardia pulcherrima* Moore, 1867
 Genus 261. *Megalodes* Guenee 1852
 1049. *Megalodes kashmirensis* Hampson, 1894
 1050. *Megalodes denticulosa* Walker, 1865
 Genus 262. *Taxophleps* Hampson, 1893
 1051. *Taxophleps trilatalis* Walker, 1865
 Genus 263. *Tarache* Hübner, 1818
 1052. *Tarache upsilon* Walker, 1865
 1053. *Tarache opalinoides* Guenee, 1852
 1054. *Tarache notabilis* Guenee, 1852
 1055. *Tarache catenula* Walker, 1865
 1056. *Tarache swinhoei* Butler, 1883
 1057. *Tarache olivacea* Hampson, 1891
 1058. *Tarache binominata* Butler, 1892
 1059. *Tarache tropica* Guenee, 1852
 1060. *Tarache basifera* Walker, 1857

1061. *Tarache imbuta* Walker, 1865
 1062. *Tarache crocata* Guenee, 1852
 1063. *Tarache flavonigra* Swinhoe, 1884
 Genus 264. *Xanthoptera* Guenee, 1852
 1064. *Xanthoptera marginata* Walker, 1866
 1065. *Xanthoptera fuscicilia* Hampson, 1891
 1066. *Xanthoptera opella* Swinhoe, 1885
 1067. *Xanthoptera excise* Swinhoe, 1885
 1068. *Xanthoptera nigripalpis* Walker, 1866
 1069. *Xanthoptera veprecola* Swinhoe, 1885
 1070. *Xanthoptera spicea* Guenee, 1852
 1071. *Xanthoptera magna* Swinhoe, 1885
 1072. *Xanthoptera grisea* Hampson, 1891
 1073. *Xanthoptera argentifrons* Butler, 1881
 1074. *Xanthoptera plebeian* Butler, 1881
 Genus 265. *Acontia* Ochsenheimer, 1818
 1075. *Acontia malvae* Esper, 1777
 1076. *Acontia transversa* Guenee, 1852
 1077. *Acontia intersepta* Guenee, 1852
 1078. *Acontia graellsii* Feisth, 1837
 1079. *Acontia marmoralis* (Fabricius, 1794)
 Genus 266. *Marimatha* Walker, 1865
 1080. *Marimatha subflavalis* Walker, 1865
 1081. *Marimatha xanthoptera* Hampson, 1894
 Genus 267. *Swinhoea* Hampson, 1894
 1082. *Swinhoea vegeta* Swinhoe, 1885
 Genus 268. *Metachrostis* Hübner, 1818
 1083. *Metachrostis miasma* Hampson, 1891
 1084. *Metachrostis fasciata* Hampson, 1891
 1085. *Metachrostis quinaria* Moore, 1881
 1086. *Metachrostis incondita* Butler, 1878
 1087. *Metachrostis hypenoides* Butler, 1889
 1088. *Metachrostis unduligera* Butler, 1889
 1089. *Metachrostis rectifascia* Hampson, 1894
 1090. *Metachrostis punctigera* Walker, 1864
 1091. *Metachrostis bipars* Hampson, 1893
 1092. *Metachrostis honesta* Walker, 1864
 1093. *Metachrostis itwarra* Swinhoe, 1885
 1094. *Metachrostis badia* Swinhoe, 1886
 1095. *Metachrostis mallarba* Swinhoe, 1885
 1096. *Metachrostis uberosa* Swinhoe, 1885
 1097. *Metachrostis pulla* Swinhoe, 1885
 1098. *Metachrostis separata* Walker, 1865
 1099. *Metachrostis divisa* Hampson, 1894
 1100. *Metachrostis trigona* Hampson, 1893
 1101. *Metachrostis brunnea* Hampson, 1893
 1102. *Metachrostis excisa* Hampson, 1893
 1103. *Metachrostis emarginata* Hampson, 1893
 1104. *Metachrostis egens* Moore, 1881
 1105. *Metachrostis obliquisigna* Hampson, 1894
 1106. *Metachrostis obscura* Hampson, 1894
 1107. *Metachrostis distituta* Moore, 1881
 1108. *Metachrostis conspersa* Butler, 1880
 1109. *Metachrostis acervalis* Swinhoe, 1886
 1110. *Metachrostis venata* Butler, 1880
 Genus 269. *Naranga* Moore, 1881
 1111. *Naranga diffusa* Walker, 1865
 Subfamily RIVULINAE
 Genus 270. *Rivula* Guenee, 1844
 1112. *Rivula bioculalis* Moore, 1877
 1113. *Rivula basalis* Hampson, 1893
 1114. *Rivula biatomea* Moore, 1883
 1115. *Rivula ochracea* Moore, 1879
 1116. *Rivula curvifera* (Walker, 1862)
 1117. *Rivula niveipuncta* Swinhoe, 1905
 1118. *Rivula pallida* Moore, 1882
 1119. *Rivula striatura* Swinhoe, 1895
 Genus 271. *Zagira* Walker, 1866
 1120. *Zagira irrecta* Walker, 1865
 1121. *Zagira divisa* Walker, 1865
 1122. *Zagira contentaria* Walker, 1865
 1123. *Zagira lunifera* Moore, 1881
 1124. *Zagira reticulata* Moore, 1881
 1125. *Zagira Multiguttata* Moore, 1881
 Subfamily PLUSIINAE BOISDUVAL, 1829
 Tribe ARGYROGRAMMATINI (Eichlin & Cunningham, 1978)
 Genus 272. *Agrapha* Hübner, [1821] 1816
 1126. *Agrapha albostriata* (Bremer & Grey, 1853)
 1127. *Agrapha (Acanthoplusia) agnata* (Staudinger, 1892)
 1128. *Agrapha limbirena* Guenee, 1852
 1129. *Agrapha aeneofusa* Swinhoe, 1891
 1130. *Agrapha agnata* (Staudinger, 1892)
 1131. *Agrapha oxygramma* (Geyer, 1832)
 1132. *Agrapha furcifera* (Walker, [1858] 1857)
 Genus 273. *Dactyloplusia* Chou & Lu, 1979
 1133. *Dactyloplusia impulsa* (Walker, 1865)
 Genus 274. *Sclerogenia* Ichinose, 1973
 1134. *Sclerogenia jessica* (Butler, 1878)
 Genus 275. *Scriptoplusia* Ronkay, 1987
 1135. *Scriptoplusia nigriluna* (Walker, [1858] 1857)

Genus 276. *Zonoplusia* Chou & Lu, 1979

1136. *Zonoplusia ochreata* (Walker, 1865)

Genus 277. *Thysanoplusia* Ichnose, 1973

1137. *Thysanoplusia orichalcea* Fabricius, 1775

1138. *Thysanoplusia intermixta* Warren, 1913

Genus 278. *Anadevidia* Kostrowicki, 1961

1139. *Anadevidia peponis* (Fabricius, 1775)

1140. *Anadevidia hebetata* (Butler, 1889)

Genus 279. *Chrysodeixis* Hubner, 1821

1141. *Chrysodeixis eriosoma* Doubleday, 1843

1142. *Chrysodeixis acuta* (Walker, [1858] 1857)

1143. *Chrysodeixis chalcites* (Esper, 1789)

Genus 280. *Trichoplusia* McDunnough, 1944

1144. *Trichoplusia ni* Hübner, 1803

1145. *Trichoplusia intermixta* (Warren, 1913)

1146. *Trichoplusia daubei* (Boisduval, 1840)

Genus 281. *Autographa* Hübner, 1821

1147. *Autographa gamma* (Linnaeus, 1758)

Subfamily PALINDIINAE

Genus 282. *Ramadasa* Moore, 1877

1148. *Ramadasa pavo* Walker, 1856

1149. *Ramadasa hieroglyphica* Moore, 1879

Genus 283. *Callyna* Guenee, 1852

1150. *Callyna siderea* Guenee, 1852

1151. *Callyna monoleuca* Walker, 1858

1152. *Callyna jugaria* Walker, 1858

1153. *Callyna costiplaga* Moore, 1879

1154. *Callyna picta* Moore, 1879

Genus 284. *Westermannia* Hübner, 1823

1155. *Westermannia superba* Hübner, 1806

1156. *Westermannia argentea* Hampson, 1893

1157. *Westermannia triangularis* Moore, 1877

1158. *Westermannia cornucopia* Hampson, 1893

Genus 285. *Nagasena* Moore, 1882

1159. *Nagasena albescens* Moore, 1879

Genus 286. *Brevipecten* Hampson, 1894

1160. *Brevipecten captatus* Butler, 1889

Genus 287. *Doranaga* Moore, 1884

1161. *Doranaga stramiea* Hampson, 1893

1162. *Doranga leucospila* Walker, 1865

Genus 288. *Pterogonia* Swinhoe, 1891

1163. *Pterogonia episcopalis* Swinhoe, 1891

Genus 289. *Homodes* Guenee, 1852

1164. *Homodes vivida* Guenee, 1852

Genus 290. *Bryophilopsis* Hampson, 1894

1165. *Bryophilopsis griseata* Hampson, 1894

Subfamily SARROTHRIPINAE

Genus 291. *Plotheia* Walker, 1857

1166. *Plotheia celtis* Moore, 1857

1167. *Plotheia aenescens* Moore, 1879

1168. *Plotheia rabdota* Hampson, 1891

1169. *Plotheia metapillela* Walker, 1866

Genus 292. *Hyblaea* Fabricius, 1794

1170. *Hyblaea puera* Cramer, 1779

1171. *Hyblaea constellata* Guenee, 1852

1172. *Hyblaea firmamentum* Guenee, 1852

1173. *Hyblaea hypocyanea* Swinhoe, 1886

Genus 293. *Labanda* Walker, 1859

1174. *Labanda fasciata* Walker, 1865

1175. *Labanda griseinigra* Hampson, 1894

1176. *Labanda semipars* Walker, 1858

Genus 294. *Chlumetia* Walker, 1865

1177. *Chlumetia alternans* Moore, 1879

1178. *Chlumetia transversa* Walker, 1865

Genus 295. *Barasa* Walker, 1862

1179. *Barasa acronyctoides* Walker, 1862

Genus 296. *Blenina* Walker, 1857

1180. *Blenina donnans* Walker, 1857

1181. *Blenina accipiens* Walker, 1857

1182. *Blenina lichenosa* Moore, 1877

1183. *Blenina quinararia* Moore, 1879

1184. *Blenina angulipennis* Moore, 1879

Genus 297. *Argryothripa* Hampson, 1894

1185. *Argryothripa lilacina* Moore, 1879

1186. *Argryothripa occulta* Swinhoe, 1885

1187. *Argryothripa xanthosticta* Hampson, 1894

1188. *Argryothripa grisea* Hampson, 1891

1189. *Argryothripa robusta* Moore, 1879

Genus 298. *Clettharra* Walker, 1863

1190. *Clettharra vitea* Swinhoe, 1885

1191. *Clettharra nigridisca* Hampson, 1891

1192. *Clettharra sceptica* Swinhoe, 1885

1193. *Clettharra punctata* Swinhoe, 1890

1194. *Clettharra variegata* Hampson, 1894

1195. *Clettharra triangularis* Hampson, 1894

1196. *Clettharra floccifera* Hampson, 1894

Genus 299. *Sarrothripa* Curtis, 1824

1197. *Sarrothripa sinuosa* Moore, 1879

1198. *Sarrothripa fascopsa* Moore, 1879

1199. *Sarrothripa indicatana* Walker, 1862

- Genus 300. *Gadirtha* Walker, 1857
1200. *Gadirtha inexacta* Walker, 1855
- Genus 301. *Neothripa* Hampson, 1894
1201. *Neothripa punctistigma* Hampson, 1894
1202. *Neothripa glaucescens* Hampson, 1894
- Subfamily: Eutelliinae Grote, 1882
- Genus 302. *Ingura* Guenee, 1852
1203. *Ingura subapicalis* Walker, 1852
1204. *Ingura cristatrix* Guenee, 1879
- Genus 303. *Anuga* Guenee, 1852
1205. *Anuga constricta* Guenee 1852
1206. *Anuga lunulata* Moore, 1867
1207. *Anuga multiplicans* (Walker, 1858)
- Genus 304. *Eutelia* Hübner, 1818
1208. *Eutelia delatrix* Guenee, 1879
1209. *Eutelia deleta* Hampson, 1891
1210. *Eutelia cinctipalpis* Walker, 1865
1211. *Eutelia obscura* Moore, 1879
1212. *Eutelia albomaculata* Hampson, 1894
1213. *Eutelia jocosatrix* Guenee, 1879
1214. *Eutelia maculata* Butler, 1889
1215. *Eutelia nugatrix* Guenee, 1879
1216. *Eutelia fulvipicta* Hampson, 1894
1217. *Eutelia apicifascia* Hampson, 1894
1218. *Eutelia inextricata* Moore, 1879
1219. *Eutelia excitans* Moore, 1886
1220. *Eutelia dulcilinea* Walker 1865
1221. *Eutelia discistriga* Walker, 1865
1222. *Eutelia favillatrix* Walker, 1858
1223. *Eutelia adulatricoides* (Mell, 1943)
1224. *Eutelia favillatrixoides* Poole, 1989
1225. *Eutelia geyeri* (Felder & Rogenhofer, 1874)
- Genus 305. *Paectes* Hubner, 1818
1226. *Paectes subapicalis* (Walker, [1858] 1857)
- Subfamily STICTOPTERINAE, HAMPSON, 1894
- Genus 306. *Risoba* Moore, 1881
1227. *Risoba repugnans* Walker, 1856
1228. *Risoba obstructa* Moore, 1881
1229. *Risoba diversipennis* Walker, 1858
1230. *Risoba literata* Moore, 1881
1231. *Risoba variegata* Moore, 1879
- Genus 307. *Odontodes* Guenee, 1852
1232. *Odontodes aleuca* Guenee, 1852
- Genus 308. *Stictoptera* Guenee, 1852
1233. *Stictoptera cuculliioides* Guenee, 1852
1234. *Stictoptera striata* Hampson, 1894
1235. *Stictoptera illucida* Walker, 1865
1236. *Stictoptera albodentata* Moore, 1879
1237. *Stictoptera anthyalus* Swinhoe, 1886
1238. *Stictoptera costata* Moore, 1879
- Genus 309. *Sadarsa* Moore, 1882
1239. *Sadarsa tenuis* Moore, 1867
1240. *Sadarsa longipennis* Moore, 1879
- Genus 310. *Grytona* Walker, 1863
1241. *Grytona hylusalis* Walker, 1863
1242. *Grytona pusilla* Moore, 1879
1243. *Grytona dorsalis* Walker, 1863
1244. *Grytona lapidaria* Walker, 1864
1245. *Gyrtona todara* (Hampson, 1912)
1246. *Gyrtona plumbeifascia* Hampson, 1894
- Genus 311. *Lophoptera* Guenee, 1852
1247. *Lophoptera anthyalus* (Hampson, 1894)
1248. *Lophoptera hemithyris* (Hampson, 1905)
1249. *Lophoptera squammigera* Guenee, 1852
1250. *Lophoptera squammilinea* Holloway, 1985
- Genus 312. *Goniocraspidum* Hampson, 1894
1251. *Goniocraspidum ennomoide* Hampson, 1894
- Genus 313. *Cymatophoropsis* Hampson, 1894
1252. *Cymatophoropsis sinuata* Moore, 1879
- Subfamily AGANAINAE
- Genus 314. *Asota* Hubner, [1819]
1253. *Asota caricae* (Fabricius, 1775)
1254. *Asota ficus* (Fabricius, 1775)
1255. *Asota heliconia* (Linnaeus, 1758)
1256. *Asota plaginota* Butler, 1875
1257. *Asota plana* (Butler, 1881)
- Genus 315. *Neochera* Hubner, [1819]
1258. *Neochera inops* (Walker, 1854)
- Subfamily AGARISTINAE
- Genus 316. *Episteme* Hubner, [1820]
1259. *Episteme arctopsa* (Chu & Chen, 1962)
- Genus 317. *Exsula* Jordan in Rothschild & Jordan, 1896
1260. *Exsula dentatrix* (Westwood, 1848)
- Genus 318. *Sarbanissa* Walker, 1865
1261. *Sarbanissa albifascia* (Walker, 1865)
- Subfamily PANTHEINAE
- Genus 319. *Trichosea* Hubner, 1818
1262. *Trichosea champa* (Moore, 1879)
1263. *Trichosea extoxantha* Hampson, 1894
- Subfamily BAGISARINAE
- Genus 320. *Bagisara* Crumb, 1956
1264. *Bagisara plagiata* (Walker, 1858)

Genus 321. *Chasmina* Walker, 1856

1265. *Chasmina judicata* (Walker, 1858)

1266. *Chasmina cadida* Walker, 1858

Genus 322. *Sphragifera* Staudinger, 1892

1267. *Sphragifera rejecta* (Fabricius, 1775)

Genus 323. *Xanthodes* Guenee, 1852

1268. *Xanthodes intersepta* Guenee, 1852

1269. *Xanthodes transversa* Guenee, 1852

Subfamily: Condicinae

Genus 324. *Bagada* Walker, 1858

1270. *Bagada poliomera* (Hampson, 1908)

Genus 325. *Condica* Walker, 1856

1271. *Condica albigutta* (Wileman, 1912)

1272. *Condica dolorosa* (Walker, 1865)

1273. *Condica illecta* (Walker, 1865)

Genus 326. *Perigea* Guenee, 1852

1274. *Perigea chinensis* Wallengren, 1860

Subfamily: Eariadinae Hampson, 191

Genus 327. *Earias* Hübner, 1825

1275. *Earias fubia* Stoll, 1787

1276. *Earias flavida* Felder, 1864

1277. *Earias insulana* Boisduval, 1833

1278. *Earias vitella* Fabricius, 1775

Subfamily: Strepsimanninae

Genus 328. *Luceria* Walker, 1859

1279. *Luceria oculalis* (Moore, 1877)

Subfamily: Gonopterinae

Genus 329. *Capotena* Walker, 1857

1280. *Capotena truncata* Walker, 1858

1281. *Capotena apriformis* Walker, 1857

Genus 330. *Pseudelydna* Hampson, 1894

1282. *Pseudelydna diurna* Swinhoe, 1889

1283. *Pseudelydna rufoflava* Walker, 1856

Genus 331. *Tympanistes* Moore, 1867

1284. *Tympanistes pallidus* Moore, 1867

1285. *Tympanistes testaceus* Moore, 1867

1286. *Tympanistes rubidorsalis* Moore, 1888

Genus 332. *Carea* Walker, 1856

1287. *Carea subtilis* Walker, 1856

1288. *Carea chlorostigma* Hampson, 1891

1289. *Carea varipes* Walker, 1856

1290. *Carea nitida* Hampson, 1894

1291. *Carea purpurea* Hampson, 1891

1292. *Carea obsolescens* Moore, 1884

1293. *Carea fasciata* Moore, 1879

1294. *Carea albopurpurea* Swinhoe, 1889

1295. *Carea costiplaga* Swinhoe, 1861

Genus 333. *Tortriciforma* Hampson, 1894

1296. *Tortriciforma viridipuncta* Hampson, 1894

Genus 334. *Tinosoma* Hampson, 1894

1297. *Tinosoma hyperythrum* Hampson, 1879

Genus 335. *Gelastocera* Butler, 1877

1298. *Gelastocera castanea* Moore, 1879

Genus 336. *Beara* Walker, 1866

1299. *Beara dichromella* Walker, 1865

Genus 337. *Pseudogonitis* Hampson, 1894

1300. *Pseudogonitis brunnea* Moore, 1879

Genus 338. *Ossonoba* Walker, 1866

1301. *Ossonoba torpida* Walker, 1866

Genus 339. *Oxygonitis* Hampson, 1893

1302. *Oxygonitis sericeata* Hampson, 1893

Genus 340. *Clethrophora* Hampson, 1894

1303. *Clethrophora distincta* Leech, 1889

Genus 341. *Churia* Moore, 1881

1304. *Churia arcuata* Walker, 1857

1305. *Churia ocellata* Butler, 1889

1306. *Churia maculata* Moore, 1881

1307. *Churia nigrisigna* Moore, 1881

1308. *Churia lilacina* Hampson, 1894

1309. *Churia discsigna* Hampson, 1884

Subfamily: Focillinae

Genus 342. *Hyposemansis* Hampson, 1894

1310. *Hyposemansis singha* Guenee, 1852

Genus 343. *Mecodina* Guenee, 1852

1311. *Mecodina cineratia* Butler, 1879

1312. *Mecodina analis* Swinhoe, 1890

1313. *Mecodina placida* Moore, 1882

1314. *Mecodina umbrosa* Hampson, 1891

1315. *Mecodina subviolacea* Butler, 1881

1316. *Mecodina odontophora* Swinhoe, 1890

1317. *Mecodina albodentata* Swinhoe, 1890

1318. *Mecodina hepatica* Moore, 1882

1319. *Mecodina lepatia* Swinhoe, 1890

1320. *Mecodina praecipua* Walker, 1865

1321. *Mecodina ruficeps* Hampson, 1894

1322. *Mecodina aequilinea* Hampson, 1926

1323. *Mecodina oxydata* Swinhoe, 1890

Genus 344. *Hyperlopha* Hampson, 1894

1324. *Hyperlopha cristifera* Walker, 1865

Genus 345. *Zethes* Rambur, 1833

1325. *Zethes duplicilinea* Hampson, 1894

1326. *Zethes vaga* Walker, 1865

1327. *Zethes perturbans* Walker, 1858
 1328. *Zethes sphaeriphora* Moore, 1867
 1329. *Zethes pulcherrima* Butler, 1881
 1330. *Zethes pictipennis* Hampson, 1894
 1331. *Zethes shivula* Guenee, 1852
 1332. *Zethes inornata* Walker, 1865
 1333. *Zethes herperoides* Guenee, 1852
 1334. *Zethes costalis* Moore, 1882
 1335. *Zethes nigrilinea* Walker, 1869
 1336. *Zethes punctistigma* Hampson, 1894
 1337. *Zethes vinolia* Hampson, 1894
 1338. *Zethes partita* Guenee, 1852

Genus 346. *Egnasia* Walker, 1858

1339. *Egnasia mesotypa* Swinhoe, 1906
 1340. *Egnasia ephyrodalis* Walker, 1858
 1341. *Egnasia rectilineata* Swinhoe, 1890
 1342. *Egnasia participalis* Walker, 1858
 1343. *Egnasia accingalis* Walker, 1858
 1344. *Egnasia polia* Hampson, 1891
 1345. *Egnasia fasciata* Moore, 1882
 1346. *Egnasia tripuncta* Swinhoe, 1890
 1347. *Egnasia castanea* Moore, 1882
 1348. *Egnasia ochreivena* Hampson, 1894
 1349. *Egnasia sinuosa* Moore, 1882
 1350. *Egnasia caduca* Swinhoe, 1892

Genus 347. *Avitta* Walker, 1858

1351. *Avitta fasciosa* Moore, 1882
 1352. *Avitta subsingnans* Walker, 1858
 1353. *Avitta rufifrons* Moore, 1882
 1354. *Avitta quadrilinea* Walker, 1857

Genus 348. *Capnodes* Guenee, 1852

1355. *Capnodes rufescens* Moore, 1877
 1356. *Capnodes ceylonica* Walker, 1865
 1357. *Capnodes luna* Hampson, 1891
 1358. *Capnodes lignicolor* Walker, 1857
 1359. *Capnodes pustulifera* Walker, 1865
 1360. *Capnodes ochreispersa* Hampson, 1894

Genus 349. *Raparna* Moore, 1882

1361. *Raparna digramma* Walker, 1865
 1362. *Raparna ochreipennis* Moore, 1882
 1363. *Raparna atrapex* Hampson, 1894
 1364. *Raparna nubulosa* Moore, 1881
 1365. *Raparna imparata* Walker, 1858
 1366. *Raparna nigriceps* Hampson, 1894
 1367. *Raparna tantilla* Swinhoe, 1885
 1368. *Raparna palpalis* Walker, 1865
 1369. *Raparna aenigmatica* Swinhoe, 1885
 1370. *Raparna lilacina* Butler, 1889

Genus 350. *Cephena* Moore, 1882

1371. *Cephena costata* Moore, 1882

Genus 351. *Dierna* Walker, 1859

1372. *Dierna acanthusalis* Walker, 1858
 1373. *Dierna strigata* Moore, 1867
 1374. *Dierna transversa* Moore, 1882

SUMMARY

Sir George Hampson has reported 1431 species of noctuid moths under 10 sub-families in his 'Fauna of British India series, moth's volumes II and III (1894). This record is century-old arrangement. At present the number of subfamilies has been raised to 29. We are reporting here the checklist of Indian noctuids, which is an outcome of our studies conducted for the past 5 years. According to our understanding based on available literature, we have arranged the genus and species of noctuids. We have recorded 351 genera and 1374 species. Among the 351 genera, the genus *Hypena* includes more number of species (71 species). The genera *Agrotis*, *Ophiura*, *Polydesma* and *Metachrostis* also accommodate higher number of species. In our expedition of Nilgiris biosphere 160 species have been described and among them 20 were recorded for the first time for the Western Ghats (Nilgiris Biosphere and Kodaikanal) Tamil Nadu part; the species are : *Lacero-noctilio* Guenée, 1852., *Spirama helicina* Hampson, 1984., *Polydesma boarmoides* Guenée, 1852 *Eudocima homanea* Hübner, [1823]., *Eudocima sikhimensis* Butler, 1895., *Doryodes grandipennis* Barnes & McDunnough, 1918., *Targalla atripars* Hampson, 1912., *Eutelia adulatricoides* Mell, 1943., *Lophotera squammigera* Guenée, 1852., *Lophotera squammilinea* Guenée, 1852., *Odontodes seranensis* Guenée, 1852., *Stictoptera cucullioides* Guenée, 1852., *Stictoptera signifera* Walker, 1857., *Aegilia sundascribens* Holloway, 1976., *Aegilia describens* Walker, 1858., *Actinotia polydon* Clerk, 1759., *Chasmina candida* Walker, 1865., *Pandesma quanavadi* Guenée, 1852., *Parallelia calefaciens* Walker, 1858., and *Pindara illibata* (Fabricius, 1775)., and *Lygephila maxima* Bremer, 1861. *Ericcia eriophora* (Guenée, 1852)., and *Sasunaga leucorina* Hampson, 1894 were recorded for the first time in India.

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A PRELIMINARY STUDY ON INSECT POLLINATORS OF TEMPERATE FRUIT CROPS IN HIMACHAL PRADESH

R.M. SHARMA AND BULGANIN MITRA*

Zoological Survey of India, Western Regional Centre, Pune-411044, Maharashtra

**Zoological Survey of India,*

'M'-Block, New Alipore, Kolkata-700053

INTRODUCTION

Pollination is an ecological process that involves the transfer of pollen from the male to the female part of the flower with the help of abiotic and biotic pollen dispersal agents. It is an essential pre-requisite for fertilization and fruit/seed setting. If there is no pollination, there will be no fertilization and no fruits or seeds will be formed (Free, 1993).

Insects constitute one among the primary groups of pollinating agents (Free, 1993). Various insect groups, which are of prime significance in pollination of agricultural and horticultural crops mainly belong to the orders Hymenoptera (bees, ants and wasps), Diptera (flies, mosquitoes, fungus gnats, midges etc.), Coleoptera (beetles and weevils), Lepidoptera (moths and butterflies), Thysanoptera (thrips), Hemiptera (bugs) and Neuroptera (lace wing flies).

Several workers like Sharma (1961), Mishra *et al* (1976), Bhalla *et al* (1983), Kumar *et al* (1985), Singh and Mishra (1986), Kumar (1988), Thakur (1988), Dashad (1989), Dashad, *et al* (1991), Thakur *et al* (1993) have studied the pollination efficiency of insect visitors, foraging preferences, foraging rate of insect visitors / pollinators of temperate fruit crops in Himachal Pradesh.

Himachal Pradesh is mainly a hilly state lying between 30°22' to 33°12' North latitude and 75°47' to 79°04' East longitude in the lap of the northwest Himalaya. The physiography of the state is almost mountainous with elevations ranging from 350 to 6500 meters above mean sea level, and the total area of the state is 55,673 sq km.

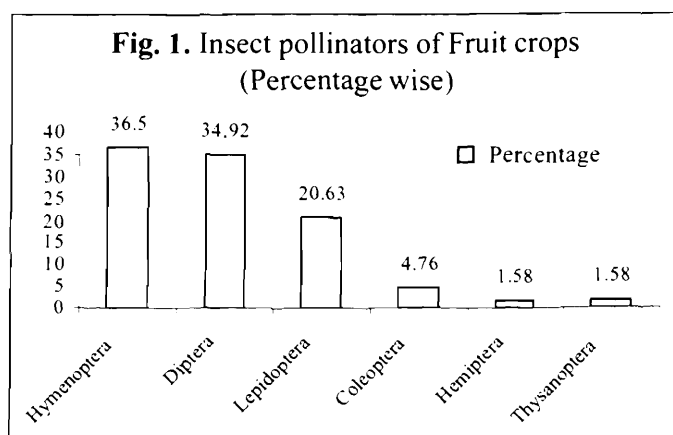
Himachal Pradesh is predominantly a horticultural state of India, having a vast potential for successful cultivation of a wide range of horticultural crops. The

important plant genera that constitute temperate fruit crops in the State are *Malus*, *Prunus*, *Pyrus*, *Juglans*, *Caryo*, *Corylus*, *Sorbus*, *Fragaria*, *Actinidia*, *Rubus*, *Ribes*, *Crataegus*, *Cydonia*, *Docynia*, *Hippophae*, *Diospyros* and *Cotoneaster*. However, Apple is the major fruit of the state accounting for 67 per cent of the total area under fruits and 88 per cent of total fruit production. Besides apple, fruit crops viz., plum, peach, pear, cherry, and apricot occupy 28 per cent, whereas, other temperate fruits such as Almonds, Walnuts, Pecans, Pistachios, Filberts, Chestnuts, Olives, Strawberries, Currants, Gooseberries, Raspberries, Blueberries, Cranberries and Kiwi occupy 5 per cent of the total area. Among nuts and dry fruits, almonds are most important and have been the monopoly of the cold and dry region of Kinnaur district of Himachal Pradesh (Verma and Jindal, 1997). Therefore, the major economy of this state depends upon the production of temperate fruits.

The present study on insect pollinators of temperate fruit crops of Himachal Pradesh is based on the collection and observations of the pollinating insects made by the authors during the period 2004-2006.

METHODOLOGY

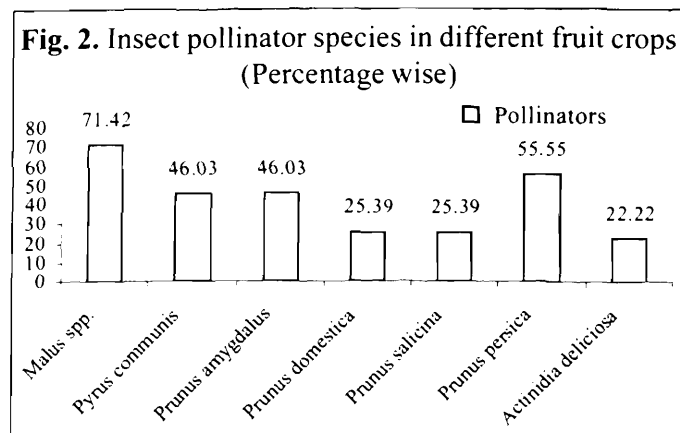
The study was conducted during flowering season of the temperate crops in different orchards of Himachal Pradesh. The observations were made in three consecutive flowering seasons of the years 2004, 2005 and 2006. The collections of insect pollinators were mostly made in the morning and late afternoon by handpicking and aerial sweeping by insect net. All the entomofaunal collections made were identified by the experts of the respective groups from the Zoological Survey of India, Kolkata.



RESULTS

The diversity of insect pollinators in temperate fruit crops is directly linked with the diversity of fruit crops. A preliminary study conducted in Himachal Pradesh by the authors revealed that 63 species under 27 families of 6 insect orders*are engaged in the process of pollination of 7 different species of temperate fruit crops in Himachal Pradesh. (Table-I; Plates-I & II). Of these, 23 species belonged to Hymenoptera, 22 species to Diptera, 13 species to Lepidoptera, 3 species to Coleoptera, 1 species to Hemiptera and 1 species to Thysanoptera. Of the 23 species of Hymenoptera, 7 species belonged to the family Vespidae, 3 species each to the families Apidae and Bombidae, 2 species each to the families Halictidae and Formicidae. Xylocopidae, Andrenidae, Ichneumonidae Ceretinae, Tenthredinidae and Scolidae were represented by 1 species each. Of the 22 species of Diptera, 13 species belonged to the family Syrphidae, 3 species to the family Muscidae, and 2 species to the families Calliphoridae. Dolichopodidae, Scathophagidae, Sepsidae and Asilidae were represented by 1 species each. Of the 13 species of Lepidoptera, 4 species belonged to the family Pieridae, 3 species to the family Nymphalidae, 1 species to the family Lycaenidae, and among moths the family Noctuidae was represented by 4 species and the family Zyganidae by 1 species. Of the 3 species of Coleoptera, 2 species each belonged to the families Chrysomelidae and Coccinellidae. One species each of Hemiptera (family Cixiidae) and Thysanoptera were also found to function as pollinators of the temperate fruit crops.

The order Hymenoptera (36.50%) formed the predominant pollinator group of temperate fruit crops



followed by the orders Diptera (34.92%), Lepidoptera (20.63%), Coleoptera (4.76%) and, lastly, Hemiptera and Thysanoptera account for 1.58% each (Fig. 1). It is also interesting to note that among the total pollinator species reported from the fruit crops of Himachal Pradesh, the maximum number of pollinator species has been recorded from the *Malus sp.* (71.42%), followed by *Prunus persica* (55.55%), *Pyrus communis* (46.03%), *Prunus amygdalus* (46.03%), *Prunus domestica* (25.39%), *Prunus salicina* (25.39%) and *Actinidia deliciosa* (22.22%) (Fig. 2).

REMARKS

Pollination success depends on several conditions like, the attractiveness of the crop flowers, the use of pesticide in the area, total size of the field, the distance to the natural habitat of the wild pollinators and presence of natural pollinator species in their foraging range. The overall decline in wild and domesticated pollinators is a lesser known crisis but has great potential to cause enormous consequences on fruit production. This decline is largely due to destruction of nesting habitats of wild pollinators, poisoning due to excessive pesticide application and constant alteration in land use practices leading to loss of adult and juvenile food resources for pollinators. However, the preliminary information presented in this report though sketchy is valuable in the sense it can be used in future.

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PLATE-I

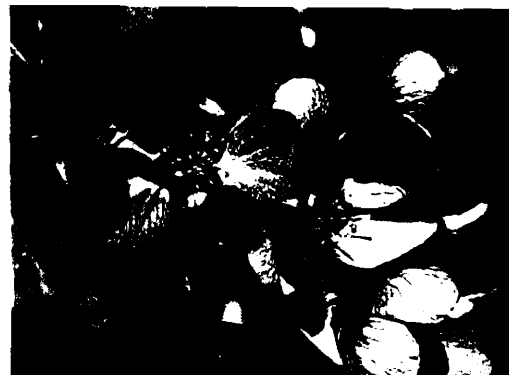
1. *Malus* sp. Common Name : Apple2. *Pyrus communis* Common Name : Pear3. *Prunus amygdalus* Common Name : Almond or Badam

PLATE-II

4. *Prunus domestica*5. *Prunus salicina*

Common Name : Plum

6. *Prunus persica* Common Name : Peach or Aru7. *Actinidia deliciosa* Common Name : Kiwi

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Table. 1 : Pollinator species and their visited plant species

SL. No.		<i>Malus spp</i>	<i>Pyrus communis</i>	<i>Prunus amygdalus</i>	<i>Prunus domestica</i>	<i>Prunus salicina</i>	<i>Prunus persica</i>	<i>Actinidia deliciosa</i>
Order HYMENOPTERA								
	Family APIDAE							
1.	<i>Apis cerana</i> Fabricius	+	+	+	+	+	+	+
2.	<i>Apis mellifera</i> Linnaeus	+	+	+			+	+
3.	<i>Apis dorsata</i> Fabricius			+				+
	Family BOMBIDAE							
4.	<i>Bombus tunicatus</i> Smith	+	+	+	+	+	+	+
5.	<i>Bombus haemorrhoidalis</i> Smith	+						
6.	<i>Bombus sp.</i>	+	+	+	+	+		
	Family VESPIDAE							
7.	<i>Vespa (Vespa) magnifica mandarina</i> Smith	+	+					
8.	<i>Vespa velutina auraria</i> Smith	+	+		+	+	+	
9.	<i>Vespa orientalis</i> (Linnaeus)				+	+		
10.	<i>Vespa magnifica</i> Smith						+	
11.	<i>Vespa flaviceps</i> Smith	+		+				
12.	<i>Polistes maculipennis</i> Sauss	+	+	+			+	
13.	<i>Polistes sp.</i>	+	+				+	
	Family HALICTIDAE							
14.	<i>Halictus sp.</i>	+	+		+	+	+	
15.	<i>Halictus dasygaster</i> Vachal	+	+	+	+	+	+	
	Family ANDRENIDAE							
16.	<i>Andrena sp.</i>	+						
	Family XYLOCOPIDAE							
17.	<i>Xylocopa fenestrata</i> (Fabricius)	+	+				+	
	Family ICHNEUMONIDAE							
18.	<i>Fileantha sp.</i>						+	

Table. 1 : Cont'd.

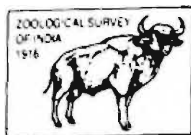
SL. No.		<i>Malus spp</i>	<i>Pyrus communis</i>	<i>Prunus amygdalus</i>	<i>Prunus domestica</i>	<i>Prunus salicina</i>	<i>Prunus persica</i>	<i>Actinidia deliciosa</i>
	Family FORMICIDAE							
19.	<i>Camponotus sp.</i>	+	+	+				
20.	<i>Holcomyrmex sp.</i>						+	
	Family CERETINIDAE							
21.	<i>Ceratina hieroglyphica</i> Smith						+	
	Family TENTHRIDINIDAE							
22.	<i>Athalia sp.</i>						+	
23.	<i>Elis thoracica</i>			+				
Order DIPTERA								
	Family SYRPHIDAE							
24.	<i>Eristalis (Eristalis) tenax</i> (Linnaeus)	+	+	+			+	
25.	<i>Eristalis (Eoseristalis) himalayensis</i> Brunetti	+	+	+				
26.	<i>Eristalinus (Eristalinus) arvorum</i> (Fabricus)	+	+					
27.	<i>Eristalis (Eoseristalis) cerealis</i> Fabricius	+	+	+			+	+
28.	<i>Eristalis angustimarginalis</i> Brunetti	+						
29.	<i>Episyrphus balteatus</i> (De Geer)	+						
30.	<i>Episyrphus sp.</i>	+						+
31.	<i>Scaeva opimius</i> (Walker)		+	+			+	
32.	<i>Eristalis sp.</i>				+	+		
33.	<i>Scaeva sp.</i>	+						
34.	<i>Metasyrphus sp.</i>	+			+	+		+
35.	<i>Melanostoma sp.</i>	+						
36.	<i>Syrphus sp.</i>		+	+			+	+
	Family MUSCIDAE							
37.	<i>Musca (Musca) domestica</i> Linnaeus	+	+	+	+	+		
38.	<i>Musca sp.</i>	+			+	+		+

Table. 1 : Cont'd.

SL. No.		<i>Malus spp</i>	<i>Pyrus communis</i>	<i>Prunus amygdalus</i>	<i>Prunus domestica</i>	<i>Prunus salicina</i>	<i>Prunus persica</i>	<i>Actinidia deliciosa</i>
39.	<i>Orthellia</i> sp.	+						
	Family SCATHOPHAGIDAE							
40.	<i>Scathophaga stereoraria</i> (Linnaeus)	+		+			+	
	Family CALLIPHORIDAE							
41.	<i>Lucilia</i> sp.	+	+	+			+	
42.	<i>Calliphora vicina</i> Robineau-Desvoidy	+	+	+			+	
	Family DOLICHOPODIDAE							
43.	<i>Dolichopus</i> sp.	+	+	+			+	
	Family SEPSIDAE							
44.	<i>Sepsis</i> sp.						+	
	Family ASILIDAE							
45.	<i>Promachus</i> sp.			+			+	
Order LEPIDOPTERA								
	Family PIERIDAE							
46.	<i>Pieris canidia indica</i> (Evans)	+	+	+	+	+	+	+
47.	<i>Pieris</i> sp.	+	+				+	+
48.	<i>Delias</i> sp.	+						
49.	<i>Gonepteryx rhamni nepalensis</i> Doubleday			+			+	
	Family NYMPHALIDAE							
50.	<i>Vanessa indica</i> (Herbst)	+	+	+			+	
51.	<i>Vanessa</i> sp.	+		+	+	+		
52.	<i>Neptus</i> sp.	+						
	Family LYCAENIDAE							
53.	<i>Heliophorus</i> sp.				+	+	+	
	Family NOCTUIDAE							
54.	<i>Heliothis</i> sp.							

Table. 1 : Cont'd.

SL. No.		<i>Malus spp</i>	<i>Pyrus communis</i>	<i>Prunus amygdalus</i>	<i>Prunus domestica</i>	<i>Prunus salicina</i>	<i>Prunus persica</i>	<i>Actinidia deliciosa</i>
55.	<i>Plusia sp.</i>	+			+	+	+	
56.	<i>Agrotis flammatra</i> Schiff	+		+				
57.	<i>Agrotis sp.</i>	+						
	Family ZYGANIDAE							
58.	<i>Zyganea sp.</i>		+				+	
Order COLEOPTERA								
	Family CHRYSOMELIDAE							
59.	<i>Altica sp.</i>	+	+	+			+	+
	Family COCCINELLIDAE							
60.	<i>Coccinella septumpunctata</i> (Linnaeus)	+	+	+	+	+	+	+
61.	<i>Coccinella sp.</i>	+	+	+			+	+
Order HEMIPTERA								
	Family CIXIIDAE							
62.	<i>Nysius sp.</i>						+	
Order THYSANOPTERA								
	Family THRIPIDAE							
63.	<i>Thrips sp.</i>	+						



Short Communication

FIRST RECORD OF *LESQUEREUSIA* SCHLUMBERGER (RHIZOPODA : PROTOZOA) FROM GROUND MOSS OF HIMACHAL PRADESH, INDIA

INTRODUCTION

The genus *Lesquereusia* Schlumberger belonging to the order Arcellinida was erected by Schlumberger in 1845 with *L. spiralis* as type species. To date there are 16 species reported globally. Of these, three species are hitherto known from India. Vanamala Naidu (1966) reported *Lesquereusia minor* Walton from a freshwater body of Andhra Pradesh and Nair *et al.* (1971) and Das *et al.* (1993) reported *L. modesta* Rhumbler and *L. spiralis* (Ehrenberg) from the freshwater habitats of West Bengal. The habitat of the genus is freshwater and the present communication deals with the first report of *L. modesta* and *L. spiralis* from ground moss.

L. modesta is characterised by opaque and hemispherical test and encrusted with quartz crystals. *L. spiralis* is characterized by transparent and semispherical test composed of closely arranged vermiform pellets, neck below the constriction with a slight elevation from which outline continued in a straight line down to mouth. Mouth is circular, contracted in its margin plain and sharply defined. In India, there are records of *L. spiralis* from Manipur (Das *et al.*, 2004), Meghalaya (Das *et al.*, 1995) and West Bengal (Das *et al.*, 1993). *L. spiralis* differs from *L. modesta* mainly in shape of the siliceous rods and

the amount of mineral particles used and in the orientation of the neck. Specimens of both the species are deposited in the National Zoological Collections of the protozoology section, Zoological Survey of India, Kolkata.

The moss samples for the present study were collected by the scientists of High Altitude Regional Centre, Solan on 16. 05. 2008 from Khelvi village, Pangi Valley (32° 53' 07. 6" N and 076° 27' 55.8" E and altitude of 2459 metre above MSL) which is on the bank of river Chanderbaga of Himachal Pradesh. Although all the 16 species are so far reported from aquatic habitat the present record of the above mentioned two species of *Lesquereusia* from ground moss may be due to the confinement of these species in the ground moss, which is the interphase between aquatic and terrestrial habitat, during flood.

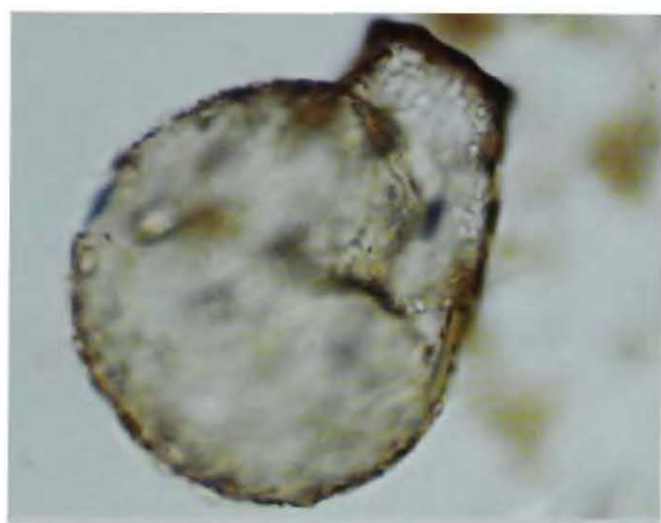


Fig.-1. *Lesquereusia modesta*—P 1011282.



Fig.-2. *Lesquereusia spiralis*—P 1011304.

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BINDU. L

*Zoological Survey of India,
Marine Biology Regional Centre,
Chennai-600 028
Email:bindushaji6@gmail.com*

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